# MI988F

## AMD Ryzen™ Embedded V1000
## Mini-ITX Motherboard

# User's Manual

Version 1.0d
(November 2021)

# Compliance

CE

This is a class B product. In a domestic environment, this product may cause radio interference in which case users may be required to take adequate measures.

FC

This product has been tested and found to comply with the limits for a Class B device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications.

## WEEE

This product must not be disposed of as normal household waste, in accordance with the EU directive of for waste electrical and electronic equipment (WEEE - 2012/19/EU). Instead, it should be disposed of by returning it to a municipal recycling collection point. Check local regulations for disposal of electronic products.

## Green IBASE


This product is compliant with the current RoHS restrictions and prohibits use of the following substances in concentrations exceeding 0.1% by weight (1000 ppm) except for cadmium, limited to 0.01% by weight (100 ppm).

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

# Important Safety Information

Carefully read the precautions before using the board.

### Environmental conditions:

- Use this product in environments with ambient temperatures between 0˚C and 60˚C.
- Do not leave this product in an environment where the storage temperature may be below -20° C or above 80° C. To prevent from damages, the product must be used in a controlled environment.

### Care for your IBASE products:

- Before cleaning the PCB, unplug all cables and remove the battery.
- Clean the PCB with a circuit board cleaner, degreaser, or use cotton swabs and alcohol.
- Vacuum the dust with a computer vacuum cleaner to prevent the fan from being clogged.

**WARNING**

### Attention during use:

- Do not use this product near water.
- Do not spill water or any other liquids on this product.
- Do not place heavy objects on the top of this product.

### Anti-static precautions

- Wear an anti-static wrist strap to avoid electrostatic discharge.
- Place the PCB on an anti-static kit or mat.
- Hold the edges of PCB when handling.
- Touch the edges of non-metallic components of the product instead of the surface of the PCB.
- Ground yourself by touching a grounded conductor or a grounded bit of metal frequently to discharge any static.

**CAUTION**

Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions or recycle them at a local recycling facility or battery collection point.

## Warranty Policy

- **IBASE standard products:**

  24-month (2-year) warranty from the date of shipment. If the date of shipment cannot be ascertained, the product serial numbers can be used to determine the approximate shipping date.

- **3rd-party parts:**

  12-month (1-year) warranty from delivery for the 3rd-party parts that are not manufactured by IBASE, such as CPU, CPU cooler, memory, storage devices, power adapter, panel and touchscreen.

* PRODUCTS, HOWEVER, THAT FAIL DUE TO MISUSE, ACCIDENT, IMPROPER INSTALLATION OR UNAUTHORIZED REPAIR SHALL BE TREATED AS OUT OF WARRANTY AND CUSTOMERS SHALL BE BILLED FOR REPAIR AND SHIPPING CHARGES.

## Technical Support & Services

1. Visit the IBASE website at www.ibase.com.tw to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative concerning problems that you may have encountered, please prepare the following information:
   - Product model name
   - Product serial number
   - Detailed description of the problem
   - The error messages in text or in screenshots if there is any
   - The arrangement of the peripherals
   - Software in use (such as OS and application software, including the version numbers)
3. If repair service is required, please log in to the RMA system of the website or and contact your distributor or sales representative for assistance.

# Table of Contents

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# Chapter 1
# General Information

The information provided in this chapter includes:

- Features
- Packing List
- Specifications
- Block Diagram
- Product View
- Board Dimensions

## 1.1 Introduction

MI988F is a mini-ITX motherboard based on the AMD Ryzen™ V1000 APU. It offers high-definition visual experience and high performance on graphics processing. It can also be well utilized for designs of low power consumption in a board range of markets, including industrial control & automation, digital signage, thin client, electronic gaming machines, and SMB storage appliances.

## 1.2 Features

- AMD Ryzen™ Embedded V1000 on board
- 2 x DDR4 SO-DIMM expandable up to 32 GB, ECC supported
- 2 x PCIe GbE LAN
- 1 x HDMI (2.0a), 1x DisplayPort (1.4), 1x 24-bit dual channel LVDS, 1 x eDP
- 4 x USB3.1, 1 x SATA III, 6 x COM
- 1 x PCIe (x8), 1x Mini-PCIe socket, 1 x M.2 M2230

## 1.3 Packing List

Your product package should include the items listed below. If any of the items below is missing, contact the distributor or dealer from whom you purchased the product.

- MI988F Motherboard
- I/O Shield
- SATA Cable (SATA-26C)
- Power Cable (PW129)

## 1.4 Optional Accessories

IBASE provides optional accessories as follows. Please contact us or your dealer if you need any.

- Power Adaptor (150W)
- COM Port Cable (PK1H)
- Audio Cable (Audio-34)

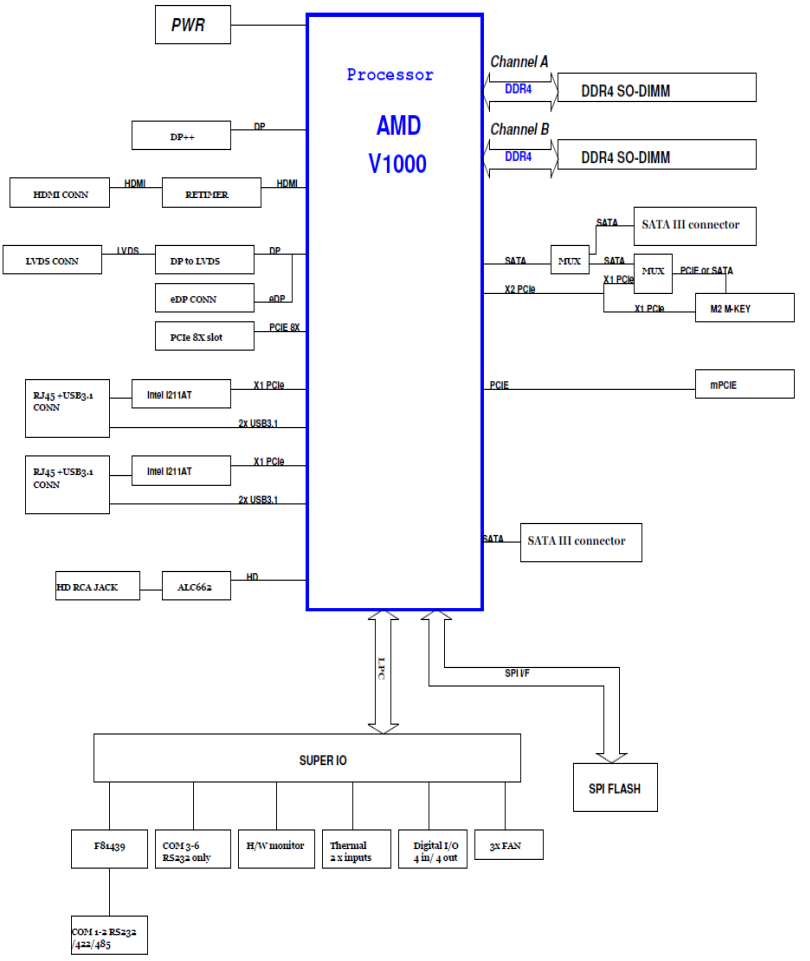
## 1.5 Specifications

| Product Name | MI988F |
|---|---|
| **Form Factor** | Mini-ITX motherboard |
| **System** | |
| **Operating System** | • Windows 10 (64-bit)<br>• Linux |
| **CPU & Chipset** | AMD Ryzen™ Embedded V1000 APU onboard |
| **Memory** | 2 x DDR4-2666 SO-DIMM, expandable up to 32 GB, ECC compatible |
| **Storage** | SSD via M.2 slot |
| **Graphics** | AMD Vega GPU integrated |
| **Network** | 2 x LAN: Intel® I211AT PCIe GbE |
| **Super I/O** | Nuvoton NCT6116D |
| **Audio Codec** | Built in HD audio with Realtek ALC662 for 5.1 channel |
| **Power Requirement** | DC-In 12 ~ 24V |
| **Watchdog Timer** | Yes (256 segments, 0, 1, 2…255 sec / min) |
| **BIOS** | AMI BIOS |
| **EuP / ErP** | Yes |
| **Dimensions** | 170 x 170 mm (6.7” x 6.7”) |
| **RoHS** | Yes |
| **Certification** | CE, FCC Class B, LVD |
| **I/O Ports** | |
| **Display** | • 1 x HDMI 2.0a (3840 x 2160 at 60 Hz)<br>• 1 x DisplayPort 1.4 (3840 x 2160 at 60 Hz)<br>• 1 x 24-bit dual channel LVDS (1920 x 1080 at 60 Hz) or eDP (1920 x 1080 at 60 Hz) |
| **LAN** | 2 x RJ45 GbE LAN |
| **USB** | 4 x USB 3.1 |

| | |
|---|---|
| **Serial** | **6 x COM ports:**<br>• COM1 & COM2: RS-232/422/485 (edge I/O connectors, jumper-less selection)<br>• COM3 ~ COM4: RS-232 only (edge I/O connectors)<br>• COM5 ~ COM6: RS-232 only (via on-board box-headers) |
| **SATA** | 2 x SATA 3.0<br>* Use either the SATA 3.0 port (connector SATA1) or the M.2 Slot. |
| **Audio Jack** | 1 x Line-In, 1 x Line-Out, 1 x Mic-In |
| **Digital IO** | 4-In & 4-Out |
| **Expansion Slots** | • 1 x PCIe (x8) slot<br>• 1 x half-size Mini-PCIe slot with USB & PCIe<br>• 1 x M.2 M2280 slot for SSD<br>* Use either the SATA 3.0 port (connector SATA1) or the M.2 Slot. |
| **Environment** | |
| **Temperature** | • Operating: 0 ~ 60 °C (32 ~ 140 °F)<br>• Storage: -20 ~ 80 °C (-4 ~ 176 °F) |
| **Relative Humidity** | 0 ~ 90 %, non-condensing at 60 °C |

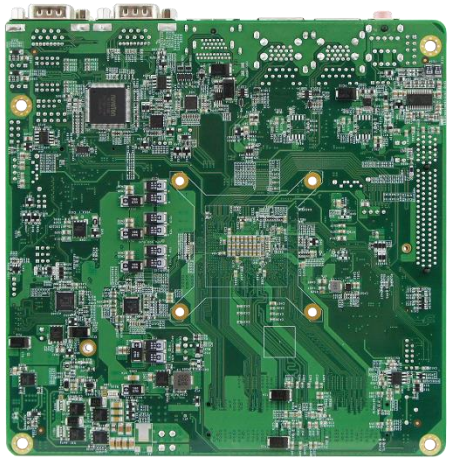
All specifications are subject to change without prior notice.

## 1.6 Block Diagram



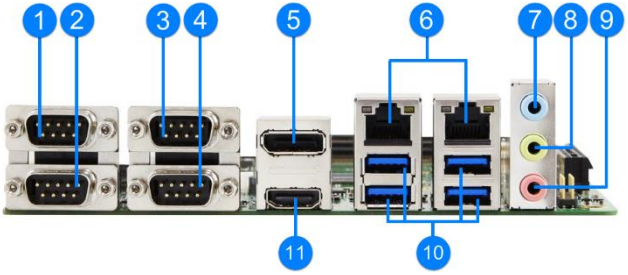
## 1.7 Product View

### Top View

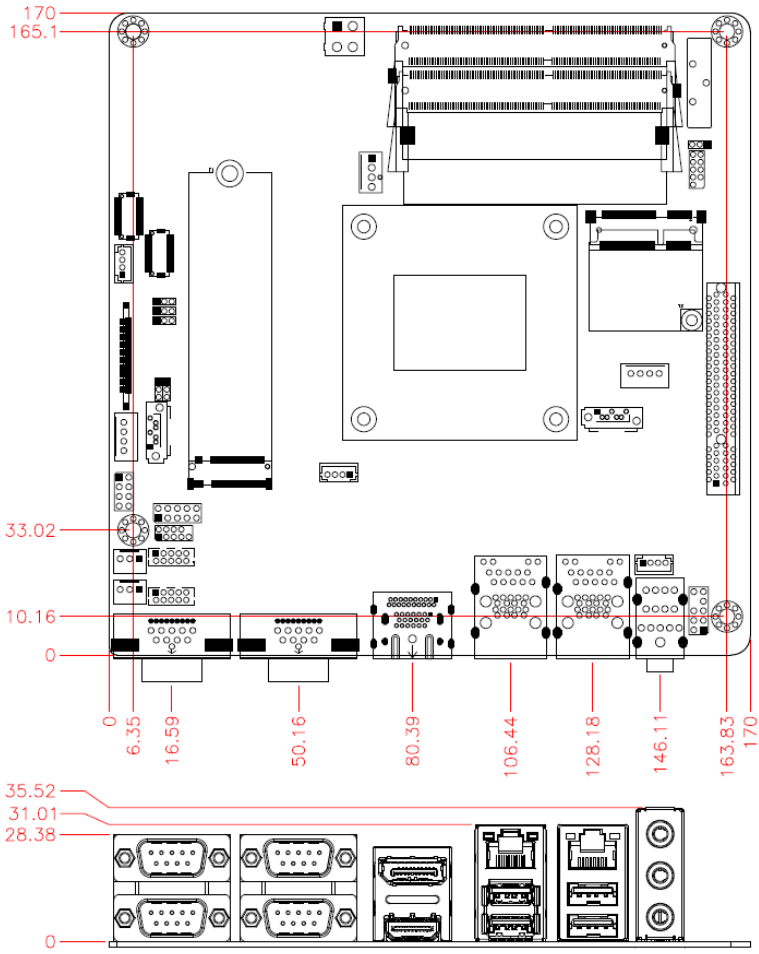
* The photos above are for reference only. Some minor components may differ.

## I/O View




| No. | Name | No. | Name |
|---|---|---|---|
| 1 | COM3 Port | 7 | Audio Line-In |
| 2 | COM4 Port | 8 | Audio Line-Out |
| 3 | COM1 Port | 9 | Microphone-In |
| 4 | COM2 Port | 10 | USB 3.1 Ports |
| 5 | DisplayPort | 11 | HDMI Port |
| 6 | GbE LAN Ports | | |

## 1.8 Dimensions



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# Chapter 2
# Hardware Configuration

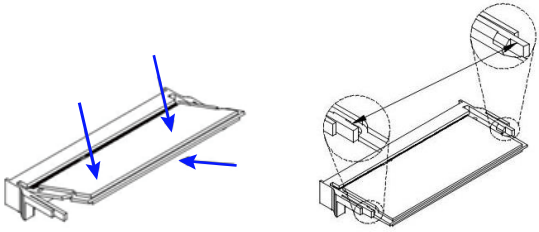
This section provides information on jumper settings and connectors on the board in order to set up a workable system. On top of that, you will also need to install crucial pieces such as the CPU and the memory before using the product. The topics covered are:

- Memory installation
- Jumper and connector locations
- Jumper settings and information of connectors

## 2.1 Installations

### 2.1.1 Installing the Memory

To install the modules, locate the memory slot on the board and perform the following steps:



1. Align the key of the memory module with that on the memory slot and insert the module slantwise.
2. Gently push the module in an upright position until the clips of the slot close to hold the module in place when the module touches the bottom of the slot.

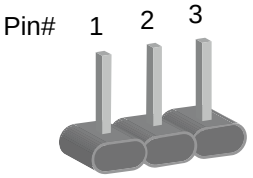
To remove the module, press the clips outwards with both hands, and the module will pop-up.

## 2.2 Setting the Jumpers

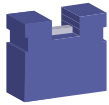
Set up and configure your board by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

### 2.2.1 How to Set Jumpers

Jumpers are short-length conductors consisting of several metal pins with a non-conductive base mounted on the circuit board. Jumper caps are used to have the functions and features enabled or disabled. If a jumper has 3 pins, you can connect either PIN1 to PIN2 or PIN2 to PIN3 by shorting.

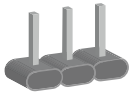
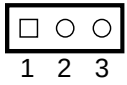
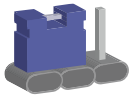
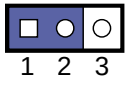
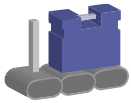
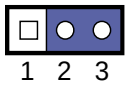



**A 3-pin jumper**



**A jumper cap**

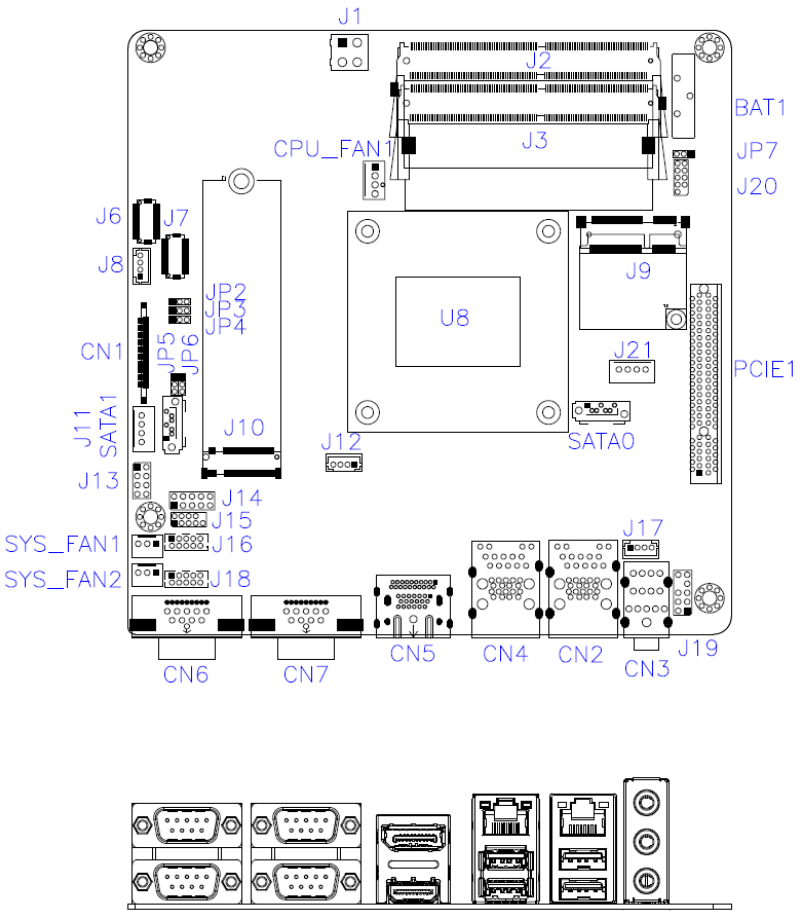
Refer to the illustration below to set jumpers.

| Pin closed | Oblique view | Illustration |
|---|---|---|
| Open |  |   |
| 1-2 |  |   |
| 2-3 |  |   |

When two pins of a jumper are encased in a jumper cap, this jumper is **closed**, i.e. turned **On**.

When a jumper cap is removed from two jumper pins, this jumper is **open**, i.e. turned **Off**.

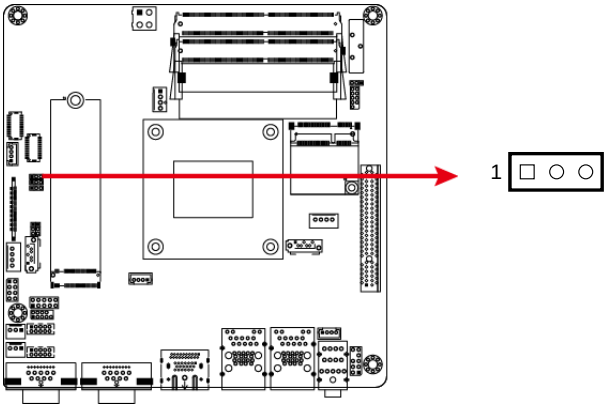
## 2.3 Jumper & Connector Locations on MI988F

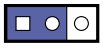
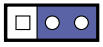


## 2.4 Jumpers Quick Reference

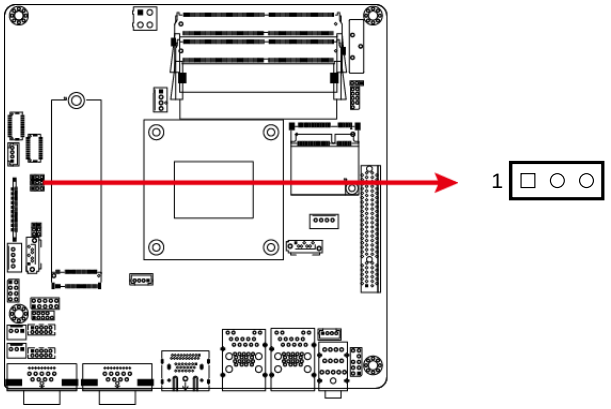
| Function | Jumper | Page |
|---|---|---|
| LCD Panel Power Selection | JP2 | 15 |
| LCD Backlight Level | JP3 | 16 |
| PWM Backlight Control Level | JP4 | 16 |
| eDP Panel Power Selection | JP5 | 17 |
| eDP / LVDS Selection | JP6 | 18 |
| Clearing CMOS Data | JP7 | 18 |

### 2.4.1 LCD Panel Power Selection (JP2)



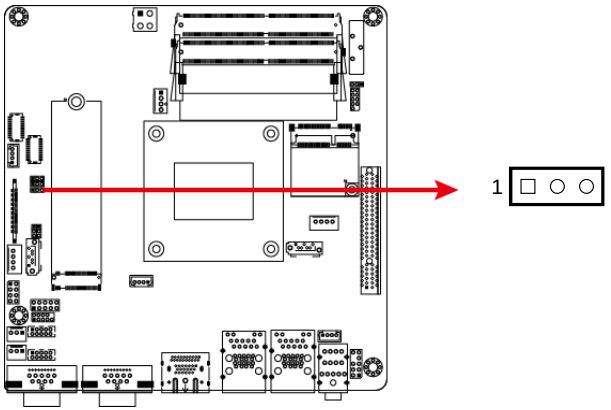

| Function | Pin closed | Illustration |
|---|---|---|
| 3.3V (default) | 1-2 |  |
| 5V | 2-3 |  |

## 2.4.2 LCD Backlight Level (JP3)



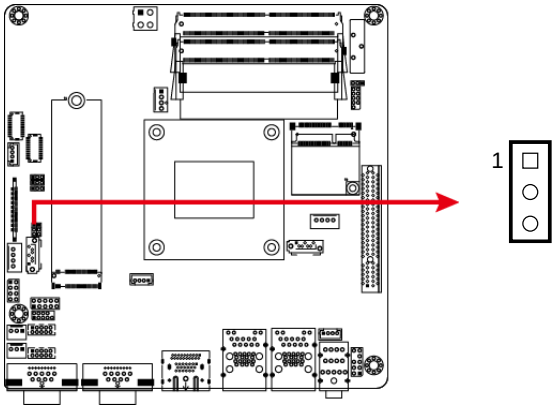

| Function | Pin closed | Illustration |
|---|---|---|
| 3.3V (default) | 1-2 | 1 |
| 5V | 2-3 | 1 |

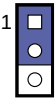
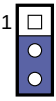
## 2.4.3 PWM Backlight Control Level (JP4)



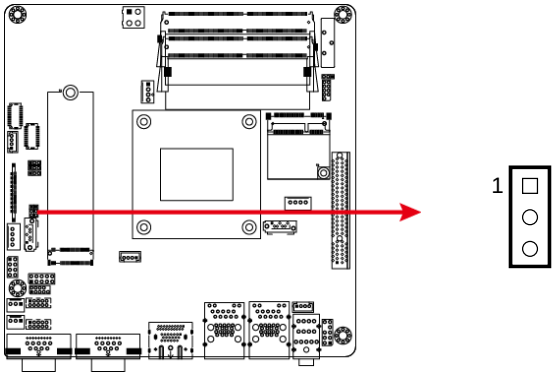

| Function | Pin closed | Illustration |
|---|---|---|
| 3.3V (default) | 1-2 | 1 |
| 5V | 2-3 | 1 |

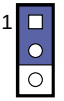
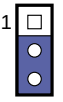
### 2.4.4 eDP Panel Power Selection (JP5)



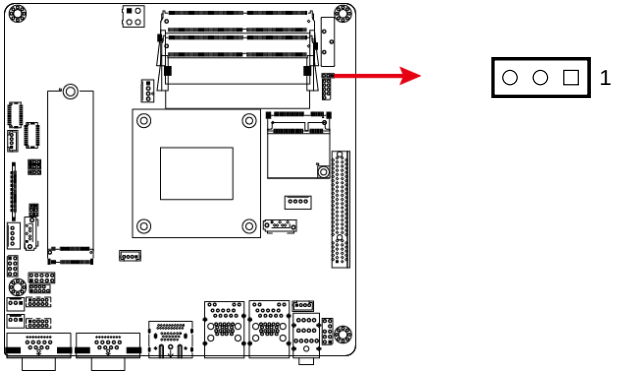

| Function | Pin closed | Illustration |
|---|---|---|
| 3.3V (default) | 1-2 |   |
| 5V | 2-3 |   |

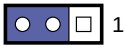
### 2.4.5 eDP / LVDS Selection (JP6)




| Function | Pin closed | Illustration |
|---|---|---|
| eDP Only (default) | 1-2 |   |
| LVDS Only | 2-3 |   |

### 2.4.6 Clear CMOS Data (JP7)

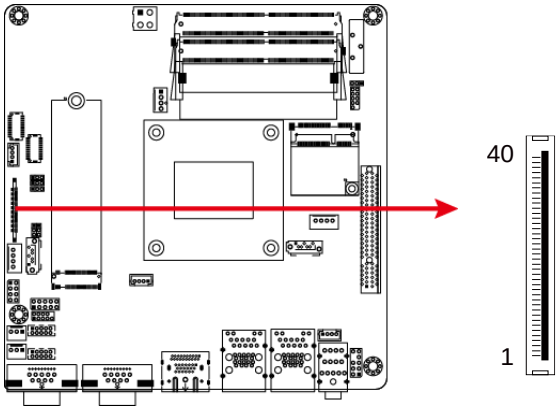



| Function | Pin closed | Illustration |
|---|---|---|
| Normal (default) | 1-2 |   |
| Clear CMOS | 2-3 |   |

## 2.5 Connectors Quick Reference

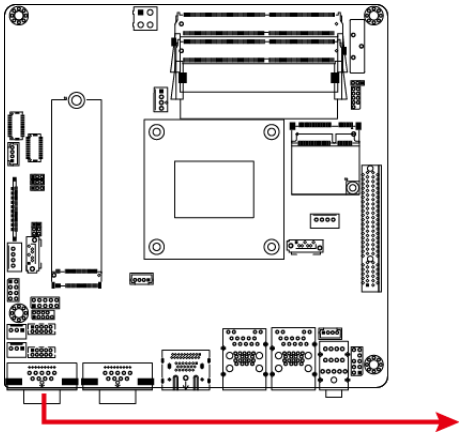
| Function | Connector | Page |
|---|---|---|
| eDP Connector | CN1 | 20 |
| COM3 & COM4 RS-232 Ports | CN6 | 21 |
| COM1 & COM2 RS-232/422/485 Ports | CN7 | 22 |
| DC-In Power Connector | J1 | 23 |
| LCD Backlight Connector | J8 | 23 |
| LVDS Connector | J6 (Channel A), J7 (Channel B) | 24 |
| SATA Power Connector | J11, J21 | 25 |
| Digital I/O Connector | J14 | 25 |
| Front Panel Settings Connector | J13 | 26 |
| COM5 & COM6 RS-232 Port | J18 (COM5), J16 (COM6) | 27 |
| Speaker Connector | J17 | 27 |
| Audio Connector | J19 | 28 |
| Fan Power Connectors | CPU_FAN1, SYS_FAN1, SYS_FAN2 | 29 |
| GbE LAN Port and Dual USB 3.1 Ports | CN2, CN4 | -- |
| DisplayPort & HDMI Port | CN5 | -- |
| DDR4 SO-DIMM Slot | J2, J3 | -- |
| Mini-PCIe Slot | J9 | -- |
| M.2 M2280 Slot | J10 | -- |
| SATA III Connector | SATA0, SATA1 | -- |
| PCIe (x8) Slot | PCIE1 | -- |
| RTC Lithium Button Cell Holder | BAT1 | -- |
| Factory Use Only | J12, J15, J20 | -- |

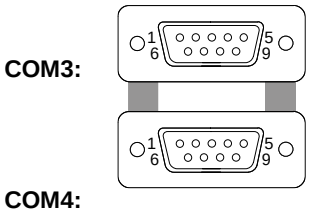
### 2.5.1 eDP Connector (CN1)




| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | +3.3V (default) / +5V | 21 | TXN0 |
| 2 | +3.3V (default) / +5V | 22 | TXP0 |
| 3 | +3.3V (default) / +5V | 23 | Ground |
| 4 | +3.3V (default) / +5V | 24 | AUXP |
| 5 | +3.3V (default) / +5V | 25 | AUXN |
| 6 | Ground | 26 | NC |
| 7 | Ground | 27 | VCC3 |
| 8 | Ground | 28 | VCC12 |
| 9 | Ground | 29 | NC |
| 10 | HOT PLUG | 30 | Ground |
| 11 | Ground | 31 | VCC5 |
| 12 | NC | 32 | NC |
| 13 | NC | 33 | Brightness |
| 14 | Ground | 34 | BKLT_EN |
| 15 | NC | 35 | VCC12 |
| 16 | NC | 36 | VCC3 |
| 17 | Ground | 37 | Ground |
| 18 | TXN1 | 38 | SMB_CLK |
| 19 | TXP1 | 39 | SMB_DATA |
| 20 | Ground | 40 | NC |

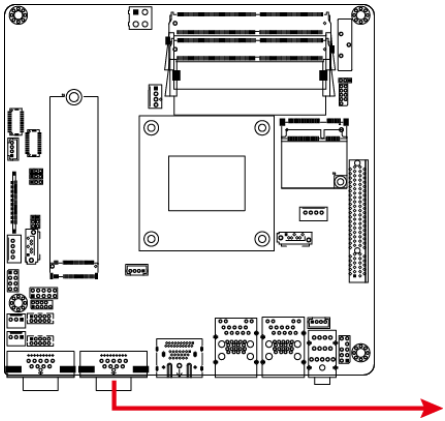
## 2.5.2 COM3 & COM4 RS-232 Ports (CN6)

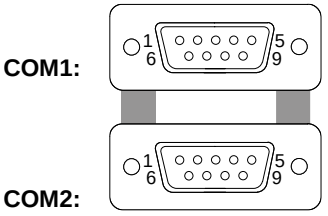





| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | DCD, Data carrier detect | 6 | DSR, Data set ready |
| 2 | RXD, Receive data | 7 | RTS, Request to send |
| 3 | TXD, Transmit data | 8 | CTS, Clear to send |
| 4 | DTR, Data terminal ready | 9 | RI, Ring indicator |
| 5 | Ground | | |

### 2.5.3 COM1 & COM2 RS-232/422/485 Ports (CN7)



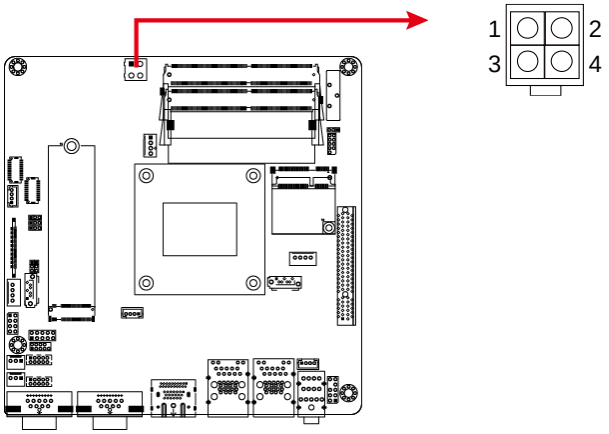



**COM1** and **COM2** RS-232/422/485 ports are jumper-less and configurable in BIOS.

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | DCD, Data carrier detect | 6 | DSR, Data set ready |
| 2 | RXD, Receive data | 7 | RTS, Request to send |
| 3 | TXD, Transmit data | 8 | CTS, Clear to send |
| 4 | DTR, Data terminal ready | 9 | RI, Ring indicator |
| 5 | Ground | | |

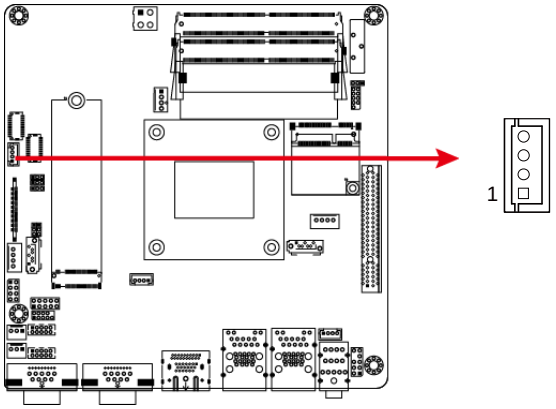
| Pin | Signal Name | | |
|---|---|---|---|
| | RS-232 | RS-422 | RS-485 |
| 1 | DCD | TX- | Data- |
| 2 | RXD | TX+ | Data+ |
| 3 | TXD | RX+ | NC |
| 4 | DTR | RX- | NC |
| 5 | Ground | Ground | Ground |
| 6 | DSR | NC | NC |
| 7 | RTS | NC | NC |
| 8 | CTS | NC | NC |
| 9 | RI | NC | NC |

### 2.5.4 DC-In Power Connector (J1)



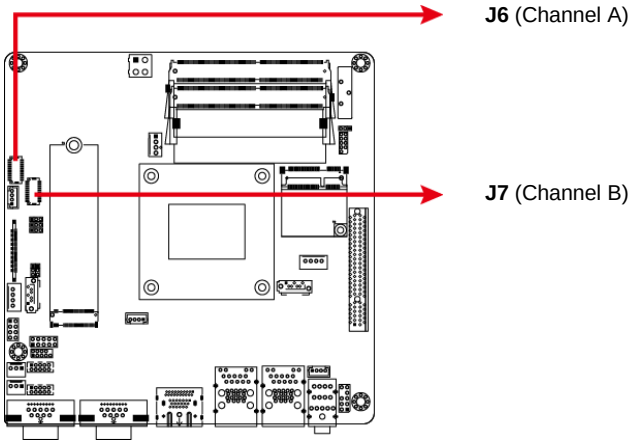

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | Ground | 2 | Ground |
| 3 | +12 ~ +24V | 4 | +12 ~ +24V |

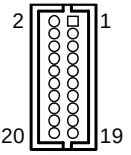
### 2.5.5 LCD Backlight Connector (J8)




| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | +12V | 3 | Brightness Control |
| 2 | Backlight Enable | 4 | Ground |

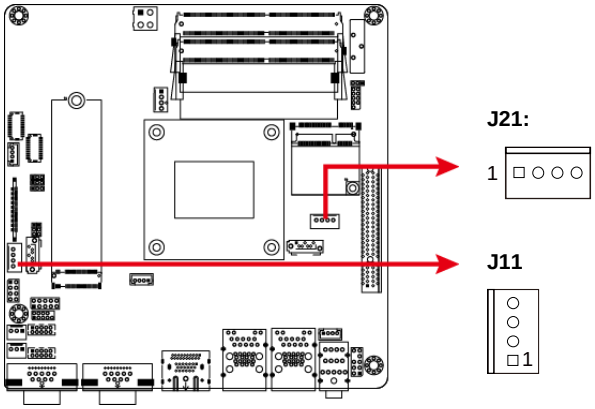
## 2.5.6 LVDS Connector (J6, J7)



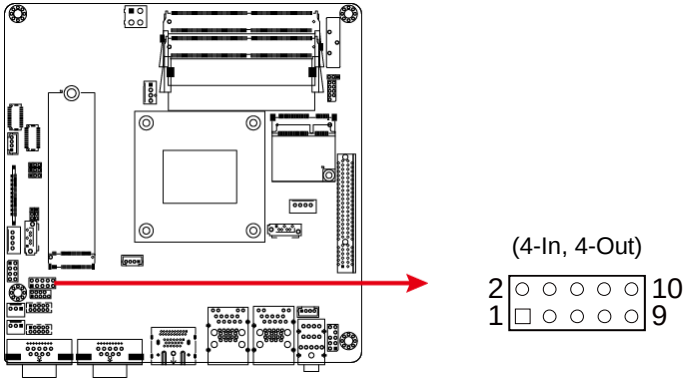

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | TX0+ | 2 | TX0- |
| 3 | Ground | 4 | Ground |
| 5 | TX1+ | 6 | TX1- |
| 7 | Ground | 8 | Ground |
| 9 | TX2+ | 10 | TX2- |
| 11 | Ground | 12 | Ground |
| 13 | TXC+ | 14 | TXC- |
| 15 | Ground | 16 | Ground |
| 17 | TX3+ | 18 | TX3- |
| 19 | +3.3 / +5V | 20 | +3.3 / +5V |

## 2.5.7 SATA Power Connector (J11, J21)



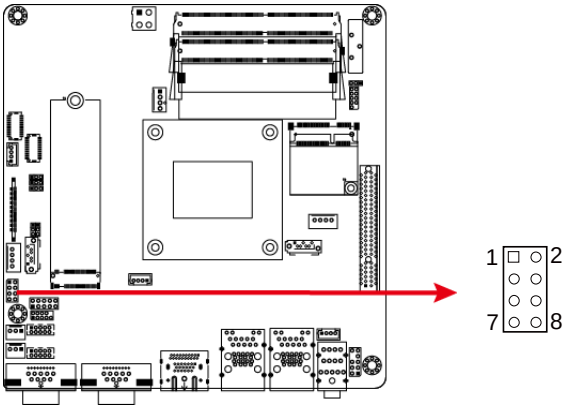

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | +5V | 3 | Ground |
| 2 | Ground | 4 | +12V |

## 2.5.8 Digital I/O Connector (J14)




| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | Ground | 2 | +5V |
| 3 | OUT3 | 4 | OUT1 |
| 5 | OUT2 | 6 | OUT0 |
| 7 | IN3 | 8 | IN1 |
| 9 | IN2 | 10 | IN0 |

### 2.5.9 Front Panel Settings Connector (J13)




| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | Power BTN- | 2 | Power BTN+ |
| 3 | HDD LED+ | 4 | HDD LED- |
| 5 | Reset BTN- | 6 | Reset BTN+ |
| 7 | Power LED+ | 8 | Power LED- |

J13 is utilized for system indicators to provide light indication of the computer activities and switches to change the computer status. It provides interfaces for the following functions.

- **ATX Power ON Switch (Pins 1 and 2)**

  The 2 pins make an “ATX Power Supply On/Off Switch” for the system that connects to the power switch on the case. When pressed, the power switch will force the system to power on. When pressed again, it will power off the system.

- **Hard Disk Drive LED Connector (Pins 3 and 4)**

  This connector connects to the hard drive activity LED on control panel. This LED will flash when the HDD is being accessed.

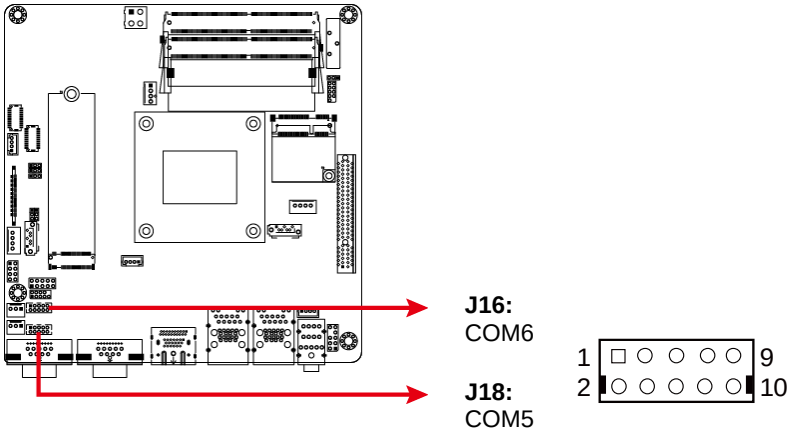
- **Reset Switch (Pins 5 and 6)**

  The reset switch allows you to reset the system without turning the main power switch off and then on again. Orientation is not required when making a connection to this header.

- **Power LED (Pins 7 and 8)**

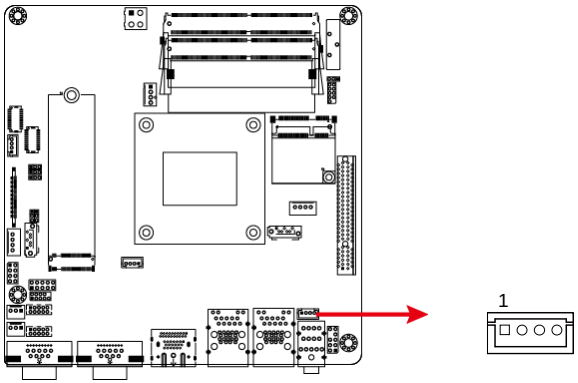
  This connector connects to the system power LED on control panel. This LED will light when the system turns on.

## 2.5.10 COM5 & COM6 RS-232 Port (J18, J16)



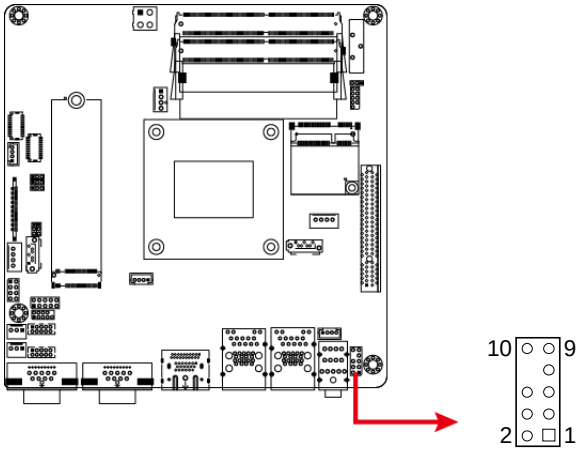

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | DCD, Data carrier detect | 2 | RXD, Receive data |
| 3 | TXD, Transmit data | 4 | DTR, Data terminal ready |
| 5 | Ground | 6 | DSR, Data set ready |
| 7 | RTS, Request to send | 8 | CTS, Clear to send |
| 9 | RI, Ring indicator | 10 | Key |

## 2.5.11 Speaker Connector (J17)



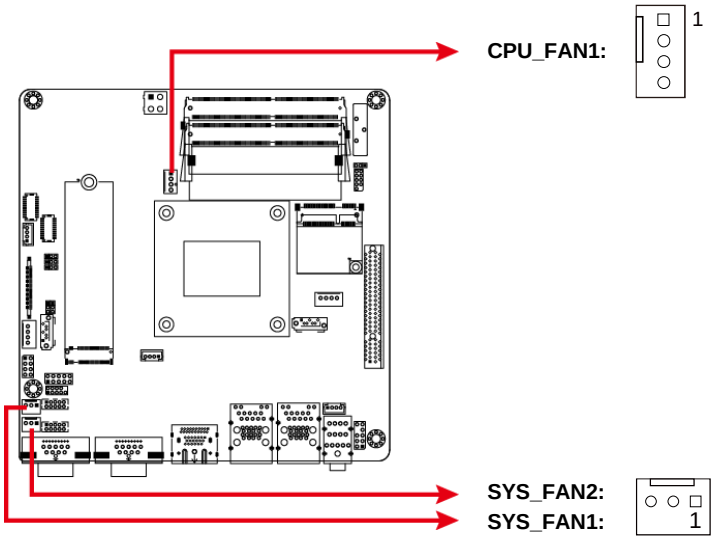

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | Speaker-R+ | 3 | Speaker-L- |
| 2 | Speaker-R- | 4 | Speaker-L+ |

## 2.5.12 Audio Connector (J19)




| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | MIC IN_L | 2 | Ground |
| 3 | MIC IN_R | 4 | AUD_DETECT |
| 5 | LINE_IN_R | 6 | JD_MIC_IN |
| 7 | Sense | 8 | KEY |
| 9 | LINE_IN_L | 10 | JD_LINE_IN |

### 2.5.13 Fan Power Connectors (CPU_FAN1, SYS_FAN1, SYS_FAN2)




**CPU_FAN1:** CPU fan power connector

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | Ground | 3 | Rotation detection |
| 2 | +12V | 4 | Control |

**SYS_FAN1 & SYS_FAN2:** System fan power connectors

| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | Ground | 3 | Rotation detection |
| 2 | +12V | | |

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# Chapter 3
# Drivers Installation

This chapter introduces installation of the following drivers:

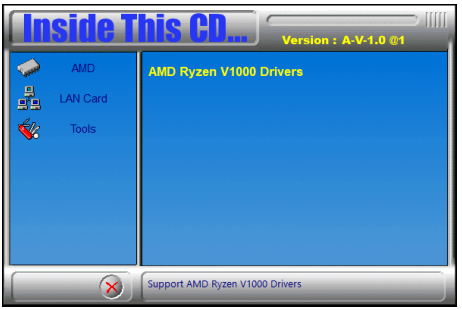
- AMD Ryzen™ V1000 Graphics Driver
- HD Audio Driver
- LAN Driver

## 3.1 Introduction

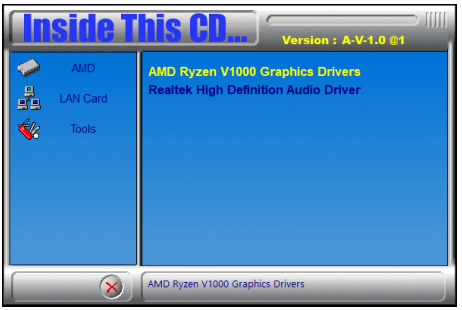
This section describes the installation procedures for software and drivers. The contents of this section include the following:

## 3.2 AMD Ryzen™ V1000 Graphics Drivers

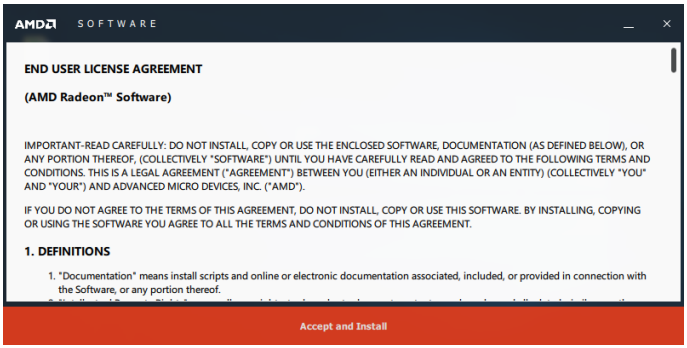
1. Go to the download page of the product. Copy the compressed drivers file to your computer. Double click the file to decompress it. Run "CDGuide" to go to the main drivers page as shown. Click **AMD** on the left pane and then **AMD Ryzen V1000 Drivers** on the right pane.



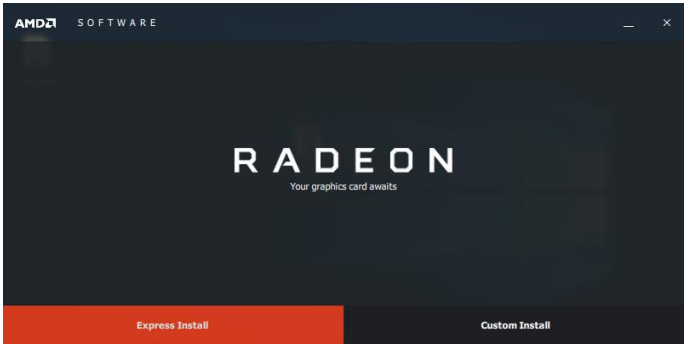

2. Click **AMD Ryzen V1000 Graphics Drivers**.



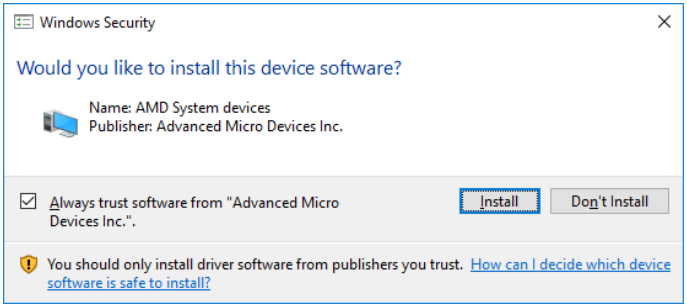
3. Read the software license agreement and click Accept and Install to proceed.




4. Choose and click on either **Express Install** or **Custom Install**.



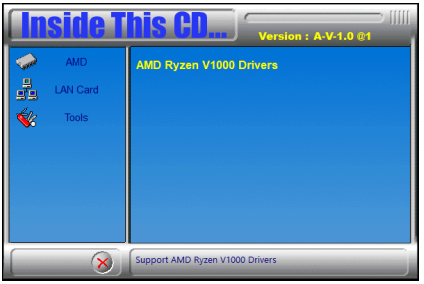

5. Click Install.



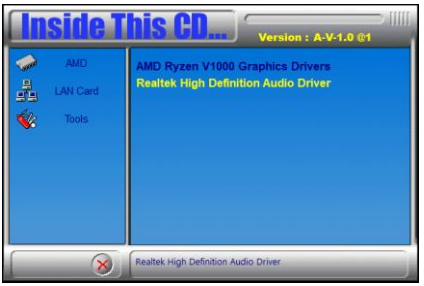

6. The driver has been completely installed. Restart the computer for changes to take effect.

## 3.3 HD Audio Driver Installation

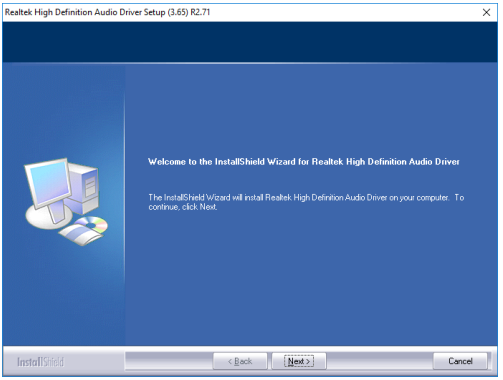
1. Click **AMD** on the left pane and then **AMD Ryzen V1000 Drivers** on the right pane.




2. Click **Realtek High Definition Audio Driver**.




3. On the *Welcome* screen of the InstallShield Wizard, click **Next**.

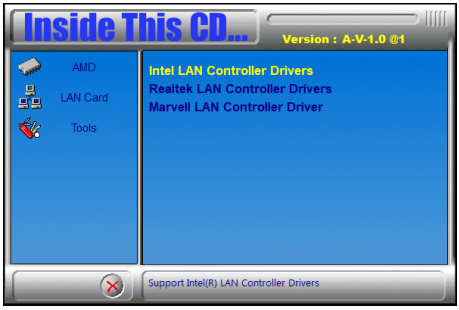



4. Click **Next** until the installation starts.

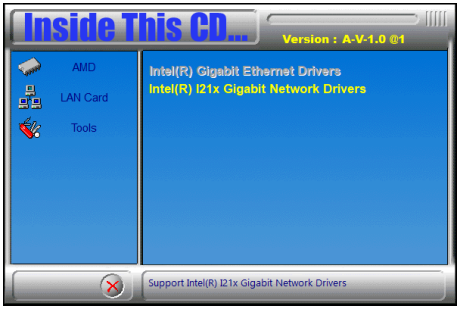
5. The driver has been completely installed. Restart the computer for changes to take effect.

## 3.4 LAN Driver Installation

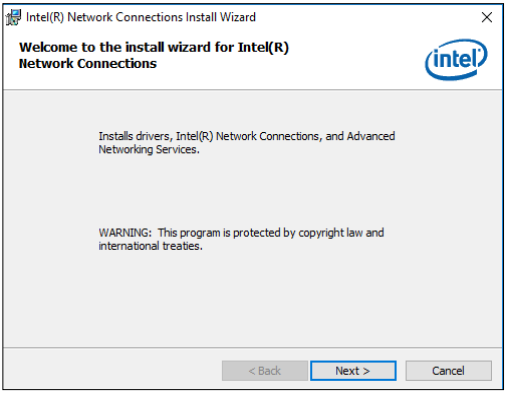
1. Click **LAN Card** on the left pane and then **Intel LAN Controller Drivers** on the right pane.



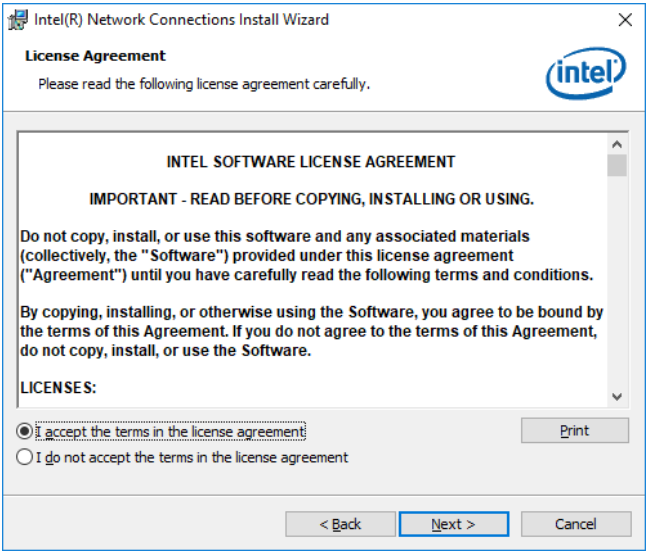

2. Click **Intel(R) I21x Gigabit Networks Drivers**.



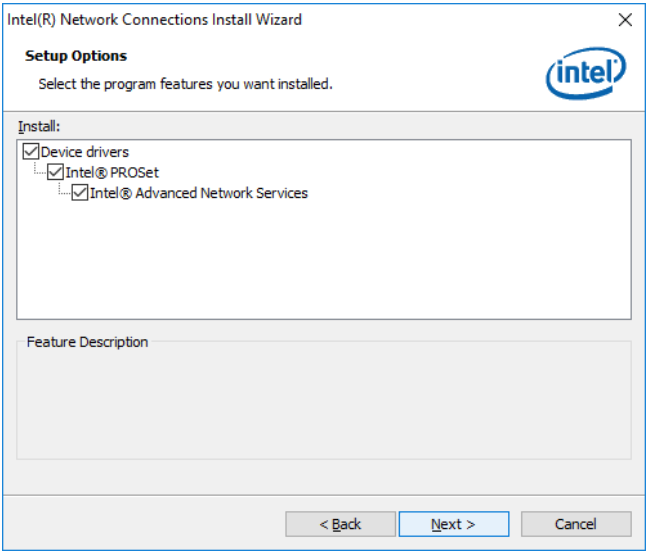

3. When the *Welcome* screen appears, click **Next**.



4. Accept the license agreement and click **Next**.




5. On the *Setup Options* screen, tick the checkbox to select the desired driver(s) for installation. Then click **Next** to continue.




6. The wizard is ready for installation. Click **Install**.
7. As the installation is complete, restart the computer for changes to take effect.

# Chapter 4
# BIOS Setup

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

- Main Settings
- Advanced Settings
- Chipset Settings
- Boot Settings
- Security Settings
- Save & Exit

## 4.1 Introduction

The BIOS (Basic Input/Output System) installed in the ROM of your computer system supports AMD APU. The BIOS provides critical low-level support for standard devices such as disk drives, serial ports and parallel ports. It also provides password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

## 4.2 BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Press the <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup.

If you still need to enter Setup, restart the system by pressing the ”Reset” button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again.

The following message will appear on the screen:

```
Press  <DEL>  to  Enter  Setup
```

In general, press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help, and <Esc> to quit.

When you enter the BIOS Setup utility, the *Main Menu* screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

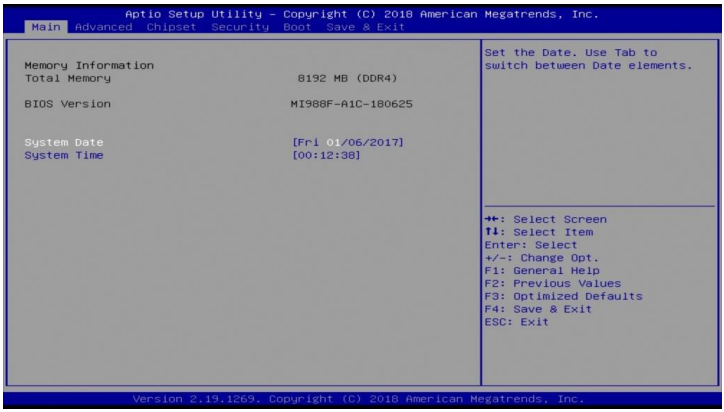
---

**Warning:** It is strongly recommended that you avoid making any changes to the chipset defaults.

These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could make the system unstable and crash in some cases.

---

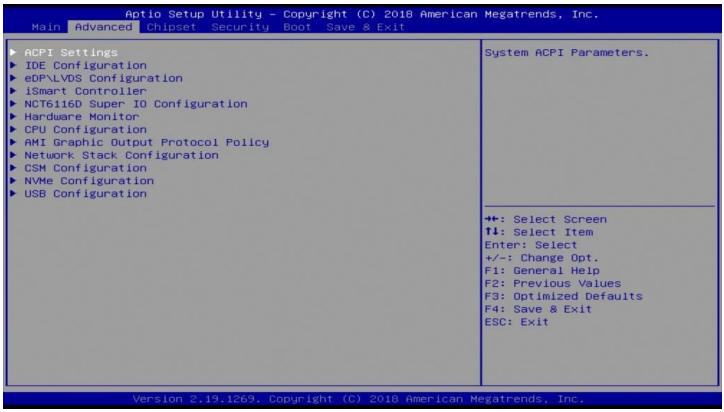
## 4.3 Main Settings



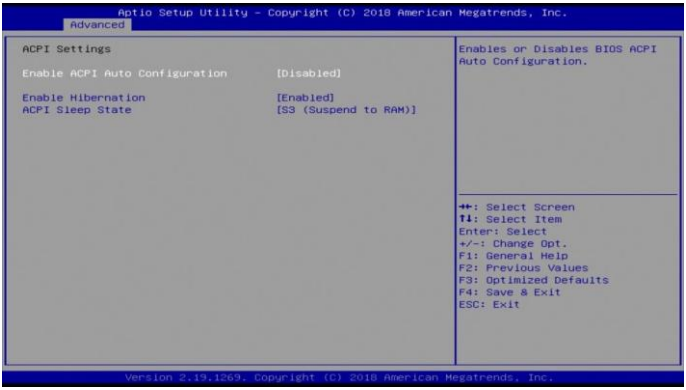

| BIOS Setting | Description |
|---|---|
| System Date | Sets the date. Use the <Tab> key to switch between the date elements. |
| System Time | Set the time. Use the <Tab> key to switch between the time elements. |

## 4.4 Advanced Settings

This section allows you to configure, improve your system and allows you to set up some system features according to your preference.

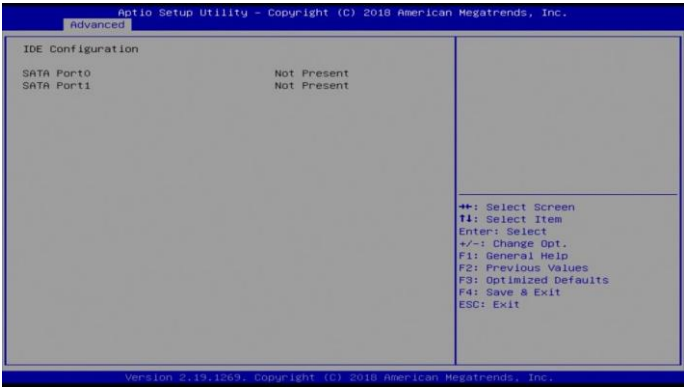


### 4.4.1 ACPI Settings



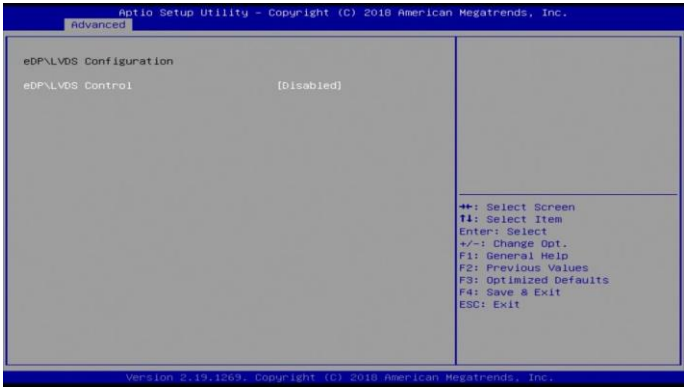

| BIOS Setting | Description |
|---|---|
| Enable ACPI Auto Configuration | Enables / Disables BIOS ACPI auto configuration. |
| Enable Hibernation | Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may be not effective with some OS. |
| ACPI Sleep State | Selects an ACPI sleep state where the system will enter when the Suspend button is pressed. |

### 4.4.2 IDE Configuration



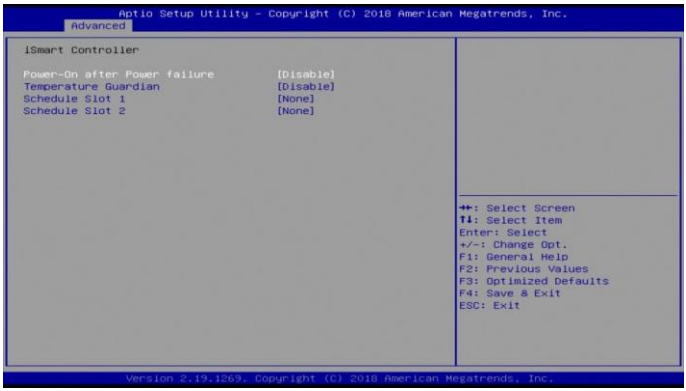

| BIOS Setting | Description |
|---|---|
| SATA Ports | Detects the connection of SATA0 and SATA1. |

### 4.4.3 eDP/LVDS Configuration




| BIOS Setting | Description |
|---|---|
| eDP / LVDS Control | Enables / Disables the eDP or LVDS function. |

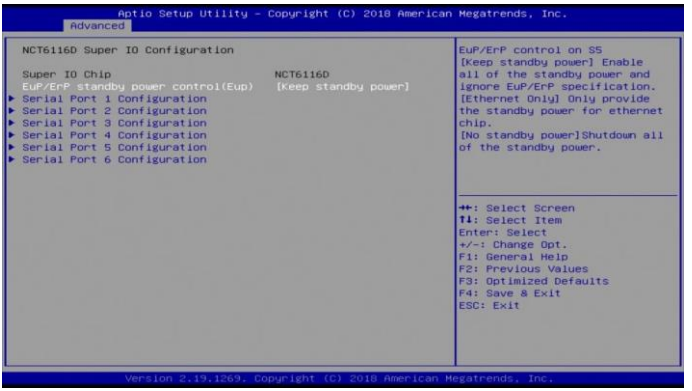
### 4.4.4 iSmart Controller




| BIOS Setting | Description |
|---|---|
| Power-On after Power failure | Enables / Disables the system to be turned on automatically after a power failure. |
| Temperature Guardian | Generate the reset signal when system hands up on POST. |

| BIOS Setting | Description |
|---|---|
| Schedule Slots | Sets up the hour / minute / day for the power-on schedule for the system.<br>Options:<br>• None<br>• Power On<br>• Power On / Off<br><br>**Important:** If you would like to set up a schedule between adjacent days, configure two schedule slots.<br><br>For example, if setting up a schedule from Wednesday 5 p.m. to Thursday 2 a.m., configure two schedule slots. But if setting up a schedule from 3 p.m to 5 p.m. on Wednesday, configure only a schedule slot. |

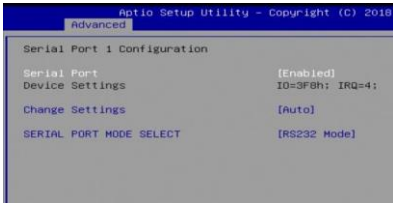
### 4.4.5 NCT6116D Super IO Configuration

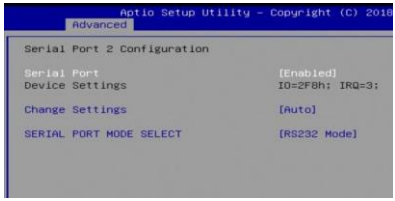


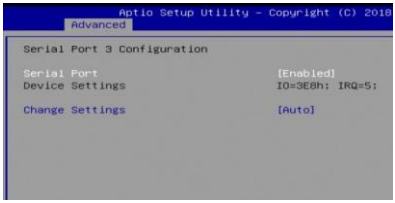

| BIOS Setting | Description |
|---|---|
| Eup / ErP Standby Power Control (EuP) | Eup/Erp Control on S5. Options are as below.<br><br>**Keep standby power:** Enables all of the standby power and ignore Eup/ErP specification.<br><br>**Ethernet only:** Only provides the standby power for the Ethernet chip.<br><br>**No standby power:** Shut down all of the standby power. |

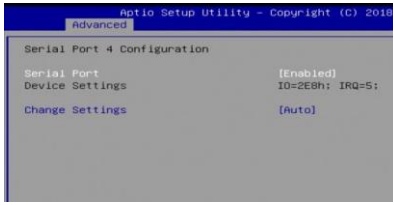
| BIOS Setting | Description |
|---|---|
| Serial Ports Configuration | Sets parameters of Serial Ports.<br>Enables / Disables the serial port and select an optimal setting for the Super IO device. |

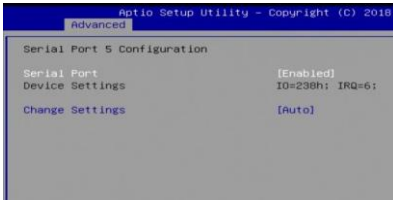
#### 4.4.5.1. Serial Port 1~6 Configuration

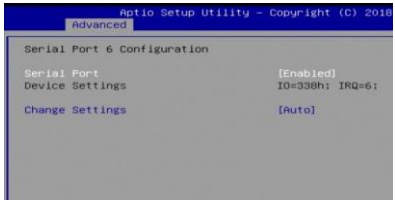


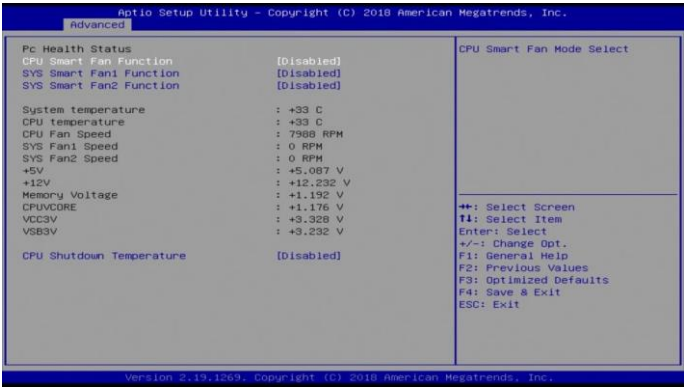



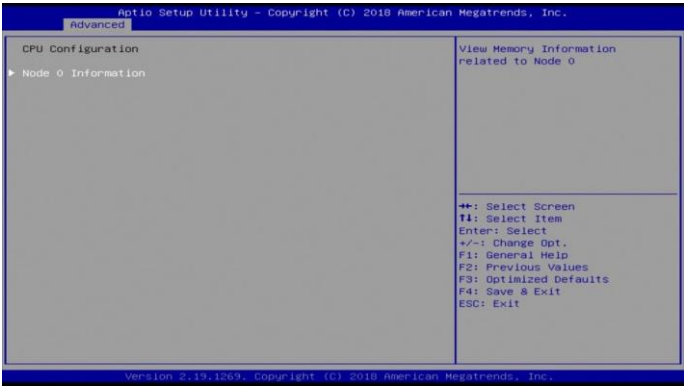

| BIOS Setting | Description |
|---|---|
| Serial Ports | Enables / Disables the serial ports. |

### 4.4.6 Hardware Monitor



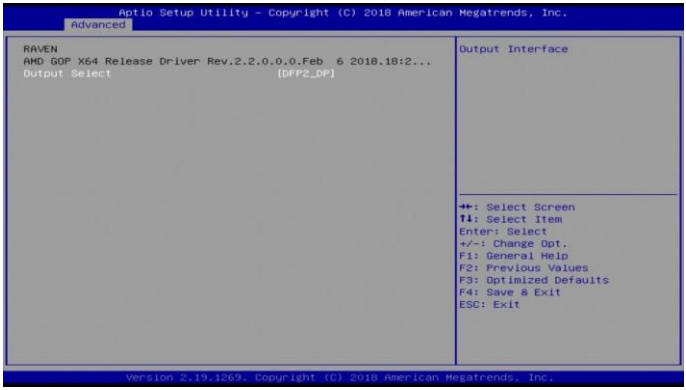

| BIOS Setting | Description |
|---|---|
| CPU Smart Fan Function | Enables / Disables the CPU smart fan feature. |
| System Smart Fans Function | Enables / Disables the system smart fans feature. |
| Temperatures / Voltages | These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status. |
| CPU Shutdown Temperature | Enables / Disables the CPU shutdown temperature function. |

### 4.4.7 CPU Configuration



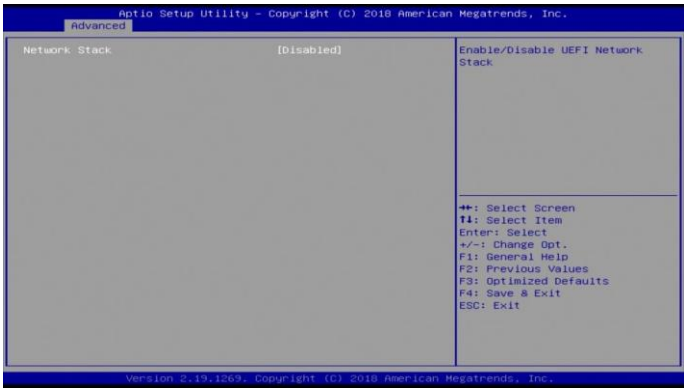

| BIOS Setting | Description |
|---|---|
| Node 0 Information | Displays the memory information related to Node 0. |

### 4.4.8 AMI Graphic Output Protocol Policy



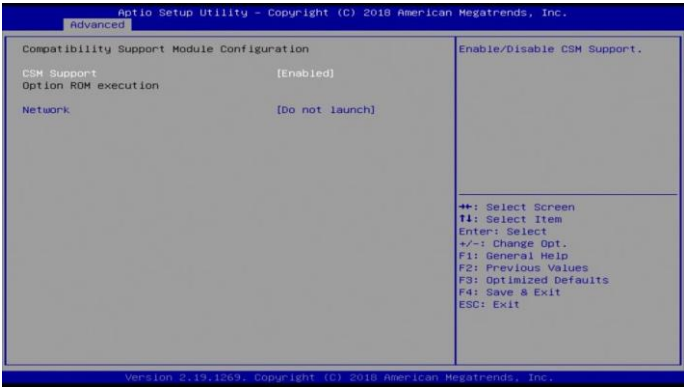

| BIOS Setting | Description |
|---|---|
| Output Select | Allows you to select an output interface. |

### 4.4.9 Network Stack Configuration



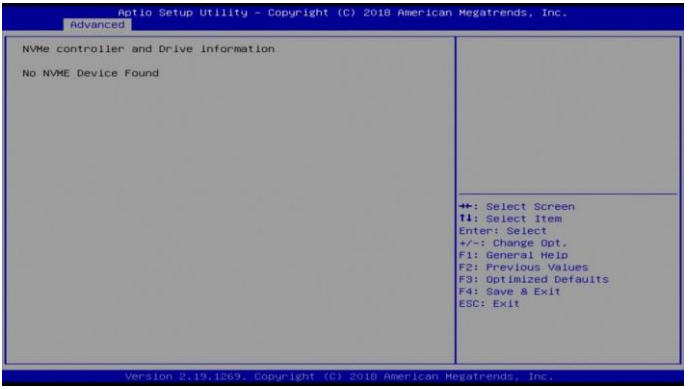

| BIOS Setting | Description |
|---|---|
| Network Stack | Enables / Disables UEFI Network Stack. |

### 4.4.10 CSM Configuration

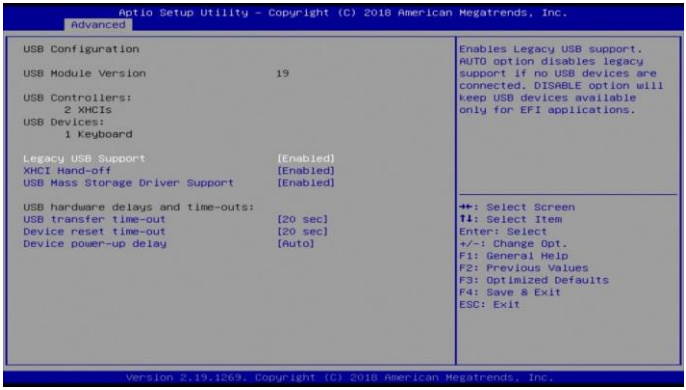



| BIOS Setting | Description |
|---|---|
| CSM Support | Enables / Disables CSM support. |
| Network | Controls the execution of UEFI and Legacy PXE OpROM.<br>Options: Do not launch / Legacy |

### 4.4.11 NVMe Configuration

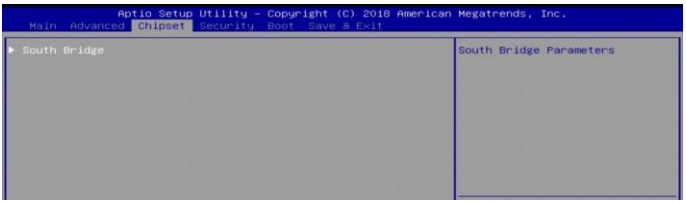


## 4.4.12 USB Configuration

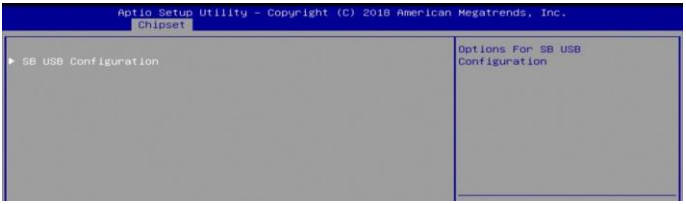



| BIOS Setting | Description |
|---|---|
| Legacy USB Support | Enables Legacy USB support.<br>• **Auto** disables legacy support if there is no USB device connected.<br>• **Disable** keeps USB devices available only for EFI applications. |
| XHCI Hand-off | This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. |
| USB Mass Storage Driver Support | Enables / Disables the support for USB mass storage driver. |
| USB Transfer time-out | The time-out value for control, bulk, and Interrupt transfers.<br>Options: 1 sec / 5 sec / 10 sec / 20 sec |
| Device reset time-out | Seconds of delaying execution of start unit command to USB mass storage device.<br>Options: 10 sec / 20 sec / 30 sec / 40 sec |
| Device power-up delay | The maximum time the device will take before it properly reports itself to the Host Controller.<br>**Auto** uses default value for a Root port it is 100ms. But for a Hub port, the delay is taken from Hub descriptor.<br>Options: Auto / Manual |

## 4.5 Chipset Settings

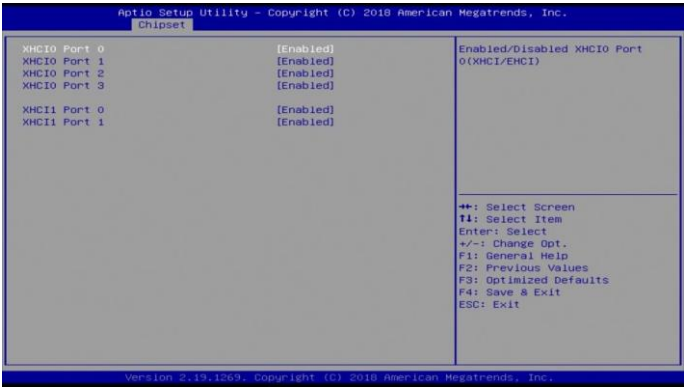



### 4.5.1 SB USB Configuration



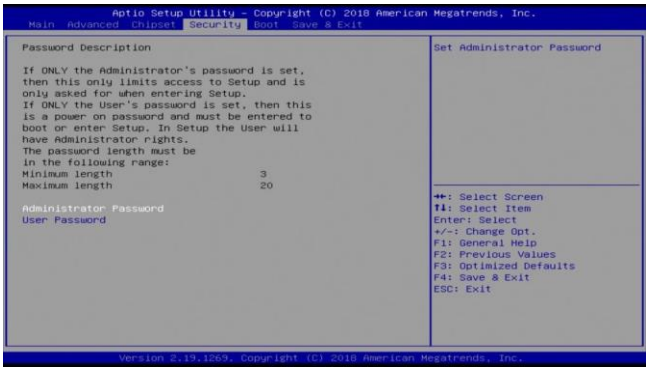

| BIOS Setting | Description |
|---|---|
| SB USB Configuration | Options for SB USB Configuration. |

#### 4.5.1.1. XHCI Ports



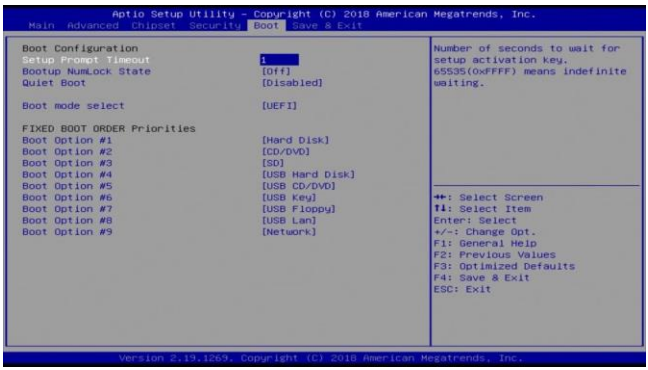

| BIOS Setting | Description |
|---|---|
| XHCI 0 & XHCI 1 Ports | Enables / Disables the XHCI0 & XHCI1 ports (XHCI/EMCI). |

## 4.6 Security Settings




| BIOS Setting | Description |
|---|---|
| Administrator Password | Sets an administrator password for the setup utility. |
| User Password | Sets a user password. |

## 4.7 Boot Settings




| BIOS Setting | Description |
|---|---|
| Setup Prompt Timeout | Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting. |
| Bootup NumLock State | Selects the keyboard NumLock state. |
| Quiet Boot | Enables / Disables Quiet Boot option. |
| Boot mode select | Selects a Boot mode, Legacy / UEFI. |
| Boot Option Priorities | Sets the system boot order. |

## 4.8 Save & Exit Settings


| BIOS Setting | Description |
|---|---|
| Save Changes and Exit | Exits system setup after saving the changes. |
| Discard Changes and Exit | Exits system setup without saving any changes. |
| Save Changes and Reset | Resets the system after saving the changes. |
| Discard Changes and Reset | Resets system setup without saving any changes. |
| Save Changes | Saves changes done so far to any of the setup options. |
| Discard Changes | Discards changes done so far to any of the setup options. |
| Restore Defaults | Restores / Loads defaults values for all the setup options. |
| Save as User Defaults | Saves the changes done so far as User Defaults. |
| Restore User Defaults | Restores the user defaults to all the setup options. |

# Appendix

This section provides the mapping addresses of peripheral
devices, the sample code of watchdog timer configuration, and types of onboard connectors.

# A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

| Address | Device Description |
|---|---|
| 0x00000A00-0x00000A0F | Motherboard resources |
| 0x00000A10-0x00000A1F | Motherboard resources |
| 0x00000A20-0x00000A2F | Motherboard resources |
| 0x00000A30-0x00000A3F | Motherboard resources |
| 0x00000A40-0x00000A4F | Motherboard resources |
| 0x00000070-0x00000071 | System CMOS/real time clock |
| 0x0000D000-0x0000DFFF | PCI Express Root Port |
| 0x0000D000-0x0000DFFF | AMD Radeon(TM) Vega 8 Graphics |
| 0x000003F8-0x000003FF | Communications Port (COM1) |
| 0x000002F8-0x000002FF | Communications Port (COM2) |
| 0x000003E8-0x000003EF | Communications Port (COM3) |
| 0x000002E8-0x000002EF | Communications Port (COM4) |
| 0x00000238-0x0000023F | Communications Port (COM5) |
| 0x00000338-0x0000033F | Communications Port (COM6) |
| 0x00000020-0x00000021 | Programmable interrupt controller |
| 0x000000A0-0x000000A1 | Programmable interrupt controller |
| 0x00000000-0x000003AF | PCI Express Root Complex |
| 0x00000000-0x000003AF | Direct memory access controller |
| 0x000003E0-0x00000CF7 | PCI Express Root Complex |
| 0x000003B0-0x000003DF | PCI Express Root Complex |
| 0x00000D00-0x0000FFFF | PCI Express Root Complex |
| 0x0000F000-0x0000FFFF | PCI Express Root Port |
| 0x0000E000-0x0000EFFF | PCI Express Root Port |
| 0x00000040-0x00000043 | System timer |
| 0x00000010-0x0000001F | Motherboard resources |

| Address | Device Description |
|---|---|
| 0x00000022-0x0000003F | Motherboard resources |
| 0x00000063-0x00000063 | Motherboard resources |
| 0x00000065-0x00000065 | Motherboard resources |
| 0x00000067-0x0000006F | Motherboard resources |
| 0x00000072-0x0000007F | Motherboard resources |
| 0x00000080-0x00000080 | Motherboard resources |
| 0x00000084-0x00000086 | Motherboard resources |
| 0x00000088-0x00000088 | Motherboard resources |
| 0x0000008C-0x0000008E | Motherboard resources |
| 0x00000090-0x0000009F | Motherboard resources |
| 0x000000A2-0x000000BF | Motherboard resources |
| 0x000000B1-0x000000B1 | Motherboard resources |
| 0x000000E0-0x000000EF | Motherboard resources |
| 0x000004D0-0x000004D1 | Motherboard resources |
| 0x0000040B-0x0000040B | Motherboard resources |
| 0x000004D6-0x000004D6 | Motherboard resources |
| 0x00000C00-0x00000C01 | Motherboard resources |
| 0x00000C14-0x00000C14 | Motherboard resources |
| 0x00000C50-0x00000C51 | Motherboard resources |
| 0x00000C52-0x00000C52 | Motherboard resources |
| 0x00000C6C-0x00000C6C | Motherboard resources |
| 0x00000C6F-0x00000C6F | Motherboard resources |
| 0x00000CD0-0x00000CD1 | Motherboard resources |
| 0x00000CD2-0x00000CD3 | Motherboard resources |
| 0x00000CD4-0x00000CD5 | Motherboard resources |
| 0x00000CD6-0x00000CD7 | Motherboard resources |
| 0x00000CD8-0x00000CDF | Motherboard resources |
| 0x00000800-0x0000089F | Motherboard resources |
| 0x00000B00-0x00000B0F | Motherboard resources |
| 0x00000B20-0x00000B3F | Motherboard resources |

| Address | Device Description |
|---|---|
| 0x00000900-0x0000090F | Motherboard resources |
| 0x00000910-0x0000091F | Motherboard resources |
| 0x00000061-0x00000061 | System speaker |
| 0x00000081-0x00000083 | Direct memory access controller |
| 0x00000087-0x00000087 | Direct memory access controller |
| 0x00000089-0x0000008B | Direct memory access controller |
| 0x0000008F-0x0000008F | Direct memory access controller |
| 0x000000C0-0x000000DF | Direct memory access controller |

# B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

| Level | Function |
|---|---|
| IRQ 4294967292 | PCI Express Root Port |
| IRQ 0 | High precision event timer |
| IRQ 0 | System timer |
| IRQ 8 | High precision event timer |
| IRQ 7 | AMD GPIO Controller |
| IRQ 4294967272 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967271 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967270 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967269 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967268 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967267 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967266 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967265 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4 | Communications Port (COM1) |
| IRQ 3 | Communications Port (COM2) |
| IRQ 5 | Communications Port (COM3) |
| IRQ 5 | Communications Port (COM4) |
| IRQ 6 | Communications Port (COM5) |
| IRQ 6 | Communications Port (COM6) |
| IRQ 53 | High Definition Audio Controller |

| Level | Function |
|---|---|
| IRQ 53 | AMD Audio CoProcessor |
| IRQ 54 | AMD High Definition Audio Controller |
| IRQ 54 | Microsoft ACPI-Compliant System |
| IRQ 55 | Microsoft ACPI-Compliant System |
| IRQ 55 | AMD SFH KMDF I2C |
| IRQ 56 ~ IRQ 204 | Microsoft ACPI-Compliant System |
| IRQ 256 ~ IRQ 511 | Microsoft ACPI-Compliant System |
| IRQ 4294967294 | PCI Express Root Port |
| IRQ 4294967293 | PCI Express Root Port |
| IRQ 4294967291 | PCI Express Root Port |
| IRQ 4294967275 | AMD Radeon(TM) Vega 8 Graphics |
| IRQ 4294967274 | AMD Radeon(TM) Vega 8 Graphics |
| IRQ 4294967273 | AMD Radeon(TM) Vega 8 Graphics |
| IRQ 4294967290 | Standard SATA AHCI Controller |
| IRQ 4294967264 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967263 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967262 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967261 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967260 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967259 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967258 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967257 | AMD USB 3.10 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 4294967287 | Intel(R) I211 Gigabit Network Connection #5 |

| Level | Function |
|---|---|
| IRQ 4294967286 | Intel(R) I211 Gigabit Network Connection #5 |
| IRQ 4294967285 | Intel(R) I211 Gigabit Network Connection #5 |
| IRQ 4294967284 | Intel(R) I211 Gigabit Network Connection #5 |
| IRQ 4294967283 | Intel(R) I211 Gigabit Network Connection #5 |
| IRQ 4294967282 | Intel(R) I211 Gigabit Network Connection #5 |
| IRQ 4294967281 | Intel(R) I211 Gigabit Network Connection #6 |
| IRQ 4294967280 | Intel(R) I211 Gigabit Network Connection #6 |
| IRQ 4294967279 | Intel(R) I211 Gigabit Network Connection #6 |
| IRQ 4294967278 | Intel(R) I211 Gigabit Network Connection #6 |
| IRQ 4294967277 | Intel(R) I211 Gigabit Network Connection #6 |
| IRQ 4294967276 | Intel(R) I211 Gigabit Network Connection #6 |
| IRQ 4294967289 | AMD PSP 10.0 Device |
| IRQ 4294967288 | AMD PSP 10.0 Device |

# C. Watchdog Timer Configuration

The Watchdog Timer (WDT) is used to generate a variety of output signals after a user programmable count. The WDT is suitable for use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven.

Under normal circumstance, you will need to restart the WDT at regular intervals before the timer counts to zero.

## 1. Sample Code: The file NCT6116D.H

```
//-----------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----------------------------------------------------------------------------
#ifndef __NCT6116D_H
#define __NCT6116D_H                                    1
//-----------------------------------------------------------------------------
#define         NCT6116D_INDEX_PORT             (NCT6116D_BASE)
#define         NCT6116D_DATA_PORT              (NCT6116D_BASE+1)
//-----------------------------------------------------------------------------
#define         NCT6116D_REG_LD                         0x07
//-----------------------------------------------------------------------------
#define NCT6116D_UNLOCK                         0x87
#define         NCT6116D_LOCK                           0xAA
//-----------------------------------------------------------------------------
unsigned int Init_NCT6116D(void);
void Set_NCT6116D_LD( unsigned char);
void Set_NCT6116D_Reg( unsigned char, unsigned char);
unsigned char Get_NCT6116D_Reg( unsigned char);
//-----------------------------------------------------------------------------
#endif          //__NCT6116D_H
```

## 2. Sample Code: The file MAIN.CPP

```
//---------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "NCT6116D.H"
//---------------------------------------------------------------------------
int main (void);

void WDTInitial(void);
void WDTEnable(unsigned char);
void WDTDisable(void);

//---------------------------------------------------------------------------
int main (void)
{
        char SIO;

        SIO = Init_NCT6116D();
        if (SIO == 0)
        {
                printf("Can not detect Nuvoton NCT6116D, program abort.\n");
                return(1);
        }

        WDTInitial();

        WDTEnable(10);

        WDTDisable();

        return 0;
}
//---------------------------------------------------------------------------
void WDTInitial(void)
{
        unsigned char bBuf;
        Set_NCT6116D_LD(0x08);                                  //switch
to logic device 8
        bBuf = Get_NCT6116D_Reg(0x30);
        bBuf &= (~0x01);
        Set_NCT6116D_Reg(0x30, bBuf);                           //Enable
WDTO
}
//---------------------------------------------------------------------------
```

```
void WDTEnable(unsigned char NewInterval)
{
        unsigned char bBuf;

        Set_NCT6116D_LD(0x08);                                  //switch
to logic device 8
        Set_NCT6116D_Reg(0x30, 0x01);                           //enable
timer

        bBuf = Get_NCT6116D_Reg(0xF0);
        bBuf &= (~0x08);
        Set_NCT6116D_Reg(0xF0, bBuf);                           //count
mode is second

        Set_NCT6116D_Reg(0xF1, NewInterval);        //set timer
}
//-------------------------------------------------------------------------
void WDTDisable(void)
{
        Set_NCT6116D_LD(0x08);                                  //switch
to logic device 8
        Set_NCT6116D_Reg(0xF1, 0x00);                           //clear
watchdog timer
        Set_NCT6116D_Reg(0x30, 0x00);
        //watchdog disabled
}
//-------------------------------------------------------------------------
```

## 3. Sample Code: The file NCT6116D.CPP

```
//---------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include "NCT6116D.H"
#include <dos.h>
//---------------------------------------------------------------------------
unsigned int NCT6116D_BASE;
void Unlock_NCT6116D (void);
void Lock_NCT6116D (void);
//---------------------------------------------------------------------------
unsigned int Init_NCT6116D(void)
{
        unsigned int result;
        unsigned char ucDid;

        NCT6116D_BASE = 0x4E;
        result = NCT6116D_BASE;

        ucDid = Get_NCT6116D_Reg(0x20);
        if (ucDid == 0xC4)
        //NCT6116D??
        {       goto Init_Finish;       }

        NCT6116D_BASE = 0x2E;
        result = NCT6116D_BASE;

        ucDid = Get_NCT6116D_Reg(0x20);
        if (ucDid == 0xC4)
        //NCT6116D??
        {       goto Init_Finish;       }

        NCT6116D_BASE = 0x00;
        result = NCT6116D_BASE;

Init_Finish:
        return (result);
}
//---------------------------------------------------------------------------
void Unlock_NCT6116D (void)
{
        outportb(NCT6116D_INDEX_PORT, NCT6116D_UNLOCK);
        outportb(NCT6116D_INDEX_PORT, NCT6116D_UNLOCK);
}
//---------------------------------------------------------------------------
```

```
void Lock_NCT6116D (void)
{
        outportb(NCT6116D_INDEX_PORT, NCT6116D_LOCK);
}
//-----------------------------------------------------------------------------
void Set_NCT6116D_LD( unsigned char LD)
{
        Unlock_NCT6116D();
        outportb(NCT6116D_INDEX_PORT, NCT6116D_REG_LD);
        outportb(NCT6116D_DATA_PORT, LD);
        Lock_NCT6116D();
}
//-----------------------------------------------------------------------------
void Set_NCT6116D_Reg( unsigned char REG, unsigned char DATA)
{
        Unlock_NCT6116D();
        outportb(NCT6116D_INDEX_PORT, REG);
        outportb(NCT6116D_DATA_PORT, DATA);
        Lock_NCT6116D();
}
//-----------------------------------------------------------------------------
unsigned char Get_NCT6116D_Reg(unsigned char REG)
{
        unsigned char Result;
        Unlock_NCT6116D();
        outportb(NCT6116D_INDEX_PORT, REG);
        Result = inportb(NCT6116D_DATA_PORT);
        Lock_NCT6116D();
        return Result;
}
//-----------------------------------------------------------------------------
```

# D. Onboard Connector Types

| Function | Connector Name | Onboard Type | Compatible Mating Type for Reference |
|---|---|---|---|
| DC-In Power Connector | J1 | Hao Guo Xing Ye ATX4PT-NY46 | Molex 39-01-2040 |
| LCD Backlight Connector | J8 | E-Call 0110-161-040 | JST PHR-4 |
| LVDS Connector | J6, J7 | HRS DF20F-20DP-1V | HRS DF20A-20DS-1C |
| SATA Power Connector | J11, J21 | Hao Guo Xing Ye WAFER25-104S-2442-ST | Hao Guo Xing Ye J99-0215-01 |
| Digital I/O Connector | J14 | E-call 0126-01-203-100 | Dupont 10P 2.54 mm-pitch (female) |
| Front Panel Settings Connector | J13 | E-call 0126-01-203-080 | Dupont 8P 2.54 mm-pitch (female) |
| COM5 & COM6 RS-232 Port | J18, J16 | Hao Guo Xing Ye DF11-10S-PA66H | HRS DF11-10DS-2C |
| Speaker Connector | J17 | JST B4B-PH-K-S | JST PHR-4 |
| Audio Connector | J19 | E-Call 0126-01-2821009 | Dupont 10P 2.54 mm-pitch (female) |
| Fan Power Connectors | CPU_FAN1 | TechBest W2-03I104132S1WT(A)-L | Molex 47054-1000 |
| | SYS_FAN1, SYS_FAN2 | E-Call 0110-02-111-030 | Molex 22-01-2031 |