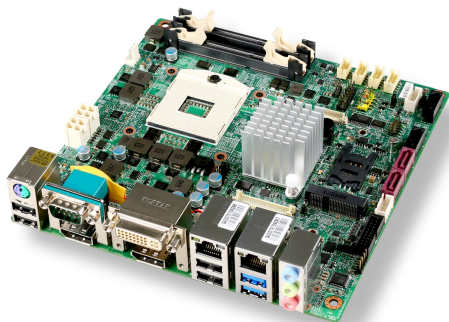


# MS-98C8

(v1.x) Industrial Computer Board



# Copyright Notice

The material in this document is our intellectual property. We take every care in the preparation of this document, but no guarantee is given as to the correctness of its contents. Our products are under continual improvement and we reserve the right to make changes without notice.

# Trademarks

All trademarks are the properties of their respective owners.

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- Realtek® is registered trademark of Realtek Semiconductor Corporation.

# Revision History

Manual Revision	Date
V1.0	2013/05

## Safety Instructions

- Always read the safety instructions carefully.
- Keep this User's Manual for future reference.
- Keep this equipment away from humidity.
- Lay this equipment on a reliable flat surface before setting it up.
- The openings on the enclosure are for air convection hence protects the equipment from overheating. **DO NOT COVER THE OPENINGS.**
- Make sure the voltage of the power source and adjust properly 110/220V before connecting the equipment to the power inlet.
- Place the power cord such a way that people can not step on it. Do not place anything over the power cord.
- Always Unplug the Power Cord before inserting any add-on card or module.
- All cautions and warnings on the equipment should be noted.
- Never pour any liquid into the opening that could damage or cause electrical shock.
- If any of the following situations arises, get the equipment checked by service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated into the equipment.
  - The equipment has been exposed to moisture.
  - The equipment does not work well or you can not get it work according to User's Manual.
  - The equipment has dropped and damaged.
  - The equipment has obvious sign of breakage.
- **DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT UNCONDITIONED, STORAGE TEMPERATURE ABOVE 60°C (140°F), IT MAY DAMAGE THE EQUIPMENT.**

**CAUTION:** Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.

警告使用者:

這是甲類資訊產品，在居住的環境中使用時，可能會造成無線電干擾，在這種情況下，使用者會被要求採取某些適當的對策。



廢電池請回收

For better environmental protection, waste batteries should be collected separately for recycling or special disposal.

## CE Conformity

Hereby, we declare that this device is in compliance with the essential safety requirements and other relevant provisions set out in the European Directive.



## FCC-A Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.



### NOTICE 1

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### NOTICE 2

Shielded interface cables and AC power cord, if any, must be used in order to comply with the emission limits.

VOIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RE-SEAU.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

# WEEE Statement



## ENGLISH

Under the European Union ("EU") Directive on Waste Electrical and Electronic Equipment, Directive 2002/96/EC, which takes effect on August 13, 2005, products of "electrical and electronic equipment" cannot be discarded as municipal waste anymore and manufacturers of covered electronic equipment will be obligated to take back such products at the end of their useful life.

## DEUTSCH

Gemäß der Richtlinie 2002/96/EG über Elektro- und Elektronik-Altgeräte dürfen Elektro- und Elektronik-Altgeräte nicht mehr als kommunale Abfälle entsorgt werden. Wir haben europaweit verschiedene Sammel- und Recyclingunternehmen beauftragt, die in die Europäische Union in Verkehr gebrachten Produkte, am Ende seines Lebenszyklus zurückzunehmen. Bitte entsorgen Sie dieses Produkt zum gegebenen Zeitpunkt ausschliesslich an einer lokalen Altgerätesammelstelle in Ihrer Nähe.

## FRANÇAIS

Au sujet de la directive européenne (EU) relative aux déchets des équipement électriques et électroniques, directive 2002/96/EC, prenant effet le 13 août 2005, que les produits électriques et électroniques ne peuvent être déposés dans les décharges ou tout simplement mis à la poubelle. Les fabricants de ces équipements seront obligés de récupérer certains produits en fin de vie. Par conséquent vous pouvez retourner localement ces matériels dans les points de collecte.

## РУССКИЙ

В соответствии с директивой Европейского Союза (ЕС) по предотвращению загрязнения окружающей среды использованным электрическим и электронным оборудованием (директива WEEE 2002/96/EC), вступающей в силу 13 августа 2005 года, изделия, относящиеся к электрическому и электронному оборудованию, не могут рассматриваться как бытовой мусор, поэтому производители вышеперечисленного электронного оборудования обязаны принимать его для переработки по окончании срока службы.

## ESPAÑOL

Bajo la directiva 2002/96/EC de la Unión Europea en materia de desechos y/o equipos electrónicos, con fecha de rigor desde el 13 de agosto de 2005, los productos clasificados como "eléctricos y equipos electrónicos" no pueden ser depositados en los contenedores habituales de su municipio, los fabricantes de equipos electrónicos, están obligados a hacerse cargo de dichos productos al término de su período de vida.

## NEDERLANDS

De richtlijn van de Europese Unie (EU) met betrekking tot Vervuiling van Elektrische en Electronische producten (2002/96/EC), die op 13 Augustus 2005 in zal gaan kunnen niet

meer beschouwd worden als vervuiling. Fabrikanten van dit soort producten worden verplicht om producten retour te nemen aan het eind van hun levenscyclus.

### SRPSKI

Po Direktivi Evropske unije ("EU") o odbačenju elektonskoj i električnoj opremi, Direktiva 2002/96/EC, koja stupa na snagu od 13. Avgusta 2005, proizvodi koji spadaju pod "elektronsku i električnu opremu" ne mogu više biti odbačeni kao običan otpad i proizvođači ove opreme biće prinuđeni da uzmu natrag ove proizvode na kraju njihovog uobičajenog veka trajanja.

### POLSKI

Zgodnie z Dyrektywą Unii Europejskiej ("UE") dotyczącą odpadów produktów elektrycznych i elektronicznych (Dyrektywa 2002/96/EC), która wchodzi w życie 13 sierpnia 2005, tzw. "produkty oraz wyposażenie elektryczne i elektroniczne" nie mogą być traktowane jako śmieci komunalne, tak więc producenci tych produktów będą zobowiązani do odbierania ich w momencie gdy produkt jest wycofywany z użycia.

### TÜRKÇE

Avrupa Birliği (AB) Kararnamesi Elektrik ve Elektronik Malzeme Atığı, 2002/96/EC Kararnamesi altında 13 Ağustos 2005 tarihinden itibaren geçerli olmak üzere, elektrikli ve elektronik malzemeler diğer atıklar gibi çöpe atılamayacak ve bu elektronik cihazların üreticileri, cihazların kullanım süreleri bittikten sonra ürünleri geri toplamakla yükümlü olacaktır.

### ČESKY

Podle směrnice Evropské unie ("EU") o likvidaci elektrických a elektronických výrobků 2002/96/EC platné od 13. srpna 2005 je zakázáno likvidovat "elektrické a elektronické výrobky" v běžném komunálním odpadu a výrobci elektronických výrobků, na které se tato směrnice vztahuje, budou povinni odebírat takové výrobky zpět po skončení jejich životnosti.

### MAGYAR

Az Európai Unió („EU”) 2005. augusztus 13-án hatályba lépő, az elektromos és elektronikus berendezések hulladékairól szóló 2002/96/EK irányelve szerint az elektromos és elektronikus berendezések többé nem kezelhetők lakossági hulladékként, és az ilyen elektronikus berendezések gyártói kötelessé válnak az ilyen termékek visszavételére azok hasznos élettartama végén.

### ITALIANO

In base alla Direttiva dell'Unione Europea (EU) sullo Smaltimento dei Materiali Elettrici ed Elettronici, Direttiva 2002/96/EC in vigore dal 13 Agosto 2005, prodotti appartenenti alla categoria dei Materiali Elettrici ed Elettronici non possono più essere eliminati come rifiuti municipali: i produttori di detti materiali saranno obbligati a ritirare ogni prodotto alla fine del suo ciclo di vita.

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**NOTE**



# Chapter 1

# Overview

Thank you for choosing the MS-98C8, an excellent industrial computer board.

Based on the innovative **Intel® QM77** chipsets for optimal system efficiency, the MS-98C8 accommodates the **Intel® Core™ i7 / i5 / i3 or Celeron®** processor in rPGA-989 (Socket G2) and supports 2 DDR3 1066/1333/1600 SO-DIMM slots to provide the maximum of 32GB memory capacity.

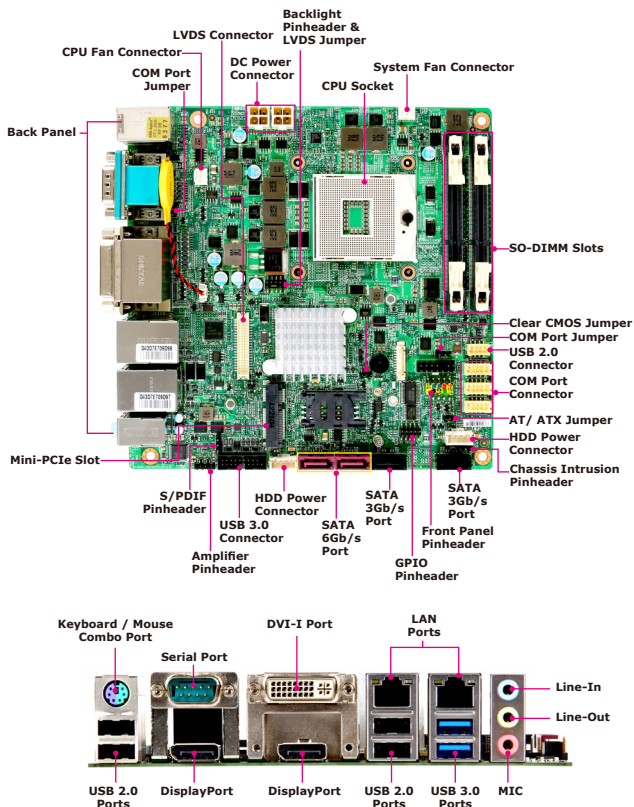
The MS-98C8 is durable under extreme environments and suitable to be applied in every industrial field, such as digital signage, kiosk, gaming, industrial control automation and POS.

## Motherboard Specifications

<b>CPU</b>	<ul style="list-style-type: none"><li>■ Intel® Core™ i7 / i5 / i3 or Celeron® processor in rPGA-989 (Socket G2)</li></ul>
<b>Chipset</b>	<ul style="list-style-type: none"><li>■ Intel® QM77 / HM76 Chipset</li></ul>
<b>Memory</b>	<ul style="list-style-type: none"><li>■ 2 unbuffered non-ECC DDR3 1066/1333/1600 SO-DIMM slots</li><li>■ Supports the maximum of 16GB</li></ul>
<b>LAN</b>	<ul style="list-style-type: none"><li>■ Intel® 82579LM Gigabit Fast Ethernet controller</li><li>■ Intel® WGI210AT Gigabit Fast Ethernet controller</li></ul>
<b>Audio</b>	<ul style="list-style-type: none"><li>■ Realtek® ALC887 Codec</li><li>■ Compliant with Azalia 1.0 specs</li></ul>
<b>RAID</b>	<ul style="list-style-type: none"><li>■ Supports RAID 0/ 1/ 5/ 10 (QM77)</li></ul>
<b>Graphics</b>	<ul style="list-style-type: none"><li>■ Graphics integrated in Intel® processor</li></ul>
<b>Back Panel I/O</b>	<ul style="list-style-type: none"><li>■ 1 PS/2 mouse and keyboard combo port</li><li>■ 4 USB 2.0 ports</li><li>■ 1 serial port</li><li>■ 2 DisplayPort</li><li>■ 1 DVI-I port</li><li>■ 2 Gigabit LAN jacks</li><li>■ 2 USB 3.0 ports</li><li>■ 3 flexible audio ports</li></ul>
<b>Onboard Connectors/ Pinheaders</b>	<ul style="list-style-type: none"><li>■ 2 USB 2.0 connector</li><li>■ 2 USB 3.0 connector</li><li>■ 2 SATA 6Gb/s ports</li><li>■ 2 SATA 3Gb/s ports</li><li>■ 4 serial port connectors</li><li>■ 2 serial port power jumpers</li><li>■ 1 front panel pinheader</li><li>■ 1 LVDS connector</li><li>■ 1 LVDS power jumper</li><li>■ 1 GPIO connector</li><li>■ 1 clear CMOS jumper</li><li>■ 1 AT/ATX mode select jumper</li><li>■ 1 S/PDIF pinheader</li><li>■ 1 chassis intrusion pinheader</li><li>■ 1 amplifier pinheader</li></ul>

<b>Slot</b>	■ 2 Mini-PCle slots (including 1 x mSATA function)
<b>Form Factor</b>	■ Mini-ITX: 17.0cm x 17.0cm ■ Power Solution: 12 / 19V auto switch
<b>Environmental</b>	■ Operating Temperature: -10°C to 60°C - Humidity: 30% ~ 80% RH, Non-Condensing - Office and similar environment, no corrosive gas ■ Storage Temperature: -20°C to 80°C - Humidity: 5% ~ 90% RH, Non-Condensing

# Motherboard Layout

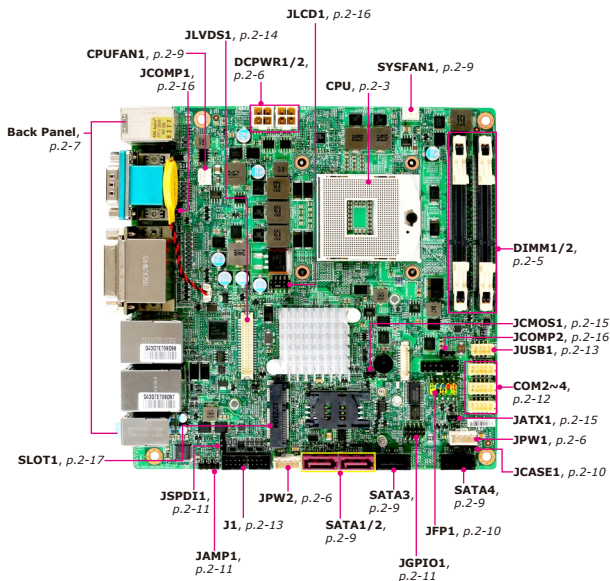


# Chapter 2

## Hardware Setup

This chapter provides you with the information on motherboard hardware configurations. Incorrect setting of jumpers and connectors may damage your motherboard. Please pay special attention not to connect these headers in wrong direction. DO NOT adjust any jumper while the motherboard is powered on.

## Quick Components Guide



## CPU (Central Processing Unit)

When you are installing the CPU, make sure that you install the cooler to prevent overheating. If you do not have the CPU cooler, consult your dealer before turning on the computer.

### **Important**

#### **Overheating**

*Overheating can seriously damage the CPU and motherboard. Always make sure the cooling fans work properly to protect the CPU from overheating. Be sure to apply an even layer of thermal paste (or thermal tape) between the CPU and the heatsink to enhance heat dissipation.*

#### **Replacing the CPU**

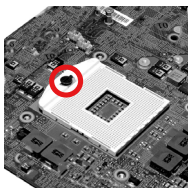
*When replacing the CPU, always turn off the system's power supply and unplug the power supply's power cord to ensure the safety of the CPU.*

### CPU Installation

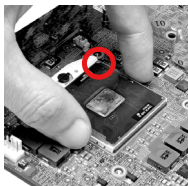
Locate the CPU socket on the motherboard. On the upper end of the CPU socket is a socket actuator in the form of a slotted screw head.

To install the CPU, follow the steps shown below:

1. Loosen the socket actuator with a parallel screwdriver.



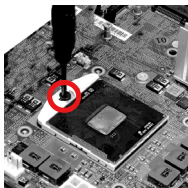
2. Locate Pin 1 in the socket and look for a golden cut edge on the CPU upper corner. Then insert the CPU into the socket. To avoid damaging the CPU pins, do not force the CPU into the socket.



3. Fasten the CPU socket with a parallel screwdriver.

#### **Important**

*Motherboard photos shown in this section are for demonstration only and may differ from the actual look of your motherboard.*

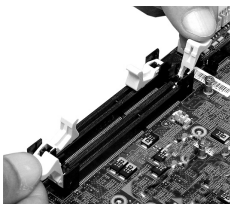




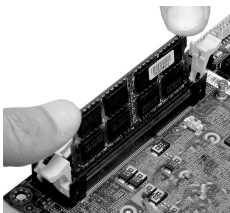
## Memory

These DIMM slots are intended for memory modules.

1. Unlock the DIMM slot by flipping open its side clips. Vertically insert the DIMM into the DIMM slot. The DIMM has an off-center notch at the bottom that will only allow it to fit one way into the DIMM slot.



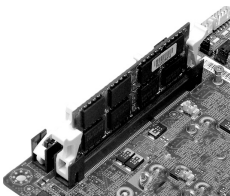
2. Push the DIMM deeply into the DIMM slot. The side clips of the DIMM slot will automatically close when the DIMM is properly seated and an audible click should be heard.



3. Manually check if the DIMM has been locked in place by the DIMM slot's side clips.

### Important

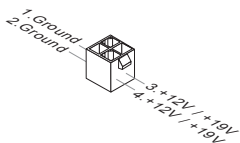
- Motherboard photos shown in this section are for demonstration only and may differ from the actual look of your motherboard.
- You can barely see the golden finger if the DIMM is properly inserted in the DIMM slot.



## Power Supply

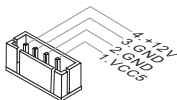
### 4-pin Power Connector: DCPWR1, DCPWR2

These connectors are used to provide power to the motherboard.



### HDD Power Connector: JPW1, JPW2

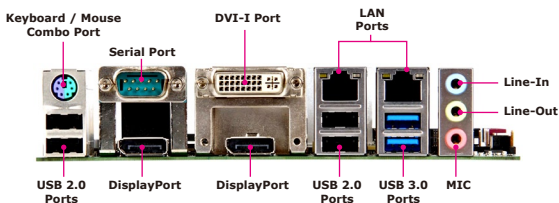
This connector is used to provide power for hard disk drives.



### Important

*Make sure that all the connectors are connected to proper power supplies to ensure stable operation of the motherboard.*

## Back Panel I/O



### ► Keyboard / Mouse Combo Port

The standard PS/2® mouse/keyboard DIN connector is for a PS/2® mouse/keyboard.

### ► Serial Port

The serial port is a 16550A high speed communications port that sends/receives 16 bytes FIFOs. You can attach a serial mouse or other serial devices directly to the connector.

### ► DisplayPort

DisplayPort is a digital display interface standard. This connector is used to connect a monitor with DisplayPort inputs.

### ► DVI-I Port

The DVI-I (Digital Visual Interface-Integrated) connector allows you to connect an LCD monitor. It provides a high-speed digital interconnection between the computer and its display device. To connect an LCD monitor, simply plug your monitor cable into the DVI connector, and make sure that the other end of the cable is properly connected to your monitor (refer to your monitor manual for more information.)

### ► USB 2.0 Port

The USB (Universal Serial Bus) port is for attaching USB devices such as keyboard, mouse, or other USB-compatible devices.

## ► USB 3.0 Port

The USB 3.0 port is backward-compatible with USB 2.0 devices and supports data transfer rate up to 5 Gbit/s (SuperSpeed).

## ► LAN Port

The standard RJ-45 LAN jack is for connection to the Local Area Network (LAN). You can connect a network cable to it.



		Left LED	Right LED
		Active LED	100M/1000M Speed LED
LED Color		Yellow	Green/Orange
10M Cable Plug-in	No Transmission	OFF	OFF
	Transmission	Yellow (Blinking)	OFF
100M Cable Plug-in	No Transmission	OFF	Green (Lighting)
	Transmission	Yellow (Blinking)	Green (Lighting)
1000M Cable Plug-in	No Transmission	OFF	Orange (Lighting)
	Transmission	Yellow (Blinking)	Orange (Lighting)
In S3/S4/S5 Standby State		OFF	OFF

## ► Audio Ports

These audio connectors are used for audio devices. It is easy to differentiate between audio effects according to the color of audio jacks.

- Line-In (Blue) - Line In, is used for external CD player, tapeplayer or other audio devices.
- Line-Out (Green) - Line Out, is a connector for speakers or headphones.
- Mic (Pink) - Mic, is a connector for microphones.

## Connector

### Serial ATA Connector: SATA1 ~ SATA4

This connector is a high-speed Serial ATA interface port. Each connector can connect to one Serial ATA device.



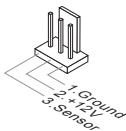
Chip	SATA 6 Gb/s	SATA 3 Gb/s
Intel QM77	SATA1, SATA2	SATA3, SATA4

### **Important**

*Please do not fold the Serial ATA cable into a 90-degree angle. Otherwise, data loss may occur during transmission.*

### Fan Power Connector: CPUFAN1, SYSFAN1

The fan power connectors support system cooling fan with +12V. When connecting the wire to the connectors, always note that the red wire is the positive and should be connected to the +12V; the black wire is Ground and should be connected to GND. If the motherboard has a System Hardware Monitor chipset on-board, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.

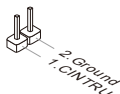


### **Important**

*Please refer to the recommended CPU fan at processor's official website or consult the vendors for proper CPU cooling fan.*

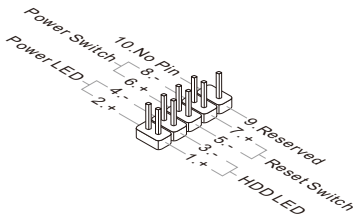
## Chassis Intrusion Pinheader: JCASE1

This connector connects to the chassis intrusion switch cable. If the computer case is opened, the chassis intrusion mechanism will be activated. The system will record this intrusion and a warning message will flash on screen. To clear the warning, you must enter the BIOS utility and clear the record.



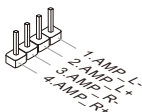
## Front Panel Pinheader: JFP1

These connectors are for electrical connection to the front panel switches and LEDs. The JFP1 is compliant with Intel® Front Panel I/O Connectivity Design Guide.



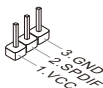
## Audio Amplifier Pinheader: JAMP1

The JAMP1 is used to connect audio amplifiers to enhance audio performance.



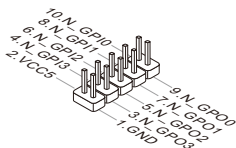
## S/PDIF Pinheader: JSPDI1

This pinheader is used to connect S/PDIF (Sony & Philips Digital Interconnect Format) interface for digital audio transmission.



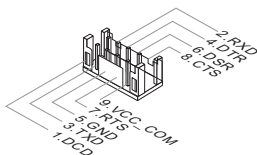
## GPIO Pinheader: JGPIO1

This connector is provided for the General-Purpose Input/Output (GPIO) peripheral module.



## Serial Port Connector: COM2, COM3, COM4

This connector is a 16550A high speed communications port that sends/ receives 16 bytes FIFOs. You can attach serial devices to it through the optional serial port bracket.



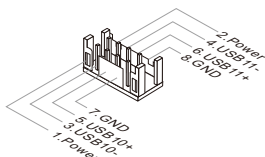
### RS-232

PIN	SIGNAL	DESCRIPTION
1	DCD	Data Carrier Detect
2	RXD	Receive Data
3	TXD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	VCC_COM1	Voltage select setting by jumper



## Front USB 2.0 Connector: JUSB1

This connector, compliant with Intel I/O Connectivity Design Guide, is ideal for connecting high-speed USB interface peripherals such as USB HDD, digital cameras, MP3 players, printers, modems and the like.

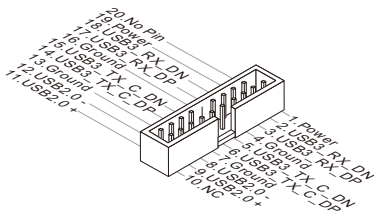


### **Important**

*Note that the pins of VCC and GND must be connected correctly to avoid possible damage.*

## Front USB 3.0 Connector: J1

The USB 3.0 connector is backwards compatible with USB 2.0 devices. It supports data transfer rates up to 5Gbits/s (SuperSpeed) and is ideal for connecting high-speed USB peripherals such as USB HDDs, digital cameras, MP3 players, printers, modems, and many others.

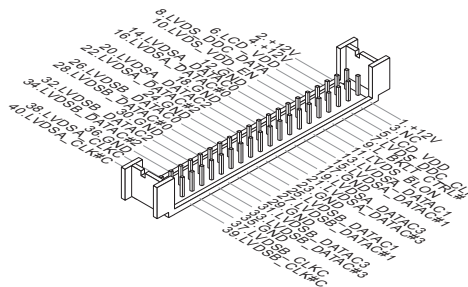


### **Important**

*Note that the pins of VCC and GND must be connected correctly to avoid possible damage.*

## LVDS Flat Panel Connector: JLVDS1

The LVDS (Low Voltage Differential Signal) connector provides a digital interface typically used with flat panels. After connecting an LVDS interfaced flat panel to the JLVDS1, be sure to check the panel datasheet and set the J2 jumper for proper power voltage.



## Jumper

### Clear CMOS Jumper: JCMOS1

There is a CMOS RAM onboard that has a power supply from an external battery to keep the data of system configuration. With the CMOS RAM, the system can automatically boot OS every time it is turned on. If you want to clear the system configuration, set the jumper to clear data.

**JCMOS1**

Keep Data



Clear CMOS

#### **Important**

*You can clear CMOS by shorting 1-2 pin while the system is off. Then return to 2-3 pin position. Avoid clearing the CMOS while the system is on; it will damage the motherboard.*

### AT/ATX Select Jumper: JATX1

This jumper allows users to select between AT and ATX power.

**JATX1**

ATX



AT

#### **Important**

*Avoid adjusting the jumper when the system is on; it will damage the motherboard.*

## Serial Port Power Jumper: JCOMP1, JCOMP2

These jumpers specify the operation voltage of the onboard serial ports.



**JCOMP1**



+5V



+12V



**JCOMP2**



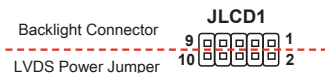
+5V



+12V

## Backlight Header & LVDS Power Jumper: JLCD1

The backlight connector is provided for LCD backlight options while the LVDS power jumper allows users to select the operation voltage of the LVDS flat panel.



PIN	SIGNAL
1	VCC5
3	L_BKLTCTL
5	INV_ON
7	GND
9	+12V



VCC5



VCC3

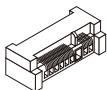


VCC3

## Slot

### Mini-PCle (Peripheral Component Interconnect Express) Slot

The Mini-PCle slot is provided for wireless LAN card, TV tuner card, Robson NAND Flash card and mSATA devices.



### **Important**

*When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.*

### SIM Card Holder

The holder is provided for SIM card.



SIM card



Holder

**NOTE**

# Chapter 3

## BIOS Setup

This chapter provides information on the BIOS Setup program and allows you to configure the system for optimum use.

You may need to run the Setup program when:

- An error message appears on the screen during the system booting up, and requests you to run SETUP.
- You want to change the default settings for customized features.

## Entering Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press <DEL> or <F2> key to enter Setup.

### Press DEL or F2 to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system by turning it OFF and On or pressing the RESET button. You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

### *Important*

*The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.*



## Control Keys

← →	Select Screen
↑ ↓	Select Item
Enter	Select
+ -	Change Option
F1	General Help
F7	Previous Values
F9	Optimized Defaults
F10	Save & Exit
Esc	Exit

## Getting Help

After entering the Setup menu, the first menu you will see is the Main Menu.

### Main Menu

The main menu lists the setup functions you can make changes to. You can use the arrow keys ( ↑ ↓ ) to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

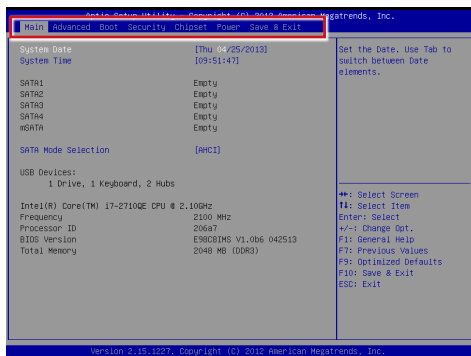
### Sub-Menu

If you find a right pointer symbol appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use arrow keys ( ↑ ↓ ) to highlight the field and press <Enter> to call up the sub-menu. Then you can use the control keys to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the <Esc >.

## General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing <F1>. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press <Esc> to exit the Help screen.

## The Menu Bar



### ► Main

Use this menu for basic system configurations, such as time, date, etc.

### ► Advanced

Use this menu to set up the items of special enhanced features.

### ► Boot

Use this menu to specify the priority of boot devices.

### ► Security

Use this menu to set supervisor and user passwords.

### ► Chipset

This menu controls the advanced features of the onboard chipsets.

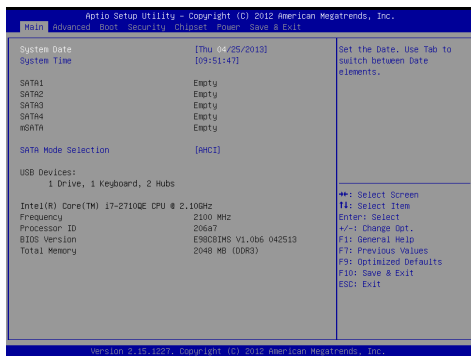
### ► Power

Use this menu to specify your settings for power management.

### ► Save & Exit

This menu allows you to load the BIOS default values or factory default settings into the BIOS and exit the BIOS setup utility with or without changes.

## Main



### ► System Date

This setting allows you to set the system date. The date format is <Day>, <Month> <Date> <Year>.

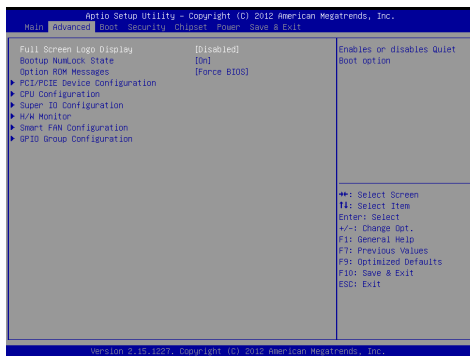
### ► System Time

This setting allows you to set the system time. The time format is <Hour> <Minute> <Second>.

### ► SATA Mode Selection

This setting specifies the SATA controller mode.

## Advanced



### ► Full Screen Logo Display

This BIOS feature determines if the BIOS should hide the normal POST messages with the motherboard or system manufacturer's full-screen logo. When it is enabled, the BIOS will display the full-screen logo during the boot-up sequence, hiding normal POST messages.

When it is disabled, the BIOS will display the normal POST messages, instead of the full-screen logo.

Please note that enabling this BIOS feature often adds 2-3 seconds of delay to the booting sequence. This delay ensures that the logo is displayed for a sufficient amount of time. Therefore, it is recommended that you disable this BIOS feature for a faster boot-up time.

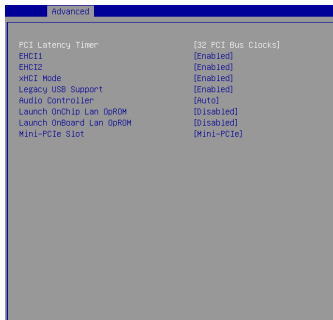
### ► Bootup NumLock State

This setting is to set the Num Lock status when the system is powered on. Setting to [On] will turn on the Num Lock key when the system is powered on. Setting to [Off] will allow users to use the arrow keys on the numeric keypad.

### ► Option ROM Messages

This item is used to determine the display mode when an optional ROM is initialized during POST. When set to [Force BIOS], the display mode used by AMI BIOS is used. Select [Keep Current] if you want to use the display mode of optional ROM.

### ► PCI/PCIE Device Configuration



### ► PCI Latency Timer

This item controls how long each PCI device can hold the bus before another takes over. When set to higher values, every PCI device can conduct transactions for a longer time and thus improve the effective PCI bandwidth. For better PCI performance, you should set the item to higher values.

### ► EHCI1, EHCI2

This setting disables/enables the USB EHCI controller. The Enhanced Host Controller Interface (EHCI) specification describes the register-level interface for a Host Controller for the Universal Serial Bus (USB) Revision 2.0.

### ► XHCI Mode

This setting disables/enables the USB XHCI controller. The eXtensible Host Controller Interface (XHCI) is a computer interface specification that defines a register-level description of a Host Controller for Universal Serial Bus (USB), which is capable of interfacing to USB 1.0, 2.0, and 3.0 compatible devices. The specification is also referred to as the USB 3.0 Host Controller specification.

### ► Legacy USB Support

Set to [Enabled] if you need to use any USB 1.1/2.0 device in the operating system that does not support or have any USB 1.1/2.0 driver installed, such as DOS and SCO Unix.

### ► Audio Controller

This setting enables/disables the onboard audio controller.

### ► Launch OnChip/OnBoard LAN OpROM

These settings enable/disable the initialization of the onboard/onchip LAN Boot ROM during bootup. Selecting [Disabled] will speed up the boot process.

### ► Mini-PCIe Slot

This setting determines the operation mode of the Mini-PCIe slot.

## ► CPU Configuration



### ► Hyper-Threading

The processor uses Hyper-Threading technology to increase transaction rates and reduces end-user response times. The technology treats the two cores inside the processor as two logical processors that can execute instructions simultaneously. In this way, the system performance is highly improved. If you disable the function, the processor will use only one core to execute the instructions. Please disable this item if your operating system doesn't support HT Function, or unreliability and instability may occur.

### ► Active Processor Cores

This setting specifies the number of active processor cores.

### ► Execute Disable Bit

Intel's Execute Disable Bit functionality can prevent certain classes of malicious "buffer overflow" attacks when combined with a supporting operating system. This functionality allows the processor to classify areas in memory by where application code can execute and where it cannot. When a malicious worm attempts to insert code in the buffer, the processor disables code execution, preventing damage or worm propagation.

### ► Intel Virtualization Technology

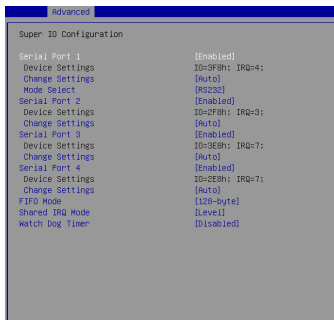
Virtualization enhanced by Intel Virtualization Technology will allow a platform to run multiple operating systems and applications in independent partitions. With virtualization, one computer system can function as multiple "Virtual" systems.

### ► EIST

EIST (Enhanced Intel SpeedStep Technology) allows the system to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production.

When disabled, the processor will return the actual maximum CPUID input value of the processor when queried.

## ► Super IO Configuration



**► Serial Port 1/ 2/ 3/ 4**

This setting enables/disables the specified serial port.

**► Change Settings**

This setting is used to change the address & IRQ settings of the specified serial port.

**► Mode Select**

Select an operation mode for the serial port 1.

**► FIFO Mode**

This setting controls the FIFO data transfer mode.

**► Shared IRQ Mode**

This setting provides the system with the ability to share interrupts among its serial ports.

**► Watch Dog Timer**

You can enable the system watch-dog timer, a hardware timer that generates a reset when the software that it monitors does not respond as expected each time the watch dog polls it.

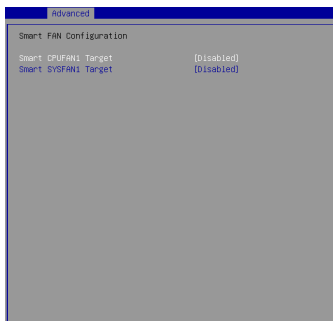
**► H/W Monitor**

These items display the current status of all monitored hardware devices/ components such as voltages, temperatures and all fans' speeds.

Advanced	
Pc Health Status	
CPU temperature	: +42 C
System temperature	: +26 C
CPUFAN1 Speed	: 4451 RPM
SYSFAN1 Speed	: N/A
Vcore	: +0.968 V
VCC5	: +5.087 V
+12V	: +12.144 V
VCC3V	: +3.344 V
3VSB	: +3.344 V
VBAT	: +3.328 V



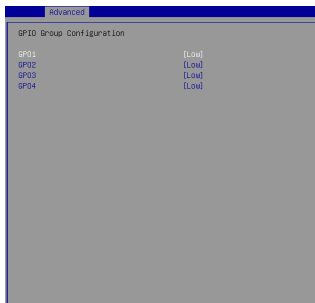
### ► Smart Fan Configuration



#### ► Smart CPUFAN1/ SYSFAN1 Target

These settings enable/disable the Smart Fan function. Smart Fan is an excellent feature which will adjust the CPU/system fan speed automatically depending on the current CPU/system temperature, avoiding the overheating to damage your system.

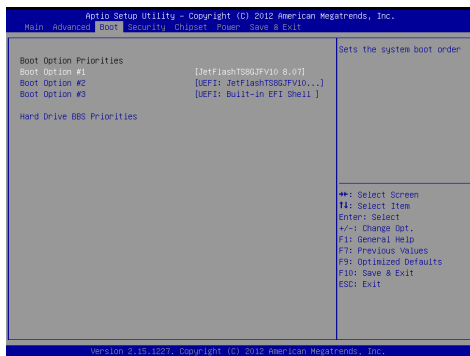
### ► GPIO Group Configuration



#### ► GPIO 1 ~ GPIO 4

These settings control the operation mode of the specified GPIO.

## Boot



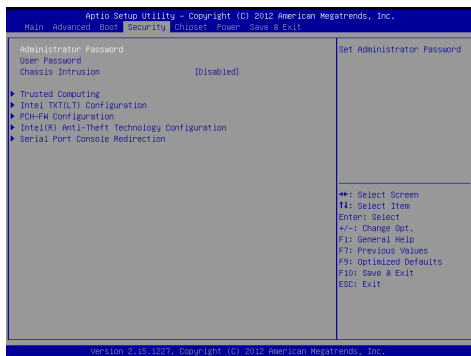
### ► Boot Option Priorities

This setting allows users to set the sequence of boot devices where BIOS attempts to load the disk operating system.

### ► Hard Drive BBS Priorities

This setting allows users to set the priority of the specified devices. First press <Enter> to enter the sub-menu. Then you may use the arrow keys ( ↑ ↓ ) to select the desired device, then press <+>, <-> or <PageUp>, <Page-Down> key to move it up/down in the priority list.

# Security



## ► Administrator Password

Administrator Password controls access to the BIOS Setup utility.

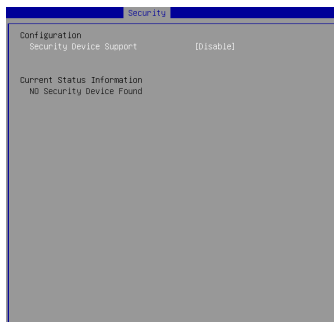
## ► User Password

User Password controls access to the system at boot and to the BIOS Setup utility.

## ► Chassis Intrusion

The field enables or disables the feature of recording the chassis intrusion status and issuing a warning message if the chassis is once opened.

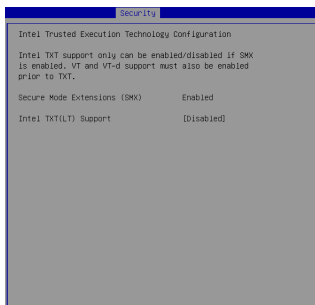
## ► Trusted Computing



## ► Security Device Support

This setting enables/disables BIOS support for security device. When set to [Disable], the OS will not show security device. TCG EFI protocol and INT1A interface will not be available.

## ► Intel TXT(LT) Configuration



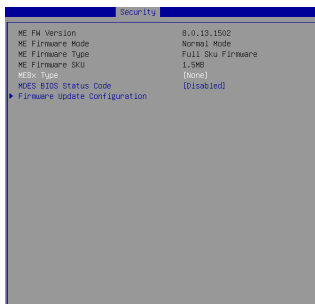
### ► Secure Mode Extensions (SMX)

This setting enables/disables the Secure Mode Extensions.

### ► Intel TXT(LT) Support

Intel TXT (Trusted Execution Technology) can only be enabled/disabled if SMX is enabled. VT and VT-d support must also be enabled prior to TXT.

### ► PCH-FW Configuration



### ► ME FW Version, ME Firmware Mode/ Type/ SKU

These settings show the firmware information of the Intel ME (Management Engine).

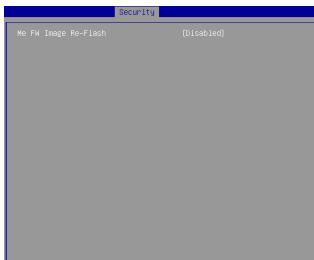
### ► MEBx Type

This setting specifies the Intel Management Engine BIOS Extension (MEBx) type.

### ► MDES BIOS Status Code

This setting enables/disables the MDES BIOS status code.

## ► Firmware Update Configuration

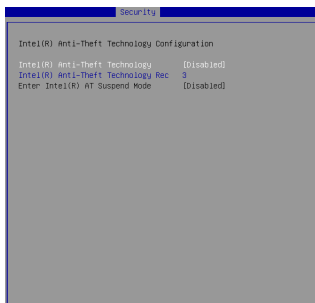


## ► ME FW Image Re-Flash

This setting enables/disables the ME FW image reflash.

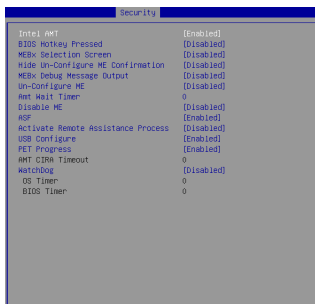
## ► Intel(R) Anti-Theft Technology Configuration

Intel Anti-Theft Technology is hardware-based technology that can lock a lost or stolen system so that personal confidential information is protected and inaccessible by unauthorized users.

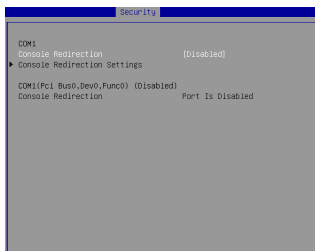


### ► **AMT Configuration (Optional)**

Intel Active Management Technology (AMT) is hardware-based technology for remotely managing and securing PCs out-of-band.



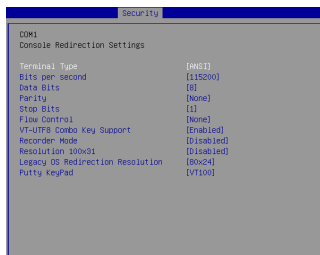
### ► **Serial Port Console Redirection**



### ► **Console Redirection**

Console Redirection operates in host systems that do not have a monitor and keyboard attached. This setting enables/disables the operation of console redirection. When set to [Enabled], BIOS redirects and sends all contents that should be displayed on the screen to the serial COM port for display on the terminal screen. Besides, all data received from the serial port is interpreted as keystrokes from a local keyboard.

## ► Console Redirection Settings



### ► Terminal Type

To operate the system's console redirection, you need a terminal supporting ANSI terminal protocol and a RS-232 null modem cable connected between the host system and terminal(s). This setting specifies the type of terminal device for console redirection.

### ► Bits per second, Data Bits, Parity, Stop Bits

This setting specifies the transfer rate (bits per second, data bits, parity, stop bits) of Console Redirection.

### ► Flow Control

Flow control is the process of managing the rate of data transmission between two nodes. It's the process of adjusting the flow of data from one device to another to ensure that the receiving device can handle all of the incoming data. This is particularly important where the sending device is capable of sending data much faster than the receiving device can receive it.

### ► VT-UTF8 Combo Key Support

This setting enables/disables the VT-UTF8 combination key support for ANSI/VT100 terminals.

### ► Recorder Mode, Resolution 100x31

These settings enable/disable the recorder mode and the resolution 100x31.

### ► Legacy OS Redirection Resolution

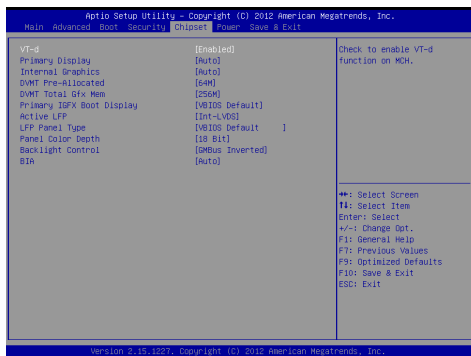
This setting specifies the redirection resolution of legacy OS.

### ► Putty Keypad

PuTTY is a terminal emulator for Windows. This setting controls the numeric keypad for use in PuTTY.



## Chipset



### ► VT-d

Intel Virtualization Technology for Directed I/O (Intel VT-d) provides the capability to ensure improved isolation of I/O resources for greater reliability, security, and availability.

### ► Primary Display

This setting specifies which is your primary graphics adapter.

### ► Internal Graphics

The setting enables/ disables the internal graphics.

### ► DVMT Pre-Allocated

This setting defines the DVMT pre-allocated memory. Pre-allocated memory is the small amount of system memory made available at boot time by the system BIOS for video. Pre-allocated memory is also known as locked memory. This is because it is "locked" for video use only and as such, is invisible and unable to be used by the operating system.

### ► DVMT Total Gfx Mem

This setting specifies the memory size for DVMT.

► **Primary IGFX Boot Display**

Use the field to select the type of device you want to use as the display(s) of the system.

► **Active LFP**

This item is used for turning on/off LVDS support. (LVDS or No LVDS)

► **LFP Panel Type**

This setting allows you to set your preferences for the boot display device.

► **Panel Color Depth**

This item is used for setting the matching LFP Panel color depth. (18bit or 24bit).

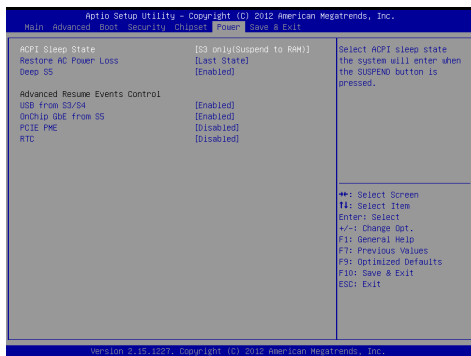
► **Backlight Control**

This item controls the panel backlight.

► **BIA**

This item controls the BIA function.

## Power



### ► ACPI Sleep State

This item specifies the power saving modes for ACPI function. If your operating system supports ACPI, you can choose to enter the Standby mode in S1 (POS) or S3 (STR) fashion through the setting of this field.

### ► Restore AC Power Loss

This setting specifies whether your system will reboot after a power failure or interrupt occurs. Available settings are:

[Power Off]	Leaves the computer in the power off state.
[Power On]	Leaves the computer in the power on state.
[Last State]	Restores the system to the previous status before power failure or interrupt occurred.

### ► Deep S5

The setting enables/disables the Deep S5 power saving mode. S5 is almost the same as G3 Mechanical Off, except that the PSU still supplies power, at a minimum, to the power button to allow return to S0. A full reboot is required. No previous content is retained. Other components may remain powered so the computer can “wake” on input from the keyboard, clock, modem, LAN, or USB device.

### \*\* Advanced Resume Events Control \*\*

#### ► USB from S3/S4

The item allows the activity of the USB device to wake up the system from S3/S4 sleep state.

#### ► OnChip GbE from S5

This field specifies whether the system will be awakened from power saving modes when activity or input signal of onchip LAN is detected.

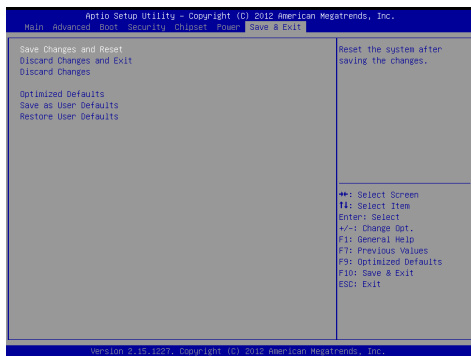
#### ► PCIE PME

This field specifies whether the system will be awakened from power saving modes when activity or input signal of onboard PCIE PME is detected.

#### ► RTC

When [Enabled], you can set the date and time at which the RTC (real-time clock) alarm awakens the system from suspend mode.

## Save & Exit



### ► **Save Changes and Reset**

Save changes to CMOS and reset the system.

### ► **Discard Changes and Exit**

Abandon all changes and exit the Setup Utility.

### ► **Discard Changes**

Abandon all changes.

### ► **Optimized Defaults**

Use this menu to load the default values set by the motherboard manufacturer specifically for optimal performance of the motherboard.

### ► **Save as User Defaults**

Save changes as the user's default profile.

### ► **Restore User Defaults**

Restore the user's default profile.

**NOTE**

# Appendix

## WDT & GPIO

This appendix provides the sample codes of WDT (Watch Dog Timer) and GPIO (General Purpose Input/Output).

## WDT Sample Code

```

SIO_INDEX_Port      equ      04Eh
SIO_DATA_Port       equ      04Fh
SIO_UnLock_Value    equ      087h
SIO_Lock_Value      equ      0AAh
WatchDog_LDN        equ      007h
WDT_UNIT            equ      60h      ; 60h = second ,
68h=minute, 40h=Disabled Watchdog timer
WDT_Timer           equ      30      ;ex. 30 seconds

```

### ► Sample Code

#### **;Enable config mode**

```

mov    dx, SIO_INDEX_Port
mov    al, SIO_UnLock_Value
out    dx, al
jmp    short $+2      ;lo_delay
jmp    short $+2      ;lo_delay
out    dx, al

```

#### **;Change to WDT**

```

mov    dx, SIO_INDEX_Port
mov    al, 07h
out    dx, al
mov    dx, SIO_DATA_Port
mov    al, WatchDog_LDN
out    dx, al

```

#### **;Active WDT**

```

mov    dx, SIO_INDEX_Port
mov    al, 30h
out    dx, al
mov    dx, SIO_DATA_Port
in     al, dx
or     al, 01h
out    dx, al

```



**;set timer**

```
mov     dx, SIO_INDEX_Port
mov     al, 0F6h
out     dx, al
mov     dx, SIO_DATA_Port
mov     al, WDT_Timer
out     dx, al
```

**;set UNIT**

```
mov     dx, SIO_INDEX_Port
mov     al, 0F5h
out     dx, al
mov     dx, SIO_DATA_Port
mov     al, WDT_UNIT
out     dx, al
```

**;enable reset**

```
mov     dx, SIO_INDEX_Port
mov     al, 0FAh
out     dx, al
mov     dx, SIO_DATA_Port
in      al, dx
or      al, 01h
out     dx, al
```

**;close config mode**

```
mov     dx, SIO_INDEX_Port
mov     al, SIO_Lock_Value
out     dx, al
```

## GPIO Sample Code

### GPI 0 ~ GPI 3

	GPI 0	GPI 1	GPI 2	GPI 3
<b>IO Address</b>				
<b>SIO GPIO Register</b>	82h	82h	82h	82h
<b>Bit</b>	0	1	2	3
<b>Sample code</b>	#1	#1	#1	#1

### GPO 0 ~ GPO 3

	GPO 0	GPO 1	GPO 2	GPO 3
<b>IO Address</b>				
<b>SIO GPIO Register</b>	81h	81h	81h	81h
<b>Bit</b>	4	5	6	7
<b>Sample code</b>	#2	#2	#2	#2

```

SIO_INDEX_Port      equ      04Eh
SIO_DATA_Port       equ      04Fh
SIO_UnLock_Value    equ      087h
SIO_Lock_Value      equ      0AAh
SIO_LDN_GPIO        equ      06h
GPI_REG             equ      082h
GPO_REG             equ      081h
GPO_0               equ      00010000b
GPO_1               equ      00100000b
GPO_2               equ      01000000b
GPO_3               equ      10000000b

```

## ► Sample Code

### #1 : Get GPI 0 status

#### ; Enable config mode

```
mov    dx, SIO_INDEX_Port
mov    al, SIO_UnLock_Value
out    dx, al
jmp     short $+2           ;lo_delay
jmp     short $+2           ;lo_delay
out    dx, al
```

#### ; Switch GPIO Configuration for SIO LDN 0x06

```
mov    dx, SIO_INDEX_Port
mov    al, 07h
out    dx, al
mov    dx, SIO_DATA_Port
mov    al, SIO_LDN_GPIO
out    dx, al
```

#### ; Get GPI 0/1/2/3 Pin Status Register

```
mov    dx, SIO_INDEX_Port
mov    al, GPI_REG
out    dx, al
mov    dx, SIO_DATA_Port
in     al, dx
;al bit0 = GPI 0 status
;al bit1 = GPI 1 status
;al bit2 = GPI 2 status
;al bit3 = GPI 3 status
```

#### ; Exit SIO

```
mov    al, SIO_CONFIG_MODE_EXIT_VALUE
out    dx, al
```

**#2 : Set GPO 0/1/2/3 status to high****; Enable config mode**

```
mov    dx, SIO_INDEX_Port
mov    al, SIO_UnLock_Value
out    dx, al
jmp    short $+2           ;lo_delay
jmp    short $+2           ;lo_delay
out    dx, al
```

**; Switch GPIO Configuration for SIO LDN 0x06**

```
mov    dx, SIO_INDEX_Port
mov    al, 07h
out    dx, al
mov    dx, SIO_DATA_Port
mov    al, SIO_LDN_GPIO
out    dx, al
```

**; Set GPO 0/1/2/3 Status to high(1).**

```
mov    dx, SIO_INDEX_Port
mov    al, GPO_REG
out    dx, al
mov    dx, SIO_DATA_Port
in     al, dx
and    Not (GPO_0+ GPO_1+ GPO_2+ GPO_3)    ;reset to 0
or     al, (GPO_0+ GPO_1+ GPO_2+ GPO_3)
out    dx, al
```

**; Exit SIO**

```
mov    al, SIO_CONFIG_MODE_EXIT_VALUE
out    dx, al
```