

# MS-98H2

***Qseven R 2.0 CPU Module Board***



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## Trademarks

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## Revision History

| Revision | Date    |
|----------|---------|
| V1.0     | 2015/11 |

## 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, or contact our technical staff via <http://www.msi.com/support/>

## 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.**

## 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](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.



廢電池請回收

Taiwan:

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



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.



## Japan JIS C 0950 Material Declaration

A Japanese regulatory requirement, defined by specification JIS C 0950, mandates that manufacturers provide material declarations for certain categories of electronic products offered for sale after July 1, 2006.

[http://www.msi.com/html/popup/csr/ceмм\\_jp.html](http://www.msi.com/html/popup/csr/ceмм_jp.html)

[http://tw.msi.com/html/popup/csr\\_tw/ceмм\\_jp.html](http://tw.msi.com/html/popup/csr_tw/ceмм_jp.html)

日本JIS C 0950材質宣言

日本工業規格JIS C 0950により、2006年7月1日以降に販売される特定分野の電気および電子機器について、製造者による含有物質の表示が義務付けられます。

[http://www.msi.com/html/popup/csr/ceмм\\_jp.html](http://www.msi.com/html/popup/csr/ceмм_jp.html)

[http://tw.msi.com/html/popup/csr\\_tw/ceмм\\_jp.html](http://tw.msi.com/html/popup/csr_tw/ceмм_jp.html)

## India RoHS

This product complies with the "India E-waste (Management and Handling) Rule 2011" and prohibits use of lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers in concentrations exceeding 0.1 weight % and 0.01 weight % for cadmium, except for the exemptions set in Schedule 2 of the Rule.

## Turkey EEE Regulation

Conforms to the EEE Regulations of the Republic Of Turkey

Türkiye EEE yönetmeliği

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

## Ukraine Restriction of Hazardous Substances

The equipment complies with requirements of the Technical Regulation, approved by the Resolution of Cabinet of Ministry of Ukraine as of December 3, 2008 № 1057, in terms of restrictions for the use of certain dangerous substances in electrical and electronic equipment.

Україна обмеження на наявність небезпечних речовин

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057.

## Vietnam RoHS

As from December 1, 2012, all products manufactured by MSI comply with Circular 30/2011/TT-BCT temporarily regulating the permitted limits for a number of hazardous substances in electronic and electric products.

### Việt Nam RoHS

Kể từ ngày 01/12/2012, tất cả các sản phẩm do công ty MSI sản xuất tuân thủ Thông tư số 30/2011/TT-BCT quy định tạm thời về giới hạn hàm lượng cho phép của một số hóa chất độc hại có trong các sản phẩm điện, điện tử"

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# 1 Overview



Thank you for choosing the MS-98H2, an excellent Qseven R 2.0 CPU Module Board. Integrating core CPU and memory functionality, it is the entry-level model for applications looking to transition from other small form factor solutions to Qseven and offers full PCI Express, USB, SATA, audio, graphics and network support.

# Board Specifications

## Processor (Optional)

- Intel® Pentium® Processor N3710 (QC/1.6GHz/2.56GHz for Burst/TDP-6W)
- Intel® Celeron® Processor N3160 (QC/1.6GHz/2.24GHz for Burst/TDP-6W)

## Memory

- Onboard DDR3L 1600 MHz memory modules
- Supports the maximum of 4 GB

## LAN

- Intel I211-AT Gigabit Fast Ethernet controller

## Graphics

- Graphics integrated in Intel processor
- DDI (Digital Display Interface): 3 x DDI-ports supports HDMI/DP1.1a/eDP multiplexed
  - HDMI up to 2560 x 1600 @ 60 Hz, 3840x2160 @ 30 Hz
  - DP1.1a up to 2560 x 1600 @ 60 Hz, 3840x2160 @ 30 Hz
  - eDP up to 2560 x 1600 @ 60 Hz

## Audio

- Supports High Definition Audio interface to the carrier board

## SATA

- Supports 2 Serial ATA interfaces
  - 2 x SATA 6Gb/s ports
  - Integrated Advanced Host Controller Interface (AHCI) controller

## USB

- 4 x USB 2.0 (to the carrier board)
- 2 x USB 3.0 (to the carrier board)

## Expansion Interface

- 4 x PCIe x1 compliant to PCIe Gen2 (5.0 GT/s) (to the carrier board)
- Supports SD 3.0 Spec (SD/SDHC/SDXC)
- Supports I2C/SMBus/UART under Windows 7

## Form Factor

- Qseven Module: 70 (L) x 70 (W) x 1.2 (H) mm

### Power

- +5 V and +5 VSB (standby power)

### Environmental

- Operating Temperature: -10 ~ 60°C (Constrain: Heatspreader for 0~40°C )
- Storage Temperature: -20 ~ 80°C
- Humidity: 10 ~ 90% RH, non-condensing

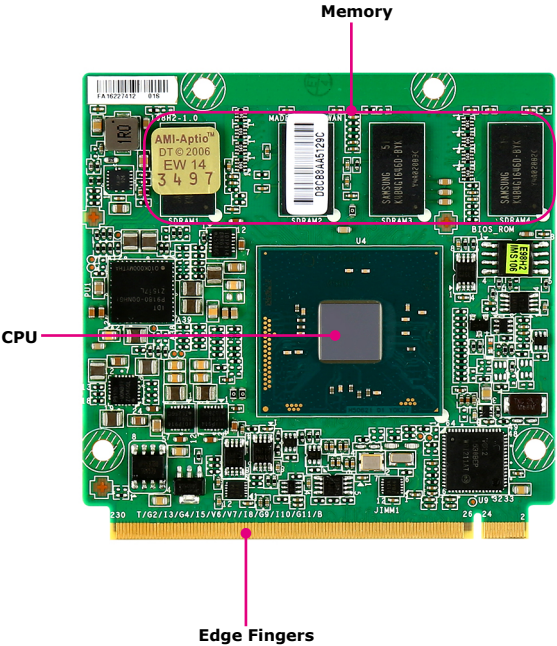
### Regulatory Compliance

- EMC: CE, FCC, BSMI, RCM, VCCI
- RoHS compliant

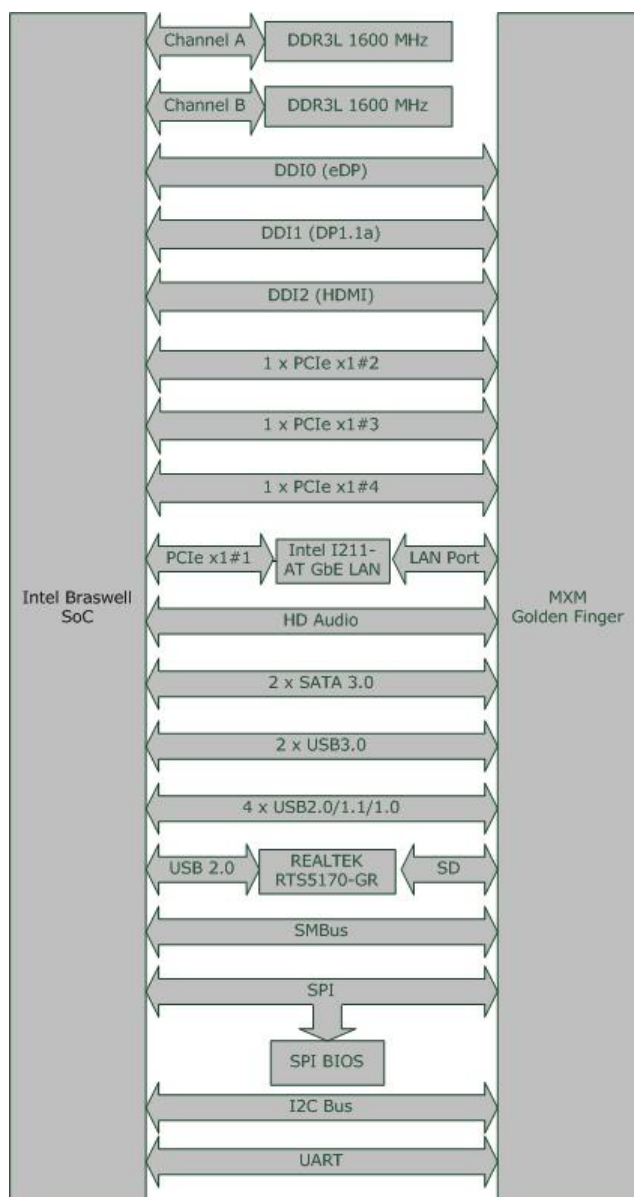
### OS Support

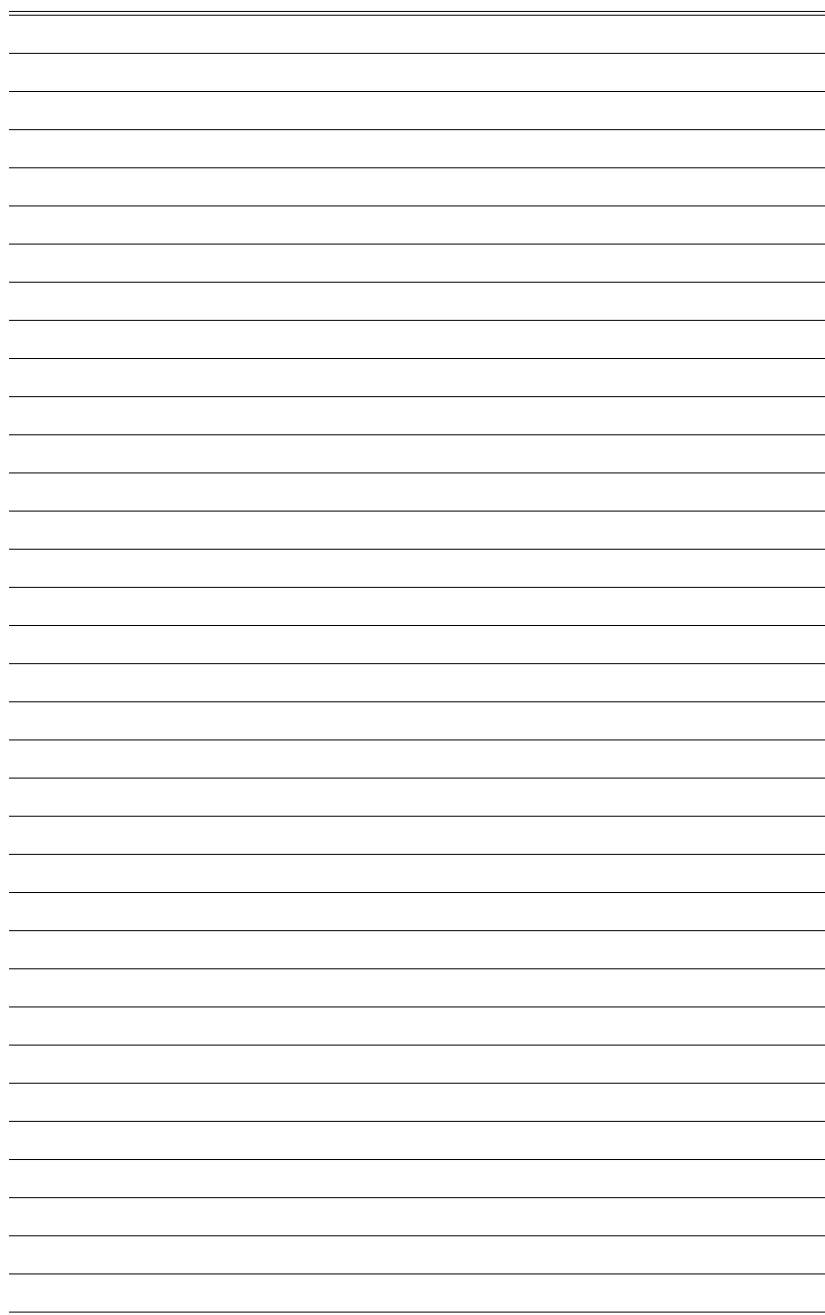
- Window 10 64-Bit
- Windows 8.1 64-Bit
- Windows 7 32/64-Bit
- Linux Kernel (Kernel 3.19)

# Board Layout



# Block Diagram





# 2 Hardware Setup

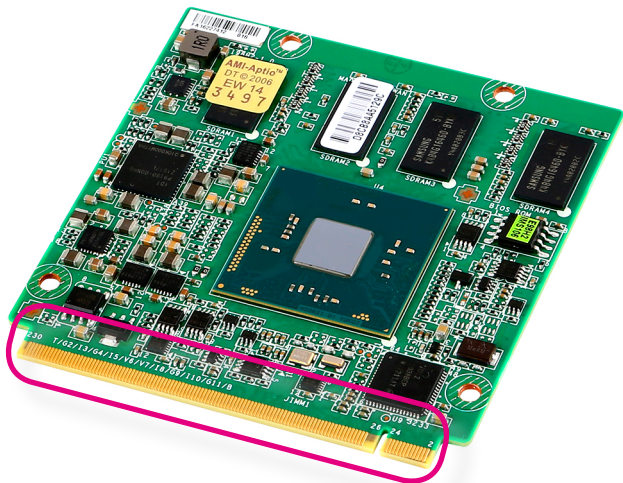


This chapter provides you with the information about hardware setup procedures. While doing the installation, be careful in holding the components and follow the installation procedures. For some components, if you install in the wrong orientation, the components will not work properly.

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

# Edge Fingers

On the top and bottom side of the Qseven Module Board are 115 edge fingers that mate with the MXM connector. The following table lists the pin assignments for all 230 edge fingers.





| Pin | Signal                    | Pin | Signal                |
|-----|---------------------------|-----|-----------------------|
| 1   | GND                       | 2   | GND                   |
| 3   | GBE_MDI3-                 | 4   | GBE_MDI2-             |
| 5   | GBE_MDI3+                 | 6   | GBE_MDI2+             |
| 7   | GBE_LINK100#              | 8   | GBE_LINK1000#         |
| 9   | GBE_MDI1-                 | 10  | GBE_MDI0-             |
| 11  | GBE_MDI1+                 | 12  | GBE_MDI0+             |
| 13  | GBE_LINK#                 | 14  | GBE_ACT#              |
| 15  | GBE_CTREF                 | 16  | SUS_S5#               |
| 17  | WAKE#                     | 18  | SUS_S3#               |
| 19  | SUS_STAT#                 | 20  | PWRBTN#               |
| 21  | NC                        | 22  | NC                    |
| 23  | GND                       | 24  | GND                   |
|     | KEY                       |     | KEY                   |
| 25  | GND                       | 26  | PWGIN                 |
| 27  | BATLOW#                   | 28  | RSTBTN#               |
| 29  | SATA0_TX+                 | 30  | SATA1_TX+             |
| 31  | SATA0_TX-                 | 32  | SATA1_TX-             |
| 33  | SATA_ACT#                 | 34  | GND                   |
| 35  | SATA0_RX+                 | 36  | SATA1_RX+             |
| 37  | SATA0_RX-                 | 38  | SATA1_RX-             |
| 39  | GND                       | 40  | GND                   |
| 41  | BIOS_DISABLE# / BOOT_ALT# | 42  | SDIO_CLK#             |
| 43  | SDIO_CD#                  | 44  | NC                    |
| 45  | SDIO_CMD                  | 46  | SDIO_WP               |
| 47  | SDIO_PWR#                 | 48  | SDIO_DAT1             |
| 49  | SDIO_DAT0                 | 50  | SDIO_DAT3             |
| 51  | SDIO_DAT2                 | 52  | NC                    |
| 53  | NC                        | 54  | NC                    |
| 55  | SDIO_DAT6                 | 56  | RSVD                  |
| 57  | GND                       | 58  | GND                   |
| 59  | HDA_SYNC / I2S_WS         | 60  | SMB_CLK / GP1_I2C_CLK |
| 61  | HDA_RST# / I2S_RST#       | 62  | SMB_DAT / GP1_I2C_DAT |
| 63  | HDA_BITCLK / I2S_CLK      | 64  | SMB_ALERT#            |
| 65  | HDA_SDI / I2S_SDI         | 66  | GP0_I2C_CLK           |
| 67  | HDA_SDO / I2S_SDO         | 68  | GP0_I2C_DAT           |

| Pin | Signal                        | Pin | Signal                      |
|-----|-------------------------------|-----|-----------------------------|
| 69  | THRM#                         | 70  | WDTRIG#                     |
| 71  | THRMTRIP#                     | 72  | NC                          |
| 73  | GND                           | 74  | GND                         |
| 75  | USB_P7- / USB_SSTX0-          | 76  | USB_P6- / USB_SSRX0-        |
| 77  | USB_P7+ / USB_SSTX0+          | 78  | USB_P6+ / USB_SSRX0+        |
| 79  | NC                            | 80  | NC                          |
| 81  | USB_P5- / USB_SSTX1-          | 82  | USB_P4- / USB_SSRX1-        |
| 83  | USB_P5+ / USB_SSTX1+          | 84  | USB_P4+ / USB_SSRX1+        |
| 85  | USB_2_3_OC#                   | 86  | USB_0_1_OC#                 |
| 87  | USB_P3-                       | 88  | USB_P2-                     |
| 89  | USB_P3+                       | 90  | USB_P2+                     |
| 91  | NC                            | 92  | USB_ID                      |
| 93  | USB_P1-                       | 94  | USB_P0-                     |
| 95  | USB_P1+                       | 96  | USB_P0+                     |
| 97  | GND                           | 98  | GND                         |
| 99  | eDP0_TX0+ / LVDS_A0+          | 100 | eDP1_TX0+ / LVDS_B0+        |
| 101 | eDP0_TX0- / LVDS_A0-          | 102 | eDP1_TX0- / LVDS_B0-        |
| 103 | eDP0_TX1+ / LVDS_A1+          | 104 | eDP1_TX1+ / LVDS_B1+        |
| 105 | eDP0_TX1- / LVDS_A1-          | 106 | eDP1_TX1- / LVDS_B1-        |
| 107 | eDP0_TX2+ / LVDS_A2+          | 108 | eDP1_TX2+ / LVDS_B2+        |
| 109 | eDP0_TX2- / LVDS_A2-          | 110 | eDP1_TX2- / LVDS_B2-        |
| 111 | LVDS_PPEN                     | 112 | LVDS_BLEN                   |
| 113 | eDP0_TX3+ / LVDS_A3+          | 114 | eDP1_TX3+ / LVDS_B3+        |
| 115 | eDP0_TX3- / LVDS_A3-          | 116 | eDP1_TX3- / LVDS_B3-        |
| 117 | GND                           | 118 | GND                         |
| 119 | eDP0_AUX+ / LVDS_A_CLK+       | 120 | eDP1_AUX+ / LVDS_B_CLK+     |
| 121 | eDP0_AUX- / LVDS_A_CLK-       | 122 | eDP1_AUX- / LVDS_B_CLK-     |
| 123 | LVDS_BLT_CTRL<br>/GP_PWM_OUT0 | 124 | NC                          |
| 125 | GP2_I2C_DAT /<br>LVDS_DiD_DAT | 126 | eDP0_HPD# /<br>LVDS_BLC_DAT |
| 127 | GP2_I2C_CLK /<br>LVDS_DiD_CLK | 128 | eDP1_HPD# /<br>LVDS_BLC_CLK |
| 129 | NC                            | 130 | NC                          |
| 131 | DP_LANE3+ / TMDS_CLK+         | 132 | RSVD (Differential Pair)    |
| 133 | DP_LANE3- / TMDS_CLK-         | 134 | RSVD (Differential Pair)    |
| 135 | GND                           | 136 | GND                         |
| 137 | DP_LANE1+ / TMDS_LANE1+       | 138 | DP_AUX+                     |
| 139 | DP_LANE1- / TMDS_LANE1-       | 140 | DP_AUX-                     |
| 141 | GND                           | 142 | GND                         |
| 143 | DP_LANE2+ / TMDS_LANE0+       | 144 | RSVD (Differential Pair)    |
| 145 | DP_LANE2- / TMDS_LANE0-       | 146 | RSVD (Differential Pair)    |
| 147 | GND                           | 148 | GND                         |

| Pin | Signal                  | Pin | Signal             |
|-----|-------------------------|-----|--------------------|
| 149 | DP_LANE0+ / TMDS_LANE2+ | 150 | HDMI_CTRL_DAT      |
| 151 | DP_LANE0- / TMDS_LANE2- | 152 | HDMI_CTRL_CLK      |
| 153 | DP_HDMI_HPD#            | 154 | RSVD               |
| 155 | PCIE_CLK_REF+           | 156 | PCIE_WAKE#         |
| 157 | PCIE_CLK_REF-           | 158 | PCIE_RST#          |
| 159 | GND                     | 160 | GND                |
| 161 | NC                      | 162 | NC                 |
| 163 | NC                      | 164 | NC                 |
| 165 | GND                     | 166 | GND                |
| 167 | PCIE2_TX+               | 168 | PCIE2_RX+          |
| 169 | PCIE2_TX-               | 170 | PCIE2_RX-          |
| 171 | UART0_TX                | 172 | UART0_RTS#         |
| 173 | PCIE1_TX+               | 174 | PCIE1_RX+          |
| 175 | PCIE1_TX-               | 176 | PCIE1_RX-          |
| 177 | UART0_RX                | 178 | UART0_CTS#         |
| 179 | PCIE0_TX+               | 180 | PCIE0_RX+          |
| 181 | PCIE0_TX-               | 182 | PCIE0_RX-          |
| 183 | GND                     | 184 | GND                |
| 185 | LPC_AD0 / GPIO0         | 186 | LPC_AD1 / GPIO1    |
| 187 | LPC_AD2 / GPIO2         | 188 | LPC_AD3 / GPIO3    |
| 189 | LPC_CLK / GPIO4         | 190 | LPC_FRAME# / GPIO5 |
| 191 | SERIRQ / GPIO6          | 192 | LPC_LDRQ# / GPIO7  |
| 193 | VCC_RTC                 | 194 | SPKR / GP_PWM_OUT2 |
| 195 | NC                      | 196 | NC                 |
| 197 | GND                     | 198 | GND                |
| 199 | SPI_MOSI                | 200 | SPI_CS0#           |
| 201 | SPI_MISO                | 202 | SPI_CS1#           |
| 203 | SPI_SCK                 | 204 | MFG_NC4            |
| 205 | VCC_5V_SB               | 206 | VCC_5V_SB          |
| 207 | MFG_NC0                 | 208 | MFG_NC2            |
| 209 | MFG_NC1                 | 210 | MFG_NC3            |
| 211 | VCC                     | 212 | VCC                |
| 213 | VCC                     | 214 | VCC                |
| 215 | VCC                     | 216 | VCC                |
| 217 | VCC                     | 218 | VCC                |
| 219 | VCC                     | 220 | VCC                |
| 221 | VCC                     | 222 | VCC                |
| 223 | VCC                     | 224 | VCC                |
| 225 | VCC                     | 226 | VCC                |
| 227 | VCC                     | 228 | VCC                |
| 229 | VCC                     | 230 | VCC                |

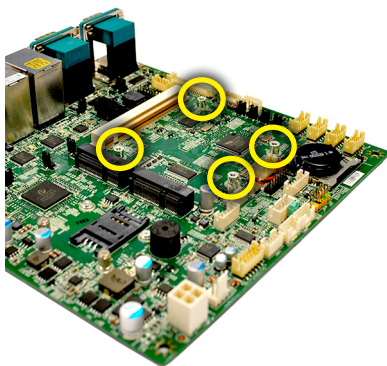
# Hardware Installation

## ► Installing Module Board onto Carrier Board

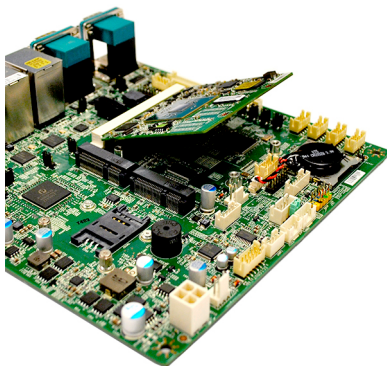
### **Important**

*The illustrations are provided to guide users on how to install the module board onto the carrier board of their choice and should be held for reference only.*

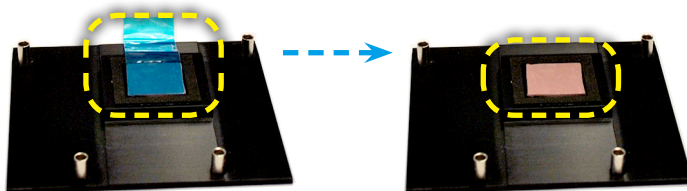
1. Locate the threaded standoffs on the carrier board.



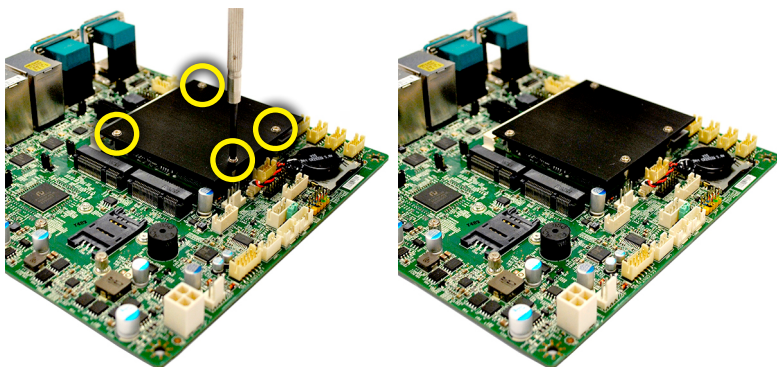
2. Locate the MXM slot on the carrier board and insert the edge fingers of the module board into the slot at a 45-degree angle.

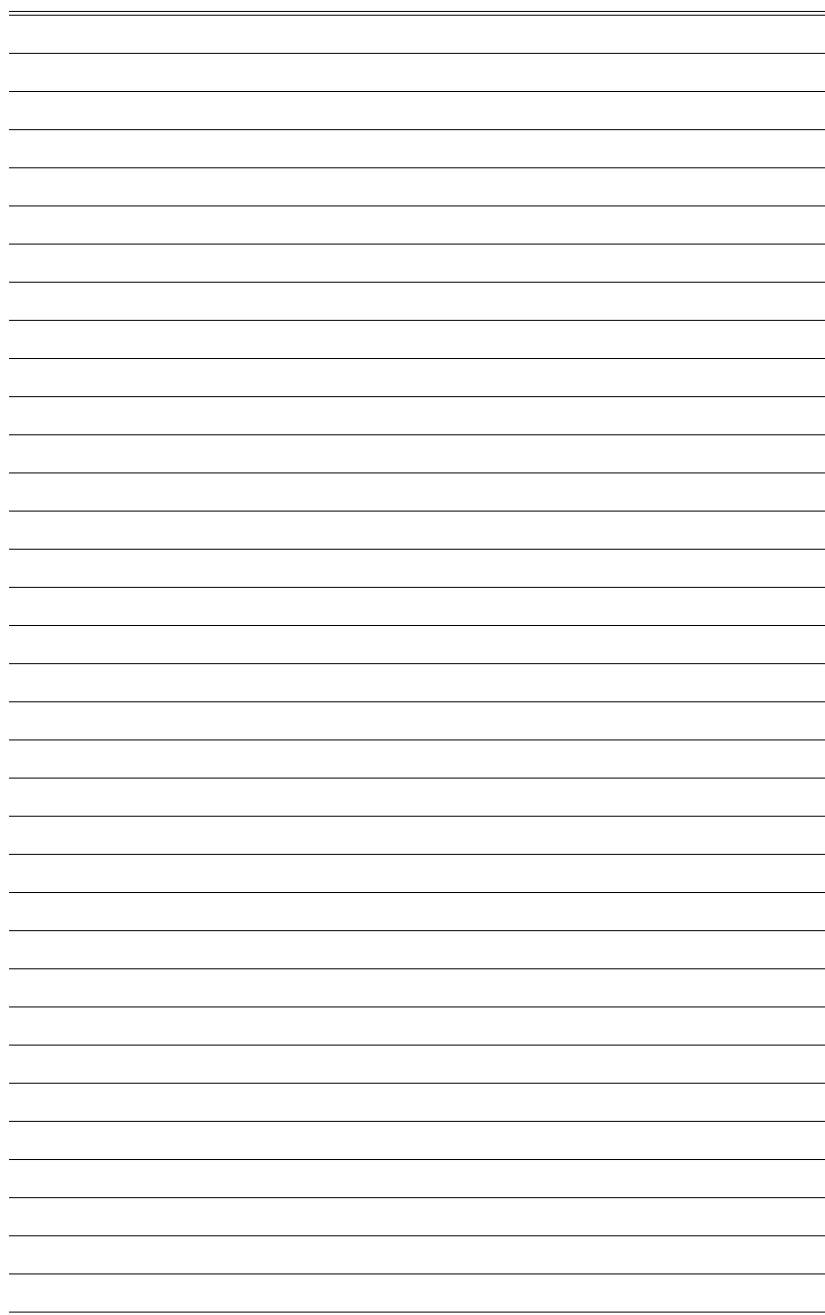


- 
3. Locate the thermal pad on the heat spreader. Peel off the protective film of the thermal pad.



- 
4. Mount the heat spreader onto the module board with mounting holes aligned. Use the provided mounting screws to secure the heat spreader to the module board and the carrier board.





# 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 <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.

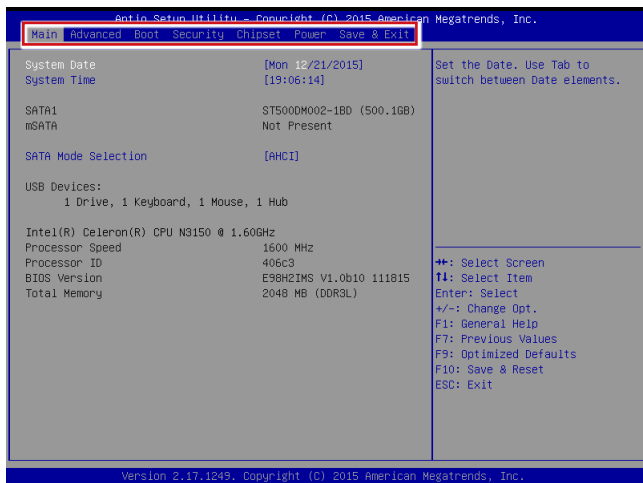
### Sub-Menu

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.

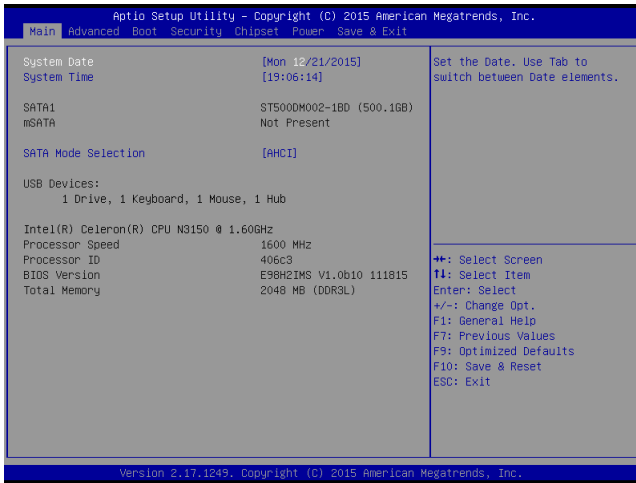
## ► Power

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>.

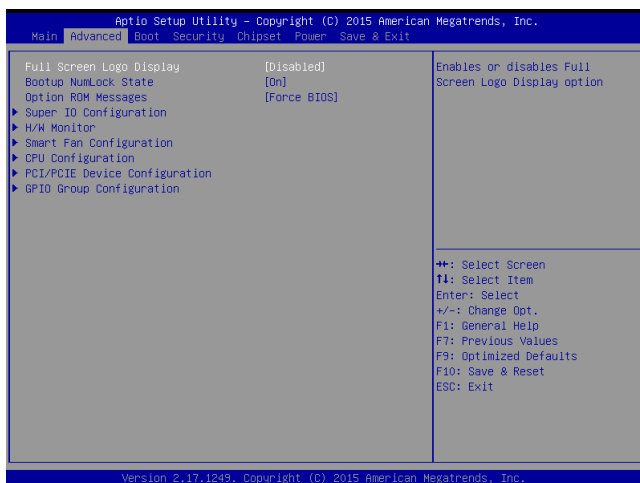
## ► System Time

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.

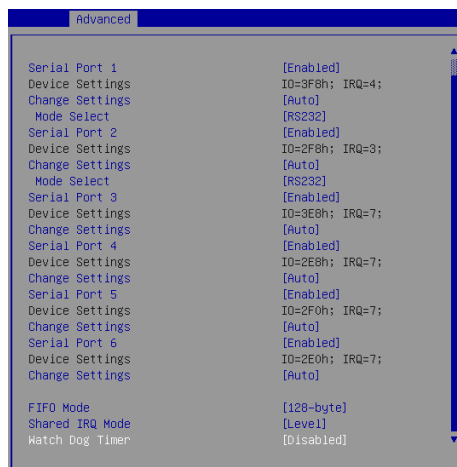
### ► Bootup NumLock State

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.

## ► Super IO Configuration



### ► Serial Port 1/ 2/ 3/ 4/ 5/ 6

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 and 2.

### ► FIFO Mode

This setting controls the FIFO data transfer mode.

### ► Shared IRQ Mode

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

### ► Watch Dog Timer

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

### ► H/W Monitor

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

| Advanced           |             |
|--------------------|-------------|
| PC Health Status   |             |
| CPU temperature    | : +42 C     |
| System temperature | : +30 C     |
| CPUFAN1 Speed      | : N/A       |
| SYSFAN1 Speed      | : N/A       |
| VCC_CORE           | : +1.456 V  |
| VCC5               | : +5.087 V  |
| +12V               | : +11.968 V |
| VCC3V              | : +3.328 V  |
| VSB3V              | : +3.296 V  |
| VSB5V              | : +4.992 V  |
| VBAT               | : +3.104 V  |

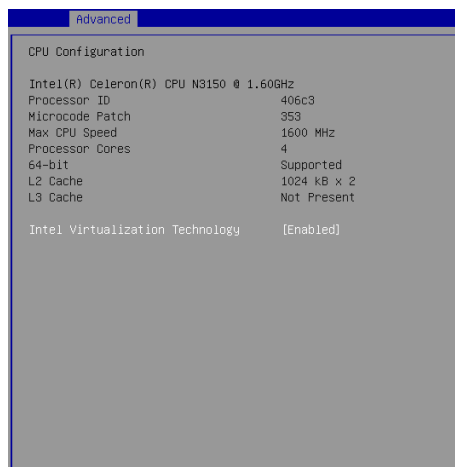
### ► Smart Fan Configuration

| Advanced                |            |
|-------------------------|------------|
| Smart FAN Configuration |            |
| Smart CPUFAN Target     | [Disabled] |
| Smart SYSFAN Target     | [Disabled] |

### ► Smart CPUFAN/SYSFAN Target

These setting enables/disables 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.

## ► CPU Configuration



## ► 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.

## ► 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.

► **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.

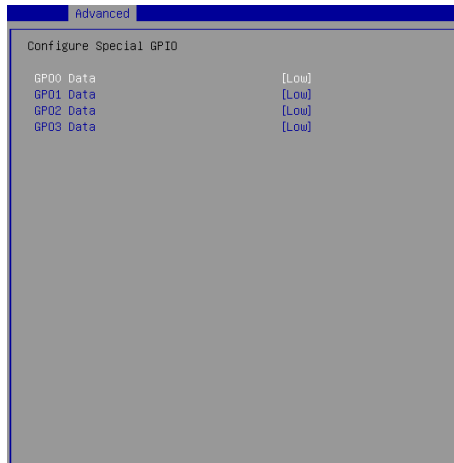
► **Audio Controller**

This setting enables/disables the onboard audio controller.

► **Launch OnBoard LAN OpROM**

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

► **GPIO Group Configuration**

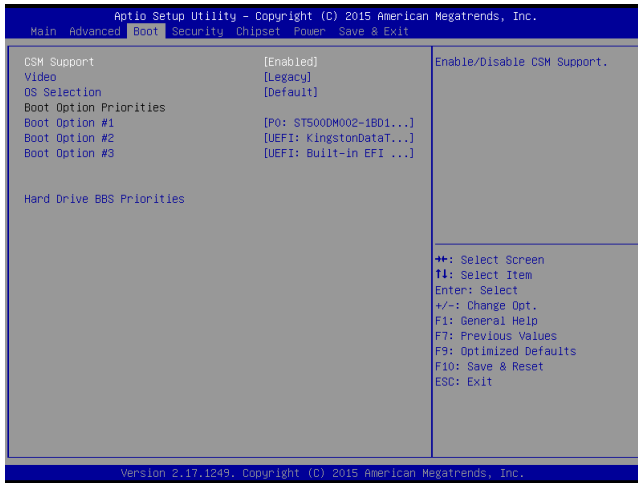


► **GPIO0 ~ GPIO3 Data**

These settings control the operation mode of the specified GPIO.



# Boot



## ► CSM Support

This setting enables/disables the support for Compatibility Support Module, a part of the Intel Platform Innovation Framework for EFI providing the capability to support legacy BIOS interfaces.

## ► Video

This setting selects the video mode.

## ► OS Selection

This setting allows users to select the Operating System.

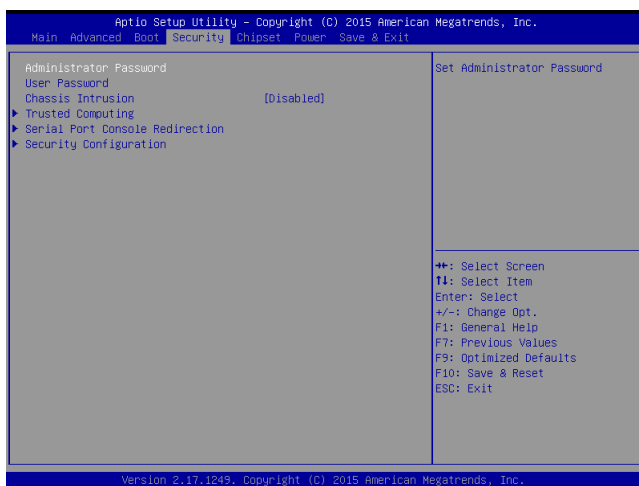
## ► Boot Option Priorities

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 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

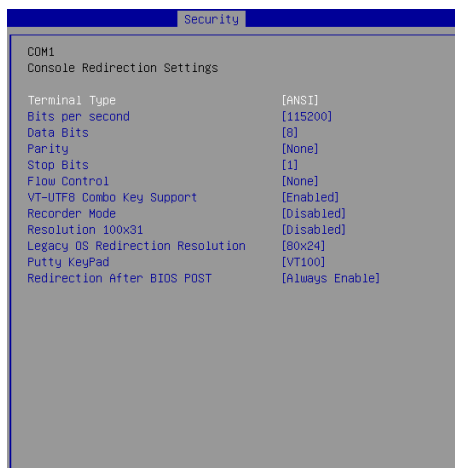


### ► Console Redirection

Console Redirection operates in host systems that do not have a monitor and keyboard attached. This setting enables/disables the operation of console redirection. When set to [Enabled], BIOS redirects and sends all contents that

should be displayed on the screen to the serial COM port for display on the terminal screen. Besides, all data received from the serial port is interpreted as keystrokes from a local keyboard.

#### ► Console Redirection Settings



#### ► Terminal Type

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

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

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

#### ► Flow Control

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

#### ► VT-UTF8 Combo Key Support

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

#### ► Recorder Mode, Resolution 100x31

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

#### ► Legacy OS Redirection Resolution

This setting specifies the redirection resolution of legacy OS.

### ► Putty Keypad

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

### ► Redirection After BIOS POST

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

## ► Security Configuration



### ► TXE FW Version

The setting shows the firmware information of the Intel Trusted Execution Engine (TXE).

### ► TXE HMRFPD

The setting enables/disables TXE HMRFPD (Host ME Region Flash Protection Override).

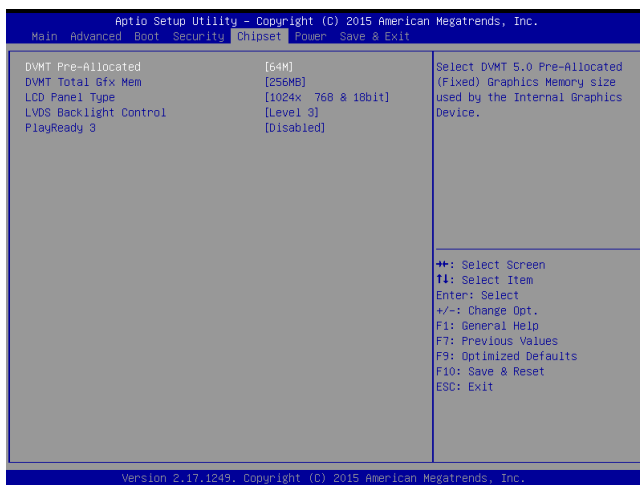
### ► TXE Firmware Update

This setting enables/disables TXE FW update.

### ► TXE EOP Message

This setting determines whether or not to send EOP (Exchange Online Protection) message before entering OS.

# Chipset



## ► 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.

## ► LCD Panel Type

This setting specifies the LCD panel type.

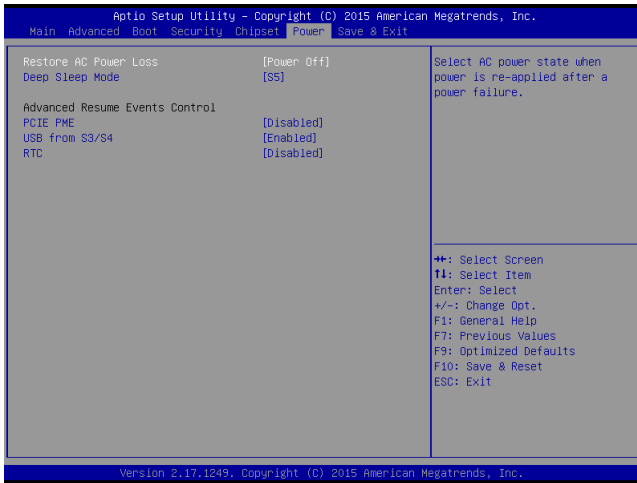
## ► LVDS Backlight Control

This setting controls the intensity of the LVDS backlight.

## ► PlayReady 3 (for Windows 10 only)

This setting enables/disables Microsoft's PlayReady 3 technology. PlayReady is a content protection technology from Microsoft that includes encryption, output protection and Digital Rights Management (DRM). Window's PlayReady 3.0 DRM can support 4K content but use more restrictive digital rights management technology to curb illegitimate streams at the same time.

# Power



## ► 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 Sleep Mode

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 \*\*

### ► PCIE PME

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

► **USB from S3/S4**

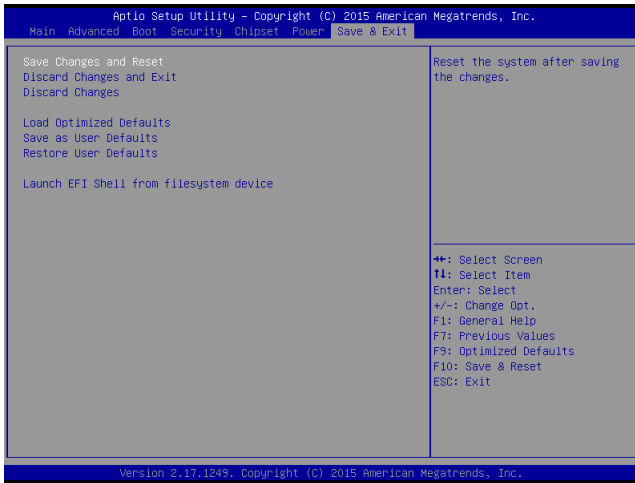
The item allows the activity of the USB device to wake up the system from S3/S4 sleep state.

► **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.

## ► Launch EFI Shell from filesystem device

This setting helps to launch the EFI Shell application from one of the available file system devices.

