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IPC Solution

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**PC104 CPU Board**

**Low Power Series**

**FB2413 User's Manual**

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FEB 2019  
Version: 1.0  
Part Number: FB2413

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- ❑ 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 install drivers, manuals, or product information, please visit us at [www.fabiatech.com](http://www.fabiatech.com)

# Table of Contents

<b>FB2413 User's Manual</b> .....	<b>i</b>
<b>Chapter 1 Introducing the FB2413 System</b> .....	<b>1</b>
Overview.....	1
Layout.....	2
Specifications.....	4
Packing List .....	5
<b>Chapter 2 Hardware Installation</b> .....	<b>6</b>
Before Installation .....	6
Hardware Features.....	7
J7: Power Connector (4-pin 2.5mm JST).....	8
J6: Reset Header .....	8
CN1: RJ45 LAN /Adapter Connector with LED indicators .....	9
CN7: Keyboard/Mouse Connector .....	10
J4: External Speaker Header .....	10
J3 & J5: USB Connector.....	11
LED1 & J2: Power LED indicator, External CF LED Header .....	11
CN5, CN4, CN3 & CN2: Serial Port Connectors.....	12
CF1: Compact Flash Socket.....	13
CN9: Serial ATA hard Disk Connector .....	13
CN6 & JP1: Battery and Clear CMOS Data .....	14
BUS1: PC/104 Bus Connectors.....	15
<b>Chapter 3 Installing VGA &amp; LCD Display</b> .....	<b>17</b>
LVDS LCD FLAT PANEL DISPLAY.....	17
CN8: Analogy VGA Display Connector .....	18
CN10 & CN11: LVDS LCD Connector and Power Connector (Optional) 19	
<b>Chapter 4 BIOS Setup</b> .....	<b>21</b>
Overview.....	21
BIOS Functions .....	22
Keyboard Convention .....	23
Main Setup .....	24
Advanced Setup.....	25

Chipset Setup .....	26
IDE Configuration .....	32
Serial Port Configuration .....	35
USB Configuration .....	37
Power Manager Configuration .....	39
PCIPnP Setup.....	40
Boot Setup .....	42
Boot Setting Configuration.....	43
Boot Device .....	46
Boot USB Device.....	47
Boot Network Drivers .....	47
Security setup.....	48
<b>Chapter 5 Driver and Utility.....</b>	<b>53</b>
VGA Drivers .....	53
WINDOWS Driver .....	53
LAN Utility & Driver .....	54
BIOS Flash Utility.....	54
Watchdog Timer .....	55
Watchdog Timer Setting .....	55
Setup Watchdog Timer Step - WDT0 and WDT1 .....	57
<b>Chapter 6 Technical Reference .....</b>	<b>61</b>
Trouble Shooting for Post Beep and Error Messages.....	61
POST BEEP .....	61
Error Message .....	61
Technical Reference.....	64
Physical and Environmental .....	64
Real-Time Clock and Non-Volatile RAM .....	64
CMOS RAM Map.....	66
I/O Port Address Map.....	67
Interrupt Request Lines (IRQ) .....	68
Serial Ports .....	69
<b>Appendix.....</b>	<b>73</b>
Dimension .....	73



## Chapter 1 Introducing the FB2413 System

### Overview

The FB2413 is a Vortex86DX3 Low power processor, all in one PC/104 CPU board. This user's manual provides information on the physical features, installation, and BIOS setup.

Built to unleash the total potential of the Vortex86DX3 Processor, the FB2413 is a single board computer capable of handling today's demanding requirements. Able to support 1000 MHz CPU, this unit supports 10/100/1000 interface network port, on board 512MB DDR3 RAM, four USB2.0 ports, and a VGA controller.

Each FB2413 has four ports for I/O communications. Three RS232 and one RS-232 /RS-422/RS485 ports are available. There are supports watchdog timers that can be configured from software to automatically reset the system. And for easy configuration, AMI BIOS are available.

The FB2413 is perfect for POS and POI applications, network systems, panel / MMI's, order entry kiosks, test equipment, and OEM projects. The unit is only 90.2x95.9mm, offering unparalleled performance in a very small footprint.





## Specifications

- ❑ Vortex86DX3 (1GHz/L1:64K, L2:512K cache) Low Power CPU.
- ❑ Onboard 512MB DDR3 RAM. (1GB maximum)
- ❑ One Realtek 8111H 10M/100/1000 Base-TX Ethernet port.
- ❑ Build-in VGA Controller support VGA port.
- ❑ Three RS-232 ports and 1 RS232/RS422/RS485 port.
- ❑ Four USB (V2.0) ports and one SATA interface.
- ❑ Compact Flash socket for 3.3V Compact Flash and Micro Drives.
- ❑ PS/2 compatible keyboard and mouse interface.
- ❑ Providing header for external speaker and hard disk access LED.
- ❑ Watchdog timer and easy software programmable watchdog timer.
- ❑ Flash BIOS with easy upgrade utility.
- ❑ PC/104 form factor, 90.2 mm x 95.9 mm (3.55" x 3.775")
- ❑ Power requirement: +5V only, 5.2A maximum. (2.5A Typical)

## Packing List

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

- Unpack and inspect the FB2413 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 FB2413 is not supplied from us, please make sure the specification of the cable(s) is compatible with the FB2413 system.

**Note:** After FB2413 is installed, 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 list the accessories that may be included in your FB2413 package. Some of the accessories are optional shipped only upon order.

- One FB2413 All-In-One PC/104 CPU board.
- One VGA (Analogy VGA interface) adapter cable.
- Four serial port adapter cables.
- One PS2 keyboard and mouse port adapter cable.
- One 12-pin LAN adapter cable with FB4760 board.
- One compact disc containing manual file in PDF format and necessary drivers and utilities.

## 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 below descriptions.

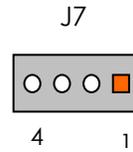
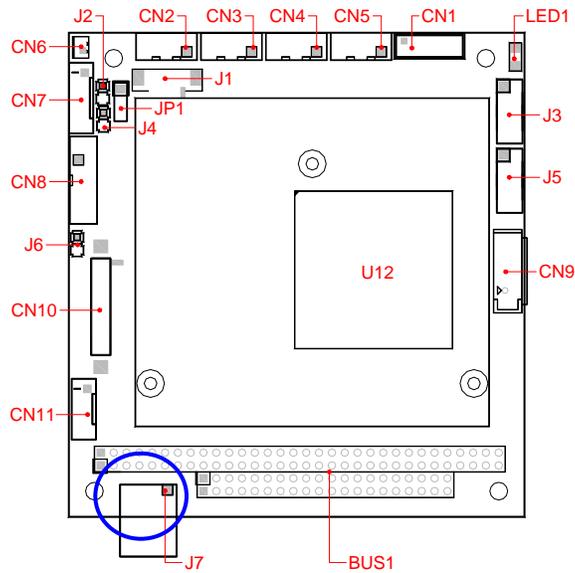
1. Before removing the board from its anti-static bag, wear an anti-static strap to prevent the generation of Electricity Static Discharge (ESD). The ESD may be generated by man's physical touch. It may do damage to the board circuit.
2. Install any connector, module, or add on board, be sure that the power is disconnected from the system board. If not, this may damage the system board components, module, or the add-on-board.
3. When you connect the connectors and memory modules, be careful with the pin orientations.

## Hardware Features

The following list is for the setup of the connectors and jumpers of the FB2413.

Item	Description
CN1	12-pin header for FB4760 RJ45-Lan adapter
CN4, CN3, CN2	10-pin 2.0mm RS-232 Serial 2, 3, 4 port connector (JST)
CN5	10-pin 2.0mm RS-232/RS422/RS485 Serial 1 port connector (JST)
CN6	2-pin 2.0mm Battery connector
CN7	6-pin for Keyboard and Mouse connector (JST)
CN8	10-pin 2.0mm CRT connector (IDC)
CN9	SATA Connector
CN10	LVDS LCD connector (DF13 30-pin) (Optional)
CN11	Power connector for LCD inverter board (JST 5-pin 2.0mm) (Optional)
CF1	Compact Flash Socket
J1	JTAG Header (Reserved)
J2	2-pin header for CF LED indicator
J3, J5	10-pin USB connector header
J4	2-pin for external speaker header
J6	2-pin Reset header
J7	4-pin Power connector
JP1	Clear CMOS data header (J1*3)
LED1	Power LED indicator
BUS1	PC-104 Connector

□ **J7: Power Connector (4-pin 2.5mm JST)**



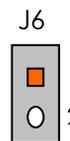
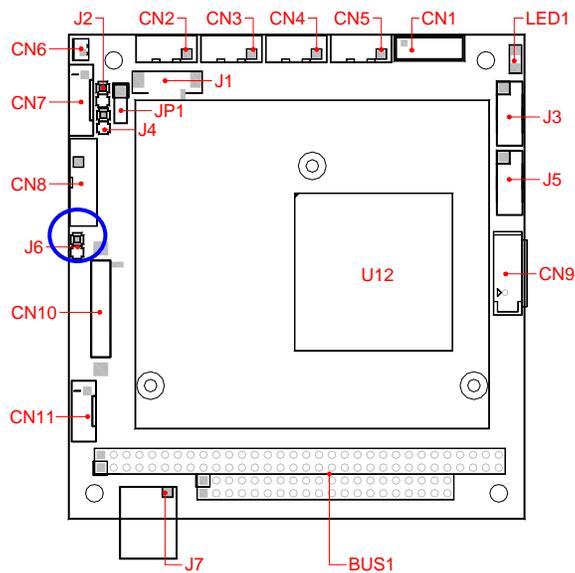
PIN	Signal
1	VCC (+5V)
2	Ground
3	Ground
4	VDD (+12V)

**Note:** FB2413 needs +5V only, +12V is not necessary.

**Note:** Be careful with the pin orientation when installing power connector. A wrong connection can easily destroy your FB2413 board.

□ **J6: Reset Header**

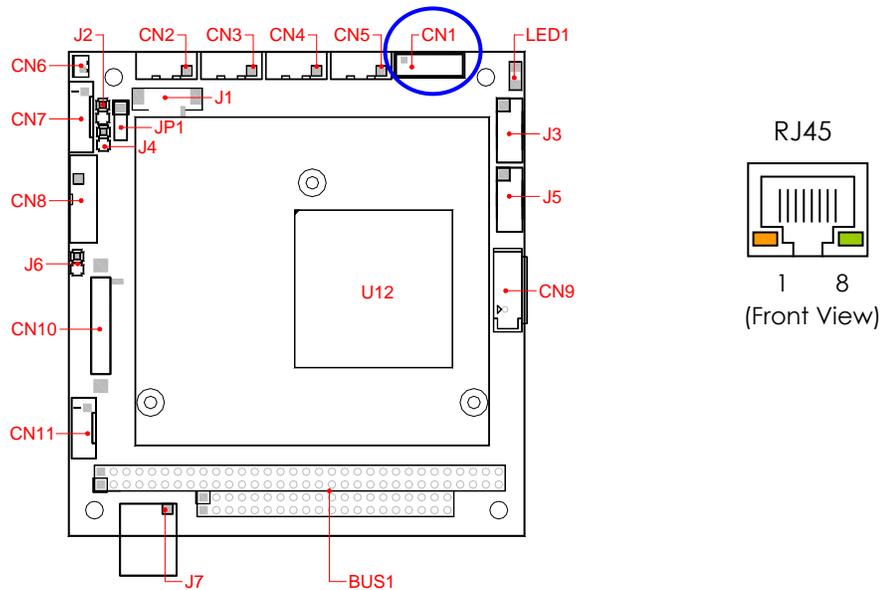
J6 is a 2-pin header for connecting to system reset button. Shorting the circuit of the 2 pins makes the hardware reset and FB2413 restart system. It is similar to power off the system and then power it on again.



PIN	Signal
1	Reset +
2	Reset -

□ **CN1: RJ45 LAN /Adapter Connector with LED indicators**

FB4760 is a RJ45 connector with 2 LEDs for LAN. The left side LED (orange) indicates data which is being accessed and the right side LED (green) indicates on-line status. (On indicates on-line and Off indicates off-line) CN1 provides twist-pair signals of LAN port if you got LAN version and adapter board (FB4760) with cable. The following lists the pin assignments of CN1 to RJ45 connector on the FB4760 LAN adapter board:

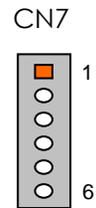
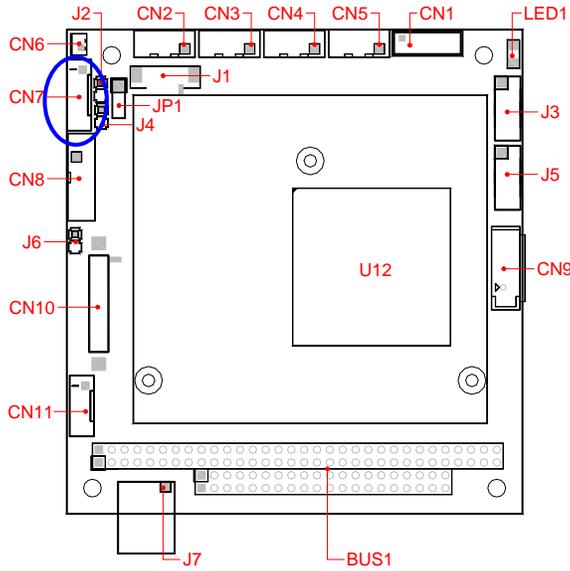


The following list the pin assignments of CN1.

CN1	Signal	RJ45	CN1	Signal	RJ45
1	VDD3.3V	-	2	Link/Active	-
3	MDI3-	8	4	MDI3+	7
5	MDI2-	5	6	MDI2+	4
7	MDI1-	6	8	MDI1+	3
9	MDI0-	2	10	MDI0+	1
11	ACT/DUP	-	12	Case GND	-

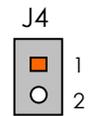
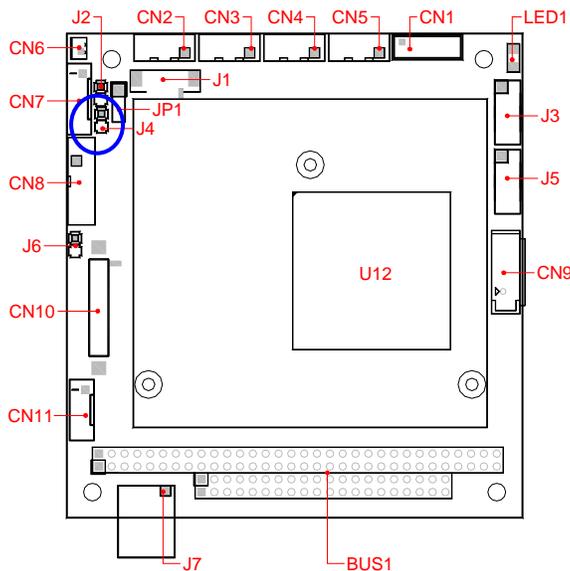
□ **CN7: Keyboard/Mouse Connector**

CN7 is a 6-pin 2.0mm JST connector, use the included KB/MS adapter cables you can attach standard PS/2 type keyboard and mouse.



PIN	Signal
1	Mouse Data
2	Keyboard Data
3	Ground
4	VCC
5	Mouse Clock
6	Keyboard Clock

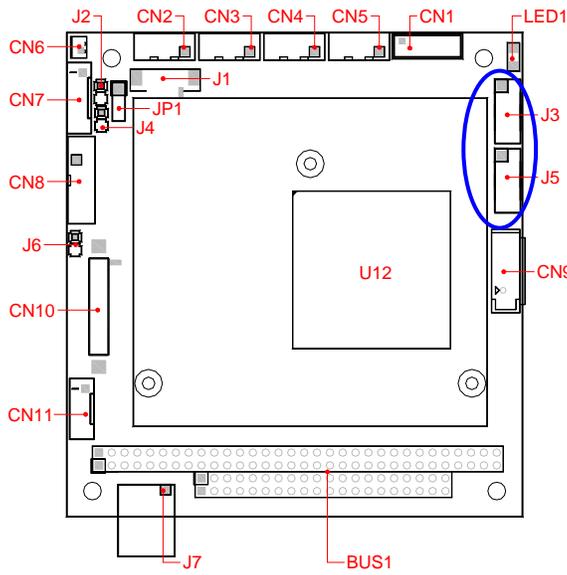
□ **J4: External Speaker Header**



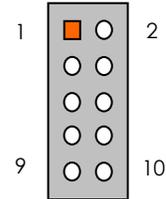
PIN	Signal
1	Speaker+
2	Speaker-

□ **J3 & J5: USB Connector**

Use the USB adapter cable, you can attach up to 4 USB devices.

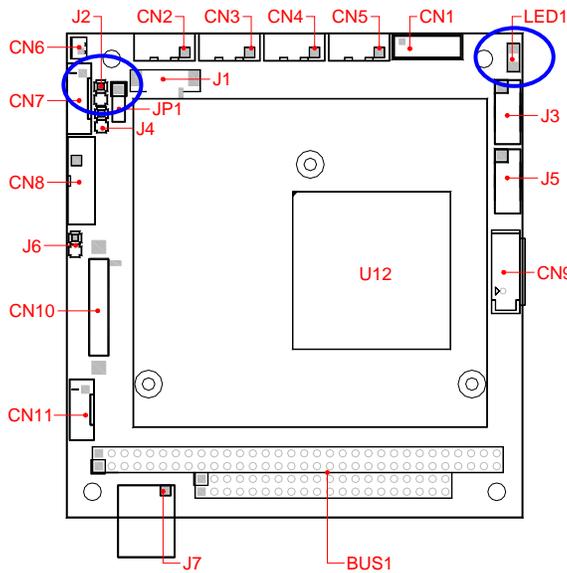


J3 & J5



PIN	Description	PIN	Description
1	USBV0	2	Case Ground
3	USBD0-	4	USBG1
5	USBD0+	6	USBD1+
7	USBG0	8	USBD1-
9	Case Ground	10	USBV1

□ **LED1 & J2: Power LED indicator, External CF LED Header**



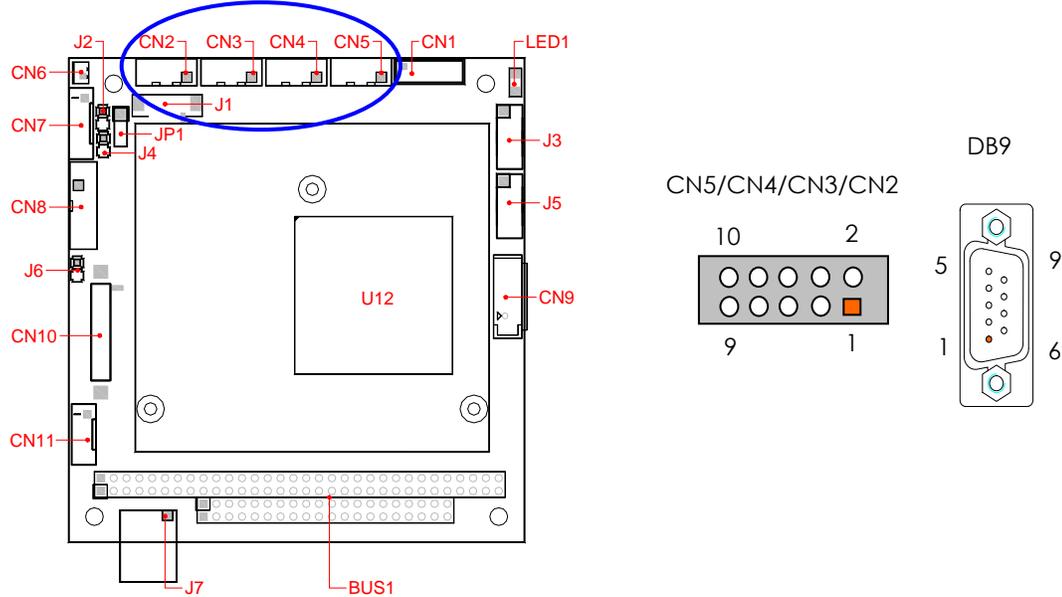
J2



PIN	Signal
1	CF LED+
2	CF LED-

□ **CN5, CN4, CN3 & CN2: Serial Port Connectors**

CN5 (Serial Port 1), CN4 (Serial Port2), CN3 (Serial Port3) & CN2 (Serial Port4) are 10-pin 2.0mm IDC connectors. The included serial port adapter cables are used to transfer 10-pin 2.0mm JST into standard DB-9 connector. The following tables show the signal connections of these connectors and the included adapter cable for CN2 to CN5.



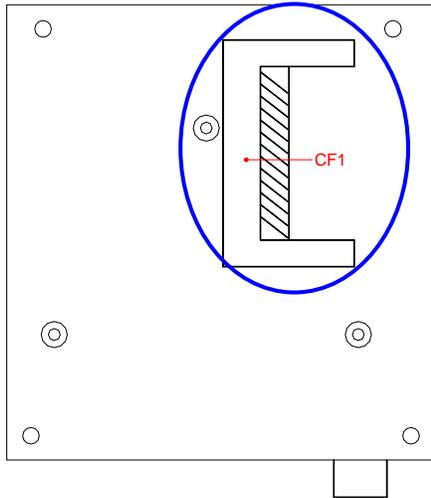
Function Connector of Serial Ports	Serial Port1	Serial Port 2	Serial Port 3	Serial Port 4
RS232 Signals	CN5	CN4	CN3	CN2
Mode Select	By BIOS	-	-	-
RS422	CN5	-	-	-
RS485	CN5	-	-	-

DB9	CN4/CN3/CN2	RS-232	RS-422	RS-485
1	1	-DCD	TX-	485-
6	2	-DSR	-	-
2	3	RXD	TX+	485+
7	4	-RTS	-	-
3	5	-TXD	RX+	-
8	6	-CTS	-	-
4	7	-DTR	RX-	-
9	8	-RI	-	-
5	9	Ground	-	-
Metal	10	Case Ground	-	-

**Note:** The Serial port 1 (CN5) is designed for multiple proposes. It could be RS-232, RS-422 or RS-485 by BIOS CMOS setting.

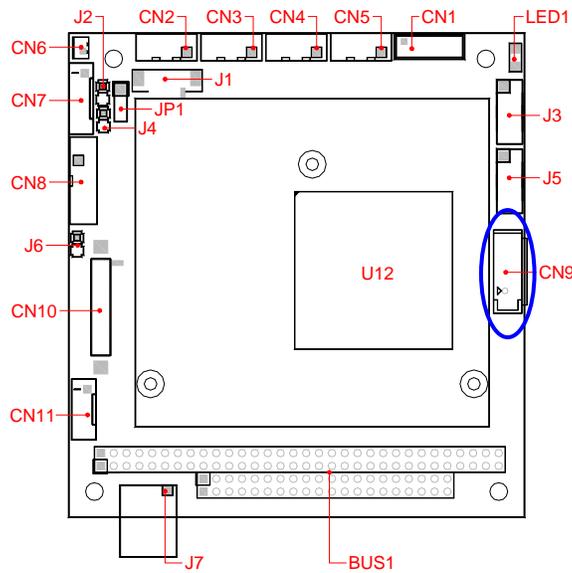
□ **CF1: Compact Flash Socket**

The Compact Flash socket CF1 (on the solder side) and supports 3.3V Compact Flash and Micro Drives. J



□ **CN9: Serial ATA hard Disk Connector**

This CN9 connector is for SATA hard disk Use the SATA cables to SATA hard disk drives.

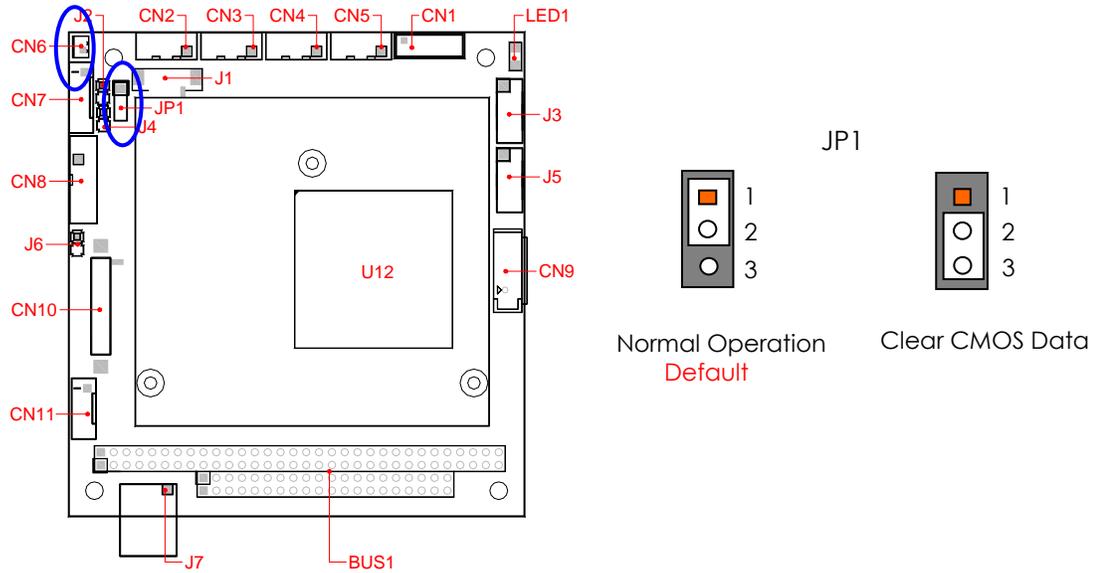


SATA – Serial ATA connector

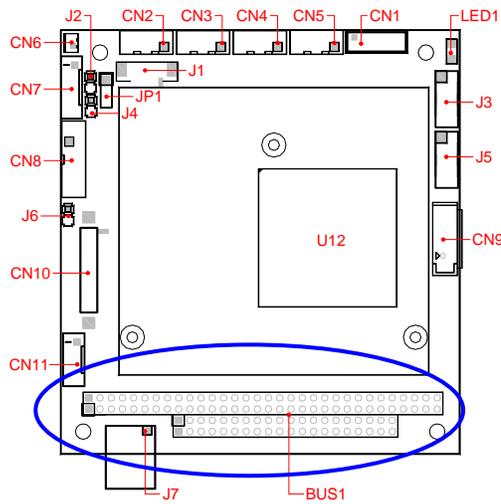
Pin	Description
1	Ground
2	TX-DP
3	TX-DN
4	Ground
5	RX-DN
6	RX-DP
7	Ground

❑ **CN6 & JP1: Battery and Clear CMOS Data**

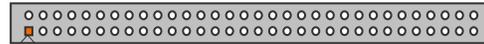
The CN6 is used to connect an external battery pack if Lithium battery is empty; please replace the battery with a new one. You can use JP1 to clear CMOS data. The CMOS store information like system date, time, boot up device, password, IRQ... that are set up with the BIOS. To clear the CMOS, set JP1 to short 2, 3 closed by jumper about the 3 sec and then return to 1, 2 close. The default setting is 1, 2 close. (System power must be turned off before you need to use JP1 to clear CMOS data or replace it with a new one.)



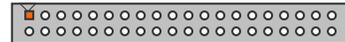
□ **BUS1: PC/104 Bus Connectors**



BUS1 – BUS A & B



BUS1 – BUS C & D



**PC/104 A & B Pin**

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	-IOCHK	A17	SA14	B1	Ground	B17	-DACK1
A2	SD7	A18	SA13	B2	RSTDRV	B18	DRQ1
A3	SD6	A19	SA12	B3	+5V	B19	-Refresh
A4	SD5	A20	SA11	B4	IRQ9	B20	BUSCLK
A5	SD4	A21	SA10	B5	*(-5V)	B21	IRQ7
A6	SD3	A22	SA9	B6	DRQ2	B22	IRQ6
A7	SD2	A23	SA8	B7	*(-12V)	B23	IRQ5
A8	SD1	A24	SA7	B8	-ZWS	B24	IRQ4
A9	SD0	A25	SA6	B9	+12V	B25	IRQ3
A10	IORDY	A26	SA5	B10	KEY	B26	-DACK2
A11	AEN	A27	SA4	B11	-SMEMW	B27	TC
A12	SA19	A28	SA3	B12	-SMEMR	B28	ALE
A13	SA18	A29	SA2	B13	-IOW	B29	+5V
A14	SA17	A30	SA1	B14	-IOR	B30	OSC
A15	SA16	A31	SA0	B15	-DACK3	B31	Ground
A16	SA15	A32	Ground	B16	DRQ3	B32	Ground

**PC/104 C & D Pin**

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
C1	GND	C11	MEMW#	D1	Ground	D11	-DACK#5
C2	SBHE	C12	SD8	D2	MEMCS16#	D12	DREQ5
C3	LA23	C13	SD9	D3	IOCS16#	D13	DACK#6
C4	LA22	C24	SD10	D4	IRQ10	D14	DREQ6
C5	LA21	C25	SD11	D5	IRQ11	D15	DACK#7
C6	LA20	C26	SD12	D6	IRQ12	D16	DREQ7
C7	LA19	C27	SD13	D7	IRQ15	D17	VCC
C8	LA18	C28	SD14	D8	IRQ14	D18	Master#
C9	LA17	C29	SD15	D9	DACK#0	D19	GND
C10	MEMR#	C20	KEY	D10	DREQ0	D20	GND

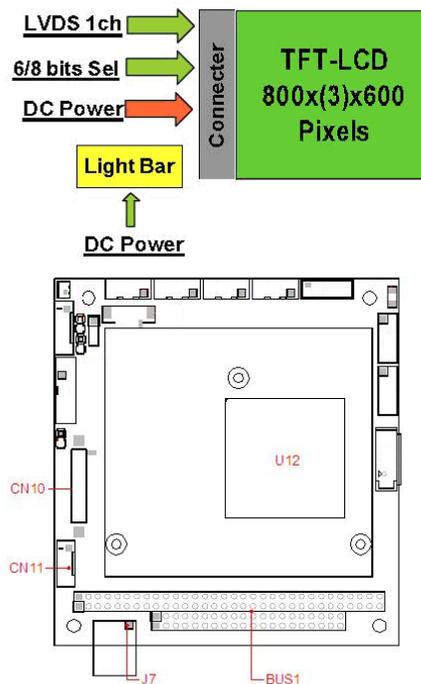


## Chapter 3 Installing VGA & LCD Display

### LVDS LCD FLAT PANEL DISPLAY

Using the BIOS setting for different types of LVDS LCD module, then set your system properly and configures BIOS setting for the right type of LVDS LCD module you are using.

The following shows the block diagram of using FB2413 for LVDS LCD module.



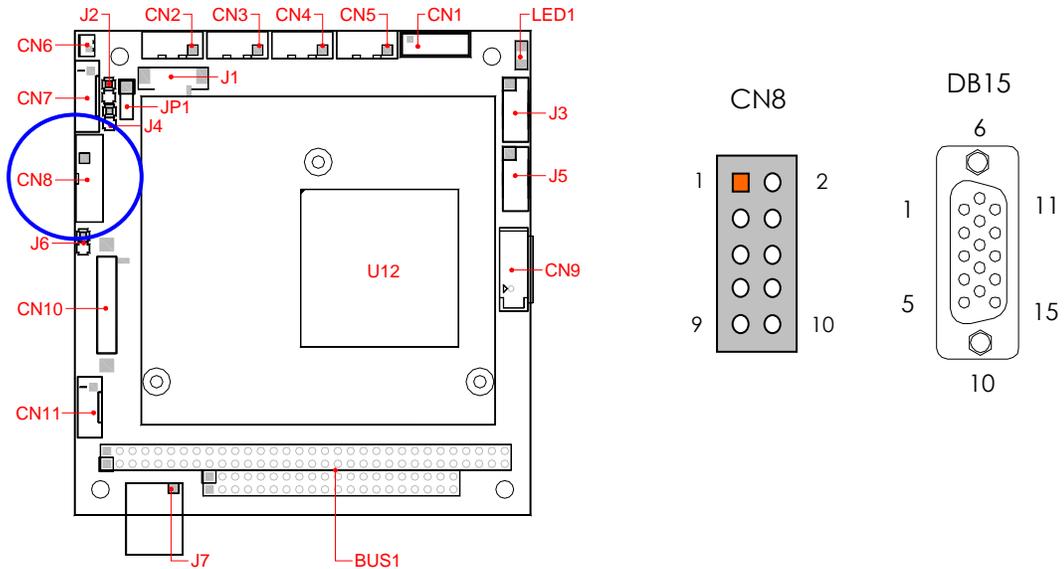
LCD Panel Block Diagram

The block diagram shows that FB2413 still needs components to be used with a (LVDS) LCD panel.

**NOTE:** Be careful with the pin orientation when installing connectors and the cables. A wrong connection can easily destroy your LCD panel. The pin 1 of the cable connectors is indicated with a sticker and the pin 1 of the ribbon cable usually has a different color.

□ **CN8: Analogy VGA Display Connector**

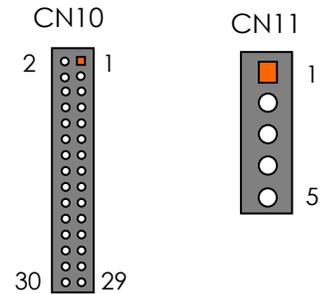
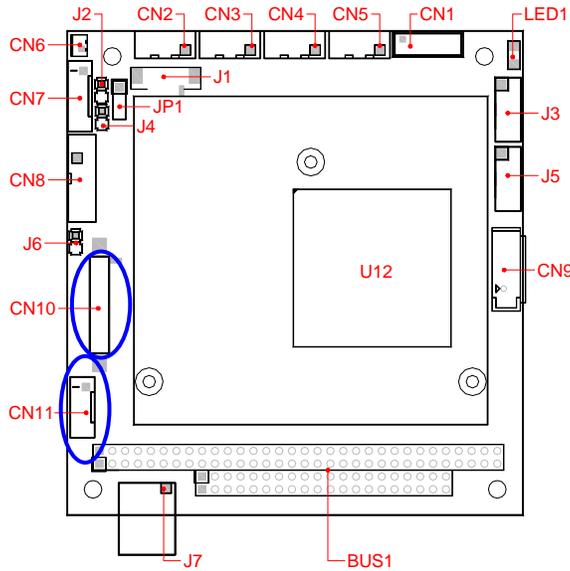
The FB2413 supports a VGA colored monitor and a LVDS LCD. It can be connected to create a compact video solution for the industrial environment. The following table and figure illustrate the pin definition of CN8 and D-sub 15-pin on the analogy VGA adapter cable:



CN8	Signal	DB-15	CN8	Signal	DB15
1	RED	1	2	Case Ground	Case
3	GREEN	2	4	Digital Ground	5,10
5	BLUE	3	6	Analog Ground	6,7,8
7	VSYNC	14	8	DDC Data	12
9	HSYNC	13	10	DDC Clock	15

□ **CN10 & CN11: LVDS LCD Connector and Power Connector (Optional)**

CN10 (DF13) is a 24-bit LVDS LCD interface connector and CN11 is the LCD power connector for backlight of LCD. The pin assignments are listed in the following table.



Pin	Signal
1	+12V
2	Ground
3	ENVDD
4	N.C.
5	VCC

Pin	Signal	Pin	Signal
1	Ground	2	LVDS_FP0+
3	LVDS_FP0-	4	Ground
5	LVDS_FP1+	6	LVDS_FP1-
7	Ground	8	LVDS_FP2+
9	LVDS_FP2 -	10	Ground
11	LVDS_CK+	12	LVDS_CK-
13	Ground	14	LDPO_AUX+
15	LTDP0_AUX-	16	Ground
17	N.C	18	N.C
19	Ground	20	N.C
21	N.C	22	Ground
23	N.C	24	N.C
25	Ground	26	Ground
27	LVDS_+3.3V	28	LVDS_+3.3V
29	LVDS_+3.3V	30	LVDS_+3.3V

**NOTE:** If any trouble occurs when connecting FB2413 with LCD panels, you could contact technical support division of FabiaTech Corporation.



## Chapter 4 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.

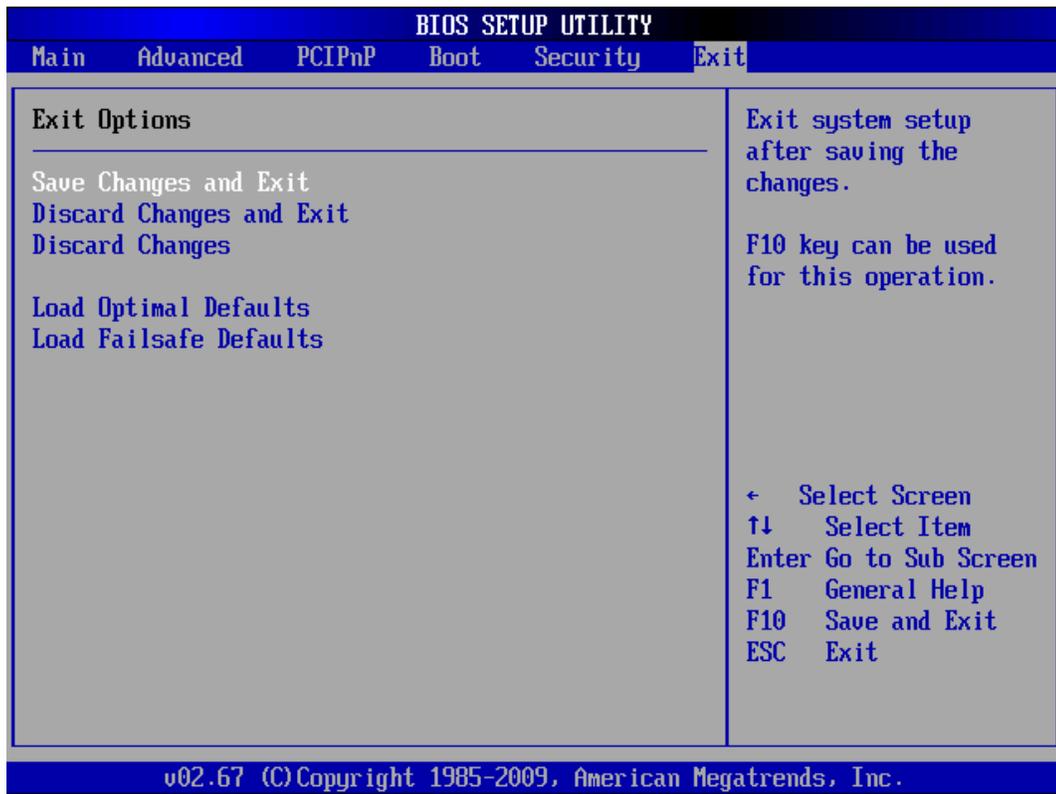
The BIOS provides a menu-driven interface to the console subsystem. The console subsystem contains special software, called firmware that interacts directly with the hardware components and facilitates interaction between the system hardware and the operating system.

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
  - CHIPSET Configuration
  - IDE Configuration
  - Serial Port Configuration
  - USB Configuration
  - Power Management Configuration
  - Shadow RAM Configuration
  - Patcher ROM Setting
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. 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.

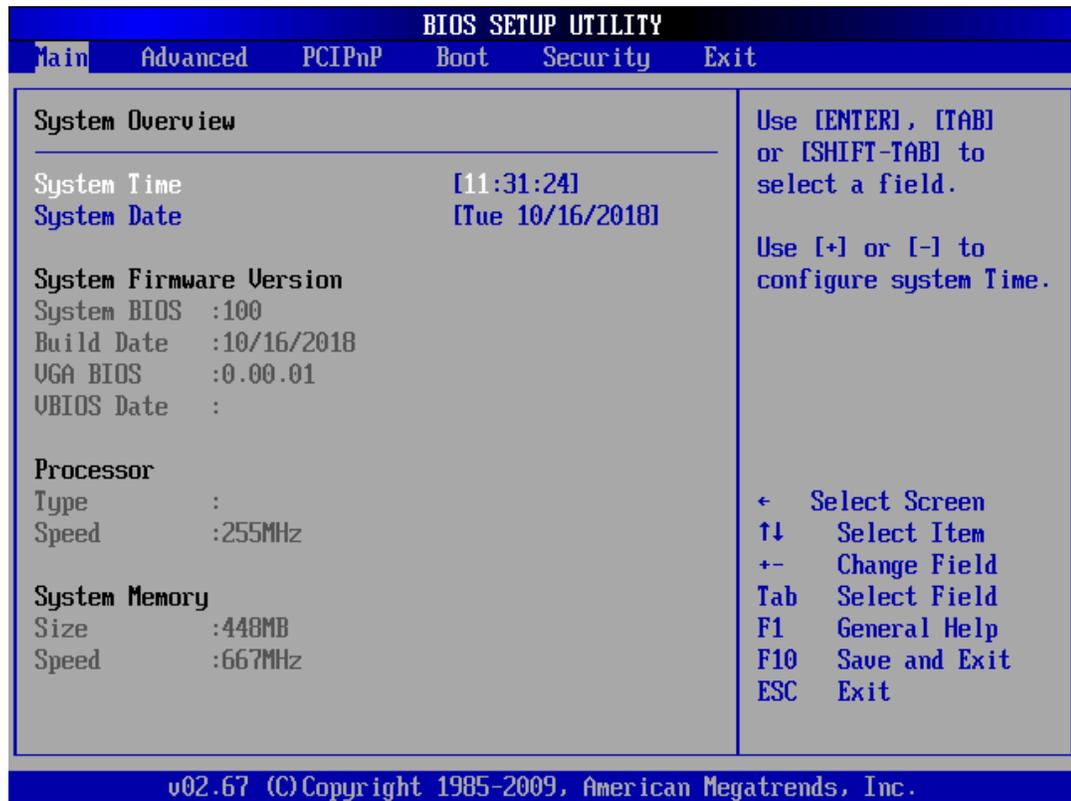
□ **Keyboard Convention**

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
ALT+F4	Hot Key - Display Advanced "Chipset" Setup
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

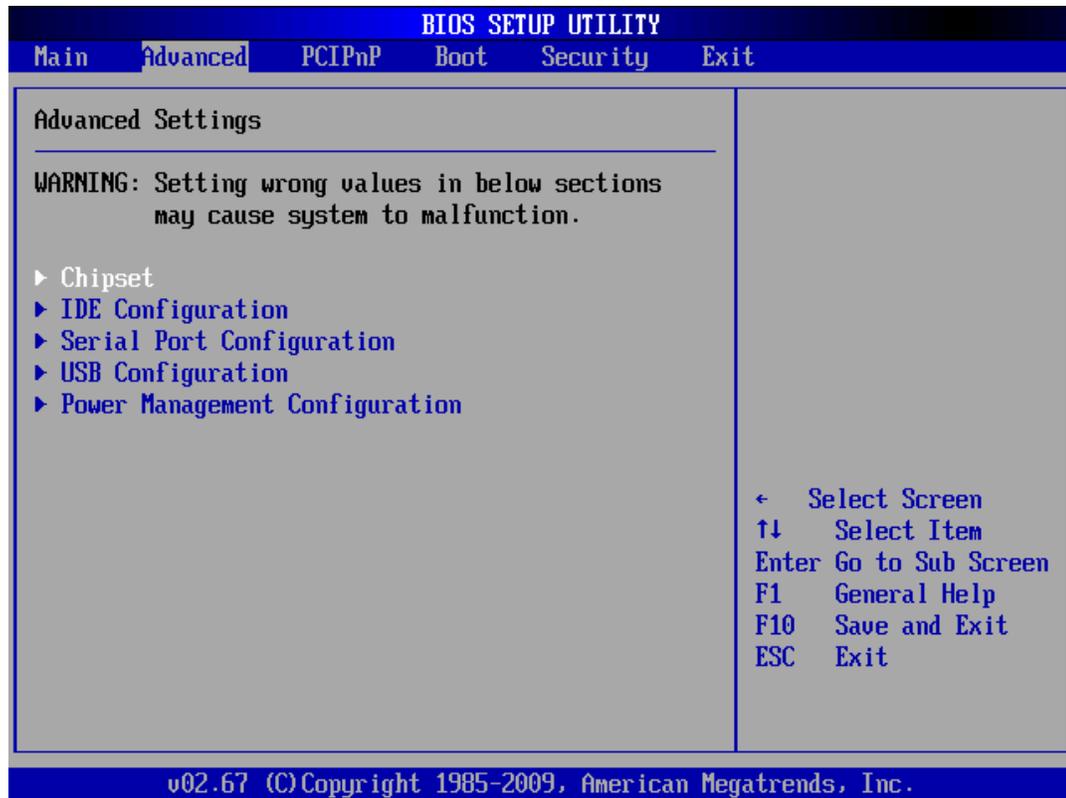
Highlight the <Date> field and then press the [Page Up] / [Page Down] or [+] / [-] keys to set the current date. Follow the month, day and year format.

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

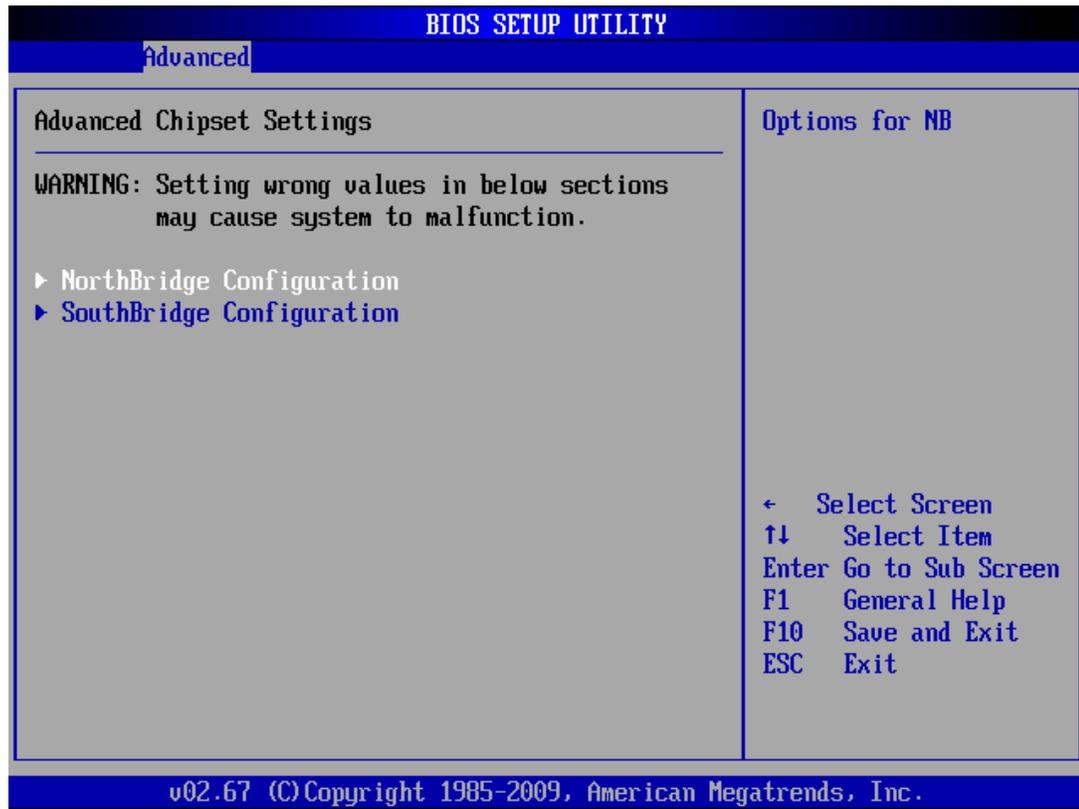
Select the *Advanced* tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as IDE Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> 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



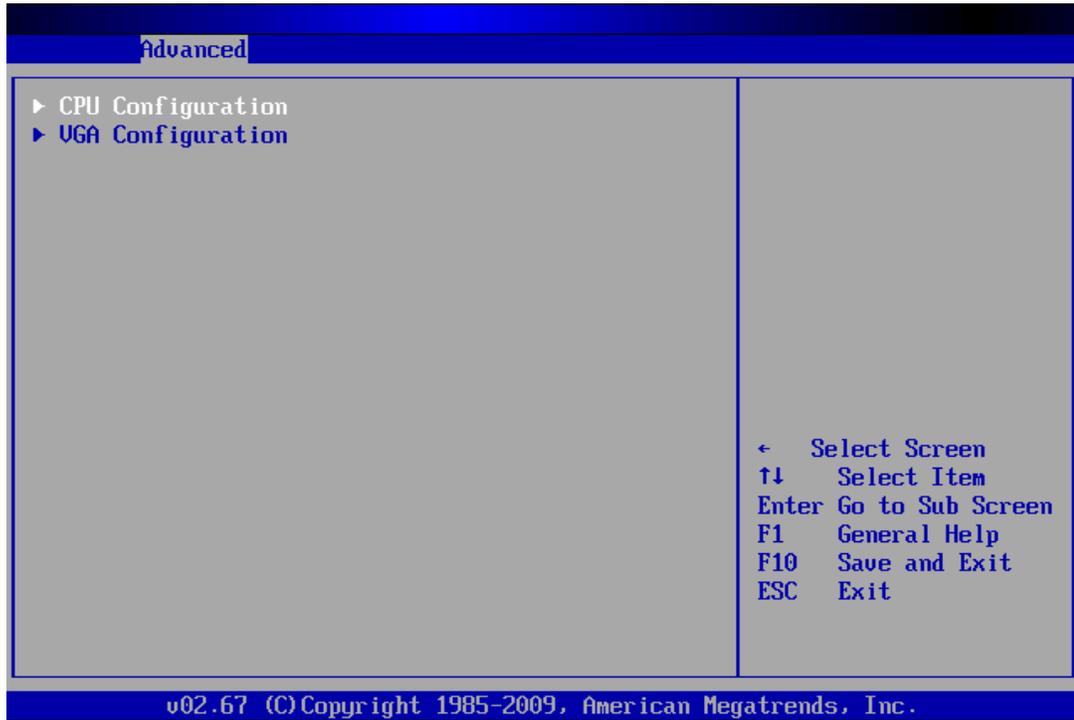
□ **Chipset Setup**

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

- NorthBridge Configuration
- SouthBridge Configuration



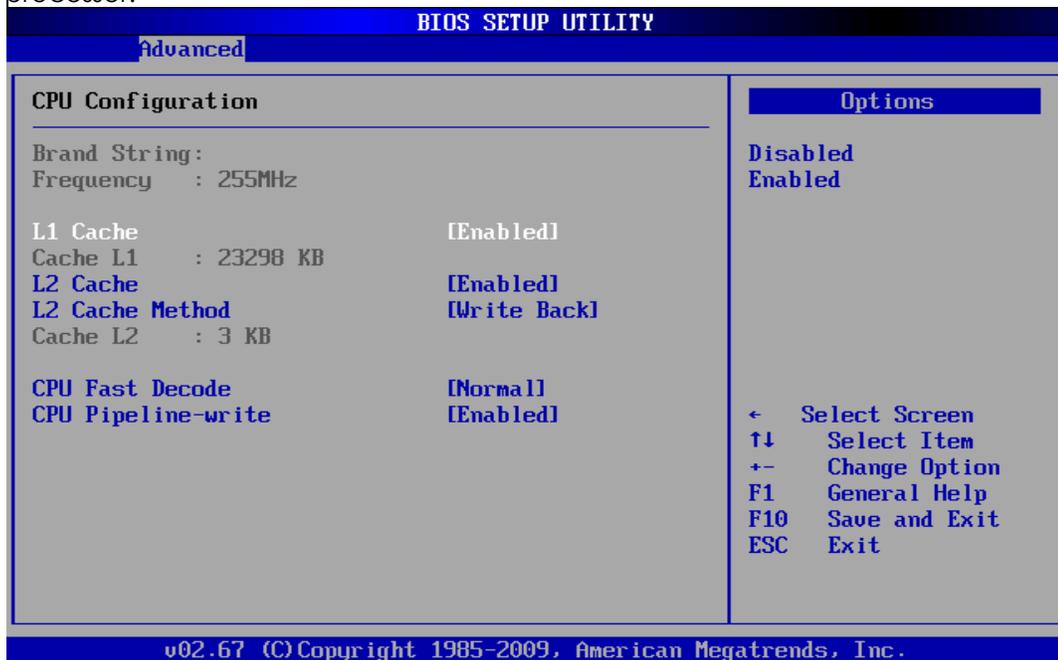
➤ Northbridge Configuration



**CPU Configuration**

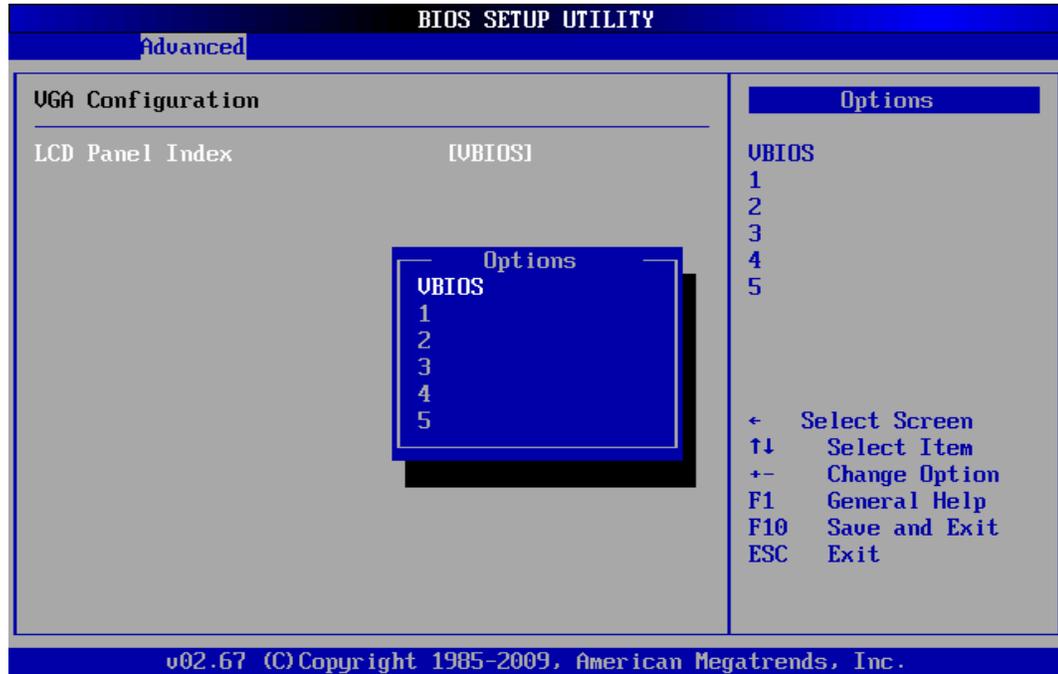
You can use this screen to select options for the CPU information. Use the up and down <Arrow> keys to select an item. Use the <Plus> and <Minus> keys to change the value of the selected option.

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



**VGA Configuration (LCD Panel Function is Optional)**

This field item is for FB2413x, when using the LCD the field specifies the selections of display for different TFT LCD display type.



**LCD Panel Index**

When use the LCD the field specifies which select display resolution for different TFT LCD display type.

**Available Options:** VBIOS, 1, 2, 3, 4, and 5

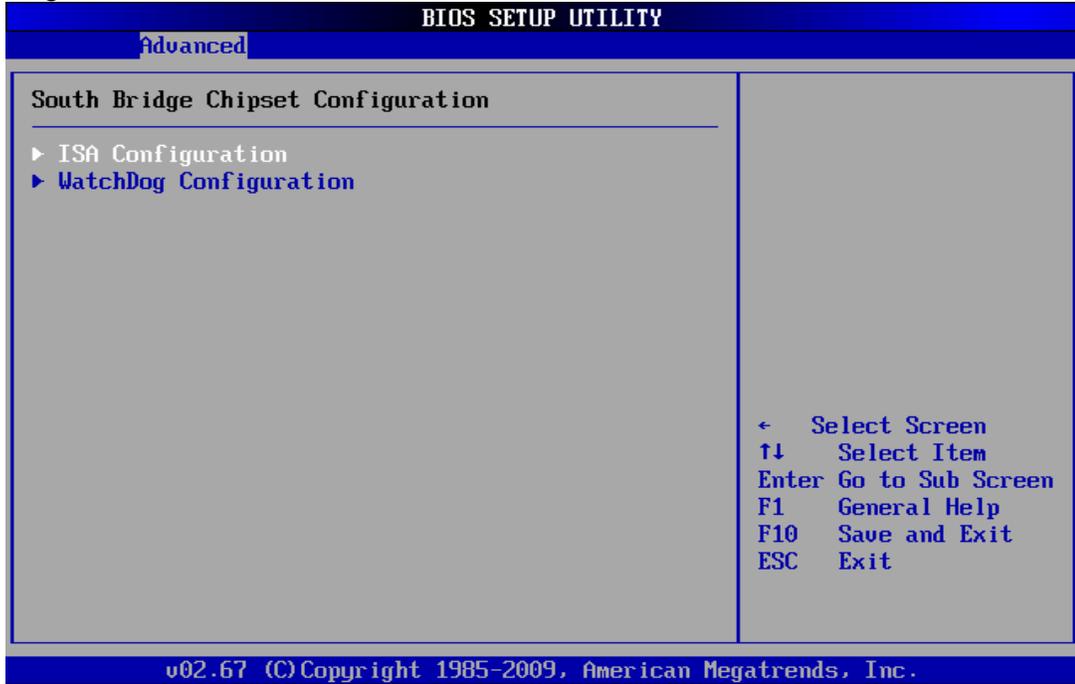
**Default setting:** VBIOS

**Flat Panel Display LCD Type Table**

Function
1: 640x480 LVDS
2: 800x600 LVDS
3: 800x600 LVDS
4: 024x600 LVDS
5: 1024x768 LVDS

➤ **Southbridge 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 ISA functions, and Watch Dog function.



*ISA Configuration*



### ISA Clock

This field sets the polling clock speed of ISA Bus (PC/104).

**Available Options:** 8.3MHz and 16.6 MHz

**Default setting:** 8.3MHz

***NOTE:*** 1. PCICLK means the PCI BUS inputs clock (33Mhz).  
2. User is recommended to use setting at 8.3MHz.

### ISA 8Bits/16bits wait-state

The recovery time is the length of time, measured in CPU clocks, which the system will delay after achieving an input/output request. This delay takes place to wait for the I/O to complete the request. This field specifies the recovery time for 8bit or 16bit I/O.

**Available Options:** 1 clock ~ 8 clock

**Default setting:** 1 clock/4 clock

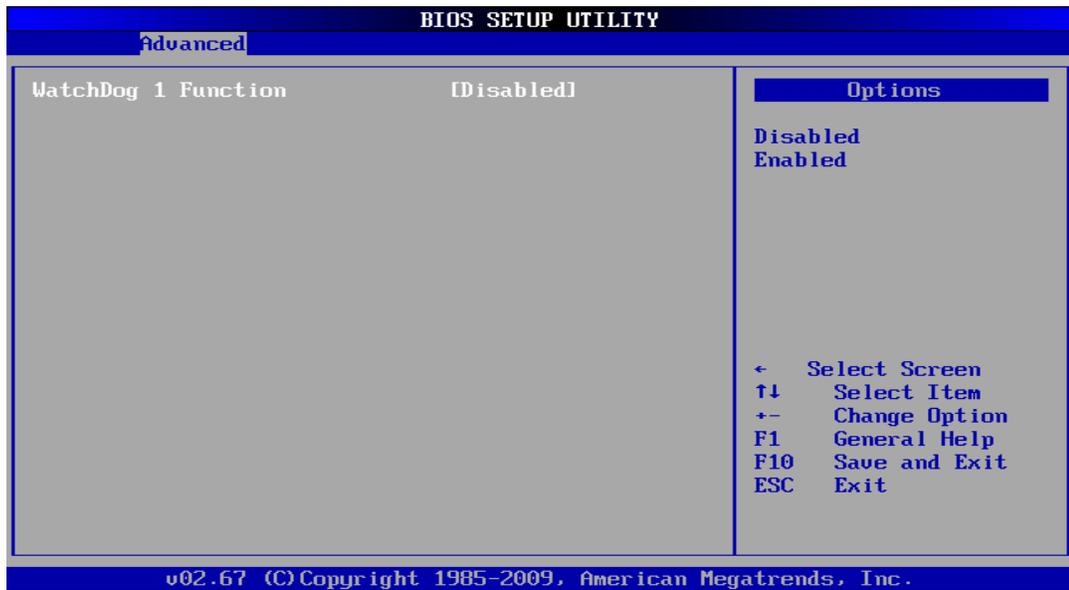
### ISA 8Bits/16bits Memory wait-state

The recovery time is the length of time, measured in CPU clocks, which the system will delay after achieving an input/output request. This delay takes place to wait for the memory to complete the request. This field specifies the recovery time for 8bit or 16bit memory (ISA BUS MEMR/W SMEMR/W).

**Available Options:** 1 clock ~ 8 clock

**Default setting:** 1 clock/4 clock

### Watchdog Configuration



#### Watchdog 1 Function

This field specifies the Enabled or Disabled of the Watchdog Function.

**Available Options:** Disabled and Enabled

**Default setting:** Disabled

#### Watchdog 1 Signal Select

This field is the Select IRQ, NMI or Reset signal trigger of onboard watchdog.

**Available Options:** IRQ 3 ~ IRQ12, IRQ14, IRQ15, NMI, and Reset

**Default setting:** Reset

#### Watchdog 1 Timer

This field is the Select when IRQ, NMI or Reset signal trigger timer of onboard watchdog.

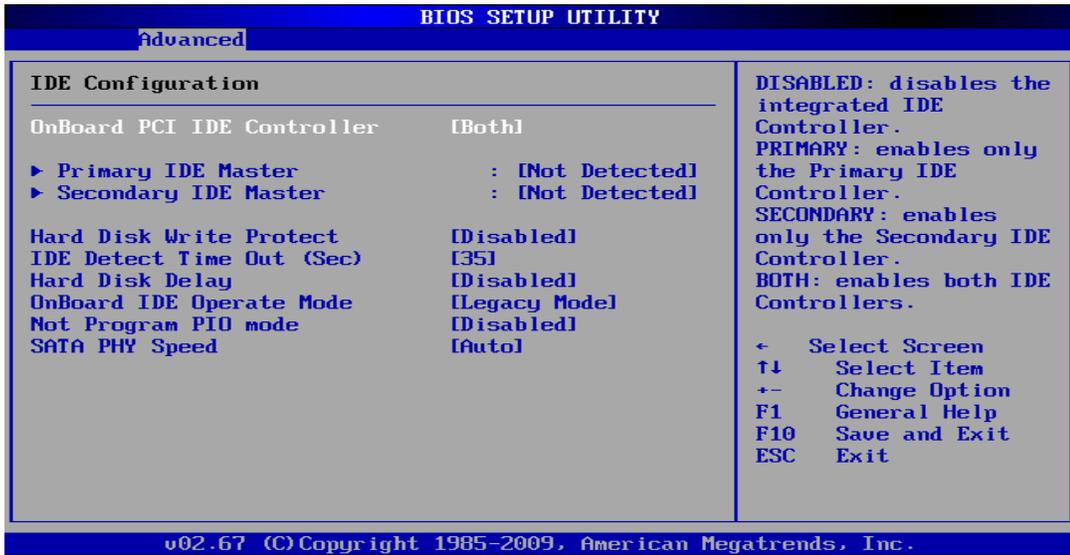
**Available Options:** 2 Sec ~ 512 Sec

**Default setting:** 64 Sec

**Note:** Please refer to the section of the "[Watchdog Timer](#)" in the Chapter 5 "Driver and Utility" for the detail description of the Watchdog ports register.

❑ **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.



➤ **Onboard PCI IDE Controller**

This item specifies the IDE channels used by the onboard PCI IDE controller

**Available Options:** Primary, Secondary, Both and Disable

**Default setting:** Both

◆ **Primary/Secondary IDE 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.

**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 *enabled*.

#### ➤ **Hard Disk Write Protect**

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

**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

#### ➤ **Hard Disk Delay (Sec.)**

Delay for a connected HDD (Sec.). The length of time in seconds the BIOS will wait for a hard disk to be ready for operation.

**Available Options:** 1, 2, 4, 8, and Disabled

**Default setting:** Disabled

➤ **OnBoard IDE Operate Mode**

This item specifies the Native Mode ONLY for Windows(R) XP and 2000.

**Available Options:** Legacy, and Native mode

**Default setting:** Native mode

➤ **Not Program PIO Mode**

If the bios cannot detect the CF or IDE, this will allow you to indicate the CF or IDE card to Primary Channel or Secondary Channel.

**Available Options:** Enabled and Disabled

**Default setting:** Disabled

➤ **SATA PHY Speed**

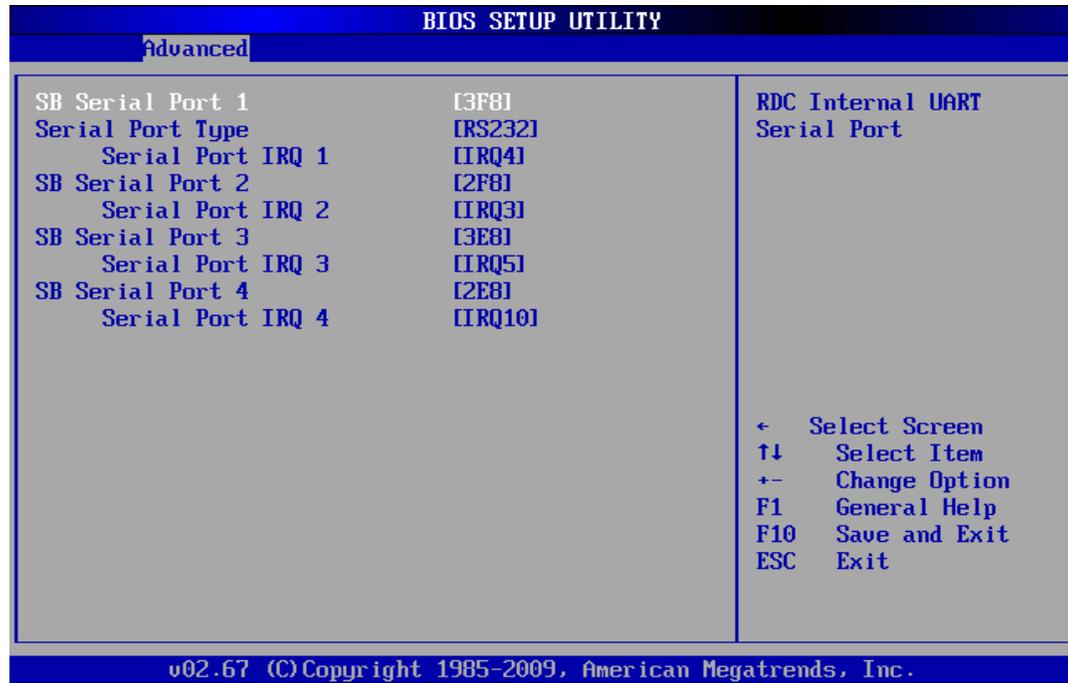
The items in this menu allow you to set or change the configurations for the SATA device speed.

**Available Options:** GEN1 Only, and AUTO

**Default setting:** AUTO

□ **Serial Port Configuration**

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



➤ **SB Serial Port 1**

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

**Available Options:** Disabled, 3F8H, 2F8H, 3E8H, 2E8H, 360, 260, 368, 268, 3E0, and 2E0H.

**Default setting:** 3F8

**Serial Port Type**

This field item can select RS232, RS422, and RS485 or select Serial port 1

**Available Options:** RS-232, RS-422, RS485, RS422 Terminal Resistor and RS485 Terminal Resistor

**Default setting:** RS-232

**Serial Port IRQ 1**

This field is the Serial port 1 Interrupt.

**Available Options:** IRQ3 ~IRQ11, IRQ12, IRQ14, and IRQ15

**Default setting:** IRQ4

➤ **SB Serial Port 2**

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

**Available Options:** Disabled, 3F8H, 2F8H, 3E8H, 2E8H, 360, 260, 368, 268, 3E0, and 2E0H.

**Default setting:** 2F8

*Serial Port 2 IRQ*

This field is the Serial port 2 Interrupt.

**Available Options:** IRQ3 ~IRQ11, IRQ12, IRQ14, and IRQ15

**Default setting:** IRQ3

➤ **SB Serial Port 3**

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

**Available Options:** Disabled, 3F8H, 2F8H, 3E8H, 2E8H, 360, 260, 368, 268, 3E0, and 2E0H.

**Default setting:** 3E8

*Serial Port 3 IRQ*

This field is the Serial port 1 Interrupt.

**Available Options:** IRQ3 ~IRQ11, IRQ12, IRQ14, and IRQ15

**Default setting:** IRQ5

➤ **SB Serial Port 4**

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

**Available Options:** Disabled, 3F8H, 2F8H, 3E8H, 2E8H, 360, 260, 368, 268, 3E0, and 2E0H.

**Default setting:** 2E8

*Serial Port 4 IRQ*

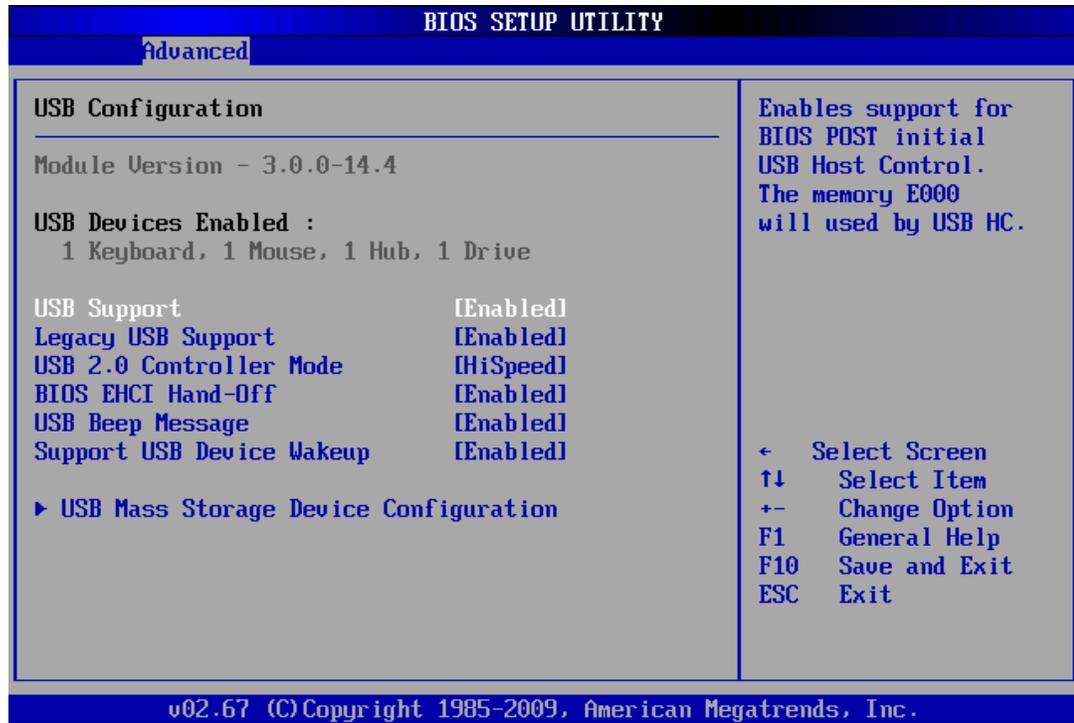
This field is the Serial port 1 Interrupt.

**Available Options:** IRQ3 ~IRQ11, IRQ12, IRQ14, and IRQ15

**Default setting:** IRQ10

❑ **USB Configuration**

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



➤ **USB Support**

Select Enable, 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:** Disabled, Enabled

**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 configured 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

➤ **USB Beep Message**

This field can select Enable the beep during USB device enumeration.

**Available Options:** Enabled and Disabled

**Default setting:** Enabled

➤ **USB Mass Storage Driver Support**

Mass storage device emulation type. If the emulation FDD, recommended formatted as FAT32 format.

**Available Options:** Disabled, and Enabled

**Default setting:** Enabled

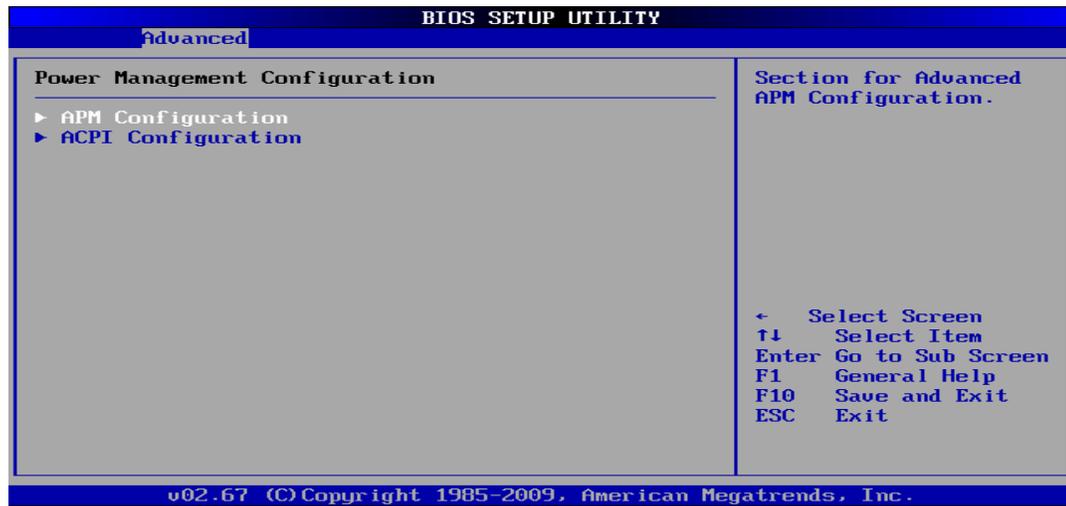
***USB Mass Storage Device Configuration***

USB mass storage device start unit command time-out.

**Available Options:** 10 sec, 20 sec, 30 sec, and 40 sec

**Default setting:** 20 sec

❑ Power Manager Configuration



➤ APM Configuration

*APM Support*

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

**Available Options:** Disable, and Enable

**Default setting:** Disable

➤ ACPI Configuration

*ACPI Aware OS*

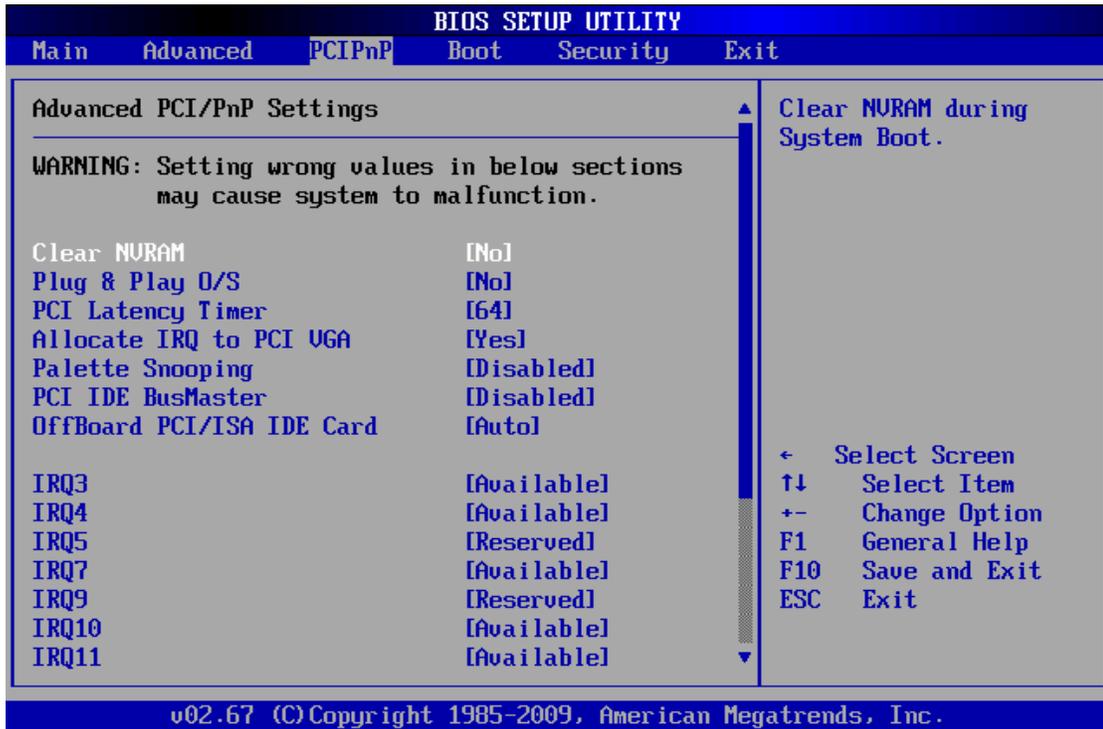
Enable or Disabled ACPI support OS

**Available Options:** Yes, and No

**Default setting:** Yes

## 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

➤ **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

➤ **DMA Channel 0 – 7**

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

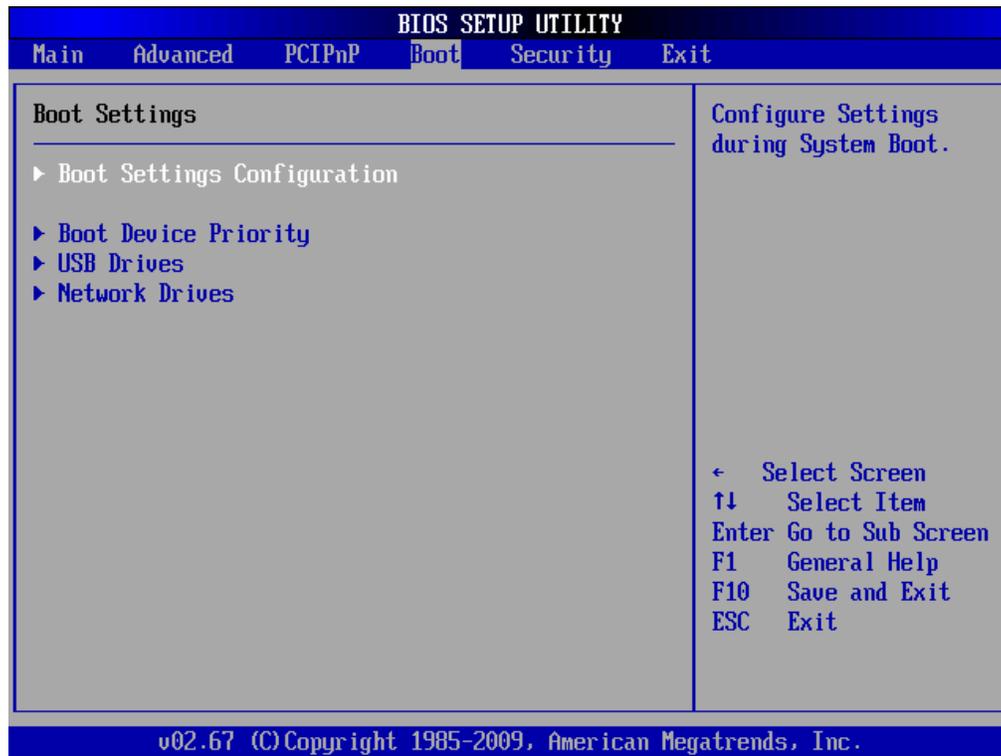
ISA/EISA devices comply with the original PC AT bus specification, requiring a specific interrupt (Such as IRQ5 for COM1).

PnP (PCI/ISA) devices: comply with the Plug and Play standard, whether designed for PCI or ISA bus architecture.

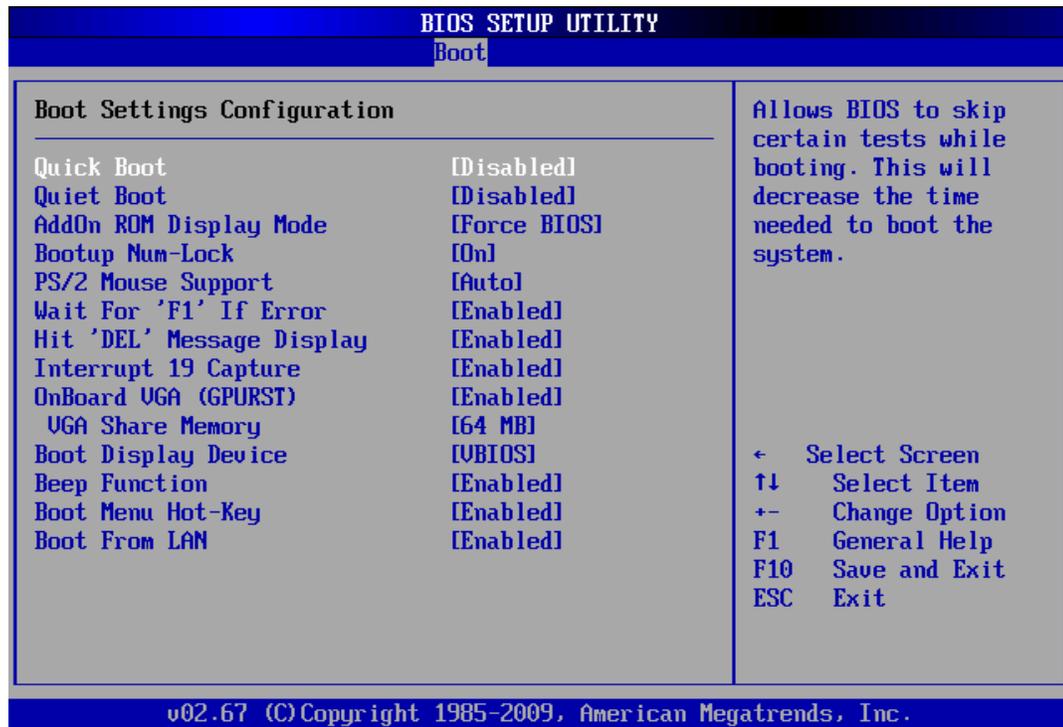
## Boot Setup

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
- USB Drives
- Network 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

➤ **Quiet Boot**

This item allows users to enable or disable Quiet boot option. If Enable, an OEM LOGO is shown instead of POST messages.

**Available Options:** Disabled, and Enabled

**Default setting:** Disabled

➤ **AddOn ROM Display Mode**

Set this option to display add-on ROM (read-only memory) messages. An example of this is a SCSI BIOS or VGA BIOS.

1. Force BIOS Set this value to allow the computer system to force a third party BIOS to display during system boot.
2. Keep Current Set this value to allow the computer system to display the information during system boot.

**Available Options:** Force BIOS and Keep Current

**Default setting:** Force BIOS

➤ **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

➤ **Interrupt 19 Capture**

Set this value to allow option ROMs such as network controllers to trap BIOS interrupt 19.

**Available options:** Disabled, Enabled

**Default setting:** Disabled

➤ **On Board VGA (GPURST)**

This field is select Enable or Disable on board VGA

**Available options:** Disabled, Enabled

**Default setting:** Enabled

***VGA Share Memory***

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:** 16MB, 32MB, 64MB, 128MB, 256MB and 512MB

**Default setting:** 64MB

➤ **Boot Display Device**

Select the Video Device which will be activated during POST. Auto (VBIOS) If external exits to display else display IPD. (IPD integral panel display) IPD integral panel display, CRT External display.

**Available Options:** CRT, and VBIOS

**Default setting:** VBIOS

➤ **Beep Function**

This field can select enable the beep during POST.

**Available Options:** Enabled and Disabled

**Default setting:** Enabled

➤ **Boot From LAN**

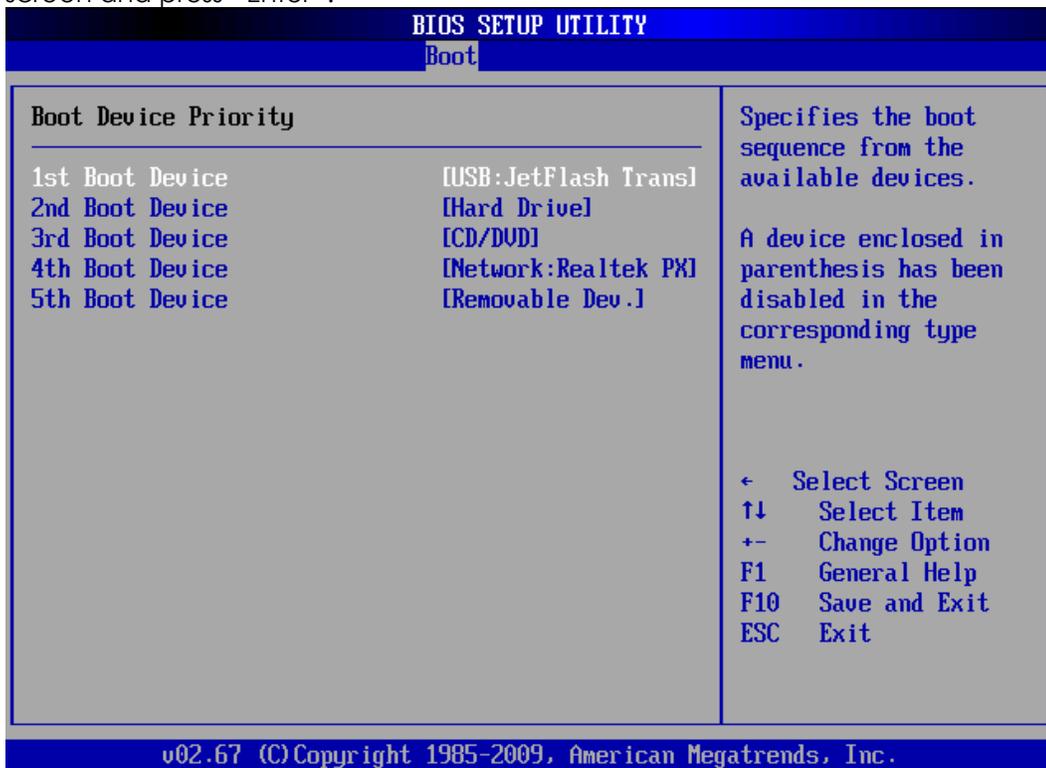
This field specifies the PXE boot ROM of the onboard LAN chip.

**Available Options:** Disabled, Enable

**Default setting:** Disable

□ **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>.



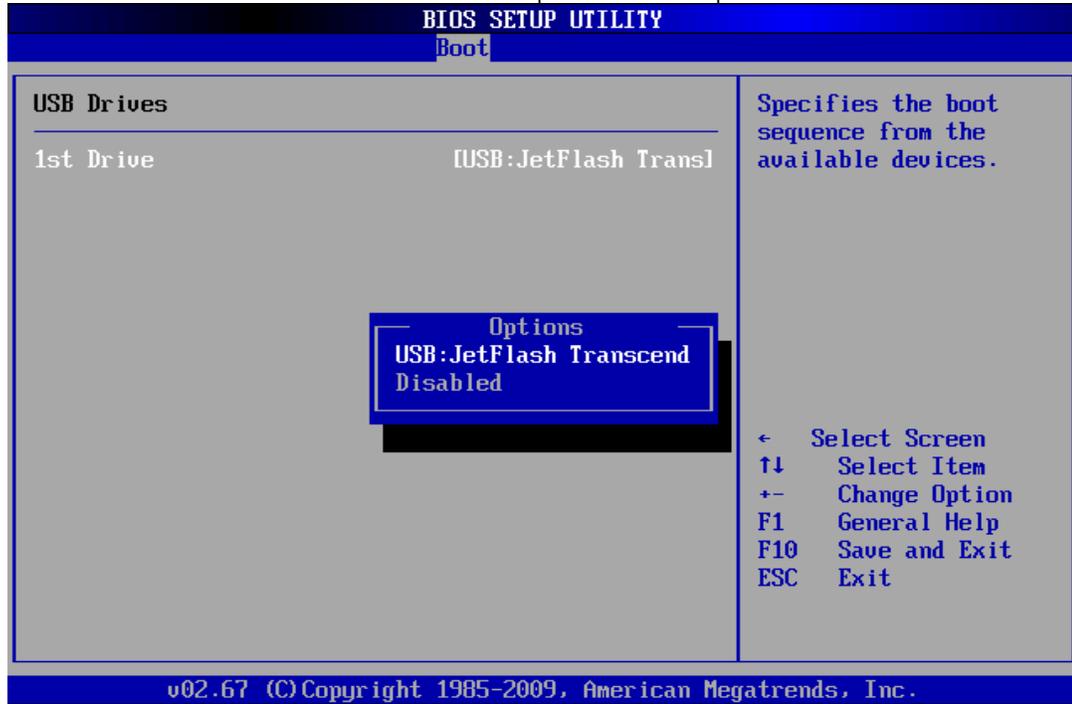
➤ **First /Second /Third Hard Disk Boot Device**

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

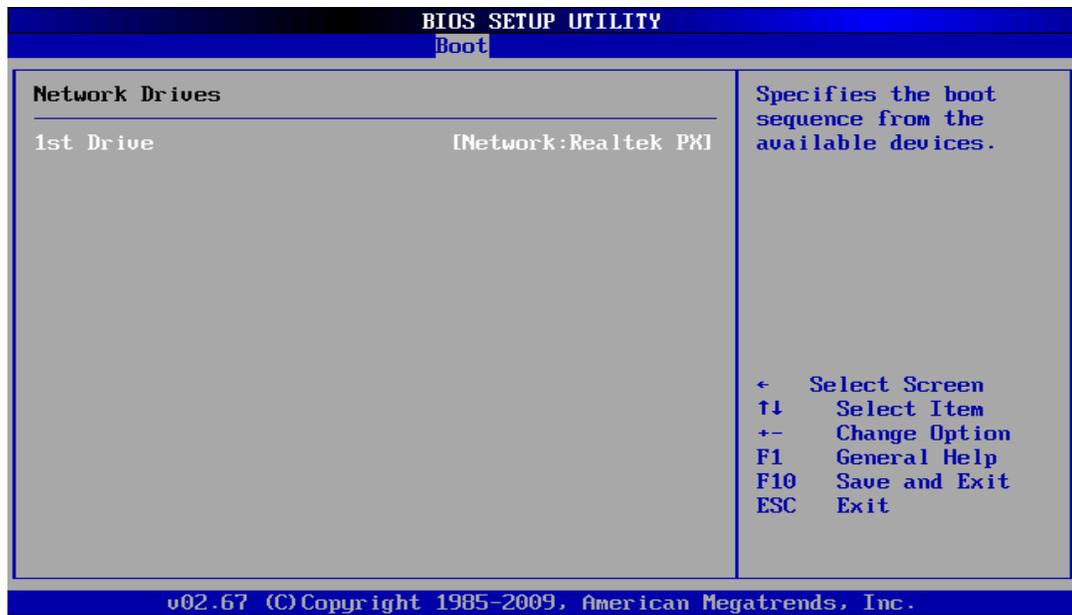
□ **Boot USB Device**

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



□ **Boot Network Drivers**

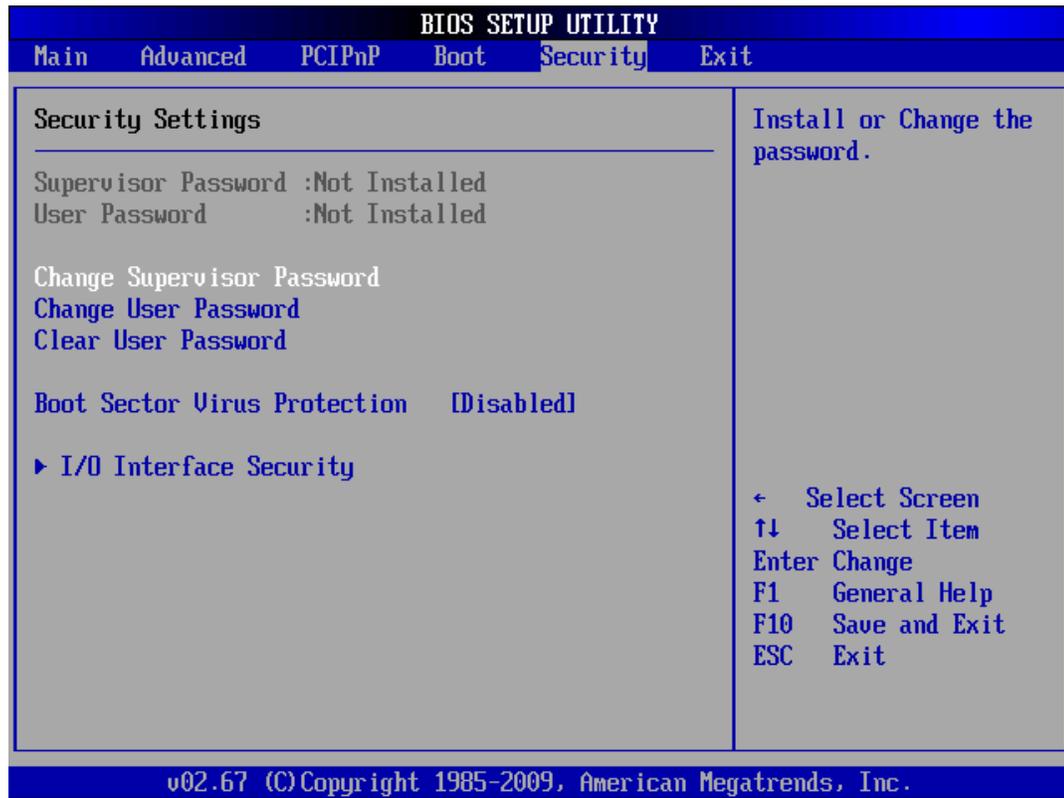
Use this screen to view the Network drives in the system. To access this screen, select Network drives on the Boot Setup screen and press <Enter>.



## 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
- Boot Sector Virus Protection
- I/O Interface Security



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!

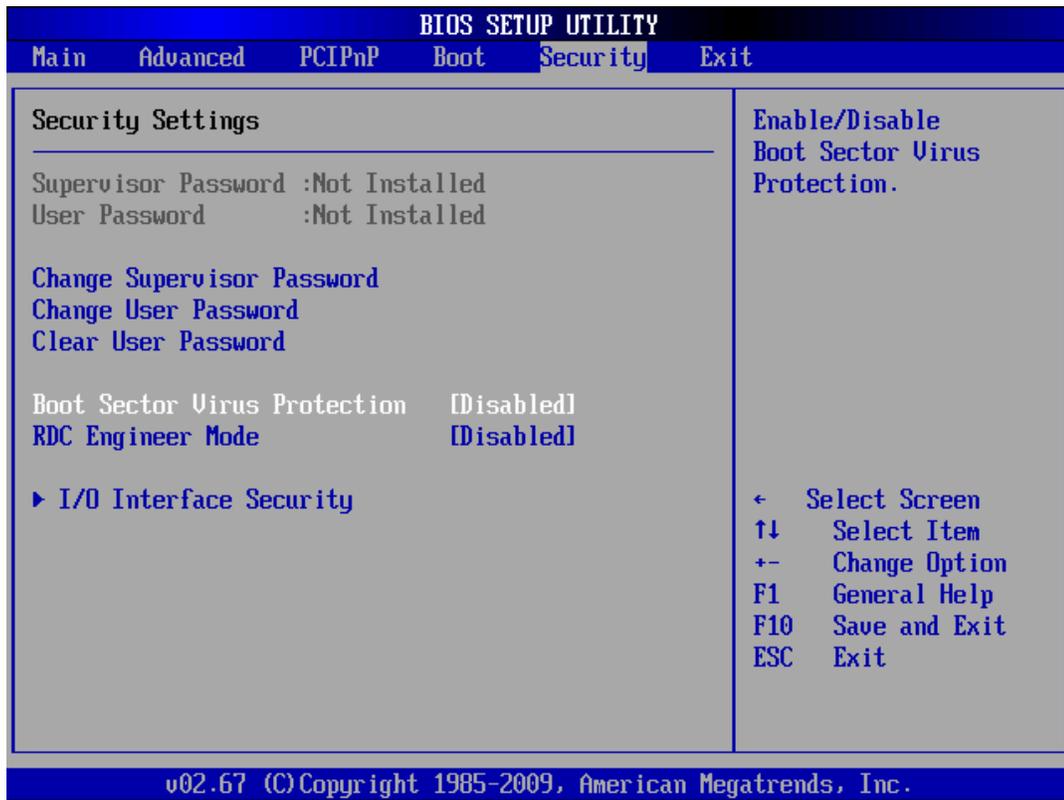
Possible VIRUS: Continue (Y/N)? \_

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)?

*RDC Engineer Mode*

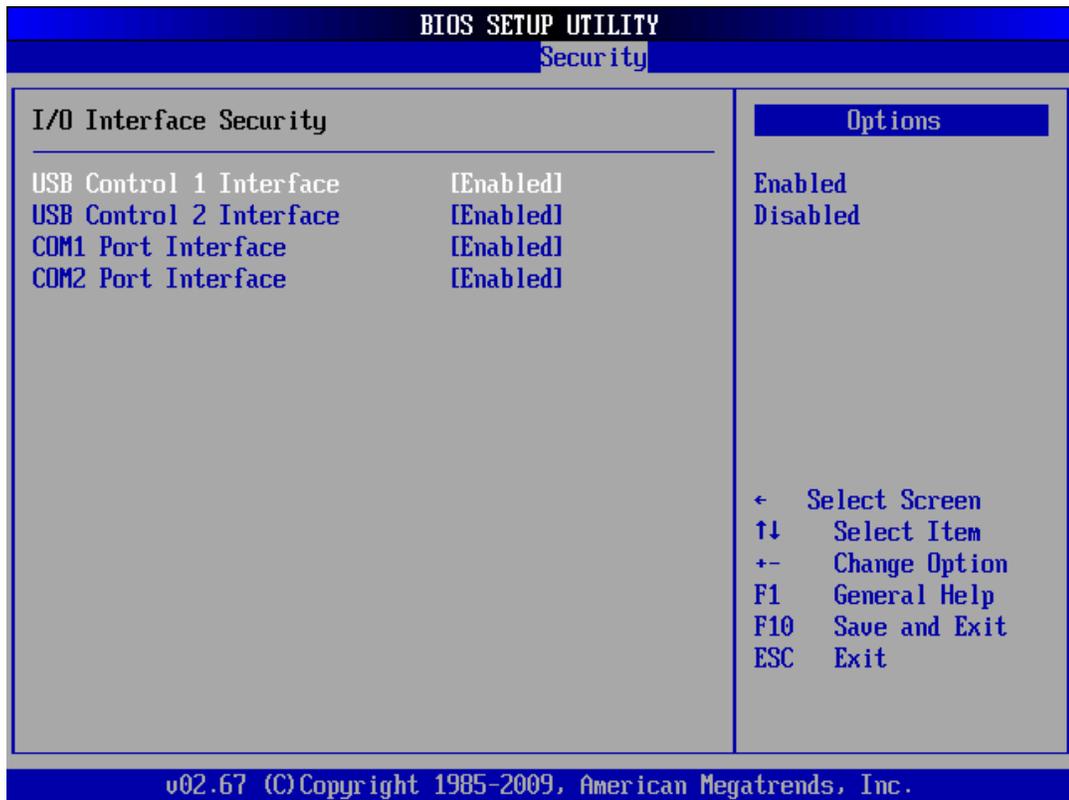


Pressing function key **ALT+F4** when in the Security menu reveals RDC Engineering Mode, which must be enabled before the Chipset submenu on the Advanced menu tab becomes visible and accessible.

**Available Options:** Disabled, Enable

**Default setting:** Disable

➤ I/O Interface Security



➤ USB Control 1/2 Interface

If Disabled are selected, the system USB Control will not be able to use a USB device.

**Available Options:** Disabled, Enabled

Default setting: Enabled

➤ COM1/2 Port Interface

If Disabled are selected, the system I/O Control will not be able to use a COM device.

**Available Options:** Disabled, Enabled

**Default setting:** Enable



## Chapter 5 Driver and Utility

The enclosed diskette includes FB2413 VGA and LAN driver. To install and configure you FB2413 system, you need to perform the following steps.

### VGA Drivers

➤ **WINDOWS Driver**

- 1 To install the VGA driver, insert the CD ROM into the CD ROM device, and enter DRIVER>VGA>Vortex86DX3. If your system is not equipped with a CD ROM device, copy the VGA driver from the CD ROM to a CF.
- 2 Execute M2015\_R5.msi 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, you can find the <DISPLAYL> icon located in the {CONTROL PANEL} group.
- 6 Adjust the <Refresh Rate>, <Cursor Animation>, <Font size>, <Resolution>, and <Big Cursor>.

**Note:** If user uses Windows XP operation system, need the update Windows XP service pack2 is provide VGA driver.

## LAN Driver

- 1 To install the LAN driver, insert the CD ROM into the CD ROM device, and enter DRIVER>LAN>RTL8111H>WINXP. If your system is not equipped with a CD ROM device, copy the LAN driver from the CD ROM to a CF.
- 2 Execute Setup.exe file.

## BIOS Flash Utility

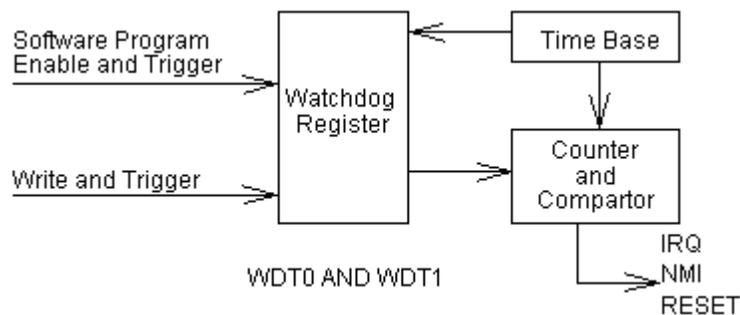
In the <UTILITY> directory, there is the BIOSMP.exe file.

- Step 1: Use the BIOSMP -U 2413VXXX.ROM 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 0 and Watchdog Timer 1, including disabled, enabled, and triggers functions.

The FB2413 is equipped with a programmable time-out period watchdog timer. User can use the program to enable the watchdog timer. Once you have enabled the watchdog timer, the program should trigger it every time before it times out. If your program fails to trigger or disable this timer before it times out because of system hang-up, it will generate a reset signal to reset the system or trigger an IRQ signal. The time-out period can be programmed to be 30.5µseconds to 512 seconds.



### Watchdog Timer Setting

The watchdog timer (WDT0 and WDT1) is a circuit that may be used from your program software to detect 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 zero and start to count again. If your program fails to trigger the watchdog timer before time-out, it will generate a reset pulse to reset the system or trigger an IRQ signal and NMI to tell your program that the watchdog is times out. To access WDT0 registers the software programmer use the index port 22hh data port 23h and access WDT1 registers, its use IO ports A8h ~ AEh.

➤ **Watchdog timer - WDT0 and WDT1**

WDT 0	3Bh	3Ah	39h
WDT 1	AAh	ABh	ACh
	D7...D0	D7...D0	D7...D0
	Counter [MSB ...LSB]		

For example:

WDT 0	3Bh	3Ah	39h	
WDT 1	AAh	ABh	ACh	
	00h	00h	01h	30.5 μsec
	--	--	02h	61.0μsec
	00h	01h	00h	7.8 m sec
	00h	02h	00h	15.6 m sec
	01h	00h	00h	2 sec
	02h	00h	00h	4 sec
	FFh	FFh	FFh	512 sec

➤ **Select Watchdog Report Signal - WDT0 and WDT1**

WDT 0	38h	
WDT 1	A9h	
Bit 7-4	Watchdog timer time out report signal select	
	0000	Reserved
	0001	IRQ3 selected
	0010	IRQ4 selected
	0011	IRQ5 selected
	0100	IRQ6 selected
	0101	IRQ7 selected
	0110	IRQ9 selected
	0111	IRQ10 selected
	1000	IRQ11 selected
	1001	IRQ12 selected
	1010	IRQ14 selected
	1011	IRQ15 selected
	1100	NMI selected
	1101	System reset selected
	1110	Reserved
	1111	Reserved
Bit 3-0	Other function. Please do not modify these bits.	

➤ **Watchdog Enabled/Disabled - WDT0 and WDT1**

WDT 0	37h	
WDT 1	A8h	
Bit 7	Reserved.	
Bit 6	0	Disable watchdog timer
	1	Enable watchdog timer
Bit 5-0	Other function. Please do not modify these bits.	

**NOTE:** If you program the watchdog to generate IRQ15 signal when it times out, you should initial IRQ15 interrupt vector and enable the second interrupt controller (8259 PIC) in order to enable CPU to process this interrupt. An interrupt service routine is required too. Before you configure the IRQ signals, make sure they are not conflicted with other devices, like Floppy, printer, serial ports, LAN, and PS/2 mouse, etc. Refer to Table 2-2 Interrupt Controller for IRQ reference.

➤ **Timeout Status – WDT0 and WDT1**

WDT 0	3Ch	
WDT 1	ADh	
Bit 7	0	Timer timeout not happened - Read only.
	1	Timer timeout happened - Read only.
Bit 6	Write this bit "1" to reset watchdog timer (Only for WDT 0.)	
Bit 5-0	Other function. Please do not modify these bits.	

➤ **Reload Register - WDT1**

WDT 1	AEh	
Bit 7-0	Writer this port to reload Watchdog Timer Counter. The read date is unknown.	

**Setup Watchdog Timer Step - WDT0 and WDT1**

➤ **WDT0 setup Step:**

1. Unlock Registers by Index 22h and data port 23h.
2. Index 37h Set Bit 6 = 0 to disable the watchdog timer 0 (WDT0).
3. Write the desired counter value to index 3Bh, 3Ah, and 39h.
4. Index 37h Set Bit 6 = 1 to enable the timer, the counter will begin to count up.
5. When counter reaches the setting value, the time out will generate signal setting by index 38h bit [7:4].
6. BIOS can read index 3Ch Bit 7 to decide whether the Watchdog timeout event will happen or not.

To clear the watchdog timer counter:

1. Index 3Ch set Bit 6 = 0 to disable timer. This will also clear counter at the same time.

***Watchdog Timer Enabled***

To enable the watchdog timer 0 (WDT 0), you have to output a byte of timer factor to the watchdog register whose index address is 22h and data port is 23H. The following is an Assemble program, which demonstrates how to enable the watchdog timer and set the time-out period at 4 seconds.

```
-----  
; Unlock Configuration Register  
-----  
Mov    dx,22h          ; Enter to extended function mode  
Mov    al,13h  
Out    dx,al  
Mov    dx,23h  
Mov    al,c5h  
Out    dx,al  
-----  
; Enabled Watch dog  
-----  
Mov    al,37h  
Mov    dx,22h  
Out    dx,al  
Mov    al,40h          ;Index 37 Bit 6 set 1  
Mov    dx,23h  
Out    dx,al  
-----  
; Lock Configuration Register  
-----  
Mov    dx,22h          ;Exit the extended function mode  
Mov    al,13h  
Out    dx,al  
Mov    dx,23h  
Mov    al,00h  
Out    dx,al
```

***Watchdog Timer Trigger***

After you enable 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.

```
;-----  
; Timer Counter  
;-----  
Mov    al,02h  
Mov    dx,3bh          ;Index 3bh set 02h =4 sec  
Out    dx,al  
;-----  
; System Reset or Interrupt  
;-----  
Mov    al,38h  
Mov    dx,22h  
Out    dx,al  
;Mov   al,50h          ;Trigger IRQ7  
Mov    al,d0h          ;System Reset  
Mov    dx,23h  
Out    dx,al  
;-----  
; Trigger (Reset) Watchdog Timer  
;-----  
Mov    al,3ch  
Mov    dx,22h  
In     dx,al  
Or     al,40h          ;Trigger Watchdog  
Mov    dx,23h  
Out    dx,al
```

***Watchdog Timer Disabled***

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

```
;-----  
; Disabled Watchdog  
;-----  
Mov    al,37h  
Mov    dx,22h  
Out    dx,al  
Mov    al,00h          ;Index 37 Bit 6 set 0  
Mov    dx,23h  
Out    dx,al
```

**➤ WDT1 setup Step:**

1. Write time into register AAh-ACh.
2. Select signal from register A9h.
3. Set register A8h bit 8 to enable WDT1.

To clear the watchdog timer counter:

1. Write any value to register A7H

***Watchdog Timer Enabled***

To enable the watchdog timer 1 (WDT 1), you have to output a byte of timer factor to the watchdog ports address is A8h. The following is an Assemble program, which demonstrates how to enable the watchdog timer 1 and set the time-out period at 4 seconds.

```
;-----  
; Enabled Watch dog  
;-----  
Mov    al,40h  
Mov    dx,a8h      ;IO port A8h Bit 6 set 1  
Out    dx,al
```

***Watchdog Timer Trigger***

```
;-----  
; Timer Counter  
;-----  
Mov    al,02h  
Mov    dx,aah      ; IO port AAh set 02h = 4 sec  
Out    dx,al  
  
;-----  
; Interrupt or System Reset  
;-----  
Mov    al,50h      ;Trigger IRQ7  
;Mov   al,d0h      ;System Reset  
Mov    dx,a9h      ; IO port A9h Select Int, Reset, NMI signal  
Out    dx,al  
  
;-----  
; Trigger (Reset) Watchdog Timer  
;-----  
Or     al,40h  
Mov    dx,aeh      ; IO port AEh Trigger Watchdog  
Out    dx,al
```

***Watchdog Timer Disabled***

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

```
;-----  
; Disabled Watchdog  
;-----  
Mov    al,40h      ; IO port A8h disabled Watchdog  
Mov    dx,a8h  
Out    dx,al
```

## Chapter 6 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.

#### ❑ **Error Message**

#### ➤ **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 initialize 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

➤ **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 ~ 60°C

Relative humidity 5 % to 95 % non-condensing

### □ Real-Time Clock and Non-Volatile RAM

The FB2413 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
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

Address	Description
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	<p>Equipment</p> <p>Bits 7-6 Number of Floppy Drives            00 1 Drive            01 2 Drives</p> <p>Bits 5-4 Monitor Type            00 Not CGA or MDA 01 40x25 CGA            01 2 Drives 80x25 CGA</p> <p>Bits 3 Display Enabled            0 Disabled            1 Enabled</p> <p>Bit 2 Keyboard Enabled            00 Not CGA or MDA 01 40x25 CGA            01 2 Drives 80x25 CGA</p> <p>Bit 1 Math Coprocessor Installed            0 Absent            1 Present</p> <p>Bit 0 Floppy Drive Installed            0 Disabled            1 Enabled</p>
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 - 00Fh	DMA Controller #1
020h - 021h	Interrupt Controller #1
022h - 023h	WDT 0 Control Register
040h - 05Fh	Timer Controller
060h - 064h	Keyboard Controller
070h - 073h	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0AFh	Interrupt Controller #2
0A8h - 0AEh	WTD1 Control Ports
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
290h - 297h	System Chipset
2F8h - 2FFh	Serial Port #2(COM2)
2B0 - 2DF	Graphics adapter Controller
3C0 - 3CF	EGA adapter
3D0 - 3DF	CGA adapter
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	- Reserved -
IRQ6	USB#0 -
IRQ7	VGA
IRQ8	Real Time Clock
IRQ9	- Reserved -
IRQ10	USB#1, LAN #1, - System -
IRQ11	- System -
IRQ12	PS2 Mouse
IRQ13	FPU
IRQ14	Primary IDE (CF)
IRQ15	- Reserved -

□ **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)

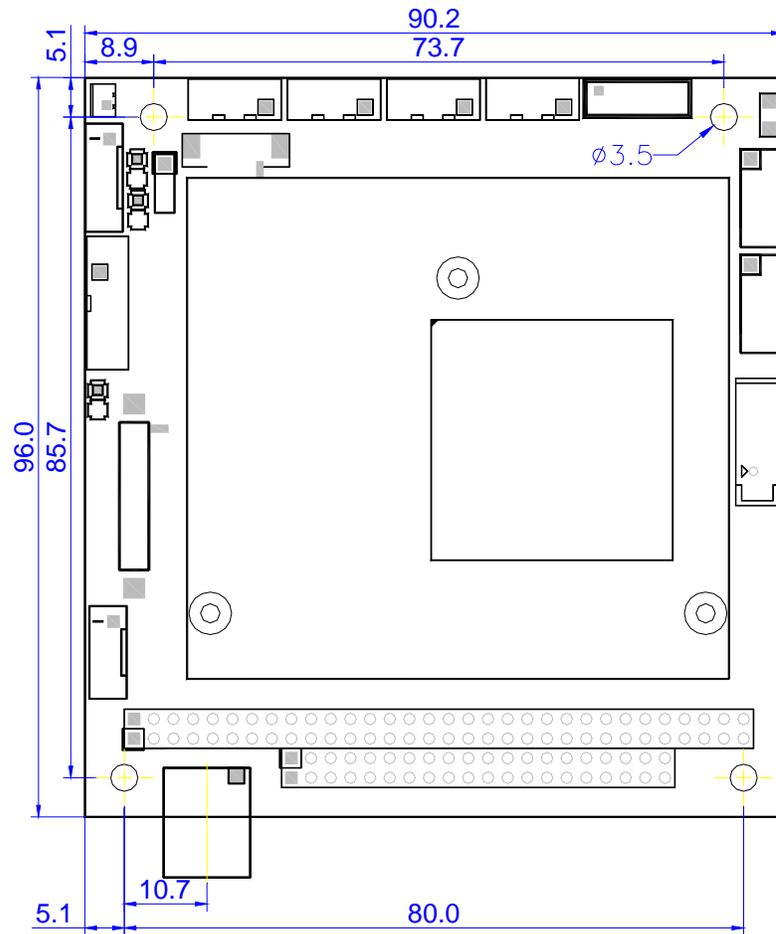
➤ **Divisor Latch (LS, MS)**

	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

Dimension

➤ Top Side



➤ Solder Side

