

# USER'S MANUAL

## **MANO321 Series**

**Intel® Celeron Processor J6412  
Mini ITX Motherboard**

**User's Manual**



[www.axiomtek.com](http://www.axiomtek.com)

## **Disclaimers**

This manual has been carefully checked and believed to contain accurate information. Axiomtek Co., Ltd. assumes no responsibility for any infringements of patents or any third party's rights, and any liability arising from such use.

Axiomtek does not warrant or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information in this document. Axiomtek does not make any commitment to update the information in this manual.

Axiomtek reserves the right to change or revise this document and/or product at any time without notice.

No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of Axiomtek Co., Ltd.

## **CAUTION**

If you replace wrong batteries, it causes the danger of explosion. It is recommended by the manufacturer that you follow the manufacturer's instructions to only replace the same or equivalent type of battery and dispose of used ones.

**©Copyright 2023 Axiomtek Co., Ltd.**

**All Rights Reserved**

**June 2023, Version A4**

**Printed in Taiwan**

## ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.
- Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components.

## Trademarks Acknowledgments

Axiomtek is a trademark of Axiomtek Co., Ltd.

Intel® and Celeron® are trademarks of Intel Corporation.

Windows® is a trademark of Microsoft Corporation.

AMI is a trademark of American Megatrend Inc.

IBM, PC/AT, PS/2, VGA are trademarks of International Business Machines Corporation.

Other brand names and trademarks are the properties and registered brands of their respective owners.

# Table of Contents

---

|   |          |
|---|----------|
| Disclaimers .....                                     | ii       |
| ESD Precautions.....                                  | iii      |
| <b>Section 1 Introduction.....</b>                    | <b>1</b> |
| 1.1 Features.....                                     | 1        |
| 1.2 Specifications.....                               | 2        |
| 1.3 Utilities Supported .....                         | 3        |
| 1.4 Block Diagram.....                                | 4        |
| <b>Section 2 Board and Pin Assignments.....</b>       | <b>5</b> |
| 2.1 Board Layout.....                                 | 5        |
| 2.2 Rear I/O.....                                     | 7        |
| 2.3 Jumper Settings .....                             | 8        |
| 2.3.1 COM1 Data/Power Select (JP1) .....              | 9        |
| 2.3.2 COM2 ~ COM6 Data/Power Select (JP2 ~ JP6) ..... | 9        |
| 2.3.3 LVDS VDD Select (JP11) .....                    | 9        |
| 2.3.4 Clear CMOS (JP12) .....                         | 10       |
| 2.3.5 AT/ATX Power Mode Select (JP13) .....           | 10       |
| 2.4 Connectors.....                                   | 11       |
| 2.4.1 COM1 D-Sub Connector (CN1) .....                | 12       |
| 2.4.2 COM Headers (CN2~CN6) .....                     | 12       |
| 2.4.3 Front Panel Header (CN10) .....                 | 13       |
| 2.4.4 Digital IO Header (CN11) .....                  | 13       |
| 2.4.5 SPI Header (CN12).....                          | 14       |
| 2.4.6 VGA Header (CN14) .....                         | 14       |
| 2.4.7 SATA 3.0 Connectors (CN15).....                 | 14       |
| 2.4.8 PCI-Express x4 Slot (CN16) .....                | 15       |
| 2.4.9 Ethernet Ports (CN17 and CN18) .....            | 16       |
| 2.4.10 Audio Jack (CN19) .....                        | 17       |
| 2.4.11 PCI-Express Mini Card Connector (CN20) .....   | 17       |
| 2.4.12 USB3.2 Gen1 Stack Ports (CN21 and CN22).....   | 18       |
| 2.4.13 HDMI Connector (CN23).....                     | 18       |
| 2.4.14 USB 2.0 Headers (CN24 and CN25) .....          | 18       |
| 2.4.15 ATX Power Input Connector (CN26).....          | 19       |
| 2.4.16 I2C Connector (CN27) .....                     | 19       |
| 2.4.17 SMBus Connectors (CN28).....                   | 19       |
| 2.4.18 LVDS Signal Connector (CN29).....              | 20       |
| 2.4.19 eDP Connector (CN50) .....                     | 21       |
| 2.4.20 SATA Power Connector (CN51) .....              | 22       |
| 2.4.21 Audio Header (CN52).....                       | 22       |

|        |  |    |
|--------|--|----|
| 2.4.22 | LVDS Backlight Control Header (CN55) ..... | 22 |
| 2.4.23 | DC Jack Power Connector (DCJACK1).....     | 22 |
| 2.4.24 | CMOS Battery Connector (BAT1) .....        | 23 |
| 2.4.25 | SIM Card Slot (SCN1).....                  | 23 |
| 2.4.26 | M.2 Key B Connector (SCN2).....            | 24 |

### **Section 3 AMI BIOS Setup Utility ..... 25**

|     |                       |    |
|-----|-----------------------|----|
| 3.1 | Starting.....         | 25 |
| 3.2 | Navigation Keys ..... | 25 |
| 3.3 | Main Menu .....       | 27 |
| 3.4 | Advanced Menu .....   | 28 |
| 3.5 | Chipset Menu .....    | 42 |
| 3.6 | Security Menu .....   | 50 |
| 3.7 | Boot Menu.....        | 51 |
| 3.8 | Save & Exit Menu..... | 52 |

### **Appendix A Watchdog Timer..... 53**

|     |                            |    |
|-----|----------------------------|----|
| A.1 | About Watchdog Timer ..... | 53 |
| A.2 | Sample Program .....       | 53 |

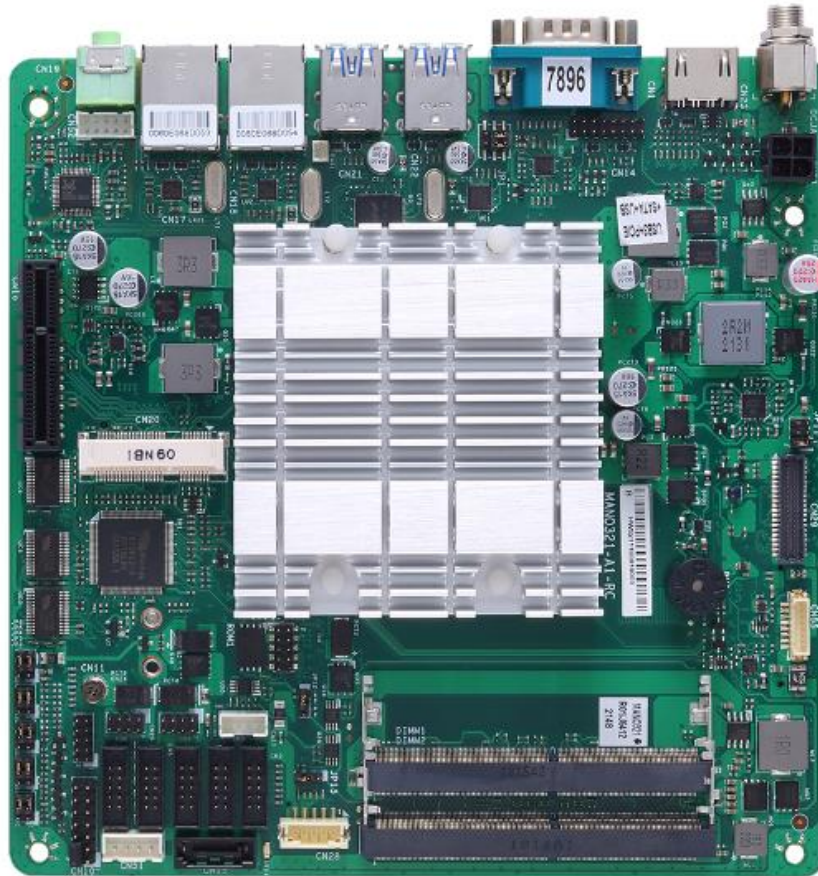
### **Appendix B Digital I/O ..... 55**

|     |                         |    |
|-----|-------------------------|----|
| B.1 | About Digital I/O ..... | 55 |
| B.2 | Sample Program .....    | 55 |

**This page is intentionally left blank.**

# Section 1

## Introduction



The MANO321 Mini-ITX motherboard supports the Intel® Celeron Processor J6412. With two DDR4 3200MHz memory support, this motherboard is built to perform best stability and reliability for industrial applications.

It comes with one SATA 3.0, four USB 3.2 GEN1, two USB 2.0 and six serial ports (two RS-232/422/485, four RS-232) providing robust storage and I/O options. Users also can increase board functionality with PCI-Express x4 (With PCIe1 \ x2 signal) and full type PCI-Express Mini Card slot. The high quality MANO321 allows four display interfaces via VGA, HDMI, LVDS and eDP in quadruplicate views, making it an ideal solution for gaming, workstation, digital signage, medical and other IoT&M2M applications.

### 1.1 Features

- Intel Celeron® J6412 Processor (Elkhart Lake)
- 2 DDR4 3200MHz memory with maximum capacity up to 32 GB
- 1 M.2 Key B type 2242/3042/3052
- 1 full type PCI Express mini card
- 4 USB 3.2 Gen 1 and 2 USB 2.0
- 1 SATA-600

## 1.2 Specifications

- **CPU**
  - Intel® Elkhart Lake for Intel Celeron® J6412 Processor (TDP:10W).
- **BIOS**
  - AMI BIOS via SPI interface.
- **System Memory**
  - Two 260-pin SO-DIMM sockets.
  - Maximum up to 32GB DDR4 memory.
  - Support 3200MHz.
- **Onboard Multi I/O**
  - Six serial ports:
    - COM1~COM2 supports RS-232/422/485; COM3~COM6 supports RS-232 only.
    - COM1 on the rear I/O; COM2~COM6 in box headers.
- **USB Interface**
  - Four USB 3.2 Gen 1 ports (on the rear I/O).
  - Two USB 2.0 in 2x4-pin header (internal).
- **Ethernet**
  - LAN1 & LAN2: 1000/100/10Mbps Gigabit/Fast Ethernet supports Wake-on-LAN, PXE with RTL8111H.
- **Serial ATA**
  - One SATA 3.0 port (6Gb/s).
- **Audio**
  - Realtek Codec ALC897.
  - Support Line-out (on the rear I/O).
  - Support Line-in/MIC-in/Line-out/Speaker in box header (internal).
- **Display**
  - Intel® Integrated Graphics:
    - One HDMI connector. Resolution max. up to 4096x2160 @24Hz.
    - One VGA header. Resolution max. up to 1920x1200
    - One 18/24-bit dual channel LVDS and one 8-pin inverter connector. LVDS resolution is max. up to 1920x1200.
    - One Embedded DisplayPort (eDP) with resolution max. up to 4096x2304 @60Hz; co-layout with LVDS (optional).
- **Expansion Interface**
  - One PCI-Express Mini Card (Support PCIe & USB signal).
  - One PCI-Express x4 slot (Only support PCIe x1 & x2 signal).
  - One SIM card slot co-lay with MiniPCIe and M.2 Key B socket (Default is M.2 Key B, by BOM option).
  - One M.2 Key B type 2242/3042/3052 includes PCIe x2, PCIe + SATA3.0, PCIe + USB 3.2 GEN1 interfaces by BOM option, Default is PCIe + SATA3.0. It also supports NVME function.



- **Power Input**
  - One 12V ATX 4-pin power input connector.
  - One 9~20V DC jack power input connector.
- **Operating Temperature**
  - 0°C ~ 60°C.
- **Storage Temperature**
  - -40°C ~ 85°C.
- **Form Factor**
  - Mini ITX (6.7" x 6.7", 17.0cm x 17.0cm).



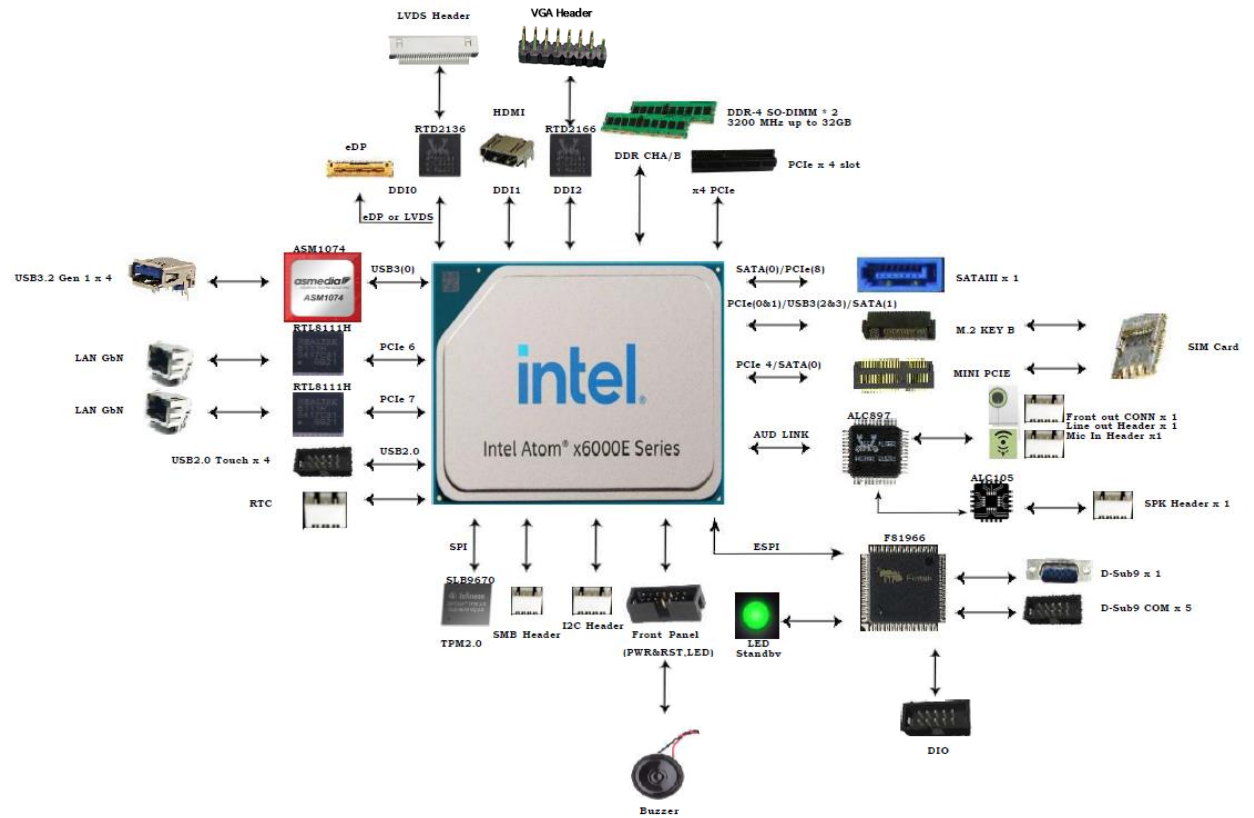
*All specifications and images are subject to change without notice.*

**Note**

### 1.3 Utilities Supported

- Chipset driver
- Graphics driver
- Intel ME driver
- Ethernet driver
- Audio driver

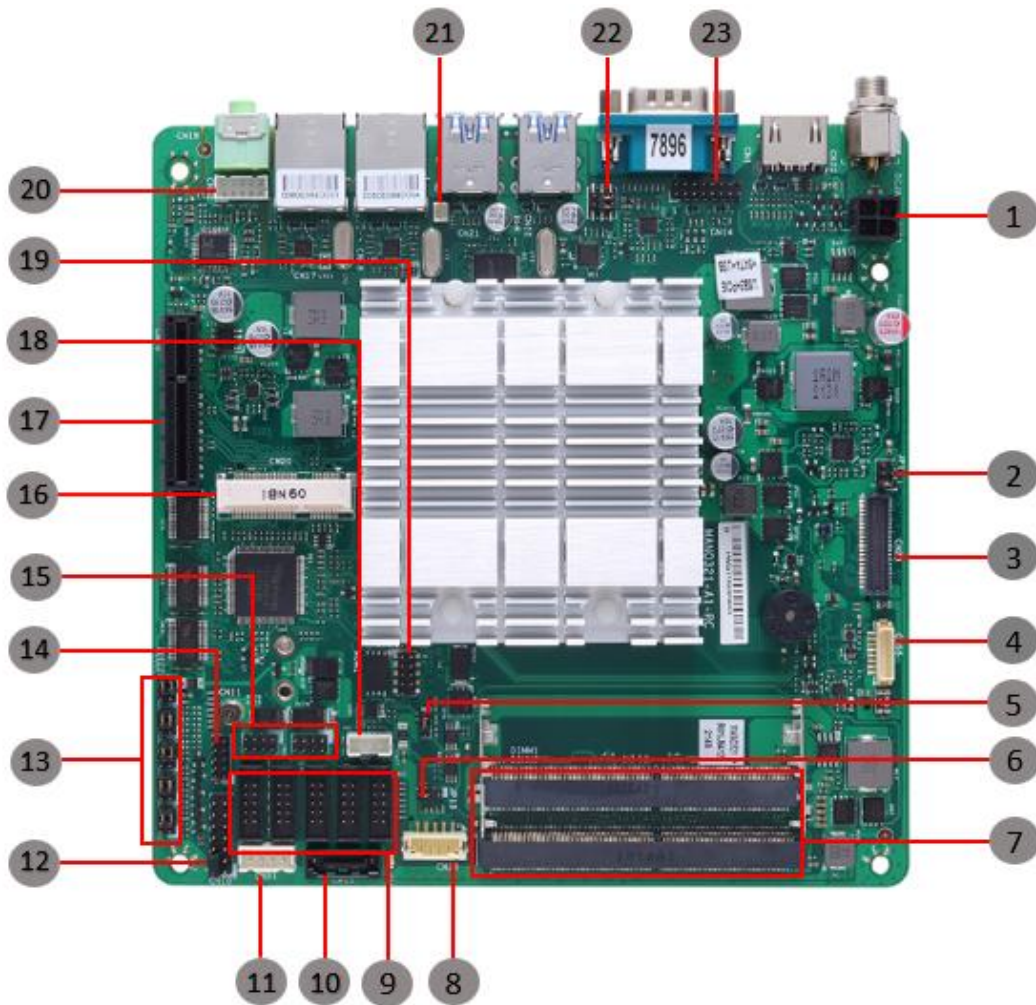
## 1.4 Block Diagram



# Section 2

## Board and Pin Assignments

### 2.1 Board Layout

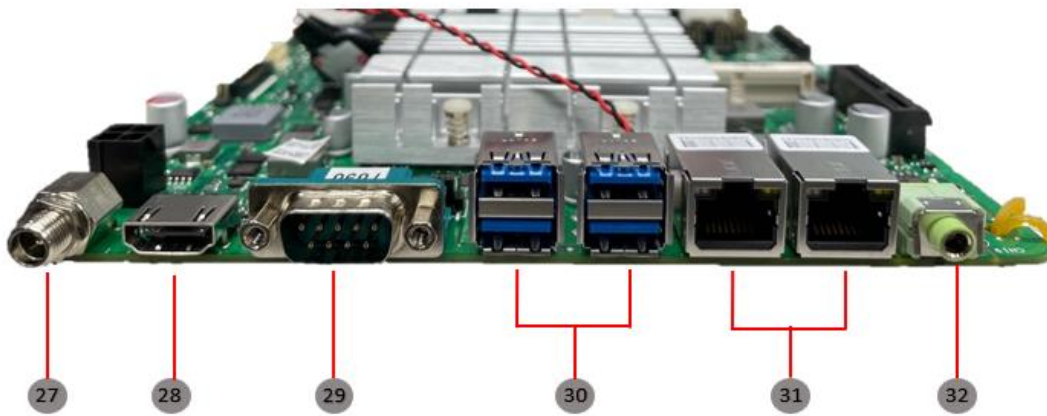


Top View



**Bottom View**

## 2.2 Rear I/O



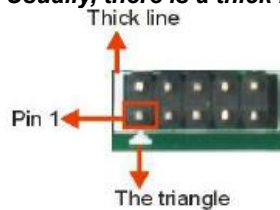
| Jumpers/Headers/Connectors |   |    |                                       |
|----------------------------|---|----|---------------------------------------|
| 1                          | 4-pin ATX Power Input Connector (CN26)    | 17 | PCI-Express x4 Slot (CN16)            |
| 2                          | LVDS VDD Select Jumper (JP11)             | 18 | I2C Header (CN27)                     |
| 3                          | LVDS Signal Header (CN29)                 | 19 | SPI Header (CN12)                     |
| 4                          | LVDS Backlight Control Header (CN55)      | 20 | Audio Header (CN52)                   |
| 5                          | AT/ATX Power Mode Select Jumper (JP13)    | 21 | CMOS Battery Connector (BAT1)         |
| 6                          | Clear CMOS (JP12)                         | 22 | COM1 Data/Power Select Jumper (JP1)   |
| 7                          | DDR4 SO-DIMM Connectors (DIMM1, DIMM2)    | 23 | VGA Header (CN14)                     |
| 8                          | SMBus Header (CN28)                       | 24 | M.2 Key B Connector (SCN2)            |
| 9                          | COM2~COM6 Headers (CN2~CN6)               | 25 | SIM Card Slot (SCN1)                  |
| 10                         | SATA 3.0 Connector (CN15)                 | 26 | eDP Connector (CN50)                  |
| 11                         | SATA Power Connector (CN51)               | 27 | DC Jack Power Connector (DCJACK1)     |
| 12                         | Front Panel Header (CN10)                 | 28 | HDMI Connector (CN23)                 |
| 13                         | COM2~6 Data/Power Select Jumper (JP2~JP6) | 29 | COM1 D-Sub Connector (CN1)            |
| 14                         | Digital I/O Connector (CN11)              | 30 | USB 3.2 Gen1 Stack Ports (CN21, CN22) |
| 15                         | USB 2.0 Header (CN24, CN25)               | 31 | Ethernet Ports (CN17, CN18)           |
| 16                         | PCI-Express Mini Card Connector (CN20)    | 32 | Audio Jack (CN19)                     |



Note

To identify the first pin of a header or jumper, please refer to the following information:

- Usually, there is a thick line or a triangle near the header or jumper pin 1.

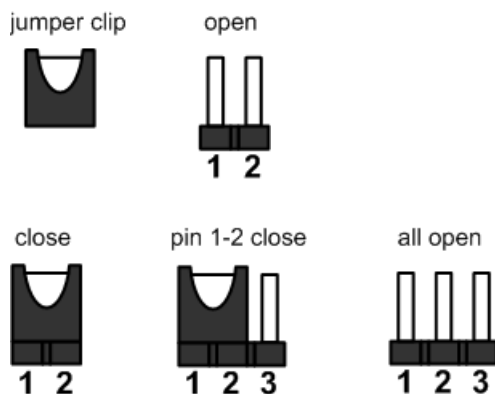


- Square pad, which you can find on the back of the motherboard, is usually used for pin 1.



## 2.3 Jumper Settings

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. The following illustration shows how to set up jumper.



Before applying power to MANO321 Series, please make sure all the jumpers are in factory default position. Below you can find a summary table of all jumpers and onboard default settings.



Note

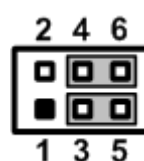
Once the default jumper setting needs to be changed, please do it under power-off condition.

| Jumper    | Description                                   | Setting   |
|-----------|---|-----------|
| JP1 ~ JP6 | COM Data/Power Select<br>Default: RS-232 Data | 3-5 Close |
|           |   | 4-6 Close |
| JP11      | LVDS VDD Select<br>Default: +3.3V Level       | 1-2 Close |
| JP12      | Clear CMOS<br>Default: Normal Operation       | 1-2 Close |
| JP13      | AT/ATX Power Mode Select<br>Default: ATX Mode | 1-2 Close |

### 2.3.1 COM1 Data/Power Select (JP1)

This is a 3x2-pin (pitch=2.00mm) jumper. The COM1 port has +5V power capability on DCD and +12V on RI by setting JP1.

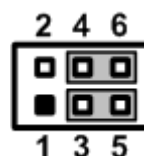
| Function                                | Setting   |
|---|-----------|
| Power: Set COM pin 1 to +5V             | 1-3 close |
| Data: Set COM pin 1 to DCD<br>(Default) | 3-5 close |
| Power: Set COM pin 9 to +12V            | 2-4 close |
| Data: Set COM pin 9 to RI<br>(Default)  | 4-6 close |



### 2.3.2 COM2 ~ COM6 Data/Power Select (JP2 ~ JP6)

This is a 3x2-pin (pitch=2.00mm) jumper. The COM2~6 port has +5V power capability on DCD and +12V on RI by setting JP2~JP6.

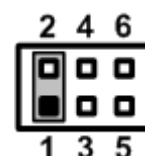
| Function                                | Setting   |
|---|-----------|
| Power: Set COM pin 1 to +5V             | 1-3 close |
| Data: Set COM pin 1 to DCD<br>(Default) | 3-5 close |
| Power: Set COM pin 8 to +12V            | 2-4 close |
| Data: Set COM pin 8 to RI<br>(Default)  | 4-6 close |



### 2.3.3 LVDS VDD Select (JP11)

The motherboard supports voltage selection for flat panel displays. Use this 2x3-pin (pitch=2.0mm) jumper to set up VDD power of the LVDS connector. To prevent hardware damage, before connecting please make sure that the input voltage of LVDS panel is correct.

| Function              | Setting   |
|-----------------------|-----------|
| +3.3V level (Default) | 1-2 close |
| +5V level             | 2-4 close |
| +12V level            | 5-6 close |



### 2.3.4 Clear CMOS (JP12)

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Remove the onboard battery.
3. Move the jumper clip from pins 1-2 (default) to pins 2-3. Keep the clip-on pins 2-3 for about 5~10 seconds, then move the clip back to pins 1-2.
4. Re-install the battery.
5. Plug the power cord and turn ON the computer.
6. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

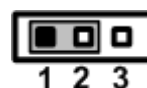
| Function                   | Setting   |
|----------------------------|-----------|
| Normal operation (Default) | 1-2 close |
| Clear CMOS                 | 2-3 close |



### 2.3.5 AT/ATX Power Mode Select (JP13)

This 3-pin (pitch=2.0mm) jumper allows you to select AT or ATX power mode.

| Function           | Setting   |
|--------------------|-----------|
| ATX mode (Default) | 1-2 close |
| AT mode            | 2-3 close |





## 2.4 Connectors

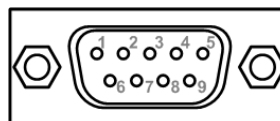
Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table showing connectors on the hardware.

| Connector  | Description                     |
|------------|---------------------------------|
| CN1        | COM1 D-Sub Connector            |
| CN2~CN6    | COM2~COM6 Headers               |
| CN10       | Front Panel Header              |
| CN11       | Digital I/O Header              |
| CN12       | SPI Header                      |
| CN14       | VGA Header                      |
| CN15       | SATA 3.0 Connector              |
| CN16       | PCI-Express x4 Slot             |
| CN17, CN18 | Ethernet Ports                  |
| CN19       | Audio Jack                      |
| CN20       | PCI-Express Mini Card Connector |
| CN21, CN22 | USB 3.2 Gen 1 Stack Ports       |
| CN23       | HDMI Connector                  |
| CN24, CN25 | USB 2.0 Headers                 |
| CN26       | 4-pin ATX Power Input Connector |
| CN27       | I2C Header                      |
| CN28       | SMBus Header                    |
| CN29       | LVDS Signal Header              |
| CN50       | eDP Connector                   |
| CN51       | SATA Power Connector            |
| CN52       | Audio Header                    |
| CN55       | LVDS Backlight Control Header   |
| DCJACK1    | DC Jack Power Connector         |
| BAT1       | CMOS Battery Connector          |
| SCN1       | SIM Card Slot                   |
| SCN2       | M.2 Key B Connector             |

## 2.4.1 COM1 D-Sub Connector (CN1)

This connector is a standard D-Sub connector for COM1 serial port interface which is selectable for RS-232/422/485 mode by BIOS setting (see section 4.4). The pin assignments of RS-232/422/485 are listed in table below.

| Pin | RS-232 | RS-422 | RS-485 |
|-----|--------|--------|--------|
| 1   | DCD#   | TX-    | Data-  |
| 2   | RXD    | TX+    | Data+  |
| 3   | TXD    | RX+    | N/C    |
| 4   | DTR#   | RX-    | N/C    |
| 5   | GND    | GND    | GND    |
| 6   | DSR#   | N/C    | N/C    |
| 7   | RTS#   | N/C    | N/C    |
| 8   | CTS#   | N/C    | N/C    |
| 9   | RI#    | N/C    | N/C    |



Note

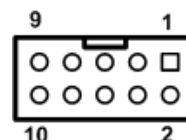
[\*]: Pin 1 of COM1 can be DCD/+5V and pin 9 of COM1 can be RI/+12V by selecting JP1 (see section 3.3.1).

## 2.4.2 COM2~COM6 Headers (CN2~CN6)

The motherboard comes with four 2x5-pin (pitch=2.00mm) headers for COM2~COM6 serial port interfaces. It has power capability on DCD# and RI# pins by setting jumper JP2~JP6.

### COM2~COM6:

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1   | DCD    | 2   | DSR    |
| 3   | RX     | 4   | RTS    |
| 5   | TX     | 6   | CTS    |
| 7   | DTR    | 8   | RI     |
| 9   | GND    | 10  | NC     |



Note

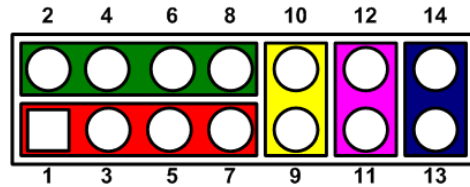
[\*]: COM 2 is RS232/422/485, COM3 ~ COM6 only support RS232.

[\*\*]: Pin 1 of COM2&6 can be DCD/+5V and pin 8 of COM2&6 can be RI/+12V by selecting JP2~JP6 (see section 3.3.2).

### 2.4.3 Front Panel Header (CN10)

The CN10 is a 2x7-pin (pitch=2.54mm) header. It includes Power-on, Reset, HDD LED and Power LED connections, allowing user to connect the PC case's front panel switch functions.

| Pin | Signal  | Pin | Signal   |
|-----|---------|-----|----------|
| 1   | PWRLED+ | 2   | EXT SPK- |
| 3   | GND     | 4   | Buzzer   |
| 5   | PWRLED- | 6   | N.C.     |
| 7   | N.C.    | 8   | EXT SPK+ |
| 9   | PWRSW-  | 10  | PWRSW+   |
| 11  | HW RST- | 12  | HW RST+  |
| 13  | HDDLED- | 14  | HDDLED+  |



#### Power LED

Pin 1 connects anode (+) of LED and pin 5 connects cathode (-) of LED. The power LED lights up when the system is powered on.

#### External Speaker and Internal Buzzer

Pin 2, 4, 6 and 8 connect the case-mounted speaker unit or internal buzzer. While connecting the board to an internal buzzer, please set pin 2 and 4 closed; while connecting to an external speaker, you need to set pins 2 and 4 opened and connect the speaker cable to pin 8(+) and pin 2(-).

#### Power On/Off Button

Pin 9 and 10 connect the power button on front panel to the board, which allows users to turn on or off power supply.

#### System Reset Switch

Pin 11 and 12 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system power supply.

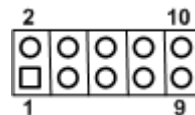
#### HDD Activity LED

This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 13 and 14 connect the hard disk drive to the front panel HDD LED, pin 13 is assigned as cathode (-) and pin 14 is assigned as anode (+).

### 2.4.4 Digital IO Header (CN11)

The CN11 is a 2x5-pin (pitch=2.00mm) header for digital I/O interface.

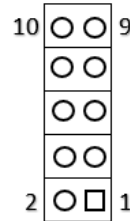
| Pin | Signal |
|-----|--------|
| 1   | 5V     |
| 2   | DO0    |
| 3   | DI0    |
| 4   | DO1    |
| 5   | DI1    |
| 6   | DO2    |
| 7   | DI2    |
| 8   | DO3    |
| 9   | DI3    |
| 10  | GND    |



### 2.4.5 SPI Header (CN12)

The CN12 is a 2x5-pin (pitch=2.00mm) header for SPI interface.

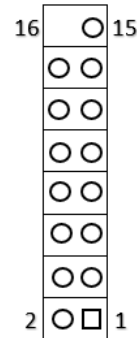
| Pin | Signal |
|-----|--------|
| 1   | NC     |
| 2   | WP     |
| 3   | VCC    |
| 4   | GND    |
| 5   | CS     |
| 6   | CLK    |
| 7   | MISO   |
| 8   | MOSI   |
| 9   | HD     |



### 2.4.6 VGA Header (CN14)

The CN14 is a 2x8-pin (pitch=2.00mm) header for VGA interface.

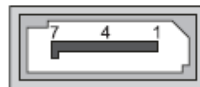
| Pin | Signal   | Pin | Signal    |
|-----|----------|-----|-----------|
| 1   | VGA_RED  | 2   | +5V       |
| 3   | VGA_GRN  | 4   | GND       |
| 5   | VGA_BLUE | 6   | NC        |
| 7   | NC       | 8   | VGA_5VDDA |
| 9   | GND      | 10  | HSYNC_C   |
| 11  | GND      | 12  | VSYNC_C   |
| 13  | GND      | 14  | 5VDDCLK   |
| 15  | GND      | 16  | NC        |



### 2.4.7 SATA 3.0 Connectors (CN15)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for SATA 3.0 interfaces allowing up to 6.0Gb/s data transfer rate. They are computer bus interfaces for connecting to devices such as hard disk drives.

| Pin | Signal   |
|-----|----------|
| 1   | GND      |
| 2   | SATA_TX+ |
| 3   | SATA_TX- |
| 4   | GND      |
| 5   | SATA_RX- |
| 6   | SATA_RX+ |
| 7   | GND      |



## 2.4.8 PCI-Express x4 Slot (CN16)

This motherboard comes with one PCI-Express x4 slot.

| Pin | Signal  | Pin | Signal  |
|-----|---------|-----|---------|
| B1  | +12V    | A1  | PRSNT1# |
| B2  | +12V    | A2  | +12V    |
| B3  | RSVD    | A3  | +12V    |
| B4  | GND     | A4  | GND     |
| B5  | SMCLK   | A5  | NC      |
| B6  | SMDAT   | A6  | NC      |
| B7  | GND     | A7  | NC      |
| B8  | +3.3V   | A8  | NC      |
| B9  | NC      | A9  | +3.3V   |
| B10 | 3.3Vaux | A10 | +3.3V   |
| B11 | WAKE#   | A11 | PERST#  |
| B12 | NC      | A12 | GND     |
| B13 | GND     | A13 | REFCLK+ |
| B14 | PETp0   | A14 | REFCLK- |
| B15 | PETn0   | A15 | GND     |
| B16 | GND     | A16 | PERp0   |
| B17 | PRSNT2  | A17 | PERn0   |
| B18 | GND     | A18 | GND     |
| B19 | PETp1   | A19 | NC      |
| B20 | PETn1   | A20 | GND     |
| B21 | GND     | A21 | PERp1   |
| B22 | GND     | A22 | PERn1   |
| B23 | NC      | A23 | GND     |
| B24 | NC      | A24 | GND     |
| B25 | GND     | A25 | NC      |
| B26 | GND     | A26 | NC      |
| B27 | NC      | A27 | GND     |
| B28 | NC      | A28 | GND     |
| B29 | GND     | A29 | NC      |
| B30 | NC      | A30 | NC      |
| B31 | NC      | A31 | GND     |
| B32 | GND     | A32 | NC      |



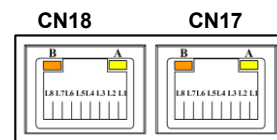
### Note

- These slot only support PCIe1 · x2 signal.

## 2.4.9 Ethernet Ports (CN17 and CN18)

The motherboard comes with two high performance plug and play Ethernet interfaces (RJ-45) which are fully compliant with the IEEE 802.3 standard. Connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end to a 1000/100/10-Base-T hub.

| Pin | 1000 Base-T  | 100/10 Base-T | Description                     |
|-----|--|---------------|---------------------------------|
| L1  | BI_DA+   | TX+           | Bidirectional or Transmit Data+ |
| L2  | BI_DA-   | TX-           | Bidirectional or Transmit Data- |
| L3  | BI_DB+   | RX+           | Bidirectional or Receive Data+  |
| L4  | BI_DC+   | N.C.          | Bidirectional or Not Connected  |
| L5  | BI_DC-   | N.C.          | Bidirectional or Not Connected  |
| L6  | BI_DB-   | RX-           | Bidirectional or Receive Data-  |
| L7  | BI_DD+   | N.C.          | Bidirectional or Not Connected  |
| L8  | BI_DD-   | N.C.          | Bidirectional or Not Connected  |
| A   | Active Link LED (Yellow)<br>Off: No link<br>Blinking: Data activity detected |               |                                 |
| B   | Speed LED<br>1000: Orange<br>100/10: Green/OFF                               |               |                                 |



**Note**

- **Speed LED turns orange for 1000Mbps or green for 100Mbps.**

### 2.4.10 Audio Jack (CN19)

The motherboard provides HD audio jack for line-out on the rear I/O. Install audio driver, and then attach audio devices to CN19.

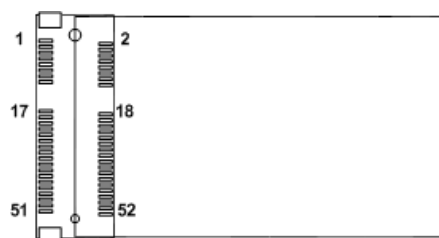
| Pin Color | Signal   |
|-----------|----------|
| Green     | Line-out |



### 2.4.11 PCI-Express Mini Card Connector (CN20)

This is a PCI-Express Mini Card connector applying to PCI-Express or USB 2.0. It also complies with PCI-Express Mini Card Spec. V1.2.

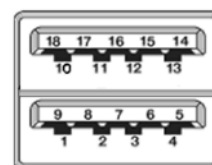
| Pin | Signal     | Pin | Signal      |
|-----|------------|-----|-------------|
| 1   | WAKE#      | 2   | +3.3VAUX    |
| 3   | NC         | 4   | GND         |
| 5   | NC         | 6   | +1.5V       |
| 7   | CLKREQ#    | 8   | UIM_PWR/NC  |
| 9   | GND        | 10  | UIM_DAT/NC  |
| 11  | REFCLK-    | 12  | UIM_CLK/NC  |
| 13  | REFCLK+    | 14  | UIM_REST/NC |
| 15  | GND        | 16  | UIM_VPP/NC  |
| 17  | NC         | 18  | GND         |
| 19  | NC         | 20  | +3.3VAUX    |
| 21  | GND        | 22  | PERST#      |
| 23  | PCIE_RX_DP | 24  | +3.3VAUX    |
| 25  | PCIE_RX_DN | 26  | GND         |
| 27  | GND        | 28  | +1.5V       |
| 29  | GND        | 30  | SMB_CLK     |
| 31  | PCIE_TX_DN | 32  | SMB_DATA    |
| 33  | PCIE_TX_DP | 34  | GND         |
| 35  | GND        | 36  | USB#4_D-    |
| 37  | GND        | 38  | USB#4_D+    |
| 39  | +3.3VAUX   | 40  | GND         |
| 41  | +3.3VAUX   | 42  | NC          |
| 43  | GND        | 44  | NC          |
| 45  | NC         | 46  | NC          |
| 47  | NC         | 48  | +1.5V       |
| 49  | NC         | 50  | GND         |
| 51  | NC         | 52  | +3.3VAUX    |



### 2.4.12 USB3.2 Gen1 Stack Ports (CN21 and CN22)

The motherboard comes with one stacked Universal Serial Bus (compliant with USB 3.2 GEN1) connector on the rear I/O for installing USB peripherals such as a keyboard, mouse, scanner, etc.

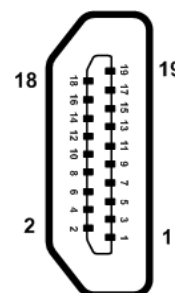
| Pin | Signal   | Pin | Signal   |
|-----|----------|-----|----------|
| 1   | USB_PWR  | 10  | USB_PWR  |
| 2   | USB#1_D- | 11  | USB#2_D- |
| 3   | USB#1_D+ | 12  | USB#2_D+ |
| 4   | GND      | 13  | GND      |
| 5   | SSRX1-   | 14  | SSRX2-   |
| 6   | SSRX1+   | 15  | SSRX2+   |
| 7   | GND      | 16  | GND      |
| 8   | SSTX1-   | 17  | SSTX2-   |
| 9   | SSTX1+   | 18  | SSTX2+   |



### 2.4.13 HDMI Connector (CN23)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which can transmit high-definition video and high-resolution audio over a single cable.

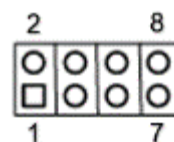
| Pin | Signal          | Pin | Signal          |
|-----|-----------------|-----|-----------------|
| 1   | HDMI OUT_DATA2+ | 2   | GND             |
| 3   | HDMI OUT_DATA2- | 4   | HDMI OUT_DATA1+ |
| 5   | GND             | 6   | HDMI OUT_DATA1- |
| 7   | HDMI OUT_DATA0+ | 8   | GND             |
| 9   | HDMI OUT_DATA0- | 10  | HDMI OUT_Clock+ |
| 11  | GND             | 12  | HDMI OUT_Clock- |
| 13  | NC              | 14  | GND             |
| 15  | HDMI OUT_SCL    | 16  | HDMI OUT_SDA    |
| 17  | GND             | 18  | +5V             |
| 19  | HDMI_HTPLG      |     |                 |



### 2.4.14 USB 2.0 Headers (CN24 and CN25)

The CN24 and CN25 are 2x4-pin (pitch=2.00mm) headers for USB 2.0 interface.

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1   | +5V    | 2   | GND    |
| 3   | USB_D- | 4   | USB_D+ |
| 5   | USB_D+ | 6   | USB_D- |
| 7   | GND    | 8   | +5V    |





### 2.4.15 ATX Power Input Connector (CN26)

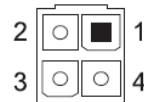
Steady and sufficient power can be supplied to all components on the board by connecting power connector. Please make sure all components and devices are properly installed before connecting the power connector.

External power supply plug fits into the connector in only one orientation. Properly press down power supply plug until it completely and firmly fits into this connector. Loose connection may cause system instability.

By default, the motherboard comes with a 4-pin ATX 90 angle connector (CN9) for DC +9~20V power input.

The CN26 provides +12V to the CPU power circuit.

| Pin | Signal |
|-----|--------|
| 1   | +12V   |
| 2   | +12V   |
| 3   | GND    |
| 4   | GND    |



### 2.4.16 I2C Connector (CN27)

The CN27 is a 4-pin (pitch=2.00mm) connector for SMBus interface which is compatible with I2C.

| Pin | Signal  |
|-----|---------|
| 1   | +3.3V   |
| 2   | I2C_SCL |
| 3   | GND     |
| 4   | I2C_SDA |



### 2.4.17 SMBus Connectors (CN28)

The CN28 is a 5-pin (pitch=2.00mm) connector. The SMBus (System Management Bus) is a simple bus for the purpose of lightweight communication.

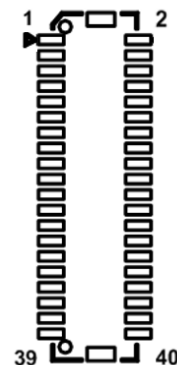
| Pin | Signals   |
|-----|-----------|
| 1   | SMB_CLK   |
| 2   | SMB_DATA  |
| 3   | SMB_ALERT |
| 4   | GND       |
| 5   | +3.3V     |



### 2.4.18 LVDS Signal Connector (CN29)

The CN29 is a 2x20-pin (pitch=1.00mm) connector for LVDS panel interface

| Pin | Signal             | Pin | Signal             |
|-----|--------------------|-----|--------------------|
| 1   | VDD <sup>[1]</sup> | 2   | VDD <sup>[1]</sup> |
| 3   | VDD <sup>[1]</sup> | 4   | VDD <sup>[1]</sup> |
| 5   | VDD <sup>[1]</sup> | 6   | VDD <sup>[1]</sup> |
| 7   | LVDS_EDID_SCL      | 8   | LVDS_EDID_SDA      |
| 9   | GND                | 10  | GND                |
| 11  | LVDS_B_DATA0-      | 12  | LVDS_B_DATA3-      |
| 13  | LVDS_B_DATA0+      | 14  | LVDS_B_DATA3+      |
| 15  | GND                | 16  | GND                |
| 17  | LVDS_B_DATA1-      | 18  | LVDS_B_CLK-        |
| 19  | LVDS_B_DATA1+      | 20  | LVDS_B_CLK+        |
| 21  | GND                | 22  | GND                |
| 23  | LVDS_B_DATA2-      | 24  | LVDS_A_DATA0-      |
| 25  | LVDS_B_DATA2+      | 26  | LVDS_A_DATA0+      |
| 27  | GND                | 28  | GND                |
| 29  | LVDS_A_DATA3-      | 30  | LVDS_A_DATA1-      |
| 31  | LVDS_A_DATA3+      | 32  | LVDS_A_DATA1+      |
| 33  | GND                | 34  | GND                |
| 35  | LVDS_A_CLK-        | 36  | LVDS_A_DATA2-      |
| 37  | LVDS_A_CLK+        | 38  | LVDS_A_DATA2+      |
| 39  | GND <sup>l</sup>   | 40  | GND                |



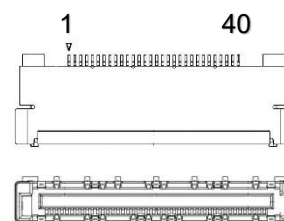
**Note**

<sup>[1]</sup>: Panel power VDD is 3.3V by default, 5V or 12V is selectable by jumper JP11, see section 3.3.3.

## 2.4.19 eDP Connector (CN50)

The embedded DisplayPort (eDP) interface is available through 40-pin connector (CN37), which is compliant with I-PEX-CABLIN II HT1 20143. The eDP is a design to replace internal digital LVDS links in computer monitor panels and TV panels.

| Pin | Signal             | Pin | Signal             |
|-----|--------------------|-----|--------------------|
| 1   | VDD <sup>[1]</sup> | 2   | VDD <sup>[1]</sup> |
| 3   | VDD <sup>[1]</sup> | 4   | VDD <sup>[1]</sup> |
| 5   | NC                 | 6   | GND                |
| 7   | GND                | 8   | GND                |
| 9   | GND                | 10  | EDP_HPD            |
| 11  | GND                | 12  | EDP_DATA3-         |
| 13  | EDP_DATA3+         | 14  | GND                |
| 15  | EDP_DATA2-         | 16  | EDP_DATA2+         |
| 17  | GND                | 18  | EDP_DATA1-         |
| 19  | EDP_DATA1+         | 20  | GND                |
| 21  | EDP_DATA0-         | 22  | EDP_DATA0+         |
| 23  | GND                | 24  | EDP_MUX+           |
| 25  | EDP_MUX-           | 26  | GND                |
| 27  | VSS_EDP_AMOLED     | 28  | VSS_EDP_AMOLED     |
| 29  | VSS_EDP_AMOLED     | 30  | VSS_EDP_AMOLED     |
| 31  | NC                 | 32  | EDP_BKLT_CTRL      |
| 33  | EDP_BKLT_EN        | 34  | NC                 |
| 35  | NC                 | 36  | VCC_EDP_BKLT       |
| 37  | VCC_EDP_BKLT       | 38  | VCC_EDP_BKLT       |
| 39  | VCC_EDP_BKLT       | 40  | NC                 |



### Note

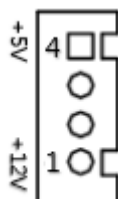
- **CN50 is co-layout with LVDS signal connector (CN29); they can't be accessed simultaneously.**

<sup>[1]</sup>: Panel power VDD is +3.3V by default, +5V or 12V is selectable by jumper JP11, see section 3.3.3.

### 2.4.20 SATA Power Connector (CN51)

The CN51 is a 4-pin (pitch=2.54mm) connector for DC +12V and +5V power output.

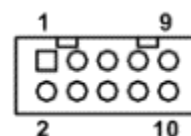
| Pin | Signal |
|-----|--------|
| 1   | +12V   |
| 2   | GND    |
| 3   | GND    |
| 4   | +5V    |



### 2.4.21 Audio Header (CN52)

The CN52 is a 2x5-pin (pitch=2.00mm) header for convenient connection and control of audio devices.

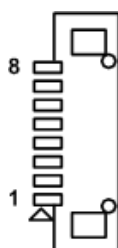
| Pin | Signal    | Pin | Signal |
|-----|-----------|-----|--------|
| 1   | MIC_IN    | 2   | GND    |
| 3   | LINE_IN_L | 4   | GND    |
| 5   | LINE_IN_R | 6   | GND    |
| 7   | SPKOUT_L  | 8   | GND    |
| 9   | SPKOUT_R  | 10  | GND    |



### 2.4.22 LVDS Backlight Control Header (CN55)

The CN55 is an 8-pin (pitch=1.25mm) header for LVDS backlight control interface.

| Pin | Signal      |
|-----|-------------|
| 1   | +12V        |
| 2   | +12V        |
| 3   | +5V         |
| 4   | LVDS_BKL_EN |
| 5   | GND         |
| 6   | GND         |
| 7   | GND         |
| 8   | LVDSPWMOUT  |



### 2.4.23 DC Jack Power Connector (DCJACK1)

The DCJACK1 is a DC jack with screw supporting 9~20VDC power input connector. Firmly insert at least 90W adapter into this connector. Loose connection may cause system instability and make sure all components/devices are properly installed before connecting.



### 2.4.24 CMOS Battery Connector (BAT1)

The BAT1 is a 2-pin (pitch=1.25mm) connector for CMOS battery interface.

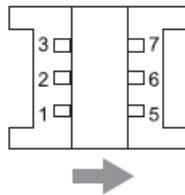
| Pin | Signal |
|-----|--------|
| 1   | +3V    |
| 2   | GND    |



### 2.4.25 SIM Card Slot (SCN1)

The SCN1 is for inserting SIM Card which is mainly used in wireless network application

| Pin | Signal    |
|-----|-----------|
| 1   | UIM_PWR   |
| 2   | UIM_RESET |
| 3   | UIM_CLK   |
| 4   | N/A       |
| 5   | GND       |
| 6   | VPP       |
| 7   | UIM_DATA  |



### 2.4.26 M.2 Key B Connector (SCN2)

The SCN2 is a M.2 Key B connector. It is suggested to install the M.2 storage module via SATA with 22mm width and 42mm length or the M.2 cellular module via USB 2.0 with 30mm width and 42mm length. It supports the M.2 storage module via PCIe x2 by BOM option with hardware change. This M.2 Key B connector also supports NVME function.

| Pin | Signal                | Pin | Signal            |
|-----|-----------------------|-----|-------------------|
| 1   | CONFIG_3              | 2   | +3.3V             |
| 3   | GND                   | 4   | +3.3V             |
| 5   | GND                   | 6   | Full Card PWR OFF |
| 7   | USB_D+                | 8   | NC                |
| 9   | USB_D-                | 10  | DAS               |
| 11  | GND                   | 12  | <b>Key B</b>      |
| 13  | <b>Key B</b>          | 14  |                   |
| 15  |                       | 16  |                   |
| 17  |                       | 18  |                   |
| 19  |                       | 20  | NC                |
| 21  | CONFIG_0              | 22  | NC                |
| 23  | NC                    | 24  | NC                |
| 25  | NC                    | 26  | NC                |
| 27  | GND                   | 28  | NC                |
| 29  | PCIE1_RX_N/USB3_RX_N  | 30  | UIM_RST           |
| 31  | PCIE1_RX_P/USB3_RX_P  | 32  | UIM_CLK           |
| 33  | GND                   | 34  | UIM_DATA          |
| 35  | PCIE1_TX_N/USB3_TX_N  | 36  | UIM_PWR           |
| 37  | PCIE1_TX_P/USB3_TX_P  | 38  | DEVSLP            |
| 39  | GND                   | 40  | NC                |
| 41  | PCIE0_RX_N/SATA1_RX_P | 42  | NC                |
| 43  | PCIE0_RX_P/SATA1_RX_N | 44  | NC                |
| 45  | GND                   | 46  | NC                |
| 47  | PCIE0_TX_N/SATA1_TX_N | 48  | NC                |
| 49  | PCIE0_TX_P/SATA1_RX_P | 50  | PERST#            |
| 51  | GND                   | 52  | CLKREQ#           |
| 53  | PCIE_CLK_N            | 54  | PEWAKE#           |
| 55  | PCIE_CLK_P            | 56  | NC                |
| 57  | GND                   | 58  | NC                |
| 59  | NC                    | 60  | NC                |
| 61  | NC                    | 62  | NC                |
| 63  | NC                    | 64  | NC                |
| 65  | NC                    | 66  | SIM_DET           |
| 67  | PLTRST                | 68  | SUSCLK            |
| 69  | CONFIG_1              | 70  | +3.3V             |
| 71  | GND                   | 72  | +3.3V             |
| 73  | GND                   | 74  | +3.3V             |
| 75  | CONFIG_2              |     |                   |



---

# Section 3

## AMI BIOS Setup Utility

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

### 3.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press <Del> during the Power On Self Test (POST) to enter BIOS setup, otherwise, POST will continue with its test routines.
2. Once you enter the BIOS, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.



**Note**

*If your computer cannot boot after making and saving system changes with BIOS setup, you can restore BIOS optimal defaults by setting JP3 (see section 3.3.3).*

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

### 3.2 Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <F9>, <F10>, <Enter>, <ESC>, <Arrow>, <+>, <->, keys, and so on.



**Note**

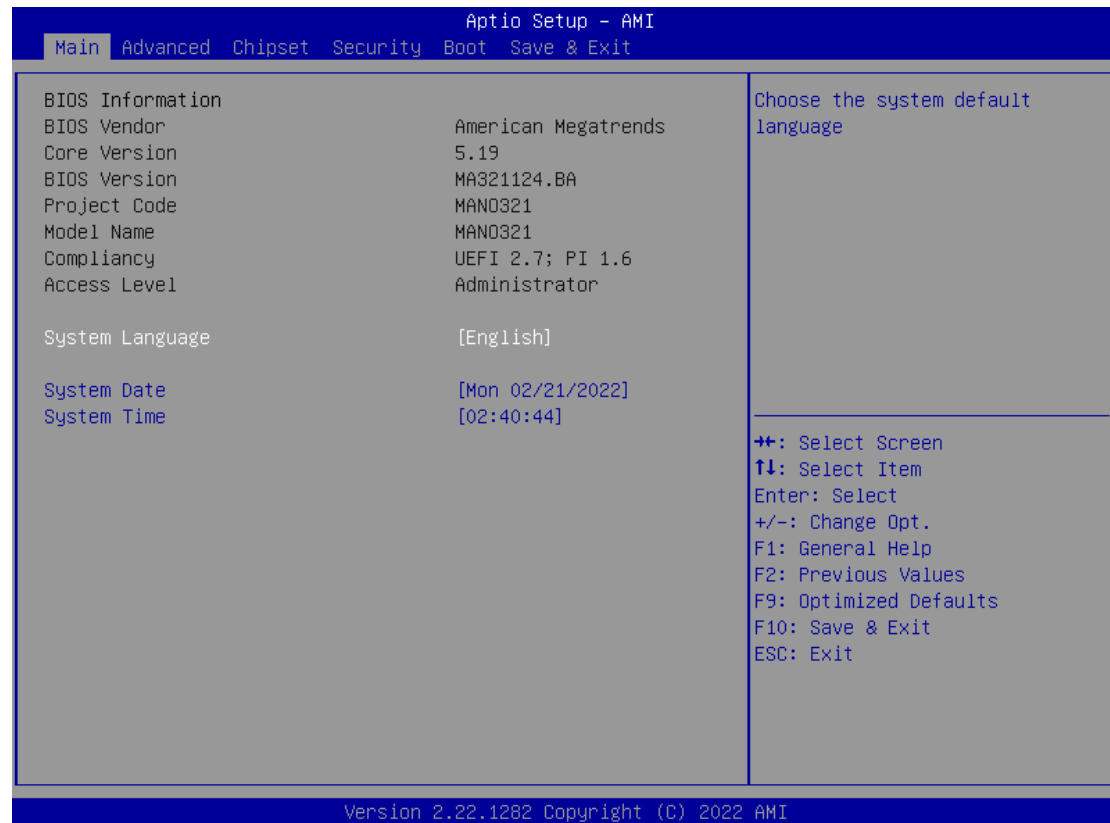
*Some of the navigation keys differ from one screen to another.*

| Hot Keys            | Description   |
|---------------------|---|
| →← Left/Right       | The Left and Right <Arrow> keys allow you to select a setup screen.   |
| ↑↓ Up/Down          | The Up and Down <Arrow> keys allow you to select a setup screen or sub screen.  |
| Enter               | The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub screens. |
| +– Plus/Minus/PU/PD | The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.   |
| F1                  | The <F1> key allows you to Show descriptions of the function keys   |
| F2                  | The <F2> key allows you to Restore the previous BIOS settings for the current submenus  |
| F9                  | The <F9> key allows you to Load the Optimized BIOS default settings for the current submenus  |
| F10                 | The <F10> key allows you to Save all the changes and exit the BIOS Setup program  |
| Esc                 | The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.                      |



### 3.3 Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.



#### BIOS Information

Display system BIOS information.

#### System Language

Use this option to choose the system default language.

#### System Date/Time

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

### 3.4 Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

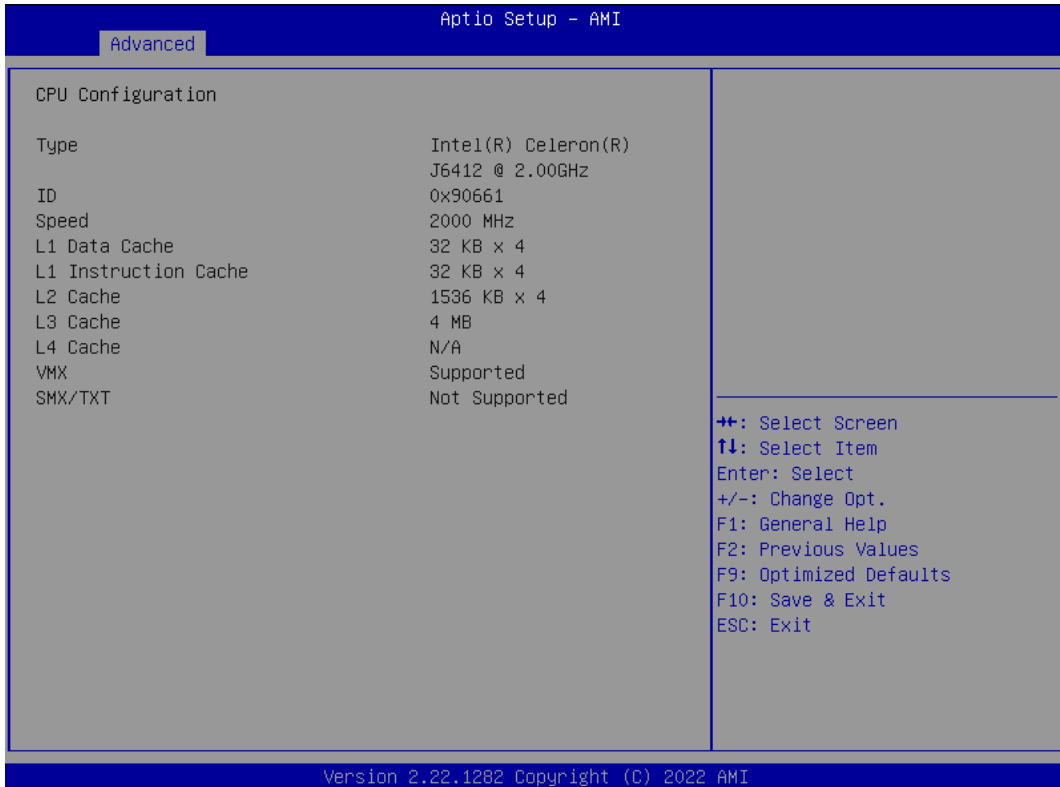
- ▶ CPU Configuration
- ▶ Trusted Computing
- ▶ ACPI Settings
- ▶ F81966 Super IO Configuration
- ▶ Hardware Monitor
- ▶ USB Configuration
- ▶ Network Stack Configuration
- ▶ Realtek PCIe GBE Family Controller

For items marked with “▶”, please press <Enter> for more options.



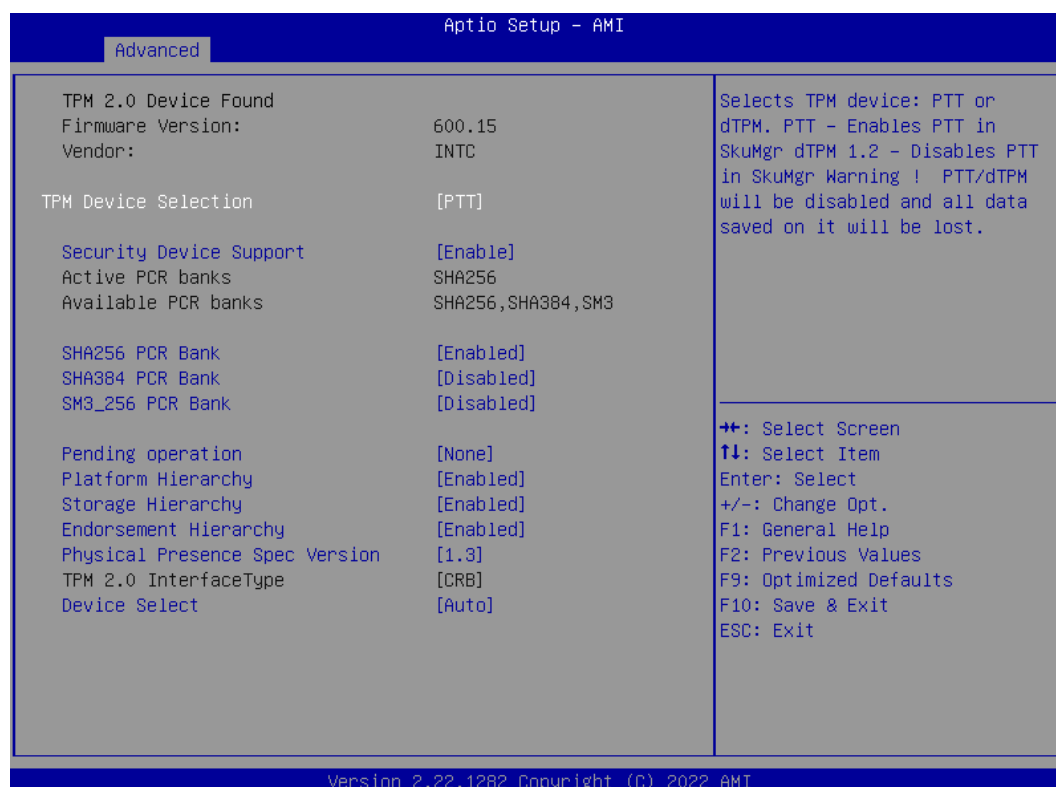
- **CPU Configuration**

This screen shows CPU information.



- **Trusted Computing**

This screen provides function for specifying the TPM settings.



### TPM Device Selection

Select TPM device:

- PTT: Intel® built-in TPM. Enables PTT in SkuMgr.
- dTPM: External extended Infineon's TPM. Disables PTT in SkuMgr.

### Security Device Support

Enable or disable BIOS support for security device. OS will not show security device. TCG EFI protocol and INT1A interface will not be available.

### SHA256 PCR Bank

Enable or Disable SHA256 PCR Bank.

### SHA384 PCR Bank

Enable or Disable SHA384 PCR Bank.

### SM3\_256 PCR Bank

Enable or Disable SM3\_256 PCR Bank.

### Pending operation

Schedule an Operation for the Security Device.



**Note**

*[!]: Your computer will reboot during restart to change State of security Device.*

### Platform Hierarchy

Enable or Disable Platform Hierarchy.

### Storage Hierarchy

Enable or Disable Storage Hierarchy.

**Endorsement Hierarchy**

Enable or Disable Endorsement Hierarchy.

**Physical Presence Spec Version**

Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3.



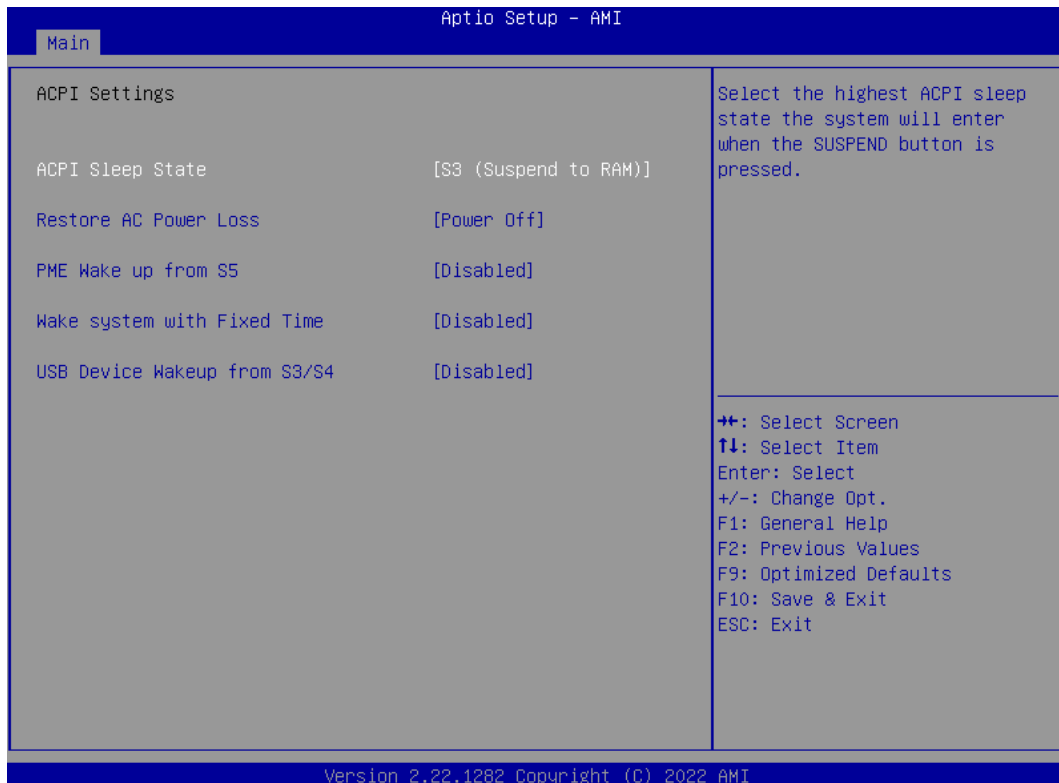
*[!]: Some HCK tests might not support 1.3.*

**Note**

**Device Select**

TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both with the default set to TPM 2.0 devices if not found, TPM 1.2 devices will be enumerated.

● **ACPI Settings**



**ACPI Sleep State**

When the suspend button is pressed, the ACPI (Advanced Configuration and Power Interface) sleep state is S3 (Suspend to RAM).

**Restore AC Power Loss**

Decide the state of system when power is re-applied after a power failure.

- Power Off: Keep the power off until the power button is pressed.
- Power On: Restore power to the computer.

**PME Wake up from S5**

Enable system to wake from S5 using PME event.

**Wake system with Fixed Time**

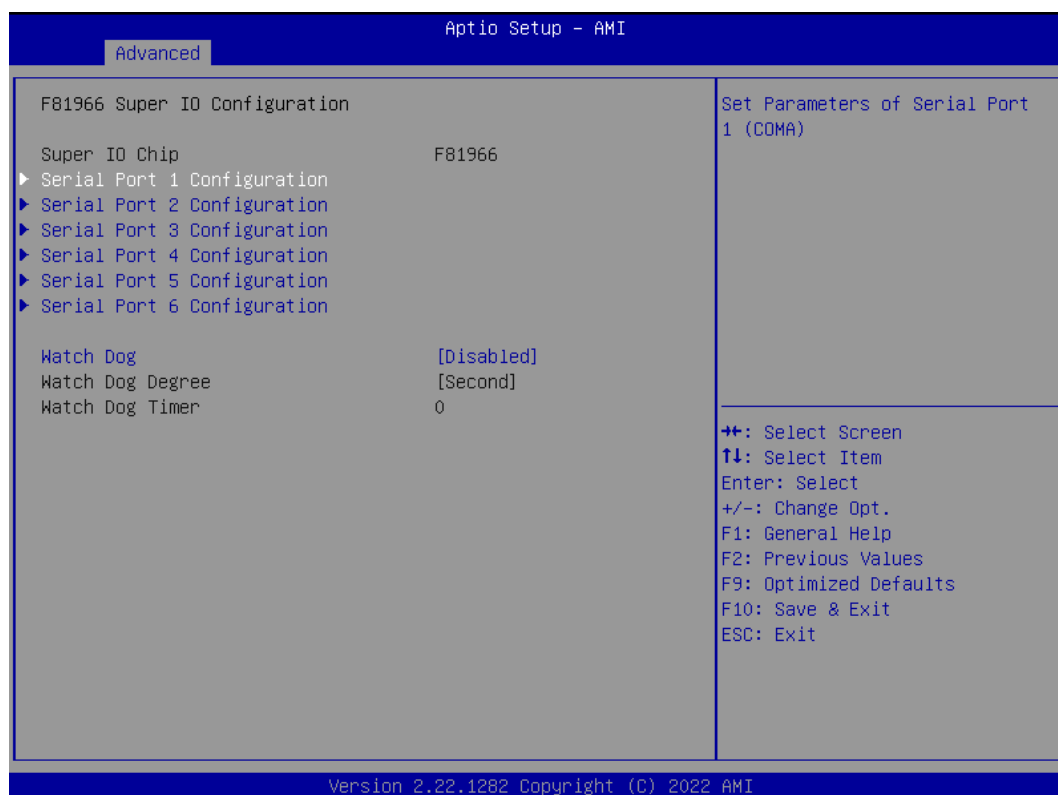
Enable or disable system wake on alarm event. When enabled, system will wake on the hr; min; sec specified.

**USB Device Wakeup from S3/S4**

When enabled, system can wake up from S3/S4 with USB device.

- **F81966 Super IO Configuration**

You can use this screen to select options for the Super IO Configuration and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with “▶”, please press <Enter> for more options.



**Serial Port 1~6 Configuration**

Use these items to set parameters related to serial port 1~6.

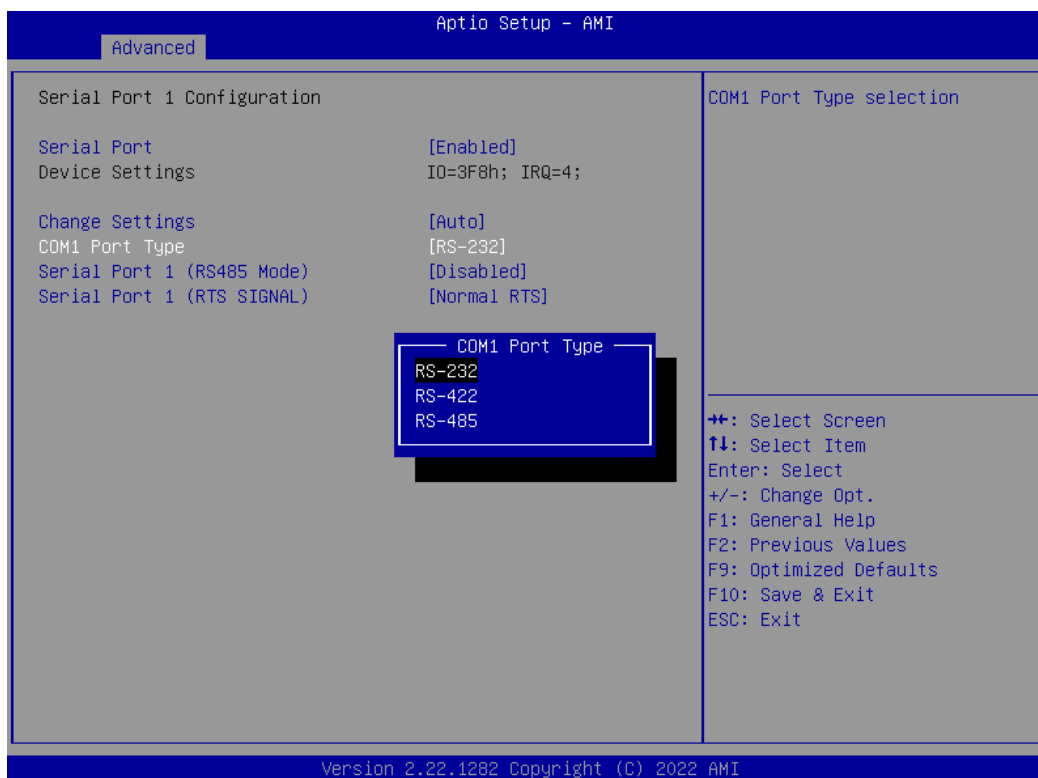
**Watch Dog Degree**

Watchdog degree selection in minute or second.

**Watch Dog Timer**

Watchdog timer value range from 1 to 255. Set 0 will disable watchdog timer.

● **Serial Port 1~2 Configuration**



**Serial Port**

Enable or disable serial port 1~2.

**Change Settings**

Select an optimal settings for Super IO device.

**For serial port 1:**

- Auto
- IO=3F8h, IRQ=4;
- IO=3F8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2F8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=3E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

**For serial port 2:**

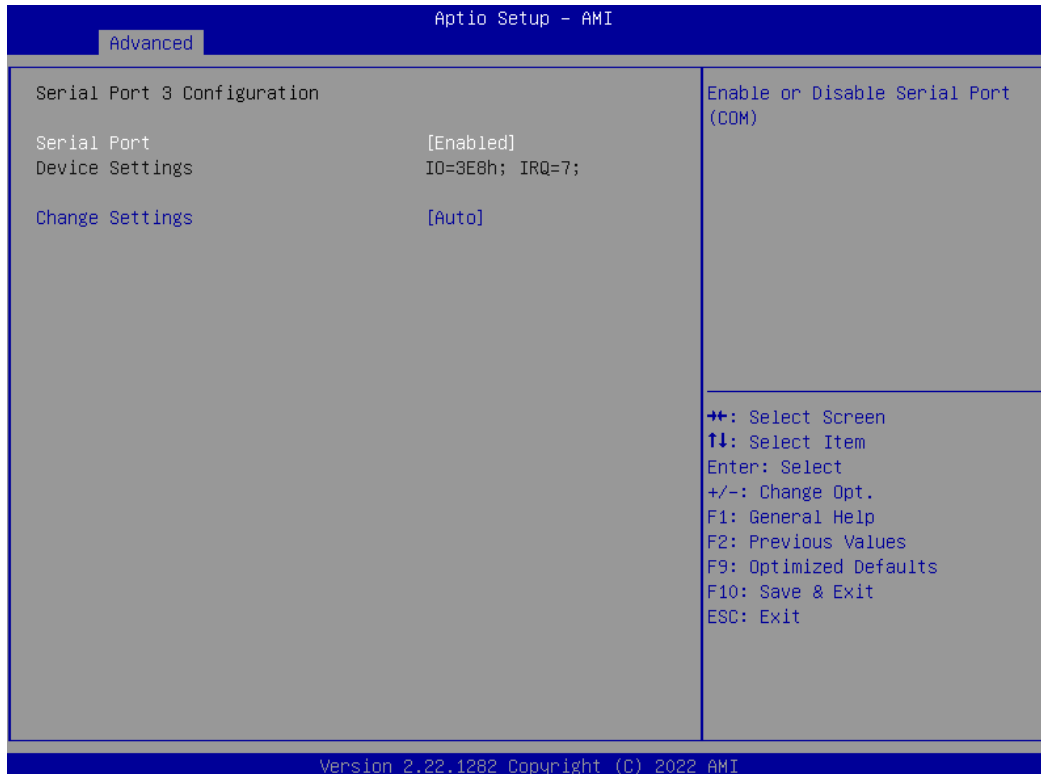
- Auto
- IO=2F8h, IRQ=3;
- IO=3F8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2F8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=3E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

**COM1&COM2 Port Type**

Select RS-232/422/485 mode for serial port 1 or port 2.



- **Serial Port 3~6 Configuration**



### Serial Port

Enable or disable serial port 3~6.

### Change Settings

Select an optimal setting for Super IO device.

#### For serial port 3:

- Auto
- IO=3E8h, IRQ=7;
- IO=3E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2F0h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2E0h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

#### For serial port 4:

- Auto
- IO=2E8h, IRQ=7;
- IO=3E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2F0h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2E0h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

**For serial port 5:**

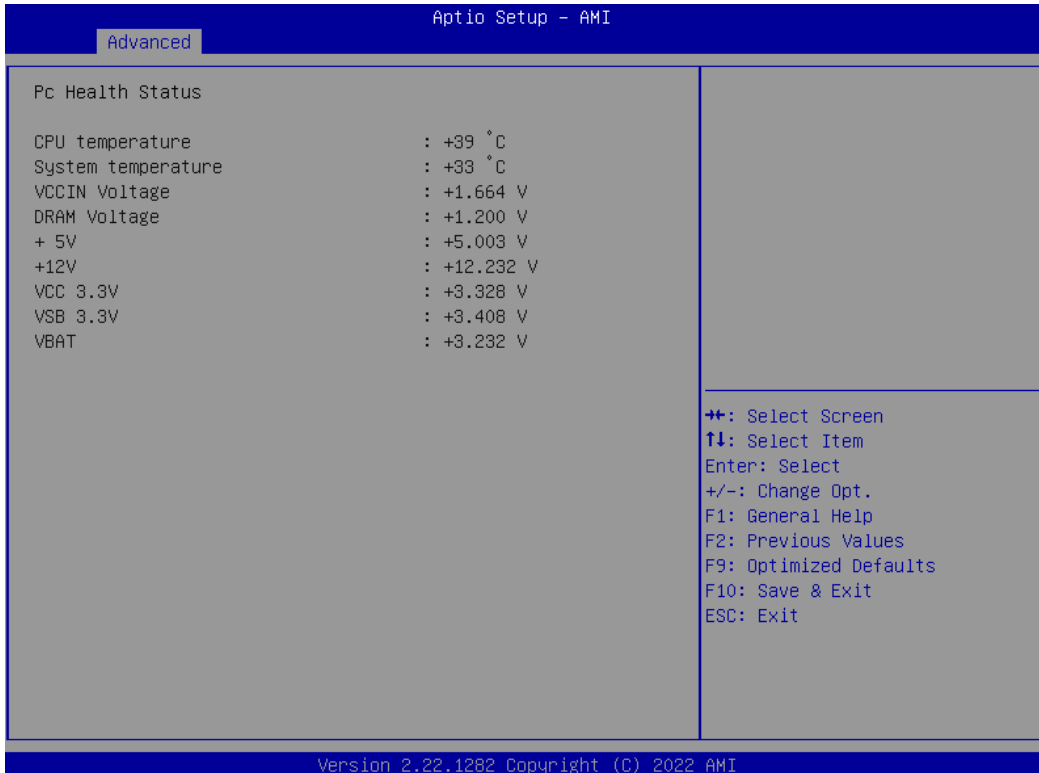
- Auto
- IO=2E0h, IRQ=7;
- IO=3E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2F0h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2E0h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

**For serial port 6:**

- Auto
- IO=2F0h, IRQ=7;
- IO=3E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2F0h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;
- IO=2E0h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

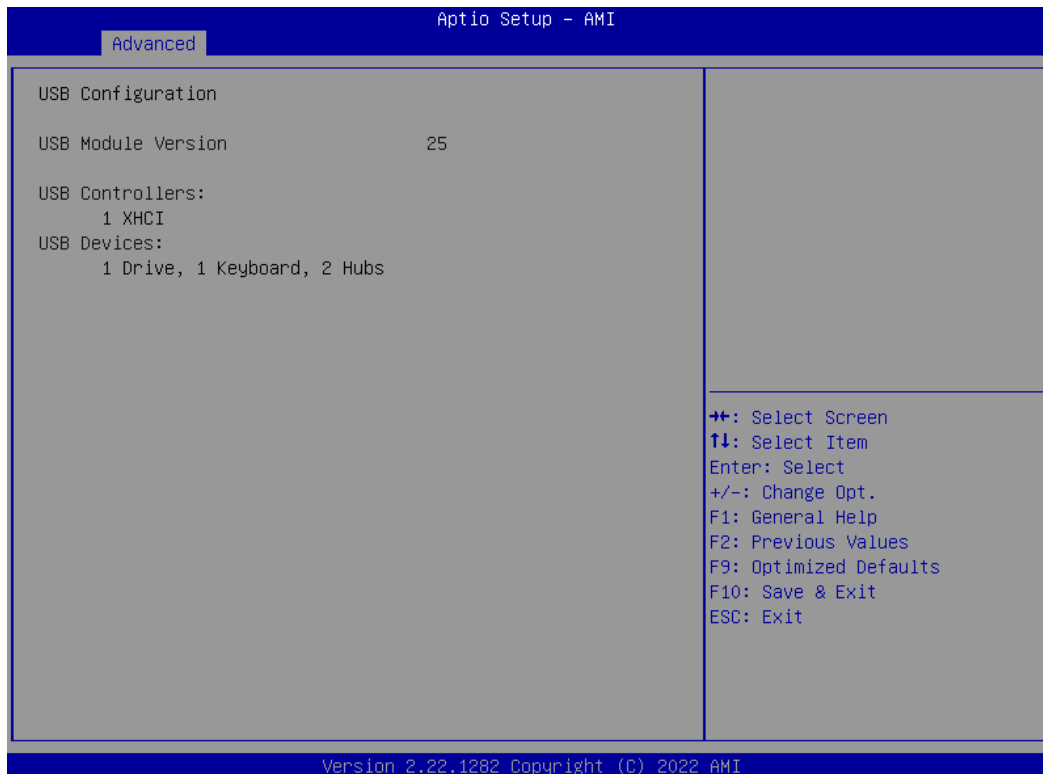
- **Hardware Monitor**

This screen monitors hardware health status.



This screen displays the temperature of system and CPU, system voltages (VCCIN, DRAM, +5V, +12V, VCC 3.3V, VSB 3.3V, VBAT).

- **USB Configuration**



**USB Devices**

Display all detected USB devices.

- **Network Stack Configuration**

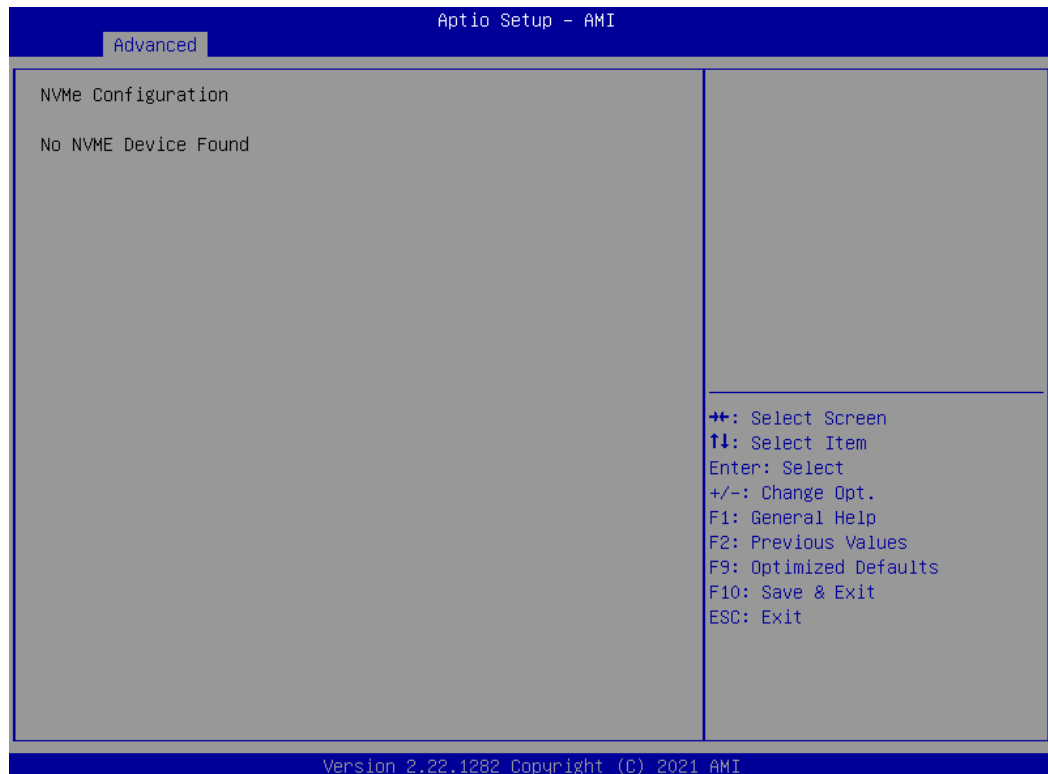


**Network Stack**

Enable or disable UEFI Network Stack.

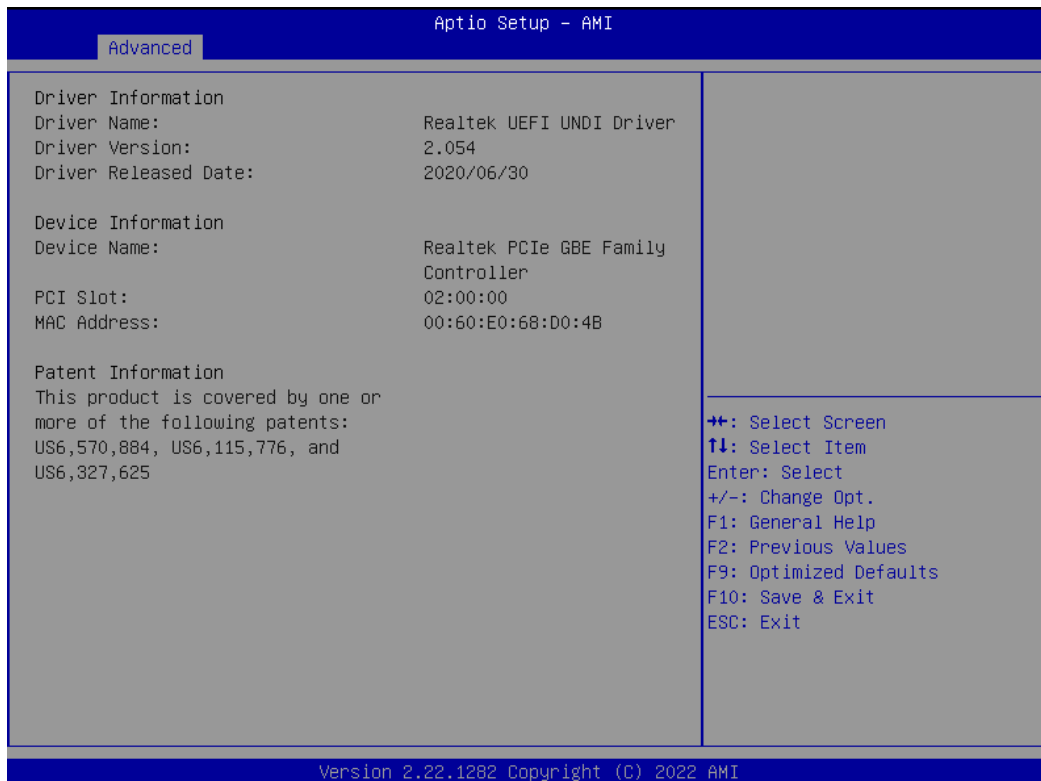
- **NVMe Configuration**

Displays information on your M.2 NVME PCIe SSD if installed.



- **Realtek PCIe GBE Family Controller**

This screen shows the LAN device information.

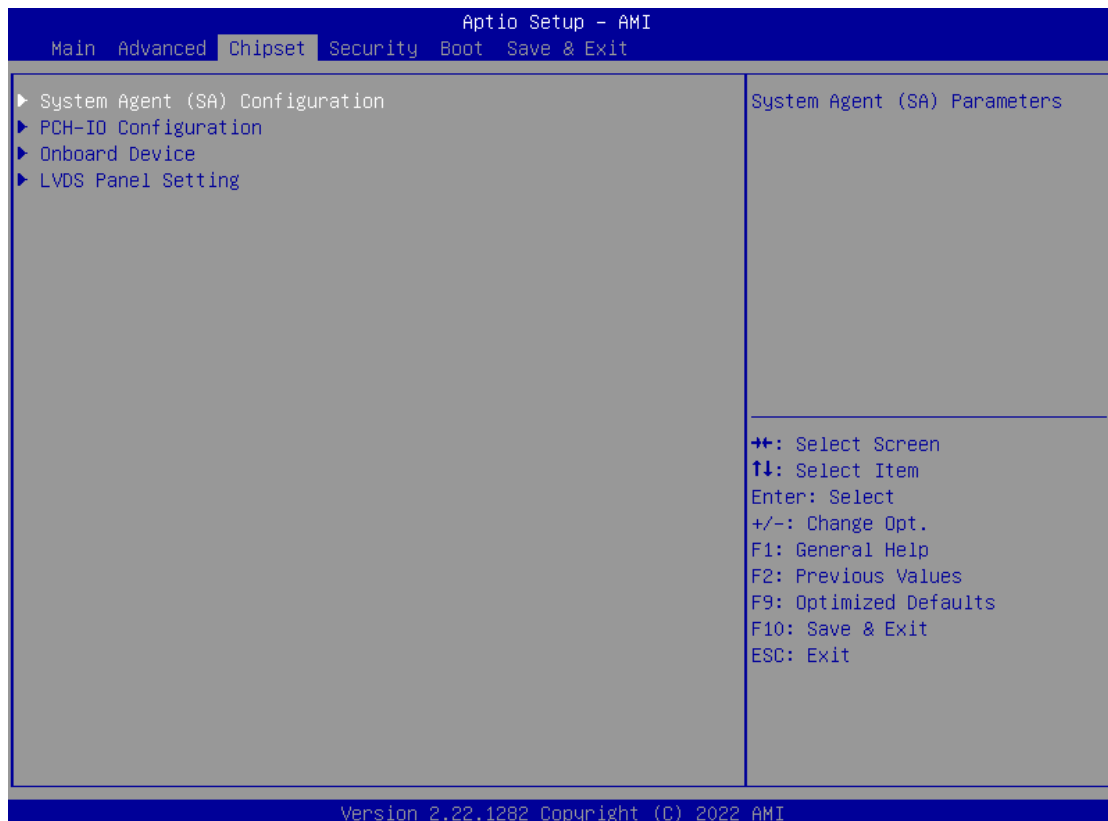


### 3.5 Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- ▶ System Agent (SA) Configuration
- ▶ PCH-IO Configuration
- ▶ Onboard Device
- ▶ LVDS Panel Setting

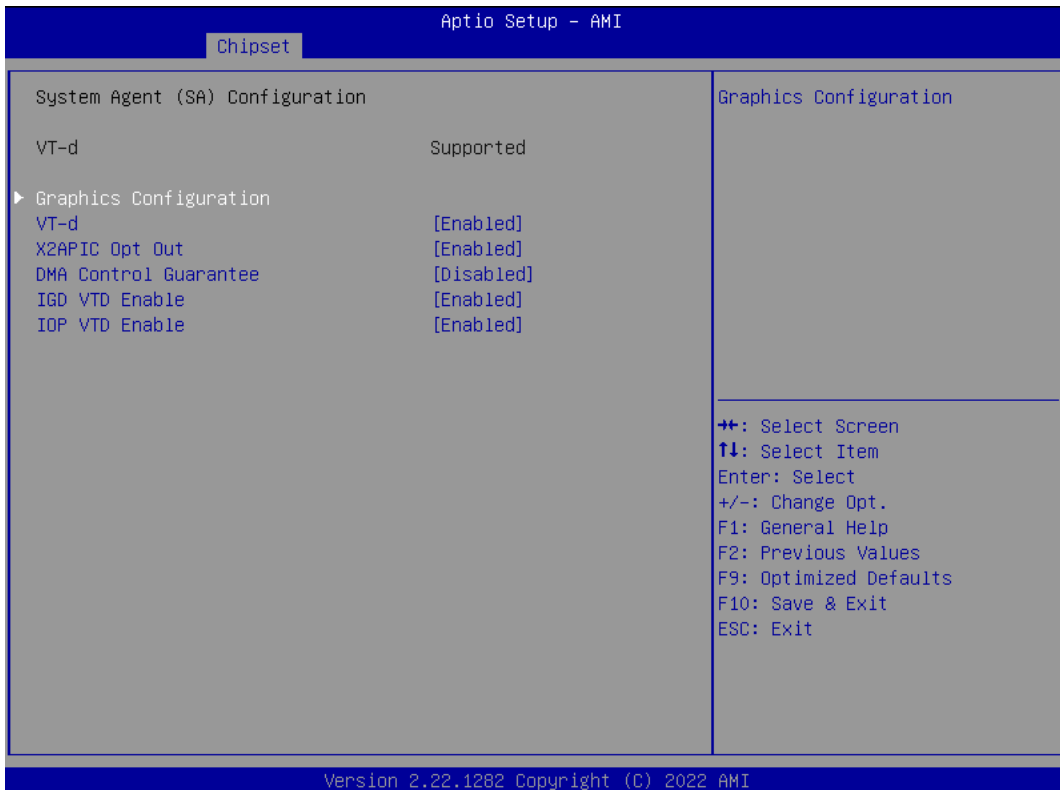
For items marked with “▶”, please press <Enter> for more options.





- **System Agent (SA) Configuration**

This screen allows users to configure System Agent (SA) parameters. For items marked with “▶”, please press <Enter> for more options.



**Graphics Configuration**

Select to open sub menu for parameters related to graphics configuration.

**VT-d**

VT-d capability.

**X2APIC Opt Out**

Enable or Disable X2APIC\_OPT\_OUT bit.

**DMA Control Guarantee**

Enable or Disable DMA\_Control\_Guarantee bit.

**IGD VTD Enable**

Enable or Disable IGD VTD.

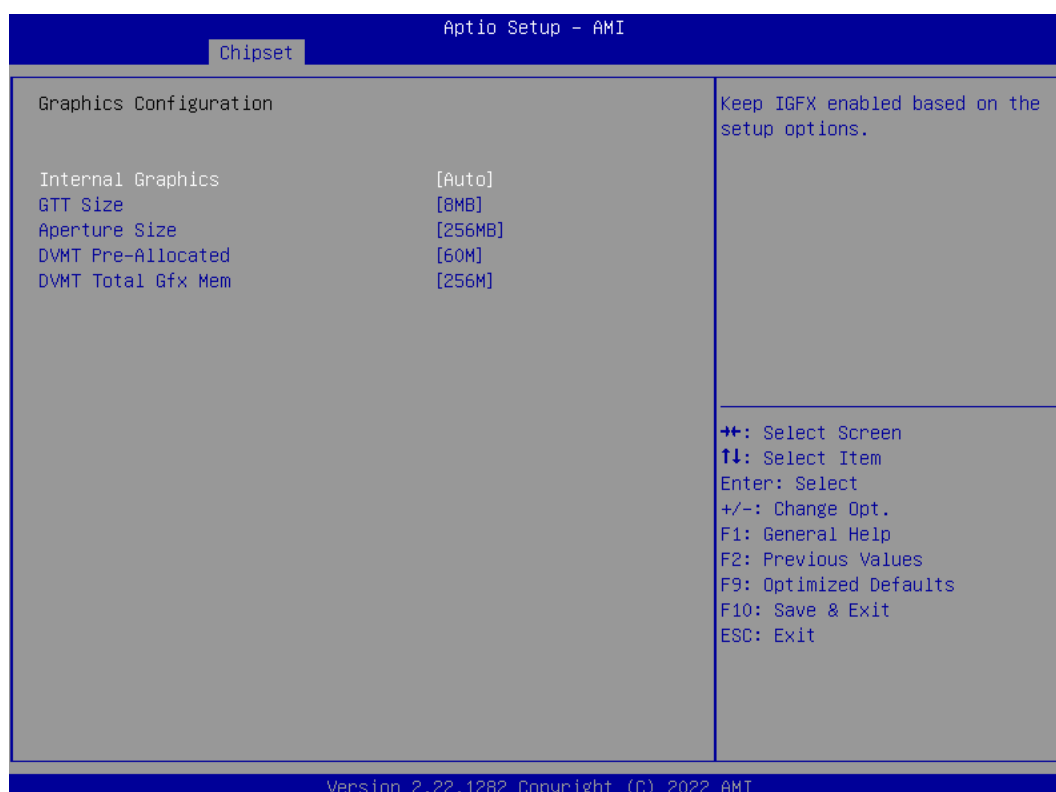
**IOP VTD Enable**

Enable or Disable IOP VTD.

**Above 4GB MMIO BIOS assignment**

This is enabled automatically when Aperture Size is set to 2048MB.

- **Graphics Configuration**



### Internal Graphics

Keep IGFX enabled based on the setup options.

### GTT Size

This option can select the GTT Size.

### Aperture Size

This option can select the Aperture Size.



**Note**

*[\*]: Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support.*

### DVMT Pre-Allocated

Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.

### DVMT Total Gfx Mem

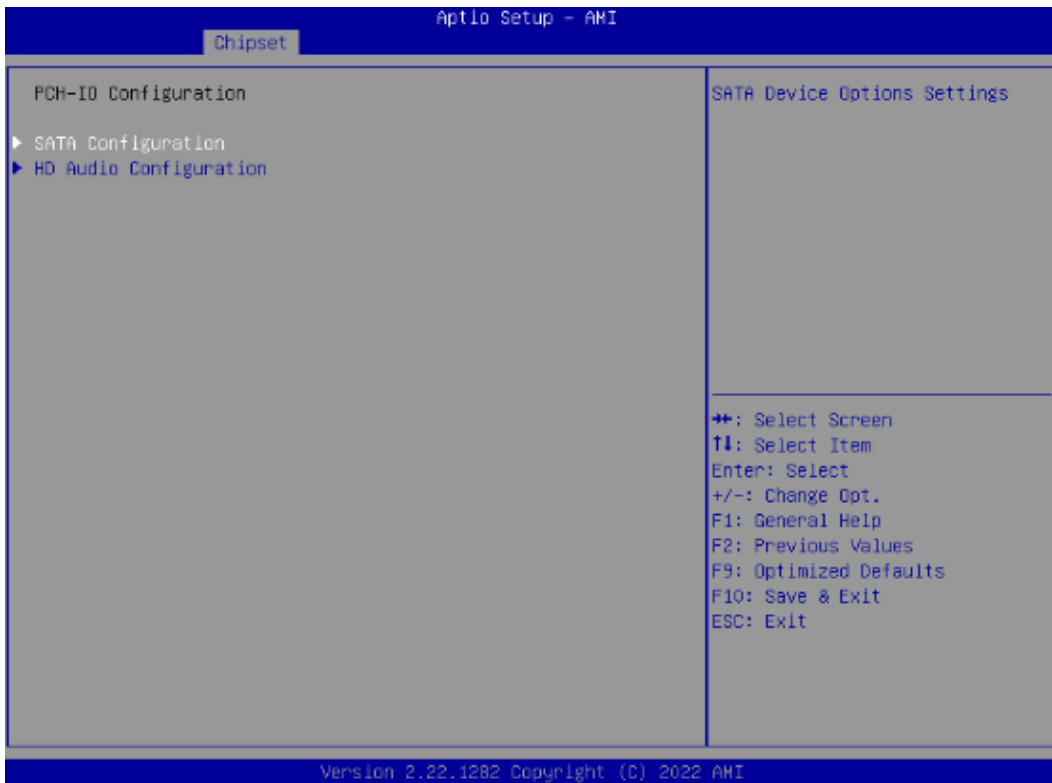
Select DVMT 5.0 Total Graphic Memory size used by the Internal Graphic Device.

### DiSM Size

DiSM Size for 2LM Sku.

- **PCH-IO Configuration**

This screen allows you to set PCH parameters.



**SATA Configuration**

SATA device options settings.

**HD Audio**

HD Audio Subsystem Configuration Settings.

- **SATA Configuration**

During system boot up, BIOS automatically detects the presence of SATA devices. In the SATA Configuration menu, you can see all currently installed SATA device(s).



**SATA Controller(s)**

Enable or disable the SATA Controller feature.

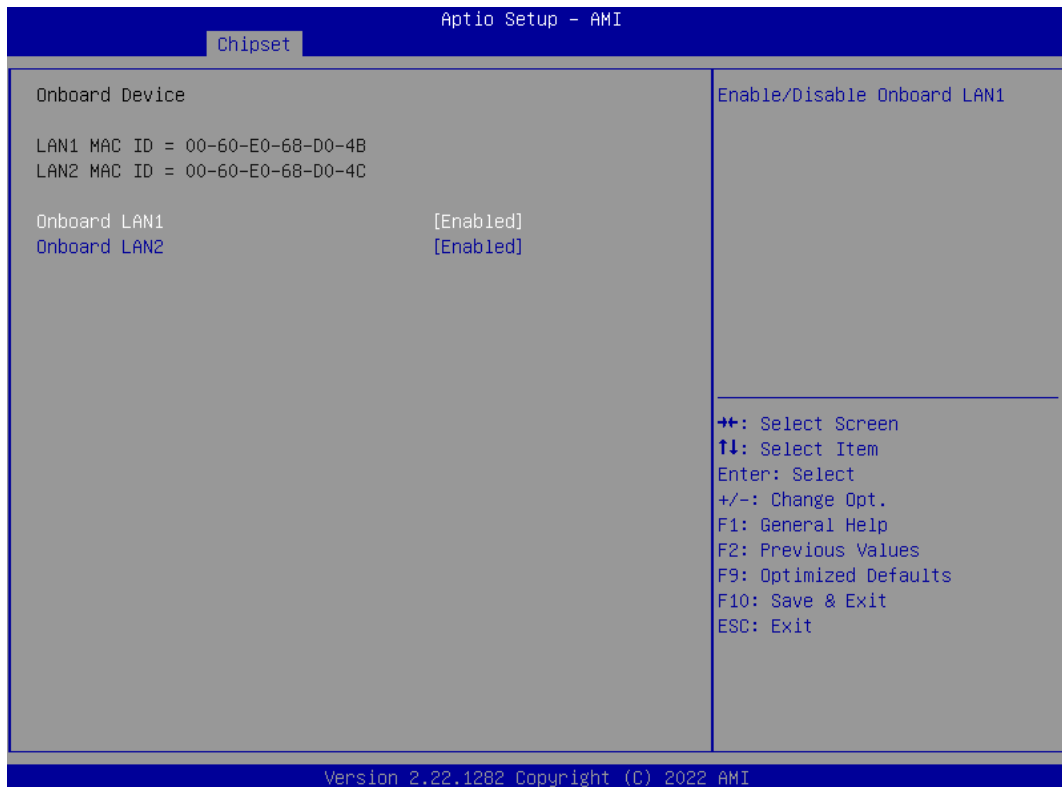
- **HD Audio**



Control detection of the HD Audio device.

- Disabled: HDA will be unconditionally disabled.
- Enabled: HDA will be unconditionally enabled.

- **Onboard Device**



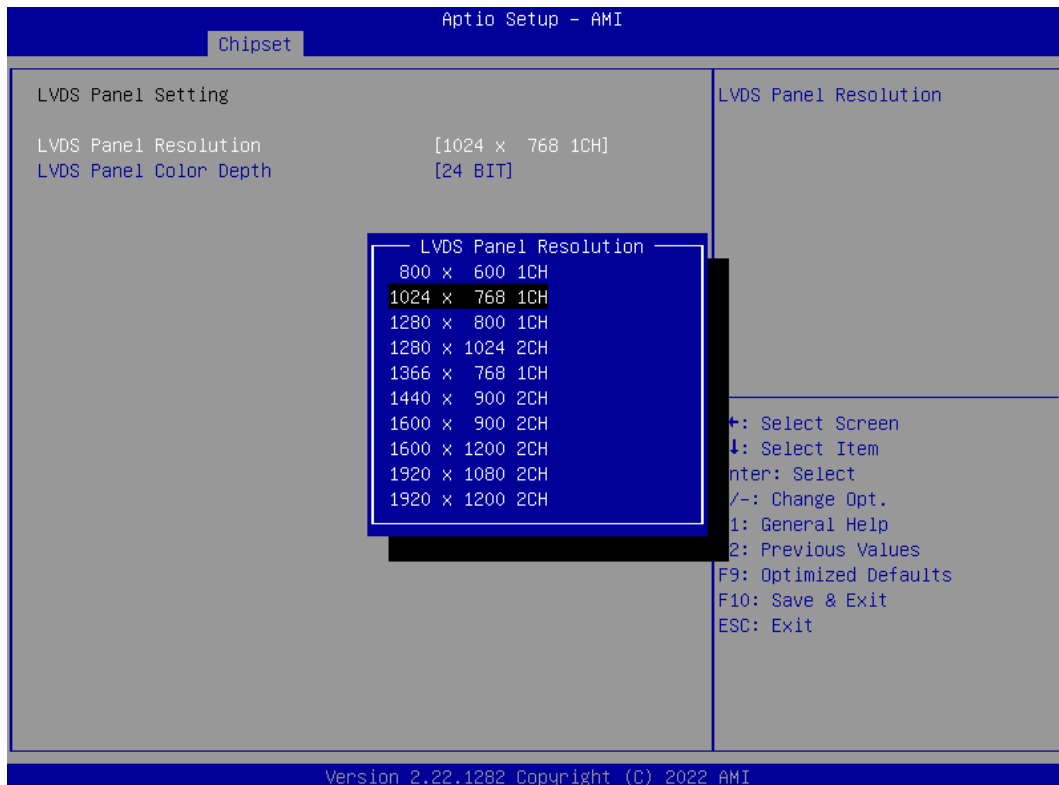
**Onboard Gigabit LAN 1/2**

Enable or disable onboard Gigabit LAN 1/2.

**Onboard LAN1/LAN2 Option ROM**

Enable or disable onboard LAN1/LAN2 Option ROM.

- **LVDS Panel Setting**



**LVDS Panel Resolution**

Allows user to set LVDS Resolution. (Default: 1024x768)

**LVDS Panel Color Depth**

Allows user to set LVDS bit rate. (Default: 24 bit)

### 3.6 Security Menu

The Security menu allows users to change the security settings for the system.



**Administrator Password**  
Set administrator password.

**User Password**  
Set user password.



## 3.7 Boot Menu

The Boot menu allows users to change boot options of the system.



### Setup Prompt Timeout

Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

### Bootup NumLock State

Use this item to select the power-on state for the keyboard NumLock.

### Boot Success Beep

Enable or disable beep sound after successful boot.

### Quiet Boot

Select to display either POST output messages or a splash screen during boot-up.

### Boot Option Priorities

These are settings for boot priority. Specify the boot device priority sequence from the available devices. Default USB device is Highly priorities.

## 3.8 Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.



### Save Changes and Reset

Reset the system after saving the changes.

### Discard Changes and Exit

Exit system setup without saving any changes.

### Restore Defaults

Restore or load default values for all the setup options.

### Boot Override

Select a drive to immediately boot that device regardless of the current boot order.

# Appendix A

## Watchdog Timer

### A.1 About Watchdog Timer

Software stability is major issue in most application. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us solution.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

### A.2 Sample Program

```
#include "stdafx.h"
#include <windows.h>
#include <stdio.h>
#include <tchar.h>
#include <stdlib.h>

#ifdef _DEBUG
#define new DEBUG_NEW
#endif

#pragma comment (lib, "User32.lib" )

#define IDT_TIMER WM_USER + 200
#define _CRT_SECURE_NO_WARNINGS 1
#define setbit(value,x) (value |= (1<<x))
#define clrbit(value,x) (value &=~(1<<x))

HINSTANCE hinstLibDLL = NULL;
LONG WDTDATA = 0;

typedef ULONG(*LPFNDDLGETIOSPACE)(ULONG);
LPFNDDLGETIOSPACE lpFnDll_Get_IO;
typedef void(*LPFNDDLSETIOSPACE)(ULONG, ULONG);
LPFNDDLSETIOSPACE lpFnDll_Set_IO;

int _tmain(int argc, _TCHAR* argv[])
{
    int unit = 0;
    int WDTtimer = 0;
    if (hinstLibDLL == NULL)
    {
        hinstLibDLL = LoadLibrary(TEXT("diodll.dll"));
        if (hinstLibDLL == NULL)
        {
            //MessageBox("Load diodll dll error", "", MB_OK);
        }
    }
    if (hinstLibDLL)
```

```
{
    lpFnDll_Get_IO =
(LPFNDDLGETIOSPACE)GetProcAddress(GetModuleHandle("diodll.dll"), "GetIoSpaceByte");
    lpFnDll_Set_IO =
(LPFNDDLSETIOSPACE)GetProcAddress(GetModuleHandle("diodll.dll"), "SetIoSpaceByte");

}
printf("Input Watch Dog Timer type, 1:Second ; 2:Minute :");
scanf("%d",&unit);
printf("\nInput Timer to countdown:");
scanf("%d", &WDTtimer);
printf("Start to countdown...");

//==Enter MB Pnp Mode==
lpFnDll_Set_IO(0x2e, 0x87);
lpFnDll_Set_IO(0x2e, 0x87);
lpFnDll_Set_IO(0x2e, 0x07);
lpFnDll_Set_IO(0x2f, 0x07); //SET LDN 07
//set LDN07 FA 10 to 11
lpFnDll_Set_IO(0x2e, 0xFA);
WDTDATA = lpFnDll_Get_IO(0x2f);
WDTDATA = setbit(WDTDATA, 0);
lpFnDll_Set_IO(0x2f, WDTDATA);

if (unit == 1)
{
    lpFnDll_Set_IO(0x2e, 0xF6);
    lpFnDll_Set_IO(0x2f, WDTtimer);

    //start watchdog counting
    lpFnDll_Set_IO(0x2e, 0xF5);
    WDTDATA = lpFnDll_Get_IO(0x2f);
    WDTDATA = setbit(WDTDATA, 5);
    lpFnDll_Set_IO(0x2f, WDTDATA);

}
else if (unit == 2)
{
    //set WDT Timer
    lpFnDll_Set_IO(0x2e, 0xF6);
    lpFnDll_Set_IO(0x2f, WDTtimer);
    //set watchdog time unit to min
    lpFnDll_Set_IO(0x2e, 0xF5);
    WDTDATA = lpFnDll_Get_IO(0x2f);
    WDTDATA = setbit(WDTDATA, 3);
    lpFnDll_Set_IO(0x2f, WDTDATA);
    //start watchdog counting
    lpFnDll_Set_IO(0x2e, 0xF5);
    WDTDATA = lpFnDll_Get_IO(0x2f);
    WDTDATA = setbit(WDTDATA, 5);
    lpFnDll_Set_IO(0x2f, WDTDATA);

}

system("pause");

return 0;
}
```

# Appendix B

## Digital I/O

### B.1 About Digital I/O

The onboard digital I/O has 8 bits. Each bit can be set to function as input or output by software programming. In default, all pins are pulled high with +5V level (according to main power). The BIOS default settings are 4 inputs and 4 outputs.

### B.2 Sample Program

```
#include "stdafx.h"

#ifdef _DEBUG
#define new DEBUG_NEW
#endif

#include <windows.h>
#include <stdio.h>
#include <tchar.h>
#include <stdlib.h>

#pragma comment (lib, "User32.lib" )

#define IDT_TIMER WM_USER + 200
#define _CRT_SECURE_NO_WARNINGS 1
#define setbit(value,x) (value |= (1<<x))
#define clrbit(value,x) (value &=~(1<<x))
#define GPIO_HIGH 1
#define GPIO_LOW 0

HINSTANCE hinstLibDLL = NULL;

LONG u8AHData = 0;
LONG u88HData = 0;
LONG u89HData = 0;

static int DI0status = 1;
static int DI1status = 1;
static int DI2status = 1;
static int DI3status = 1;

typedef ULONG(*LPFNDDLGETIOSPACE)(ULONG);
LPFNDDLGETIOSPACE lpFnDll_Get_IO;
typedef void(*LPFNDDLSETIOSPACE)(ULONG, ULONG);
LPFNDDLSETIOSPACE lpFnDll_Set_IO;

int _tmain(int argc, _TCHAR* argv[])
{
    if (hinstLibDLL == NULL)
    {
        hinstLibDLL = LoadLibrary(TEXT("di.dll"));
        if (hinstLibDLL == NULL)
        {

```

```

        //MessageBox("Load diodll.dll error", "", MB_OK);
    }
}
if (hinstLibDLL)
{
    lpFnDll_Get_IO =
(LPFNDLLGETIOSPACE)GetProcAddress(GetModuleHandle("diodll.dll"), "GetIoSpaceByte");
    lpFnDll_Set_IO =
(LPFNDLLSETIOSPACE)GetProcAddress(GetModuleHandle("diodll.dll"), "SetIoSpaceByte");
}
/*
printf("Input Watch Dog Timer type, 1:Second ; 2:Minute :");
scanf("%d",&unit);
printf("\nInput Timer to countdown:");
scanf("%d", &WDTimer);
printf("Start to countdown...");
*/
//==Enter MB Pnp Mode==
lpFnDll_Set_IO(0x2e, 0x87);
lpFnDll_Set_IO(0x2e, 0x87);
//LDN 06
lpFnDll_Set_IO(0x2e, 0x07);
lpFnDll_Set_IO(0x2f, 0x06);
//set LDN06 88h =OF
//88h <0> = 1 GPIO80 DO0 output mode set 1 or input mode set 0
lpFnDll_Set_IO(0x2e, 0x88);
u88HData = lpFnDll_Get_IO(0x2f);
u88HData = setbit(u88HData, 0);
lpFnDll_Set_IO(0x2f, u88HData);
// 88h <1> =1 GPIO81 DO1 output mode set 1 or input mode set 0
lpFnDll_Set_IO(0x2e, 0x88);
u88HData = lpFnDll_Get_IO(0x2f);
u88HData = setbit(u88HData, 1);
lpFnDll_Set_IO(0x2f, u88HData);
// 88h <2> =1 GPIO82 DO2 output mode set 1 or input mode set 0
lpFnDll_Set_IO(0x2e, 0x88);
u88HData = lpFnDll_Get_IO(0x2f);
u88HData = setbit(u88HData, 2);
lpFnDll_Set_IO(0x2f, u88HData);
// 88h <3> =1 GPIO83 DO3 output mode set 1 or input mode set 0
lpFnDll_Set_IO(0x2e, 0x88);
u88HData = lpFnDll_Get_IO(0x2f);
u88HData = setbit(u88HData, 3);
lpFnDll_Set_IO(0x2f, u88HData);

//set 89 FF-F0
// 89 <0> = 0 set GPIO 80 outputs 0 when in output mode
lpFnDll_Set_IO(0x2e, 0x89);
u89HData = lpFnDll_Get_IO(0x2f);
u89HData = clrbit(u89HData, 0);
lpFnDll_Set_IO(0x2f, u89HData);

// 89 <1> = 0
lpFnDll_Set_IO(0x2e, 0x89);
u89HData = lpFnDll_Get_IO(0x2f);
u89HData = clrbit(u89HData, 1);
lpFnDll_Set_IO(0x2f, u89HData);

//89 <2> = 0
lpFnDll_Set_IO(0x2e, 0x89);
u89HData = lpFnDll_Get_IO(0x2f);
u89HData = clrbit(u89HData, 2);
lpFnDll_Set_IO(0x2f, u89HData);

//89 <3> = 0

```

```

lpFnDll_Set_IO(0x2e, 0x89);
u89HData = lpFnDll_Get_IO(0x2f);
u89HData = clrbit(u89HData, 3);
lpFnDll_Set_IO(0x2f, u89HData);

while (1)
{
    //Get GPIO 8x Status
    lpFnDll_Set_IO(0x2e, 0x8A);
    u8AHDData = lpFnDll_Get_IO(0x2f);
    lpFnDll_Set_IO(0x2f, u8AHDData);
    if (0x10 & u8AHDData //GPIO84 DI0 status
    {
        DI0status = GPIO_HIGH;
    }
    else
    {
        DI0status = GPIO_LOW;
    }
    if (0x20 & u8AHDData //GPIO85 DI1 status
    {
        DI1status = GPIO_HIGH;
    }
    else
    {
        DI1status = GPIO_LOW;
    }
    if (0x40 & u8AHDData //GPIO86 DI2 status
    {
        DI2status = GPIO_HIGH;
    }
    else
    {
        DI2status = GPIO_LOW;
    }
    if (0x80 & u8AHDData //GPIO87 DI3 status
    {
        DI3status = GPIO_HIGH;
    }
    else
    {
        DI3status = GPIO_LOW;
    }
    if ((DI0status == GPIO_LOW && DI1status == GPIO_LOW) && (DI2status ==
GPIO_LOW && DI3status == GPIO_LOW))
    {
        printf("All DINPUT status Low\n");
    }
    else if((DI0status == GPIO_HIGH && DI1status == GPIO_HIGH) && (DI2status ==
GPIO_HIGH && DI3status == GPIO_HIGH))
    {
        printf("All DINPUT status High\n");
    }
    Sleep(1000);
}
system("pause");
return 0;
}

```