

MS-9988

COM Express Carrier Board



msi

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Revision History

| Revision | Date |
|----------|---------|
| V1.0 | 2014/06 |

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:
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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/evmtprrt_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.



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1 Overview

Thank you for choosing the MS-9988, an excellent COM (computer-on-module) Express Carrier Board. It is a highly advanced, feature-rich carrier that offers PCIe and Mini-PCIe expansion. This carrier board also features USB 3.0/USB 2.0 ports, a VGA port, DisplayPorts, LVDS interface, a parallel port connector, serial port connectors, audio jacks, SATA ports, etc.

Specifications

Storage

- 2 SATA 6Gb/s ports
- 2 SATA 3Gb/s ports

Audio

- Realtek ALC887 audio codec
- 3 rear audio jacks
- 1 front audio connector

Graphics

- VGA, DisplayPort, LVDS interfaces

Rear Panel I/O

- 3 audio jacks
- 4 USB 3.0 ports
- 3 DisplayPorts
- 1 VGA port
- 1 Gigabit LAN jack
- 2 USB 2.0 ports

Onboard Pin Headers/ Connectors/ Jumpers

- 1 * 24-pin power connector
- 1 * 4-pin power connector
- 2 * system fan connectors
- 2 * SATA 6Gb/s ports
- 2 * SATA 3Gb/s ports
- 1 * front panel connector
- 1 * front audio connector
- 1 * parallel port connector
- 2 * RS-232 serial port connectors
- 2 * GPIO pin headers
- 2 * SMBus connectors
- 1 * USB 2.0 connector (1 port)
- 1 * LVDS connector
- 1 * keyboard/mouse connector
- 1 * inverter power connector
- 2 * BIOS select jumpers
- 1 * inverter power jumper
- 1 * LVDS power jumper
- 1 * AT/ATX select jumper
- 2 * COM port power jumpers
- 1 * clear CMOS jumper

Expansion Slots

- 1 PCIe x16 slot
- 6 PCIe x1 slots
- 1 Mini-PCIe slot

Form Factor

- ATX form factor: 12" x 9.6"

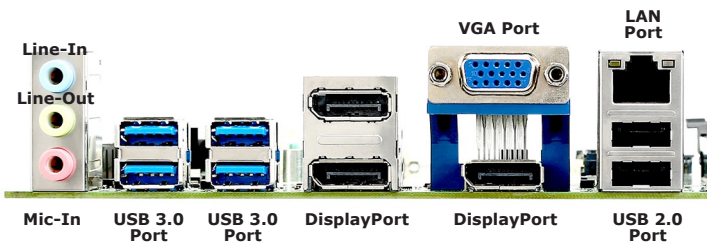
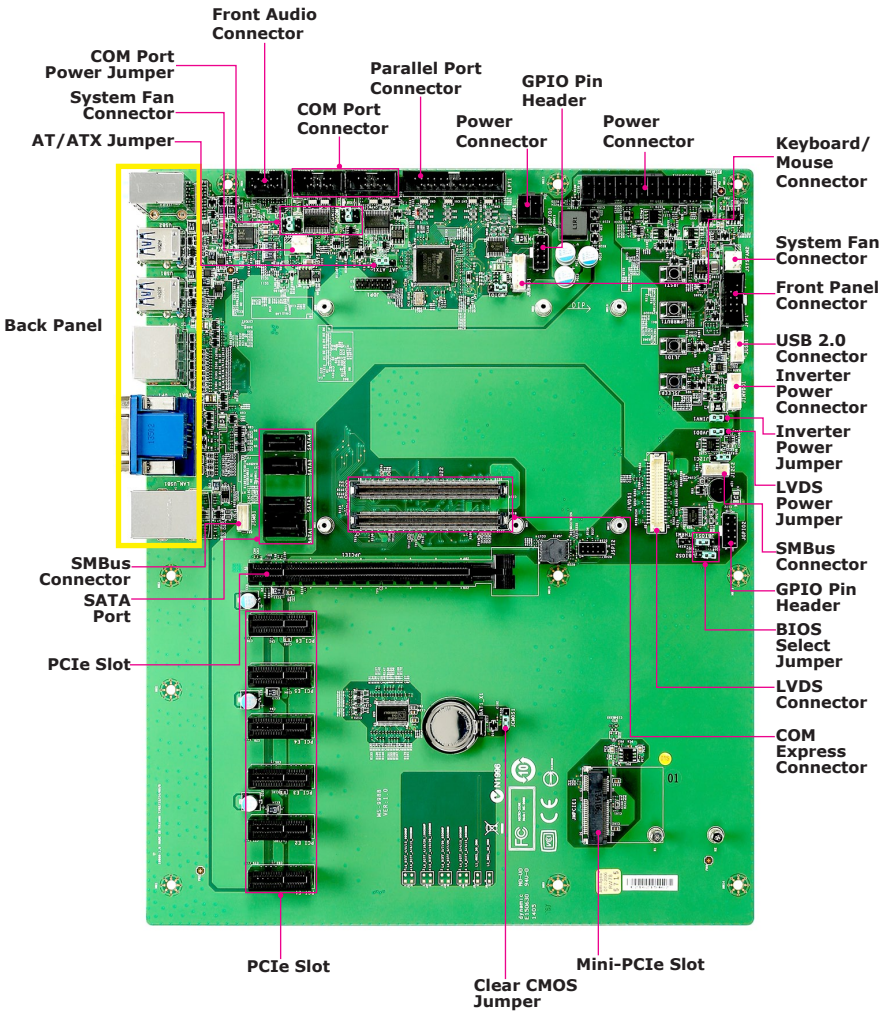
Compliance

- PICMG COM Express R2.0, Type 6

Environmental

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

Board Layout



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.

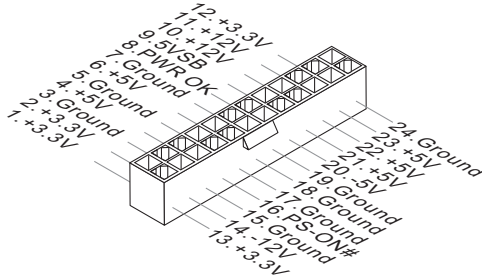
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Power Supply

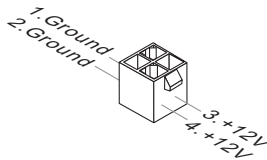
System Power Connector: PWRCONN1

This connector allows you to connect a power supply. To connect to the power supply, make sure the plug of the power supply is inserted in the proper orientation and the pins are aligned. Then push down the power supply firmly into the connector.



CPU Power Connector: JPWR1

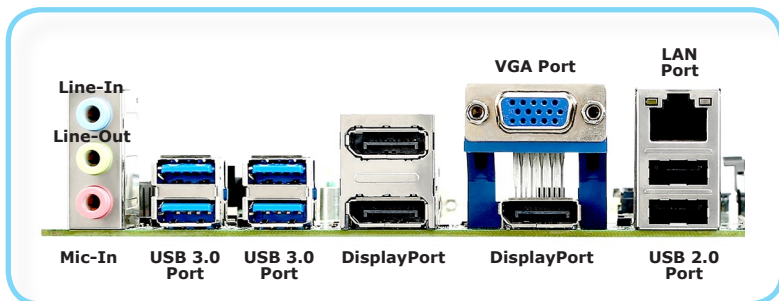
This connector is used to provide power to the CPU.



Important

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

Rear Panel I/O



► 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.

► 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).

► DisplayPort

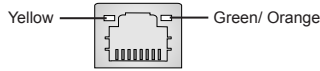
DisplayPort is a digital display interface standard. This connector is used to connect a monitor with DisplayPort inputs.

► VGA Port

The DB15-pin female connector is provided for monitor.

► 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.



| 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. |

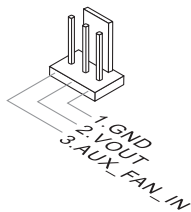
► USB 2.0 Port

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

Connector

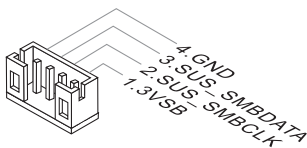
Fan Power Connector: JSYSFAN1, JSYSFAN2

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.



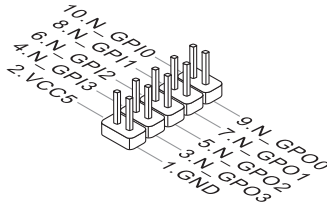
I2C Bus Connector: JSMB1, JI2C2

This connector, known as I2C, is for users to connect System Management Bus (SMBus) interface.



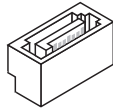
GPIO Pin Header: JGPIO1, JGPIO2

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



Serial ATA Connector: SATA1 ~ SATA4

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

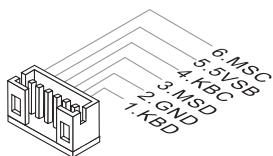


Important

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

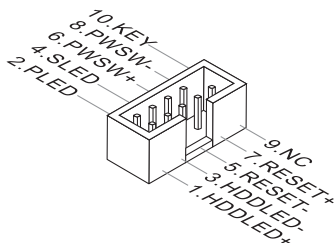
Keyboard/Mouse Connector: JKBMS1

This connector is provided to connect a keyboard and a mouse.



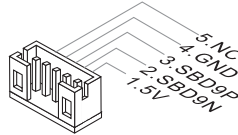
Front Panel Connector: JFP1

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.



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.

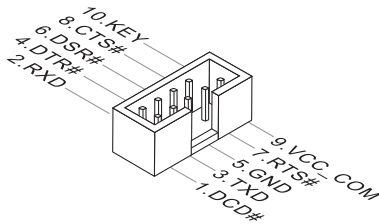


Important

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

Serial Port Connector: JCOM1, JCOM2

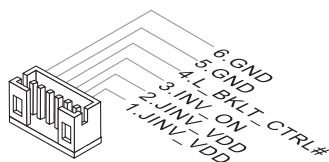
This connector is a 16550A high speed communications port that sends/receives 16 bytes FIFOs. You can attach a serial device to it.



| 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 | 12V or 5V power output, selected by jumper |

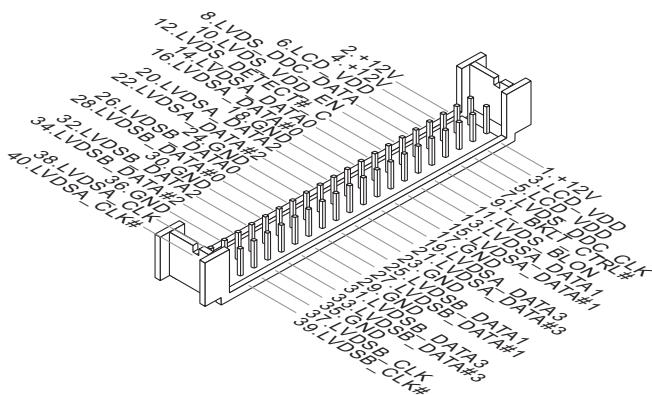
LVDS Inverter Connector: JINVDD1

The connector is provided for LCD backlight options.



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.

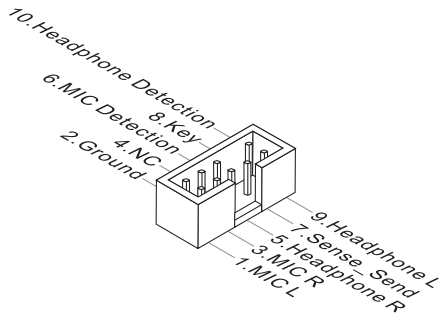


Important

Pin 12 is a detect pin. When using a customized LVDS cable, pin 12 should be a signal ground with a low impedance. Otherwise, LVDS will not function.

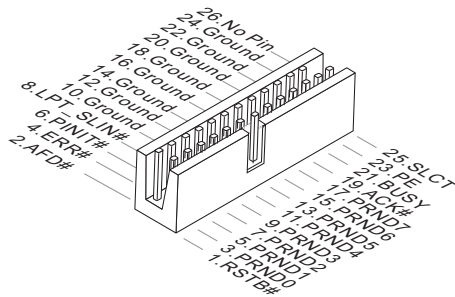
Front Audio Connector: JAUD1

This connector allows you to connect the front panel audio and is compliant with Intel Front Panel I/O Connectivity Design Guide.



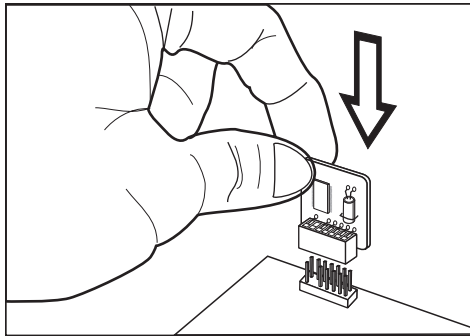
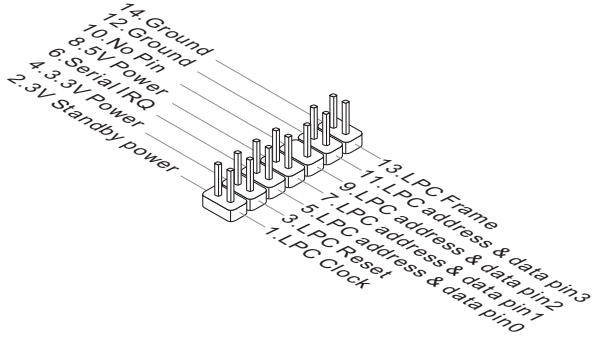
Parallel Port Connector: JLPT1

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.



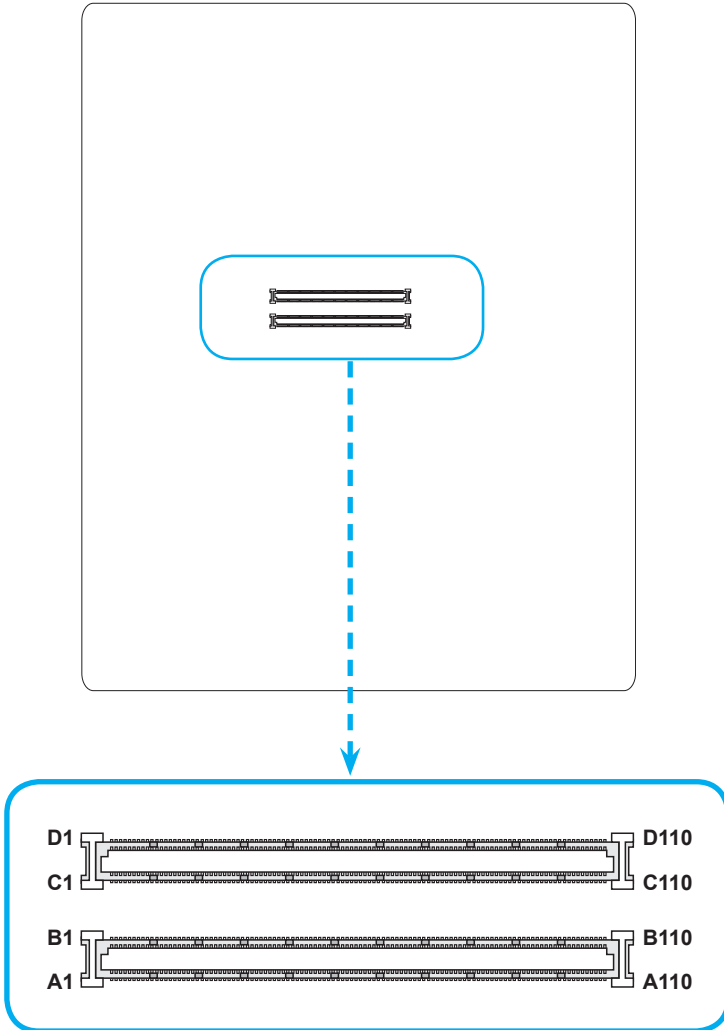
TPM Module Connector: JDP1

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



COM Express Connectors

The COM Express connectors are used to interface the COM Express carrier board to a module board. Connect the COM Express connectors on the carrier board (as indicated below) to the COM Express connectors on the module board.



| Row A | | Row B | | Row C | | Row D | |
|-------|------------------------|-------|-------------|-------|-------------------------|-------|-------------------------|
| A1 | GND (FIXED) | B1 | GND (FIXED) | C1 | GND (FIXED) | D1 | GND (FIXED) |
| A2 | GBE0_MDI3- | B2 | GBE0_ACT# | C2 | GND | D2 | GND |
| A3 | GBE0_MDI3+ | B3 | LPC_FRAME# | C3 | USB_SSRX0- | D3 | USB_SSTX0- |
| A4 | G B E 0 _ LINK100# | B4 | LPC_AD0 | C4 | USB_SSRX0+ | D4 | USB_SSTX0+ |
| A5 | G B E 0 _ LINK1000# | B5 | LPC_AD1 | C5 | GND | D5 | GND |
| A6 | GBE0_MDI2- | B6 | LPC_AD2 | C6 | USB_SSRX1- | D6 | USB_SSTX1- |
| A7 | GBE0_MDI2+ | B7 | LPC_AD3 | C7 | USB_SSRX1+ | D7 | USB_SSTX1+ |
| A8 | GBE0_LINK# | B8 | LPC_DRQ0# | C8 | GND | D8 | GND |
| A9 | GBE0_MDI1- | B9 | LPC_DRQ1# | C9 | USB_SSRX2- | D9 | USB_SSTX2- |
| A10 | GBE0_MDI1+ | B10 | LPC_CLK | C10 | USB_SSRX2+ | D10 | USB_SSTX2+ |
| A11 | GND (FIXED) | B11 | GND (FIXED) | C11 | GND (FIXED) | D11 | GND (FIXED) |
| A12 | GBE0_MDI0- | B12 | PWRBTN# | C12 | USB_SSRX3- | D12 | USB_SSTX3- |
| A13 | GBE0_MDI0+ | B13 | SMB_CK | C13 | USB_SSRX3+ | D13 | USB_SSTX3+ |
| A14 | GBE0_CTREF | B14 | SMB_DAT | C14 | GND | D14 | GND |
| A15 | SUS_S3# | B15 | SMB_ALERT# | C15 | DDI1_PAIR6+ | D15 | DDI1_CTRL- CLK_AUX+ |
| A16 | SATA0_TX+ | B16 | SATA1_TX+ | C16 | DDI1_PAIR6- | D16 | DDI1_CTRL- DATA_AUX- |
| A17 | SATA0_TX- | B17 | SATA1_TX- | C17 | RSVD | D17 | RSVD |
| A18 | SUS_S4# | B18 | SUS_STAT# | C18 | RSVD | D18 | RSVD |
| A19 | SATA0_RX+ | B19 | SATA1_RX+ | C19 | PCIE_RX6+ | D19 | PCIE_TX6+ |
| A20 | SATA0_RX- | B20 | SATA1_RX- | C20 | PCIE_RX6- | D20 | PCIE_TX6- |
| A21 | GND (FIXED) | B21 | GND (FIXED) | C21 | GND (FIXED) | D21 | GND (FIXED) |
| A22 | SATA2_TX+ | B22 | SATA3_TX+ | C22 | PCIE_RX7+ | D22 | PCIE_TX7+ |
| A23 | SATA2_TX- | B23 | SATA3_TX- | C23 | PCIE_RX7- | D23 | PCIE_TX7- |
| A24 | SUS_S5# | B24 | PWR_OK | C24 | DDI1_HPDP | D24 | RSVD |
| A25 | SATA2_RX+ | B25 | SATA3_RX+ | C25 | DDI1_PAIR4+ | D25 | RSVD |
| A26 | SATA2_RX- | B26 | SATA3_RX- | C26 | DDI1_PAIR4- | D26 | DDI1_PAIR0+ |
| A27 | BATLOW# | B27 | WDT | C27 | RSVD | D27 | DDI1_PAIR0- |
| A28 | ATA_ACT# | B28 | AC_SDIN2 | C28 | RSVD | D28 | RSVD |
| A29 | AC_SYNC | B29 | AC_SDIN1 | C29 | DDI1_PAIR5+ | D29 | DDI1_PAIR1+ |
| A30 | AC_RST# | B30 | AC_SDIN0 | C30 | DDI1_PAIR5- | D30 | DDI1_PAIR1- |
| A31 | GND (FIXED) | B31 | GND (FIXED) | C31 | GND (FIXED) | D31 | GND (FIXED) |
| A32 | AC_BITCLK | B32 | SPKR | C32 | DDI2_CTRL- CLK_AUX+ | D32 | DDI1_PAIR2+ |
| A33 | AC_SDOUT | B33 | I2C_CK | C33 | DDI2_CTRL- DATA_AUX- | D33 | DDI1_PAIR2- |
| A34 | BIOS_DIS0# | B34 | I2C_DAT | C34 | DDI2_DDC_ AUX_SEL | D34 | DDI1_DDC_ AUX_SEL |

| | | | | | | | |
|-----|--------------|-----|--------------|-----|---------------------|-----|-------------|
| A35 | THRMTRIP# | B35 | THRM# | C35 | RSVD | D35 | RSVD |
| A36 | USB6- | B36 | USB7- | C36 | DDI3_CTRL-CLK_AUX+ | D36 | DDI1_PAIR3+ |
| A37 | USB6+ | B37 | USB7+ | C37 | DDI3_CTRL-DATA_AUX- | D37 | DDI1_PAIR3- |
| A38 | USB_6_7_OC# | B38 | USB_4_5_OC# | C38 | DDI3_DDC_AUX_SEL | D38 | RSVD |
| A39 | USB4- | B39 | USB5- | C39 | DDI3_PAIR0+ | D39 | DDI2_PAIR0+ |
| A40 | USB4+ | B40 | USB5+ | C40 | DDI3_PAIR0- | D40 | DDI2_PAIR0- |
| A41 | GND (FIXED) | B41 | GND (FIXED) | C41 | GND (FIXED) | D41 | GND (FIXED) |
| A42 | USB2- | B42 | USB3- | C42 | DDI3_PAIR1+ | D42 | DDI2_PAIR1+ |
| A43 | USB2+ | B43 | USB3+ | C43 | DDI3_PAIR1- | D43 | DDI2_PAIR1- |
| A44 | USB_2_3_OC# | B44 | USB_0_1_OC# | C44 | DDI3_HPD | D44 | DDI2_HPD |
| A45 | USB0- | B45 | USB1- | C45 | RSVD | D45 | RSVD |
| A46 | USB0+ | B46 | USB1+ | C46 | DDI3_PAIR2+ | D46 | DDI2_PAIR2+ |
| A47 | VCC_RTC | B47 | EXCD1_PERST# | C47 | DDI3_PAIR2- | D47 | DDI2_PAIR2- |
| A48 | EXCD0_PERST# | B48 | EXCD1_CPPE# | C48 | RSVD | D48 | RSVD |
| A49 | EXCD0_CPPE# | B49 | SYS_RESET# | C49 | DDI3_PAIR1- | D49 | DDI2_PAIR3+ |
| A50 | LPC_SERIRQ | B50 | CB_RESET# | C50 | DDI3_PAIR3- | D50 | DDI2_PAIR3- |
| A51 | GND (FIXED) | B51 | GND (FIXED) | C51 | GND (FIXED) | D51 | GND (FIXED) |
| A52 | PCIE_TX5+ | B52 | PCIE_RX5+ | C52 | PEG_RX0+ | D52 | PEG_TX0+ |
| A53 | PCIE_TX5- | B53 | PCIE_RX5- | C53 | PEG_RX0- | D53 | PEG_TX0- |
| A54 | GPI0 | B54 | GPO1 | C54 | TYPE0# | D54 | PEG_LAN_RV# |
| A55 | PCIE_TX4+ | B55 | PCIE_RX4+ | C55 | PEG_RX1+ | D55 | PEG_TX1+ |
| A56 | PCIE_TX4- | B56 | PCIE_RX4- | C56 | PEG_RX1- | D56 | PEG_TX1- |
| A57 | GND | B57 | GPO2 | C57 | TYPE1# | D57 | TYPE2# |
| A58 | PCIE_TX3+ | B58 | PCIE_RX3+ | C58 | PEG_RX2+ | D58 | PEG_TX2+ |
| A59 | PCIE_TX3- | B59 | PCIE_RX3- | C59 | PEG_RX2- | D59 | PEG_TX2- |
| A60 | GND (FIXED) | B60 | GND (FIXED) | C60 | GND (FIXED) | D60 | GND (FIXED) |
| A61 | PCIE_TX2+ | B61 | PCIE_RX2+ | C61 | PEG_RX3+ | D61 | PEG_TX3+ |
| A62 | PCIE_TX2- | B62 | PCIE_RX2- | C62 | PEG_RX3- | D62 | PEG_TX3- |
| A63 | GPI1 | B63 | GPO3 | C63 | RSVD | D63 | RSVD |
| A64 | PCIE_TX1+ | B64 | PCIE_RX1+ | C64 | RSVD | D64 | RSVD |
| A65 | PCIE_TX1- | B65 | PCIE_RX1- | C65 | PEG_RX4+ | D65 | PEG_TX4+ |
| A66 | GND | B66 | WAKE0# | C66 | PEG_RX4- | D66 | PEG_TX4- |
| A67 | GPI2 | B67 | WAKE1# | C67 | RSVD | D67 | GND |
| A68 | PCIE_TX0+ | B68 | PCIE_RX0+ | C68 | PEG_RX5+ | D68 | PEG_TX5+ |

| | | | | | | | |
|------|---------------|------|----------------|------|-------------|------|-------------|
| A69 | PCIE_TX0- | B69 | PCIE_RX0- | C69 | PEG_RX5- | D69 | PEG_TX5- |
| A70 | GND (FIXED) | B70 | GND (FIXED) | C70 | GND (FIXED) | D70 | GND (FIXED) |
| A71 | LVDS_A0+ | B71 | LVDS_B0+ | C71 | PEG_RX6+ | D71 | PEG_TX6+ |
| A72 | LVDS_A0- | B72 | LVDS_B0- | C72 | PEG_RX6- | D72 | PEG_TX6- |
| A73 | LVDS_A1+ | B73 | LVDS_B1+ | C73 | GND | D73 | GND |
| A74 | LVDS_A1- | B74 | LVDS_B1- | C74 | PEG_RX7+ | D74 | PEG_TX7+ |
| A75 | LVDS_A2+ | B75 | LVDS_B2+ | C75 | PEG_RX7- | D75 | PEG_TX7- |
| A76 | LVDS_A2- | B76 | LVDS_B2- | C76 | GND | D76 | GND |
| A77 | LVDS_VDD_EN | B77 | LVDS_B3+ | C77 | RSVD | D77 | RSVD |
| A78 | LVDS_A3+ | B78 | LVDS_B3- | C78 | PEG_RX8+ | D78 | PEG_TX8+ |
| A79 | LVDS_A3- | B79 | LVDS_BKLT_EN | C79 | PEG_RX8- | D79 | PEG_TX8- |
| A80 | GND (FIXED) | B80 | GND (FIXED) | C80 | GND (FIXED) | D80 | GND (FIXED) |
| A81 | LVDS_A_CK+ | B81 | LVDS_B_CK+ | C81 | PEG_RX9+ | D81 | PEG_TX9+ |
| A82 | LVDS_A_CK- | B82 | LVDS_B_CK- | C82 | PEG_RX9- | D82 | PEG_TX9- |
| A83 | LVDS_I2C_CK | B83 | LVDS_BKLT_CTRL | C83 | RSVD | D83 | RSVD |
| A84 | LVDS_I2C_DAT | B84 | VCC_5V_SBY | C84 | GND | D84 | GND |
| A85 | GPI3 | B85 | VCC_5V_SBY | C85 | PEG_RX10+ | D85 | PEG_TX10+ |
| A86 | KBD_RST# | B86 | VCC_5V_SBY | C86 | PEG_RX10- | D86 | PEG_TX10- |
| A87 | KBD_A20GATE | B87 | VCC_5V_SBY | C87 | GND | D87 | GND |
| A88 | PCIE0_CK_REF+ | B88 | BISO_DIS1# | C88 | PEG_RX11+ | D88 | PEG_TX11+ |
| A89 | PCIE0_CK_REF- | B89 | VGA_RED | C89 | PEG_RX11- | D89 | PEG_TX11- |
| A90 | GND (FIXED) | B90 | GND (FIXED) | C90 | GND (FIXED) | D90 | GND (FIXED) |
| A91 | SPI_POWER | B91 | VGA_GRN | C91 | PEG_RX12+ | D91 | PEG_TX12+ |
| A92 | SPI_MISO | B92 | VGA_BLU | C92 | PEG_RX12- | D92 | PEG_TX12- |
| A93 | GPO0 | B93 | VGA_HSYNC | C93 | GND | D93 | GND |
| A94 | SPI_CLK | B94 | VGA_VSYNC | C94 | PEG_RX13+ | D94 | PEG_TX13+ |
| A95 | SPI_MOSI | B95 | VGA_I2C_CK | C95 | PEG_RX13- | D95 | PEG_TX13- |
| A96 | GND | B96 | VGA_I2C_DAT | C96 | GND | D96 | GND |
| A97 | TYPE10# | B97 | SPI_CS# | C97 | RSVD | D97 | RSVD |
| A98 | RSVD | B98 | RSVD | C98 | PEG_RX14+ | D98 | PEG_TX14+ |
| A99 | RSVD | B99 | RSVD | C99 | PEG_RX14- | D99 | PEG_TX14- |
| A100 | GND (FIXED) | B100 | GND (FIXED) | C100 | GND (FIXED) | D100 | GND (FIXED) |
| A101 | RSVD | B101 | RSVD | C101 | PEG_RX15+ | D101 | PEG_TX15+ |
| A102 | RSVD | B102 | RSVD | C102 | PEG_RX15- | D102 | PEG_TX15- |
| A103 | RSVD | B103 | RSVD | C103 | GND | D103 | GND |

| | | | | | | | |
|------|-------------|------|-------------|------|-------------|------|-------------|
| A104 | VCC_12V | B104 | VCC_12V | C104 | VCC_12V | D104 | VCC_12V |
| A105 | VCC_12V | B105 | VCC_12V | C105 | VCC_12V | D105 | VCC_12V |
| A106 | VCC_12V | B106 | VCC_12V | C106 | VCC_12V | D106 | VCC_12V |
| A107 | VCC_12V | B107 | VCC_12V | C107 | VCC_12V | D107 | VCC_12V |
| A108 | VCC_12V | B108 | VCC_12V | C108 | VCC_12V | D108 | VCC_12V |
| A109 | VCC_12V | B109 | VCC_12V | C109 | VCC_12V | D109 | VCC_12V |
| A110 | GND (FIXED) | B110 | GND (FIXED) | C110 | GND (FIXED) | D110 | GND (FIXED) |

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: JAT_ATX1

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



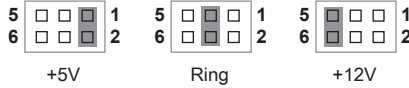
ATX



AT

COM Port Power Jumper: VCOM1, VCOM2

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



BIOS Select Jumper: JBIOS1, JBIOS2

This jumper is used to enable/disable the BIOS flash. When you intend to update the BIOS code, short connect pin#2-3 first. Under normal operation, we suggest that you enable the BIOS flash protection by short connecting pin#1-2 to protect the system BIOS from virus infection.

| JBIOS1 | JBIOS2 | Description |
|--------|--------|--|
| 1 | 1 | Enable Carrier Board Flash ROM (Default) |
| 1 | 1 | Enable Module Board Flash ROM |

LVDS Power Jumper: JVDD1

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



Inverter Power Jumper: JINV1

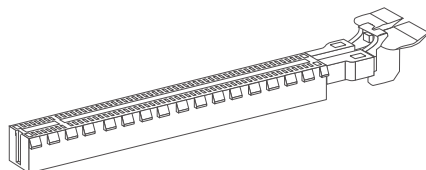
Use this jumper to specify the operation voltage of the inverter module.



Slot

PCIe (Peripheral Component Interconnect Express) Slot

The PCI Express slot supports PCIe interface expansion cards.



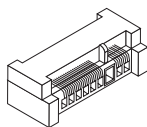
PCIe x16 slot



PCIe x1 slot

Mini-PCIe (Peripheral Component Interconnect Express) Slot

The Mini-PCIe slot is provided for wireless LAN cards, TV tuner cards, Robson NAND Flash cards and other Mini-PCIe cards.



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.*
- *As the system BIOS is under continuous update for better system performance, the illustrations in this chapter should be held for reference only.*

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 key to enter Setup.

Press 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.

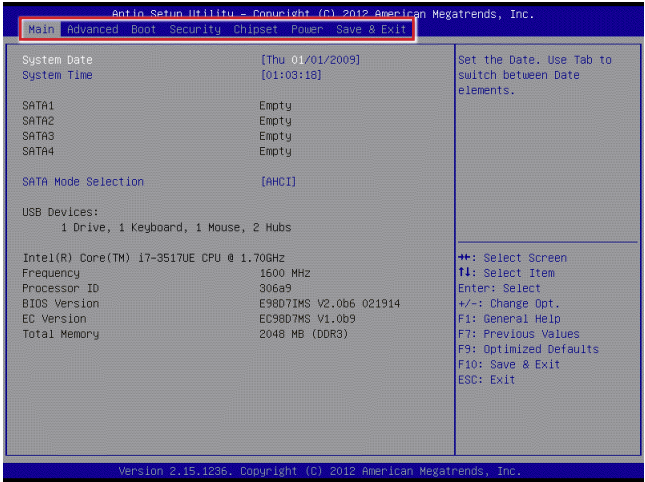
Sub-Menu

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.

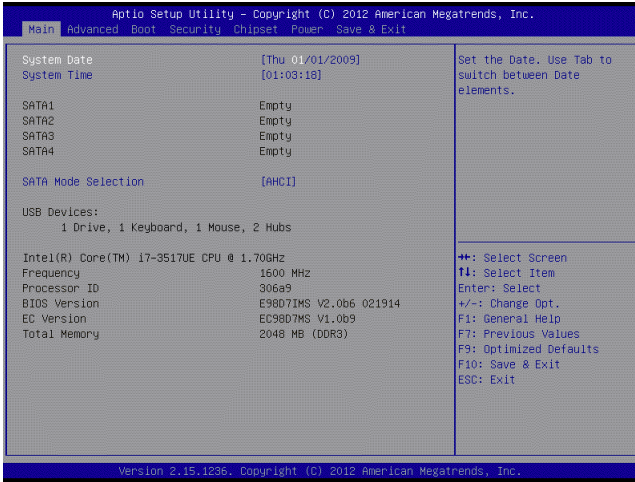
► **Power**

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>.

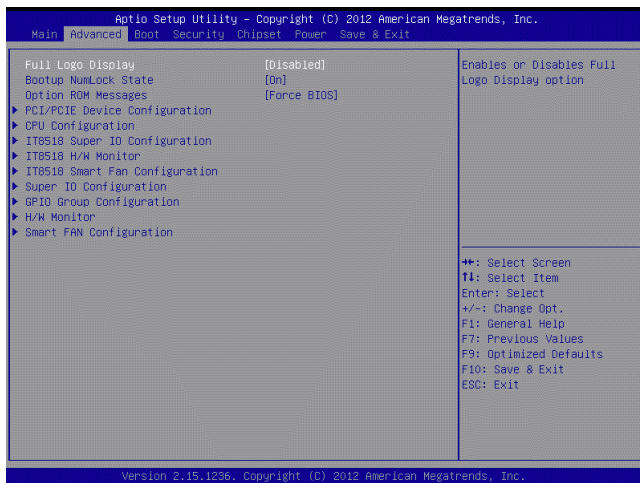
► System Time

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.

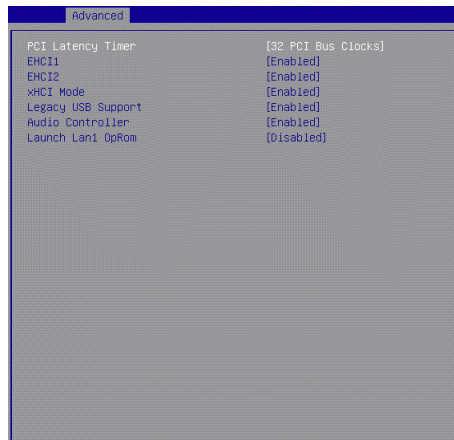
► Bootup NumLock State

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 LAN1 OpROM

This setting enables/disables the initialization of the specified LAN Boot ROM during bootup. Selecting [Disabled] will speed up the boot process.

► CPU Configuration

| Advanced | |
|---|------------|
| CPU Configuration | |
| Intel(R) Core(TM) i7-3517UE CPU @ 1.70GHz | |
| CPU Signature | 306a9 |
| Microcode Patch | 19 |
| CPU Speed | 1600 MHz |
| Processor Cores | 2 |
| Intel HT Technology | Supported |
| Intel VT-x Technology | Supported |
| Intel SMX Technology | Supported |
| 64-bit | Supported |
| L2 Cache | 256 kB x 2 |
| L3 Cache | 4096 kB |
| Hyper-threading | [Enabled] |
| Active Processor Cores | [#11] |
| Execute Disable Bit | [Enabled] |
| Intel Virtualization Technology | [Disabled] |
| EIST | [Enabled] |

► 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.

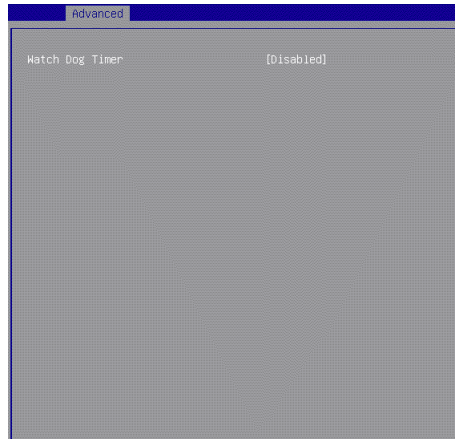
► Intel Virtualization Technology

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.

► IT8518 Super IO Configuration

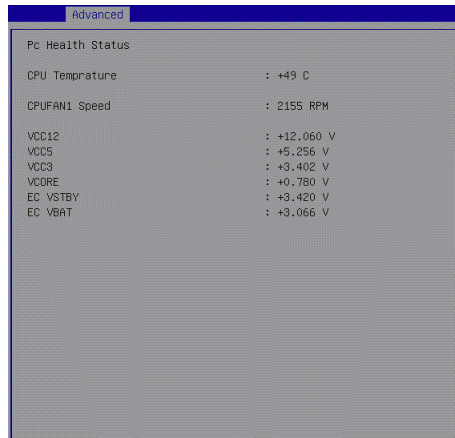


► Watch Dog Timer

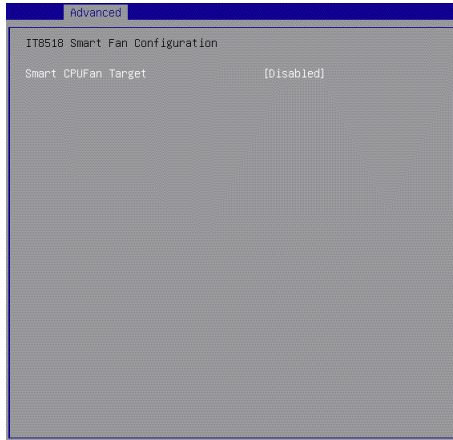
You can enable the system watch-dog timer, a hardware timer that generates a reset when the software that it monitors does not respond as expected each time the watch dog polls it.

► IT8518 H/W Monitor (*the Compact Module*)

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



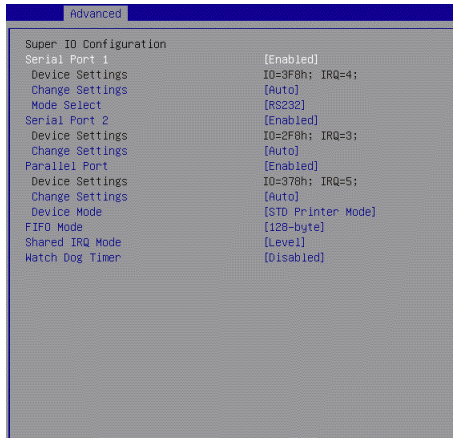
► **IT8518 Smart Fan Configuration** *(the Compact Module)*



► **Smart CPUFAN 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.

► **Super IO Configuration** *(the Carrier Board)*



► **Serial Port 1, Serial Port 2**

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.

► **Parallel Port**

This setting enables/disables 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.

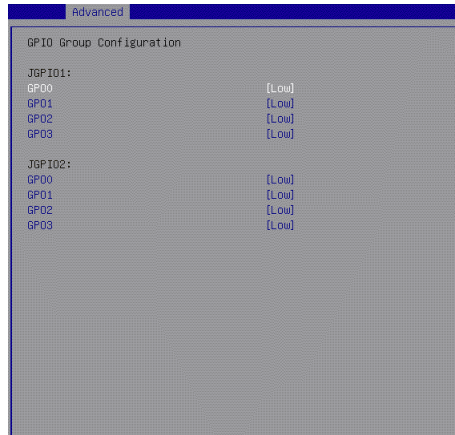
► **Shared IRQ Mode**

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.

► **GPIO Group Configuration (the Carrier Board)**

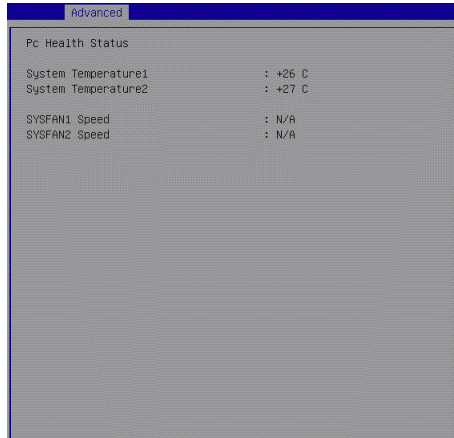


► **GPO0 ~ GPO3**

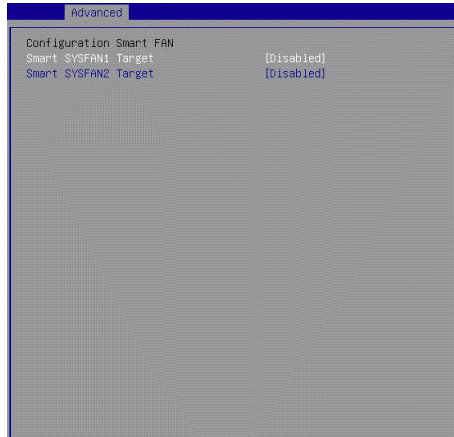
These settings control the operation mode of the specified GPIO.

► **H/W Monitor** *(the Carrier Board)*

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



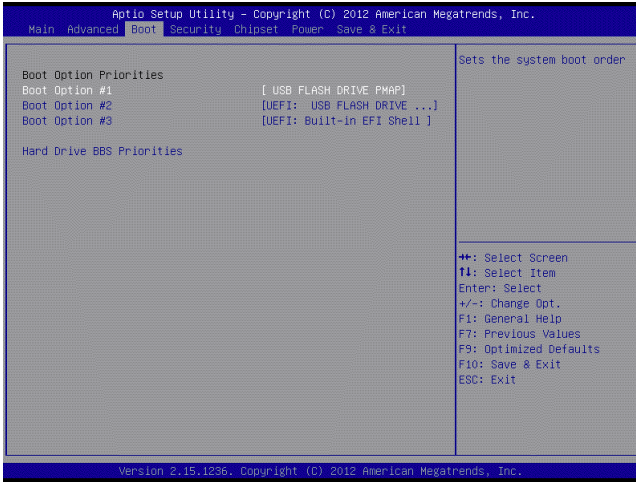
► **Smart Fan Configuration** *(the Carrier Board)*



► **Smart SYSFAN1, SYSFAN2 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.

Boot



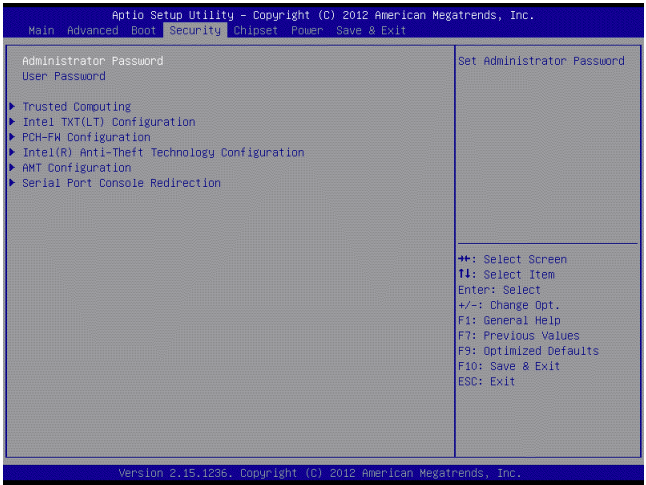
► Boot Option Priorities

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

Security



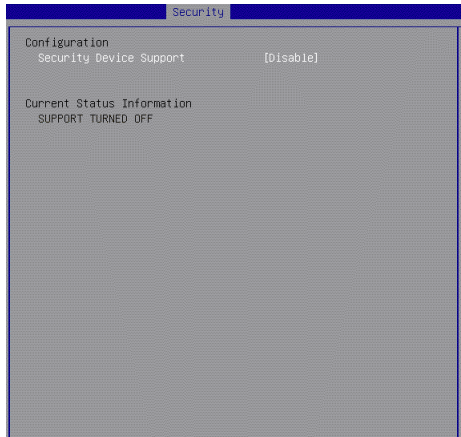
▶ **Administrator Password**

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.

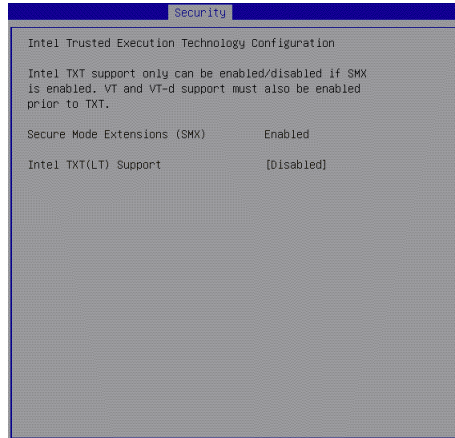
▶ **Trusted Computing**



► 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.

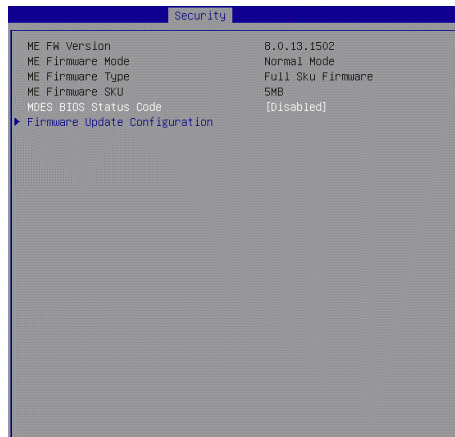
► Intel TXT(LT) Configuration



► 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).

► **MDES BIOS Status Code**

This setting enables/disables the MDES BIOS status code.

► **Firmware Update Configuration**

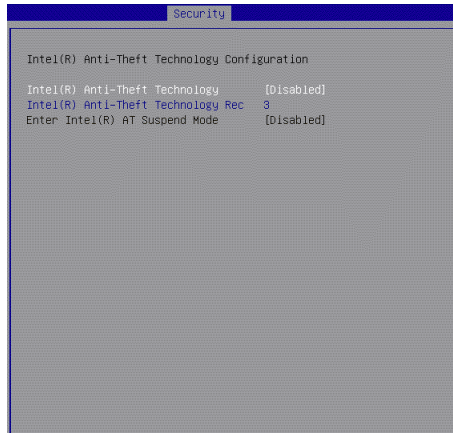


► **ME FW Image Re-Flash**

This setting enables/disables the ME FW image reflash.

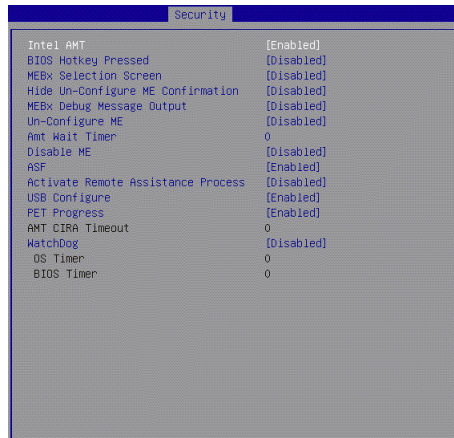
► **Intel(R) Anti-Theft Technology Configuration**

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.

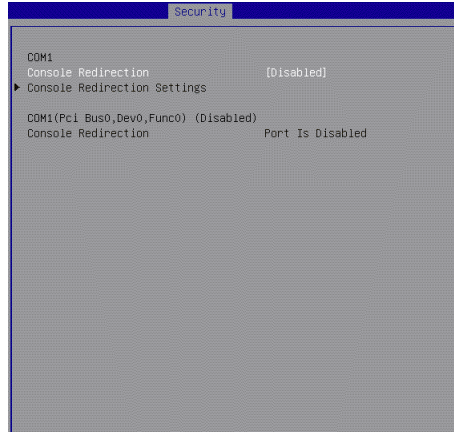


► AMT Configuration

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

| COM1 Console Redirection Settings | |
|--------------------------------------|-----------------|
| Terminal Type | [ANSI] |
| Bits per second | [115200] |
| Data Bits | [8] |
| Parity | [None] |
| Stop Bits | [1] |
| Flow Control | [None] |
| VT-UTF8 Combo Key Support | [Enabled] |
| Recorder Mode | [Disabled] |
| Resolution 100x31 | [Disabled] |
| Legacy OS Redirection Resolution | [80x24] |
| Putty Keypad | [VT100] |
| Redirection After BIOS POST | [Always Enable] |

► 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.

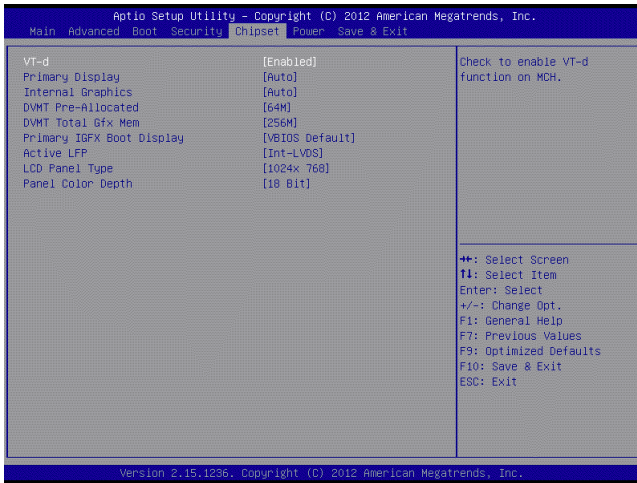
► Putty Keypad

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

► Redirection After BIOS POST

This setting determines whether or not to keep terminals' console redirection running after the BIOS POST has booted.

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 field specifies the size of system memory allocated for video memory.

▶ 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)

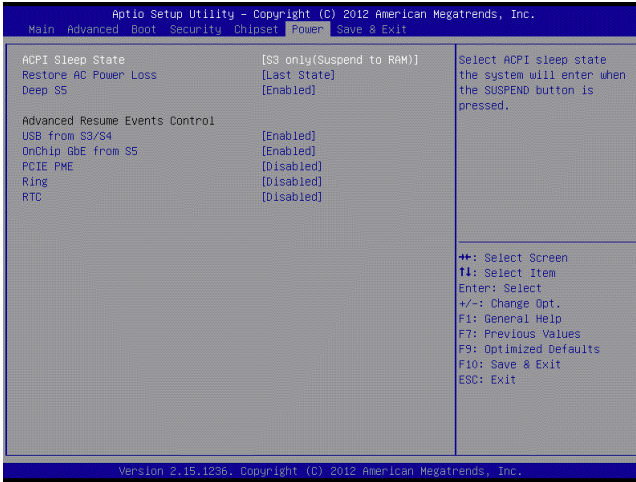
▶ **LCD Panel Type**

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

▶ **Panel Color Depth**

This item is used for setting the matching panel color depth.

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/PCI PME is detected.

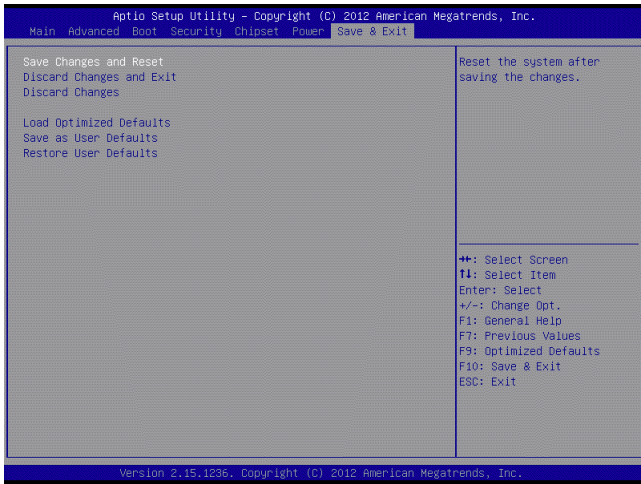
► **Ring**

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], 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.

► Load Optimized Defaults

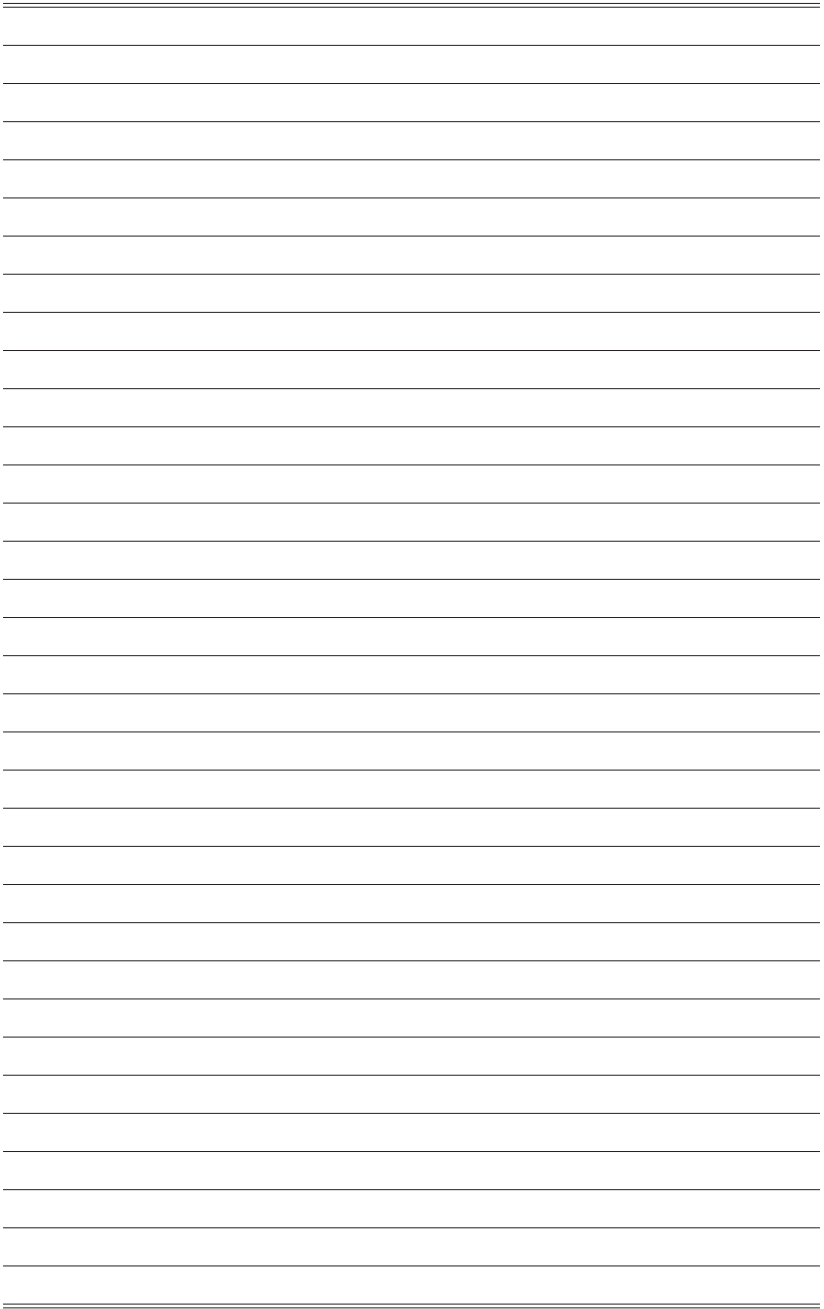
Use this menu to load the default values set by the motherboard manufacturer specifically for optimal performance of the motherboard.

► Save as User Defaults

Save changes as the user's default profile.

► Restore User Defaults

Restore the user's default profile.



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

;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 UINIT
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

JGPIO1

- GPI 0 ~ GPI 3

| | GPI 0 | GPI 1 | GPI 2 | GPI 3 | | | | |
|-------------------|-------|-------|-------|-------|--|--|--|--|
| IO Address | | | | | | | | |
| SIO GPIO Register | B2h | | | | | | | |
| Bit | 0 | 1 | 2 | 3 | | | | |
| Sample code | #1 | | | | | | | |

- GPO 0 ~ GPO 3

| | GPO 0 | GPO 1 | GPO 2 | GPO 3 | | | | |
|-------------------|-------|-------|-------|-------|--|--|--|--|
| IO Address | | | | | | | | |
| SIO GPIO Register | B1h | | | | | | | |
| Bit | 4 | 5 | 6 | 7 | | | | |
| Sample code | #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    0B2h
GPO_REG             equ    0B1h
GPO0_Value          equ    00010000b

```

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 bit0 = GPI 0 status
; Exit SIO
mov    dx, SIO_INDEX_Port
mov    al, SIO_Lock_Value
out    dx, al

#2 : Set GPO 0 to high
; 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

; Set GPO 0 Register
mov    dx, SIO_INDEX_Port
mov    al, GPO_REG
out    dx, al
mov    dx, SIO_DATA_Port
in     al, dx
and    al, not GPO0_Value ;clear al bit4 (GPO 0)
or     al, GPO0_Value     ;set GPO 0
out    dx, al

; Exit SIO
mov    dx, SIO_INDEX_Port
mov    al, SIO_Lock_Value
out    dx, al

```

JGPIO2

- GPI 0 ~ GPI 3

| | GPI 0 | GPI 1 | GPI 2 | GPI 3 | | | | |
|------------------|-------|-------|-------|-------|--|--|--|--|
| IO Address | | | | | | | | |
| EC GPIO Register | 16h | | | | | | | |
| Bit | 4 | 5 | 6 | 7 | | | | |
| Sample code | #1 | | | | | | | |

- GPO 0 ~ GPO 3

| | GPO 0 | GPO 1 | GPO 2 | GPO 3 | | | | |
|------------------|-------|-------|-------|-------|--|--|--|--|
| IO Address | | | | | | | | |
| EC GPIO Register | 16h | | | | | | | |
| Bit | 0 | 1 | 2 | 3 | | | | |
| Sample code | #2 | | | | | | | |

```

INDEX_Port    equ    066h
DATA_Port     equ    062h
Read_cmd      equ    080h
write_cmd     equ    081h
GPI_REG       equ    016h
GPO_REG       equ    016h
GPO0_Value    equ    00000001b

```

Sample Code:**#1 : Get GPI 0 status**

```
; Enable config mode
```

```

mov    dx, INDEX_Port
mov    al, Read_cmd
out    dx, al
jmp    short $+2          ;Io_delay
jmp    short $+2          ;Io_delay

```

```
; Get GPI 0 Pin Status Register
```

```

mov    dx, DATA_Port
mov    al, GPI_REG
out    dx, al
mov    dx, DATA_Port
in    al, dx
; al bit4 = GPI 0 status

```

#2 : Set GPO 0 to high***;* Enable config mode**

```
mov    dx, INDEX_Port
mov    al, Read_cmd
out    dx, al
jmp    short $+2          ;Io_delay
jmp    short $+2          ;Io_delay

mov    dx, DATA_Port
mov    al, GPI_REG
out    dx, al
mov    dx, DATA_Port
in     al, dx

and    al, not GPO0_value ;clear al bit (GPO 0)
or     al, GPO0_value     ;set GPO 0
mov    bl, al

mov    dx, INDEX_Port
mov    al, Write_cmd
out    dx, al
jmp    short $+2          ;Io_delay
jmp    short $+2          ;Io_delay

mov    dx, DATA_Port
mov    al, GPO_REG
out    dx, al
mov    dx, DATA_Port
mov    al, bl
out    dx, al
```