FabiaTech Corporation

IPC Solution

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Small Cube System

Fanless Series

FX5311 User's Manual

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Returning Your Board for Service & Technical Support

If your board requires servicing, contact the dealer from whom you purchased the product for service information. You can help assure efficient servicing of your product by following these guidelines:

- A list of your name, address, telephone, facsimile number, or email address where you may be reached during the day
- Description of you peripheral attachments
- Description of your software (operating system, version, application software, etc.) and BIOS configuration
- Description of the symptoms (Extract wording any message)

For updated BIOS, drivers, manuals, or product information, please visit us at www.fabiatech.com.

Table of Contents

FX5311 User's Manual i

Chapter 1 Introducing the FX5311 System 1

Overview 1

Series Comparison Table 2

Layout 3

Specifications 4

Packing List 5

Chapter 2 Hardware Installation 7

Before Installation 7

Removing Covers –Installing Hardware 8

LED Indicators 10

I/O Peripheral Connectors 11

Connecting the DC Power and Power Switch 13

Jumper Setting 14

Chapter 3 BIOS Setup 17

Overview 17

BIOS Functions 18

Keyboard Convention 19

Main Setup 20

Advanced Setup 21

CPU Configuration 21

IDE Configuration 22

SuperIO Chipset - Configuration ITE8712 Super IO Chipset 24

Hardware Health Configuration 25

APM Configuration 26

USB Configuration 28

PCIPnP Setup 30

Boot Setup 32

Boot Setting Configuration 33

Boot Device 35

Hard Disk Drives 36

Removable Drives....36
Security setup....37
Chipset Setup....39
Northbridge VIA CX700 Configuration....40
Southbridge VIA CX700 Configuration....41
Chapter 4 Software Installation....43
VIA HyperionPro Driver....43
WIN 2000/XP Driver....43
VGA Drivers....44
WINXP/WIN2000 Driver....44
Audio Drivers....44
WIN 2000/XP Driver....44
LAN Utility & Driver....45
BIOS Flash Utility....45
Watchdog Timer....46
Watchdog Timer Setting....47
Watchdog Timer Enabled....48
Watchdog Timer Trigger....48
Watchdog Timer Disabled....49
Programming RS-485....50
Initialize COM port....50
Send out one character (Transmit)....51
Send out one block data (Transmit – the data more than two characters)....51
Receive data....51
Basic Language Example....51
Chapter 5 Technical Reference....53
Trouble Shooting for Post Beep and Error Messages....53
Technical Reference....56
Physical and Environmental....56
Real-Time Clock and Non-Volatile RAM....56
CMOS RAM Map....58
I/O Port Address Map....59
Interrupt Request Lines (IRQ)....60
DMA Channel Map....61

Serial Ports 62
Appendix..... 66
Dimension 66

Chapter 1 Introducing the FX5311 System

Overview

The FX5311 is an embedded system with low-power CPU module inside. This user's manual provides information on the physical features, installation, and BIOS setup of the FX5311.

Built to unleash the total potential of the VIA Eden (V4) ™ Low power processor, Able to support 1GHz CPU, this system supports two 10/100 Base –T LAN ports, audio, two USB2.0 ports, and So-DIMM socket supports up to 1GB DDR2 RAM, and a VGA controller.

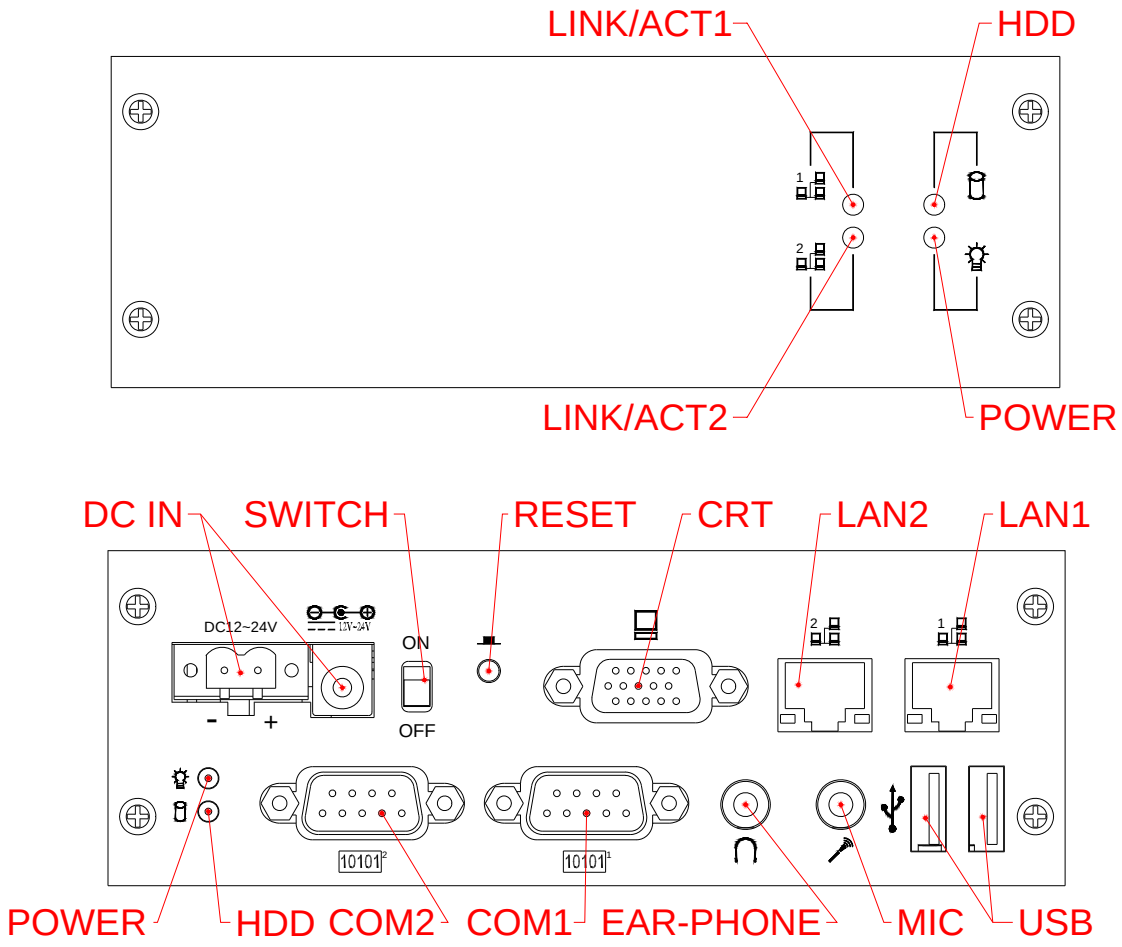
Each FX5311 has two ports for I/O communications. Two RS-232C ports are available.

The FX5311 is perfect for ATM machines, KIOSK, point-of-sales/point-of- information, gaming and infotainment, measurement technology, lotteries, and banking and small Embedded Control. The unit is only 102.0mm (D) X145.0mm (W) X50.4mm (H).

Series Comparison Table

Model	FX5311
System Processor	VIA Eden(V4) 1GHz
Chipset	*VIA CX700M*
1 DDR2 So-DIMM (Max.)	*1GB*
VGA	*Yes*
Watchdog Timer	*Yes*
Multi I/O	*Two RS232*
Storage	*One SATA HDD and CF*
USB 2.0	*Two*
Audio	*Ear-Phone/Line-In And MIC-In*
RJ45 LAN port(10/100Mbps)	*Two Realtek RTL8100C*
Operating Temperature	0~+ 50℃ (32~122℉)
Storage Temperature	-20~+60℃(4~140℉)
Dimensions (Unit: mm)	102(D) x145(W) X 50.4(H)

Layout


LINK/ACT1
HDD
LINK/ACT2
POWER
DC IN
SWITCH
RESET
CRT
LAN2
LAN1
DC12~24V
ON
OFF
POWER
HDD
COM2
COM1
EAR-PHONE
MIC
USB

Specifications

- ***Processor Board –***

  VIA Eden (V4) ™ Low Power 1GHz CPU with 1GB DDR2-RAM.

- ***I/O Outlets –***

  Two 10/100 base-TX Ethernet LAN ports with RJ45.

  One CRT and two USB ports (2.0) and two RS-232 serial ports.

  Two Audio connectors for Earphone-out and Line-In/Microphone-In.

  One DC-In plug connector and one terminal block with power switch.

  One push button reset switch.

  Two power LED, two HDD/CF access LED, and two LAN LED's.

- ***Storage Bay-***

  Compact Flash socket for Compact Flash modules or MicroDrives.

  One SATA 2.5" hard disk space

- ***Power requirement –***

  +12~+24V DC, 1.26A maximum (0.82A typical) with DC 19V input.

- ***Dimensions -***

  102.0mm (D) x 145.0mm (W) x 50.4mm (H)

Packing List

Upon receiving the package, verify the following things. Should any of the mentioned happens, contact us for immediate service.

- Unpack and inspect the FX5311 package for possible damage that may occur during the delivery process.
- Verify the accessories in the package according to the packing list and see if there is anything missing or incorrect package is included.
- If the cable(s) you use to install the FX5311 is not supplied from us, please make sure the specification of the cable(s) is compatible with the FX5311 system.

Note: after you install the FX5311, it is recommended that you keep the diskette or CD that contains drivers and document files, and keep the document copies, or unused cables in the carton for future use.

The following lists the accessories that may be included in your FX5311 package. Some accessories are optional items that are only shipped upon order.

- One FX5311 embedded system.
- One AC to DC power adapter and 1 AC power code.
- One pack of 2.5" SATA hard disk installation kit with fixed screws.
- One 2-pin apartable terminal block.
- One FX5311K1 universal fixers and 6 screws.(Optional)
- One compact disc includes software utility and manual.

Chapter 2 Hardware Installation

This chapter introduces the system connectors & jumper settings, and guides you to apply them for field application.

Before Installation

Before you install the system, make sure you follow the following descriptions.

1. Before removing the cover, shut down the operation System and disconnect power switch to off and unplug AC-to DC Adapter cable.

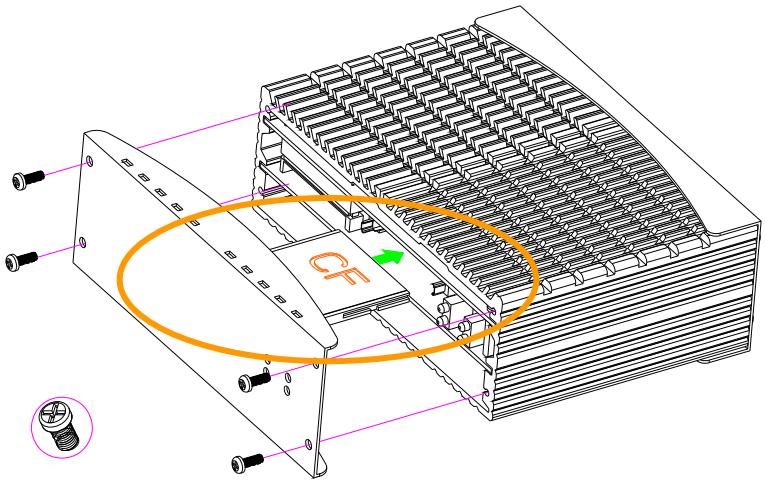
2. Install any connector, Compact Flash, and hard disk is sure that the power is disconnected or power switch to off from the system. If not, this may damage the system.

3. The ESD (Electricity Static Discharge) may be created from human body that touches the board. It may do damage to the board circuit.

□ Removing Covers –Installing Hardware

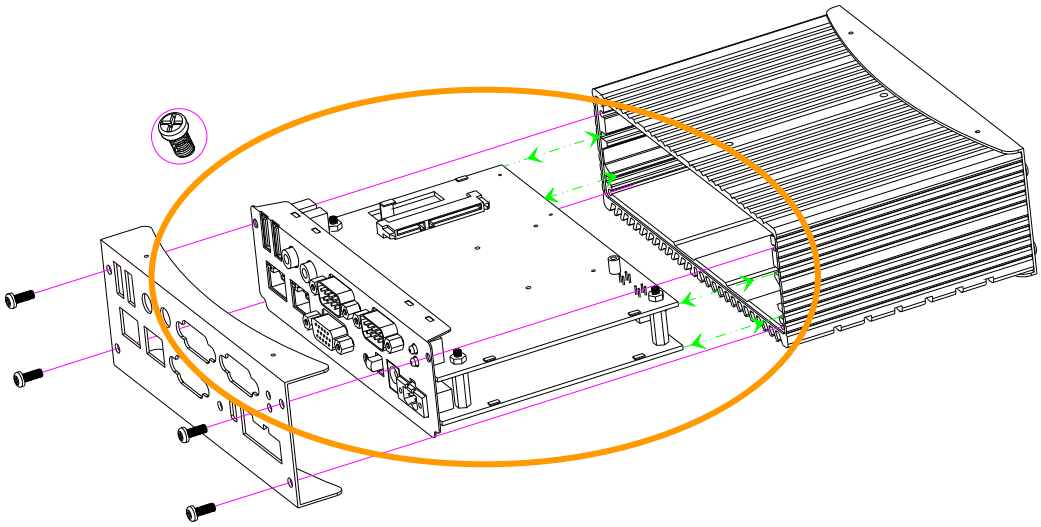
If you are installing hardware option, you can remove the front and back cover. The following figure will guide you how to install 2.5" HDD inside, Compact Flash modules, and DDR2-RAM module the FX5311 and how to install the FX5311 fixers. (Please see the spots circled.)

➢ a. Unscrew front cover and Installing Compact Flash

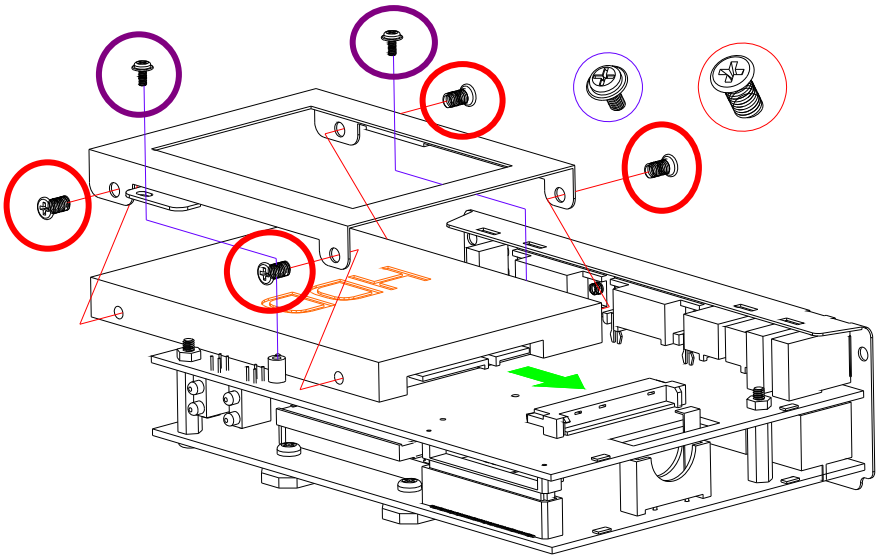


Note: The Compact Flash socket supports Compact Flash Modules and Micro Drives.

➢ b. Unscrew back cover and Installing Hard Disk



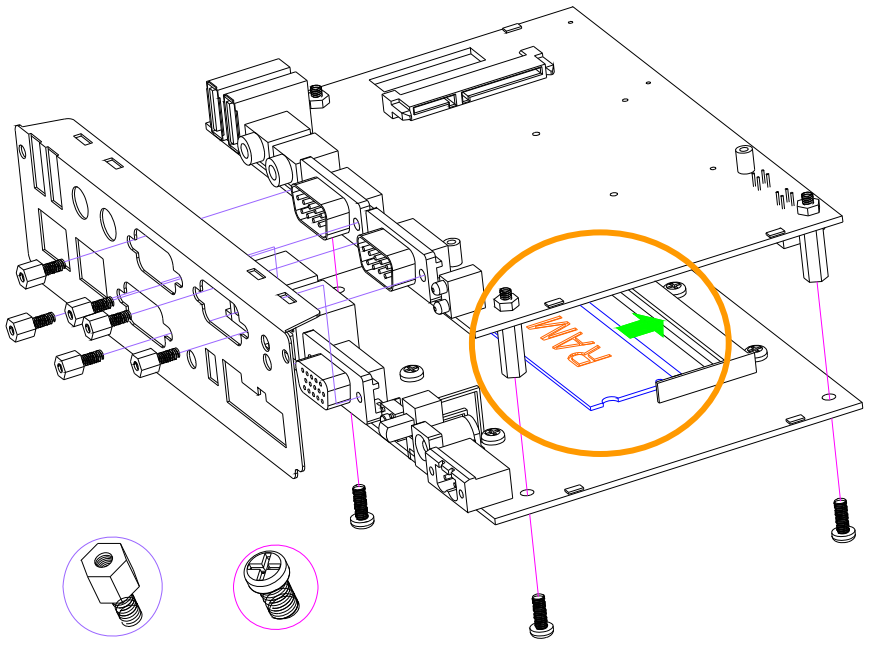
✧ ***b1. Installing Hard Disk***



Note: Use caution when handling the hard disk to prevent damage to SATA connector as you inserted hard disk. Be careful with the orientation when installing connectors.

➢ **c. Installing Memory: So-DIMM Socket for DDR2 RAM Modules**

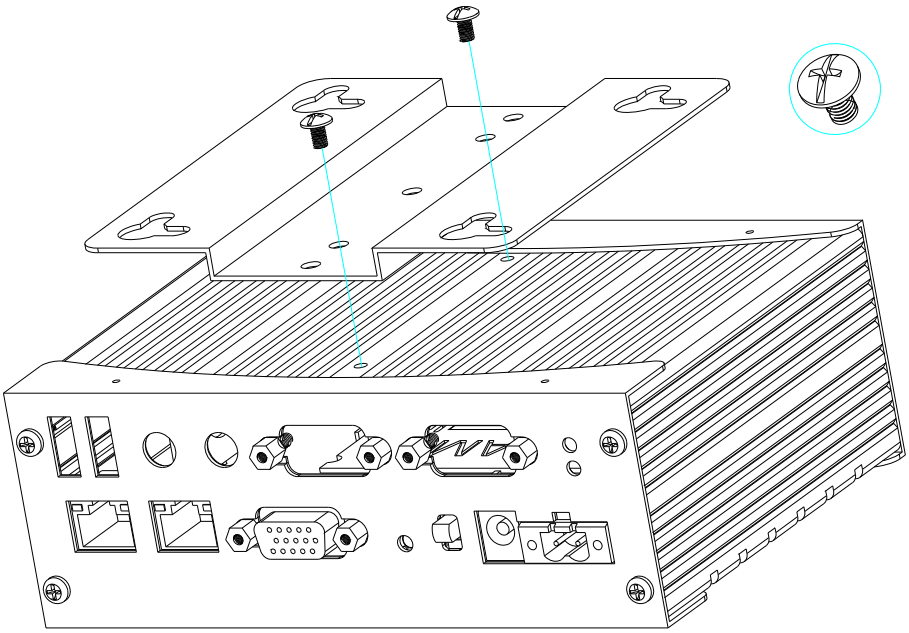
You may extend additional memory to FX5311, See as following figure and rear pictures. The So-DIMM socket supports 512MB to 1GB of DDR2 RAM modules.



➢ **d. Installing the universal fixers**

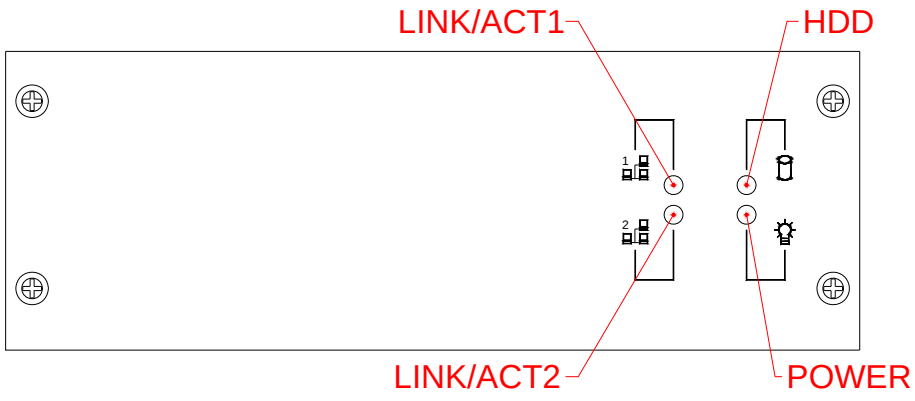
Please refer to the down side figure for installing the FX5311 with universal fixers.

d1. FX5311K1 universal fixers.



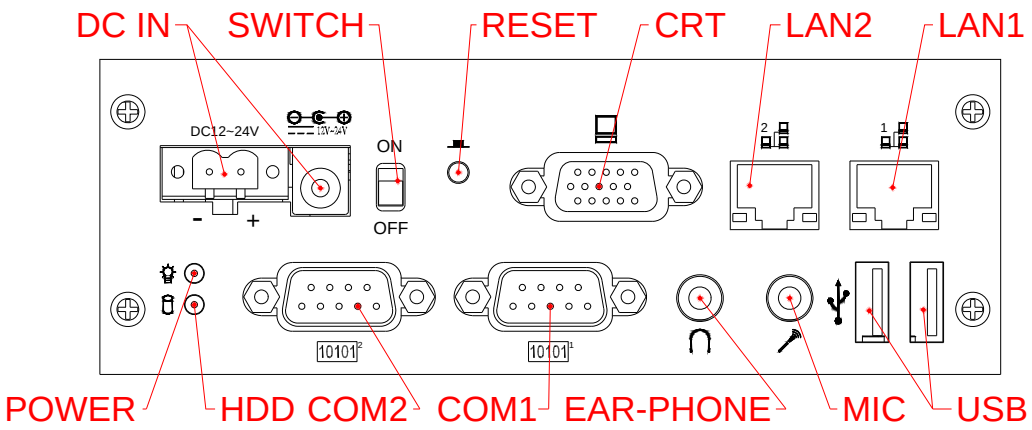
□ **LED Indicators**

The Power and HDD LED's has two distinctive statuses: Off for inactive operation and blinking light for activity. And the 2 LED's for LAN ports. The LAN1 and LAN2 LED's (Green) indicate on-line of LAN1 and LAN2 respectively.

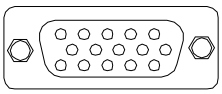


□ I/O Peripheral Connectors

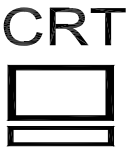
View from the back side, If you are connecting the monitor, keyboard, mouse, LAN, audio, COM and USB to the FX5311. See following figure and a side pictures.



1. A CRT connector is provided for CRT signals



CRT



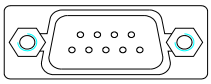
DB15	Signal
1	Red
2	Green
3	Blue
13	Hsync
14	Vsync
12	DDC Data
15	DDC Clock
5 & 10	Digital Ground
6,7,8	Analog Ground
Others	Not Used

2. Connecting the COM ports

The DB9 (COM1/2) is standard serials port connector. The following tables show the signal connections of these connectors.

COM

10101

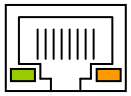


DB-9	RS-232 Signal
1	-DCD
6	-DSR
2	RXD
7	-RTS
3	-TXD
8	-CTS
4	-DTR
9	-RI
5	Ground
Case	Case Ground

3. Connecting the L1/L2 LAN ports

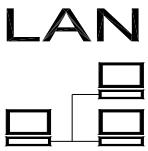
The RJ45 connector with 2 LED's for WAN/LAN. The right side LED (orange) indicates data is being accessed and the left side LED (green) indicates on-line status. (On indicates on-line and off indicates off-line)

RJ45 connector



1 8

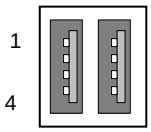
(Front View)



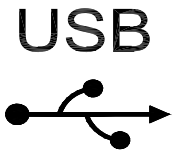
RJ45	LAN1/2	RJ45	LAN1/2
1	TPTX+	5	FBG
2	TPTX -	6	TPRX -
3	TPRX+	7	FBG
4	FBG	8	FBG

4. Connecting the USB Ports

The FX5311 supports a four port USB connector. Any USB device can be attached to USB ports with plug-and-play supported.



(Front View)



USB#1/2	Signal
Pin 1	USBV
Pin 2	USBD-
Pin 3	USBD+
Pin 4	USBG

5. Connecting the Audio Microphone In/Line-in, Earphone-out

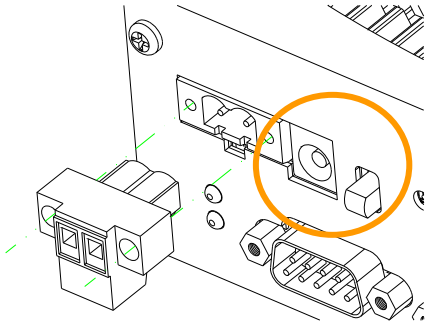
Mic-In

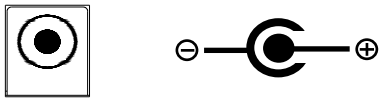
EAR-Phone

□ Connecting the DC Power and Power Switch

Power is supplied through an external AC/DC power adapter or power DC In. Check the technical specification section for information about AC/DC power input voltage. See following figure and a side pictures.

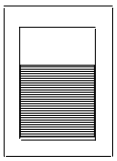
1. DC-Power Jack: Use External AC/DC power adapter



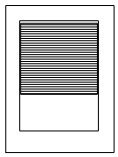


DC +12V~+24V, 30W minimum

Since the switch does include a power switch, plugging its power adapter into a power outlet then switch power to on, when you final installed system hardware device.

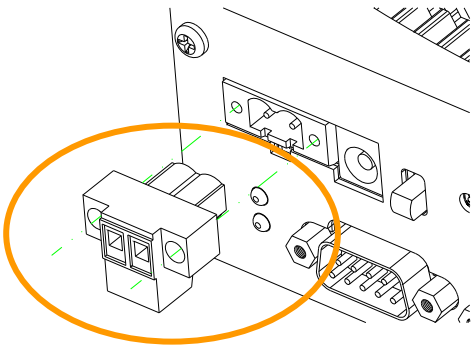


Off: Power Off



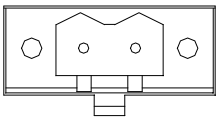
On: Power On

2. DC Power Connector: Use external 2-pin apart able terminal block. (Please see the spots circled.)



DC12~24V

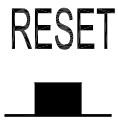
− +



Terminal Block

3. Reset Push Button

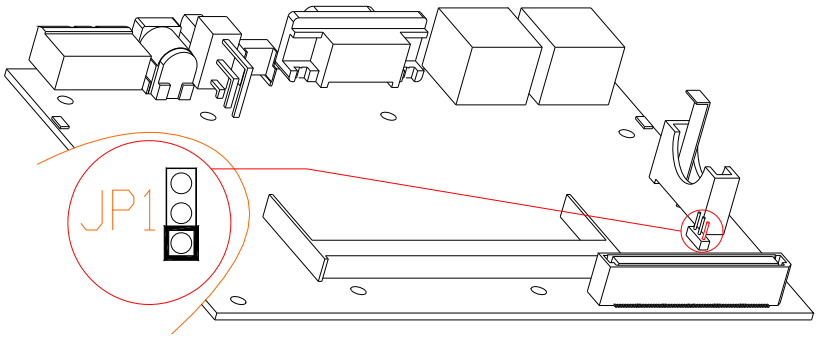
The FX5311 has a push button switcher for system reset; Push and release the button will cause hardware reset of FX5311 and restart system booting.



□ **Jumper Setting**

The COM2 is designed for multiple proposes, Use JP1 of the transfer board selects RS-232, RS422 or RS-485 of COM2 connector and JP4/JP5 to select Line-In or Mic-In of Mic-In connector (Please see the **b. transfer board** spots circled.), and JP1 of CPU board is used to select clear CMOS data.

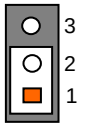
➢ **a. CPU board**



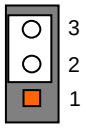
a1. JP1: Clear CMOS Setting

You can use JP1 to clear CMOS data. The CMOS stores information like system date, time, boot up device, password, IRQ... which are set up with the BIOS. To clear the CMOS, set JP1 to 2-3 and then return to 1-2 before system powers off. The default setting is 1-2 closed.

JP1



Factory Preset

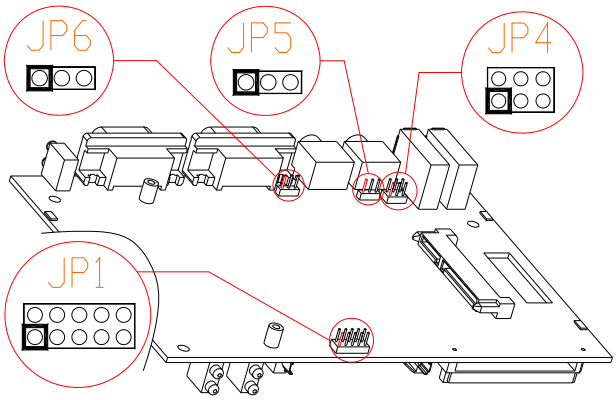


Clear CMOS Data

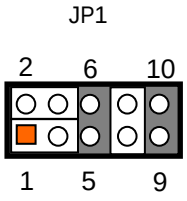
➢ b. Transfer board

b1. COM2:- R232/422/485 Selection

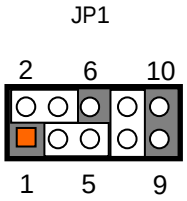
The DB9-COM2 is standard serial port connector. The following tables show the signal connections of DB9. Serial port 2 is designed for multiple proposes. Use JP1 selects the RS-232, RS-422 or RS-485.



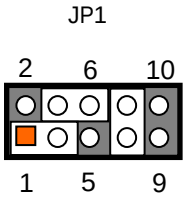
DB-9	RS-232	RS-422	RS-485
1	-DCD		
6	-DSR		
2	RXD	RX-	485-
7	-RTS	TX-	
3	-TXD	RX+	485+
8	-CTS	TX+	
4	-DTR		
9	-RI		
5	Ground		
Metal	Case Ground		



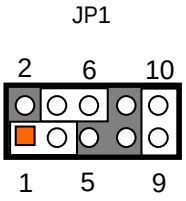
RS-232
Factory Preset



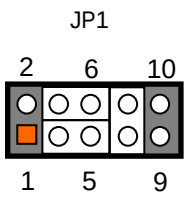
RS-422



RS-485
Terminator
Disabled

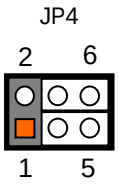


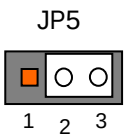
RS-485
Terminator
Enabled



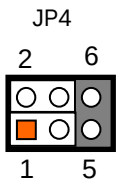
*Note: Changing the setting in BIOS setup program

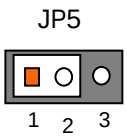
b2. JP4 and JP5: Mic-in and Line-In Selection





LINE-In





MIC-In
Factory Preset

Chapter 3 BIOS Setup

This chapter describes the BIOS setup.

Overview

BIOS are a program located on a Flash memory chip on a circuit board. It is used to initialize and set up the I/O peripherals and interface cards of the system, which includes time, date, hard disk drive, the ISA bus and connected devices such as the video display, diskette drive, and the keyboard. This program will not be lost when you turn off the system.

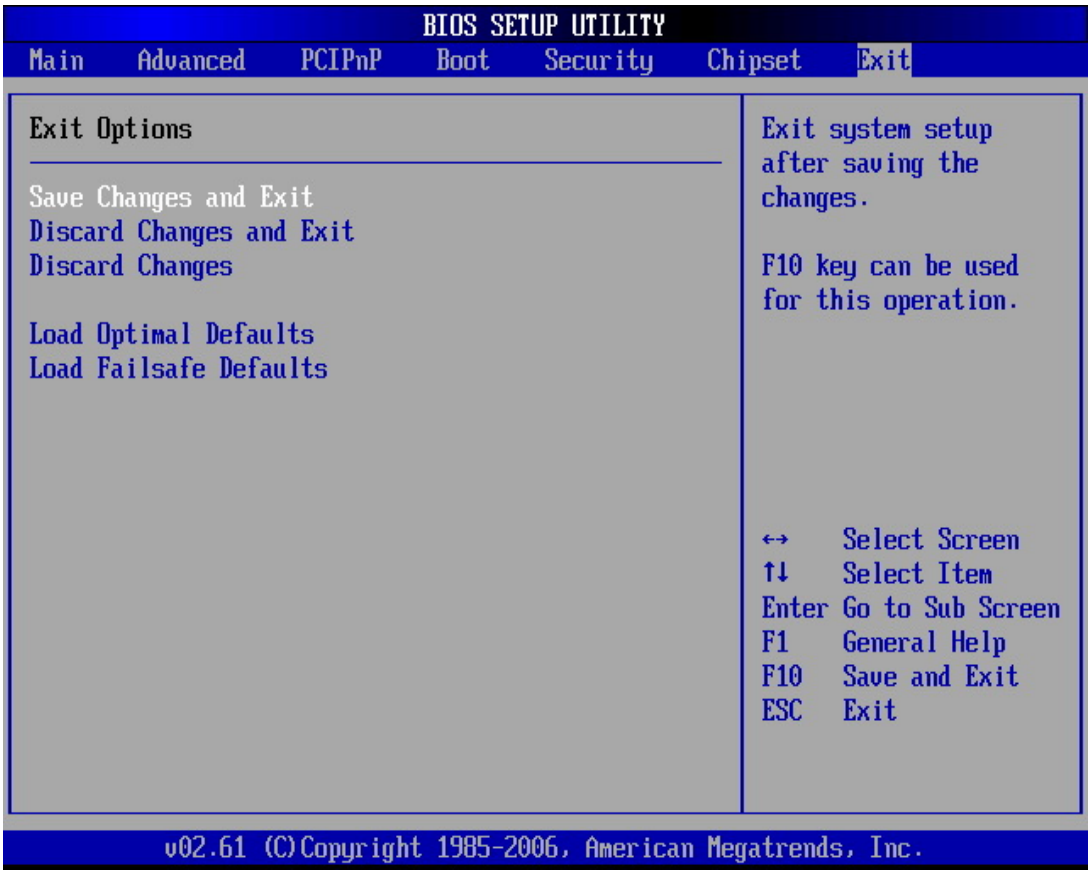
The BIOS provides a menu-driven interface to the console subsystem. The console subsystem contains special software, called firmware that interacts directly with the hardware components and facilitates interaction between the system hardware and the operating system.

The BIOS default values ensure that the system will function at its normal capability. In the worst situation the user may have corrupted the original settings set by the manufacturer.

All the changes you make will be saved in the system RAM and will not be lost after power-off.

When you start the system, the BIOS will perform a self-diagnostics test called Power On Self Test (POST) for all the attached devices, accessories, and the system. Press the [Del] key to enter the BIOS Setup program, and then the main menu will show on the screen.

Note: Change the parameters when you fully understand their functions and subsequence.



□ **BIOS Functions**

On the menu, you can perform the following functions

1. Main
2. Advanced
   - CPU Configuration
   - IDE Configuration
   - SuperIO Configuration
   - Hardware Health Configuration
   - APM Configuration
   - USB Configuration
3. PCIPnP
4. Boot
   - Boot Settings Configuration
   - Boot Device Priority
   - Hard Disk Drives
   - CD/DVD Drivers
5. Security
   - Change Supervisor Password
   - Change User Password
   - Clear User Password
   - Boot Sector Virus Protection
6. Chipset

- NorthBridge VIA CX700 Configuration
- SouthBridge VIA CX700 Configuration

7. Exit
   - Save Changes and Exit: Exit system setup after saving the changes.F10 key can be used for this operation.
   - Discard Changes and Exit: Exit system setup without saving any changes. ESC key can be used for this operation.
   - Discard Changes: Discard changes down so far any of the set questions. F7 key can be used this operation.
   - Load Optimized Default: to auto configure the system according to optimal setting with pre-defined values. This is also the factory default setting of the system when you receive the board.
   - Load Fail-Safe Default: to configure the system in fail-safe mode with predefined values.

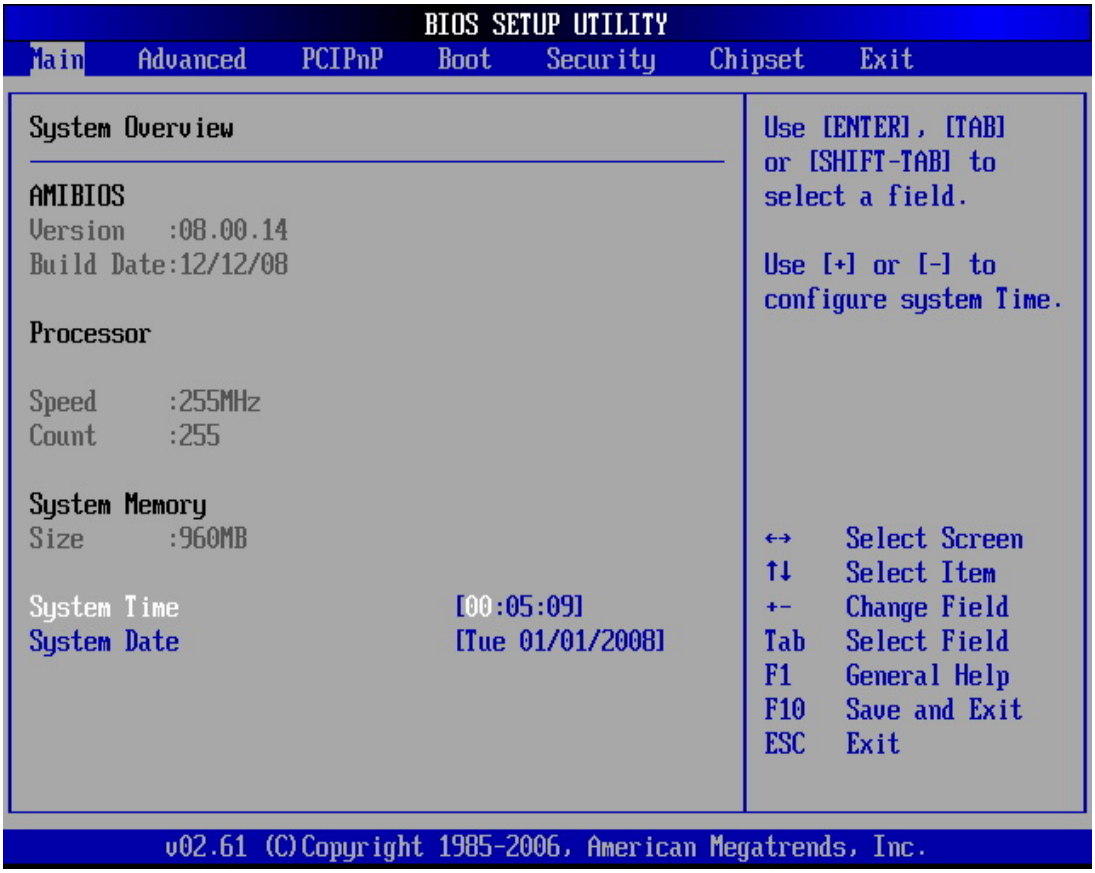
Keyboard Convention

On the BIOS, the following keys can be used to operate and manage the menu:

Item	Function
ESC	To exit the current menu or message
Page Up/Page Down	To select a parameter
F1	To display the help menu if you do not know the purpose or function of the item you are going to configure
F8	Fail-Safe Default
F9	Optimized Default
F10	Save and exit
UP/Down Arrow Keys	To go upward or downward to the desired item

Main Setup

This section describes basic system hardware configuration, system clock setup and BIOS version information. If the CPU board is already installed in a working system, you will not need to select this option anymore.



- **System Memory**

This option is display-only which is determined by POST (Power On Self Test) of the BIOS.

- **System Date & Time Setup**

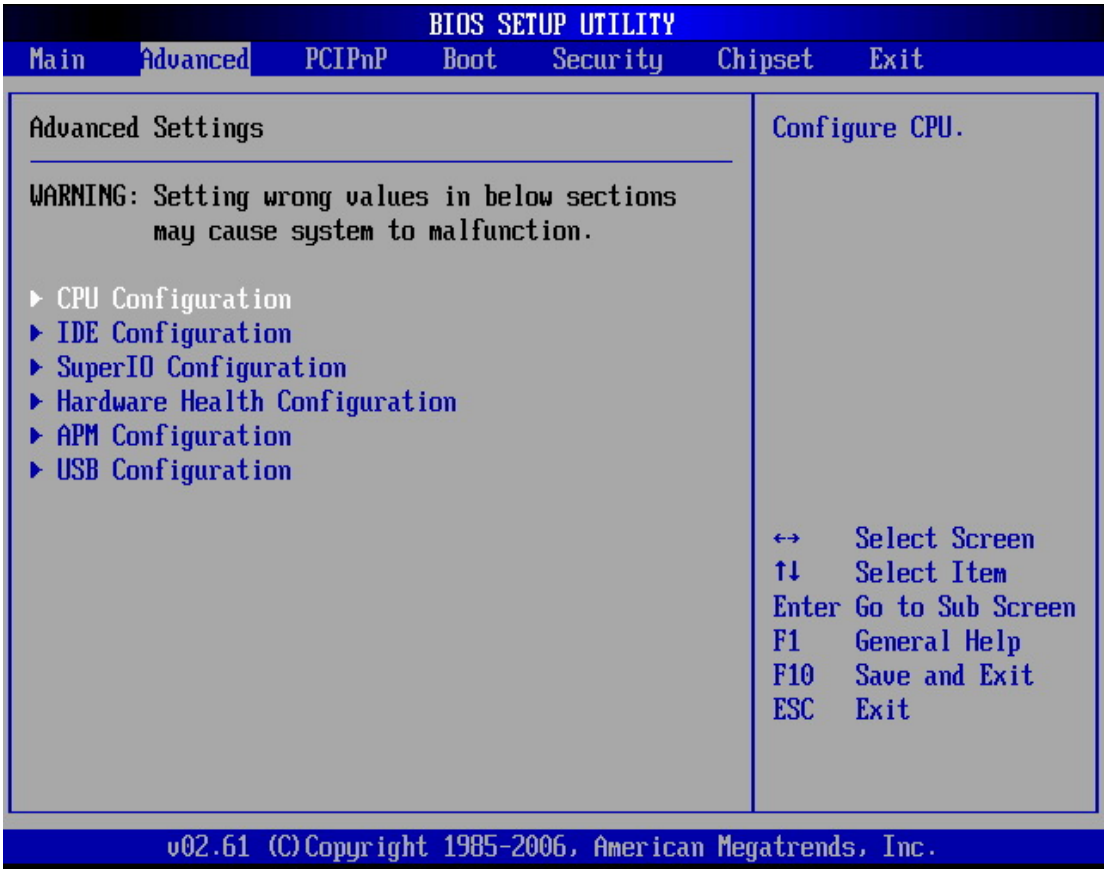
Highlight the <Date> field and then press the [Page Up] / [Page Down] or [+]/ [-] keys to set the current date. Follow the month, day and year format.

Highlight the <Time> field and then press the [Page Up] / [Page Down] or [+]/ [-] keys to set the current date. Follow the hour, minute and second format.

The user can bypass the date and time prompts by creating an AUTOEXEC.BAT file. For information on how to create this file, please refer to the MS-DOS manual.

Advanced Setup

Select the *Advanced* tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as SuperIO Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screen is shown below. The sub menus are described on the following pages



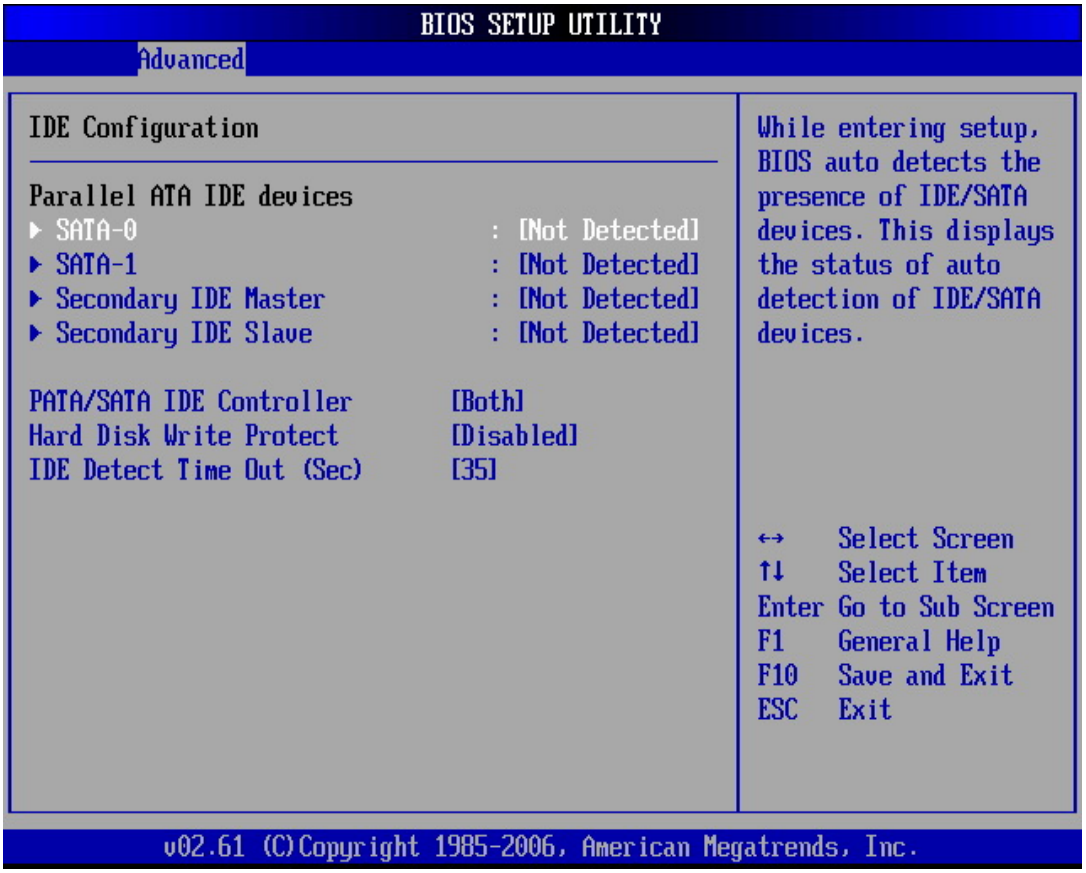
➢ **CPU Configuration**

You can use this screen to select options for the CPU information. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option.

Note: The CPU Configuration setup screen varies depending on the installed processor.

➢ **IDE Configuration**

You can use this screen to select options for the IDE Configuration Settings. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option. A description of the selected item appears on the right side of the screen. The settings are described on the following pages. An example of the *IDE Configuration* screen is shown below.



➢ **SATA-0<1>/IDE Secondary Master/Slave**

IDE hard drive controllers can support up to two separate hard drives. These drives have a master/slave relationship, which is determined by the cabling configuration used to attach them to the controller. Your system supports one IDE controller – a primary – so you have the ability to install up to two separate hard disks.

LBA/Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB. The Optimal and Fail-Safe default setting is *Auto*

Hard Disk Type

The BIOS supports various types for user settings, The BIOS supports <Pri Master>, <Pri Slave>, so the user can install up to two hard disks. For the master and slave

jumpers, please refer to the hard disk's installation descriptions and the hard disk jumper settings.

You can select <AUTO> under the <TYPE> and <MODE> fields. This will Enabled auto detection of your IDE drives during boot up. This will allow you to change your hard drives (with the power off) and then power on without having to reconfigure your hard drive type. If you use older hard disk drives, which do not support this feature, then you must configure the hard disk drive in the standard method as described above by the <USER> option.

PIO MODE
PIO means Programmed Input/Output. Rather than have the BIOS issue a series of commands to affect a transfer to or from the disk drive, PIO allows the BIOS to tell the controller what it wants and then let the controller and the CPU perform the complete task by them. This is simpler and more efficient (and faster). Your system supports five modes, numbered from 0 to 4, which primarily differ in timing. When Auto is selected, the BIOS will select the best available mode.

BLOCK (Multi-Sector Transfer)
This option allows your hard disk controller to use the fast block mode to transfer data to and from your hard disk drive (HDD).

S.M.A.R.T

This field is used to activate the S.M.A.R.T (System Management and Reporting Technologies) function for S.M.A.R.T HDD drives. This function requires an application that can give S.M.A.R.T message.

32 Bit Data Transfer
This option sets the 32-bit data transfer option. The Optimal and Fail-Safe default setting is e*nabled*.

- **PATA/SATA IDE Controller**

This item specifies the ATA/IDE channels used by the onboard PATA/SATA IDE controller.

Available Options: SATA, IDE, Disabled, and Both

Default setting: Both

- **Hard Disk Write Protect**

Set this option to protect the hard disk drive from being overwritten. The Optimal and Fail-Safe default setting is d*isabled*.

Available Options: Disabled, Enabled

Default setting: Disabled

➢ **IDE Detect Time Out (Sec.)**

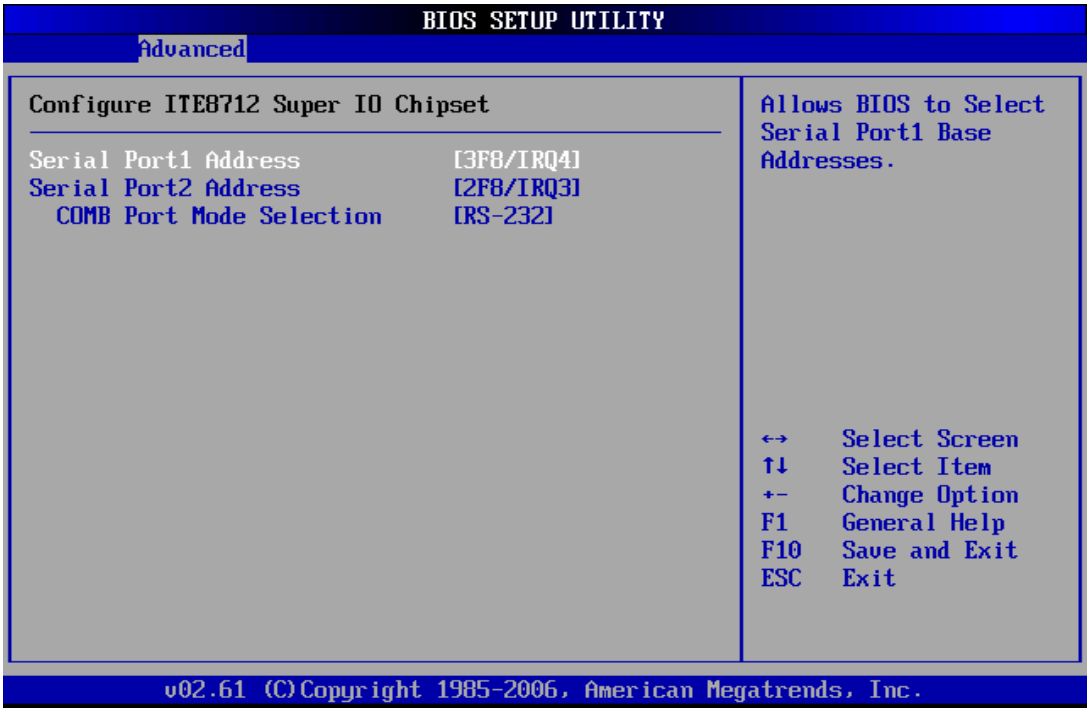
Set this option to stop the AMIBIOS from searching for IDE devices within the specified number of seconds. Basically, this allows you to fine-tune the settings to allow for faster boot times. Adjust this setting until a suitable timing that can detect all IDE disk drives attached is found.

Available Options: 0, 5, 10, 15, 20, 25, 30, and 35

Default setting: 35

➢ **SuperIO Chipset - Configuration ITE8712 Super IO Chipset**

This section describes the function of Super I/O settings.



➢ **Serial Port 1 Address**

These fields select the I/O port address for each Serial port.

Available Options: Disabled, 3F8H/IRQ4, 3E8H/IRQ4, 2F8H/IRQ4 and 2E8H/IRQ3.

Default setting: 3F8H/IRQ4

➢ **Serial Port 2 Address**

These fields select the I/O port address for each Serial port.

Available Options: Disabled, 3F8H/IRQ4, 3E8H/IRQ4, 2F8H/IRQ4 and 2E8H/IRQ3.

Default setting: 2F8H/IRQ3

■ ***COMB Port Mode Selection***

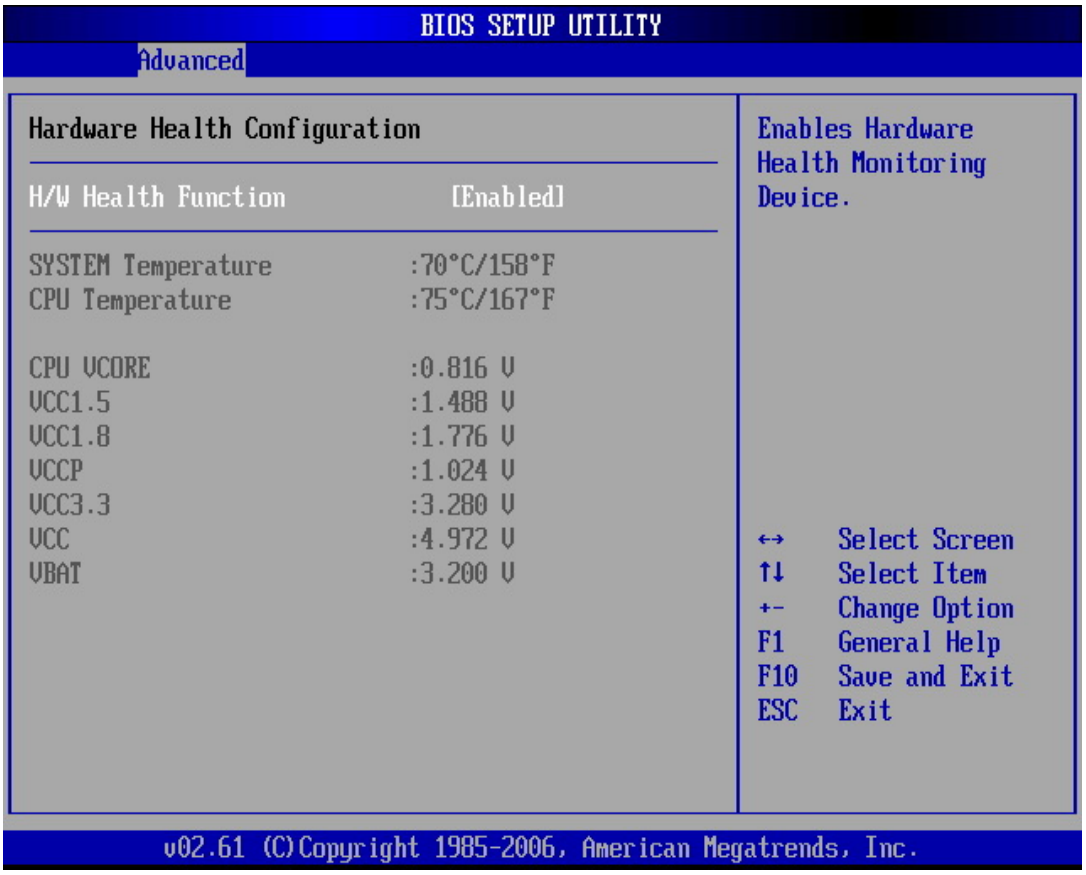
These fields item can select RS-232, RS-422 and RS-485 of select port 2.

Available Options: RS-232, RS-422 and RS485

Default setting: RS-232

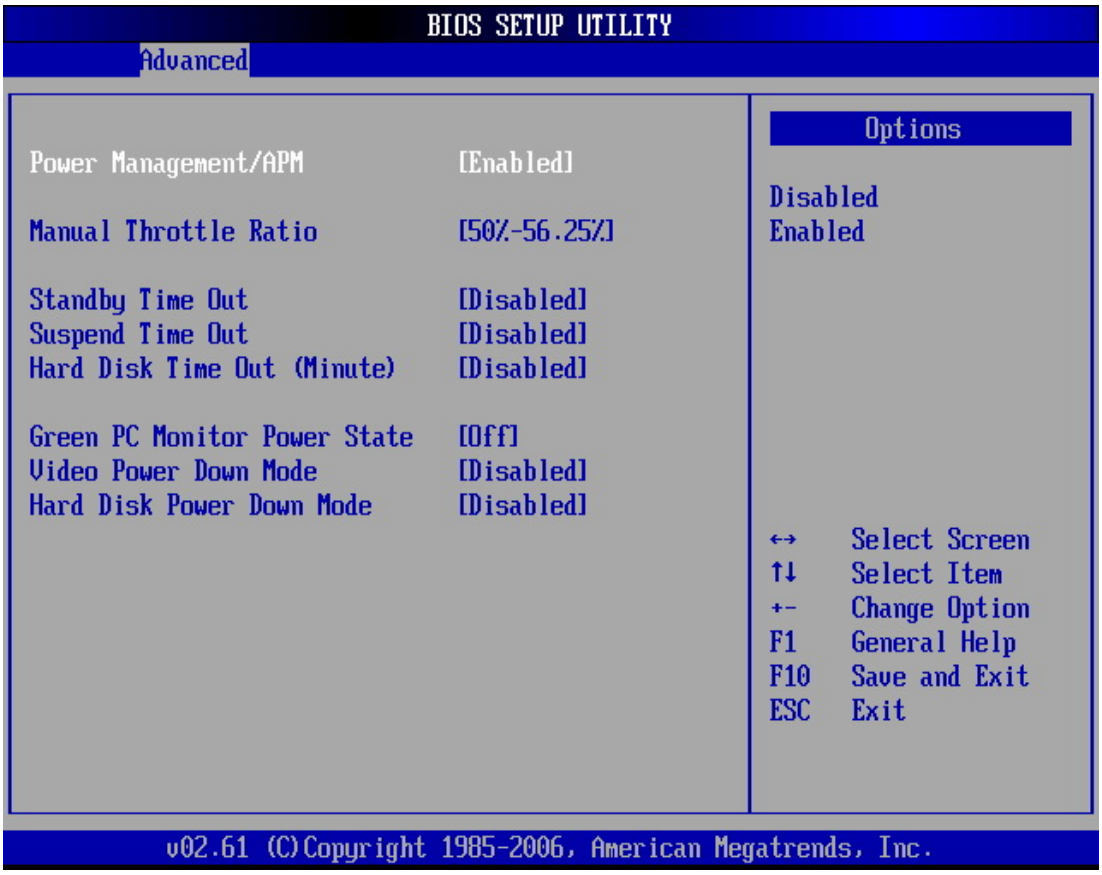
➢ **Hardware Health Configuration**

On the Hardware Monitor Setup screen, you can monitor the system temperature, CPU voltage, and VCC voltage...



➢ **APM Configuration**

You can use this screen to select options for the USB Configuration.



➢ **Power Manager /APM**

Select Enabled to activate the chipset Power Management and APM (Advanced Power Management) features.

Available Options: Disabled and Enabled

Default setting: Enabled

➢ **Manual Throttle Ration**

In a power management state, the BIOS can throttle the CPU clock to reduce power consumption. For example, a throttle ratio of *50%* means the clock is turned off half of its normal operational time.

Available Options: 0~6.25%, 18.75~25%, 50%~56.25%, 75%~87.5%, and up to 97.5%

Default setting: 50%~56.25%

- **Standby Time Out**

This field specifies the length of a period of system inactivity (like hard disk or video) while in full power on state. When this length of time expires, the system enters Standby power state.

Available Options: Disabled, 1 Minute, 2 Minute, 4 Minute, and 8 Minute, up to 60 Minute.

Default setting: Disabled

- **Suspend Time Out**

This field specifies the length of time the system waits before it enters suspend mode.

Available Options: Disabled, 1 Minute, 2 Minute, 4 Minute, and 8 Minute, up to 60 Minute.

Default setting: Disabled

- **Hard Disk Time Out (Minute)**

This option specifies the amount of time the hard disk drive can be inactive before the computer enters a power-conserving state specified in the **Hard Disk Drive Power Down Mode** option.

Available Options: Disabled, 1 Minute, 2 Minute, and 3 Minute, up to 15 Minute.

Default setting: Disabled

- **Green PC Monitor Power State**

This option specifies the power state that the green PC-compliant video monitor enters when the BIOS places it in a power saving state after the specified period of display inactivity has expired.

Available Options: Standby, Suspend, and Off

Default setting: Off

- **Video Power Down Mode**

This field specifies the power conserving state that video subsystem enters after the specified period of display inactivity has expired.

Available Options: Disabled, Standby, Suspend

Default setting: Disabled

➢ **Hard Disk Power Down Mode**

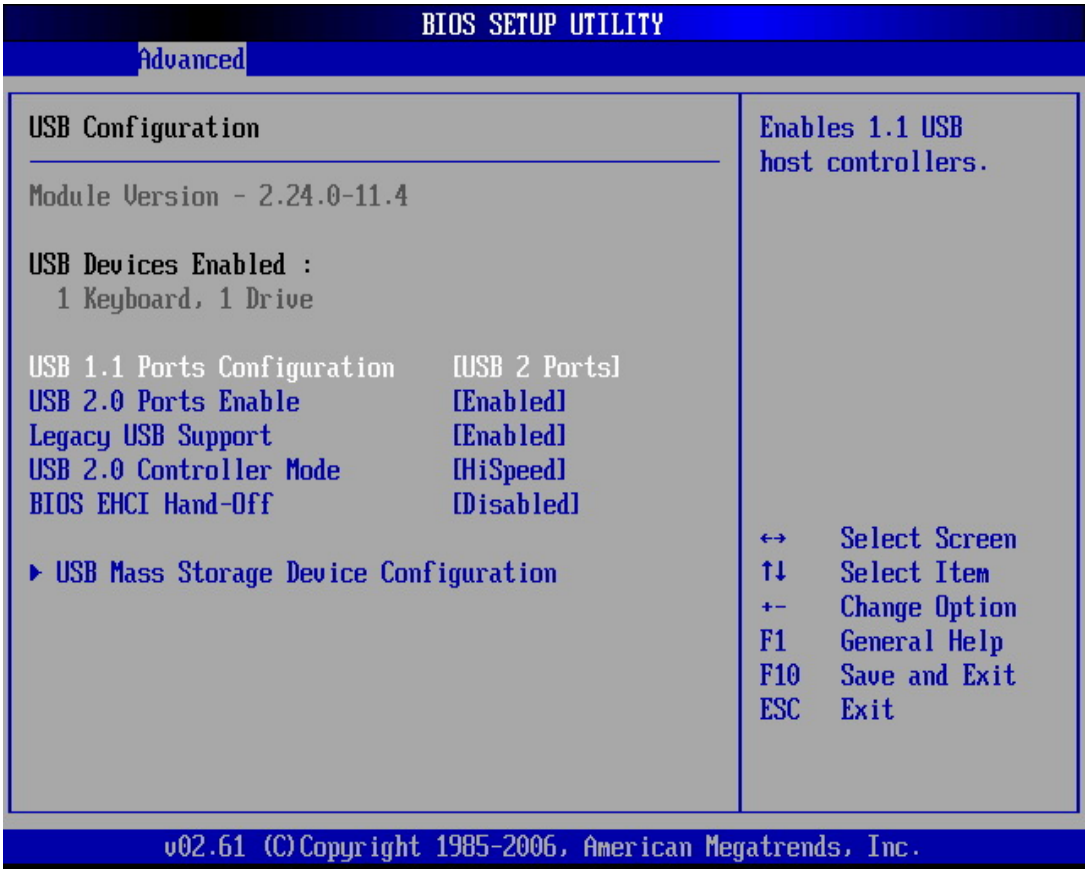
This field specifies the power conserving state that the hard disk drive enters after the specified period of hard drive inactivity has expired.

Available Options: Disabled, Standby, Suspend

Default setting: Disabled

➢ **USB Configuration**

You can use this screen to select options for the USB Configuration.



➢ **USB 1.1 Ports Configuration**

Set this value to allow the system to Enabled or Disabled the onboard USB ports. The Optimal and Fail-Safe default setting is 2 USB Ports.

Available Options: USB 2 Ports, and Disabled

Default setting: USB 2 Ports

- **USB 2.0 Ports Enable**

This field is Enables USB controllers. Select Enabled, if a USB device is installed to the system. If Disabled are selected, the system will not be able to use a USB device.

Available Options: Enabled, and Disabled

Default setting: Enabled

- **Legacy USB Support**

Legacy USB Support refers to the USB mouse and USB keyboard support. Normally if this option is not enabled; any attached USB mouse or USB keyboard will not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB drivers loaded on the system. Set this value to Enabled or Disabled the Legacy USB Support.

Available Options: Disabled, Enabled and AUTO

Default setting: Auto

- **USB 2.0 Controller Mode**

This field is configures the USB 2.0 controllers in High speed (480Mbps) or Full speed (12Mbps).

Available Options: HiSpeed and FullSpeed

Default setting: Hispeed

- **BIOS ECHI Hand-Off**

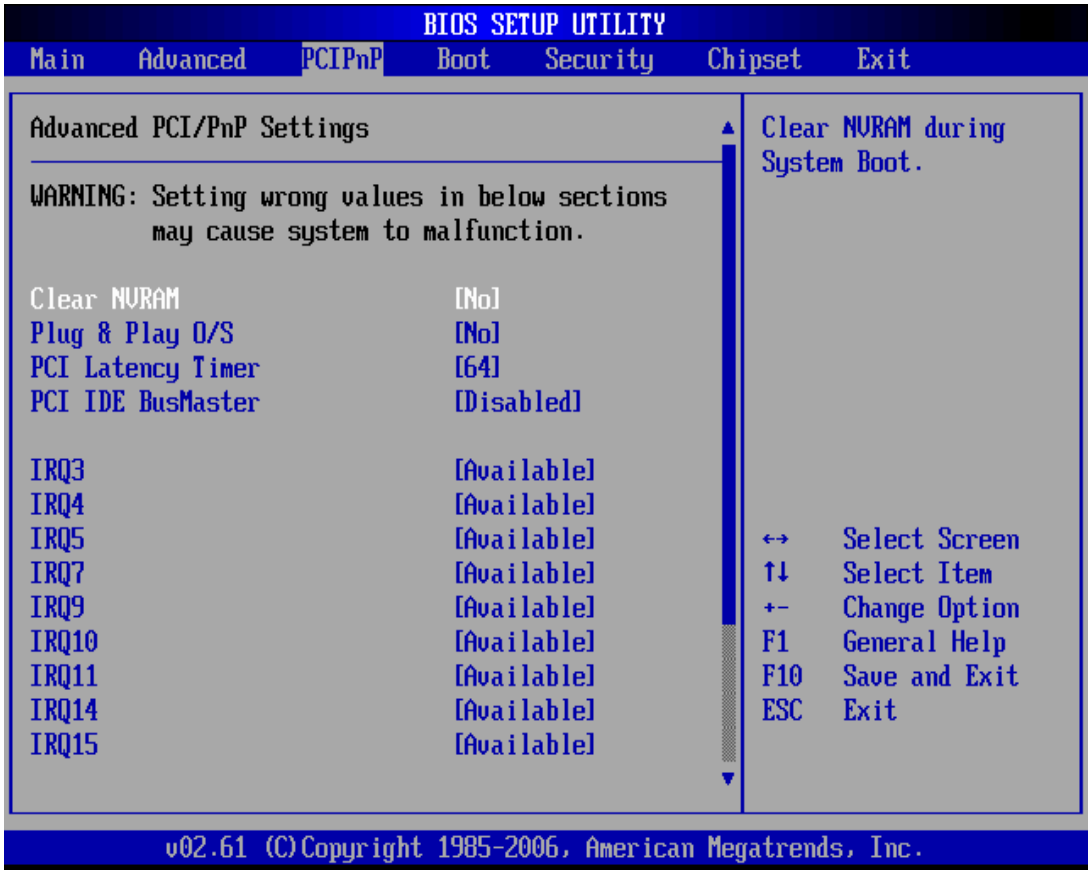
This is a workaround for OS without ECHI Hand-Off support. The ECHI ownership change should claim by ECHI driver.

Available Options: Enabled and Disabled

Default setting: Enabled

PCIPnP Setup

Select the *PCI/PnP* tab from the setup screen to enter the Plug and Play BIOS Setup screen. You can display a Plug and Play BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.



- **Clear NVRAM**

Clear NVRAM during system boot.

Available Options: Yes, No

Default setting: No

- **Plug and Plug Aware O/S**

Set to Yes to inform BIOS that the operating system can handle Plug and Play (PnP) devices.

Available Options: Yes, No

Default setting: No

- **PCI Latency Timer**

This field specifies the latency timings (in PCI clock) PCI devices installed in the PCI expansion bus.

Available Options: 32, 64, 96, 128, 160,192, 224, and 248

Default setting: 64

- **Palette Snoop**

When Enabled is selected, multiple VGA devices operating on different buses can handle data from the CPU on each set of palette registers on every video device. Bit 5 of the command register in the PCI device configuration space is the VGA Palette Snoop bit. (0 is disabled).

Available Options:

Disabled: Data read and written by the CPU is only directed to the PCI VGA devices palette registers.

Enabled: Data read and written by the CPU is directed to both the PCI VGA devices palette registers.

Default setting: Disabled

- **PCI IDE BusMaster**

This option is to specify that the IDE controller on the PCI local bus have bus-mastering capability.

Available Options: Enabled, Disabled

Default setting: Disabled

- **IRQ 3 –15**

When I/O resources are controlled manually, you can assign each system interrupt as one of the following types, based on the type of device using the interrupt:

Available: Specified IRQ is available to the used by PCI/PnP devices.

Reserved: Specified IRQ is reserved for used by Legacy ISA devices.

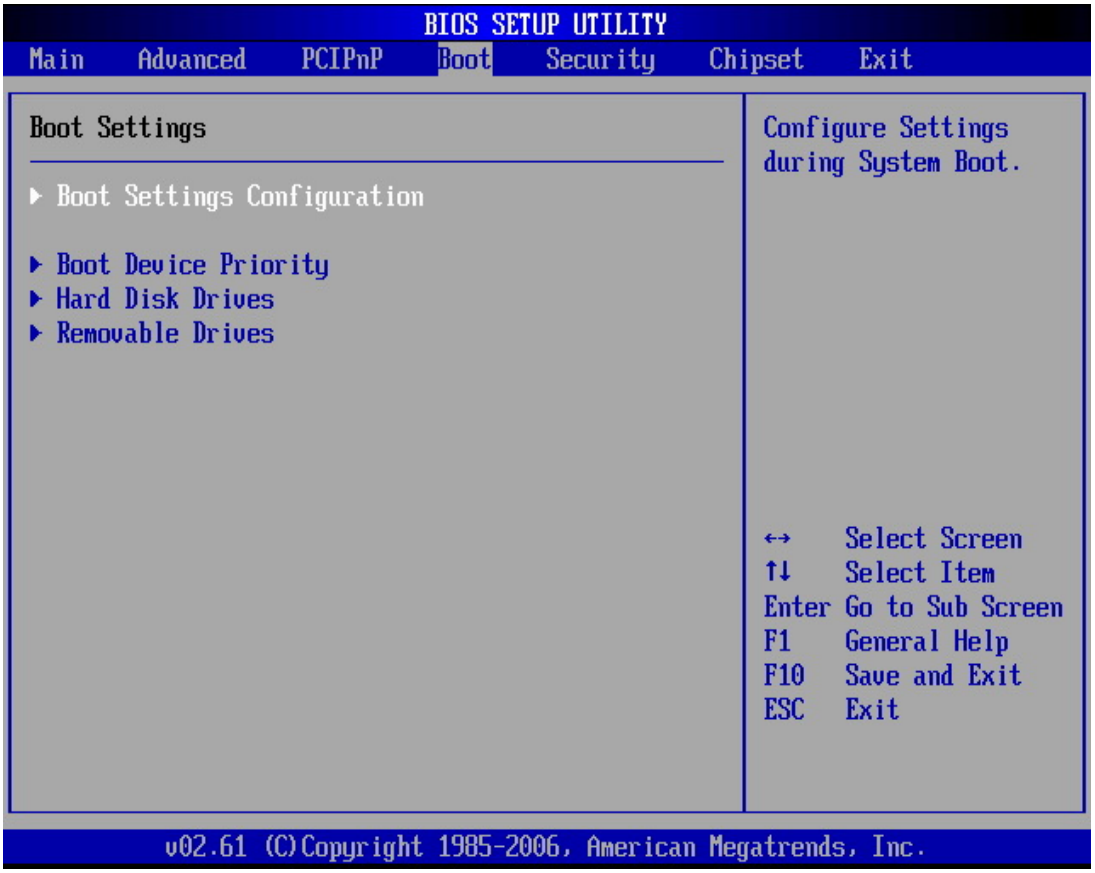
Available Options: Available and Reserved

Default setting: Available

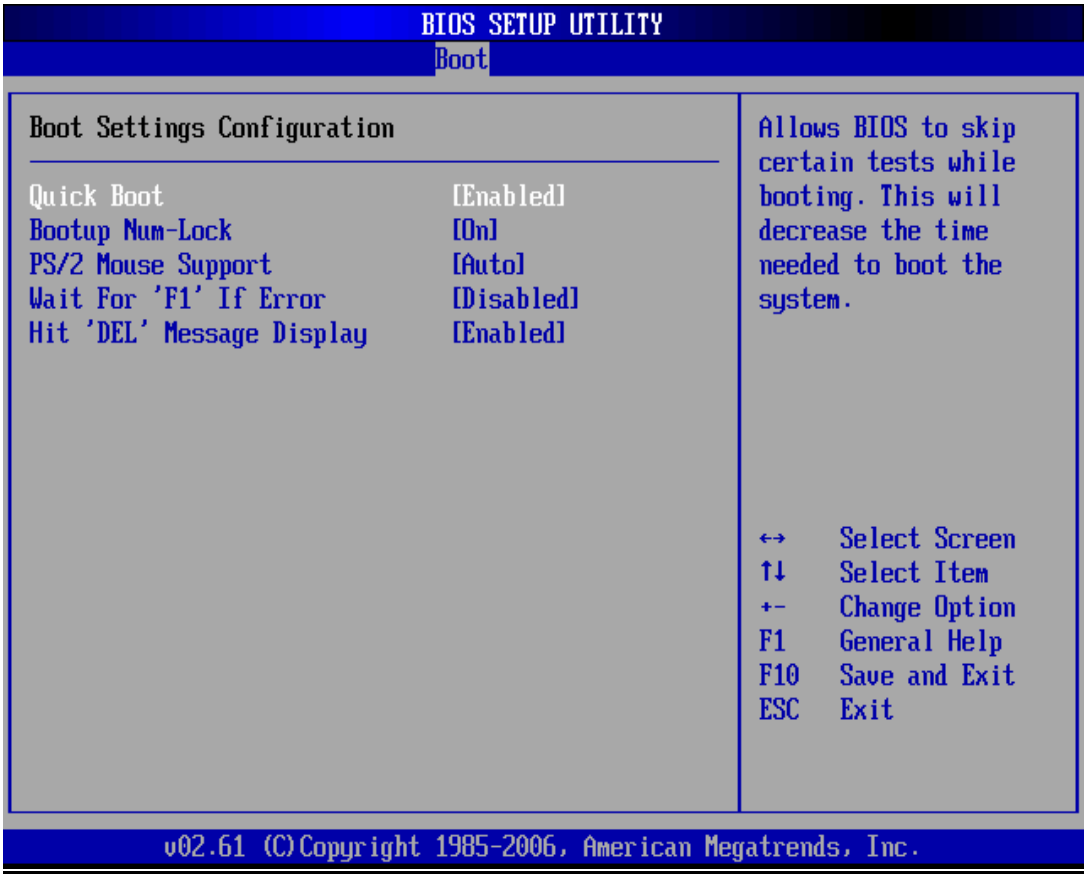
Boot Setup

Select the *Boot* tab from the setup screen to enter the Boot BIOS Setup screen. You can select any of the items in the left frame of the screen, such as Boot Device Priority, to go to the sub menu for that item. You can display a Boot BIOS Setup option by highlighting it using the <Arrow> keys. All Boot Setup options are described in this section. Select an item on the Boot Setup screen to access the sub menu for:

- Boot Setting Configuration
- Boot Device Priority
- Hard disk drives
- Removable Drivers



➢ **Boot Setting Configuration**



➢ **Quick Boot**

This field is used to activate the quick boot function of the system. When set to Enabled,

1. BIOS will not wait for up to 40 seconds if a Ready signal is not received from the IDE drive, and will not configure its drive.

2. BIOS will not wait for 0.5 seconds after sending a RESET signal to the IDE drive.

3. You cannot run BIOS Setup at system boot since there is no delay for the Hit, Del. To run Setup message.

Available Options: Disabled, Enabled

Default setting: Enabled

➢ **Boot Up Num-Lock**

This field is used to activate the Num Lock function upon system boot. If the setting is on, after a boot, the Num Lock light is lit, and user can use the number key.

Available options: On, Off

Default setting: On

- **PS/2 Mouse Support**

The PS/2 mouse function is optional. Before you configure this field, make sure your system board supports this feature. The setting of ***Enabled*** allows the system to detect a PS/2 mouse on boot up. If detected, IRQ12 will be used for the PS/2 mouse. IRQ 12 will be reserved for expansion cards if a PS/2 mouse is not detected. ***Disabled*** will reserve IRQ12 for expansion cards and therefore the PS/2 mouse will not function.

Available options: Disabled, Enabled and Auto

Default setting: Auto

- **Wait for 'F1' If Error**

AMIBIOS POST error messages are followed by:

Press <F1> to continue

If this field is set to ***Disabled***, the AMIBIOS does not wait for you to press the <F1> key after an error message.

Available options: Disabled, Enabled

Default setting: Disabled

- **Hit 'DEL' Message Display**

Set this field to ***Disabled*** to prevent the message as follows:

Hit 'DEL' if you want to run setup

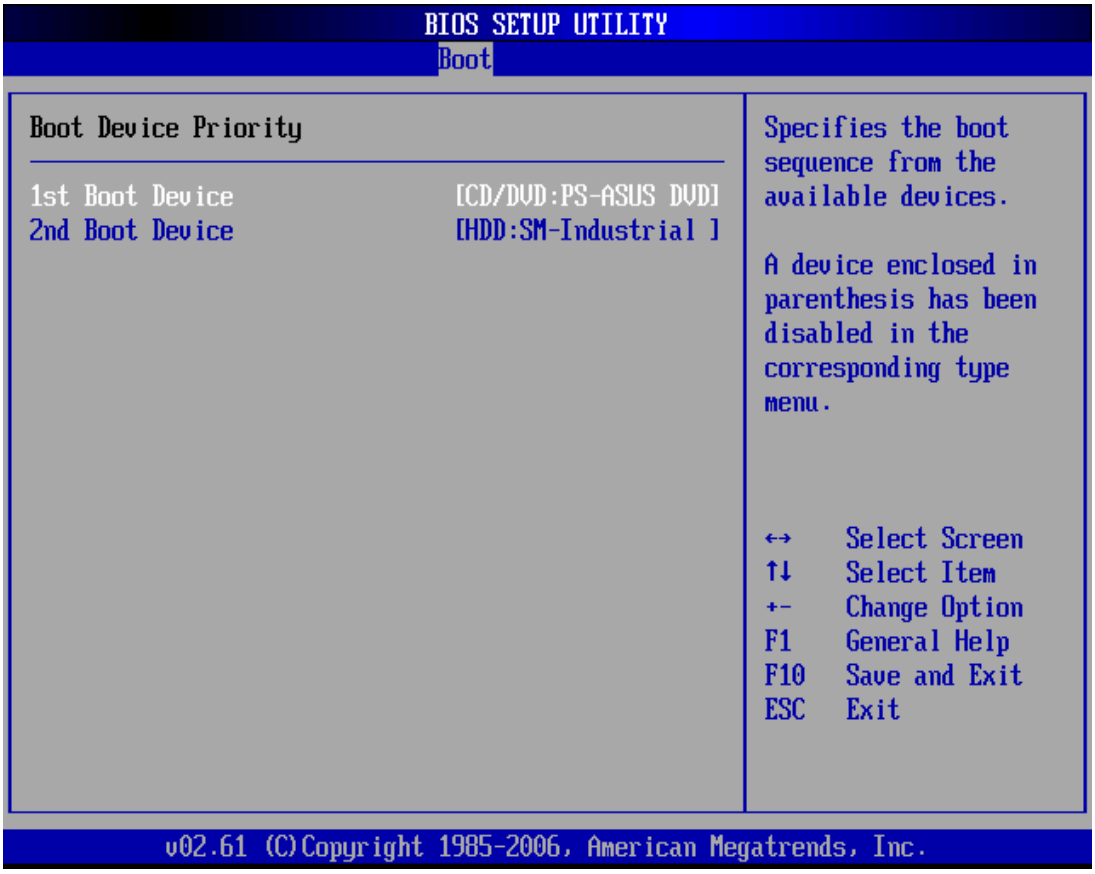
It will prevent the message from appearing on the first BIOS screen when the computer boots.

Available options: Disabled, Enabled

Default setting: Enabled

➢ **Boot Device**

Use this screen to specify the order in which the system checks for the device to boot from. To access this screen, select Boot Device Priority on the Boot Setup screen and press <Enter>.



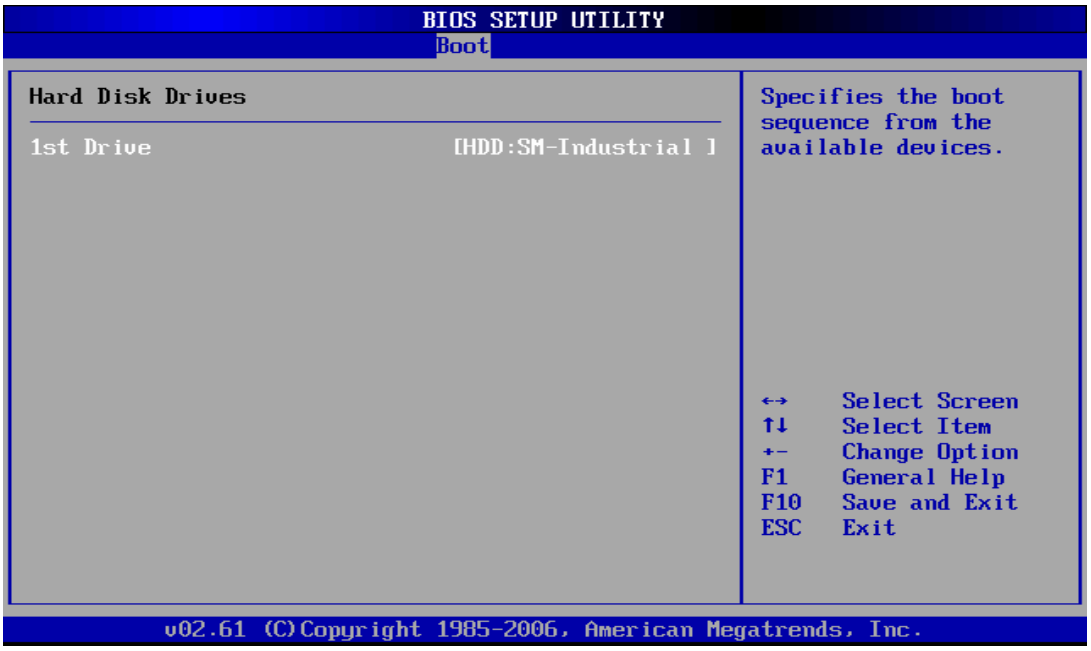
➢ **First /Second /Third Hard Disk Boot Device**

Set the boot device options to determine the sequence in which the computer checks which device to boot from. The settings are *Removable Dev., Hard Drive, or ATAPI CDROM.*

Note: When you select a boot category from the boot menu, a list of devices in that category appears. For example, if the system has three hard disk drives connected, then the list will show all three hard disk drives attached

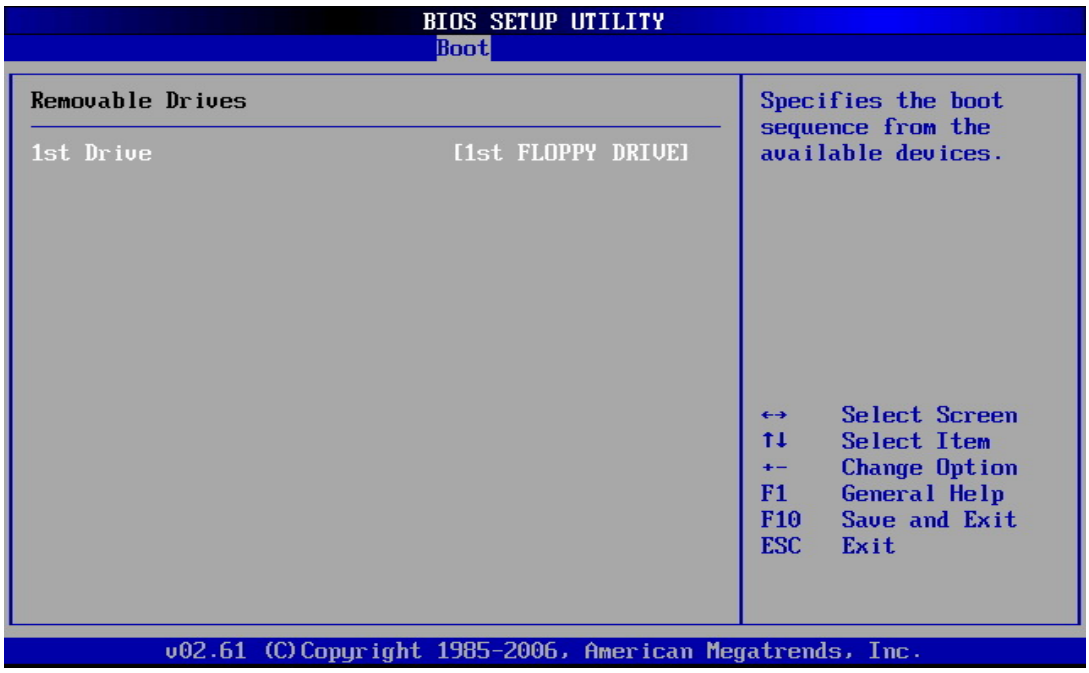
➢ Hard Disk Drives

Use this screen to view the hard disk drives in the system. To access this screen, select Hard disk drives on the Boot Setup screen and press <Enter>.



➢ Removable Drives

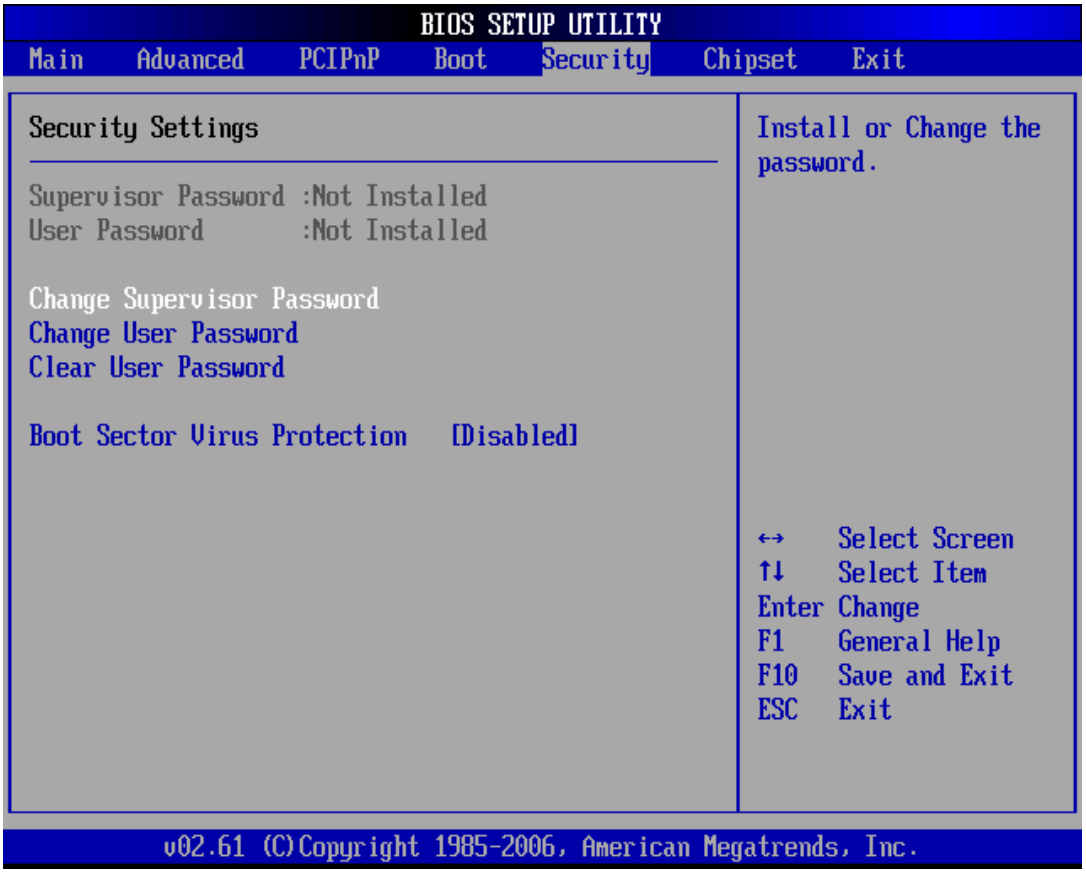
Use this screen to view the removable drives in the system. To access this screen, select removable drives on the Boot Setup screen and press <Enter>.



Security setup

There are two security passwords: Supervisor and User. Supervisor is a privileged person that can change the User password from the BIOS. According to the default setting, both access passwords are not set up and are only valid after you set the password from the BIOS.

- Change Supervisor Password
- Change User Password
- Clear User Password
- Boot Sector Virus Protection



To set the password, please complete the following steps.

1. Select **Change Supervisor Password.**

2. Type the desired password (up to 6 character length) when you see the message, “Enter New Supervisor Password.”

3. Then you can go on to set a user password (up to 6 character length) if required. Note that you cannot configure the User password until the Supervisor password is set up.

4. Enter Advanced BIOS Features screen and point to the Security Option field.

5. Select System or Setup.

✧ **Always:** a visitor who attempts to enter BIOS or operating system will be prompted for password.

✧ **Setup:** a visitor who attempts to the operating system will be prompted for user password. You can enter either User password or Supervisor password.

6. Point to **Save Settings and Exit** and press Enter.

7. Press Y when you see the message, "Save Current Settings and Exit (Y/N)?"

Note: it is suggested that you write down the password in a safe place to avoid that password may be forgotten or missing.

➢ **Clear User Password**

Select Clear User Password from the Security Setup menu and press <Enter>. Clear New Password > [Ok] [Cancel] appears. Type the password and press <Enter>. The screen does not display the characters entered. Retype the password as prompted and press <Enter>.

➢ **Password Check**

This field enables password checking every time the computer is powered on or every time the BIOS Setup is executed. If ***Always*** is chosen, a user password prompt appears every time and the BIOS Setup Program executes and the computer is turned on. If ***Setup*** is chosen, the password prompt appears if the BIOS executed.

Available options: Setup, Always

Default setting: Setup

➢ **Boot Sector Virus Protection**

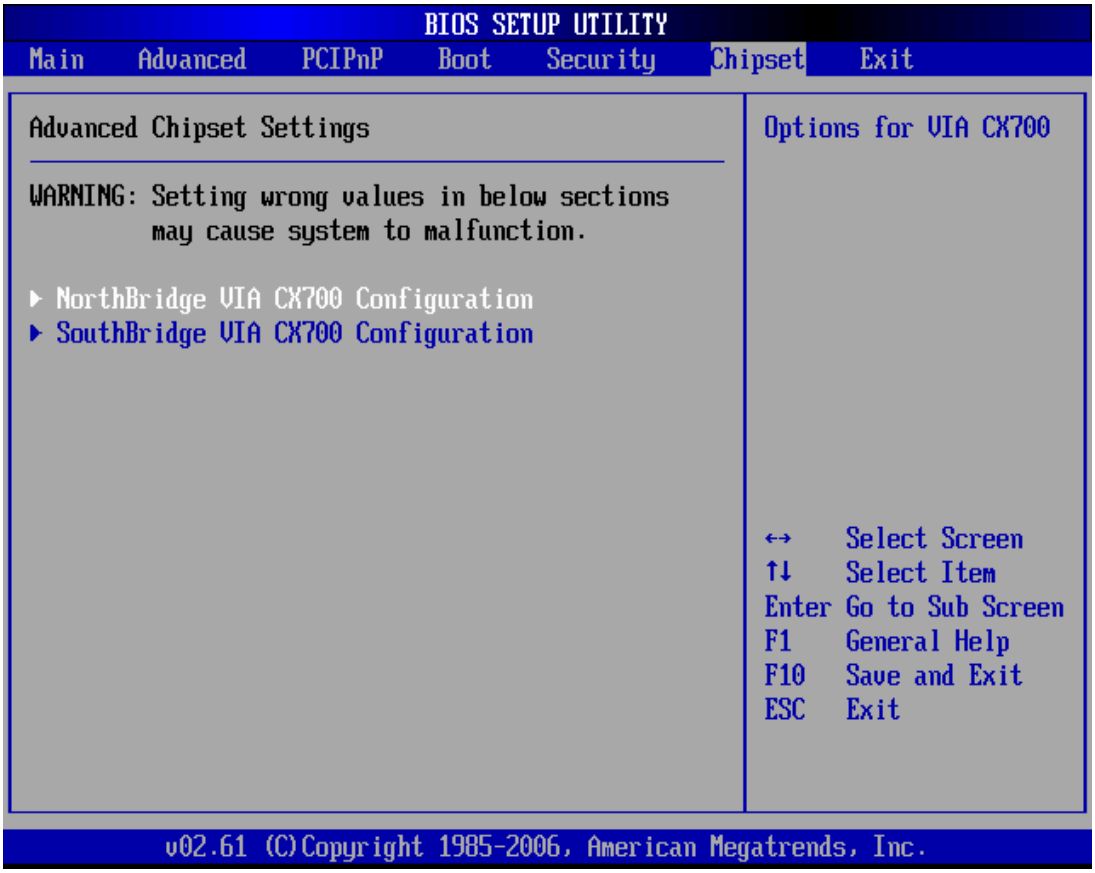
This option is near the bottom of the Security Setup screen. The Optimal and Fail-Safe default setting is *disabled*

Enabled: Set this value to prevent the Boot Sector Virus Protection. This is the default setting.
Disabled: Select Enabled to enable boot sector protection, displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. If enabled, the following appears when a write is attempted to the boot sector. You may have to type N several times to prevent the boot sector write. Boot Sector Write!
Possible VIRUS: Continue (Y/N)? _
The following appears after any attempt to format any cylinder, head, or sector of any hard disk drive via the BIOS INT 13 Hard disk drive Service:
Format!!!
Possible VIRUS: Continue (Y/N)?

Chipset Setup

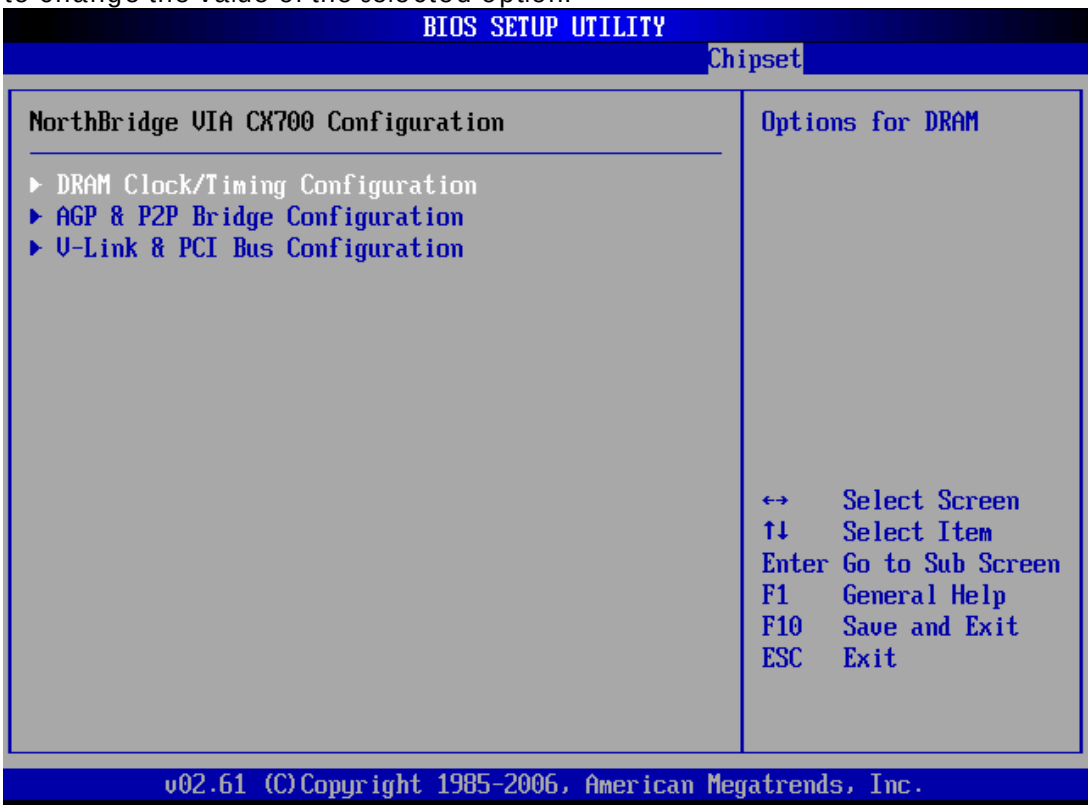
This section describes the configuration of the board's chipset features.

- NorthBridge VIA CX700 Configuration
- SouthBridge VIA CX700 Configuration



➢ **Northbridge VIA CX700 Configuration**

You can use this screen to select options for the North Bridge Configuration. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option.



➢ **DRAM Clock/Timing Configuration**

DRAM Timing

If the installed SDRAM supports SPD function, select auto. If not, you can select based on other access time of the SDRAM.

Available Options: Auto, Manual, Turbo and Ultra

Default setting Auto

➢ **AGP & P2P Bridge Configuration**

Onchip VGA Configuration

VGA Frame Buffer Size

This field is share memory architecture (SMA) for frame buffer memory. SMA allows system memory to be efficiently share by the host CPU and allocated depending on user preference, application requirements, and total size of system memory.

Available Options: Disabled, 16MB,32MB, 64MB and 128MBA

Default setting: 32MBU

V- LINKAGP & PCI Bus Configuration Timing

***P*CI Master 0WS Write**

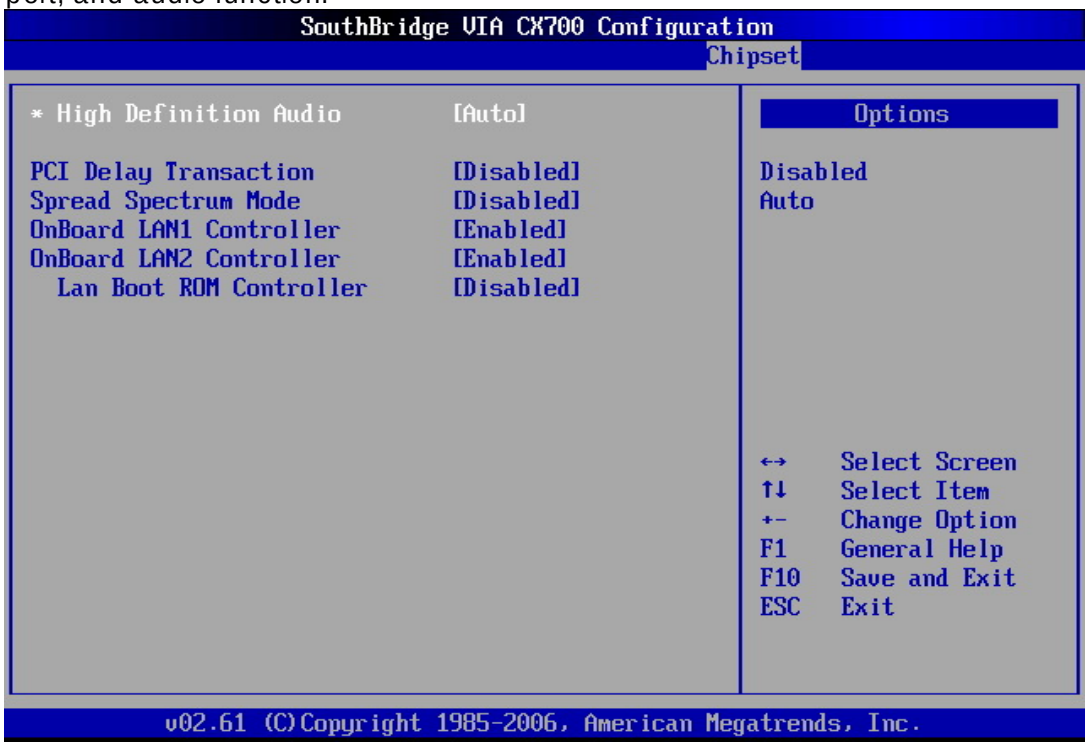
This field specifies the PCI Master 0 wait state installed in the PCI expansion bus.

Available Options: Disabled and Enabled

Default setting: Enabled U

- **Southbridge VIA CX700 Configuration**

You can use this screen to select options for the South Bridge Configuration. South Bridge is a chipset on the motherboard that controls the basic I/O functions, LAN port, and audio function.



- **High Definition Audio**

This field specifies the internal Audio Control.

Available Options: Disabled, and Auto

Default setting: Auto

- **PCI Delayed Transaction**

This field specifies the chipset has an embedded 32-bit posted write buffer to support delay transactions cycles. Select Enabled to support compliance with PCI specification version 2.

Available Options: Disabled, and Enabled

Default setting: Enabled

- **On Board LAN1/2 Controller**

This field specifies the Enabled or Disabled of the onboard LAN chip.

Available Options: Disabled, and Enabled

Default setting: Enabled

- ***LAN Boot ROM Controller***

This field specifies the PXE boot ROM of the onboard LAN chip.

Available Options: Disabled, and Enabled

Default setting: Disabled

Chapter 4 Software Installation

The enclosed diskette includes FX5311 VGA, Audio, USB, System and LAN driver. To install and configure you FX5311 system, you need to perform the following steps.

VIA HyperionPro Driver

WIN 2000/XP Driver

Installs VIA Chipset, IRQ Routing, AGP Driver, SATA HDD driver and PCI IDE Bus Master 4in 1Driver.

1 To install the VIA 4 IN 1 driver, insert the CD ROM into the CD ROM device, and enter DRIVER>SysChip>CX-700M. If your system is not equipped with a CD ROM device, copy the VIA 4 IN 1 driver from the CD ROM to CF or USB Device.

2 Execute SETUP.exe file.

3 The screen shows the SETUP type. Press any key to enter the main menu.

4 As the setup is completed, the system will generate the message as follows.

Yes, I want to restart my computer now. Installation is done!

No, I will restart my computer later.

System must be restart then complete the installation.

VGA Drivers

WINXP/WIN2000 Driver

1 To install the VGA driver, insert the CD ROM into the CD ROM device, and enter DRIVER>VGA>CX-700M> WINXP_2K>SETUP. If your system is not equipped with a CD ROM device, copy the VGA driver from the CD ROM to CF.

2 Execute SETUP.exe file.

3 The screen shows the SETUP type. Press any key to enter the main menu.

4 As the setup is completed, the system will generate the message as follows:

Yes, I want to restart my computer now. Installation is done!

No, I will restart my computer later.

System must be restart then complete the installation.

5 In the WINDOWS XP/2K, you can find the <DISPLAYL> icon located in the {CONTROL PANEL} group.

6 Adjust the <Color>,<Font size> and <Resolution>.

Audio Drivers

WIN 2000/XP Driver

Step 1: To install the AUDIO driver, insert the CD ROM into the CD ROM device, and enter DRIVER>AUDIO>ALC888>WIN2K&XP.

Step 2: Execute setup.exe file.

Step 3: The screen shows the SETUP type. Press any key to enter the main menu.

Step 4: As the setup is completed, the system will generate the message as follows.

Yes, I want to restart my computer now. Installation is done!

No, I will restart my computer later.

System must be restart then complete the installation.

LAN Utility & Driver

1 To install the LAN utility OR driver, insert the CD ROM into the CD ROM device, and enter DRIVER>LAN>RTL8139C. If your system is not equipped with a CD ROM device, copy the LAN driver from the CD ROM to CF.

2 Execute install.exe file.

Note: In the RTL8139C directory, a README.TXT is included to provide installation information.

BIOS Flash Utility

In the <UTILITY> directory, there is the Afu409.EXE file.

Step 1: Use the Afu409.EXE program to update the BIOS setting.

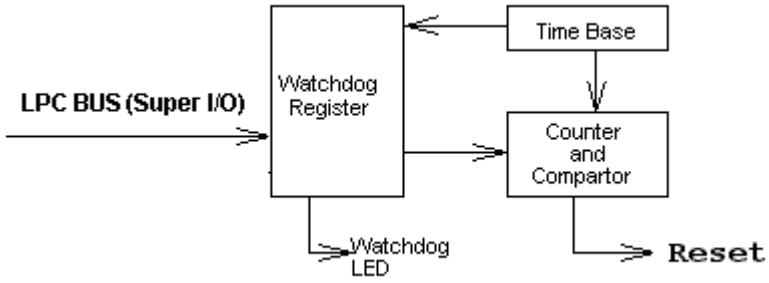
Step 2: And then refer to the chapter "BIOS Setup", as the steps to modify BIOS.

Step 3: Now the CPU board's BIOS loaded with are the newest program; user can use it to modify BIOS function in the future, when the BIOS add some functions.

Watchdog Timer

This section describes how to use the Watchdog Timer, including disabled, enabled, and trigger functions.

The FX5311 is equipped with a programmable time-out period watchdog timer. You can use your own program to Enabled the watchdog timer. Once you have enabled the watchdog timer, the program should trigger the I/O every time before the timer times out. If your program fails to trigger or disable this timer before it times out, e.g. because of a system hang-up, it will generate a reset signal to reset the system. The time-out period can be programmed to be set from 1 to 255 seconds or minutes.



Watchdog Timer Setting

The watchdog timer is a circuit that may be used from your program software to detect system crashes or hang-ups. The watchdog timer is automatically disabled after reset.

Once you have enabled the watchdog timer, your program must trigger the watchdog timer every time before it times out. After you trigger the watchdog timer, it will be set to non-zero value to watchdog counter and start to count down again. If your program fails to trigger the watchdog timer before time-out, it will generate a reset pulse to reset the system.

The factor of the watchdog timer time-out constant is approximately 1 second. The period for the watchdog timer time-out is between 1 to FF timer factors.

If you want to reset your system when watchdog times out, the following table listed the relation of timer factors between time-out periods.

Time Factor	Time-Out Period (Seconds)	Time-Out Period (Minutes)
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
“	“	“
“	“	“
“	“	“
FF	FF	FF

Watchdog Timer Enabled

To Enabled the watchdog timer, you have to output a byte of timer factor to the watchdog register whose address is 2Eh and data port is 2fH. The following is an Assemble program, which demonstrates how to enable the watchdog timer and set the time-out period at 28 seconds.

```
;--------------------------------------------------------------------------------
; Enter the extended function mode, interruptible double-write
;--------------------------------------------------------------------------------
Mov     dx, 2eh         ; Enter to extended function mode
Mov     al, 87h
Out     dx,al
Out     dx,al
Mov     al,07h
Out     dx,al
;-------------------------------------------------------------------------------------------------
; Logical device 8, configuration register CRF5 Bit 3,CRF6 Bit 0~7
;-------------------------------------------------------------------------------------------------
Mov     dx,2fh
Mov     al,08h          ; Select Logical Device 8 of watchdog timer
Out     dx,al
Mov     dX,2eh
Mov     al,0f5h         ;Set second as counting unit
Out     dx,al
Mov     dx,2fh
In      al,dx
Or      al,c0           ; Trigger P/W LED.
And     al,not c8h      ;Set Second.
;And    al,c8h          ;Set Minute.
Out     dx,al
Mov     dx,2eh
Mov     al,0f6h
Out     dx,al
Mov     dx,2fh
Mov     al,28h          ; Set timeout interval as 28seconds and start counting
Out     dx,al
;-----------------------------------------
; Exit extended function mode
;-----------------------------------------
Mov     dx,2eh
Mov     al,0aah
Out     dx,al
```

Watchdog Timer Trigger

After you enabled the watchdog timer, your program must write the same factor as enabling to the watchdog register at least once every time-out period to its previous setting. You can change the time-out period by writing another timer factor to the watchdog register at any time, and you must trigger the watchdog before the new time-out period in next trigger.

Watchdog Timer Disabled

To Disabled the watchdog timer, simply write a 00H to the watchdog register.

```
;--------------------------------------------------------------------------------
; Enter the extended function mode, interruptible double-write
;--------------------------------------------------------------------------------
Mov     dx,2eh          ; Enter to extended function mode
Mov     al,87h
Out     dx,al
Out     dx,al
;--------------------------------------------------------------------------------------------------------------------
; Logical device 8, configuration register CRF5 Bit 3(Sec./Min.), CRF6 Bit 0~7 (Count.)
;--------------------------------------------------------------------------------------------------------------------
Mov     al,07h
Out     dx,al
Mov     dx,2fh
Mov     al,08h          ; Select Logical Device 8 of watchdog timer
Out     dx,al
Mov     dX,2eh
Mov     al,0f5h         ;Set second as counting unit
Out     dx,al
Mov     dx,2fh
In      al,dx
And     al,not c8h      ;Set Second or Minute.
Out     dx,al
Mov     dx,2eh
Mov     al,0f6h
Out     dx,al
Mov     dx,2fh
Mov     al,00h          ; Set Watchdog Timer Disabled
Out     dx,al
;-----------------------------------------
; Exit extended function mode
;-----------------------------------------
Mov     dx,2eh          ;Exit the extended function mode
Mov     al,0aah
Out     dx,al
```

Programming RS-485

The majority communicative operation of the RS-485 is in the same of the RS-232. When the RS-485 precedes the transmission, which needs control the TXC signal, and the installing, steps are as follows:

Step 1: Enabled TXC

Step 2: Send out data

Step 3: Waiting for data empty

Step 4: Disabled TXC

Note: Please refer to the section of the "Serial Ports" in the Chapter 5 "Technical Reference" for the detail description of the COM ports register.

Initialize COM port

Step 1: Initialize COM port in the receiver interrupt mode, and /or transmitter interrupt mode. (All of the communication protocol buses of the RS-485 are in the same.)

Step 2: Disabled TXC (transmitter control), the bit 0 of the address of offset+4 just sets "0".

NOTE: Control the FX5311 system "DTR" signal to the RS-485 TXC communication.

Send out one character (Transmit)

Step 1: Enabled TXC signal, and the bit 0 of the address of offset+4 just sets "1".

Step 2: Send out the data. (Write this character to the offset+0 of the current COM port address)

Step 3: Wait for the buffer's data empty. Check transmitter holding register (THRE, bit 5 of the address of offset+5), and transmitter shift register (TSRE, bit 6 of the address of offset+5) are all sets must be "0".

Step 4: Disabled TXC signal, and the bit 0 of the address of offset+4 sets "0"

Send out one block data (Transmit – the data more than two characters)

Step 1: Enabled TXC signal, and the bit 0 of the address of offset+4 just sets "1".

Step 2: Send out the data. (Write all data to the offset+0 of the current COM port address)

Step 3: Wait for the buffer's data empty. Check transmitter holding register (THRE, bit 5 of the address of offset+5), and transmitter shift register (TSRE, bit 6 of the address of offset+5) are all sets must be "0".

Step 4: Disabled TXC signal, and the bit 0 of the address of offset+4 sets "0"

Receive data

The RS-485's operation of receiving data is in the same of the RS-232's.

Basic Language Example

a. Initial 86C450 UART

```
10      OPEN "COM1:9600,m,8,1"AS #1 LEN=1
20      REM Reset DTR
30      OUT &H3FC, (INP(%H3FC) AND &HFA)
```

```
40      RETURN
```

b. Send out one character to COM1

```
10      REM Enabled transmitter by setting DTR ON
20      OUT &H3FC, (INP(&H3FC) OR &H01)
30      REM Send out one character
40      PRINT #1, OUTCHR$
50      REM Check transmitter holding register and shift register
60      IF ((INP(&H3FD) AND &H60) >0) THEN 60
70      REM Disabled transmitter by resetting DTR
80      OUT &H3FC, (INP(&H3FC) AND &HEF)
90      RETURN
```

c. Receive one character from COM1

```
10      REM Check COM1: receiver buffer
20      IF LOF(1)<256 THEN 70
30      REM Receiver buffer is empty
40      INPSTR$"
50      RETURN
60      REM Read one character from COM1: buffer
70      INPSTR$=INPUT$(1,#1)
80      RETURN
```

NOTE: The RS-485 of the FX5311 uses COM2. If you want to program it and hardware setup, please refer to the BIOS Setup for COM2 address setup and Chapter 2 "Hardware Installation": Jumper Setting.

Chapter 5 Technical Reference

This section outlines the errors that may occur when you operate the system, and also gives you the suggestions on solving the problems.

Topic include:

- Trouble Shooting for Post Beep & Error Messages
- Technical Reference

Trouble Shooting for Post Beep and Error Messages

The following information informs the Post Beep & error messages. Please adjust your systems according to the messages below. Make sure all the components and connectors are in proper position and firmly attached. If the errors still exist, please contact with your distributor for maintenance.

➢ **POST BEEP**

Currently there are two kinds of beep codes in BIOS setup.

- One indicates that a video error has occurred and the BIOS cannot initialize the video screen to display any additional information. This beep code consists of a single long beep followed by three short beeps.
- The other indicates that an error has occurred in your DRAM. This beep code consists of a constant single long beep.

➢ **CMOS BATTERY FAILURE**

When the CMOS battery is out of work or has run out, the user has to replace it with a new battery.

- **CMOS CHECKSUM ERROR**

This error informs that the CMOS has corrupted. When the battery runs weak, this situation might happen. Please check the battery and change a new one when necessary.

- **DISK BOOT FAILURE**

When you can't find the boot device, insert a system disk into Drive A and press < Enter >. Make sure both the controller and cables are all in proper positions, and also make sure the disk is formatted. Then reboot the system.

- **DISKETTE DRIVES OR TYPES MISMATCH ERROR**

When the diskette drive type is different from CMOS, please run setup or configure the drive again.

- **ERROR ENCOUNTERED INITIALIZING HARD DRIVE**

When you can't initializes the hard drive, ensure the following things:

1. The adapter is installed correctly
2. All cables are correctly and firmly attached
3. The correct hard drive type is selected in BIOS Setup

- **ERROR INITIALIZING HARD DISK CONTROLLER**

When this error occurs, ensure the following things:

1. The cord is exactly installed in the bus.
2. The correct hard drive type is selected in BIOS Setup
3. Whether all of the jumpers are set correctly in the hard drive

- **FLOPPY DISK CONTROLLER ERROR OR NO CONTROLLER PRESENT**

When you cannot find or initialize the floppy drive controller, please ensure the controller is in proper BIOS Setup. If there is no floppy drive installed, ensure the Diskette Drive selection in Setup is set to NONE.

- **KEYBOARD ERROR OR NO KEYBOARD PRESENT**

When this situation happens, please check keyboard attachment and no keys being pressed during the boot. If you are purposely configuring the system without a keyboard, set the error halt condition in BIOS Setup to HALT ON ALL, BUT KEYBOARD. This will cause the BIOS to ignore the missing keyboard and continue the boot procedure.

- **MEMORY ADDRESS ERROR**

When the memory address indicates error, you can use this location along with the memory map for your system to find and replace the bad memory chips.

- **MEMORY SIZE HAS CHANGED**

Memory has been added or removed since last boot. In EISA mode, use Configuration Utility to re-configure the memory configuration. In ISA mode enter BIOS Setup and enter the new memory size in the memory fields.

- **MEMORY VERIFYING ERROR**

It indicates an error verifying a value is already written to memory. Use the location along with your system's memory map to locate the bad chip.

- **OFFENDING ADDRESS MISSING**

This message is used in connection with the I/O CHANNEL CHECK and RAM PARITY ERROR messages when the segment that has caused the problem cannot be isolated.

- **REBOOT ERROR**

When this error occurs that requires you to reboot. Press any key and the system will reboot.

- **SYSTEM HALTED**

Indicates the present boot attempt has been aborted and the system must be rebooted. Press and hold down the CTRL and ALT keys and press DEL.

Technical Reference

Physical and Environmental

Temperature: Operating 0°C ~ 50°C

Relative humidity 5 % to 95 % non-condensing

DC-AC adapter

Input AC Voltage Range: 100V~240V/1A, 50Hz ~60Hz

Output DC Voltage: 19V/3.42A Maximal

Surface Temperature of Chassis：

5°C to 45°C (W/HDD)/0°C to 50°C (W/CF card only)

Real-Time Clock and Non-Volatile RAM

The FX5311 contains a real-time clock compartment that maintains the date and time in addition to storing configuration information about the computer system. It contains 14 bytes of clock and control registers and 114 bytes of general purpose RAM. Because of the use of CMOS technology, it consumes very little power and can be maintained for long periods of time using an internal Lithium battery. The contents of each byte in the CMOS RAM are listed below:

Address	Description
00	Seconds
01	Second alarm
02	Minutes
03	Minute alarm
04	Hours
05	Hour alarm
06	Day of week
07	Date of month
08	Month
09	Year
0A	Status register A
0B	Status register B

Address	Description
0C	Status register C
0D	Status register D
0E	Diagnostic status byte
0F	Shutdown status byte
10	Diskette drive type byte, drive A and B
11	Fixed disk type byte, drive C
12	Fixed disk type byte, drive D
13	Reserved
14	Equipment byte
15	Low base memory byte
16	High base memory byte
17	Low expansion memory byte
18	High expansion memory byte
19-2D	Reserved
2E-2F	2-byte CMOS checksum
30	Low actual expansion memory byte
31	High actual expansion memory byte
32	Date century byte
33	Information flags (set during power on)
34-7F	Reserved for system BIOS

CMOS RAM Map

Register	Description
00h -10h	Standard AT-compatible RTC and Status and Status Register data definitions
11h – 13h	Varies
14h	Equipment Bits 7-6 Number of Floppy Drives 00 1 Drive 01 2 Drives Bits 5-4 Monitor Type 00 Not CGA or MDA 01 40x25 CGA 01 2 Drives 80x25 CGA Bits 3 Display Enabled 0 Disabled 1 Enabled Bit 2 Keyboard Enabled 00 Not CGA or MDA 01 40x25 CGA 01 2 Drives 80x25 CGA Bit 1 Math Coprocessor Installed 0 Absent 1 Present Bit 0 Floppy Drive Installed 0 Disabled 1 Enabled
15h	Base Memory (in 1KB increments), Low Byte
16h	Base Memory (in 1KB increments), High Byte
17h	IBM-compatible memory (in 1KB increments), Low Byte
18h	IBM-compatible memory (in 1KB increments), High Byte (max 15 MB)
19h-2Dh	Varies
2Eh	Standard CMOS RAM checksum, high byte
2Fh	Standard CMOS RAM checksum, low byte
30h	IBM-compatible Extended Memory, Low Byte (POST) in KB
31h	IBM-compatible Extended Memory, High Byte (POST) in KB
32h	Century Byte
33h	Reserved. Do not use
34h	Reserved. Do not use
35h	Low byte of extended memory (POST) in 64 KB
36h	High byte of extended memory (POST) in 64 KB
37h-3Dh	Varies
3Eh	Extended CMOS Checksum, Low Byte (including 34h-3Dh)
3Fh	Extended CMOS Checksum, High Byte (including 34h-3Dh)

I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses, which also becomes the identity of the device. There is a total of 1K-port address space available. The following table lists the I/O port addresses used on the Industrial CPU Card.

Address	Device Description
000h - 01Fh	DMA Controller #1
020h - 03Fh	Interrupt Controller #1
040h - 05Fh	Timer
060h - 06Fh	Keyboard Controller
070h - 071h	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0BFh	Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
2E8h – 2EFh	Serial Port #4(COM4)
2F8h - 2FFh	Serial Port #2(COM2)
3E8h – 3EFh	Serial Port #3(COM3)
3F8h - 3FFh	Serial Port #1(COM1)

Interrupt Request Lines (IRQ)

There are a total of 15 IRQ lines available on the Industrial CPU Card. Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on the Industrial CPU Card.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt Cascade
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	USB#0
IRQ6	Reserved
IRQ7	USB#1
IRQ8	Real Time Clock
IRQ9	SM-BUS
IRQ10	LAN#1
IRQ11	USB#2/LAN#2/VGA
IRQ12	USB#3/PS2 Mouse
IRQ13	FPU
IRQ14	Primary IDE
IRQ15	Secondary IDE (CF)

DMA Channel Map

The equivalents of two 8237A DMA controllers are implemented in the FX5311 board. Each controller is a four-channel DMA device that will generate the memory addresses and control signals necessary to transfer information directly between a peripheral device and memory. This allows high speeding information transfer with less CPU intervention. The two DMA controllers are internally cascaded to provide four DMA channels for transfers to 8-bit peripherals (DMA1) and three channels for transfers to 16-bit peripherals (DMA2). DMA2 channel 0 provides the cascade interconnection between the two DMA devices, thereby maintaining IBM PC/AT compatibility.

The following is the system information of DMA channels:

DMA Controller 1	DMA Controller 2
Channel 0: Spare	Channel 4: Cascade for controller 1
Channel 1: Reserved for IBM SDLC	Channel 5: Spare
Channel 2: Diskette adapter	Channel 6: Spare
Channel 3: Spare	Channel 7: Spare

Serial Ports

The ACEs (Asynchronous Communication Elements ACE1 to ACE2) are used to convert parallel data to a serial format on the transmit side and convert serial data to parallel on the receiver side. The serial format, in order of transmission and reception, is a start bit, followed by five to eight data bits, a parity bit (if programmed) and one, one and half (five-bit format only) or two stop bits. The ACEs are capable of handling divisors of 1 to 65535, and produce a 16x clock for driving the internal transmitter logic.

Provisions are also included to use this 16x clock to drive the receiver logic, also included in the ACE a completed MODEM control capability, and a processor interrupt system that may be software tailored to the computing time required to handle the communications link.

The following table is a summary of each ACE accessible register

DLAB	Port Address	Register
0	Base + 0	Receiver buffer (read)
		Transmitter holding register (write)
0	Base + 1	Interrupt enable
X	Base + 2	Interrupt identification (read only)
X	Base + 3	Line control
X	Base + 4	MODEM control
X	Base + 5	Line status
X	Base + 6	MODEM status
X	Base + 7	Scratched register
1	Base + 0	Divisor latch (least significant byte)
1	Base + 1	Divisor latch (most significant byte)

- **Receiver Buffer Register (RBR)**

Bit 0-7: Received data byte (Read Only)

- **Transmitter Holding Register (THR)**

Bit 0-7: Transmitter holding data byte (Write Only)

- **Interrupt Enable Register (IER)**

Bit 0: Enable Received Data Available Interrupt (ERBFI)

Bit 1: Enable Transmitter Holding Empty Interrupt (ETBEI)

Bit 2: Enable Receiver Line Status Interrupt (ELSI)

Bit 3: Enable MODEM Status Interrupt (EDSSI)

Bit 4: Must be 0

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

- **Interrupt Identification Register (IIR)**

Bit 0: "0" if Interrupt Pending

Bit 1: Interrupt ID Bit 0

Bit 2: Interrupt ID Bit 1

Bit 3: Must be 0

Bit 4: Must be 0

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

- **Line Control Register (LCR)**

Bit 0: Word Length Select Bit 0 (WLS0)

Bit 1: Word Length Select Bit 1 (WLS1)

WLS1	WLS0	Word Length
0	0	5 Bits
0	1	6 Bits
1	0	7 Bits
1	1	8 Bits

Bit 2: Number of Stop Bit (STB)

Bit 3: Parity Enable (PEN)

Bit 4: Even Parity Select (EPS)

Bit 5: Stick Parity

Bit 6: Set Break

Bit 7: Divisor Latch Access Bit (DLAB)

- **MODEM Control Register (MCR)**

Bit 0: Data Terminal Ready (DTR)

Bit 1: Request to Send (RTS)

Bit 2: Out 1 (OUT 1)

Bit 3: Out 2 (OUT 2)

Bit 4: Loop

Bit 5: Must be 0

Bit 6: Must be 0

Bit 7: Must be 0

- **Line Status Register (LSR)**

Bit 0: Data Ready (DR)

Bit 1: Overrun Error (OR)

Bit 2: Parity Error (PE)

Bit 3: Framing Error (FE)

Bit 4: Break Interrupt (BI)

Bit 5: Transmitter Holding Register Empty (THRE)

Bit 6: Transmitter Shift Register Empty (TSRE)

Bit 7: Must be 0

- **MODEM Status Register (MSR)**

Bit 0: Delta Clear to Send (DCTS)

Bit 1: Delta Data Set Ready (DDSR)

Bit 2: Training Edge Ring Indicator (TERI)

Bit 3: Delta Receive Line Signal Detect (DSLSD)

Bit 4: Clear to Send (CTS)

Bit 5: Data Set Ready (DSR)

Bit 6: Ring Indicator (RI)

Bit 7: Received Line Signal Detect (RSLD)

- **Divisor Latch (LS, MS)**

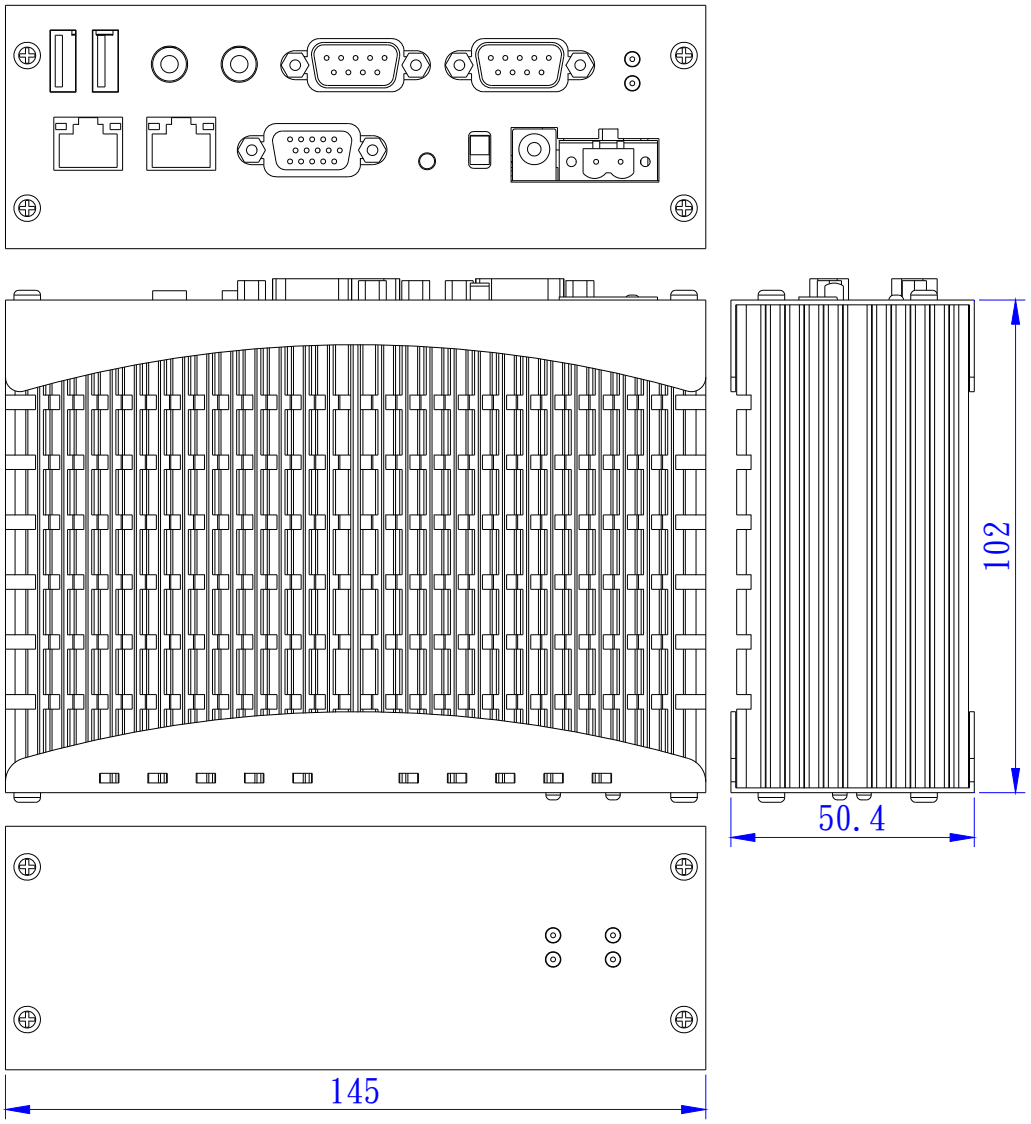
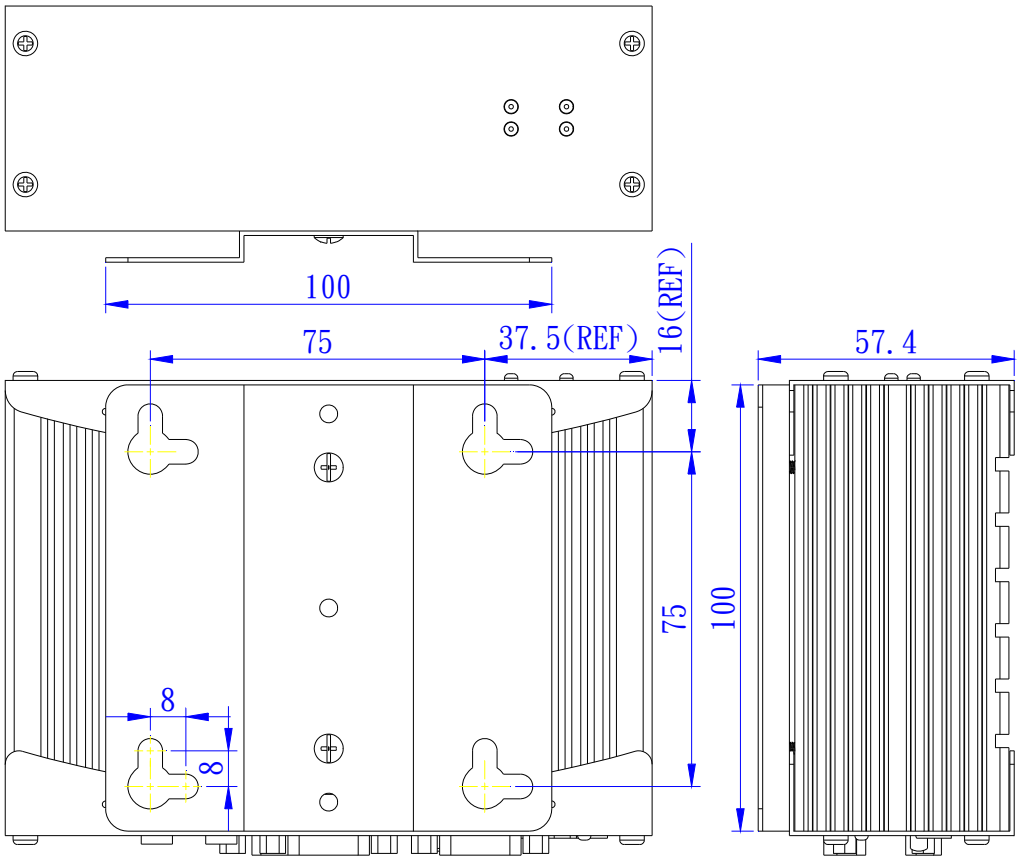
	LS	MS
Bit 0:	Bit 0	Bit 8
Bit 1:	Bit 1	Bit 9
Bit 2:	Bit 2	Bit 10
Bit 3:	Bit 3	Bit 11
Bit 4:	Bit 4	Bit 12
Bit 5:	Bit 5	Bit 13
Bit 6:	Bit 6	Bit 14
Bit 7:	Bit 7	Bit 15

Desired Baud Rate	Divisor Used to Generate 16x Clock
300	384
600	192
1200	96
1800	64
2400	48
3600	32
4800	24
9600	12
14400	8
19200	6
28800	4
38400	3
57600	2
115200	1

Appendix

Dimension

a. FX5311



b. FX5311K1