

WAFER-4821

DX4-100 MHz with

Ethernet SBC Ver 1.x

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Introduction

Welcome to the WAFER-4821 DX4-100 with Ethernet Single Board Computer. The WAFER-4821 is a stand alone board with PC/104 connector, which comes equipped with four COM Ports and advanced high-performance multi-mode I/O and Ethernet function, designed for the system manufacturers, integrators, or VARs to provide all the performance, reliability, and quality.

An advanced high performance super I/O function is supported by the Maple chipset. The on-chip UARTs are compatible with the NS16C550. The parallel port and IDE interface are compatible with IBM PC/AT and XT architecture's, as well as EPP and ECP.

The most outstanding feature in the WAFER-4821 is the built-in PC/104 expansion bus. Based on the PC/104 bus, you can easily install over thousands of PC/104 modules from hundreds vendors in the world. The WAFER-4821 has external power connector that can let it connects to power supply directly. It is very suitable for your standalone applications. Also, it provides four COM Ports : three RS232C, one RS-232C or RS-422/485 Port, for industrial field site application.

1.1 Specifications :

The WAFER-4821 DX4-100 with Ethernet Single Board Computer provides the following specification:

.. **System on Chip (SOC):**

- System core logic, I/O, CPU(DX4-100) in one chip.
- **Real-time clock/calendar and battery backup :**
by DS12887 or equivalent.

.. **Memory :**

- **DRAM memory :** up to 32MB, 1 pcs 72-pin SIMM on board 4MB designed for customer requirement.
- **Disk on Chip socket :** support one Disk on Chip socket size up to 72MB.

.. **Ethernet Interface :**

- **Chipset :** Realtek RTL-8019AS chipset (on board).
- **Type :** 16-bit Ethernet, Novell NE2000 compatible, 10Base-T 10 MBps.
- **Connection :** on-board RJ-45 connector.

.. **Integrated Multi I/O :**

- **IDE hard disk drive interface :** Supports up to two IDE hard disk drives. Can be disabled by BIOS Setup.
- **Floppy disk drive interface :** Supports two 2.88 MB, 1.44MB, 1.2MB, 720KB, or 360KB floppy disk drives. Can be disabled by BIOS Setup.
- **Four high speed Series ports :** Three RS-232C, one RS-232C or RS-422/485 Port.
- **PS/2 Mouse/Keyboard Connector :** 6-pin Mini DIN Keyboard Connector.

.. **Digital I/O : 4 TTL inputs and 4 TTL outputs**

.. **Industrial features :**

- **Watch-dog timer :** Software programmable time period can be set from 1 to 255 seconds. Reset is generated when CPU does not periodically trigger the timer.

- **PC/104 expansion bus** : A 64-pin and 40-pin, industrial embedded-PC bus standard.
 - **External power connector** : 5-pin male connector (model: 2571-08TS)
 - **Keyboard connector** : 6-pin mini-DIN keyboard connector.
- .. **General :**
- **Power Consumption** : +5V @ 1.65A (DX4-100MHz, 32MB RAM)
 - **Operating Temperature** : 0° ~ 55°C
 - **Humidity** : 5% ~ 95%, non-condensed
 - **Dimension**: 102.01mm(W) x 146.48mm(L)

1.2 What You Have

In addition to this *User's Manual*, the WAFER-4821 package includes the following items:

- WAFER-4821 DX4-100 with Ethernet Single Board Computer
- RS-232/Printer Cable
- FDD/HDD Cable
- 6-pin Mini-Din Keyboard/Mouse Adapter Cable

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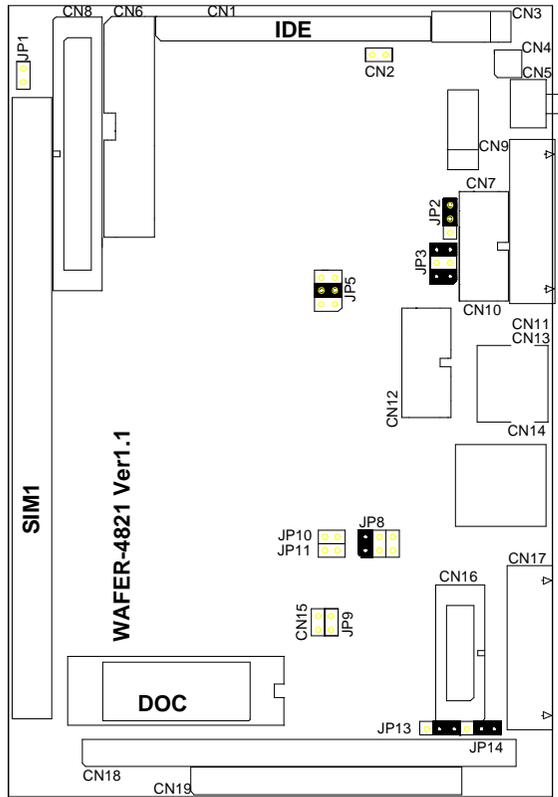
Installation

This chapter describes how to install the WAFER-4821. The layout of WAFER-4821 is shown on the next page and the Unpacking Precautions that you should be careful with is described on the following page. Also included is the jumpers and switches setting for this board's configuration, such as: system clock setting and Watchdog timer.

2.1 WAFER-4821's Layout

Please, refer to next page >

2.1 WAFER-4821's Layout



2.2 Unpacking Precautions

Some components on WAFER-4821 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 follow these precautions:

- ✓ Ground yourself to remove any static charge before touching your WAFER-4821 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 WAFER-4821 SBC by its edges. Don't touch IC chips, leads or circuitry if not necessary.
- ✓ Do not plug any connector or jumper while the power is on.

2.3 CPU Setting for WAFER-4821

• JP5 : CPU CLOCK SETTING:

The system clock is generated by the AV9155C-02, and the different CPU clock frequency can be selected by JP5 and shown as following table:

CPU CLK	1-2	3-4	5-6
50MHz	CLOSE	OPEN	CLOSE
60MHz	OPEN	OPEN	CLOSE
75MHz	CLOSE	CLOSE	OPEN
100MHz	OPEN	CLOSE	OPEN

2.4 Watch-Dog Timer

The Watch-Dog Timer is enabled by reading port 443H. 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. The Watch-Dog Timer is disable by reading port 043H, or 843H.

• JP2 : Watch-Dog Timer Type Selector

1-2	RESERVED
2-3	RESET

2.5 DiskOnChip™ Flash Disk

The DiskOnChip™ don't need any extra software utility because the DOC is 100% software compatible to hard disk. It is just "plug and play", easy and reliable. Right now, the DOC is available from 2MB to 144MB.

• JP3 : DiskOnChip™ Memory Address Setting

ADDRESS	1-2	3-4	5-6
CE00H	OPEN	CLOSE	CLOSE
D600H	CLOSE	OPEN	CLOSE
DE00H	OPEN	OPEN	CLOSE

2.6 COM2 RI Pin Setting

The COM2 (CN16) can supply +5V or +12V power to the serial devices via RI pin (Pin 9) of the COM port connector. The max. current is 1A with fuse protection. If the output is set to 12V, make sure that you have 12V to supply to the board.

• JP13, JP14 : for CN16, Pin 8 Selector

CN16 Pin9	JP14	JP13
RI Signal	2-3	Don't care
+5V	1-2	2-3
+12V	1-2	1-2

* +5V or +12V output is fuse protected.

2.7 COM2 RS-232, RS-422 or RS-485 Setting

The COM2 (CN16) can be set to RS-232 or RS-422/485 for industrial field site application..

• JP8 : COM2(CN16) RS-232/422/485 setting

	RS-232	RS-422	RS-485
1-2	CLOSE	OPEN	OPEN
3-4	OPEN	CLOSE	CLOSE
5-6	OPEN	OPEN	CLOSE

2.8 Free IRQ3 and IRQ4 Setting

If you want to free IRQ3 and IRQ4 for other application then the COM2 and COM1 have to be disabled by BIOS setting and the jumper JP9 and JP10 have to be closed to free IRQ3 and IRQ4, respectively.

• JP9 : Free IRQ3 setting

OFF	Enable COM2
ON	Disable COM2

• JP10 : Free IRQ4 setting

OFF	Enable COM1
ON	Disable COM1

2.9 Clear CMOS Setup

If you forget the CMOS password, you can clear or reset it by closing the **JP11**. After JP11 is closed, turn on the power for about 3 seconds then turn it off and open the JP11. Now, the password and CMOS contents have been cleared from your CMOS.

- **JP11 : Clear CMOS**

OFF	NORMAL
ON	CLEAR

2.10 Ethernet (RTL8019AS) PNP MODE Setting

The Ethernet (RTL8019AS) can use the PNP mode or the JUMPERLESS mode (Non-PNP). If you want to use the JUMPERLESS mode that must close the JP1 and set the properties of the RSET8019.EXE to JUMPERLESS.

- **JP1 : The Ethernet PNP setting**

OPEN	PNP MODE
CLOSE	JUMPERLESS MODE

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Connection

This chapter describes how to connect peripherals, switches and indicators to the WAFER-4821 board. You can access most of the connectors from the top of the board while it is installed in the chassis.

3.1 Floppy Disk Drive Connector

WAFER-4821 board comes equipped with a 34-pin daisy-chain driver connector cable. The detailed pin assignment of the connector is specified as following table:

• CN8 : FLOOPY DISK DRIVE 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 0#
11	GROUND	12	DRIVE SELECT 1#
13	GROUND	14	DRIVE SELECT 0#
15	GROUND	16	MOTOR ENABLE 1#
17	GROUND	18	DIRECTION#
19	GROUND	20	STEP#
21	GROUND	22	WRITE DATA#
23	GROUND	24	FDCWE#
25	GROUND	26	TRACK 0#
27	GROUND	28	WRITE PROTECT#
29	GROUND	30	READ DATA#
31	GROUND	32	HEAD#
33	GROUND	34	DISK CHANGE#

3.2 IDE Disk Drive Connector

You can attach two IDE (Integrated Device Electronics) hard disk drives to the WAFER-4821 internal controller. The board comes equipped with a 44-pin flat-cable connector. The detailed pin assignment of the connector is specified as following table:

● CN1: 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	GND	20	N/C
21	N/C	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	IDE CHRDY	28	BALE
29	N/C	30	GROUND
31	IRQ14	32	IOCS16
33	SA 1	34	N/C
35	SA 0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND
41	VCC	42	VCC
43	GND	44	VCC

3.3 Parallel Port

This port is usually connected to a printer, The WAFER-4821 includes an on-board parallel port, accessed through a 26-pin flat-cable connector CN6. The detailed pin assignment of the connector is specified as following table:

● CN6 : 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	LPT SELECT LN#	18	GND
19	GND	20	GND
21	GND	22	GND
23	GND	24	GND
25	GND	26	N/C

3.4 Serial Ports

The WAFER-4821 offers four high speed NS16C550 compatible UARTs with Read/Receive 16 byte FIFO serial ports. These ports let you connect to serial devices or a communication network. Two 9-pin connector, one 10-pin and one 14-pin headers are provided by the WAFER-4821. The detailed pin assignment of the connectors are specified as following tables:

● CN10 : Serial Port3 Connector (9-pin DSUB)

Pin#	Signal Name	Pin#	Signal Name
1	DCD	6	DSR
2	RX	7	RTS
3	TX	8	CTS
4	DTR	9	RI
5	GND	10	NC

● CN17 : Serial Port1 Connector (9-pin DSUB)

Pin#	Signal Name	Pin#	Signal Name
1	DCD	6	DSR
2	RX	7	RTS
3	TX	8	CTS
4	DTR	9	RI
5	GND	10	GND

● **CN16 : Serial Port2 Connector (14-pin Header/W Housing)**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	2	DSR
3	RX	4	RTS
5	TX	6	CTS
7	DTR	8	RI
9	GND	10	NC
11	TX2+	12	TX2-
13	RX2+	14	RX2-

● **CN11 : Serial Port4 Connector (10-pin Header/W Housing)**

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

3.5 Keyboard/Mouse Connector

The WAFER-4821 provides a 6-pin Mini-DIN connector CN13 on the board mounting bracket for single board computer applications.

● **CN13 : PS/2Mouse, Keyboard Connector (Mini Din)**

PIN NO.	DESCRIPTION
1	KBDAT
2	MDAT
3	GND
4	+5V
5	KBCLK
6	MCLK

3.6 External Switches and Indicators

There are many external switches and indicators for monitoring and controlling your CPU board. These features are completely optional. The detailed pin assignment of the connectors is specified as following table:

● **CN5 : RESET BUTTON**

PIN NO.	DESCRIPTION
1	RESET
2	GND

• **CN2 : IDE LED connector**

PIN-NO	DESCRIPTION
1	HDD ACTIVE#
2	+5V

3.7 External Power Connector

The WAFER-4821 has an on-board external power connector CN3 one 2-pin power connector CN7. It let you connect power directly to the CPU board without passive backplane application.

• **CN3 : EXTERNAL POWER CONNECTOR**

PIN NO.	Description
1	VCC
2	VCC
3	GND
4	GND
5	+12V

• **CN7 : EXTERNAL POWER LED CONNECTOR**

PIN NO.	Description
1	+5V
2	GND

3.8 External Speaker

The WAFER-4821 has its own buzzer, you also can connect it to the external speaker through the connector CN15 :

• **CN15 : External Speaker Connector**

PIN NO.	DESCRIPTION
1	+5V
2	Speaker

3.9 PC/104 Connection Bus

The WAFER-4821 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.

• CN19 : PC/104-40 Connector

PIN NO.	Description	PIN NO	Description
1	GND	21	GND
2	SBHE#	22	MCS16#
3	LA23	23	IOCS16#
4	LA22	24	IRQ10
5	LA21	25	IRQ11
6	LA20	26	IRQ12
7	LA19	27	IRQ15
8	LA18	28	IRQ14
9	AL17	29	DACK0#
10	MEMR#	30	DRQ0
11	MEMW#	31	DACK5#
12	SD8	32	DRQ5
13	SD9	33	DACK6#
14	SD10	34	DRQ6
15	SD11	35	DACK7#
16	SD12	36	DRQ7
17	SD13	37	VCC
18	SD14	38	MASTER#
19	SD15	39	GND
20	GND	40	GND

• **CN18 : 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	N/C
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	N/C
23	SA8	55	IRQ5
24	SA7	56	IRQ4
25	SA6	57	IRQ3
26	SA5	58	N/C
27	SA4	59	TC
28	SA3	60	BALE
29	SA2	61	VCC
30	SA1	62	OSC
31	SA0	63	GND
32	GND	64	GND

3.10 IrDA Infrared Interface Port

WAFER-4821 built-in IrDA port supports Serial Infrared (SIR) or Amplitude Shift Keyed IR (ASKIR) interface. If you want to use the IrDA port, you have to configure the SIR or ASKIR model in the BIOS's Peripheral Setup's COM4. Then the normal RS-232 COM4 will be disabled.

- **CN9 : IR Connector**

PIN NO.	DESCRIPTION
1	VCC
2	N/C
3	IR-RX
4	GND
5	IR-TX

3.11 LAN RJ45 Connector

The WAFER-4821 built-in RJ45 LAN connector is for 10Mbps Ethernet (NE-2000 compatible) operation.

- **CN14 : LAN RJ45 Connector**

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

- **CN4 : LAN LED**

Green LED for LINK and Yellow LED for RX.

3.12 Digital I/O

One characteristic of digital circuit is its fast respond to high or low signal. This kind of respond is badly needed for harsh and critical industrial operating environment. That's why we design 4-bit digital inputs and 4-bit digital outputs on the WAFER-4821.

Digital Input and Output, generally, are control signals. You can use these signals to control external devices that needs On/Off circuit or TTL devices. The register address is 340H (or 240H, 260H) (configured with BIOS setting).

- **CN12 : Digital I/O**

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

4

AMI BIOS Setup

The WAFER-4821 uses AMI BIOS for system configuration, and the AMI BIOS setup program is designed to provide maximum flexibility in configuring the system by offering various options which may be selected for 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 and initialization and system configuration verification.

Note: for your convenience, a diskette containing files for updating the BIOS is included with the following content:
FLASH634.COM : flash utility to update BIOS

After the POST routines are completed, the following message appears :

" Hit DEL if you want to run SETUP"

To access AMI BIOS SETUP UTILITY, press key. The following screen will be displayed at this time:

AMIBIOS HIFLEX SETUP UTILITY - VERSION 1.22
(C)1999 American Megatrends, Inc. All Rights Reserved

Standard CMOS Setup
Advanced CMOS Setup
Advanced Chipset Setup
Peripheral Setup
Auto-Detect Hard Disks
Change User Password
Change Supervisor Password
Auto Configuration with Optimal Settings
Auto Configuration with Fail Safe Settings
Save Settings and Exit
Exit Without Saving

Standard CMOS setup for changing time, date, hard disk type, etc.
ESC:Exit F1:Sel F2/F3:Color F10:Save & Exit

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 setting. Please refer to the following screen for this setup

AMIBIOS SETUP - STANDARD CMOS SETUP	
(C)1999 American Megatrends, Inc. All Rights Reserved	
Date (mm/dd/yyyy): Thu Oct 14, 1999	Base Memory: 0 KB
Time (hh/mm/ss) : 12:03:16	Ext'd Memory: 0 MB
Floppy Drive A: 1.44 MB 3½	
Floppy Drive B: Not Installed	
	LBA Blk PIO 32Bit
Type	Size Cyln Head W/Com Sec Mode Mode Mode Mode
Pri Master : Auto	Off
Pri Slave : Auto	Off
Sec Master : Not Installed	
Sec Slave : Not Installed	
Boot Sector Virus Protection	Disabled
Month: Jan - Dec	ESC:Exit F1:Sel
Day: 01 - 31	PgUp/PgDn:Modify
Year: 1901 - 9999	F1:Help F2/F3:Color

To set the Date, for example, press either the arrow or <Enter> button on your keyboard to select one of the fields (Months, Date or Year) then press either <PgUp> or <PgDn> to set it to the current Months, Date and Year. Do the same steps for Time setting.

For IDE hard disk drive setup, please check the following possible setup procedure:

1. Use the Auto-Detect Hard Disk option in the main menu; the computer will automatically detect the HDD specifications.
2. Manually enter the specifications by yourself by selecting the Type of your HDD.

4.3 Advanced CMOS Setup

The following screen will be displayed if you select Advanced CMOS Setup:

AMIBIOS SETUP - ADVANCED CMOS SETUP (C)1999 American Megatrends, Inc. All Rights Reserved		
Quick Boot	Enabled	Available Options: Disabled ▶ Enabled
1st Boot Device	Floppy	
2nd Boot Device	IDE-0	
3rd Boot Device	CDROM	
Try Other Boot Devices	Yes	
Floppy Access Control	Read-Write	
Hard Disk Access Control	Read-Write	
S.M.A.R.T. for Hard Disks	Disabled	
BootUp Num-Lock	On	
PS/2 Mouse Support	Enabled	
System Keyboard	Absent	
Password Check	Setup	
Boot To OS/2	No	
Wait For 'F1' If Error	Enabled	
Hit 'DEL' Message Display	Enabled	
System BIOS Cacheable	Enabled	
C000,32k Shadow	Enabled	
C800,32k Shadow	Disabled	
D000,64k Shadow	Disabled	
D800,32k Shadow	Disabled	
		ESC:Exit f1:Setl PgUp/PgDn:Modify F1:Help F2/F3:Color

You can change the value of each options by using <PgUp> and <PgDn> key. The available values are shown on the right screen.

Quick Boot > *Enabled*: this will enable the BIOS to boot quickly when you turn on your computer. The BIOS will only check the first 1MB of the system memory.

Quick Boot > *Disabled*: the BIOS will test all system memory when it boots up. It will spend about 40 seconds until it receives a

Ready signal from the HDD. It will also wait for you to press the key or not.

1st, 2nd, 3rd Boot Device > to define the device type for booting after the routines check up completes. If the 1st Boot Device fails, the BIOS will attempt to boot from the 2nd or the 3rd device.

Try Other Boot Devices > the BIOS will try to boot from any other available device in the system if the 1st, 2nd and 3rd device fails to boot.

Floppy Access Control > to define the read/write access which is set when booting from a floppy drive.

Hard Disk Access Control > to define the read/write access which is set when booting from a HDD.

S.M.A.R.T. for Hard Disks > to allow BIOS to use the **S**ystem **M**anagement and **R**eporting **T**echnologies protocol for reporting server system information on a network

BootUp Num-Lock > to turn on/off the Num-Lock option on a enhanced keyboard when you boot. If you turn it off, the arrow keys on the numeric keypad can be used just as the other set of arrow keys on the keyboard and vice versa.

PS/2 Mouse Support > to testify whether or not a PS/2 mouse is supported.

System Keyboard > to testify whether or not a keyboard is attached to the computer.

Primary Display > to define the type of display monitor of the system. The Absent option is for network file servers.

Password Check > to define if a password is necessary or not for access to the system.

Boot to OS/2 > if you run the OS/2 operating system, this option must be set to yes.

System BIOS Cacheable > to define whether or not the memory segment F000H can be read from or written to cache memory. Setting it Enabled will give faster execution in your system.

XXXX, 16k Shadow > ROM Shadow is a technique in which BIOS code is copied from slower ROM to faster RAM. If you enable it then the BIOS will be executed from the RAM. Each option allows 16KB segment to be shadowed to the RAM.

4.4 Advanced Chipset Setup

AMIBIOS SETUP - ADVANCED CHIPSET SETUP (C)1999 American Megatrends, Inc. All Rights Reserved		
AT Bus Clock	Automatic	Available Options: ▶ Automatic 14.318MHz CLKSRC/5 CLKSRC/3 CLKSRC/2.5 CLKSRC/1.5 CLKSRC/1.000 CLKSRC/4 CLKSRC/2 24MHz
RAS Precharge Time	2T	
RAS to CAS Read Cycle Delay	2T	
RAS to CAS Write Cycle Delay	2T	
CAS Precharge Read Time	1T	
CAS Precharge Write Time	1T	
CAS Width in Read Cycle	1T	
CAS Width in Write Cycle	1T	
		ESC:Exit F1:Sel PgUp/PgDn:Modify F1:Help F2/F3:Color

Note: do not change any value on this page unless you understand well the impact of every value to your system.

4.5 Peripheral Setup

AMIBIOS SETUP - PERIPHERAL SETUP (C)1999 American Megatrends, Inc. All Rights Reserved		
OnBoard IDE	Primary	Available Options: Disabled ▶ Primary Secondary
OnBoard Serial Port1	3F8h/COM1	
OnBoard Serial Port2	2F8h/COM2	
OnBoard Parallel Port	378h	
Parallel Port Mode	SPP/BPP	
Parallel Port IRQ	5	
Parallel Port DMA Channel	0	
OnBoard FDC	Enabled	
OnBoard Serial Port3	3E8h/COM3	
Serial Port3 IRQ	11	
OnBoard Serial Port4	2E8h/COM4	
Serial Port4 Mode	Normal	
IrDA Protocol	1.6 uS	
Serial Port4 IRQ	10	
OnBoard GPIO Port	340h	

When you enter the Peripheral Setup, the following items are available for setting:

- On-board IDE : to define the on-board Integrated Drive Electronics controller channel(s) to be used. Available options are: Primary, Secondary and Disabled.
- On-board FDC : The floppy disk drive controller can be **Enabled** or **Disabled** by this item. When you do not need floppy disk, the FDD controller can be disabled. If you set it **Auto**, the BIOS will try to enable any floppy drive controller on the ISA Bus.
- Serial Port 1 : The options are **Disable, 3F8, 2F8, 3E8, 2E8 and Auto**. You can set the I/O address of the serial port 1 or disable it.
- Serial Port 2 : The options are **Disable, 3F8, 2F8, 3E8, 2E8 and Auto**. You can set the I/O address of the serial port 2 or disable it.
- Serial Port 3 : The options are **Disable, 3F8, 2F8, 3E8, 2E8 and Auto**. You can set the I/O address of the serial port 3 or disable it.
- Serial Port 4 : The options are **Disable, 3F8, 2F8, 3E8, 2E8 and Auto**. You can set the I/O address of the serial port 4 or disable it.
- OnBoard Parallel Port : The options are **Auto, Disable, 3BC, 378 or 278**. You can set the I/O address of the parallel port or disable it.
- IrDA Protocol : to specify the function mode if an IrDA mode is selected.
- Parallel Port Mode : WAFER-4821 provides **EPP,ECP,ECP/EPP**,and **SPP/BPP** Mode. **EPP** passes the parallel port to be used with devices which stick to the **EPP** specification. The existing parallel port signals will be used by EPP to provide asymmetric bi-directional data transfer driven by the host devices. **ECP** passes the parallel port to be used with devices which stick to the ECP specification.
- Parallel Port IRQ : to define the Interrupt Request (IRQ) which is used by the parallel port.
- Parallel Port DMA Channel : to set the DMA Channel used by the parallel port.

4.6 Auto-Detect Hard Disk

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 4 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 older system, incorrect parameters may be detected. In this case, you need to enter the correct parameters manually or low-level format the disk.

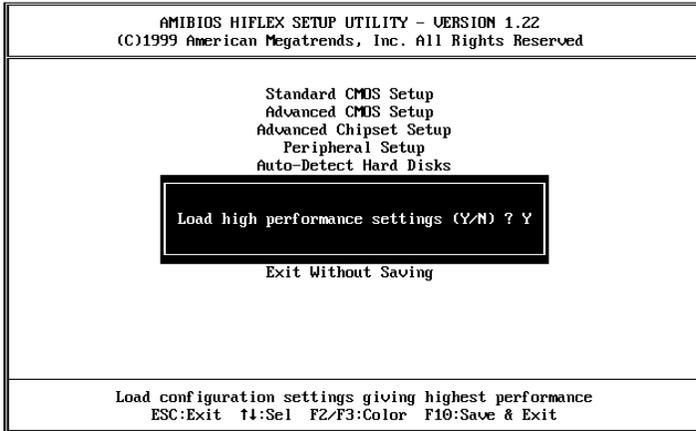
4.7 Change Supervisor Password

This option sets a password that is used to protect your system and Setup Utility. Supervisor Password has higher priority than User Password. 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 Supervisor Password, you can choose every setup/option on the main menu but with User Password, you can only choose three setup/options (USER PASSWORD, SAVE SETTING AND EXIT and EXIT WITHOUT SAVING). To disable these passwords, enter the BIOS SETUP room with Supervisor Password and then just press the <Enter> key instead of entering a new password when the 'Enter Password' prompt pop-up.

*N.B. : if you forget the password, do the Clear/Reset CMOS procedure (see Part2.3 the CPU Setting for WAFER-4821 >> **Clear CMOS SETUP**)*

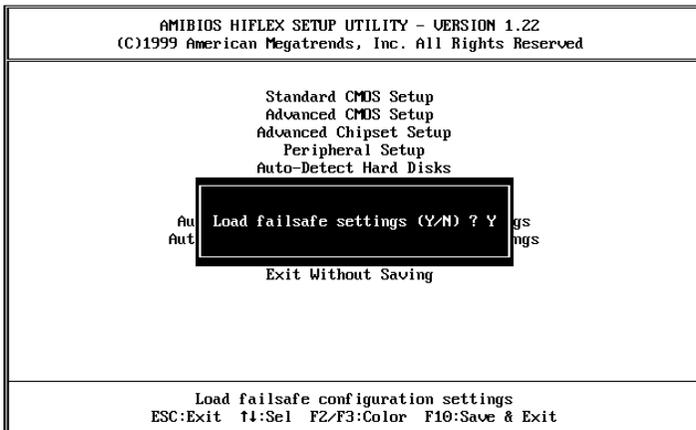
4.8 Auto Configuration with Optimal Settings

This option lets you load the *Optimal* default settings. These settings are *best-case values* which will provide the best performance. Whenever your CMOS RAM is damaged, this Optimal settings will be loaded automatically.



4.9 Auto Configuration with Fail Safe Settings

This option lets you load the *Fail Safe* default settings when something happens to your computer so that it cannot boot normally. These settings are not the most optimal settings but are the most stable settings.



4.10 Save Settings and Exit

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



4.11 Exit Without Saving

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.



Appendix A. Watch-Dog Timer

The WatchDog Timer is provided 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 correctly, hardware on the board will perform a hardware reset (cold boot) to bring the system back to a known state.

The Watch-Dog Timer is controlled by three I/O ports.

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

To enable the Watch-Dog Timer, user has to define Timer before enable the Watch-dog Timer function. The output data is a value of time interval and the range of the value is from 01(hex) to FF(hex) and time interval 1 sec to 255 sec.

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

This 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 Watch-Dog Timer must be periodically refreshed by reading the same I/O port 043H and 443H. This must be done within the time out period that is selected by software, 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 Watch-Dog Timer, otherwise the system will reset.

Example program:

```
TIMER_PORT = 443H
TIMER_START = 443H
TIMER_STOP = 843H
;
; INITIAL TIME PERIOD COUNTER
;
    MOV DX, TIME_PORT
    OUT AL, 8 ; 8 SECONDS
;
; 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 Information

IO Address Map

I/O address Range	Description
000-01F	DMA Controller #1
020-021	Interrupt Controller #1, Master
040-05F	8254 timer
060-06F	8042 (Keyboard Controller)
070-07F	Real time Clock, NMI Mask
080-09F	DMA Page Register
0A0-0BF	Interrupt Controller #2
0C0-0DF	DMA Controller #2
0F0	Clear Math Coprocessor Busy
0F1	Reset Math Coprocessor
0F8-0FF	Math Coprocessor
1F0-1F8	Fixed Disk
200-207	Game I/O
278-27F	Parallel Printer Port 2 (LPT3)
2E8-2EF	Serial Port 4
2F8-2FF	Serial Port 2
300-31F	Prototype Card
360-36F	Reserved
378-37F	Parallel Printer Port 1 (LPT2)
3B0-3BF	Monochrome Display and Printer Adapter (LPT1)
3C0-3CF	Reserved
3D0-3DF	Color/Graphics Monitor Adapter
3E8-3EF	Serial Port 3
3F0-3F7	Diskette Controller
3F8-3FF	Serial Port 1
443	Watch dog timer enable
843 or 043	Watch dog timer disable

1st MB Memory Address Map

Memory address	Description
00000-9FFFF	System memory
A0000-BFFFF	VGA buffer
C0000-C7FFF	VGA BIOS
C8000-EFFFF	Free for customer application
F0000-FFFFF	System BIOS
1000000-	Extend BIOS

IRQ Mapping Chart

IRQ0	System Timer	IRQ8	RTC Clock
IRQ1	Keyboard	IRQ9	Unused
IRQ2	Cascade to IRQ Controller	IRQ10	COM4
IRQ3	COM2	IRQ11	COM3
IRQ4	COM1	IRQ12	PS/2 mouse
IRQ5	Unused	IRQ13	FPU
IRQ6	FDC	IRQ14	Primary IDE
IRQ7	Printer	IRQ15	Unused

DMA Channel Assignments

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

Appendix C. Digital Input and Output

Digital Input and Output, generally, are control signals. You can use these signals to control external devices that needs On/Off circuit or TTL devices. The register address is 340H. This register is designed to latch the output data.

• CN16 : Digital I/O

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

Below is the specifications of WAFER-4821 Digital I/O:

- ¡ Digital Input/Output channels : 4 bits
- ¡ TTL Devices compatible
- ¡ Digital Logic level 0: +0.5V max
- ¡ Digital Logic level 1: 3.5V to 5V
- ¡ Register Address: 340H

Example program:

```
PORT_ADRESS = 340H
```

```
G_LOOP: MOV  DX, PORT_ADDRESS
        IN   AL, DX
        CMP  AL, P_STATUS
        JNE  W_LOOP
        CMP  X_STATUS, 0
        JE   G_LOOP
        OUT  DX, AL
        MOV  X_STATUS, 0
        JMP  G_LOOP
W_LOOP: MOV  P_STATUS, AL
        MOV  X_STATUS, 1
        ;
        ; WAIT HERE
        ;
        JMP  G_LOOP
X_STATUS DB 0
P_STATUS DB
```