

NanoCOM-WHU

COM Express Module

User's Manual 1st Ed

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Packing List

Before setting up your product, please make sure the following items have been shipped:

| Item | Quantity |
|---------------|----------|
| ● NanoCOM-WHU | 1 |

If any of these items are missing or damaged, please contact your distributor or sales representative immediately.

About this Document

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the product page at AAEON.com for the latest version of this document.

Safety Precautions

Please read the following safety instructions carefully. It is advised that you keep this manual for future references

1. All cautions and warnings on the device should be noted.
2. Make sure the power source matches the power rating of the device.
3. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
4. Always completely disconnect the power before working on the system's hardware.
5. No connections should be made when the system is powered as a sudden rush of power may damage sensitive electronic components.
6. If the device is not to be used for a long time, disconnect it from the power supply to avoid damage by transient over-voltage.
7. Always disconnect this device from any AC supply before cleaning.
8. While cleaning, use a damp cloth instead of liquid or spray detergents.
9. Make sure the device is installed near a power outlet and is easily accessible.
10. Keep this device away from humidity.
11. Place the device on a solid surface during installation to prevent falls
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. Watch out for high temperatures when the system is running.
14. Do not touch the heat sink or heat spreader when the system is running
15. Never pour any liquid into the openings. This could cause fire or electric shock.
16. As most electronic components are sensitive to static electrical charge, be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and contain all electronic components in any static-shielded containers.

17. If any of the following situations arises, please contact our service personnel:
 - i. Damaged power cord or plug
 - ii. Liquid intrusion to the device
 - iii. Exposure to moisture
 - iv. Device is not working as expected or in a manner as described in this manual
 - v. The device is dropped or damaged
 - vi. Any obvious signs of damage displayed on the device
18. **DO NOT LEAVE THIS DEVICE IN AN UNCONTROLLED ENVIRONMENT WITH TEMPERATURES BEYOND THE DEVICE'S PERMITTED STORAGE TEMPERATURES (SEE CHAPTER 1) TO PREVENT DAMAGE.**

Warning!



This device complies with Part 15 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.

Caution:

There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions and your local government's recycling or disposal directives.

Attention:

Il y a un risque d'explosion si la batterie est remplacée de façon incorrecte. Ne la remplacer qu'avec le même modèle ou équivalent recommandé par le constructeur. Recycler les batteries usées en accord avec les instructions du fabricant et les directives gouvernementales de recyclage.

China RoHS Requirements (CN)

产品中有毒有害物质或元素名称及含量

AAEON Main Board/ Daughter Board/ Backplane

| 部件名称 | 有毒有害物质或元素 | | | | | |
|--|-----------|-----------|-----------|-----------------|---------------|-----------------|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr(VI)) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 印刷电路板 及其电子组件 | × | ○ | ○ | ○ | ○ | ○ |
| 外部信号 连接器及线材 | × | ○ | ○ | ○ | ○ | ○ |
| <p>O: 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。</p> <p>X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。</p> <p>备注: 此产品所标示之环保使用期限, 系指在一般正常使用状况下。</p> | | | | | | |

China RoHS Requirement (EN)

Poisonous or Hazardous Substances or Elements in Products

AAEON Main Board/ Daughter Board/ Backplane

| Component | Poisonous or Hazardous Substances or Elements | | | | | |
|---|---|--------------|--------------|------------------------------|--------------------------------|---------------------------------------|
| | Lead (Pb) | Mercury (Hg) | Cadmium (Cd) | Hexavalent Chromium (Cr(VI)) | Polybrominated Biphenyls (PBB) | Polybrominated Diphenyl Ethers (PBDE) |
| PCB & Other Components | X | ○ | ○ | ○ | ○ | ○ |
| Wires & Connectors for External Connections | X | ○ | ○ | ○ | ○ | ○ |
| <p>O: The quantity of poisonous or hazardous substances or elements found in each of the component's parts is below the SJ/T 11363-2006-stipulated requirement.</p> <p>X: The quantity of poisonous or hazardous substances or elements found in at least one of the component's parts is beyond the SJ/T 11363-2006-stipulated requirement.</p> <p>Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only</p> | | | | | | |

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Chapter 1

Product Specifications

1.1 Specifications

System

| | |
|-----------------------------|---|
| Form Factor | COM Express Mini size, 84mm x 55mm |
| CPU | 8th Generation Intel® Core™ ULT Series Processors |
| CPU Frequency | — |
| Chipset | Onboard 8th Generation Intel® Core™ SoC |
| Memory Type | Onboard DDR4-2400/2133, non ECC support. |
| Max. Memory Capacity | Up to 8GB |
| BIOS | AMI BIOS, Legacy free BIOS |
| Wake on LAN | Yes |
| Watchdog Timer | 255 Levels |
| Power Requirement | Standard: +12V |
| Power Supply Type | AT Mode |
| Power Consumption (Typical) | TBD |
| Dimension (L x W) | 3.31" x 2.17" (84 mm x 55 mm) |
| Operating Temperature | 32°F ~ 140°F (0°C ~ 60°C) |
| Storage Temperature | -4°F ~ 158°F (-20°C ~ 70°C) |
| Operating Humidity | 0% ~ 90% relative humidity, non-condensing |
| MTBF (Hours) | TBD |
| Certification | CE/FCC Class A |

Display

| | |
|--------------------|-------------------------------|
| VGA/LCD Controller | Intel® UHD Graphics 620 / 610 |
| Video Output | eDP, DDI x 1 |
| LVDS Interface | — |

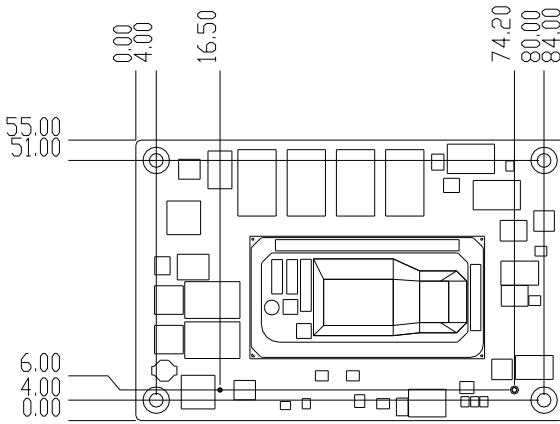
I/O

| | |
|-----------------|-------------------------------------|
| Ethernet | Intel® I219 GbE x 1 |
| Audio | HD Audio x 1 |
| USB port | USB 3.2 Gen 2 x 2 USB 2.0 x 8 |
| Serial Port | 2-wire UART x 2 (TX/RX) |
| HDD Interface | SATA3 x 2 |
| Onboard Storage | eMMC |
| Expansion Slot | PCIe [x1] x4 I2C LPC SMBus |
| GPIO | 8-bit |
| TPM | fTPM |

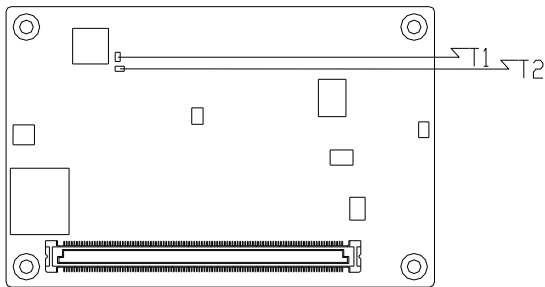
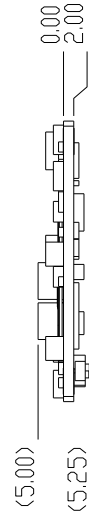
Chapter 2

Hardware Information

2.1 Dimensions, Jumpers and Connectors

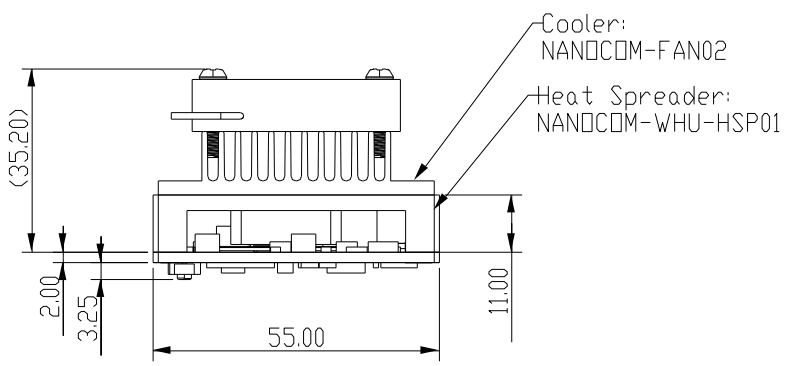


Component Side



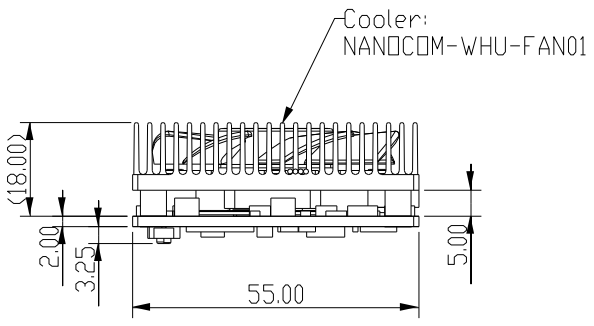
Solder Side

With Standard Thermal Solution



Unit:mm

With one-piece Thermal Solution



Unit:mm

2.2 Row A/B Connector Pin Definitions

| Row A | | Row B | |
|-------|----------------|-------|-------------|
| A1 | GND (FIXED) | B1 | GND (FIXED) |
| A2 | GBE0_MDI3- | B2 | GBE0_ACT# |
| A3 | GBE0_MDI3+ | B3 | LPC_FRAME# |
| A4 | GBE0_LINK100# | B4 | LPC_AD0 |
| A5 | GBE0_LINK1000# | B5 | LPC_AD1 |
| A6 | GBE0_MDI2- | B6 | LPC_AD2 |
| A7 | GBE0_MDI2+ | B7 | LPC_AD3 |
| A8 | GBE0_LINK# | B8 | N.C |
| A9 | GBE0_MDI1- | B9 | N.C |
| A10 | GBE0_MDI1+ | B10 | LPC_CLK |
| A11 | GND (FIXED) | B11 | GND (FIXED) |
| A12 | GBE0_MDI0- | B12 | PWRBTN# |
| A13 | GBE0_MDI0+ | B13 | SMB_CK |
| A14 | N.C | B14 | SMB_DAT |
| A15 | SUS_S3# | B15 | SMB_ALERT# |
| A16 | SATA0_TX+ | B16 | SATA1_TX+ |
| A17 | SATA0_TX- | B17 | SATA1_TX- |
| A18 | SUS_S4# | B18 | SUS_STAT# |
| A19 | SATA0_RX+ | B19 | SATA1_RX+ |
| A20 | SATA0_RX- | B20 | SATA1_RX- |
| A21 | GND (FIXED) | B21 | GND (FIXED) |
| A22 | USB3_RXN0 | B22 | USB3_TXN0 |
| A23 | USB3_RXP0 | B23 | USB3_TXP0 |
| A24 | SUS_S5# | B24 | PWR_OK |

| Row A | | Row B | |
|-------|-------------|-------|--------------|
| A25 | USB3_RXN1 | B25 | USB3_TXN1 |
| A26 | USB3_RXP1 | B26 | USB3_TXP1 |
| A27 | BATLOW# | B27 | WDT |
| A28 | ATA_ACT# | B28 | N.C |
| A29 | AC_SYNC | B29 | AC_SDIN1 |
| A30 | AC_RST# | B30 | AC_SDIN0 |
| A31 | GND (FIXED) | B31 | GND (FIXED) |
| A32 | AC_BITCLK | B32 | SPKR |
| A33 | AC_SDOUT | B33 | I2C_CK |
| A34 | BIOS_DIS0# | B34 | I2C_DAT |
| A35 | THRMTRIP# | B35 | THRM# |
| A36 | USB6- | B36 | USB7- |
| A37 | USB6+ | B37 | USB7+ |
| A38 | USB_6_7_OC# | B38 | USB_4_5_OC# |
| A39 | USB4- | B39 | USB5- |
| A40 | USB4+ | B40 | USB5+ |
| A41 | GND (FIXED) | B41 | GND (FIXED) |
| A42 | USB2- | B42 | USB3- |
| A43 | USB2+ | B43 | USB3+ |
| A44 | USB_2_3_OC# | B44 | USB_0_1_OC# |
| A45 | USB0- | B45 | USB1- |
| A46 | USB0+ | B46 | USB1+ |
| A47 | VCC_RTC | B47 | EXCD1_PERST# |
| A48 | EXCD0_CPPE# | B48 | EXCD1_CPPE# |
| A49 | EXCD0_CPPE# | B49 | SYS_RESET# |
| A50 | LPC_SERIRQ | B50 | CB_RESET# |

| Row A | | Row B | |
|-------|-------------|-------|-------------|
| A51 | GND (FIXED) | B51 | GND (FIXED) |
| A52 | N.C. | B52 | N.C. |
| A53 | N.C. | B53 | N.C. |
| A54 | GPI0 | B54 | GPO1 |
| A55 | N.C. | B55 | N.C. |
| A56 | N.C. | B56 | N.C. |
| A57 | GND | B57 | GPO2 |
| A58 | PCIE_TX3+ | B58 | PCIE_RX3+ |
| A59 | PCIE_TX3- | B59 | PCIE_RX3- |
| A60 | GND (FIXED) | B60 | GND (FIXED) |
| A61 | PCIE_TX2+ | B61 | PCIE_RX2+ |
| A62 | PCIE_TX2- | B62 | PCIE_RX2- |
| A63 | GPI1 | B63 | GPO3 |
| A64 | PCIE_TX1+ | B64 | PCIE_RX1+ |
| A65 | PCIE_TX1- | B65 | PCIE_RX1- |
| A66 | GND | B66 | WAKE0# |
| A67 | GPI2 | B67 | WAKE1# |
| A68 | PCIE_TX0+ | B68 | PCIE_RX0+ |
| A69 | PCIE_TX0- | B69 | PCIE_RX0- |
| A70 | GND (FIXED) | B70 | GND (FIXED) |
| A71 | EDP_TXP2 | B71 | DDIO_PAIR0+ |
| A72 | EDP_TXN2 | B72 | DDIO_PAIR0- |
| A73 | EDP_TXP1 | B73 | DDIO_PAIR1+ |
| A74 | EDP_TXN1 | B74 | DDIO_PAIR1- |
| A75 | EDP_TXP0 | B75 | DDIO_PAIR2+ |
| A76 | EDP_TXN0 | B76 | DDIO_PAIR2- |

| Row A | | Row B | |
|-------|---------------|-------|--------------------------------|
| A77 | EDP_VDD_EN | B77 | N.C. |
| A78 | N.C. | B78 | N.C. |
| A79 | N.C. | B79 | EDP_BKLT_EN |
| A80 | GND (FIXED) | B80 | GND (FIXED) |
| A81 | EDP_TXP3 | B81 | DDIO_PAIR3+ |
| A82 | EDP_TXN3 | B82 | DDIO_PAIR3- |
| A83 | EDP_AUXP | B83 | EDP_BKLTCTL |
| A84 | EDP_AUXN | B84 | VCC_5V_SBY |
| A85 | GPI3 | B85 | VCC_5V_SBY |
| A86 | N.C. | B86 | VCC_5V_SBY |
| A87 | EDP_HDP | B87 | VCC_5V_SBY |
| A88 | PCIE0_CK_REF+ | B88 | BISO_DIS1# |
| A89 | PCIE0_CK_REF- | B89 | DDIO_HPDP |
| A90 | GND (FIXED) | B90 | GND (FIXED) |
| A91 | SPI_POWER | B91 | N.C. |
| A92 | SPI_MISO | B92 | N.C. |
| A93 | GPO0 | B93 | N.C. |
| A94 | SPI_CLK | B94 | N.C. |
| A95 | SPI_MOSI | B95 | DDIO_DDC_AUX_SEL |
| A96 | GND | B96 | N.C. |
| A97 | TYPE10# | B97 | SPI_CS# |
| A98 | RS1_TX | B98 | DDIO_CTRL_CLK or DDIO_AUX+ |
| A99 | RS1_RX | B99 | DDIO_CTRL_DATA or DDIO_AUX- |
| A100 | GND (FIXED) | B100 | GND (FIXED) |

| Row A | | Row B | |
|-------|-------------|-------|-------------|
| A101 | RS2_TX | B101 | FAN_PWMOUT |
| A102 | RS2_RX | B102 | FAN_TACHIN |
| A103 | LID# | B103 | SLEEP# |
| A104 | VCC_12V | B104 | VCC_12V |
| A105 | VCC_12V | B105 | VCC_12V |
| A106 | VCC_12V | B106 | VCC_12V |
| A107 | VCC_12V | B107 | VCC_12V |
| A108 | VCC_12V | B108 | VCC_12V |
| A109 | VCC_12V | B109 | VCC_12V |
| A110 | GND (FIXED) | B110 | GND (FIXED) |

Chapter 3

AMI BIOS Setup

3.1 System Test and Initialization

The system uses certain routines to perform testing and initialization during the boot up sequence. If an error, fatal or non-fatal, is encountered, the system will output a few short beeps or an error message. The board can usually continue the boot up sequence with non-fatal errors.

The system configuration verification routines check the current system configuration against the values stored in the CMOS memory. If they do not match, an error message will be output, and the BIOS setup program will need to be run to set the configuration information in memory.

There are three situations in which the CMOS settings will need to be set or changed:

- Starting the system for the first time
- The system hardware has been changed
- The CMOS memory has lost power and the configuration information is erased

The system's CMOS memory uses a backup battery for data retention. The battery must be replaced when it runs down.

3.2 AMI BIOS Setup

The AMI BIOS ROM has a pre-installed Setup program that allows users to modify basic system configurations, which is stored in the battery-backed CMOS RAM and BIOS NVRAM so that the information is retained when the power is turned off.

To enter BIOS Setup, press or <F2> immediately while your computer is powering up.

The function for each interface can be found below.

Main – Date and time can be set here. Press <Tab> to switch between date elements

Advanced – Enable/ Disable boot option for legacy network devices

System I/O – For configuring PCI Express settings

Security – The setup administrator password can be set here

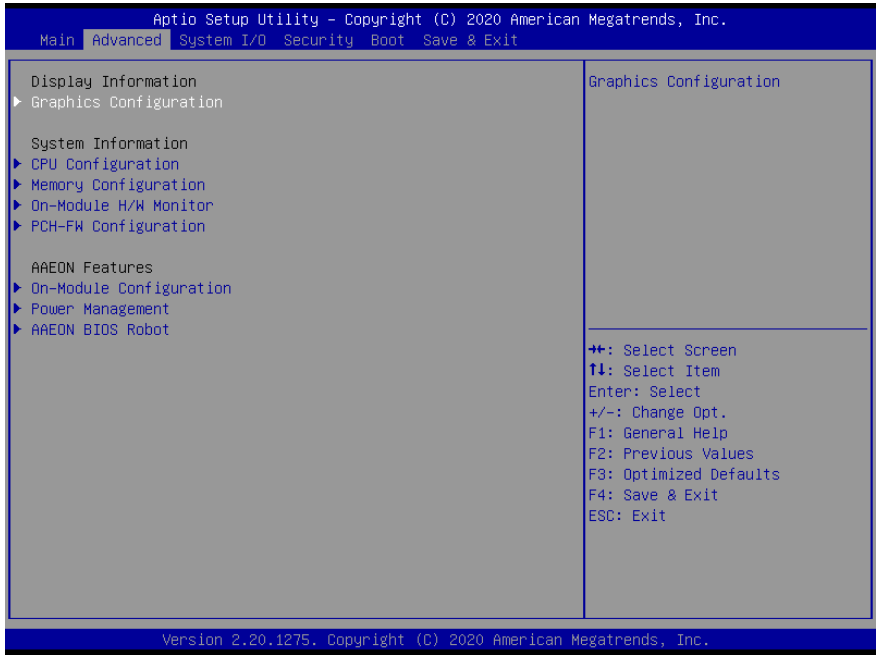
Boot – Enable/ Disable Quiet Boot option

Save & Exit – Save your changes and exit the program

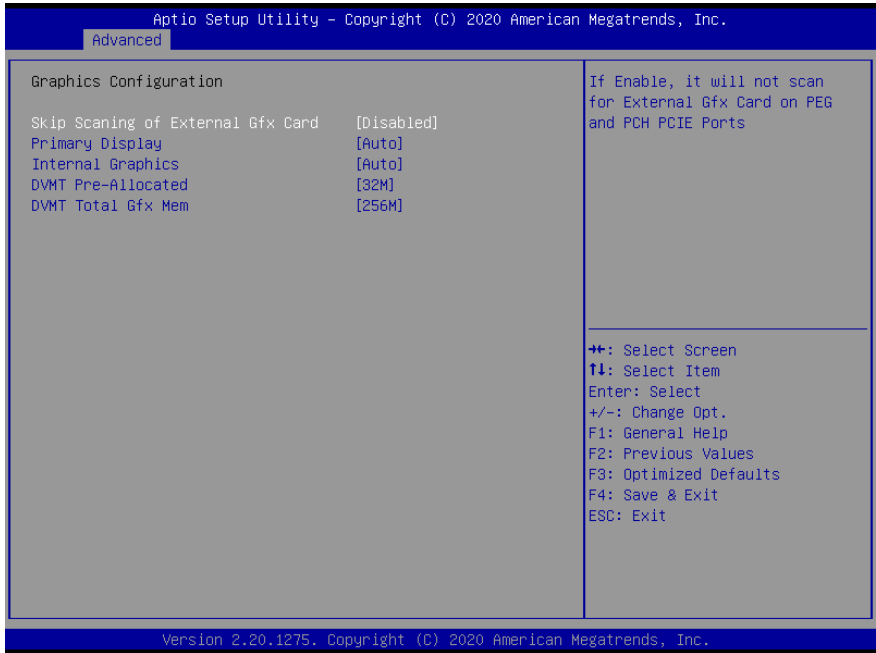
3.3 Setup Submenu: Main



3.4 Setup Submenu: Advanced



3.4.1 Graphics Configuration



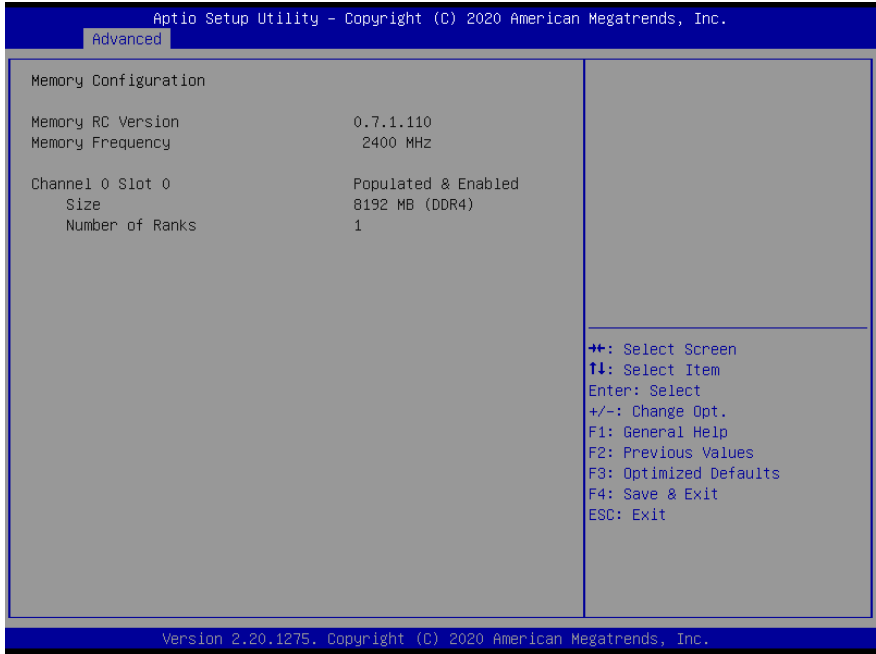
| Options Summary | | |
|---|----------|-----------------------------------|
| Skip Scanning of External Gfx Card | Enable | |
| | Disable | Optimal Default, Failsafe Default |
| If Enable, it will not scan for External Gfx Card on PEG and PCH PCIE Ports. | | |
| Primary Display | Auto | Optimal Default, Failsafe Default |
| | IGFS | |
| | PCI | |
| Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select SG for Switchable Gfx. | | |
| Internal Graphics | Auto | Optimal Default, Failsafe Default |
| | Disabled | |
| | Enabled | |
| Keep IGFS enabled based on the setup options. | | |

Table Continues on Next Page...

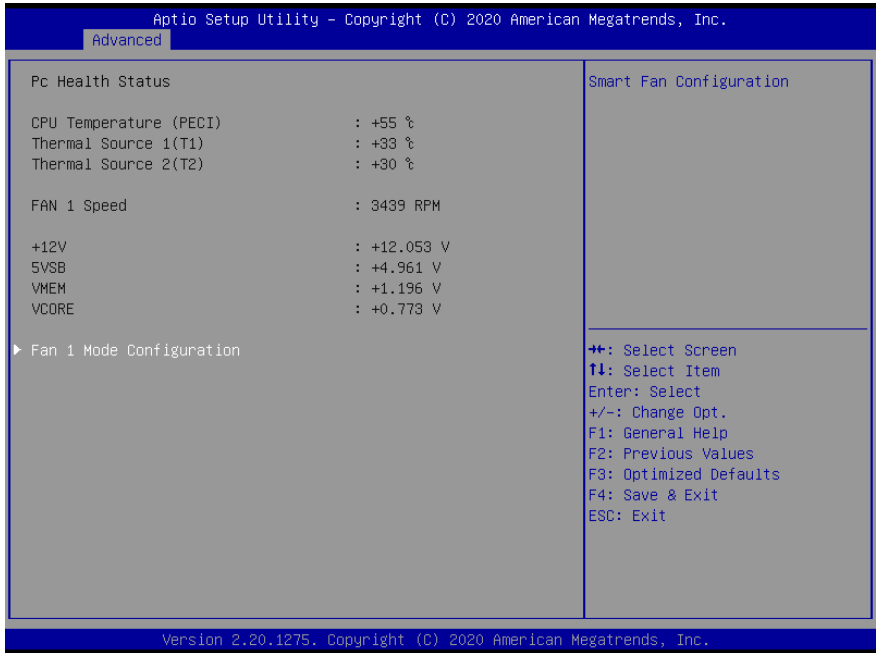
| Options Summary | | |
|--|--------|-----------------------------------|
| DVMT Pre-Allocated | 0M | |
| | 32M | Optimal Default, Failsafe Default |
| | 64M | |
| | 4M | |
| | 8M | |
| | 12M | |
| | 16M | |
| | 20M | |
| | 24M | |
| | 28M | |
| | 32M/F7 | |
| | 36M | |
| | 40M | |
| | 44M | |
| | 48M | |
| | 52M | |
| 56M | | |
| 60M | | |
| Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device. | | |
| DVMT Total Gfx Mem | 128M | |
| | 256M | Optimal Default, Failsafe Default |
| | MAX | |

| Options Summary | | |
|---|----------|-----------------------------------|
| Intel® SpeedStep™ | Disabled | |
| | Enabled | Optimal Default, Failsafe Default |
| Allows more than two frequency ranges to be supported. | | |
| Turbo Mode | Disabled | |
| | Enabled | Optimal Default, Failsafe Default |
| Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled). | | |

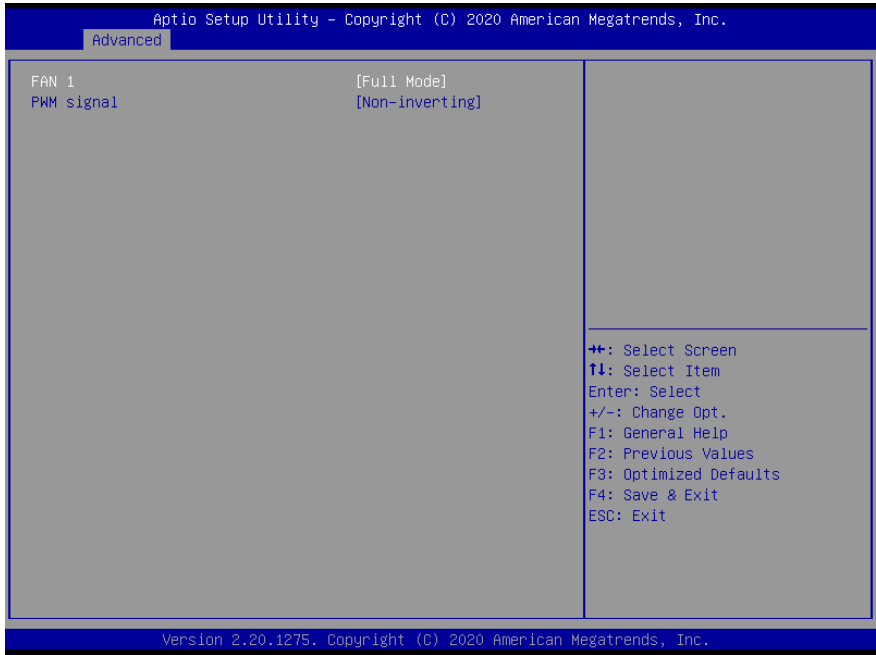
3.4.3 Memory Configuration



3.4.4 On-Module H/W Monitor

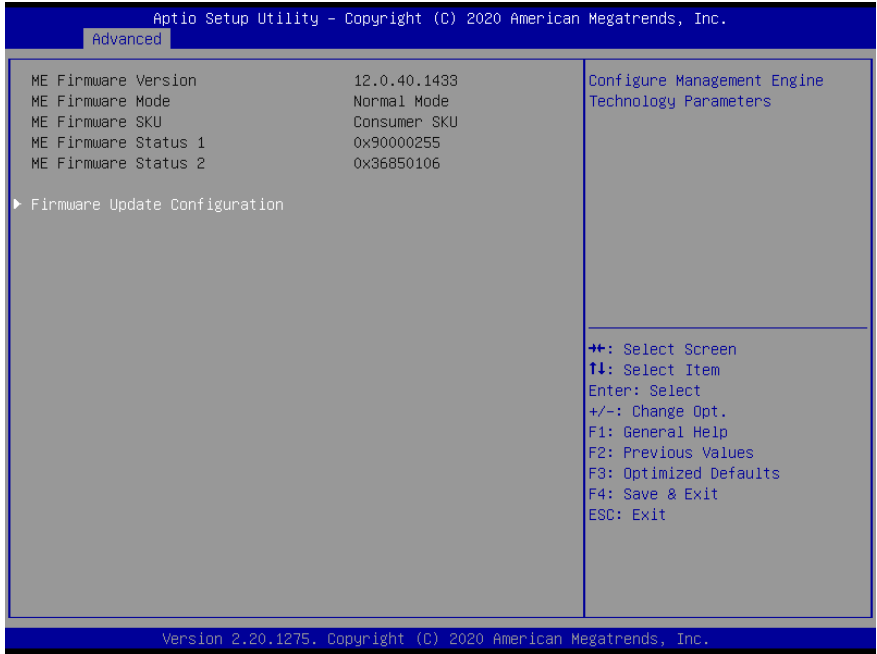


3.4.4.1 Fan 1 Mode Configuration

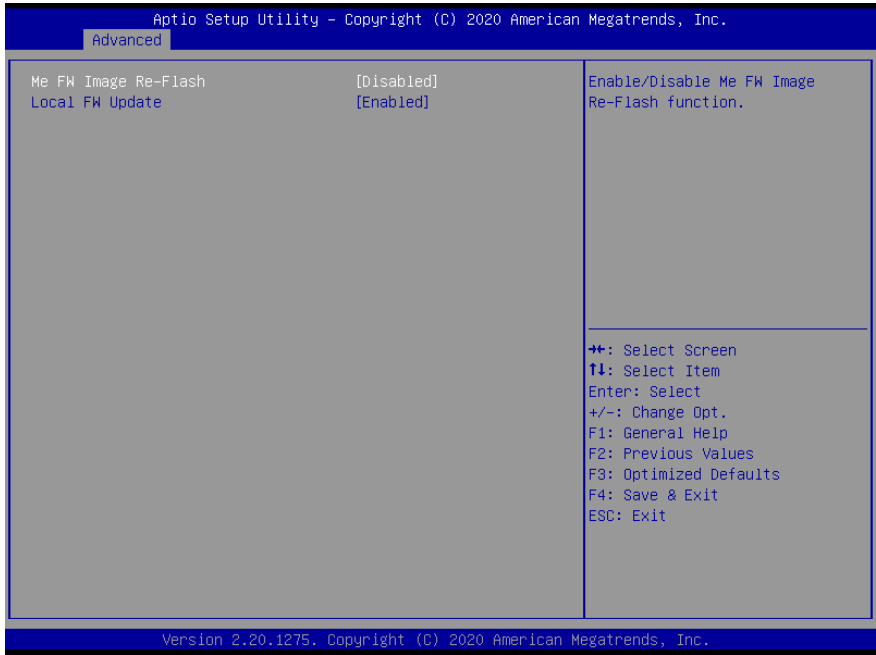


| Options Summary | | |
|---|--------------------|-----------------------------------|
| FAN 1 | Full Mode | Optimal Default, Failsafe Default |
| | Manual Mode by PWM | |
| | Auto Mode by PWM | |
| Choose the mode for FAN 1. | | |
| PWM signal | Non-inverting | Optimal Default, Failsafe Default |
| | Inverting | |
| Select output PWM of inverting or non-inverting signal. | | |

3.4.5 PCH-FW Configuration

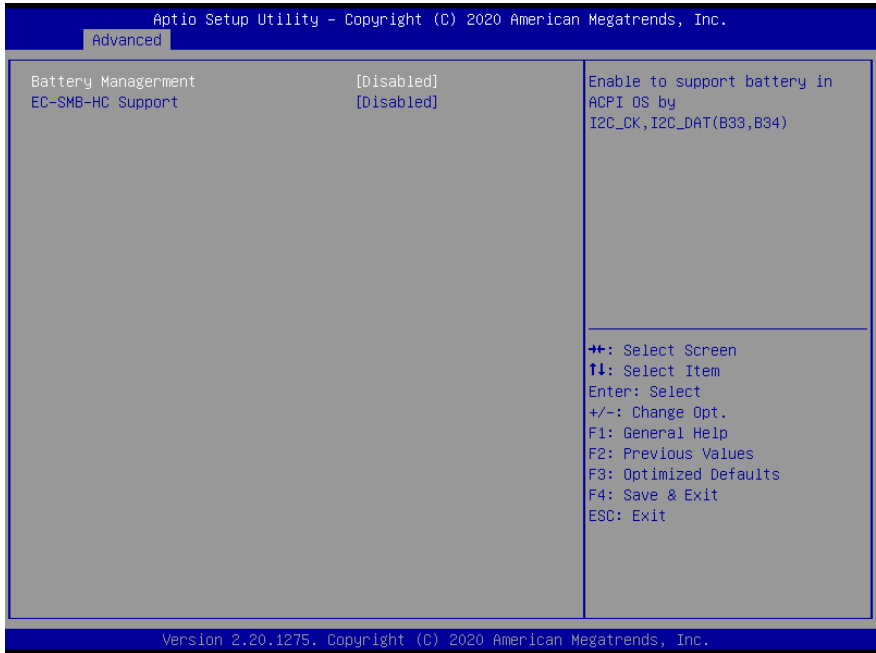


3.4.5.1 Firmware Update Configuration



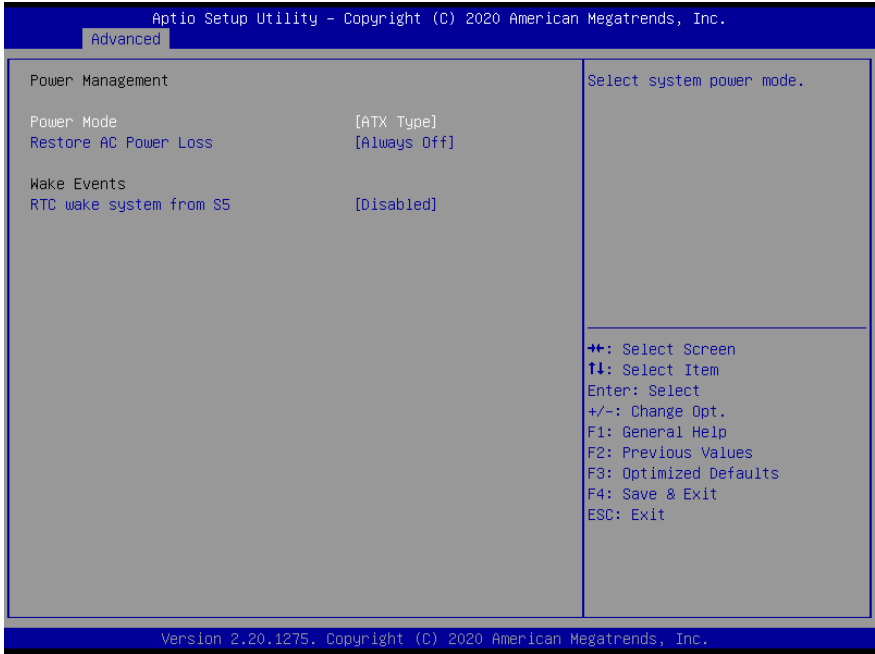
| Options Summary | | |
|---|----------|-----------------------------------|
| Me FW Image Re-Flash | Enabled | |
| | Disabled | Optimal Default, Failsafe Default |
| Enable/Disable Me FW Image Re-Flash function. | | |
| Local FW Update | Enabled | Optimal Default, Failsafe Default |
| | Disabled | |
| Options for Local FW Update function. | | |

3.4.6 On-Module Configuration



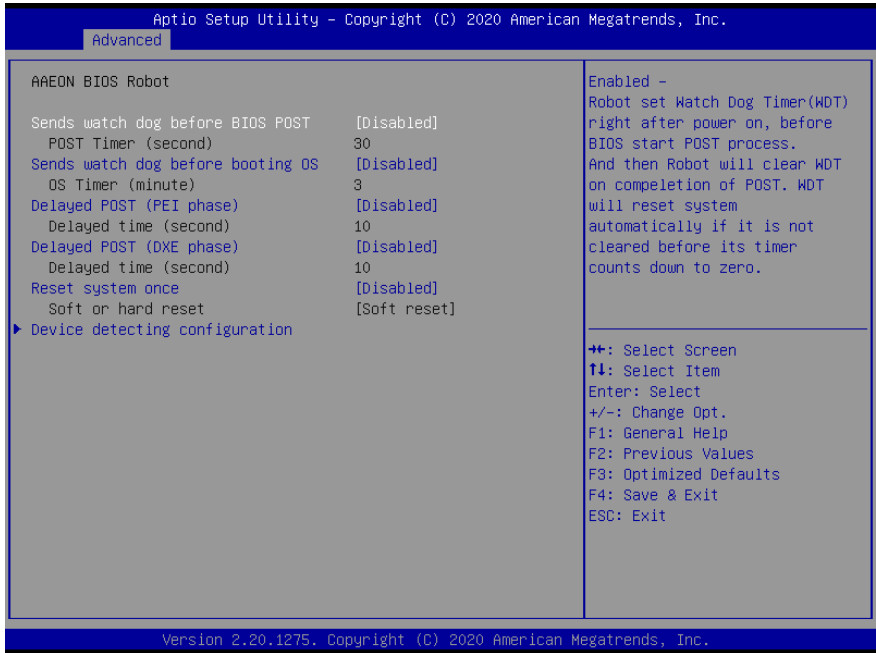
| Options Summary | | |
|--|-------------|-----------------------------------|
| Battery Management | Disabled | Optimal Default, Failsafe Default |
| | One Battery | |
| Enable to support battery in ACPI OS by I2C_CK, I2C_DAT(B33,B34) | | |
| EC-SMB-HC Support | Enabled | |
| | Disabled | Optimal Default, Failsafe Default |
| SMBus Host Controller Interface via Embedded Controller. | | |

3.4.7 Power Management



| Options Summary | | |
|---|--------------|-----------------------------------|
| Power Mode | ATX Type | Optimal Default, Failsafe Default |
| | AT Type | |
| Select system power mode. | | |
| Restore AC Power Loss | Last State | |
| | Always On | |
| | Always Off | Optimal Default, Failsafe Default |
| IO Restore AC Power Loss. | | |
| RTC wake system from S5. | Disabled | Optimal Default, Failsafe Default |
| | Fixed Time | |
| | Dynamic Time | |
| Fixed Time: System will wake on the hr:min:sec specified. | | |
| Dynamic Time: System will wake on the current time + Increase minute(s) | | |

3.4.8 AAEON BIOS Robot



| Options Summary | | |
|---|----------|-----------------------------------|
| Sends watch dog before BIOS POST. | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| Enabled - Robot set Watch Dog Timer (WDT) right after power on, before BIOS start POST process. And then Robot will clear WDT on completion of POST. WDT will reset system automatically if it is not cleared before its timer counts down to zero. | | |
| Sends watch dog before booting OS | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| Enabled - Robot set Watch Dog Timer (WDT) after POST completion, before BIOS transfer control to OS. | | |
| WARNING: Before enabling this function, a program in OS must be in responsible for clearing WDT. Also, this function should be disabled if OS is going to update itself. | | |

Table Continues on Next Page

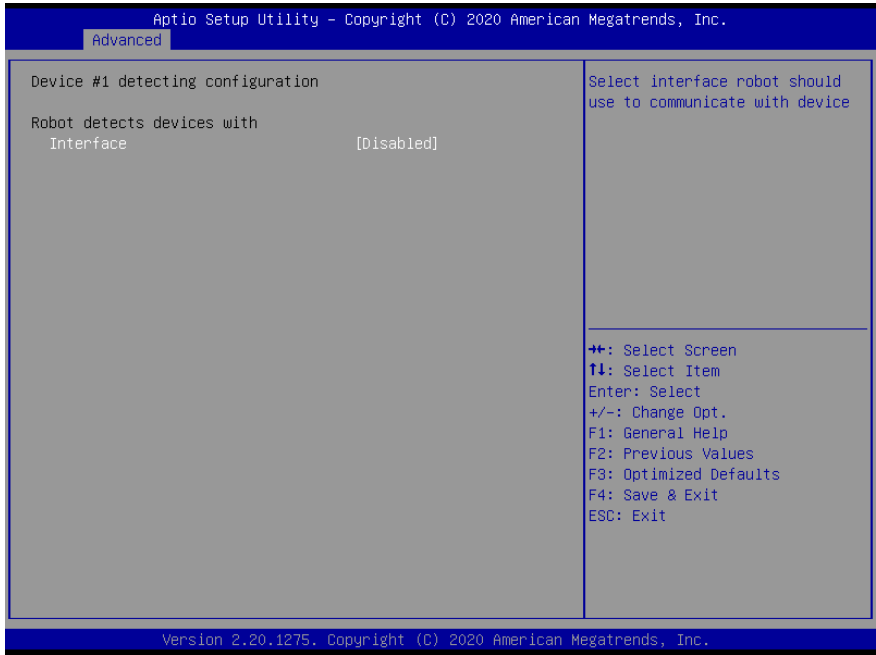
| Options Summary | | |
|--|----------|-----------------------------------|
| Delayed POST (PEI phase) | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| Enabled – Robot holds BIOS from starting POST, right after power. This allows BIOS POST to start with stable power or start after system is physically warmed-up. Note: Robot does this before ‘Sends watch dog’. | | |
| Delayed POST (DXE phase) | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| Enabled – Robot holds BIOS from starting POST, right after power. This allows BIOS POST to start with stable power or start after system is physically warmed-up. Note: Robot does this before ‘Sends watch dog’. | | |
| Reset System once | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| Enabled – Robot resets system for one time on each boot. This will send a soft or hard reset to onboard devices, thus puts devices to more stable state. | | |

3.4.8.1 Device Detecting Configuration



| Options Summary | | |
|--|------------------|-----------------------------------|
| Action | Reset System | Optimal Default, Failsafe Default |
| | Hold System | |
| Select action that robot should do. | | |
| Soft or hard reset | Soft | Optimal Default, Failsafe Default |
| | Hard | |
| Select reset type robot should send on each boot. | | |
| Retry-Count | 3 | Optimal Default, Failsafe Default |
| Fill retry counter here. Robot will reset system at most counter times, and then let the system continues its POST. | | |
| At time | After show logo | Optimal Default, Failsafe Default |
| | Before show logo | |
| Select robot action time: After show logo: Robot will do action after logo is displayed. System devices are almost ready. Before show logo: Robot will do action earlier before logo, but some devices may not be ready. | | |

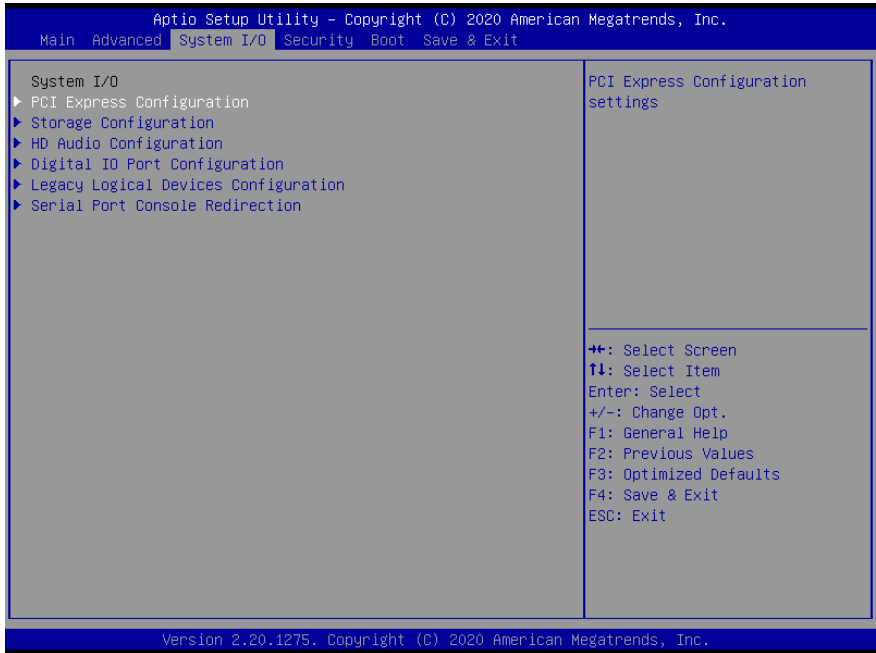
3.4.8.1.1 Device #1~5 Detecting Configuration



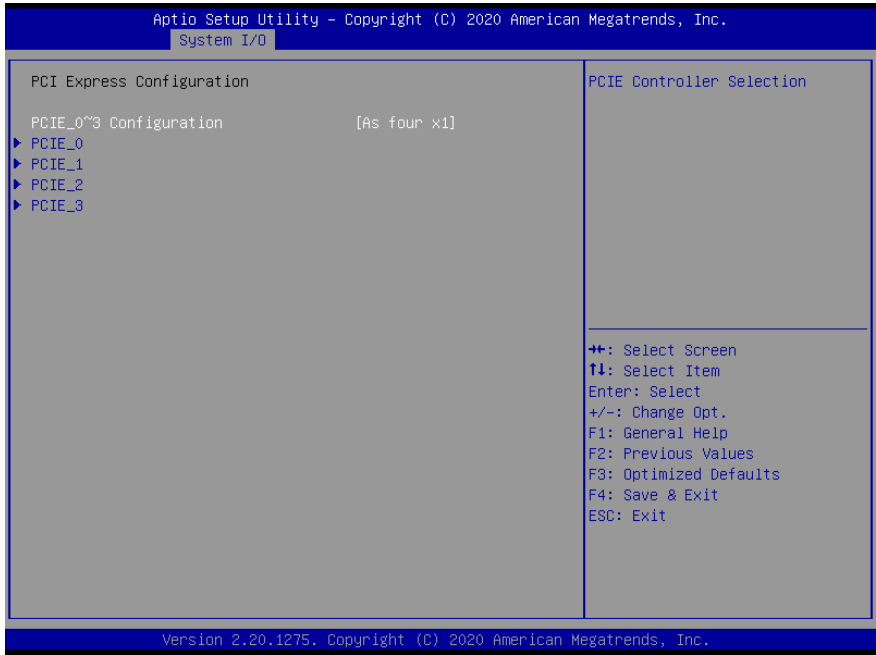
| Options Summary | | |
|---|------------|-----------------------------------|
| Interface | Disabled | Optimal Default, Failsafe Default |
| | PCI | |
| | DIO | |
| | SMBUS | |
| | Legacy I/O | |
| | Super I/O | |
| | MMIO | |
| Select interface robot should use to communicate with device. | | |

Note: This menu is the same for all Devices #1 thru #5.

3.5 Setup Submenu: System I/O

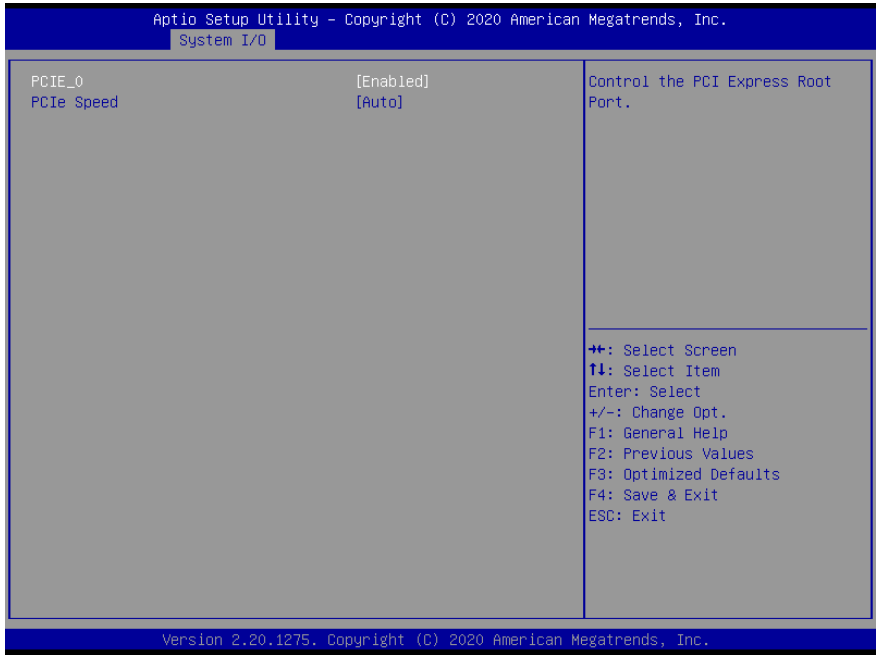


3.5.1 PCI Express Configuration



| Options Summary | | |
|-----------------------------------|----------------------|-----------------------------------|
| PCI Express_0~3 Configuration | As Four x1 | Optimal Default, Failsafe Default |
| | As one x2 and two x1 | |
| | As two x2 | |
| | As one x4 | |
| PCI Express Controller Selection. | | |

3.5.1.1 PCIE_# Configuration



| Options Summary | | |
|------------------------------------|----------|-----------------------------------|
| PCIE_N | Disabled | |
| | Enabled | Optimal Default, Failsafe Default |
| Control the PCI Express Root Port. | | |
| PCIE Speed | Auto | Optimal Default, Failsafe Default |
| | Gen1 | |
| | Gen2 | |
| | Gen3 | |
| Configure PCIe Speed. | | |

Note: This menu is the same for PCIE_0, PCIE_1, PCIE_2, and PCIE_3.

3.5.2 Storage Configuration

Aptio Setup Utility - Copyright (C) 2020 American Megatrends, Inc.

System I/O

| | | |
|---------------------|--------------------|--|
| eMMC 5.0 Controller | [Enabled] | Enable or Disable SCS eMMC 5.0 Controller |
| eMMC 5.0 HS400 Mode | [Enabled] | |
| Driver Strength | [40 Ohm] | |
| SATA Controller(s) | [Enabled] | ++: Select Screen ↑↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |
| SATA Mode Selection | [AHCI] | |
| SATA Port 0 | Empty | |
| Port 0 | [Enabled] | |
| Hot Plug | [Disabled] | |
| Configured as eSATA | Hot Plug supported | |
| External | [Disabled] | |
| Spin Up Device | [Disabled] | |
| SATA Device Type | [Hard Disk Drive] | |
| SATA Port 1 | Empty | |
| Port 1 | [Enabled] | |
| Hot Plug | [Disabled] | |
| Configured as eSATA | Hot Plug supported | |
| External | [Disabled] | |
| Spin Up Device | [Disabled] | |
| SATA Device Type | [Hard Disk Drive] | |

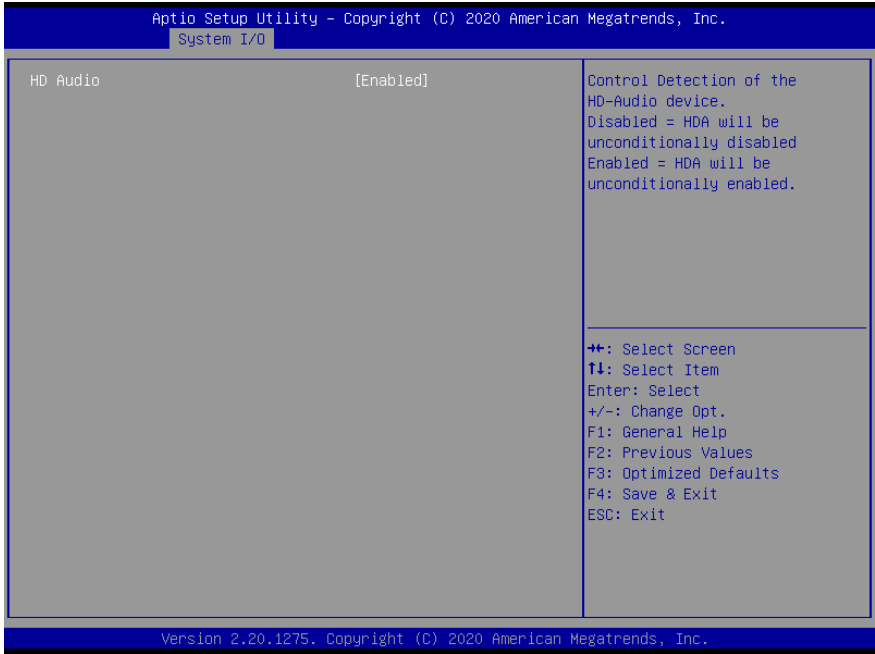
Version 2.20.1275. Copyright (C) 2020 American Megatrends, Inc.

| Options Summary | | |
|--|----------|-----------------------------------|
| eMMC 5.0 Controller | Disabled | |
| | Enabled | Optimal Default, Failsafe Default |
| Enable or Disable SCS eMMC 5.0 Controller. | | |
| eMMC 5.0 HS400 Mode | Disabled | |
| | Enabled | Optimal Default, Failsafe Default |
| Enable or Disable SCS eMMC HS400 Mode. | | |
| Driver Strength | 33 Ohm | |
| | 40 Ohm | Optimal Default, Failsafe Default |
| | 50 Ohm | |
| Sets I/O driver strength. | | |
| SATA Controller(s) | Enabled | Optimal Default, Failsafe Default |
| | Disabled | |
| Enable/Disable SATA Device. | | |

Table Continues on Next Page

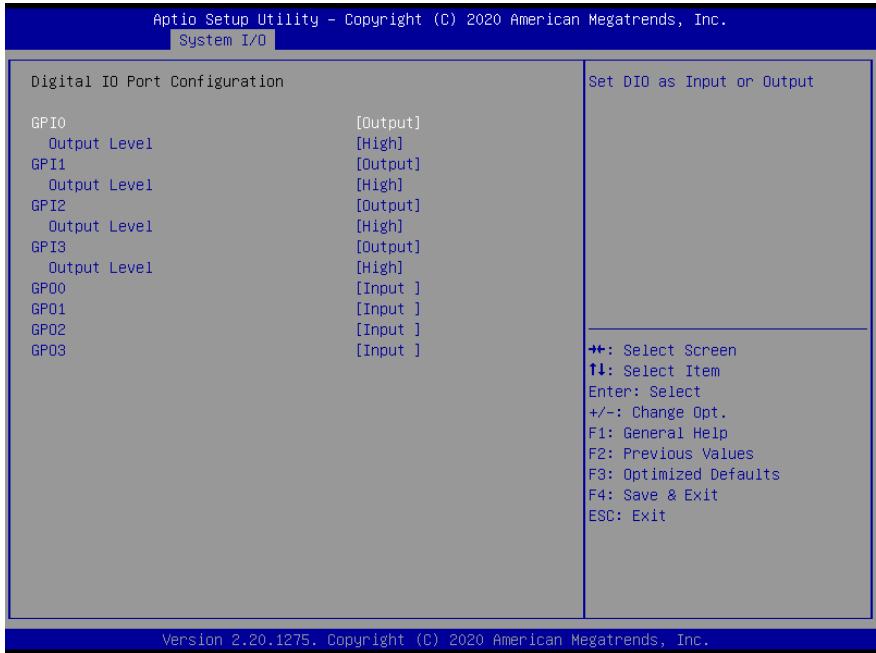
| Options Summary | | |
|--|---|-----------------------------------|
| SATA Mode Selection | AHCI | Optimal Default, Failsafe Default |
| | Intel RST Premium with Intel Optane System Acceleration | |
| Determines how SATA controller(s) operate. | | |
| SATA Port 0/1 Configuration | | |
| Port 0/1 | Disabled | |
| | Enabled | Optimal Default, Failsafe Default |
| Enable or Disable SATA Port 0/1 | | |
| Hot Plug | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| Designates this port as Hot Pluggable. | | |
| External | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| Marks this port as external. | | |
| Spin Up Device | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| If enabled for any of ports Staggered Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot. | | |
| SATA Device Type | Hard Disk Drive | Optimal Default, Failsafe Default |
| | Solid State Drive | |
| Identify the SATA port is connected to Solid State Drive or Hard Disk Drive. | | |

3.5.3 HD Audio Configuration



| Options Summary | | |
|--|----------|-----------------------------------|
| HD Audio | Disabled | |
| | Enabled | Optimal Default, Failsafe Default |
| Control Detection of the HD-Audio device. Disabled: HD-Audio will be unconditionally disabled. Enabled: HD-Audio will be unconditionally disabled. | | |

3.5.4 Digital IO Port Configuration

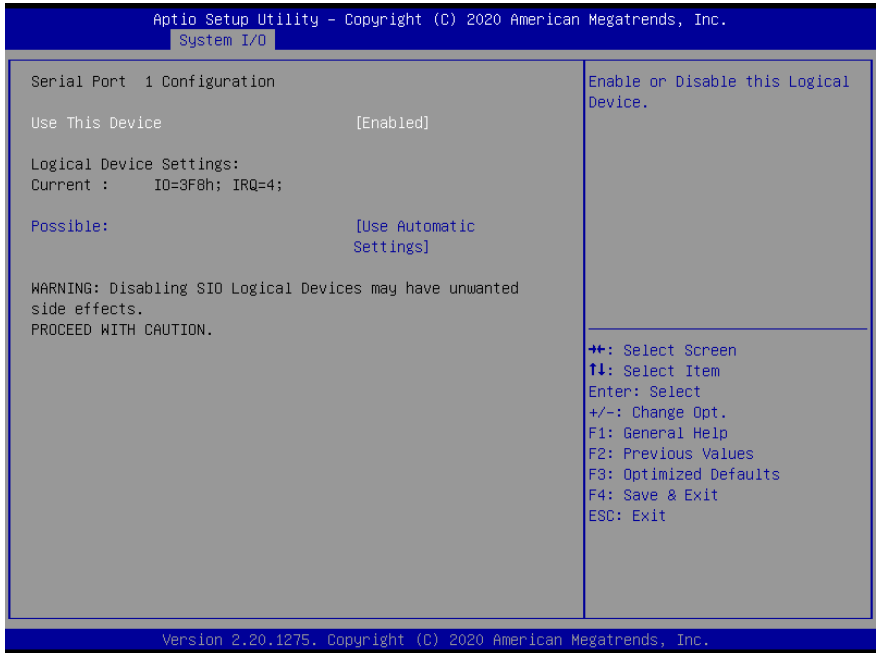


| Options Summary | | |
|--|--------|-----------------------------------|
| IO Type | Output | Optimal Default, Failsafe Default |
| | Input | |
| Set IO as Input or Output | | |
| IO Data | Low | |
| | High | Optimal Default, Failsafe Default |
| Set is output level when DIO pin is output | | |

3.5.5 Legacy Logical Devices Configuration

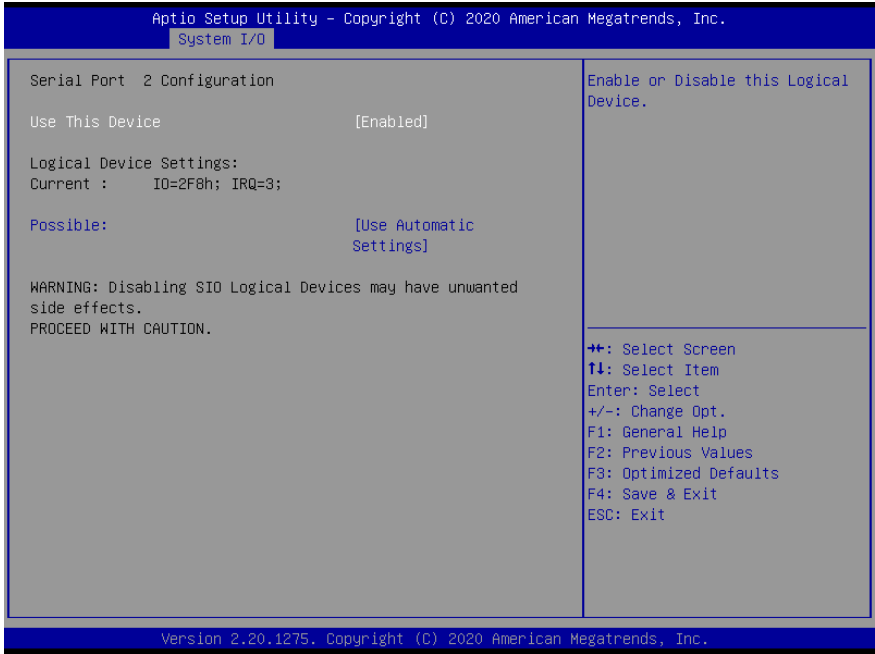


3.5.5.1 [*Active*] Serial Port 1



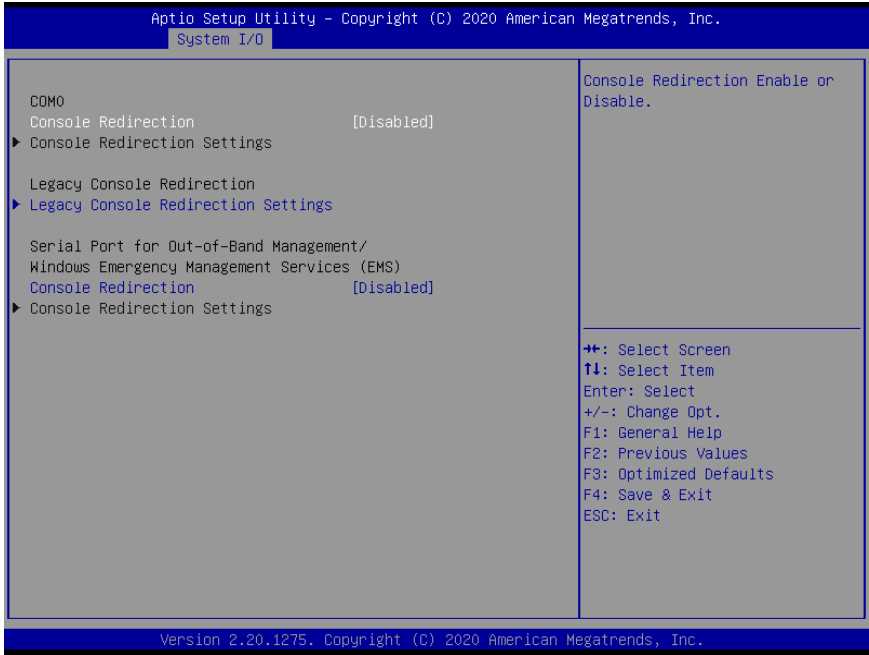
| Options Summary | | |
|--|------------------------|-----------------------------------|
| Use This Device | Disabled | |
| | Enabled | Optimal Default, Failsafe Default |
| Enable or Disable this Logical Device. | | |
| Possible | Use Automatic Settings | Optimal Default, Failsafe Default |
| | IO=3F8h; IRQ=4; DMA; | |
| | IO=2C8h; IRQ=11; DMA | |
| Allows the user to change the device resource settings. New settings will be reflected on this setup page after system restarts. | | |

3.5.5.2 [*Active*] Serial Port 2



| Options Summary | | |
|--|------------------------|-----------------------------------|
| Use This Device | Disabled | |
| | Enabled | Optimal Default, Failsafe Default |
| Enable or Disable this Logical Device. | | |
| Possible | Use Automatic Settings | Optimal Default, Failsafe Default |
| | IO=2F8h; IRQ=3; DMA; | |
| | IO=2D8h; IRQ=10; DMA | |
| Allows the user to change the device resource settings. New settings will be reflected on this setup page after system restarts. | | |

3.5.6 Serial Port Console Redirection



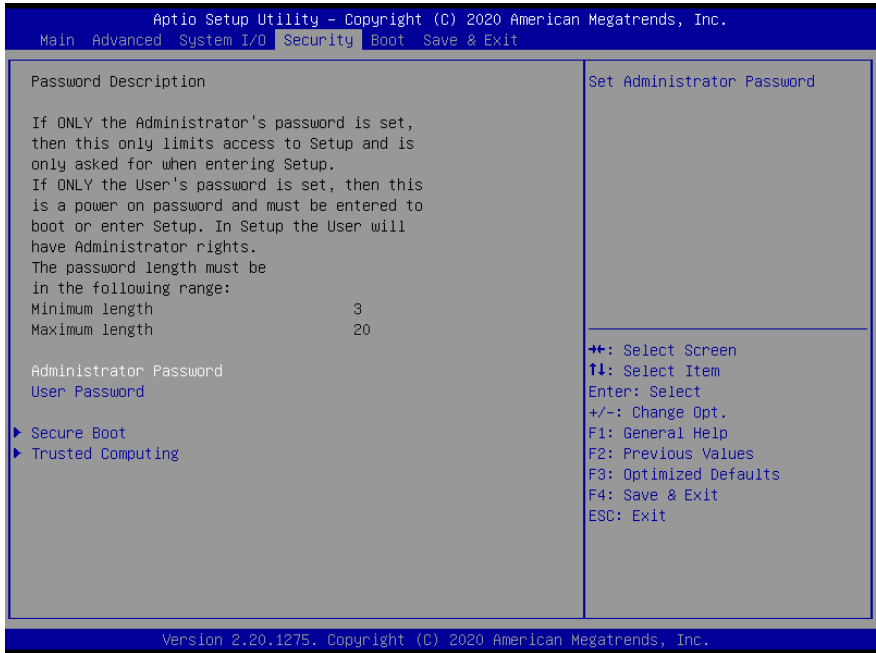
| Options Summary | | |
|--|----------|-----------------------------------|
| Console Redirection (COM0) | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| Console Redirection Enable or Disable. | | |
| Console Redirection | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| Console Redirection Enable or Disable. | | |

3.5.6.1 Legacy Console Redirection Settings



| Options Summary | | |
|--|---------------|-----------------------------------|
| Redirection COM Port | COM0 | Optimal Default, Failsafe Default |
| Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages | | |
| Resolution | 80x24 | Optimal Default, Failsafe Default |
| | 80x25 | |
| On Legacy OS, the Number of Rows and Columns supported redirection. | | |
| Redirect After POST | Always Enable | Optimal Default, Failsafe Default |
| | Bootloader | |
| When Bootloader is selected, then Legacy Console Redirection is disabled before booting to legacy OS. When Always Enable is selected, then Legacy Console Redirection is enabled for legacy OS. Default setting for this option is set to Always Enable. | | |

3.6 Setup Submenu: Security



Change User/Administrator Password

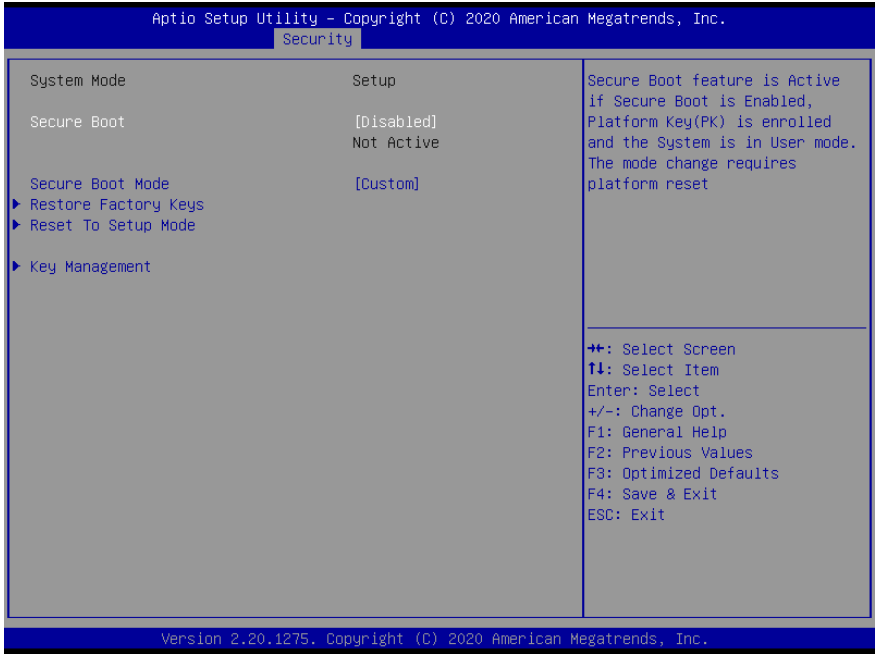
You can set an Administrator Password or User Password. An Administrator Password must be set before you can set a User Password. The password will be required during boot up, or when the user enters the Setup utility. A User Password does not provide access to many of the features in the Setup utility.

Select the password you wish to set, and press Enter. In the dialog box, enter your password (must be between 3 and 20 letters or numbers). Press Enter and retype your password to confirm. Press Enter again to set the password.

Removing the Password

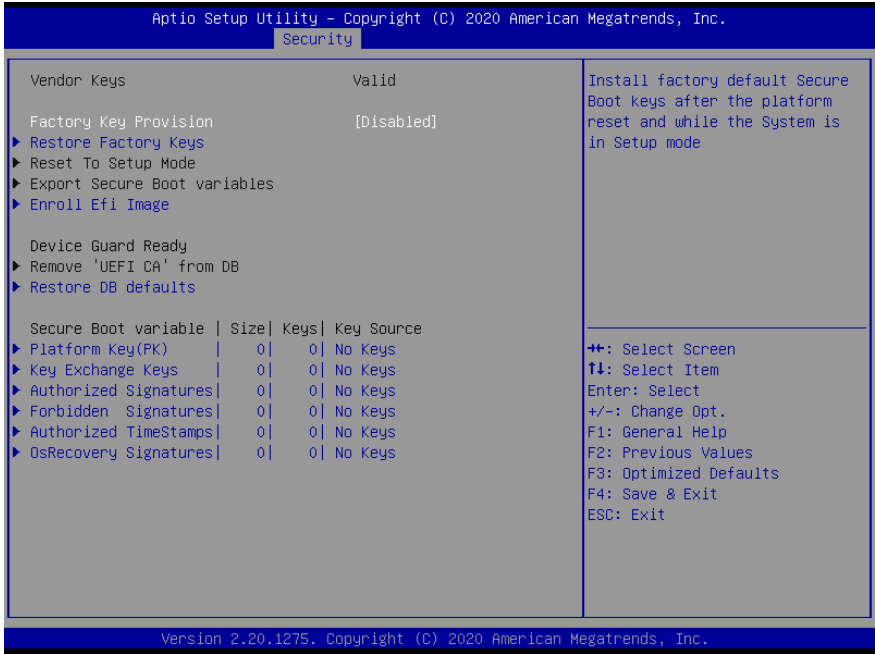
Select the password you want to remove and enter the current password. At the next dialog box press Enter to disable password protection.

3.6.1 Secure Boot



| Options Summary | | |
|--|----------|-------------------------------------|
| Secure Boot | Disable | Optimal Default, Failsafe Default |
| | Enable | |
| Secure Boot feature is Active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the System mode is in User mode. Changing the mode requires platform reset. | | |
| Secure Boot Mode | Standard | Optimal Default, Failsafe Default |
| | Custom | |
| Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication. | | |
| Restore Factory Keys | No | Press 'Yes' to restore factory keys |
| | Yes | |
| Force System to User Mode. Install factory default Secure Boot key databases | | |
| Key Management | | |
| Enables expert users to modify Secure Boot Policy variables without full authentication | | |

3.6.2 Key Management



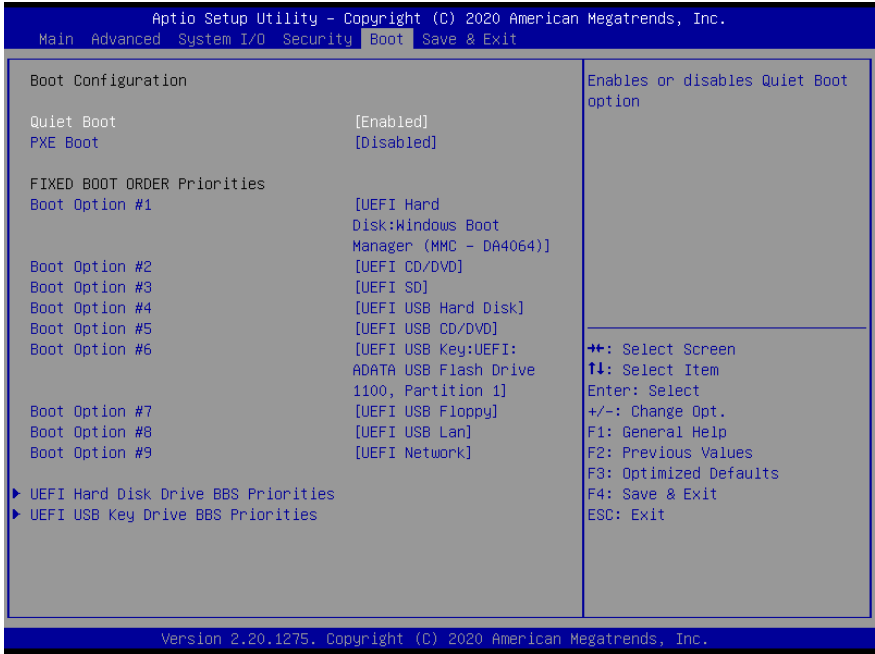
| Options Summary | | |
|--|----------|---|
| Factory Key Provision | Disabled | Optimal Default, Failsafe Default |
| | Enabled | |
| Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode. | | |
| Restore Factory Keys | No | Press 'Yes' to install factory default keys |
| | Yes | |
| Force System to User Mode. Install Factory default Secure Boot key databases. | | |
| Enroll EFI image | - | - |
| Allow the image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database(db). | | |
| Restore DB defaults | No | Press 'Yes' to install factory default keys |
| | Yes | |
| Restore DB Variable to factory defaults. | | |

| Secure Boot Variable | Size | Keys# | Key Source |
|--|------|-------|--|
| Platform Key (PK) 0 0 No Key | | | Update Enroll Factory Defaults or load certificates from a file: 1.Public key Certificate: a) EFI_SIGNATURE_LIST b) EFI_CERT_X509 (DER) c) EFI_CERT_RSA2048 (bin) d) EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image (SHA256) Key Source: Factory, External, Mixed |
| Key Exchange keys 0 0 No Key | | | Update |
| | | | Append |
| Authorized Signatures 0 0 No Key | | | Update |
| | | | Append |
| | | | Enroll Factory Defaults or load certificates from a file: 1.Public key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory, External, Mixed |
| | | | Enroll Factory Defaults or load certificates from a file: 1.Public key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory, External, Mixed |

Table Continues on Next Page

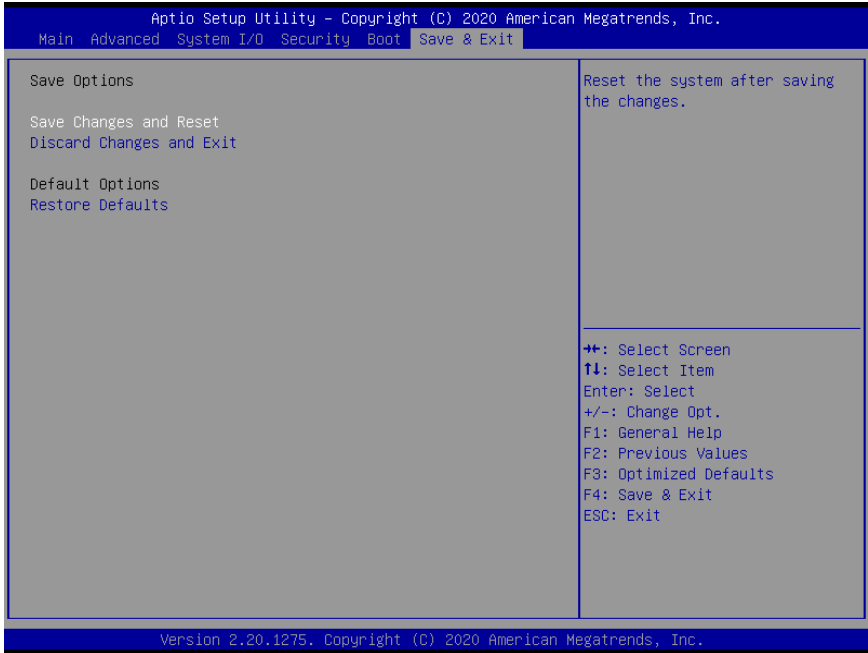
| Secure Boot Variable Size Keys# Key Source | | |
|--|--------|---|
| Forbidden Signatures 0 0 No Key | Update | Enroll Factory Defaults or load certificates from a file: 1.Public key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory, External, Mixed |
| | Append | |
| Authorized TimeStamps 0 0 No Key | Update | Enroll Factory Defaults or load certificates from a file: 1.Public key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory, External, Mixed |
| | Append | |
| OsRecovery Signatures 0 0 No Key | Update | Enroll Factory Defaults or load certificates from a file: 1.Public key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory, External, Mixed |
| | Append | |

3.7 Setup Submenu: Boot



| Options Summary | | |
|--|----------|-----------------------------------|
| Quiet Boot | Disabled | |
| | Enabled | Optimal Default, Failsafe Default |
| Enables or disables Quiet Boot option. | | |
| PXE Boot | Disabled | Optimal Default, Failsafe Default |
| | UEFI | |
| Controls the execution of UEFI and Legacy Network OpROM. | | |

3.8 Setup Submenu: Save & Exit



Chapter 4

Drivers Installation

4.1 Driver Download and Installation

Drivers for the NanoCOM-WHU can be downloaded from the product page on the AAEON website by following this link:

<https://www.aaeon.com/en/p/com-express-modules-nanocom-whu>

Download the driver(s) you need and extract the zip. Then, follow the steps below to install the drivers.

Step 1 – Install Chipset Drivers

1. Open the **Intel(R) Chipset Device Software 10.1.18019.8144** folder.
2. Run the **SetupChipset.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically

Step 2 – Install Graphics Driver

1. Open the **Intel Graphic 27.20.100.7922 x64** folder
2. Run the **igxpın.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically
5. A Read Me file is included in the folder in case you have any questions during installation

Step 3 – Install Network Drivers

1. Open the **Intel(R) Network Connections Software 24.1** folder
2. Run the **PROWinx64.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically

Step 4 – Install Audio Drivers

1. Open the **Realtek Audio R2.82** folder
2. Run the **0009-64bit_Win7_Win8_Win81_Win10_R282.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically

Step 5 – Install Intel Management Engine Firmware

1. Open the **Intel(R) Management Engine Firmware 1910.12.0.1239** folder
2. Run the **MEISetup.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically

Step 6 – Install Intel Serial IO Drivers

1. Open the **Intel Serial IO 30.100.1841.2** folder
2. Run the **SetupSerialIO.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically
5. A Read Me file is included in the folder in case you have any questions during installation, as well as instructions to verify installation

Appendix A

Watchdog Timer Programming

A.1 Watchdog Timer Initial Program

Table 1: Embedded BRAM relative register table

| | Default Value | Note |
|----------------------------|---------------|----------------------------------|
| Index | 0x284(Note1) | BRAM Index Register |
| Data | 0x285(Note2) | BRAM Data Register |
| Logical Device Number | 0xA8(Note3) | Watch dog Logical Device Number |
| Function and Device Number | 0x00(Note4) | Watch dog Function/Device Number |

Table 2: Watchdog relative register table

| | Option Register | BitNum | Value | Note |
|--------------------------|-----------------|--------------|-----------|---|
| Timer Counter | 0x00(Note5) | | (Note10) | Time of watchdog timer (0~255) |
| Counting Unit | 0x01(Note6) | 0(Note7) | 0(Note11) | Select time unit. 0: second 1: minute |
| Watchdog RST pulse width | 0x01(Note8) | [3:2](Note9) | 0(Note12) | 0: 20ms 1: 60ms 2: 100ms 3: 250ms |

```

*****
// Embedded BRAM relative definition (Please reference to Table 1)
#define byte EcBRAMIndex //This parameter is represented from Note1
#define byte EcBRAMData //This parameter is represented from Note2
#define byte BRAMLDRReg //This parameter is represented from Note3
#define byte BRAMFnDataReg //This parameter is represented from Note4
#define void EcBRAMWriteByte(byte Offset, byte Value);
#define byte EcBRAMReadByte(byte Offset);
#define void IOWriteByte(byte Offset, byte Value);
#define byte IOReadByte(byte Offset);
// Watch Dog relative definition (Please reference to Table 2)
#define byte TimerReg //This parameter is represented from Note5
#define byte TimerVal // This parameter is represented from Note10
#define byte UnitReg //This parameter is represented from Note6
#define byte UnitBit //This parameter is represented from Note7
#define byte UnitVal //This parameter is represented from Note11
#define byte RSTReg //This parameter is represented from Note8
#define byte RSTBit //This parameter is represented from Note9
#define byte RSTVal //This parameter is represented from Note12
*****

```

```
*****
VOID Main() {
    // Procedure : AaeonWDTConfig
    // (byte)Timer : Time of WDT timer.(0x00~0xFF)
    // (boolean)Unit : Select time unit(0: second, 1: minute).
    AaeonWDTConfig();

    // Procedure : AaeonWDTEnable
    // This procedure will enable the WDT counting.
    AaeonWDTEnable();
}
*****
```

```

*****
// Procedure : AaeonWDTEnable
VOID AaeonWDTEnable (){
    WDTEnableDisable(1);
}

// Procedure : AaeonWDTConfig
VOID AaeonWDTConfig (){
    // Disable WDT counting
    WDTEnableDisable(0);
    // WDT relative parameter setting
    WDTParameterSetting();
}

VOID WDTEnableDisable(byte Value){
    ECBRAMWriteByte(TimerReg , Value);
}

VOID WDTParameterSetting(){
    Byte TempByte;

    // Watchdog Timer counter setting
    ECBRAMWriteByte(TimerReg , TimerVal);
    // WDT counting unit setting
    TempByte = ECBRAMReadByte(UnitReg);
    TempByte |= (UnitVal << UnitBit);
    ECBRAMWriteByte(UnitReg , TempByte);
    // WDT RST pulse width setting
    TempByte = ECBRAMReadByte(RSTReg);
    TempByte |= (RSTVal << RSTBit);
    ECBRAMWriteByte(RSTReg , TempByte);
}
*****

```

```
*****
```

```
VOID ECBRAMWriteByte(byte OPReg, byte OPBit, byte Value){
```

```
    IOWriteByte(EcBRAMIndex, 0x10);  
    IOWriteByte(EcBRAMData, BRAMLDNReg);  
    IOWriteByte(EcBRAMIndex, 0x11);  
    IOWriteByte(EcBRAMData, BRAMFnDataReg);
```

```
    IOWriteByte(EcBRAMIndex, 0x13 + OPReg);  
    IOWriteByte(EcBRAMData, Value);
```

```
    IOWriteByte(EcBRAMIndex, 0x12);  
    IOWriteByte(EcBRAMData, 0x30);           //Write start
```

```
}
```

```
Byte ECBRAMReadByte(byte OPReg){
```

```
    IOWriteByte(EcBRAMIndex, 0x10);  
    IOWriteByte(EcBRAMData, BRAMLDNReg);  
    IOWriteByte(EcBRAMIndex, 0x11);  
    IOWriteByte(EcBRAMData, BRAMFnDataReg);
```

```
    IOWriteByte(EcBRAMIndex, 0x12);  
    IOWriteByte(EcBRAMData, 0x10);           //Read start
```

```
    IOWriteByte(EcBRAMIndex, 0x13 + OPReg);  
    Return      IOReadByte(EcBRAMData, Value);
```

```
}
```

```
*****
```

Appendix B

I/O Information

B.1 I/O Address Map





















































| 圖示 | 輸入/輸出(I/O) |
|----|---|
| | [0000000000000000 - 000000000000CF7] PCI Express Root Complex |
| | [0000000000000020 - 0000000000000021] 可程式化插斷控制器 |
| | [0000000000000024 - 0000000000000025] 可程式化插斷控制器 |
| | [0000000000000028 - 0000000000000029] 可程式化插斷控制器 |
| | [000000000000002C - 000000000000002D] 可程式化插斷控制器 |
| | [000000000000002E - 000000000000002F] 主機板資源 |
| | [0000000000000030 - 0000000000000031] 可程式化插斷控制器 |
| | [0000000000000034 - 0000000000000035] 可程式化插斷控制器 |
| | [0000000000000038 - 0000000000000039] 可程式化插斷控制器 |
| | [000000000000003C - 000000000000003D] 可程式化插斷控制器 |
| | [0000000000000040 - 0000000000000043] 系統計時器 |
| | [000000000000004E - 000000000000004F] 主機板資源 |
| | [0000000000000050 - 0000000000000053] 系統計時器 |
| | [0000000000000061 - 0000000000000061] 主機板資源 |
| | [0000000000000063 - 0000000000000063] 主機板資源 |
| | [0000000000000065 - 0000000000000065] 主機板資源 |
| | [0000000000000067 - 0000000000000067] 主機板資源 |
| | [0000000000000068 - 0000000000000068] Microsoft ACPI 相容內嵌控制器 |
| | [000000000000006C - 000000000000006C] Microsoft ACPI 相容內嵌控制器 |
| | [0000000000000070 - 0000000000000070] 主機板資源 |
| | [0000000000000080 - 0000000000000080] 主機板資源 |
| | [0000000000000092 - 0000000000000092] 主機板資源 |
| | [00000000000000A0 - 00000000000000A1] 可程式化插斷控制器 |
| | [00000000000000A4 - 00000000000000A5] 可程式化插斷控制器 |
| | [00000000000000A8 - 00000000000000A9] 可程式化插斷控制器 |
| | [00000000000000AC - 00000000000000AD] 可程式化插斷控制器 |
| | [00000000000000B0 - 00000000000000B1] 可程式化插斷控制器 |
| | [00000000000000B2 - 00000000000000B3] 主機板資源 |
| | [00000000000000B4 - 00000000000000B5] 可程式化插斷控制器 |
| | [00000000000000B8 - 00000000000000B9] 可程式化插斷控制器 |
| | [00000000000000BC - 00000000000000BD] 可程式化插斷控制器 |
| | [00000000000002F8 - 00000000000002FF] 通訊連接埠 (COM2) |
| | [00000000000003F8 - 00000000000003FF] 通訊連接埠 (COM1) |
| | [00000000000004D0 - 00000000000004D1] 可程式化插斷控制器 |
| | [0000000000000680 - 000000000000069F] 主機板資源 |
| | [0000000000000D00 - 0000000000000FFF] PCI Express Root Complex |
| | [000000000000164E - 000000000000164F] 主機板資源 |
| | [0000000000001800 - 00000000000018FE] 主機板資源 |
| | [0000000000001854 - 0000000000001857] 主機板資源 |
| | [0000000000002000 - 00000000000020FE] 主機板資源 |
| | [0000000000003000 - 000000000000303F] Intel(R) UHD Graphics 620 |
| | [0000000000003060 - 000000000000307F] Standard SATA AHCI Controller |
| | [0000000000003080 - 0000000000003083] Standard SATA AHCI Controller |
| | [0000000000003090 - 0000000000003097] Standard SATA AHCI Controller |
| | [000000000000EFA0 - 000000000000EFBF] Intel(R) SMBus - 9DA3 |





















































B.2 Memory Address Map





















































| 圖示 | 地址範圍 | 設備名稱 |
|-------|---|---|
| ▼ 記憶體 | | |
| | [00000000000A0000 - 00000000000BFFFF] | PCI Express Root Complex |
| | [0000000040000000 - 00000000403FFFFF] | 主機板資源 |
| | [0000000090000000 - 000000009FFFFFFF] | Intel(R) UHD Graphics 620 |
| | [0000000090000000 - 00000000DFFFFFFF] | PCI Express Root Complex |
| | [00000000A0000000 - 00000000A0FFFFFFF] | Intel(R) UHD Graphics 620 |
| | [00000000A1120000 - 00000000A112FFFF] | Intel(R) USB 3.1 可延伸主機控制器 - 1.10 (Microsoft) |
| | [00000000A113C000 - 00000000A113DFFF] | Standard SATA AHCI Controller |
| | [00000000A1140000 - 00000000A11400FF] | Intel(R) SMBus - 9DA3 |
| | [00000000A1141000 - 00000000A1141FFF] | Intel SD 主機控制器 |
| | [00000000A1143000 - 00000000A11437FF] | Standard SATA AHCI Controller |
| | [00000000A1144000 - 00000000A11440FF] | Standard SATA AHCI Controller |
| | [00000000E0000000 - 00000000EFFFFFFF] | 主機板資源 |
| | [00000000FC800000 - 00000000FE7FFFFF] | PCI Express Root Complex |
| | [00000000FCF00000 - 00000000FCFFFFFFF] | High Definition Audio 控制器 |
| | [00000000FD000000 - 00000000FD69FFFF] | 主機板資源 |
| | [00000000FD6A0000 - 00000000FD6AFFFF] | Intel(R) Serial IO GPIO Host Controller - INT34BB |
| | [00000000FD6B0000 - 00000000FD6CFFFF] | 主機板資源 |
| | [00000000FD6D0000 - 00000000FD6DFFFF] | Intel(R) Serial IO GPIO Host Controller - INT34BB |
| | [00000000FD6E0000 - 00000000FD6EFFFF] | Intel(R) Serial IO GPIO Host Controller - INT34BB |
| | [00000000FD6F0000 - 00000000FDFFFFFFF] | 主機板資源 |
| | [00000000FE000000 - 00000000FE01FFFF] | 主機板資源 |
| | [00000000FE010000 - 00000000FE010FFF] | Intel(R) SPI (flash) Controller - 9DA4 |
| | [00000000FE1D9000 - 00000000FE1D9FFF] | Intel(R) Management Engine Interface |
| | [00000000FE1DA000 - 00000000FE1DAFFF] | Intel(R) Serial IO I2C Host Controller - 9DE8 |
| | [00000000FE1DB000 - 00000000FE1DBFFF] | Intel(R) Serial IO I2C Host Controller - 9DC5 |
| | [00000000FE1DC000 - 00000000FE1DFFFF] | High Definition Audio 控制器 |
| | [00000000FE1E0000 - 00000000FE1FFFFFFF] | Intel(R) Ethernet Connection (6) I219-LM |
| | [00000000FE200000 - 00000000FE7FFFFF] | 主機板資源 |
| | [00000000FED00000 - 00000000FED003FF] | 高精度度事件計時器 |
| | [00000000FED10000 - 00000000FED17FFF] | 主機板資源 |
| | [00000000FED18000 - 00000000FED18FFF] | 主機板資源 |
| | [00000000FED19000 - 00000000FED19FFF] | 主機板資源 |
| | [00000000FED20000 - 00000000FED3FFFF] | 主機板資源 |
| | [00000000FED40000 - 00000000FED44FFF] | 信賴平台模組 2.0 |
| | [00000000FED45000 - 00000000FED8FFFF] | 主機板資源 |
| | [00000000FED90000 - 00000000FED93FFF] | 主機板資源 |
| | [00000000FEE00000 - 00000000FEEFFFFFFF] | 主機板資源 |
| | [00000000FF000000 - 00000000FFFFFFFFF] | 主機板資源 |
















































B.3 IRQ Mapping Chart





















































| IRQ | Device |
|-----|---|
| 00 | 系統計時器 |
| 03 | 通訊連接埠 (COM2) |
| 04 | 通訊連接埠 (COM1) |
| 14 | Intel(R) Serial IO GPIO Host Controller - INT348B |
| 55 | Microsoft ACPI-Compliant System |
| 56 | Microsoft ACPI-Compliant System |
| 57 | Microsoft ACPI-Compliant System |
| 58 | Microsoft ACPI-Compliant System |
| 59 | Microsoft ACPI-Compliant System |
| 60 | Microsoft ACPI-Compliant System |
| 61 | Microsoft ACPI-Compliant System |
| 62 | Microsoft ACPI-Compliant System |
| 63 | Microsoft ACPI-Compliant System |
| 64 | Microsoft ACPI-Compliant System |
| 65 | Microsoft ACPI-Compliant System |
| 66 | Microsoft ACPI-Compliant System |
| 67 | Microsoft ACPI-Compliant System |
| 68 | Microsoft ACPI-Compliant System |
| 69 | Microsoft ACPI-Compliant System |
| 70 | Microsoft ACPI-Compliant System |
| 71 | Microsoft ACPI-Compliant System |
| 72 | Microsoft ACPI-Compliant System |
| 73 | Microsoft ACPI-Compliant System |
| 74 | Microsoft ACPI-Compliant System |
| 75 | Microsoft ACPI-Compliant System |
| 76 | Microsoft ACPI-Compliant System |
| 77 | Microsoft ACPI-Compliant System |
| 78 | Microsoft ACPI-Compliant System |
| 79 | Microsoft ACPI-Compliant System |
| 80 | Microsoft ACPI-Compliant System |
| 81 | Microsoft ACPI-Compliant System |
| 82 | Microsoft ACPI-Compliant System |
| 83 | Microsoft ACPI-Compliant System |
| 84 | Microsoft ACPI-Compliant System |
| 85 | Microsoft ACPI-Compliant System |
| 86 | Microsoft ACPI-Compliant System |
| 87 | Microsoft ACPI-Compliant System |
| 88 | Microsoft ACPI-Compliant System |
| 89 | Microsoft ACPI-Compliant System |
| 90 | Microsoft ACPI-Compliant System |
| 91 | Microsoft ACPI-Compliant System |
| 92 | Microsoft ACPI-Compliant System |
| 93 | Microsoft ACPI-Compliant System |
| 94 | Microsoft ACPI-Compliant System |
| 95 | Microsoft ACPI-Compliant System |
| 96 | Microsoft ACPI-Compliant System |
| 97 | Microsoft ACPI-Compliant System |
| 98 | Microsoft ACPI-Compliant System |
| 99 | Microsoft ACPI-Compliant System |
| 100 | Microsoft ACPI-Compliant System |





















































| | |
|--|---------------------------------|
|  (ISA) 0x00000064 (100) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000065 (101) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000066 (102) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000067 (103) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000068 (104) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000069 (105) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000006A (106) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000006B (107) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000006C (108) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000006D (109) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000006E (110) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000006F (111) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000070 (112) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000071 (113) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000072 (114) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000073 (115) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000074 (116) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000075 (117) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000076 (118) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000077 (119) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000078 (120) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000079 (121) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000007A (122) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000007B (123) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000007C (124) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000007D (125) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000007E (126) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000007F (127) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000080 (128) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000081 (129) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000082 (130) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000083 (131) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000084 (132) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000085 (133) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000086 (134) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000087 (135) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000088 (136) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000089 (137) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000008A (138) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000008B (139) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000008C (140) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000008D (141) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000008E (142) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000008F (143) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000090 (144) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000091 (145) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000092 (146) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000093 (147) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000094 (148) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000095 (149) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000096 (150) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000097 (151) | Microsoft ACPI-Compliant System |




















































| | | |
|---|------------------------|---------------------------------|
|  | (ISA) 0x00000097 (151) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x00000098 (152) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x00000099 (153) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x0000009A (154) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x0000009B (155) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x0000009C (156) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x0000009D (157) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x0000009E (158) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x0000009F (159) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000A0 (160) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000A1 (161) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000A2 (162) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000A3 (163) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000A4 (164) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000A5 (165) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000A6 (166) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000A7 (167) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000A8 (168) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000A9 (169) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000AA (170) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000AB (171) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000AC (172) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000AD (173) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000AE (174) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000AF (175) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000B0 (176) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000B1 (177) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000B2 (178) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000B3 (179) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000B4 (180) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000B5 (181) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000B6 (182) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000B7 (183) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000B8 (184) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000B9 (185) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000BA (186) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000BB (187) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000BC (188) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000BD (189) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000BE (190) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000BF (191) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000C0 (192) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000C1 (193) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000C2 (194) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000C3 (195) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000C4 (196) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000C5 (197) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000C6 (198) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000C7 (199) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000C8 (200) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000C9 (201) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000000CA (202) | Microsoft ACPI-Compliant System |

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|--|---------------------------------|
|  (ISA) 0x000000CA (202) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000000CB (203) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000000CC (204) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000100 (256) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000101 (257) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000102 (258) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000103 (259) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000104 (260) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000105 (261) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000106 (262) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000107 (263) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000108 (264) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000109 (265) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000010A (266) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000010B (267) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000010C (268) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000010D (269) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000010E (270) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000010F (271) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000110 (272) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000111 (273) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000112 (274) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000113 (275) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000114 (276) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000115 (277) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000116 (278) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000117 (279) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000118 (280) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000119 (281) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000011A (282) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000011B (283) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000011C (284) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000011D (285) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000011E (286) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000011F (287) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000120 (288) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000121 (289) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000122 (290) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000123 (291) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000124 (292) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000125 (293) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000126 (294) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000127 (295) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000128 (296) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000129 (297) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000012A (298) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000012B (299) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000012C (300) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000012D (301) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000012E (302) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000012F (303) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000130 (304) | Microsoft ACPI-Compliant System |

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|--|---------------------------------|
|  (ISA) 0x00000130 (304) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000131 (305) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000132 (306) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000133 (307) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000134 (308) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000135 (309) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000136 (310) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000137 (311) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000138 (312) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000139 (313) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000013A (314) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000013B (315) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000013C (316) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000013D (317) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000013E (318) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000013F (319) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000140 (320) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000141 (321) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000142 (322) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000143 (323) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000144 (324) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000145 (325) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000146 (326) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000147 (327) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000148 (328) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000149 (329) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000014A (330) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000014B (331) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000014C (332) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000014D (333) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000014E (334) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000014F (335) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000150 (336) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000151 (337) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000152 (338) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000153 (339) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000154 (340) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000155 (341) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000156 (342) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000157 (343) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000158 (344) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000159 (345) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000015A (346) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000015B (347) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000015C (348) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000015D (349) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000015E (350) | Microsoft ACPI-Compliant System |
| (ISA) 0x0000015F (351) | Microsoft ACPI-Compliant System |
| (ISA) 0x00000160 (352) | Microsoft ACPI-Compliant System |
| (ISA) 0x00000161 (353) | Microsoft ACPI-Compliant System |
| (ISA) 0x00000162 (354) | Microsoft ACPI-Compliant System |
| (ISA) 0x00000163 (355) | Microsoft ACPI-Compliant System |

| | |
|--|---------------------------------|
|  (ISA) 0x00000163 (355) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000164 (356) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000165 (357) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000166 (358) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000167 (359) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000168 (360) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000169 (361) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000016A (362) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000016B (363) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000016C (364) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000016D (365) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000016E (366) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000016F (367) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000170 (368) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000171 (369) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000172 (370) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000173 (371) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000174 (372) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000175 (373) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000176 (374) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000177 (375) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000178 (376) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000179 (377) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000017A (378) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000017B (379) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000017C (380) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000017D (381) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000017E (382) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000017F (383) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000180 (384) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000181 (385) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000182 (386) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000183 (387) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000184 (388) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000185 (389) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000186 (390) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000187 (391) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000188 (392) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000189 (393) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000018A (394) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000018B (395) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000018C (396) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000018D (397) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000018E (398) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000018F (399) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000190 (400) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000191 (401) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000192 (402) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000193 (403) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000194 (404) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000195 (405) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000196 (406) | Microsoft ACPI-Compliant System |

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|--|---------------------------------|
|  (ISA) 0x00000196 (406) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000197 (407) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000198 (408) | Microsoft ACPI-Compliant System |
|  (ISA) 0x00000199 (409) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000019A (410) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000019B (411) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000019C (412) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000019D (413) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000019E (414) | Microsoft ACPI-Compliant System |
|  (ISA) 0x0000019F (415) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001A0 (416) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001A1 (417) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001A2 (418) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001A3 (419) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001A4 (420) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001A5 (421) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001A6 (422) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001A7 (423) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001A8 (424) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001A9 (425) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001AA (426) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001AB (427) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001AC (428) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001AD (429) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001AE (430) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001AF (431) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001B0 (432) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001B1 (433) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001B2 (434) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001B3 (435) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001B4 (436) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001B5 (437) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001B6 (438) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001B7 (439) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001B8 (440) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001B9 (441) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001BA (442) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001BB (443) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001BC (444) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001BD (445) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001BE (446) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001BF (447) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001C0 (448) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001C1 (449) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001C2 (450) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001C3 (451) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001C4 (452) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001C5 (453) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001C6 (454) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001C7 (455) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001C8 (456) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001C9 (457) | Microsoft ACPI-Compliant System |

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|--|---------------------------------|
|  (ISA) 0x000001C9 (457) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001CA (458) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001CB (459) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001CC (460) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001CD (461) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001CE (462) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001CF (463) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001D0 (464) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001D1 (465) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001D2 (466) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001D3 (467) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001D4 (468) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001D5 (469) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001D6 (470) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001D7 (471) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001D8 (472) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001D9 (473) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001DA (474) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001DB (475) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001DC (476) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001DD (477) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001DE (478) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001DF (479) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001E0 (480) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001E1 (481) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001E2 (482) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001E3 (483) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001E4 (484) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001E5 (485) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001E6 (486) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001E7 (487) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001E8 (488) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001E9 (489) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001EA (490) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001EB (491) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001EC (492) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001ED (493) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001EE (494) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001EF (495) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001F0 (496) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001F1 (497) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001F2 (498) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001F3 (499) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001F4 (500) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001F5 (501) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001F6 (502) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001F7 (503) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001F8 (504) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001F9 (505) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001FA (506) | Microsoft ACPI-Compliant System |
|  (ISA) 0x000001FB (507) | Microsoft ACPI-Compliant System |
| (ISA) 0x000001FC (508) | Microsoft ACPI-Compliant System |

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|---|------------------------|---|
|  | (ISA) 0x000001FC (508) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000001FD (509) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000001FE (510) | Microsoft ACPI-Compliant System |
|  | (ISA) 0x000001FF (511) | Microsoft ACPI-Compliant System |
|  | (PCI) 0x00000010 (16) | High Definition Audio 控制器 |
|  | (PCI) 0x00000010 (16) | Intel SD 主機控制器 |
|  | (PCI) 0x00000010 (16) | Intel(R) Serial IO I2C Host Controller - 9DE8 |
|  | (PCI) 0x00000020 (32) | Intel(R) Serial IO I2C Host Controller - 9DC5 |
|  | (PCI) 0xFFFFF0FA (-6) | Intel(R) Management Engine Interface |
|  | (PCI) 0xFFFFF0FB (-5) | Intel(R) Ethernet Connection (6) I219-LM |
|  | (PCI) 0xFFFFF0FC (-4) | Intel(R) UHD Graphics 620 |
|  | (PCI) 0xFFFFF0FD (-3) | Intel(R) USB 3.1 可延伸主機控制器 - 1.10 (Microsoft) |
|  | (PCI) 0xFFFFF0FE (-2) | Standard SATA AHCI Controller |

Appendix C

Programming Digital I/O

C.1 DIO Programming

NanoCOM-WHU utilizes an AAEON chipset as its Digital I/O controller.

Below are the procedures to complete its configuration which you can use to develop a customized program to fit your application.

C.2 Digital I/O Register

Table 1: Embedded BRAM relative register table

| | Default Value | Note |
|---|---------------|--|
| Index | 0x284(Note1) | BRAM Index Register |
| Data | 0x285(Note2) | BRAM Data Register |
| Logical Device Number | 0xA2(Note3) | Watch dog Logical Device Number |
| IO Direction Function and Device Number | 0x00(Note4) | DIO Input/Output Function/Device Number |
| IO Value/Status Function and Device Number | 0x01(Note5) | DIO Output Data Function/Device Number |

Table 2: Digital I/O relative register table

| | Register | | | |
|-----------------|-----------------|-----------|----------|------|
| | Option Register | BitNum | Value | Note |
| GPI0 Pin Status | 0x00(Note6) | 0(Note7) | (Note15) | GPA2 |
| GPI1 Pin Status | 0x00(Note6) | 1(Note8) | (Note16) | GPA3 |
| GPI2 Pin Status | 0x00(Note6) | 2(Note9) | (Note17) | GPA4 |
| GPI3 Pin Status | 0x00(Note6) | 3(Note10) | (Note18) | GPA5 |
| GPO0 Pin Status | 0x00(Note6) | 4(Note11) | (Note19) | GPJ0 |
| GPO1 Pin Status | 0x00(Note6) | 5(Note12) | (Note20) | GPJ1 |
| GPO2 Pin Status | 0x00(Note6) | 6(Note13) | (Note21) | GPJ2 |
| GPO3 Pin Status | 0x00(Note6) | 7(Note14) | (Note22) | GPJ3 |

C.3 Digital I/O Sample Program

```
*****
// Embedded BRAM relative definition (Please reference to Table 1)
#define byte EcBRAMIndex //This parameter is represented from Note1
#define byte EcBRAMData //This parameter is represented from Note2
#define byte BRAMLDNReg //This parameter is represented from Note3
#define byte BRAMFnData0Reg //This parameter is represented from Note4
#define byte BRAMFnData1Reg //This parameter is represented from Note5
#define void EcBRAMWriteByte(byte Offset, byte Value);
#define byte EcBRAMReadByte(byte Offset);
#define void IOWriteByte(byte Offset, byte Value);
#define byte IOReadByte(byte Offset);
// Digital Input Status relative definition (Please reference to Table 2)
#define byte DIO0ToDIO7Reg // This parameter is represented from Note6
#define byte DIO0Bit // This parameter is represented from Note7
#define byte DIO1Bit // This parameter is represented from Note8
#define byte DIO2Bit // This parameter is represented from Note9
#define byte DIO3Bit // This parameter is represented from Note10
#define byte DIO4Bit // This parameter is represented from Note11
#define byte DIO5Bit // This parameter is represented from Note12
#define byte DIO6Bit // This parameter is represented from Note13
#define byte DIO7Bit // This parameter is represented from Note14
#define byte DIO0Val // This parameter is represented from Note15
#define byte DIO1Val // This parameter is represented from Note16
#define byte DIO2Val // This parameter is represented from Note17
#define byte DIO3Val // This parameter is represented from Note18
#define byte DIO4Val // This parameter is represented from Note19
#define byte DIO5Val // This parameter is represented from Note20
#define byte DIO6Val // This parameter is represented from Note21
#define byte DIO7Val // This parameter is represented from Note22
*****
```

```
*****
VOID Main() {
    Boolean PinStatus ;

    // Procedure : AaeonReadPinStatus
    // Input :
    //     Example, Read Digital I/O Pin 3 status
    // Output :
    //     InputStatus :
    //         0: Digital I/O Pin level is low
    //         1: Digital I/O Pin level is High
    PinStatus = AaeonReadPinStatus(DIO0ToDIO7Reg, DIO3Bit);

    // Procedure : AaeonSetOutputLevel
    // Input :
    //     Example, Set Digital I/O Pin 6 level
    AaeonSetOutputLevel(DIO0ToDIO7Reg, DIO6Bit, DIO6Val);
}
*****
```



```
*****
Boolean AaeonReadPinStatus(byte OptionReg, byte BitNum){
    Byte TempByte;

    TempByte = ECBRAMReadByte(BRAMFnData1Reg, OptionReg);
    If (TempByte & BitNum == 0)
        Return 0;
    Return 1;
}
VOID AaeonSetOutputLevel(byte OptionReg, byte BitNum, byte Value){
    Byte TempByte;

    TempByte = ECBRAMReadByte(BRAMFnData1Reg, OptionReg);
    TempByte |= (Value << BitNum);
    ECBRAMWriteByte(OptionReg, BitNum, Value);
}
*****
```

```
*****
```

```
VOID ECBRAMWriteByte(byte OPReg, byte OPBit, byte Value){
```

```
    IOWriteByte(EcBRAMIndex, 0x10);
    IOWriteByte(EcBRAMData, BRAMLDNReg);
    IOWriteByte(EcBRAMIndex, 0x11);
    IOWriteByte(EcBRAMData, BRAMFnDataReg);
```

```
    IOWriteByte(EcBRAMIndex, 0x13 + OPReg);
    IOWriteByte(EcBRAMData, Value);
```

```
    IOWriteByte(EcBRAMIndex, 0x12);
    IOWriteByte(EcBRAMData, 0x30);           //Write start
```

```
}
```

```
Byte ECBRAMReadByte(byte FnDataReg, byte OPReg){
```

```
    IOWriteByte(EcBRAMIndex, 0x10);
    IOWriteByte(EcBRAMData, BRAMLDNReg);
    IOWriteByte(EcBRAMIndex, 0x11);
    IOWriteByte(EcBRAMData, FnDataReg);
```

```
    IOWriteByte(EcBRAMIndex, 0x12);
    IOWriteByte(EcBRAMData, 0x10);         //Read start
```

```
    IOWriteByte(EcBRAMIndex, 0x13 + OPReg);
    Return      IOReadByte(EcBRAMData, Value);
```

```
}
```

```
*****
```