SOM-4455 SOM-ETX Module

AMD Geode LX800 CPU Module with CPU, VGA/LVDS, Audio & LAN

User Manual

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Packing List

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

- SOM-4455 System On Module CPU module
- CD-ROM or Disks for utility, drivers, and manual (in PDF format)
- Heatsink for A1 version, Heatspreader for A2 version

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

Additional Information and Assistance

1. Visit the Advantech web site at **www.advantech.com** where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance.

Please have the following information ready before you call:

- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

Declarantion of Certification

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

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 instructions 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.

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.*

Contents

General Information

This chapter gives background information on the SOM-4455 CPU System on Module.

Sections include:

- Introduction
- Specification

Chapter 1   General Information

1.1   Introduction

SOM-4455 is low power consumption but high performance embedded ETX CPU module that enable customer to extend their system to more applications that they cannot reach before. This new CPU module adapts AMD new generation Geode LX 800 series platform which integrated faster and more flexible display solution. Integrated graphic accelerator provides multiple display options to customer (CRT, LCD or CRT+LCD) without extra charge. For I/O connect interface, USB 2.0 allows customer to transmit data under high transfer rate; two serial ports make SOM-4455 possible to connect and communication other devices. Low power consumption makes it possible to save more power and make system more reliable by fan-less design. All of these features make SOM-4455 to be the best choice for outdoor and high system reliable -demanded applications.

SOM-4455 complies with the "Green Function" standard and supports Doze, Standby and Suspend modes. The small size (95 mm x 114 mm) and use of four high capacity connectors based on the proven SOM-ETX form factor, allow the SOM-ETX modules to be easily and securely mounted onto a customized solution board or our standard SOM-DB4400 development board.

SOM-ETX is a stand CPU module which is with all main components on board and connects to customer's carrier board by 4 connectors. Customer can make the necessary design on their carrier board base on different demand. SOM-ETX is not only sufficiently reducing the developing period but also keep the maximum design flexibility for satisfying different market demand.

1.2   Specifications

1.2.1   Standard System On Module functions

• **CPU:** On board AMD Geode LX800 CPU

  (Detail CPU support information please contact your sales

  representative)

• **BIOS:** Award 4 Mb Flash BIOS

• **Chipset:** AMD Geode LX800 + CS5536

• **Cache memory:** AMD Geode LX800 integrated L2 cache.

• **System memory:** 1 x 200 pin SODIMM sockets, Double Data Rate (DDR) 128 MB to 1 GB, up to DDR 400 MHz.

• **Power management:** Supports power saving modes including Normal / Standby / Suspend modes. S3 mode mouse resume is not support

• **Enhanced IDE interface:** 1 EIDE channel for two devices. BIOS auto-detect up to UDMA -100 (Rev.A1); 2 EIDE channel for four devices. BIOS auto-detect up to UDMS-100 (Part of Rev.A2 model)

• **SATA interface:** 2 SATA-100 Channels for two SATA devices (Part of Rev.A2 model)

• **Watchdog timer:** 255 levels timer interval, from 1 to 255 sec or min setup by software, jumper less selection, generates system reset

• **USB interface:** Support 4 USB 2.0 ports

• **Expansion Interface:** PCI and ISA interface

1.2.2   VGA/flat panel Interface

• **Chipset:** AMD Geode LX800 integrated 2D graphic controller

• **Frame buffer:** Share system memory up to 32 MB

• **Display type:** Simultaneously supports CRT / LCD displays.Supports 24/18-bit LVDS or 18-bit TTL interface

• **Display mode:**

  CRT Mode: Support up to 1024 x 768 @ 24 bit

  LCD Mode: Support up to 1024 x 768 @ 18 bit (TTL)

  　　　　　　　Support up to 1024 x 768 @ 24 bit (LVDS)

1.2.3 Audio function

• **Audio interface:** Support AC'97 audio codec for Line out, Line in and MIC in.

1.2.4 Ethernet

• **Chipset:** 10/100Mbps: Intel 82551ER Controller. Base on IEEE 10Base-T and 100Base-TX standard

1.2.5 Mechanical and environmental

• **Dimensions:** SOM ETX form-factor, 114 mm x 95 mm (4.5" x 3.74")
• **Power supply voltage:** +5 V power only
• **Power requirement:**

> Typical: 5V @ 1.5A
>
> Max.:5V @ 2.2A

• **Operating temperature:** $0 \sim 60°$ C $(32 \sim 140°$ F)
• **Operating humidity:** 0% ~ 90% relative humidity, non-condensing
• **Weight:** 0.103 Kg (weight of total package)

Mechanical Information

This Chapter gives mechanical and connector information on the SOM-4455 CPU System on Module

Sections include:

- Connector Information
- Mechanical Drawing

Chapter 2 Mechanical Information

2.1 Board Connector

There are four connectors at the rear side of SOM-4455 for connecting to carrier board.
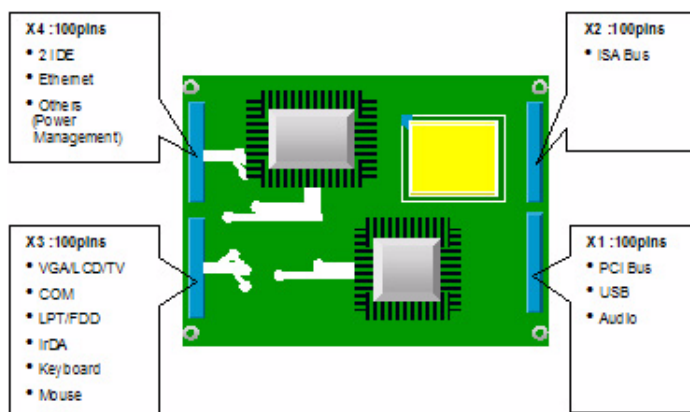
Figure 2.1: SOM-4455 Locating Connectors

Pin Assignments for X1/2/3/4 connectors

Please refer to Advantech SOM-ETX Design Guide

2.2 Board Mechanical Drawing

2.2.1 Front Side
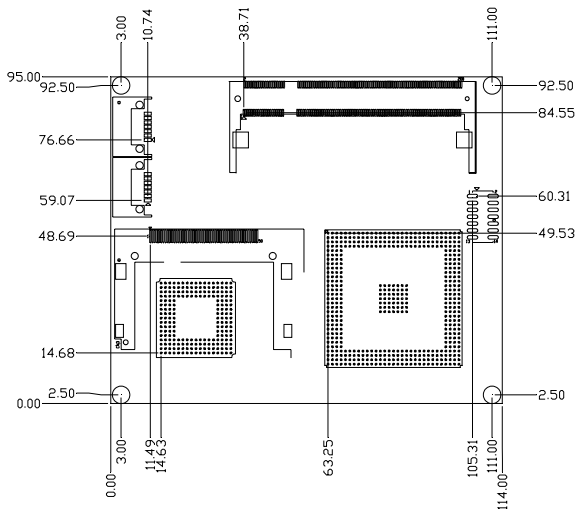
Figure 2.2: SOM-4455 Front Side Drawing

2.2.2 Rear Side
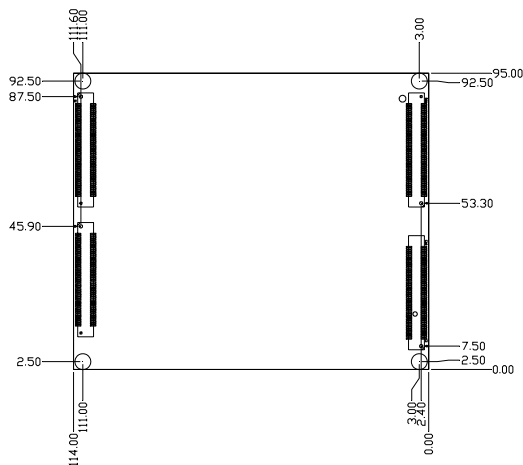
Figure 2.3: SOM-4455 Rear Side Drawing

2.3 Heatspreader Mechanical Drawing (Rev.A2)

2.3.1 Drawing of Heatspreader- Front View
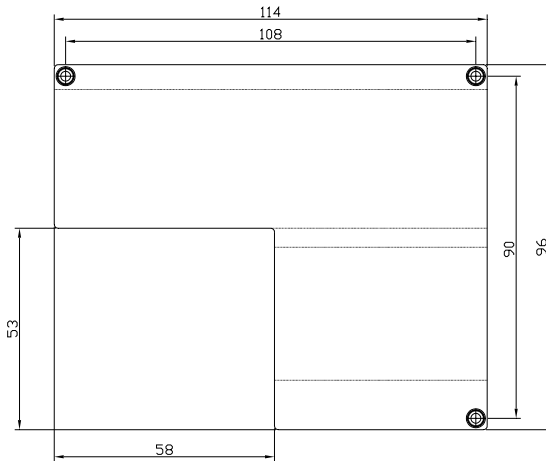
Figure 2.4: Heatspreader Front Drawing of SOM-4455

2.3.2 Drawing of Heatspreader- Side View
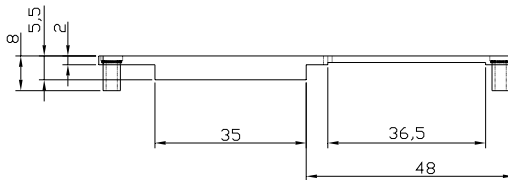
Figure 2.5: Heatspreader Side Drawing of SOM-4455

BIOS Setup Information

This Chapter gives basic BIOS upgrade and Setup information on the SOM-4455 CPU System on Module

Sections include:

- Safety Precautions
- BIOS Update
- Basic BIOS Setup

Chapter 3   BIOS Setup Information

3.1   Introduction

The SOM-4455 system BIOS is located in Flash ROM device. A Single Flash chip holds the system BIOS, VGA BIOS and network Boot ROM (optional). This method minimizes the number of chips and difficulty of configuration.

3.2   Safety Precautions

Warning!   *Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on, because sensitive electronic components can be damaged by a sudden rush of power.*

Caution!   *Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. 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 use.*

3.3 BIOS Update

The SOM-4455 is supplied with a software utility on CD-ROM. It contains the necessary file for update BIOS. If you cannot find below files, we can visit Advantech website at www.advantech.com.tw to download it or contact our technical support person for help.

There are two files required for BIOS updating as below.

AWDFLASH.EXE

This program allows you to update the BIOS Flash ROM.

4455V110.BIN (Example)

This binary file contains the system BIOS.

Follow below process to complete BIOS updating.

1.　　Apply power to the SOM-4455 application. Make sure that the AWDFLASH.EXE and *.BIN files are located in the working drive.

Note: Make sure that you do not run AWDFLASH.EXE while your system is operating in EMM386 mode.

2.　　At the prompt, type AWDFLASH.EXE and press <Enter>. The BIOS configuration program will then display the following:
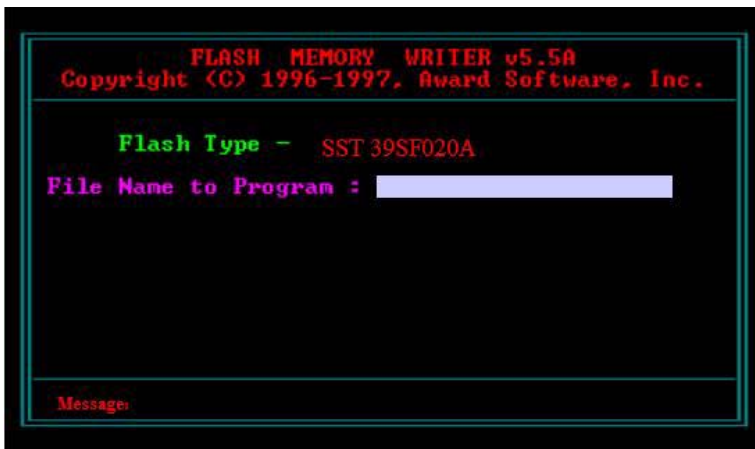
Above picture is just an example view, the really picture maybe different by different version of Awdflash.exe program.

3. At the prompt, type in the BIN file. When you are sure that you have entered the file name correctly press <Enter>. The screen will ask "Do you want to save?" If you wish to continue press Y. If you change your mind or have made a mistake press N.

4. If you decide to continue, the screen will issue a prompt which will then ask "Are you sure to program (Y/N)?" If you wish to continue, press Y. Press N to exit the program. The new BIOS configuration will then write to the ROM BIOS chip.

3.4   Basic BIOS Setup

Awards BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM so that it retains the Setup information when the power is turned off.

Note: Please do not change the setting unless the default value does not meet your requirement. Inappropriately reconfigure BIOS setting may cause the system unstable. If the system becomes unstable. Please load the default value to ensure the system stability.

3.4.1   Enter the BIOS setup screen

Power on the system and click <Del> key under the BIOS post screen, below BIOS setup screen will show up.
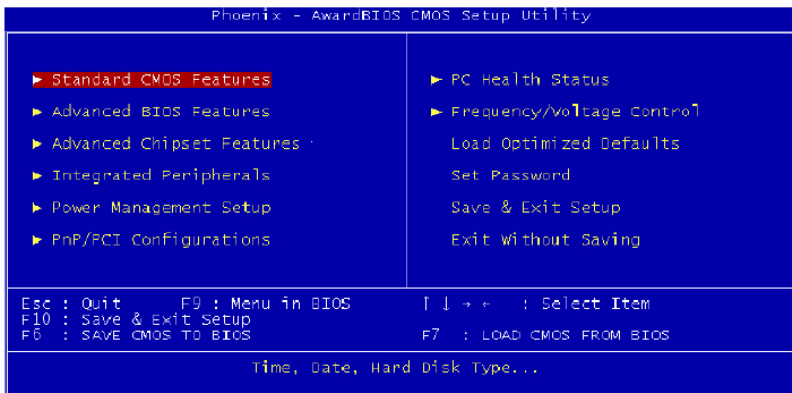
Press arrow key to select the item your would like to change the setting. Press"Enter" key to enter the sub-screen.

3.4.2　Main Setup Item

Standard CMOS Features

This item allows user to change the basic BIOS setting such as System Date, Time, FDD.....

Advanced BIOS Features

This item allows user to change the CPU and booting devices

Advanced Chipset Features

This item allows user to change the chipset and memory setting.

Integrated Peripherals

This item allows user to change the Integrated Peripherals setting such as HDD, on board LAN, USB.

Power Management Setup

This item allows user to change the system power management items, such as ACPI functions.

PnP/PCI Configurations

This item allows user to change the Plug and Play and PCI resource setting, such as IRQ for VGA and USB...

PC Health Status

This item allows user to monitor the system situation such as CPU & system temperature, and voltage....

Load Optimized Default

This item allows user to load the optimized BIOS setting to reach the best performance

Set Password

This item allows user to set Supervisor/User Passwords.

Save & Exit Setup

This item help to save BIOS change you did and exit the setup screen.

Exit Without Saving

This item exit the BIOS setup screen without saving any change use made.

Driver Installation

This chapter gives you the driver installation information on the SOM-4455 CPU System on Module.

Sections include:

- Driver Information
- Driver Installation

Chapter 4 Driver Installation

4.1 Driver Introduction

The CD shipped with SOM-4455 should contain below drivers, please follow below sequence to complete the driver installation.

Step 1- Install SATA Driver for Windows XP
    This is only for part of SOM-4455 Rev.A2 models which is with SATA function

Step 2-Install AMD AES Driver for Windows XP

Step 3-Install AMD LX800 Graphic Driver for Windows XP

Step 4-Install Audio Driver for Windows XP

Step 5-Install Ethernet Driver for Windows XP

Step 6-Install ISA Driver for Windows XP

Step 7-Install RAID Driver for Window XP
    This is only for part of SOM-4455 Rev.A2 models which is with SATA function

Note: For Windows XP Embedded support, please contact sales representative or technical person.

Note: Downloading the update for Windows XP or Windows 2000 may be required for enabling USB 2.0 function. Details information please refers to below web link.

http://www.microsoft.com/whdc/system/bus/USB/USB2support.mspx

4.2 Driver Installation

Insert the SOM-4455 CD into the CD-ROM device, An auto run program should show up and please click SOM-4455, and follow below installation process from Step 1 to Step 7.

Note: If the auto-run program doesnít execute appropriately. You can find related driver by the direction of CD-ROM:\SOM\SOM-ETX\SOM-4455

4.2.1   Step 1- Install SATA Driver for Windows XP

Note: If the SATA hard disk is used for installing Windows XP, this driver is required to be installed for recognizing SATA hard disk.

1.   Attach a floppy drive to the system and copy the software in "Storage\SATA Driver" folder to a floppy disk: (with txtsetup.oem and Win2kXP folder).
2.   Boot from the installation CD-ROM of Windows XP.
3.   Immediately press <F6> to add further SCSI/RAID driver after the installation starts.
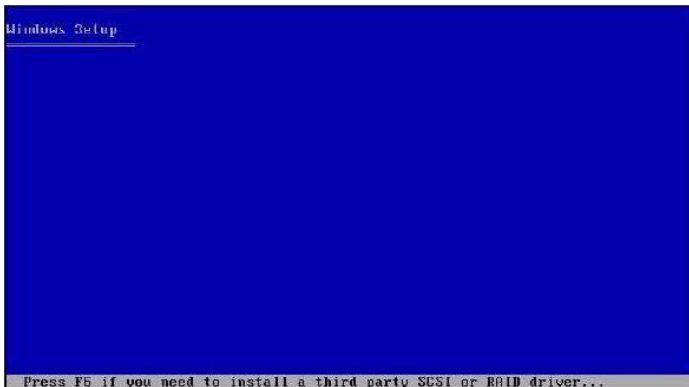
4.   At the prompt, press <S> to add an additional device.
5.   Insert above created floppy disk into floppy device and press <ENTER>.

6. Select correct driver (VIA RAID Controller for Windows XP) and press <ENTER> to continue installation.
7. Follow the instruction and complete RAID driver installation.

4.2.2　Step 2- Install AES Driver for Windows XP

1. Open Control Panel/System applet and Click "Hardware" tab.
2. Click "Device Manager" button.
3. Click "Other Devices" and right click "Entertainment Encryption/ Decryption Device" then select "Update driver".
4. This will open up update driver wizard. Follow the wizard.
5. Select "Install from the list or specific location" and press next.
6. Select "Don't search I will choose the driver to install" and press next.
7. Select "Show all device" and press "Have Disk".
8. Selection the direction of the driver (CD-ROM:\Chipset\AES).
9. Press OK button. Follow the instruction and complete AES driver installation.

4.2.3　Step 3- Install AMD LX800 Graphic Driver for Windows XP

1. Open Control Panel/System applet and Click "Hardware" tab.
2. Click "Device Manager" button.
3. Click "Other Devices" and right click "Video Controller (VGA Compatible)" then select "Update driver".
4. This will open up update driver wizard. Follow the wizard.
5. Select "Install from the list or specific location" and press next.
6. Select "Don't search I will choose the driver to install" and press next.
7. Select "Display Adapters" and press next.
8. Press the "Disk" button.
9. Selection the direction of the driver (CD-ROM:\VGA).
10. Press OK button. Follow the instruction and complete VGA driver installation.

4.2.4　Step 4- Install Audio Driver for Windows XP/2000

1. Enter the Control Panel\System\Hardware\Device Manager.
2. Delete "Multimedia Audio Controller" in the "Other Devices" and reboot the system.

3. At windows startup, Windows finds a "Multimedia Audio Controller" device, please click "Next".
4. Select the Option: "Search for a suitable driver for my device (Recommended)" and click on "Next".
5. Check the Specify location checkbox and enter the direction of CD-ROM:\Audio then click "Next".
6. Follow the instruction and complete Audio driver installation.

4.2.5 Step 5- Install Ethernet Driver for Windows XP

1. Click on the "LAN" folder and double click the "e100exp.exe" file.
2. Follow the instructions that the driver installation wizard shows.
3. The system will help you to complete the driver installation.

4.2.6 Step 6- Install ISA Driver for Windows XP

1. Enter the Control Panel\System\Hardware\Device Manager.
2. Click "Other Devices" and right click "Other PCI Bridge Device" then select "Update driver".
3. Choose "Install from a list of specific location" and click "Next".
4. Choose "Search for the best driver in these locations" and mark the "Include this location in the search:" then type in the direction of "Chipset/IT8888".
5. Follow the instructions that the driver installation wizard shows.

4.2.7 Step 7- Install RAID Driver for Windows XP

1. Click on the "Storage/RAID" folder and double click the "Setup.exe" file.
2. Follow the instructions that the driver installation wizard shows The system will help you to complete the driver installation.

System Assignments

This Appendix gives you the information about the watchdog timer programming on the SOM-4455 CPU System on Module.

Sections include:

- Watchdog Timer Programming

Appendix A Watchdog Timer

A.1 Programming the Watchdog Timer

Below is a sample of programming code for controlling the watchdog timer function.

```
-------------------------------------------------------------------------------
Enter the extended function mode, interruptible double-write |
-------------------------------------------------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
-------------------------------------------------------------------------------
Configured logical device 8, configuration register CRF6 |
-------------------------------------------------------------------------------
MOV DX,2EH
MOV AL,2BH
OUT DX,AL
MOV DX,2FH
IN AL,DX
AND AL.OEFH;Setbit 4=0 Pin 89=WDTO
OUT DX,AL
MOV DX,2EH
MOV AL,07H; point to Logical Device Number Reg.
OUT DX,AL
MOV DX,2FH
MOV AL,08H; select logical device 8
OUT DX,AL;
MOV DX,2EH
MOV AL,30H;Set watch dog activate or inacticate
OUT DX,AL
```

```asm
MOV DX,2FH
MOV AL,01H; 01:activate 00:inactivate
OUT DX,AL;
MOV DX,2EH
MOV AL,F5H; Setting counter unit is second
OUT DX,AL
MOV DX,2FH
MOV AL,00H
OUT DX,AL;
MOV DX,2EH
MOV AL,F6H
OUT DX,AL
MOV DX,2FH
MOV AL,05H; Set 5 seconds
OUT DX,AL
;----------------------------------------------------------------------------------
; Exit extended function mode |
;----------------------------------------------------------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL
```

System Assignments

This Appendix gives you the information about the system resource allocation on the SOM-4455 CPU System on Module.

Sections include:

- System I/O ports
- DMA Channel Assignments
- Interrupt Assignments
- 1st MB Memory Map

Appendix B System Assignments

B.1 System I/O Ports

Table B.1: System I/O ports	
Addr. range	
(Hex)	**Device**
000-00F	DMA controller
010-01F	Motherboard resources
020-021	Programmable interrupt controller
022-02D	Motherboard resources
030-03F	Motherboard resources
040-043	System timer
044-05F	Motherboard resources
060-060	Keyboard controller
061-061	System speaker
062-063	Motherboard resources
070-073	System CMOS/real time clock
074-07F	Motherboard resource
080-090	DMA controller
091-093	Motherboard resource
094-09F	DMA controller
0A0-0A1	Programmable interrupt controller
0A2-0BF	Motherboard resource
0C0-0DF	DMA controller
0E0-0EF	Motherboard resource
0F0-0FF	Numeric data processor

Table B.1: System I/O ports

170-177	Secondary IDE Channel
1F0-1F7	Primary IDE Channel
274-277	ISAPNP Read DATA Port
279-279	ISAPNP Read DATA Port
2F8-2FF	Communications Port (COM2)
376-376	Secondary IDE Channel
378-37F	Printer Port (LPT1)
3B0-3BA	AMD WIN XP Graphic Driver
3C0-3DF	AMD WIN XP Graphic Driver
3F6-3F6	Primary IDE Channel
3F8-3FF	Communications Port (COM1)
4D0-4D1	Motherboard resource
778-77B	Printer Port (LPT1)
A78-A7B	Motherboard resource
B78-B7B	Motherboard resource
BBC-BBF	Motherboard resource

B.2 DMA Channel Assignments

Table B.2: DMA Channel assignments

Channel	Function
0	Available
1	Available
2	Floppy disk (8-bit transfer)
3	Parallel**
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

** Parallel port DMA default setting: DMA 3, Parallel port DMA selection: DMA 1 or 3

B.3   Interrupt Assignments

Table B.3: Interrupt Assignments	
Interrupt#	**Interrupt source**
NMI	Parity error detected
IRQ 0	System timer
IRQ 1	Keyboard
IRQ 2	Interrupt from controller 2 (cascade)
IRQ 3	Serial communication port 2
IRQ 4	Serial communication port 1
IRQ 5	Available
IRQ 6	Diskette controller (FDC)
IRQ 7	Parallel port 1 (print port)
IRQ 8	Real-time clock
IRQ 9	Reserve
IRQ 10	Available
IRQ 11	Available
IRQ 12	PS/2 mouse
IRQ 13	Numeric data processor
IRQ 14	Preliminary IDE
IRQ 15	Available

USB and Ethernet IRQ is automatically set by the system

B.4 1st MB Memory Map

Addr. range (Hex)	Device
Table B.4: Table B.4: 1st MB Memory Map	
E000h - FFFFh	System ROM
CC00h - DFFFh	Available
C000h - C7FFh	VGA BIOS
B800h - BFFFh	CGA/EGA/VGA text
B000h - B7FFh	Reserved for graphic mode usage
A000h - AFFFh	EGA/VGA graphics
0000h - 9FFFh	Base memory