# **AMS322**

## **Compact Expandable Fanless System**

## **User's Manual**

Version 1.0 (December 2024)



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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 European Union (EU). If users modify and/or install other devices in this equipment, the CE conformity declaration may no longer apply.

### FC

AMS322 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 2 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).

- Hexavalent chromium: 1,000 ppm
- Poly-brominated biphenyls (PBBs): 1,000 ppm
- Poly-brominated diphenyl ethers (PBDEs): 1,000 ppm
- Cadmium: 100 ppm
- Mercury: 1,000 ppm
- Lead: 1,000 ppm
- Bis(2-ethylhexyl) phthalate (DEHP): 1,000 ppm
- Butyl benzyl phthalate (BBP): 1,000 ppm
- Dibutyl phthalate (DBP): 1,000 ppm
- Diisobutyl phthalate (DIBP): 1,000 ppm

### **Important Safety Information**

Carefully read the precautions before using the device.

#### **Environmental conditions:**

- Lay the device horizontally on a stable and solid surface.
- Make sure you leave plenty of space around the device for ventilation.
- Use this product in environments with ambient temperatures  $-10^{\circ}C \sim 50^{\circ}C$ .
- Do not leave this device in an environment where the storage temperature may go below -20°c or above 80°c.

#### 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**

It is advised 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.



Danger of explosion if internal lithium-ion battery is replaced by an incorrect type. 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.

#### • 3<sup>rd</sup>-party parts:

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

 Products 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 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, 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)
- 3. If repair service is required, you can download the RMA form at the website of IBASE. 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

Designed for machine automation, industrial applications, and harsh environments, the fanless AMS322 embedded computer delivers high performance with low power consumption and operates within a temperature range from -10°C to 60°C with airflow. Engineered with a passive finned heat sink for efficient heat transfer, the AMS322 incorporates the MBE320 motherboard, powered by 11th Gen Intel® Core<sup>™</sup> i7/i5/i3 processors. It supports dual DDR4 SO-DIMM up to 64GB and features front removable drive bay for 2.5" SSD. The system includes six antenna ports and ensures robust connectivity through M.2 2230 E-Key and 3052 B-Key slots, supporting WLAN, 4G, and 5G modules.



AMS322

#### 1.2 Features

- Compact fanless system with for IBASE MBE320 proprietary board
- 11th Gen Intel® Core™ i7/i5/i3 Processors
- Front removable drive bay for 2.5" SSD
- 2x PCI-E (x4) expansion slot
- Over/Under/Reverse voltage protection
- Supports DIN-rail mount & wall mount
- 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.

#### <u>AMS322</u>

•	AMS322	x 1
•	Terminal Block for DC-In Power Adapter (3-pin)	x 1
•	Terminal Block for Remote Power Button (2-pin)	x 1
•	Wall Mount Kit	x 1
•	Round Head Screw (for Wall Mount Kit)	x 4



### **1.4 Optional Accessories**

- WiFi / Bluetooth antenna kit
- LTE / 5G antenna kit
- GPS antenna kit
- 24V/180W power adaptor

#### 1.5 Specifications

Models

#### AMS322-i7M

Fanless System with MBE320-i7 and Intel® Core™ i7 1185G7E Processor AMS322-i5M

Fanless System with MBE320-i5 and Intel® Core  $^{\rm m}$  i5 1145G7E Processor AMS322-i3M

Fanless System with MBE320-i3, w/ Intel® Core™ i3 1115G4E Processor

System			
Motherboard	MBE320		
Operating System	<ul><li>Windows10 (64-bit)</li><li>Linux Ubuntu</li></ul>		
CPU	11th Gen Intel® Core™ i7/i5/i3 Mobile Processors		
CPU Speed	Up to 4.4GHz		
Memory	2x DDR4 SO-DIMM, Max. 64GB		
Rear Panel External I/O	<ul> <li>1x 2-pin DC-in terminal block for 24V (±10%)</li> <li>1x 2-pin terminal block for remote power button</li> <li>1x Power Button</li> <li>3x RJ45 2.5G Ethernet port</li> <li>2x DisplayPort connectors</li> <li>3x USB 3.1 ports</li> <li>3x USB 2.0 ports</li> <li>1x RS232/422/485 port for COM#1</li> <li>1x RS232 port for COM#2</li> <li>1x Audio jack for Line-out</li> <li>1x Red LED for HDD/SSD, 1x Green LED for Power</li> <li>1x Blue LED &amp; 1x White LED programmable</li> </ul>		
Expansion Slots	1x M.2 2230 E-Key (USB 2.0 & PCI-E) 1x M.2 3052 B-Key (USB 3.0 & PCI-E) 2x PCI-E (x4) slots		
Storage	1x 2.5" HDD/SSD (external-accessible)		
Construction	Aluminum & steel Chassis		
Color	Silver & Gray		
Mounting	<ul> <li>Desktop or wall mounting (wall mounting kit included)</li> <li>Side mounting</li> <li>DIN-rail mounting (optional)</li> </ul>		



Dimensions	275mm (W) x 140mm (D) x 70mm (H) 10.83" (W) x 5.51" (D) x 2.76" (H)	
Weight 3.5kg		
Operating Temperature	-10°C to 60°C (14°F~140°F) *with air flow -10°C to 50°C (14°F to 122°F) without air flow	
Storage Temperature	-20°C to 80°C (-4°F to 176°F)	
Relative Humidity	5~90% @ 45°C, (non-condensing)	
Vibration	Non-Operating: 1.0 grms / 5~500Hz / random operation Operatiing: 0.25 grms / 5~500Hz / random operation	
Shock	Operating: 20 g / 11 ms Non-operating: 40 g / 11 ms	
Certification	CE / LVD / FCC Class-B	

All specifications are subject to change without prior notice.

#### 1.6 Product View – AMS322 and IP302

**Front View** 



No.	Name	No.	Name
1	LED Indicator (from top to bottom: S1*, E1*, SSD, HDD, Power)	6	3x 2.5GbE Ports
2	Audio Jack for Line-Out	7	Power Button
3	2x COM Ports	8	Terminal block for remote power button
4	DP Ports	9	DC-in terminal block for 24V (±10%)
5	3x USB 3.1 & 3x USB 2.0	10	Removal 2.5" SSD Tray

\* The LED indicators S1 (for status) and E1 (for errors) are configurable by users.







**Rear View** 



#### **IP302 Expansion Card**



Remarks: The IP302 slots both have PCIe(4x) signals only for AMS322 system.

#### 1.7 Dimensions – AMS322

Unit: mm









(Right Side)

## Chapter 2 Hardware Configuration

The information provided in this chapter includes:

- Essential installations before you begin
- Information and locations of connectors



#### 2.1 Hardware Installations

Remove and replace the bottom cover for the installation / replacement of memory module and M.2 socket devices. Release the screws shown below.



#### 2.1.1 Memory Installation / Replacement

- 1. After removing the bottom cover, locate the memory slots.
- 2. Press the ejector tab of the memory slot outwards with your fingertips.



- 3. Hold the memory module and align the key of the module with that on the memory slot.
- 4. Gently push the module in an upright position until the ejector tabs of the memory slot close to hold the module in place when the module touches the bottom of the slot.



To remove the module, press the ejector tabs outwards with your fingertips to eject the module.

#### 2.1.2 M.2 Installation / Replacement

- 1. After removing the bottom cover, locate the M.2 sockets.
- 2. There are two M.2 sockets available on AMS322 (J17: E-Key and J9: B-Key), as shown in the picture below. Locate the desired socket to be used for installation/replacement of M.2 devices to proceed.



3. To install or replace a card, align the key of the card to the interface, and insert the card slantwise. Push the card down and fix it with a flat head screw.



#### 2.1.3 SSD Installation

1. To install or replace the SSD, follow the instructions below.



Release 2 screws to pull out the SSD tray.



Remove/replace the four screws shown to remove or install the SSD.

#### 2.1.4 WiFi / 4G / 5G Antenna Installation

Thread the WiFi / 4G / 5G 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).

#### 2.1.5 Mounting Installation

When mounting the AMS322 to any type of surface, ensure that you have enough room for power and signal cable routing, and have good ventilation. The method of mounting must be able to support weight of the device plus the suspension weight of all the cables to be attached to the system.

The AMS322 system comes with a set of wall mount kit and four round head screws that are to be used in securing the mounting brackets to the main unit, as shown in the picture below.



### 2.2 Jumper Setting

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.

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

Pin	Oblique view	Illustration
Open		□ ○ ○ 1 2 3
1-2 closed		<b>1</b> 2 3
2-3 closed		□ • • 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 Jumper & Connector Locations on Motherboard

#### Motherboard: MB320



### 2.4 Jumpers Quick Reference

Function	Jumper
Clear RTC	JP1
Clear ME	JP2
M.2 B-Key Support Type	JP4
AT/ATX Mode Setting	JP5

### 2.4.1 Clear RTC (JP1)



Function	Pin	Illustration
Normal (default)	1-2 Closed	<b>□</b> • ○ 1
Clear CMOS	2-3 Closed	□ • • 1

#### 2.4.2 Clear ME (JP2)



### 2.4.3 M.2 B-Key Support Type (JP4)



Function	Pin	Illustration
USB	1-2 Closed	<b>□</b> • ○ 1
PCle	2-3 Closed	□ • • 1



#### 2.4.4 AT/ATX Mode Setting (JP5)

### 2.5 Connectors Quick Reference

Function	Connector
SATA Connector	CN1
Line Out Jack	CN2
COM1 / 2 Ports	CN3
USB 2.0 Ports	CN4
DisplayPort Ports	CN5,CN7
USB 3.1 Ports	CN6,CN8
I226V GbE Ports	CN9, CN10, CN11
Terminal Block for Remote Access	CN12
Power Button	SW1
RTC Battery Connector	J1
SATA Power Connector	J2
SO-DIMM Sockets	J3, J4
SPI Debug Header	J5
SIM Card Slot for 4G/5G	J6
M.2 E-Key Socket	J7
M.2 B-Key Socket	J9
ESPI Debug Header	J10
Reset Header	J11
Digital IO Connector	J12
AT On/Off Switch	J13
DC_IN Connector	J14





# 2.5.1 LED1: 4x LED Indicators (Power, HDD, RTC battery low, Programmable)

Green (Power LED) Red (HDD LED) Blue(RTC battery low LED) Green/yellow (GPIO LED)

- 2.5.2 CN2: Line Out Jack
- 2.5.3 CN3: COM1 / COM2 Ports
- 2.5.4 CN4: USB 2.0 Ports
- 2.5.5 CN5, CN7: DisplayPort Ports
- 2.5.6 CN6, CN8: USB 3.1 Ports
- 2.5.7 CN9, CN10, CN11: I226V GbE Ports
- 2.5.8 CN12 : Terminal Block Connector for Remote Access
- 2.5.9 J14: DC\_IN Connector (2-pin terminal block)



#### 2.5.10 J1: RTC Battery Connector



#### 2.5.11 J2: SATA Power Connector



2.5.12 J3, J4: SO-DIMM Sockets



#### 2.5.13 J5: SPI Debug Header



#### 2.5.14 J6: SIM Card Slot for 4G/5G



2.5.15 J7: M.2 E-Key Socket



Note: J7 supports USB 2.0 & PCIe (for wifi module)

#### 2.5.16 J9: M.2 B-Key Socket



Note: J9 supports USB 2.0 & 3.0 & PCIe (for 4G / 5G module)

#### 2.5.17 J10: ESPI Debug Header



#### 2.5.18 J11: Reset Header





### 2.5.19 J12: Digital IO Connector

### 2.5.20 J13 : AT On/Off Switch



## **Chapter 3 Driver Installation**

The information provided in this chapter includes:

- Intel<sup>®</sup> Chipset Software Installation Utility
- Graphics Driver Installation
- HD Audio Driver Installation
- LAN Driver Installation
- Intel<sup>®</sup> ME Drivers Installation


#### 3.1 Introduction

This section describes the installation procedures for software drivers.

#### 3.2 Intel<sup>®</sup> Chipset Software Installation Utility

The Intel<sup>®</sup> 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.

 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 Intel and then Intel(R) TigerLake-U Chipset Drivers.



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



- 3. When the *Welcome* screen to the Intel<sup>®</sup> Chipset Device Software appears, click **Next** to continue.
- 4. Accept the terms in the software license agreement.
- 5. On the Readme File Information screen, click Install.

Intel(R) Chipset Device Software
* Product: Intel(R) Chipset Device Software * Package version: 10.1.18460.8229 * Installer version: 3.1.7.131 * Date: 07/17/2020
NOTE: For the list of supported chipsets, please refer to the Release Notes
* CONTENTS OF THIS DOCUMENT This document contains the following sections:
1. Overview 2. System Requirements
Back Install Cancel

6. When Intel<sup>®</sup> Chipset Device Software has been completely installed, click **Finish** to complete the setup process.

#### 3.3 Graphics Driver Installation

- 1. Click Intel and then Intel(R) TigerLake-U Chipset Drivers.
- 2. Click Intel(R) HD Graphics Driver.



- 3. When the *Welcome* screen appears, click **Next**.
- 4. Accept the terms in the license agreement and click Yes.
- 5. On the *Readme File Information* screen, click **Next**.



Refer to the Readme file below to view the system requirements and installation information.

Driver Version: 27.20.100.9219			^
Release Version: Production Version			
Operating System(s): Microsoft Windows* 10-64 (RS3) Microsoft Windows* 10-64 (RS4) Microsoft Windows* 10-64 (RS5) Microsoft Windows* 10-64 (19H1) Microsoft Windows* 10-64 (19H2) Microsoft Windows* 10-64 (20H1)			~
	< Back	Next >	Cancel

- 6. In the Setup Progress screen, click Next.
- 7. When Setup is Complete, click **Finish** to restart the computer.

#### 3.4 HD Audio Driver Installation

- 1. Click Intel and then Intel(R) TigerLake-U Chipset Drivers.
- 2. Click Realtek High Definition Audio Driver.

	intel	Intel(R) Chipset Software Installation Utility
	LAN Card	Intel(R) HD Graphics Driver
목표	LAN Card	Realtek High Definition Audio Driver
64	Tools	Intel(R) PRO LAN Network Drivers
		Intel(R) ME 15.x Drivers
		Intel(R) Thunderbolt Drivers

- 3. On the *Welcome* screen of the InstallShield Wizard, click Next.
- 4. When InstallShield Wizard has completed the installation, restart the computer.

~	
	InstallShield Wizard Complete The InstallShield Wizard has successfully installed Realtek High Definition Audio Driver. Before you can use the program, you must restart your computer.
	<ul> <li>Yes, I want to restart my computer now.</li> <li>No, I will restart my computer later.</li> <li>Remove any disks from their drives, and then click Finish to complete setup.</li> </ul>
InstallShield	< Back Finish Cancel

Realtek High Definition Audio Driver Setup (4.27) R2.79

3

#### 3.5 LAN Driver Installation

- 1. Click Intel and then Intel(R) TigerLake-U Chipset Drivers
- 2. Click Intel(R) PRO LAN Network Drivers.

-	intel	Intel(R) Chipset Software Installation Utility
	LAN Card	Intel(R) HD Graphics Driver
크림	LAN Gard	Realtek High Definition Audio Driver
612	Tools	Realtek High Definition Audio Driver Intel(R) PRO LAN Network Drivers
		Intel(R) ME 15.x Drivers
		Intel(R) Thunderbolt Drivers

#### 3. Click Install Drivers and Software.

📕 Intel® Network Connections		×
(intel) Network	Connections	
	Install Drivers and Software	
	View User Guides	
	View Release Notes	
Networking at Intel.com		Version: 25.2.0.0

- 4. On the Welcome screen to the Install Wizard, click Next.
- 5. Accept the terms in the License Agreement and click Next.
- 6. Click **Next** in the Setup Options screen.
- 7. Install Wizard is now ready to install the program, click Install.
- 8. When Install Wizard has completed the installation, click Finish.

#### 3.6 Intel<sup>®</sup> Management Engine Driver Installation

1. Click Intel and then Intel(R) TigerLake-U Chipset Drivers.

#### 2. Click Intel(R) ME 15.x Drivers.



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

ntel® Management Engine Components Welcome	(intel)
You are about to install the following product:	
Intel® Management Engine Components 2029.15.0.1721	
It is strongly recommended that you exit all programs before continuing. Click Next to continue, or click Cancel to exit the setup program.	

- 4. Accept the terms in the license agreement and click **Next** to continue.
- 5. Click **Next** to install to the default folder, or click **Change** to choose another destination folder.
- 6. When the Intel Management Engine Components has been successfully installed, click **Finish**.



# 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:

- Introduction
- BIOS Setup
- Main Settings
- Advanced Settings
- Chipset Settings
- Security Settings
- Boot Settings
- Save & Exit Settings



#### 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 <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

Main Advanced Chipset Se	Saring boot save a LAIT	
BIOS Information		Set the Date. Use Tab to
BIOS Version	MBE320-JC001-240429 (C)	switch between Date elements. Default Ranges:
Total Memory	32768 MB	Year: 1998-9999
Memory Speed	2667 MT/s	Months: 1–12 Days: Dependent on month
System Language	[English]	Range of Years may vary.
	[Mon 06/10/2024]	
System Time	[04:11:28]	
		-
		<pre>→+: Select Screen  1↓: Select Item</pre>
		Enter: Select +/-: Change Opt.
		F1: General Help
		F2: Previous Values
		F3: Optimized Defaults
		F4: Save & Exit
		ESC: Exit

BIOS Setting	Description
System Date	Sets the date. Use the <tab> key to switch between date elements.</tab>
System Time	Set the time. Use the <tab> key to switch between time 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	
<ul> <li>CPU Configuration</li> <li>Power &amp; Performance</li> <li>PCH-FW Configuration</li> <li>Trusted Computing</li> <li>ACPI Settings</li> <li>Super IO Configuration</li> <li>Hardware Monitor</li> <li>USB Configuration</li> <li>Network Stack Configuration</li> <li>Integrated Peripherals</li> <li>NVMe Configuration</li> </ul>	<pre>CPU Configuration Parameters ++: Select Screen f1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
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BIOS Setting	Description
CPU Configuration	Displays CPU configuration parameters.
Power & Performance	Shows power and performance options.
PCH-FW Configuration	Configures management engine technology parameters.
Trusted Computing	Configures management engine technology parameters.
ACPI Settings	Displays system ACPI parameters.
Super IO Configuration	Displays super IO chip parameters.
Hardware Monitor	Shows super IO monitor hardware status.
Network Stack Configuration	Enable/Disable UEFI Network Stack.
USB Configuration	Displays USB configuration parameters.
NVMe Configuration	Configures NVME Device



## 4.4.1 CPU Configuration

CPU Configuration		When enabled, a VMM can utilize the additional
Type ID Speed VMX SMX/TXT Intel (VMX) Virtualization Technol Active Processor Cores Hyper—Threading AES	11th Gen Intel(R) Cor 0x806C1 3000 MHz Supported Not Supported [Enabled] [All] [Enabled] [Enabled]	hardware capabilities provided by Vanderpool Technology.
		<pre>++: Select Screen ++: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>

BIOS Setting	Description
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	Number of cores to enable in each processor package.
Hyper-Threading	Enable or Disable Hyper-Threading Technology.
AES	Enables / Disables AES (Advanced Encryption Standard).

### 4.4.2 Power & Performance

Advanced	ADVID SCRUP - MIL	
CPU - Power Management Control Intel(R) SpeedStep(tm) Intel(R) Speed Shift Technology Config TDP Configurations	(Enabled) (Enabled)	Allows more than two frequency ranges to be supported.
Advanced		
Config TDP Configurations Configurable TDP Boot Hode	[Deactivate]	Configurable TOP Mode as Nominal/Up/Down/Deactivate TEP selection. Deactivate option will set MSR to Nominal and HMID to Zero. For TGL-UP3: Nominal=Nominal. Up=cTDP Dowr1 and Down=cTDP Down2
0	— Configurable TDP Boot Moc ominal own a eactivate	Select Screen
BIOS Setting	Description	
CPU - Power Management Control	CPU - Power Manage	ement Control Options
Intel Speedstep	Allows more than two frequency ranges to be supported	
Intel Speed Shift Technology	Enable/Disable Intel Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P- states.	
Config TDP Configurations	cTDP (Assured Power) Configurations	
Configurable TDP Boot Mode	Configurable TDP Mode as Nominal/Up/Down/ Deactiivate TDP selection. Deactivate option will set MSR to Nominal and MMIO to zero. For TCL UP3: Nominal=Nominal, Up=cTDP Down1 and Down=cTDP Down2	

## 4.4.3 PCH-FW Configuration

Advanced			
ME Firmware Version ME Firmware Mode ME Firmware SKU ME State	15.0.35.1951 Normal Mode Consumer SKU [Enabled]	When Disabled ME will be put into ME Temporarily Disabled Mode.	
BIOS Setting	Description		
ME State		When disabled, ME will be put into ME Temporarily Disabled Mode.	

## 4.4.4 Trusted Computing

TPM 2.0 Device Found		Enables or Disables BIOS
Firmware Version:	600.7	support for security device.
Vendor:	INTC	0.S. will not show Security Device. TCG EFI protocol and
Security Device Support	[Enable]	INT1A interface will not be
Active PCR banks	SHA256	available.
Available PCR banks	SHA256,SHA384,SM3	
SHA256 PCR Bank	[Enabled]	
SHA384 PCR Bank	[Disabled]	
SM3_256 PCR Bank	[Disabled]	
Pending operation	[None]	
Platform Hierarchy	[Enabled]	++: Select Screen
Storage Hierarchy	[Enabled]	11: Select Item
Endorsement Hierarchy	[Enabled]	Enter: Select
Physical Presence Spec Version	[1.3]	+/-: Change Opt.
TPM 2.0 InterfaceType	[CRB]	F1: General Help
Device Select	[Auto]	F2: Previous Values
		F3: Optimized Defaults
		F4: Save & Exit

BIOS Setting	Description	
Security Device Support	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.	
SHA256 / SHA384 / SH3_256 PCR Bank	Option: Enabled / Disabled	
	Schedule an operation for the security device.	
Pending operation	Note: Your computer will reboot during restart in order to change state of security device.	
Platform / Storage / Endorsement Hierarchy	Enables / Disables the Platform / Storage / Endorsement Hierarchy	
Physical Presence Spec Version	Select to tell O.S to support PPI Spec Version (1.2 or 1.3). <b>Note:</b> Some HCK tests might not support 1.3.	
Device Select	Auto will support TPM 1.2 / 2.0 devices with the default set to TPM 2.0. If not found, TPM 1.2 devices will be enumerated	

## 4.4.5 ACPI Settings

ACPI Settings		Enables or Disables System ability to Hibernate (OS/S4
	[Enabled]	Sleep State). This option may not be effective with some operating systems.
		++: Select Screen ++: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit

BIOS Setting	Description	
Enable Hibernation	Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may not be effective with some OS.	

## 4.4.6 Super IO Configuration

Super IO Configuration		Set Parameters of Serial Port
		4 (COMD)
Super IO Chip Serial Port 1 Configuration Serial Port 2 Configuration Serial Port 3 Configuration Serial Port 4 Configuration	F81964	
		<pre>++: Select Screen t1: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
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#### 4.4.7 Hardware Monitor

Advanced		
Pc Health Status		Smart Fan Mode Select
SYS_FAN1 Smart Fan Function SYS_R_FAN1 Smart Fan Function CPU Temperature SYS_FAN1 Speed SYS_R_FAN1 Speed VCDRE VBAT VCC12V Memory Voltage	[Disabled] [Disabled] : +38 C : +37 C : N/A : N/A : +1.664 V : +3.027 V : +12.144 V : +1.200 V	
		<pre>++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
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BIOS Setting	Description	
Smart Fan Function	Controls the CPU fan temperature by setting up a threashold temperature.	
	Options: Disabled (default),. 50 °C, 60 °C, 70 °C, 80 °C	
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	

#### 4.4.8 USB Configuration



BIOS Setting	Description	
	Enables / Disables Legacy USB support.	
Legacy USB Support	<ul> <li>Auto disables legacy support if there is no USB device connected.</li> </ul>	
	<ul> <li>Disable keeps USB devices available only for EFI applications.</li> </ul>	
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 delay	Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor. Options: Auto, Manual	



## 4.4.9 Network Stack Configuration

Advanced		
Network Stack	[Disabled]	Enable/Disable UEFI Network Stack ++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
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BIOS Setting	Description
Network Stack	Enable/Disable UEFI Network Stack

## 4.4.10 USB Configuration

Advanced		
Advanced Integrated Peripherals USB Port(CN6) Power USB Port(CN8) Power USB Port(CN4) Power RTC Battery Low Alert	[Enabled] [Enabled] [Enabled] [2.6V]	USB port power control.
		<pre>++: Select Screen 11: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save &amp; Exit ESC: Exit</pre>
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#### 4.4.11 NVME Configuration





### 4.5 Chipset Settings

Main Advanced Chipset Security Boot Save & Ex.	ft
<ul> <li>▶ System Agent (SA) Configuration</li> <li>▶ PCH-IO Configuration</li> </ul>	System Agent (SA) Parameters
	++: Select Screen 14: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
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BIOS Setting	Description
System Agent (SA) Configuration	System Agent (SA) parameters
PCH-IO Configuration	PCH parameters
VT-d	Enables / Disables VT-d capability.
USB Port Disable Override	Selectively enable/disable the corresponding USB port from reporting a device connection to the controller.

### 4.5.1 System Agent Configuration





## 4.5.2 PCH-IO Configuration

BIOS Setting	Description
SATA and RST Configuration	SATA device options settings
USB Configuration	USB configuration settings
Power-on after Power failure	Specify what state to go to when power is re- applied after a power failure (G3 state).

PCH-IO Configuratio	n	
<ul> <li>SATA And RST Config</li> <li>USB Configuration</li> </ul>		
Power-On after Powe	r failure	[Power On]
SATA And RST Config	uration	
SATA Controller(s)		[Enabled]
Serial ATA Port 0 Software Preserve Not Flue	i .	Empty Unknown Loisabledj
Serial ATA Port 1 Software Preserve Hot Plug	t.	Phison SSBP064 (64.0GB) SUPPORTED [Disabled]
Serial ATA Port 2 Software Preserve Hot Plug		Empty Unknown (Disabled)
US8 Configuration		
US8 Port Disable Ov	erride	[Disabled]
PCH-IO Configuratio	n	
<ul> <li>SATA And RST Config</li> <li>USB Configuration</li> </ul>	uration	
Power-On after Powe	r failure	(Power On)

## 4.6 Security Settings

Main Advanced Chipset Secur	ity Boot Save & Exit	
Password Description		Set Administrator Password
If ONLY the Administrator's pas then this only limits access to only asked for when entering Se If ONLY the User's password is is a power on password and must boot or enter Setup. In Setup 1 have Administrator rights. The password length must be in the following range: Minimum length Maximum length	) Setup and is etup. set, then this : be entered to	++: Select Screen
Administrator Password User Password ► Secure Boot		<pre>fl: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values</pre>
BIOS Setting	Description	
Administrator Password	Sets an administrato	r password.
User Password	Sets a user passwore	d.
Secure Boot	Secure Boot configu	ration
System Mode	User	Secure Boot feature is Active if Secure Boot is Enabled,
Secure Boot	[Disabled] Not Active	Platform Key(PK) is enrolled and the System is in User mode. The mode change requires
Secure Boot Mode ▶ Restore Factory Keys ▶ Reset To Setup Mode	[Custom]	platform reset
Key Management	Secure Boot	
System Mode	User	Secure Boot mode options: Standard or Custom.
Secure Boot	[Disabled] Not Active	In Custom mode, Secure Boot Policy variables can be configured by a physically
Sacure Boot Mode Restore Factory Keys Reset To Setup Mode		present user without full authentication
Key Management	Secure Boot Mode	
System Mode	User	Force System to User Mode.
Secure Boot	[Disabled] Not Active	Install factory default Secure Boot key databases
Secure Boot Mode Restore Factory Keys Reset To Setup Mode	[Custom]	
Key Management Press	- Install factory defaults - 'Yes' to proceed 'No' to ca Yes No	elect Screen elect Item t Select
System Mode	Setup	Enables expert users to modify
Secure Boot	[Disabled] Not Active	Secure Boot Policy variables without full authentication
Secure Boot Mode Restore Factory Keys Reset To Setup Mode Koy Monagement	[Custom]	



## 4.7 Boot Settings

Main Advanced Chipset Security	Boot Save & Exit	
Boot Configuration Setup Prompt Timeout Bootup NumLock State Quiet Boot FIXED BOOT ORDER Priorities Boot Option #1	1 [Dn] [Disabled] [Hard Disk:Windows]	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Boot Option #2 Boot Option #3 Boot Option #4 Boot Option #5 Boot Option #6 Boot Option #7 Boot Option #8 Boot Option #9 Boot Option #10	[NVME] [CD/DVD] [SD] [USB Hard Disk] [USB CD/DVD] [USB Key] [USB Floppy] [USB Lan] [Network]	++: Select Screen fl: Select Item Enter: Select +/-: Change Opt. F1: General Help
▶ UEFI Hard Disk Drive BBS Priorities Version 2	.22.1282 Copyright (C) 202	F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
BIOS Setting	Description	

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.
Fixed Boot Order Priorities	Sets the system boot order.
UEFI Hard Disk Drive BBS Priorities	Specifies the Boot Device Priority sequence from available Uefl Hark Disk Drives.

### 4.8 Save & Exit Settings

Save Options Save Changes and Exit	Exit system setup after saving the changes.
Discard Changes and Exit	the changes.
Discura 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	++: Select Screen
	<b>↑↓:</b> Select Item
	Enter: Select
	+/-: 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

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
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x0000063-0x0000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x0000067-0x0000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x0000080-0x0000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x0000EFA0-0x0000EFBF	Intel(R) SMBus - 06A3
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x0000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller

Address	Device Description
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x00001800-0x000018FE	Motherboard resources
0x00000F0-0x000000F0	Numeric data processor
0x0000000-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x00001854-0x00001857	Motherboard resources
0x00002000-0x000020FE	Motherboard resources
0x00003000-0x0000303F	Intel(R) UHD Graphics 630
0x00003090-0x00003097	Standard SATA AHCI Controller
0x00003080-0x00003083	Standard SATA AHCI Controller
0x00003060-0x0000307F	Standard SATA AHCI 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 4294967294	Intel(R) PCI Express Root Port #12 - 06B3
IRQ 16	High Definition Audio Controller
IRQ 4	Communications Port (COM1)
IRQ 3	Communications Port (COM2)
IRQ 7	Communications Port (COM3)
IRQ 6	Communications Port (COM4)
IRQ 13	Numeric data processor
IRQ 55~IRQ 204	Microsoft ACPI-Compliant System
IRQ 256 ~ IRQ 511	Microsoft ACPI-Compliant System
IRQ 4294967293	Intel(R) PCI Express Root Port #11 - 06B2
IRQ 4294967289	Intel(R) USB 3.1 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 0	System timer
IRQ 45	Trusted Platform Module 2.0
IRQ 4294967290	Intel(R) UHD Graphics 630
IRQ 4294967292	Intel(R) PCIe Controller (x16) - 1901
IRQ 14	Intel(R) Serial IO GPIO Host Controller - INT3450
IRQ 4294967291	Standard SATA AHCI Controller
IRQ 4294967279~83	Intel(R) Ethernet Controller (3) I225-V
IRQ 4294967284~88	Intel(R) Ethernet Controller (3) I225-V #2
IRQ 4294967278	Intel(R) Management Engine Interface
IRQ 4294967294	Intel(R) PCI Express Root Port #12 - 06B3

### 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

```
//-----
//
// 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 81964 watch dog program\n");
      SIO = Init_F81964();
      if (SIO == 0)
      {
            printf("Can not detect Fintek 81964, program abort.\n");
            return(1);
      M(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 &= (\sim0x0F);
      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
```

# **IBASE**

```
bBuf = Get_F81964_Reg(0xF5);
      bBuf &= \sim 0x20;
      bBuf = 0x40;
      Set_F81964_Reg(0xF5, bBuf); //disable WDT
}
//-----
//-----
//
// 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);
                        //Fintek 81964
      if (ucDid == 0x07)
      { goto Init_Finish; }
      F81964 BASE = 0x2E;
      result = F81964_BASE;
      ucDid = Get_F81964_Reg(0x20);
      if (ucDid == 0x07)
                        //Fintek 81964
      { 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;
}
//-----
```

//-----// // 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 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