AGS103T

Advanced Gateway & Ultra-Compact Fanless System

User's Manual

Version 1.0A (July 2022)



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Compliance

CE

This product has passed CE tests for environmental specifications and limits. This product is in accordance with the directives of the Union European (EU). If users modify and/or install other devices in this equipment, the CE conformity declaration may no longer apply.

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 device.

Environmental conditions:

- Lay the device horizontally on a stable and solid surface in case the device may fall, causing serious damage.
- Make sure you leave plenty of space around the device for ventilation.
- Use this product in environments with ambient temperatures -20°C ~ 70°C.
- Do not leave this device in an environment where the storage temperature may go below -40°C or above 85°C. This could damage the device. The device must be used in a controlled environment.

Care for your IBASE products:

- Before cleaning the device, turn it off and unplug all cables such as power in case a small amount of electrical current may still flow.
- Use neutral cleaning agents or diluted alcohol to clean the device chassis with a cloth. Then wipe the chassis with a dry cloth.
- Vacuum the dust with a computer vacuum cleaner to prevent the air vent or slots from being clogged.



Attention during use:

- Do not use this product near water.
- Do not spill water or any other liquids on your device.
- Do not place heavy objects on the top of the device.
- Operate this device from the type of power indicated on the marking label. If you are not sure of the type of power available, consult your distributor or local power company.
- Ensure that you apply correctly the power supply voltage.
- Do not walk on the power cord or allow anything to rest on it.
- If you use an extension cord, make sure that the total ampere rating of the product plugged into the extension cord does not exceed its limits.

Avoid Disassembly

You are not suggested to disassemble, repair or make any modification to the device. Disassembly, modification, or any attempt at repair could generate hazards and cause damage to the device, even bodily injury or property damage, and will void any warranty.



Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

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, memory, storage device, power adapter, panel and touchscreen.

PRODUCTS, HOWEVER, THAT FAILS 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 <u>www.ibase.com.tw</u> to find the latest information about the product.
- 2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.
 - 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)
- If repair service is required, you can download the RMA form at <u>http://www.ibase.com.tw/english/Supports/RMAService/</u>. Fill out the form and contact your distributor or sales representative.

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Chapter 1 General Information

The information provided in this chapter includes:

- Features
- Packing List
- Optional Accessories
- Specifications
- Product View
- Dimensions



1.1 Introduction

The AGS103T embedded computer is an ultra-compact fanless system AGS103T integrating the Intel Atom® x6000E Series processors (codenamed Elkhart Lake) that deliver up to 4 cores with 40% increase in CPU performance and improved graphics when compared with previous versions. Based on the economical 10nm technology, the low-power platform is suitable for embedded applications in factory automation, IoT gateway, and automatic control systems.



AGS103T

1.2 Features

- Ultra-Compact, rugged and fanless system with Intel[®] Atom[™] x6414RE / x6212RE series processor
- Over/Under/Reverse voltage protection
- 9V~36V DC wide-range power input
- Display output through HDMI and DVI-I
- DIN-rail mount & Wall mount compatibility
- GPIO 4-in & 4-out
- 3 x 2.5 Gigabit Ethernet
- 3 x full-size Mini PCI-E sockets, 1x 3052 M.2 B-Key,
- TPM 2.0



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 the dealer from whom you purchased the product.

| • | AGS103T / AGS103TS | x 1 |
|---|---------------------------------------|-----|
| • | Wall Mount Kit | x 1 |
| • | Round Head Screw (for Wall Mount Kit) | x 4 |
| • | Thermal Pad 19 x 19 x 2 mm | x 1 |
| | 28 x 18 x 2 mm | x 1 |
| • | DIN Rail Bracket | x 1 |

1.4 Optional Accessories

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

- DC-In Power Adapter
- Power Cord
- WiFi Antenna Kit
- 4G/LTE or GPS Antenna Kit

1.5 Specifications

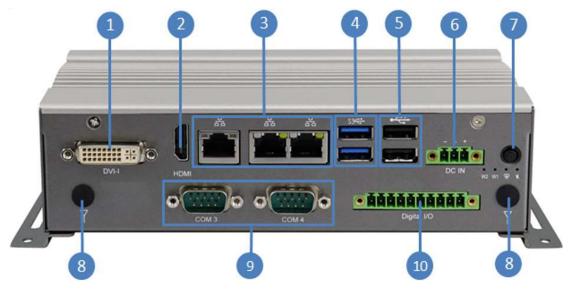
| Product Name | AGS103T | AGS103TS | | |
|---------------------------|---|--|--|--|
| System | | | | |
| Motherboard | IB803 | | | |
| Carrier Board | IP802 | | | |
| Operating System | Windows10 (64-bit)Linux Ubuntu | | | |
| CPU | Intel [®] Atom™ x6414RE Intel [®] Atom™ x6212RE | | | |
| CPU Speed | Up to 1.5 GHz | | | |
| Memory | 1 x DDR4-3200 SO-DIMM, expandable to 16 GB (Non-ECC) | | | |
| Storage | 1 slot for mSATA SSD | 1 slot for mSATA SSD 1 slot for 2.5" SSD | | |
| Super I/O | Fintek F81964D-I | | | |
| Audio Codec | Realtek ALC888S | | | |
| Network | 3 x Intel [®] I226IT GbE LAN | | | |
| Power Supply | DC-In 9V ~ 36V (3-pin terminal b | block) | | |
| BIOS | AMI BIOS | | | |
| Watchdog | Watchdog Timer 256 segments, | 0, 1, 2255 sec/min | | |
| ТРМ | 2.0 | | | |
| Chassis | Aluminum & steel, silver | | | |
| Mounting | Desktop mount / Wall mount (wall mount kit included)DIN rail mount | | | |
| Dimensions (W x H x D) | 190 x 52 x 110 mm | 190 x 68 x 110 mm | | |
| Weight | 1.1 kg | 1.25 kg | | |
| Certificate | CE / LVD / FCC Class B (pre-scan) | | | |

| I/O Ports | | | |
|-----------------------|--|--|--|
| Left External I/O | 2 x RS232/422/485 port: COM1 & COM2, select from BIOS 1 x Antenna hole for WLAN module 1 x Speaker-out / Mic-in connector | | |
| Right External I/O | 1 x Antenna hole for WLAN module 2 x Nano SIM card slot * The socket signal from 1x Mini-PCIe(J4), 1x M.2 slot. | | |
| Rear External I/O | 1 x DVI-I 1 x HDMI 2 x USB 3.1 2 x USB 2.0 3 x RJ45 2.5GbE LAN port 4 x LED indicators (WLAN, WWAN, Heartbeat, Power/ troubleshooting) 1 x power button 1 x 3-pin DC-in terminal block type for 9V-36V 2 x Antenna hole for WLAN module 2 x RS-232/422/485 port: COM3 & COM4 1 x 4-In & 4-Out GPIO connector | | |
| Expansion slots | 1 x full-size Mini-PCIe socket with USB 2.0 1 x full-size Mini-PCIe socket with USB 2.0 & PCIe 1 x full-size Mini-PCIe socket with USB 2.0 & SATA for SSD 1 x M.2 B3052 socket with USB 3.0 & PCIe for 4G/5G module 1 x 2.5" SSD slot (for AGS103TS only) | | |
| | Environment | | |
| Temperature | Operating: -20°C ~ 70°C (-4°F ~ 158°F) Storage: -40°C ~ 85°C (-40°F ~ 185°F) | | |
| Relative Humidity | 5 ~ 90% at 45°C (non-condensing) | | |
| Vibration | With IEC 60068-2-64 Operating: 2 Grms / 5 ~ 500 Hz (Random operation) Non-operating: 3 Grms / 5 ~ 500Hz (Random operation) | | |
| Shock | With MIL-STD-810G Operating: 30 g / 11 ms duration Non-operating: 40 g / 11 ms duration | | |

All specifications are subject to change without prior notice.

1.6 Product View – AGS103T

Front View



| No. | Name | No. | Name |
|-----|--------------------|-----|-------------------|
| 1 | CN1: DVI-I Port | 6 | DC In |
| 2 | CN2: HDMI Port | 7 | DC In Power Input |
| 3 | Gigabit LAN Ports | 8 | Antenna Holes |
| 4 | CN5: USB 3.1 Ports | 9 | COM3/COM4 Ports |
| 5 | CN6: USB 2.0 Ports | 10 | Digital I/O |



Oblique View



Remarks: Two Nano SIM card slots are located on the right side.



Side View

Remarks: Aside from the antenna hole, the picture above shows the following:

CN7 : 2 in 1 Audio Jack (Line-out/Line-in) CN8 : COM1 Connector

CN10 : COM2 Connector

Bottom View



Remarks: For AGS103TS, the bottom has a compartment for a 2.5" SSD slot.

AGS103TS with Wall Mount Brackets



AGS103TS with DIN Rail Mount (Optional)

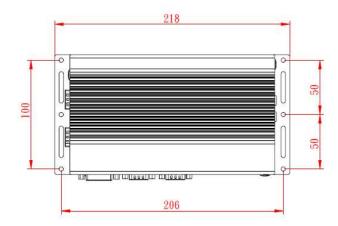


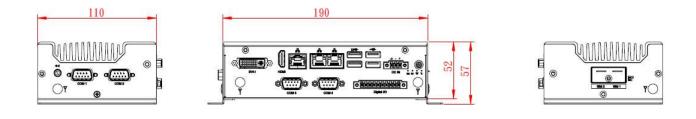


General Information

1.7 Dimensions -AGS103T

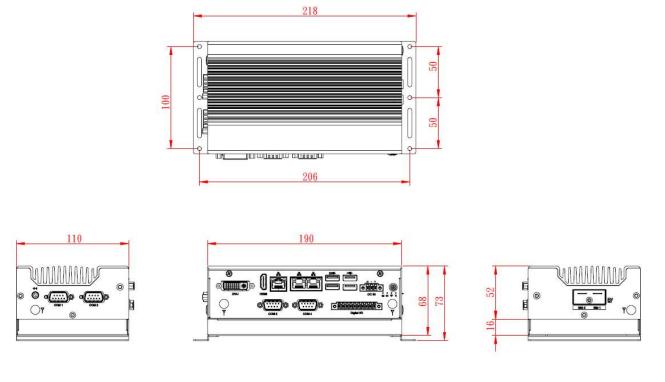
Unit: mm





1.8 Dimensions – AGS103TS

Unit: mm



Chapter 2 Hardware Configuration

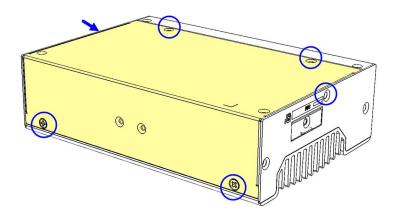
The information provided in this chapter includes:

- Installations
- Information and locations of connectors



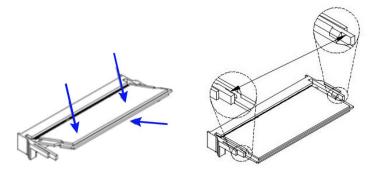
2.1 Installations

Turn your product upside down and take away the device bottom cover by removing 6 screws as indicated below for the installation or replacement of the memory module, mSATA SSD or WLAN card. After installations, secure the device bottom cover back.



2.1.1 Memory Installation / Replacement

If you need to install or replace a memory module, follow the instructions below for installation after you disassemble the device cover.



- 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.

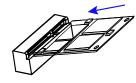
To remove the module, press the clips outwards with both hands, and the module will pop-up.

2.1.2 Mini-PCIe & M.2 Cards Installation / Replacement

After removing the bottom cover, follow the instructions below.

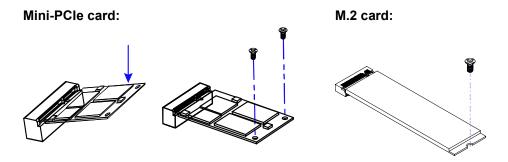
1. Locate the mini-PCIe or M.2 slot, align the key of the card to the interface, and insert the card slantwise.





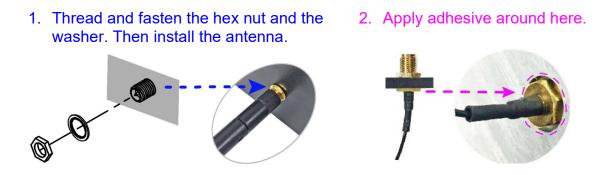
| M.2 card: | |
|-----------|--|
| | |

2. Push the card down and fix it with the supplied 2 flat head screws for the mini-PCIe card and with one screw for M.2 card.



2.1.3 WiFi / 3G / 4G Antenna Installation

Thread the WiFi / 3G / 4G antenna extension cable through an antenna hole of the front I/O cover and fasten the antenna as shown below. Then apply adhesive to the edge of the hex nut behind the front I/O cover to prevent the extension cable from falling if the cable becomes loose.



Info: The diameter of the nut is around 6.35 mm (0.25"-36UNC).

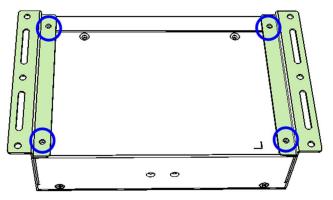
2.1.4 Mounting Installation

Requirements

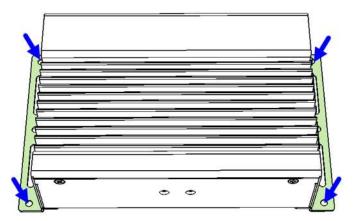
Before mounting the system, ensure that you have enough room for power and signal cable routing, and have good ventilation for the power adaptor. The method of mounting must be able to support the weight of the device plus the weight of the suspending cables to be attached to the system. Use the following methods for mounting your system:

2.1.4.1. Wall-Mounting Installation

1. Turn your product upside down to attach the mounting brackets to your product and secure with the supplied 4 screws.

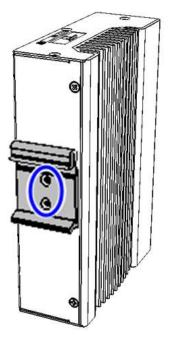


2. Prepare at least 4 screws (M3) to install the device on wall.



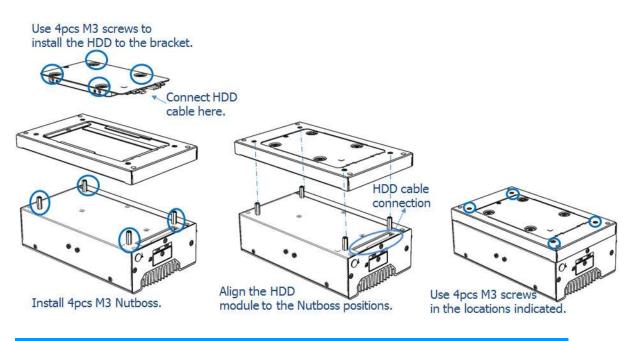
2.1.4.2. DIN Rail Mounting Installation (Optional)

1. Attach the DIN rail mounting bracket to your product, and secure with the supplied 2 screws.



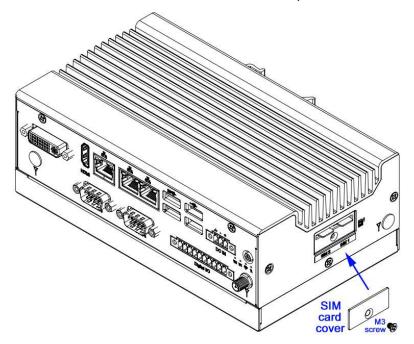
2. Hook the DIN rail mounting bracket over the top of the DIN rail, and then press the lower section of the bracket towards the DIN rail to clip the bracket onto it.

2.1.5 HDD Module Installation



2.1.6 SIM Card Installation

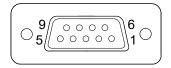
1. The SIM card socket design is push-in/push-out type. To install or remove a SIM card, remove the SIM card cover, as shown in the picture below, by releasing the M3 screw. After insertion/removal of the SIM card, replace the SIM card cover and lock it back into place.



2.1.7 Pinout for COM Ports, DC-In Power & Line-Out Jack





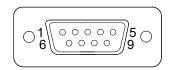


COM1 and COM2 ports are jumper-less and configurable in BIOS.

| Pin | Assignment | | | |
|-----|--------------------------|--------|--------|--|
| | RS-232 | RS-422 | RS-485 | |
| 1 | DCD, Data carrier detect | TX- | DATA- | |
| 2 | RXD, Receive data | TX+ | DATA+ | |
| 3 | TXD, Transmit data | RX+ | NC | |
| 4 | DTR, Data terminal ready | RX- | NC | |
| 5 | Ground | Ground | Ground | |
| 6 | DSR, Data set ready | NC | NC | |
| 7 | RTS, Request to send | NC | NC | |
| 8 | CTS, Clear to send | NC | NC | |
| 9 | RI, Ring indicator | NC | NC | |

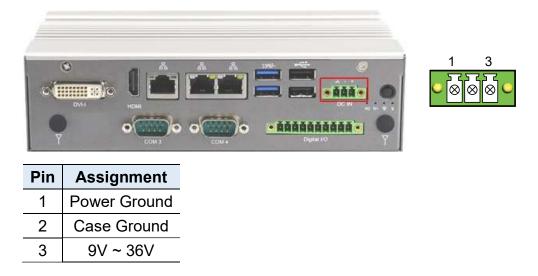
RS-232 COM3 & COM4 Ports





| Pin | Assignment | | | |
|-----|--------------------------|--------|--------|--|
| | RS-232 | RS-422 | RS-485 | |
| 1 | DCD, Data carrier detect | TX- | DATA- | |
| 2 | RXD, Receive data | TX+ | DATA+ | |
| 3 | TXD, Transmit data | RX+ | NC | |
| 4 | DTR, Data terminal ready | RX- | NC | |
| 5 | Ground | Ground | Ground | |
| 6 | DSR, Data set ready | NC | NC | |
| 7 | RTS, Request to send | NC | NC | |
| 8 | CTS, Clear to send | NC | NC | |
| 9 | RI, Ring indicator | NC | NC | |
| | | | | |

J2 DC-In Power Connector (3-pin terminal block)





4-In & 4-Out GPIO Connector (10-pin terminal block)



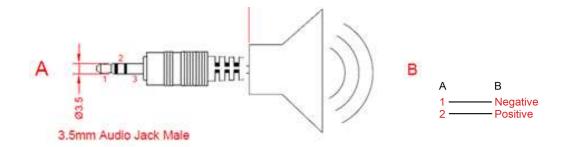


| Pin | Assignment | Pin | Assignment |
|-----|------------|-----|------------|
| 1 | +5V | 6 | OUT0 |
| 2 | IN0 | 7 | OUT1 |
| 3 | IN1 | 8 | OUT2 |
| 4 | IN3 | 9 | OUT3 |
| 5 | IN4 | 10 | Ground |

Line-Out / Line-In Jack



This connector supports Line-in and Line-out. Line-out supports a 2W speaker. Please see diagram below.

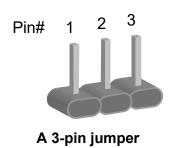


2.2 Setting the Jumpers

Set up and configure your device 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 jumper cap

Refer to the illustration below to set jumpers.

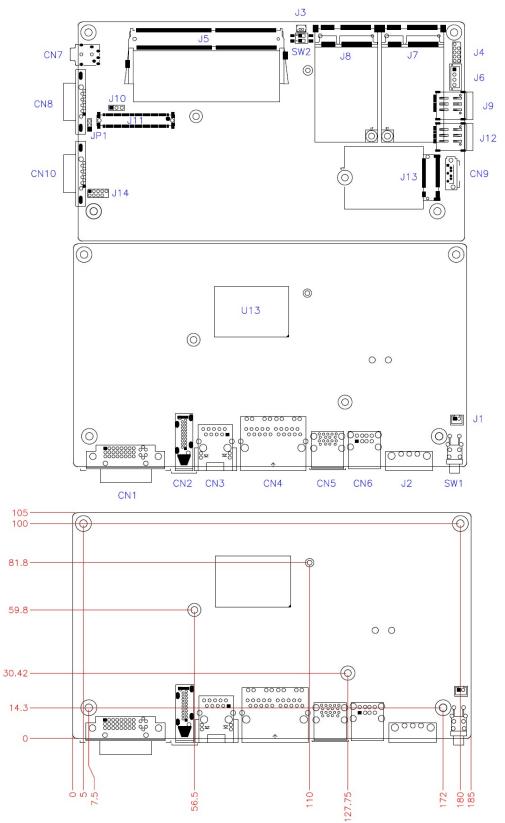
| Pin closed | Oblique view | Illustration in the manual |
|------------|--------------|---------------------------------------|
| Open | | $\Box \bigcirc \bigcirc \\ 1 \ 2 \ 3$ |
| 1-2 | | |
| 2-3 | | □ • • 1 2 3 |

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**.

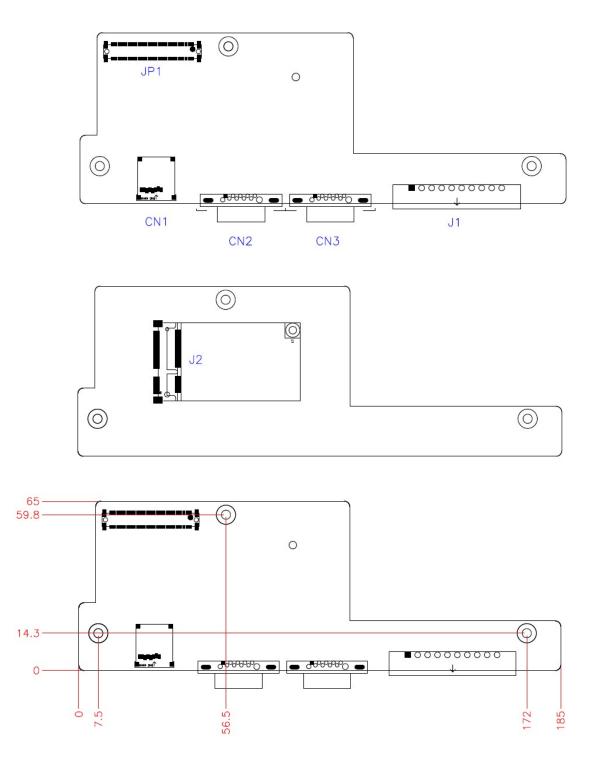
2.3 Motherboard Jumper & Connector Locations

IB803T Motherboard



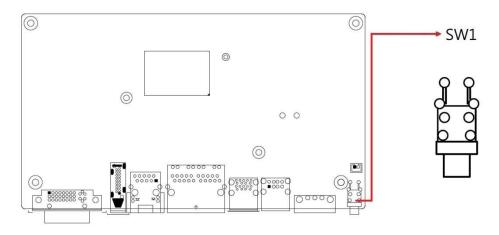
2

IP802 Carrier Board

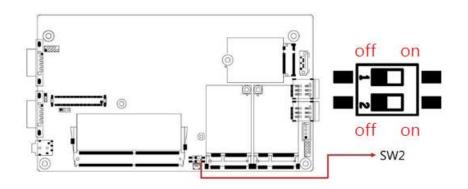


2.4 IB803T Motherboard Jumpers and Connectors

2.4.1 SW1: Power Button Switch



2.4.2 RTC RST# (SW2-1) & SRTC RST# (SW2-2)

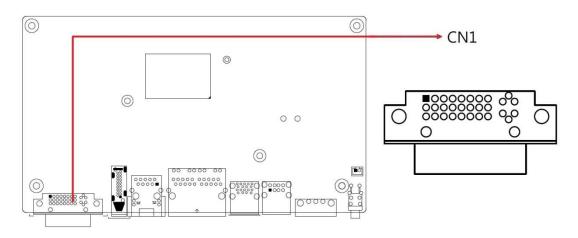


| RTC RST# (SW2-1) | | |
|------------------|-----|--|
| Function Setting | | |
| Normal | OFF | |
| Clear CMOS | ON | |

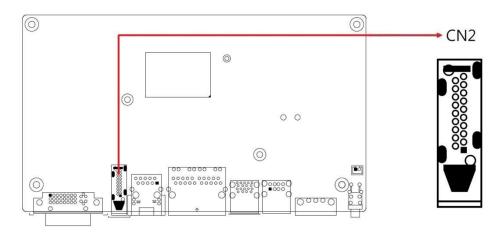
SRTC RST# (SW2-2)

| Function | Setting |
|-----------------------|---------|
| Normal | OFF |
| Clear ME RTC Register | ON |

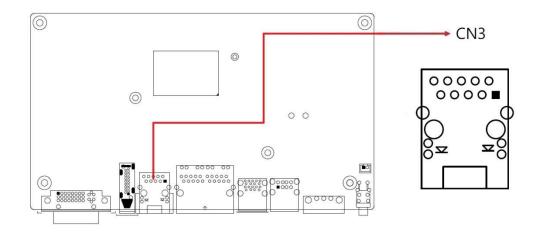
2.4.3 DVI-I Connector (CN1)



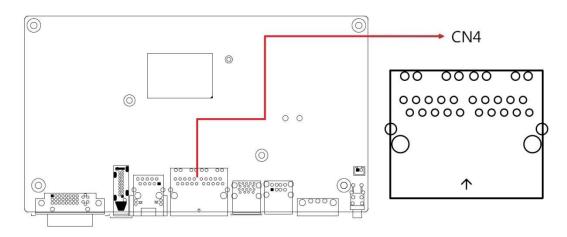
2.4.4 HDMI Connector (CN2)



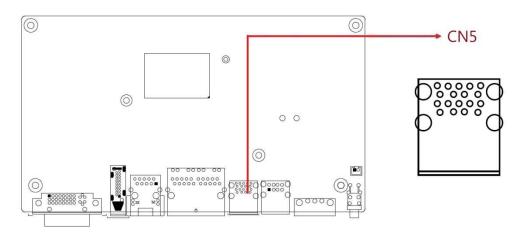
2.4.5 2.5 Gigabit LAN RJ45 Connector (CN3)



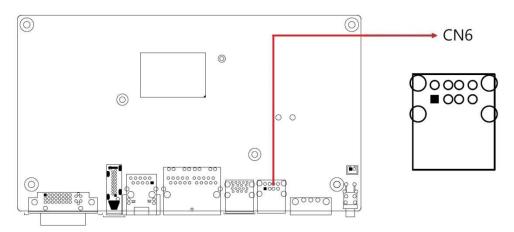
2.4.6 2.5 Gigabit LAN RJ45 Connectors (CN4)



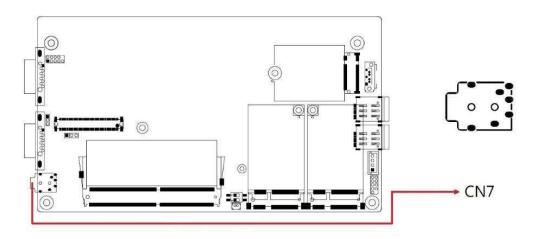
2.4.7 Dual USB 3.1 Connector (CN5)



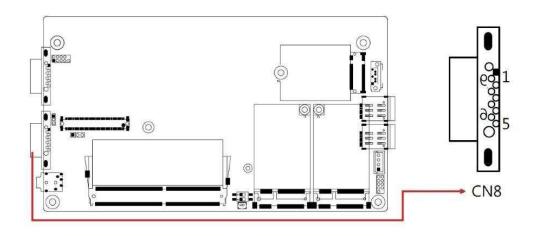
2.4.8 Dual USB 2.0 Connector (CN6)



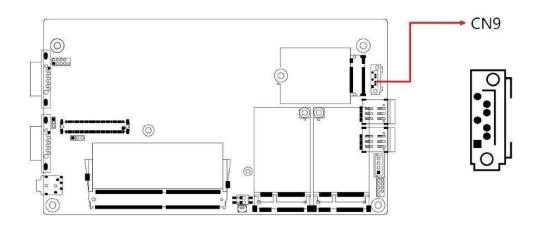
2.4.9 Line-Out / Line-In Connector (CN7)



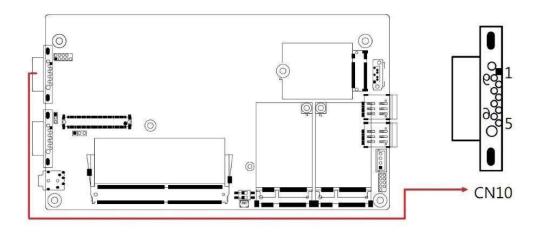
2.4.10 COM1 Connector (CN8)



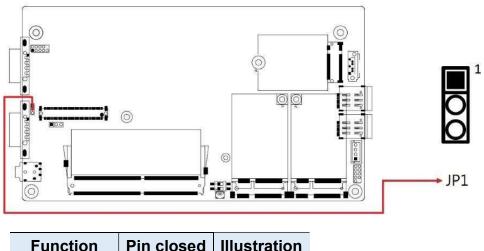
2.4.11 SATA Connector (CN9)



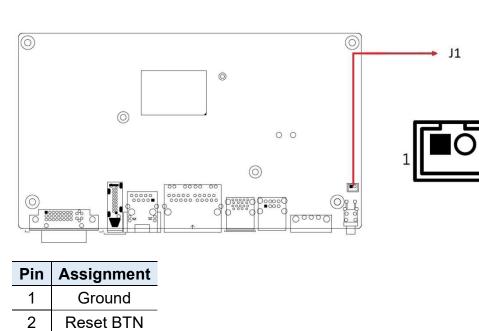
2.4.12 COM2 Connector (CN10)



2.4.13 AT/ATX Mode (JP1)

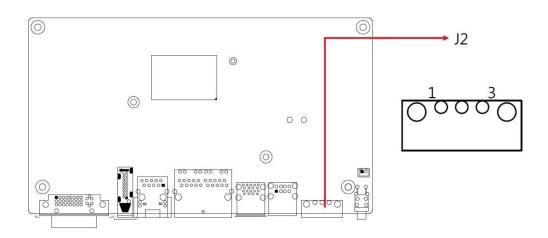


| Function | Pin closed | illustration |
|---------------|------------|--------------|
| ATX (default) | 1-2 | ○ • ∎ 1 |
| AT | 2-3 | ••□1 |

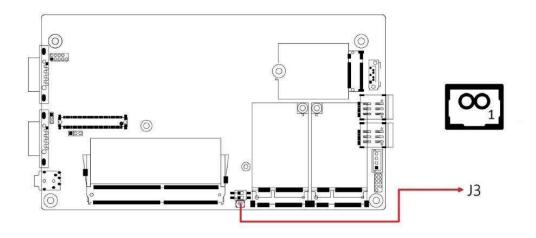


2.4.14 Reset Button Connector (J1)

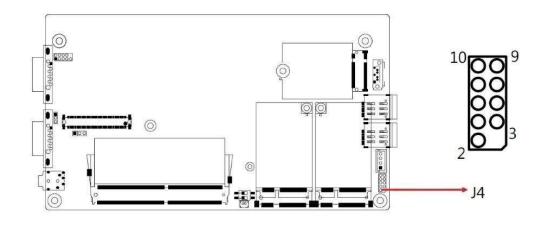
2.4.15 J2: DC-In Power Connector (3-pin terminal block)



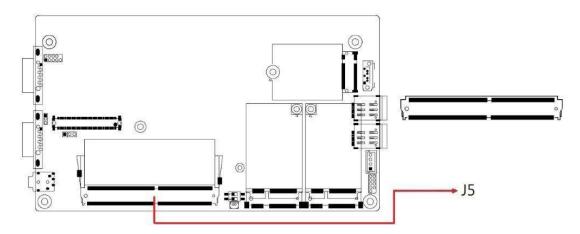
2.4.16 J3: RTC Battery Connector



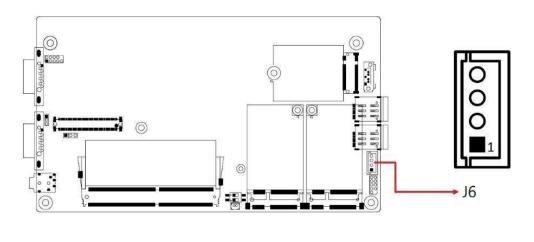
2.4.17 J4: SPI Firmware Header





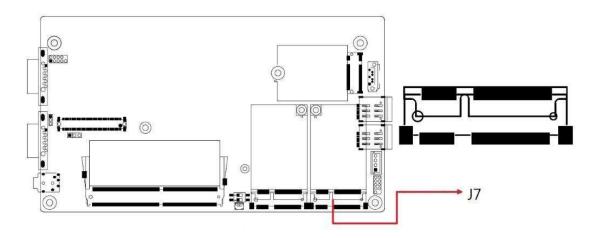


2.4.19 J6: SATA Power Connector

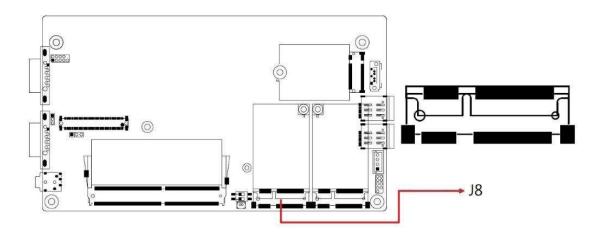


| Pin | Assignment |
|-----|------------|
| 1 | 5V |
| 2 | GND |
| 3 | GND |
| 4 | Х |

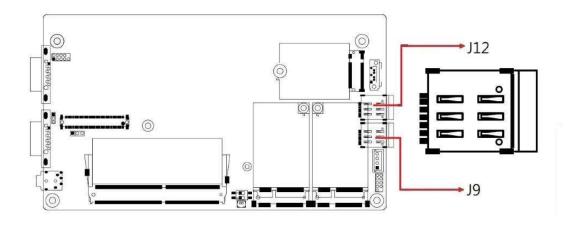
2.4.20 J7: Mini PCIe Socket (Supports USB & SIM2)



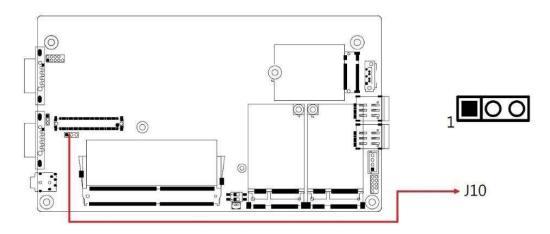
2.4.21 J8: Mini PCIe Socket (Supports USB & SATA)

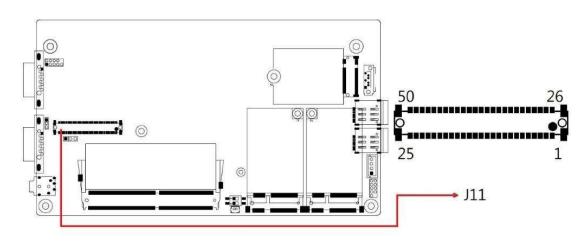


2.4.22 J9(SIM1), J12(SIM2): SIM Socket



2.4.23 J10: Power IC JTAG



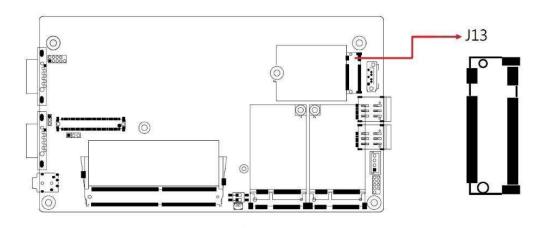


2.4.24 J11: Board-to-Board Connector

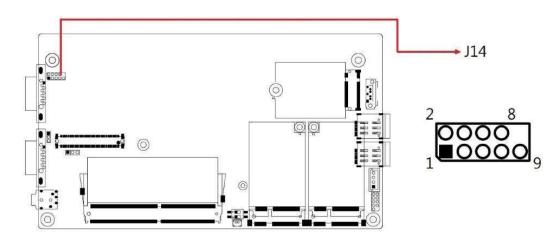
J11: Board-to-Board Connector

| Pin | Assignment | Pin | Assignment | |
|-----|--------------------------------|-----|------------------------------------|--|
| 1 | Ground | 26 | VCC5 | |
| 2 | GPIO_IN0 | 27 | VCC5 | |
| 3 | GPIO_IN1 | 28 | GPIO_OUT0 | |
| 4 | GPIO_IN2 | 29 | GPIO_OUT1 | |
| 5 | GPIO_IN3 | 30 | GPIO_OUT2 | |
| 6 | (COM3) DSR, Data set ready | 31 | GPIO_OUT3 | |
| 7 | (COM3) RTS, Request to send | 32 | (COM3) DCD, Data carrier detect | |
| 8 | (COM3) CTS, Clear to send | 33 | (COM3) RXD, Receive data | |
| 9 | (COM3) RI, Ring indicator | 34 | (COM3) TXD, Transmit data | |
| 10 | (COM4) DSR, Data set ready | 35 | (COM3) DTR, Data terminal ready | |
| 11 | (COM4) RTS, Request to send | 36 | (COM4) DCD, Data carrier detect | |
| 12 | (COM4) CTS, Clear to send | 37 | (COM4) RXD, Receive data | |
| 13 | (COM4) RI, Ring indicator | 38 | (COM4) TXD, Transmit data | |
| 14 | Ground | 39 | (COM4) DTR, Data terminal ready | |
| 15 | USB_D+ | 40 | Ground | |
| 16 | USB_D- | 41 | PLT_RST# | |
| 17 | Ground | 42 | Ground | |
| 18 | USB_D+ | 43 | PCIE_CLK_DP | |
| 19 | USB_D- | 44 | PCIE_CLK_DN | |
| 20 | Ground | 45 | Ground | |
| 21 | VCC3_3 | 46 | PCIE_RXP | |
| 22 | VCC3_3 | 47 | PCIE_RXN | |
| 23 | Ground | 48 | Ground | |
| 24 | 3VDUAL | 49 | PCIE_TXP | |
| 25 | 3VDUAL | 50 | PCIE_TXN | |

2.4.25 J13: M.2 B-Key Socket (Supports PCIe & USB3.0)



2.4.26 J14: Port 80 Header



- 2.4.27 LED1: Power_Fail (Red)
- 2.4.28 LED2: Heartbeat (Blue)
- 2.4.29 LED3: WWAN1 (Green)
- 2.4.30 LED4: WWAN2 (Green)

Chapter 3 Driver Installation

The information provided in this chapter includes:

- Intel[®] Chipset Software Installation Utility
- Graphics Driver Installation
- HD Audio Driver Installation
- Intel[®] Management Engine Drivers Installation
- LAN Driver Installation



3.1 Introduction

This section describes the installation procedures for software drivers. The software drivers are in a disk enclosed with the product package. If you find anything missing, please contact the distributor where you made the purchase.

Note: After installing your Windows operating system, you must install the Intel[®] Chipset Software Installation Utility first before proceeding with the drivers installation.

3.2 Intel[®] Chipset Software Installation Utility

The Intel[®] Chipset drivers should be installed first before the software drivers to install INF files for Plug & Play function for the chipset components. Follow the instructions below to complete the installation.

1. Insert the disk enclosed in the package with the board. Click **Intel** on the left pane and then **Intel(R) Elkhartlake Chipset Drivers** on the right pane.

| In | side T | Version : EM-5.0.1 |
|----|----------|--|
| | Intel | Intel(R) Elkhartlake Chipset Drivers |
| | LAN Card | |
| 1 | Tools | |
| | | |
| | | |
| | | |
| | | |
| | 8 | Support Intel(R) Elkhartlake Chipset Drivers |

2. Click Intel(R) Chipset Software Installation Utility.

| LAN Card | Intel(R) Chipset Software Installation Utility Intel(R) Elkhartlake Graphics Driver Realtek High Definition Audio Driver Intel(R) ME Drivers |
|----------|---|
|----------|---|

- 3. When the *Welcome* screen to the Intel[®] Chipset Device Software appears, click **Next** to continue.
- 4. Accept the software license agreement and proceed with the installation process.
- 5. On the *Readme File Information* screen, click **Install** for installation.
- 6. After the installation, press **Finish** to complete the setup process.

| Intel® Installation Framework | – 🗆 X |
|---|---------------------------------|
| Intel® Graphics Driver | |
| Welcome to the Setup Program | (intel) |
| This setup program will install the following components: - Intel® Graphics Driver | |
| It is strongly recommended that you exit all programs before conti | nuing. Click Next to continue. |
| | |
| < Back | Next > Cancel |
| | — Intel® Installation Framework |

3.3 Graphics Driver Installation

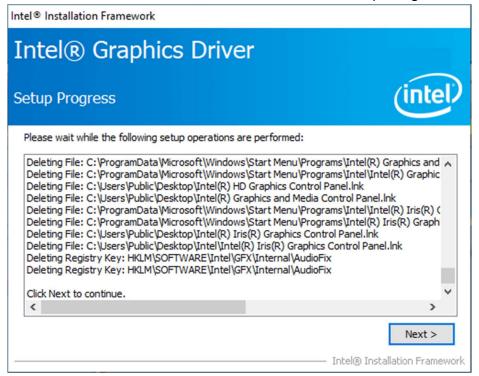
- 1. Insert the disk enclosed in the package with the board. Click **Intel** on the left pane and then **Intel(R) Elkhartlake Chipset Drivers** on the right pane.
- 2. Click Intel(R) Elkhartlake Graphics Driver.



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

| Intel® Installation Framework – | × |
|---|-------|
| Intel® Graphics Driver | |
| License Agreement | |
| You must accept all of the terms of the license agreement in order to continue the setup program. Do you accept the terms? | |
| GRAPHIC DRIVERS SOFTWARE LICENSE AGREEMENT (Version January 2020) IMPORTANT NOTICE PLEASE READ AND AGREE BEFORE DOWNLOADING, INSTALLING, COPYING OR USING This Software License Agreement (the "Agreement") is between you, or the company or other legal entity that you represent and warrant you have the legal authority to bind, (each, "You" or "Your") and Intel Corporation and its subsidiaries (collectively, "Intel") regarding Your use of the Software defined below. By downloading, installing, copying or otherwise using the Software, You agree to be bound by the terms of this Agreement. If You do not agree to the terms of this Agreement, or do not have legal authority or required age to agree to them, do not download, install, copy or otherwise use the Software. | < |
| <back fram<="" installation="" intel®="" no="" td="" yes=""><td>ework</td></back> | ework |

4. Click **Yes** to accept the license agreement and click **Next** in The Readme File Information screen. Click **Next** in the Setup Progress screen.



5. Restart the computer when prompted. Click **Finish**, then remove any installation media from the drives.

| Intel® Installation Framework - | |
|--|------------------------------|
| Intel® Graphics Driver | |
| Setup Is Complete | (intel) |
| You must restart this computer for the changes to take effect. Would you like to r computer now? | estart the |
| Yes, I want to restart this computer now. No, I will restart this computer later. | |
| Click Finish, then remove any installation media from the drives. | |
| Intel® Inct | Finish allation Framework |
| Theorem 1150 | anasovi i i union/orik |

3.4 HD Audio Driver Installation

1. Insert the disk enclosed in the package with the board. Click Intel on the left pane and then **Intel(R) Elkhartlake Chipset Drivers** on the right pane.



2. Click Realtek High Definition Audio Driver.

3. On the Welcome screen, click Next to continue.

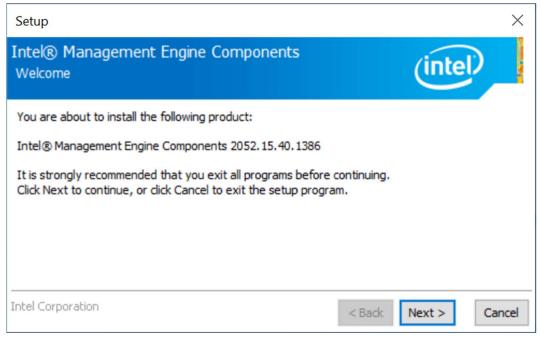
4. When the InstallShield Wizard has successfully installed the Realtek Audio Driver, restart the computer. Click **Finish** to complete the setup.

3.5 Intel® ME Drivers Installation

1. Insert the disk enclosed in the package with the board. Click Intel on the left pane and then **Intel(R) ME Drivers**.



2. The welcome screen to the Intel® Management Engine Components appears. Click **Next** to continue.



3

3. Accept the license agreement and click Next.

| Setup | × |
|--|-----|
| Intel® Management Engine Components License Agreement | |
| INTEL SOFTWARE LICENSE AGREEMENT(OEM / IHV / ISV Distribution & Single User) IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING. Do not use or load software (including drivers) from this site or any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement, which Intel may modify from time to time following reasonable notice to You. If you do not wish to so agree, do not install or use the Software. Please Also Note: • If you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor (IHV) | ^ |
| or Independent Software Vendor (ISV), this complete LICENSE AGREEMENT applies; • If you are an End-User, then only Exhibit A, the INTEL SOFTWARE LICENSE AGREEMENT, applies. For OEMs, IHVs and ISVs: | |
| LICENSE. Subject to the terms of this Agreement, Intel grants to You a nonexclusive, I accept the terms in the License Agreement. | * |
| Intel Corporation <back next=""> Can</back> | cel |

4. On the Setup's Destination Folder screen, click Next to continue.

| Setup | × |
|---|------------------------------------|
| Intel® Management Engine Components Destination Folder | (intel) |
| Click Next to install to the default folder, or click Change to | choose another destination folder. |
| C:\Program Files (x86)\Intel\Intel(R) Management Engine | Components |
| | Change |
| l | |
| Intel Corporation | < Back Next > Cancel |

5. After the Intel® components have been completely installed, click Finish.

3.6 LAN Driver Installation

1. Insert the disk enclosed in the package with the board. Click **LAN Card** on the left pane and then **Intel LAN Controller Drivers** on the right pane.



2. Choose Intel(R) I21x Gigabit Network Drivers.



- 3. In the welcome screen to the install wizard for Intel(R) Network Connections, click **Next**.
- 4. On the next screen, accept the terms in the license agreement and click **Next**.



5. In the Setup Options screen, click Next.

| Intel(R) Network Connections Install Wizard | | | × |
|--|--------|--------|---------|
| Setup Options Select the program features you want instal | led. | | (intel) |
| Install: | | | |
| Device drivers | | | |
| Feature Description | | | |
| [| < Back | Next > | Cancel |

6. Click **install** to begin the installation.

| 🕼 Intel(R) Network Connections Install Wi | izard | | × |
|--|------------------------|------------------------|----------------|
| Ready to Install the Program The wizard is ready to begin installation. | | | (intel) |
| Click Install to begin the installation. If you want to review or change any of yo the wizard. | our installation setti | ngs, click Back. Click | Cancel to exit |
| | < Back | Install | Cancel |

7. Click **Finish** when Install wizard has completed.

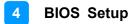
| 🕼 Intel(R) Network Connections Install W | /izard | X |
|--|---|---------|
| Install wizard Completed | | (intel) |
| To access new features, o properties of the network | open Device Manager, and view the adapters. | |
| | < Back Finish | Cancel |

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
- Security Settings
- Boot Settings
- Save & Exit





4.1 Introduction

The BIOS (Basic Input/Output System) installed in the ROM of your computer system supports Intel® processors. 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 key immediately allows you to enter the Setup utility. If you are a little bit late pressing the 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 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

| Main Advanced Chipset | Aptio Setup – AMI Security Boot Save & Exit | |
|----------------------------------|--|---|
| Total Memory Memory Data Rate | 8192 MB 2667 MTPS | Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 1998-9999 |
| System Date System Time | [Fri 08/20/2021] [13:53:00] | Months: 1–12 Days: Dependent on month Range of Years may vary. |
| | | <pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre> |
| | Version 2.21.1278 Copyright (C) 20 | 21 AMI |

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



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.

| | Main Advanced Chipset Security Boot Save & Exit | | |
|---|--|--|--|
| CPU Configuration PCH-FW Configuration Trusted Computing ACPI Settings Fintek Super ID Configuration Fintek Hardware Monitor USB Configuration Network Stack Configuration | CPU Configuration Parameters ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit | | |

| BIOS Setting | Description |
|----------------------------------|---|
| CPU Configuration | Displays CPU configuration parameters. |
| PCH-FW Configuration | Configure Management Engine Technology Parameters. |
| Trusted Computing | Configure security device parameters. |
| ACPI Settings | Displays system ACPI parameters. |
| Fintek Super IO Configuration | Displays super IO chip parameters. |
| Fintek Hardware Monitor | Shows super IO monitor hardware status. |
| USB Configuration | Displays USB configuration parameters. |
| Network Stack Configuration | Enables / Disables UEFI Network Stack. |

4.4.1 CPU Configuration

| Aptio Setup - AMI | | |
|--|--|---|
| CPU Configuration Type ID Speed VMX SMX/TXT Intel (VMX) Virtualization Technol | Intel Atom(R) x6413E 0x90661 1500 MHz Supported Not Supported [Enabled] | When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology. |
| | | <pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre> |
| Version (| 2.21.1278 Copyright (C) 202 | 1 AMI |

| BIOS Setting | Description |
|---|--|
| Intel (VMX) Virtualization Technolgy | When enabled, a VMM can ultilize the additional hardware capabilities provided by Varderpool Technology. |

4.4.2 PCH-FW Configuration

| Main Advanced Chipset Sec | Aptio Setup – AMI urity Boot Save & Exit | |
|---|--|---|
| CPU Configuration PCH-FW Configuration Trusted Computing ACPI Settings Fintek Super ID Configuration Fintek Hardware Monitor USB Configuration Network Stack Configuration | | Configure Management Engine Technology Parameters |
| | | <pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre> |
| Ve | rsion 2.21.1278 Copyright (C |) 2021 AMT |
| | | |
| | | |
| Advanced | Aptio Setup – AMI | |
| Advanced ME Firmware Version ME Firmware Mode ME Firmware SKU ME Firmware Status 1 ME Firmware Status 2 ME State | Aptio Setup - AMI 15.40.10.2204 Normal Mode Consumer SKU 0x90000255 0x89100106 [Enabled] | When Disabled ME will be put into ME Temporarily Disabled Mode. |
| ME Firmware Version ME Firmware Mode ME Firmware SKU ME Firmware Status 1 ME Firmware Status 2 | 15.40.10.2204 Normal Mode Consumer SKU 0x90000255 0x89100106 | into ME Temporarily Disabled |

| BIOS Setting | Description |
|--------------|--|
| ME State | When disabled, ME will be put into ME temporarily Disabled Mode. |

4.4.3 Trusted Computing

| Aptio Setup - AMI Advanced | | | |
|--------------------------------|--------------|---|--|
| TPM 2.0 Device Found | | Enables or Disables BIOS | |
| Firmware Version: | 7.62 | support for security device. | |
| Vendor: | IFX | 0.S. will not show Security | |
| Security Device Support | (Enable) | Device. TCG EFI protocol and INT1A interface will not be | |
| Active PCR banks | SHA256 | available. | |
| Available PCR banks | SHA-1,SHA256 | | |
| SHA-1 PCR Bank | [Disabled] | | |
| SHA256 PCR Bank | [Enabled] | | |
| Pending operation | [None] | | |
| Platform Hierarchy | [Enabled] | 2 | |
| Storage Hierarchy | [Enabled] | ++: Select Screen | |
| Endorsement Hierarchy | [Enabled] | 14: Select Item | |
| TPM 2.0 UEFI Spec Version | [TCG_2] | Enter: Select | |
| Physical Presence Spec Version | [1.3] | +/-: Change Opt. | |
| TPM 2.0 InterfaceType | [TIS] | F1: General Help | |
| Device Select | [Auto] | F2: Previous Values | |

| BIOS Setting | Description |
|--------------------------------------|--|
| Security Device Support | Enables / Disables BIOS support for security device. OS will not show security device. TCG EFI protocol and INTIA interface will not be available. |
| SHA-1 PCR Bank | Enables / Disables SHA-1 PCR Bank. |
| SHA256 PCR Bank | Enables / Disables SHA256 PCR Bank. |
| Pending operation | Schedule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device. |
| Platform Hierarchy | Enables / Disables platform hierarchy. |
| Storage Hierarchy | Enables / Disables storage hierarchy. |
| Endorsement Hierarchy | Enables / Disables endorsement hierarchy. |
| TPM2.0 UEFI Spec Version | Selects the supported TCG version based o your OS. TCG_1_2: supports Windows 8 /10. TCG_2: supports new TCG2 protocol and event format for Windows 10 or later. |
| Physical Presence Spec Version | Selects to show the PPI Spec Version (1.2 or 1.3) that the OS supports. Note: Some HCK tests might not support 1.3. |
| Device Select | TPM 1.2 will restrict support to TPM 1.2 devices only. TPM 2.0 will restrict support to TPM 2.0 devices only. Auto will support both with the default being set to TPM 2.0 deices if not found, and TPM 1.2 device will be enumerated. |

4.4.4 ACPI Settings

| | Aptio Setup – AMI | |
|---|---|---|
| Main Advanced <u>Chipset Security</u> CPU Configuration PCH-FW Configuration Trusted Computing AOPI Settings Fintek Super IO Configuration Fintek Hardware Monitor USB Configuration Network Stack Configuration | BOOL SAVE & EXIL | System ACPI Parameters. |
| | | <pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre> |
| Version | 2.21.1278 Copyright (C) 2021 | AMI |
| Advanced | Aptio Setup — AMI | |
| ACPI Settings Enable Hibernation ACPI Sleep State | [Enabled] [S3 (Suspend to RAM)] | Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems. |
| Advanced | Aptio Setup - AMI | |
| ACPI Settings Enable Hibernation ACPI Sleep State | [Enabled] [S3 (Suspend to RAM)] | Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed. |
| | ACPI Sleep State | →+: Select Screen |

| BIOS Setting | Description |
|-----------------------|--|
| 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 (Suspend Disabled or S3) where the system will enter when the Suspend button is pressed. |



4.4.5 **Fintek Super IO Configuration**

| Advanced | Aptio Setup - AMI |
|--|--|
| Fintek Super IO Confi | guration |
| Super IO Chip Power Failure > Serial Port 1 Configu > Serial Port 2 Configu > Serial Port 3 Configu > Serial Port 4 Configu | ination Ination |
| BIOS Setting | Description |
| Power Failure | Options: Always on, Always off |
| Serial Ports | Sets parameters of serial ports. Enables / Disables the serial port and select an optimal |

Serial Port 1 Configuration

Configuration



setting for the Super IO device.

| Advanced | Aptio Setup – AMI | |
|--------------------------------|---|---|
| Serial Port 1 Configuratio | n | Select an optimal settings for Super IO Device |
| Serial Port Device Settings | [Enabled] IO=3F8h; IRQ=4; | |
| Change Settings Device Mode | (Auto) [RS232] | |
| Advanced | Aptio Setup – AMI | |
| Serial Port 1 Configuratio | n | Change the Serial Port mode. |
| Serial Port Device Settings | [Enabled] IO=3F8h; IRQ=4; | |
| Change Settings Device Mode | [Auto] [RS232] | |
| | Device Mode RS232 RS485 TX Low Active RS485 with Termination TX Low RS422 RS422 with Termination | elect Screen elect Item |



Serial Port 2 Configuration

| | Aptio Setup – AMI | |
|--------------------------------------|---|---|
| Advanced Serial Port 2 Configuration | | Enable or Disable Serial Port |
| Serial Port | [Enabled] | (COM) |
| Device Settings | IO=2F8h; IRQ=3; | |
| Change Settings Device Mode | [Auto] [RS232] | |
| | | |
| Advanced | Aptio Setup - AMI | |
| Serial Port 2 Configuration | | Select an optimal settings for Super IO Device |
| Serial Port Device Settings | [Enabled] IO=2F8h; IRQ=3; | |
| Change Settings | [Auto] | |
| Device Mode | [RS232] | |
| Advanced | Aptio Setup - AMI | |
| Serial Port 2 Configuration | | Select an optimal settings for |
| Serial Port | [Enabled] | Super IO Device |
| Device Settings Change Settings | IO=2F8h; IRQ=3; [Auto] | |
| Device Mode | [RS232] | |
| | Auto IO=2F8h; IRQ=3; IO=3F8h; IRQ=3,4,5,6,7,9,10,11,1 IO=2F8h; IRQ=3,4,5,6,7,9,10,11,1 IO=3E8h; IRQ=3,4,5,6,7,9,10,11,1 IO=2E8h; IRQ=3,4,5,6,7,9,10,11,1 | 2; 2; Select Screen |
| Advanced | Aptio Setup - AMI | |
| Serial Port 2 Configuration | · · · · · · · · · · · · · · · · · · · | Change the Serial Port mode. |
| Serial Port Device Settings | [Enabled] IO=2F8h; IRQ=3; | |
| Change Settings | [Auto] | |
| Device Mode | | |
| | Device Mode | ive elect Screen elect Item : Select Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |

Serial Port 3 Configuration

| | Aptio Setup - AMI | |
|---|--|--|
| Advanced | | |
| Serial Port 3 Configuration Serial Port Device Settings | [Enabled] IO=3E8h; IRQ=5; | Enable or Disable Serial Port (COM) |
| Change Settings Device Mode | [Auto] [RS232] | |
| Advanced | Aptio Setup – AMI | |
| Serial Port 3 Configuration Serial Port Device Settings Change Settings Device Mode | [Enabled] IO=3E8h; IRQ=5; [Auto] [RS232] Auto IO=3E8h; IRQ=7; IO=3E8h; IRQ=3,4,5,6,7,9,10,11 IO=2E8h; IRQ=3,4,5,6,7,9,10,11 IO=2F0h; IRQ=3,4,5,6,7,9,10,11 IO=2E0h; IRQ=3,4,5,6,7,9,10,11 | ,12: ,12: ,12: ,12: ,12: ,12: ,12: ,12: |
| | /ersion 2.21.1278 Copyright (C) 2 | 021 MM1 |
| Advanced | Aptio Setup - AMI | |
| Serial Port 3 Configuration | | Change the Serial Port mode. |

| Huvanceu | | |
|--------------------------------|--|--|
| Serial Port 3 Configuration | 1 | Change the Serial Port mode. |
| Serial Port Device Settings | <pre>[Enabled] IO=3E8h; IRQ=5;</pre> | |
| Change Settings Device Mode | [Auto] [RS232] | |
| | Device Mode RS232 RS485 TX Low Active RS485 with Termination TX Low Acti RS422 RS422 with Termination | ve elect Screen elect Item : Select Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |
| | Version 2.21.1278 Copyright (C) 2021 | AMI |



Serial Port 4 Configuration

| Advanced | Aptio Setup - AMI | |
|---|--|---|
| Serial Port 4 Configuration Serial Port Device Settings Change Settings Device Mode | [Enabled] IO=2E8h; IRQ=10; [Auto] [RS232] | Enable or Disable Serial Port (COM) |
| Advanced | Aptio Setup – AMI | |
| Serial Port 4 Configuration Serial Port Device Settings Change Settings Device Mode | [Enabled] IO=2E8h; IRQ=10; [Auto] [RS232] Auto Change Settings 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=2E0h; IRQ=3,4,5,6,7,9,10,11,12 IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12 | Select Screen Select Item r: Select Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |
| M | ersion 2.21.1278 Copyright (C) 2021 | L AMI |

| Advanced | Aptio Setup – AMI | |
|--|---|--|
| Serial Port 4 Configurati | on | Change the Serial Port mode. |
| Serial Port Device Settings Change Settings Device Mode | <mark>[Enabled]</mark> IO=2E8h; IRQ=10; [Auto] [RS232] | |
| | Device Mode RS232 RS485 TX Low Active RS485 with Termination TX Low RS422 RS422 with Termination | Active elect Screen elect Item : Select Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |
| | Version 2.21.1278 Copyright (C) | 2021 AMI |



4.4.6 Fintek Hardware Monitor

| Main Advanced Chipset Security Boot Save & Exit • CPU Configuration • Chipset Computing • Fintex Homitor hardware status • Fintex Homitor hardware status • Trusted Computing • Fintex Homitor hardware indice • • • • • • • • • • • • • • • • • • • | | Aptio Setup - AMI | |
|---|--|-------------------------------------|---|
| Actio Setup - AMI Advanced Pc Health Status CPU temperature : +47 C System temperature : +49 C Vcore : +1.632 V +5V : +5.067 V Hemory Voltage : +1.192 V ++: Select Screen 14: Select Item Enter: Select Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit | CPU Configuration PCH-FW Configuration Trusted Computing ACPI Settings Fintek Super IO Configuration Fintek Handware Monitor USB Configuration | | ++: Select Screen 1↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F3: Save & Exit |
| Actio Setup - AMI Advanced Pc Health Status CPU temperature : +47 C System temperature : +49 C Vcore : +1.632 V +5V : +5.067 V Hemory Voltage : +1.192 V ++: Select Screen 14: Select Item Enter: Select Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit | | | |
| Advanced Pc Health Status CPU temperature : +47 C System temperature : +49 C Vcore : +1.632 V +5V : +5.087 V Hemory Voltage : +1.192 V ++: Select Screen 11: Select Item Enter: Select : +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit F4: Save & Exit | Version | 2.21.1278 Copyright (C) 202: | L AMI |
| CPU temperature : +47 C System temperature : +49 C Vcore : +1.632 V +5V : +5.087 V Hemory Voltage : +1.192 V ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit | Advanced | Aptio Setup — AMI | |
| System temperature : +49 C Vcore : +1.632 V +5V : +5.087 V Memory Voltage : +1.192 V **: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit | Pc Health Status | | |
| | System temperature Vcore +5V | : +49 C : +1.632 V : +5.087 V | <pre>fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit</pre> |

| BIOS Setting | Description |
|-------------------------|--|
| Temperatures / Voltages | These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only as monitored by the system and showing the PC health status |

4.4.7 USB Configuration

| Advanced | Aptio Setup – AMI | |
|------------------------------------|----------------------------|--|
| USB Configuration | | Enables Legacy USB support. |
| USB Module Version | 25 | AUTO option disables legacy support if no USB devices are connected. DISABLE option will |
| USB Controllers: | | keep USB devices available |
| 1 XHCI USB Devices: | | only for EFI applications. |
| 1 Drive, 1 Keyboard, 1 Mouse | | |
| | | |
| XHCI Hand-off | [Enabled] | |
| USB Mass Storage Driver Support | [Enabled] | |
| USB hardware delays and time-outs: | | →+: Select Screen |
| USB transfer time-out | [20 sec] | ↑↓: Select Item |
| Device reset time-out | [20 sec] | Enter: Select |
| Device power-up delay | [Auto] | +/-: Change Opt. |
| | | F1: General Help |
| Mass Storage Devices: | fAutol | F2: Previous Values |
| Generic Ultra HS-COMBO | (HUTO) | F3: Optimized Defaults F4: Save & Exit |
| | | ESC: Exit |
| | | |
| | | |
| | | |
| Version | 2.21.1278 Copyright (C) 20 | 1 221 AMI |

| BIOS Setting | Description |
|------------------------------------|---|
| Legacy USB | Enables / Disables Legacy USB support. |
| | Auto disables legacy support if there is no USB device connected. |
| Support | Disable keeps USB devices available only for EFI applications. |
| XHCI Hand-pff | 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 USB mass storage driver support. |
| USB Transfer time-out | Sets the time-out value 1, 5, 10 or 20 sec(s) for Control, Bulk, and Interrupt transfers. |
| Device reset time- out | Sets the seconds (10, 20, 30, 40 secs) of delaying execution of start unit command to USB mass storage device. |
| Device power-up | The maximum time the device will take before it properly reports itself to the Host Controller. |
| delay | Auto uses default value. For a Root port, it is 100 ms. For a Hub port, the delay is taken from Hub descriptor. |
| Generic Ultra MS- COMBO | Mas storage device emulation type. 'AUTO' enumerates devices according to their media format. Optical drives are emulated as 'CDROM' drives with no media will be emulated according to a drive type |



4.4.8 Network Stack Configuration

| Main Advanced Chipset Se | Aptio Setup - AMI | |
|---|---------------------------------|---|
| CPU Configuration PCH-FW Configuration Trusted Computing ACPI Settings Fintek Super IO Configuration Fintek Hardware Monitor USB Configuration Network Stack Configuration | | <pre>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>></pre> |
| L | /ersion 2.21.1278 Copyright (C) | 2021 AMI |
| | | |
| | Antin Setun - AMI | |
| Advanced | Aptio Setup — AMI | |
| Advanced Network Stack | [Disabled] | Enable/Disable UEFI Network Stack |
| | | |
| Network Stack | [Disabled] Network Stack | Stack ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |

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

4.5 Chipset Settings

4.5.1 System Agent (SA) Configuration

| Main Advanced Chipset Security | Aptio Setup - AMI Boot Save & Exit | |
|---|--|--|
| System Agent (SA) Configuration PCH-IO Configuration | | System Agent (SA) Parameters |
| Chipset | Aptio Setup - AMI | |
| System Agent (SA) Configuration | | VT-d capability |
| VT-d | Supported | |
| Graphics Configuration VT-d | [Enabled] | |
| Chipset | Aptio Setup — AMI | |
| Graphics Configuration | | Select which of IGFX/PEG/PCI Graphics device should be |
| Primary Display Internal Graphics GTT Size Aperture Size | [Auto] [Auto] [8H8] [256M8] | Primary Display Or select HG for Hybrid Gfx. |
| Chipset | Aptio Setup — AMI | |
| Graphics Configuration | | Select the Aperture Size |
| Primary Display Internal Graphics GTT Size Aperture Size | [Auto] [Auto] [8MB] [256MB] | Note: Above 46B MMID BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support. |
| | Aperture Size 128MB 256MB 512MB 1024MB 2048MB | ++: Select Screen ↑↓: Select Item |

| BIOS Setting | Description |
|-------------------|--|
| Primary display | Select which of IGFX/PEG/PCI Graphics device should be Primary Display or select HG for Hybrid Gfx |
| Internal Graphics | Keep IGFX enabled based on the setup options |
| GTT Size | Options: 2MB, 4MB, 8MB |
| Aperture Size | 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 |

4.5.2 PCH-IO Configuration

| SATA Controller(s) [Enabled] SATA Mode Selection [AHCI] Serial ATA Port 0 TS64GMTS400I (64.0GB) Software Preserve SUPPORTED Port 0 [Enabled] Hot Plug [Disabled] Configured as eSATA Hot Plug supported | Main Advanced Chipset Secur | Aptio Setup - AMI rity Boot Save & Exit | |
|--|---|--|---|
| Chipset SATA Device Options Settings SATA Configuration SATA Device Options Settings Chipset Aptio Setup - AMI Chipset Chipset Chipset Chipset Chipset Chipset Chipset Sata Configuration SATA Configuration Sata Ande Selection Sata Ande Selection Software Preserve SuPPORTED Software Preserve SuPPORTED SupPort 1 Hot Plug Configured as eSATA Hot Plug Supported +*: Select Screen 11: Select Item Hot Plug Configured as eSATA | | , | PCH Parameters |
| SATA Configuration Aptio Setup - AMI Chipset SATA Configuration SATA Configuration SATA Controller(s) SATA Mode Selection Serial ATA Port 0 Software Preserve SUPPORTED Port 0 Hot Plug Configured as eSATA Hot Plug Supported Serial ATA Port 1 Software Preserve SUPPORTED Port 1 Hot Plug Configured as eSATA Hot Plug supported Fi Select Screen Hot Plug supported Fi Select Item Enter: Select +-: Change Opt. Fi General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit | Chipset | Aptio Setup - AMI | |
| Chipset SATA Configuration SATA Configuration SATA Controller(s) SATA Controller(s) SATA Mode Selection Software Preserve SUPPORTED Port 0 IEnabled] Configured as eSATA Hot Plug Configured as eSATA Hot Plug Supported Software Preserve SUPPORTED Port 1 Hot Plug Configured as eSATA Hot Plug Supported Configured as eSATA Hot Plug Supported Freserve SUPPORTED Fort 1 Hot Plug Configured as eSATA Hot Plug Supported Freserve SUPPORTED Fort 1 Hot Plug Configured as eSATA Hot Plug Supported Freserve SUPPORTED Fort 1 Hot Plug Configured as eSATA Hot Plug Supported Freserve SUPPORTED Fort 1 Hot Plug Configured as eSATA Hot Plug Supported Freserve SUPPORTED Fort 1 Software Preserve SU | | | SATA Device Options Settings |
| SATA Controller(s) [Enabled] SATA Mode Selection [AHCI] Serial ATA Port 0 TS64GMTS400I (64.0GB) Software Preserve SUPPORTED Port 0 [Enabled] Configured as eSATA Hot Plug supported Serial ATA Port 1 TS126ASTMM16KI (128.0 Software Preserve SUPPORTED Port 1 [Enabled] Hot Plug [Disabled] Configured as eSATA Hot Plug supported Fort 1 [Enabled] Hot Plug [Disabled] Configured as eSATA Hot Plug supported Fi Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit | Chipset | Aptio Setup - AMI | |
| | Port 0 Hot Plug Configured as eSATA Serial ATA Port 1 Software Preserve Port 1 Hot Plug | [AHCI] TS64GMTS400I (64.0GB) SUPPORTED [Enabled] Hot Plug supported TS128ASTMM16KI (128.0 SUPPORTED [Enabled] [Disabled] | ++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit |

| BIOS Setting | Description |
|------------------------|--|
| SATA Controller(s) | Enables / Disables the Serial ATA. |
| SATA Mode Selection | Determines how SATA controller(s) operate. |
| Serial ATA Port 0~1 | Enables / Disables Serial Port 0~1. |
| SATA Ports Hot Plug | Enables / Disables SATA Ports HotPlug. |



| Chipset | Aptio Setup – AMI | |
|---|-------------------|---|
| PCH-IO Configuration ▶ SATA Configuration ▶ M.2 USB Configuration | | M.2 USB Configuration settings |
| Chipset | Aptio Setup – AMI | |
| M.2 USB Configuration M.2 USB3.0 Support | [Enabled] | Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS. |
| Chipset | Aptio Setup – AMI | |
| M.2 USB Configuration M.2 USB3.0 Support | [Enabled] | Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB |

| M.2 USB3.0 Support | [Enabled] | port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS. |
|--------------------|---|---|
| | M.2 USB3.0 Support — Disabled Enabled | <pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre> |
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| BIOS Setting | Description |
|--------------------------|---|
| M.2 USB Configuration | M.2 USB Configuration Settings |
| M.2 USB 3.0 Support | Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plugged into the connector will not be dtected by BIOS or OS. |

4.6 Security Settings

| Aptio Setup Main Advanced Chipset <mark>Security</mark> Boot Save & | |
|---|--|
| Password Description If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup. If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights. The password length must be in the following range: Minimum length 3 Maximum length 30 Administrator Password User Password Secure Boot | Set Administrator Password ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |
| Version 2.21.1278 Copy | right (C) 2021 AMI |

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

| Aptio Setup - AMI Chipset | | |
|---|------------------------------------|---|
| SATA Configuration | | Enable/Disable SATA Device. |
| SATA Controller(s) SATA Mode Selection | [Enabled] [AHCI] | |
| | | |
| Serial ATA Port 0 Software Preserve | TS64GMTS400I (64.0GB) SUPPORTED | |
| Port 0 | [Enabled] | |
| Hot Plug | [Disabled] | |
| Configured as eSATA | Hot Plug supported | |
| Serial ATA Port 1 | TS128ASTMM16KI (128.0 | |
| Software Preserve | SUPPORTED | |
| Port 1 | [Enabled] | |
| Hot Plug | [Disabled] | ++: Select Screen |
| Configured as eSATA | Hot Plug supported | ↑↓: Select Item Enter: Select |

| SATA ConfigurationDetermines how SATA controller(s)SATA Controller(s)[Enabled] [AHCI]SATA Hode SelectionIAHCI]Serial ATA Port 0TS64GMTS400I (64.0GB) SUPPORTED [Enabled] [Disabled]Port 0[Enabled] [Disabled]Hot Plug[Disabled] [Disabled]Configured as eSATAHot Plug supported [Enabled] [Disabled]Port 1[Enabled] [Disabled]Hot Plug[Disabled]Configured as eSATA[Disabled] [Enabled]Hot Plug[Disabled]Configured as eSATAHot Plug supportedPort 1[Enabled] [Disabled]Hot Plug[Disabled]Configured as eSATAHot Plug supportedFi: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |
|--|
| |

Aptio Setup - AMI

SATA Configuration

SATA Controller(s) SATA Mode Selection

Serial ATA Port 0 Software Preserve Hot Plug Configured as eSATA Serial ATA Port 1 Software Preserve Port 1 Hot Plug Configured as eSATA

[Enabled] [AHCI]

TS64GMTS400I (64.0GB) SUPPORTED [Disabled] Hot Plug supported TS126ASTMM16KI (128.0... SUPPORTED [Enabled] [Disabled] Hot Plug supported

↔: Select Screen †∔: Select Item

Chipset

Chipset

Aptio Setup - AMI

SATA Configuration

SATA Controller(s) SATA Mode Selection

Serial ATA Port O Software Preserve Port 0 Configured as eSATA Serial ATA Port 1 Software Preserve Port 1 Hot Plug Configured as eSATA

[Enabled] [AHCI]

TS64GMTS400I (64.0GB) SUPPORTED [Enabled] [Disabled] Hot Plug supported TS128ASTMM16KI (128.0... SUPPORTED [Enabled] [Disabled] Hot Plug supported

Designates this port as Hot Pluggable. ↔: Select Screen ↑↓: Select Item Enter: Select

Enable or Disable SATA Port

- Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

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| Aptio Setup – AMI Chipset | | |
|--|--|--|
| Chipset SATA Configuration SATA Controller(s) SATA Mode Selection Serial ATA Port 0 Software Preserve Port 0 Hot Plug Configured as eSATA Serial ATA Port 1 Software Preserve Port 1 Hot Plug Configured as eSATA | Aptio Setup - AMI [Enabled] [AHCI] TS646MTS400I (64.0GB) SUPPORTED [Enabled] Hot Plug Supported TS1286STMH16KI (128.0 SUPPORTED [Enabled] [Disabled] Hot Plug Supported | Enable or Disable SATA Port ++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help |
| Vers | ion 2.21.1278 Copyright (C) 202 | F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |

| SATA Configuration Designates this port as Hot SATA Controller(s) [Enabled] SATA Mode Selection [AHCI] Serial ATA Port 0 TS64GMTS400I (64.0GB) Software Preserve SUPPORTED Port 0 [Enabled] Hot Plug [Disabled] Configured as eSATA Hot Plug supported Serial ATA Port 1 TS126ASTMM16K1 (128.0 Software Preserve SUPPORTED Port 1 [Enabled] Hot Plug [Disabled] Configured as eSATA Hot Plug supported Software Preserve SUPPORTED Port 1 [Enabled] Hot Plug [Disabled] Configured as eSATA Hot Plug supported Ti Select Item Enter: Select t/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit | Aptio Setup - AMI Chipset | | |
|--|--|--|---|
| | SATA Controller(s) SATA Mode Selection Serial ATA Port 0 Software Preserve Port 0 Hot Plug Configured as eSATA Serial ATA Port 1 Software Preserve Port 1 Hot Plug | [AHCI] TS64GMTS400I (64.0GB) SUPPORTED [Enabled] Hot Plug supported TS128ASTMM16KI (128.0 SUPPORTED [Enabled] [Disabled] | <pre>Pluggable. ++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit</pre> |









4.7 Boot Settings

| Aptio Setup – AMI Main Advanced Chipset Security <mark>Boot</mark> Save & Exit | | |
|--|--|--|
| Boot Configuration Setup Prompt Timeout Bootup NumLock State Quiet Boot FIXED BOOT ORDER Priorities Boot Option #1 Boot Option #2 Boot Option #3 Boot Option #4 Boot Option #5 Boot Option #7 Boot Option #7 Boot Option #8 > UEFI Hard Disk Drive BBS Priorities | 1 [Disabled] [Hard Disk:Windows] [CD/DVD] [USB Hard Disk] [USB CD/DVD] [USB Key] [USB Floppy] [USB Floppy] [USB Lan] [Network] | <pre>Select the keyboard NumLock state ++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit</pre> |
| Version 2 | .21.1278 Copyright (C) 2021 | AMI |

| BIOS Setting | Description |
|--|--|
| Setup Prompt Timeout | Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting. |
| Bootup NumLock State | Turns on/off the keyboard NumLock state. |
| Quiet Boot | Enables / Disables Quiet Boot option. |
| Fixed Boot Order Priorities | Sets the system boot order. |
| UEFI Hard Disk Drive BBS Priorities | Specifies the boot device priority sequence from available UEFI hard disk drives. |

4.8 Save & Exit Settings

| Aptio Setup – A Main Advanced Chipset Security Boot Save & Exit | |
|---|---|
| Save Options Save Changes and Exit Discard Changes and Exit Save Changes and Reset Discard Changes and Reset Save Changes Discard Changes Default Options Restore Defaults Save as User Defaults Restore User Defaults Boot Override | Exit system setup after saving the changes. →+: Select Screen ↑↓: Select Item Enter: Select |
| Windows Boot Manager (PO: TS64GMTS400I) Launch EFI Shell from filesystem device Version 2.21.1278 Copyrigh | +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit |

| 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 and the sample code of watchdog timer configuration.

- I/O Port Address Map
- Interrupt Request Lines (IRQ)
- Watchdog Timer Configuration



A. I/O Port Address Map

Resource

0x0000000-0x00000CF7 0x0000020-0x00000021 0x00000024-0x00000025 0x0000028-0x00000029 0x000002C-0x0000002D 0x000002E-0x000002F 0x0000030-0x00000031 0x0000034-0x00000035 0x0000038-0x00000039 0x000003C-0x000003D 0x00000040-0x00000043 0x0000004E-0x0000004F 0x00000050-0x00000053 0x0000061-0x0000061 0x0000063-0x0000063 0x0000065-0x0000065 0x0000067-0x0000067 0x0000070-0x00000070 0x0000080-0x0000080 0x00000092-0x00000092 0x000000A0-0x000000A1 0x000000A4-0x000000A5 0x000000A8-0x000000A9 0x000000AC-0x000000AD 0x000000B0-0x000000B1 0x00000B2-0x00000B3 0x00000B4-0x00000B5 0x00000B8-0x00000B9 0x00000BC-0x00000BD 0x000002E8-0x000002EF 0x000002F8-0x000002FF 0x000003E8-0x000003EF 0x000003F8-0x000003FF 0x000004D0-0x000004D1 0x00000680-0x0000069F 0x00000A00-0x00000A0F 0x00000A10-0x00000A1F

Device

PCI Express Root Complex Programmable interrupt controller Programmable interrupt controller Programmable interrupt controller Programmable interrupt controller Motherboard resources Programmable interrupt controller Programmable interrupt controller Programmable interrupt controller Programmable interrupt controller System timer Motherboard resources System timer Motherboard resources Programmable interrupt controller Motherboard resources Programmable interrupt controller Programmable interrupt controller Programmable interrupt controller Communications Port (COM4) Communications Port (COM2) Communications Port (COM3) Communications Port (COM1) Programmable interrupt controller Motherboard resources Motherboard resources Motherboard resources

Resource

0x0000063-0x0000063 0x0000065-0x0000065 0x0000067-0x0000067 0x00000070-0x00000070 0x0000080-0x0000080 0x0000092-0x0000092 0x000000A0-0x000000A1 0x000000A4-0x000000A5 0x000000A8-0x000000A9 0x000000AC-0x000000AD 0x000000B0-0x000000B1 0x00000B2-0x00000B3 0x000000B4-0x000000B5 0x00000B8-0x00000B9 0x00000BC-0x00000BD 0x000002E8-0x000002EF 0x000002F8-0x000002FF 0x000003E8-0x000003EF 0x000003F8-0x000003FF 0x000004D0-0x000004D1 0x00000680-0x0000069F 0x00000A00-0x00000A0F 0x00000A10-0x00000A1F 0x00000A20-0x00000A2F 0x00000D00-0x0000FFFF 0x0000164E-0x0000164F 0x00001800-0x000018FE 0x00001854-0x00001857 0x00002000-0x000020FE 0x00003000-0x00003FFF 0x00004000-0x00004FFF 0x00005000-0x00005FFF 0x00006000-0x0000603F 0x00006060-0x0000607F 0x00006080-0x00006083 0x00006090-0x00006097 0x0000EFA0-0x0000EFBF

Device

Motherboard resources Motherboard resources Motherboard resources Motherboard resources Motherboard resources Motherboard resources Programmable interrupt controller Motherboard resources Programmable interrupt controller Programmable interrupt controller Programmable interrupt controller Communications Port (COM4) Communications Port (COM2) Communications Port (COM3) Communications Port (COM1) Programmable interrupt controller Motherboard resources Motherboard resources Motherboard resources Motherboard resources PCI Express Root Complex Motherboard resources Motherboard resources Motherboard resources Motherboard resources Intel(R) PCI Express Root Port #2 - 4B3A Intel(R) PCI Express Root Port #1 - 4B39 Intel(R) PCI Express Root Port #0 - 4B38 Intel(R) UHD Graphics Standard SATA AHCI Controller Standard SATA AHCI Controller Standard SATA AHCI Controller Intel(R) SMBus Controller - 4B23

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 0 | System timer |
| IRQ 3 | Communications Port (COM2) |
| IRQ 4 | Communications Port (COM1) |
| IRQ 5 | Communications Port (COM3) |
| IRQ 10 | Communications Port (COM4) |
| IRQ 16 | High Definition Audio Controller |
| IRQ 55 ~ IRQ 204 | Microsoft ACPI-Compliant System |
| IRQ 256 ~ IRQ 511 | Microsoft ACPI-Compliant System |
| IRQ 4294967273 | Intel(R) Management Engine Interface |
| IRQ 4294967274~79 | Intel I226 Gigabit Network Connection #5 |
| IRQ 4294967280~85 | Intel I226 Gigabit Network Connection #6 |
| IRQ 4294967286~91 | Intel I226 Gigabit Network Connection #4 |
| IRQ 4294967292 | Intel(R) UHD Graphics |
| IRQ 4294967293 | Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft) |
| IRQ 4294967294 | Standard SATA AHCI Controller |

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 the 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.

Sample Code

```
//-----
11
// 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 "F81964.H"
//-----
int main (int argc, char *argv[]); void EnableWDT(int);
void DisableWDT(void);
//-----
int main (int argc, char *argv[])
{
    unsigned char bBuf;
    unsigned char bTime;
    char **endptr;
    char SIO;
    printf("Fintek 81866 watch dog program\n");
    SIO = Init_F81964();
    if (SIO == 0)
    {
         printf("Can not detect Fintek 81866, program abort.\n");
         return(1);
    }//if (SIO == 0)
    if (argc != 2)
    {
         printf(" Parameter incorrect!!\n");
         return (1);
    }
```

```
bTime = strtol (argv[1], endptr, 10);
    printf("System will reset after %d seconds\n", bTime);
    if (bTime)
        EnableWDT(bTime); }
    {
    else
        DisableWDT(); }
    {
    return 0;
}
//-----
void EnableWDT(int interval)
{
    unsigned char bBuf;
    bBuf = Get_F81964_Reg(0x2B);
    bBuf &= (~0x20);
    Set_F81964_Reg(0x2B, bBuf);
                                     //Enable WDTO
    Set F81964 LD(0x07);
                                      //switch to logic device 7
    Set_F81964_Reg(0x30, 0x01);
                                      //enable timer
    bBuf = Get_F81964_Reg(0xF5);
    bBuf &= (\sim 0x0F);
    bBuf |= 0x52;
    Set F81964 Reg(0xF5, bBuf);
                                      //count mode is second
    Set_F81964_Reg(0xF6, interval);
                                      //set timer
    bBuf = Get_F81964_Reg(0xFA);
    bBuf |= 0x01;
    Set_F81964_Reg(0xFA, bBuf);
                                      //enable WDTO output
    bBuf = Get_F81964_Reg(0xF5);
    bBuf |= 0x20;
    Set_F81964_Reg(0xF5, bBuf); //start counting
}
//-----
void DisableWDT(void)
{
    unsigned char bBuf;
    Set_F81964_LD(0x07);
                                      //switch to logic device 7
    bBuf = Get F81964 Reg(0xFA);
    bBuf &= ~0x01;
    Set_F81964_Reg(0xFA, bBuf);
                                     //disable WDTO output
    bBuf = Get_F81964_Reg(0xF5);
    bBuf &= ~0x20;
    bBuf |= 0x40;
    Set F81964 Reg(0xF5, bBuf); //disable WDT
}
//-----
```

```
//-
   -----
\parallel
// 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 "F81964.H"
#include <dos.h>
//-----
unsigned int F81964 BASE; void Unlock F81964 (void); void Lock F81964 (void);
//-----
unsigned int Init F81964(void)
{
    unsigned int result;
    unsigned char ucDid;
    F81964 BASE = 0x4E:
    result = F81964 BASE;
    ucDid = Get_F81964_Reg(0x20);
    if (ucDid == 0x07)
                                   //Fintek 81866
        goto Init_Finish; }
    {
    F81964 BASE = 0x2E;
    result = F81964 BASE;
    ucDid = Get_F81964_Reg(0x20);
    if (ucDid == 0x07)
                                   //Fintek 81866
        goto Init_Finish; }
    {
    F81964 BASE = 0x00;
    result = F81964 BASE;
Init Finish:
   return (result);
}
//-----
                 _____
void Unlock_F81964 (void)
{
    outportb(F81964 INDEX PORT, F81964 UNLOCK);
    outportb(F81964_INDEX_PORT, F81964_UNLOCK);
}
//-----
void Lock_F81964 (void)
{
    outportb(F81964 INDEX PORT, F81964 LOCK);
}
             _____
//--
void Set_F81964_LD( unsigned char LD)
{
    Unlock_F81964();
```

```
outportb(F81964 INDEX PORT, F81964 REG LD);
   outportb(F81964_DATA_PORT, LD); Lock_F81964();
}
//----
          -----
void Set F81964 Reg( unsigned char REG, unsigned char DATA)
{
   Unlock F81964();
   outportb(F81964 INDEX PORT, REG);
   outportb(F81964_DATA_PORT, DATA);
   Lock F81964();
}
//-----
unsigned char Get F81964 Reg(unsigned char REG)
{
   unsigned char Result;
   Unlock F81964();
   outportb(F81964 INDEX PORT, REG);
   Result = inportb(F81964 DATA PORT);
   Lock F81964();
   return Result;
}
//-----
//-----
\parallel
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// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
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// PURPOSE.
//
//-----
#ifndef F81964_H
#define F81964_H 1
//-----
#define F81964_INDEX_PORT (F81964_BASE)
#define F81964_DATA_PORT (F81964_BASE+1)
//-----
#define F81964 REG LD 0x07
//-----
#define F81964_UNLOCK 0x87
#define F81964_LOCK 0xAA
//-----
unsigned int Init F81964(void);
```

void Set_F81964_LD(unsigned char); void Set_F81964_Reg(unsigned char, unsigned char); unsigned char Get_F81964_Reg(unsigned char);

//-----

#endif // F81964_H