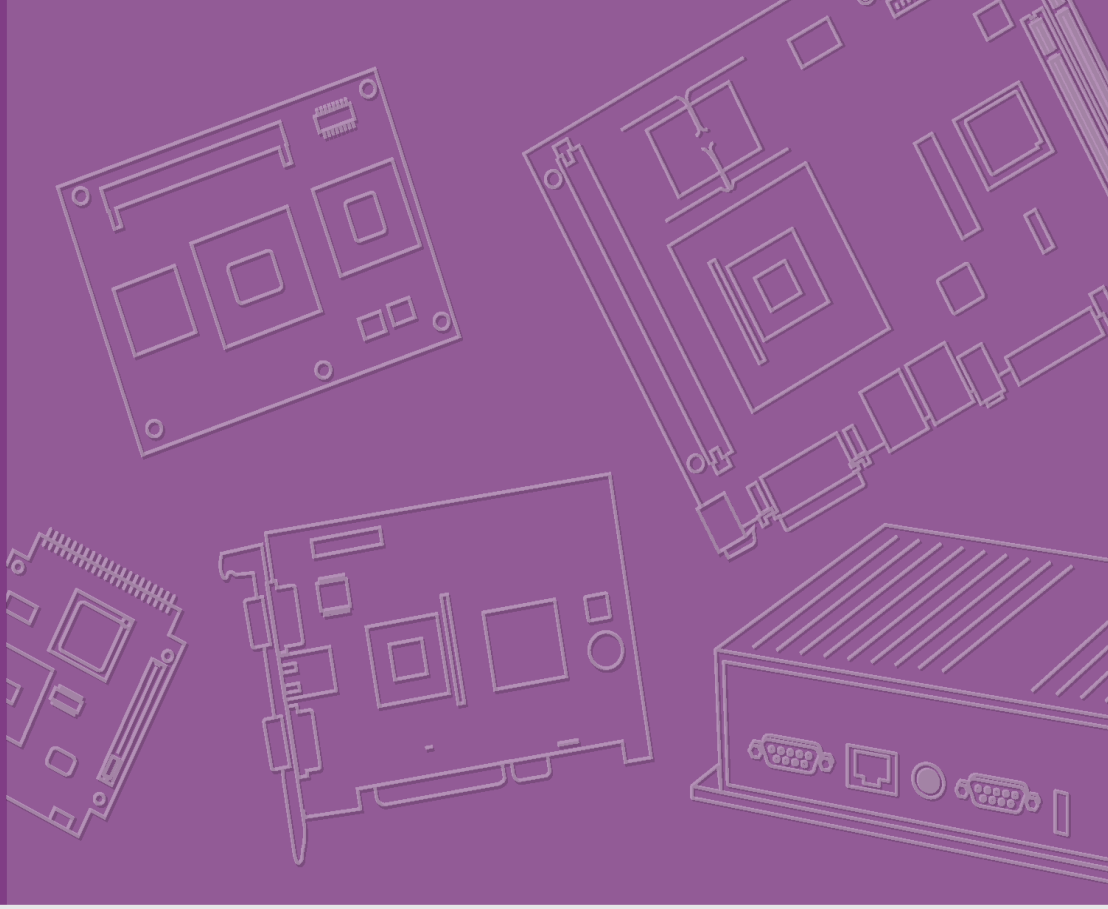

User Manual

ASMB-781

LGA1155
Intel® Xeon® E3/ Core™ i3 ATX Server Board with 2 PCIe x16 Expansion Slots

ADVANTECH
Enabling an Intelligent Planet

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Acknowledgements

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A Message to the Customer

Advantech Customer Services

Each and every Advantech product is built to the most exacting specifications to ensure reliable performance in the harsh and demanding conditions typical of industrial environments. Whether your new Advantech equipment is destined for the laboratory or the factory floor, you can be assured that your product will provide the reliability and ease of operation for which the name Advantech has come to be known.

Your satisfaction is our primary concern. Here is a guide to Advantech's customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

Technical Support

We want you to get the maximum performance from your products. So if you run into technical difficulties, we are here to help. For the most frequently asked questions, you can easily find answers in your product documentation. These answers are normally a lot more detailed than the ones we can give over the phone.

So please consult this manual first. If you still cannot find the answer, gather all the information or questions that apply to your problem, and with the product close at hand, call your dealer. Our dealers are well trained and ready to give you the support you need to get the most from your Advantech products. In fact, most problems reported are minor and are easily solved over the phone.

In addition, free technical support is available from Advantech engineers every business day. We are always ready to give advice on application requirements or specific information on the installation and operation of any of our products.

Declaration of Conformity

FCC

This device complies with the requirements in part 15 of the FCC rules:

Operation is subject to the following two conditions:

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

This equipment has been tested and found to comply with the limits for a Class B 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 device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. The user is advised that any equipment changes or modifications not expressly approved by the party responsible for compliance would void the compliance to FCC regulations and therefore, the user's authority to operate the equipment.

Caution! *There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

Memory Compatibility

Brand	Size	Speed	Vendor PN	Advantech PN	ECC
Transcend	1GB	1333 MHz		NA	Yes
	2GB	1333 MHz		NA	Yes
	4GB	1333 MHz		NA	Yes
InnoDisk	4GB	1333 MHz		NA	Yes
Transcend	1GB	1333 MHz		96D3-1G1333NN-TR	No
	4GB	1333 MHz		96D3-4G1333NN-TR	No
Apacer	2GB	1333 MHz		96D3-2G1333NN-AP	No
	4GB	1333 MHz		96D3-4G1333NN-AP	No
ADATA	8GB	1333 MHz		N/A	No

ASMB-781 Ordering Information

Part Number	Chipset	Memory	LAN	IPMI
ASMB-781G2-00A1E	C206	DDR3 ECC/Non-ECC	2	-
ASMB-781G4-00A1E	C206	DDR3 ECC/Non-ECC	4	Yes

Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Initial Inspection

Before you begin installing your motherboard, please make sure that the following materials have been shipped:

- 1 ASMB-781 Startup Manual
- 1 Driver CD (user's manual is included)
- 2 Serial ATA HDD data cables
- 2 Serial ATA HDD power cables
- 1 I/O port bracket
- 1 Warranty card

If any of these items are missing or damaged, contact your distributor or sales representative immediately. We have carefully inspected the ASMB-781 mechanically and electrically before shipment. It should be free of marks and scratches and in perfect working order upon receipt. As you unpack the ASMB-781, check it for signs of shipping damage. (For example, damaged box, scratches, dents, etc.) If it is damaged or it fails to meet the specifications, notify our service department or your local sales representative immediately. Also notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After inspection, we will make arrangements to repair or replace the unit.

Contents

Chapter 1

Hardware Configuration

1.1 Introduction

The ASMB-781 motherboard is the most advanced Intel® C206 board for industrial server grade applications that require high-performance computing. The motherboard supports 2nd generation Intel® Xeon® E3/ Core™ i3 and DDR3 1066/1333 MHz memory up to 32 GB. ASMB-781 provides an ASPEED AST-1300/2300 onboard graphic controller, with 64MB onboard graphics VRAM.

ASMB-781 provides a mainstream PCIe x16 gen II expansion slot or 2 x PCIe x16 (x8 link) double-deck expansion cards for add-on graphic cards to meet higher graphics performance demands. In addition, the ASMB-781 has four Gigabit Ethernet LAN (G4 version) via dedicated PCIe bus, which offers bandwidth up to 300 MB/s, eliminating network bottlenecks. High reliability and outstanding performance make the ASMB-781 the ideal platform for industrial networking applications.

By using the Intel® C206 chipset, the ASMB-781 offers three 32-bit, 33 MHz PCI slots; one PCIe x1 slot, one PCIe x4 slot, two PCIe x16 slot and a variety of features such as 2 onboard SATA III interfaces (bandwidth = 600 MB/s) and 4 onboard SATA II with software RAID; 12 USB 2.0 connectors. These powerful I/O capabilities ensure even more reliable data storage capabilities and high-speed I/O peripheral connectivity.

The ASMB-781 also adopts Advantech's unique, patented Sleep Mode Control Circuit for AT Power Mode. With all the excellent features and outstanding performance, the ASMB-781 is the ideal platform for today's industrial applications.

1.2 Features

- **PCIe architecture:** The Intel® C206 PCH chipset supports 2 PCIe x16 slot, 1 PCIe x4 slot, 1 PCIe x1 slot, 2 SATA III and 4 SATA II connectors.
- **High Performance I/O capability:** Four Gigabit LAN via PCIe bus, 3 PCI 32-bit/ 33MHz PCI slots, and 12 USB 2.0 ports. (2*Type A USB2.0)
- **Standard ATX form factor with industrial features:** ASMB-781 provides industrial features like long product life, reliable operation under wide temperature range, watchdog timer functions, etc.
- **Automatic power on after power failure:** It is often necessary to have an unattended system come back into operation when power resumes after a power failure. Advantech's industrial motherboard allows users to set the system to power on automatically without anyone hitting power button. Please refer to the detailed "AT" mode settings in Table 1.5 of Section 1.8.3.

1.3 Specifications

1.3.1 System

- **SATA hard disk drive interface:** Six on-board SATA III/II connectors support Advanced Host Controller Interface (AHCI) technology and have data transmission rates up to 600 MB/s or 300 MB/s.
- **System Chipset:** Intel® C206

1.3.2 Memory

- **RAM:** Up to 32 GB in four 240-pin DIMM sockets. Supports dual-channel DDR3 ECC/Non-ECC 1066/1333 SDRAM.

Note! *A 32-bit OS may not fully detect 4 GB of RAM when 4 GB is installed.*

1.3.3 Input/Output

- **PCIe slot:** 2 PCIe x16 expansion slot, 1 PCIe x4 expansion slot, and 1 PCIe x1 expansion slot
- **PCI Bus:** 3 PCI slots, 32-bit, 33 MHz PCI 2.2 compliant
- **Enhanced parallel port:** Configured to LPT1 or disabled. Standard DB-25 female connector cable is a optional accessory. LPT1 supports EPP/SPP/ECP.
- **Serial port:** Two serial ports. (COM1 is rear IO, COM2 is on board connector)
- **Keyboard and PS/2 mouse connector:** One 6-pin mini-DIN connectors is located on the mounting bracket for easy connection to PS/2 keyboard and mouse.
- **USB port:** Supports up to 12 USB 2.0 ports with transmission rates up to 480 Mbps.
- **LPC:** One LPC connector to support Advantech LPC modules, such as TPM module.
- **GPIO:** ASMB-781 supports 8-bit GPIO from super I/O for general purpose control application.

1.3.4 Graphics

- **Chipset:** Discrete VGA chip Aspeed AST2300/1300 onboard
- **Display memory:** 64 GB
- **CRT:** Up to 1920 x 1200 @ 60 Hz refresh rate

1.3.5 Ethernet LAN

- Supports dual/four 10/100/1000 Mbps Ethernet port (s) via PCIe bus which provides a 300 MB/s data transmission rate.
- **Interface:** 10/100/1000 Mbps
- **Controller:** LAN1: Intel 82579LM; LAN2: Intel 82574L; LAN3/4: Intel 82580DB (G4 version only).

1.3.6 Industrial Features

- **Watchdog timer:** Can generate system reset or NC. The watchdog timer is programmable, with each unit equal to one second or one minute (255 levels).

1.3.7 Mechanical and Environmental Specifications

- **Operating temperature:** 0 ~ 60° C (32 ~ 140° F, Depending on CPU)
- **Storage temperature:** -40 ~ 85° C (-40 ~ 185° F)
- **Humidity:** 5 ~ 95% non-condensing
- **Power supply voltage:** +3.3 V, +5 V, ±12 V, 5 VSB
- **Power consumption:**

  Max. load: +3.3 V at 2.74 A, +5 V at 1.12A, +12 V at 0.08 A, +12 V(8P) at 4.86 A, +5 Vsb at 1.81A, -12 V at 0.01 A

- **Board size:** 304.8 x 228.6 mm (12" x 9.6")
- **Board weight:** 0.5 kg (1.68 lb)

1.4 Jumpers and Connectors

Connectors on the ASMB-781 motherboard link it to external devices such as hard disk drives and a keyboard. In addition, the board has a number of jumpers that are used to configure your system for your application.

The tables below list the function of each of the jumpers and connectors. Later sections in this chapter give instructions on setting jumpers. Chapter 2 gives instructions for connecting external devices to your motherboard.

Table 1.1: Jumper list

Label	Function
JCMOS1	CMOS clear
JMECLR1	ME clear
JME1	ME update
JWDT1	Watch dog selection
JGREEN1	Deep sleep Sx mode
JUSB_1,JUSB_2	USB/KBMS normal(2-3)/standby power selection(1-2)
CPUFAN_SEL1, SYSFAN_SEL1	FAN PWM(1-2)/DC mode selection(2-3)
PSON1	AT(1-2) / ATX(2-3)
JCFG1	PCI-E port (slot 6) assign to 1 x 16 link (Default) or 2 x 8 link for riser card use

Table 1.2: Connector list

Label	Function
ATX24P_P1	ATX 24 Pin main power connector (for System)
ATX8P_P1	Processor power connector (for CPU)
SATA1~SATA6	Serial ATA1~6
USB56,USB78,USB910	USB port 5,6,7,8,9,10 (Header)
USB11,USB12	USB port 11,12(USB type A)
PCI1,PCI2,PCI5	PCI slot
PCIE3	PCIE x4 slot
PCIE4,PCIE6	PCIE x16 slot
PCIE7	PCIE x1 slot
DIMMA0,DIMMA1,DIMMB0,DIMMB1	DDR3 slot
CPUFAN1	CPU FAN connector
SYSFAN1,SYSFAN2,SYSFAN3,SYSFAN4	System FAN connector
LAN1_USB12,LAN2_USB34	LAN1 / USB port 1, 2 stack connector LAN2 / USB port 3, 4 stack connector
LAN3_4	LAN 3,4 stack connector
VGA_COM1	VGA+COM connector
KBMS1	PS/2 keyboard and mouse connector
KBMS2	External keyboard and mouse connector(6 pin)

Table 1.2: Connector list	
SPI1	SPI socket
SPI_CN1	SPI flash card pin header
LANLED1,LANLED2	LAN LED extension connector
FP_SMB1	Front panel SMBus header
IPMI1	IPMI header
GPIO1	GPIO header
FPAUD1	Audio front panel header
LPT1	Parallel port
COM2	Serial port: RS-232
JFP1	Front panel header

1.5 Board Layout: Jumper and Connector Locations

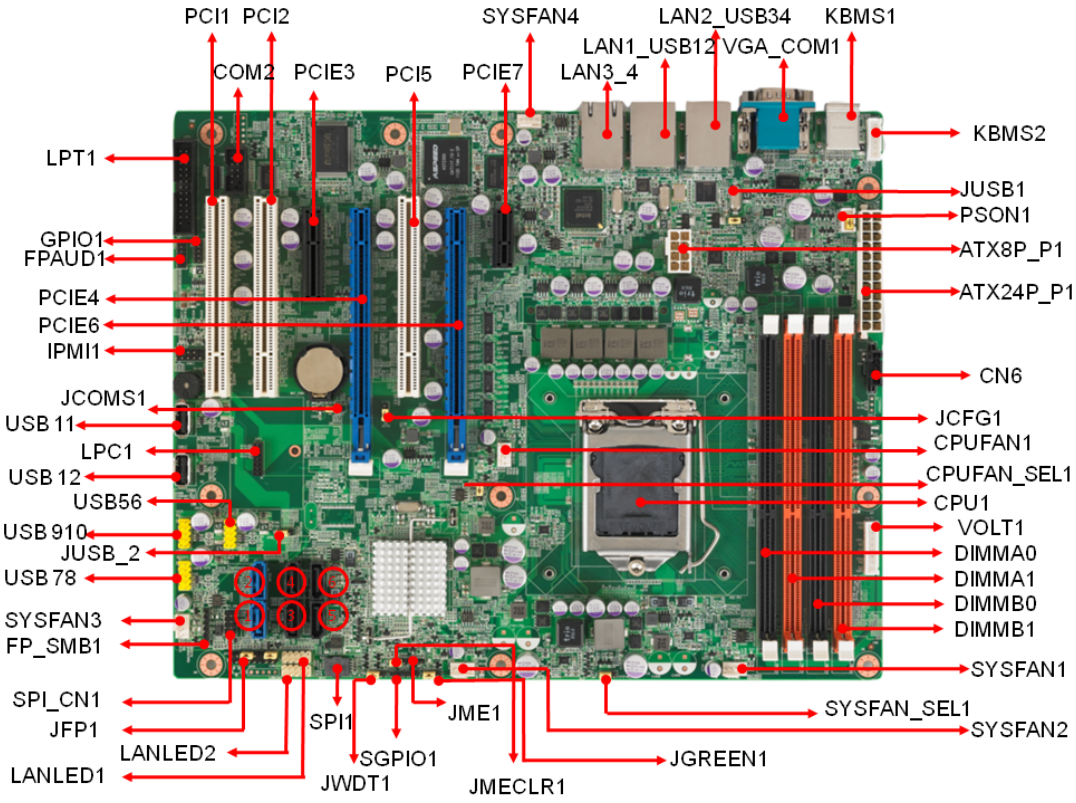


Figure 1.1 Jumper and Connector Locations

Figure 1.2 I/O connectors

1.6 ASMB-781 Block Diagram

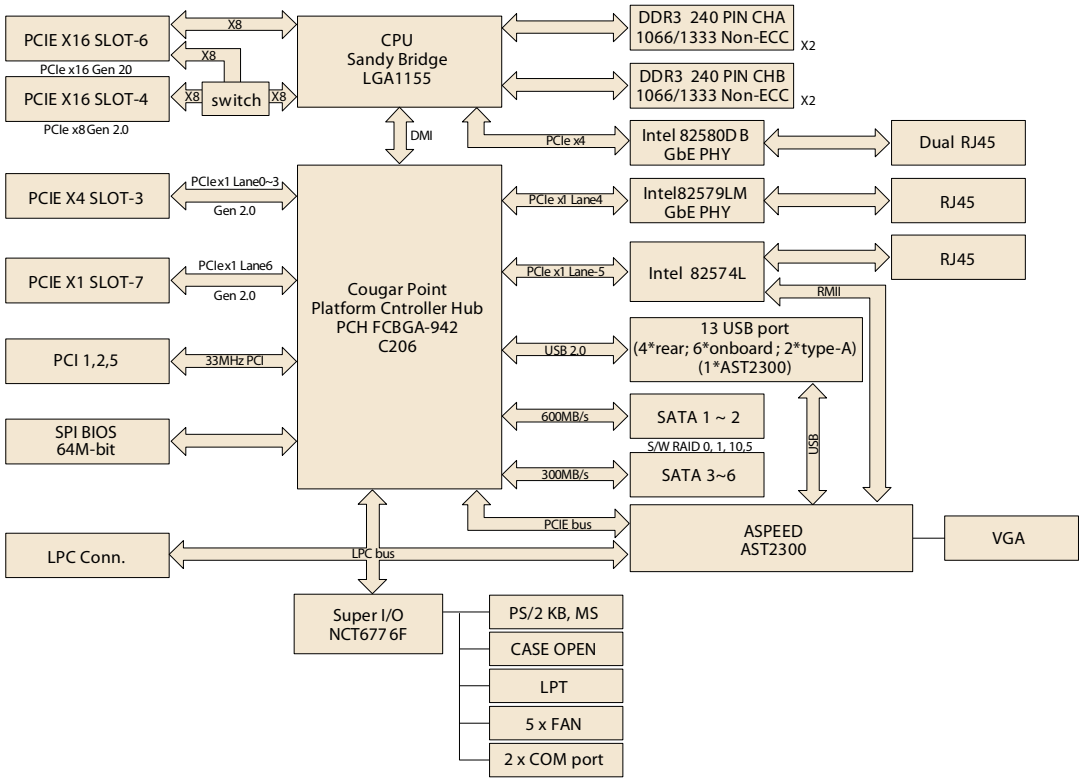


Figure 1.3 ASMB-781 Block Diagram

1.7 Safety Precautions

Warning! *Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.*

Caution! *Always ground yourself to remove any static charge before touching the motherboard. Modern electronic devices are very sensitive to static electric discharges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.*

Caution! *The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacturer. Discard used batteries according to manufacturer's instructions.*

Caution! *There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

1.8 Jumper Settings

This section provides instructions on how to configure your motherboard by setting the jumpers. It also includes the motherboard default settings and your options for each jumper.

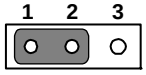
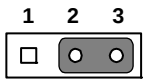
1.8.1 How to set jumpers

You can configure your motherboard to match the needs of your application by setting the jumpers. A jumper is a metal bridge that closes an electrical circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" (or turn on) a jumper, you connect the pins with the clip. To "open" (or turn off) a jumper, you remove the clip. Sometimes a jumper consists of a set of three pins, labeled 1, 2, and 3. In this case you connect either pins 1 and 2, or 2 and 3. A pair of needle-nose pliers may be useful when setting jumpers.

1.8.2 CMOS and ME clear (JCMOS1, JMECLR1)

The ASMB-781 motherboard contains a jumper that can erase CMOS data and reset the system BIOS information. Normally this jumper should be set with pins 1-2 closed. If you want to reset the CMOS data, set J1 to 2-3 closed for just a few seconds, and then move the jumper back to 1-2 closed. This procedure will reset the CMOS to its default setting.

Table 1.3: JCMOS1, JMECLR1

Function	Jumper Setting	
* Keep CMOS and ME data		1-2 closed
Clear CMOS and ME data		2-3 closed

* default setting

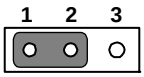
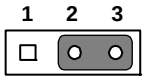
ME update (JME1)

The ASMB-781 contains a jumper that can update for ME firmware. Normally this jumper should be set with pin 1-2 closed. If you want to update ME firmware, set JME1 to 2-3 closed for new ME firmware update.

Table 1.4: JME1	
Function	**Jumper Setting**
*Lock ME update	1-2 closed (add jumper diagram)
ME update	2-3 closed (add jumper diagram)

1.8.3 Watchdog timer output (JWDT1)

The ASMB-781 contains a watchdog timer that will reset the CPU. This feature means the ASMB-781 will recover from a software failure or an EMI problem. The JWDT1 jumper settings control the outcome of what the computer will do in the event the watchdog timer is tripped.

Table 1.5: Watchdog timer output (JWDT1)		
Function	**Jumper Setting**	
*Reset		1-2 closed
NC		2-3 closed
* default setting		

Note! *The interrupt output of the watchdog timer is a low level signal. It will be held low until the watchdog timer is reset.*

ME update (JGREEN1)

The ASMB-781 contains a jumper that can support energy saving for BIOS deep S5 feature. Normally this jumper should be set with pin 1-2 closed. If you want to disable, set JGREEN1 to 2-3 closed for disable.

Table 1.6: ME update (JGREEN1)	
Function	**Jumper Setting**
*Enable	1-2 closed (add jumper diagram)
Disable	2-3 closed (add jumper diagram)

USB power switch (JUSB_1, JUSB_2)

The ASMB-781 contains a jumper that can support USB stand-by power when S5 mode, Normally this jumper should be set with pin 1-2 closed. If you want to disable, set JUSB_1,JSUB_2 to 2-3 closed for disable.

Table 1.7: USB power switch (JUSB_1, JUSB_2)	
Function	**Jumper Setting**
*USB stand-by power	1-2 closed (add jumper diagram)
Normal	2-3 closed (add jumper diagram)

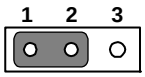
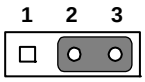
CPU,SYSTEM fan PWM/DC mode selection(CPUFAN_SEL1, SYSFAN_SEL1)

The ASMB-781 contains a jumper that can support PWM or DC mode, Normally this jumper should be set with pin 1-2 closed. If you want to change to DC mode, set CPUFAN_SEL1, SYSFAN_SEL1 to 2-3 closed for disable.

Table 1.8: (CPUFAN_SEL1, SYSFAN_SEL1)

Function	Jumper Setting
*PWM mode	1-2 closed (add jumper diagram)
DC mode	2-3 closed (add jumper diagram)

Table 1.9: ATX/AT mode selector (PSON1)

Function	Jumper Setting
AT Mode	 1-2 closed
* ATX Mode	 2-3 closed
* default setting	

PCIe x16 slot(slot6) switch(JCFG1)

The ASMB-781 contains a jumper that can assign PCI-E port (slot 6) to 1 x 16 link (Default) or 2 x 8 link for riser card use. Normally this jumper should be set with pin 1-2 closed. If you want to support riser card, set JCFG1 to 2-3 closed.

Table 1.10: PCIe x16 slot switch (JCFG1)

Function	Jumper Setting
*1 x 16 link	1-2 closed (add jumper diagram)
2 x 8 link	2-3 closed (add jumper diagram)

1.9 System Memory

ASMB-781 has four 240-pin memory sockets for DDR3 ECC/Non-ECC 1066/1333 MHz memory modules with maximum capacity of 32GB (Maximum 8GB for each DIMM).

Please note that both versions ASMB-781 do NOT support registered DIMMs (RDIMMs).

Brand	Size	Speed	Vendor PN	Advantech PN	ECC
Transcend	1GB	1333 MHz		NA	Yes
	2GB	1333 MHz		NA	Yes
	4GB	1333 MHz		NA	Yes
InnoDisk	4GB	1333 MHz		NA	Yes
Transcend	1GB	1333 MHz		96D3-1G1333NN-TR	No
	4GB	1333 MHz		96D3-4G1333NN-TR	No

Apacer	2GB	1333 MHz		96D3-2G1333NN-AP	No
	4GB	1333 MHz		96D3-4G1333NN-AP	No
ADATA	8GB	1333 MHz		N/A	No

1.10 Memory Installation Procedures

To install DIMMs, first make sure the two handles of the DIMM socket are in the “open” position. i.e. The handles lean outward. Slowly slide the DIMM module along the plastic guides on both ends of the socket, and then press the DIMM module right down into the socket, until you hear a click. This is when the two handles have automatically locked the memory module into the correct position of the DIMM socket. To remove the memory module, just push both handles outward, and the memory module will be ejected by the mechanism in the socket.

1.11 Cache Memory

The ASMB-781 supports a CPU with one of the following built-in full speed L3 caches:

The built-in third-level cache in the processor yields much higher performance than conventional external cache memories.

- 8 MB for 2nd Generation Intel Xeon E3-1275 CPU
- 6 MB for 2nd Generation Intel Xeon-E3-1225 CPU
- 3 MB for 2nd Generation Intel Core i3-2120 CPU
- 3 MB for Intel Pentium G850 CPU

1.12 Processor Installation

The ASMB-781 is designed for LGA1155, Intel Xeon® E3/Core™ i3 processor.

1.13 PCI Bus Routing Table

AD PCI slot INT	**PCI1**	**PCI2**	**PCI5**
	AD16	**AD21**	**AD22**
A	A	F	G
B	B	G	H
C	C	H	E
D	D	E	F

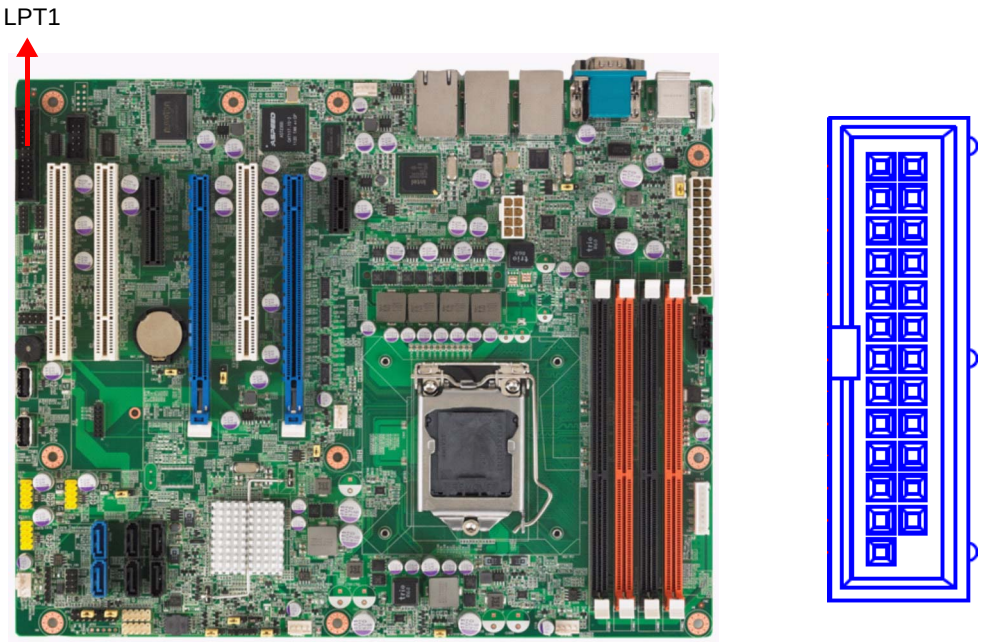
Chapter 2

Connecting Peripherals

2.1 Introduction

You can access most of the connectors from the top of the board as it is being installed in the chassis. If you have a number of cards installed, you may need to partially remove a card to make all the connections.

2.2 Parallel Port (LPT1)



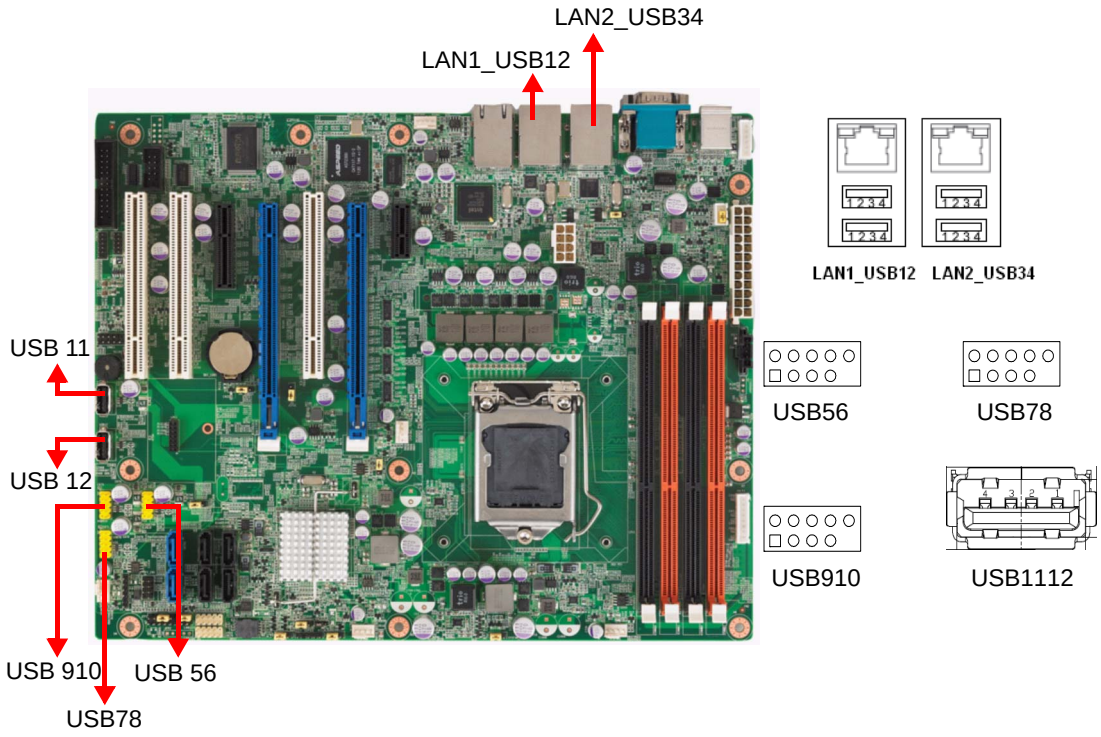
The parallel port is normally used to connect the motherboard to a printer. The ASMB-781 includes an onboard parallel port, accessed through a 25-pin flat-cable connector, LPT1.

2.3 USB Ports (LAN2_USB34, USB56, USB78, USB910, USB1112)

These ports support Plug & Play and hot swapping for up to 127 external devices. The USB ports comply with USB specification rev. 2.0. Transmission rates of up to 480 Mbps and fuse protection are supported. The USB interface can be disabled in the system BIOS setup.

The ASMB-781 is equipped with two or four high-performance 1000 Mbps Ethernet LANs. They are supported by all major network operating systems. The RJ-45 jacks on the rear plate provide convenient 1000 Mbps operation.

If all USB ports will be used, USB power is recommended to switch to +5V instead of +5VSB.



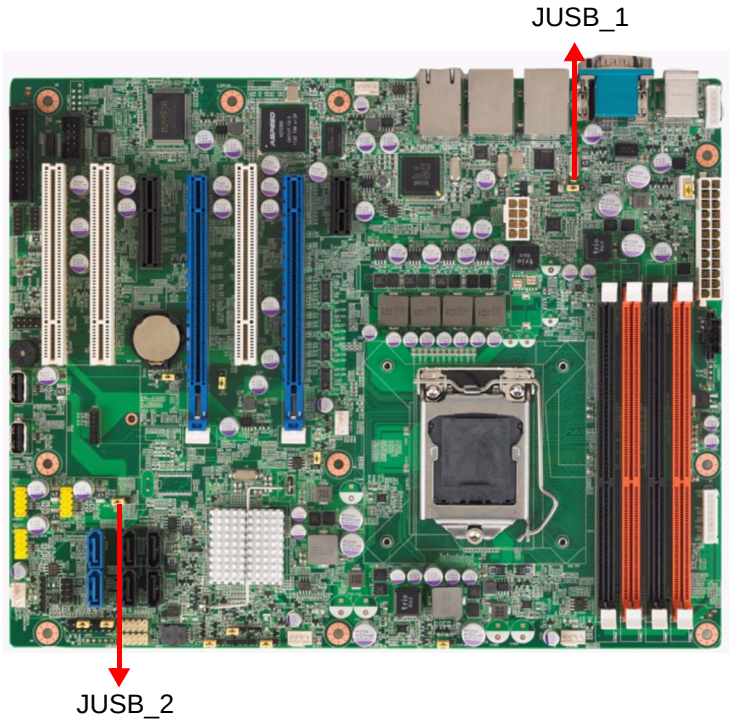
LAN 1/2 LED Indicator

LAN Mode	LAN Indicator
1 Gbps Link on	LED1 Green on (left)
100 Mbps Link on	LED1 Orange on (left)
10 Mbps Link on	LED1 N/A (left)
Active	LED2 Green flash (right)

LAN 3/4 LED Indicator

LAN Mode	LAN Indicator
1 Gbps Link on	LED1 Green on (Right)
100 Mbps Link on	LED1 Orange on (Right)
10 Mbps Link on	LED1 N/A (Right)
Active	LED2 Green flash (left)

2.4 USB Power Switch

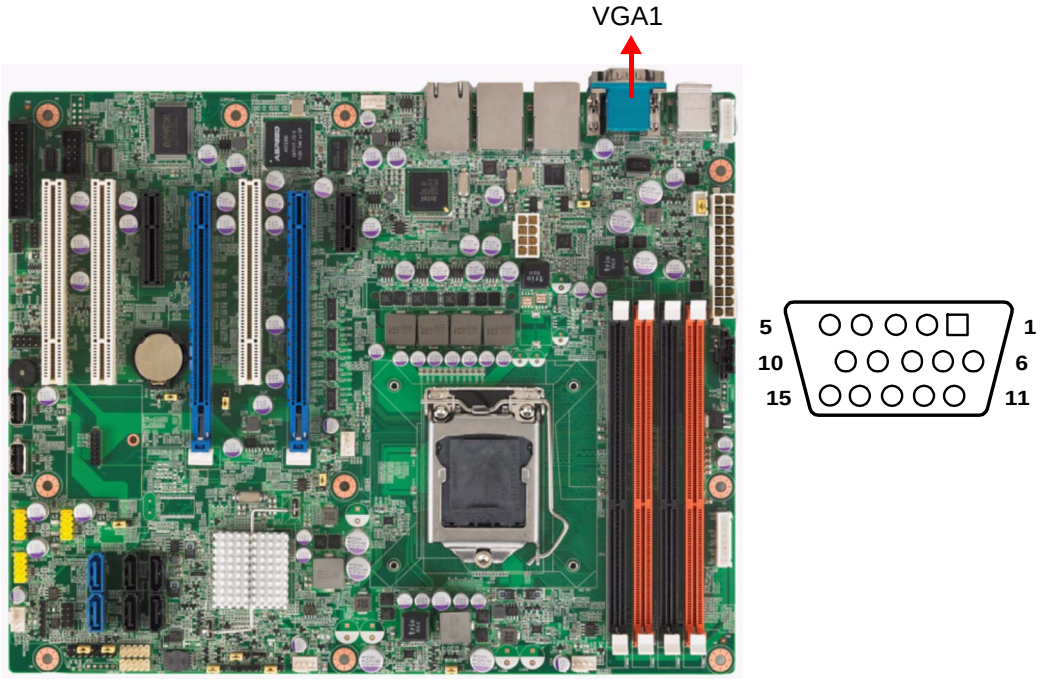


Jumper	USB Ports
JUSB_1	USB port 1~4 and KBMS
JUSB_2	USB port 5~12

ASMB-781 allows user to set USB and KBMS power between +5VSB and +5V. When the jumper is set as Normal, the board doesn't support waked from S3 via keyboard or mouse.

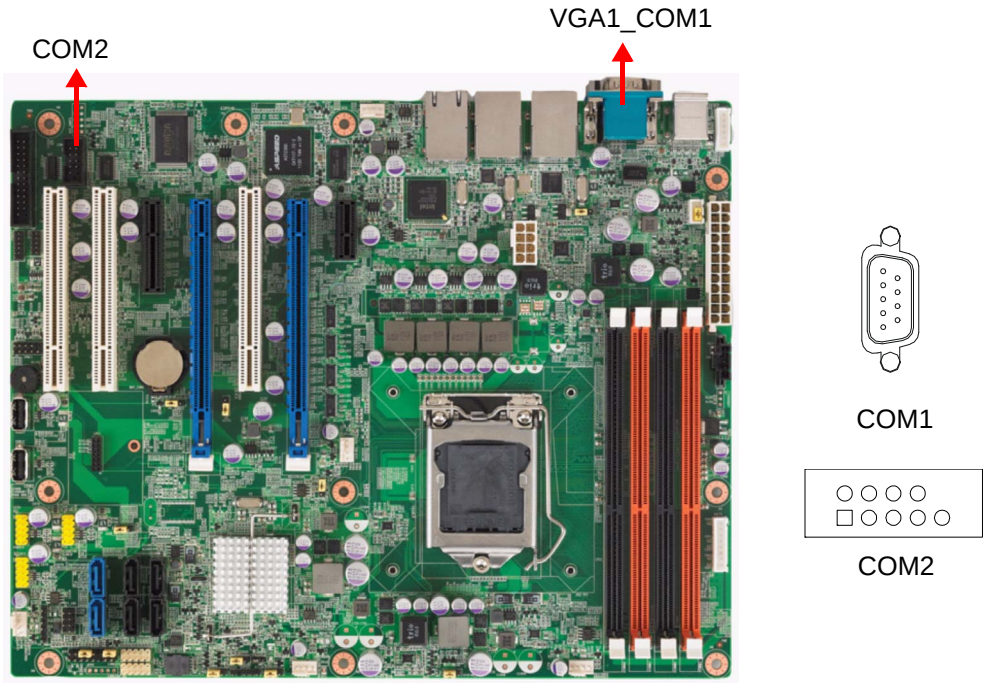
Note! *When USB power is switched to Normal, it can't be connected with powered KVM.*

2.5 VGA Connector (VGA1)



The ASMB-781 includes a VGA interface that can drive conventional CRT displays. Pin assignments of VGA1 are detailed in Appendix B.

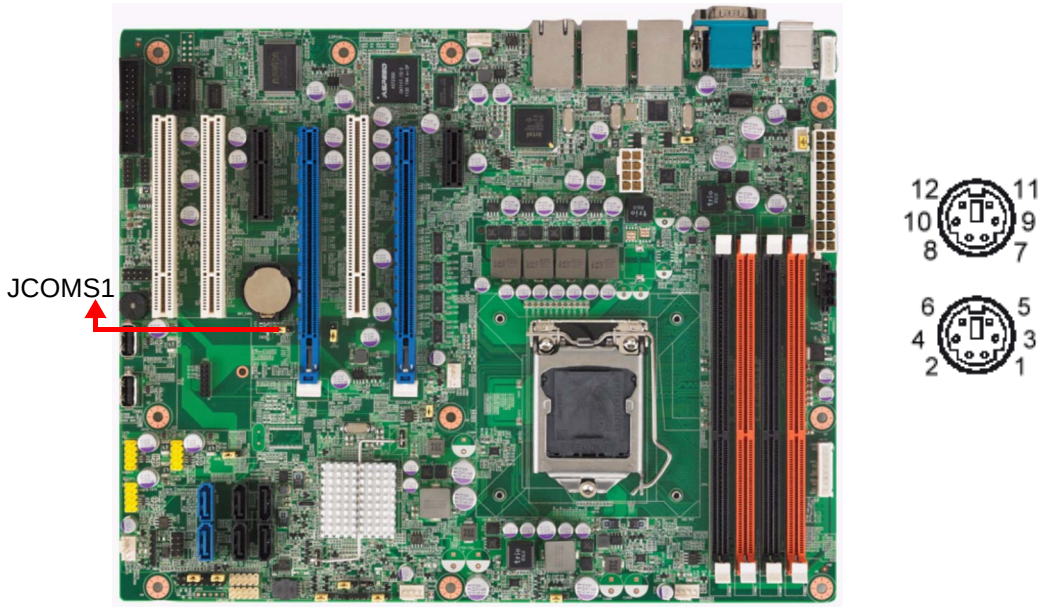
2.6 Serial Ports (COM1, COM2)



The ASMB-781 offers two serial ports (one on the rear panel and one onboard).These ports can connect to a serial mouse, printer or communications network. The IRQ and address ranges for those ports are fixed. However, if you want to disable the port or change these parameters later, you can do this in the system

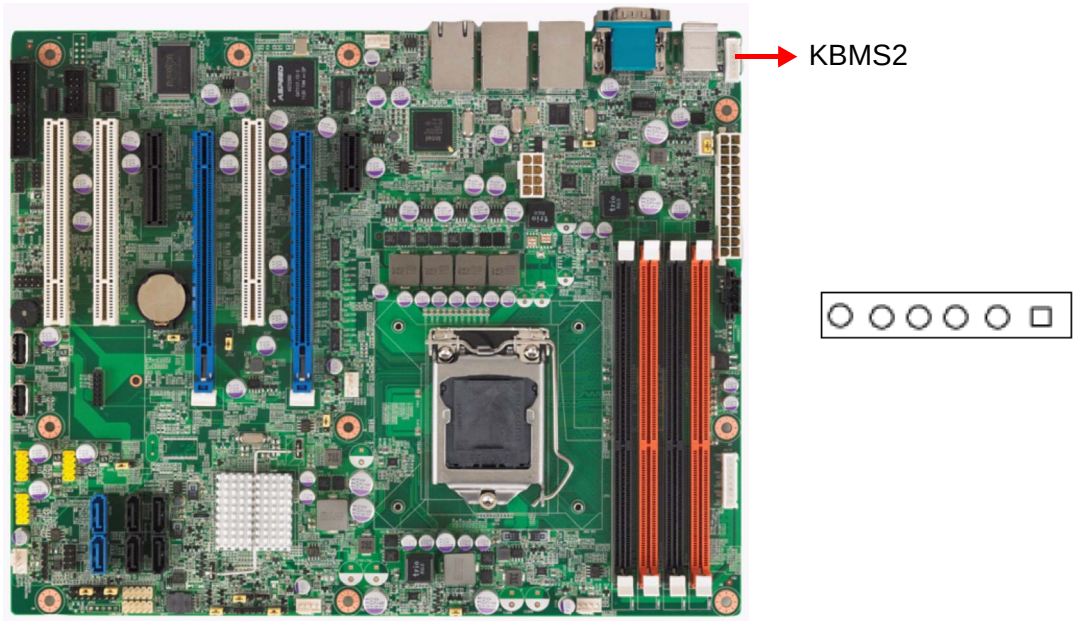
BIOS setup. Different devices implement the RS-232 standards in different ways. If you are having problems with a serial device, please be sure to check the pin assignments for the connector.

2.7 PS/2 Keyboard and Mouse Connector (KBMS1)



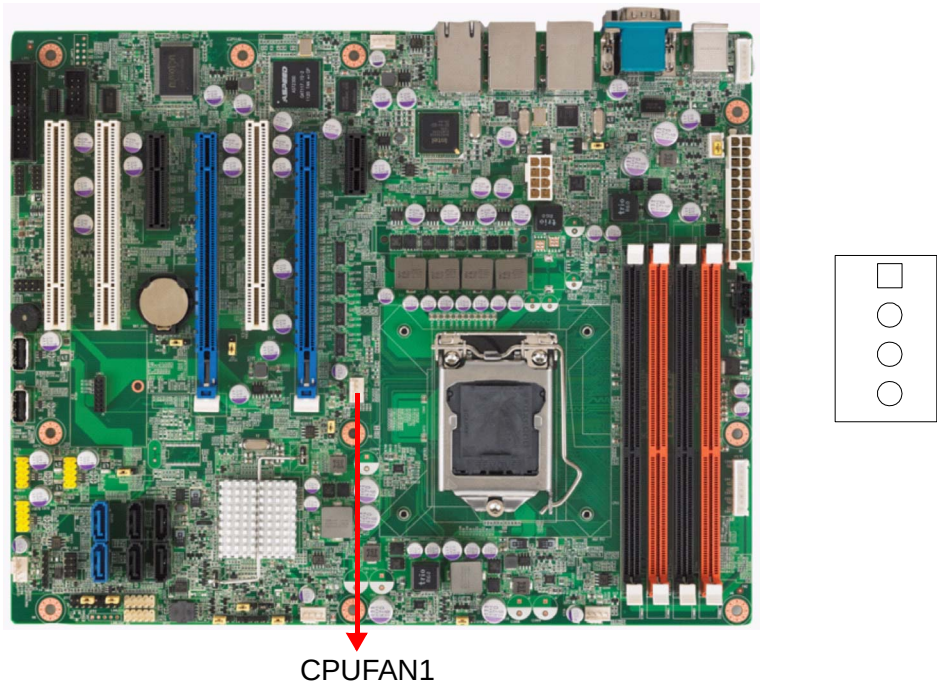
Two 6-pin mini-DIN connectors (KBMS1) on the rear panel of the motherboard provide PS/2 keyboard and mouse connections.

2.8 External Keyboard & Mouse (KBMS2)



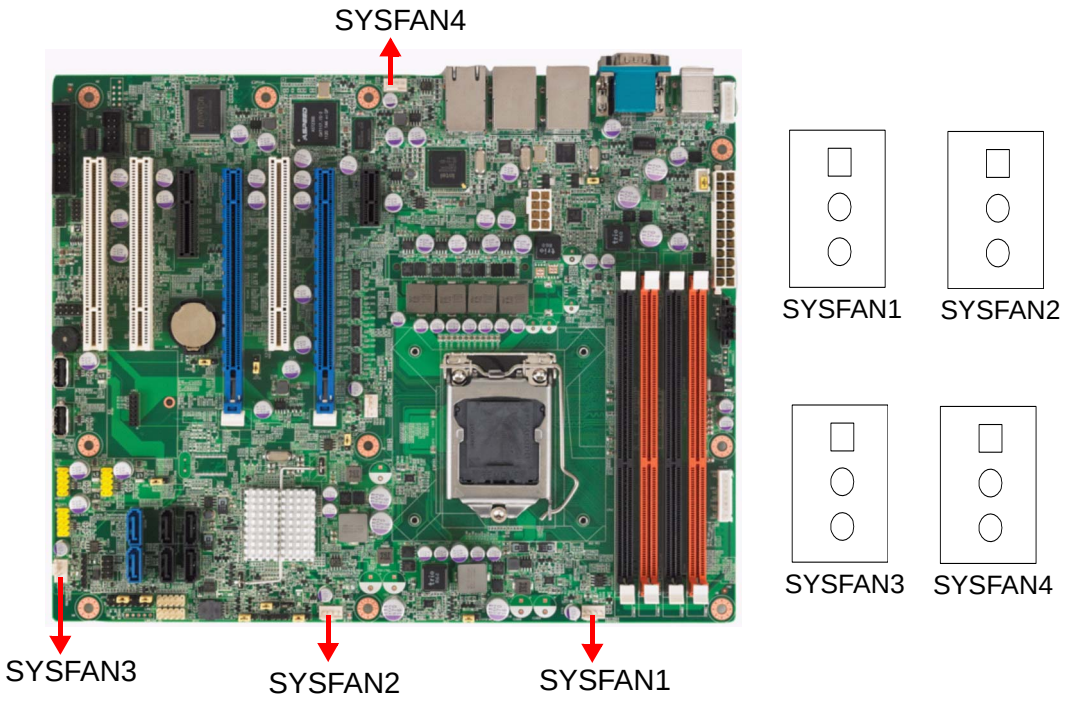
There is also an extra onboard external keyboard and mouse connector on the motherboard. This gives system integrators greater flexibility in designing their systems.

2.9 CPU Fan Connector (CPUFAN1)



If a fan is used, this connector supports cooling fans that draw up to 500 mA (6 W).

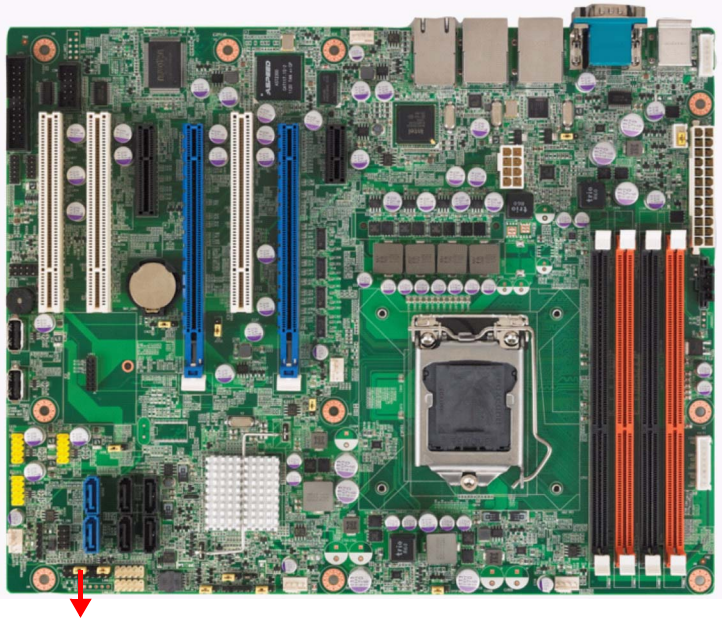
2.10 System FAN Connector (SYSFAN1, SYSFAN2, SYSFAN3 and SYSFAN4)



If a fan is used, this connector supports cooling fans that draw up to 500 mA (6 W).

2.11 Front Panel Connectors (JFP1)

There are several external switches and LEDs to monitor and control the ASMB-781.



JFP1

2	4	6	8	10	12	14	16
1	3	5	7	9	11	13	15

RSTBTN	Case Open	SPEAKER	
PWRBTN	HDDLED	PWRLED	NC

2.11.1 Power LED (JFP1)

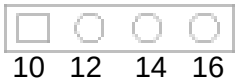
JFP1 pin9 and pin13 are for the power LED. Refer to Appendix B for detailed information on the pin assignments. If a PS/2 or ATX power supply is used, the system's power LED status will be as indicated as follows.

Table 2.1: PS/2 or ATX power supply LED status

Power mode	LED (PS/2 power)	LED (ATX power)
System On	On	On
System Suspend	Fast flashes	Fast flashes
System Off	Off	Off
System Off in deep sleep	Off	Off

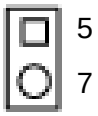
2.11.2 External Speaker (JFP1 pins 10, 12, 14, 16)

JFP2 pins 10, 12, 14, 16 connector for an external speaker. The ASMB-781 provides an onboard buzzer as an alternative. To enable the buzzer, set pins 14-16 as closed.



2.11.3 HDD LED Connector (JFP1 pins 5 & 7)

You can connect an LED to connector JFP1 to indicate when the HDD is active.

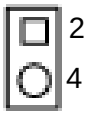


2.11.4 ATX Soft Power Switch (JFP1 pins 1 & 3)

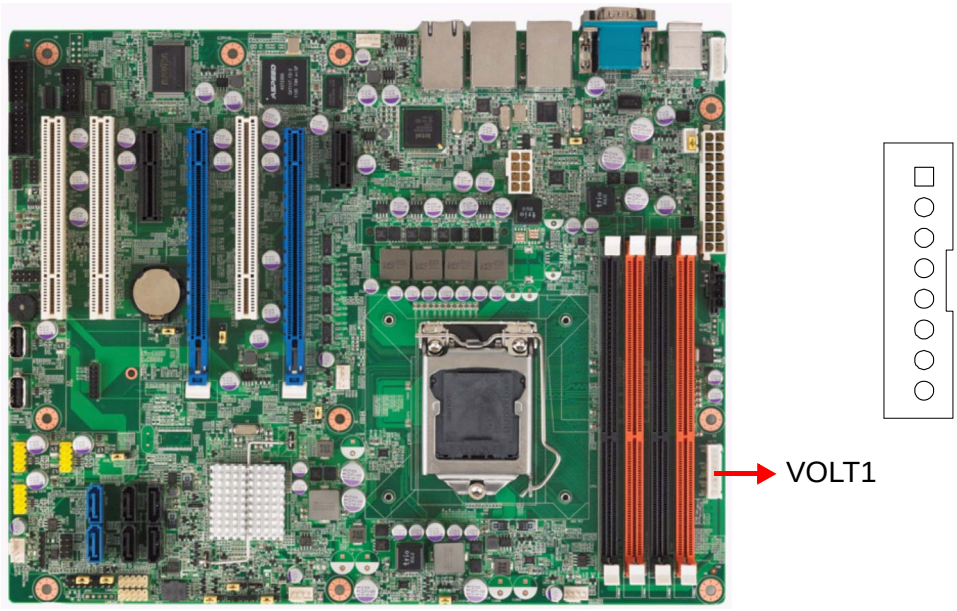
If your computer case is equipped with an ATX power supply, you should connect the power on/off button on your computer case to pins 1 and 3 of JFP1. This connection enables you to turn your computer on and off.

2.11.5 Reset Connector (JFP1 pins 2 & 4)

Many computer cases offer the convenience of a reset button.

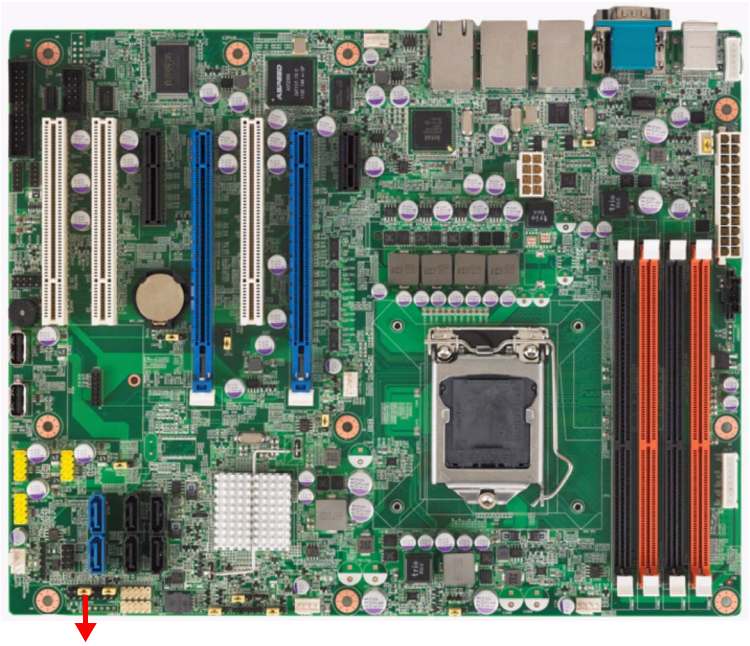


2.12 8-pin Alarm Board Connector (VOLT1)



VOLT1 connects to the alarm board of Advantech chassis. These alarm boards give warnings if a power supply or fan fails, if the chassis overheats, or if the backplane malfunctions.

2.13 Case Open Connector (JFP1 pin 6 & 8)

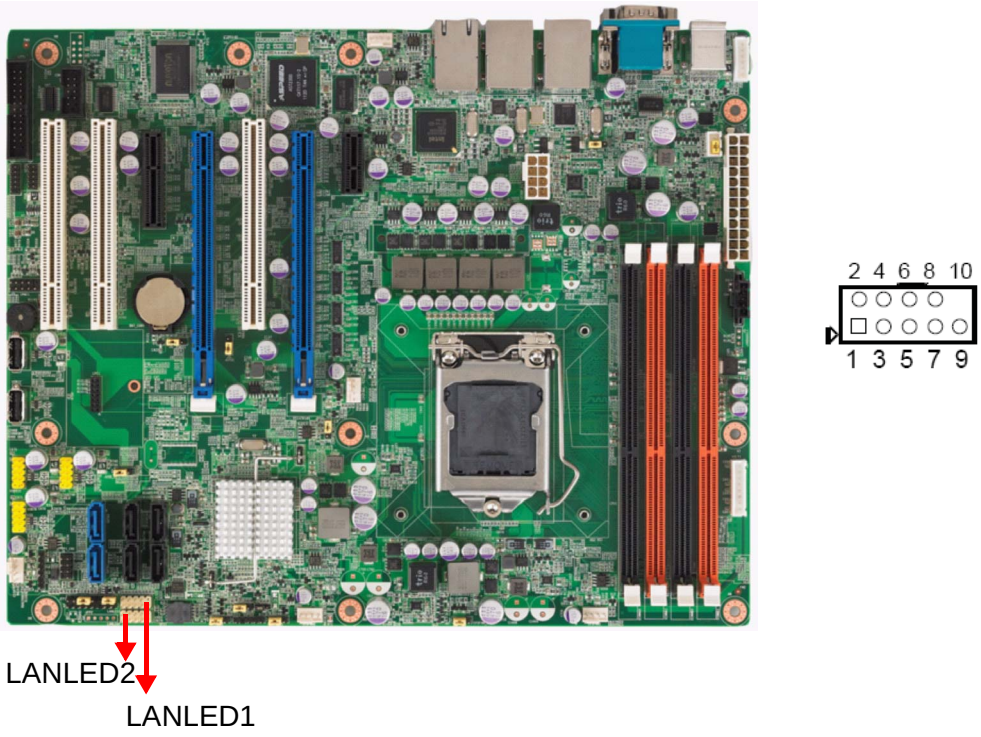


JFP1 pin 6 & 8 are for chassis with a case open sensor. The warning message will show in post screen.

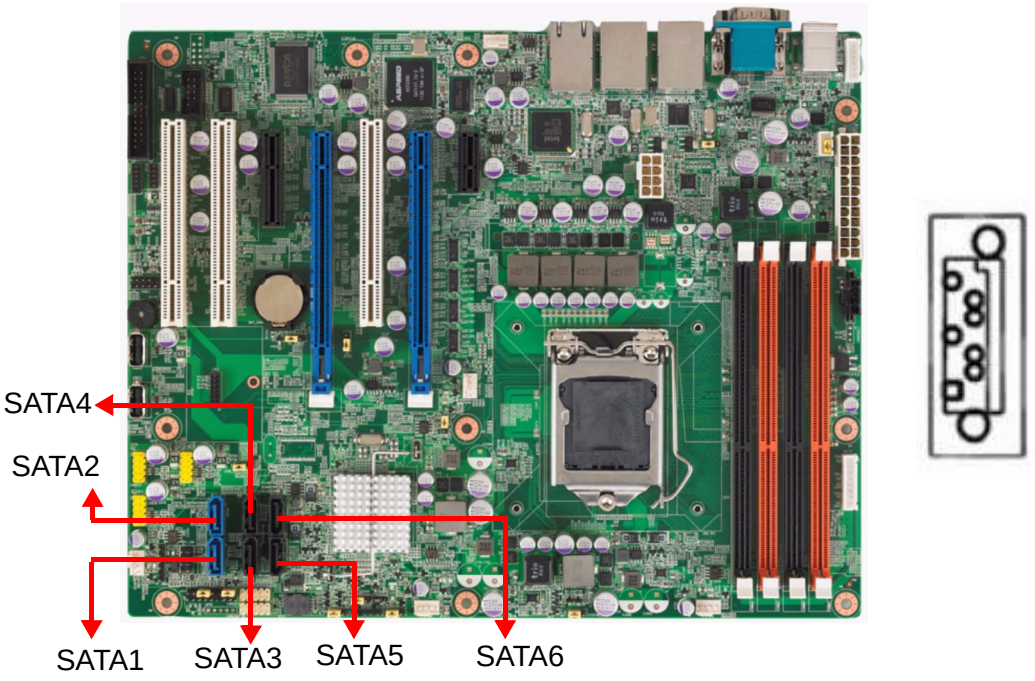
2.14 Front Panel LAN Indicator Connector (LANLED1 and LANLED2)

Table 2.2: Front Panel LAN Indicator Connector

Pin	Signal	Pin	Signal
1	LAN1/3_LED0_ACT	2	LAN2/4_LED1_ACT
3	VCC3_LAN1LED	4	VCC3_LAN2LED
6	LAN1/3_LED1_1000M	6	LAN2/4_LED2_1000
7	LAN1/3_LED2_100M	8	LAN2/4_LED0_100
9	VCC3	10	NC



2.15 Serial ATA Interface (SATA1, SATA2, SATA3, SATA4, SATA5 & SATA6)

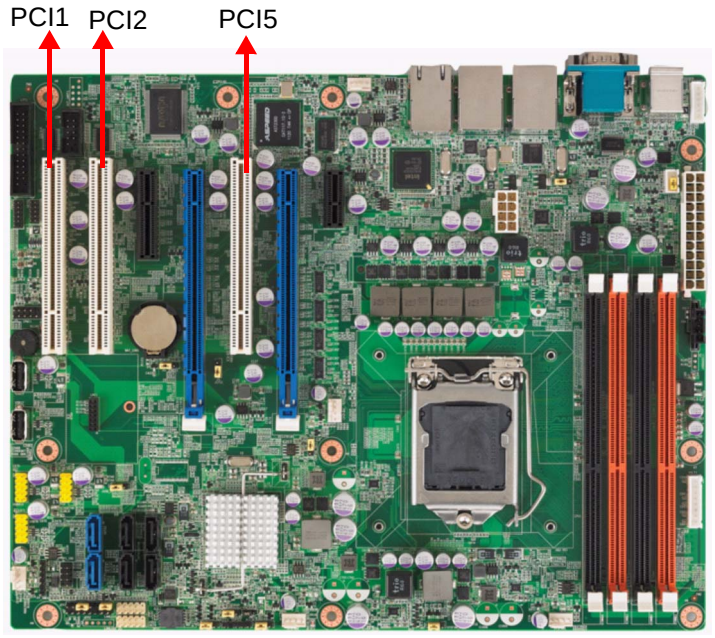


ASMB-781 features two high performance serial ATA III interfaces (up to 600 MB/s, blue connector) and four serial ATA II interfaces (up to 300 MB/s, black connector).

Note!

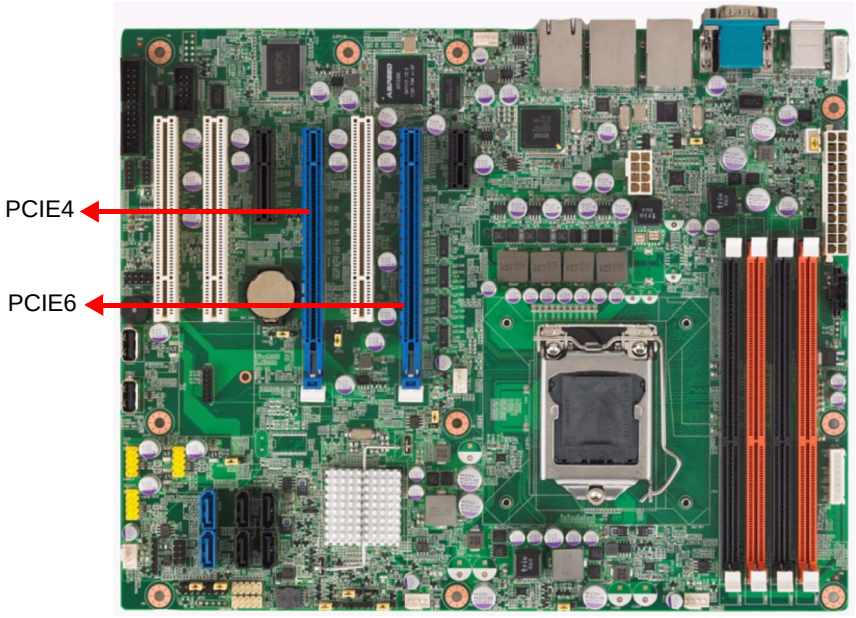
1. *ASMB-781 on board SATA only supports Fedora 14 and 15 and SATA mode in BIOS should be set as AHCI mode.*
2. *If SATA mode is set as IDE mode, when user is installing Fedora 14 and 15, ODD has been connected on SATA port 3~6.*

2.16 PCI Slots (PCI 1, 2, 5)

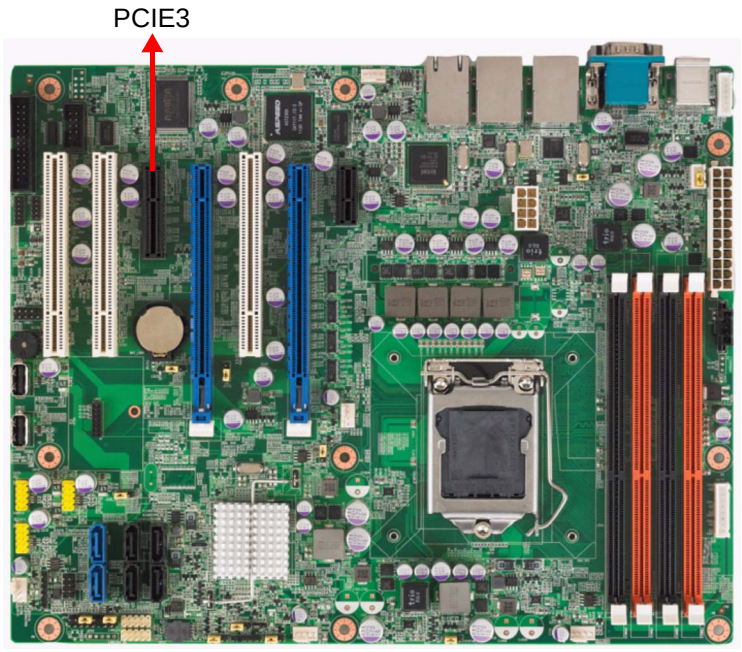


The ASMB-781 provides three 32-bit / 33 MHz PCI slots.

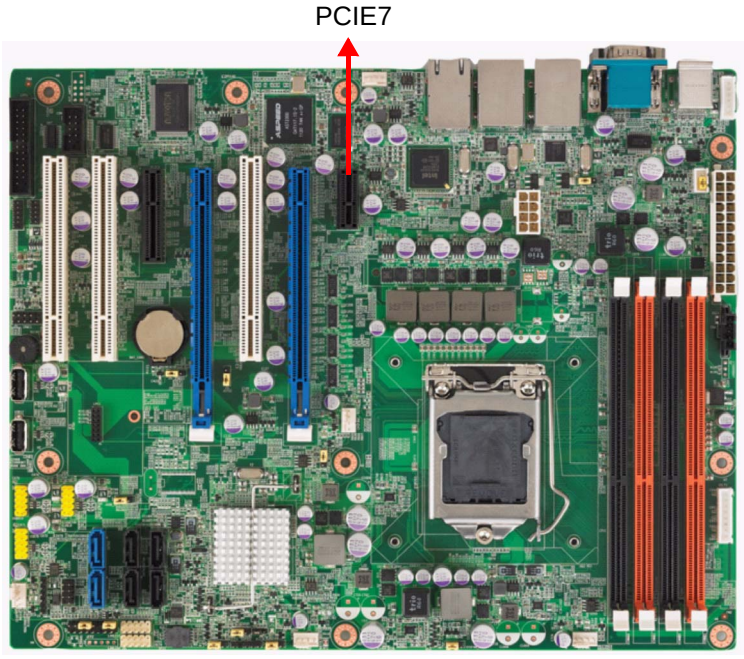
2.17 PCIe x16 Expansion Slot (PCIE4 and PCIE6)



2.18 PCIEX4_1

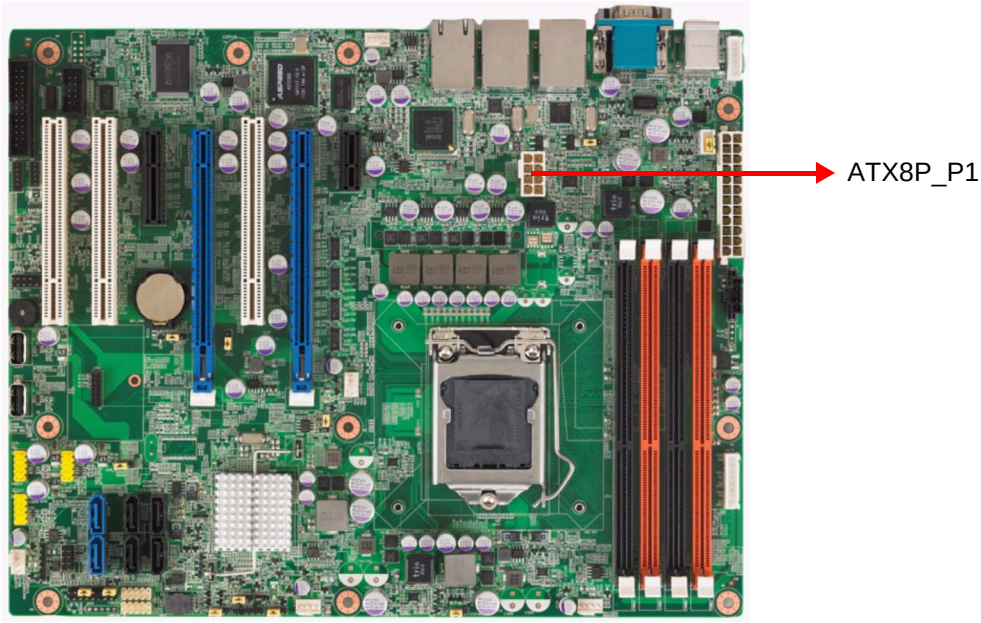


2.19 PCIEX1_1



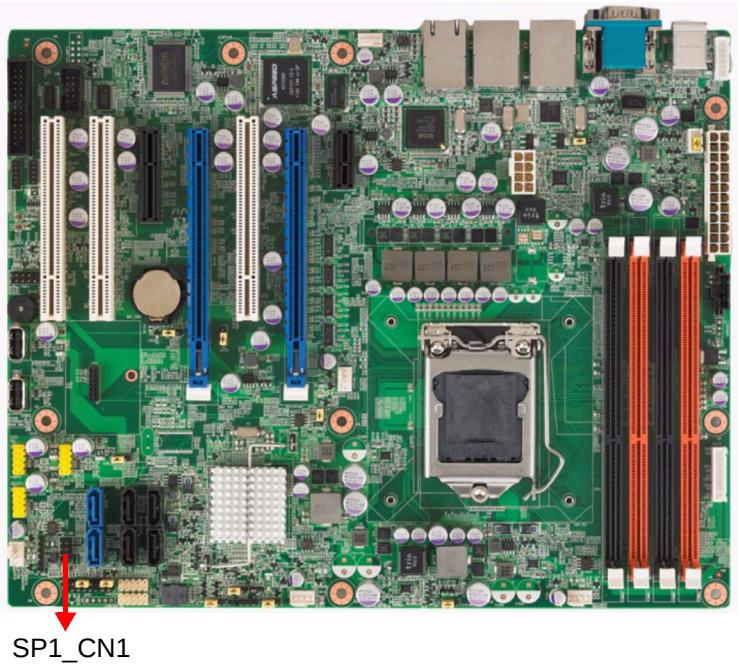
2.20 Auxiliary 8-pin power connector (ATX8P_P1)

For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12 V Specification 2.0 (or later version). Do not forget to connect the 8-pin EATX12 V power plug; otherwise, the system will not boot.



2.21 SPI Flash connector(SPI_CN1)

SPI flash card pin header which can flash BIOS while ASMB-781 can not be power on and ensures platform integrity.



2.22 Low Pin Count Connector (LPC1)

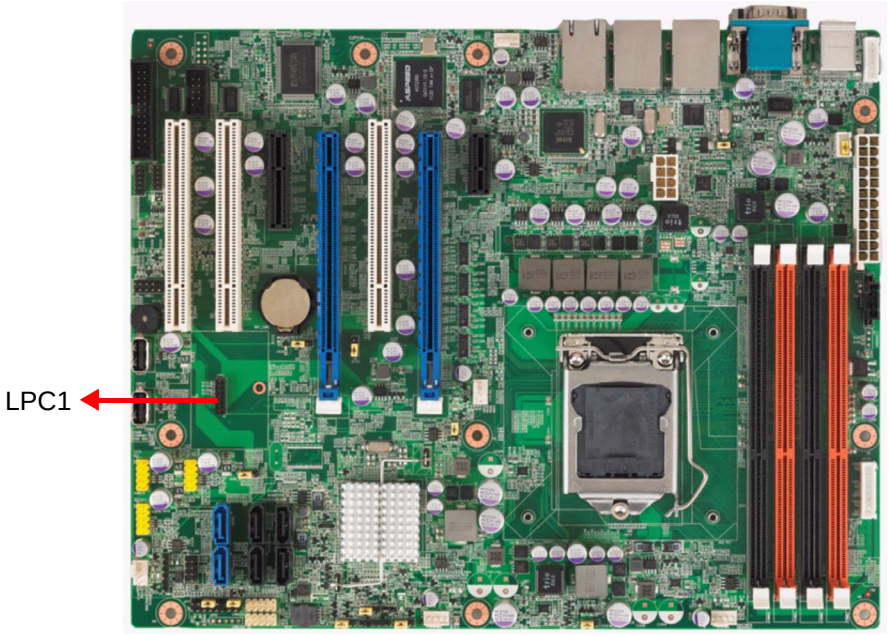


Table 2.3: Advantech LPC Module List

P/N	Description
PCA-COM232-00A1E	4 Ports RS-232 Module (Need to modify BIOS)
PCA-COM485-00A1E	4 Ports RS-485/422 Module (Need to modify BIOS)
PCA-TPM-00A1E	TPM Module

Chapter 3

BIOS Operation

3.1 Introduction

AMIBIOS has been integrated into myriad motherboards for decades. In the past, people often referred to the AMIBIOS setup menu as BIOS, BIOS setup or CMOS setup.

With the AMIBIOS Setup program, you can modify BIOS settings and control the special features of your computer. The Setup program uses a number of menus for making changes and turning the special features on or off. This chapter describes the basic navigation of the ASMB-781 setup screens.

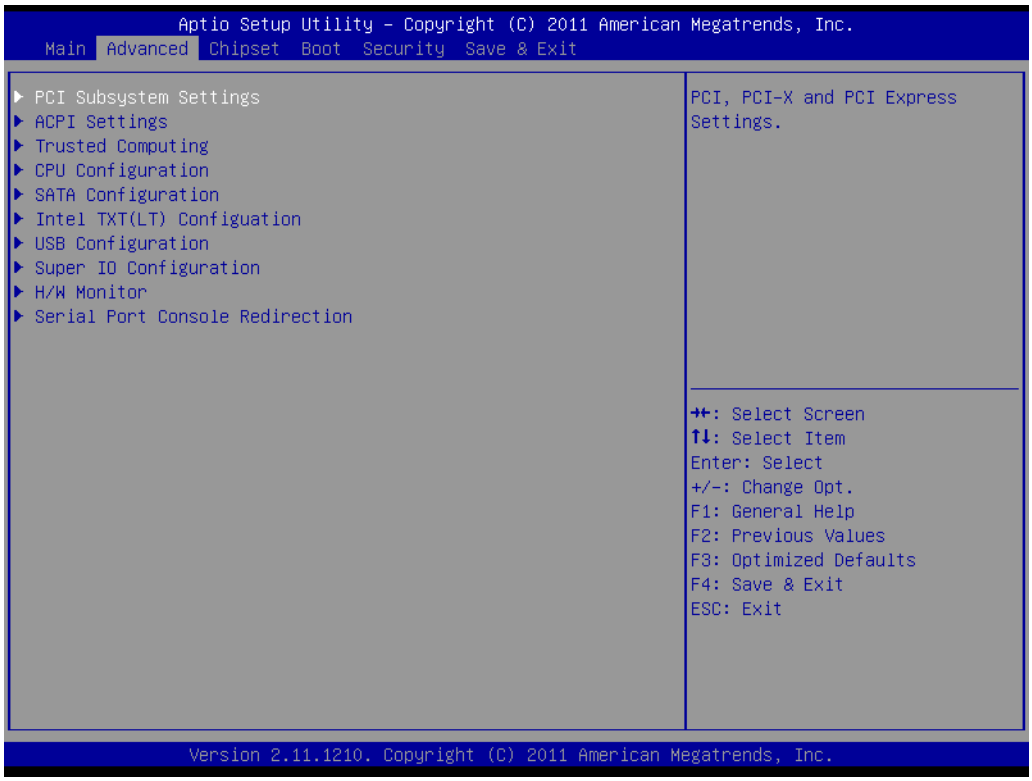


Figure 3.1 Main setup screen

AMI's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in NVRAM area so it retains the Setup information when the power is turned off.

3.2 Entering BIOS Setup

Press <Del> or <F2> at bootup to enter AMI BIOS Setup Utility, the Main Menu will appear on the screen. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.

When users first enter the BIOS Setup Utility, they enter the Main setup screen. Users can always return to the Main setup screen by navigating to the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.

3.2.1 Main Menu

Press <Del> at bootup to enter AMI BIOS CMOS Setup Utility, the Main Menu will appear on the screen. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.

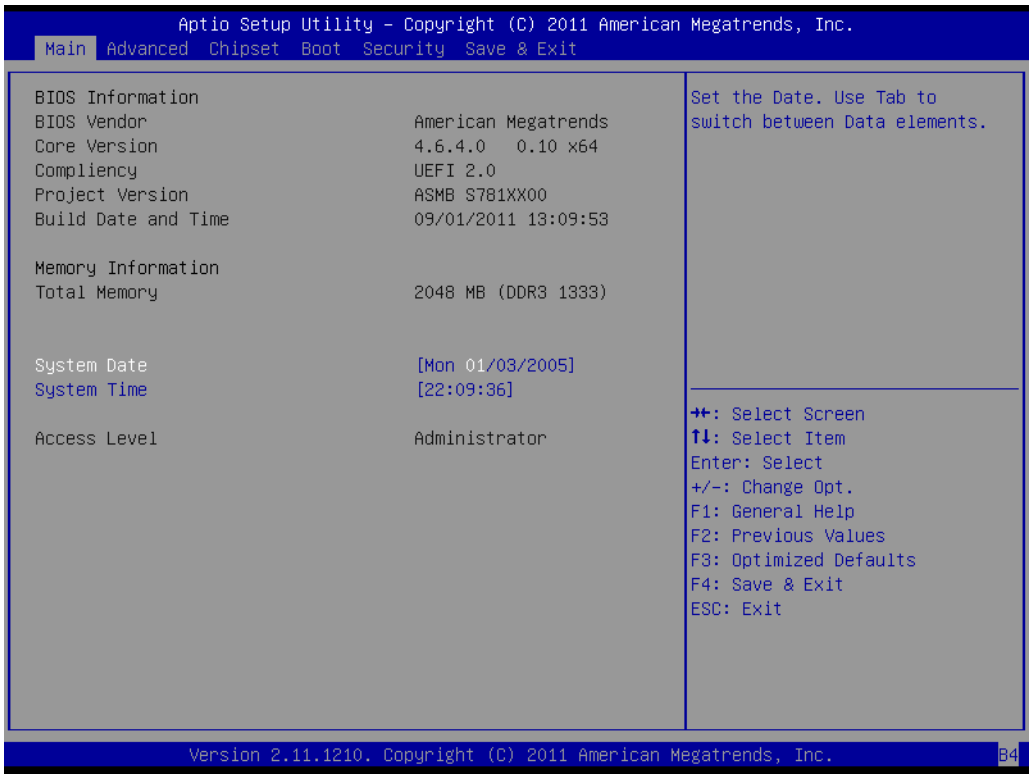


Figure 3.2 Main setup screen

The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can be. The right frame displays the key legend.

Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

3.2.2 System time / System date

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.3 Advanced BIOS Features Setup

Select the Advanced tab from the ASMB-781 setup screen to enter the Advanced BIOS setup screen. You can select any of the items in the left frame of the screen, such as CPU configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens are shown below. The sub menus are described on the following pages.

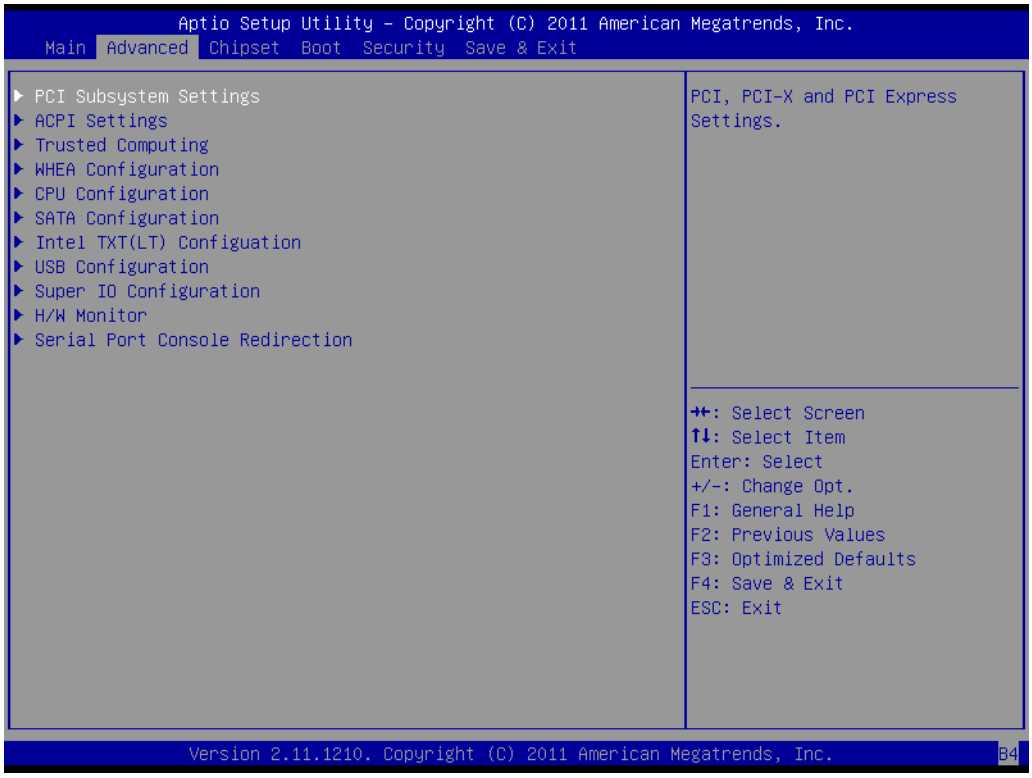


Figure 3.3 Advanced BIOS features setup screen

3.4 PCI Subsystem Settings

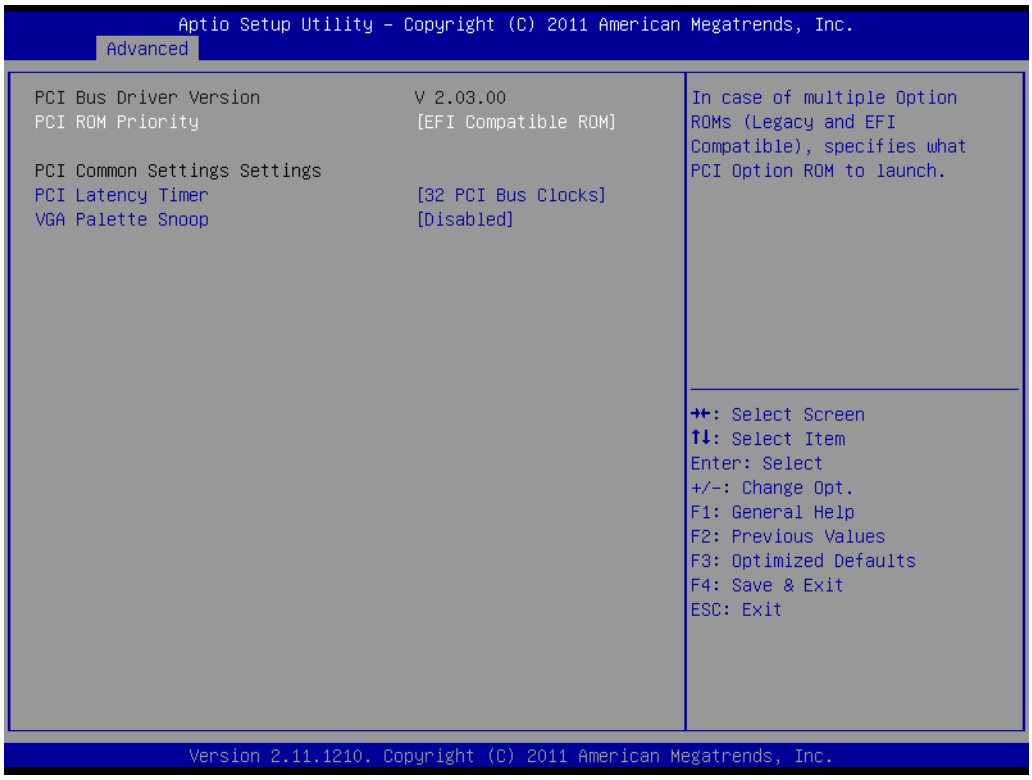


Figure 3.4 PCI subsystem settings screen

PCI ROM Priority

In case of multiple Option ROMs (Legacy and EFI Compatible) specifies what PCI option ROM to launch.

PCI Latency Timer

Value in units of PCI clocks for PCI device latency timer register.

VGA Palette Snoop

This item is designed to solve problems caused by some non-standard VGA cards.

3.4.1 ACPI Settings

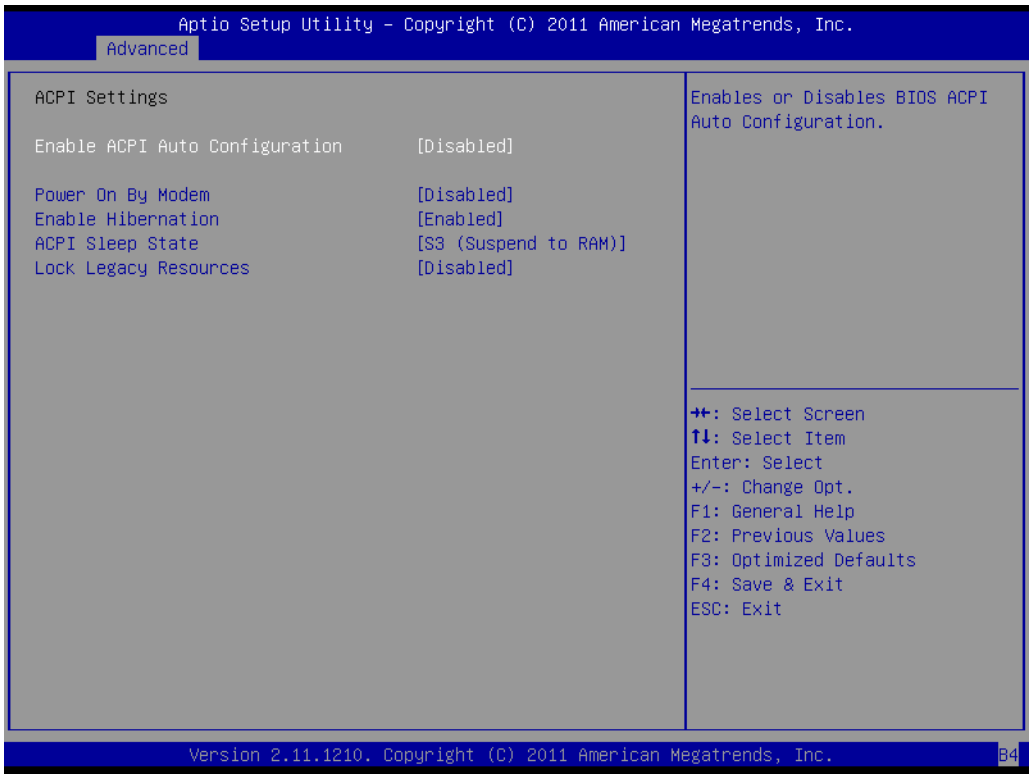


Figure 3.5 ACPI Settings

Enable ACPI Auto Configuration

"Enable" or "disable" ACPI Auto Configuration.

Power On By Modem

Power on by modem can be supported by COM2 only.

Enable Hibernation

"Enable" or "disable" Hibernation.

ACPI Sleep State

Specifies the ACPI sleep state when the system enters suspend.

Lock Legacy Resources

"Enable" or "Disable" Lock Legacy Resources.

3.4.2 Trusted Computing

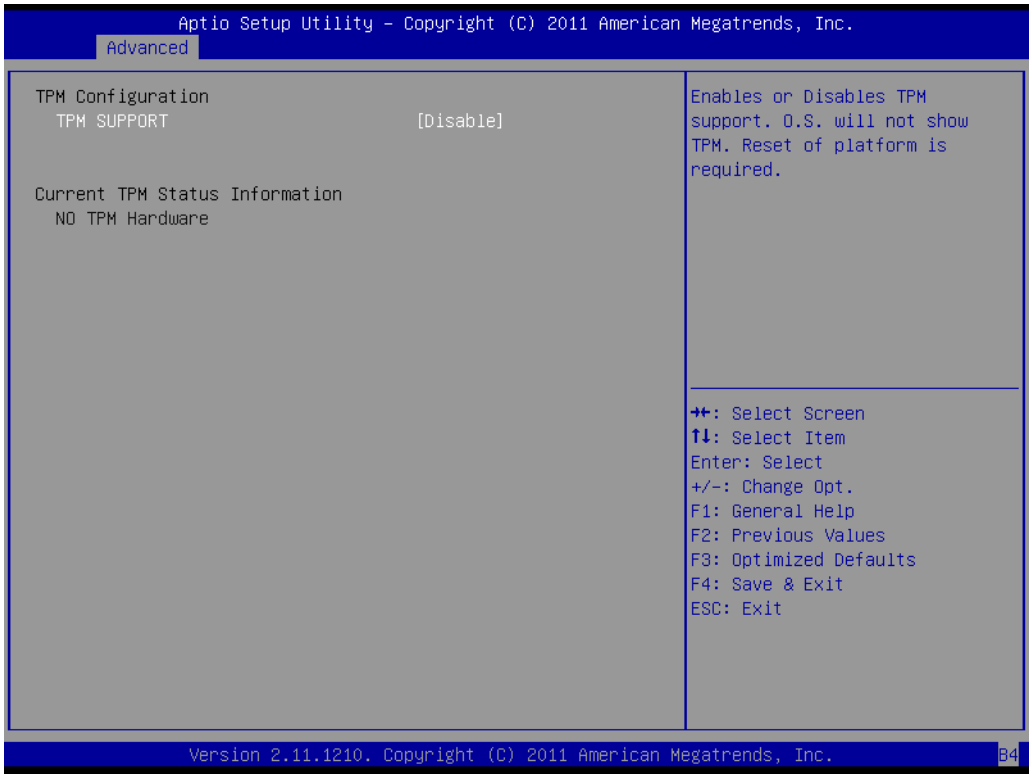


Figure 3.6 TPM Settings

TPM Support

“Enable” or “disable” TPM Support. You can purchase Advantech LPC TPM module to enable TPM function. P/N: PCA-TPM-00A1E

3.4.3 CPU Configuration

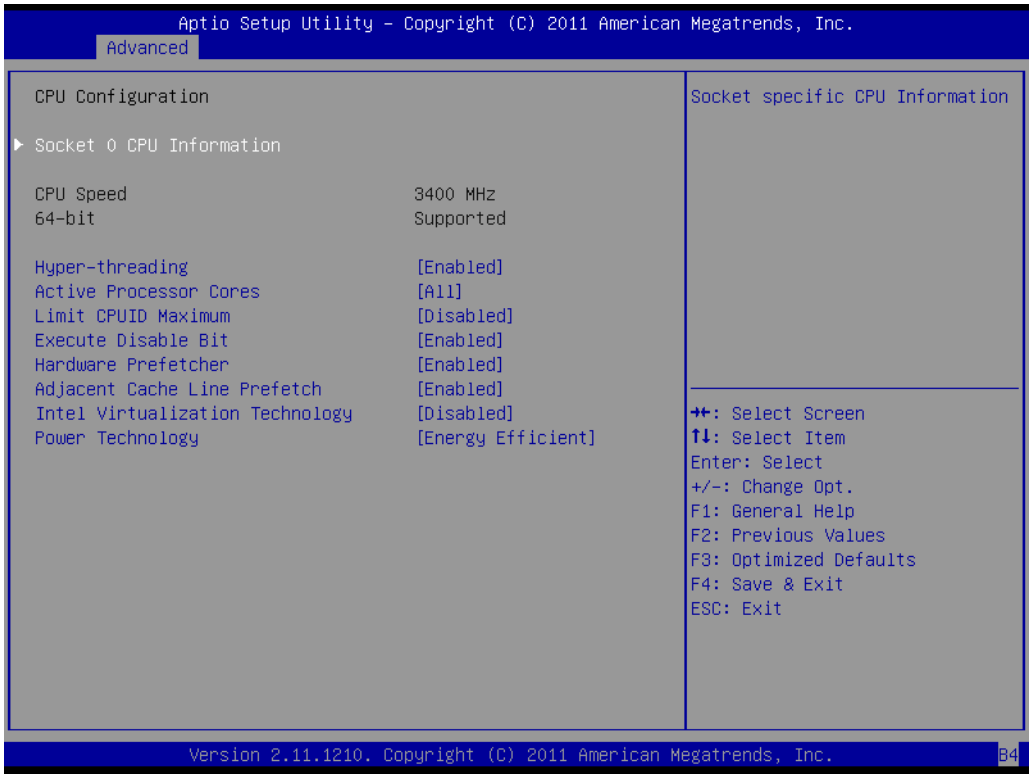


Figure 3.7 CPU Configuration

Hyper-threading

This item allows you to enable or disable Intel Hyper Threading technology.

Active Processor Core

Use this to select how many processor cores you want to activate when you are using a dual or quad core processor.

Limit CPUID Maximum

Setting this item to [Enable] allows legacy operating systems to boot even without support for CPUs with extended CPUID functions.

Execute Disable Bit

This item specifies the Execute Disable Bit Feature. The settings are Enabled and Disabled. The Optimal and Fail-Safe default setting is Enabled. If Disabled is selected, the BIOS forces the XD feature flag to always return to 0.

Hardware Prefetcher

Hardware Prefetcher is a technique that fetches instructions and/or data from memory into the CPU cache memory well before the CPU needs it, so that it can improve the load-to-use latency. You may choose to enable or disable it.

Adjacent Cache Line Prefetch

The Adjacent Cache-Line Prefetch mechanism, like automatic hardware prefetch, operates without programmer intervention. When enabled through the BIOS, two 64-byte cache lines are fetched into a 128-byte sector, regardless of whether the additional cache line has been requested or not. You may choose to enable or disable it.

Intel Virtualization Technology

This feature is used to enable or disable the Intel Virtualization Technology (IVT) extension. It allows multiple operating systems to run simultaneously on the same

system. It does this by creating virtual machines, each running its own x86 operating system.

Power Technology

Default is “Energy Efficient”. User can set “EIST”, "P-STATE”, “C3”,”C6” and “Package C State Limit” under “Custom Mode”.

3.4.4 SATA Configuration

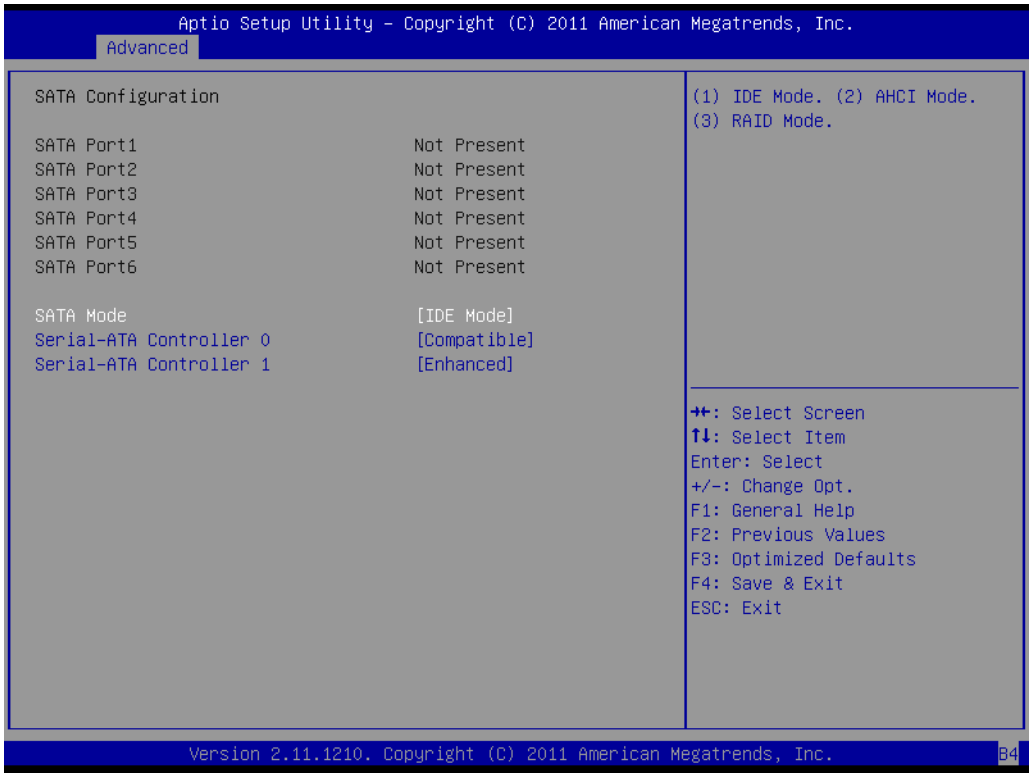


Figure 3.8 SATA Configuration

SATA Mode

This can be configured as IDE, RAID, AHCI, or Disabled.

Serial-ATA Controller 0

This item appears only when you set the SATA Mode item to [IDE Mode]. Set to [Enhanced] to support two SATA 6.0 Gb/s and two SATA 3.0 Gb/s devices. Set to [Compatible] when using Windows 98/NT/2000/MS-DOS. Up to four SATA devices are supported under these operating systems.

Serial-ATA Controller 1

This item appears only when you set the SATA Mode item to [IDE Mode]. Set to [Enhanced] to support two SATA 3.0 Gb/s devices.

3.4.5 Intel TXT(LT) Configuration

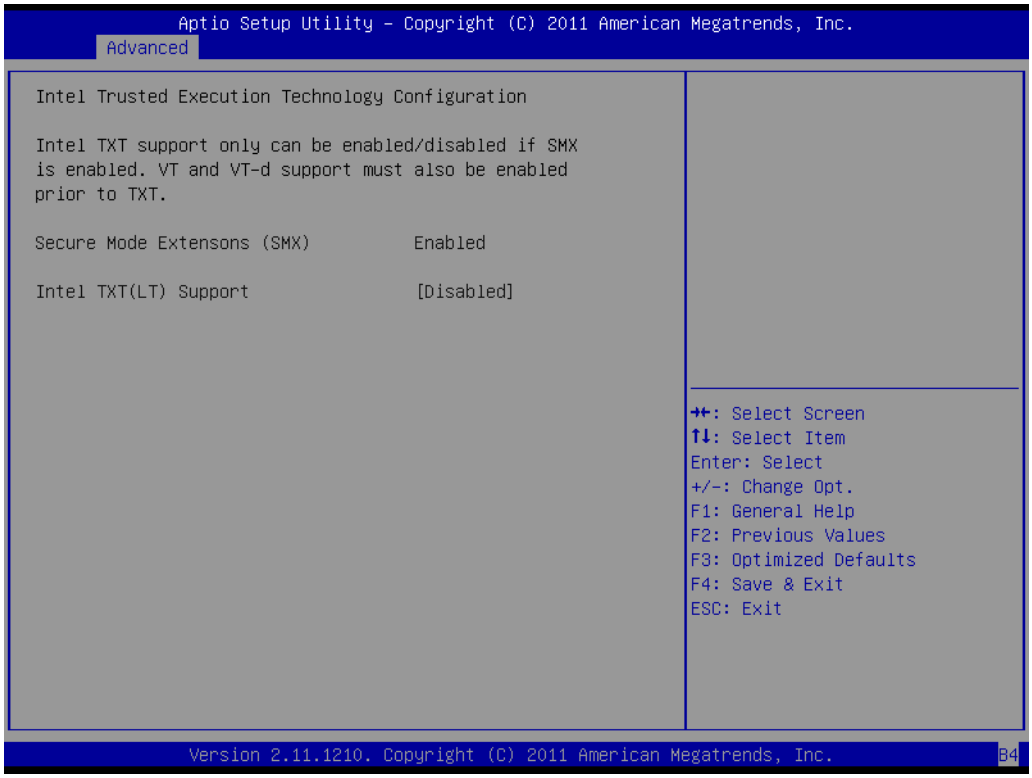


Figure 3.9 Intel Trusted Execution Technology Configuration

Intel Trusted Execution Technology Configuration

To enable or disable Intel Trusted Execution Technology if SMX is enable, and VT-D support must also be enabled prior to TXT.

3.4.6 USB Configuration

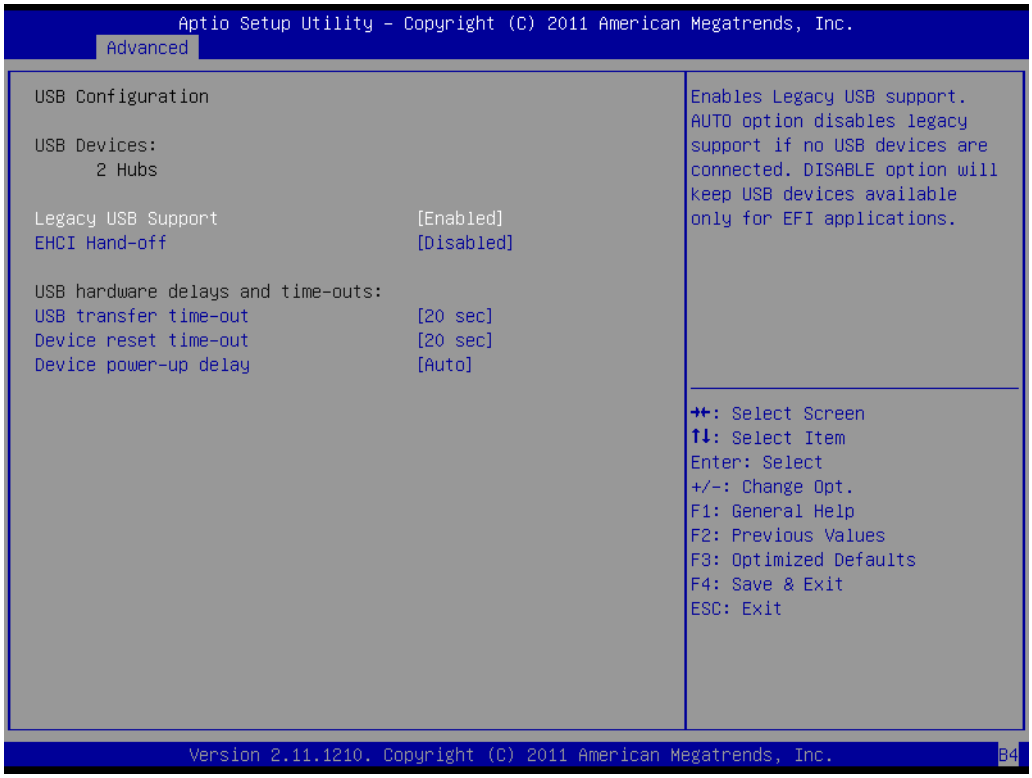


Figure 3.10 USB Configuration

Legacy USB Support

This is for supporting USB device under a legacy OS such as DOS. When choosing "AUTO", the system will automatically detect if any USB device is plugged into the computer and enable USB legacy mode when a USB device is plugged and disable USB legacy mode when no USB device is plugged.

EHCI Hand-off

This enables or disables supporting an OS without EHCI hand-off feature.

USB transfer time-out

Allows you to select the USB transfer time-out value. [1,5,10,20sec]

Device reset time-out

Allows you to select the USB device reset time-out value. [10,20,30,40 sec]

Device power-up delay

This item appears only when you set the Device power-up delay item to [manual].

Mass Storage Devices

This item only shows when plugging a USB flash device. User can choose “Auto”, “Floppy”, “Forced FDD”, “Hard Disk” and “CD-ROM” to simulate USB flash device.

3.4.7 NCT6776 Super IO Configuration

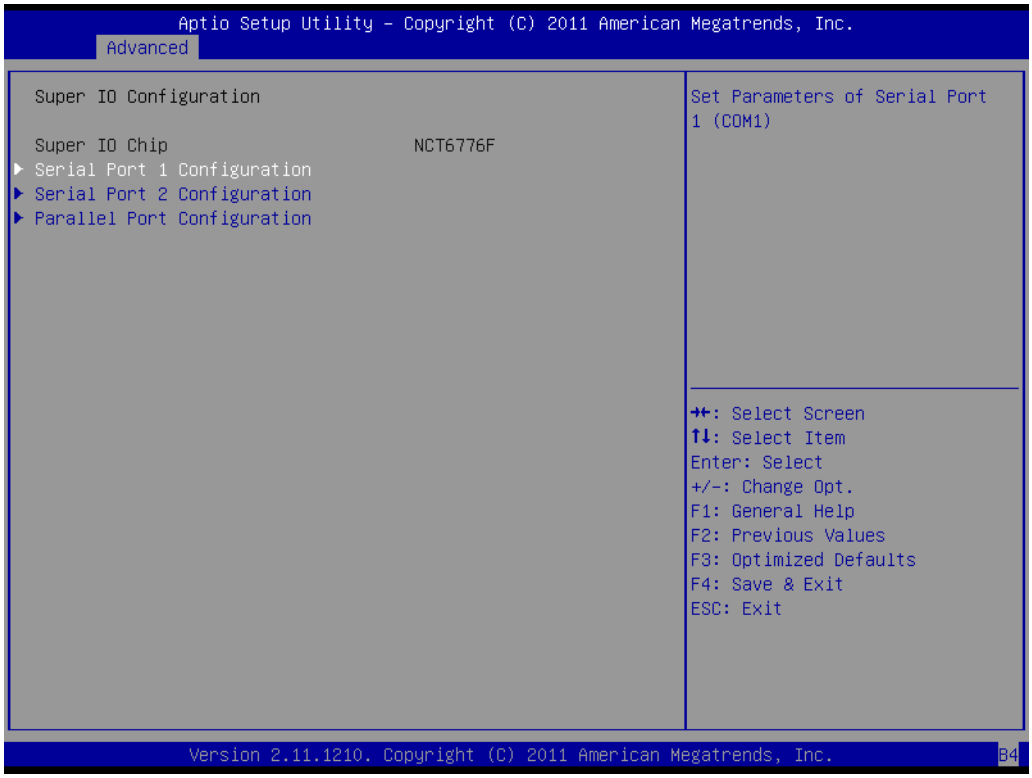


Figure 3.11 Super IO Configuration

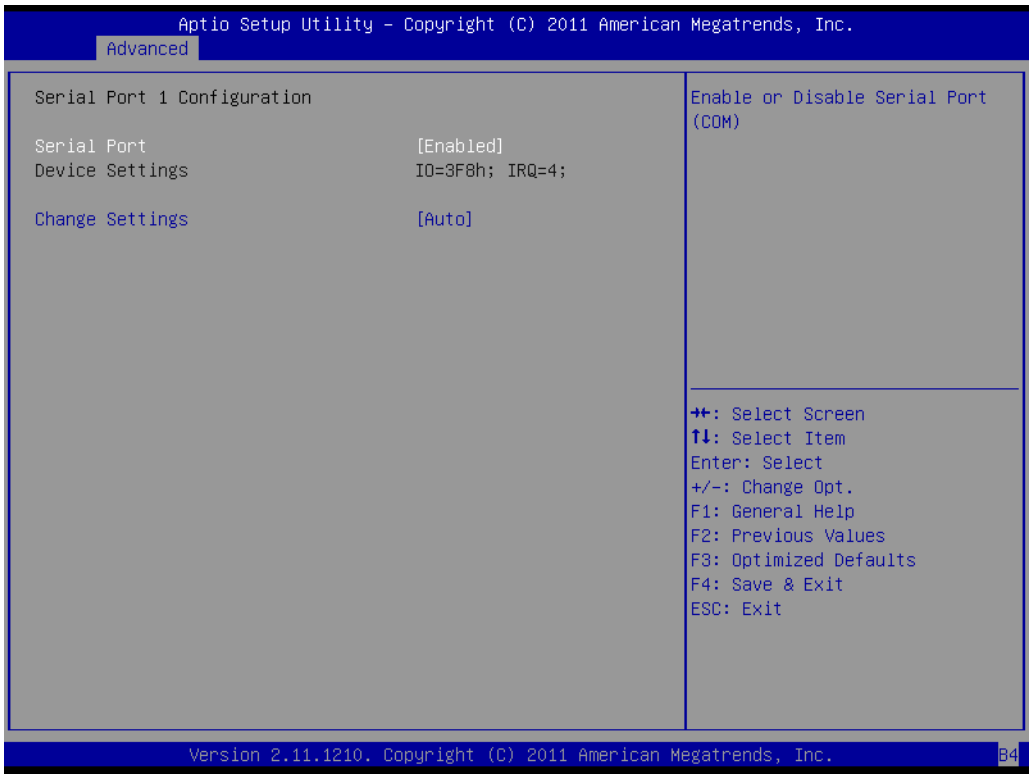


Figure 3.12 Serial Port 1 Configuration

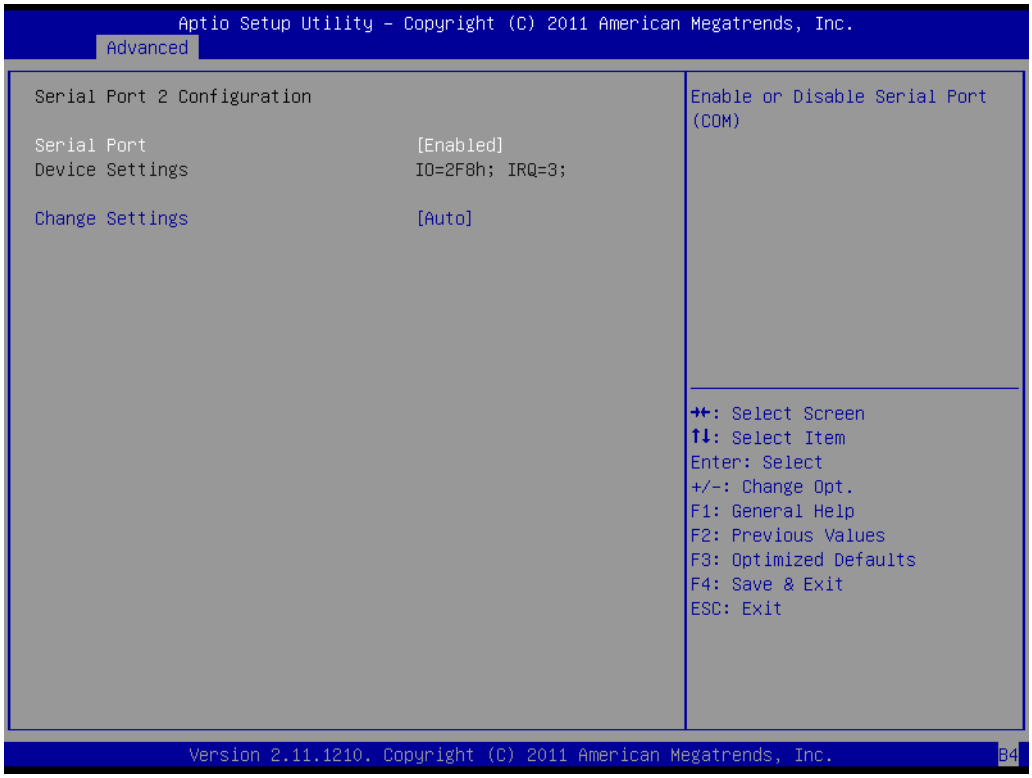


Figure 3.13 Serial Port 2 Configuration

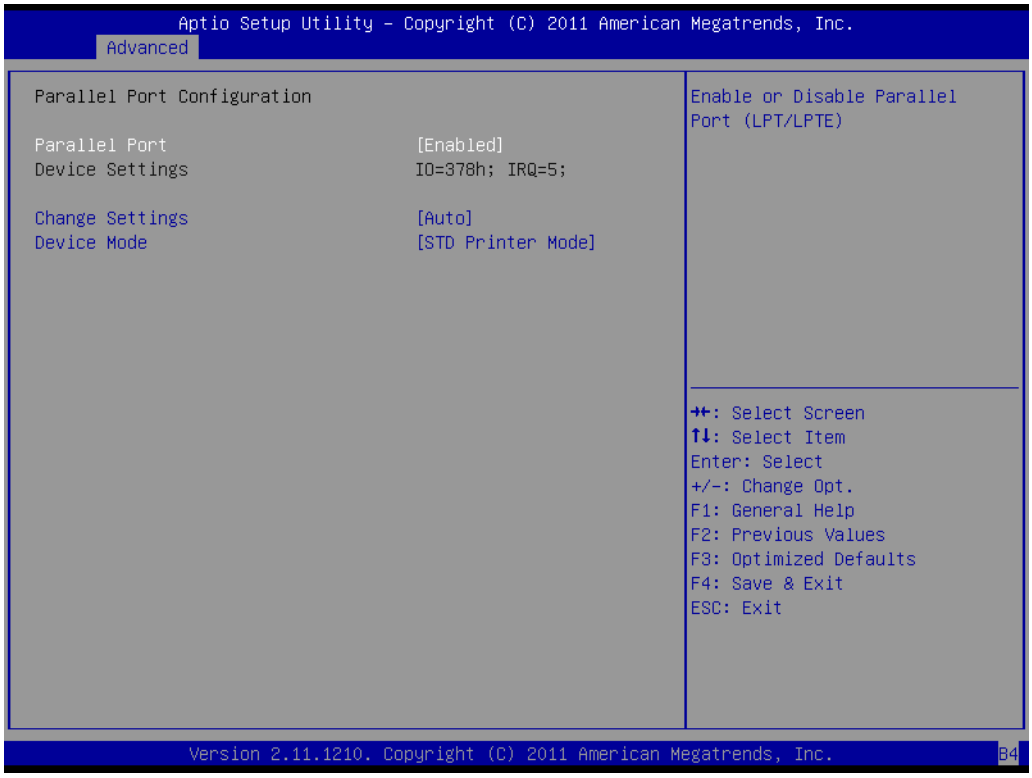


Figure 3.14 Parallel Configuration

Serial Port 1 Configuration

Serial Port

“Enable” or “disable” Serial Port 1.

Change Settings

Select optimal settings for serial port 1.

Serial Port 2 Configuration

Serial Port

“Enable” or “disable” Serial Port 2.

Change Settings

Select optimal settings for serial port 2.

Device Mode

Serial port 2 could be selected as "Standard serial port mode", "IrDA 1.0 (HP SIR) mode", or "ASKIR mode".

Parallel Port

“Enable” or “disable” Parallel Port.

Change Settings

Select optimal settings for parallel port.

3.4.8 H/W Monitor

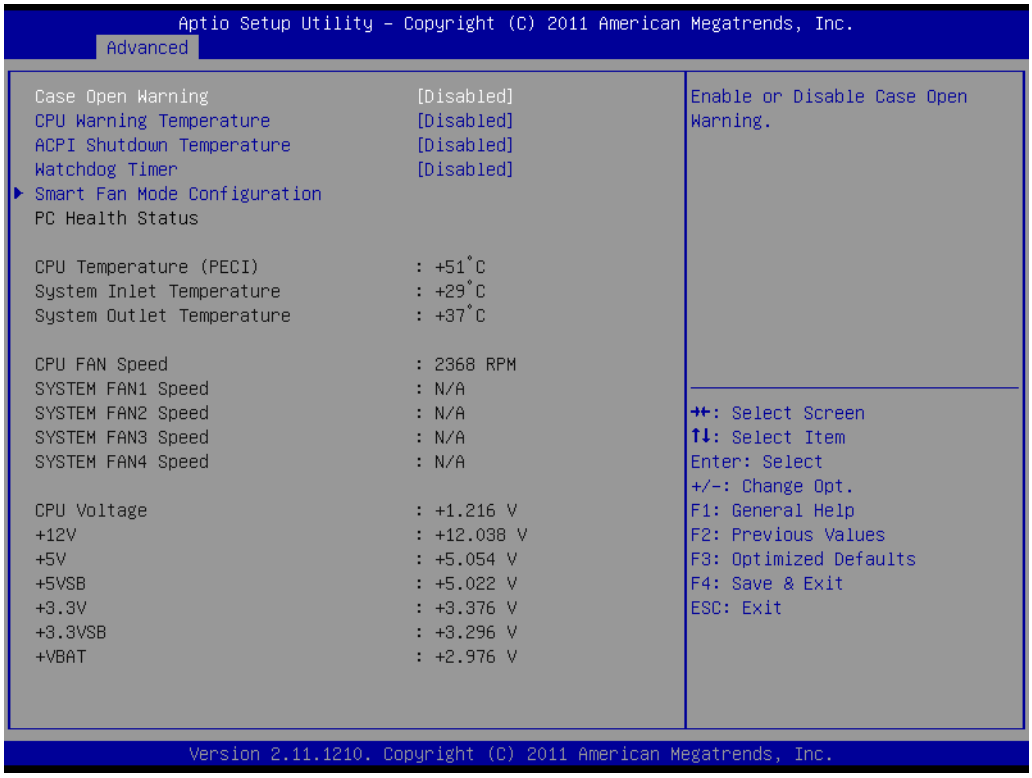


Figure 3.15 PC Health Status

CPU temperature (PECI)

CPU Temperature showed here is CPU T-junction temperature via PECI.

Case Open Warning

Enable/Disable the Chassis Intrusion monitoring function. When enabled and the case is opened, the warning message will show in post screen.

CPU Warning Temperature

Use this to set the CPU warning temperature threshold. When the system reaches the warning temperature, the speaker will beep.

ACPI Shutdown Temperature

Use this to set the ACPI shutdown temperature threshold. When the system reaches the shutdown temperature, it will be automatically shut down by ACPI OS to protect the system from overheat damage.

Watchdog Timer

Enable and Disable the watchdog timer function

Smart Fan Mode Configuration

“Enable” or “Disable” CPU FAN and System FAN Mode to SMART FAN setting

3.4.9 Serial Port Console Redirection

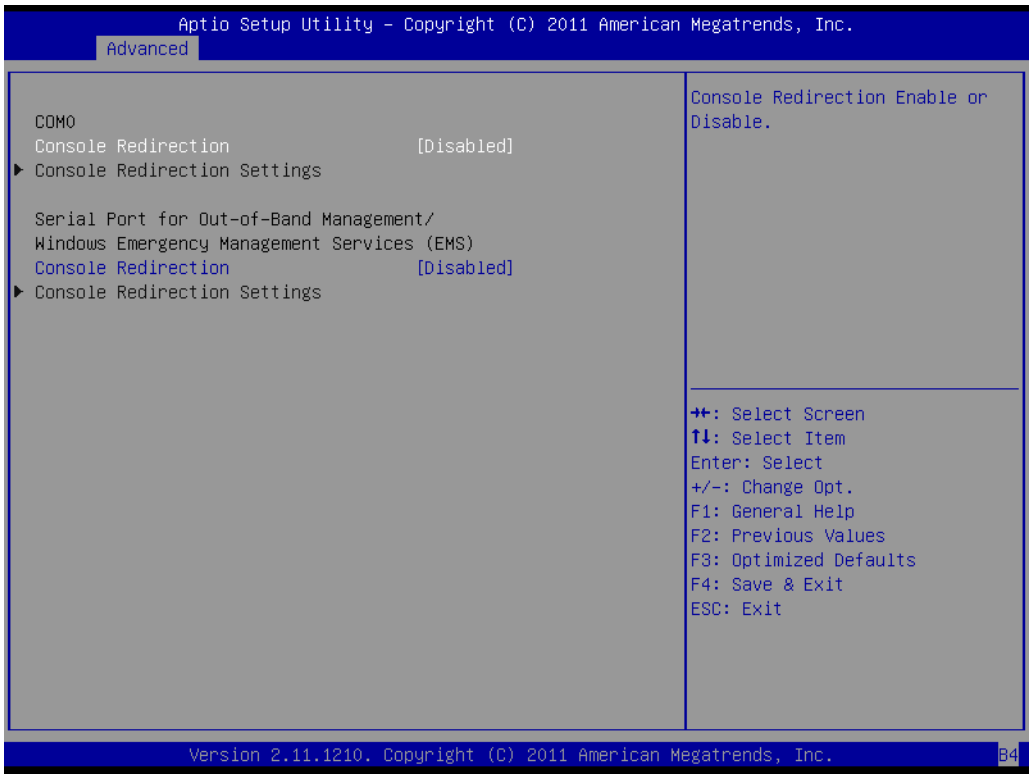
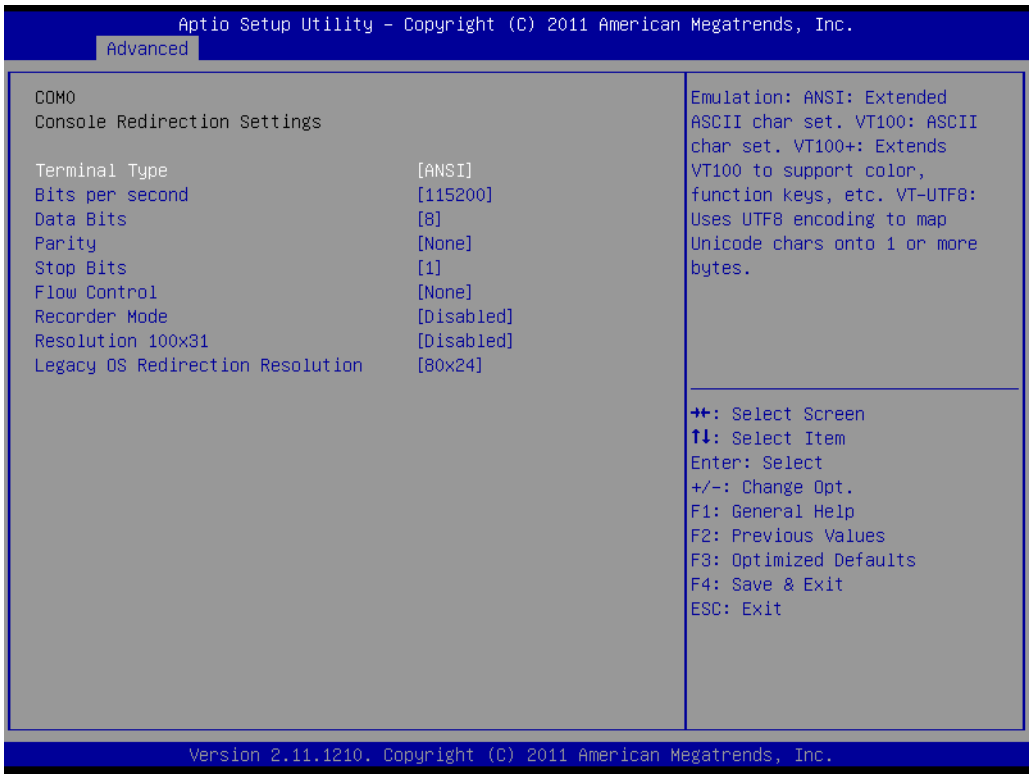


Figure 3.16 Serial Port Console Redirection

Console Redirection

To “Enable or disable" console redirectoin feature



Terminal Type

Select a terminal type to be used for console redirection.

Options available: VT100/VT100+/ANSI /VT-UTF8.

Bits per second

Select the baud rate for console redirection.

Options available: 9600/19200/57600/115200.

Parity

A parity bit can be sent with the data bits to detect some transmission errors.

Even: parity bi is 0 if the num of 1's in the data bits is even.

Odd: parity bit is0if num of 1's the data bits is odd.

Mark: parity bit is always 1. Space: Parity bit is always 0.

Mark and Space Parity do not allow for error detection.

Options available: None/Even/Odd/Mark/Space.

Stop Bits

Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.

Options available: 1/2.

Flow Control

Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.

Options available: None/Hardware RTS/CTS.

Recorder Mode

When this mode enabled, only text will be send. This is to capture Terminal data.

Options available: Enabled/Disabled.

Resolution 100x31

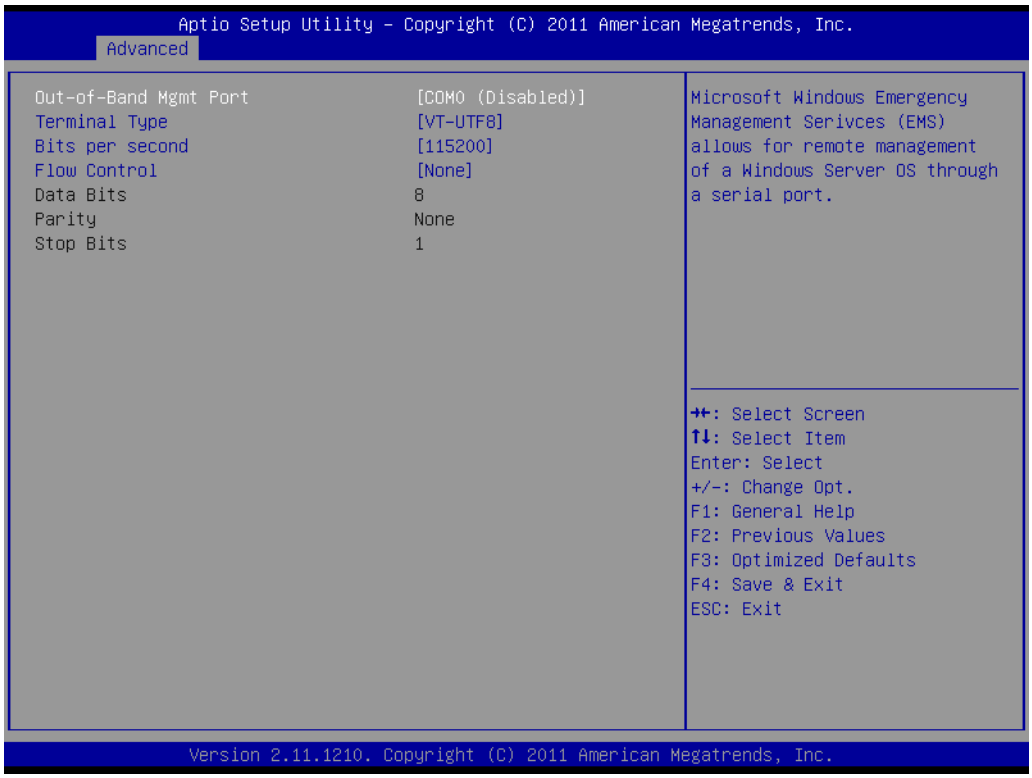
Enables or disables extended terminal resolution.

Options available: Enabled/Disabled.

Legacy OS Redirection Resolution

On Legacy OS, the number of Rows and Columns supported redirection.

Options available: 80x24/80X25.



Console Redirection Setting

Out-of-Band Mgmt Port

To select the com port user would like to set for having console redirection feature.

Terminal Type

It could be set as "VT100", "VT100+", "VT-UTF8", or "ANSI", and "VT-UTF8" is the default setting.

Bits per second

To select serial port transmission, and the speed must be matched on the other side. It could be set as "9600", "19200", "57600", or "115200", and "115200" is the default setting.

Flow Control

Flow control can prevent data loss from buffer overflow, and it could set as "None", "Hardware RTS/CTS", or "Software Xon/Xoff", and "None" is the default setting.

3.5 Chipset

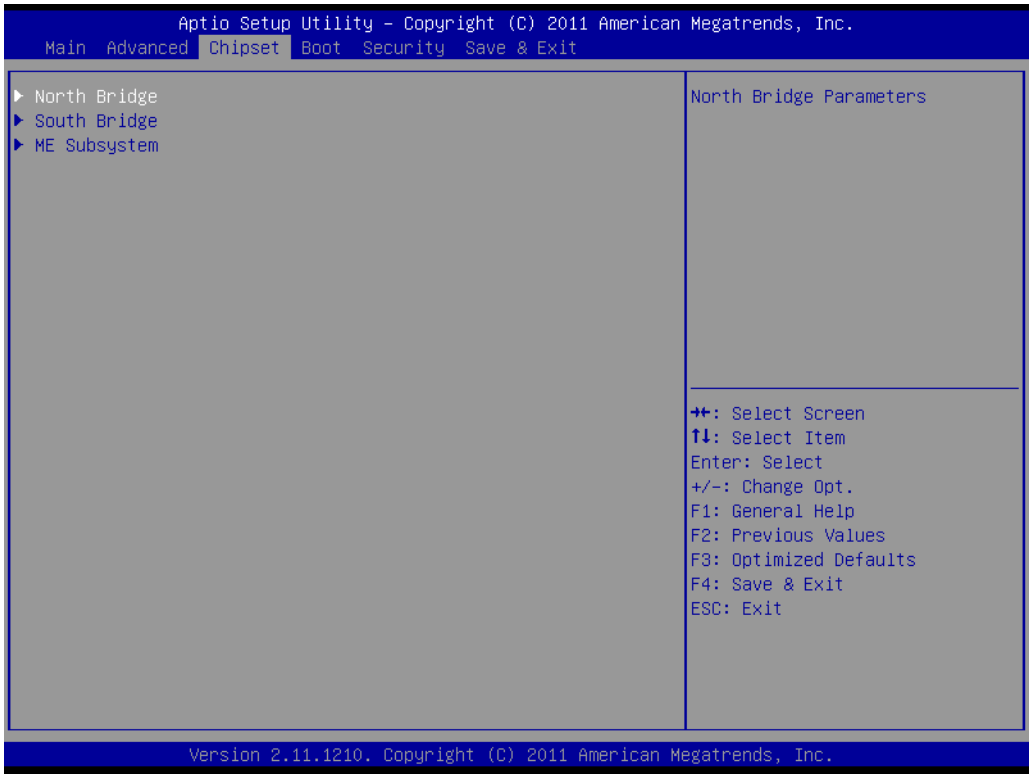


Figure 3.17 Chipset

3.5.1 North Bridge

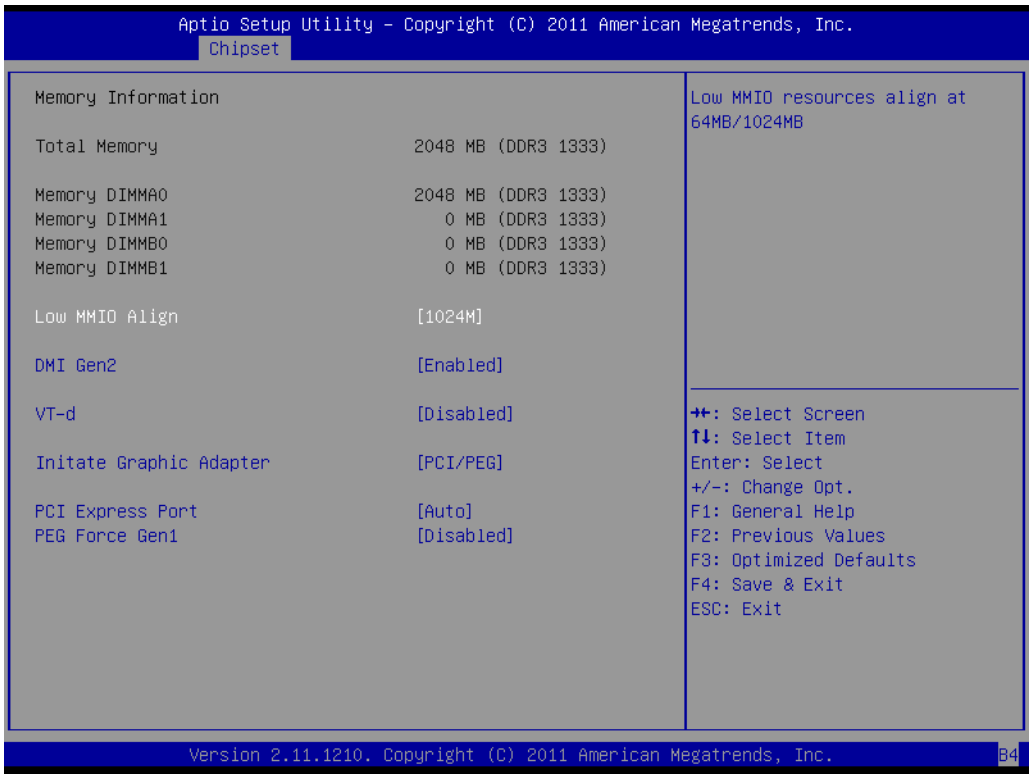


Figure 3.18 North Bridge

Low MMIO Align

Low MMIO resources align at 64MB/1024MB.

DMI Gen2

Enable or disable DMI Gen2

VT-d

To support Intel chipset virtualization technology for directed I/O.

Initiate Graphic Adapter

This setting allows user to select which graphics controller to be the primary graphic device when booting up.

PEG Force Gen1

Allows user to force PEG port downgrade to Gen1.

3.5.2 South Bridge

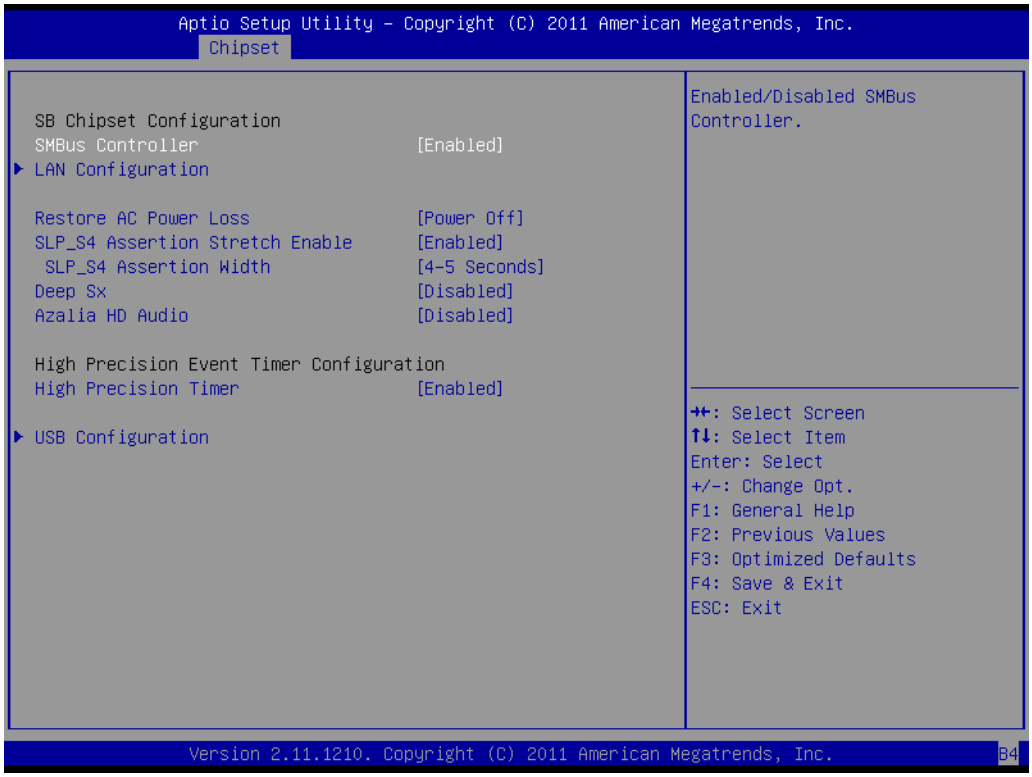


Figure 3.19 South Bridge

SMBus Controller

Disable/enable the system SMBUS function

Restore AC Power Loss

The system goes into on/off state after an AC power loss.

SLP_S4 Assertion Stretch Enable

This item allows you to set a delay of a set number of seconds.

Deep Sx

“Enable” or “Disable” Deep S5 feature. When deep S5 is enable, most power including 5VSB will be off during deep S5 for energy saving.

Azalia HD Audio

Enables or disables the HD Audio controller.

High Precision Timer

Enables or disables High Precision Event Timer (HPET)

Note! *When a system enters G3 status with deep S5 enabled, some power supply's 5VSB won't drop until after more than 30 seconds. If "Restore AC Power Loss" is set to "power on", the system won't boot up in 30 seconds after power failure. We recommend the user wait for more than 30 seconds to power on after a power failure. On the other hand, system will auto power on if power is restored within 30 seconds, before 5VSB actually drops, even if "Restore AC Power Loss" is set to "power off".*

3.6 LAN Configuration

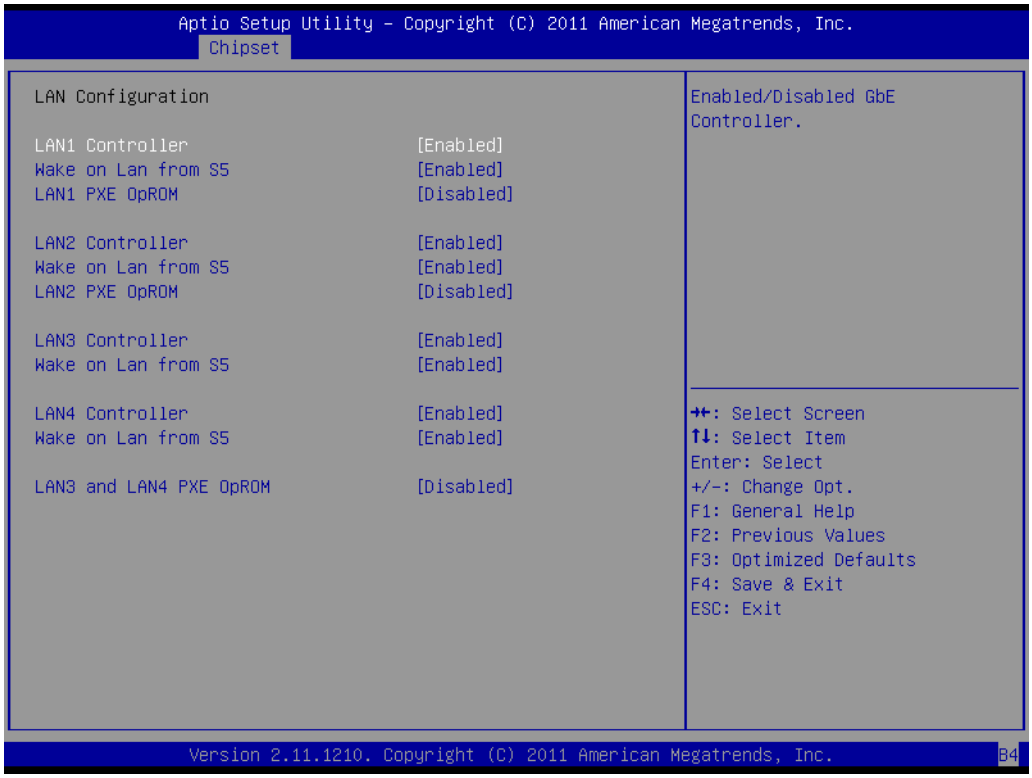


Figure 3.20 LAN configuration screen

LAN1~4 Controller

Enables or disables the GbE controller.

Wake on LAN1~4 from S5

Enables or disables GbE LAN wake up from S5 function.

LAN1~4 PXE Option-ROM

Enables or disables GbE LAN boot.

3.6.1 USB Configuration

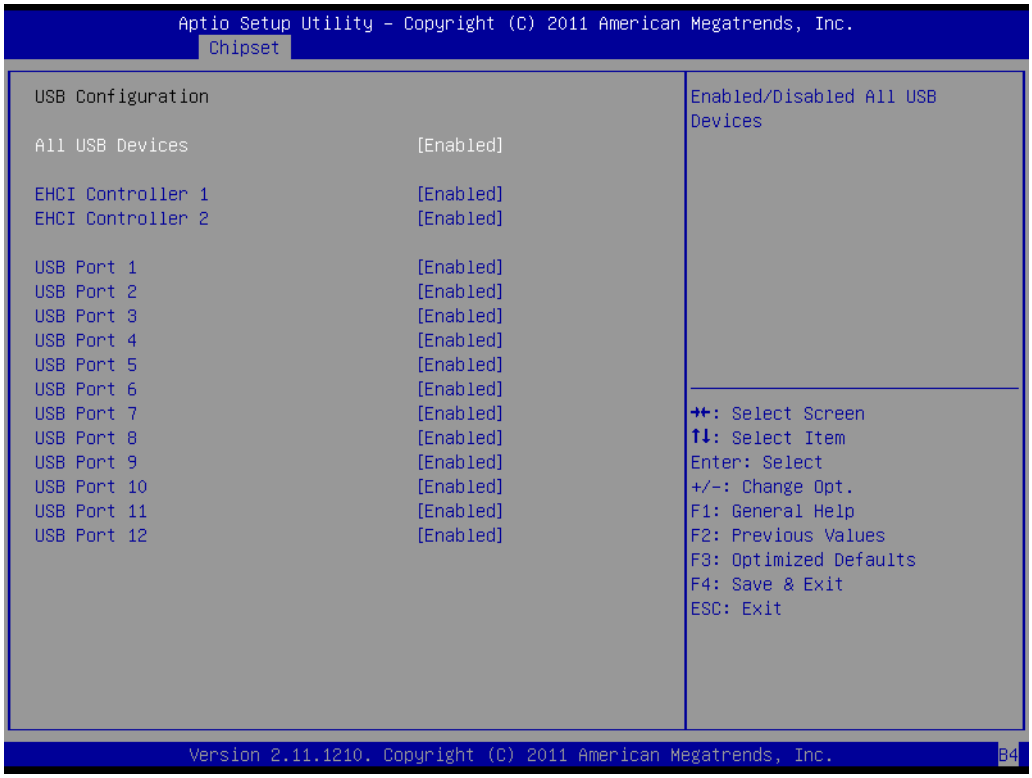


Figure 3.21 USB Configuration

All USB Devices

“Enable” or “Disable” All USB Devices.

EHCI Controller 1 & 2

“Enable” or “Disable” EHCI Controller 1 or 2.

USB Port 1~12

“Enable” or “Disable” USB Port 1~12.

3.7 Boot

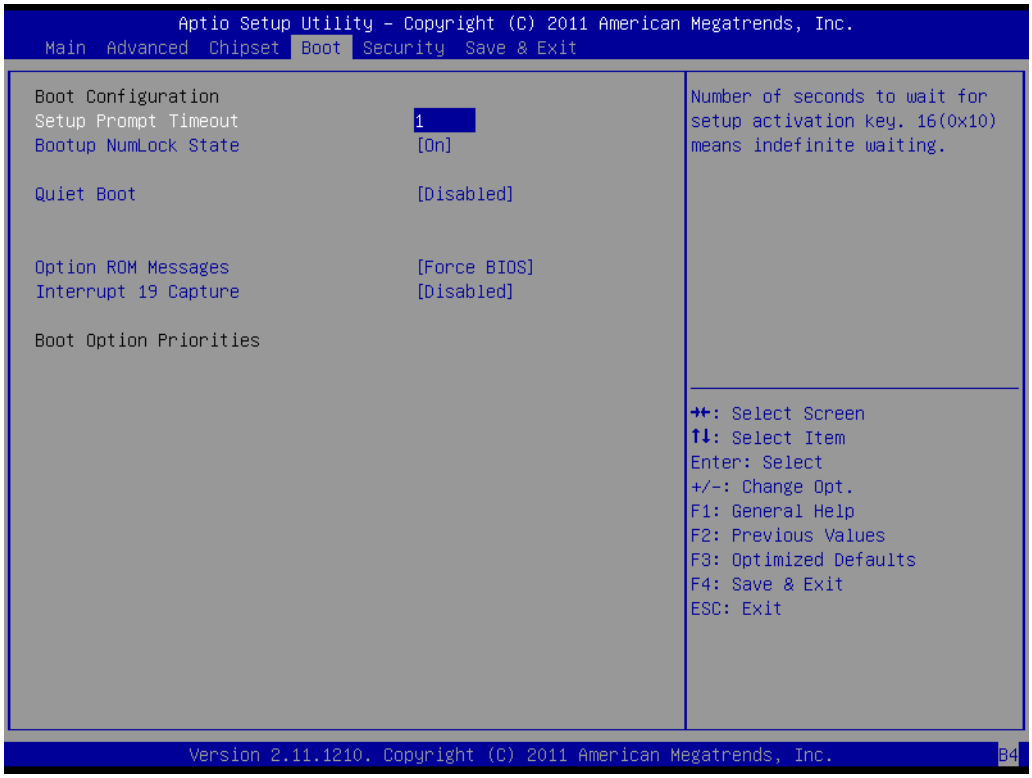


Figure 3.22 Boot

Setup Prompt Timeout

Use the <+> and <-> keys to adjust the number of seconds to wait for setup activation key.

Bootup NumLock State

“On” or “Off” power-on state for the NumLock

Quiet Boot

If this option is set to Disabled, the BIOS displays normal POST messages. If Enabled, an OEM Logo is shown instead of POST messages.

Option ROM Messages

“Force BIOS or Keep Current” to set the display mode for Option ROM

Interrupt 19 Capture

“Enable” or “Disable” Option ROM to trap Interrupt 19

Boot Option Priorities

Choose boot priority from boot device.

3.8 Security

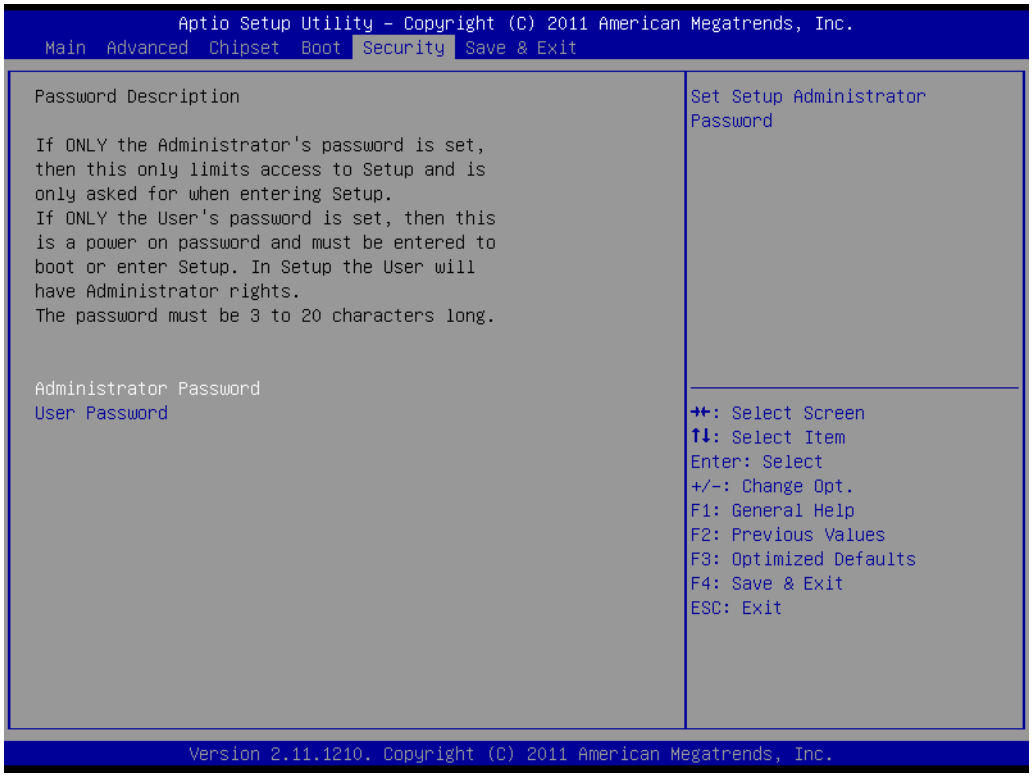


Figure 3.23 Security

Select Security Setup from the ASMB-781 Setup main BIOS setup menu. All Security Setup options, such as password protection, are described in this section. To access the sub menu for the following items, select the item and press <Enter>.

3.9 Save & Exit

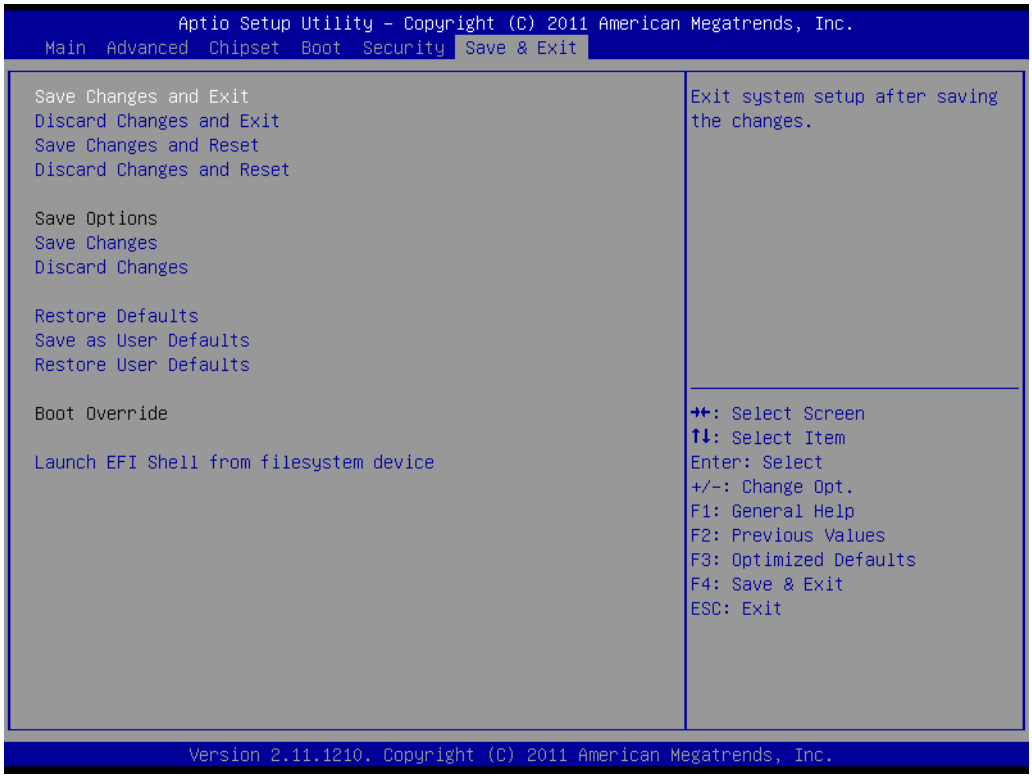


Figure 3.24 Save & Exit

Save changes and exit

When you have completed system configuration, select this option to save your changes, exit BIOS setup and reboot the computer so the new system configuration parameters can take effect.

1. Select Exit Saving Changes from the Exit menu and press <Enter>. The following message appears:

   Save Configuration Changes and Exit Now?

   [Yes] [No]

2. Select Yes or No.

Discard changes and exit

Select this option to quit Setup without making any permanent changes to the system configuration.

1. Select Exit Discarding Changes from the Exit menu and press <Enter>. The following message appears:

   Quit without saving?

   [Yes] [No]

2. Select Yes to discard changes and exit.

Discard Changes

Select Discard Changes from the Exit menu and press <Enter>.

Chapter 4

Chipset Software Installation Utility

4.1 Before you begin

To facilitate the installation of the enhanced display drivers and utility software, read the instructions in this chapter carefully. The drivers for the ASMB-781 are located on the software installation CD.

Note! *The files on the software installation CD are compressed. Do not attempt to install the drivers by copying the files manually. You must use the supplied SETUP program to install the drivers.*

Before you begin, it is important to note that most display drivers need to have the relevant software application already installed in the system prior to installing the enhanced display drivers. In addition, many of the installation procedures assume that you are familiar with both the relevant software applications and operating system commands. Review the relevant operating system commands and the pertinent sections of your application software's user manual before performing the installation.

4.2 Introduction

The Intel® Chipset Software Installation (CSI) utility installs the Windows INF files that outline to the operating system how the chipset components will be configured. This is needed for the proper functioning of the following features:

- Core PCI PnP services
- Serial ATA interface support
- USB 1.1/2.0 support (USB 2.0 driver needs to be installed separately for Windows 98)
- Identification of Intel chipset components in the Device Manager

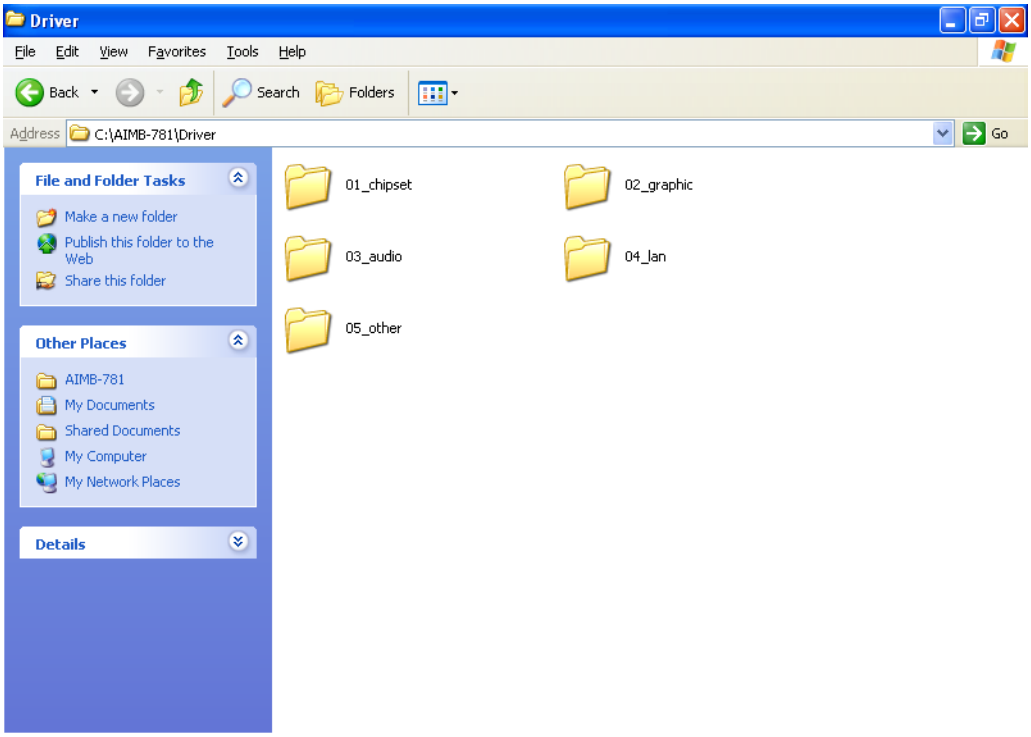
Note! *The chipset driver is used for the following versions of Windows, and it has to be installed before installing all the other drivers:*

- *Windows® server 2003 R2 (32-bit)*
- *Windows® server 2003 R2 (64-bit)*
- *Windows® server 2008 R2 (64-bit)*
- *Windows® 7 SP1 (32-bit)*
- *Windows® 7 SP1 (64-bit)*
- *Windows® XP Professional SP3 (32-bit)*
- *Windows® XP Professional SP3 (64-bit)*

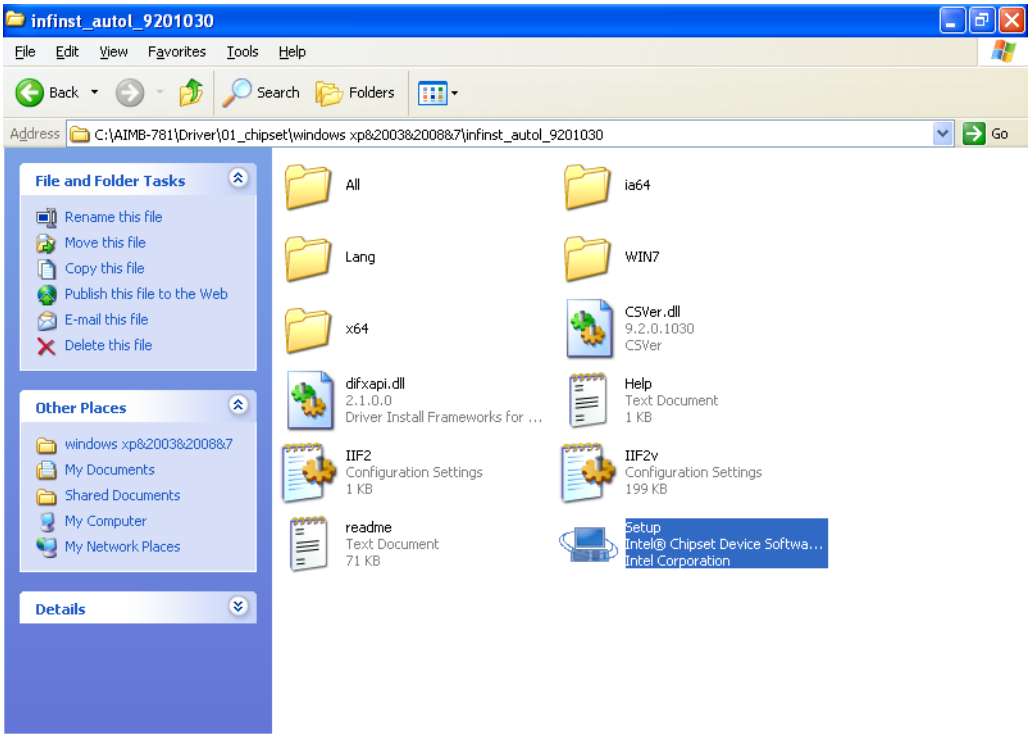
Note! *Windows® 7 has a VGA limitation and cannot support some 3D type desktop themes; select traditional desktop themes instead.*

4.3 Windows XP / Windows 7 Driver Setup

1. Insert the driver CD into your system's CD-ROM drive. You can see the driver folders items. Move the mouse cursor over the folder "01-Chipset". In CSI folder, you can click find an executable file to complete implementation of the driver.



2. Click setup to execute program.



Chapter 5

VGA Setup

5.1 Introduction

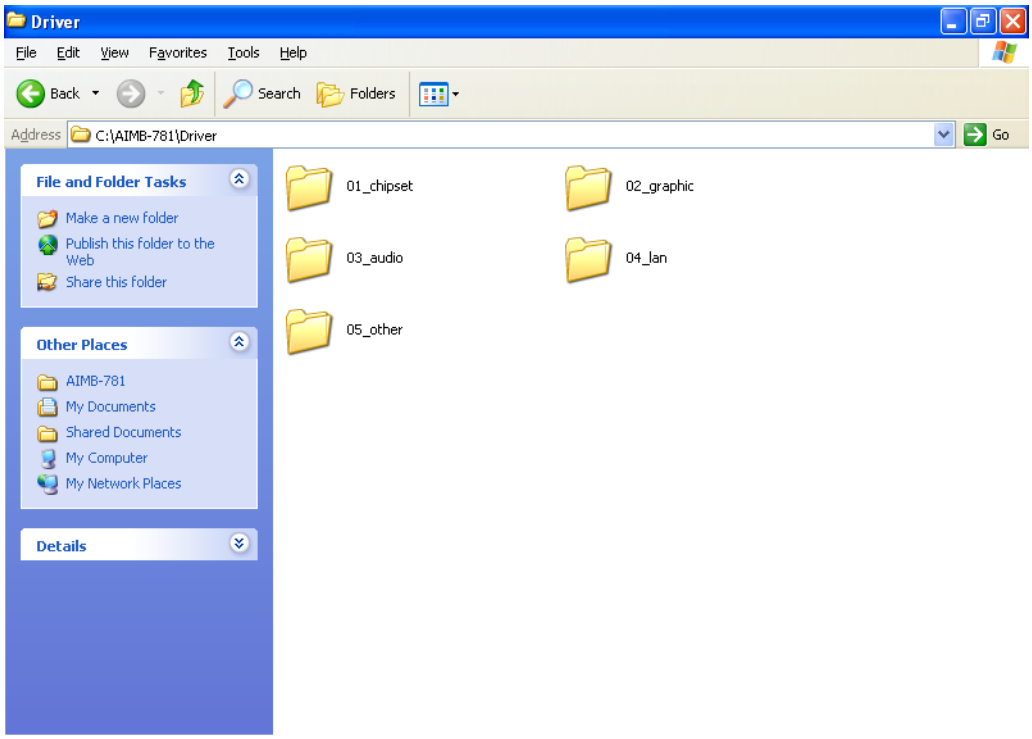
The 2nd Gen Intel® Core™i processors are embedded with integrated graphics controller. You need to install the VGA driver to enable this function, which includes the following features:

- Optimized integrated graphic solution: With Intel® Graphics Flexible Display Interface, it supports versatile display options and 32-bit 3D graphics engine. Dual independent display, enhanced display modes for widescreen flat panels for extend, twin, and clone dual display mode, and optimized 3D support deliver an intensive and realistic visual experience.

5.2 Windows XP/Windows 7 Driver Setup

Note! *Before installing this driver, make sure the INF driver has been installed in your system. See Chapter 4 for information on installing the INF driver.*

Insert the driver CD into your system's CD-ROM drive. You can see the driver folders items. Navigate to the "02-Graphic" folder and click the executable file to complete the installation of the drivers for Windows® 7, XP.



Note! *Please use Windows 2008 server R2(WinS08R2) VGA driver version for Windows 7 VGA driver.*

Chapter 6

LAN Configuration

6.1 Introduction

The ASMB-781 has four Gigabit Ethernet LANs via dedicated PCI Express x1 lanes (GbE LAN1: Intel 82579LM; GbE LAN2: Intel 82574L; GbE LAN3/4: Intel 82580DB (Optional)) that offer bandwidth of up to 500 MB/sec, eliminating the bottleneck of network data flow and incorporating Gigabit Ethernet at 1000 Mbps.

6.2 Features

- 10/100/1000 Mbps Ethernet controller
- 10/100/1000 Mbps triple-speed MAC
- Full duplex at 10, 100, or 1000 Mbps and half duplex at 10 or 100 Mbps
- Wake-on-LAN (WOL) support
- PCIe x1 host interface

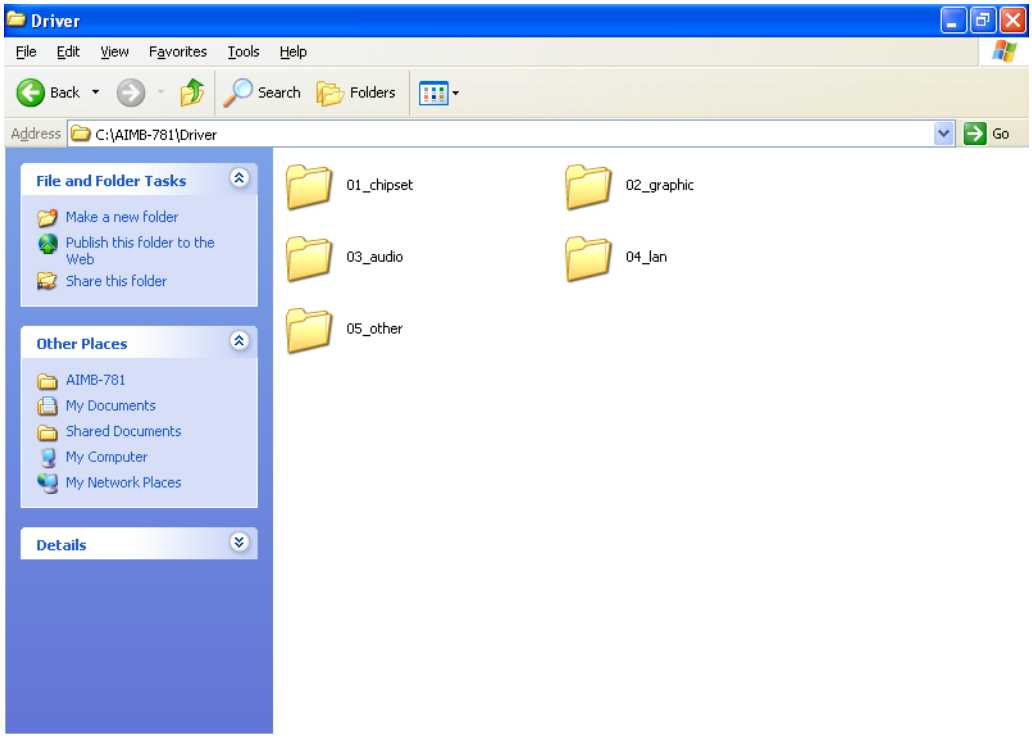
6.3 Installation

Note! *Before installing the LAN drivers, make sure the CSI utility has been installed on your system. See Chapter 4 for information on installing the CSI utility.*

The integrated Intel® gigabit Ethernet controller supports all major network operating systems. However, the installation procedure varies with different operating systems. In the following sections, refer to the one that provides the driver setup procedure for the operating system you are using.

6.4 Win XP /Win 7 Driver Setup (LAN)

Insert the driver CD into your system's CD-ROM drive. Select folder "04-LAN" then click the proper Lan driver for the OS.



Appendix A

Programming the Watchdog Timer

The ASMB-781's watchdog timer can be used to monitor system software operation and take corrective action if the software fails to function within the programmed period. This section describes the operation of the watchdog timer and how to program it.

A.1 Watchdog timer overview

The watchdog timer is built in to the super I/O controller NCT6776F. It provides the following functions for user programming:

- Can be enabled and disabled by user's program
- Timer can be set from 1 to 255 seconds or 1 to 255 minutes
- Generates an interrupt or resets signal if the software fails to reset the timer before time-out

A.2 Programming the Watchdog Timer

The I/O port address of the watchdog timer is 2E (hex) and 2F (hex). 2E (hex) is the address port. 2F (hex) is the data port. You must first write an address value into address port 2E (hex), and then write/read data to/from the assigned register through data port 2F (hex).

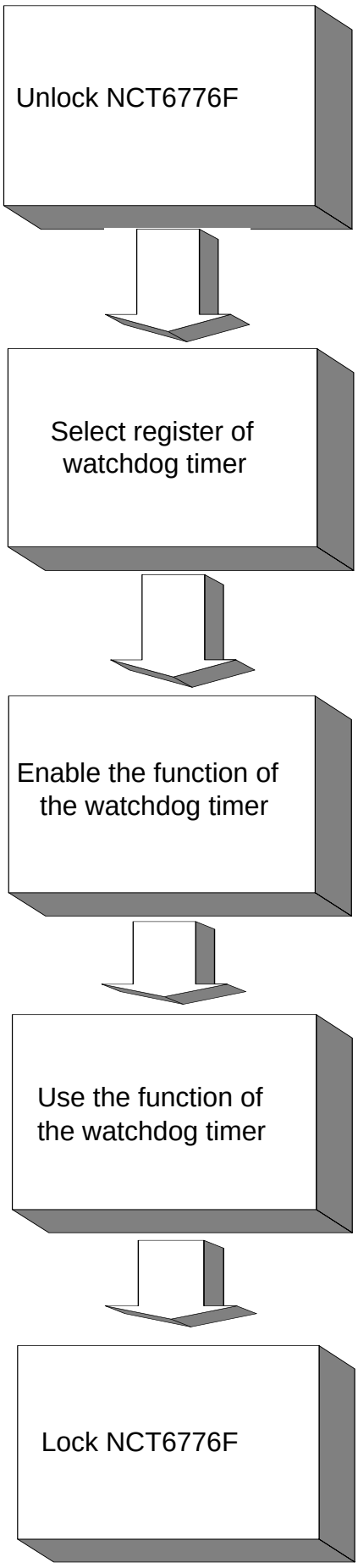

Unlock NCT6776F
Select register of watchdog timer
Enable the function of the watchdog timer
Use the function of the watchdog timer
Lock NCT6776F

Table A.1: Watchdog timer registers		
Address of register (2E)	Read/ Write	Value (2F) & description
87 (hex)	-	Write this address to I/O address port 2E (hex) twice to unlock the NCT6776F
07 (hex)	write	Write 08 (hex) to select register of watchdog timer.
30 (hex)	write	Write 01 (hex) to enable the function of the watchdog timer. Disabled is set as default.
F5 (hex)	write	Set seconds or minutes as units for the timer. Write 0 to bit 3: set seconds as counting unit. [default]. Write 1 to bit 3: set minutes as counting unit. Write 1 to bit 4: Watchdog timer count mode is 1000 times faster. If bit 3 is 0, the count mode is 1/1000 seconds mode. If bit 3 is 1, the count mode is 1/1000 minutes mode.
F6 (hex)	write	0: stop timer [default] 01 ~ FF (hex): The amount of the count, in seconds or minutes, depends on the value set in register F5 (hex). This number decides how long the watchdog timer waits for strobe before generating an interrupt or reset signal. Writing a new value to this register can reset the timer to count with the new value.
F7 (hex)	read/ write	Bit 6: Write 1 to enable keyboard to reset the timer, 0 to disable.[default] Bit 5: Write 1 to generate a timeout signal immediately and automatically return to 0. [default=0] Bit 4: Read status of watchdog timer, 1 means timer is “timeout”.
AA (hex)	-	Write this address to I/O port 2E (hex) to lock NCT6776F.

A.2.1 Example Programs

Enable watchdog timer and set 10 seconds as the timeout interval

```
;--------------------------------------------------------
Mov dx,2eh ; Unlock NCT6776F
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
in al,dx
Or al,08h
Out dx,al
;--------------------------------------------------------
Dec dx; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;--------------------------------------------------------
```

```
Dec dx ; Set second as counting unit
Mov al,0f5h
Out dx,al
Inc dx
In al,dx
And al,not 08h
Out dx,al
;--------------------------------------------------------
Dec dx ; Set timeout interval as 10 seconds and start counting
Mov al,0f6h
Out dx,al
Inc dx
Mov al,10; 10 minutes
Out dx,al
;--------------------------------------------------------
Dec dx ; lock NCT6776F
Mov al,0aah
Out dx,al
```

Enable watchdog timer and set 5 minutes as the timeout interval

```
;--------------------------------------------------------
Mov dx,2eh ; unlock NCT6776F
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
In al,dx
Or al,08h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;--------------------------------------------------------
Dec dx ; Set minute as counting unit
Mov al,0f5h
Out dx, al
Inc dx
In al,dx
Or al, 08h
```

```
Out dx,al
;--------------------------------------------------------
Dec dx ; Set timeout interval as 5 minutes and start counting
Mov al,0f6h
Out dx,al
Inc dx
Mov al,5; 5 minutes
Out dx,al
;--------------------------------------------------------
Dec dx ; lock NCT6776F
Mov al,0aah
Out dx,al
```

Enable watchdog timer to be reset by mouse

```
;--------------------------------------------------------
Mov dx,2eh ; unlock NCT6776F
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
In al,dx
Or al,01h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable watchdog timer to be reset by mouse
Mov al,0f7h
Out dx,al
Inc dx
In al,dx
Or al,80h
Out dx,al
;--------------------------------------------------------
Dec dx ; lock NCT6776F
Mov al,0aah
Out dx,al
```

Enable watchdog timer to be reset by keyboard

```
;--------------------------------------------------------
Mov dx,2eh ; unlock NCT6776F
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable watchdog timer to be strobed reset by keyboard
Mov al,0f7h
Out dx,al
Inc dx
In al,dx
Or al,40h
Out dx,al
;--------------------------------------------------------
Dec dx ; lock NCT6776F
Mov al,0aah
Out dx,al
```

Generate a time-out signal without timer counting

```
;--------------------------------------------------------
Mov dx,2eh ; unlock NCT6776F
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable the function of watchdog timer
Mov al,30h
```

```
Out dx,al
Inc dx
In al,dx
Or al,01h
Out dx,al
;--------------------------------------------------------
Dec dx ; Generate a time-out signal
Mov al,0f7h
Out dx,al ;Write 1 to bit 5 of F7 register
Inc dx
In al,dx
Or al,20h
Out dx,al
;--------------------------------------------------------
Dec dx ; lock NCT6776F
Mov al,0aah
Out dx,al
```

Appendix B

I/O Pin Assignments

B.1 Parallel Port (LPT1)

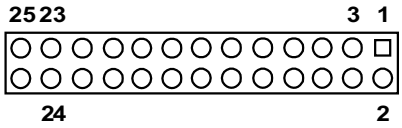
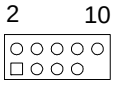
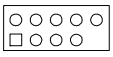


Table B.1: Parallel Port (LPT1)			
Pin	**Signal**	**Pin**	**Signal**
1	STROBE*	14	GND*
2	AFD*	15	D6
3	D0	16	IGND
4	ERR*	17	D7
5	D1	18	GND
6	INIT*	19	ACK*
7	D2	20	GND
8	SLIN*	21	BUSY
9	D3	22	GND
10	GND	23	PE
11	D4	24	GND
12	GND	25	SLCT
13	D5	26	N/C

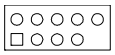
B.2 USB Header (USB56, USB78, USB910)



USB56



USB78



USB910

Table B.2: USB Header (USB56,USB78,USB910,USB1112,USB1314)			
Pin	**Signal**	**Pin**	**Signal**
1	USB_VCC5	2	USB_VCC5
3	USB_D-	4	USB_D-
5	USB_D+	6	USB_D+
7	GND	8	GND
9	Key	10	N/C

B.3 VGA Connector (VGA)

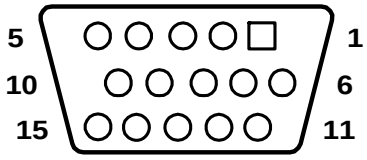
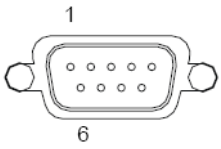
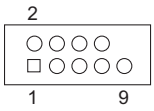


Table B.3: VGA Connector (VGA)			
Pin	**Signal**	**Pin**	**Signal**
1	RED	9	VCC
2	GREEN	10	GND
3	BLUE	11	N/C
4	N/C	12	SDT
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	SCK
8	GND		

B.4 RS-232 Interface (COM12)



COM1



COM2

Table B.4: RS-232 Interface (COM12)			
COM1		**COM2**	
Pin	**Signal**	**Pin**	**Signal**
1	DCD	1	DCD
2	SIN	2	DSR
3	SOUT	3	SIN
4	DTR	4	RTS
5	GND	5	SOUT
6	DSR	6	CTS
7	RTS	7	DTR
8	CTS	8	RI
9	RI	9	GND

B.5 PS/2 Keyboard and Mouse Connector (KBMS1)

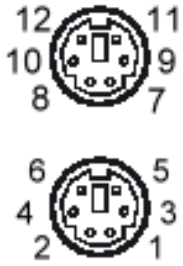


Table B.5: Keyboard and Mouse Connector (KBMS1)

Pin	Signal
1	KB DATA
2	N/C
3	GND
4	KB VCC
5	KB CLK
6	N/C
7	M_DATA
8	N/C
9	GND
10	M_VCC
11	M_CLK
12	N/C

B.6 External Keyboard Connector (KBMS2)

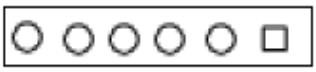


Table B.6: External Keyboard Connector (KBMS2)

Pin	Signal
1	KB CLK
2	KB DATA
3	MS DATA
4	GND
5	VCC
6	MS CLK

B.7 System Fan Power Connector (SYSFAN1~4)

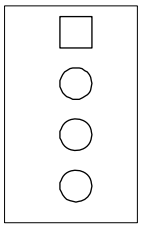


Table B.7: Fan Power Connector (SYSFAN1/SYSFAN2)	
Pin	**Signal**
1	GND
2	+12 V
3	DETECT
4	PWM

B.8 Power LED (JFP1)

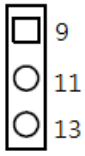


Table B.8: Power LED (JFP1)	
Pin	**Function**
9	LED power (3.3 V)
11	NC
13	Ground

B.9 External Speaker Connector (JFP1)

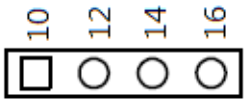


Table B.9: External Speaker Connector (JFP1)	
Pin	**Function**
10	SPK_VCC
12	SPK_OBS
14	SPK_BUZ
16	SPK_OUT

B.10 Reset Connector (JFP1)

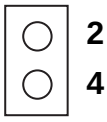


Table B.10: Reset Connector (JFP1)	
Pin	**Signal**
2	RESET
4	GND

B.11 HDD LED Connector (JFP1)

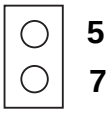


Table B.11: HDD LED Connector (JFP1)	
Pin	**Signal**
5	HDD_LED+
7	HDD_LED-

B.12 ATX Soft Power Switch (JFP1)

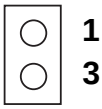


Table B.12: ATX Soft Power Switch (JFP1)	
Pin	**Signal**
1	PWR-BTN
3	GND

B.13 Front panel SMBus connector (FP_SMB1)

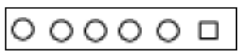
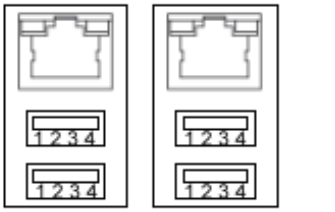


Table B.13: Front panel SMBus connector(FP_SMB1)	
Pin	**Signal**
1	GND

Table B.13: Front panel SMBus connector(FP_SMB1)	
2	SMB_FP_ALERT
3	SMB_FP_DATA
4	SMB_FP_CLK
5	NC
6	+3.3 V

B.14 USB/LAN ports (LAN1_USB12 and LAN2_USB34)



LAN1_USB12 LAN2_USB34

Table B.14: USB Port			
Pin	**Signal**	**Pin**	**Signal**
1	VCC_DUAL	3	Data0+
2	Data0-	4	GND

Table B.15: Giga LAN 10/100/1000 Mbps RJ-45 port			
Pin	**Signal**	**Pin**	**Signal**
1	MID0+	5	MID2+
2	MID0-	6	MID2+
3	MID1+	7	MID3+
4	MID1-	8	MID3+

B.15 Front Panel Audio Connector (FPAUD1)

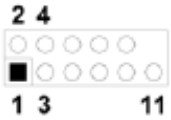


Table B.16: Front Panel Audio Connector (FPAUD1)			
Pin	**Signal**	**Pin**	**Signal**
1	ACZ_VCC	2	GND
3	ACZ_SYNC	4	ACZ_BITCLK
5	ACZ_SDOUT	6	ACZ_SDIN0
7	ACZ_SDIN1	8	ACZ_RST
9	ACZ_12V	10	GND
11	GND	12	N/C

B.16 8-pin Alarm Board Connector (VOLT1)

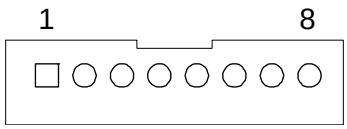


Table B.17: 8-pin Alarm Board Connector (VOLT1)			
Pin	**Signal**	**Pin**	**Signal**
1	5VSB	5	VCC
2	GND	6	VCC3
3	GND	7	-12V
4	-5V	8	+12V

B.17 Case Open Connector (JFP1)

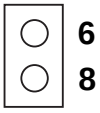


Table B.18: Case Open Connector (JFP1)	
Pin	**Signal**
6	CASEOP
8	GND

B.18 Front Panel LAN LED Connector (LAN_LED1/2)

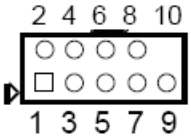


Table B.19: LAN LED Connector (LAN_LED1/2)

Pin	Signal	Pin	Signal
1	LAN1/3_LED0_ACT	2	LAN2/4_LED1_ACT
3	VCC3_LAN1LED	4	VCC3_LAN2LED
5	LAN1/3_LED1_1000M	6	LAN2/4_LED2_1000
7	LAN1/3_LED2_100M	8	LAN2/4_LED0_100
9	VCC3	10	N/C

B.19 SPI_CN1: SPI flash card pin connector

Table B.20: SPI_CN1:SPI fresh card pin connector

Pin	Signal	Pin	Signal
1	+3VSB	2	GND
3	SPI_CS#	4	SPI_CLK
5	SPI_MISO	6	SPI_MOSI
7	N/A	8	NC

B.20 System I/O Ports

Table B.21: System I/O ports

Addr. range (Hex)	Device
000-01F	DMA controller
020-021	Interrupt controller 1, master
022-023	Chipset address
040-05F	8254 timer
060-06F	8042 (keyboard controller)
070-07F	Real-time clock, non-maskable interrupt (NMI) mask
080-09F	DMA page register
0A0-0BF	Interrupt controller 2
0C0-0DF	DMA controller
0F0	Clear math co-processor
0F1	Reset math co-processor
0F8-0FF	Math co-processor
1F0-1F8	Fixed disk
290-297	On-board hardware monitor
2F8-2FF	Serial port 2
300-31F	Prototype card
360-36F	Reserved

Table B.21: System I/O ports	
380-38F	SDLC, bisynchronous 2
3A0-3AF	Bisynchronous 1
3B0-3BF	Monochrome display and printer adapter (LPT1)
3C0-3CF	Reserved
3D0-3DF	Color/graphics monitor adapter
3F0-3F7	Diskette controller
3F8-3FF	Serial port 1

B.21 DMA Channel Assignments

Table B.22: DMA channel assignments	
Channel	**Function**
0	Available
1	Available
2	Available
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

B.22 Interrupt Assignments

Table B.23: Interrupt assignments		
Priority	**Interrupt#**	**Interrupt source**
1	NMI	Parity error detected
2	IRQ0	Interval timer
3	IRQ1	Keyboard
-	IRQ2	Interrupt from controller 2 (cascade)
4	IRQ8	Real-time clock
5	IRQ9	Cascaded to INT 0A (IRQ 2)
6	IRQ10	Available/Serial communication port 4
7	IRQ11	Available
8	IRQ12	PS/2 mouse
9	IRQ13	INT from co-processor
10	IRQ14	Available
11	IRQ15	Available
12	IRQ3	Serial communication port 2
13	IRQ4	Serial communication port 1
14	IRQ5	Serial communication port 3
15	IRQ6	Available
16	IRQ7	Parallel port 1 (print port)

B.23 1st MB Memory Map

Table B.24: 1st MB memory map

Addr. range (Hex)	Device
E0000h - FFFFFh	BIOS
CC000h - DFFFFh	Unused
C0000h - CBFFFh	VGA BIOS
A0000h - BFFFFh	Video Memory
00000h - 9FFFFh	Base memory

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