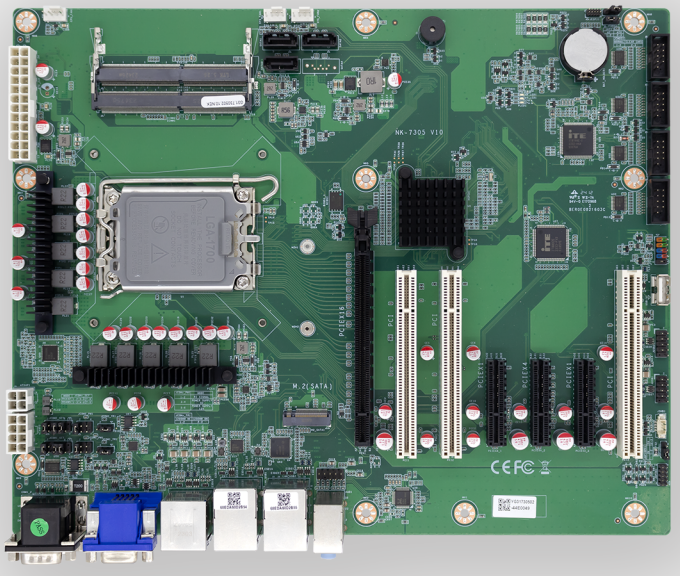
Embedded Industrial Motherboard



NK-7306

User Manual

- Rich CPU platform options
- Notebook memory slot design
- Stable power supply design
- 3-year warranty with worry-free after-sales
- Conformal coating on the entire board
- Flexible optional accessories

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- Product name and serial number
- Description of peripheral devices
- Description of user software (operating system, version, application software, etc.)
- Complete description of the problem encountered
- Complete content of any error messages

Safety Instructions

- Please read these safety instructions carefully.
- Please keep this user manual for future reference.
- Before cleaning the device with a damp cloth, unplug the power cord from the socket. Do not use liquid or spray cleaners to clean the device.
- The power socket should be installed near the device for easy connection; avoid stepping on the power cord, especially at the plug, socket, or connection points on the device.
- Do not use the device in a humid environment.
- Do not place the device near heat sources such as radiators, heat registers, stoves, or other heat-producing devices (including amplifiers).
- Before installation, ensure the device is placed on a stable surface. Accidental drops may cause damage to the device.
- The openings on the device casing are for air convection to prevent overheating. Do not cover these openings.
- When connecting the device to a power adapter, please follow the rated input voltage and current markings on the device. Do not use a power adapter that is not provided with the product or does not match the specifications. Due to differences in circuit design, using an incompatible power adapter may damage internal components.
- Before connecting the device to a power socket, ensure the voltage of the power socket meets the requirements. Read, note, and follow all safety instructions to ensure proper and safe installation and connection of the device.
- Place the power cord in a location where it is not easily tripped over, and do not cover the power cord with any objects.
- Please pay attention to all warning labels on the device.
- If the device is not used for a long time, disconnect it from the power socket to avoid damage from excessive voltage fluctuations.
- Do not allow any liquid to enter the ventilation openings to prevent fire or short circuits.
- Do not open the device by yourself; for your safety, please have the device opened by a certified engineer.
- If any of the following situations occur, please have the device repaired by a professional:
- The power cord or plug is damaged
- Liquid has entered the device
- The device has been exposed to a highly humid environment
- The device is not functioning properly, or you cannot get it to work properly using the user manual
- The device has been dropped or damaged
- The device has obvious external damage
- If the product is a display screen, do not apply excessive pressure to the screen, as this may cause permanent damage to the screen.
- Do not place the device in an environment outside the recommended storage temperature range, i.e., below -40° C (40° F) or above 85° C (185° F), as this may damage the device.
- Any unverified components may cause unexpected damage to the device. To ensure proper installation, only use the components provided in the accessory box, such as screws.
- Note: The computer is equipped with a battery-powered real-time clock circuit. If the battery is replaced incorrectly, there is a risk of explosion. Therefore, only use the same type or equivalent battery recommended by the manufacturer for replacement. Please follow the manufacturer's instructions for disposing of old batteries.
- Whenever performing hardware operations, be sure to completely disconnect the chassis power. When the device is powered on, do not change any connections or configurations to avoid damaging sensitive electronic components due to sudden power surges.
- Avoid direct sunlight on the display screen and keep it away from strong light and other heat sources. Prolonged exposure to such environments may cause the display screen to fade and be damaged.
- If consumers use a power adapter for charging, they should purchase a power adapter that is certified by CCC and meets standard requirements.
- Warning: Operating this device in a residential environment may cause radio interference.

Warnings and Notes



- Warning to users: There are non-insulated dangerous voltages inside the product, which may cause electric shock.
- During operation, users must pay special attention to the warning information in this manual to avoid personal injury.
- Maintenance information is for authorized service personnel only. To reduce the risk of electric shock, do not perform any maintenance other than the provided operating information unless authorized.
- To reduce the risk of electric shock, do not disassemble the casing (or back). There are no user-serviceable parts inside the device. Please consult authorized service personnel for service information.

The notes in this manual help users avoid hardware damage or data loss. For example, if the battery is replaced incorrectly, there is a risk of explosion. Therefore, only use the same type or equivalent battery recommended by the manufacturer for replacement. Please follow the manufacturer's instructions for disposing of old batteries.



Maintenance Warnings

Warning: Maintenance information is for authorized service personnel only. To reduce the risk of electric shock, do not perform any maintenance other than the provided operating information unless authorized.

Warning: To reduce the risk of electric shock, do not disassemble the casing (or back). There are no user-serviceable parts inside the device. Please consult authorized service personnel for service information.

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Chapter 1 Product Introduction

1.1 Product Overview

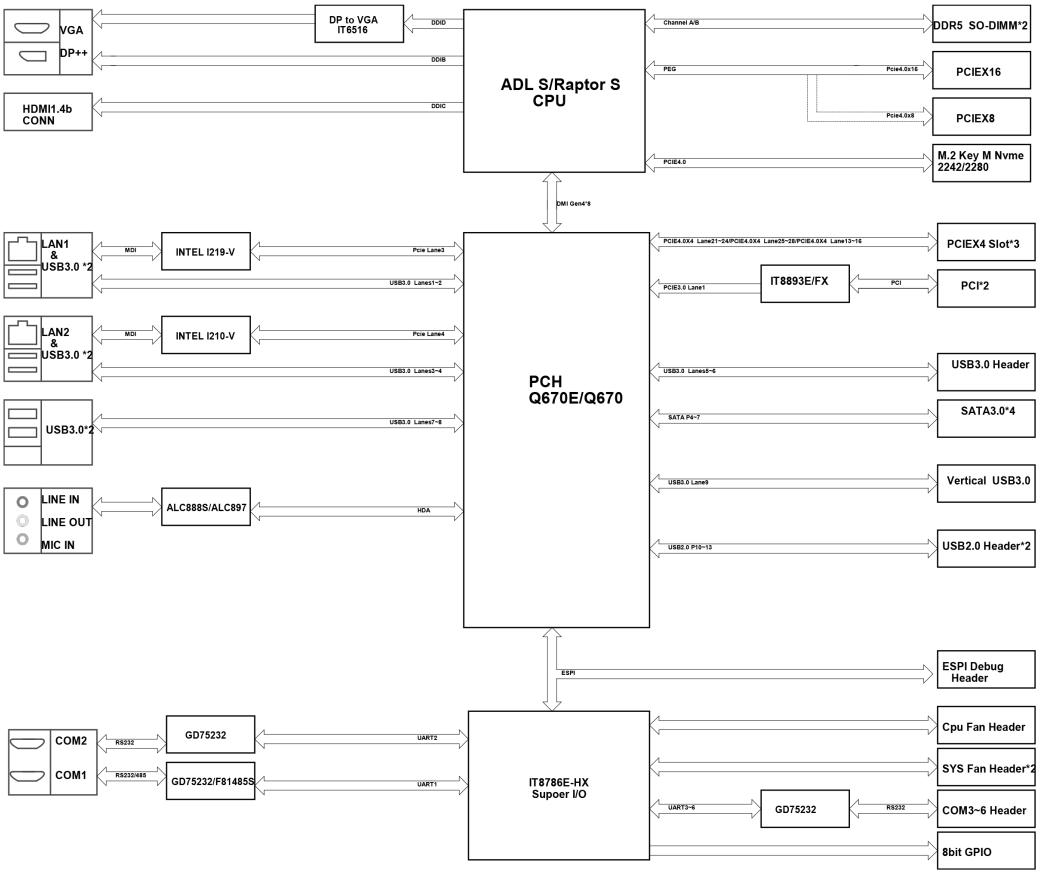
Standard ATX motherboard, using Q670/Q670E chipset, supports Intel 12th/13th/14th Gen Core [i9/i7/i5/i3] / Pentium / Celeron processors, with maximum TDP support up to 125W. Features two DDR5 SO-DIMM memory slots (Non-ECC) supporting up to 128GB, 2 LAN ports, 13 USB ports, 6 COM ports. Built-in M.2-2242/2280 M-Key slot supports SATA or NVME system drive simultaneously. 4x SATA 3.0 interfaces with built-in RAID (0,1,5,10) functionality. Allows users to connect displays to VGA, HDMI, and DP++ ports simultaneously.

Also provides 2 x PCIeX16(Gen4), 3 x PCIeX4(Gen4), and 2 x PCI slots for user expansion of various function cards. The product is widely applicable in machine vision, energy & environment, industrial automation, smart manufacturing, and other fields.

1.2 Product Specifications

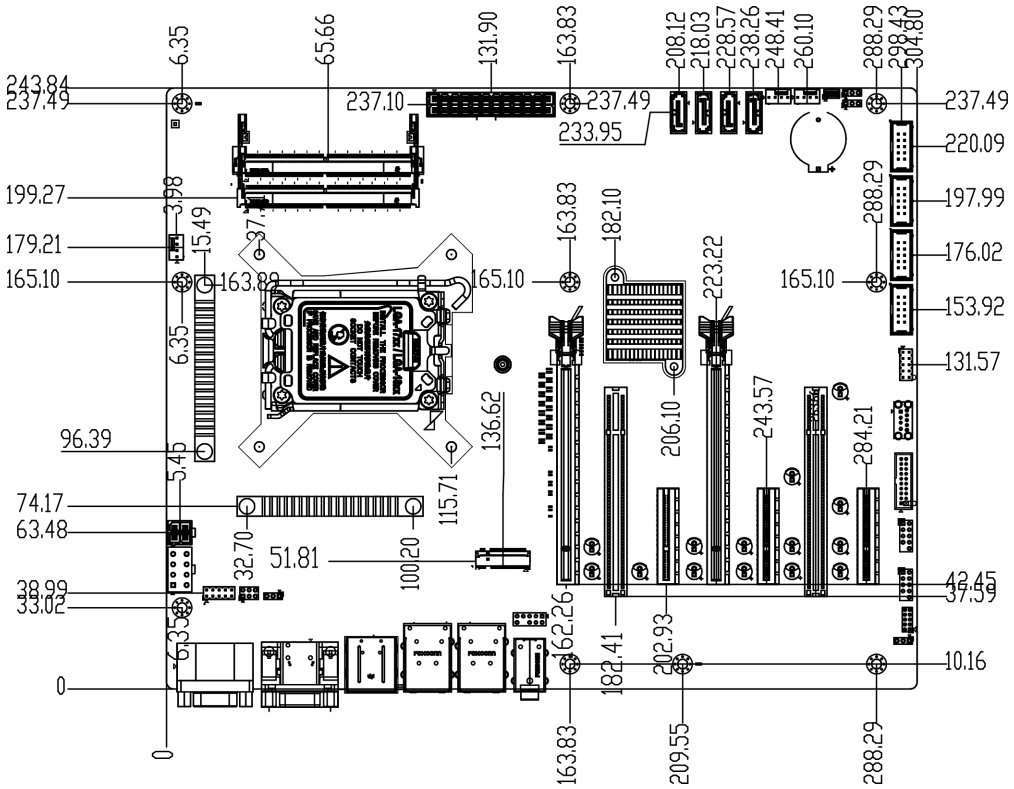
Projet		Content
Processor System	CPU	Intel® 12/13/14 th Generation Celeron/Pentium/Core-I series processor, TDP up to 125W
	Socket	LGA1700
	Chipset	Intel Q670/Q670E
	BIOS	AMI 256Mb UEFI BIOS
Memory	Technology	Dual Channel(Non-ECC) DDR5-4800MHz, up to 64GB
	Slot	2 x DDR5 SO-DIMM slots
Storage	SATA	4 x SATA3.0 ports,Support software RAID 0,1,5,10
	M.2	1 x M.2-2242/2280 M Key Slot(PCIE/Signal)
Graphic	Controller	Intel HD graphics integrated
Audio	Codec	Realtek ALC 897 codec
Rear I/O	Display	1 x VGA, resolution up to 1920x1200@60Hz
		1 x DP，resolution up to 4096x2160@60Hz
		1 x HDMI，resolution up to 4096x2160@30Hz
	Ethernet	2 x GbE(RJ45);LAN1：Intel i219-V controller ;LAN 2：Intel i210-AT controller
	USB	6 x USB3.0(5Gbps)
	Serial Port	2 x RS485/232
	Audio	1 x Mic-in，1 x Line-in，1 x Line-out
Internal I/O	USB	2xUSB3.0 Pin header(1x2*5pin),4xUSB2.0 Pin header,(2x2*5pin),1 x vertical USB2.0 type-A connector
	Serial	4 x RS232 wafer(2*5pin)
	eSPI	1 x eSPI header (2*5pin)
	FAN	2 x System FAN (1*4pin),1 x CPU FAN (1*4pin)
	GPIO	1 x 8bit GPIO(2*5pin)
	SMbus	1 x SMbus wafer(2*5pin)
	FP	1 x FP(Power LED, HDD LED, Power button, Reset button)
Expansion Slots	PCIe X 16	2 x PCIe X 16(Gen4) slots （1 x 16 or 2 x 8(default) link)
	PCIe X 4	3 x PCIe X 4(Gen4) slots
	PCI	2 x PCI slots
Security	TPM	fTPM2.0
Watchdog Timer	Output&Interval	System reset，programmable from 1~255 sec
Power	Type	ATX Power Input：24-Pin ATX + 8/12-Pin ATX 12V
O.S Support	MS Windows	Windows10/11
	Linux	Linux
Mechanism	Dimensions	(L)305mm x(W) 244mm
	Gross Weight	0.71KG
Environment	Operating	0°C ~ 60°C
	Storage	-40°C ~ 85°C
	Humidity	5~95% (Non-condensing)

1.3 Block Diagram

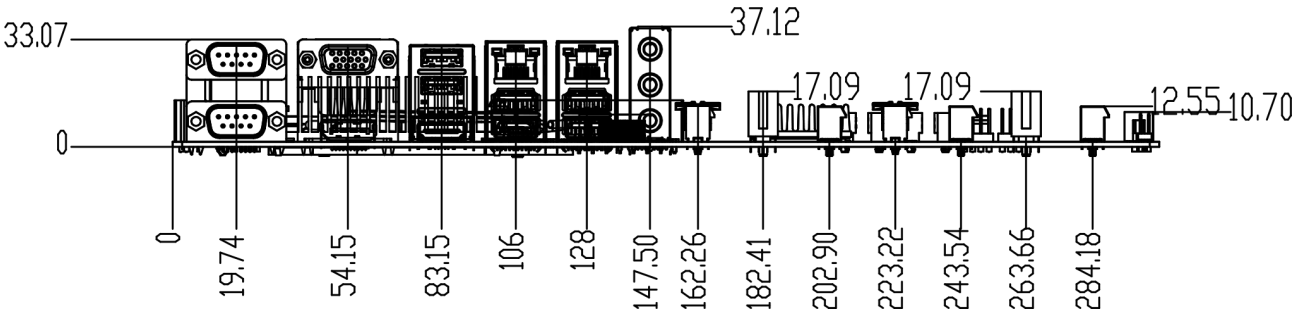


1.4 Structure Diagram

1.4.1 Motherboard Dimension Diagram



1.4.2 Motherboard I/O Dimension Diagram



1.5 Package List

1.5.1 Order Information

Part No.	Model	Description
F31.730611.11.NEK	NK-7306	ATX，Q670，12/13/14th，2*DDR5-4800，M.2-2242/2280(SATA/NVME)，ATX Power Input

1.5.2 Packing List

Part No.	Qty	Description
KF0.001015.00.L54	2	Single COM port Cable(Length=500mm)
KF0.001025.00.L54	1	Single SATA Date Cable(Length=600mm)
L91.000117.00.G35	1	Single I/O Port Bracket

Note: Driver CD is not provided. Please visit Nodka support website for driver download.

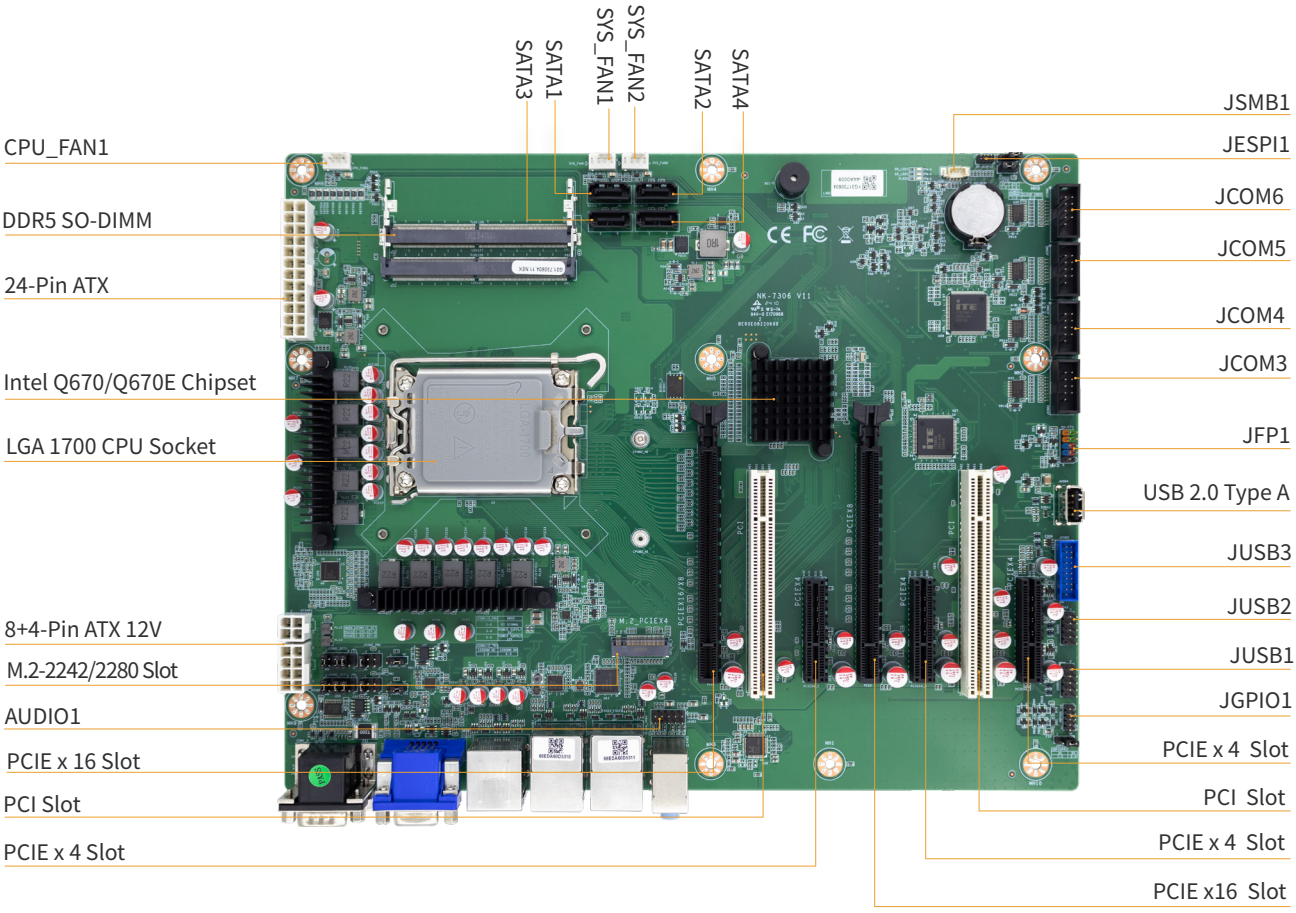
1.5.3 Optional Accessories

Part No.	Description
L45.000014.00.B14	LGA1700 2U CPU Cooler,TDP up to 125W
L45.000017.00.B14	LGA1700 4U CPU Cooler,TDP up to 125W
KF0.001015.00.L54	Single COM port Cable(Length=500mm)
KF0.001092.00.L54	Dual COM Cable with Bracket(Length=300mm)
KF0.001025.00.L54	Single SATA Date Cable(Length=600mm)
KF0.001091.00.L54	1 in 2*USB3.0 Type-A Y Cable with Bracket(Length=300mm)
KF0.001090.00.L54	1 in 2*USB2.0 Type-A Y Cable with Bracket(Length=300mm)
L91.000117.00.G35	Single I/O Port Bracket

Chapter 2 Interfaces and Jumpers Introduction

2.1 Interfaces Introduction

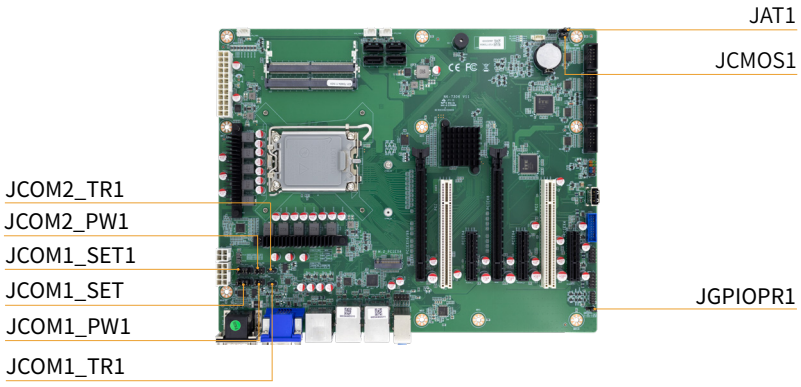
The interfaces on the motherboard are divided into internal interfaces and coastline (rear I/O) interfaces. Internal interfaces need to be connected to devices via cables, while coastline interfaces can be directly connected to devices to achieve corresponding functions. The interface locations are shown in the figure below:





2.2 Jumpers Introduction

A jumper is a metal bridge used to close a circuit. It consists of two parts: metal pins and a small metal clip (the jumper cap). To "close" a jumper, connect the pins with the jumper cap. To "open" a jumper, remove the jumper cap from the pins. Some jumpers have three pins, labeled 1, 2, and 3. In this case, connect pins 1-2 or 2-3 with the jumper cap. Jumper settings are shown in this manual as follows:

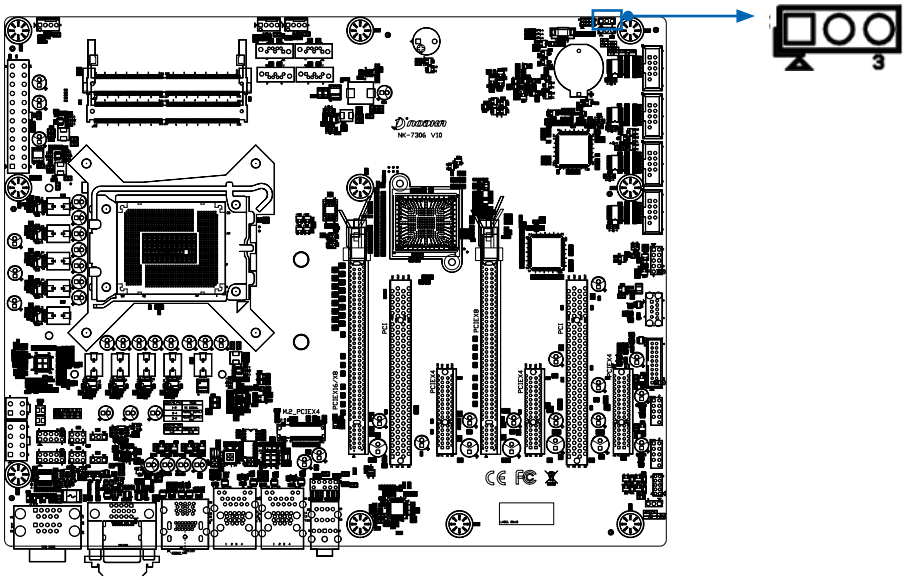


2.3Interfaces and Jumpers Function Description

2.3.1 JAT1

The motherboard supports both ATX and AT power-on modes. ATX is the power button start mode (default). AT is the power-on automatically after AC restore mode. JAT1 is the jumper for selecting between AT and ATX modes. It supports hardware or BIOS setting for the power-on auto-restart mode. For detailed settings, refer to section 4.4.2-2. The hardware function jumper settings for power-on auto-start are as follows:

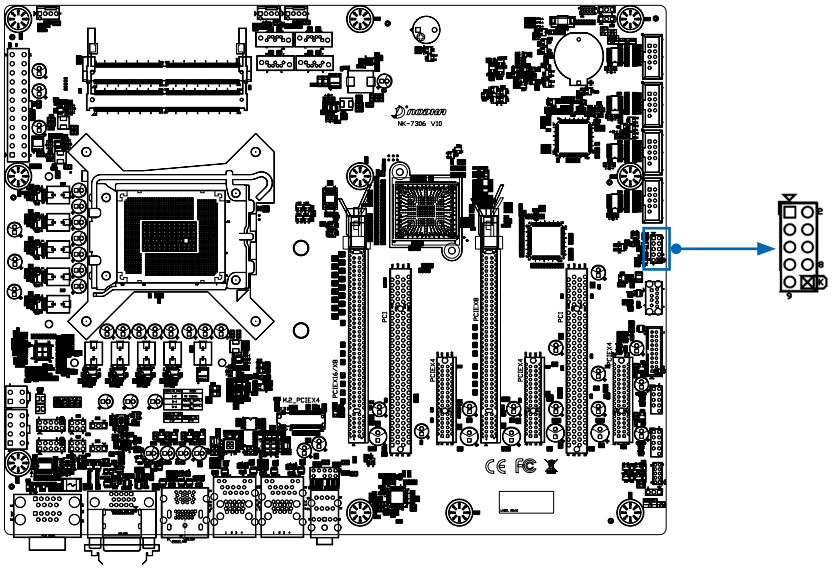
JAT1 Jump Setting	
Setting	Function
1-2 Shorted	AT Mode, Auto Power-On
2-3 Shorted	ATX Mode, Power Button Start (Default)



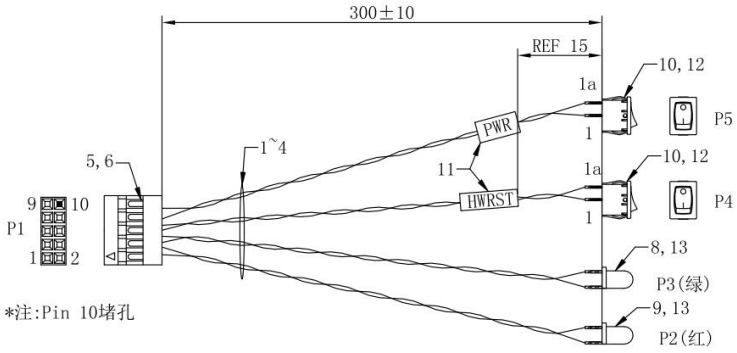
2.3.2 JFP1

JFP1 is an internal Pitch=2.54mm, 2*5pin Wafer interface. It provides signals for Power Switch, Reset Switch, HDD LED, Power LED, etc. It can be extended via cable to an external interface panel. The pin definitions and cable drawing are referenced below:

JFP1 Pin Definitions			
Pin	Pin Name	Pin	Pin Name
1	SATA_LED+	2	PWR_LED+
3	SATA_LED-	4	PWR_LED-
5	GND	6	PWRBTN_N
7	RESET#	8	GND
9	N/C		



定义	P1	颜色	P2	P3	P4	P5
SATA_LED+	1	绿		1		
SATA_LED-	3	黑		2		
PWR_LED+	2	红	1			
PWR_LED-	4	黑	2			
HWRST_N	5	白				1a
HWRST_N	7	白				1
PWR_SW_N	6	绿			1a	
PWR_SW_N	8	绿			1	



2.3.3 USB Interfaces

USB is an external bus standard that regulates the connection and communication between computers and external devices. It offers advantages such as fast transmission speed, ease of use, hot-plug support, flexible connection, and independent power supply. It can connect various peripherals like mice, keyboards, U disks, cameras, etc.

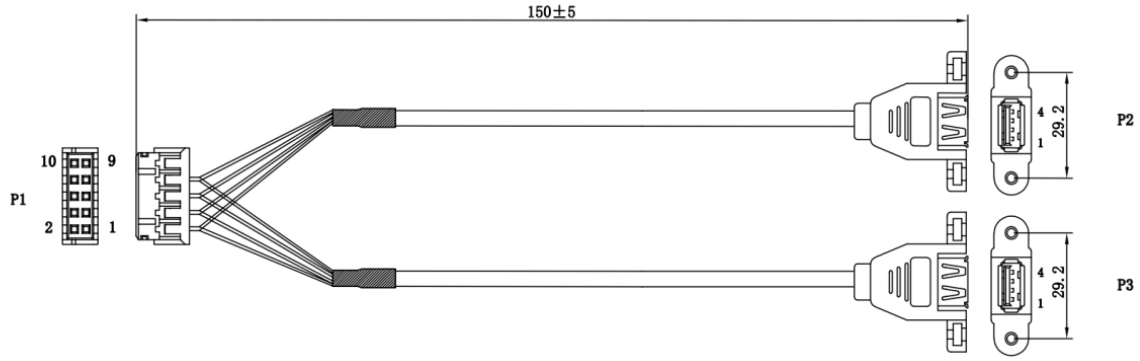
The motherboard has a total of 13 USB ports, including 6 coastline USB3.0 ports; internally: 2x USB3.0 headers, 4x USB2.0 headers, and one vertical USB2.0 Type-A connector. Their functions are shown in the table below:

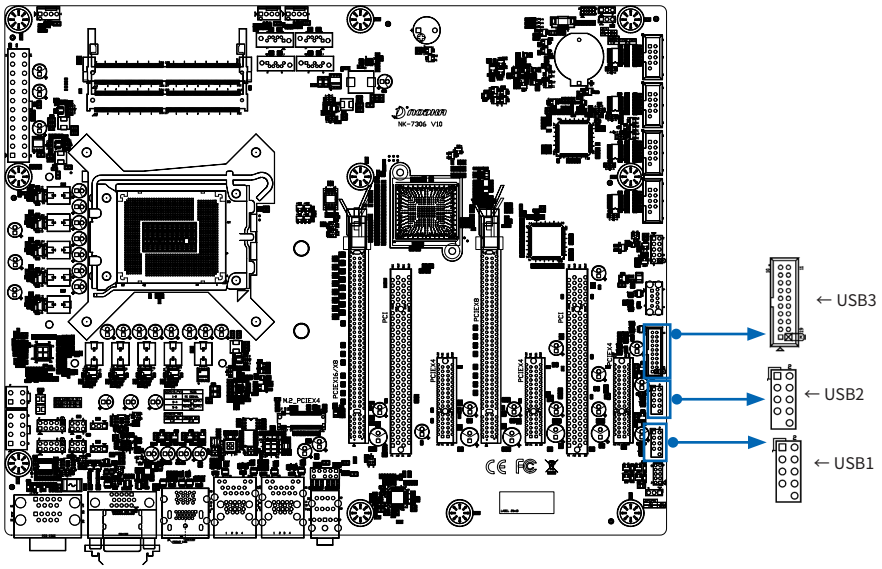
USB2.0/3.0 Function		
USB Version	Theoretical Max Speed	Max Voltage/Current
USB3.0	5Gbps	5V/1300mA
USB2.0	480Mbps	5V/1300mA

2.3.3.1 JUSB1 & JUSB2

JUSB1 and JUSB2 are internal Pitch=2.54mm, 2*5pin Pinheader interfaces. They can be connected to 2 USB2.0 Type-A ports via a Y-cable. The pin definitions and cable drawing are referenced below:

JUSB1、JUSB2 Pin Definitions			
Pin	Pin Name	Pin	Pin Name
1	PVCC5	2	PVCC5
3	JUSB1_N	4	JUSB2_N
5	JUSB1_P	6	JUSB2_P
7	GND	8	GND
x	x	10	GND





2.3.3.2 JUSB3

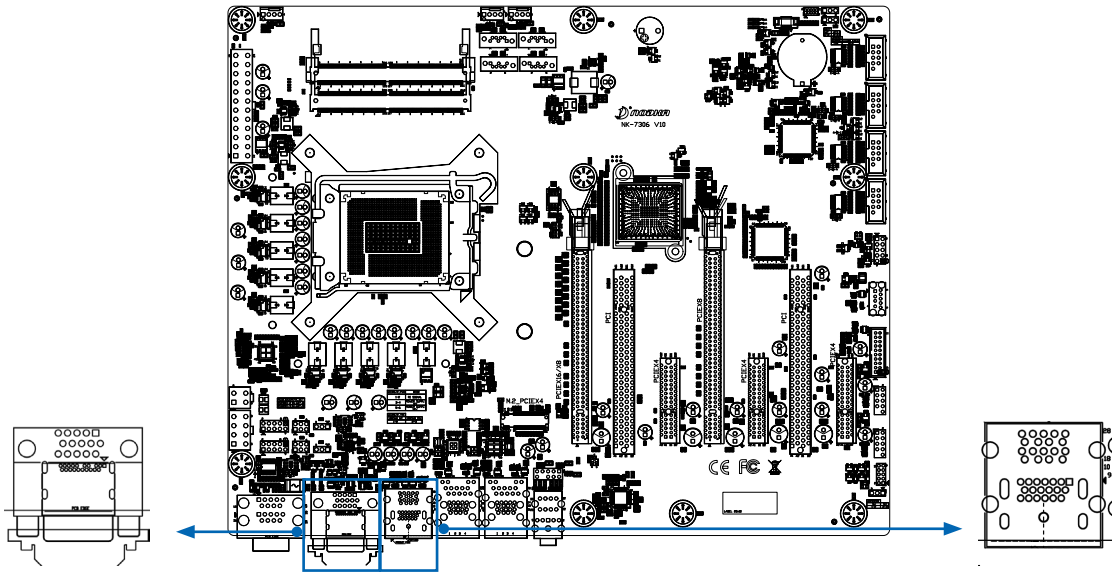
JUSB3 is an internal Pitch=2.0mm, 2*10pin wafer interface. It can be connected to USB3.0 ports via a Y-cable. The pin definitions and cable drawing are referenced below:

JUSB3 Pin Definitions			
Pin	Pin Name	Pin	Pin Name
1	P5VUSB	X	X
2	USB_P5_RXN	19	P5VUSB
3	USB_P5_RXP	18	USB_P6_RXN
4	GND	17	USB_P6_RXP
5	USB_P5_TXN	16	GND
6	USB_P5_TXP	15	USB_P6_TXN
7	GND	14	USB_P6_TXP
8	USB_P5_DP_R	13	GND
9	USB_P5_DN_R	12	USB_P6_DN_R
10	GND	11	USB_P6_DP_R

2.3.4 Display Interfaces

The motherboard design includes multiple video interfaces: VGA, HDMI, and DP, supporting independent triple display. These interfaces utilize various video interface protocols, which primarily convert the computer's video output signal into a signal suitable for display on a monitor, connected via the display interface. The functions of VGA, HDMI, and DP are shown in the table below:

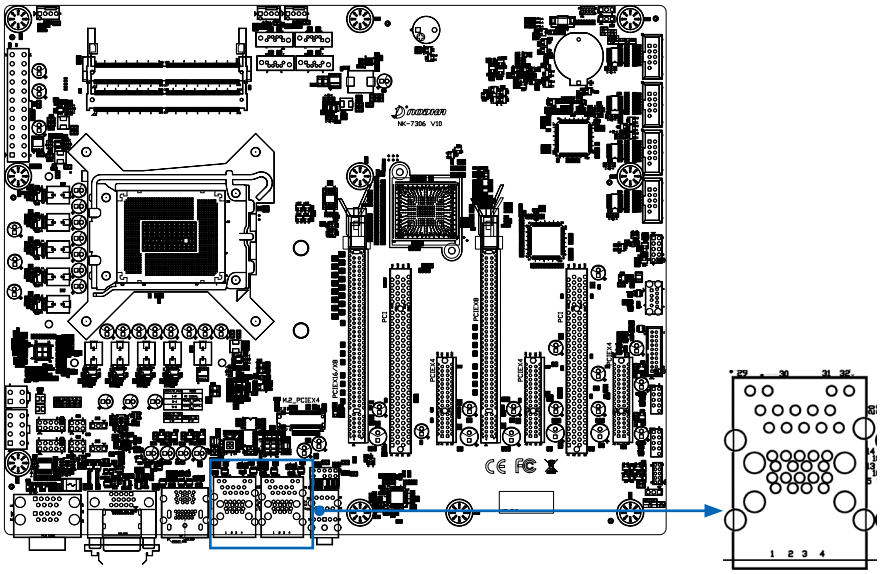
VGA、HDMI、DP Function		
Display Interface	Signal Type	Max Resolution
VGA	Analog	2560x1600@60Hz
HDMI	Digital	4096X2304@30Hz
DP	Digital	4096X2304@60Hz



2.3.5 LAN Ports

The main function of the LAN port is to send or receive data, used for communication between the device and the computer network. Common LAN ports based on transmission speed include 10M (10Mbps), 100M (100Mbps), 1000M (1Gbps), etc. This board supports 2 Gigabit LAN ports and supports Wake-on-LAN (WoL) function. The network indicator status functions are as follows:

Network Indicator Status		
Indicator	Status	Function
Link Indicator (L)	Yellow Solid	Network Connected
	Yellow Blinking	Data Transfer
	Off	Connection Error or No Link
Speed Indicator (R)	Orange Solid	1000Mbps
	Green Solid	100Mbps
	Off	10Mbps



2.3.6 COM Ports

COM (Communication Port) is an interface on computers used for serial communication. It can use different serial communication protocols, such as RS-232, RS-422, RS-485, etc. These protocols define data transmission rules, voltage levels, and signal characteristics to ensure reliable data transmission between COM ports.

2.3.6.1 COM1/COM2

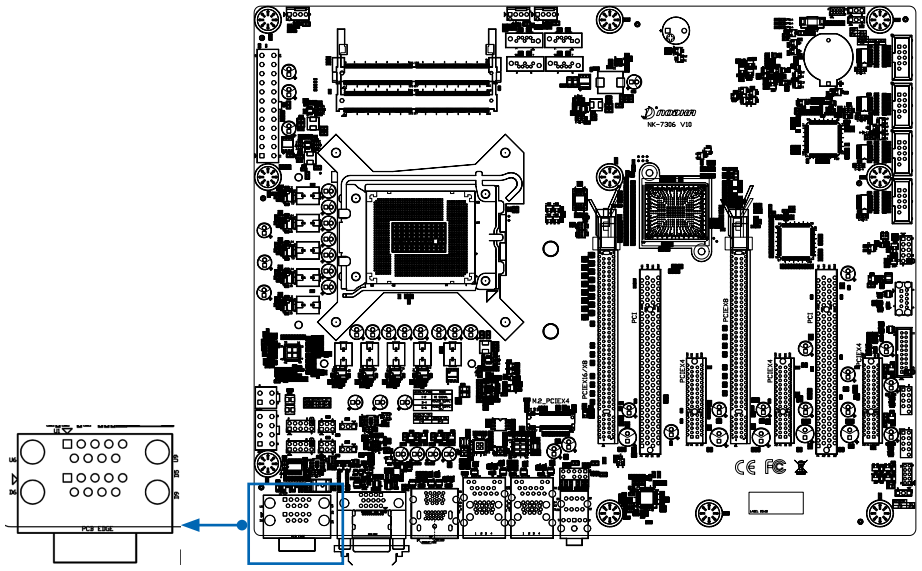
COM1/COM2 are standard DB9 interfaces. They default to supporting Wake On Ring function. COM1/COM2 support RS485 and RS232 modes (default). The working mode of the serial port can be switched by setting the JCOM1_SET and JCOM2_SET1 jumpers. Set JCOM1_PWI and JCOM2_PWI jumpers to switch RI signal function, 3.3V, and 5V power supply functions. Set JCOM1_TRI and JCOM2_TRI jumpers to switch the 120Ω terminal resistor. COM1/COM2 definitions and mode settings are as follows:

COM1/COM2 Pin Definitions			
RS232		RS485	
Pin	Pin Name	Pin	Pin Name
1	COM_DCD#	1	D-
2	COM_SIN	2	D+
3	COM_SOUT	3	N/C
4	COM_DTR#	4	N/C
5	GND	5	GND
6	COM_DSR#	6	N/C
7	COM_RTS#	7	N/C
8	COM_CTS#	8	N/C
9	COM_RI#	9	N/C

JCOM1_SET /JCOM2_SET1 Jump Setting	
Setting	Function
1-3，4-6，7-9 Shorted	Set RS485 Mode
1-2，5-6，7-8 Shorted	Set RS232 Mode

JCOM1_PW1 /JCOM2_PW1 Jump Setting	
Setting	Function
1-2 Shorted	Set RI signal mode
3-4 Shorted	Set 5V power supply mode
5-6 Shorted	Set 12V power supply mode

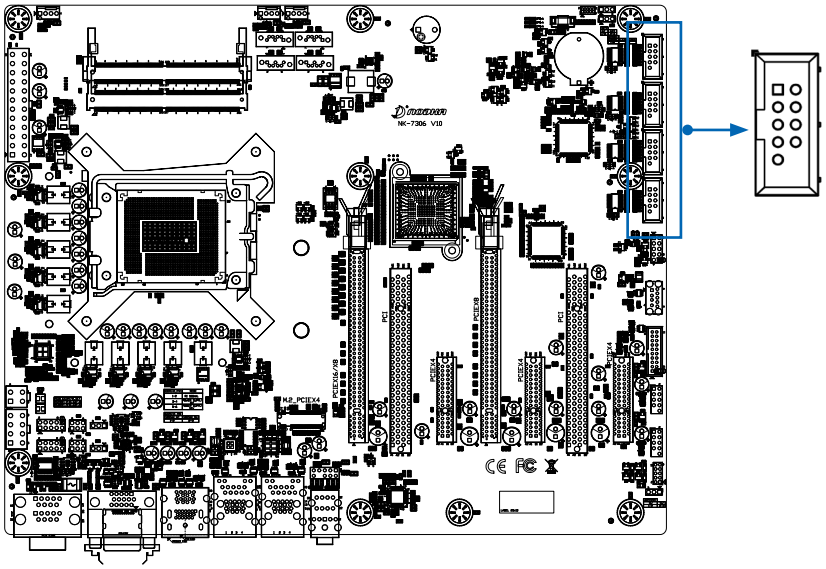
JCOM1_TR1 /JCOM2_TR1 Jump Setting	
Setting	Function
1-2 Shorted	Disable 120Ω Terminal Resistor
2-3 Shorted	Enable 120Ω Terminal Resistor



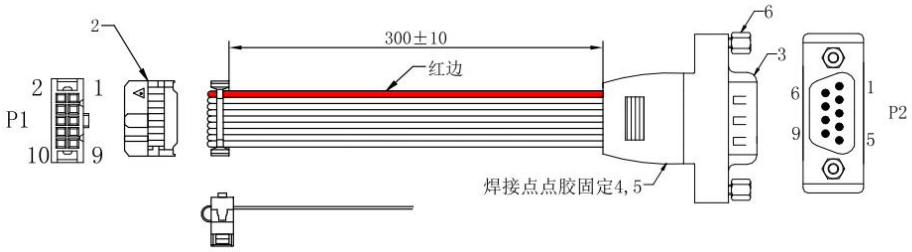
2.3.6.2 JCOM3/JCOM4/JCOM5/JCOM6

JCOM3/JCOM4/JCOM5/JCOM6 are internal Pitch=2.54mm, 2*5pin wafer interfaces. They can be extended via cable to 9-pin COM ports. They default to supporting Wake On Ring function and only support RS232 mode. The pin definitions and cable reference are as follows:

JCOM2 Pin Definitions			
Pin	Pin Name	Pin	Pin Name
1	COM_DCD#	2	COM_DSR#
3	COM_RXD	4	COM_RTS#
5	COM_TXD	6	COM_CTS#
7	COM_DTR#	8	COM_RI#
9	GND		



P1	Color	P2
1	灰印红边	1
2	灰	6
3	灰	2
4	灰	7
5	灰	3
6	灰	8
7	灰	4
8	灰	9
9	灰	5

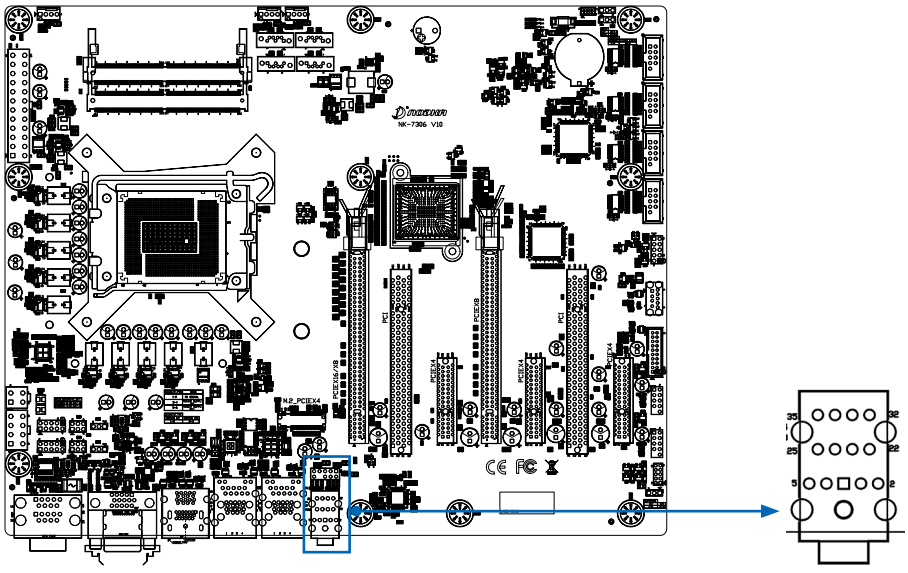


2.3.7 Audio Interface

The audio interface (rear I/O) separately supports Line-in, Line-out, and Mic-in. Line-in is for audio input, allowing analog audio signals from other players (like tape recorders, non-digital signals) to be recorded internally into the computer via Line-in. Line-out is for audio output, which can be connected to external audio devices like speakers or headphones. Mic-in is for microphone input, which can be connected to a microphone.

JAUD1 is an internal Pitch=2.54mm, 2x5pin wafer interface. It can be extended via cable to support Line-out and Mic-in. This interface can connect external devices such as microphones, headphones, or speakers. The pin definitions and cable reference are as follows:

JAUD1 Pin Definitions			
Pin	Pin Name	Pin	Pin Name
1	A_MIC2_L	2	AGND
3	A_MIC2_R	4	PRESENCE#
5	A_LINE2_L	6	MIC_JD
7	AGND	8	N/C
9	A_LINE2_R	10	ADUIO_JD



2.3.8 Storage Interfaces

The motherboard supports two storage methods: SATA 3.0 and M.2-2242/2280 storage interfaces.

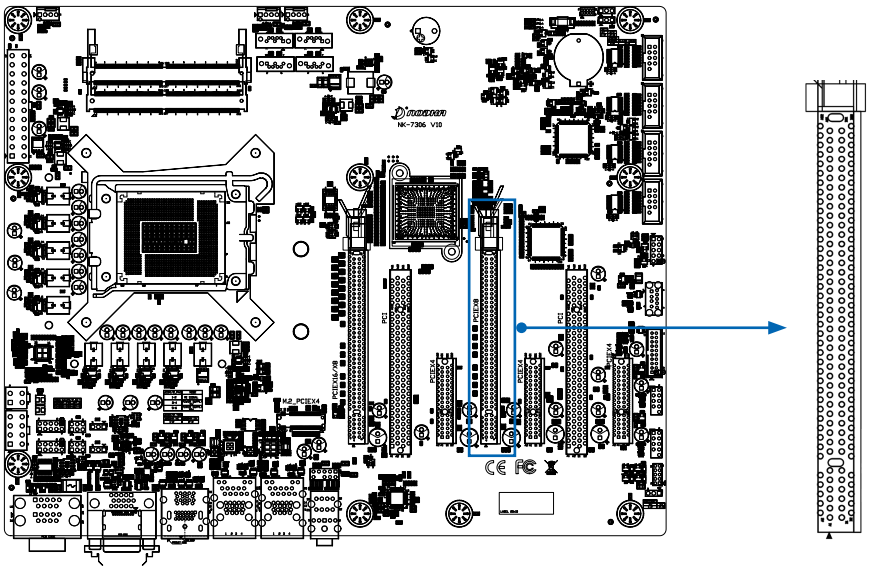
SATA 3.0 is an interface standard for connecting hard disk storage devices. It supports a maximum transfer rate of 6 Gbps (gigabits per second), providing faster data transfer speeds.

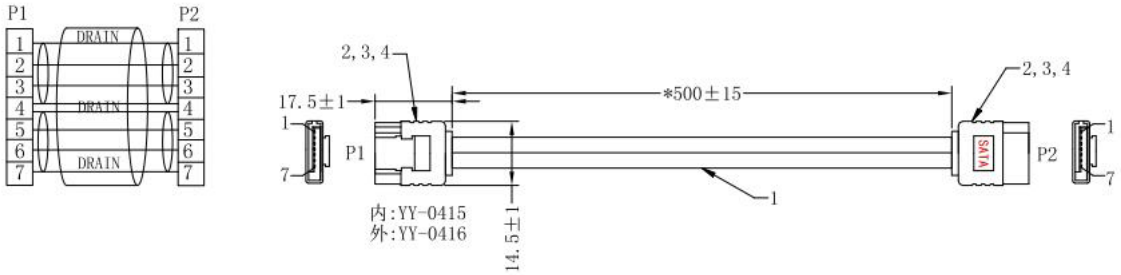
M.2-2242 is a size standard within the M.2 specification, suitable for M.2 storage devices. Solid State Drives (SSDs) or other storage devices conforming to the M.2-2242/2280 size standard can be used.

2.3.8.1 SATA1/SATA2/SATA3/SATA4 Interfaces

SATA1/SATA2/SATA3/SATA4 are internal SATA interfaces for 2.5/3.5 inch HDD/SSD. They can connect HDDs or SSDs via cables. The pin definitions and cable reference are as follows:

SATA1 & JSATAPWR1 Pin Definitions					
SATA1				JSATAPWR1	
Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
1	GND	2	SATA1_TXP_C	1	+5V
3	SATA1_TXN_C	4	GND	2	GND
5	SATA0_RXN_C	6	SATA0_RXP_C	N/C	N/C
7	GND	8	GND	N/C	N/C
9	GND	N/C	N/C	N/C	N/C

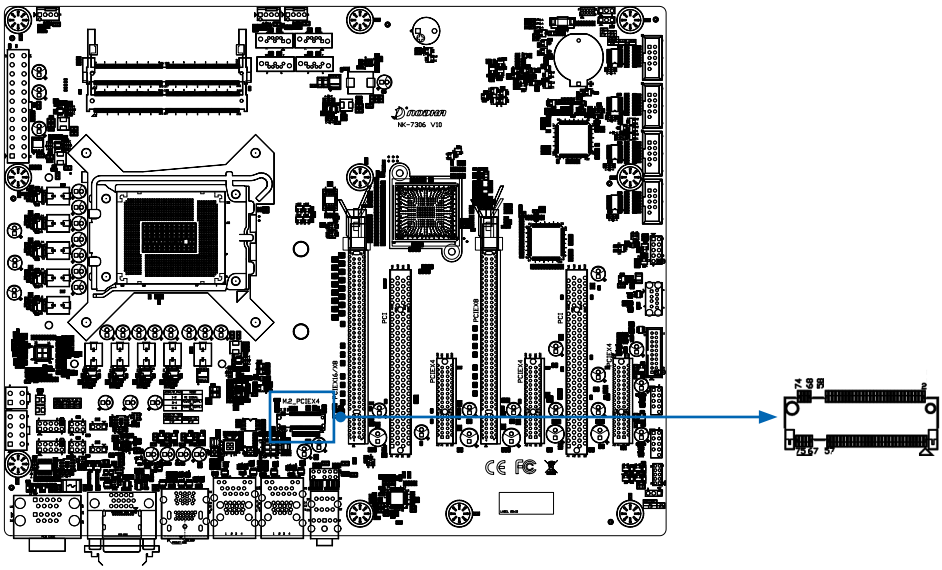




2.3.8.2 M.2-2242/2280 Interface

M2_SSD is the M.2-2242/2280 interface. "2242" indicates the M.2 module size is 22mm wide and 42mm long. "2280" indicates the M.2 module size is 22mm wide and 80mm long. The motherboard has a built-in M-Key solid-state drive connector supporting SATA protocol SSDs and NVMe PCIe SSDs (based on specs). The interface location and pin definitions are as follows:

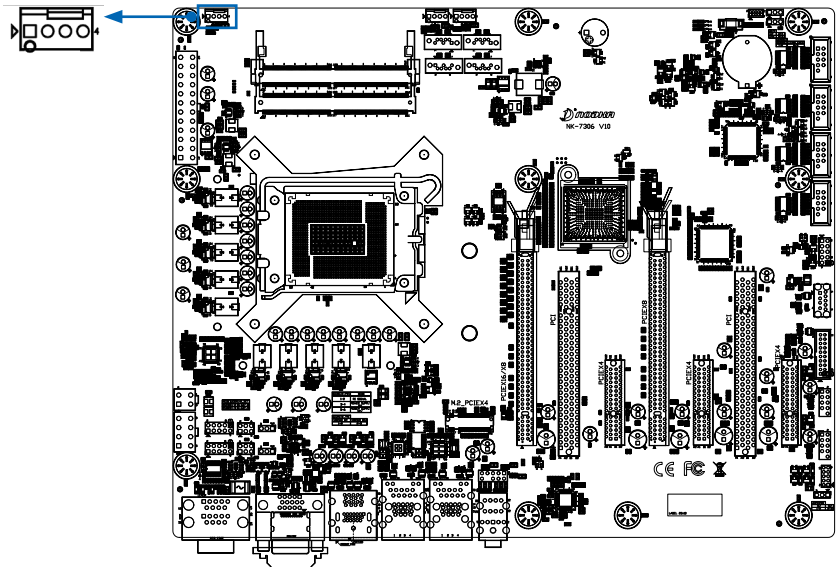
M.2-2242 M-Key Pin Definitions			
Pin	Pin Name	Pin	Pin Name
1	GND	2	PVCC3_CPU_M2
3	GND	4	PVCC3_CPU_M2
5	PCIE_PEG60_RXN3	6	N/C
7	PCIE_PEG60_RXP3	8	N/C
9	GND	10	M.2_NVME_LED#
11	PCIE_PEG60_TXN3/M2_SSD_P3_TX_C_DN	12	PVCC3_CPU_M2
13	PCIE_PEG60_TXP3/M2_SSD_P3_TX_C_DP	14	PVCC3_CPU_M2
15	GND	16	PVCC3_CPU_M2
17	PCIE_PEG60_RXN2	18	PVCC3_CPU_M2
19	PCIE_PEG60_RXP2	20	N/C
21	GND	22	N/C
23	PCIE_PEG60_TXN2/M2_SSD_P2_TX_C_DN	24	N/C
25	PCIE_PEG60_TXP2/M2_SSD_P2_TX_C_DP	26	N/C
27	GND	28	N/C
29	PCIE_PEG60_RXN1	30	N/C
31	PCIE_PEG60_RXP1	32	N/C
33	GND	34	N/C
35	PCIE_PEG60_TXN1/M2_SSD_P1_TX_C_DN	36	N/C
37	PCIE_PEG60_TXP1/M2_SSD_P1_TX_C_DP	38	N/C
39	GND	40	N/C
41	PCIE_PEG60_RXN0/M2_SSD_P0_RX_R_DN	42	N/C
43	PCIE_PEG60_RXP0/M2_SSD_P0_RX_R_DP	44	N/C
45	GND	46	N/C
47	PCIE_PEG60_TXN0/M2_SSD_P0_TX_C_DN	48	N/C
49	PCIE_PEG60_TXP0/M2_SSD_P0_TX_C_DP	50	PLTRST_CPUM2
51	GND	52	CLK_NVME_M.2_SSD1#
53	PCH_CLK_CPUM2_DN	54	PMC_WAKE_N
55	PCH_CLK_CPUM2_DP	56	N/C
57	GND	58	N/C
67	N/C		
69	N/C	68	N/C
71	GND	70	PVCC3_CPU_M2
73	GND	72	PVCC3_CPU_M2
75	GND	74	PVCC3_CPU_M2



2.3.9 CPU_FAN1

CPU_FAN1 is an internal CPU fan interface, used to connect a 12V CPU fan. The fan operation mode can be set via BIOS. Refer to Chapter 4, section 4.3.3 (HW Monitor) for settings. The pin definitions are as follows:

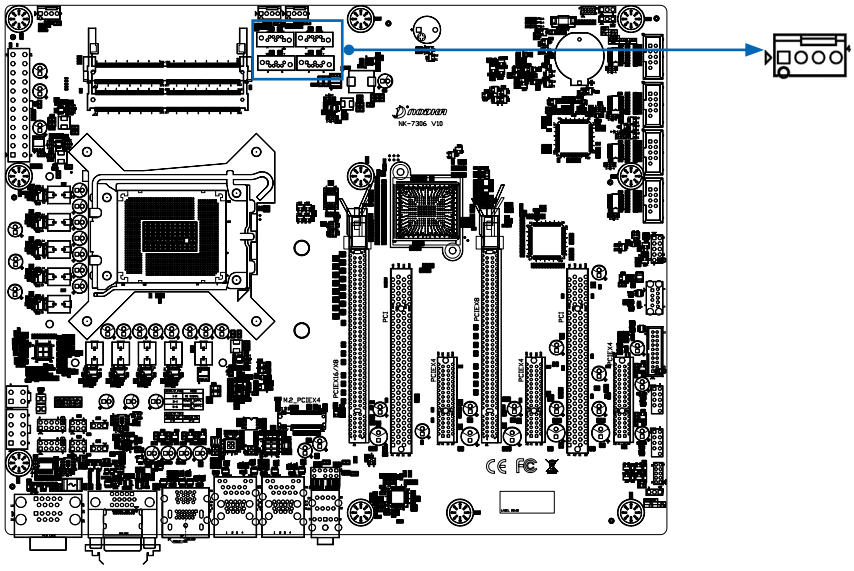
CPU_FAN1 Pin Definitions			
Pin	Pin Name	Pin	Pin Name
1	CTRL	2	TACH
3	12V	4	GND



2.3.10 SYS_FAN1/SYS_FAN2

SYS_FAN1/SYS_FAN2 are internal system fan interfaces, used to connect 12V system fans. The fan operation mode can be set via BIOS. Refer to Chapter 4, section 4.3.3 (HW Monitor) for settings. The pin definitions are as follows:

SYS_FAN Pin Definitions			
Pin	Pin Name	Pin	Pin Name
1	CTRL	2	TACH
3	12V	4	GND

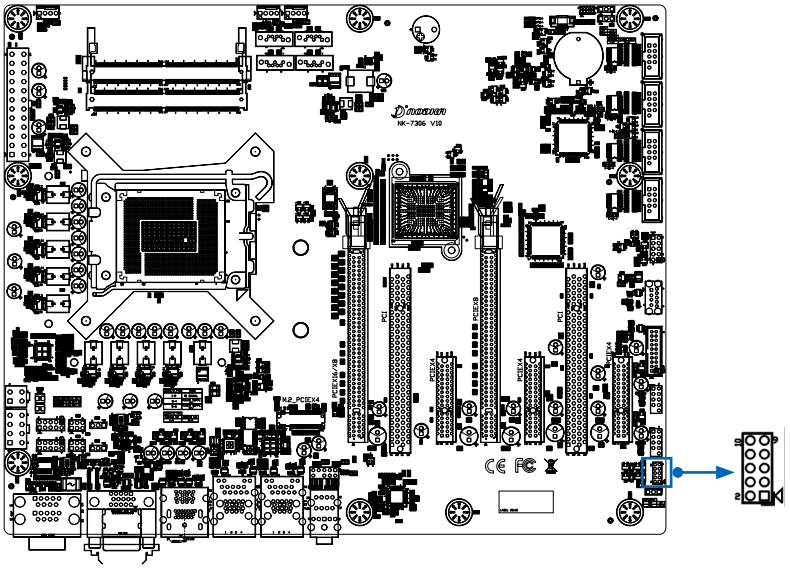


2.3.11 JGPIO1

JGPIO1 is an internal Pitch=1.25mm, 2*5pin interface. It can set or read the high/low status values of GPIO. Refer to Appendix 1 for the GPIO routine. Depending on actual usage, the drive voltage can be set to 5V (default) or 3.3V via the JGPIOPR1 jumper. The pin definitions and drive voltage setting jumper settings are as follows:

JGPIOPR1 Jump Setting	
Setting	Function
1-2 Shorted	Set GPIO 3.3V
2-3 Shorted	Set GPIO 5V

JGPIO1 Pin Definitions			
Pin	Pin Name	Pin	Pin Name
1	JGPIO8	2	JGPIO1
3	JGPIO7	4	JGPIO2
5	JGPIO6	6	JGPIO3
7	JGPIO5	8	JGPIO4
9	PVCC_GPIO	10	GND



2.3.12 JCMOS1

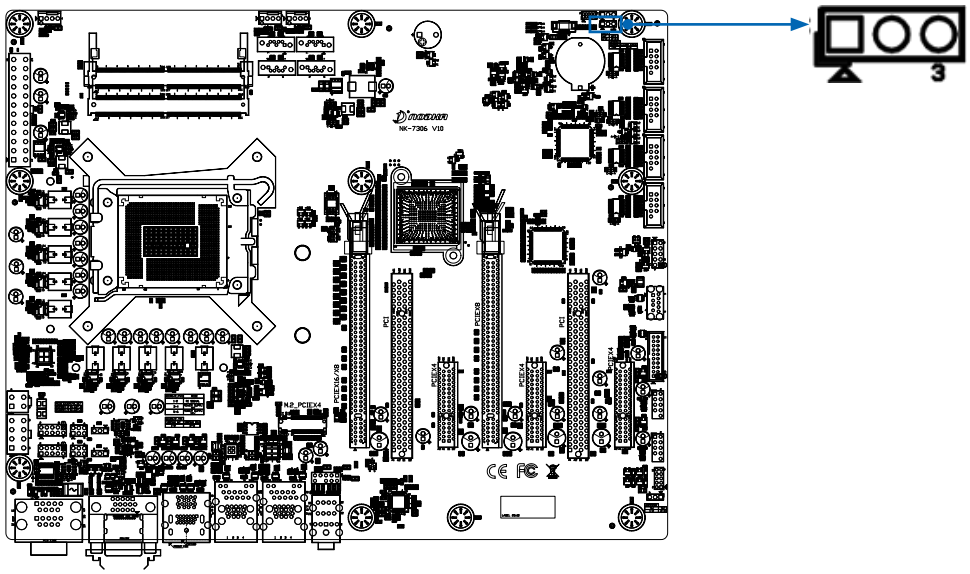
CMOS is a readable/writable RAM chip on the system motherboard. Its content can be read and written by programs and stores specific parameters about the system configuration. It relies on the system power and a backup battery for power; the information is not lost after a system power failure. However, when the backup battery is depleted, the information in the CMOS may be lost. JCMOS1 can be used to clear the CMOS information.

Step 1: Power off

Step 2: Remove the jumper cap from (1-2) and place it on (2-3), wait for 10s. The BIOS will load factory default settings (clears CMOS but not time). Restore the jumper cap to (1-2).

Step 3: If you need to clear both CMOS and time information, remove the battery (BAT1), wait for 20s, then both time and CMOS information will be cleared. Reinsert the battery. The information is now cleared. The CMOS jumper settings are as follows:

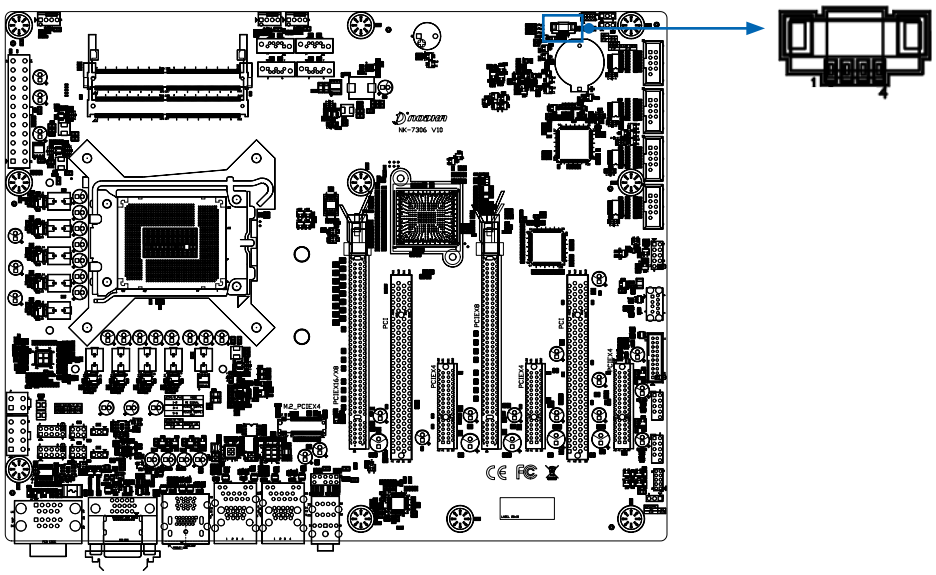
JCOMS1 Jump Setting	
Setting	Function
1-2 Shorted	Normal CMOS Operation
2-3 Shorted	Clear CMOS Information



2.3.13 JSMB1

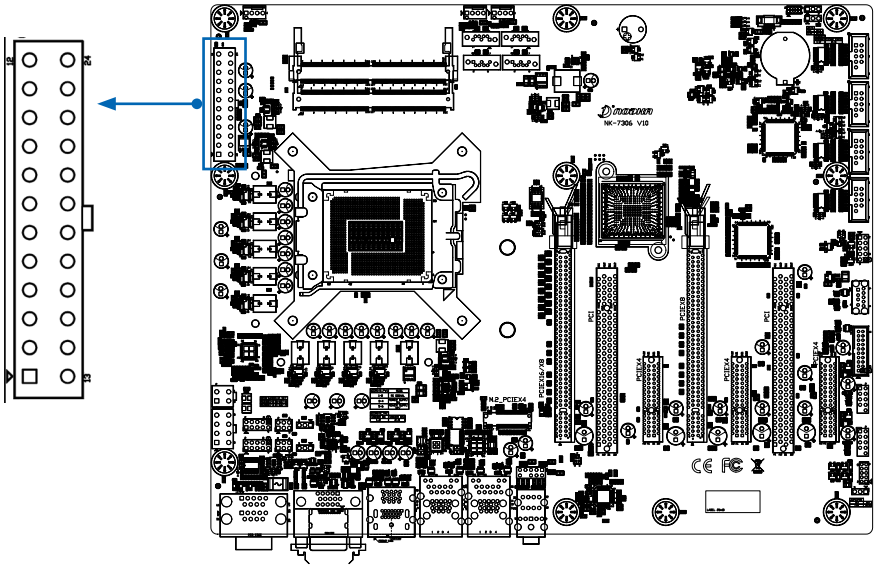
SMBus (System Management Bus) is a serial bus protocol based on the standard I2C protocol. SMBus provides a communication method for managing and controlling various devices within a computer system. It can be used to monitor and manage hardware devices in a computer system, such as sensors, temperature monitors, power management hardware devices, etc. The pin definitions are as follows:

JSMB1 Pin Definitions			
Pin	Pin Name	Pin	Pin Name
1	+5V	2	SMBCLK_EXT
3	SMBDATA_EXT	4	GND



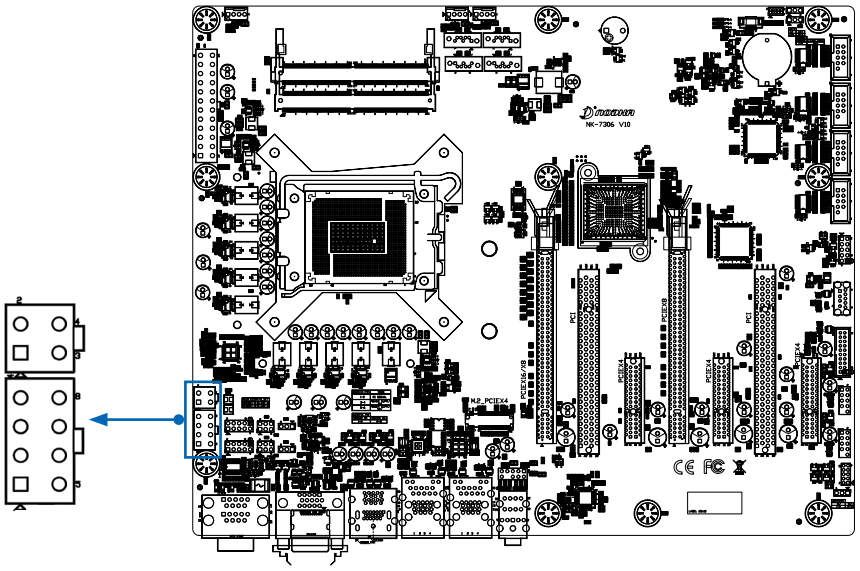
2.3.14 Motherboard ATX Power Connector (ATX_24P1)

ATX_24P1 is the motherboard's internal main power connector interface. It can be connected to an ATX power supply to provide power to the motherboard.



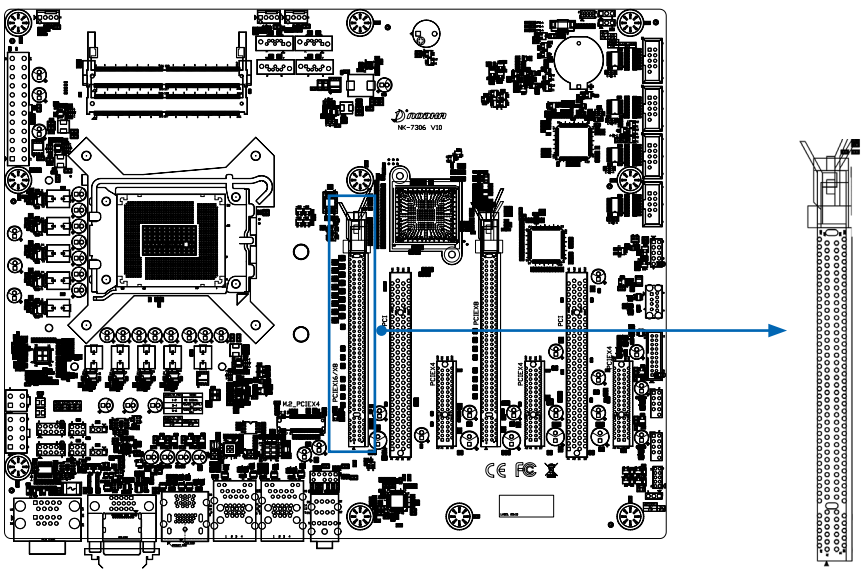
2.3.15 CPU 12V Power Connector (ATX8P2+ATX4P1)

ATX8P2+ATX4P1 is the motherboard's internal power connector interface, providing stable 12V power to the CPU.



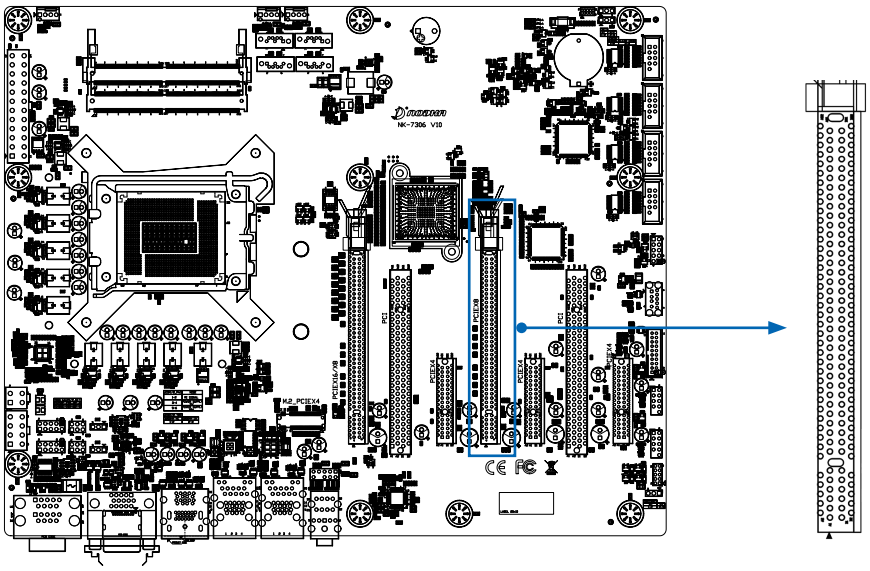
2.3.16 PCIE X16/X8 Slot

The PCIe x16 slot is primarily used for graphics cards, RAID array cards, etc. This slot has excellent compatibility and can be downward compatible with x1/x4/x8 level devices. It can be said that the PCIe x16 slot is the universal PCIe slot. The PCIe x16 slot is often used for graphics cards and has a direct connection to the central processor (CPU), physically located close to the CPU. This reduces latency in data exchange between the graphics card and the processor, allowing full utilization of system performance.



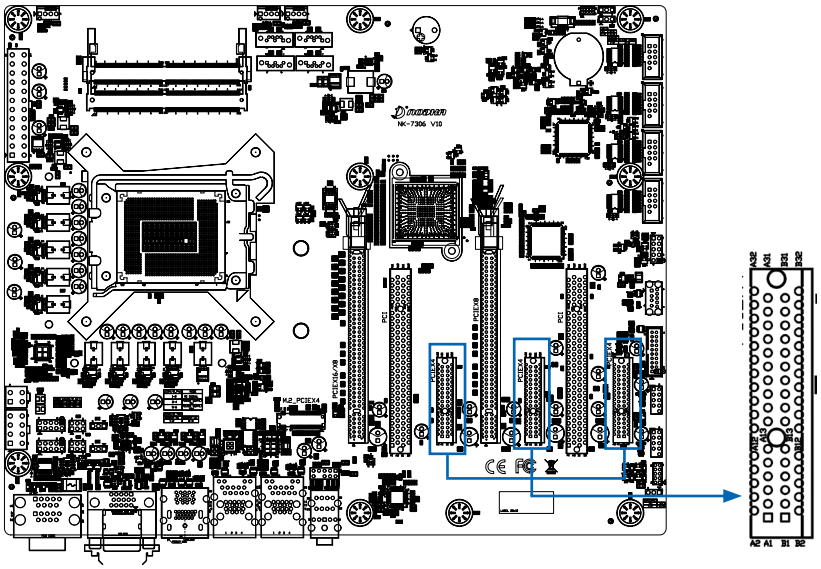
2.3.17 PCIE X8 Slot

For compatibility, the PCIe x8 slot is usually manufactured in the physical form of a PCIe x16 slot, but only half of the data pins are active, meaning the actual bandwidth is only half that of a true PCIe x16 slot.



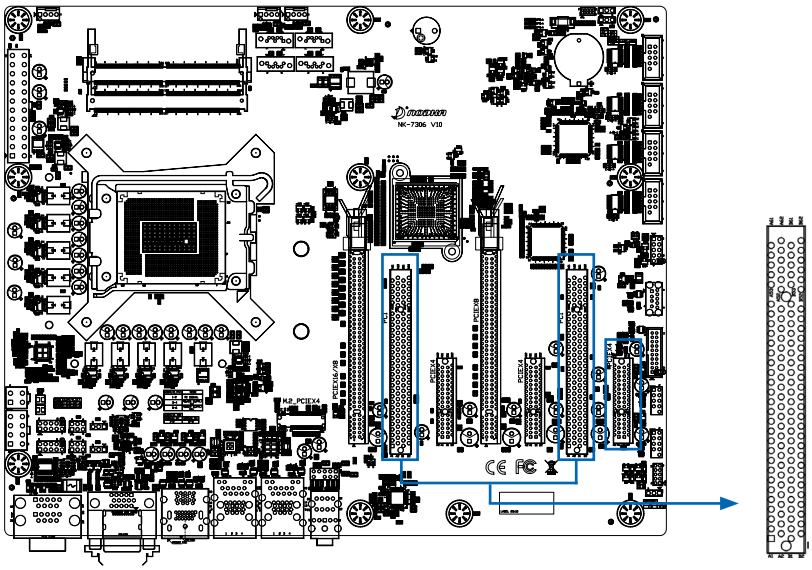
2.3.18 PCIE X4 Slot

The PCIe X4 slot can be used to expand PCIe X4 signal function cards and is downward compatible with x1/x2 level devices.



2.3.19 PCI Slot

The PCI slot can be used to expand PCI signal function cards. Its bit width is 32-bit or 64-bit, with an operating frequency of 33MHz, and a maximum data transfer rate of 133MB/sec (32-bit) and 266MB/sec (64-bit). It can accommodate expansion cards such as sound cards, network cards, USB 2.0 cards, RAID cards, etc.



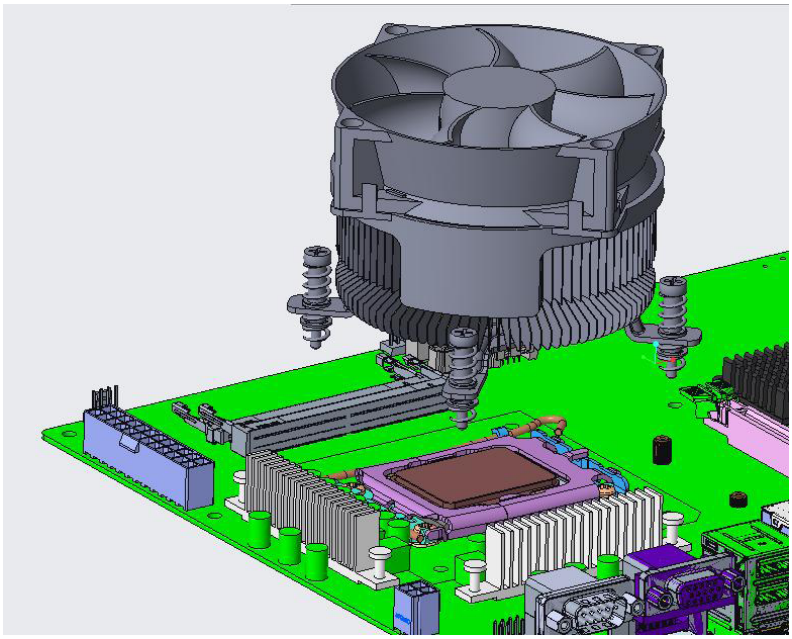
Chapter 3 Installation Brief Instructions

3.1 Cooler Installation Instructions

Step 1: Open the small package of thermal grease and apply it to the Cooler. Align the 4 spring fasteners on the Cooler with the motherboard screw holes. Press down the spring fasteners and secure them.

Step 2: Connect the Cooler FAN power interface to the CPU_FAN interface on the motherboard.

Detailed operation is shown in the figure below:



3.2 CPU Installation Instructions

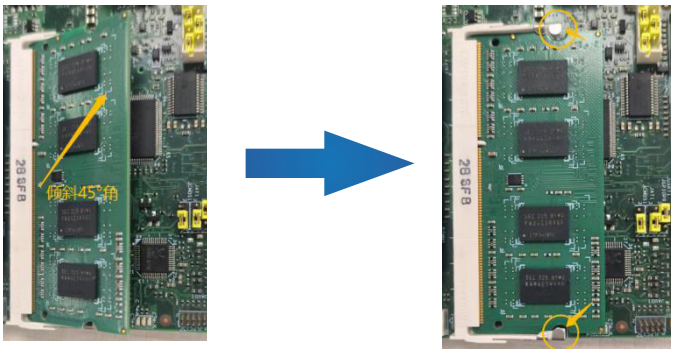
Open the Socket lever. Check if the internal pins are damaged. Then select a CPU that complies with this product's specifications. Intel has a universal polarity marker, which is a "triangle". When the small triangle on the CPU matches the direction of the triangle on the Socket protector cover, place the CPU in and close the lever to install the CPU.





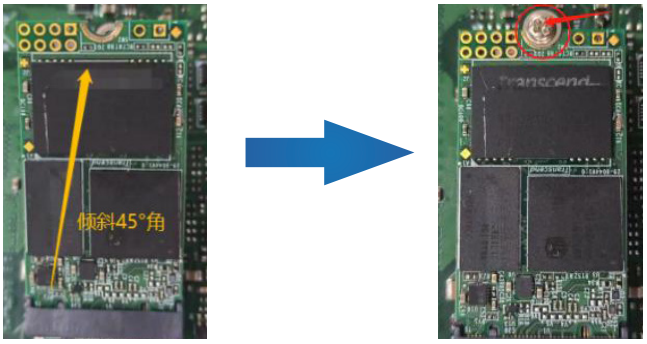
3.3 Memory Module Installation Instructions

Take out the SO-DIMM memory module. Insert the memory module into the memory slot at a 45° angle. Press down gently until it clicks into the latches.



3.4 M.2 SSD Device Installation Instructions

Take out the M.2 SSD. Insert the SSD into the M-KEY slot at a 45° angle. Secure it using 1 M2 screw.
Detailed operation is shown in the figure below:



Chapter 4 AMI BIOS Setup

The AMI BIOS ROM has a built-in setup program that saves the computer's most essential basic input/output programs and allows users to modify basic system configurations. After configuration, the system settings are saved in the motherboard's FLASH memory. When the power is off, the battery on the board provides the necessary power to the FLASH to preserve the settings. When the power is turned on, press the <Del> or <Esc> button during the BIOS POST process to access the CMOS SETUP screen. The interface is divided into left and right columns. Items in the left column displayed in gray are non-configurable options, while those in blue are configurable. The upper right box shows a description of the selected item in the left box, and the lower right shows hotkey operations.

4.1 Hotkey Operation Instructions

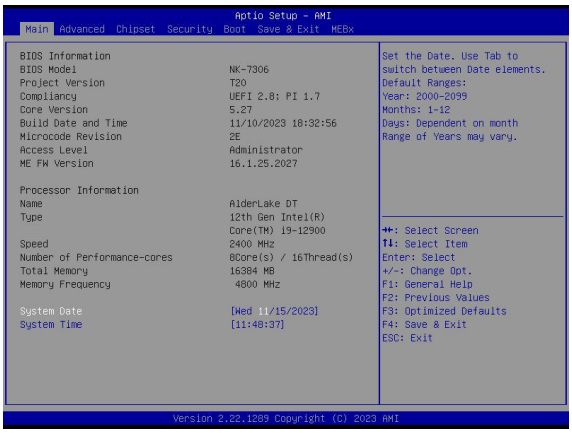
Hotkey usage instructions:

Hot Key	Function	Context
< ← >< → >	BIOS Menu Selection	Inside BIOS Interface
< ↑ >< ↓ >	BIOS Option Selection	Inside BIOS Interface
<CTRL>+<ALT>+<DEL>	Restart System	After System Powers On
<Enter>	Confirm Selection	Inside BIOS Interface
<DEL>	Enter BIOS Setup Interface	Inside BIOS Interface
<ESC>	Exit BIOS Setup Interface	After System Powers On
<F3>	Load default	Inside BIOS Interface
<F4>	Save Settings and Exit	Inside BIOS Interface
<F7>	Call BIOS Quick Boot Option Menu	After System Powers On

4.2 Main Menu

Press <Del> after system startup to enter the BIOS setup interface. The main menu will appear on the screen. Use the up/down/left/right arrow keys to select the relevant options, then press <Enter> to enter the submenu.

The Main menu is the first interface users see when entering the BIOS. It allows querying of BIOS version, CPU, memory, and other related information. It also allows setting the system date and time. The Main menu is shown in the figure below:



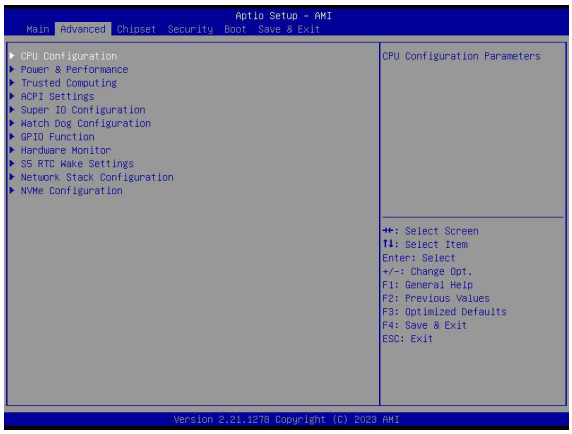
4.2.1 System Date and Time Setting

Select System Date or System Time to change the system date or time respectively. Press <Tab> or < ← >< → > to move between fields. The system date format is "Month / Day / Year". The system time is in 24-hour format, "Hour : Minute : Second". Press "+", "-", and number keys to modify values. Press Enter to switch between Month/Day/Year or Hour/Minute/Second. After setting, press F4 to save settings, which take effect after restart.

4.3 Advanced Menu

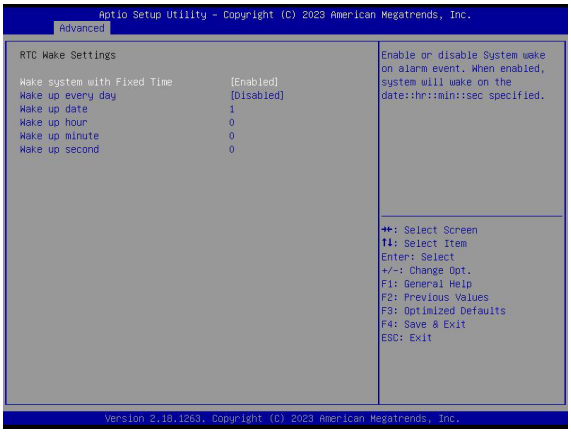
Enter the Advanced menu to configure system functions. It provides access to advanced system settings. Here you can configure various advanced options such as CPU settings, memory settings, SATA settings, overclocking settings, virtualization options, etc. Use < ↑ >< ↓ > to select and <Enter> to enter setting options. This section will introduce the Advanced setting options.

The Advanced menu is shown in the figure below:Advance:



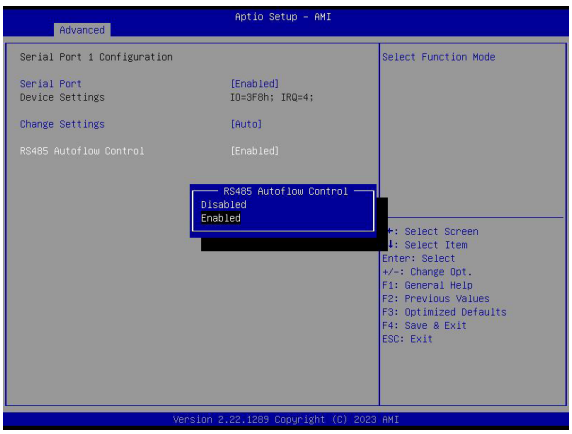
4.3.1 Scheduled Wake-up Function

In the Advanced menu, navigate to RTC Wake Settings -> Wake system with Fixed Time. Set the system scheduled wake-up function to Enable or Disable (default is Disable). When set to Enabled, you can set the date, hour, minute, and second to wake the system at the specified time. After setting, press F4 to save and exit; it takes effect after restart.



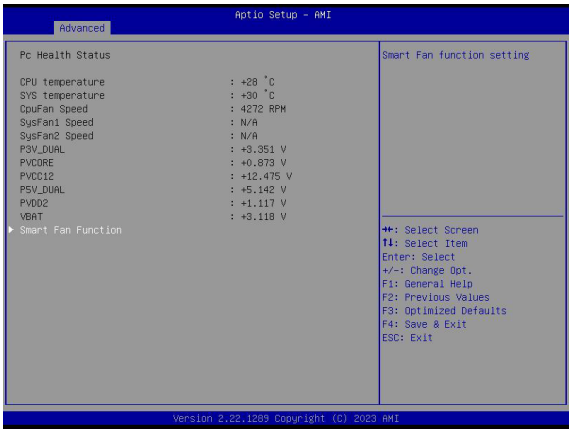
4.3.2 COM Mode Setting

In the Advanced menu, navigate to Super IO Configuration -> Serial Port 1/2 Configuration -> Serial Port [X] / RS485 Autoflow Control. Serial Port X (X represents the serial port number) is for enabling or disabling the COM port (default is Enabled). RS485 Autoflow Control is for enabling or disabling RS485 flow control (default is Enable). If the hardware serial port is set to RS485 (via jumper), this should be set to Enabled. If RS232 mode is needed, the flow control for the corresponding serial port should be changed to Disable. After setting, press F4 to save and exit; it takes effect after restart.

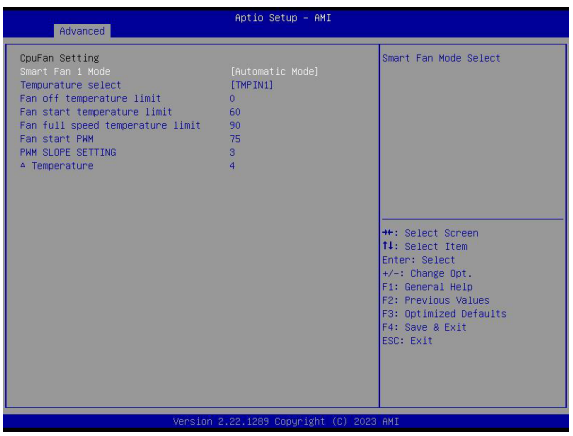


4.3.3 HW Monitor

In the Advanced menu, selecting the Hardware Monitor option will display information such as CPU temperature, system temperature, important voltage parameter values, Smart Fan Function, etc.

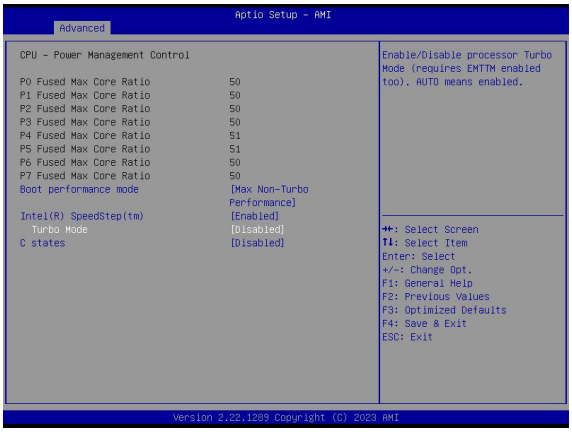


Smart Fan Function: Includes CPU Fan Setting, SysFan1 Setting, and SysFan2 Setting. Smart Fan Mode is divided into Manual Mode (Software Mode) and Intelligent Mode (Automatic Mode), default is Automatic Mode. Selecting Software Mode allows setting system temperature thresholds, fan start temperature, fan stop temperature, fan mode, duty cycle, etc., according to user application requirements. SysFan1 Setting and SysFan2 Setting are configured similarly to CPU Fan Setting.



4.3.4 Turbo Mode Setting

In the Advanced menu, navigate to Power & Performance > CPU - Power Management Control > Boot performance mode. The default is Turbo Performance. Select Max Non-Turbo Performance and simultaneously change Turbo Mode to Disabled to turn off turbo boost (overclocking).

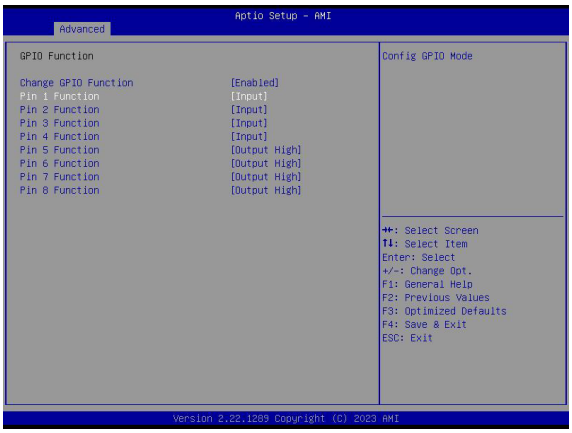


4.3.5 USB Power in Shutdown/Sleep Setting

In the Advanced menu, navigate to OS Configuration > USB Power in S4/S5. This setting can Enable or Disable whether the USB ports continue to provide power when the system is in S4 (Hibernate) or S5 (Soft Off) states. Default is Enabled, meaning USB ports have power.

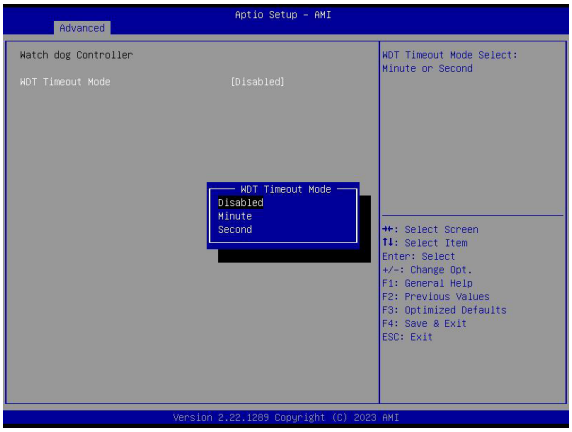
4.3.6 GPIO Setting

In the Advanced menu, select GPIO Function -> Change GPIO Function. This can Enable or Disable GPIO (default is Disabled). When set to Enabled, individual GPIO Pins can be set as Input, Output Low, or Output High. After setting, press F4 to save and exit; it takes effect after system restart.



4.3.7 Watch Dog Setting

In the Advanced menu, select Watch Dog Configuration > Watch Dog Controller. This can Enable or Disable the Watch Dog function (default is Disabled). After setting, press F4 to save and exit; it takes effect after system restart. For detailed usage, see Appendix 2.



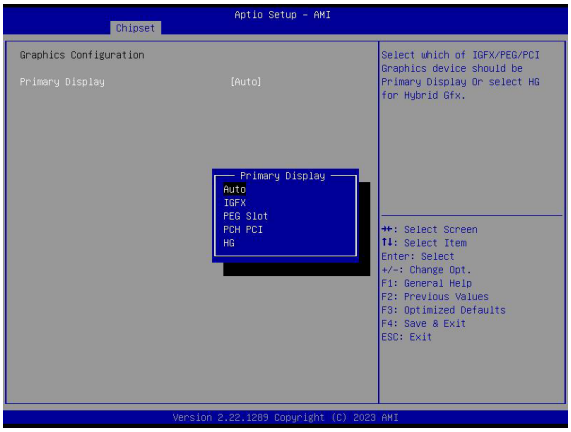
4.4 Chipset Menu

Enter the Chipset menu to configure the computer's chipset options. The chipset is the integrated circuit that connects various components on the motherboard. Settings here may involve PCIe configuration, USB configuration, hard disk controller settings, etc. Use < ↑ >< ↓ > to select and <Enter> to enter setting options. This section will introduce the Chipset setting options. The Chipset menu is shown below:



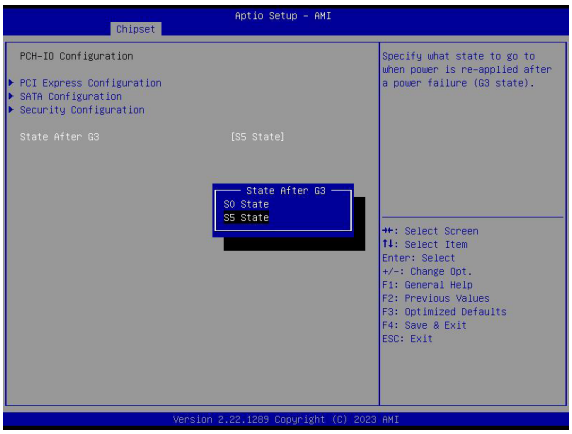
4.4.1 Display Priority

In the Chipset menu, select System Agent (SA) Configuration > Graphics Configuration > Primary Display. This sets the display priority. After setting, press F4 to save and exit; it takes effect after system restart.



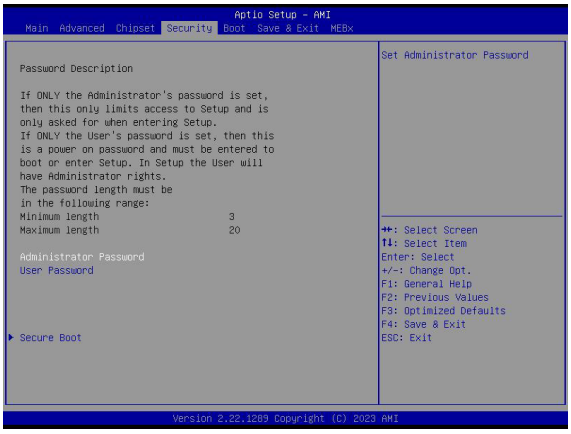
4.4.2 Power On After AC Loss

In the Chipset menu, select PCH-IO Configuration > State After G3. This can Enable or Disable powering on automatically after AC power is restored (after a power loss, G3 state). S0 State represents AT mode (auto power-on after connecting power). S5 State represents ATX mode (requires pressing Power button after connecting power). Default is S5 State. After setting, press F4 to save and exit; it takes effect after system restart.



4.5 Security Menu

Enter the Security menu to set security functions like password protection for the system. Select to enter the submenus for setting administrator and user password security protection options. Use < ↑ >< ↓ > to select and <Enter> to enter setting options. This section will introduce the Security setting options. The Security menu is shown below:



4.5.1 Administrator Password Setting

In the Security menu, select Administrator Password, press Enter. Use the keyboard to input a value containing letters, numbers, characters, etc., with a length of six or more characters, to set the administrator password. After setting, press F4 to save settings; it takes effect after system restart.

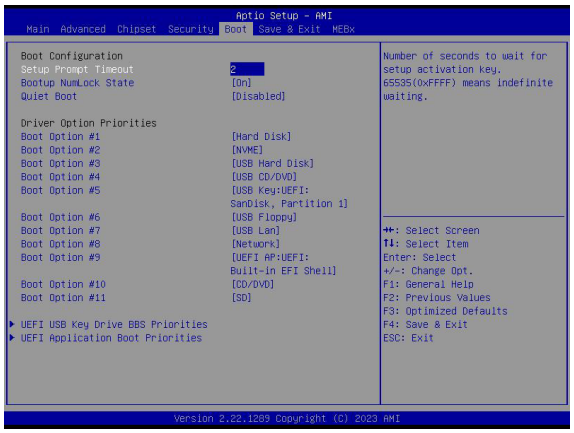
4.5.2 User Password Setting

In the Security menu, select User Password, press Enter. Use the keyboard to input a value containing letters, numbers, characters, etc., with a length of six or more characters, to set the user password. After setting, press F4 to save settings; it takes effect after system restart.

After setting the password, please remember it. Otherwise, you will be unable to enter the system due to lack of permissions, resulting in additional repair costs!

4.6 BOOT Menu

Enter the BOOT menu to set the system boot sequence, select boot options and boot interface settings. Use the < ↑ >< ↓ > keys to select and the <Enter> key to enter setting options. This section will introduce the BOOT setting options. The BOOT menu is shown below:



4.6.1 Set Num Lock Status at Boot

In the BOOT menu, select Boot Num Lock State. Choose ON/OFF to enable or disable the Num Lock key on the keyboard at boot. After setting, press F4 to save settings; it takes effect after system restart.

4.6.2 Set Boot Logo

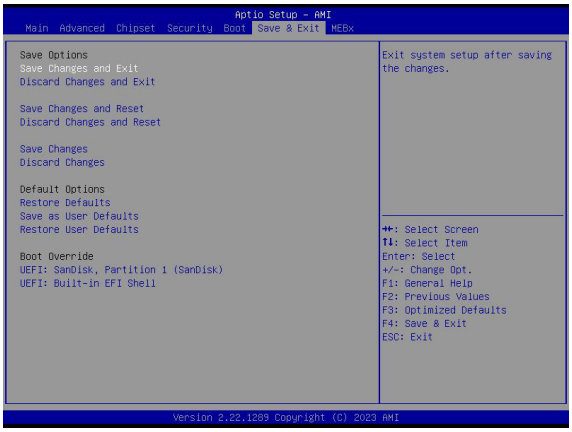
In the BOOT menu, select Quiet Boot to turn the boot logo screen on or off. Select "Enable" to have the boot logo screen, select "Disable" to turn off the boot logo screen. After setting, press F4 to save settings; it takes effect after system restart.

4.6.3 Set Boot Priority Order

In the BOOT menu, select Boot Option Priorities: This allows setting the boot device priority order. Boot Option #1 is the first priority boot item, Boot Option #2 is the second boot item, and so on. After setting, press F4 to save settings; it takes effect after system restart.

4.7 Save & Exit Menu

In the BOOT menu, select Boot Option Priorities: This allows setting the boot device priority order. Boot Option #1 is the first priority boot item, Boot Option #2 is the second boot item, and so on. After setting, press F4 to save settings; it takes effect after system restart.



4.7.1 Save Changes and Reset

In the Save & Exit menu, select Save Changes and Reset. Press F4 to save settings; the system will restart and changes take effect.

4.7.2 Discard Changes and Reset

In the Save & Exit menu, select Discard Changes and Reset. Press F4 (or follow prompt, often Enter or Y); the system will restart without saving any changes.

4.7.3 Restore Defaults

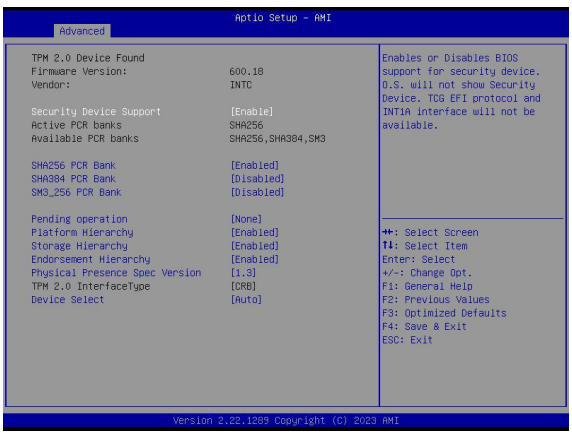
In the Save & Exit menu, select Restore Defaults. Press F4 (or follow prompt) to load BIOS default settings. The system will restart and defaults take effect.

4.7.4 Set Boot Device Priority

In the Save & Exit menu, select Boot Override (list of devices). Select a device to boot from it once without changing the permanent boot order. Press F4 (or just select the device) to initiate boot.

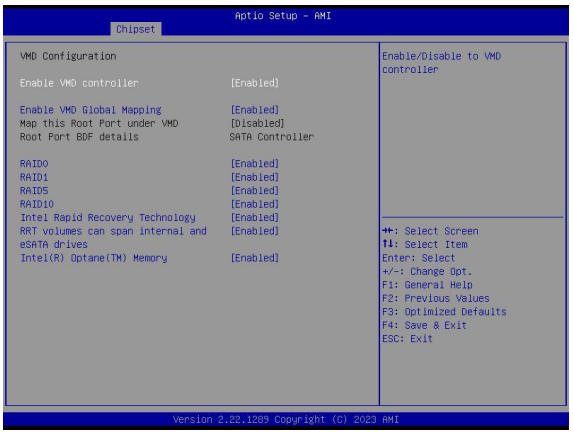
4.7.5 TPM Function Setting

In the Save & Exit menu, select Boot Override, press F4 to save settings, system restart takes effect.



4.7.6 Raid Function

In the Chipset menu, navigate to System Agent (SA) Configuration -> VMD setup menu -> Enable VMD controller. This can configure the RAID function. After setting, press F4 to save and exit; it takes effect after system restart.



Appendix 1: GPIO Routine

PIN 1 Function:

```
IoWrite8(0xA01,IoRead8(0xA01)&~BIT0); //OUTPUT
IoWrite8(0xA01,IoRead8(0xA01)|BIT0); //INPUT
IoWrite8(0xA02,IoRead8(0xA02)|BIT0); //OUTPUT HIGH
IoWrite8(0xA02,IoRead8(0xA02)&~BIT0); //OUTPUT LOW
```

PIN 2 Function:

```
IoWrite8(0xA01,IoRead8(0xA01)&~BIT1); //OUTPUT
IoWrite8(0xA01,IoRead8(0xA01)|BIT1); //INPUT
IoWrite8(0xA02,IoRead8(0xA02)|BIT1); //OUTPUT HIGH
IoWrite8(0xA02,IoRead8(0xA02)&~BIT1); //OUTPUT LOW
```

PIN 3 Function:

```
IoWrite8(0xA01,IoRead8(0xA01)&~BIT2); //OUTPUT
IoWrite8(0xA01,IoRead8(0xA01)|BIT2); //INPUT
IoWrite8(0xA02,IoRead8(0xA02)|BIT2); //OUTPUT HIGH
IoWrite8(0xA02,IoRead8(0xA02)&~BIT2); //OUTPUT LOW
```

PIN 4 Function:

```
IoWrite8(0xA01,IoRead8(0xA01)&~BIT3); //OUTPUT
IoWrite8(0xA01,IoRead8(0xA01)|BIT3); //INPUT
IoWrite8(0xA02,IoRead8(0xA02)|BIT3); //OUTPUT HIGH
IoWrite8(0xA02,IoRead8(0xA02)&~BIT3); //OUTPUT LOW
```

PIN 5 Function:

```
IoWrite8(0xA01,IoRead8(0xA01)&~BIT4); //OUTPUT
IoWrite8(0xA01,IoRead8(0xA01)|BIT4); //INPUT
IoWrite8(0xA02,IoRead8(0xA02)|BIT4); //OUTPUT HIGH
IoWrite8(0xA02,IoRead8(0xA02)&~BIT4); //OUTPUT LOW
```

PIN 6 Function:

```
IoWrite8(0xA01,IoRead8(0xA01)&~BIT5); //OUTPUT
IoWrite8(0xA01,IoRead8(0xA01)|BIT5); //INPUT
IoWrite8(0xA02,IoRead8(0xA02)|BIT5); //OUTPUT HIGH
IoWrite8(0xA02,IoRead8(0xA02)&~BIT5); //OUTPUT LOW
```

PIN 7 Function:

```
IoWrite8(0xA01,IoRead8(0xA01)&~BIT6); //OUTPUT
IoWrite8(0xA01,IoRead8(0xA01)|BIT6); //INPUT
IoWrite8(0xA02,IoRead8(0xA02)|BIT6); //OUTPUT HIGH
IoWrite8(0xA02,IoRead8(0xA02)&~BIT6); //OUTPUT LOW
```

PIN 8 Function:

```
IoWrite8(0xA01,IoRead8(0xA01)&~BIT7); //OUTPUT
IoWrite8(0xA01,IoRead8(0xA01)|BIT7); //INPUT
IoWrite8(0xA02,IoRead8(0xA02)|BIT7); //OUTPUT HIGH
IoWrite8(0xA02,IoRead8(0xA02)&~BIT7); //OUTPUT LOW
```

Appendix 2: Watchdog Routine

```
IoWrite8(0x2E,0x88);
IoWrite8(0x2E,0x88); //SIO ENTER
IoWrite8(0x2E, 0x07);     //watchdog
IoWrite8(0x2F, 0x08);

if(gWatchdogmode==0)
{
IoWrite8(0x2E, 0xF1);
IoWrite8(0x2F, 0x00); //disable watch dog
}
else if(gWatchdogmode==1)
{
IoWrite8(0x2E, 0xF0);
IoWrite8(0x2F, 0x00);
IoWrite8(0x2E, 0xF1);
IoWrite8(0x2F, gWatchdogvalue); //SEC MODE
}
else
{
   IoWrite8(0x2E, 0xF0);
   IoWrite8(0x2F, 0x08);
   IoWrite8(0x2E, 0xF1);
   IoWrite8(0x2F, gWatchdogvalue); //MIN MODE

}

IoWrite8(0X2E, 0xAA); //EXIT SIO


     }

   IoWrite8(0X2E, 0xAA); //EXIT SIO
```