SOM-4455 SOM-ETX
Module

AMD Geode LX800 CPU Module
with CPU, VGA/LVDS, Audio & LAN
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http://www.advantech.com/support
This manual is for the SOM-4455.
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

Declaration 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.
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Chapter 1

General Information

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

- Introduction
- Specification
1.1 Introduction

SOM-4455 is low power consumption but high performance embedded ETX CPU module that enables customers to extend their system to ever more applications. This new CPU module adopts the AMD new generation Geode LX 800 series processor which offers a faster and more flexible display solution. The integrated graphic accelerator provides multiple display options: (CRT, LCD or CRT+LCD) without extra charge. For I/O, there is high speed USB 2.0 and two serial ports. Low power consumption makes it possible to save energy and make the system more reliable; all in a fanless design. All of these features make SOM-4455 the best choice for outdoor and highly reliable applications.

SOM-4455 complies with the "Green Function" standard and supports Doze, Standby and Suspend modes. The small size board (95 mm x 114 mm) uses four high capacity connectors based on the proven SOM-ETX form factor, allowing 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 standard CPU module with all the main components on board and connects to the customer's own carrier board with 4 connectors. The customer can make the necessary designs on their own carrier board base. SOM-ETX not only significantly reduces development time but also keeps maximum design flexibility for satisfying different market demands.

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 UDMA-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: RTL8100CL-LF Ethernet Controller based on IEEE 802.3u 100Base-T 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: 5 V @ 1.5 A
  - Max.: 5 V @ 2.2 A
- **Operating temperature:** 0 ~ 60° C (32 ~ 140° F)
- **Operating humidity:** 0% ~ 90% relative humidity, non-condensing
- **Weight:** 0.103 Kg (weight of total package)
Chapter 2

Mechanical Information

This Chapter gives mechanical and connector information on the SOM-4455 CPU System on Module.
Sections include:
- Connector Information
- Mechanical Drawing
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](image)

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
Chapter 3

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
3.1 **Introduction**

The SOM-4455 system BIOS is located in Flash ROM. 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:

   ![BIOS Configuration Program](image)

   **Note!** 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 values do not meet your requirements. Inappropriately reconfiguring the BIOS setting may cause the system to become unstable. If the system becomes unstable, please load the default values to ensure 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 you 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.
Chapter 4

Driver Installation

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

Sections include:
- Driver Information
- Driver Installation
4.1 **Driver Introduction**

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

1. Install SATA Driver for Windows XP  
   This is only for part of SOM-4455 Rev.A2 models which is with SATA function.
2. Install AMD AES Driver for Windows XP
3. Install AMD LX800 Graphic Driver for Windows XP
4. Install Audio Driver for Windows XP
5. Install Ethernet Driver for Windows XP
6. Install ISA Driver for Windows XP
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. For detailed information please refer to below web link.

http://www.microsoft.com/whdc/system/bus/USB/USB2support.mspx
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
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,0EFH; Set bit 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 watchdog activate or inactivate
OUT DX,AL
MOV DX,2FH
MOV AL,01H; 01: activate 00: inactivate
OUT DX,AL;
MOV DX,2EH
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
Appendix B

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
## B.1 System I/O Ports

<table>
<thead>
<tr>
<th>Addr. range (Hex)</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>000-00F</td>
<td>DMA controller</td>
</tr>
<tr>
<td>010-01F</td>
<td>Motherboard resources</td>
</tr>
<tr>
<td>020-021</td>
<td>Programmable interrupt controller</td>
</tr>
<tr>
<td>022-02D</td>
<td>Motherboard resources</td>
</tr>
<tr>
<td>030-03F</td>
<td>Motherboard resources</td>
</tr>
<tr>
<td>040-043</td>
<td>System timer</td>
</tr>
<tr>
<td>044-05F</td>
<td>Motherboard resources</td>
</tr>
<tr>
<td>060-060</td>
<td>Keyboard controller</td>
</tr>
<tr>
<td>061-061</td>
<td>System speaker</td>
</tr>
<tr>
<td>062-063</td>
<td>Motherboard resources</td>
</tr>
<tr>
<td>070-073</td>
<td>System CMOS/real time clock</td>
</tr>
<tr>
<td>074-07F</td>
<td>Motherboard resource</td>
</tr>
<tr>
<td>080-090</td>
<td>DMA controller</td>
</tr>
<tr>
<td>091-093</td>
<td>Motherboard resource</td>
</tr>
<tr>
<td>094-09F</td>
<td>DMA controller</td>
</tr>
<tr>
<td>0A0-0A1</td>
<td>Programmable interrupt controller</td>
</tr>
<tr>
<td>0A2-0BF</td>
<td>Motherboard resource</td>
</tr>
<tr>
<td>0C0-0DF</td>
<td>DMA controller</td>
</tr>
<tr>
<td>0E0-0EF</td>
<td>Motherboard resource</td>
</tr>
<tr>
<td>0F0-0FF</td>
<td>Numeric data processor</td>
</tr>
<tr>
<td>170-177</td>
<td>Secondary IDE Channel</td>
</tr>
<tr>
<td>1F0-1F7</td>
<td>Primary IDE Channel</td>
</tr>
<tr>
<td>274-277</td>
<td>ISAPNP Read DATA Port</td>
</tr>
<tr>
<td>279-279</td>
<td>ISAPNP Read DATA Port</td>
</tr>
<tr>
<td>2F8-2FF</td>
<td>Communications Port (COM2)</td>
</tr>
<tr>
<td>376-376</td>
<td>Secondary IDE Channel</td>
</tr>
<tr>
<td>378-37F</td>
<td>Printer Port (LPT1)</td>
</tr>
<tr>
<td>3B0-3BA</td>
<td>AMD WIN XP Graphic Driver</td>
</tr>
<tr>
<td>3C0-3DF</td>
<td>AMD WIN XP Graphic Driver</td>
</tr>
<tr>
<td>3F6-3F6</td>
<td>Primary IDE Channel</td>
</tr>
<tr>
<td>3F8-3FF</td>
<td>Communications Port (COM1)</td>
</tr>
<tr>
<td>4D0-4D1</td>
<td>Motherboard resource</td>
</tr>
<tr>
<td>778-77B</td>
<td>Printer Port (LPT1)</td>
</tr>
<tr>
<td>A78-A7B</td>
<td>Motherboard resource</td>
</tr>
<tr>
<td>B78-B7B</td>
<td>Motherboard resource</td>
</tr>
<tr>
<td>BBC-BBF</td>
<td>Motherboard resource</td>
</tr>
</tbody>
</table>
B.2 DMA Channel Assignments

Table B.2: DMA Channel Assignments

<table>
<thead>
<tr>
<th>Channel</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Available</td>
</tr>
<tr>
<td>1</td>
<td>Available</td>
</tr>
<tr>
<td>2</td>
<td>Floppy disk (8-bit transfer)</td>
</tr>
<tr>
<td>3</td>
<td>Parallel**</td>
</tr>
<tr>
<td>4</td>
<td>Cascade for DMA controller 1</td>
</tr>
<tr>
<td>5</td>
<td>Available</td>
</tr>
<tr>
<td>6</td>
<td>Available</td>
</tr>
<tr>
<td>7</td>
<td>Available</td>
</tr>
</tbody>
</table>

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

B.3 Interrupt Assignments

Table B.3: Interrupt Assignments

<table>
<thead>
<tr>
<th>Interrupt#</th>
<th>Interrupt source</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMI</td>
<td>Parity error detected</td>
</tr>
<tr>
<td>IRQ 0</td>
<td>System timer</td>
</tr>
<tr>
<td>IRQ 1</td>
<td>Keyboard</td>
</tr>
<tr>
<td>IRQ 2</td>
<td>Interrupt from controller 2 (cascade)</td>
</tr>
<tr>
<td>IRQ 3</td>
<td>Serial communication port 2</td>
</tr>
<tr>
<td>IRQ 4</td>
<td>Serial communication port 1</td>
</tr>
<tr>
<td>IRQ 5</td>
<td>Available</td>
</tr>
<tr>
<td>IRQ 6</td>
<td>Diskette controller (FDC)</td>
</tr>
<tr>
<td>IRQ 7</td>
<td>Parallel port 1 (print port)</td>
</tr>
<tr>
<td>IRQ 8</td>
<td>Real-time clock</td>
</tr>
<tr>
<td>IRQ 9</td>
<td>Reserve</td>
</tr>
<tr>
<td>IRQ 10</td>
<td>Available</td>
</tr>
<tr>
<td>IRQ 11</td>
<td>Available</td>
</tr>
<tr>
<td>IRQ 12</td>
<td>PS/2 mouse</td>
</tr>
<tr>
<td>IRQ 13</td>
<td>Numeric data processor</td>
</tr>
<tr>
<td>IRQ 14</td>
<td>Preliminary IDE</td>
</tr>
<tr>
<td>IRQ 15</td>
<td>Available</td>
</tr>
</tbody>
</table>

USB and Ethernet IRQ is automatically set by the system
**B.4 1st MB Memory Map**

<table>
<thead>
<tr>
<th>Addr. range (Hex)</th>
<th>Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>E000h - FFFFh</td>
<td>System ROM</td>
</tr>
<tr>
<td>CC00h - DFFFh</td>
<td>Available</td>
</tr>
<tr>
<td>C000h n C7FFh</td>
<td>VGA BIOS</td>
</tr>
<tr>
<td>B800h - BFFFh</td>
<td>CGA/EGA/VGA text</td>
</tr>
<tr>
<td>B000h - B7FFh</td>
<td>Reserved for graphic mode usage</td>
</tr>
<tr>
<td>A000h - AFFFh</td>
<td>EGA/VGA graphics</td>
</tr>
<tr>
<td>0000h - 9FFFh</td>
<td>Base memory</td>
</tr>
</tbody>
</table>