

# GENE-APL5

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3.5" Subcompact Board

User's Manual 4<sup>th</sup> Ed

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## Packing List

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

| Item        | Quantity |
|-------------|----------|
| ● GENE-APL5 | 1        |

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

## About this Document

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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 [AAEON.com](http://AAEON.com) for the latest version of this document.

## Safety Precautions

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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 the 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<br>(Pb) | 汞<br>(Hg) | 镉<br>(Cd) | 六价铬<br>(Cr(VI)) | 多溴联苯<br>(PBB) | 多溴二苯醚<br>(PBDE) |
| 印刷电路板<br>及其电子组件  | ○         | ○         | ○         | ○               | ○             | ○               |
| 外部信号<br>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  | ○   | ○            | ○            | ○                            | ○                              | ○                                     |
| Wires & Connectors for External Connections   | ○   | ○            | ○            | ○                            | ○                              | ○                                     |
| <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><b>Note:</b> The Environment Friendly Use Period as labeled on this product is applicable under normal usage only</p> |   |              |              |                              |                                |                                       |

# Table of Contents

---

|   |          |
|---|----------|
| <b>Chapter 1 - Product Specifications</b> .....                       | <b>1</b> |
| 1.1 Specifications .....  | 2        |
| <b>Chapter 2 – Hardware Information</b> .....                         | <b>5</b> |
| 2.1 Dimensions .....  | 6        |
| 2.1.1 Dimensions (Optional HDMI SKU) .....                            | 8        |
| 2.2 Jumpers and Connectors.....                                       | 10       |
| 2.2.1 Jumpers and Connectors (Optional HDMI SKU).....                 | 12       |
| 2.3 Block Diagram .....   | 14       |
| 2.4 List of Jumpers .....   | 15       |
| 2.4.1 LVDS Port 1 Backlight Inverter VCC Selection (JP1) .....        | 16       |
| 2.4.2 LVDS Port 1 Operating VDD Selection (JP1) .....                 | 16       |
| 2.4.3 LVDS Port 1 Backlight Lightness Control Mode Selection (JP2) .. | 16       |
| 2.4.4 COM2 Pin8 Function Selection (JP3).....                         | 16       |
| 2.4.5 COM3 Pin8 Function Selection (JP4).....                         | 17       |
| 2.4.6 Auto Power Button Enable/Disable Selection (JP5) .....          | 17       |
| 2.4.7 Front Panel Connector (JP6) .....                               | 17       |
| 2.4.8 LVDS Port 2 Backlight Inverter VCC Selection (JP7) .....        | 18       |
| 2.4.9 LVDS Port 2 Operating VDD Selection (JP7) .....                 | 18       |
| 2.4.10 LVDS Port 2 Backlight Lightness Control Mode Selection (JP8) . | 18       |
| 2.4.11 Touch Screen 4, 5, 8 Wire Selection (JP9) .....                | 18       |
| 2.4.12 Clear CMOS Jumper (JP10).....                                  | 19       |
| 2.5 List of Connectors.....   | 20       |
| 2.5.1 +5VSB Output w/SMBus (CN1) .....                                | 22       |
| 2.5.2 LVDS Port 1 Inverter / Backlight Connector (CN2) .....          | 22       |
| 2.5.3 +5V Output for SATA HDD (CN3).....                              | 23       |
| 2.5.4 SATA Port (CN4).....  | 23       |

|        |  |    |
|--------|--|----|
| 2.5.5  | External Power Input (CN5).....                        | 24 |
| 2.5.6  | External +5VSB Input (CN6) (Optional).....             | 24 |
| 2.5.7  | Audio I/O Port (CN7).....                              | 25 |
| 2.5.8  | LVDS Port 1 (CN8).....                                 | 26 |
| 2.5.9  | COM Port 2 (CN9).....                                  | 28 |
| 2.5.10 | LPT Port or Digital I/O Port (CN10).....               | 30 |
| 2.5.11 | LPC Port (CN11).....                                   | 33 |
| 2.5.12 | COM Port 3 (CN12).....                                 | 34 |
| 2.5.13 | BIOS Debug Port (CN13).....                            | 36 |
| 2.5.14 | COM Port 4 (CN14).....                                 | 36 |
| 2.5.15 | PS/2 Keyboard/Mouse Combo Port (CN15).....             | 37 |
| 2.5.16 | USB 2.0 Port 2 (CN16).....                             | 38 |
| 2.5.17 | USB 2.0 Port 3 (CN17).....                             | 38 |
| 2.5.18 | COM Port 1 (CN18) (Wafer, Optional).....               | 39 |
| 2.5.19 | USB 2.0 Port 4 (CN19).....                             | 40 |
| 2.5.20 | USB 2.0 Port 5 (CN20).....                             | 40 |
| 2.5.21 | LVDS Port 2 (CN21).....                                | 41 |
| 2.5.22 | Touchscreen Connector (CN22).....                      | 43 |
| 2.5.23 | CPU Fan (CN23, Optional).....                          | 46 |
| 2.5.24 | LVDS Port 2 Inverter / Backlight Connector (CN24)..... | 46 |
| 2.5.25 | USB 3.0 Ports 0 and 1 (CN25).....                      | 47 |
| 2.5.26 | LAN (RJ-45) Port 2 (CN26).....                         | 48 |
| 2.5.27 | LAN (RJ-45) Port 1 (CN27).....                         | 48 |
| 2.5.28 | COM Port 1 (CN28, D-SUB 9).....                        | 49 |
| 2.5.29 | HDMI Port (CN29, Optional).....                        | 50 |
| 2.5.30 | Battery (CN30).....                                    | 51 |
| 2.5.31 | VGA Port (CN31).....                                   | 51 |
| 2.5.32 | Micro SIM Card Socket (CN32).....                      | 52 |

|   |  |           |
|---|--|-----------|
| 2.5.33                                  | Mini-Card Slot (Half-Mini) (CN33) .....              | 52        |
| 2.5.34                                  | mSATA (Full-Size) (CN34).....                        | 55        |
| <b>Chapter 3 - AMI BIOS Setup .....</b> |  | <b>58</b> |
| 3.1                                     | System Test and Initialization .....                 | 59        |
| 3.2                                     | AMI BIOS Setup .....                                 | 60        |
| 3.3                                     | Setup submenu: Main .....                            | 61        |
| 3.4                                     | Setup submenu: Advanced .....                        | 62        |
| 3.4.1                                   | Advanced: Trusted Computing.....                     | 63        |
| 3.4.2                                   | Advanced: CPU Configuration .....                    | 65        |
| 3.4.3                                   | Advanced: SATA Configuration .....                   | 67        |
| 3.4.3.1                                 | PCI Express Configuration.....                       | 69        |
| 3.4.4                                   | Advanced: Hardware Monitor .....                     | 70        |
| 3.4.4.1                                 | CPU Smart Fan Configuration .....                    | 71        |
| 3.4.5                                   | Advanced: SIO Configuration.....                     | 72        |
| 3.4.5.1                                 | SIO Configuration: Serial Port 1 Configuration ..... | 73        |
| 3.4.5.2                                 | SIO Configuration: Serial Port 2 Configuration.....  | 74        |
| 3.4.5.3                                 | SIO Configuration: Serial Port 3 Configuration.....  | 75        |
| 3.4.5.4                                 | SIO Configuration: Serial Port 4 Configuration.....  | 76        |
| 3.4.5.5                                 | SIO Configuration: Parallel Port Configuration ..... | 77        |
| 3.4.6                                   | Advanced: Power Management.....                      | 78        |
| 3.4.7                                   | Advanced: Digital IO Port Configuration .....        | 79        |
| 3.5                                     | Setup submenu: Chipset.....                          | 80        |
| 3.5.1                                   | Chipset: North Bridge .....                          | 81        |
| 3.5.1.1                                 | North Bridge: LVDS Panel Configuration .....         | 82        |
| 3.6                                     | Setup submenu: Security .....                        | 84        |
| 3.7                                     | Setup submenu: Boot.....                             | 85        |
| 3.8                                     | Setup submenu: Save & Exit .....                     | 86        |
| 3.9                                     | Note for Users.....                                  | 87        |

|   |            |
|---|------------|
| <b>Chapter 4 – Drivers Installation</b> .....                     | <b>88</b>  |
| 4.1 Driver Download/Installation .....                            | 89         |
| <b>Appendix A - Watchdog Timer Programming</b> .....              | <b>91</b>  |
| A.1 Watchdog Timer Registers .....                                | 92         |
| A.2 Watchdog Sample Program.....                                  | 93         |
| <b>Appendix B - I/O Information</b> .....                         | <b>96</b>  |
| B.1 I/O Address Map .....   | 97         |
| B.2 Memory Address Map .....                                      | 99         |
| B.3 IRQ Mapping Chart.....  | 100        |
| <b>Appendix C – Mating Connectors</b> .....                       | <b>105</b> |
| C.1 List of Mating Connectors and Cables.....                     | 106        |
| <b>Appendix D – Electrical Specifications for I/O Ports</b> ..... | <b>109</b> |
| D.1 Electrical Specifications for I/O Ports.....                  | 110        |
| <b>Appendix E – Digital I/O Ports</b> .....                       | <b>111</b> |
| E.1 Digital I/O Register.....                                     | 112        |
| E.2 Digital I/O Sample Code (4 in 4 out, 2 low 2 high).....       | 114        |

# Chapter 1

---

Product Specifications

## 1.1 Specifications

---

### System

|                             |   |
|-----------------------------|---|
| Form Factor                 | 3.5" SubCompact Board                               |
| CPU                         | Intel® Pentium® N4200/ Celeron® N3350 Processor SoC |
| CPU Frequency               | Up to 2.5 GHz                                       |
| Chipset                     | Intel® Pentium® N4200/ Celeron® N3350 Processor SoC |
| Memory Type                 | DDR3L 1866MHz, SODIMM x 1                           |
| Max. Memory Capacity        | Up to 8GB   |
| BIOS                        | UEFI  |
| Wake on LAN                 | Yes   |
| Watchdog Timer              | 255 Levels  |
| Power Requirement           | +12V OR +9~19V (optional)                           |
| Power Supply Type           | AT/ ATX   |
| Power Consumption (Typical) | Intel® N4200, DDR3L 1600MHz 8GB, 1.57A@ +12V        |
| Dimension (L x W)           | 5.75" x 4" (146mm x 101.7mm)                        |
| Operating Temperature       | 32°F ~ 140°F (0°C ~ 60°C)                           |
| Storage Temperature         | -40°F ~ 176°F (-40°C ~ 81°C)                        |
| Operating Humidity          | 0% ~ 90% relative humidity, non-condensing          |
| MTBF (Hours)                | 128,000   |



## System

|               |        |
|---------------|--------|
| Certification | CE/FCC |
|---------------|--------|

## I/O

|                |   |
|----------------|---|
| Ethernet       | Intel® i210/I211, 10/100/1000Base-TX, RJ-45 x 2 |
| Audio          | High Definition Audio Interface                 |
| USB Port       | USB 3.0 x 2<br>USB 2.0 x 4                      |
| Serial Port    | RS-232 x 2 , RS-232/422/485 x 2                 |
| Parallel Port  | SPP/EPP/ECP x 1 (Option, Shared with DIO)       |
| HDD Interface  | SATA 3.0 x 1<br>+5V SATA power connector x 1    |
| FDD Interface  | —   |
| SSD            | mSATA   |
| Expansion Slot | mSATA x 1 (Full-size) MiniCard x 1 (Half-size)  |
| DIO            | 8-bit   |
| SIM            | x 1 (uSIM) (Optional)                           |
| TPM            | TPM2.0 x 1 (Optional)                           |
| Touch          | x 1 (Optional)                                  |

## Display

|                           |   |
|---------------------------|---|
| VGA/LCD Controller        | Intel® Atom™ N4200/ N3350 Processor SoC integrate |
| Video Output              | VGA/LVDS/ LVDS2 (co-layout with HDMI, optional)   |
| Backlight inverter supply | Yes   |

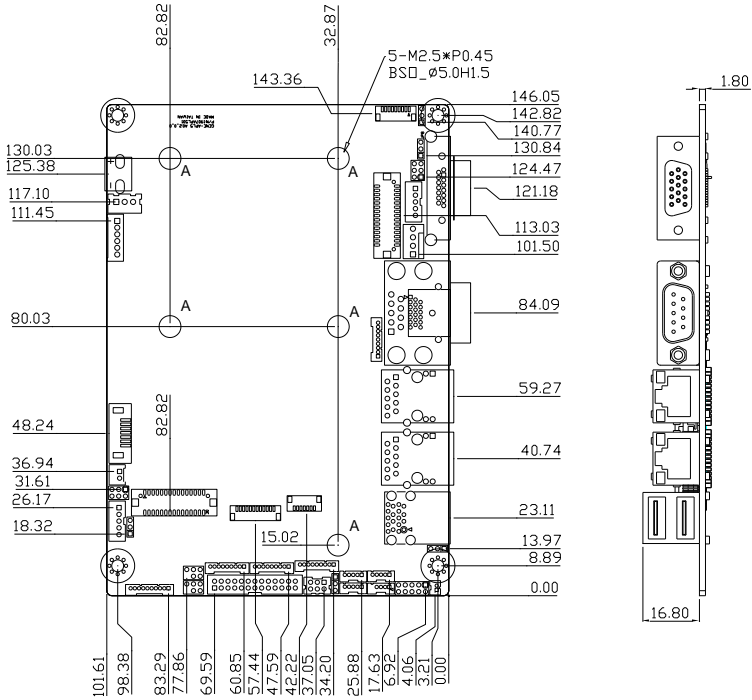
# Chapter 2

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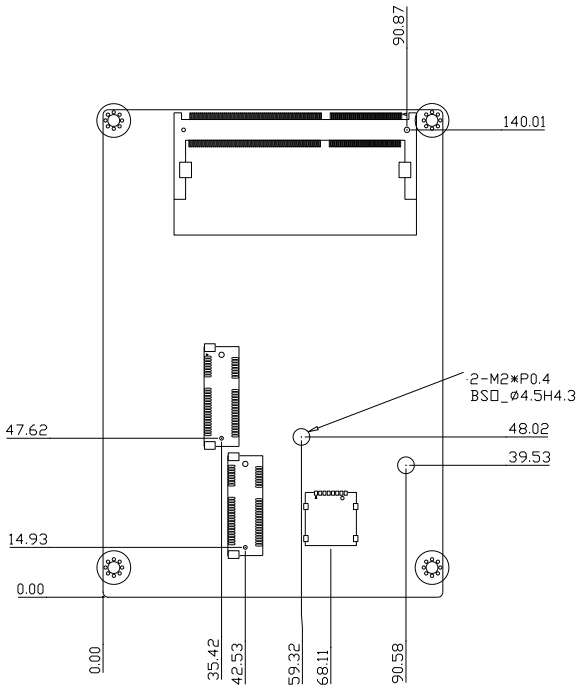
Hardware Information

## 2.1 Dimensions

### Component Side

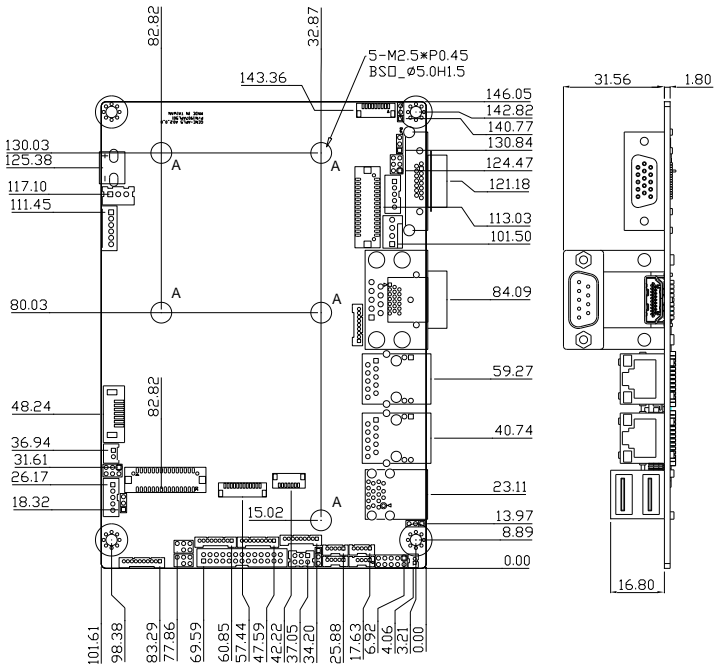


### Solder Side

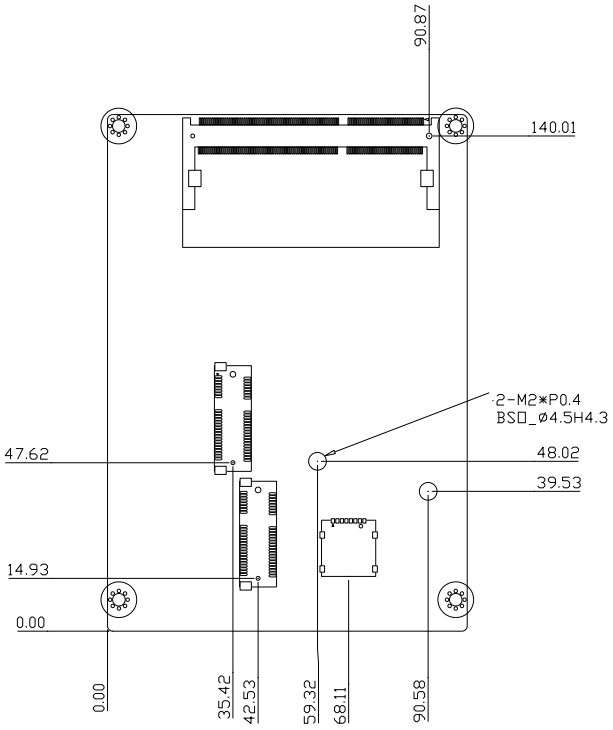


## 2.1.1 Dimensions (Optional HDMI SKU)

### Component Side

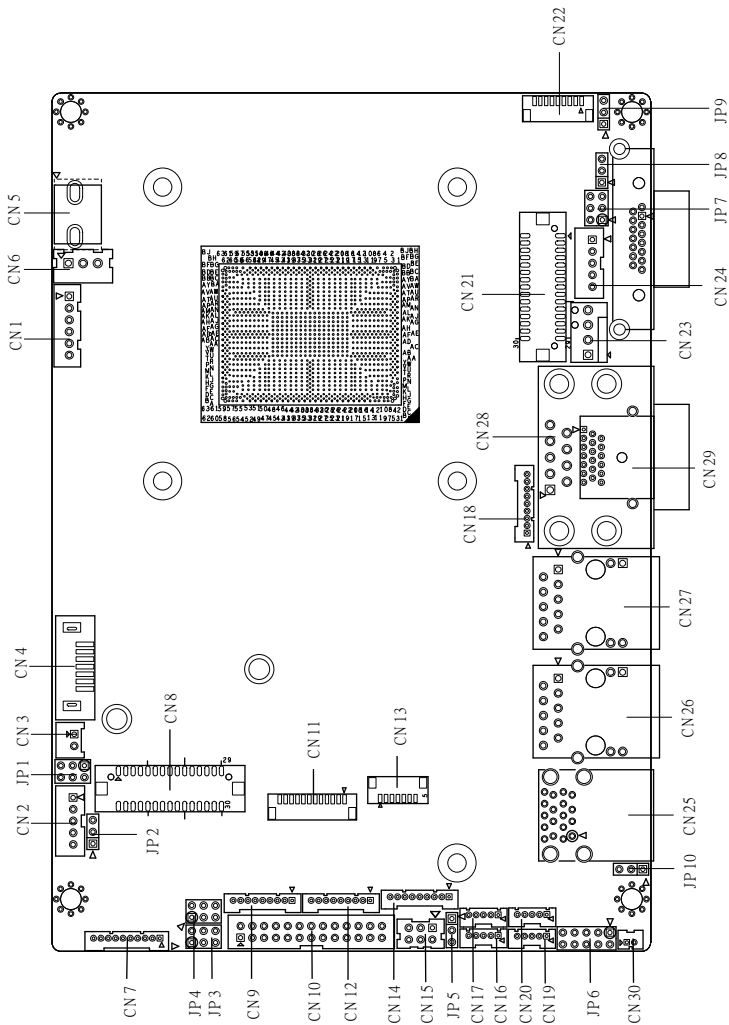


Solder Side



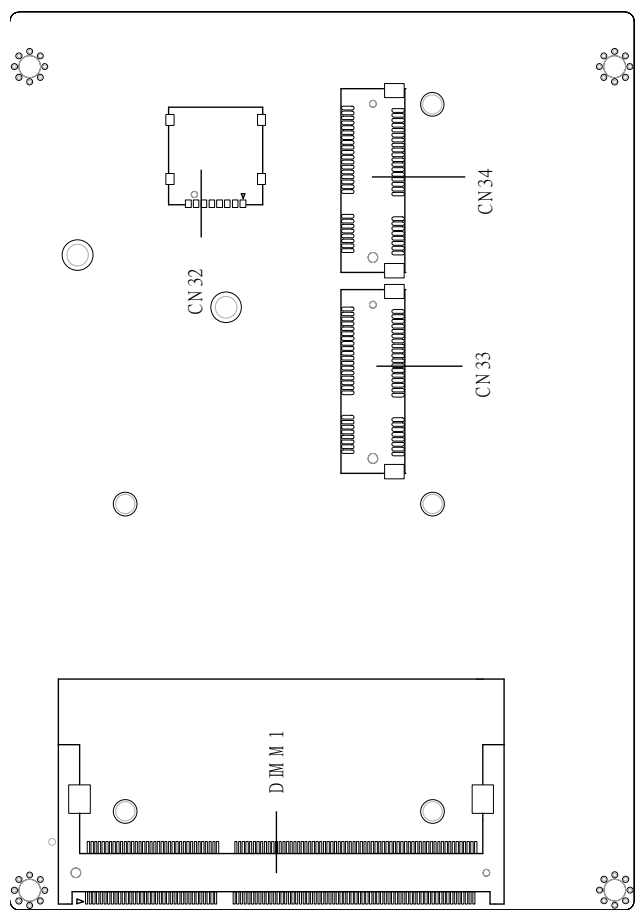
## 2.2 Jumpers and Connectors

### Component Side



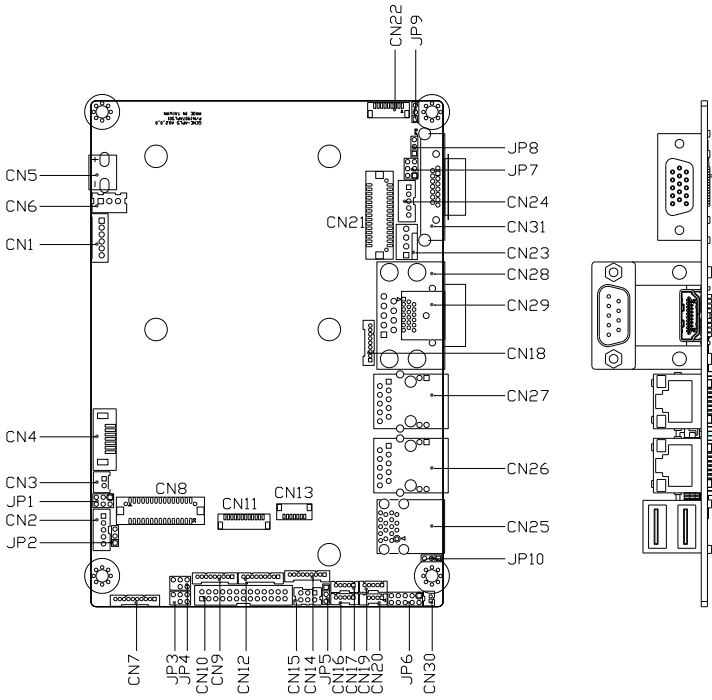


### Solder Side

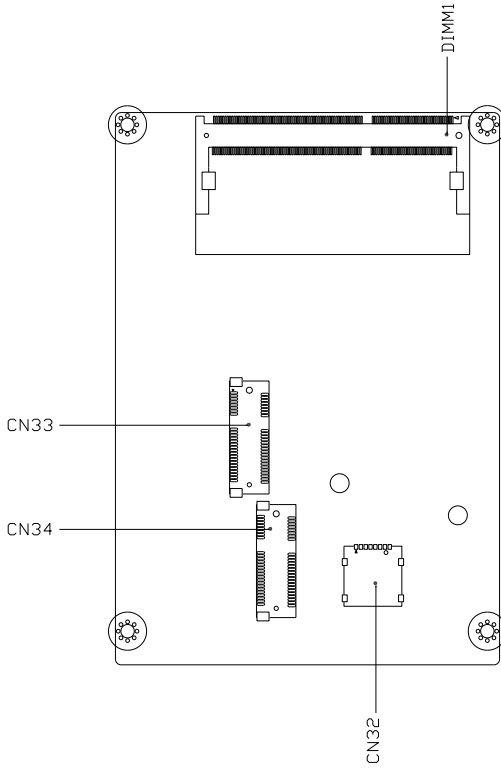


## 2.2.1 Jumpers and Connectors (Optional HDMI SKU)

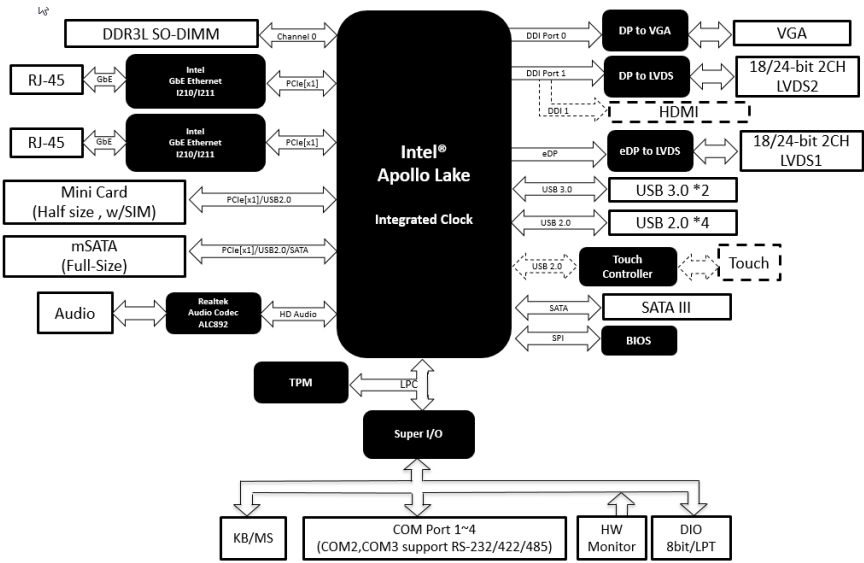
### Component Side



### Solder Side



## 2.3 Block Diagram



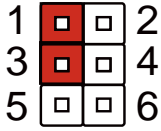
## 2.4 List of Jumpers

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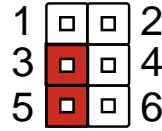
Please refer to the table below for all of the board's jumpers that you can configure for your application

| Label | Function  |
|-------|---|
| JP1   | LVDS Port1 Backlight Inverter VCC Selection and Operating VDD Selection |
| JP2   | LVDS Port1 Backlight Lightness Control Mode Selection                   |
| JP3   | COM2 Pin8 Function Selection  |
| JP4   | COM3 Pin8 Function Selection  |
| JP5   | Auto Power Button Enable/Disable Selection                              |
| JP6   | Front Panel Connector   |
| JP7   | LVDS Port2 Backlight Inverter VCC Selection and Operating VDD Selection |
| JP8   | LVDS Port2 Backlight Lightness Control Mode Selection                   |
| JP9   | Touch Screen 4/5/8-wire Mode Selection                                  |
| JP10  | Clear CMOS Jumper   |

### 2.4.1 LVDS Port 1 Backlight Inverter VCC Selection (JP1)

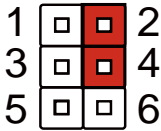


+12V

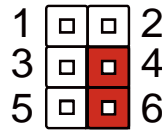


+5V (Default)

### 2.4.2 LVDS Port 1 Operating VDD Selection (JP1)

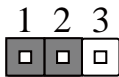


+3.3V (Default)

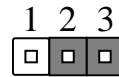


+5V

### 2.4.3 LVDS Port 1 Backlight Lightness Control Mode Selection (JP2)

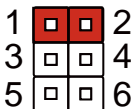


VR Mode (Default)

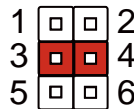


PWM Mode

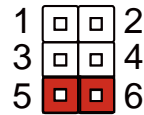
### 2.4.4 COM2 Pin8 Function Selection (JP3)



+12V

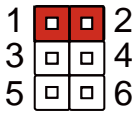


Ring (Default)

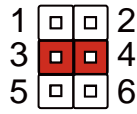


+5V

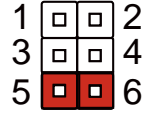
## 2.4.5 COM3 Pin8 Function Selection (JP4)



+12V

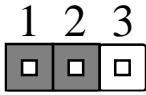


Ring (Default)



+5V

## 2.4.6 Auto Power Button Enable/Disable Selection (JP5)



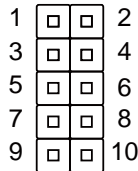
Disable/ATX



Enable/AT (Default)

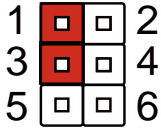
※ When disabled, the power button of JP6 (1-2) will be used to power on the system.

## 2.4.7 Front Panel Connector (JP6)

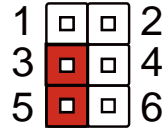


| Pin | Pin Name   | Pin | Pin Name   |
|-----|------------|-----|------------|
| 1   | PWR_BTN-   | 2   | PWR_BTN+   |
| 3   | HDD_LED-   | 4   | HDD_LED+   |
| 5   | SPEAKER-   | 6   | SPEAKER+   |
| 7   | PWR_LED-   | 8   | PWR_LED+   |
| 9   | H/W RESET- | 10  | H/W RESET+ |

## 2.4.8 LVDS Port 2 Backlight Inverter VCC Selection (JP7)

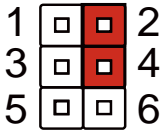


+12V

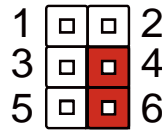


+5V (Default)

## 2.4.9 LVDS Port 2 Operating VDD Selection (JP7)

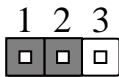


+3.3V (Default)



+5V

## 2.4.10 LVDS Port 2 Backlight Lightness Control Mode Selection (JP8)

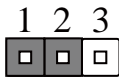


VR Mode (Default)



PWM Mode

## 2.4.11 Touch Screen 4, 5, 8 Wire Selection (JP9)



4/8 Wires Mode (Default)

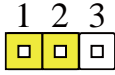


5 Wires Mode

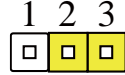


### 2.4.12 Clear CMOS Jumper (JP10)

---



Normal (Default)



Clear CMOS

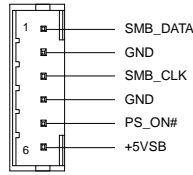
## 2.5 List of Connectors

Please refer to the table below for all of the board's connectors that you can configure for your application

| Label | Function                                  |
|-------|---|
| CN1   | +5VSB Output w/SMBus                      |
| CN2   | LVDS Port1 Inverter / Backlight Connector |
| CN3   | +5V Output for SATA HDD                   |
| CN4   | SATA Port                                 |
| CN5   | External Power Input                      |
| CN6   | External +5VSB Input (Optional)           |
| CN7   | Audio I/O Port                            |
| CN8   | LVDS Port1                                |
| CN9   | COM Port 2                                |
| CN10  | LPT Port or Digital I/O Port              |
| CN11  | LPC Port                                  |
| CN12  | COM Port 3                                |
| CN13  | SPI Debug Port                            |
| CN14  | COM Port 4                                |
| CN15  | PS/2 Keyboard/Mouse Combo Port            |
| CN16  | USB 2.0 Port 2                            |
| CN17  | USB 2.0 Port 3                            |
| CN18  | COM Port 1 (Wafer, Optional)              |
| CN19  | USB 2.0 Port 4                            |
| CN20  | USB 2.0 Port 5                            |
| CN21  | LVDS Port2                                |
| CN22  | Touch Screen Connector (Optional)         |
| CN23  | CPU FAN (Optional)                        |

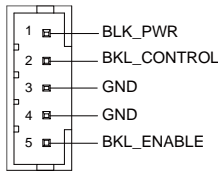
| Label | Function                                  |
|-------|---|
| CN24  | LVDS Port2 Inverter / Backlight Connector |
| CN25  | USB Ports 0 and 1                         |
| CN26  | LAN (RJ-45) Port2                         |
| CN27  | LAN (RJ-45) Port1                         |
| CN28  | COM Port 1 (D-SUB 9)                      |
| CN29  | HDMI Port (Optional)                      |
| CN30  | Battery                                   |
| CN31  | VGA Port                                  |
| CN32  | Micro SIM Card Socket                     |
| CN33  | Mini-Card Slot (Half-Size)                |
| CN34  | mSATA Slot (Full-Size)                    |
| DIMM1 | DDR3L SO-DIMM Slot                        |

## 2.5.1 +5VSB Output w/SMBus (CN1)



| Pin | Pin Name | Signal Type | Signal level |
|-----|----------|-------------|--------------|
| 1   | SMB_DATA | I/O         | +3.3V        |
| 2   | GND      | GND         |              |
| 3   | SMB_CLK  | I/O         | +3.3V        |
| 4   | GND      | GND         |              |
| 5   | PS_ON#   | OUT         | +5V          |
| 6   | +5VSB    | PWR         | +5V          |

## 2.5.2 LVDS Port 1 Inverter / Backlight Connector (CN2)

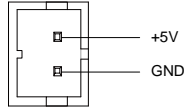


| Pin | Pin Name    | Signal Type | Signal level |
|-----|-------------|-------------|--------------|
| 1   | BKL_PWR     | PWR         | +5V / +12V   |
| 2   | BKL_CONTROL | OUT         |              |
| 3   | GND         | GND         |              |
| 4   | GND         | GND         |              |
| 5   | BKL_ENABLE  | OUT         | +5V          |

\* LVDS BKL\_PWR can be set to +5V or +12V by JP1

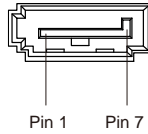
\* LVDS BKL\_CONTROL can be set by JP2

### 2.5.3 +5V Output for SATA HDD (CN3)



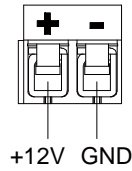
| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | +5V      | PWR         | +5V          |
| 2   | GND      | GND         |              |

### 2.5.4 SATA Port (CN4)



| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | GND      | GND         |              |
| 2   | SATA_TX+ | DIFF        |              |
| 3   | SATA_TX- | DIFF        |              |
| 4   | GND      | GND         |              |
| 5   | SATA_RX- | DIFF        |              |
| 6   | SATA_RX+ | DIFF        |              |
| 7   | GND      | GND         |              |

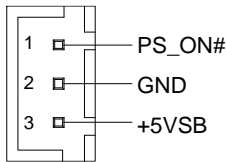
## 2.5.5 External Power Input (CN5)



| Pin | Pin Name | Signal Type | Signal Level  |
|-----|----------|-------------|---------------|
| 1   | +VIN     | PWR         | 9V~19V or 12V |
| 2   | GND      | GND         |               |

※There are two types of power input, 9V~19V or 12V only, by BOM Change.

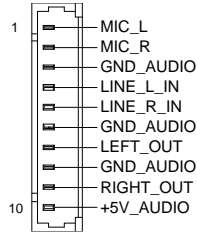
## 2.5.6 External +5VSB Input (CN6) (Optional)



| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | PS_ON#   | OUT         | +5V          |
| 2   | GND      | GND         |              |
| 3   | +5VSB    | PWR         | +5V          |

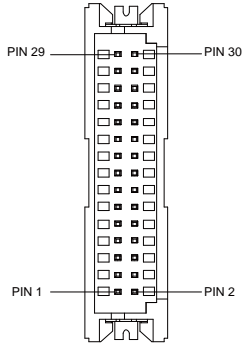
※Please make sure ATX power is full discharge when a system that use this connector(CN6) power off. Discharge time is relative to power supply and it may be 3~5s or more seconds.

## 2.5.7 Audio I/O Port (CN7)



| Pin | Pin Name  | Signal Type | Signal Level |
|-----|-----------|-------------|--------------|
| 1   | MIC_L     | IN          |              |
| 2   | MIC_R     | IN          |              |
| 3   | GND_AUDIO | GND         |              |
| 4   | LINE_L_IN | IN          |              |
| 5   | LINE_R_IN | IN          |              |
| 6   | GND_AUDIO | GND         |              |
| 7   | LEFT_OUT  | OUT         |              |
| 8   | GND_AUDIO | GND         |              |
| 9   | RIGHT_OUT | OUT         |              |
| 10  | +5V_AUDIO | PWR         | +5V          |

## 2.5.8 LVDS Port 1 (CN8)



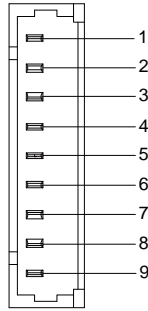
\*LVDS LCD\_PWR can be set to +3.3V or +5V by JP1

| Pin | Pin Name    | Signal Type | Signal Level |
|-----|-------------|-------------|--------------|
| 1   | BKL_ENABLE  | OUT         |              |
| 2   | BKL_CONTROL | OUT         |              |
| 3   | LCD_PWR     | PWR         | +3.3V/+5V    |
| 4   | GND         | GND         |              |
| 5   | LVDS_A_CLK- | DIFF        |              |
| 6   | LVDS_A_CLK+ | DIFF        |              |
| 7   | LCD_PWR     | PWR         | +3.3V/+5V    |
| 8   | GND         | GND         |              |
| 9   | LVDS_DA0-   | DIFF        |              |
| 10  | LVDS_DA0+   | DIFF        |              |
| 11  | LVDS_DA1-   | DIFF        |              |
| 12  | LVDS_DA1+   | DIFF        |              |
| 13  | LVDS_DA2-   | DIFF        |              |
| 14  | LVDS_DA2+   | DIFF        |              |
| 15  | LVDS_DA3-   | DIFF        |              |
| 16  | LVDS_DA3+   | DIFF        |              |



| Pin | Pin Name    | Signal Type | Signal Level |
|-----|-------------|-------------|--------------|
| 17  | DDC_DATA    | I/O         | +3.3V        |
| 18  | DDC_CLK     | I/O         | +3.3V        |
| 19  | LVDS_DB0-   | DIFF        |              |
| 20  | LVDS_DB0+   | DIFF        |              |
| 21  | LVDS_DB1-   | DIFF        |              |
| 22  | LVDS_DB1+   | DIFF        |              |
| 23  | LVDS_DB2-   | DIFF        |              |
| 24  | LVDS_DB2+   | DIFF        |              |
| 25  | LVDS_DB3-   | DIFF        |              |
| 26  | LVDS_DB3+   | DIFF        |              |
| 27  | LCD_PWR     | PWR         | +3.3V/+5V    |
| 28  | GND         | GND         |              |
| 29  | LVDS_B_CLK- | DIFF        |              |
| 30  | LVDS_B_CLK+ | DIFF        |              |

## 2.5.9 COM Port 2 (CN9)



### RS-232

| Pin | Pin Name     | Signal Type | Signal Level |
|-----|--------------|-------------|--------------|
| 1   | DCD2         | IN          |              |
| 2   | DSR2         | IN          |              |
| 3   | RX2          | IN          |              |
| 4   | RTS2         | OUT         | ±5V          |
| 5   | TX2          | OUT         | ±5V          |
| 6   | CTS2         | IN          |              |
| 7   | DTR2         | OUT         | ±5V          |
| 8   | RI2/+5V/+12V | IN          | +5V/+12V     |
| 9   | GND          | GND         |              |

### RS-485

| Pin | Pin Name  | Signal Type | Signal Level |
|-----|-----------|-------------|--------------|
| 1   | RS485_D2- | I/O         | ±5V          |
| 2   | NC        |             |              |
| 3   | RS485_D2+ | I/O         | ±5V          |
| 4   | NC        |             |              |

|   |             |     |          |
|---|-------------|-----|----------|
| 5 | NC          |     |          |
| 6 | NC          |     |          |
| 7 | NC          |     |          |
| 8 | NC/+5V/+12V | PWR | +5V/+12V |
| 9 | GND         | GND |          |

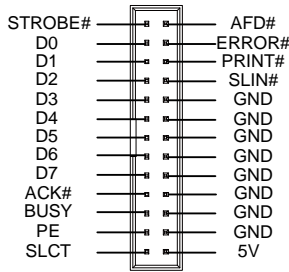
## RS-422

| Pin | Pin Name    | Signal Type | Signal Level |
|-----|-------------|-------------|--------------|
| 1   | RS422_TX2-  | OUT         | ±5V          |
| 2   | NC          |             |              |
| 3   | RS422_TX2+  | OUT         | ±5V          |
| 4   | NC          |             |              |
| 5   | RS422_RX2+  | IN          |              |
| 6   | NC          |             |              |
| 7   | RS422_RX2-  | IN          |              |
| 8   | NC/+5V/+12V | PWR         | +5V/+12V     |
| 9   | GND         | GND         |              |

\* COM2 RS-232/422/485 can be set by BIOS setting. Default is RS-232.

\* Pin 8 function can be set by JP3.

## 2.5.10 LPT Port or Digital I/O Port (CN10)

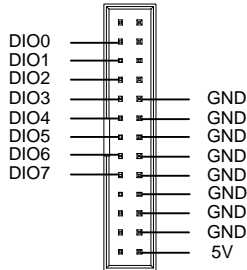


※ LPT or Digital I/O function can be selected by BIOS setting. Default is Digital I/O.

| LPT Port |          |             |              |
|----------|----------|-------------|--------------|
| Pin      | Pin Name | Signal Type | Signal Level |
| 1        | STROBE#  | IN          |              |
| 2        | AFD#     | I/O         |              |
| 3        | PD0      | I/O         |              |
| 4        | ERROR#   | IN          |              |
| 5        | PD1      | I/O         |              |
| 6        | PRINT#   | I/O         |              |
| 7        | PD2      | I/O         |              |
| 8        | SLIN#    | I/O         |              |
| 9        | PD3      | I/O         |              |
| 10       | GND      | GND         |              |
| 11       | PD4      | I/O         |              |
| 12       | GND      | GND         |              |
| 13       | PD5      | I/O         |              |
| 14       | GND      | GND         |              |
| 15       | PD6      | I/O         |              |
| 16       | GND      | GND         |              |

## LPT Port

| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 17  | PD7      | I/O         |              |
| 18  | GND      | GND         |              |
| 19  | ACK#     | IN          |              |
| 20  | GND      | GND         |              |
| 21  | BUSY     | IN          |              |
| 22  | GND      | GND         |              |
| 23  | PE       | IN          |              |
| 24  | GND      | GND         |              |
| 25  | SLCT     | IN          |              |
| 26  | 5V       | PWR         | +5V          |

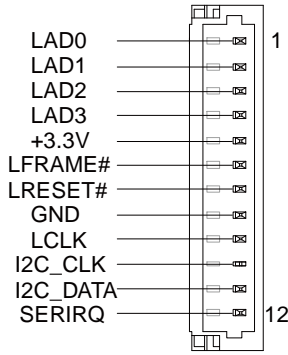


## Digital I/O Port

| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | NC       |             |              |
| 2   | NC       |             |              |
| 3   | DIO0     | I/O         | +5V          |
| 4   | NC       |             |              |
| 5   | DIO1     | I/O         | +5V          |

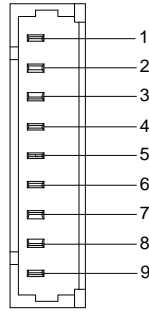
| Digital I/O Port |          |             |              |
|------------------|----------|-------------|--------------|
| Pin              | Pin Name | Signal Type | Signal Level |
| 6                | NC       |             |              |
| 7                | DIO2     | I/O         | +5V          |
| 8                | NC       |             |              |
| 9                | DIO3     | I/O         | +5V          |
| 10               | GND      | GND         |              |
| 11               | DIO4     | I/O         | +5V          |
| 12               | GND      | GND         |              |
| 13               | DIO5     | I/O         | +5V          |
| 14               | GND      | GND         |              |
| 15               | DIO6     | I/O         | +5V          |
| 16               | GND      | GND         |              |
| 17               | DIO7     | I/O         | +5V          |
| 18               | GND      | GND         |              |
| 19               | NC       |             |              |
| 20               | GND      | GND         |              |
| 21               | NC       |             |              |
| 22               | GND      | GND         |              |
| 23               | NC       |             |              |
| 24               | GND      | GND         |              |
| 25               | NC       |             |              |
| 26               | 5V       | PWR         | +5V          |

## 2.5.11 LPC Port (CN11)



| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | LAD0     | I/O         | +3.3V        |
| 2   | LAD1     | I/O         | +3.3V        |
| 3   | LAD2     | I/O         | +3.3V        |
| 4   | LAD3     | I/O         | +3.3V        |
| 5   | +3.3V    | PWR         | +3.3V        |
| 6   | LFRAME#  | IN          |              |
| 7   | LRESET#  | OUT         | +3.3V        |
| 8   | GND      | GND         |              |
| 9   | LCLK     | OUT         |              |
| 10  | I2C_CLK  | OUT         | +3.3V        |
| 11  | I2C_DATA | I/O         | +3.3V        |
| 12  | SERIRQ   | I/O         | +3.3V        |

## 2.5.12 COM Port 3 (CN12)



| RS-232 |              |             |              |
|--------|--------------|-------------|--------------|
| Pin    | Pin Name     | Signal Type | Signal Level |
| 1      | DCD3         | IN          |              |
| 2      | DSR3         | IN          |              |
| 3      | RX3          | IN          |              |
| 4      | RTS3         | OUT         | ±5V          |
| 5      | TX3          | OUT         | ±5V          |
| 6      | CTS3         | IN          |              |
| 7      | DTR3         | OUT         | ±5V          |
| 8      | RI3/+5V/+12V | IN          | +5V/+12V     |
| 9      | GND          | GND         |              |

| RS-485 |           |             |              |
|--------|-----------|-------------|--------------|
| Pin    | Pin Name  | Signal Type | Signal Level |
| 1      | RS485_D3- | I/O         | ±5V          |
| 2      | NC        |             |              |
| 3      | RS485_D3+ | I/O         | ±5V          |



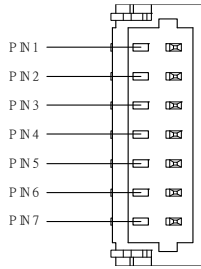
|   |             |     |          |
|---|-------------|-----|----------|
| 4 | NC          |     |          |
| 5 | NC          |     |          |
| 6 | NC          |     |          |
| 7 | NC          |     |          |
| 8 | NC/+5V/+12V | PWR | +5V/+12V |
| 9 | GND         | GND |          |

| RS-422 |             |             |              |
|--------|-------------|-------------|--------------|
| Pin    | Pin Name    | Signal Type | Signal Level |
| 1      | RS422_TX3-  | OUT         | ±5V          |
| 2      | NC          |             |              |
| 3      | RS422_TX3+  | OUT         | ±5V          |
| 4      | NC          |             |              |
| 5      | RS422_RX3+  | IN          |              |
| 6      | NC          |             |              |
| 7      | RS422_RX3-  | IN          |              |
| 8      | NC/+5V/+12V | PWR         | +5V/+12V     |
| 9      | GND         | GND         |              |

\* COM3 RS-232/422/485 can be set by BIOS setting. Default is RS-232.

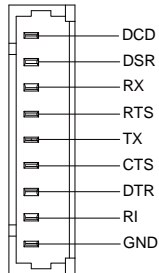
\* Pin 8 function can be set by JP4.

## 2.5.13 BIOS Debug Port (CN13)



| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | SPI_MISO | OUT         |              |
| 2   | GND      | GND         |              |
| 3   | SPI_CLK  | IN          |              |
| 4   | +3.3VSB  | PWR         | +3.3V        |
| 5   | SPI_MOSI | IN          |              |
| 6   | SPI_CS   | IN          |              |
| 7   | NC       |             |              |

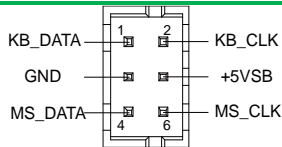
## 2.5.14 COM Port 4 (CN14)



| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | DCD4     | IN          |              |
| 2   | DSR4     | IN          |              |
| 3   | RX4      | IN          |              |

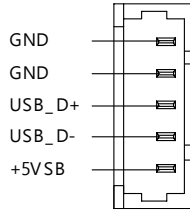
|   |      |     |     |
|---|------|-----|-----|
| 4 | RTS4 | OUT | ±9V |
| 5 | TX4  | OUT | ±9V |
| 6 | CTS4 | IN  |     |
| 7 | DTR4 | OUT | ±9V |
| 8 | RI4  | IN  |     |
| 9 | GND  | GND |     |

### 2.5.15PS/2 Keyboard/Mouse Combo Port (CN15)



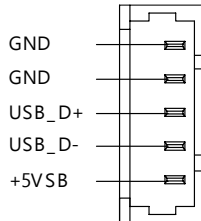
| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | KB_DATA  | I/O         | +5V          |
| 2   | KB_CLK   | I/O         | +5V          |
| 3   | GND      | GND         |              |
| 4   | +5VSB    | PWR         | +5V          |
| 5   | MS_DATA  | I/O         | +5V          |
| 6   | MS_CLK   | I/O         | +5V          |

### 2.5.16 USB 2.0 Port 2 (CN16)



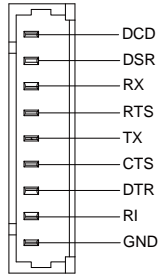
| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | +5VSB    | PWR         | +5V          |
| 2   | USB_D-   | DIFF        |              |
| 3   | USB_D+   | DIFF        |              |
| 4   | GND      | GND         |              |
| 5   | GND      | GND         |              |

### 2.5.17 USB 2.0 Port 3 (CN17)



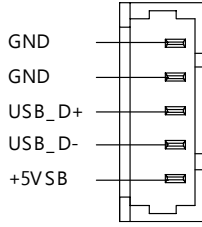
| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | +5VSB    | PWR         | +5V          |
| 2   | USB_D-   | DIFF        |              |
| 3   | USB_D+   | DIFF        |              |
| 4   | GND      | GND         |              |
| 5   | GND      | GND         |              |

## 2.5.18COM Port 1 (CN18) (Wafer, Optional)



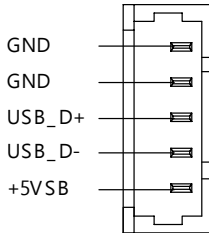
| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | DCD1     | IN          |              |
| 2   | DSR1     | IN          |              |
| 3   | RX1      | IN          |              |
| 4   | RTS1     | OUT         | ±9V          |
| 5   | TX1      | OUT         | ±9V          |
| 6   | CTS1     | IN          |              |
| 7   | DTR1     | OUT         | ±9V          |
| 8   | RI1      | IN          |              |
| 9   | GND      | GND         |              |

### 2.5.19 USB 2.0 Port 4 (CN19)



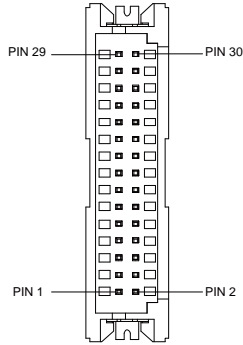
| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | +5VSB    | PWR         | +5V          |
| 2   | USB_D-   | DIFF        |              |
| 3   | USB_D+   | DIFF        |              |
| 4   | GND      | GND         |              |
| 5   | GND      | GND         |              |

### 2.5.20 USB 2.0 Port 5 (CN20)



| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | +5VSB    | PWR         | +5V          |
| 2   | USB_D-   | DIFF        |              |
| 3   | USB_D+   | DIFF        |              |
| 4   | GND      | GND         |              |
| 5   | GND      | GND         |              |

## 2.5.21LVDS Port 2 (CN21)



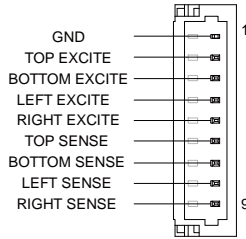
\*LVDS2 LCD\_PWR can be set to +3.3V or +5V by JP7

| Pin | Pin Name    | Signal Type | Signal Level |
|-----|-------------|-------------|--------------|
| 1   | BKL_ENABLE  | OUT         |              |
| 2   | BKL_CONTROL | OUT         |              |
| 3   | LCD_PWR     | PWR         | +3.3V/+5V    |
| 4   | GND         | GND         |              |
| 5   | LVDS_A_CLK- | DIFF        |              |
| 6   | LVDS_A_CLK+ | DIFF        |              |
| 7   | LCD_PWR     | PWR         | +3.3V/+5V    |
| 8   | GND         | GND         |              |
| 9   | LVDS_DA0-   | DIFF        |              |
| 10  | LVDS_DA0+   | DIFF        |              |
| 11  | LVDS_DA1-   | DIFF        |              |
| 12  | LVDS_DA1+   | DIFF        |              |
| 13  | LVDS_DA2-   | DIFF        |              |
| 14  | LVDS_DA2+   | DIFF        |              |
| 15  | LVDS_DA3-   | DIFF        |              |
| 16  | LVDS_DA3+   | DIFF        |              |

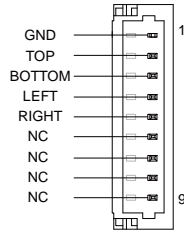
| Pin | Pin Name    | Signal Type | Signal Level |
|-----|-------------|-------------|--------------|
| 17  | DDC_DATA    | I/O         | +3.3V        |
| 18  | DDC_CLK     | I/O         | +3.3V        |
| 19  | LVDS_DB0-   | DIFF        |              |
| 20  | LVDS_DB0+   | DIFF        |              |
| 21  | LVDS_DB1-   | DIFF        |              |
| 22  | LVDS_DB1+   | DIFF        |              |
| 23  | LVDS_DB2-   | DIFF        |              |
| 24  | LVDS_DB2+   | DIFF        |              |
| 25  | LVDS_DB3-   | DIFF        |              |
| 26  | LVDS_DB3+   | DIFF        |              |
| 27  | LCD_PWR     | PWR         | +3.3V/+5V    |
| 28  | GND         | GND         |              |
| 29  | LVDS_B_CLK- | DIFF        |              |
| 30  | LVDS_B_CLK+ | DIFF        |              |



## 2.5.22 Touchscreen Connector (CN22)

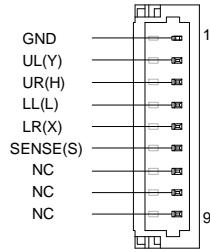


| 8-Wire |               |             |              |
|--------|---------------|-------------|--------------|
| Pin    | Pin Name      | Signal Type | Signal Level |
| 1      | GND           | GND         |              |
| 2      | TOP EXCITE    | IN          |              |
| 3      | BOTTOM EXCITE | IN          |              |
| 4      | LEFT EXCITE   | IN          |              |
| 5      | RIGHT EXCITE  | IN          |              |
| 6      | TOP SENSE     | IN          |              |
| 7      | BOTTOM SENSE  | IN          |              |
| 8      | LEFT SENSE    | IN          |              |
| 9      | RIGHT SENSE   | IN          |              |



## 4-Wire

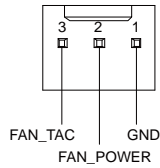
| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | GND      | GND         |              |
| 2   | TOP      | IN          |              |
| 3   | BOTTOM   | IN          |              |
| 4   | LEFT     | IN          |              |
| 5   | RIGHT    | IN          |              |
| 6   | NC       |             |              |
| 7   | NC       |             |              |
| 8   | NC       |             |              |
| 9   | NC       |             |              |



## 5-Wire

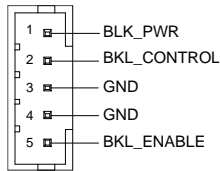
| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | GND      | GND         |              |
| 2   | UL(Y)    | IN          |              |
| 3   | UR(H)    | IN          |              |
| 4   | LL(L)    | IN          |              |
| 5   | LR(X)    | IN          |              |
| 6   | SENSE(S) | IN          |              |
| 7   | NC       |             |              |
| 8   | NC       |             |              |
| 9   | NC       |             |              |

### 2.5.23 CPU Fan (CN23, Optional)



| Pin | Pin Name  | Signal Type | Signal Level |
|-----|-----------|-------------|--------------|
| 1   | GND       | GND         |              |
| 2   | FAN_POWER | PWR         | +12V         |
| 3   | FAN_TAC   | IN          |              |

### 2.5.24 LVDS Port 2 Inverter / Backlight Connector (CN24)

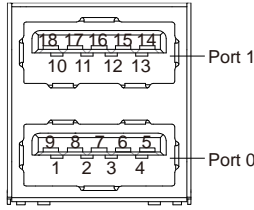


| Pin | Pin Name    | Signal Type | Signal level |
|-----|-------------|-------------|--------------|
| 1   | BKL_PWR     | PWR         | +5V / +12V   |
| 2   | BKL_CONTROL | OUT         |              |
| 3   | GND         | GND         |              |
| 4   | GND         | GND         |              |
| 5   | BKL_ENABLE  | OUT         | +5V          |

\* LVDS2 BKL\_PWR can be set to +5V or +12V by JP7

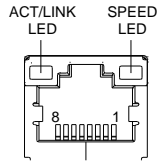
\* LVDS2 BKL\_CONTROL can be set by JP8

## 2.5.25 USB 3.0 Ports 0 and 1 (CN25)



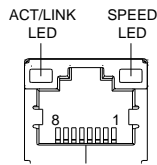
| Pin | Pin Name  | Signal Type | Signal Level |
|-----|-----------|-------------|--------------|
| 1   | +5VSB     | PWR         | +5V          |
| 2   | USB_D-    | DIFF        |              |
| 3   | USB_D+    | DIFF        |              |
| 4   | GND       | GND         |              |
| 5   | USB_SSRX- | DIFF        |              |
| 6   | USB_SSRX+ | DIFF        |              |
| 7   | GND       | GND         |              |
| 8   | USB_SSTX- | DIFF        |              |
| 9   | USB_SSTX+ | DIFF        |              |
| 10  | +5VSB     | PWR         | +5V          |
| 11  | USB_D-    | DIFF        |              |
| 12  | USB_D+    | DIFF        |              |
| 13  | GND       | GND         |              |
| 14  | USB_SSRX- | DIFF        |              |
| 15  | USB_SSRX+ | DIFF        |              |
| 16  | GND       | GND         |              |
| 17  | USB_SSTX- | DIFF        |              |
| 18  | USB_SSTX+ | DIFF        |              |

### 2.5.26 LAN (RJ-45) Port 2 (CN26)



| Pin | Pin Name | Signal Type | Signal level |
|-----|----------|-------------|--------------|
| 1   | MDI0+    | DIFF        |              |
| 2   | MDI0-    | DIFF        |              |
| 3   | MDI1+    | DIFF        |              |
| 4   | MDI2+    | DIFF        |              |
| 5   | MDI2-    | DIFF        |              |
| 6   | MDI1-    | DIFF        |              |
| 7   | MDI3+    | DIFF        |              |
| 8   | MDI3-    | DIFF        |              |

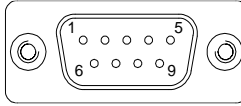
### 2.5.27 LAN (RJ-45) Port 1 (CN27)



| Pin | Pin Name | Signal Type | Signal level |
|-----|----------|-------------|--------------|
| 1   | MDI0+    | DIFF        |              |
| 2   | MDI0-    | DIFF        |              |
| 3   | MDI1+    | DIFF        |              |
| 4   | MDI2+    | DIFF        |              |
| 5   | MDI2-    | DIFF        |              |
| 6   | MDI1-    | DIFF        |              |

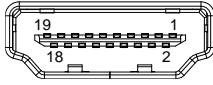
|   |       |      |
|---|-------|------|
| 7 | MDI3+ | DIFF |
| 8 | MDI3- | DIFF |

### 2.5.28 COM Port 1 (CN28, D-SUB 9)



| Pin | Pin Name | Signal Type | Signal level |
|-----|----------|-------------|--------------|
| 1   | DCD      | IN          |              |
| 2   | RX       | IN          |              |
| 3   | TX       | OUT         | ±9V          |
| 4   | DTR      | OUT         | ±9V          |
| 5   | GND      | GND         |              |
| 6   | DSR      | IN          |              |
| 7   | RTS      | OUT         | ±9V          |
| 8   | CTS      | IN          |              |
| 9   | RI       | IN          |              |

## 2.5.29 HDMI Port (CN29, Optional)



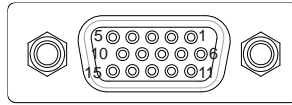
| Pin | Pin Name    | Signal Type | Signal level |
|-----|-------------|-------------|--------------|
| 1   | TMDS_DAT2+  | DIFF        |              |
| 2   | GND         | GND         |              |
| 3   | TMDS_DAT2-  | DIFF        |              |
| 4   | TMDS_DAT1+  | DIFF        |              |
| 5   | GND         | GND         |              |
| 6   | TMDS_DAT1-  | DIFF        |              |
| 7   | TMDS_DAT0+  | DIFF        |              |
| 8   | GND         | GND         |              |
| 9   | TMDS_DAT0-  | DIFF        |              |
| 10  | TMDS_CLK+   | DIFF        |              |
| 11  | GND         | GND         |              |
| 12  | TMDS_CLK-   | DIFF        |              |
| 13  | NC          |             |              |
| 14  | NC          |             |              |
| 15  | DDC_CLK     | I/O         | +5V          |
| 16  | DDC_DATA    | I/O         | +5V          |
| 17  | GND         | GND         |              |
| 18  | +5V         | I/O         | +5V          |
| 19  | HPLG_DETECT | IN          |              |



### 2.5.30 Battery (CN30)

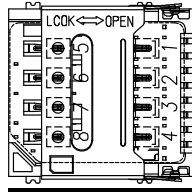
| Pin | Pin Name | Signal Type | Signal level |
|-----|----------|-------------|--------------|
| 1   | +3.3V    | PWR         | 3.3V         |
| 2   | GND      | GND         |              |

### 2.5.31VGA Port (CN31)



| Pin | Pin Name      | Signal Type | Signal level |
|-----|---------------|-------------|--------------|
| 1   | RED           | OUT         |              |
| 2   | GREEN         | OUT         |              |
| 3   | BLUE          | OUT         |              |
| 4   | NC            |             |              |
| 5   | GND           | GND         |              |
| 6   | RED_GND_RTN   | GND         |              |
| 7   | GREEN_GND_RTN | GND         |              |
| 8   | BLUE_GND_RTN  | GND         |              |
| 9   | +5V           | PWR         | +5V          |
| 10  | NC            |             |              |
| 11  | NC            |             |              |
| 12  | DDC_DATA      | I/O         | +5V          |
| 13  | HSYNC         | OUT         |              |
| 14  | VSYNC         | OUT         |              |
| 15  | DDC_CLK       | I/O         | +5V          |

### 2.5.32 Micro SIM Card Socket (CN32)



| Pin | Pin Name | Signal Type | Signal level |
|-----|----------|-------------|--------------|
| 1   | UIM_PWR  | PWR         |              |
| 2   | UIM_RST  | IN          |              |
| 3   | UIM_CLK  | IN          |              |
| 4   | NC       |             |              |
| 5   | GND      | GND         |              |
| 6   | UIM_VPP  | PWR         |              |
| 7   | UIM_DATA | I/O         |              |
| 8   | NC       |             |              |

### 2.5.33 Mini-Card Slot (Half-Mini) (CN33)

| Pin | Pin Name      | Signal Type | Signal level |
|-----|---------------|-------------|--------------|
| 1   | PCIE_WAKE#    | IN          |              |
| 2   | +3.3VSB       | PWR         | +3.3V        |
| 3   | NC            |             |              |
| 4   | GND           | GND         |              |
| 5   | NC            |             |              |
| 6   | +1.5V         | PWR         | +1.5V        |
| 7   | PCIE_CLK_REQ# | IN          |              |

| Pin | Pin Name      | Signal Type | Signal level |
|-----|---------------|-------------|--------------|
| 8   | UIM_PWR       | PWR         |              |
| 9   | GND           | GND         |              |
| 10  | UIM_DATA      | I/O         |              |
| 11  | PCIE_REF_CLK- | DIFF        |              |
| 12  | UIM_CLK       | IN          |              |
| 13  | PCIE_REF_CLK+ | DIFF        |              |
| 14  | UIM_RST       | IN          |              |
| 15  | GND           | GND         |              |
| 16  | UIM_VPP       | PWR         |              |
| 17  | NC            |             |              |
| 18  | GND           | GND         |              |
| 19  | NC            |             |              |
| 20  | W_DISABLE#    | OUT         | +3.3V        |
| 21  | GND           | GND         |              |
| 22  | PCIE_RST#     | OUT         | +3.3V        |
| 23  | PCIE_RX-      | DIFF        |              |
| 24  | +3.3VSB       | PWR         | +3.3V        |
| 25  | PCIE_RX+      | DIFF        |              |
| 26  | GND           | GND         |              |
| 27  | GND           | GND         |              |
| 28  | +1.5V         | PWR         | +1.5V        |
| 29  | GND           | GND         |              |
| 30  | SMB_CLK       | I/O         | +3.3V        |
| 31  | PCIE_TX-      | DIFF        |              |
| 32  | SMB_DATA      | I/O         | +3.3V        |
| 33  | PCIE_TX+      | DIFF        |              |

| Pin | Pin Name | Signal Type | Signal level |
|-----|----------|-------------|--------------|
| 34  | GND      | GND         |              |
| 35  | GND      | GND         |              |
| 36  | USB_D-   | DIFF        |              |
| 37  | GND      | GND         |              |
| 38  | USB_D+   | DIFF        |              |
| 39  | +3.3VSB  | PWR         | +3.3V        |
| 40  | GND      | GND         |              |
| 41  | +3.3VSB  | PWR         | +3.3V        |
| 42  | NC       |             |              |
| 43  | GND      | GND         |              |
| 44  | NC       |             |              |
| 45  | NC       |             |              |
| 46  | NC       |             |              |
| 47  | NC       |             |              |
| 48  | +1.5V    | PWR         | +1.5V        |
| 49  | NC       |             |              |
| 50  | GND      | GND         |              |
| 51  | NC       |             |              |
| 52  | +3.3VSB  | PWR         | +3.3V        |

### 2.5.34 mSATA (Full-Size) (CN34)

※ CN34 can be changed to mini-card by BOM change.

| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 1   | NC       | IN          |              |
| 2   | +3.3V    | PWR         | +3.3V        |
| 3   | NC       |             |              |
| 4   | GND      | GND         |              |
| 5   | NC       |             |              |
| 6   | +1.5V    | PWR         | +1.5V        |
| 7   | NC       |             |              |
| 8   | NC       |             |              |
| 9   | GND      | GND         |              |
| 10  | NC       |             |              |
| 11  | NC       |             |              |
| 12  | NC       |             |              |
| 13  | NC       |             |              |
| 14  | NC       |             |              |
| 15  | GND      | GND         |              |
| 16  | NC       |             |              |
| 17  | NC       |             |              |
| 18  | GND      | GND         |              |
| 19  | NC       |             | GND          |
| 20  | NC       |             |              |
| 21  | GND      | GND         |              |
| 22  | NC       | OUT         |              |
| 23  | SATA_RX+ | DIFF        |              |
| 24  | +3.3V    | PWR         | +3.3V        |

| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 25  | SATA_RX- | DIFF        |              |
| 26  | GND      | GND         |              |
| 27  | GND      | GND         |              |
| 28  | +1.5V    | PWR         | +1.5V        |
| 29  | GND      | GND         |              |
| 30  | SMB_CLK  | I/O         | +3.3V        |
| 31  | SATA_TX- | DIFF        |              |
| 32  | SMB_DATA | I/O         | +3.3V        |
| 33  | SATA_TX+ | DIFF        |              |
| 34  | GND      | GND         |              |
| 35  | GND      | GND         |              |
| 36  | NC       |             |              |
| 37  | GND      | GND         |              |
| 38  | NC       |             |              |
| 39  | +3.3V    | PWR         | +3.3V        |
| 40  | GND      | GND         |              |
| 41  | +3.3V    | PWR         | +3.3V        |
| 42  | NC       |             |              |
| 43  | GND      | GND         |              |
| 44  | NC       |             |              |
| 45  | NC       |             |              |
| 46  | NC       |             |              |
| 47  | NC       |             |              |
| 48  | +1.5V    | PWR         | +1.5V        |
| 49  | NC       |             |              |
| 50  | GND      | GND         |              |

| Pin | Pin Name | Signal Type | Signal Level |
|-----|----------|-------------|--------------|
| 51  | NC       |             |              |
| 52  | +3.3V    | PWR         | +3.3V        |

# Chapter 3

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AMI BIOS Setup



## 3.1 System Test and Initialization

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These routines test and initialize board hardware. If the routines encounter an error during the tests, you will either hear a few short beeps or see an error message on the screen. There are two kinds of errors: fatal and non-fatal. The system can usually continue the boot up sequence with non-fatal errors.

### System configuration verification

These routines check the current system configuration stored in the CMOS memory and BIOS NVRAM. If system configuration is not found or system configuration data error is detected, system will load optimized default and re-boot with this default system configuration automatically.

There are four situations in which you will need to setup system configuration:

1. You are starting your system for the first time
2. You have changed the hardware attached to your system
3. The system configuration is reset by Clear-CMOS jumper
4. The CMOS memory has lost power and the configuration information has been erased.

The GENE-APL5 CMOS memory has an integral lithium battery backup for data retention. However, you will need to replace the complete unit when it finally runs down.

## 3.2 AMI BIOS Setup

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AMI BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM and BIOS NVRAM so that it retains the Setup information when the power is turned off.

### Entering Setup

Power on the computer and press <Del> or <ESC> immediately. This will allow you to enter Setup.

**Main** – Set the date, use tab to switch between date elements.

**Advanced** – Enable/disable boot option for legacy network devices.

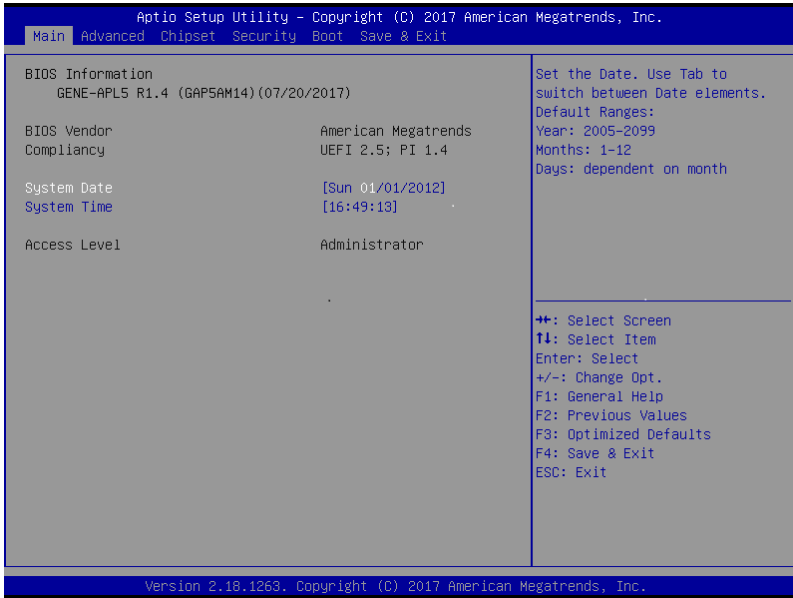
**Chipset** – Host bridge parameters.

**Boot** – Enable/Disable quiet Boot Option

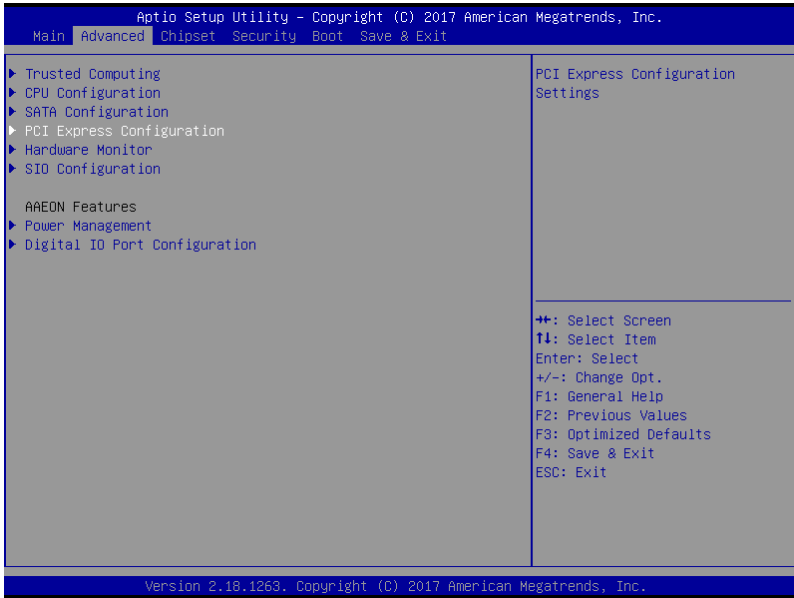
**Security** – Set setup administrator password.

**Save & Exit** – Save your changes and exit the program

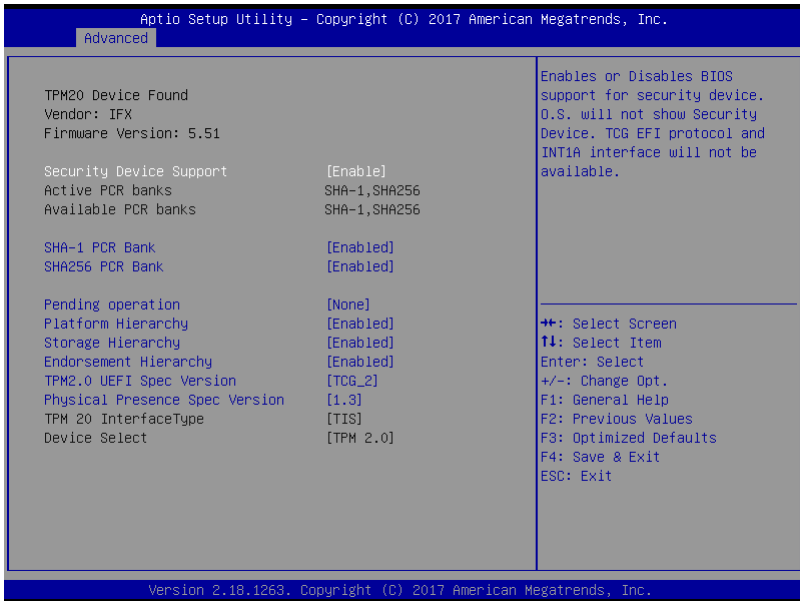
### 3.3 Setup submenu: Main



### 3.4 Setup submenu: Advanced



### 3.4.1 Advanced: Trusted Computing

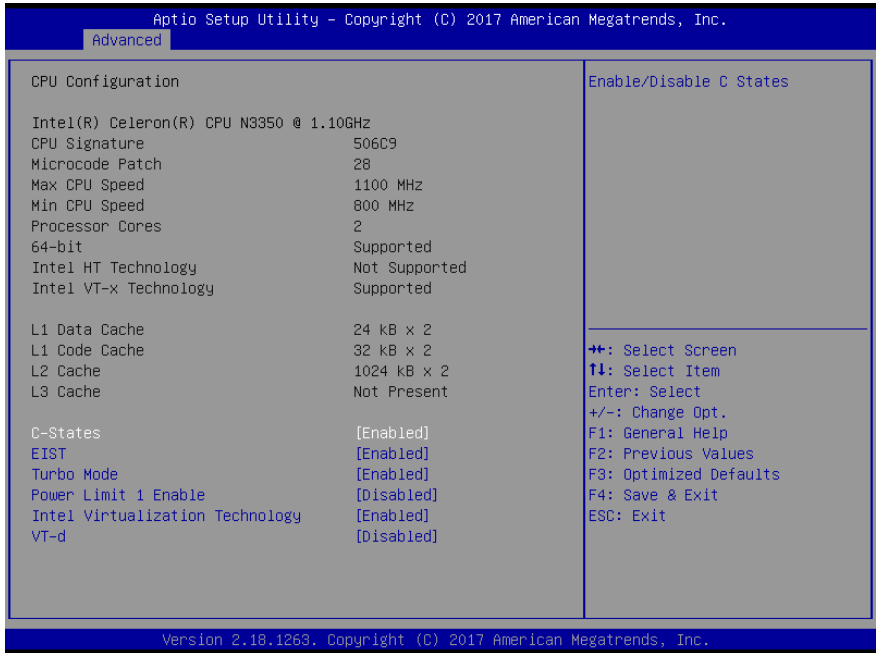


Options summary:

|   |           |                                   |
|---|-----------|-----------------------------------|
| Security Device Support   | Disable   |                                   |
|   | Enable    | Optimal Default, Failsafe Default |
| Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available. |           |                                   |
| SHA-1 PCR Bank  | Disable   |                                   |
|   | Enable    | Optimal Default, Failsafe Default |
| Enable or Disable SHA-1 PCR Bank  |           |                                   |
| SHA256 PCR Bank   | Disable   |                                   |
|   | Enable    | Optimal Default, Failsafe Default |
| Enable or Disable SHA256 PCR Bank   |           |                                   |
| Pending Operation   | None      | Optimal Default, Failsafe Default |
|   | TPM Clear |                                   |
| Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.            |           |                                   |

|  |          |                                   |
|--|----------|-----------------------------------|
| Platform Hierarchy   | Disabled |                                   |
|  | Enabled  | Optimal Default, Failsafe Default |
| Enable or disable Platform Hierarchy   |          |                                   |
| Storage Hierarchy  | Disabled |                                   |
|  | Enabled  | Optimal Default, Failsafe Default |
| Enable or Disable Storage Hierarchy  |          |                                   |
| Endorsement Hierarchy  | Disabled |                                   |
|  | Enabled  | Optimal Default, Failsafe Default |
| Enable or Disable Endorsement Hierarchy  |          |                                   |
| TPM2.0 UEFI Spec Version   | TCG_1_2  |                                   |
|  | TCG_2    | Optimal Default, Failsafe Default |
| Select the TCG2 Spec Version Support,<br>TCG_1_2: the Compatible mode for Win8/Win10<br>TCG_2: Support new TCG2 protocol and event format for Win10 or later |          |                                   |
| Physical Presence Spec Version   | 1.2      |                                   |
|  | 1.3      | Optimal Default, Failsafe Default |
| Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.   |          |                                   |

### 3.4.2 Advanced: CPU Configuration



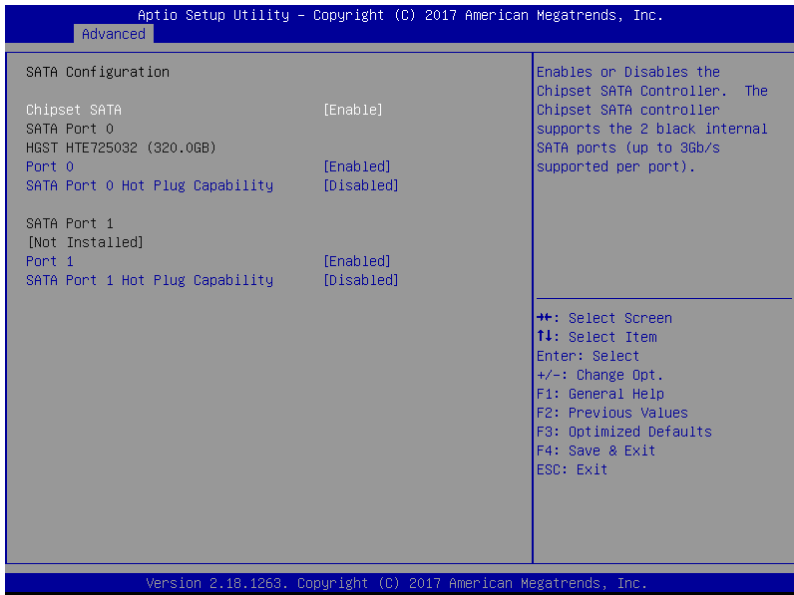
Options summary:

|   |          |                                   |
|---|----------|-----------------------------------|
| C-States  | Disabled |                                   |
|   | Enabled  | Optimal Default, Failsafe Default |
| Enable/Disable C States.  |          |                                   |
| EIST™   | Disabled |                                   |
|   | Enabled  | Optimal Default, Failsafe Default |
| Enable/Disable Intel SpeedStep.   |          |                                   |
| Turbo Mode  | Disabled |                                   |
|   | Enabled  | Optimal Default, Failsafe Default |
| Turbo Mode  |          |                                   |
| Power Limit 1 Enable  | Disabled | Optimal Default, Failsafe Default |
|   | Enabled  |                                   |
| Enable/Disable Power Limit 1  |          |                                   |
| Intel Virtualization Technology   | Disabled |                                   |
|   | Enabled  | Optimal Default, Failsafe Default |
| When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology. |          |                                   |

|                         |          |                                   |
|-------------------------|----------|-----------------------------------|
| VT-d                    | Disabled | Optimal Default, Failsafe Default |
|                         | Enabled  |                                   |
| Enable/Disable CPU VT-d |          |                                   |



### 3.4.3 Advanced: SATA Configuration



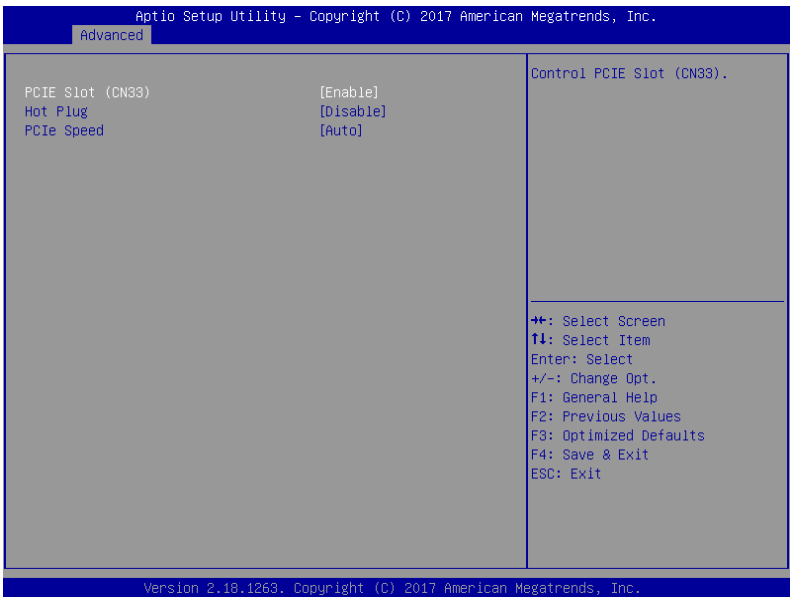
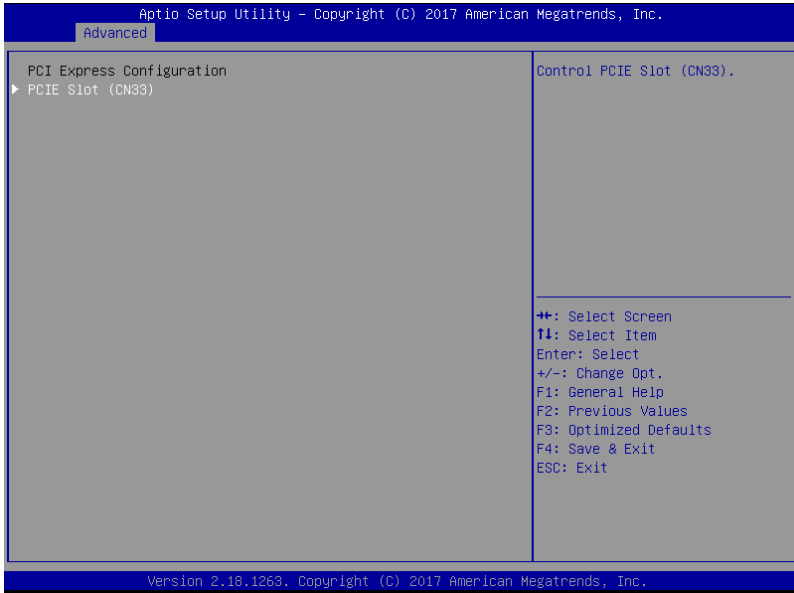
Options summary:

|   |          |                                   |
|---|----------|-----------------------------------|
| Chipset SATA  | Disabled |                                   |
|   | Enabled  | Optimal Default, Failsafe Default |
| Enables or Disables the Chipset SATA Controller. The Chipset SATA controller supports the 2 black internal SATA ports (up to 3Gb/s supported per port). |          |                                   |
| Port 0  | Disabled |                                   |
|   | Enabled  | Optimal Default, Failsafe Default |
| Enable or Disable SATA Port   |          |                                   |
| SATA Port 0 Hot Plug Capability   | Disabled | Optimal Default, Failsafe Default |
|   | Enabled  |                                   |
| If enabled, SATA port will be reported as Hot Plug capable.   |          |                                   |

|                             |          |                                   |
|-----------------------------|----------|-----------------------------------|
| Port 1                      | Disabled |                                   |
|                             | Enabled  | Optimal Default, Failsafe Default |
| Enable or Disable SATA Port |          |                                   |
| SATA Port 0 Hot             | Disabled | Optimal Default, Failsafe Default |

|   |         |  |
|---|---------|--|
| Plug Capability   | Enabled |  |
| If enabled, SATA port will be reported as Hot Plug capable. |         |  |

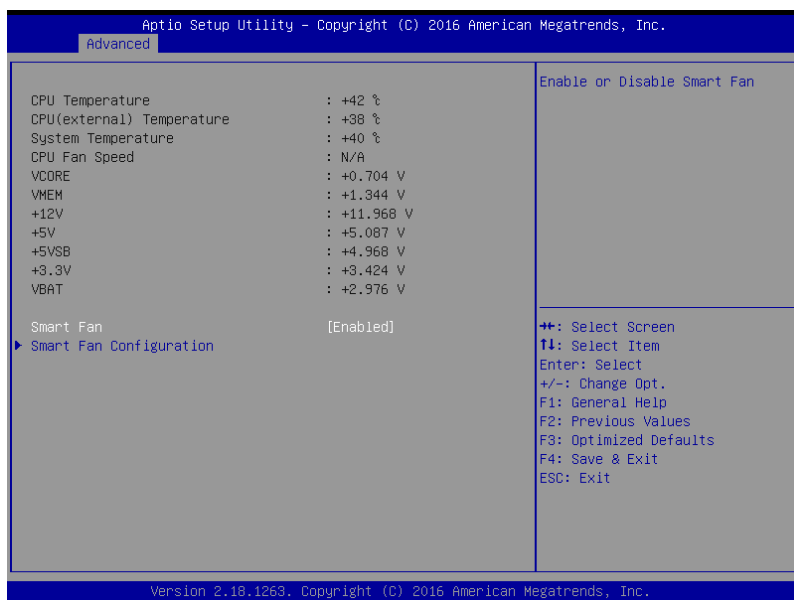
### 3.4.3.1 PCI Express Configuration



Options summary:

|                                      |          |                                   |
|--------------------------------------|----------|-----------------------------------|
| PCIe Slot (CN33)                     | Disabled |                                   |
|                                      | Enabled  | Optimal Default, Failsafe Default |
| Control PCIe Slot (CN33)             |          |                                   |
| Hot Plug                             | Disabled | Optimal Default, Failsafe Default |
|                                      | Enabled  |                                   |
| PCIe Express Hot Plug Enable/Disable |          |                                   |
| PCIe Speed                           | Auto     | Optimal Default, Failsafe Default |
|                                      | Gen 1    |                                   |
|                                      | Gen 2    |                                   |
| Configure PCIe Speed                 |          |                                   |

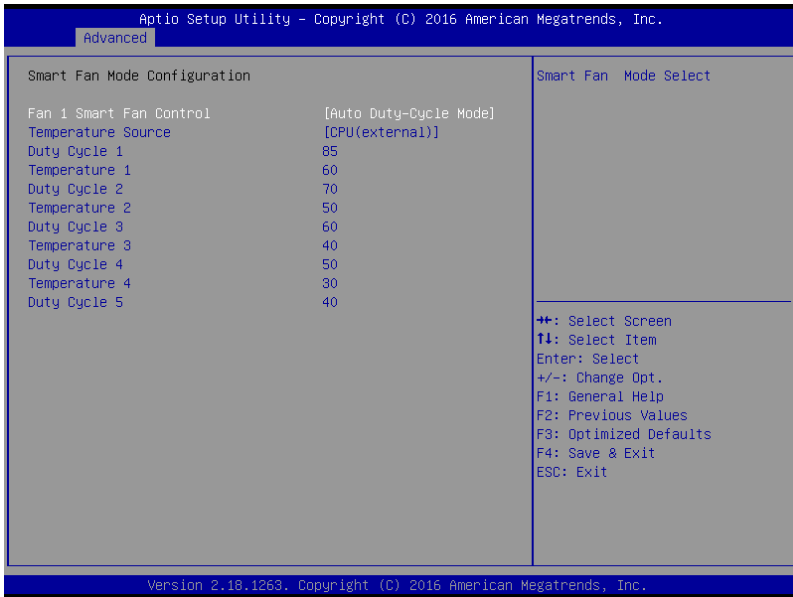
### 3.4.4 Advanced: Hardware Monitor



Options summary:

|                                |         |                                   |
|--------------------------------|---------|-----------------------------------|
| Smart Fan                      | Disable |                                   |
|                                | Enable  | Optimal Default, Failsafe Default |
| Enables or Disables Smart Fan. |         |                                   |

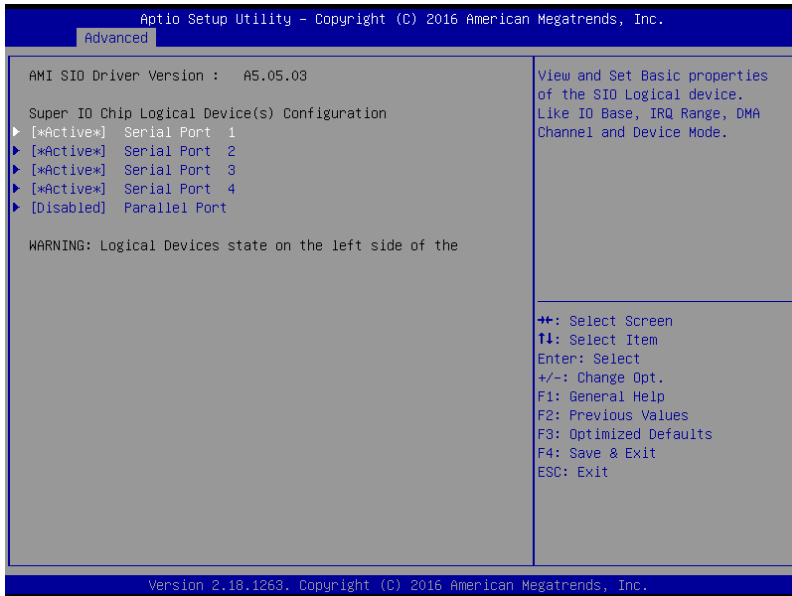
### 3.4.4.1 CPU Smart Fan Configuration



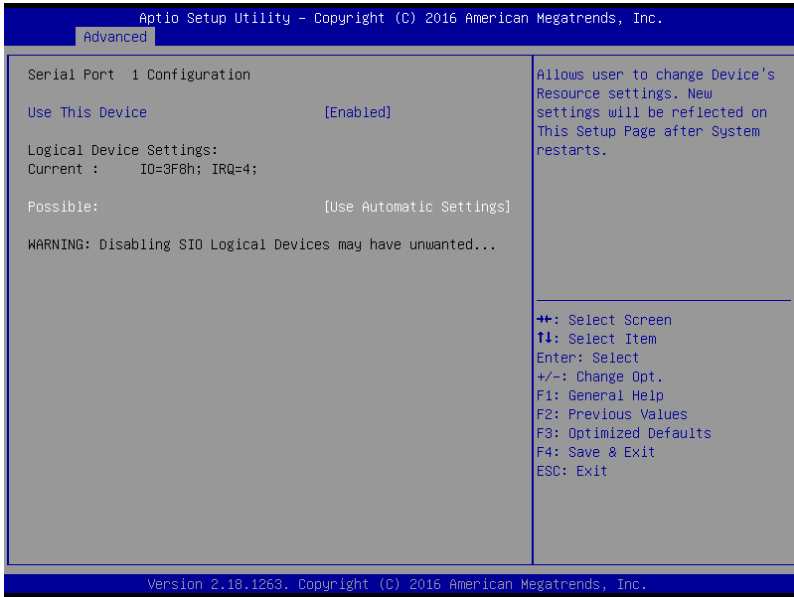
Options summary:

|   |                      |                                   |
|---|----------------------|-----------------------------------|
| Fan 1 Smart Fan Control   | Manual Duty Mode     |                                   |
|   | Auto Duty-Cycle Mode | Optimal Default, Failsafe Default |
| Smart Fan Mode Select   |                      |                                   |
| Temperature Source  | CPU                  |                                   |
|   | CPU(external)        | Optimal Default, Failsafe Default |
|   | System               |                                   |
| Select the monitored temperature source for this fan.   |                      |                                   |
| Duty Cycle 1  | 85                   |                                   |
| Temperature 1   | 60                   |                                   |
| Auto fan speed control. Fan speed will follow different temperature by different duty cycle 1-100 |                      |                                   |

### 3.4.5 Advanced: SIO Configuration



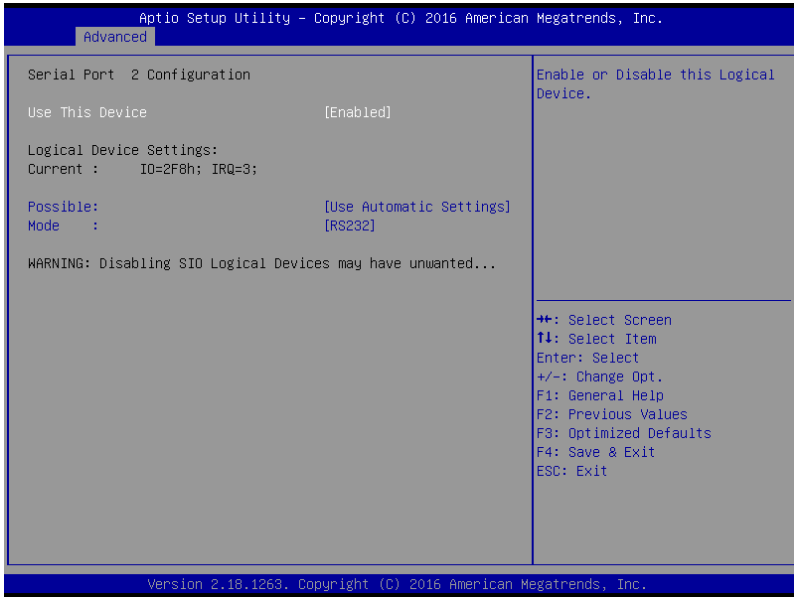
### 3.4.5.1 SIO Configuration: Serial Port 1 Configuration



Options summary:

|  |                        |                                   |
|--|------------------------|-----------------------------------|
| Use This Device  | Disable                |                                   |
|  | Enable                 | Optimal Default, Failsafe Default |
| Enable or Disable this Logical Device.   |                        |                                   |
| Possible:  | Use Automatic Settings | Optimal Default, Failsafe Default |
|  | IO=3F8h; IRQ=4         |                                   |
|  | IO=2F8h; IRQ=3         |                                   |
| Allows user to change Device's Resource settings. New settings will be reflected on This Setup Page after System restarts. |                        |                                   |

### 3.4.5.2 SIO Configuration: Serial Port 2 Configuration

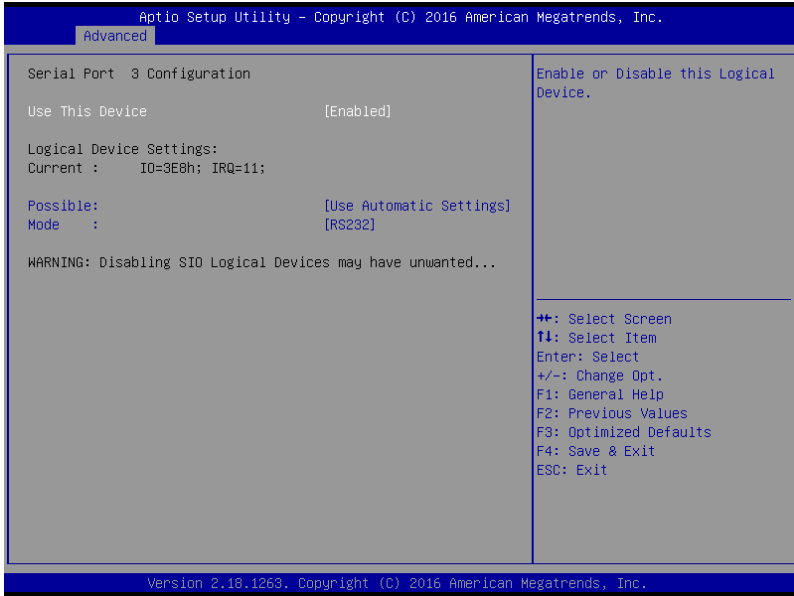


Options summary:

|  |                        |                                   |
|--|------------------------|-----------------------------------|
| Use This Device  | Disable                |                                   |
|  | Enable                 | Optimal Default, Failsafe Default |
| Enable or Disable this Logical Device.   |                        |                                   |
| Possible:  | Use Automatic Settings | Optimal Default, Failsafe Default |
|  | IO=2F8h; IRQ=3         |                                   |
|  | IO=3F8h; IRQ=4         |                                   |
| Allows user to change Device's Resource settings. New settings will be reflected on This Setup Page after System restarts. |                        |                                   |
| Mode:  | RS232                  | Optimal Default, Failsafe Default |
|  | RS422                  |                                   |
|  | RS485                  |                                   |
| UART RS232, 422, 485 selection.  |                        |                                   |



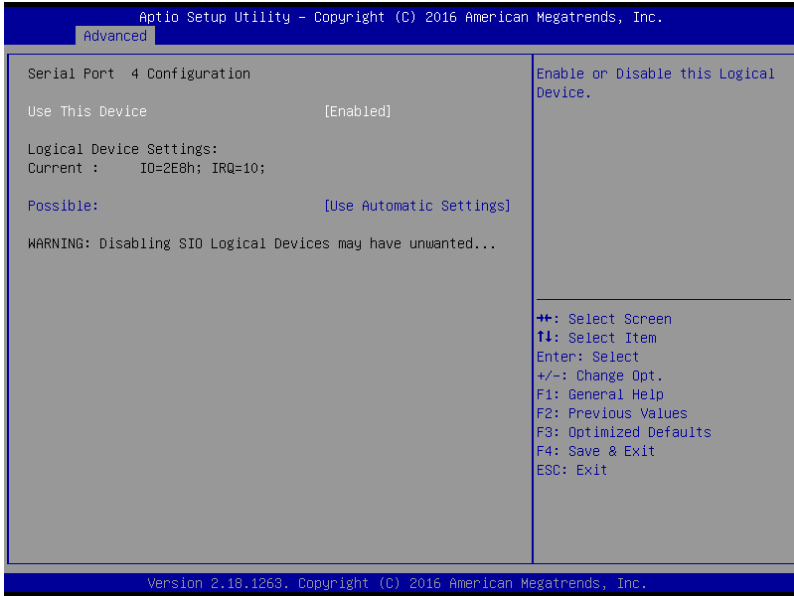
### 3.4.5.3 SIO Configuration: Serial Port 3 Configuration



Options summary:

|  |                        |                                   |
|--|------------------------|-----------------------------------|
| Use This Device  | Disable                |                                   |
|  | Enable                 | Optimal Default, Failsafe Default |
| Enable or Disable this Logical Device.   |                        |                                   |
| Possible:  | Use Automatic Settings | Optimal Default, Failsafe Default |
|  | IO=3E8h; IRQ=11        |                                   |
|  | IO=2E8h; IRQ=11        |                                   |
| Allows user to change Device's Resource settings. New settings will be reflected on This Setup Page after System restarts. |                        |                                   |
| Mode:  | RS232                  | Optimal Default, Failsafe Default |
|  | RS422                  |                                   |
|  | RS485                  |                                   |
| UART RS232, 422, 485 selection.  |                        |                                   |

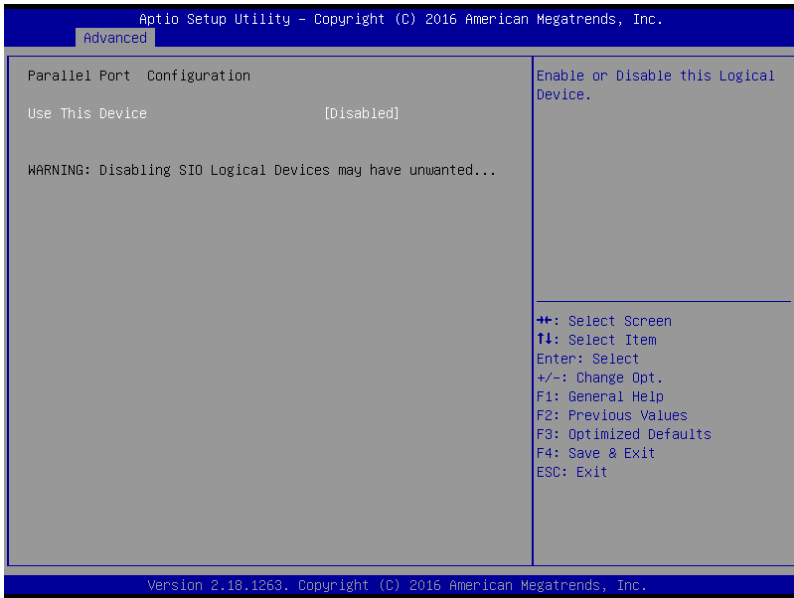
### 3.4.5.4 SIO Configuration: Serial Port 4 Configuration



Options summary:

|  |                        |                                   |
|--|------------------------|-----------------------------------|
| Use This Device  | Disable                |                                   |
|  | Enable                 | Optimal Default, Failsafe Default |
| Enable or Disable this Logical Device.   |                        |                                   |
| Possible:  | Use Automatic Settings | Optimal Default, Failsafe Default |
|  | IO=2E8h; IRQ=10        |                                   |
|  | IO=3E8h; IRQ=10        |                                   |
| Allows user to change Device's Resource settings. New settings will be reflected on This Setup Page after System restarts. |                        |                                   |

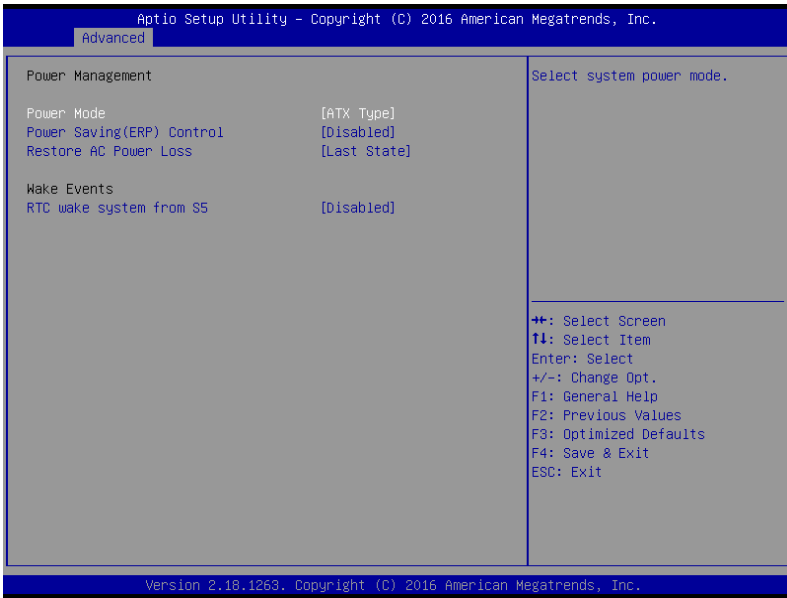
### 3.4.5.5 SIO Configuration: Parallel Port Configuration



Options summary:

|  |         |                                   |
|--|---------|-----------------------------------|
| Use This Device                        | Disable |                                   |
|  | Enable  | Optimal Default, Failsafe Default |
| Enable or Disable this Logical Device. |         |                                   |

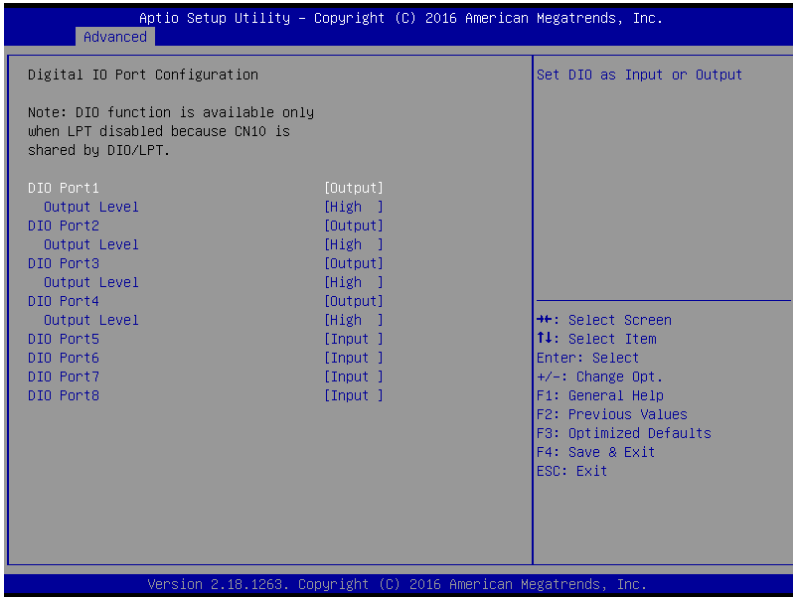
### 3.4.6 Advanced: Power Management



Options summary:

|   |            |                                   |
|---|------------|-----------------------------------|
| Power Mode                                      | ATX Type   | Optimal Default, Failsafe Default |
|   | AT Type    |                                   |
| Select system power mode                        |            |                                   |
| Power Saving(ERP) Control                       | Disabled   | Optimal Default, Failsafe Default |
|   | Enabled    |                                   |
| Configure power mode for power saving function. |            |                                   |
| Restore AC Power Loss                           | Last State | Optimal Default, Failsafe Default |
|   | Always On  |                                   |
|   | Always Off |                                   |
|   |            |                                   |
| RTC wake system from S5                         | Disable    | Optimal Default, Failsafe Default |
|   | Fixed Time |                                   |
| Select system power mode                        |            |                                   |

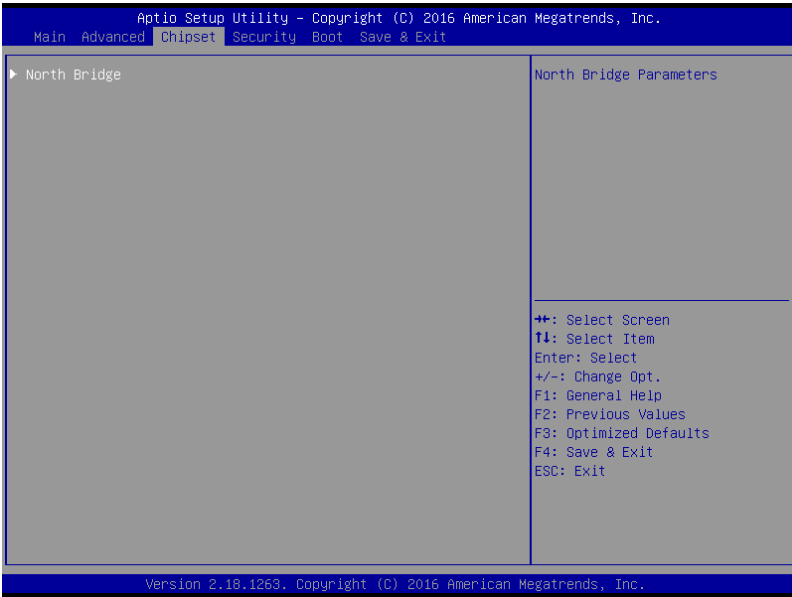
### 3.4.7 Advanced: Digital IO Port Configuration



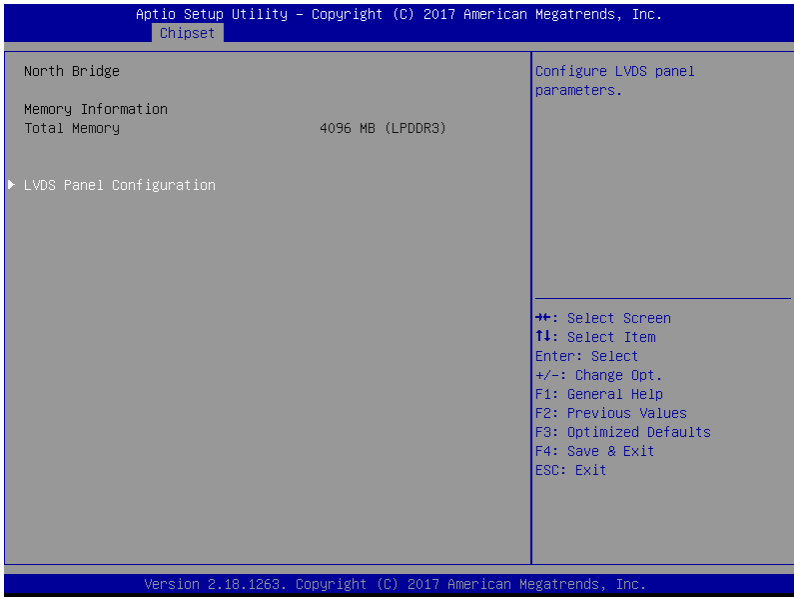
Options summary:

|   |        |                                   |
|---|--------|-----------------------------------|
| DIO Port*                               | Output |                                   |
|   | Input  |                                   |
| Set DIO as Input or Output              |        |                                   |
| Output Level                            | High   | Optimal Default, Failsafe Default |
|   | Low    |                                   |
| Set output level when DIO pin is output |        |                                   |

### 3.5 Setup submenu: Chipset

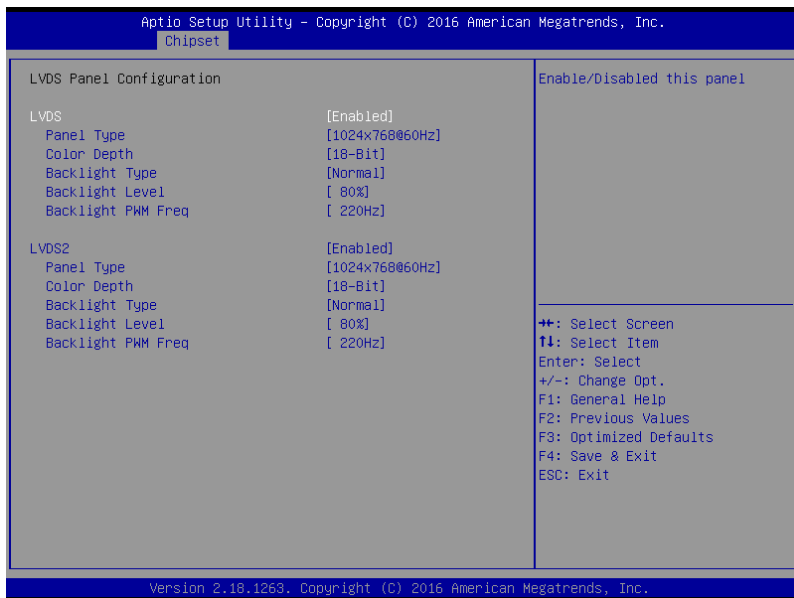


### 3.5.1 Chipset: North Bridge



### 3.5.1.1 North Bridge: LVDS Panel Configuration

\* LVDS2 only available for 2 LVDS SKU



Options summary:

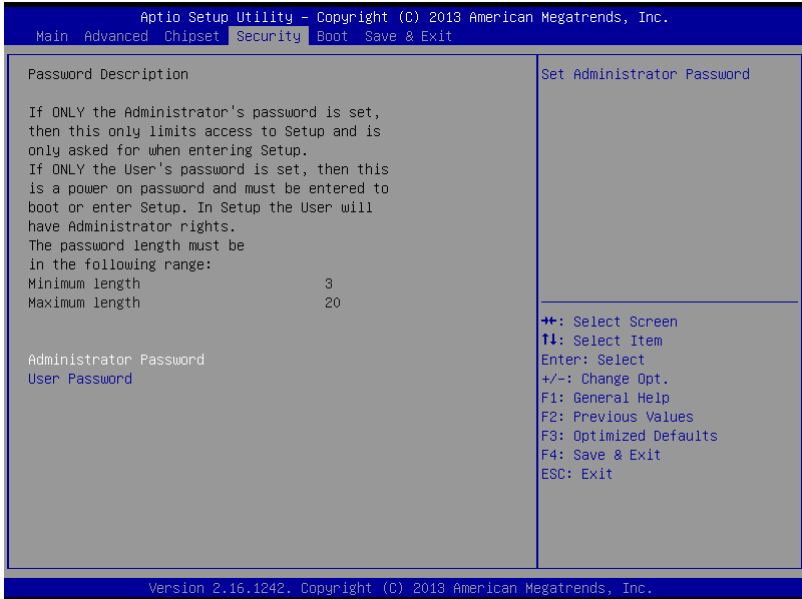
|                             |                |                                   |
|-----------------------------|----------------|-----------------------------------|
| LVDS                        | Disabled       | Optimal Default, Failsafe Default |
|                             | Enabled        |                                   |
| Enable/Disabled this panel. |                |                                   |
| LVDS Panel Type             | 640x480@60Hz   | Optimal Default, Failsafe Default |
|                             | 800x480@60Hz   |                                   |
|                             | 800x600@60Hz   |                                   |
|                             | 1024x600@60Hz  |                                   |
|                             | 1024x768@60Hz  |                                   |
|                             | 1280x768@60Hz  |                                   |
|                             | 1280x800@60Hz  |                                   |
|                             | 1280x1024@60Hz |                                   |
|                             | 1366x768@60Hz  |                                   |
|                             | 1440x900@60Hz  |                                   |
|                             | 1600x1200@60Hz |                                   |
|                             | 1920x1080@60Hz |                                   |
|                             | 1920x1200@60Hz |                                   |



Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.

|  |          |                                   |
|--|----------|-----------------------------------|
| Color Depth                                      | 18-bit   | Optimal Default, Failsafe Default |
|  | 24-bit   |                                   |
|  | 36-bit   |                                   |
|  | 48-bit   |                                   |
| Select panel type                                |          |                                   |
| Backlight Type                                   | Normal   | Optimal Default, Failsafe Default |
|  | Inverted |                                   |
| Select backlight control signal type             |          |                                   |
| Backlight Level                                  | 0%       | Optimal Default, Failsafe Default |
|  | 10%      |                                   |
|  | 20%      |                                   |
|  | 30%      |                                   |
|  | 40%      |                                   |
|  | 50%      |                                   |
|  | 60%      |                                   |
|  | 70%      |                                   |
|  | 80%      |                                   |
|  | 90%      |                                   |
| 100%   |          |                                   |
| Select backlight control level                   |          |                                   |
| Backlight PWM Freq                               | 100Hz    | Optimal Default, Failsafe Default |
|  | 200Hz    |                                   |
|  | 220Hz    |                                   |
|  | 500Hz    |                                   |
|  | 1KHz     |                                   |
|  | 2.2KHz   |                                   |
|  | 6.5KHz   |                                   |
| Select PWM frequency of backlight control signal |          |                                   |

## 3.6 Setup submenu: Security



### Change User/Supervisor Password

You can install a Supervisor password, and if you install a supervisor password, you can then install a user password. A user password does not provide access to many of the features in the Setup utility.

If you highlight these items and press Enter, a dialog box appears which lets you enter a password. You can enter no more than six letters or numbers. Press Enter after you have typed in the password. A second dialog box asks you to retype the password for confirmation. Press Enter after you have retyped it correctly. The password is required at boot time, or when the user enters the Setup utility.

### Removing the Password

Highlight this item and type in the current password. At the next dialog box press Enter to disable password protection.

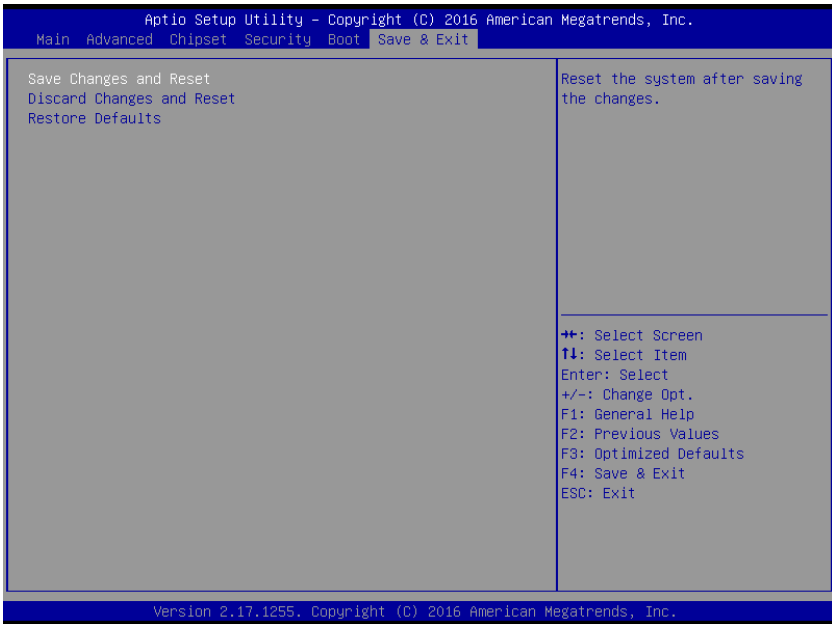
### 3.7 Setup submenu: Boot



Options summary:

|   |          |                                   |
|---|----------|-----------------------------------|
| Quiet Boot  | Disabled | Optimal Default, Failsafe Default |
|   | Enabled  |                                   |
| Enable/Disable showing boot logo.   |          |                                   |
| Monitor Mwait   | Disable  | Optimal Default, Failsafe Default |
|   | Enabled  |                                   |
|   | Auto     |                                   |
| Enable/Disable Monitor Mwait. To install Linux OS, please set this item to disable. |          |                                   |
| Ipv4 PXE Support  | Disabled | Optimal Default, Failsafe Default |
|   | Enabled  |                                   |
| Enable Ipv4 PXE Boot Support. If disabled IPV4 PXE boot option will not be created. |          |                                   |

### 3.8 Setup submenu: Save & Exit



### 3.9 Note for Users

---

1. To Install Linux OS, set the **Monitor Mwait** to Disabled (Boot->Monitor Mwait->[Disabled])

# Chapter 4

---

Drivers Installation

## 4.1 Driver Download/Installation

---

Drivers for the GENE-APL5 can be downloaded from the product page on the AAEON website by following this link:

<https://www.aaeon.com/en/p/embedded-single-board-computers-gene-apl5>

Download the driver(s) you need and follow the steps below to install them.

### Step 1 – Install Chipset Drivers

1. Open the **Step1 - Chipset** folder followed by **SetupChipset.exe**
2. Follow the instructions
3. Drivers will be installed automatically

### Step 2 – Install Graphics Drivers

1. Open the **Step2 - VGA** folder followed by **Setup.exe**
2. Follow the instructions
3. Drivers will be installed automatically

### Step 3 – Install LAN Drivers

1. Click on the **Step3 - LAN** folder and select your OS
2. Open the **.exe** file in the folder
3. Follow the instructions
4. Drivers will be installed automatically

### Step 4 – Install Audio Drivers

1. Open the **Step4 - Audio** folder followed by **0006-64bit\_Win7\_Win8\_Win81\_Win10\_R279.exe**
2. Follow the instructions
3. Drivers will be installed automatically

### Step 5 – Install TXE Driver

1. Open the **Step5 - TXE** folder followed by **SetupTXE.exe**
2. Follow the instructions
3. Drivers will be installed automatically

### Step 6 – Install Touch Driver

1. Open the **Step6 - Touch** folder followed by **Setup.exe**
2. Follow the instructions
3. Drivers will be installed automatically

### Step 7 – Install GPIO Driver

1. Open the **Step6 - GPIO** folder followed by **SetupSerialIO.exe**
2. Follow the instructions
3. Drivers will be installed automatically



# Appendix A

---

## Watchdog Timer Programming

## A.1 Watchdog Timer Registers

| Table 1 : Watch dog relative IO address |               |   |
|---|---------------|---|
|   | Default Value | Note  |
| I/O Base Address                        | 0xA10         | I/O Base address for Watchdog operation.<br>This address is assigned by SIO LDN7, register 0x60-0x61. |

| Table 2 : Watchdog relative register table |        |        |       |  |
|--|--------|--------|-------|--|
| Register                                   | Offset | BitNum | Value | Note   |
| Watchdog WDTRST# Enable                    | 0x00   | 7      | 1     | Enable/Disable time out output via WDTRST#<br>0: Disable<br>1: Enable  |
| Pulse Width                                | 0x05   | 0:1    | 01    | Width of Pulse signal<br>00: 1ms (do not use)<br>01: 25ms<br>10: 125ms<br>11: 5s<br><b>Pulse width is must longer then 16ms.</b> |
| Signal Polarity                            | 0x05   | 2      | 0     | 0: low active<br>1: high active<br><b>Must set this bit to 0</b>   |
| Counting Unit                              | 0x05   | 3      | 0     | Select time unit.<br>0: second<br>1: minute  |
| Output Signal Type                         | 0x05   | 4      | 1     | 0: Level<br>1: Pulse<br><b>Must set this bit to 1</b>  |
| Watchdog Timer Enable                      | 0x05   | 5      | 1     | 0: Disable<br>1: Enable  |
| Timeout Status                             | 0x05   | 6      | 1     | 1: timeout occurred. Write a 1 to clear timeout status   |
| Timer Counter                              | 0x06   |        |       | Time of watchdog timer (0~255)   |

## A.2 Watchdog Sample Program

```
*****
// WDT I/O operation relative definition (Please reference to Table 1)
#define WDTAddr    0x510 // WDT I/O base address
Void  WDTWriteByte(byte Register, byte Value);
byte  WDTReadByte(byte Register);
Void  WDTSetReg(byte Register, byte Bit, byte Val);
// Watch Dog relative definition (Please reference to Table 2)
#define DevReg     0x00 // Device configuration register
    #define WDTRstBit 0x80 // Watchdog WDTRST# (Bit7)
    #define WDTRstVal 0x80 // Enabled WDTRST#
#define TimerReg   0x05 // Timer register
    #define PSWidthBit 0x00 // WDTRST# Pulse width (Bit0:1)
    #define PSWidthVal 0x01 // 25ms for WDTRST# pulse
    #define PolarityBit 0x02 // WDTRST# Signal polarity (Bit2)
    #define PolarityVal 0x00 // Low active for WDTRST#
    #define UnitBit    0x03 // Unit for timer (Bit3)
    #define ModeBit    0x04 // WDTRST# mode (Bit4)
    #define ModeVal    0x01 // 0:level 1: pulse
    #define EnableBit  0x05 // WDT timer enable (Bit5)
    #define EnableVal  0x01 // 1: enable
    #define StatusBit  0x06 // WDT timer status (Bit6)
#define CounterReg 0x06 // Timer counter register
*****

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

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

*****
// Procedure : AaeonWDTEnable
```

```

VOID AaeonWDTEnable (){
    WDTEnableDisable(1);
}

// Procedure : AaeonWDTConfig
VOID AaeonWDTConfig (byte Counter, BOOLEAN Unit){
    // Disable WDT counting
    WDTEnableDisable(0);
    // Clear Watchdog Timeout Status
    WDTClearTimeoutStatus();
    // WDT relative parameter setting
    WDTParameterSetting(Timer, Unit);
}

VOID WDTEnableDisable(byte Value){
    If (Value == 1)
        WDTSetBit(TimerReg, EnableBit, 1);
    else
        WDTSetBit(TimerReg, EnableBit, 0);
}

VOID WDTParameterSetting(byte Counter, BOOLEAN Unit){
    // Watchdog Timer counter setting
    WDTWriteByte(CounterReg, Counter);
    // WDT counting unit setting
    WDTSetBit(TimerReg, UnitBit, Unit);
    // WDT output mode set to pulse
    WDTSetBit(TimerReg, ModeBit, ModeVal);
    // WDT output mode set to active low
    WDTSetBit(TimerReg, PolarityBit, PolarityVal);
    // WDT output pulse width is 25ms
    WDTSetBit(TimerReg, PSWidthBit, PSWidthVal);
    // Watchdog WDTRST# Enable
    WDTSetBit(DevReg, WDTRstBit, WDTRstVal);
}

VOID WDTClearTimeoutStatus(){
    WDTSetBit(TimerReg, StatusBit, 1);
}

*****
*****

```

```
VOID  WDTWriteByte(byte Register, byte Value){
    IOWriteByte(WDTAddr+Register, Value);
}

byte  WDTReadByte(byte Register){
    return IOReadByte(WDTAddr+Register);
}

VOID  WDTSetBit(byte Register, byte Bit, byte Val){
    byte TmpValue;

    TmpValue = WDTReadByte(Register);
    TmpValue &= ~(1 << Bit);
    TmpValue |= Val << Bit;
    WDTWriteByte(Register, TmpValue);
}
```


































```
*****
```




















# Appendix B

---

I/O Information

## B.1 I/O Address Map

| DESKTOP-TGD04TV   |                                       |                                   |
|---|---------------------------------------|-----------------------------------|
| Input/output (IO)   |                                       |                                   |
|    | [0000000000000000 - 000000000000006F] | PCI Express Root Complex          |
|    | [0000000000000020 - 0000000000000021] | Programmable interrupt controller |
|    | [0000000000000024 - 0000000000000025] | Programmable interrupt controller |
|    | [0000000000000028 - 0000000000000029] | Programmable interrupt controller |
|    | [000000000000002C - 000000000000002D] | Programmable interrupt controller |
|    | [000000000000002E - 000000000000002F] | Motherboard resources             |
|    | [0000000000000030 - 0000000000000031] | Programmable interrupt controller |
|    | [0000000000000034 - 0000000000000035] | Programmable interrupt controller |
|    | [0000000000000038 - 0000000000000039] | Programmable interrupt controller |
|    | [000000000000003C - 000000000000003D] | Programmable interrupt controller |
|    | [0000000000000040 - 0000000000000043] | System timer                      |
|    | [000000000000004E - 000000000000004F] | Motherboard resources             |
|    | [0000000000000050 - 0000000000000053] | System timer                      |
|    | [0000000000000060 - 0000000000000060] | Standard PS/2 Keyboard            |
|    | [0000000000000061 - 0000000000000061] | Motherboard resources             |
|    | [0000000000000063 - 0000000000000063] | Motherboard resources             |
|    | [0000000000000064 - 0000000000000064] | Standard PS/2 Keyboard            |
|    | [0000000000000065 - 0000000000000065] | Motherboard resources             |
|    | [0000000000000067 - 0000000000000067] | Motherboard resources             |
|    | [0000000000000070 - 0000000000000070] | Motherboard resources             |
|    | [0000000000000070 - 0000000000000077] | System CMOS/real time clock       |
|    | [0000000000000078 - 000000000000CF7]  | PCI Express Root Complex          |
|    | [0000000000000080 - 000000000000008F] | Motherboard resources             |
|    | [0000000000000092 - 0000000000000092] | Motherboard resources             |
|  | [00000000000000A0 - 00000000000000A1] | Programmable interrupt controller |
|  | [00000000000000A4 - 00000000000000A5] | Programmable interrupt controller |
|  | [00000000000000A8 - 00000000000000A9] | Programmable interrupt controller |
|  | [00000000000000AC - 00000000000000AD] | Programmable interrupt controller |
|  | [00000000000000B0 - 00000000000000B1] | Programmable interrupt controller |
|  | [00000000000000B2 - 00000000000000B3] | Motherboard resources             |
|  | [00000000000000B4 - 00000000000000B5] | Programmable interrupt controller |
|  | [00000000000000B8 - 00000000000000B9] | Programmable interrupt controller |
|  | [00000000000000BC - 00000000000000BD] | Programmable interrupt controller |


































|   |                                       |   |
|---|---------------------------------------|---|
|  | [00000000000002E8 - 0000000000002EF]  | Communications Port (COM4)  |
|  | [0000000000002F8 - 0000000000002FF]   | Communications Port (COM2)  |
|  | [0000000000003E8 - 0000000000003EF]   | Communications Port (COM3)  |
|  | [0000000000003F8 - 0000000000003FF]   | Communications Port (COM1)  |
|  | [000000000000400 - 00000000000047F]   | Motherboard resources   |
|  | [0000000000004D0 - 0000000000004D1]   | Programmable interrupt controller                                     |
|  | [000000000000500 - 0000000000005FE]   | Motherboard resources   |
|  | [000000000000680 - 00000000000069F]   | Motherboard resources   |
|  | [000000000000A00 - 000000000000A0F]   | Motherboard resources   |
|  | [000000000000A10 - 000000000000A1F]   | Motherboard resources   |
|  | [000000000000A20 - 000000000000A2F]   | Motherboard resources   |
|  | [000000000000D00 - 000000000000FFF]   | PCI Express Root Complex  |
|  | [000000000000D000 - 000000000000DFFF] | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9 |
|  | [000000000000E000 - 000000000000EFFF] | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8 |
|  | [000000000000F000 - 000000000000F03F] | Intel(R) HD Graphics  |
|  | [000000000000F040 - 000000000000F05F] | Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4                 |
|  | [000000000000F060 - 000000000000F07F] | Standard SATA AHCI Controller   |
|  | [000000000000F080 - 000000000000F083] | Standard SATA AHCI Controller   |
|  | [000000000000F090 - 000000000000F097] | Standard SATA AHCI Controller   |





































## B.2 Memory Address Map

| Address Range                           | Device Name   |
|---|---|
| [0000000000A0000 - 0000000000BFFFFF]    | PCI Express Root Complex  |
| [0000000000C0000 - 0000000000DFFFFF]    | PCI Express Root Complex  |
| [0000000000E0000 - 0000000000FFFFFF]    | PCI Express Root Complex  |
| [000000007B800001 - 000000007BFFFFFF]   | PCI Express Root Complex  |
| [000000007C000001 - 000000007CFFFFFF]   | PCI Express Root Complex  |
| [0000000080000000 - 000000008FFFFFFF]   | Intel(R) HD Graphics  |
| [0000000080000000 - 00000000CFFFFFFF]   | PCI Express Root Complex  |
| [0000000090000000 - 000000009FFFFFFF]   | Intel(R) HD Graphics  |
| [0000000091000000 - 0000000091FFFFFF]   | High Definition Audio Controller                                      |
| [0000000091100000 - 000000009111FFFFF]  | Intel(R) I211 Gigabit Network Connection                              |
| [0000000091100000 - 000000009111FFFFF]  | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9 |
| [0000000091120000 - 0000000091123FFF]   | Intel(R) I211 Gigabit Network Connection                              |
| [0000000091200000 - 000000009121FFFFF]  | Intel(R) I211 Gigabit Network Connection #2                           |
| [0000000091200000 - 000000009122FFFFF]  | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8 |
| [0000000091220000 - 0000000091223FFF]   | Intel(R) I211 Gigabit Network Connection #2                           |
| [0000000091300000 - 000000009130FFFFF]  | Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)         |
| [0000000091310000 - 0000000091313FFF]   | High Definition Audio Controller                                      |
| [0000000091314000 - 0000000091315FFF]   | Standard SATA AHCI Controller   |
| [0000000091318000 - 00000000913180FFF]  | Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4                 |
| [0000000091319000 - 00000000913197FFF]  | Standard SATA AHCI Controller   |
| [000000009131A000 - 000000009131A0FFF]  | Standard SATA AHCI Controller   |
| [000000009131E000 - 000000009131EFFF]   | Intel(R) Trusted Execution Engine Interface                           |
| [00000000D0C00000 - 00000000D0C00653]   | Intel(R) Serial IO GPIO Host Controller - INT3452                     |
| [00000000D0C40000 - 00000000D0C40763]   | Intel(R) Serial IO GPIO Host Controller - INT3452                     |
| [00000000D0C50000 - 00000000D0C5076B]   | Intel(R) Serial IO GPIO Host Controller - INT3452                     |
| [00000000D0C70000 - 00000000D0C70673]   | Intel(R) Serial IO GPIO Host Controller - INT3452                     |
| [00000000E0000000 - 00000000EFFFFFFF]   | Motherboard resources   |
| [00000000E0000000 - 00000000EFFFFFFF]   | PCI Express Root Complex  |
| [00000000FEA00000 - 00000000FEAFFFFFFF] | Motherboard resources   |
| [00000000FED00000 - 00000000FED003FFF]  | High precision event timer  |
| [00000000FED01000 - 00000000FED01FFFF]  | Motherboard resources   |
| [00000000FED03000 - 00000000FED03FFFF]  | Motherboard resources   |
| [00000000FED06000 - 00000000FED06FFFF]  | Motherboard resources   |
| [00000000FED08000 - 00000000FED09FFFF]  | Motherboard resources   |
| [00000000FED1C000 - 00000000FED1CFFFF]  | Motherboard resources   |
| [00000000FED40000 - 00000000FED44FFFF]  | Trusted Platform Module 2.0   |
| [00000000FED80000 - 00000000FEDBFFFFF]  | Motherboard resources   |
| [00000000FEE00000 - 00000000FEEFFFFFFF] | Motherboard resources   |



































## B.3 IRQ Mapping Chart

| Interrupt request (IRQ)   |                       |   |
|---|-----------------------|---|
|    | (ISA) 0x00000000 (00) | System timer                                      |
|    | (ISA) 0x00000001 (01) | Standard PS/2 Keyboard                            |
|    | (ISA) 0x00000003 (03) | Communications Port (COM2)                        |
|    | (ISA) 0x00000004 (04) | Communications Port (COM1)                        |
|    | (ISA) 0x00000008 (08) | High precision event timer                        |
|    | (ISA) 0x0000000A (10) | Communications Port (COM4)                        |
|    | (ISA) 0x0000000B (11) | Communications Port (COM3)                        |
|    | (ISA) 0x0000000C (12) | PS/2 Compatible Mouse                             |
|    | (ISA) 0x0000000E (14) | Intel(R) Serial IO GPIO Host Controller - INT3452 |
|    | (ISA) 0x0000000E (14) | Intel(R) Serial IO GPIO Host Controller - INT3452 |
|    | (ISA) 0x0000000E (14) | Intel(R) Serial IO GPIO Host Controller - INT3452 |
|    | (ISA) 0x0000000E (14) | Intel(R) Serial IO GPIO Host Controller - INT3452 |
|    | (ISA) 0x00000036 (54) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x00000037 (55) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x00000038 (56) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x00000039 (57) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x0000003A (58) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x0000003B (59) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x0000003C (60) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x0000003D (61) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x0000003E (62) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x0000003F (63) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x00000040 (64) | Microsoft ACPI-Compliant System                   |
|    | (ISA) 0x00000041 (65) | Microsoft ACPI-Compliant System                   |
|   | (ISA) 0x00000042 (66) | Microsoft ACPI-Compliant System                   |
|  | (ISA) 0x00000043 (67) | Microsoft ACPI-Compliant System                   |
|  | (ISA) 0x00000044 (68) | Microsoft ACPI-Compliant System                   |
|  | (ISA) 0x00000045 (69) | Microsoft ACPI-Compliant System                   |
|  | (ISA) 0x00000046 (70) | Microsoft ACPI-Compliant System                   |
|  | (ISA) 0x00000047 (71) | Microsoft ACPI-Compliant System                   |
|  | (ISA) 0x00000048 (72) | Microsoft ACPI-Compliant System                   |
|  | (ISA) 0x00000049 (73) | Microsoft ACPI-Compliant System                   |
|  | (ISA) 0x0000004A (74) | Microsoft ACPI-Compliant System                   |



































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|  |                        |                                 |
|--|------------------------|---------------------------------|
|   | (ISA) 0x0000004A (74)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000004B (75)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000004C (76)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000004D (77)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000004E (78)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000004F (79)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000050 (80)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000051 (81)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000052 (82)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000053 (83)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000054 (84)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000055 (85)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000056 (86)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000057 (87)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000058 (88)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000059 (89)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005A (90)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005B (91)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005C (92)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005D (93)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005E (94)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005F (95)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000060 (96)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000061 (97)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000062 (98)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000063 (99)  | 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 |

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|  |                        |                                 |
|--|------------------------|---------------------------------|
|   | (ISA) 0x0000004A (74)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000004B (75)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000004C (76)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000004D (77)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000004E (78)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000004F (79)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000050 (80)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000051 (81)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000052 (82)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000053 (83)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000054 (84)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000055 (85)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000056 (86)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000057 (87)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000058 (88)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000059 (89)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005A (90)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005B (91)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005C (92)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005D (93)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005E (94)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x0000005F (95)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000060 (96)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000061 (97)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000062 (98)  | Microsoft ACPI-Compliant System |
|   | (ISA) 0x00000063 (99)  | 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 |

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|   |                        |                                 |
|---|------------------------|---------------------------------|
|    | (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) 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                                       |
|    | (ISA) 0x000001FD (509) | Microsoft ACPI-Compliant System                                       |
|    | (ISA) 0x000001FE (510) | Microsoft ACPI-Compliant System                                       |
|    | (ISA) 0x000001FF (511) | Microsoft ACPI-Compliant System                                       |
|    | (PCI) 0x00000019 (25)  | High Definition Audio Controller                                      |
|    | (PCI) 0xFFFFFED (-19)  | Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)         |
|    | (PCI) 0xFFFFFEE (-18)  | Intel(R) I211 Gigabit Network Connection                              |
|    | (PCI) 0xFFFFFEF (-17)  | Intel(R) I211 Gigabit Network Connection                              |
|    | (PCI) 0xFFFFFFF0 (-16) | Intel(R) I211 Gigabit Network Connection                              |
|    | (PCI) 0xFFFFFFF1 (-15) | Intel(R) I211 Gigabit Network Connection                              |
|    | (PCI) 0xFFFFFFF2 (-14) | Intel(R) I211 Gigabit Network Connection                              |
|    | (PCI) 0xFFFFFFF3 (-13) | Intel(R) I211 Gigabit Network Connection                              |
|    | (PCI) 0xFFFFFFF4 (-12) | Intel(R) I211 Gigabit Network Connection #2                           |
|    | (PCI) 0xFFFFFFF5 (-11) | Intel(R) I211 Gigabit Network Connection #2                           |
|    | (PCI) 0xFFFFFFF6 (-10) | Intel(R) I211 Gigabit Network Connection #2                           |
|    | (PCI) 0xFFFFFFF7 (-9)  | Intel(R) I211 Gigabit Network Connection #2                           |
|    | (PCI) 0xFFFFFFF8 (-8)  | Intel(R) I211 Gigabit Network Connection #2                           |
|    | (PCI) 0xFFFFFFF9 (-7)  | Intel(R) I211 Gigabit Network Connection #2                           |
|    | (PCI) 0xFFFFFFFA (-6)  | Intel(R) Trusted Execution Engine Interface                           |
|    | (PCI) 0xFFFFFFFB (-5)  | Intel(R) HD Graphics  |
|    | (PCI) 0xFFFFFFF4 (-4)  | Standard SATA AHCI Controller   |
|   | (PCI) 0xFFFFFFF3 (-3)  | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9 |
|  | (PCI) 0xFFFFFFF2 (-2)  | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8 |

# Appendix C

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Mating Connectors

## C.1 List of Mating Connectors and Cables

The table notes mating connectors and available cables.

| Connector Label | Function                              | Mating Connector |                 | Available Cable           | Cable P/N  |
|-----------------|---------------------------------------|------------------|-----------------|---------------------------|------------|
|                 |                                       | Vendor           | Model no        |                           |            |
| CN1             | External AUX Power and PS_ON#         | JST              | PHR-6           | N/A                       | N/A        |
| CN2             | LVDS Port1 Inverter Connector         | JST              | PHR-5           | N/A                       | N/A        |
| CN3             | +5Vout Connector                      | JST              | PHR-2           | 2 Pins For SATA HDD Power | 1702150155 |
| CN4             | SATA Connector                        | Molex            | 887505318       | SATA Cable                | 1709070500 |
| CN5             | Power Input Connector                 | Molex            | 19211-0003      | Power Cable               | 170204010R |
| CN6             | External +5VSB Power Input and PS_ON# | JST              | XHP-3           | ATX Cable                 | 170220020B |
| CN7             | Audio Connector                       | Molex            | 51021-1000      | Audio Cable               | 1709100254 |
| CN8             | LVDS Port1                            | HIROSE           | DF13-30DS-1.25C | N/A                       | N/A        |



|      |                                    |       |             |                        |            |
|------|------------------------------------|-------|-------------|------------------------|------------|
|      | Connector                          |       |             |                        |            |
| CN9  | COM Port<br>#2<br>Connector        | Molex | 51021-0900  | Serial Port<br>Cable   | 1701090150 |
| CN10 | LPT or<br>Digital I/O<br>Connector | Molex | 51110-2650  | Parallel Port<br>Cable | 1701260200 |
| CN11 | LPC<br>Connector                   | JST   | SHR-12V-S-B | AAEON LPC<br>Cable     | 1703120130 |
| CN12 | COM Port<br>#3<br>Connector        | Molex | 51021-0900  | Serial Port<br>Cable   | 1701090150 |
| CN14 | COM Port<br>#4<br>Connector        | Molex | 51021-0900  | Serial Port<br>Cable   | 1701090150 |
| CN15 | PS/2 KB/MS<br>Connector            | JST   | PHDR-06VS   | PS/2 KB/MS<br>Cable    | 1700060152 |
| CN16 | USB Port<br>#2<br>Connector        | Molex | 51021-0500  | USB Cable              | 1700050207 |
| CN17 | USB Port<br>#3<br>Connector        | Molex | 51021-0500  | USB Cable              | 1700050207 |
| CN19 | USB Port<br>#4<br>Connector        | Molex | 51021-0500  | USB Cable              | 1700050207 |
| CN20 | USB Port                           | Molex | 51021-0500  | USB Cable              | 1700050207 |

|      |                                     |        |                 |                  |            |
|------|-------------------------------------|--------|-----------------|------------------|------------|
|      | #5<br>Connector                     |        |                 |                  |            |
| CN21 | LVDS Port2<br>Connector             | HIROSE | DF13-30DS-1.25C | N/A              | N/A        |
| CN22 | Touch<br>Screen<br>Connector        | JST    | SHR-9V-S-B      | N/A              | N/A        |
| CN23 | CPU Fan<br>Connector                | Molex  | 22-01-2035      | N/A              | N/A        |
| CN24 | LVDS Port1<br>Inverter<br>Connector | JST    | PHR-5           | N/A              | N/A        |
| CN30 | External<br>RTC<br>Connector        | Molex  | 51021-0200      | Battery<br>Cable | 175011301C |

# Appendix D

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Electrical Specifications for I/O Ports

## D.1 Electrical Specifications for I/O Ports

| Connector Label | Signal name      | Rate output                | I/O                                       |
|-----------------|------------------|----------------------------|---|
| CN2             | +5V/+12V         | +5V/1.5A or<br>+12V/1.5A   | LVDS Port1 Inverter / Backlight Connector |
| CN3             | +5V              | +5V/1A                     | +5V Output for SATA HDD                   |
| CN8             | +3.3V/+5V        | +3.3V/2A or<br>+5V/2A      | LVDS Port1                                |
| CN9             | +5V/+12V         | +5V/1A or<br>+12V/1A       | COM Port 2                                |
| CN10            | +5V              | +5V/1A                     | Digital IO Port                           |
| CN12            | +5V/+12V         | +5V/1A or<br>+12V/1A       | COM Port 3                                |
| CN16            | +5VSB            | +5V/0.5A                   | USB 2.0 Ports 2                           |
| CN17            | +5VSB            | +5V/0.5A                   | USB 2.0 Ports 3                           |
| CN19            | +5VSB            | +5V/0.5A                   | USB 2.0 Ports 4                           |
| CN20            | +5VSB            | +5V/0.5A                   | USB 2.0 Ports 5                           |
| CN21            | +3.3V/+5V        | +3.3V/2A or<br>+5V/2A      | LVDS Port2                                |
| CN23            | +12V             | +12V/0.5A                  | CPU FAN                                   |
| CN24            | +5V/+12V         | +5V/1.5A or<br>+12V/1.5A   | LVDS Port2 Inverter / Backlight Connector |
| CN25            | +5VSB            | +5V/1A (per channel)       | USB Ports 0 and 1                         |
| CN34            | +3.3V            | +3.3V/1A                   | mSATA (Full-Mini Card)                    |
| CN33            | +3.3VSB<br>+1.5V | +3.3V/1.1A<br>+1.5V/0.375A | Mini-Card Slot (Half-Mini Card)           |

# Appendix E

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Digital I/O Ports

## E.1 Digital I/O Register

### 7.1.2 Logic Device Number Register (LDN) — Index 07h

| Bit | Name | R/W | Reset   | Default | Description   |
|-----|------|-----|---------|---------|---|
| 7-0 | LDN  | R/W | LRESET# | 00h     | 00h: Select FDC device configuration registers.<br>03h: Select Parallel Port device configuration registers.<br>04h: Select Hardware Monitor device configuration registers.<br>05h: Select KBC device configuration registers.<br>06h: Select GPIO device configuration registers.<br>07h: Select WDT device configuration registers.<br>0Ah: Select PME, ACPI and ERP device configuration registers.<br>10h: Select UART1 device configuration registers.<br>11h: Select UART2 device configuration registers.<br>12h: Select UART3 device configuration registers.<br>13h: Select UART4 device configuration registers.<br>14h: Select UART5 device configuration registers.<br>15h: Select UART6 device configuration registers.<br>Otherwise: Reserved. |

### GPIO8 Output Enable Register — Index 88h

| Bit | Name      | R/W | Reset   | Default | Description   |
|-----|-----------|-----|---------|---------|---|
| 7   | GPIO87_OE | R/W | LRESET# | 0       | 0: GPIO87 is in input mode.<br>1: GPIO87 is in output mode. |
| 6   | GPIO86_OE | R/W | LRESET# | 0       | 0: GPIO86 is in input mode.<br>1: GPIO85 is in output mode. |
| 5   | GPIO85_OE | R/W | LRESET# | 0       | 0: GPIO85 is in input mode.<br>1: GPIO85 is in output mode. |
| 4   | GPIO84_OE | R/W | LRESET# | 0       | 0: GPIO84 is in input mode.<br>1: GPIO84 is in output mode. |
| 3   | GPIO83_OE | R/W | LRESET# | 0       | 0: GPIO83 is in input mode.<br>1: GPIO83 is in output mode. |
| 2   | GPIO82_OE | R/W | LRESET# | 0       | 0: GPIO82 is in input mode.<br>1: GPIO82 is in output mode. |
| 1   | GPIO81_OE | R/W | LRESET# | 0       | 0: GPIO81 is in input mode.<br>1: GPIO81 is in output mode. |
| 0   | GPIO80_OE | R/W | LRESET# | 0       | 0: GPIO80 is in input mode.<br>1: GPIO80 is in output mode. |

**GPIO8 Output Data Register — Index 89h (This byte could be also written by base address + 2)**

| Bit | Name       | R/W | Reset   | Default | Description  |
|-----|------------|-----|---------|---------|--|
| 7   | GPIO87_VAL | R/W | LRESET# | 1       | 0: GPIO87 outputs 0 when in output mode.<br>1: GPIO87 outputs 1 when in output mode. |
| 6   | GPIO86_VAL | R/W | LRESET# | 1       | 0: GPIO86 outputs 0 when in output mode.<br>1: GPIO86 outputs 1 when in output mode. |
| 5   | GPIO85_VAL | R/W | LRESET# | 1       | 0: GPIO85 outputs 0 when in output mode.<br>1: GPIO85 outputs 1 when in output mode. |
| 4   | GPIO84_VAL | R/W | LRESET# | 1       | 0: GPIO84 outputs 0 when in output mode.<br>1: GPIO84 outputs 1 when in output mode. |
| 3   | GPIO83_VAL | R/W | LRESET# | 1       | 0: GPIO83 outputs 0 when in output mode.<br>1: GPIO83 outputs 1 when in output mode. |
| 2   | GPIO82_VAL | R/W | LRESET# | 1       | 0: GPIO82 outputs 0 when in output mode.<br>1: GPIO82 outputs 1 when in output mode. |
| 1   | GPIO81_VAL | R/W | LRESET# | 1       | 0: GPIO81 outputs 0 when in output mode.<br>1: GPIO81 outputs 1 when in output mode. |
| 0   | GPIO80_VAL | R/W | LRESET# | 1       | 0: GPIO80 outputs 0 when in output mode.<br>1: GPIO80 outputs 1 when in output mode. |

**GPIO8 Pin Status Register — Index 8Ah (This byte could be also read by base address + 2)**

| Bit | Name      | R/W | Reset | Default | Description                   |
|-----|-----------|-----|-------|---------|-------------------------------|
| 7   | GPIO87_IN | R   | -     | -       | The pin status of GPIO87/PD7. |
| 6   | GPIO86_IN | R   | -     | -       | The pin status of GPIO86/PD6. |
| 5   | GPIO85_IN | R   | -     | -       | The pin status of GPIO85/PD5. |
| 4   | GPIO84_IN | R   | -     | -       | The pin status of GPIO84/PD4. |
| 3   | GPIO83_IN | R   | -     | -       | The pin status of GPIO83/PD3. |
| 2   | GPIO82_IN | R   | -     | -       | The pin status of GPIO82/PD2. |
| 1   | GPIO81_IN | R   | -     | -       | The pin status of GPIO81/PD1. |
| 0   | GPIO80_IN | R   | -     | -       | The pin status of GPIO80/PD0. |

## E.2 Digital I/O Sample Code (4 in 4 out, 2 low 2 high)

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```
Outputb(0x2E,0x87); //enter configuration
Outputb(0x2E,0x87);

Outputb(0x2E,0x07); //set LDN
Outputb(0x2F,0x06);

Outputb(0x2E,0xA0); //GPIO set 5 register
Outputb(0x2F,0xF0);

Outputb(0x2E,0xA1); //GPIO output data register
Outputb(0x2F,0x30);

Outputb(0x2E,0xAA); //exit configuration
```