SOM-4470 ETX Module

Intel®Pentium® III/Celeron SOM-ETX CPU Module with SVGA/ LCD/LAN/SSD Interface

User's Manual

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This manual is for the SOM-4470

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Version History

June, 2002: SOM-4470 User's Manual 2nd edition (Part no. 2006447001)
Corrected error on page 10: Sec. 2.1 Connector Location X3 and X4 reversed.

October 2001, SOM-DB4470 User's Manual 1st edition (Part no. 2006447000)

Contents

Packing list

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

- 1 SOM-4470 System On Module CPU module
- CD-ROM or Disks for utility, drivers, and manual (in PDF format)

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

CHAPTER 1

General Information

This chapter gives background information on the SOM-4470 CPU System On Module.

Sections include:

- Introduction
- Specifications
- Board Dimensions

1.1 Introduction

The SOM-4470 is an Intel low-power Pentium ® III processor System On Module (SOM) with audio controller, a AGP SVGA controller, a PCI 10/100Base-T Ethernet interface. When using an Intel ® Pentium ® III processor, the SOM-4470 achieves outstanding performance that surpasses most SOMs in its class. On-board features include two serial ports, one multi-mode parallel (ECP/EPP/SPP) port, two USB (Universal Serial Bus) ports, a floppy drive controller, and a keyboard/ PS/2 mouse interface. The built-in high-speed PCI IDE controller supports both PIO and UDMA/33 bus master modes. Up to two IDE devices can be connected, including large hard disks, CD-ROM drives, and tape backup drives. The SOM-4470 features power management to minimize power consumption. It complies with the "Green Function" standard and supports Doze, Standby and Suspend modes. In addition, the board's watchdog timer can automatically reset the system or generate an interrupt if the system stops due to a program bug or EMI.The small size (95 mm x 114 mm) and use of four high capacity connectors based on the proven 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.

The SOM-4470 is a highly integrated multimedia SOM that combines audio, video, and network functions. It provides 16-bit half-duplex, 8-bit full-duplex, integrated 3D audio, and up to 1024 x 768 resolution @ 16.8 M colors with 4 MB display memory. Major on-board devices adopt PCI technology, to achieve outstanding computing performance when used with Intel ® Pentium ® processors. The SOM-4470 also supports TV-out that supports NTSC/PAL format and video-in function for multimedia applications.

1.2 Specifications

1.2.1 Standard System On Module functions

- **CPU:** On board Intel Pentium III-500 MHz (SOM-4470F-L0A1&SOM-4470F-L4A1) or Celeron 400 MHz processor (SOM-4470F-J0A1)
- **BIOS:** Award 256KB Flash memory
- **Chipset:** Intel 440BX
- **Green function:** APM 1.1 compliant
- **2nd level cache:** 128 KB or 256 KB on the processor
- **RAM:** One 144-pin SO-DIMM socket accepts 32 ~ 256 MB SDRAM
- **Enhanced IDE interface:** 2 EIDE channels support up to 4 IDE devices. BIOS auto-detect, PIO Mode3 or Mode4, UDMA/33 transfer
- **FDD interface:** Supports one FDD share with Parallel Port
- **Infrared:** One 115 Kbps infrared port, IrDA compliant
- **Parallel port:** One parallel port, supports SPP/EPP/ECP parallel mode
- **Serial port:** two serial ports, COM 1: RS-232 and COM 2 : RS-232 (TTL Output)
- **Watchdog timer:** 62-level interval from 1 to 62 seconds. Generates system reset. Jumperless selection and software enabled/disabled
- **Keyboard/mouse connector:** Supports standard PC/AT keyboard and PS/2 mouse interface
- **USB interface:** Two USB connectors compliant with USB Spec. Rev. 1.1

1.2.2 AGP SVGA/flat panel interface

- **Chipset:** SMI Lynx 721 with 4/8 MB memory
- **Display memory:** 4 MB SOM-4470F-J0A1/SOM-4470F-L4A1) or 8 MB (SOM-4470F-L0A1) on the Lynx 721 chip
- **Display type:** Simultaneously supports CRT and flat panel displays. Also supports up to 18-bit TFT LCD panels, 64-bit graphics acceleration
- **Display resolution:** Flat panel display up to 800 x 600 @ 24 bpp, 1024 x 768 @ 24 bpp. CRT monitors up to 1024 x 768 @ 24 bpp, 1280 x 1024 @ 16 bpp

1.2.3 Audio function

- **Chipset:** ESS ES 1989
- **Audio controller:** AC97 Ver. 2.0 compliant interface, Multistream Direst Sound and Direct Sound 3D acceleration
- **Stereo sound:** 8-bit full-duplex
- **Audio interface:** Microphone in, Line in, Line out

1.2.4 TV-out

• **Chipset:** SMI Lynx 721

• Supports NTSC, NTSC=EIA (Japan) and PAL TV formats

• Provides Composite video and S-video outputs via RCA (composite) connector and S-video connetor

• Supports 640 x 480 and 800 x 600 input resolutions

• Supports Windows © 95/98 and Windows NT drivers

• Over-scan, under-scan and position adjustable

• Auto-detection of TV presence met Interface

1.2.5 PCI bus Ethernet interface

• **Chipset:** Intel 82559ER Ethernet controller

• **Ethernet interface**: IEEE 802.3U compatible 100/10Base-T interface. Includes software drivers and boot ROM

1.2.6 Mechanical and environmental

• **Dimensions** (L x W): SOM-ETX form factor, 95 mm x 114 mm (3.7" x 4.5")

• **Power supply voltage**: +5 V ± 5%

• **Power requirements:** Max: 4.5 A @ +5 V

Typical: 3.8 A @ 5 V, (with 64 MB DRAM, Pentium ® III 500 MHz CPU)

3.1 A @ 5 V (with 64 MB DRAM, Celeron 400 MHz CPU)

• **Operating temperature:** 0 ~ 60° C (32 ~ 140° F)

• **Operation humidity:** 0% ~90% Relative Humidity, noncondensing

• **Weight:** 74g (weight of total package)

1.3 Board dimensions

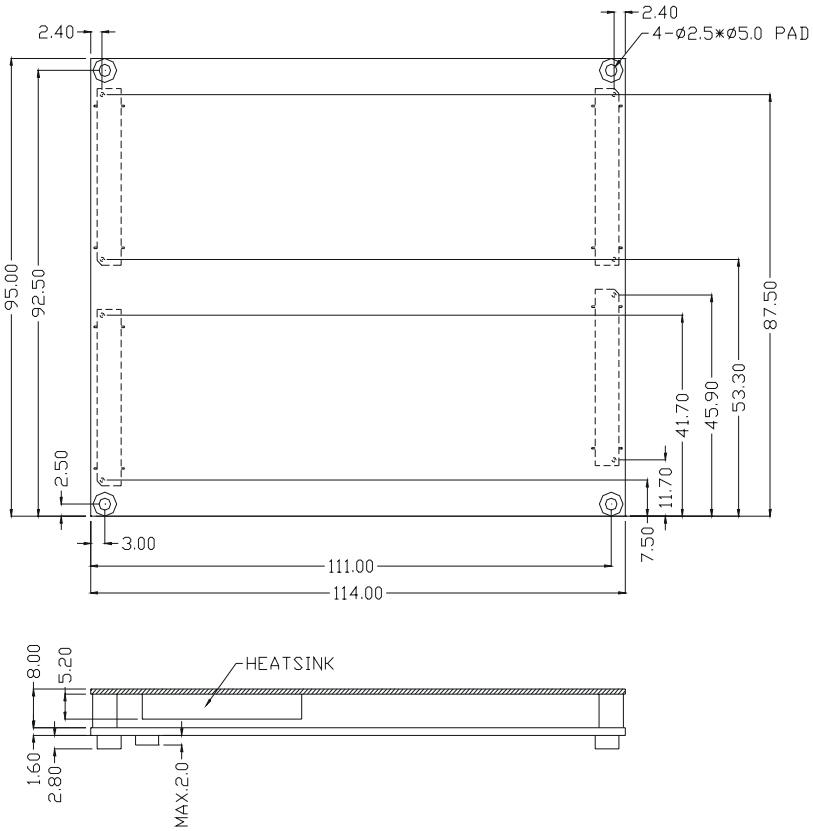


Figure 1-1: SOM-4470 dimensions

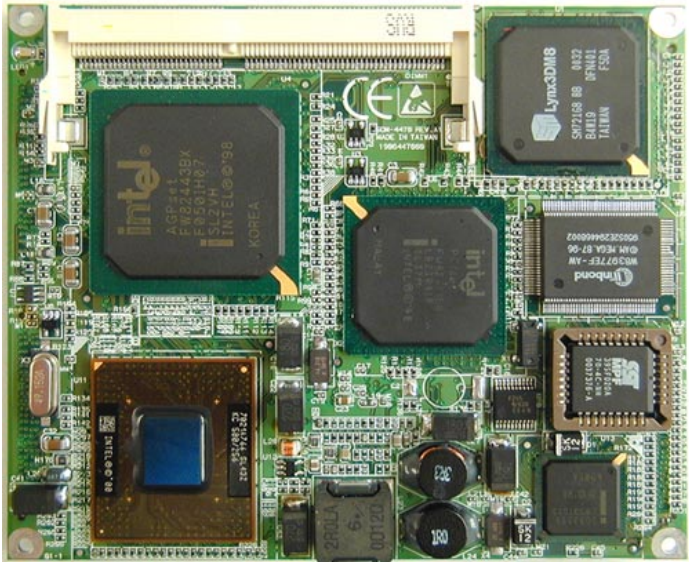


Figure 1-2: SOM-4470 Top view

CHAPTER 2

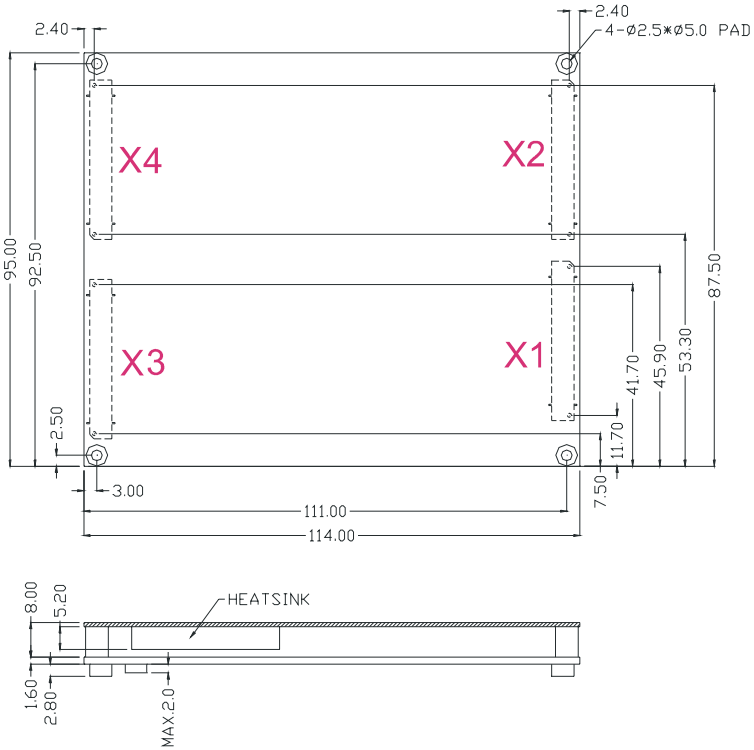
Connector Assignments and Descriptions

This chapter tells how to set up the SOM-4470 hardware. It includes instructions on connecting peripherals, switches and indicators. Make sure you read all the safety precautions before you begin the installation procedure.

2.1 Connector Locations

The board has a number of connectors that allow you to configure your system to suit your application.

The tables below shows the function of each of the board's connectors:



SOM-4470 Locating Connectors

2.2 Pin Assignments for X1, X2, X3, X4 connectors

Please refer to SOM-ETX Design and Specification Guide, Chapter 2

2.3 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 the chassis.*

CHAPTER 3

Software Configuration (optional for SOM-4470)

This chapter details the software configuration information. It shows you how to configure the SOM-4470 card to match your application requirements.

Sections include:

- LCD display configuration
- Connections for two standard LCDs

3.1 Introduction

The SOM-4470 system BIOS and custom drivers are located in a 256 KB, 32-pin Flash ROM. A single Flash chip holds the system BIOS and VGA BIOS. The display type can be configured via software. This method minimizes the number of chips and eases configuration. You can change the display BIOS simply by reprogramming the Flash chip.

3.2 Utility CD disk

The SOM-4470 is supplied with a software utility on CD-ROM. This disk contains the necessary file for setting up the VGA display. Directories and files on the disk are as follows:

```
├─ AWDFLASH.EXE
├─ CBROM.EXE
└─ 4470Vxxx.BIN
```

AWDFLASH.EXE
This program allows you to update the BIOS Flash ROM.

4470110.BIN
This binary file contains the system BIOS.

CBROM.EXE
This program allows you to combine your own VGA BIOS with system BIOS (4470V110.BIN).

3.3 VGA display software configuration

The SOM-4470 on-board VGA/LCD interface supports an 24-bit TFT LCD, flat panel displays and traditional analog CRT monitors. The interface can drive CRT displays with resolutions up to 1024 x 768 in 24 bpp. It is also capable of driving color panel displays with resolutions of 1024 x 768 in 24 bpp. The LCD type is configured completely via the software utility, so you do not have to set any jumpers. Configure the LCD type as follows:

1. Apply power to the SOM-4470 application with a color TFT display attached. This is the default setting for the SOM-4470 series. 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 VGA configuration program will then display the following:

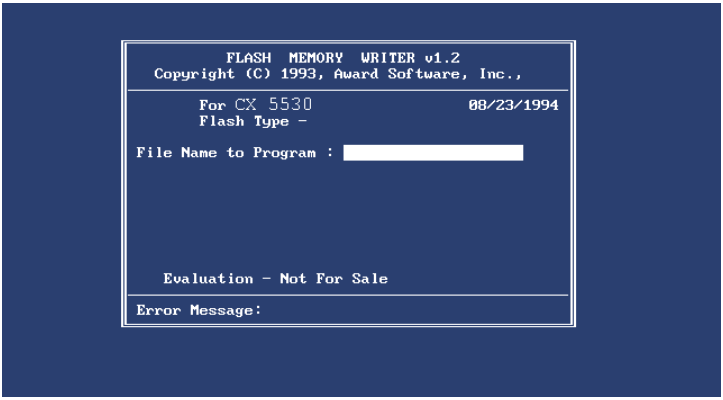


Figure 3-2: BIOS VGA setup screen

3. At the prompt, type in the BIN file which supports your display. 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 VGA configuration will then write to the ROM BIOS chip. This configuration will remain the same until you run the AWDFLASH.EXE program and change the settings.

3.4 Connections for two standard LCDs

3.4.1 Connections for Toshiba LTM10C042(640 x 480 TFT color LCD)

Table 3-1: Connections for Toshiba LTM10C042

LTM10C042		SOM-4450	
Pin	**Name**	**Pin**	**Name**
1	GND	3	GND
2	CLK	35	SHFCLK
3	GND	4	GND
4	R0	27	PD12
5	R1	28	PD13
6	R2	29	PD14
7	GND	8	GND
8	R3	30	PD15
9	R4	31	PD16
10	R5	32	PD17
11	GND	33	GND
12	G0	19	PD6
13	G1	20	PD7
14	G2	21	PD8
15	GND	33	GND
16	G3	22	PD9
17	G4	23	PD10
18	G5	24	PD11
19	GND	34	GND
20	ENAB	37	M
21	GND	34	GND
22	B0	11	PD0
23	B1	12	PD1
24	B2	13	PD2
25	GND	39	GND
26	B3	14	PD3
27	B4	15	PD4
28	B5	16	PD5
29	GND	39	GND
30	VDD	5	+5 V
31	VDD	6	+5 V

3.4.2 Connections for Toshiba LTM12C275A (800 x 600 TFT color LCD)

Table 3-2: Connections for Toshiba LTM12C275A

LTM12C275A		SOM-4450	
Pin	**Name**	**Pin**	**Name**
1	GND	3	GND
2	NCLK	35	SHFCLK
3	NC	-	NC
4	NC	-	NC
5	GND	4	GND
6	R0	27	PD12
7	R1	28	PD13
8	R2	29	PD14
9	R3	30	PD15
10	R4	31	PD16
11	R5	32	PD17
12	GND	8	GND
13	G0	19	PD6
14	G1	20	PD7
15	G2	21	PD8
16	G3	22	PD9
17	G4	23	PD10
18	G5	24	PD11
19	GND	33	GND
20	B0	11	PD0
21	B1	12	PD1
22	B2	13	PD2
23	B3	14	PD3
24	B4	15	PD4
25	B5	16	PD5
26	ENAB	37	M/DE
27	GND	34	GND
28	VCC	5	+5 V
29	VCC	6	+5 V
30	GND	39	GND

APPENDIX A

Programming the Watchdog Timer

A.1 Programming the watchdog timer

To program the watchdog timer, you must write a program which writes I/O port address 443 (hex). The output data is a value of time interval. The value range is from 01 (hex) to 3E (hex), and the related time interval is 1 sec. to 62 sec.

Data	Time Interval
01	1 sec.
02	2 sec.
03	3 sec.
04	4 sec.
• •	
• •	
• •	
3E	62 sec.

After data entry, your program must refresh the watchdog timer by rewriting the I/O port 443 (hex) while simultaneously setting it. When you want to disable the watchdog timer, your program should read I/O port 443 (hex).

The following example shows how you might program the watchdog timer in BASIC:

```
10      REM  Watchdog timer example program
20      OUT &H443, data REM  Start and restart the watchdog
30      GOSUB 1000 REM  Your application task #1,
40      OUT &H443, data REM  Reset the timer
50      GOSUB 2000 REM  Your application task #2,
60      OUT &H443, data REM  Reset the timer
70      X=INP (&H443) REM, Disable the watchdog timer
80      END
1000    REM  Subroutine #1, your application task
•       •
•       •
•       •
1070    RETURN
2000    REM  Subroutine #2, your application task
•       •
•       •
•       •
2090    RETURN
```

APPENDIX B

System Assignments

- System I/O ports
- DMA channel assignments
- Interrupt assignments
- 1st MB memory map

B.1 System I/O ports

Table B-1: System I/O ports

Addr. range (Hex)	Device
000-01F	DMA controller (slave)
020-03F	Interrupt controller 1, (master)
040-05F	8254 timer/counter
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 (slave)
0C0-0DF	DMA controller (master)
0F0	Clear math co-processor
0F1	Reset math co-processor
0F8-0FF	Math co-processor
1F0-1F8	1st fixed disk
200-207	Game I/O
278-27F	Reserved
2F8-2FF	Serial port 2
300-31F	Ethernet**
360-36F	LPT2
378-37F	Parallel printer port 1 (LPT1)
380-38F	SDLC, bisynchronous 2
3A0-3AF	Bisynchronous 1
3B0-3BF	Monochrome display
3C0-3CF	Reserved
3D0-3DF	Color/graphics monitor adapter
3F0-3F7	Diskette controller
3F8-3FF	Serial port 1
443	Watchdog timer

** default setting

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 select: DMA 1, 3

B.3 Interrupt assignments

Table B-3: Interrupt assignments

Interrupt#	Interrupt source
NMI	Parity error detected
IRQ 0	Interval 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	Reserved for watchdog timer
IRQ 12	PS/2 mouse
IRQ 13	INT from co-processor
IRQ 14	Preliminary IDE
IRQ 15	Secondary IDE for CompactFlash

USB and Ethernet IRQ is automatically set by the system

B.4 1st MB memory map

Table B-4: 1st MB memory map

Addr. range (Hex)	Device
F000h - FFFFh	System ROM
E000h - EFFFh	Reserved for BIOS boot
CC00h - DFFFh	available
C000h - CB00h	VGA BIOS
B800h - BFFFh	CGA/EGA/VGA text
B000h - B7FFh	Reserved for graphic mode usage
A000h - AFFFh	EGA/VGA graphics
0000h - 9FFFh	Base memory

* default setting