NOVA-4898-R3

Low Power GXLV/GX1 MMX with SVGA/LCD, Ethernet, & Audio SBC.

PCB Version 3.3

User Manual

Version 3.3

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1. Introduction

NOVA-4898 is designed for limited space applications with only the size of a 5 1/4 " hard drive. It supports the full functions of an AT& ATX-compatible industrial computer on a single board. The NOVA-4898 is equipped with a low-power consumption and high performance GX1 processor on board. It also contains an SDRAM DIMM socket that can support up to 512 MB memory.

The NOVA-4898 provides an Ethernet interface, audio interface, and socket for DiskOnChip, EIDE interface, one parallel port, three RS-232 serial ports, one RS-232/422/485 serial port with auto-direction, and a PS/2 keyboard/mouse interface. The built-in SVGA/LCD display controller supports both the CRT and LCD display simultaneously. It offers the resolutions of LCD screen up to 800 x 600 and CRT resolutions up to 1280 x 1024 @ 256 colors &1024x 768 @ 16 bpp. It also provides TV-OUT interface for PAL or NTSC TV. The display type is configured through software utility. The Flash ROM contains both the system BIOS and the VGA BIOS. If necessary, reprogramming the Flash ROM allows modifications.

The RS485 has an outstanding feature of intelligent directing control, which eliminates the extra control signal such as RTS. With this feature you can develop your program using your normal RS232, no need to change to a special control routine. This feature is especially important in WINDOWS programming where the program do not allow you to catch the control pin freely.

Finally, one PC/104 connector and one PCI slots are included for the future application that might come in handy.

1.1 Specifications

- **NS GX1-233/266/300 MMX 32-Bit x86 Processor:**
  - ✓ Supports Intel MMX instruction set extension for the acceleration of multi media applications
  - ✓ 16 KB unified L1 cache
  - ✓ Five-stage pipelined integer unit
  - ✓ Integrated Floating Point Unit（FPU）
- **System memory:** One 168-pin DIMM socket support up to 512MB SDRAM
- **BIOS:** AWARD 256 KB Flash memory
- **Display Controller:**
  - ✓ MediaGx processor has implemented the UMA technology that provides 1.5~4MB display memory, setup through BIOS Setup Menu.
  - ✓ Support CRT and TFT LCD displays simultaneously
  - ✓ Support 18-bit TFT LCD panel resolution up to 800x600 @ 18bpp
  - ✓ Support non-interlaced CRT monitors resolutions up to 1280x1024 @ 256 colors &1024x768 @ 16bpp
- **Audio:**
  - ✓ Compliant to AC97, support stereo
  - ✓ Connector: Speaker, Mic-in, Line-in, Line-out, CD-in
- **TV-OUT:** Support both NTSC and PAL.
- **IDE interface:** The IDE support to four PCI Enhanced IDE hard drives
- **FDD interface:** Support up to two floppy disk drives, 5.25"（360KB and 1.2MB）and/or 3.5"（720KB, 1.44MB, and 2.88MB）
- **Serial ports:** four RS232 ports, one RS232 port can be set to RS-422/485 with Self-Tuner technology or can be set to infrared port with Transfer rate up to 115 KBPS
- **Parallel port:** One Parallel port, supports SPP/EPP/ECP mode

- **PS/2 Mouse/Keyboard connector:** A 6-pin connector for easy connection to a keyboard or PS/2 mouse
- **USB interface:** Two USB ports, USB 1.0 compliant
- **Power management**: supports power saving modes including Normal/Doze/Sleep modes. APM1.1 compliant
- **Watchdog timer:** can be set by 1-255 seconds period. Reset or NMI was generated when CPU did not periodically trigger the timer.
- **10/100Mbps Ethernet Controller:** Intel 82559,82551,or Realtek RTL8100BL IEEE802.u 100 BASE-TX standard Dual Auto -sensing interface to 10MBps or 100MBps networks. On board RJ45 connectors provide for easy connection.
- **DiskOnChip**^{TM} **Flash Disk:** supports one 32-pin socket for DiskOnChip Flash Disk
- **CompactFlash Disk:** The CompactFlash Storage Card also runs in True IDE Mode that is compatible with an IDE disk drive. It can be used with a passive adapter in a Type II socket.
- **Expansion bus:** one **PC/104** and one **PCI slot**
- **Power supply:** +5V @1.8A（typical）,+12V @50mA（typical）Power supply can use 5V only , +5V @2.0A (typical)
- **Operating temperature:** -10~60℃
- **Dimension:** 8″（L）x5.75″（W）（203mmx146mm）

1.2 Package Contents

Before you begin installing the product, please check that all of the following listed materials are included in the package:

- 1 NOVA-4898 All-in-one single board computer
- 1 CD disk for utility and drivers
- 1 3.5" IDE flat cable (40-pin to 40-pin 2.54mm pitch)
- 1 standard D25 connector for parallel cable (Printer)
- 3 serial port flat cable (RS-232 , 2.54mm pitch)
- 1 combo serial port cable (RS-232/422/485 , 2.54mm pitch)
- 1 floppy cable (for 3.5" FDD only)
- 1 2.5" IDE flat cable (44-pin to 44-pin 2.0mm pitch)
- 1 VGA ROUND CABLE(10 pin to D-SUB 15 pin)
- 1 one to two 6pin mini Din Connector for keyboard and mouse
- 1 audio cable sets •
- 1 TV AV cable •
- 1 LCD 44 Pin Connector (FP24-01A)•

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

2. Installation

This chapter gives you a step-by-step guidance as to install NOVA-4898 hardware, including directions on how to configure the setting for jumpers and connecting peripherals, switches and indicators. Before installation, please pay attention to the unpacking precautions on the following page for safety.

2.1 NOVA-4898 Block Diagram & Board Layout
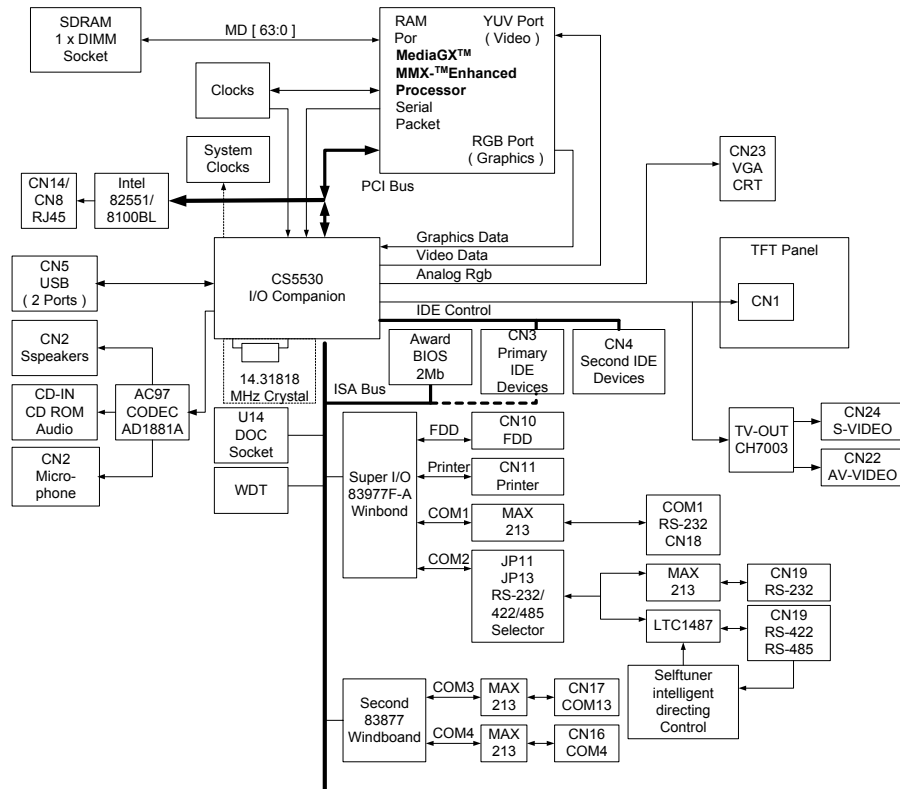
NOVA-4898
VER3.3

2.2 Unpacking Precautions

Some components of NOVA-4898 SBC are very sensitive to static electric charges and can be damaged by a sudden rush of power. To protect it from unintended damage, be sure to note these precautions:

- Ground yourself to remove any static charge before touching the NOVA-4898 SBC. You can do it by using a grounded wrist strap at all times or by frequently touching any conducting materials that is connected to the ground.
- Handle your NOVA-4898 SBC by its edges. If not necessary, don't touch IC chips, leads or circuitry.
- Do not plug any connector or jumper while the power is on.
- There is one 168-pin DIMM socket that accept 3.3V non-buffered SDRAM. The max. Memory size is 512MB.

2.3 Compact Flash Setting (JP3)

Set the operating mode of CompactFlash disk

- **JP3 : Compact Flash Setting**

Address	JP3
MASTER	CLOSE
SLAVE	**OPEN**

2.4 Watchdog Timer Setting

Reading port 443H enables the Watchdog Timer. It should be triggered before the time-out period ends, otherwise it will assume the program operation is abnormal and will issue a reset signal to start again, or activate NMI to CPU. Reading port 043/843H disables the Watchdog Timer. For detail information about Watch-Dog Timer Refer to Appendix A

- **JP14 : Watchdog Active Type Setting**

JP14	DESCRIPTION
1-2	Activate NMI to CPU when WDT time-out
2-3	Reset when WDT time-out
OPEN	Disable WDT

2.5 Clear CMOS Setup

If you need to clear the CMOS Setup (for example when you forget the password, you should first clear the CMOS setup and then reset the password), you should close JP9 for about 3 seconds, then open it again. To set back to normal operation mode, please open JP9.

- **JP9: Clear CMOS Setup (Reserve Function)**

JP9	DESCRIPTION
1-2	**Normal Operation**
2-3	Clear CMOS Setup

2.6 COM2 Setting JP11, JP12 , JP13

The COM2 (CN19) can supply +5V or +12V power to the serial devices via RI pin (Pin 8) of the COM port connector. The maximum electric current is 1A with fuse protection leading from these two connector's 5V/12V output. If the output is set to 12V, make sure that you have 12V power supply connected to the board.

CN19 Pin 8	JP11	JP12
RI Signal	2-3	Disregard
+5V	**1-2**	**2-3**
+12V	**1-2**	**1-2**

● **COM2 RS-232, RS-422 or RS-485 Setting JP13**

The COM2 (CN19) can be set to RS-232 or RS-422/485 for industrial field site application. Moreover when this port is set to RS-485 mode the board equipped self-tuner IC will automatically sense the data direction to eliminate data collision. This feature is particularly important in WINDOWS programming where the program do not allow you to catch the control pin freely.

JP13	DESCRIPTION
1-2	**RS232**
2-3	RS422/RS485

2.7 LCD Voltage Selector

The LCD interface connector CN1 can provide 5V or 3.3V power supply by selecting the JP1 to meet the different LCD requirement.

JP1	DESCRIPTION
1-2	5V
2-3	**3.3V**

● **JP2: LCD CLOCK Setting**

JP2	DESCRIPTION
1-2	Normal
2-3	**Inverse**

2.8 DiskOnChip™ Flash Disk Memory Address Setting

The DiskOnChip™ Flash Disk Chip (DOC) is manufactured by M-Systems. As the DOC is 100% compatible to hard disk so DOS Customer doesn't need to install any extra software utility. The "Plug and play" feature is both easy and reliable. Right now DOC is available from 2MB to 144MB.**The MD-2200-Xmb series DOC will share only 8KB memory address.**

● **JP7 & JP8: DiskOnChip Memory Address Setting**

ADDRESS	JP8				JP7		
	1-2	3-4	5-6	7-8	1-2	3-4	5-6
CC000	OPEN	OPEN	CLOSE	OPEN	OPEN	CLOSE	CLOSE
CE000	OPEN	OPEN	OPEN	CLOSE	OPEN	CLOSE	CLOSE
D0000	CLOSE	OPEN	OPEN	OPEN	CLOSE	OPEN	CLOSE
D2000	OPEN	CLOSE	OPEN	OPEN	CLOSE	OPEN	CLOSE
D4000	OPEN	OPEN	CLOSE	OPEN	CLOSE	OPEN	CLOSE
D6000	OPEN	OPEN	OPEN	CLOSE	CLOSE	OPEN	CLOSE
D8000	CLOSE	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSE
DA000	OPEN	CLOSE	OPEN	OPEN	OPEN	OPEN	CLOSE
DC000	OPEN	OPEN	CLOSE	OPEN	OPEN	OPEN	CLOSE
DE000	OPEN	OPEN	OPEN	CLOSE	OPEN	OPEN	CLOSE

3. Connection

In this chapter, you can find a detailed guide on how to connect peripherals, switches and indicators to the NOVA-4898 board.

3.1 Floppy Disk Drive Connector (CN10)

NOVA-4898 board is equipped with a 34-pin daisy-chain driver connector cable.

● **CN10: FDC CONNECTOR**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GROUND	2	REDUCE WRITE
3	GROUND	4	N/C
5	GROUND	6	N/C
7	GROUND	8	INDEX#
9	GROUND	10	MOTOR ENABLE A#
11	GROUND	12	DRIVE SELECT B#
13	GROUND	14	DRIVE SELECT A#
15	GROUND	16	MOTOR ENABLE B#
17	GROUND	18	DIRECTION#
19	GROUND	20	STEP#
21	GROUND	22	WRITE DATA#
23	GROUND	24	WRITE GATE#
25	GROUND	26	TRACK 0#
27	GROUND	28	WRITE PROTECT#
29	GROUND	30	READ DATA#
31	GROUND	32	SIDE 1 SELECT#
33	GROUND	34	DISK CHANGE#

3.2 PCI E-IDE Disk Drive Connector (CN3,CN4)

For IDE HDD connection, The NOVA-4898 was designed with one 2.54mm connector (CN3) & one 2.0mm connector (CN4), which could be converted to two 2.54mm standard IDE connector via proprietary cable. Using these cables you can attach up to four IDE hard disk drives to the NOVA-4898.

● **CN3: 40-pin Primary IDE Interface Connector**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	IDE DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	IDE CHRDY	28	GROUND
29	IDE DACK	30	GROUND−DEFAULT
31	INTERRUPT	32	N/C
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND

- **CN4: 44-pin Secondary Mini-pitched IDE Interface Connector**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	IDE DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	IDE CHRDY	28	GROUND
29	IDE DACK	30	GROUND–DEFAULT
31	INTERRUPT	32	N/C
33	SA1	34	N/C
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND
41	VCC	42	VCC
43	GROUND	44	N/C

3.3 Parallel Port (CN11)

This port is usually connected to a printer; The NOVA-4898 includes an on-board parallel port (CN11) that is accessed through a 26-pin flat-cable connector.

● **CN11: Parallel Port Connector**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	STROBE#	2	DATA 0
3	DATA 1	4	DATA 2
5	DATA 3	6	DATA 4
7	DATA 5	8	DATA 6
9	DATA 7	10	ACKNOWLEDGE
11	BUSY	12	PAPER EMPTY
13	PRINTER SELECT	14	AUTO FORM FEED #
15	ERROR#	16	INITIALIZE
17	PRINTER SELECT LN#	18	GROUND
19	GROUND	20	GROUND
21	GROUND	22	GROUND
23	GROUND	24	GROUND
25	GROUND	26	N/C

3.4 Serial Ports (CN16, CN17, CN18, CN19)

The NOVA-4898 offers four high speeds NS16C550 compatible UARTs with Read/Receive 16 byte FIFO serial ports. These ports let you connect to serial devices or a communication network. Three 10-pin headers and one 14-pin header are provided. For detailed pin assignment of the these connectors please refer to the following tables:

● **CN18 (com1), Serial Port (10-pin Header/W Housing)**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	GND	10	GND

● **CN17 (com3), CN16 (com4): Serial Port Connector (10-pin Header/W Housing)**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	N/C

● **CN19 (com2): Serial Port Connector (14-pin Header/W Housing)**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION	
1	DCD	2	DSR	
3	RXD	4	RTS	RS-232
5	TXD	6	CTS	
7	DTR	8	RI	
9	GND	10	N/C	
11	RS422/RS485 TX2+	12	RS422/RS485 TX2-	RS-422/485
13	RS422 RX2+	14	RS422 RX2-	

Note: If you want to use the RS485, just connect to TX2-, TX2+. If you want to use the RS422, please connect to TX2-, TX2+, RX2+, and RX2-.

3.5 Audio Connector

The audio function was organized by CX5530 I/O companions and NS AD1881 CODEC, which compliant with AC97. You can use CD-IN as the input port (e.g.: connected to the output of CD player), depending on the type of connector that you have.

● **CD-IN: CD_AUDIO INPUT Connector**

PIN NO.	DESCRIPTION
1	JCD_R
2	GND
3	GND
4	JCD_L

- **CN2: Audio Connector**

  This is the output port of your Sound System. Pin 1-2-3 can be connected to earphone and 5-6-7 can be connected to loudspeaker. Pin 9-10-11 can be used as input port if it is connected to the earphone jack of your CD. Pin 15-16 is for microphone.

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	LINE OUT R	2	GND
3	LINE OUT L	4	GND
5	LINE OUT R	6	LINE OUT L
7	GND	8	GND
9	LINE IN L	10	LINE IN R
11	GND	12	GND
13	GND	14	GND
15	MIC IN	16	GND

3.6 Keyboard & PS/2 Mouse Connector (CN13)

A 6-pin connector (CN13) is provided for easy connection to a keyboard or PS/2 mouse. The card comes with a cable to convert from the 6-pin connector to a two 6-pin mini-DIN connector for keyboard and mouse connection.

- **CN13: 6-pin Keyboard & Mouse Connector**

PIN NO.	DESCRIPTION
1	+5V
2	MOUSE DATA
3	MOUSE CLOCK
4	KEYBOARD DATA
5	KEYBOARD CLOCK
6	GROUND

3.7 USB Port Connector CN5

The NOVA-4898 provides two USB interfaces, which give the completed plug and play, for up to 127 external devices.

- **CN5: Internal USB Connector**

1.	USBVCC1	5.	GND
2.	D1F-	6.	D2F+
3.	D1F+	7.	D2F-
4.	GND	8.	USBVCC2

3.8 IrDA Infrared Interface Port (CN6)

The NOVA-4898 has in it a built-in IrDA port which supports Serial Infrared (SIR) or Amplitude Shift Keyed IR (ASKIR) interface. When you want to use IrDA port, then you would have to set SIR or ASKIR model in the BIOS's Peripheral Setup's COM2 after which the normal RS-232 COM2 will be disabled.

- **CN6: IrDA Connector**

PIN NO.	DESCRIPTION
1	VCC
2	
3	IRRX
4	Ground
5	IR-TX
6	

3.9 VGA Connector (CN23)

The NOVA-4898 has a built-in 10-pin VGA connector and comes with a cable to convert from the 10-pin connector to 15-pin VGA connector allows direct connection to the CRT monitor.

- **CN23: 10-pin VGA Connector**

1	RED	6	DDCCLK
2	GREEN	7	DDCDAT
3	BLUE	8	GROUND
4	HSYNC	9	GROUND
5	VSYNC	10	GROUND

3.10 LCD Interface Connector

The NOVA-4898 provides a 2x25-pin connector CN1, for the LCD flat panel interface and the LVDS flat panel interface.

- **CN1: 50-pin LCD Connector**

PIN NO.	Description	PIN NO.	Description
1	N/C	2	N/C
3	N/C	4	N/C
5	N/C	6	N/C
7	N/C	8	N/C
9	N/C	10	N/C
11	N/C	12	N/C
13	N/C	14	RED3
15	RED5	16	RED4
17	N/C	18	RED2
19	N/C	20	RED0
21	RED1	22	GREEN4
23	GREEN3	24	GREEN2
25	GREEN5	26	GREEN1
27	BLUE5	28	GREEN0
29	FPVCC	30	FPVCC

31	N/C	32	N/C
33	BLUE2	34	BLUE 4
35	BLUE1	36	BLUE 3
37	BLUE0	38	N/C
39	M	40	N/C
41	SHFCLK	42	ENABKL
43	FPVCC	44	FLM
45	FPVEE	46	LP
47	GROUND	48	GROUND
49	+12V	50	+12V

The NOVA-4898 can also support TFT LCD panels, specifications and other details listed below: (Please note that this is just a reference table, NOVA-4898 may support even more types of panels listed herein.)

Video Display type	Resolution	Example
TFT VGA	640X480, 64K Color, 18bits	Toshiba LTM10C209A
TFT VGA	640X480, 64K Color, 18bits	PRIME VIEW P46CV1
TFT VGA	640X480, 64K Color, 18bits	NEC NL6448AC33-18
TFT SVGA	800X600, 64K Color, 18bits	IMES M121-53H
TFT SVGA	800X600, 64K Color, 18bits	Toshiba LTM12C289A
TFT SVGA	800X600, 64K Color, 18bits	Toshiba LTM12C275A

The display options need to be setup manually from BIOS. The BIOS "**Integrated Peripheral**" Setup will allow you to choose display resolution either 640X480 or 800X600.

LCD Interface Connector – only support up to 18 bit TFT-LCD. For better display quality, the length of LCD cable should be shorter than 35 cm.

3.11 LAN RJ45 Connector and Ethernet LED

The NOVA-4898 built-in RJ45 LAN connector is for 10/100Mbps Ethernet (Intel 82559 or Realtek 8100).

● **CN14: LAN RJ45 Connector**

1	TX+	5	GND
2	TX-	6	RX-
3	RX+	7	GND
4	GND	8	GND

● **CN8: LAN RJ45 & LAN LED Connector**

1	D0+	2	D0-
3	RX+	4	RX-
5	D1-	6	GROUND
7	D1+	8	GROUND
9	TX+	10	TX-

● **JP16: Ethernet LED setup**

LED	Description
D1	Speed
D2	Active

● **JP16: Ethernet LED Connector**

PIN NO	Description
1	D1+
2	D1-
3	D2+
4	D2-

3.12 External Switches and Indicators (JP15)

There are several external switches and indicators that allow you to monitor and control your CPU board. All these functions are in the JP15 connector.

- **JP15: External Switches and Indicators**

	PIN	DESCRIPTION	PIN	DESCRIPTION	
Power LED	2	+5V	1	Speaker	Speaker
	4	N/C	3	N/C	
	6	GND	5	N/C	
KeyLock	8	KeyLock	7	+5V	
	10	GND	9	Reset Switch	Reset button
	12	GND	11	GND	
	14	N/C	13	IDE LED	IDE LED
ATX Signal	16	ATX Power Control Pin	15	+5V	
	18	ATX 5Vsb	17	ATX Power Button Pin1	* ATX Power Button
	20	ATX 5Vsb	19	ATX Power Button Pin2	

3.13 External Power Connector

The NOVA-4898 has an on-board external power connector CN20. You can connect power directly to the CPU board.

- **CN20: External Power Connector**

PIN NO.	DESCRIPTION
1	+12V
2	GROUND
3	GROUND
4	VCC5V

3.14 PC/104 Connection Bus

The NOVA-4898 PC/104 expansion bus let you attach any kind of PC/104 modules. The PC/104 bus has already become the industrial embedded PC bus standard, so you can easily install over thousands of PC/104 modules from hundreds of vendors in the world. There are two PC/104 connectors on this board: PC/104-64 and PC/104-40.

● **CN9: PC/104-40 Connector**

PIN NO.	Description	PIN NO	Description
1	GND	21	GND
2	MCS16#	22	SBHE#
3	IOCS16#	23	LA23
4	IRQ10	24	LA22
5	IRQ11	25	LA21
6	IRQ12	26	LA20
7	IRQ15	27	LA19
8	IRQ14	28	LA18
9	DACK0#	29	LA17
10	DRQ0	30	MEMR#
11	DACK5#	31	MEMW#
12	DRQ5	32	SD8
13	DACK6#	33	SD9
14	DRQ6	34	SD10
15	DACK7#	35	SD11
16	DRQ7	36	SD12
17	VCC	37	SD13
18	MASTER#	38	SD14
19	GND	39	SD15
20	GND	40	GND

● **CN7: PC/104-64 Connector**

PIN NO.	Description	PIN NO.	Description
1	IOCHCK#	33	GND
2	SD7	34	IRSTDRV
3	SD6	35	VCC
4	SD5	36	IRQ9
5	SD4	37	-5V
6	SD3	38	DRQ2
7	SD2	39	-12V
8	SD1	40	ZWS
9	SD0	41	+12V
10	IOCHRDY	42	GND
11	AEN	43	SMEMW#
12	LA19	44	SMEMR#
13	LA18	45	IOW#

14	LA17	46	IOR#
15	SA16	47	DACK3#
16	SA15	48	DRQ3
17	SA14	49	DACK1#
18	SA13	50	DRQ1
19	SA12	51	REFRESH#
20	SA11	52	SYSCLK
21	SA10	53	IRQ7
22	SA9	54	IRQ6
23	SA8	55	IRQ5
24	SA7	56	IRQ4
25	SA6	57	IRQ3
26	SA5	58	DACK2
27	SA4	59	TC
28	SA3	60	BALE
29	SA2	61	VCC
30	SA1	62	OSC
31	SA0	63	GND
32	GND	64	GND

3.15 Digital I/O (CN12)

One characteristic of digital circuit is its fast response to high or low signal. This kind of response is highly needed for harsh and critical industrial operating environment. This is the reason we designed 4-bit digital inputs and 4-bit digital outputs on the NOVA-4898.

Digital Input and Output, generally, are just control signals. You can use these signals to control external devices that needs to turn On/Off circuit or TTL devices. The register address is 240H, 260H or 280H, which is selected and setup in BIOS SETUP MENU. You can read or write data to the selected address to enable the function of digital IO.

- **CN12: Digital I/O**

READ		WRITE	
Bit0	DIN0	Bit0	DO0
Bit1	DIN1	Bit1	DO1
Bit2	DIN2	Bit2	DO2
Bit3	DIN3	Bit3	DO3

PIN #	Signal Name	PIN #	Signal Name
1	GND	2	VCC
3	DO3	4	DO2
5	DO1	6	DO0
7	DIN3	8	DIN2
9	DIN1	10	DIN0

3.16 TV-OUT (CN22, CN24)

Provide composite and S-video & AV-video TV-OUT for NTSC or PAL.

- **CN22: AV-Video**

PIN #	Signal Name	PIN #	Signal Name
1	COMPOSITE	2	GND

- **CN24: S-Video**

PIN #	Signal Name	PIN #	Signal Name
1	CHROME	2	GND
3	LUME	4	GND

4. AWARD BIOS Setup

NOVA-4898 uses the AWARD PCI/ISA BIOS for system configuration. The AWARD BIOS setup program is designed to provide maximum flexibility in configuring the system by offering various options that may be selected to meet end-user requirements. This chapter is written to assist you in the proper usage of these features.

4.1 Getting Start

When you turn on the power button, the BIOS will enter the Power-On-Self-Test routines. These routines will be executed for system test, initialization and system configuration verification. After the POST routines are completed, the following message appears:

" Hit DEL if you want to run SETUP"

To access AWARD BIOS SETUP UTILITY, press <Del> key. The following screen will be displayed at this time:

```
                    ROM PCI/ISA BIOS (2A434I9A)
                        CMOS SETUP UTILITY
                       AWARD SOFTWARE, INC.

    STANDARD CMOS SETUP            INTEGRATED PERIPHERALS

    BIOS FEATURES SETUP            PASSWORD SETTING

    CHIPSET FEATURES SETUP         IDE HDD AUTO DETECTION

    POWER MANAGEMENT SETUP         SAVE & EXIT SETUP

    PNP/PCI CONFIGURATION          EXIT WITHOUT SAVING

    LOAD BIOS DEFAULTS

    LOAD SETUP DEFAULTS

    Esc : Quit                     ↑ ↓ → ←   : Select Item
    F10 : Save & Exit Setup        (Shift)F2 : Change Color

```

4.2 Standard CMOS Setup

The Standard CMOS Setup is used for basic hardware system configuration. The main function is for Date/Time setting and Floppy/Hard Disk Drive setting. Please refer the following screen for this setup.

```
                      ROM PCI/ISA BIOS (2A434I9A)
                         STANDARD CMOS SETUP
                         AWARD SOFTWARE, INC.

     Date (mm:dd:yy) : Wed, Dec 20 2000
     Time (hh:mm:ss) : 20 :  3 : 42

     HARD DISKS          TYPE    SIZE   CYLS HEAD PRECOMP LANDZ SECTOR  MODE

     Primary Master   :    0       0      0    0       0     0      0  CHS
     Primary Slave    :    0       0      0    0       0     0      0  CHS
     Secondary Master :    0       0      0    0       0     0      0  CHS
     Secondary Slave  :    0       0      0    0       0     0      0  CHS

     Drive A : None
     Drive B : None

     Video   : EGA/VGA
     Halt On : All Errors


     ESC : Quit              ↑ ↓ → ←   : Select Item      PU/PD/+/- : Modify
     F1  : Help              (Shift)F2 : Change Color
```

To set the Date, for example, press either the arrow or <Enter> button on your keyboard to select one of the fields (Month, Date or Year) then press either <PgUp> or <PgDn> to increase or decrease the value of that field. Follow the same steps for Time setting.

For IDE hard disk drive setup, please check the following possible setup procedure:
1. Use the Auto setting for detection during boot-up.
2. Use the IDE HDD AUTO DETECTION in the main menu; the computer will automatically detect the HDD specifications.
3. Manually enter the specifications by yourself from the "User" option.

Note:

If you need more information on any particular field, just highlight it then press <F1> button. A pop-up window will come out to give you more information on that field.

4.3 BIOS Features Setup

This BIOS Features Setup is designed for the 'fine tuning' of your system in order to improve its performance. In normal operation, you don't have to change any default setting. The default setting is pre-set for most reliable operation.

```
                        ROM PCI/ISA BIOS (2A434I9A)
                           BIOS FEATURES SETUP
                           AWARD SOFTWARE, INC.

    Virus Warning              : Disabled   Video  BIOS Shadow  : Enabled
    CPU Internal Cache         : Enabled    C8000-CBFFF Shadow  : Disabled
                                            CC000-CFFFF Shadow  : Disabled
    Quick Power On Self Test   : Enabled    D0000-D3FFF Shadow  : Disabled
    Boot Sequence              : A,C,SCSI   D4000-D7FFF Shadow  : Disabled
    Swap Floppy Drive          : Disabled   D8000-DBFFF Shadow  : Disabled
    Boot Up Floppy Seek        : Enabled    DC000-DFFFF Shadow  : Disabled
    Boot Up NumLock Status     : On         Cyrix 6x86/MII CPUID: Enabled
    Boot Up System Speed       : High
    Gate A20 Option            : Fast
    Memory Parity Check        : Enabled
    Typematic Rate Setting     : Disabled
    Typematic Rate (Chars/Sec) : 6
    Typematic Delay (Msec)     : 250
    Security Option            : Setup
    PCI/VGA Palette Snoop      : Disabled   ESC : Quit        ↑↓→← : Select Item
    OS Select For DRAM > 64MB  : Non-OS2    F1  : Help        PU/PD/+/- : Modify
    Report No FDD For WIN 95   : Yes        F5  : Old Values  (Shift)F2 : Color
                                            F6  : Load BIOS  Defaults
                                            F7  : Load Setup Defaults
```

4.4 Chipset Features Setup

This setup function works mostly on board's chipset. This option is used to change the chipset's configuration. Please proceed carefully whilst changing any default setting, otherwise the system will run unstable.

```
                    ROM PCI/ISA BIOS (2A434I9A)
                       CHIPSET FEATURES SETUP
                        AWARD SOFTWARE, INC.

  SDRAM CAS latency Time   : 3 T
  SDRAM Clock Ratio Div By : 4

  16-bit I/O Recovery (CLK): 5
  8-bit  I/O Recovery (CLK): 5

  USB Controller           : Disabled

  Multiple Monitor Support : No Onboard

  Video Memory Size        : 2.5 M
  TV Output Mode           : NTSC
  Flat Panel Status        : Enabled
  Flat Panel Resolution    : 640x480
                                       ESC : Quit        ↑↓→← : Select Item
                                       F1  : Help        PU/PD/+/- : Modify
                                       F5  : Old Values  (Shift)F2 : Color
                                       F6  : Load BIOS  Defaults
                                       F7  : Load Setup Defaults
```

4.5 Power Management Setup

Power Management Setup helps user to handle the NOVA-4898 board's "green" function. Say for an example, this particular feature can shut down the video display and hard disk to save energy. The power management setup screen is shown below:

```
                    ROM PCI/ISA BIOS (2A434I9A)
                      POWER MANAGEMENT SETUP
                       AWARD SOFTWARE, INC.

  Power Management     : Disabled    IRQ1  (KeyBoard)   : ON
                                     IRQ3  (COM 2)      : OFF
       ** PM Timers **              IRQ4  (COM 1)      : OFF
  Doze Mode            : Disabled    IRQ5  (LPT 2)      : OFF
  Standby Mode         : Disabled    IRQ6  (Floppy Disk): OFF
  HDD Power Down       : Disabled    IRQ7  (LPT 1)      : OFF
  MODEM Use IRQ        : NA          IRQ9  (IRQ2 Redir) : OFF
                                     IRQ10 (Reserved)   : OFF
  Throttle Duty Cycle  : 33.3 %      IRQ11 (Reserved)   : OFF
                                     IRQ12 (PS/2 Mouse) : OFF
                                     IRQ13 (Coprocessor): OFF
                                     IRQ14 (Hard Disk)  : OFF
                                     IRQ15 (Reserved)   : OFF


                                     ESC : Quit        ↑↓→← : Select Item
                                     F1  : Help        PU/PD/+/- : Modify
                                     F5  : Old Values  (Shift)F2 : Color
                                     F6  : Load BIOS  Defaults
                                     F7  : Load Setup Defaults
```

4.6 PNP / PCI CONFIGURATION

This menu is used to assign certain IRQ to your PNP/PCI devices manually.

```
                    ROM PCI/ISA BIOS (2A434I9A)
                      PNP/PCI CONFIGURATION
                       AWARD SOFTWARE, INC.

 PNP OS Installed       : No      PCI IRQ Actived By  : Edge
 Resources Controlled By  : Manual
 Reset Configuration Data : Disabled   Used MEM base addr  : N/A

 IRQ-3  assigned to : PCI/ISA PnP
 IRQ-4  assigned to : PCI/ISA PnP
 IRQ-5  assigned to : PCI/ISA PnP
 IRQ-7  assigned to : PCI/ISA PnP
 IRQ-9  assigned to : PCI/ISA PnP
 IRQ-10 assigned to : PCI/ISA PnP
 IRQ-11 assigned to : PCI/ISA PnP
 IRQ-12 assigned to : PCI/ISA PnP
 IRQ-14 assigned to : PCI/ISA PnP
 IRQ-15 assigned to : PCI/ISA PnP
 DMA-0  assigned to : PCI/ISA PnP
 DMA-1  assigned to : PCI/ISA PnP   ESC : Quit        ↑↓→← : Select Item
 DMA-3  assigned to : PCI/ISA PnP   F1  : Help        PU/PD/+/- : Modify
 DMA-5  assigned to : PCI/ISA PnP   F5  : Old Values  (Shift)F2 : Color
 DMA-6  assigned to : PCI/ISA PnP   F6  : Load BIOS  Defaults
 DMA-7  assigned to : PCI/ISA PnP   F7  : Load Setup Defaults
```

- **PNP OS Installed**: if you install Plug and Play operating system (OS), the OS will reassign the interrupt if you select *Yes* in this field. If you install a non-Plug and Play OS or if you want to prevent reassigning of interrupt settings, select *No* in this field.

- **Resources Controlled By**: select *Auto* if you want the computer to assign the IRQs automatically and vice versa.

- **Reset Configuration Data**: *Enabling* this field means you allow the configuration data to be reset.

- **IRQ-xx assigned to**: these fields show whether a PCI/ISA uses certain IRQ.

4.7 LOAD BIOS DEFAULTS

```
                    ROM PCI/ISA BIOS (2A434I9A)
                       CMOS SETUP UTILITY
                      AWARD SOFTWARE, INC.
  ┌──────────────────────────────────┬──────────────────────────────┐
  │   STANDARD CMOS SETUP            │     INTEGRATED PERIPHERALS   │
  │                                 │                              │
  │   BIOS FEATURES SETUP           │     PASSWORD SETTING         │
  │                                 │                              │
  │   CHIPSET FEATURES SETUP        │     IDE HDD AUTO DETECTION   │
  │                                 │                              │
  │   POWER MANAGEMENT SETUP        │     SAVE & EXIT SETUP        │
  │                    ┌────────────────────────────┐  SAVING      │
  │   PNP/PCI CONFIGURA │  Load BIOS  Defaults (Y/N)? N │          │
  │   LOAD BIOS DEFAULT └────────────────────────────┘          │
  │                                 │                              │
  │   LOAD SETUP DEFAULTS           │                              │
  ├──────────────────────────────────┴──────────────────────────────┤
  │  Esc : Quit                        ↑ ↓ → ←   : Select Item       │
  │  F10 : Save & Exit Setup           (Shift)F2 : Change Color      │
  ├──────────────────────────────────────────────────────────────────┤
  │                                                                  │
  └──────────────────────────────────────────────────────────────────┘
```

If you select 'Y' to this field, the BIOS Defaults will be loaded except Standard CMOS SETUP. The default settings are not optimal and turning all high performance into disabled condition. Select 'N' to abort.

> *Suggestion:*
>
> *For the first time or for our primary user, we suggest you to use LOAD SETUP DEFAULTS because it is the safest mode for your system.*

4.8 LOAD SETUP DEFAULTS

```
                        ROM PCI/ISA BIOS (2A434I9A)
                          CMOS SETUP UTILITY
                          AWARD SOFTWARE, INC.
  ┌──────────────────────────────────────────────────────────────────┐
  │                                                                    │
  │     STANDARD CMOS SETUP              INTEGRATED PERIPHERALS         │
  │                                                                    │
  │     BIOS FEATURES SETUP             PASSWORD SETTING                │
  │                                                                    │
  │     CHIPSET FEATURES SETUP          IDE HDD AUTO DETECTION          │
  │                                                                    │
  │     POWER MANAGEMENT SETUP          SAVE & EXIT SETUP               │
  │                         ┌──────────────────────────┐               │
  │     PNP/PCI CONFIGURA    │                        SAVING            │
  │                         │ Load SETUP Defaults (Y/N)? N │            │
  │     LOAD BIOS DEFAULT    └──────────────────────────┘               │
  │                                                                    │
  │     LOAD SETUP DEFAULTS          │                                  │
  ├──────────────────────────────────────────────────────────────────┤
  │  Esc : Quit                         ↑ ↓ → ←   : Select Item         │
  │  F10 : Save & Exit Setup            (Shift)F2 : Change Color        │
  ├──────────────────────────────────────────────────────────────────┤
  │                                                                    │
  │                                                                    │
  └──────────────────────────────────────────────────────────────────┘
```

If you select 'Y' to this field, the Setup Defaults will be loaded except Standard CMOS SETUP. The default settings are optimal configuration settings for your system.

4.9 INTEGRATED PERIPHERALS

```
                        ROM PCI/ISA BIOS (2A434I9A)
                          INTEGRATED PERIPHERALS
                          AWARD SOFTWARE, INC.
  ┌──────────────────────────────────────────────────────────────────┐
  │  IDE HDD Block Mode      : Enabled   IR Transmission delay  : Enabled │
  │  Primary IDE Channel     : Enabled   Onboard Parallel Port  : 378/IRQ7│
  │    Master Drive PIO Mode  : Auto     Parallel Port Mode     : SPP    │
  │    Slave Drive PIO Mode   : Auto     ECP Mode Use DMA       : 3      │
  │  Secondary IDE Channel    : Enabled  EPP Mode Select        : EPP1.7 │
  │    Master Drive PIO Mode  : Auto     Digital I/O            : 280h   │
  │    Slave Drive PIO Mode   : Auto     Onboard Serial Port 3  : 3E8H   │
  │                                      Serial Port 3 Use IRQ  : IRQ11  │
  │  IDE Primary Master UDMA  : Auto     Onboard Serial Port 4  : 2E8H   │
  │  IDE Primary Slave  UDMA  : Auto     Serial Port 4 Use IRQ  : IRQ10  │
  │  IDE Secondary Master UDMA: Auto                                    │
  │  IDE Secondary Slave  UDMA: Auto     Build in CPU Audio     : Enabled │
  │                                      Audio I/O Base Address : 220H   │
  │  KBC input clock         : 8 MHz     MPU-401 I/O Base Address : 330H  │
  │  Onboard FDC Controller  : Enabled   Audio IRQ Select       : IRQ 5  │
  │  Onboard Serial Port 1   : 3F8/IRQ4  Audio Low  DMA Select  : DMA 1  │
  │  Onboard Serial Port 2   : 2F8/IRQ3  Audio High DMA Select  : DMA 5  │
  │  UART Mode Select        : Normal                                   │
  │  UART2 Duplex Mode       : Half                                     │
  │  RxD , TxD Active        : Hi,Lo                                    │
  └──────────────────────────────────────────────────────────────────┘
```

This option is used to assign Onboard I/O, IRQ, and DMA etc. If you don't know how to configure them, just press <F7> to load Setup Defaults.

The flat panels will then be applied with two modes: 640x480 or 800x600, for which it needs to set up from BIOS for proper flat panel resolution.

- **Digital I/O Base Address -- 240H, 260H, 280H, Disabled**
  To select the I/O address for digital I/O function.
- **Build in CPU Audio -- Enabled, Disabled**
  To disable/enable the audio function.
- **Audio I/O Base Address -- 220H, 240H, 260H, 280H**
  To select the I/O address for audio function.
- **MPU-401 I/O Base Address -- 300H, 330H, Disabled**
  To select the I/O address for MPU-401 (midi interface).
- **Audio IRQ Select -- 5, 7, 10, Disabled**
  To select the interrupt for audio function.
- **Audio Low DMA Select -- DMA0, DMA1, DMA3, Disabled**
  To select the high DMA channel.
- **Audio High DMA Select -- DMA5, DMA6, DMA7, Disabled**
  To select the high DMA channel.
- **Multiple Monitor Support -- No Onboard, PCI first, M/B first**
  To select the primary VGA for multiple monitor support in WINDOWS.
- **Video Memory Size -- 1.5M, 2.5M, 4.0M**
  To select the size of video memory. It makes use of system memory for display.
- **TV-OUT Mode – NTSC, PAL**
  To select the TV-OUT mode.

4.10 PASSWORD SETTING

Password SETTING sets a password that is used to protect your system and Setup Utility. Once you setup the password, the system will always ask you to key-in password every time you enter the BIOS SETUP. If you enter the BIOS SETUP with Password, you can choose from every setup/option on the main menu. To disable the password, enter the BIOS SETUP room with Password and then just press the <Enter> key instead of entering a new password when the message 'Enter Password' is prompted on your screen.

Note: if you forget the password, do the Clear/Reset CMOS procedure (see Section 2.5 Clear CMOS Setup)

4.11 IDE HDD AUTODETECTION

This option detects the parameters of an IDE hard disk drive (HDD sector, cylinder, head, etc) automatically and will put the parameters into the Standard CMOS Setup screen. Up to 2 IDE drives can be detected and the parameters will be listed in the box. Press <Y> if you accept these parameters. Press <N> to skip the next IDE drives.

Note: If your IDE HDD was formatted in previous version of an older system, incorrect parameters may be detected. In this case, you need to enter the correct parameters manually or low-level format the disk
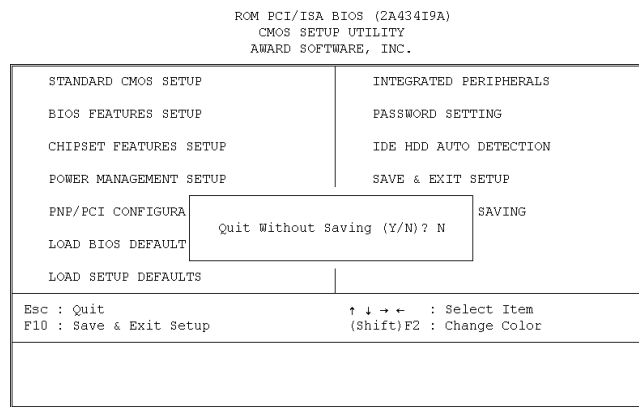
4.12 SAVE AND EXIT SETUP

```
                    ROM PCI/ISA BIOS (2A434I9A)
                       CMOS SETUP UTILITY
                      AWARD SOFTWARE, INC.
 ┌─────────────────────────────────────────────────────────────┐
 │  STANDARD CMOS SETUP              INTEGRATED PERIPHERALS      │
 │                                                              │
 │  BIOS FEATURES SETUP             PASSWORD SETTING            │
 │                                                              │
 │  CHIPSET FEATURES SETUP          IDE HDD AUTO DETECTION      │
 │                                                              │
 │  POWER MANAGEMENT SETUP           SAVE & EXIT SETUP          │
 │                          ┌────────────────────────┐          │
 │  PNP/PCI CONFIGURA       │                        │ SAVING   │
 │                          │ SAVE to CMOS and EXIT (Y/N)? N    │
 │  LOAD BIOS DEFAULT       │                        │          │
 │                          └────────────────────────┘          │
 │  LOAD SETUP DEFAULTS             │                           │
 ├──────────────────────────────────┴──────────────────────────┤
 │ Esc : Quit                      ↑ ↓ → ←  : Select Item       │
 │ F10 : Save & Exit Setup         (Shift)F2 : Change Color     │
 └─────────────────────────────────────────────────────────────┘
```

Select this option when you finish setting all the parameters and want to save them into the CMOS. Simply press <Enter> key and all the configuration changes will be saved.

4.13 Quit Without Saving

```
                    ROM PCI/ISA BIOS (2A434I9A)
                      CMOS SETUP UTILITY
                      AWARD SOFTWARE, INC.
   ┌─────────────────────────────────────────────────────────────────┐
   │    STANDARD CMOS SETUP              INTEGRATED PERIPHERALS         │
   │                                                                   │
   │    BIOS FEATURES SETUP              PASSWORD SETTING               │
   │                                                                   │
   │    CHIPSET FEATURES SETUP           IDE HDD AUTO DETECTION         │
   │                                                                   │
   │    POWER MANAGEMENT SETUP           SAVE & EXIT SETUP              │
   │                                                                   │
   │    PNP/PCI CONFIGURA┌──────────────────────────┐ SAVING           │
   │                     │ Quit Without Saving (Y/N)? N │               │
   │    LOAD BIOS DEFAULT └──────────────────────────┘                 │
   │                                                                   │
   │    LOAD SETUP DEFAULTS              │                             │
   ├─────────────────────────────────────────────────────────────────┤
   │ Esc : Quit                     ↑ ↓ → ←   : Select Item            │
   │ F10 : Save & Exit Setup        (Shift)F2 : Change Color           │
   ├─────────────────────────────────────────────────────────────────┤
   │                                                                   │
   └─────────────────────────────────────────────────────────────────┘
```

Select this option if you want to exit the Setup without saving the changes that you made. Just simply press <Enter> key and you will exit the BIOS SETUP without saving the changes.

5. SVGA Setup

5.1 Introduction

The NOVA-4898 is equipped with on-board LCD/VGA interface. The its specifications and features described below:

5.1.1 Chipset

The NOVA-4898 uses a Cyrix CX5530 chipset as its SVGA controller. It is compatible with many common 18-bit LCD displays and traditional analog CRT monitors. The VGA BIOS supports LCD. In addition, it also accepts interlaced and non-interlaced analog monitors (color and monochrome VGA) with high-resolution quality while maintaining complete IBM VGA compatibility. But digital monitors (i.e. MDA, CGA, and EGA) may be NOT supported. Multiple frequency (multisync) monitors will be operated as if they were analog monitors.

5.1.2 Display memory

Having 1.5 ~ 4 MB UMA memory, the VGA controller can make CRT displays or color panel displays perform resolutions up to 1024 x 768 at 64 K colors. The display memory can be modified up to 4 MB in BIOS for true-color resolution of 1024 x 768.

5.1.3 Display drivers

1. Win95, 98 drivers (VGA & Audio) in

   \VGA\MediaGX\National Geode Win9x Drivers 1.3

2. WinNT4.0 drivers in

   \VGA\MediaGX\Nt40Vga\

5.2 Further Information

For more detailed information about the PCI/SVGA installation in your NOVA-4898, including driver updates, troubleshooting instructions, please refer to the website shown below where we provide additional resources that you may need. If you could not find the information you need, please contact with your local contributor or ICP support team at:

ICP web site: www.ieiworld.com.tw

6. Audio

6.1 Introduction

With on-board audio interface, NOVA-4898 can perform high-quality stereo sound and FM music synthesis (ESFM) by using the CX5530 audio controller. The audio interface has the following functions namely recording, compressing, and playing back voice, sound, and music with a built-in mixer control. In addition, the on board audio interface supports the Plug and Play (PnP) standard and provides PnP configuration for audio, FM, and MPU-104 logical devices. It is compatible with AC97 version 2.0, voice, and music functions. The ESFM synthesizer is registered compatible with the OPL3 and has extended capabilities.

6.1.1 Audio drivers

1. Installing software driver in Windows NT
The driver was provided from the CD utility.
WinNT4.0 Audio drivers in
\Audio\MediaGX

2. Installing software driver in Win95/98
The software drivers was supported from Windows 95/98,
please set up from...
Win98\drivers\audio\cyrix\mgxsb16.inf

7. PCI Bus Ethernet Interface

7.1 Introduction

The NOVA-4898 provides a high performance 32-bit Ethernet chipset, which is completely compliant with IEEE 802.3 100 Mbps CSMA/CD standards. It is both 100Base-T and 10Base-T compatible so it is suitable for major network operating systems.

The Ethernet port supplies a standard RJ-45 connector on board. In order to utilize the network boot feature, please add in the boot ROM image files for the appropriate network operating system.

Appendix A. Watchdog Timer

The Watchdog Timer is a device to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working normally, hardware on the board will perform hardware reset (cold boot) to bring the system back to a known state.

Three I/O ports control the Watchdog Timer.

443	Write	Set Watchdog Time period
443 (hex)	Read	Enable the refresh the Watch-Dog Timer.
043/843 (hex)	Read	Disable the Watchdog Timer.

Prior to enable the Watchdog Timer, user has to define Timer first. The output data is the value of time interval. The range of value is from 01(hex) to FF (hex) and 1 sec to 255 sec for time interval.

Data	Time Interval
01	1 sec
02	2 sec
03	3 sec
04	4 sec
.	.
.	.
.	.
FF	255 sec

This action will enable and activate the countdown timer, which will eventually time out, and reset the CPU to ensure that this reset condition does not occur. The Watchdog Timer must be periodically

refreshed by reading the same I/O port 043/843H and 443H. This must be done within the time out period defined by software setting, please refer to the example program.

A tolerance of at least 5% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time consuming. Therefore if the time out period has been set to 10 seconds, the I/O port 443H must be read within 7 seconds.

Note:
When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system will reset.

Example assembly program:

```
TIMER_PORT    = 443H
TIMER_START   = 443H
TIMER_STOP    = 843H

;;INITIAL TIME PERIOD COUNTER
MOV DX, TIME_PORT
MOV AL, 8:    ;;8 SECONDS
OUT DX,AL
;;ADD YOUR APPLICATION HERE
MOV DX, TIMER_START
IN AL, DX.    ;;START COUNTER
```

```
;;ADD YOUR APPLICATION HERE
W_LOOP:
MOV DX, TIMER_STOP
IN AL, DX
MOV DX, TIMER_START
IN AL, DX.          ;;RESTART COUNTER

;;ADD YOUR APPLICATION HERE
CMP EXIT_AP, 0
JNE W_LOOP
MOV DX, TIMER_STOP
IN AL, DX
;;EXIT AP
```

Appendix B. I/O Address Map

B.1 System I/O Address Map

I/O Address Map	Description
000-01F	DMA Controller #1
020-021	Interrupt Controller # 1, Master
022-023	Chipset address
040-05F	System Timer
060-06F	Standard 101/102 keyboard Controller
070-07F	Real time Clock, NMI Controller
080-0BF	DMA Page Register
0A0-0BF	Interrupt Controller # 2
0C0-0DF	DMA Controller # 2
0F0-0FF	Math Coprocessor
170-1FF	VIR BUS Master PCI IDE Controller
220-22F	Audio 16bit sound
2E8-2EF	Serial Port 4
2F8-2FF	Serial Port 2
378-37F	Parallel Printer Port 1
3B0-3DF	Cyrix Graphic Adapter
3E8-3EF	Serial Port 3
3F0-3F7	Floppy Disk Controller
3F8-3FF	Serial Port 1
443	Watch dog timer enable
043/843	Watch dog timer disable

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

B.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 defaults setting: DMA 1.5
  Audio High DMA select: DMA 1.3
  Audio Low DMA select: DMA 5.6.7
** parallel port DMA default setting: DMA 3
  parallel port DMA select: DMA 1.3

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 8	Real-time clock
IRQ 9	LAN 82559
IRQ 10	Serial communication port 4
IRQ 11	Serial communication port 3
IRQ 12	PS/2 mouse
IRQ 13	Numeric data processor
IRQ 14	CX5530 Primary IDE controller
IRQ 15	CX5530 Second IDE controller
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
  Ethernet IRQ is automatic set by the system

B.4 1st MB memory map

Address	Description
F000h-FFFFh	System ROM
D800h-EFFFh	Unused
C800h-D7FFh	Ethernet ROM*
C000h-C7FFh	Expansion ROM*
B800h-BFFFh	CGA/EGA/VGA text
B000h-B7FFh	Unused
A000h-AFFFh	EGA/VGA graphics
0000h-9FFFh	Base memory
D000-D400H	Available

*   Default setting
** If Ethernet boot ROM is enabled.