MS-98D2

(v1.x) Industrial Computer Board

msi

Copyright Notice

The material in this document is the intellectual property of **MICRO-STAR INTER-NATIONAL**. 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.

- MSI® is a registered trademark of Micro-Star Int'l Co.,Ltd.
- NVIDIA® is a registered trademark of NVIDIA Corporation.
- AMD® is a registered trademark of AMD Corporation.
- Intel® is a registered trademark of Intel Corporation.
- Windows® is a registered trademark of Microsoft Corporation.
- AMI® is a registered trademark of Advanced Micro Devices, Inc.
- Award® is a registered trademark of Phoenix Technologies Ltd.
- Realtek® is a registered trademark of Realtek Semiconductor Corporation.

Revision History

Revision	Date
V1.1	2013/10

Technical Support

If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance.

Visit the MSI website for technical guide, BIOS updates, driver updates, and other information:
http://www.msi.com/service/download/

Contact our technical staff at:
http://support.msi.com/

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。

Chemical Substances Information

In compliance with chemical substances regulations, such as the EU REACH Regulation (Regulation EC No. 1907/2006 of the European Parliament and the Council), MSI provides the information of chemical substances in products at:

http://www.msi.com/html/popup/csr/evmtprtt_pcm.html

Battery Information

European Union:

Batteries, battery packs, and accumulators should not be disposed of as unsorted household waste. Please use the public collection system to return, recycle, or treat them in compliance with the local regulations.

Taiwan:

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

廢電池請回收

California, USA:

The button cell battery may contain perchlorate material and requires special handling when recycled or disposed of in California.

For further information please visit:

http://www.dtsc.ca.gov/hazardouswaste/perchlorate/

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

CE Conformity

Hereby, Micro-Star International CO., LTD declares 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 RESEAU.

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

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. MSI will comply with the product take back requirements at the end of life of MSI-branded products that are sold into the EU. You can return these products to local collection points.

CONTENTS

1 **Overview**

Thank you for choosing the MS-98D2, an excellent industrial computer board.

Based on the innovative Intel® NM10 chipset for optimal system efficiency, the MS-98D2 accommodates the Intel® Atom™ Processor D2550 and supports one DDR3 1067 SO-DIMM slot to provide the maximum of 4GB memory capacity.

The MS-98D2 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.

Mainboard Specifications

Processor

- Intel® Atom™ Processor D2550

Chipset

- Intel® NM10 chipset

Memory

- 1 unbuffered non-ECC DDR3 1067 SO-DIMM slot
- Supports the maximum of 4GB

LAN

- Realtek® RTL8111E Gigabit Fast Ethernet controller

Audio

- Realtek® ALC887 High Definition Audio codec
- 1 audio pinheader
- 1 amplifier pinheader

Storage

- 2 SATA 3Gb/s ports

Graphics

- Integrated Graphic Engine Intel® HD 3650 Graphics
    - 1 internal vertical type HDMI connector
    - 1 LVDS connector
    - 1 VGA port

Rear Panel I/O

- 1 DC-in 12V power jack
- 1 PS/2 mouse/keyboard combo port
- 1 VGA port
- 4 USB 2.0 ports
- 1 RJ45 Gigabit LAN jack
- 1 RJ11 jack (12/24V, MAX 2A)

Onboard Pinheaders/ Connectors/ Jumpers

- 2 SATA 3Gb/s connectors
- 1 SATA power connector
- 2 USB 2.0 pinheaders (3 ports)
- 6 serial port connectors
- 1 CPU fan connector
- 1 system fan connector
- 1 front panel pinheader
- 1 LVDS connector
- 1 inverter connector
- 2 DC power connectors
- 1 parallel port pinheader
- 1 front audio pinheader
- 1 amplifier pinheader
- 1 GPIO pinheader
- 1 HDMI connector
- 1 VGA connector
- 1 TPM pinheader
- 1 keyboard/mouse connector
- 1 chassis intrusion pinheader
- 1 clear CMOS jumper
- 1 LVDS power jumper
- 2 serial port jumpers
- 1 RJ11 power select jumper
- 1 ATX/AT select jumper

Slot

- 1 Mini-PCIe slot

Form Factor

- Mini-ITX: 17.0cm x 17.0cm

Environmental

- Operating Temperature: 0°C ~ 60°C
- Storage Temperature: -20°C ~ 80°C
- Humidity: 5% ~ 90% RH, Non-Condensing

Mainboard Layout

RJ11 Power Jumper

LVDS Connector

DC Power Connector

LVDS Power Jumper

Back Panel

KB/MS Connector

VGA Connector

Inverter Connector

HDMI Connector

Clear CMOS Jumper

Chassis Intrusion Pinheader

Amplifier Pinheader

Parallel Port Pinheader

Front Audio Phineader

AT/ATX Jumper

COM Port Jumper

COM Port Jumper

COM Port Connector

Front Panel Pinheader

TPM Connector

SO-DIMM Slot

Fan Connector

SATA Power Connector

SATA Port

USB 2.0 Pinheader

Mini-PCIe Slot

GPIO Pinheader

DC Power Jack

Mouse/ Keyboard Combo Port

VGA Port

USB 2.0 Port

USB 2.0 Port

LAN Port

RJ11 Jack

2 Hardware Setup

This chapter provides you with the information about hardware setup procedures. While doing the installation, be careful in holding the components and follow the installation procedures. For some components, if you install in the wrong orientation, the components will not work properly.

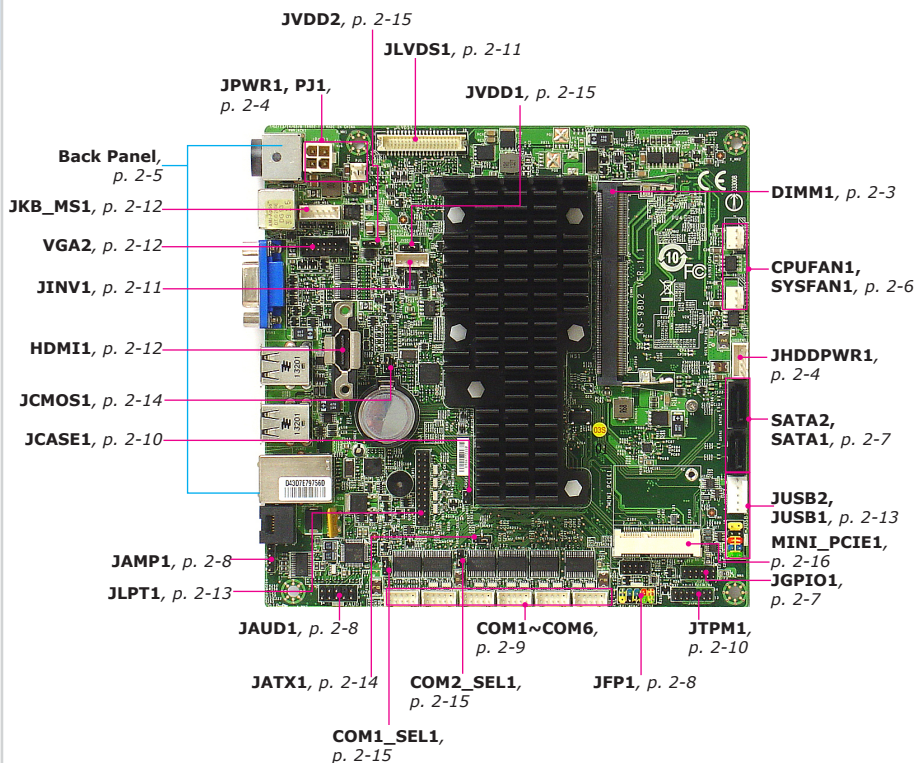Use a grounded wrist strap before handling computer components. Static electricity may damage the components.

Quick Component Guide

JVDD2, *p. 2-15*

JLVDS1, *p. 2-11*

JPWR1, PJ1, *p. 2-4*

JVDD1, *p. 2-15*

Back Panel, *p. 2-5*

DIMM1, *p. 2-3*

JKB_MS1, *p. 2-12*

VGA2, *p. 2-12*

CPUFAN1, SYSFAN1, *p. 2-6*

JINV1, *p. 2-11*

HDMI1, *p. 2-12*

JHDDPWR1, *p. 2-4*

JCMOS1, *p. 2-14*

SATA2, SATA1, *p. 2-7*

JCASE1, *p. 2-10*

JUSB2, JUSB1, *p. 2-13*

MINI_PCIE1, *p. 2-16*

JAMP1, *p. 2-8*

JGPIO1, *p. 2-7*

JLPT1, *p. 2-13*

JAUD1, *p. 2-8*

COM1~COM6, *p. 2-9*

JTPM1, *p. 2-10*

JATX1, *p. 2-14*

COM2_SEL1, *p. 2-15*

JFP1, *p. 2-8*

COM1_SEL1, *p. 2-15*
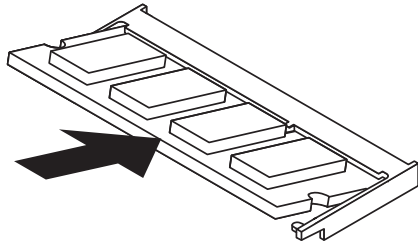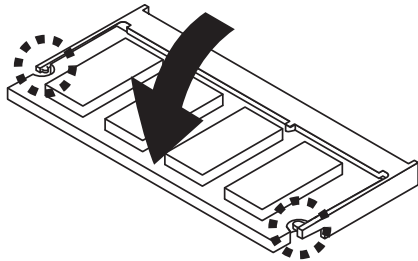
Memory

The SO-DIMM slot is intended for memory modules.

1. Locate the SO-DIMM slot. Align the notch on the DIMM with the key on the slot and insert the DIMM into the slot.

2. Push the DIMM gently down-wards until the slot levers click and lock the DIMM in place.

3. To uninstall the DIMM, flip the slot levers outwards and the DIMM will be released instantly.

Important

You can barely see the golden finger if the DIMM is properly inserted in the DIMM slot.

Power Supply

DC Power Connector: JPWR1

This connector is used to provide power to the motherboard.
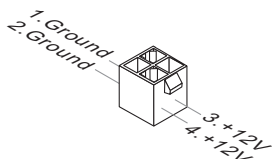
SATA Power Connector: JHDDPWR1

This connector is used to provide power to SATA devices.

DC Out Power Connector: PJ1

The connector provides 12V DC out.

Important

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

Rear Panel I/O

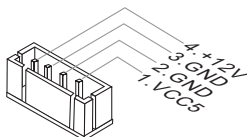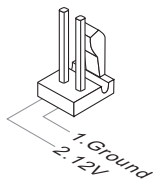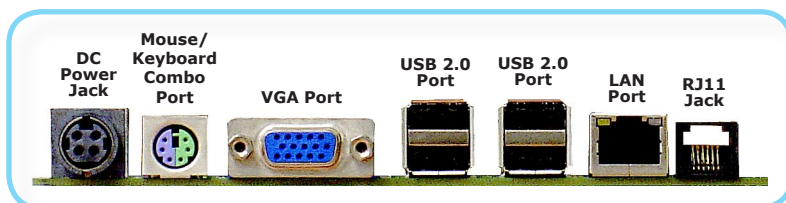### ➤ DC Power Jack

This DC jack provides 12V power for the system.

➤ Keyboard / Mouse Combo Port

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

➤ VGA Port

The DB15-pin female connector is provided for monitor.

➤ USB 2.0 Port

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

➤ 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.

Yellow ——— Green/ Orange
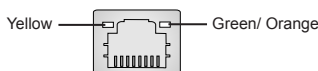
LED	Color	LED State	Condition
Left	Yellow	Off	LAN link is not established.
		On (steady state)	LAN link is established.
		On (blinking)	The computer is communicating with another computer on the LAN.
Right	Green	Off	10 Mbit/sec data rate is selected.
		On	100 Mbit/sec data rate is selected.
	Orange	On	1000 Mbit/sec data rate is selected.

➤ RJ11 Jack

The standard RJ11 jack is provided for cash drawers.

Connector

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 onboard, you must use a specially designed fan with speed sensor to take advantage of the CPU fan control.
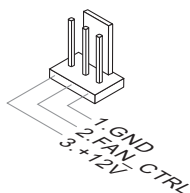
Important

- *Please refer to your processor's official website or consult your vendor to find recommended CPU cooling fans.*
- *If there are not enough ports on the mainboard to connect all system fans, adapters are available to connect a fan directly to a power supply.*
- *Before first boot up, ensure that there are no cables impeding any fan blades.*

Serial ATA Connector: SATA1, SATA2

This connector is a high-speed Serial ATA interface port. Each connector can connect to one Serial ATA device.
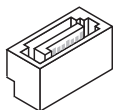
Speed Chipset	SATA 3 Gb/s
Intel NM10	SATA1, SATA2

Important

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

GPIO Pinheader: JGPIO1

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

10. GPIO Output 3
8. GPIO Output 2
6. GPIO Output 1
4. GPIO Output 0
2. VCC5
12. KEY
11. GND
9. GPIO Input 3
7. GPIO Input 2
5. GPIO Input 1
3. GPIO Input 0
1. VCC3
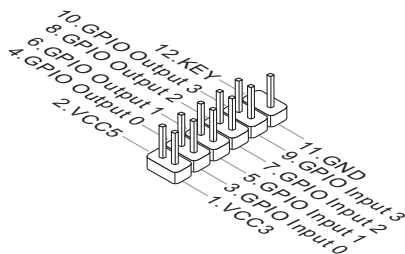
Audio Amplifier Pinheader: JAMP1

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

1. AMP_L-
2. AMP_L+
3. AMP_R-
4. AMP_R+
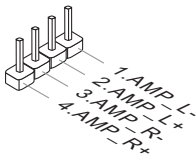
Front Audio Pinheader: JAUD1

This connector allows you to connect the front audio panel located on your computer case.

10. Line Out Jack Detect
8. Key
6. MIC Jack Detect
4. NC
2. GND
9. Line Out L
7. NC
5. Line Out R
3. MIC L
1. MIC R
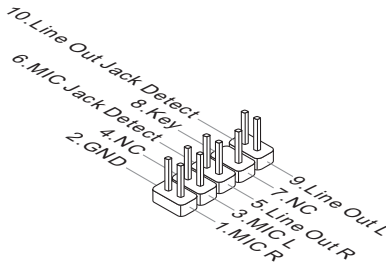
Front Panel Connector: JFP1

This front panel connector is provided for electrical connection to the front panel switches & LEDs and is compliant with Intel Front Panel I/O Connectivity Design Guide.

Power Switch
Power LED
10. No Pin
8. -
6. +
4. -
2. +
9. Reserved
7. +
5. +
3. -
1. +
Reset Switch
HDD LED
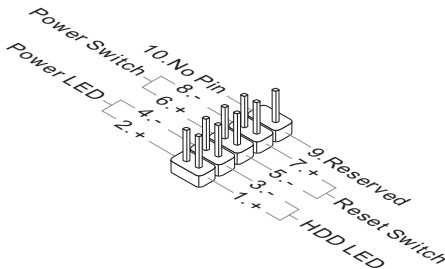
Serial Port Connector: COM1 (RS-232/-422/-485)
Serial Port Connector: COM2~6 (RS-232)

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

RS-232
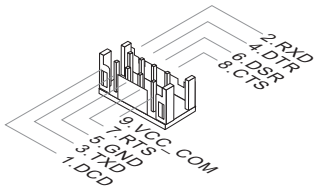
RS-232

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_COM	Power Source

RS-422
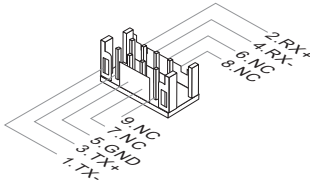
RS-422

PIN	SIGNAL	DESCRIPTION
1	422 TXD-	Transmit Data, Negative
2	422 RXD+	Receive Data, Positive
3	422 TXD+	Transmit Data, Positive
4	422 RXD-	Receive Data, Negative
5	GND	Signal Ground
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection

RS-485
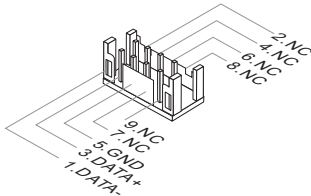
RS-485

PIN	SIGNAL	DESCRIPTION
1	485 TXD-	Transmit Data, Negative
2	NC	No Connection
3	485 TXD+	Transmit Data, Positive
4	NC	No Connection
5	GND	Signal Ground
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection

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.

2. Ground
1. CINTRU
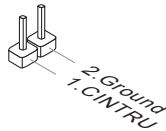
TPM Module Connector: JTPM1

This connector connects to a TPM (Trusted Platform Module) module (optional). Please refer to the TPM security platform manual for more details.

14. Ground
12. Ground
10. No Pin
8. 5V Power
6. Serial IRQ
4. 3.3V Power
2. 3V Standby power

13. LPC Frame
11. LPC address & data pin3
9. LPC address & data pin2
7. LPC address & data pin1
5. LPC address & data pin0
3. LPC Reset
1. LPC Clock
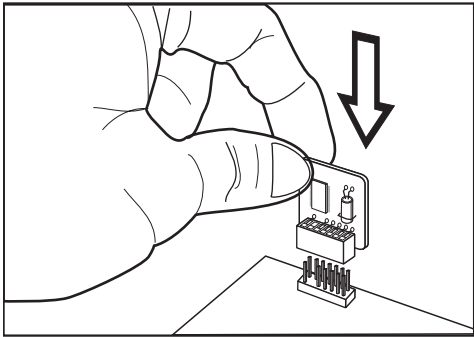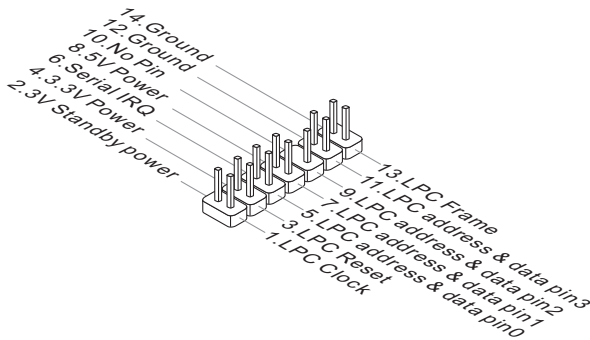
LVDS Inverter Connector: JINVT1

The connector is provided for LCD backlight options.

5. VCC5
4. L_BKLT_CTRL#
3. LVDS_BLON
2. GND
1. +12V
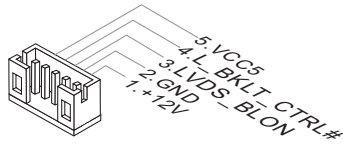
LVDS Connector: JLVDS1

The LVDS (Low Voltage Differential Signal) connector provides a digital interface typically used with flat panels. After connecting an LVDS interface flat panel to the JLVDS1, be sure to check the panel datasheet and set the LVDS jumper to proper power voltage.
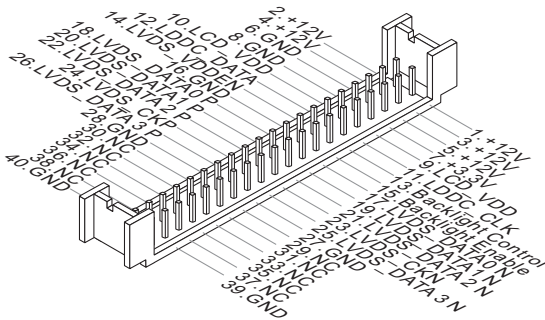
HDMI Connector: HDMI1 HƏMI

The High-Definition Multimedia Interface (HDMI) is an all-digital audio/video interface capable of transmitting uncompressed streams. HDMI supports all TV format, including standard, enhanced, or high-definition video, plus multi-channel digital audio on a single cable.
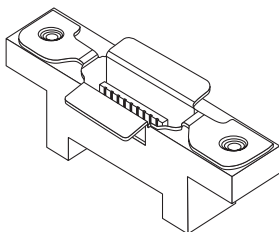
VGA Connector: VGA2

This connector is provided for monitors.
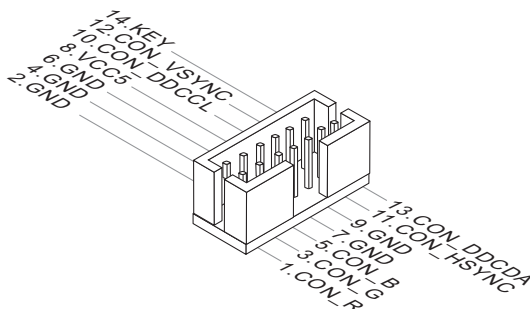
Keyboard/Mouse Connector: JKB_MS1

This connector is provided to connect a keyboard and a mouse.
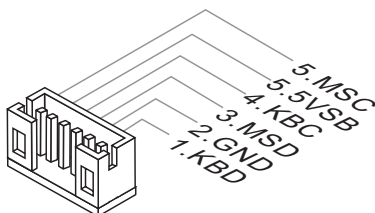
Front USB 2.0 Connector: JUSB1, JUSB2

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.

8. Ground
10. NC
6. USB1+
4. USB1-
2. VCC

9. No Pin
7. Ground
5. USB0+
3. USB0-
1. VCC

5. Ground
4. Ground
3. Data+
2. Data-
1. Power
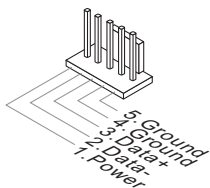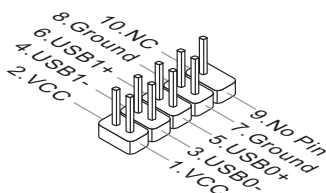
Important

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

Parallel Port Pinheader: JLPT1

The mainboard provides a 26-pin header for connection to an optional parallel port bracket. The parallel port is a standard printer port that supports Enhanced Parallel Port (EPP) and Extended Capabilities Parallel Port (ECP) mode.

26. No Pin
24. Ground
22. Ground
20. Ground
18. Ground
16. Ground
14. Ground
12. Ground
10. Ground
8. LPT_SLIN#
6. PINIT#
4. ERR#
2. AFD#

25. SLCT
23. PE
21. BUSY
19. ACK#
17. PRND7
15. PRND6
13. PRND5
11. PRND4
9. PRND3
7. PRND2
5. PRND1
3. PRND0
1. RSTB#
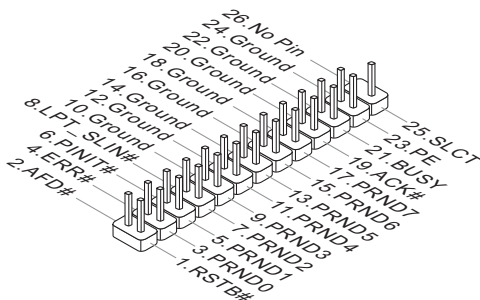
Jumper

Important

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

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.

Normal   Clear CMOS

Important

You can clear CMOS by shorting 2-3 pin while the system is off. Then return to 1-2 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.

AT   ATX

Serial Port Jumper: COM1_SEL1

The jumper specifies the pin 9 assignment of the COM1.

COM Voltage   Ring
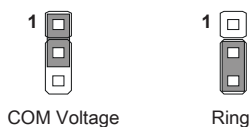
Serial Port Jumper: COM2_SEL1

The jumper specifies the pin 9 assignment of the COM2.

COM Voltage   Ring
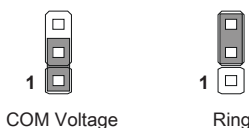
LVDS Power Jumper: JVDD1

Use this jumper to specify the operation voltage of the LVDS interface flat panel.

3V   5V

RJ11 Power Jumper: JVDD2

Use this jumper to specify the operation voltage for RJ11.

24V   +12V

Slot

Mini-PCIe (Peripheral Component Interconnect Express) Slot

The Mini-PCIe slot is provided for connecting the Mini-PCIe interface expansion card.
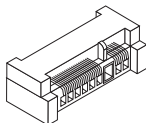
Important

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.

3 **BIOS Setup**

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

Users may need to run the Setup program when:

- An error message appears on the screen at system startup and requests users to run SETUP.
- Users want to change the default settings for customized features.

Important

Please note that BIOS update assumes technician-level experience.

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
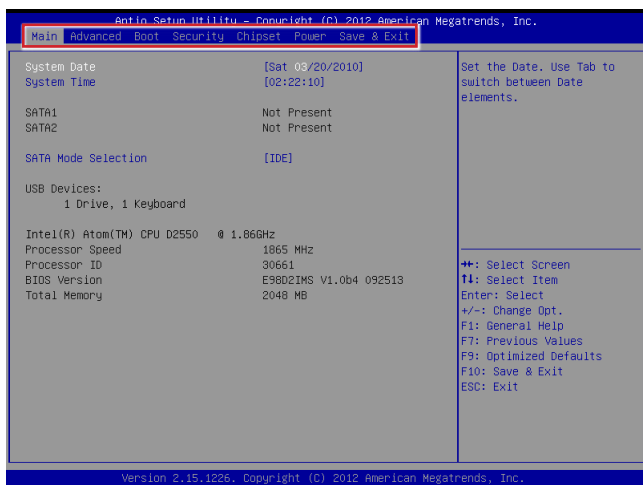
▸**Main**

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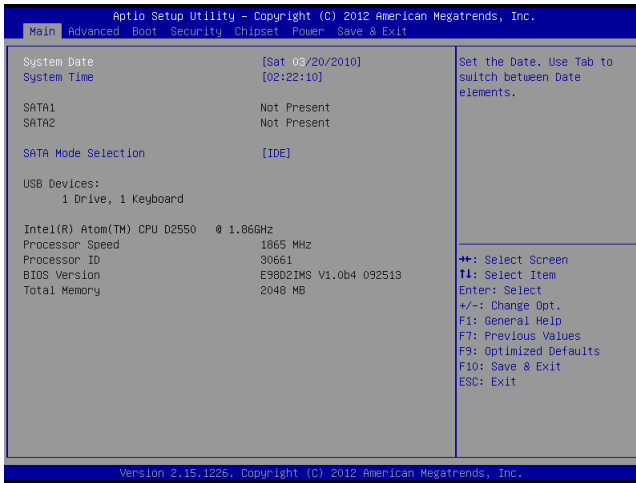
▸ **System Date**
This setting allows you to set the system date. The date format is <Day>, <Month> <Date> <Year>.

▸ **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
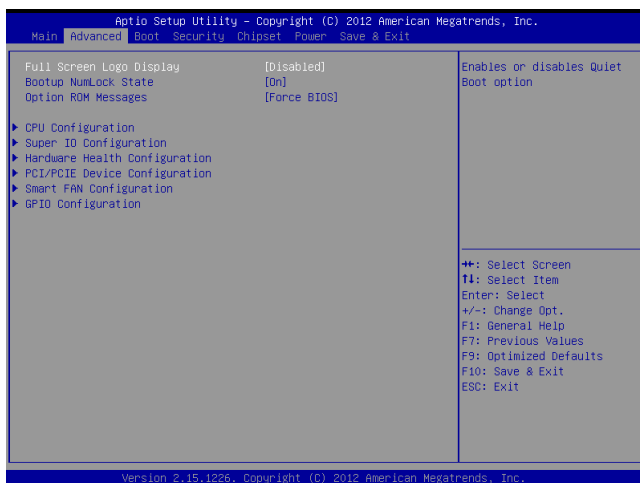
▶**Full Screen Logo Display**

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.

▸ **CPU Configuration**

```
        Advanced

CPU Configuration

Processor Type              Intel(R) Atom(TM) CPU D2550
EMT64                       Not Supported
Processor Speed             1865 MHz
System Bus Speed            533 MHz
Ratio Status                14
Actual Ratio                14
System Bus Speed            533 MHz
Processor Stepping          30661
Microcode Revision          269
L1 Cache RAM                2x56 k
L2 Cache RAM                2x512 k
Processor Core              Dual
Hyper-Threading             Supported

Hyper-Threading             [Enabled]
Execute Disable Bit         [Enabled]
Limit CPUID Maximum         [Disabled]
```

▸ **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.

▸ **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.

▸ **Limit CPUID Maximum**

This feature allows you to circumvent problems with older operating systems that do not support the Intel Pentium 4 processor with Hyper-Threading Technology. When enabled, the processor will limit the maximum CPUID input value to 03h when queried, even if the processor supports a higher CPUID input value. 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/ 5/ 6**

This setting enables/disables the specified serial port.

   ▶ **Device Settings**

   This item shows the address & IRQ settings of 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.

   ▶ **Voltage Select**

   Select an operation voltage for the specified serial port.

▶ **Parallel Port**

This setting enables/disables the parallel port.

   ▶ **Device Settings**

   This item shows the address & IRQ settings of the parallel port.

   ▶ **Change Settings**

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

   ▶ **Device Mode**

   Select an operation mode for the parallel port.

► **FIFO Mode**

This setting controls the FIFO data transfer mode.

► **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.

► **Hardware Health Configuration**

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

▸ **PCI/PCIE Device Configuration**

```
                  Advanced
PCI Latency Timer              [32 PCI Bus Clocks]
Legacy USB Support             [Enabled]
Audio Controller               [Enabled]
Launch OnBoard Lan 1 OpROM     [Disabled]
```
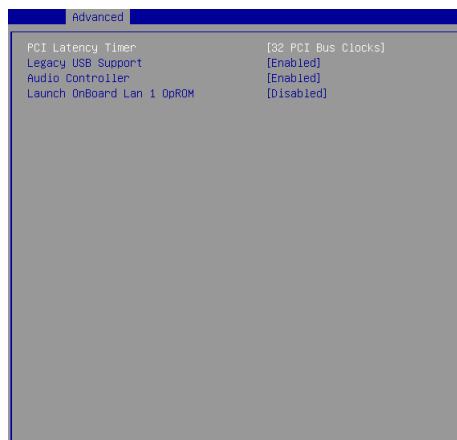
▸ **PCI Latency Timer**

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 trans- actions for a longer time and thus improve the effective PCI bandwidth. For better PCI performance, you should set the item to higher values.

▸ **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 OnBoard LAN 1 OpROM**

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

▶ **Smart Fan Configuration**

```
                 Advanced

Configuration Smart FAN

Smart CPUFAN1 Target          [Disabled]
Smart SYSFAN1 Target          [Disabled]
```

▶ **Smart CPUFAN1/ SYSFAN1 Target**

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

▶ **GPIO Configuration**

```
                 Advanced

Configure Special GPIO

GPO0 Data                     [Low]
GPO1 Data                     [Low]
GPO2 Data                     [Low]
GPO3 Data                     [Low]
```
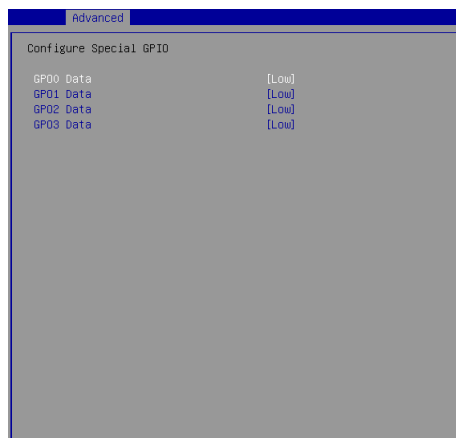
▶ **GPO0 ~ GPO3 Data**

These settings control the operation mode of the specified GPIO.

Boot

```
                    Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
              Main   Advanced   Boot  Security  Chipset  Power  Save & Exit

                                                                       Sets the system boot order

          Boot Option Priorities
          Boot Option #1                     [UEFI: SanDisk Cruzer Bl...]
          Boot Option #2                     [SanDisk Cruzer Blade 8.02]
          Boot Option #3                     [UEFI: Built-in EFI Shell ]

          Hard Drive BBS Priorities


                                                                       →←: Select Screen
                                                                       ↑↓: Select Item
                                                                       Enter: Select
                                                                       +/-: Change Opt.
                                                                       F1: General Help
                                                                       F7: Previous Values
                                                                       F9: Optimized Defaults
                                                                       F10: Save & Exit
                                                                       ESC: Exit



                    Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

▸ **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>, <PageDown> key to move it up/down in the priority list.

Security
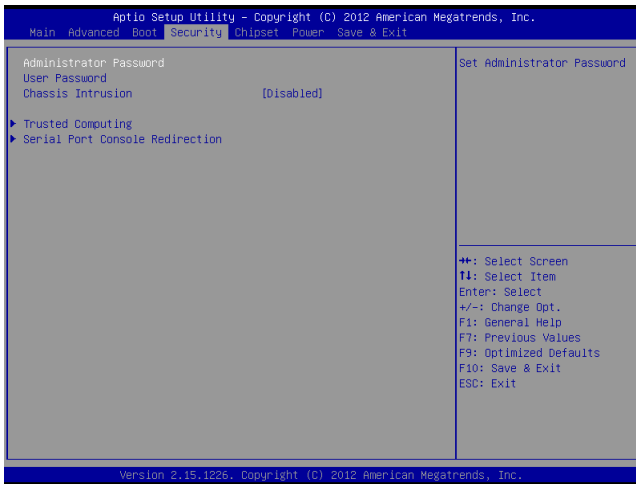
▶ **Administrator Password**

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
Configuration
  Security Device Support         [Disable]


Current Status Information
  NO Security Device Found
```
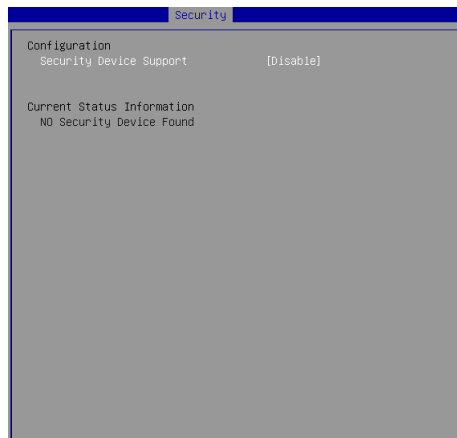
▶ **Security Device Support**

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.

▶ **Serial Port Console Redirection**

```
                          Security
COM1
  Console Redirection             [Disabled]
▶ Console Redirection Settings
```

▶ **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 re-direction. 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
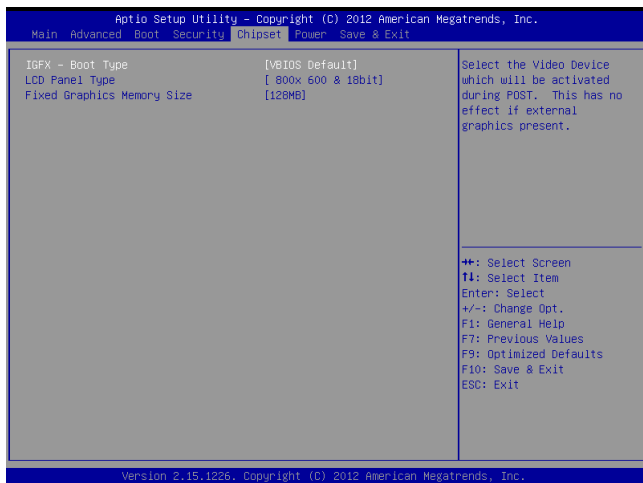
▸**IGFX - Boot Type**

Use the field to select the type of device you want to use as the boot display of the system.

▸**LCD Panel Type**

This setting allows you to set the resolution of the LCD panel.

▸**Fixed Graphics Memory Size**

This setting specifies the size of system memory allocated for video memory.

Power

```
                   Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
      Main  Advanced  Boot  Security  Chipset  Power  Save & Exit

   Restore AC Power Loss          [Power Off]            Select AC power state when
   Deep S5                        [Enabled]              power is re-applied after
                                                         a power failure.
   Advanced Resume Events Control
   USB from S3/S4                 [Enabled]
   PCIE/PCI PME                   [Disabled]
   Ring                           [Disabled]
   RTC                            [Disabled]

                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F7: Previous Values
                                                         F9: Optimized Defaults
                                                         F10: Save & Exit
                                                         ESC: Exit

                   Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

▸ **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.

▶ **PCIE/PCI PME**

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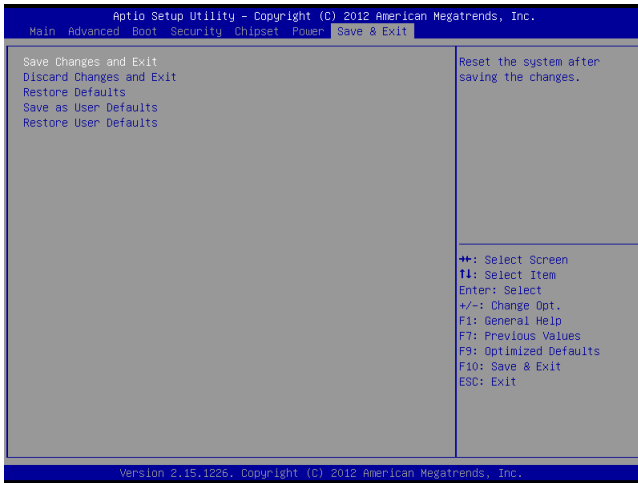
▶ **Ring**

An input signal on the serial Ring Indicator (RI) line (in other words, an incoming call on the modem) awakens the system from a soft off state.

▶ **RTC**

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

Save & Exit

```
        Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
   Main  Advanced  Boot  Security  Chipset  Power  Save & Exit

  Save Changes and Exit                                    Reset the system after
  Discard Changes and Exit                                 saving the changes.
  Restore Defaults
  Save as User Defaults
  Restore User Defaults




                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F7: Previous Values
                                                           F9: Optimized Defaults
                                                           F10: Save & Exit
                                                           ESC: Exit


           Version 2.15.1226. Copyright (C) 2012 American Megatrends, Inc.
```

▶ **Save Changes and Exit**
Save changes to CMOS and exit the Setup Utility.

▶ **Discard Changes and Exit**
Abandon all changes and exit the Setup Utility.

▶ **Restore Defaults**
Restore the factory defaults.

▶ **Save as User Defaults**
Save all changes as the user defaults.

▶ **Restore User Defaults**
Restore the preset user defaults.

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           ;Io_delay
    jmp     short $+2           ;Io_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
;Acive 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 UINT
    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				
IO Address	538h	538h	538h	538h				
SIO GPIO Register								
Bit	1	2	6	7				
Sample code	#2	#2	#2	#2				

● GPO 0 ~ GPO 3

	GPO 0	GPO 1	GPO 2	GPO 3				
IO Address	50Ch	50Ch	50Ch	50Ch				
SIO GPIO Register								
Bit	2	3	4	5				
Sample code	#3	#3	#3	#3				

```
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     0A2h
GPI_ADD               equ     50Fh
GPO_ADD               equ     538h
GPO_0                 equ     00000010b
```

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             ;Io_delay
    jmp    short $+2             ;Io_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 Pin Status Register
```

```
        mov     dx, SIO_INDEX_Port
        mov     al, GPI_REG
        out     dx, al
        mov     dx, SIO_DATA_Port
        in      al, dx
        ;al bit2 = GPI 0 status
    ; Exit SIO
        mov     al, SIO_CONFIG_MODE_EXIT_VALUE
        out     dx, al

#2 : Get GPI 3 status
        in      al, GPI_ADD
        ;al bit4 = GPI 3 status

#3 : Set GPO 0 status to high
        mov     dx, GPO_ADD
        in      al, dx
        and     al, Not GPO_0
        or      al, GPO_0
        out     dx, al
```