# SOM-2353

**User's Manual**

**Geode™ GX1 SOM 144**
**System On Module**

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This manual is for the SOM-2353

Part No. 2006235300

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## Packing list

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

- 1 SOM-2353 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.

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CHAPTER 1

# General Information

This chapter provides background information for the SOM-2353.

Sections include:

•Card specifications

•Board layout

## 1.1 Introduction

Advantech's new SOM 144 Module, the SOM-2353, a Goede GX1 system on module comes equipped with 64M SDRAM , a VGA interface which supports CRT monitor with up to 4MB display memory, two USB interfaces, IrDA interfaces, AC 97 interfaces, a 10/100 base-T Ethernet interface (for SOM-2353) and a Compact Flash solid state disk socket (for SOM-2353). In addition, it is equipped with two RS-232 serial ports. One bi-directional printer port supports SPP, ECP and EPP modes. Three master PCI interfaces, an IDE HDD interface and a floppy disk controller provide functional expansion. With its industrial grade reliability, the SOM-2353 can operate continuously at temperatures up to 140 F (60 C). This compact unit offers all these functions within the space of a 2.5" hard disk drive (68mm * 100mm). The numerous features provide an ideal price/performance solution for high-end commercial and industrial applications where stability and reliability are essential. The SOM-2353 is compact; highly integrated; and easy to maintain, upgrade, and install. These features make it ideal for applications of small industrial controller, Panel PC, security system, Internet gateway, instruments, medical equipment, building automation and so on.

## 1.2 Specifications

**CPU**: NS Geode GX1-300MHz

**Chipset:** NS CS5530A

**BIOS:** AWARD 256KB FLASH BIOS

**RAM memory:** 64MB SDRAM on board.

**SSD:** CompactFlash socket

**PCI/IDE/ Serial port /USB/AC97/KB/Mouse (SODIMM socket ):**

**I/O expansion:** 3 master PCI bus (3.3V PCI)

**Enhanced IDE hard disk drive interface:**

Supports up to two hard disk drives. BIOS auto-detect. (DMA33)

**Serial ports:** Support two serial ports ,TTL signal

**PS/2 Keyboard and PS/2 Mouse**

**Universal Serial Bus:**

Two independent USB interfaces (OpenHCI, Rev. 1.0) specification compliant

**AC97 codec interface:**

AC97 Specification Revision 1.3, 2.0, and 2.1 compliant interface.

**VGA/Ethernet/IrDA/FDD/Printer/ATX Power (front-end connector):**
**VGA:**

2D Graphics Accelerator, supports VGA and VESA

Display memory: up to4MB share memory

Supports up to 1280x1024x8 bpp and 1024 x768x16 bpp

**10/100 Base T Ethernet interface:** controller RTL8139C ( SOM 2353A only)

**Infrared:** Supports IrDA version 1.0 SIR (115.2kbps), IrDA version 1.1 MIR (1.152M bps) and FIR (4M bps) proocol, and SHART ASK-IR protocol (max baud rate 57.6kbps)

**Supports ATX power supply**

**Floppy disk drive interface/Multi-mode parallel port:**

FDD interface and parallel port share the same bus either FDD or Parallel port can be used at one time.

FDD interface supports up to two floppy disk drives

Parallel supports SPP, ECP and EPP.

**Power management**: Supports power saving modes including Normal/Doze/Sleep modes. APM 1.1 compliant

**30 Pin FPC connector:** 18 bit LCD signal output

***Note: All interfaces are compliant with SOM 144 Specification and Design Guide Rev 1.0***

### 1.2.1 Mechanical and Environmental

**Power supply voltage:** +5 V (4.75 V to 5.25 V)

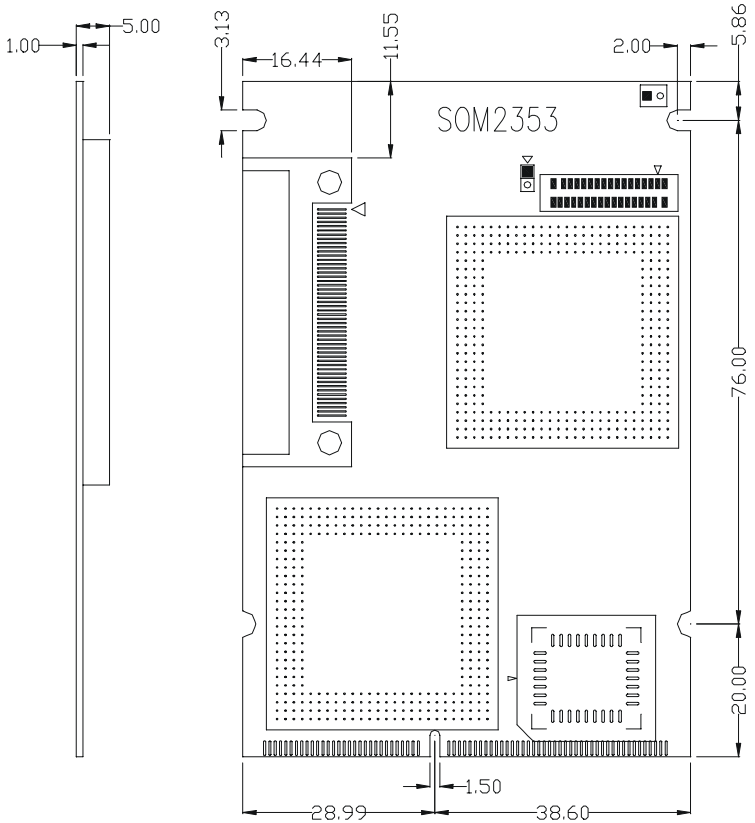
**Max. Power requirements:** +5 V @ 1.6 A

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

**Board Size:** 68 mm x 100 mm

**Weight:** 0.07 Kg

## 1.3 Board layout: dimensions



CHAPTER 2

# Installation

This chapter explains the setup procedures of SOM-2353 hardware, including instructions on setting jumpers and connecting peripherals, switches and indicators. Be sure to read all safety precautions before you begin the installation procedure.

## 2.1 Jumpers and connectors

On-board connectors link to external devices such as hard disk drives, keyboards, floppy drives, and so on. In addition, the board has jumpers for configuring your board for specific applications.

The table below lists the function of each of the board's jumpers and connectors. Later sections in this chapter give detailed information on each jumper setting, and instructions for connecting external devices to your card.

Table 2-1: Jumpers and connectors

| Name | Function |
|---|---|
| CN1 | 30 Pin FPC connector for 18-bit LCD signal |
| CN2 | CompactFlash socket |
| CN3 | SODIMM gold finger (PCI/IDE/ Serial port /USB/AC97/ KB/Mouse ) |
| CN4 | Front-end connector(VGA/Ethernet/IrDA/FDD/Printer/ |
| JP1 | Clear CMOS |

## 2.2 Board layout: jumper/connector locations

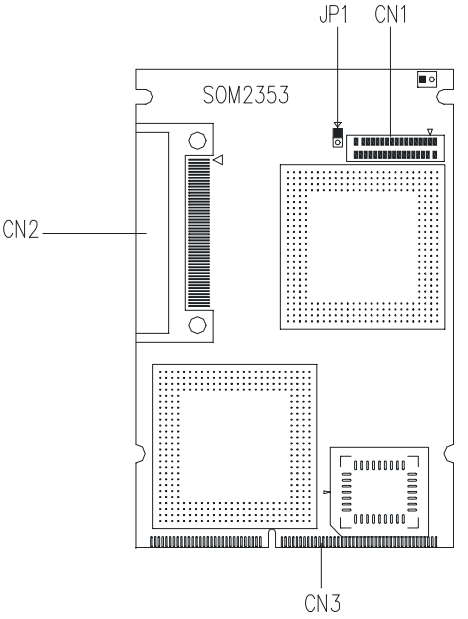



**Figure 2-1: Board layout: jumper/connector locations**

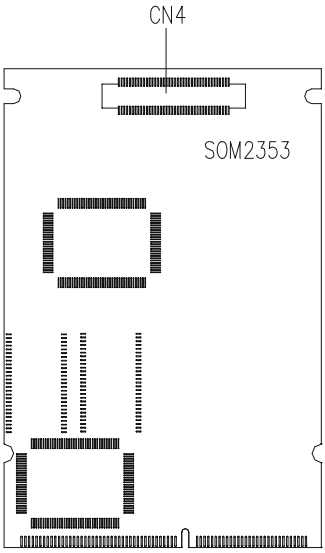



**Figure 2-2: Solder side connectors**

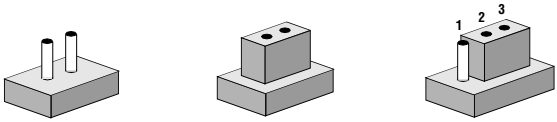
## 2.3 Safety precautions

*Warning!* *Always completely disconnect the power cord from your chassis whenever you are working on it. Do not make connections while the power is on because sensitive electronic components can be damaged by the sudden rush of power. Only experienced electronics personnel should open the PC chassis.*

*Caution!* *Always ground yourself to remove any static charge before touching the CPU card. 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.*

## 2.4 Setting jumpers

You may configure your card to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric 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" a jumper, you connect the pins with the clip. To "open" a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.




**Open** **Closed** **Closed 2-3**

The jumper settings are schematically depicted in this manual as follows:


**Open** **Closed** **Closed 2-3**

A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

Generally, you simply need a standard cable to make most connections.

### 2.4.1 Clear CMOS (J1)

This jumper is used to erase CMOS data and reset system BIOS information.

The procedure for clearing CMOS is:

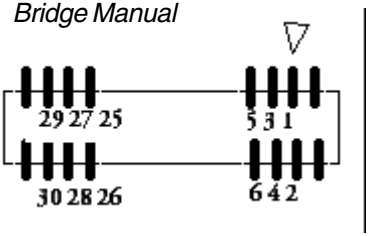
1. Turn off the system.
2. Short pin 1 and pin 2.
3. Turn on the system. The BIOS is now reset to its default setting.

## 2.5 30-pin FPC Connector (CN1)

This connector provides interfaces for 18-bit LCD signal outputs.

To connect a LCD panel output, users need to build their LCD control cirket in the solution board or carrier board that they want to put SOM-2353 module on.

*Note: About the LCD control circuit, please refer SOM-DB2300.pdf or in your CD-ROM and NS Geode™ CS5530A I/O Companion Multi-Function South Bridge Manual*




### 2.5.1 Pinout of 30-pin FPC connector

Table 2-2 30-pin FPC connector (CN1)

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | GND | 2 | FP_DD1 |

| | | | |
|---|---|---|---|
| 3 | FP_DD0 | 4 | FP_DD3 |
| 5 | FP_DD2 | 6 | FP_DD5 |
| 7 | FP_DD4 | 8 | FP_DD7 |
| 9 | FP_DD6 | 10 | GND |
| 11 | FP_DD8 | 12 | FP_DD9 |
| 13 | FP_DD10 | 14 | FP_DD11 |
| 15 | FP_DD12 | 16 | FP_DD13 |
| 17 | FP_DD14 | 18 | FP_DD15 |
| 19 | GND | 20 | FP_DD16 |
| 21 | FP_DD17 | 22 | GND |
| 23 | FP_SCLK | 24 | FP_FVSYNC |
| 25 | FP_ENDISP | 26 | FP_FHSYNC |
| 27 | FP_EN | 28 | FP_BIASEN |
| 29 | FP_VDDEN | 30 | GND |

### 2.5.2 Singal Description

#### GND

Ground

#### FP_DD0~17

**Flat Panel Data Port Lines 17 to 0.**This is the data port to an attached active matrix TFT panel. This port may optionally be tied to a DSTN formatter chip, LVDS transmitter, or digital NTSC/PAL encoder.

F4BAR+Memory Offset 04h[7] enables the flat panel data bus:

0 = FP_DATA[17:0] is forced low

1 = FP_DATA[17:0] is driven based upon power sequence control

#### FP_SCLK

**Flat Panel Clock.**This is the clock for the flat panel interface.

#### FP_FVSYNC

**Flat Panel Vertical Sync Output.**This is the vertical sync for an attached active matrix TFT flat panel. This represents a delayed version of the input flat panel vertical sync signal withthe appropriate pipeline delay relative to the pixel data.

## FP_FHSYNC

**Flat Panel Horizontal Sync Output.**This is the horizontal sync for an attached active matrix TFT flat panel. This represents a delayed version of the input flat panel horizontal sync signal with the appropriate pipeline delay relative to the pixel data.

## FP_EN

**Flat Panel Display Enable Output.**This is the display enable for an attached active matrix TFT flat panel. This.signal qualifies active pixel data on the flat panel interface.

## FP_ENDISP

**Display Enable Input.**This signal qualifies active data on the pixel input port. It is used to qualify active pixel data for all display modes and configurations and is not specific

## FP_BIASEN

**Flat Panel Backlight Enable Output.**This is the enable signal for the backlight power supply to an attached flat panel. It is under control of the power sequence control logic.

## FP_VDDEN

**Flat Panel VDD Enable.**This is the enable signal for the VDD supply to an attached flat panel. It is under the control of power sequence control logic. A transition on bit 6 of the DisplayConfiguration Register (F4BAR+Memory Offset 04h) initiates a power-up/down sequence.

## 2.6 CompactFlash interface (CN2)

This socket accepts an IDE-compatible CompactFlash memory card.

The CompactFlash interface uses a secondary IDE channel, which should be set as the master channel.

## 2.7 144-pin SODIMM of SOM 144/PCI (PCI/ IDE/ Serial port /USB/AC97/KB/Mouse) (CN3)

The SOM-2353 is compliant with *SOM 144 Design Specification Rev. 1.0.* For the description of each signal, please refer this document. You may find it in the CD-ROM that comes with your SOM-2353 module.

## 2.8 Recommended front-end 80-pin connector (VGA/Ethernet/IrDA/Printer/FDD/ ATX) (CN4)

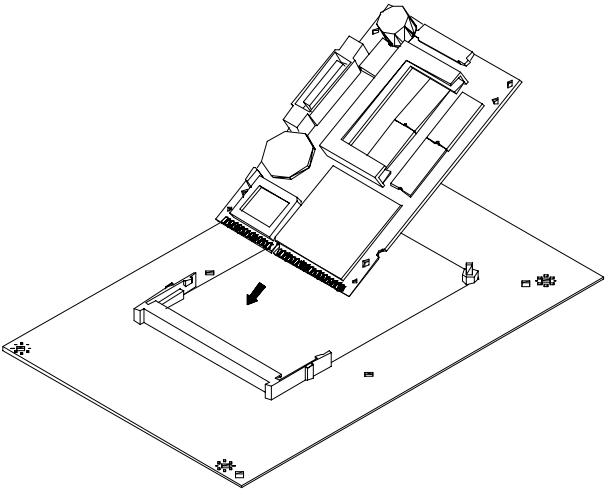
The SOM-2353 is compliant with the SOM 144 Design Specification Rev. 1.0. For the description of each signal, please refer to this document. It is included on the CD-ROM that comes with your SOM-2353 module.

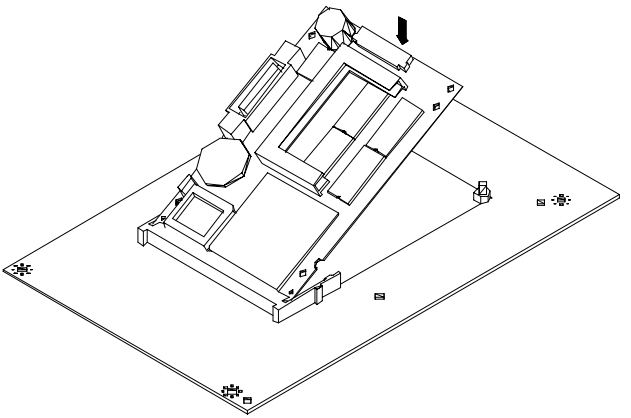
## 2.9 Card installation

1. Plug SOM 144 module into the solution board's SODIMM socket.

2. Connet the front-end connector to the solution board

3. Must screw the SOM 144 module and the solution board together.



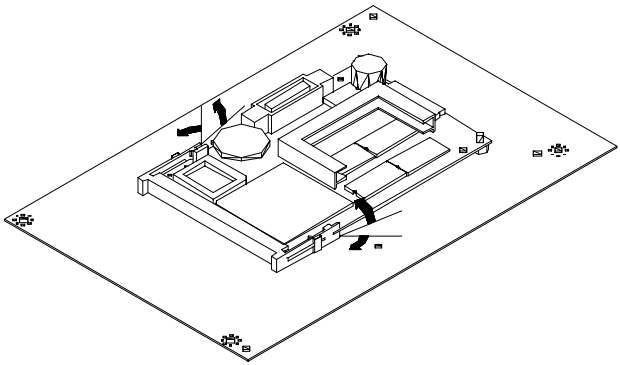


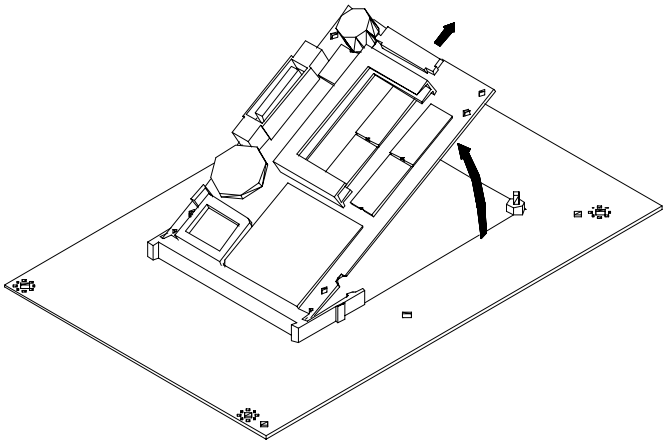
## 2.10 Card removal

1. Unscrew two screws.

2. Bend out the positioning holders of SODIMM socket and release the SOM 144 module.

3. Unplug SOM 144 module from the socket.





CHAPTER 3

# Software Configuration

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

Sections include:

- VGA display software configuration
- Ethernet interface configuration

## 3.1 Introduction

The SOM-2353 system BIOS and custom drivers are located in a 256 KB, 32-pin Flash ROM device, designated U14. 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-2353 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:

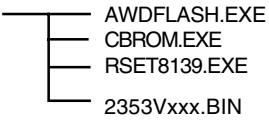



**Figure 3-1: Contents of the SOM-2353 utility disk**

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

**2353V110.BIN**
This binary file contains the system BIOS.

**CBROM.EXE**
This program allows you to combine your own VGA BIOS with system BIOS (2353V110.BIN).

**RSET8139.EXE**

This program enables you to view the current Ethernet configuration, reconfigure the Ethernet interface (medium type, etc.), and execute useful diagnostic functions.

## 3.3 VGA display software configuration

The SOM-2353 on-board VGA/LCD interface supports an 18-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 16 bpp. It is also capable of driving color panel displays with resolutions of 1024 x 768 in 18 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-2353 with a color TFT display attached. This is the default setting for the SOM-2353. 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:

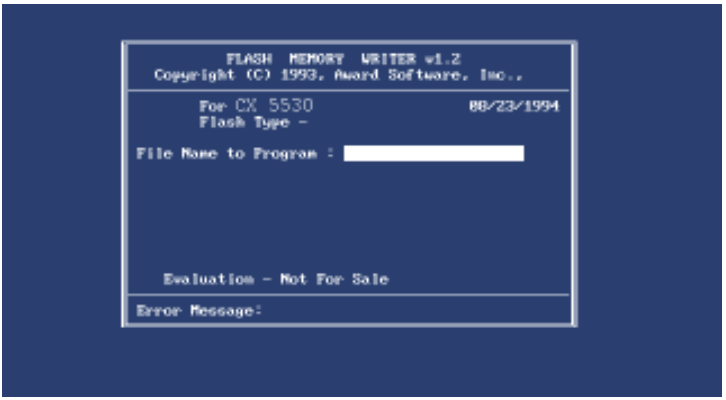



**Figure 3-2: BIOS VGA setup screen**

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 Ethernet interface configuration

The SOM-2353 on-board Ethernet interface supports all major network operating systems. To configure the medium type, to view the current configuration, or to run diagnostics, do the following:

1. Power the SOM-2353 on. Make sure that the RSET8139.EXE file is located in the working drive.
2. At the prompt, type RSET8139.EXE and press <Enter>. The Ethernet configuration program will then be displayed.
3. This simple screen shows all the available options for the Ethernet interface. Just highlight the option you wish to change by using the Up and Down keys. To change a selected item, press <Enter>, and a screen will appear with the available options. Highlight your option and press <Enter>. Each highlighted option has a helpful message guide displayed at the bottom of the screen for additional information.
4. After you have made your selections and are sure this is the configuration you want, press ESC. A prompt will appear asking if you want to save the configuration. Press Y if you want to save.

The Ethernet Setup Menu also offers three very useful diagnostic functions. These are:

1. Run EEPROM test
2. Run Diagnostics on Board
3. Run Diagnostics on Network

Each option has its own display screen that shows the format and result of any diagnostic tests undertaken.

APPENDIX A

# System Assignments

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

# A.1 System I/O ports

Table A-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) control |
| 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 |
| 170- 178 | 2nd fixed disk for CompactFlash |
| 1F0-1F8 | 1st fixed disk |
| 200-207 | Game I/O |
| 278-27F | LPT2 |
| 2F8-2FF | Serial port 2 |
| 360-36F | Reserved |
| 378-37F | Parallel printer port 1 (LPT1) |
| 380-38F | SDLC, bisynchronous 2 |
| 3A0-3AF | Bisynchronous 1 |
| 3B0-3BF | Monochrome display and printer adapter |
| 3C0-3CF | EGA |
| 3D0-3DF | Color/graphics monitor adapter |
| 3F0-3F7 | Diskette controller |
| 3F8-3FF | Serial port 1 |

* PNP audio I/O map range from 220 ~ 250H (16 bytes)
  MPU-401 select from 300 ~ 330H (2 bytes)

** default setting

## A.2 DMA channel assignments

Table A-2: DMA channel assignments

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

* Audio DMA default setting: DMA 1.5

Audio Low DMA select: DMA 1.3

Audio High DMA select: DMA 5.6.7

** Parallel port DMA default setting: DMA 3

Parallel port DMA select: DMA 1.3

## A.3 Interrupt assignments

Table A-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 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 |
| IRQ 3 | Serial communication port 2 |
| IRQ 4 | Serial communication port 1 |
| IRQ 5 | Audio* |
| IRQ 6 | Diskette controller (FDC) |
| IRQ 7 | Parallel port 1 (print port) |

* Audio default setting: IRQ5
  USB and Ethernet IRQ is automatically set by the system

## A.4 1st MB memory map

Table A-4: 1st MB memory map

| Addr. range (Hex) | Device |
|---|---|
| E000h - FFFFh | System ROM |
| C800h - 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 |

* default setting

APPENDIX B

# LCD Services

This appendix contains information of a detailed or specialized nature. It includes information about 18-bit TFT LCD interfaces.

## B.1 LCD services

LCD screens are very popular on Advantech's CPU cards, biscuit PCs and POS series products, such as the PCA-6135/6145/6153, and PCA-6751/PCA-6751V. "Lighting" LCDs is virtually impossible without technical expertise. Advantech provides LCD lighting and integration services to assist our customers in setting up their systems. Advantech's LCD lighting guide explains how to make connections between LCD interfaces and LCD panels, as well as how to control contrast, brightness, $V_{EE}$ source, LCD inverter and all other factors that affect the successful installation of LCD panels.

The following information details our LCD lighting services:

a) This policy is only valid for Advantech products that include LCD support

b) The customer should **send** the following LCD components for service:

- DC-AC inverter and cable (i.e. connector with/without wires) and data sheet
- LCD flat panel and cable (connector with/without wires) and complete data sheet

c) Advantech will normally charge the customer a deposit. The deposit will be refunded when servicing exceeds a minimum volume

d) The customer must sign the agreement and fax it to us prior to sending the LCD package. Advantech reserves the right to refuse service if the customer cannot provide the required documents and auxiliary parts

e) Advantech will supply a BIOS file and connection cable to the customer upon completing the service

f) A minimum of seven working days is required for completion of service, starting from receipt of the LCD package by Advantech

For the 18-bit TFT display support list, please contact our customer service department for more detailed information and service files. See our web site at: **http://support.advantech.com/**