



EMA-8141

STX Industrial Motherboard
USER Manual V1.0

USER MANUAL 用户手册

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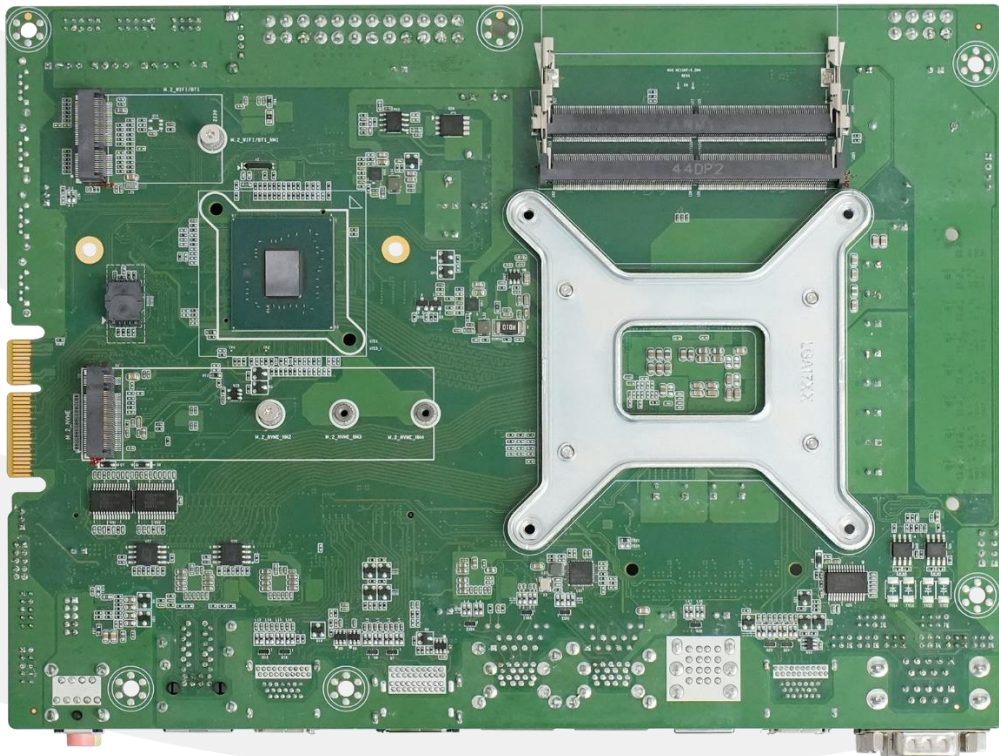
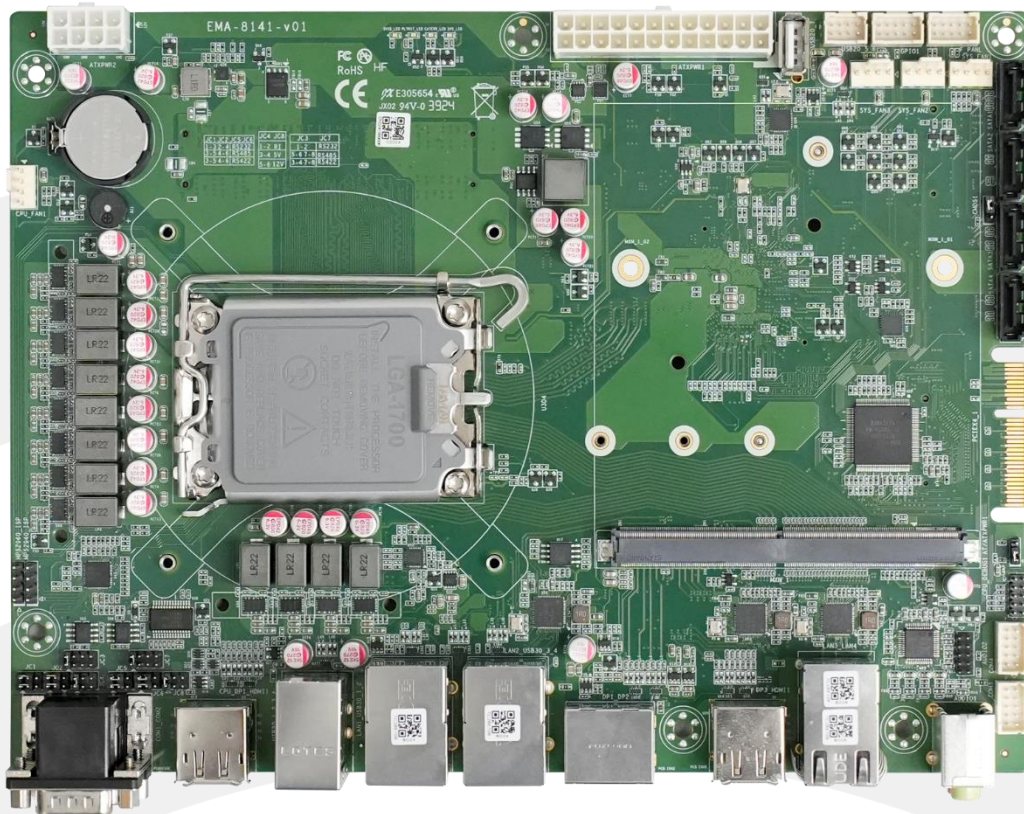
第一章 产品介绍

1.1 产品规格

Model		EMA-8141
Configuration	Specification	Description
Processor	CPU	Intel®12/13/14 th Alder Lake-S/Raptor Lake-S/Meteor Lake-S Refresh LGA1700 TDP 125W
	Chipset	Intel PCH H610/Q670
	BIOS	AMI EFI BIOS
Memory	Type	DDR5 13/14 th 5600MT/s 12 th 4800MT/s
	Max. Capacity	64GB
	Socket	2*SO-DIMM
Expansion Slot	M.2	1*M.2 Key M for PCIe(Only Q670) 1*M.2 Key E for WIFI/BT
	MXM	1*MXM3.1
	PCI-Express	1*PCIe3.0 x4
Storage	SATA	4*SATA3.0(7 Pins)
Graphics	Multiple Display	6 Ports
	I/O	1*DP(From CPU) 1*HDMI(From CPU) 3*DP(From GPU DP_A/B/D) 1*HDMI(From GPU DP_C)
	Resolution	DP:7680*4320@60Hz HDMI:4096*2160@60Hz
Ethernet	Controller	Integrated 10/100/1000M Adaption (Intel® Ethernet Controller i226+i219)
	I/O	H610:2*RJ45 Q670:4*RJ45
COM	I/O	2*RS232/RS422/RS485
	Header Pin	2*RS232

GPIO	Header Pin	1*8bit GPIO(2.0mm_2*5Pin)
USB Type-C	I/O	4*USB3.0 4*USB2.0
	On Board Header	1*USB2.0 Type A
	Header Pin	2*USB2.0(2*2.54mm_2*5Pin)
Audio	Chipset	Integrated High Definition Audio Stereo(ALC897)
	I/O	1*Line Out 1*MIC In
	Header Pin	1*Line Out+1 x MIC In(1*2.54mm_2*5Pin)
Others	ESPI	1*ESPI(2.0mm_2*5Pin)
	Watch Dog	255Level
	F_Panel	1*F_Panel(2.0mm_2*5Pin)
Power Supply	Power Type	ATX power supply, support ATX/AT mode(jumper head), DC ATX 24+8 input, support S0, S3, S4, S5
	RTC	Limited 3.3V/210mAH
Environment	Operating Temperature	0~60°C
	Storage Temperature	-20~80°C
	Operating Humidity	95%&40°C(non-condensing)
Physical	尺寸 Dimensions	243.8*180mm
	PCB color	Green
OS	Windows	Support
	Linux	Support

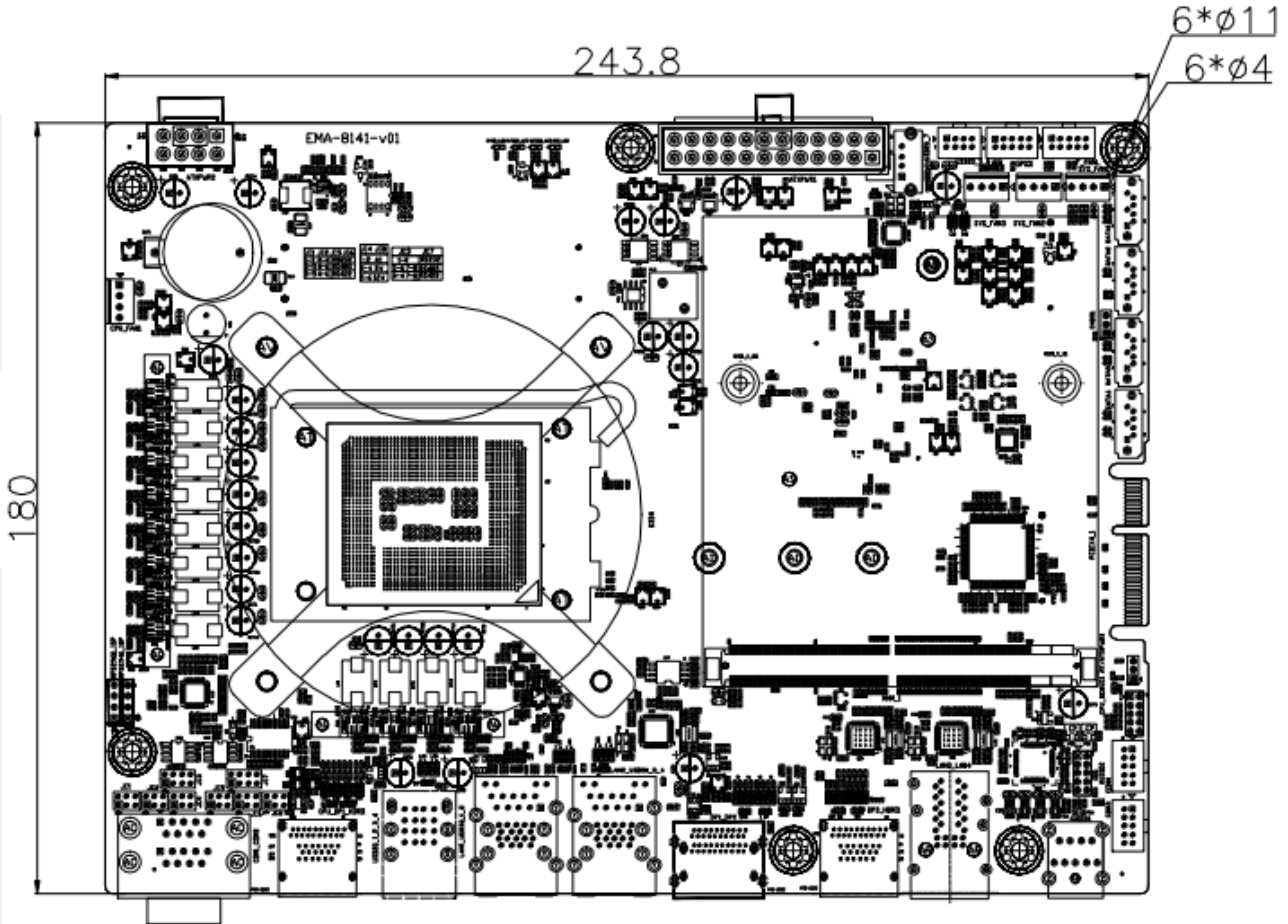
1.2 Product Photos



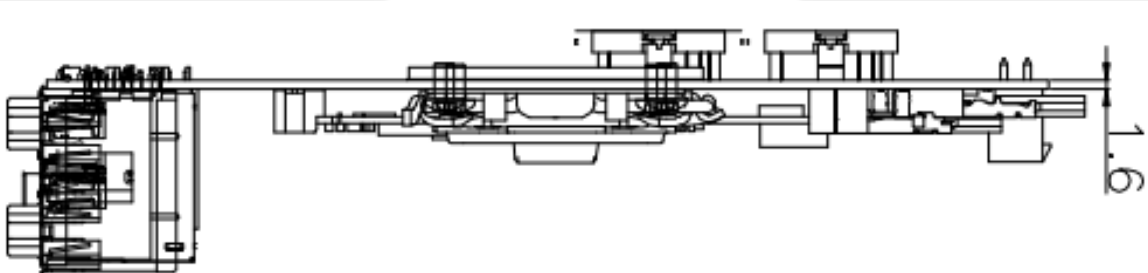
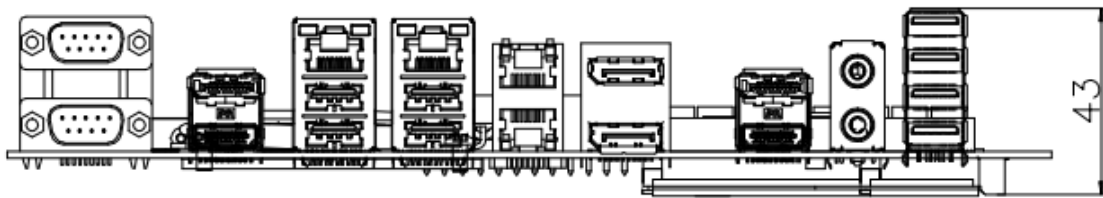
Chapter 2 Hardware Configuration

2.1 Ports/Dimensions

When installing the device, please refer to this diagram and carefully read the instructions below. Handle all components with care during installation. For certain parts, improper installation may prevent the device from functioning correctly.

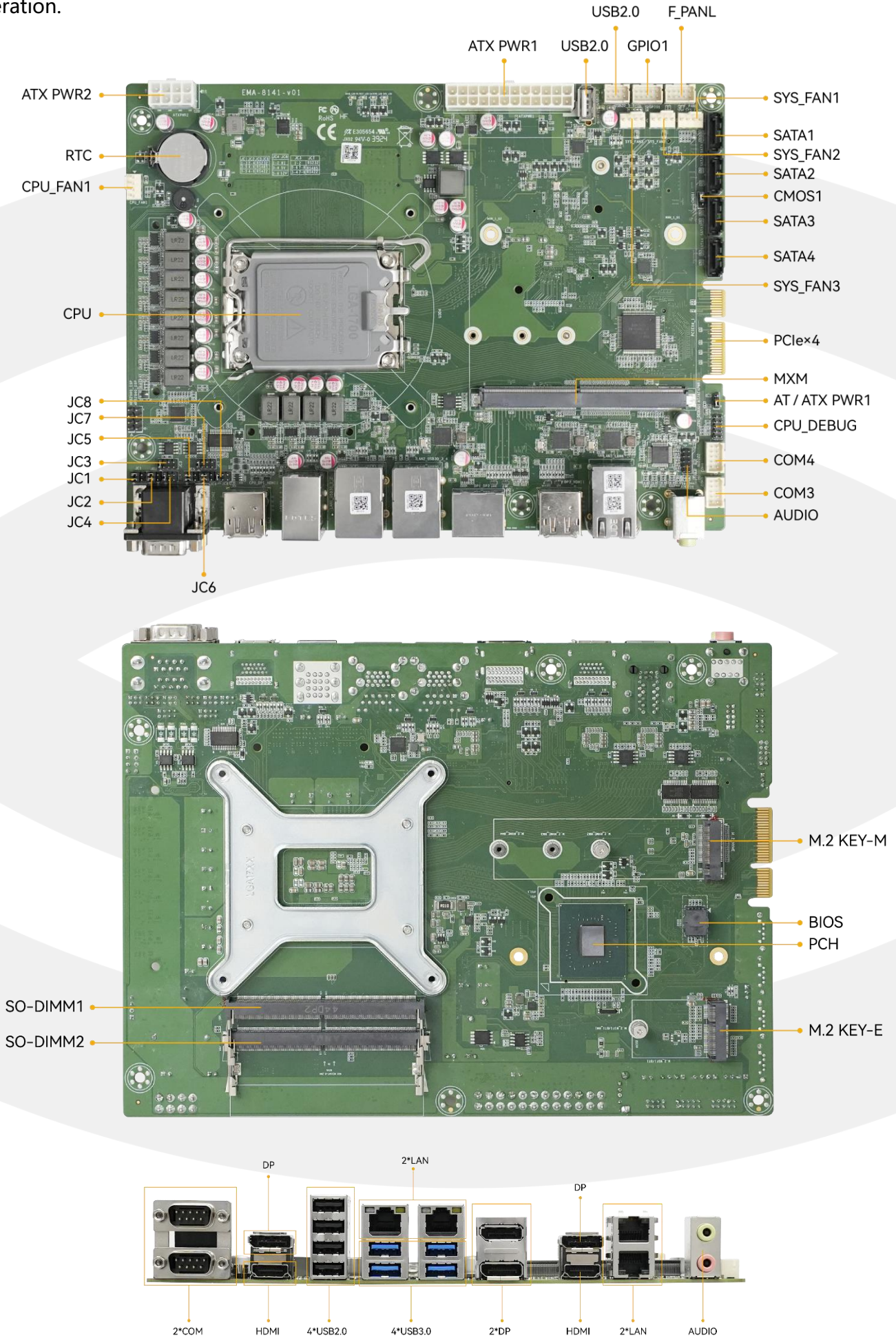


Mechanical Drawing (TOP Side)



Mechanical Drawing (Bottom Side)

Before use, please refer to this diagram and carefully read the instructions before proceeding with any operation.



Notice:

Pin	Definition
MXM	PCIe(GEN5)
M.2 KEY_M	PCIe(GEN4)
M.2 KEY_E	PCIe(GEN3)
PCIeX4_1	PCIe(GEN3)
SATA	GEN3
USB3.0	Q670:GEN2 H610:GEN1

2.2 Hardware Installation

When handling components, wear anti-static gloves to prevent potential damage caused by static electricity.

The key components of this motherboard are integrated circuits, which are highly susceptible to static damage. Therefore, before proceeding with the motherboard installation, please ensure the following preparations are made:

1. Hold the motherboard by the edges, avoiding components and connector pins.
2. Wear an anti-static wrist strap or gloves when handling components like the CPU and RAM.
3. Store components on an anti-static mat or in an anti-static bag before installation.
4. Ensure the power switch is off before connecting the power cord.

2.3 Jumper wire function setup

Please configure the necessary jumpers according to your requirements.

Tip: To identify the first pin of a jumper or connector:

1. Look for markings near the connector, such as "1," a bold line, or a triangle symbol.
2. Check the solder pads on the back; the square pad indicates the first pin.
3. A white arrow is marked next to the first pin of all jumpers.

2.3.1 Clear CMOS Jumper Wire Setup:

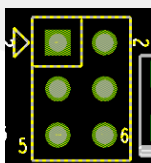
CMOS1 clear CMOS, 1*3Pin, 2.0mm pin definition:



Setup	Functions
1-2 short circuit	Clear CMOS content, all BIOS setup restores factory settings
2-3 short circuit	Normal working status(Default)

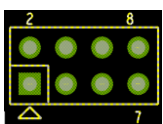
2.3.2 COM1,COM2 working mode options:

Configure COM1 (DB9) operation mode by adjusting jumpers C1, JC2, and JC3. Different jumper settings correspond to different modes.



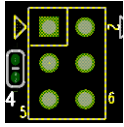
Pin	RS232	RS485	RS422
JC1	1-3、 2-4	3-5、 4-6	3-5、 4-6
JC2	1-3、 2-4	3-5、 4-6	3-5、 4-6

JC3 Pin definition:



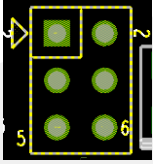
Pin	RS232	RS485	RS422
JC3	1-2	5-6、 7-8	3-4、 7-8

JC4 is used to select the voltage mode for COM1 (DB9). Different jumper settings allow for different voltage modes. JC4 pin definition:



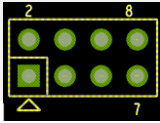
Pin	RI	5V	12V
JC4	1-2	3-4	5-6

Use jumpers JC5, JC6, and JC7 to configure the operating mode for COM2 (DB9). Different jumper settings correspond to different modes. JC5, JC6 definition:



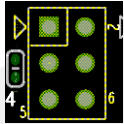
Pin	RS232	RS485	RS422
JC5	1-3、 2-4	3-5、 4-6	3-5、 4-6
JC6	1-3、 2-4	3-5、 4-6	3-5、 4-6

JC7 pin definition:



Pin	RS232	RS485	RS422
JC7	1-2	5-6、 7-8	3-4、 7-8

JC8 is used to select the voltage mode for COM2 (DB9). Different jumper settings correspond to different voltage modes. JC8 pin definition:



Pin	RI	5V	12V
JC8	1-2	3-4	5-6

2.3.3 Working mode options:

choose AT/ATXPWR1 working mode, 1*3pin, 2.0mm, ATPWR1 pin definition:

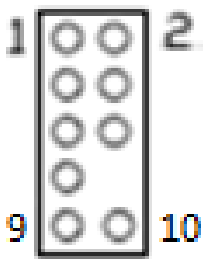


Pin	Functions
1-2 short circuit	ATX mode
2-3 short circuit	AT mode

2.4 Pin definitions

2.4.1 Audio pin

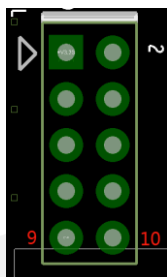
AUDIO2 2.0mm, 2*5Pin pin



Pin	Signal	Pin	Signal
1	MIC L	2	GND
3	MIC R	4	PRESENCE
5	Line out R	6	MIC-JD
7	IO-SENSE	8	NC
9	Line out L	10	LINE-JD

2.4.2 ESPI port

CPU_DEBUG1 2.0mm, 2*5Pin



Pin	Signal	Pin	Signal
1	+V3.3S	2	ESPI_RESET_N
3	ESPI_CLK	4	ESPI_IO_0
5	ESPI_CS	6	ESPI_IO_1
7	ESPI_IO_3	8	ESPI_IO_2
9	GND	10	ESPI_ALERT_N

2.4.3 USB port

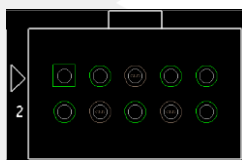
USB20_5_6 USB 2.0 port, 2.0mm, 2*4Pin



Pin	Signal	Pin	Signal
1	+5V	2	+5V
3	USB1_Data-	4	USB2_Data-
5	USB1_Data+	6	USB2_Data+
7	GND	8	GND

2.4.4 Front panel ports

F_PANEL FPANEL, 2.0mm, 2*5Pin



Pin	Signal	Pin	Signal
1	HDD LED+	2	PW LED+
3	HDD LED-	4	PW LED-
5	GND	6	PW Button
7	RESET	8	GND
9	NC	10	NC

2.4.5 GPIO port

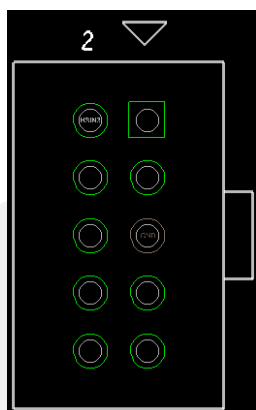
GPIO1 GPIO port, 2.0mm, 2*5Pin



Pin	Signal	Pin	Signal
1	GND	2	VCC_5V
3	GPO1	4	GPI1
5	GPO2	6	GPI2
7	GPO3	8	GPI3
9	GPO4	10	GPI4

2.4.6 Serial port

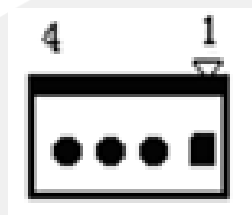
COM3, COM4 RS232, 2.0mm, 2*5Pin



Pin	Signal
1	DCD#
2	RXD
3	TXD
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#
10	NC

2.4.7 Fan power port

Support 4 fan socket: CPU_FAN1, SYS_FAN1, SYS_FAN2, SYS_FAN3, 4Pin fan definition:



Set	Function
1	GND
2	+12V
3	FAN_TACH
4	FAN_PWM

Note: SYS_FAN1, SYS_FAN2, SYS_FAN3 share the same fan speed.

Chapter 3 BIOS Setup

AMI BIOS Refresh

The BIOS provides low-level hardware drivers and acts as a bridge between hardware and the operating system. As hardware and software applications are constantly updated, you may need to update your BIOS when issues arise, such as the system not supporting the latest CPU.

AFUDOS.EXE is the program used to read and write BIOS data to the FLASH IC on the motherboard. This operation must be performed in a pure DOS environment.

Steps to Update BIOS:

Boot the system using a bootable disk to enter a pure DOS environment.

Run the AFUDOS.EXE program to write the BIOS file (e.g., XXXX.ROM) into the FLASH IC using the following command:

```
A:\Afudos XXXX.rom
```

To include additional parameters, add a space and "/" after the command.

For example: Afudos 6872T0000.rom/P/B/C/N/X

Note:

- 1. Only update the BIOS when necessary, such as when encountering system issues.**
- 2. Do not power off or restart the system during the update process to avoid BIOS corruption and potential system failure.**
- 3. To prevent data loss, back up the current BIOS before proceeding with the update.**

AMI BIOS Description:

During startup, the BIOS performs self-diagnosis on the motherboard hardware, configures hardware timing parameters, and finally hands over control to the operating system. Correctly configuring BIOS settings is crucial for system stability and optimal performance.

Accessing BIOS Settings:

When the computer starts, after completing the self-diagnosis, a message like "Del->SETUP" will appear on the screen. Press the Del key at this point, and once the BIOS finishes detecting IDE and other devices, it will automatically enter the SETUP screen.

1. Turn on the system or restart it. The monitor will display self-test information.
2. When the prompt "Press to enter setup" appears in the middle of the screen, press Del to access the BIOS setup utility.
3. Use the arrow keys to navigate to the option you want to modify, then press Enter to access its submenu.
4. Use the arrow keys and Enter to adjust values and select BIOS options.
5. Press Esc at any time to return to the previous screen.

Appendix

Appendix 1: Watchdog Programming Instructions

Watchdog Reference Code (ASM)

The watchdog timer can be controlled by interacting with specific ports. By writing data to the corresponding ports, you can manage various functions of the Watchdog Timer.

This is typically done by sending data to particular memory-mapped I/O addresses that are tied to the Watchdog Timer, allowing you to configure or reset the timer for system monitoring. Here's a basic structure for controlling a Watchdog Timer in assembly:

```
void main()
int indexp = 0x2e, datap = 0x2f;

outportb(indexp, 0x87);

outportb(indexp, 0x01); //unlock
outportb(indexp, 0x55);
outportb(indexp, 0x55);

outportb(indexp, 0x07);
outportb(datap, 0x07);

outportb(indexp, 0x72);
outportb(datap, 0xc0); //set second
/*outportb(datap, 0x40); set minute*/

outportb(indexp, 0x73);
outportb(datap, 0x03); //set 3 seconds

outportb(indexp, 0x02);
outportb(datap, 0x02); //lock
```

Appendix 2: Terms List

ACPI (Advanced Configuration and Power Interface)

ACPI specification allows the operating system to control most of the power management for the computer and its attached devices.

BIOS (Basic Input/Output System)

BIOS is software in PCs that includes input/output control code interfaces. It performs hardware detection during startup, initializes the operating system, and provides an interface between the OS and hardware. BIOS is stored in a read-only memory (ROM) chip.

BUS

A bus is a data channel in a computer system that enables communication between different components. It refers to a set of hardware lines, typically the local lines within the CPU and main memory.

Chipset

An integrated chip designed to perform one or more related functions. It refers to the system chipset consisting of the Northbridge and Southbridge, which determines the motherboard's architecture and primary functions.

CMOS (Complementary Metal-Oxide-Semiconductor)

A widely used type of semiconductor known for its high speed and low power consumption. On motherboards, CMOS refers to a portion of the CMOS RAM that stores date, time, system information, and configuration settings.

COM (Serial Port)

A general-purpose serial communication interface, typically using a standard DB9 male connector.

DIMM (Dual Inline Memory Module)

A small circuit board with memory chips, providing a 64-bit memory bus width.

DRAM (Dynamic Random Access Memory)

A common type of memory used in computers, typically storing one bit per transistor and capacitor. DRAM types have diversified, including SDRAM, DDR SDRAM, and RDRAM.

I2C (Inter-Integrated Circuit)

A two-wire serial bus developed by PHILIPS, used to connect microcontrollers to peripheral devices.

LAN (Local Area Network)

A network of computers within a small area, such as an office or building, enabling shared access to data, devices, and resources. It typically includes servers, workstations, and communication links.

LED (Light Emitting Diode)

A semiconductor device that lights up when current passes through it, commonly used to visually indicate status, such as power being on or a hard drive operating.

PnP (Plug and Play)

A specification that allows automatic configuration of external devices by the PC without the need for manual user intervention. For this feature to work, BIOS must support PnP, and a PnP expansion card is required.

POST (Power-On Self Test)

During system startup, the BIOS performs a series of diagnostic tests to check the proper connection and functionality of components like RAM, keyboard, and hard drive.

PS/2

An interface specification developed by IBM for connecting keyboards and mice. PS/2 is a 6-pin DIN connector, and can also be used for other devices, such as modems.

USB (Universal Serial Bus)

A hardware interface suitable for low-speed peripheral devices, such as keyboards and mice. A PC can connect up to 127 USB devices, with a data transfer rate of 12 Mbps. USB supports hot-swapping and multiple data streams, allowing devices to be plugged in while the system is running and automatically recognized.

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