Custom Embedded Solutions

MB-80190

User Manual, Version 0.22010

Intel® Atom™ Pineview Processor based 3.5” Embedded Board with VGA, LVDS, Dual GbE, SATA, CF & Mini PCI

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1. General Information

1.1 Introduction

WIN ENTERPRISES is pleased to announce the launch of Intel® Pineview-D/Pineview-M low-voltage processor-based 3.5 inch Embedded SBC, with mini PCI support. Excellent performance and low-power features make the MB-80190 powerful performers able to drive the newest, most dynamic applications, including value-oriented embedded devices.

Designed with Intel® Pineview chipset and ICH8-M I/O controller supporting Intel® Pineview-D/Pieview-M processors. In addition, the MB-80190 supports one onboard 200pin DDRII SO-DIMM socket up to 2GB memory. The Intel® Pineview-D/Pineview-M chipset also supports 18-bit LVDS resolutions up to 1366 x 768 (Pineview-D) and CRT resolutions up to 2048 x 1536 (Pineview-D). Through dual Intel® 82574L Ethernet controller, the MB-80190 supports two 10/100/1000 LAN ports.

Expansion and I/O connectors include one mini PCI interface, two SATA, two serial ports, eight digital I/O port and six USB2.0 ports. Onboard type II CompactFlash™ socket offers alternative storage and operating system boot capabilities. Designed with efficient power consumption, MB-80190 is suitable for space conscious and harsh working environment applications including medical instruments, POS/Kiosk, thin client, multimedia, test equipments, and industrial control systems. MB-80190 is fully compliant with the RoHS directive.

Contact a sales representative or email to: sales@win-ent.com for more detailed specifications and pricing information. Additional product information is available on the WIN ENTERPRISES website: www.win-ent.com.com.

1.2 Specifications

System

CPU	Intel® Atom Pineview processor
BIOS	AMI® SPI BIOS
System Chipset	Intel® Pineview + ICH8M
System Memory	1 x 200-pin DDR2 SO-DIMM socket supports *667MHz/800MHz memory max. up to 2GB w/o ECC registered ** dependent on CPU*
SSD	1 x 50-pin CompactFlash type I/II
Watchdog Timer	255 levels timer interval, (1sec. to 255min.), setup by software.
Expansion Interface	1 x Mini PCI
Battery	Lithium 3V/220mAH

I/O

I/O Interface	2 x SATA, 2 x RS-232, 1 x IrDA 1.0 compliant, 1 x PS/2 KB/MS
USB	6 x USB 2.0
Audio	High definition audio interface
GPIO	Onboard programmable 8-bit Digital I/Os
Ethernet	
Speed	10/100/1000Mbps
Interface	2 x RJ-45
Ethernet Interface	IEEE 802.3 10/100/1000 Mbps compliant physical layer

Features:

- Low power consumption at 8W (Pineview N450 CPU + chipset)
- Fanless and Compact design
- Support Up to 8 COM port (via optional daughter board)
- Intel® Atom Pineview processor
- Mini PCI & CompactFlash supported
- 2 x GbE Ethernet

Display

Chipset	Intel® Pineview processor Integrated
Memory Size	Intel® DVMT support up to 256MB
Resolution	VGA: 1400 x 1050 (Pineview-M), 2048 x 1536 (Pineview-D)
LCD/LVDS Interface	LVDS: 1280 x 800 (Pineview-M); 1366 x 768 (Pineview-D); 18-bit LVDS
Dual Simultaneous Display	VGA + LVDS

Mechanical and Environment

Dimension (L x W)	145mm (L) x 102mm (W) (5.7" L x 4" W)
Operating Temperature	0℃ ~ 60℃ (32℉ ~ 140℉)
Operating Humidity	10% ~ 85% relative humidity, non-condensing
Storage Temperature	-20℃ ~ 85℃ (-4℉ ~ 185℉)
Storage Humidity	10% ~ 85% relative humidity, non-condensing

Power

Power Supply Voltage	+12V DC in
Power Consumption	TBD

Packing List

- 1 x MB-80190 SBC
- 1 x CD (Manual, Quick installation guide, Utility driver)

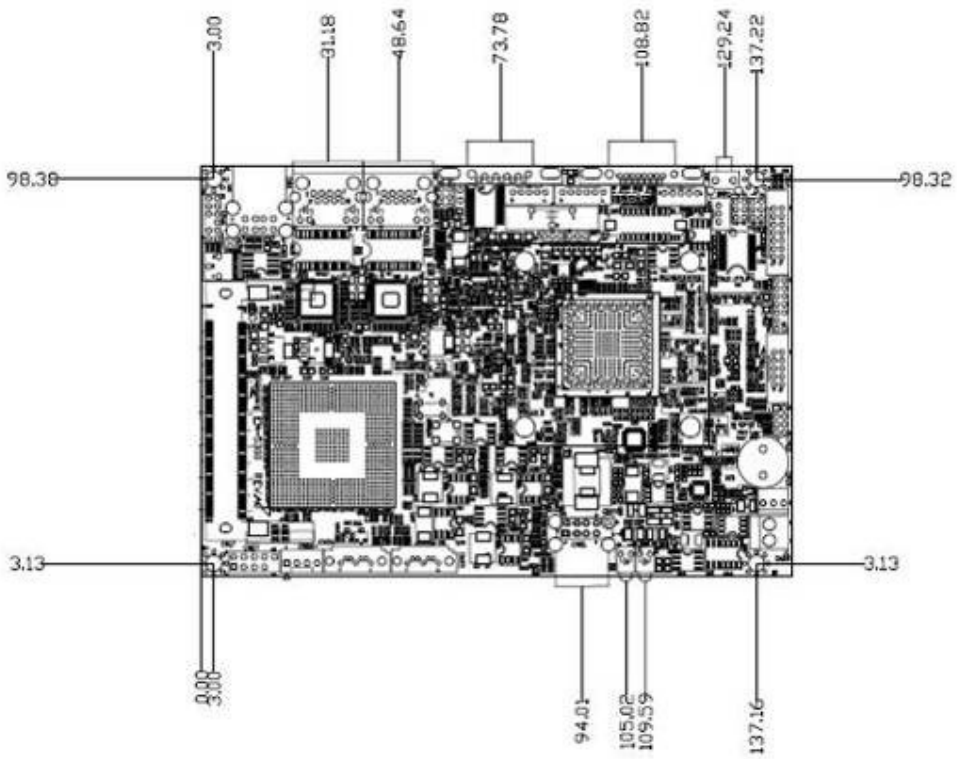
Ordering Information

Standard	
MB-8019A	3.5" Embedded Board with Intel Pineview N450 CPU, VGA, Dual GbE, SATA, CF, COM, USB, mini PCI
MB-8019B	3.5" Embedded Board with Intel Pineview D510 CPU, VGA, Dual GbE, SATA, CF, COM, USB, mini PCI
MB-8019C	3.5" Embedded Board with Intel Pineview D410 CPU, VGA, Dual GbE, SATA, CF, COM, USB, mini PCI

* Note：All specifications are subject to change without prior notice

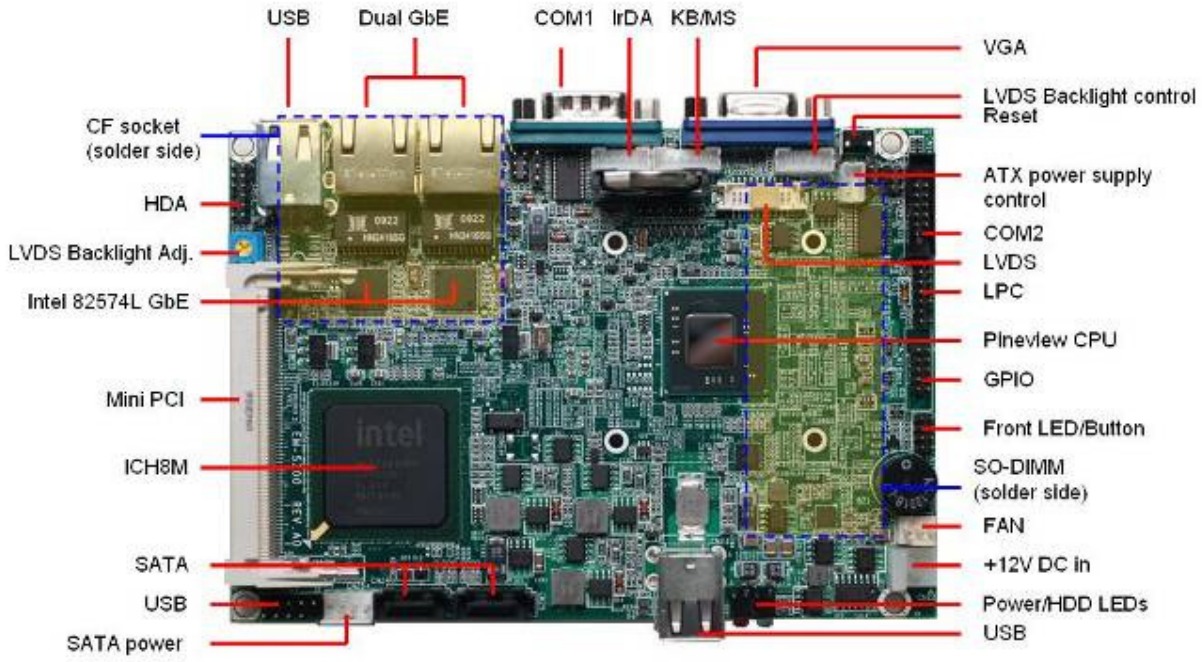
1.3 Board Layout

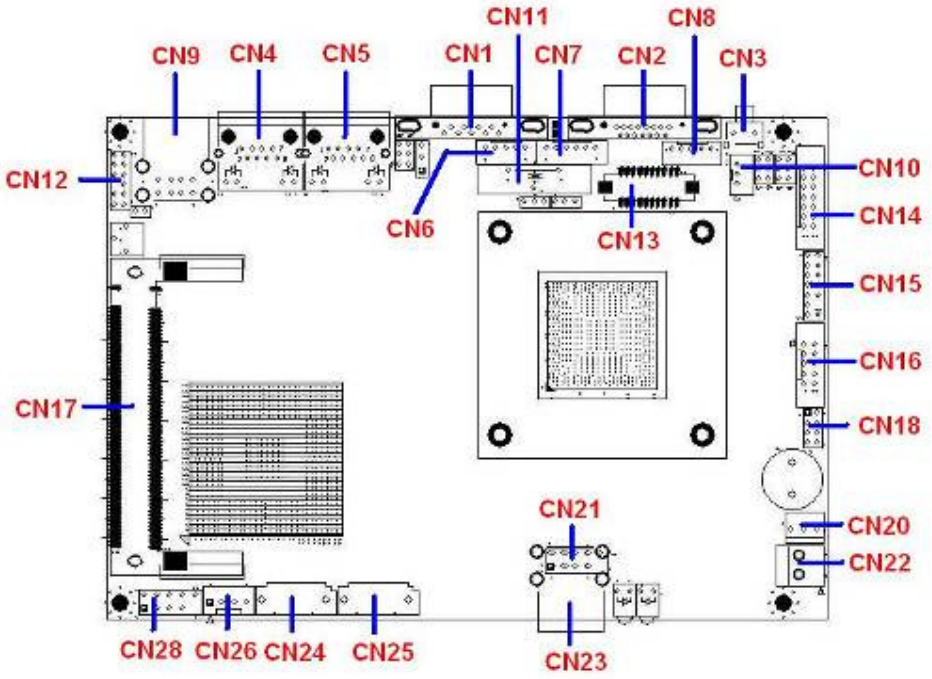
1.4 Board Dimension



2. Connector/Jumper Configuration

MB-80190 Pin assignment




CN11
CN8
CN9
CN4
CN5
CN1
CN7
CN2
CN3
CN12
CN10
CN6
CN13
CN14
CN15
CN16
CN17
CN18
CN21
CN20
CN22
CN28
CN26
CN24
CN25
CN23

CN1: COM1

PIN1: DCD

PIN2: RXD

PIN3: TXD

PIN4: DTR

PIN5: GND

PIN6: DSR

PIN7: RTS

PIN8: CTS

PIN9: RI

CN2: VGA

PIN1: RED

PIN2: GREEN

PIN3: BLUE

PIN4: NC

PIN5: GND

PIN6: GND

PIN7: GND

PIN8: GND

PIN9: +5V

PIN10: GND

PIN11: NC

PIN12: DDC DATA

PIN13: HSYNC

PIN14: VSYNC

PIN15: DDC CLK

CN3: Reset Button

PIN1: RESET

PIN2: GND

CN4: LAN1

PIN1: MDI0+

PIN2: MDI0-

PIN3: MDI1+

PIN4: MDI2+

PIN5: MDI2-

PIN6: MID1-

PIN7: MDI3+

PIN8: MDI3-

LED(RIGHT):SPEED

LED(LEFT): ACT/LINK

CN5: LAN2

PIN1: MDI0+

PIN2: MDI0-

PIN3: MDI1+

PIN4: MDI2+

PIN5: MDI2-

PIN6: MID1-

PIN7: MDI3+

PIN8: MDI3-

LED(RIGHT):SPEED

LED(LEFT): ACT/LINK

CN6: IR

PIN1: +5V

PIN2: NC

PIN3: IRRX

PIN4: GND

PIN5: IRTX

CN7: PS2 KB/MS

PIN1: KBD CLK

PIN2: KBD DATA

PIN3: MS CLK

PIN4: GND

PIN5: +5V

PIN6: MS DATA

CN8: LVDS Backlight Control

PIN1: +12V

PIN2: GND

PIN3: BKLTEN#

PIN4: BKLTCTL

PIN5: +5V

CN9: USB

CN10: ATX Power Supply Control

PIN1: +5VSTBY(Output)

PIN2: PSON#

PIN3: GND

CN11: Battery Socket

CN12: HDA Connector

PIN1: +5V

PIN2: GND

PIN3: GND

PIN4: BITCLK

PIN5: +3.3V

PIN6: NC

PIN7: SDIN0

PIN8: SYNC

PIN9: GND

PIN10: RESET

PIN11: SDOUT

PIN12: SDIN1

CN13: LVDS Connector

PIN1: LVDS A0+

PIN2: LVDS A0-

PIN3: GND

PIN4: GND

PIN5: LVDS A1+

PIN6: LVDS A1-

PIN7: GND

PIN8: VCC(+3.3V/+5V)

PIN9: LVDS A2+

PIN10: LVDS A2-

PIN11: CLK+

PIN12: CLK-

PIN13: GND

PIN14: GND

PIN15: NC

PIN16: NC

PIN17: BKLTEN

PIN18: VCC(+3.3V/+5V)

PIN19: DDC DATA

PIN20: DDC CLK

CN14: COM2 (RS232/422/485)

PIN1: DCD

PIN2: DSR

PIN3: RXD

PIN4: RTS

PIN5: TXD

PIN6: CTS

PIN7: GND

PIN8: RI

PIN9: GND

PIN10: NC

PIN11: 485 TXD+

PIN12: 485 TXD-

PIN13: 485 RXD+

PIN14: 485 RXD-

CN15: LPC Connector

PIN1: +3.3V

PIN2: LAD0

PIN3: LAD1

PIN4: LAD2

PIN5: LAD3

PIN6: LFRAME

PIN7: RESET

PIN8: +5V

PIN9: CLK

PIN10: PME

PIN11: GND

PIN12: NC

PIN13: SERIRQ

PIN14: LDRQ

CN16: GPIO

PIN1: +3.3V

PIN2: GND

PIN3: GPIO0

PIN4: GPIO1

PIN5: GPIO2

PIN6: GPIO3

PIN7: GPIO4

PIN8: GPIO5

PIN9: GPIO6

PIN10: GPIO7

CN17: MINI PCI

CN18: Front Panel

PIN1: Power LED+

PIN2: Power LED-

PIN3: HDD LED+

PIN4: HDD LED-

PIN5: Power Button-

PIN6: Power Button+

PIN7: Reset Button+

PIN8: Reset Button-

CN20: FAN Connector

PIN1: SENSOR

PIN2: +12V

PIN3: GND

CN21: USB Port0/1(PIN HEADER)

PIN1: +5V

PIN2: +5V

PIN3: USBD0-

PIN4: USBD1-

PIN5: USBD0+

PIN6: USBD1+

PIN7: GND

PIN8: GND

PIN9: NC

PIN10: GND

CN22: +12V DC in

PIN1: +12V

PIN2: GND

3. BIOS Setting

3.1. Entering the CMOS Setup Program

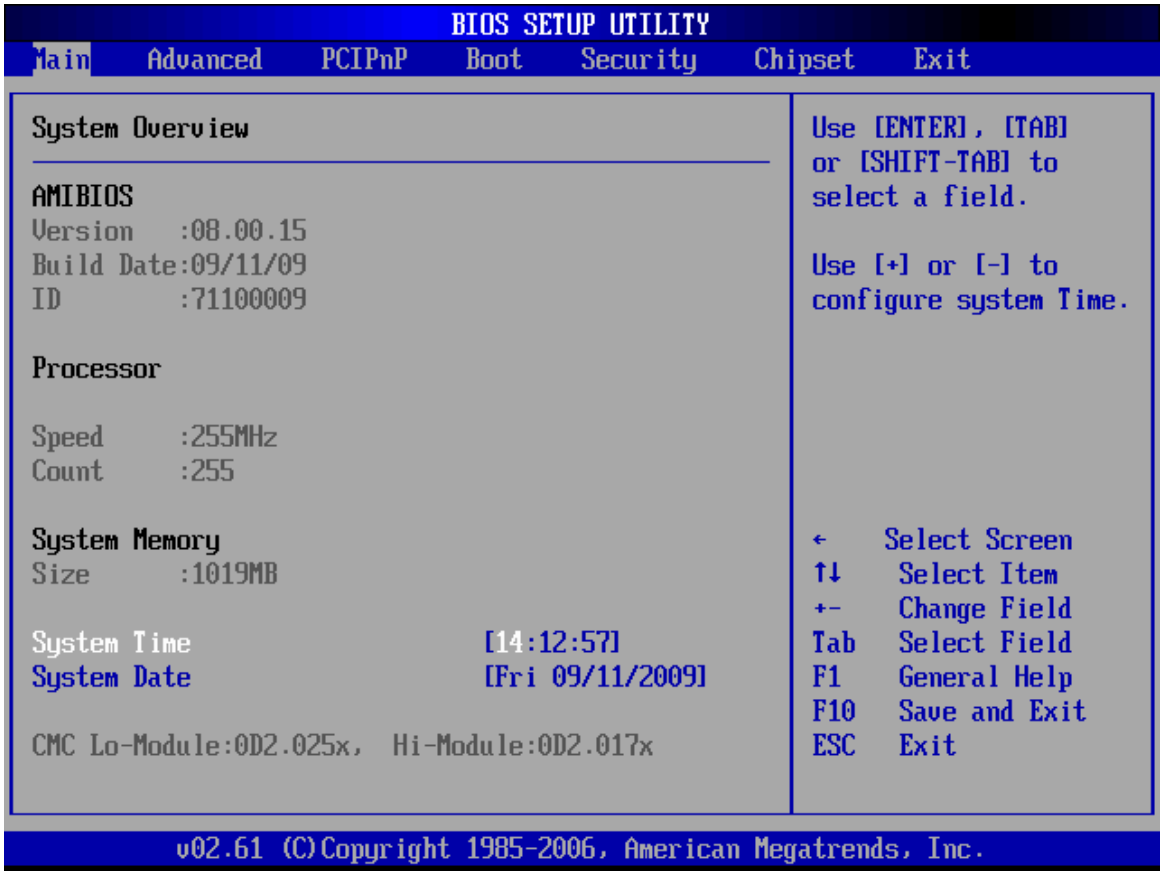
Use the CMOS Setup program to modify the system parameters to reflect the options installed in your system and to customize your system. For example, you should run the Setup program after you:

1. Received an error code at startup
2. Install another disk drive
3. Use your system after not having used it for a long time
4. Find the original setup missing
5. Replace the battery
6. Change to a different type of CPU
7. Run the Flash program to update the system BIOS

Run the CMOS Setup program after you turn on the system. On-screen instructions explain how to use the program.

⇩ **Enter the CMOS Setup program's main menu as follows:**

1. Turn on or reboot the system. After the BIOS performs a series of diagnostic checks, the following message appears:
   "Press DEL to enter SETUP"
2. Press the <DEL> key to enter CMOS Setup program. The main menu appears:



3. Choose a setup option with the arrow keys and press <Enter>. See the following sections for a brief description of each setup option.

AMIBIOS: Displays the auto-detected BIOS information.
Processor: Displays the auto-detected CPU specification.
System Memory: Displays the auto-detected system memory.
SystemTime: [hour:min:sec]
This item allows you to set the system time.
System Date: [Day mm/dd/yyyy]
This item allows you to set the system date.

In the main menu, press F10 (“Save Changes and Exit”) to save your changes and reboot the system. Choosing “Discard Changes and Exit” ignores your changes and exits the program. Pressing <ESC> anywhere in the program returns you to the main menu.

3.2. Menu Options

The main menu options of the CMOS Setup program are described in the following and the following sections of this chapter.

Main: For changing the basic system configurations.

Advanced: For changing the advanced system settings.

PCIPnP: For changing the advanced PCI/PnP Settings.

Boot: For changing the system boot configurations.

Security: Use this menu to set User and Supervisor Passwords.

Chipset: For changing the chipset settings.

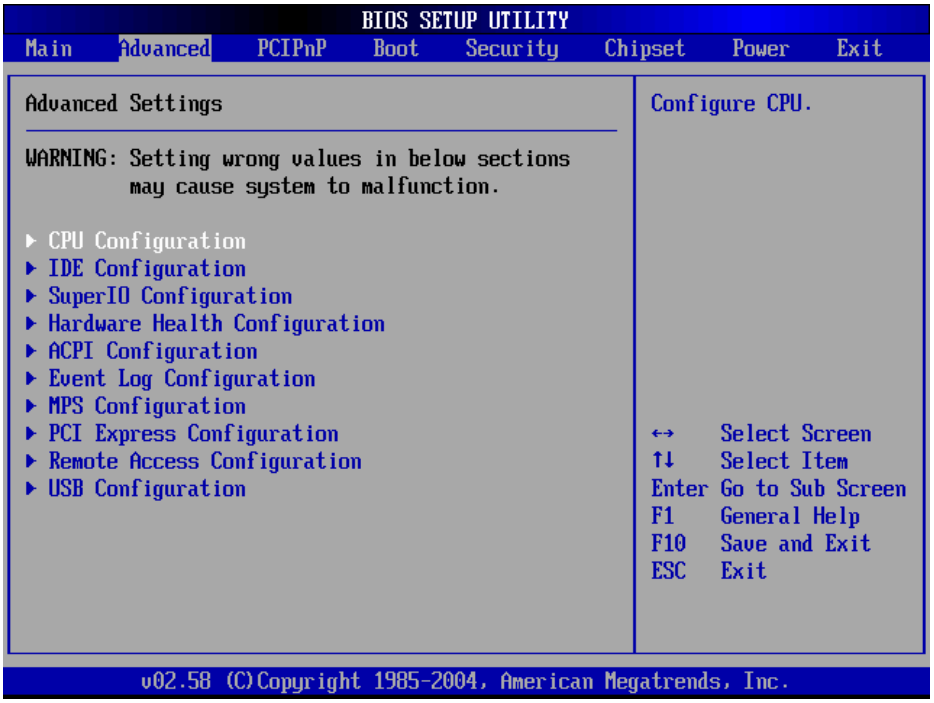
Exit: For selecting the exit options and loading default settings.

3.3. Advanced Menu

The Advanced menu items allow you to change the settings for the CPU and other system devices.

⇩ Use the Advanced Setup option as follows:

1. Choose “Advanced” from the main menu. The following screen appears:

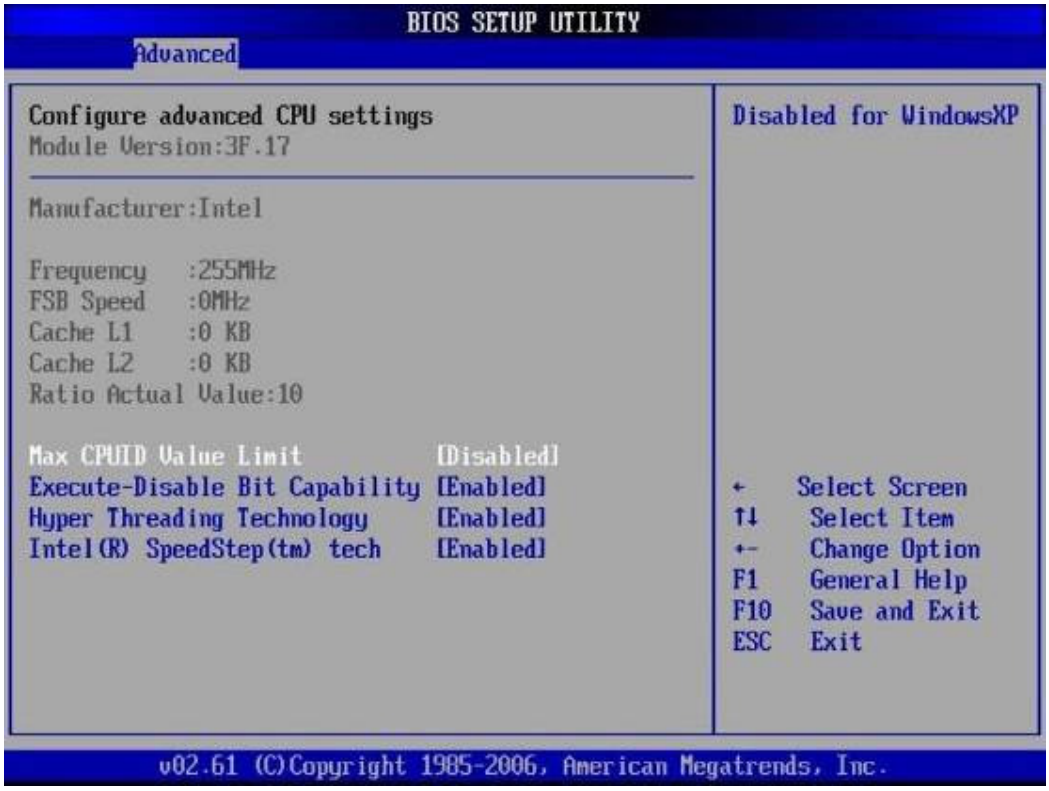


2. Use the arrow keys to move between fields. Modify the selected field using the PgUP/PgDN/+/- keys. Some fields let you enter numeric values directly.

3. After you have finished with the Advanced setup, press the <ESC> key to return to the main menu.

3.3.1. CPU Configuration

This sub menu shows the CPU-related information which is automatically detected by BIOS.



3.3.2. IDE Configuration

This sub menu allows you to set or change the configurations for the IDE devices installed in the system.

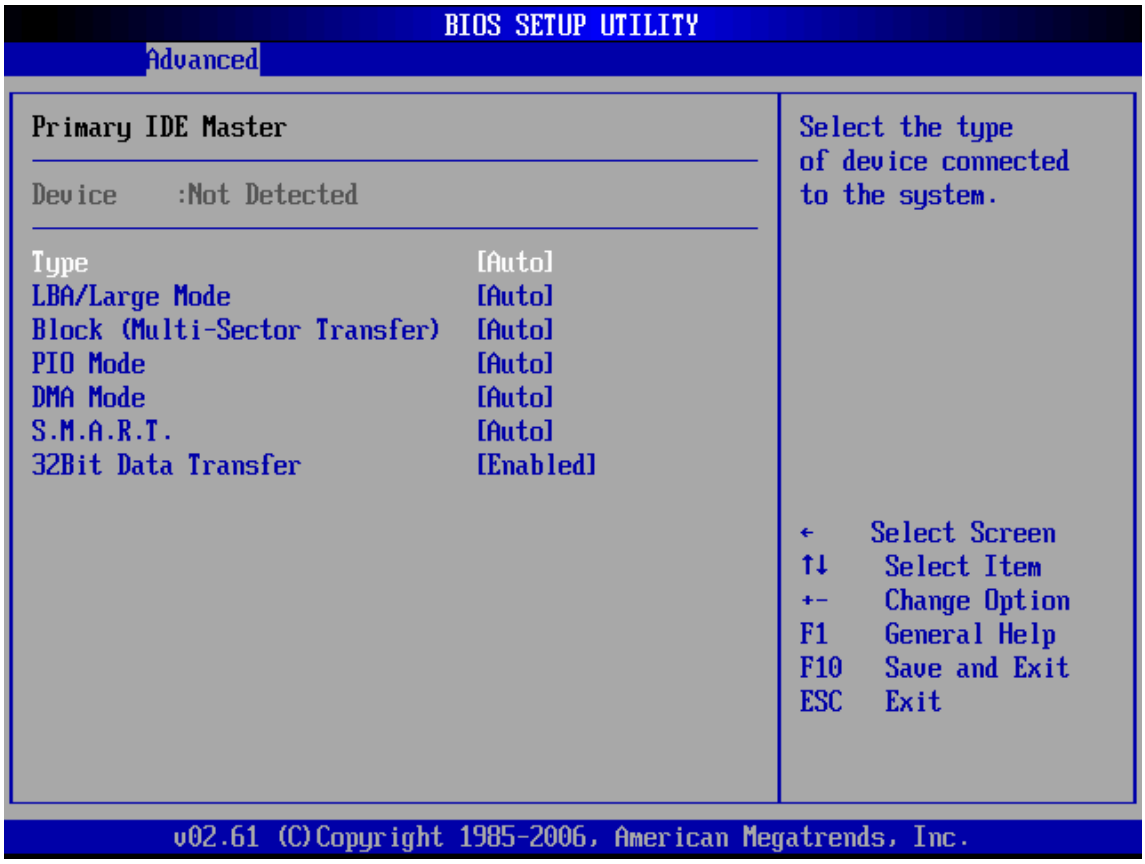
Primary * IDE Master

This information is auto-detected by BIOS and is not user-configurable. It will show "Not Detected" if no IDE device is installed in the system.

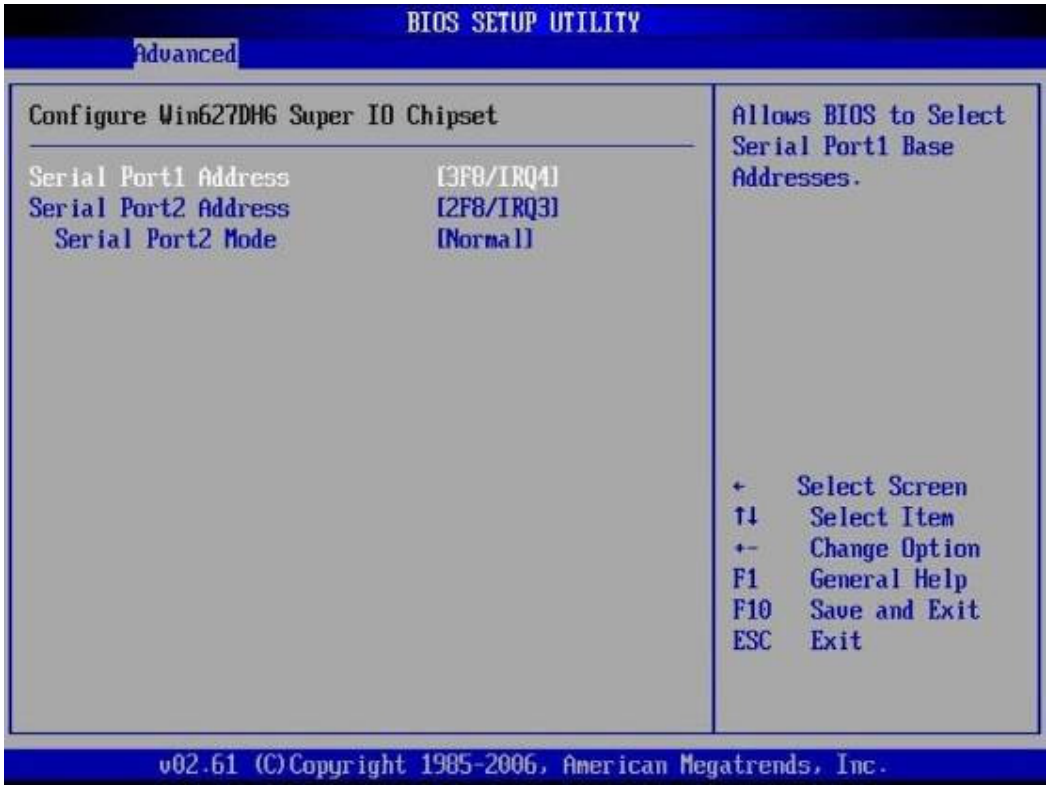
Primary IDE Slave

This information is auto-detected by BIOS and is not user-configurable. It will show "Not Detected" if no IDE device is installed in the system.

Following screens allow you to setup the parameters of IDE devices.


BIOS SETUP UTILITY
Advanced
Primary IDE Master
Device :Not Detected
Type [Auto]
LBA/Large Mode [Auto]
Block (Multi-Sector Transfer) [Auto]
PIO Mode [Auto]
DMA Mode [Auto]
S.M.A.R.T. [Auto]
32Bit Data Transfer [Enabled]
Select the type of device connected to the system.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.

3.3.3 Super IO Configuration



Serial Port1 Address: [3F8/IRQ4]

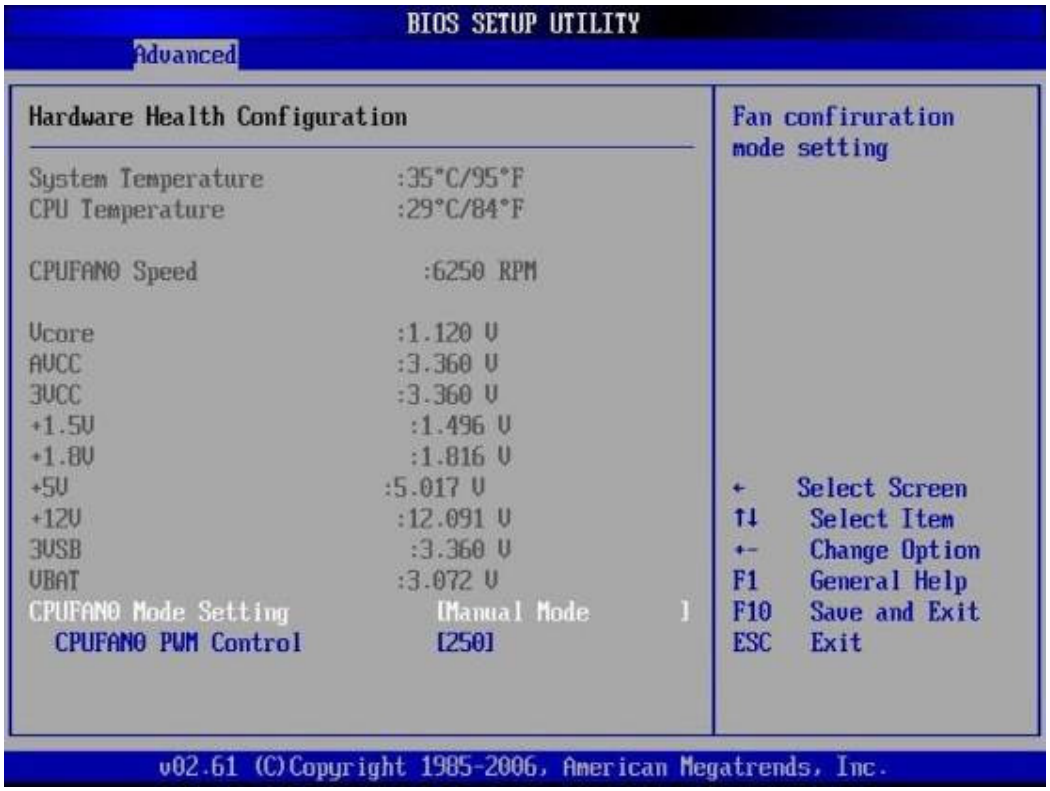
Selects the Serial Port1 base address and IRQ.

Serial Port2 Address: [2F8/IRQ3]

Selects the Serial Port2 base address and IRQ.

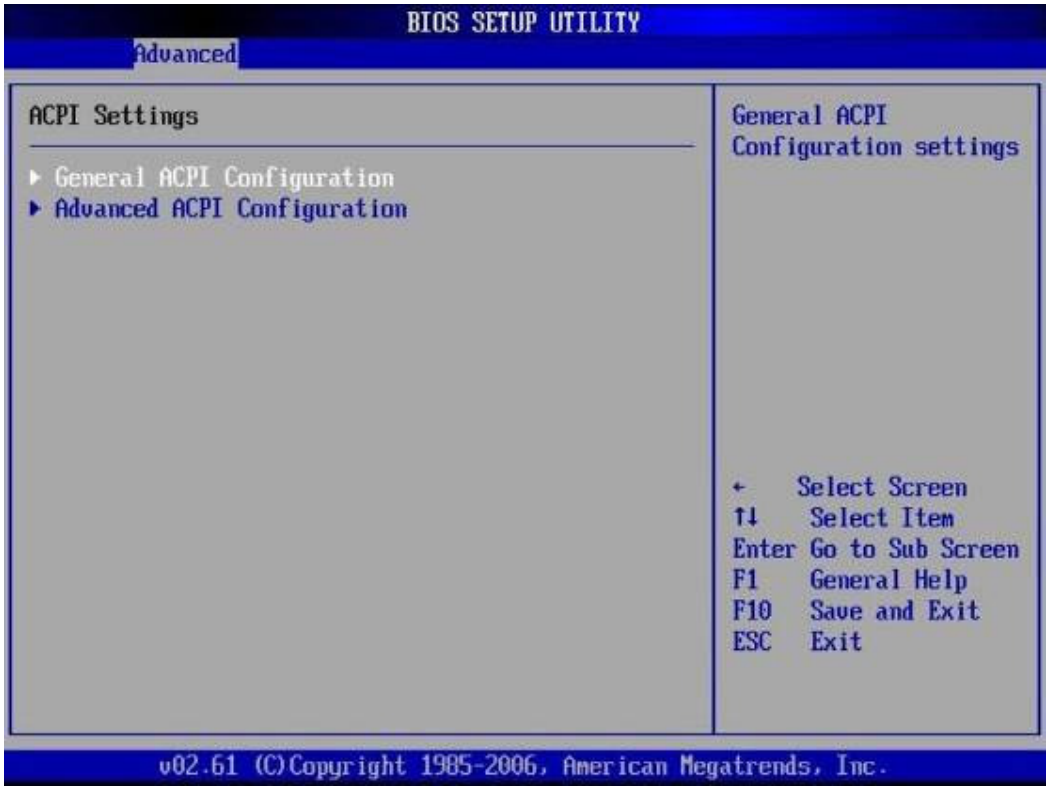
3.3.4 Hardware Health Configuration

This screen shows you the CPU core voltage, System voltage, System temperature.

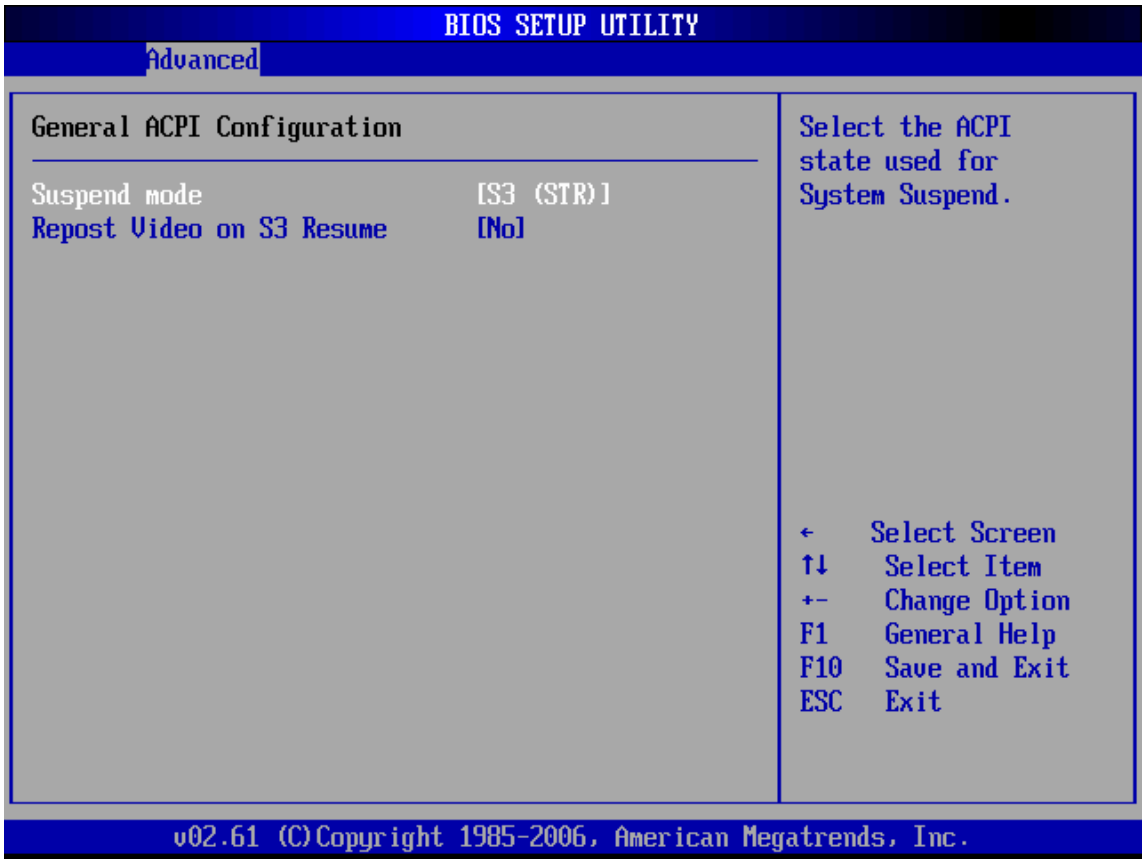


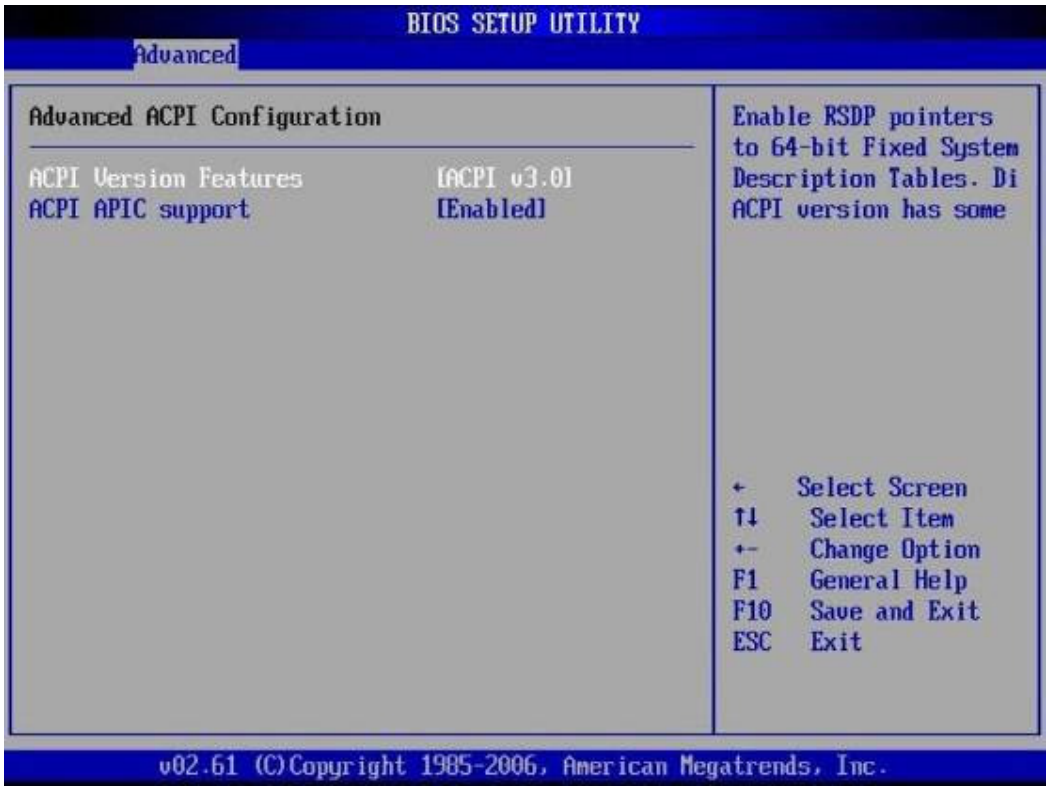
3.3.5 ACPI Configuration

This sub menu is used to change the settings for the ACPI.



This sub menu is used to change the settings for the ACPI.


BIOS SETUP UTILITY
Advanced
General ACPI Configuration
Suspend mode [S3 (STR)]
Repost Video on S3 Resume [No]
Select the ACPI state used for System Suspend.
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.


BIOS SETUP UTILITY
Advanced
Advanced ACPI Configuration
ACPI Version Features [ACPI v3.0]
ACPI APIC support [Enabled]
Enable RSDP pointers to 64-bit Fixed System Description Tables. Di ACPI version has some
← Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
v02.61 (C)Copyright 1985-2006, American Megatrends, Inc.

Advanced ACPI Configuration:

This sub menu configures additional ACPI options. It contains below sub-menus:

ACPI Version Features: [ACPI v3.0]

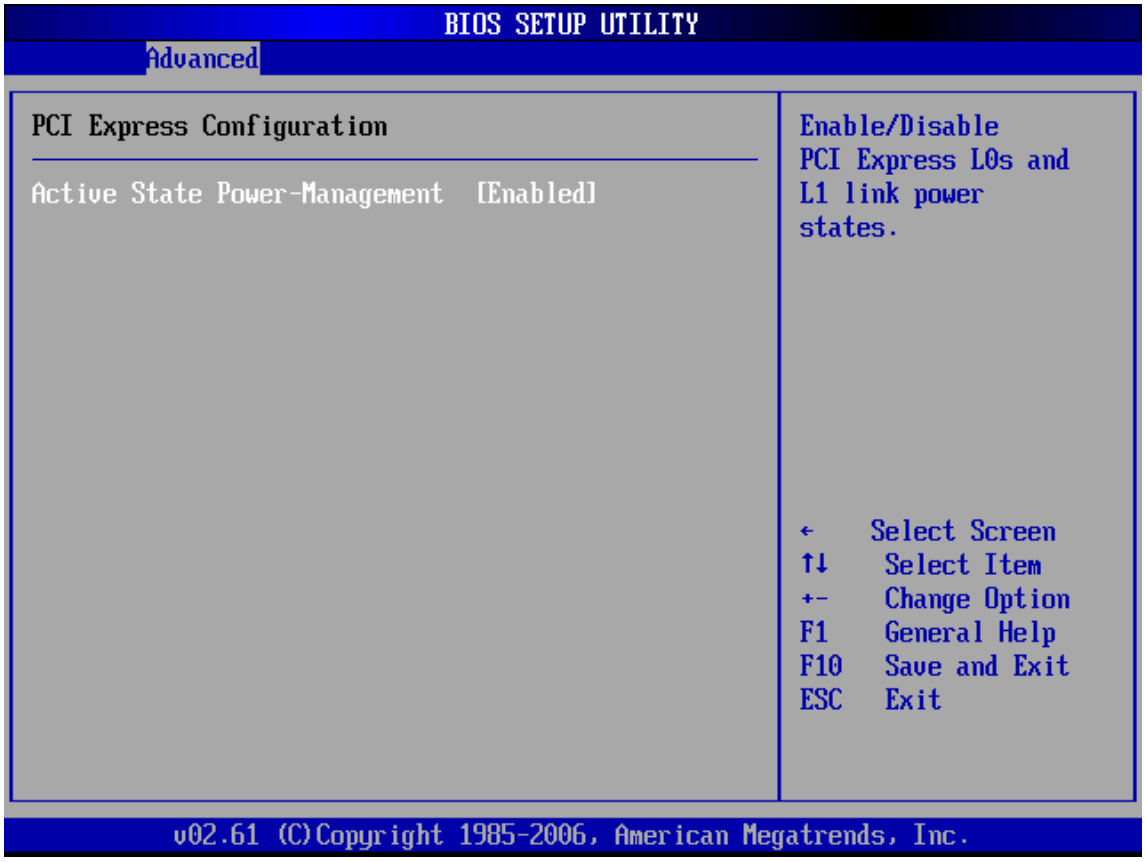
This item allows you to enable or disable RSPD pointers to 64-bit Fixed System Description Tables.

ACPI APIC support: [Enabled]

This item allows you to enable or disable APIC features.

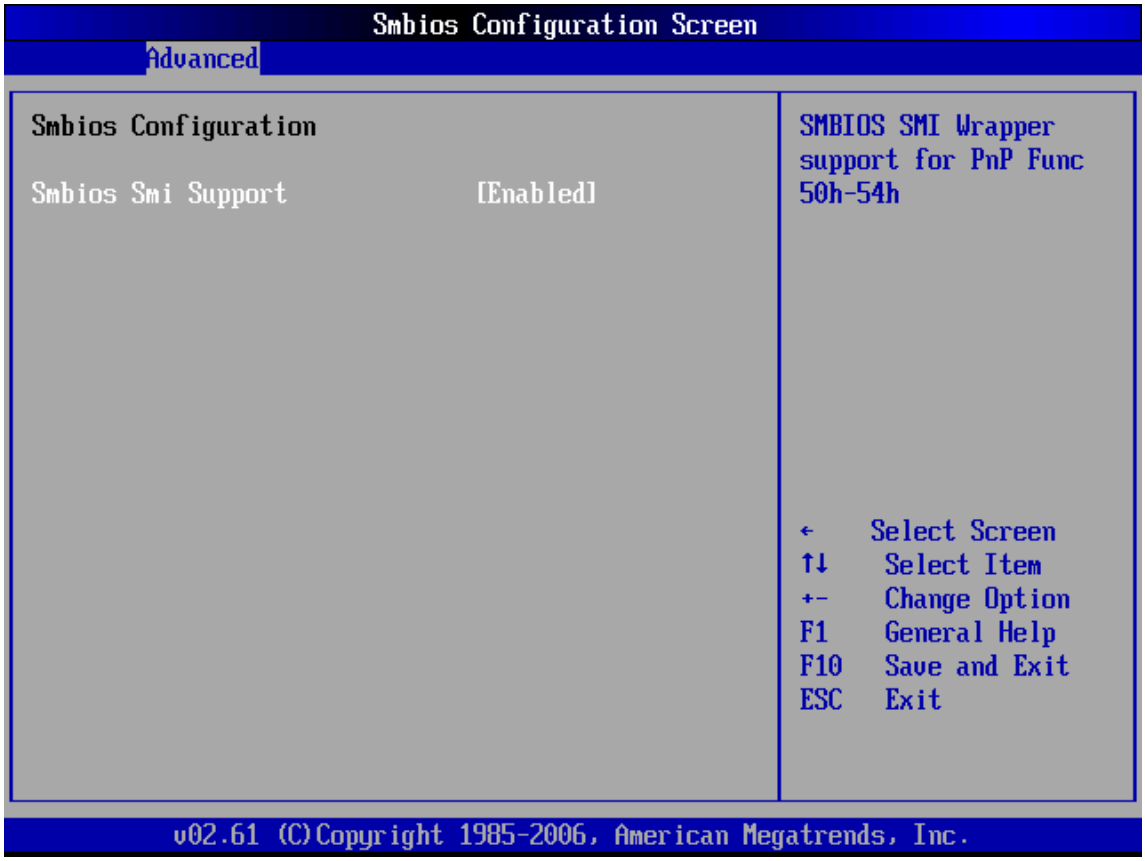
3.3.6 PCI Express Configuration

This sub menu allows you to enable or disable Active State Power-Management :



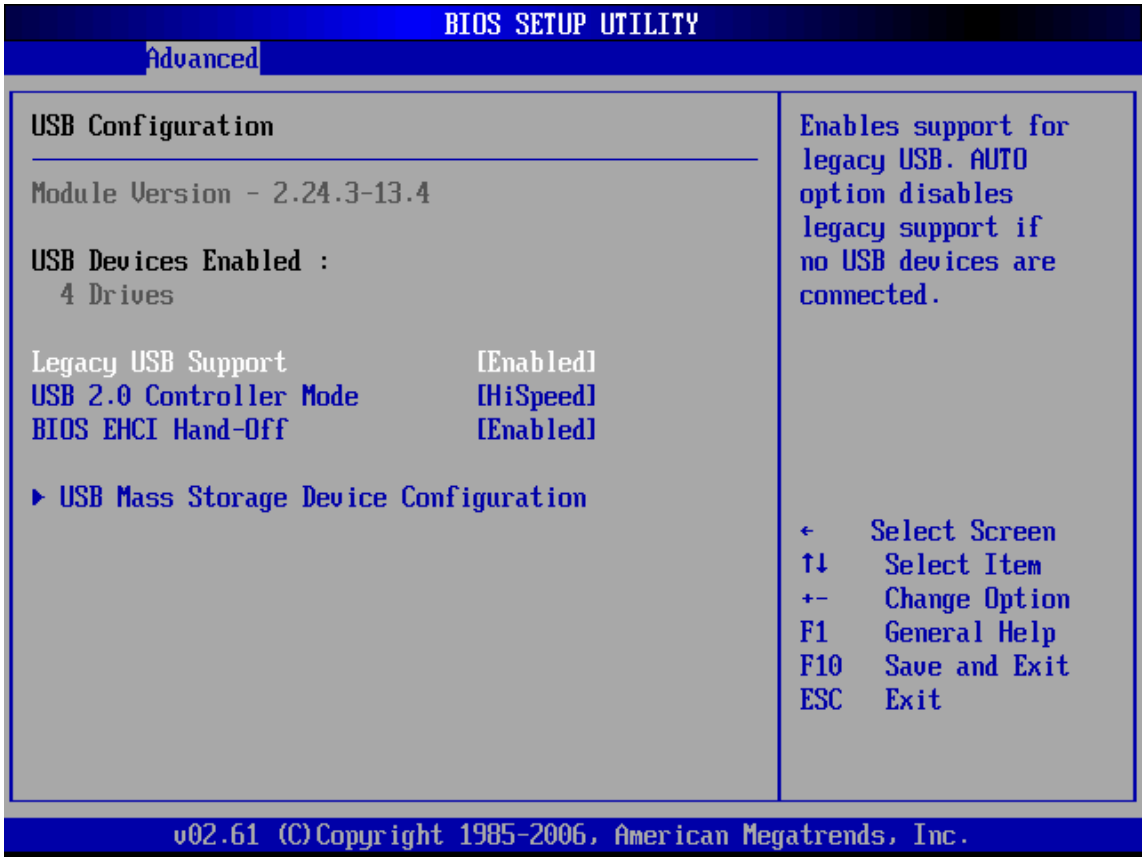
3.3.7 Smbios Configuration

This sub menu allows you to enable or disable Smbios :



3.3.8 USB Configuration

This sub menu allows you to change the USB-related features.



Legacy USB Support: [Enabled]

Enables support for legacy USB. AUTO option disables legacy support if no USB devices are connected.

USB 2.0 Controller Mode: [FullSpeed]

This item allows you to configure the USB 2.0 controller in Hi Speed(480Mbps) or Full Speed(12Mbps).

BIOS EHCI Hand-Off

This item allows you to Enable/Disable BIOS EHCI Hand-Off

USB Mass Storage Device Configuration

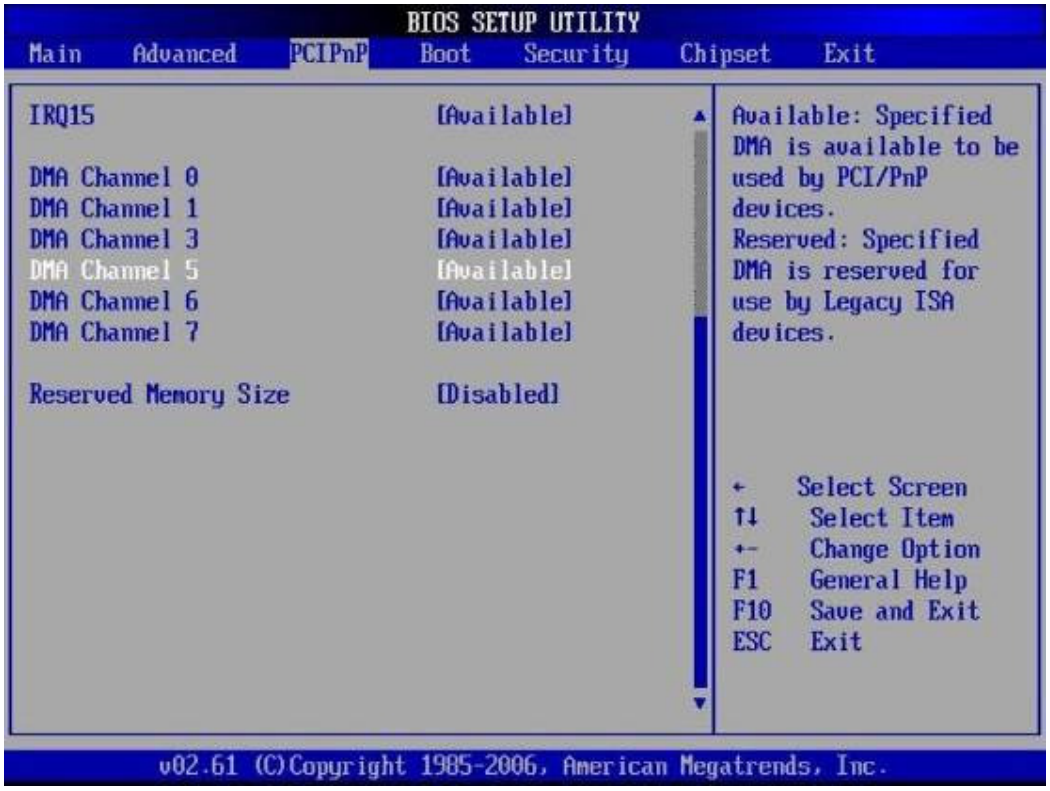
This item allows you to configure USB Mass Storage Device

3.4. PCIPnP Menu

This PCIPnP menu items allow you to change the settings for the advanced PCI/PnP.

⇩Use the PCIPnP Setup option as follows:

1. Choose “PCIPnP” from the main menu. The following screen appears:



2. Use the arrow keys to move between items and to select values. Modify the selected fields using the PgUP/PgDN keys. Press the <F1> "Help" key for information on the available options:

3. After you have finished with the PCIPnP Setup, press the <ESC> key to return to the main menu.

Clear NVRAM

This item allows you to clear the BIOS setting

Plug & Play O/S: [No]

No: lets the BIOS configure all the devices in the system.

Yes: lets the OS configure Plug & Play devices not required for boot if your system has a Plug & Play operating system.

PCI Latency Timer: [64]

This item allows you to select the value in units of PCI clocks for the PCI device latency timer register. This setting controls how many PCI clocks each PCI device can hold the bus before another PCI device takes over.

Allocate IRQ to PCI VGA: [Yes]

BIOS assigns an IRQ to PCI VGA card if the card requests for an IRQ.

Palette Snooping: [Disabled]

This item allows you to enable or disable the feature. When set to [Enabled], the palette snooping feature informs the PCI devices that an ISA graphics device is installed in the system so that the device can function correctly.

PCI IDE BusMaster: [Enabled]

This item allows you to enable or disable the feature.

Enable: BIOS uses PCI bus mastering for reading/writing to IDE devices.

OffBoard PCI/ISA IDE Card

This item allows you to configure the setting of Off-Board PCI/ISA IDE Card.

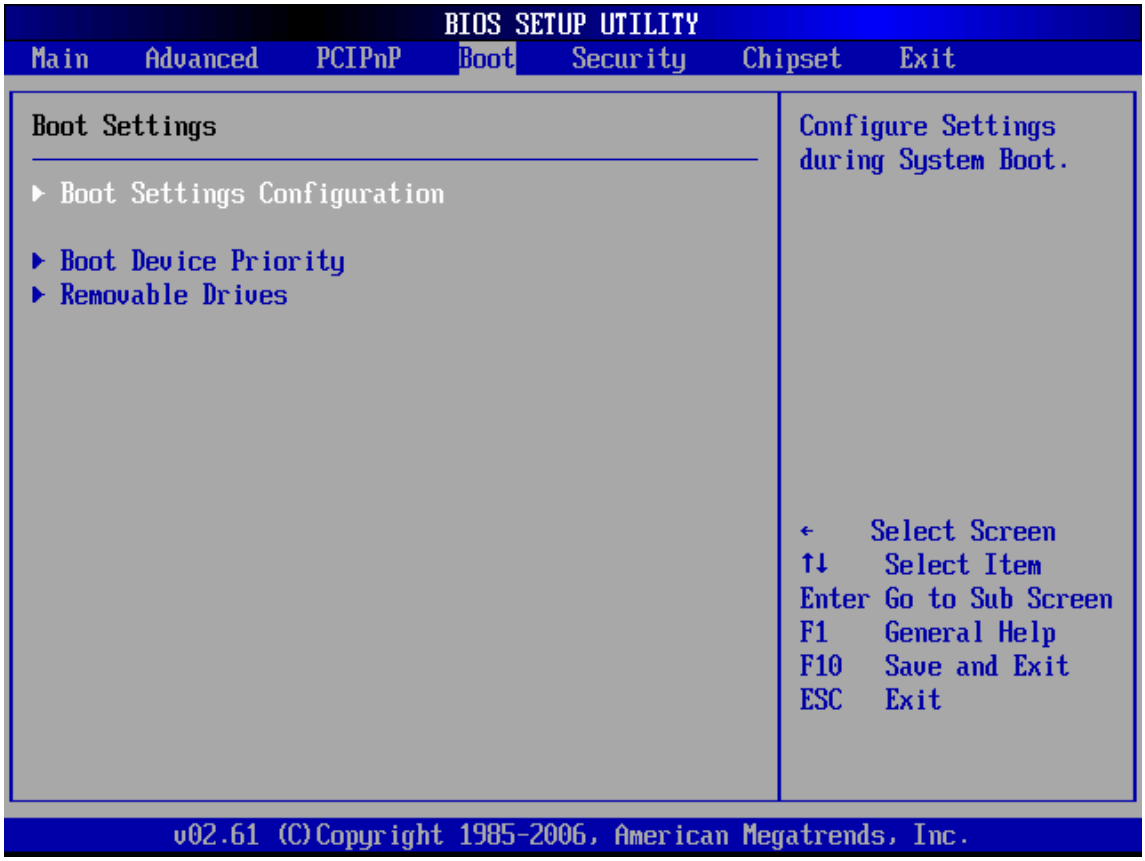
Reserved Memory Size: [Disabled]

This item allows you to select the reserved memory for legacy ISA devices.

3.5. Boot Menu

⇩ **Use the Boot Setup option as follows:**

1. Choose “Boot” from the main menu. The following screen appears:

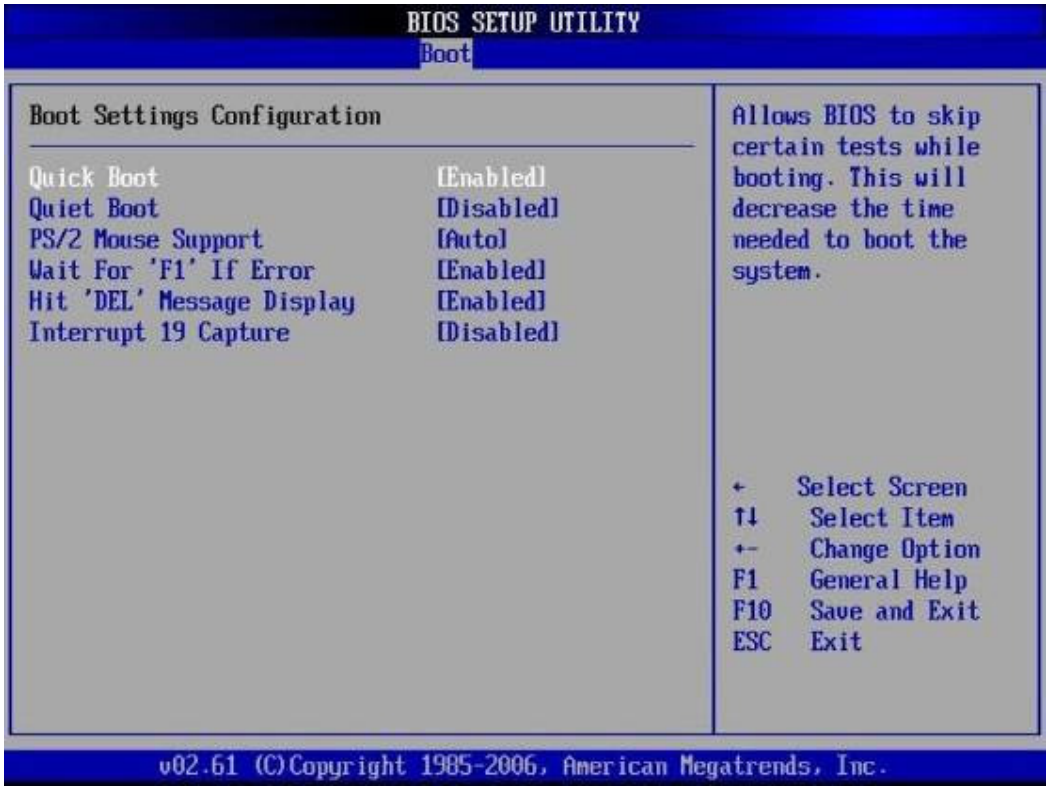


2. Move between items and select values by using the arrow keys. Modify the selected fields using the PnUP/PgDN Keys. For information on the various options, press <F1> key .

3. After you have finished with the Boot setup, press the <ESC> key to return to the main menu.

3.5.1. Boot Settings Configuration

This item is used to configure system boot setting with below sub menus:



Quick Boot: [Enabled]
This item allows BIOS to skip certain tests (POST, Power On Self Tests) while booting. This will decrease the time needed to boot the system.

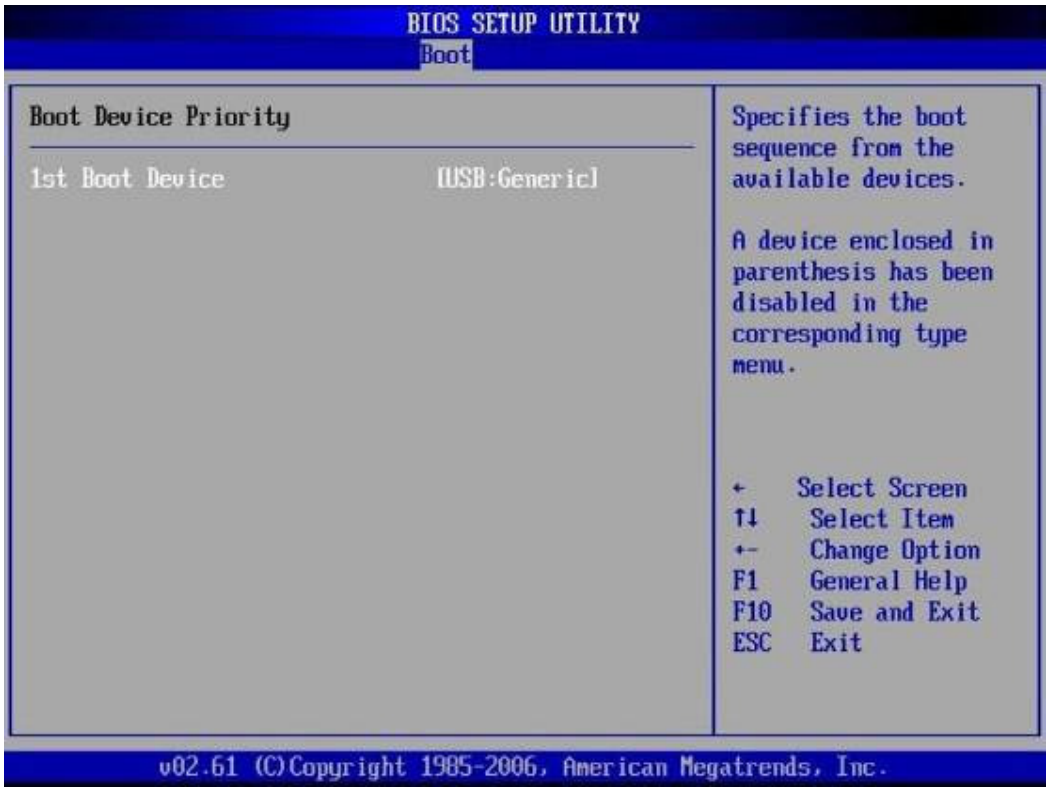
Quiet Boot: [Disabled]
This item allows you to enable or disable the full screen logo display feature. Disabed: displays normal POST messages.

PS/2 Mouse Support: [Auto]
Allows you to select the options of PS/2 Mouse.

Interrupt 19 Capture: [Disabled]
This item allows the option ROMs to trap Interrupt 19.

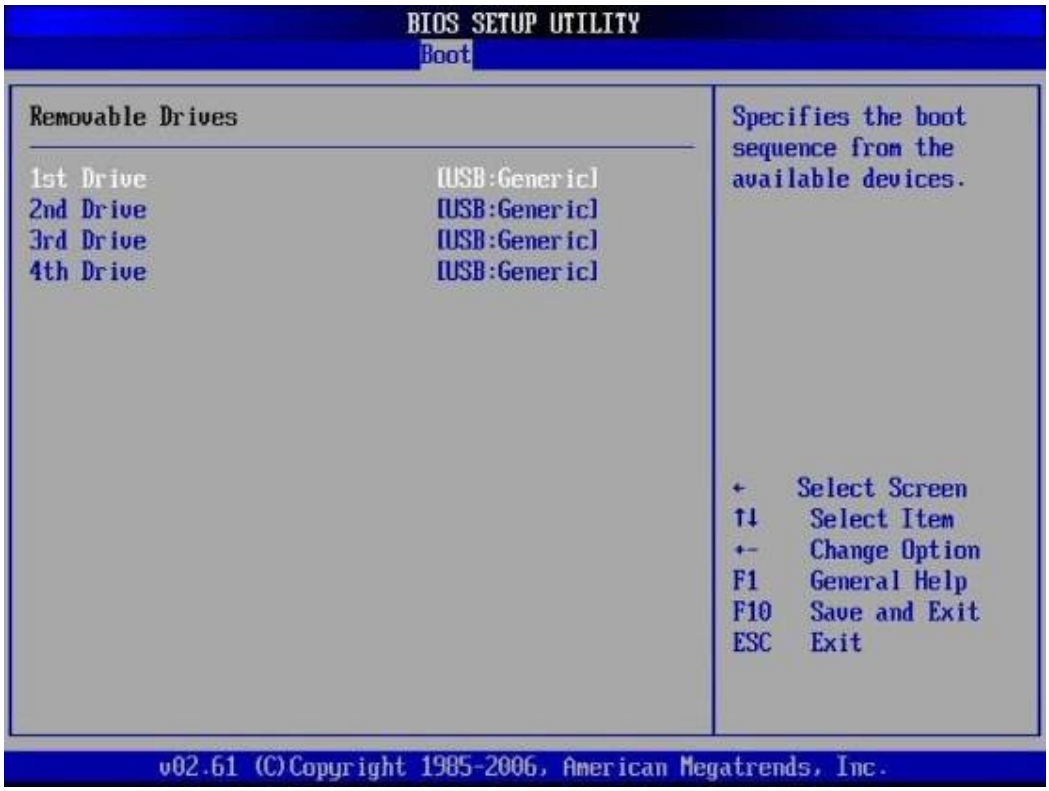
3.5.2. Boot Device Priority

This item is used to configure system boot setting with below sub menus:



3.5.3. Removable Drives

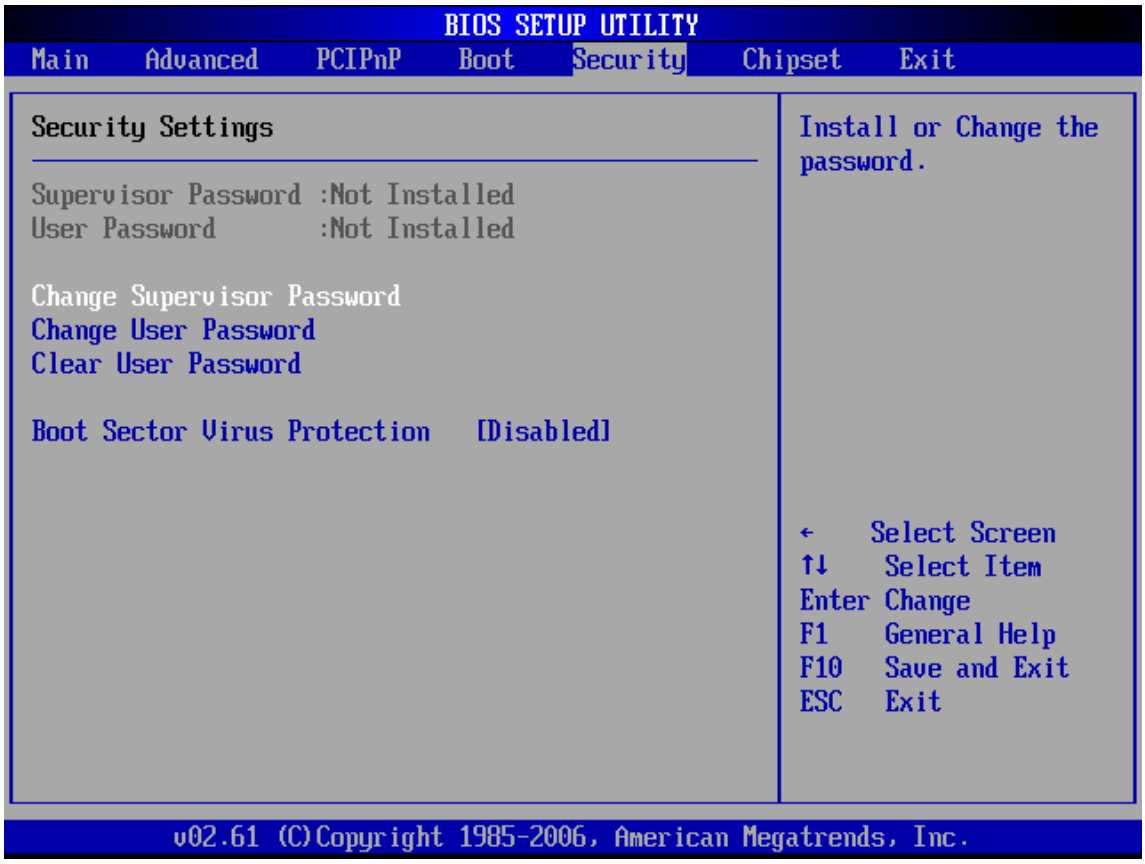
This item is used to configure system boot setting with below sub menus:



3.6. Security Menu

⇩**Use the Security Setup option as follows:**

1. Choose “Security” from the main menu. The following screen appears:



2. Move between items and select values by using the arrow keys. Modify the selected fields using the PgUP/PgDN keys. Please press the <F1> key for information on the various options.

3. After you have finished with the Security setup, press the <ESC> key to return to the main menu.

Change Supervisor Password:

This item allows you to set or change the supervisor password. The Supervisor

Password item on top of the screen shows the default Not Installed. After you have set a password, this item shows Installed.

Change User Password:

This item allows you to set or change the user password. The User Password item on top of the screen shows the default Not Installed. After you have set a password, this item shows Installed.

Clear User Password:

This item allows you to clear the user password.

Boot Sector Virus Protection: [Disabled]

This item allows you to enable or disable the boot sector virus protection. If enabled, AMI BIOS will issue a warning when a virus or program attempts to write to the hard disk's boot sector or attempts to execute disk format command.

3.7. Chipset Menu

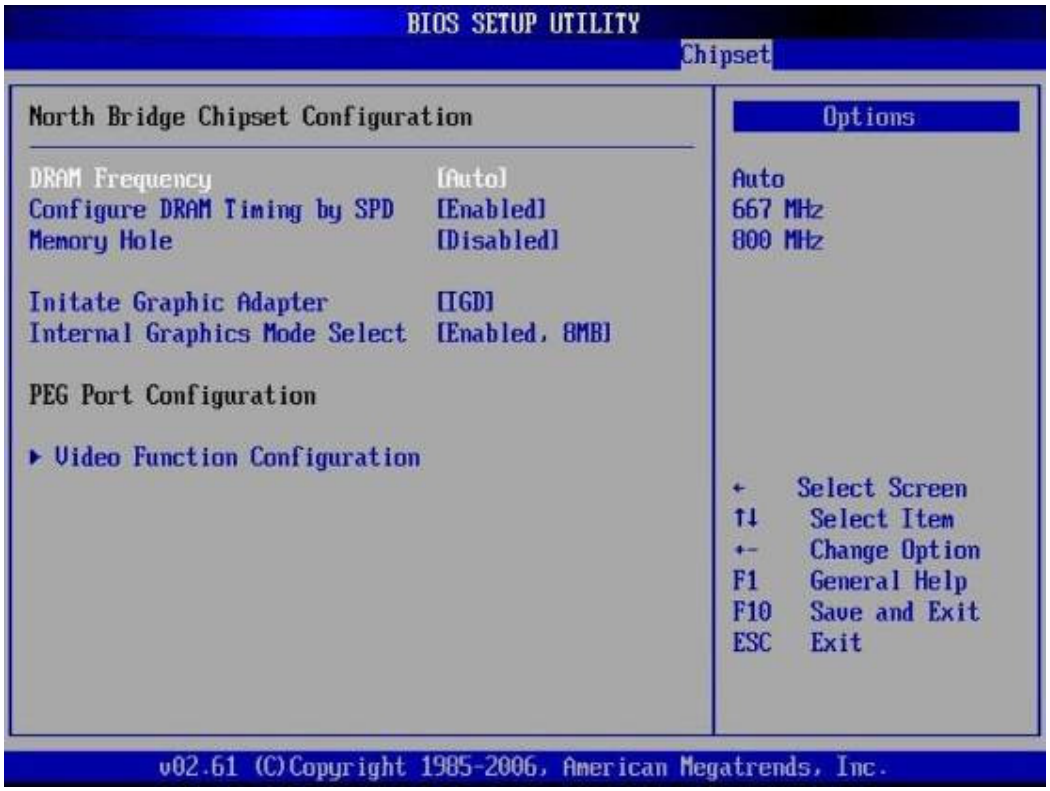
⇩**Use the Chipset Setup option as follows:**

1. Choose “Chipset” from the main menu. The following screen appears.

2. Move between items and select values by using the arrow keys. Modify the selected field the PgUP/PgDN keys. For information on the various options, press <F1> key.

2.7.2 After you have finished with the Chipset Setup, press the <ESC> key to return to the main menu.

3.7.1. North Bridge Configuration



Primary Graphics Adapter: [PCIe/IGD]

This item allows you to set the graphic adapter.

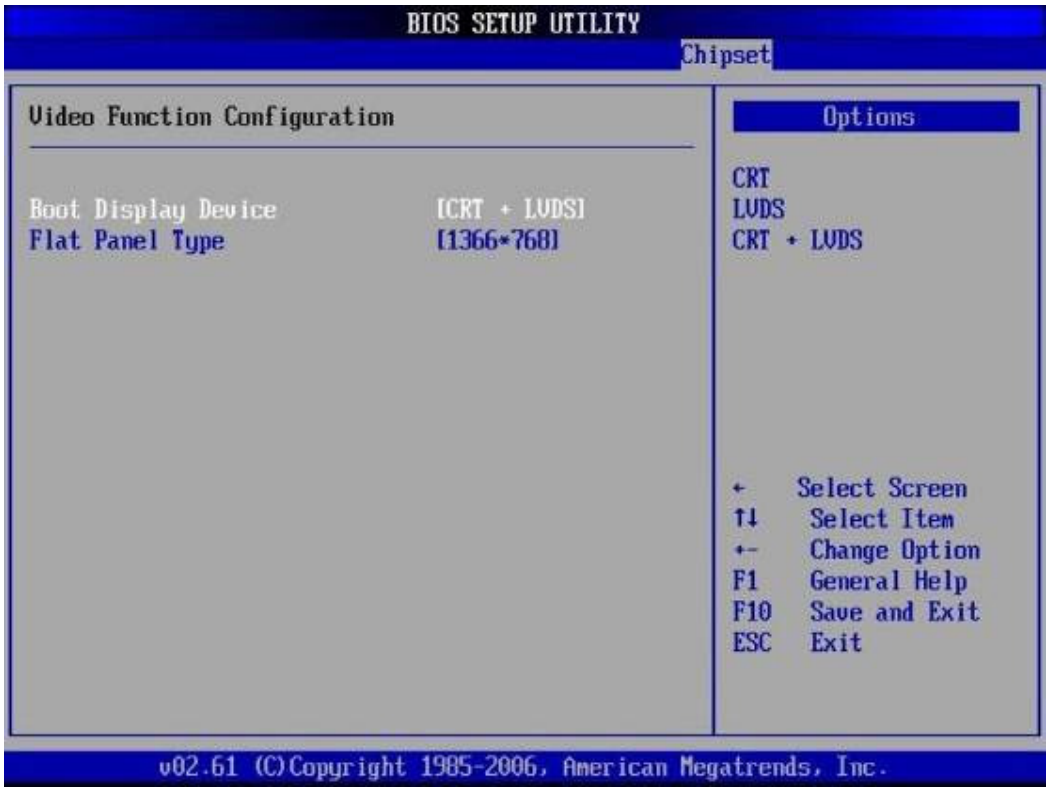
Internal Graphics Mode Select : [Enabled, 8MB]

Select the amount of system memory used by the internal graphics device.

Boot Display Configuration

This item allows you to configure Boot Display Function.

3.7.2. Video Function Configuration



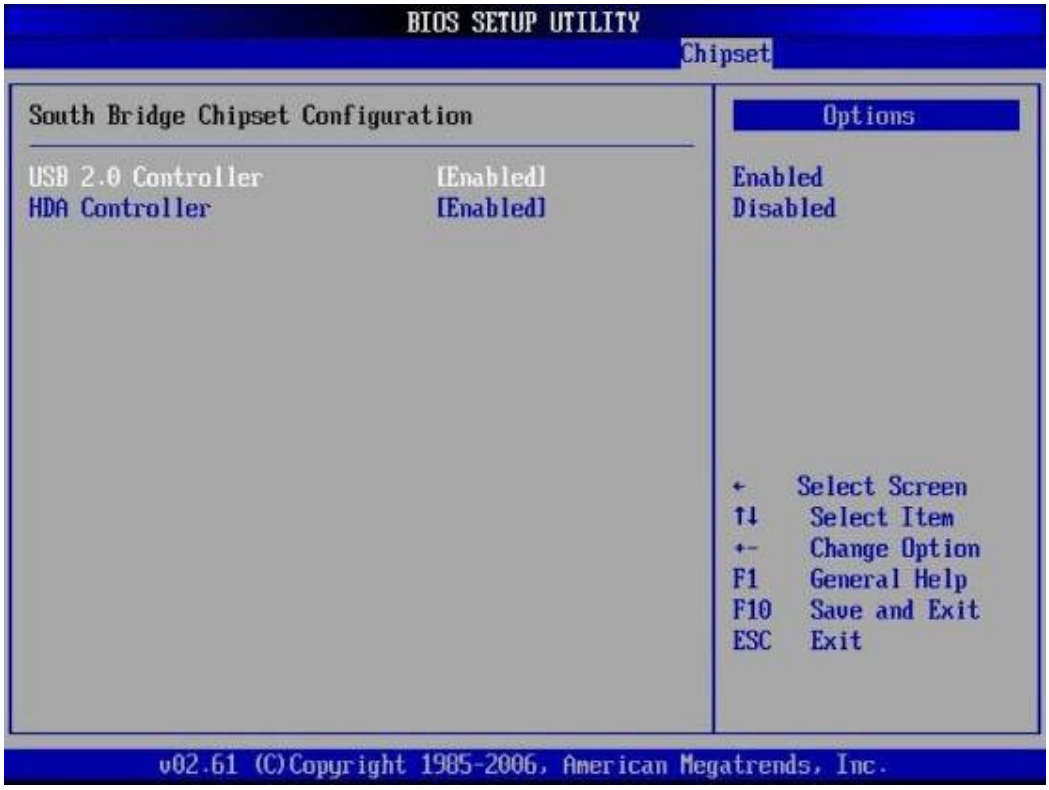
Boot Display Device: [CRT + LVDS]

This item allows you to set the boot display device.

Flat Panel Type : [1366*768]

This item allows you to configure the panel type.

3.7.3 South Bridge Configuration



USB 2.0 Controller: [Enabled]

This item allows you to enable or disable the USB 2.0 controller.

HDA Controller: [Enabled]

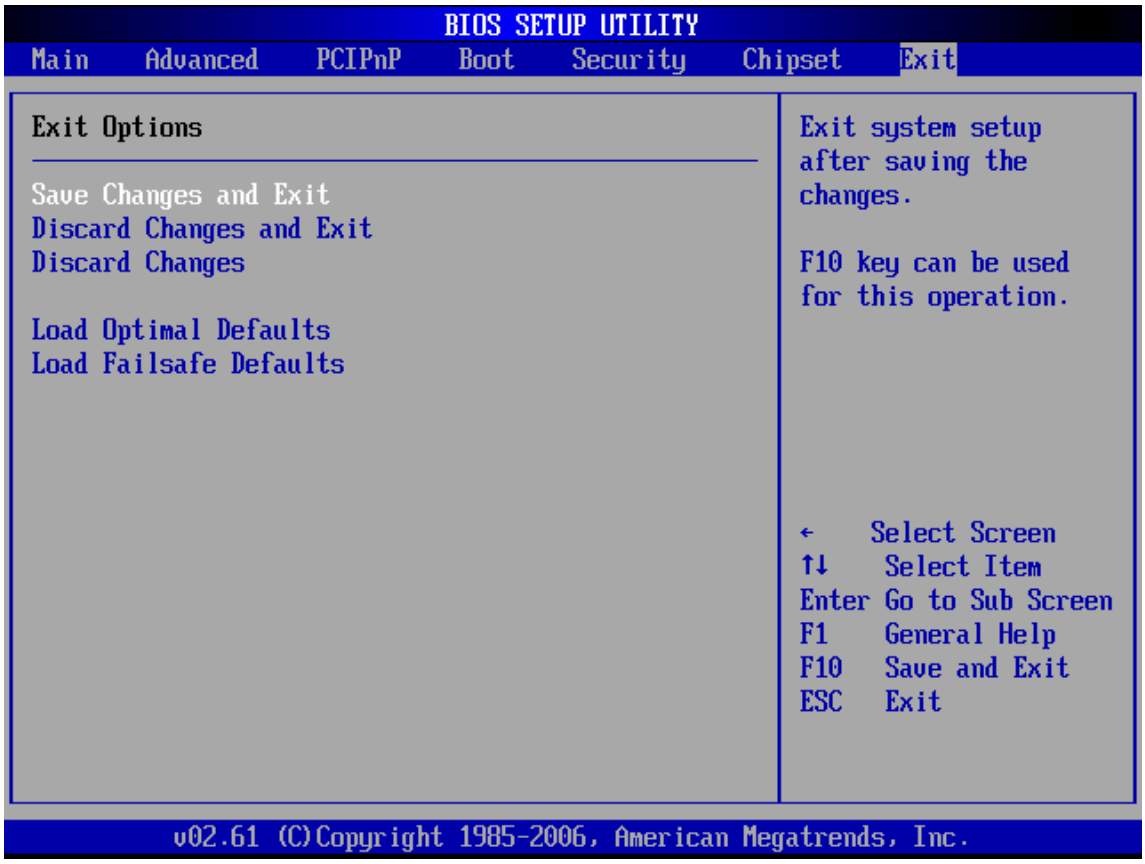
This item allows you to enable or disable the Audio controller.

3.8 Exit

The item allows you to save or discard your changes to the BIOS items, and load the optimal defaults or failsafe defaults for the BIOS items.

⇩Use the Exit option as follows:

1. Choose “Exit” from the main menu, the following screen appears.



2. Move between items and select values by using the arrow keys. Modify the selected fields using the PgUP/PgDN keys. For information on the various options, please press <F1> key.

3. Please press the <ESC> key to return the main menu after finishing with the Exit Options.

Save Changes and Exit:
Save changes of values to CMOS and exit the CMOS setup program. F10 key can be used for this operation.

Discard Changes and Exit:
Discard all CMOS changes and exit the CMOS setup program. ESC key can be used for this operation.

Discard Changes:
Discard all CMOS changes and load the previously saved values. F7 key can be used for this operation.

Load Optimal Defaults:
This item allows you to load optimal defaults for each of the parameters on the Setup menus, which will provide the best performance settings for your system. F9 key can be used for this operation.

Load Failsafe Defaults:
This item allows you to load failsafe defaults for each of the parameters on the Setup menus, which will provide the most stable performance settings. F8 key can be used for this operation.

Appendix A: Watchdog Timer Programming Guide

```
;--------------------------------------------------------------------------
;Enter the extended function mode, interruptible double-write
;--------------------------------------------------------------------------
MOV DX,2EH    ; Unlock W83627DHG
MOV AL,87H
OUT DX,AL
OUT DX,AL
;--------------------------------------------------------------------------
; Configure logical device 8
;--------------------------------------------------------------------------
MOV AL,07H
OUT DX,AL       ; Point to Logical Device Number Reg.
INC DX
MOV AL,08H
OUT DX,AL       ; Select logical device 8
;--------------------------------------------------------------------------
; Set minute as counting unit
;--------------------------------------------------------------------------
DEC DX
MOV AL,F5H
OUT DX,AL        ; Select CRF5
INC DX
MOV AL,08H
OUT DX,AL        ; Set Watchdog time-our to minute mode
;-----------------------------------------------------------------------------
; Load 2 minutes to Watchdog Counter and start counting down
;-----------------------------------------------------------------------------
DEC DX
MOV AL,F6H
OUT DX,AL        ; Select CRF6
INC DX
MOV AL,02H
```

```
OUT DX,AL       ; Time-out occurs after 2 minutes
;-------------------------------------------------------------------------------
; Exit extended function mode
;-------------------------------------------------------------------------------
DEC DX
MOV AL,AAH
OUT DX,AL
```

Appendix B: GPIO Programming Guide

1. GPI0~7 data read through 2Eh address

```
;--------------------------------------------------------------------------
;Enter the extended function mode, interruptible double-write
;--------------------------------------------------------------------------
 MOV DX, 2EH
 MOV AL, 87H
 OUT DX, AL          ;O 2E 87
 OUT DX, AL          ;O 2E 87
;--------------------------------------------------------------------------
; Select logical device 9
;--------------------------------------------------------------------------
 MOV DX, 2EH         ; Point to logic device number register
 MOV AL, 07H
 OUT DX, AL          ;O 2E 07
 MOV DX, 2FH         ;Select logic device 9
 MOV AL, 09H
 OUT DX, AL          ;O 2F 09
;--------------------------------------------------------------------------
 ; Configure Register (CR30) and set GPIO to GPI function
;--------------------------------------------------------------------------
 MOV DX, 2EH         ; Configure Register (CR30)
 MOV AL, 30H
 OUT DX, AL          ;O 2E 30
 MOV DX, 2FH         ;Enable GPIO Port
 MOV AL, 02H
 OUT DX, AL          ;O 2F 02
 MOV DX, 2EH         ; Configure Register (CRF0)
 MOV AL, F0H
 OUT DX, AL          ;O 2E F0
 MOV DX, 2FH         ;Set all GPIO to input
 MOV AL, FFH
 OUT DX, AL          ;O 2F FF
;--------------------------------------------------------------------------
 ;Reading data from GPI0~7
;--------------------------------------------------------------------------
 MOV DX, 2EH
 MOV AL, F1H
 OUT DX, AL          ;O 2E F1
 MOV DX, 2FH
 IN AL,DX            ;Read value (00~FF)
 ;--------------------------------------------------------------------------
Note: Bit 0= GPI0, Bit 1= GPI1…….. Bit 7= GPI7
```

2. GPO0~7 access through 2Eh address

```
;--------------------------------------------------------------------------------
;Enter the extended function mode, interruptible double-write
;--------------------------------------------------------------------------------
 MOV DX, 2EH
 MOV AL, 87H
 OUT DX, AL          ;O 2E 87
 OUT DX, AL          ;O 2E 87
;--------------------------------------------------------------------------------
; Select logical device 9
;--------------------------------------------------------------------------------
 MOV DX, 2EH         ; Point to logic device number register
 MOV AL, 07H
 OUT DX, AL          ;O 2E 07
 MOV DX, 2FH         ;Select logic device 9
 MOV AL, 09H
 OUT DX, AL          ;O 2F 09
;--------------------------------------------------------------------------------
 ; Configure Register (CR30) and set GPIO to GPO function
;--------------------------------------------------------------------------------
 MOV DX, 2EH         ; Configure Register (CR30)
 MOV AL, 30H
 OUT DX, AL          ;O 2E 30
 MOV DX, 2FH         ;Enable GPIO Port I
 MOV AL, 02H
 OUT DX, AL          ;O 2F 02
 MOV DX, 2EH         ; Configure Register (CRF0)
 MOV AL, F0H
 OUT DX, AL          ;O 2E F0
 MOV DX, 2FH         ;Set all GPIO to output
 MOV AL, 00H
 OUT DX, AL          ;O 2F 00
;--------------------------------------------------------------------------------
 ;Output data to GPO0~7
;--------------------------------------------------------------------------------
 MOV DX, 2EH
 MOV AL, F1H
 OUT DX, AL          ;O 2E F1
 MOV DX, 2FH
 MOV AL,XXH          ;XX (00~FF)= output value
 OUT DX, AL          ;O 2F XX
 ;-------------------------------------------------------------------------------
 Note: Bit 0= GPO0, Bit 1= GPO1…….. Bit 7= GPO7
```