

# LV-6712

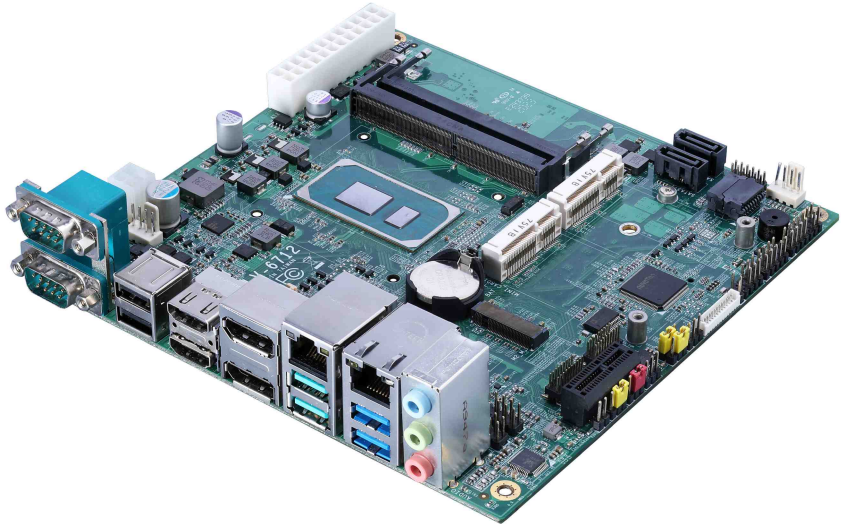
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## Mini-ITX Mobile Motherboard

### User's Manual

**Edition 1.7**

**2022/07/19**



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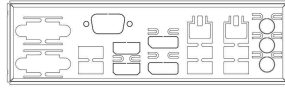
Any questions please visit our website at <http://www.commell.com.tw>

## Packing List:

Please check the package content before you starting using the board.



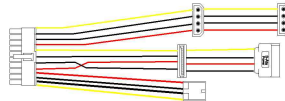
**1 x LV-6712 Mini-ITX Motherboard  
(include Cooler Fan)**



**1 x I/O Shield  
(OPLATE-CUHDLAT) / (1270077)**



**1 x DC Power Cable  
(OALDC-A) / (1040433)**



**1 x Power Cable  
(OALATX-P3S2 / 1040058)**



**2 x SATA Cable  
(OALSATA3-L) / (1040529)**

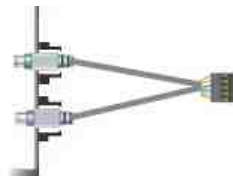


**1 x Driver CD  
(Including User's Manual)**

## OPTIONAL:



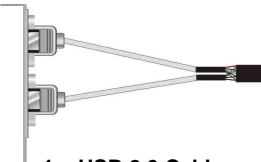
**1 x Audio cable  
(OALPJ-HD) / (1040120)**



**1 x PS/2 Keyboard & Mouse cable  
(OALPS2/KMB) / (1040610)**



**1 x Dual COM PORT Cable  
(OALES-BKU2) / (1040087)**



**1 x USB 2.0 Cable  
(OALUSBA-1) / (1040172)**

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# Chapter 1 <Introduction>

## 1.1 <Product Overview>

LP-6712 is a Mini-ITX Motherboard which supports 11th Generation Intel® Core™ U-Series processors, integrated Iris® Xe Graphics, DDR4 memory, Realtek High Definition Audio, Intel Gigabit LAN, USB3.2 Gen2, SATA3 with AHCI function for a system.

### **New feature for Tiger Lake UP3**

Tiger Lake UP3 processors are based on the 10nm process node, and offer long-life availability. They have a PCIe Gen4 for M.2 2280 slot, and new Intel Iris® Xe Graphics with up to 96 EUs.

### **All in One multimedia solution**

The board provides two MiniPCIe slot (one support mSATA), one M.2 2280 slot and PCIe x1 slot.

### **Tiger Lake support Windows10 version 2004 64bit and Linux kernel 5.8**

Intel recommends using Windows 10 version 2004 64bit. It may lose some drivers if you use other Windows version.

### **Support OpenVINO for AI Computing**

You can find more information at [Intel website](#)

## 1.2 <Product Specification>

### System

Processor	Intel® Tiger Lake UP3 Processor FCBGA1449 package
Memory	2 x DDR4 SO-DIMM 3200 MHz up to 64GB, Support Non-ECC, unbuffered memory
Watchdog Timer	Generates a system reset with internal timer for 1min/s ~ 255min/s
Real Time Clock	Chipset integrated RTC with onboard lithium battery
Expansion	2 x MiniPCIe ( Minicard 2 support mSATA) (Note1) 1 x M.2 (Key M 2280) Slot support PCIe Gen4 1 x PCIe x1 Slot

### Graphics

Chipset	Intel® Iris® Xe Graphics (Note2)
Display Interface	2 x DisplayPort, 2 x HDMI

### LAN

Chip	1 x Intel® I219-LM Gigabit PHY LAN (Support iAMT 15.0) 1 x Intel® I225-LM Gigabit LAN (up to 2.5GbE)
------	---

### I/O

Serial ATA	2 x SATA3
Audio	Realtek ALC262 HD Audio
Internal I/O	2 x SATA3, 4 x RS232, 2 x USB2.0, 1 x GPIO , 1 x PS/2, 1 x SMBus, 1 x Audio, 1 x LVDS (Note2), 1 x LCD inverter connector
Rear I/O	4 x USB3.2 Gen2 , 2 x USB2.0, 2 x LAN, 2 x RS232/422/485, 1 x Audio, 2 x HDMI, 2 x DisplayPort

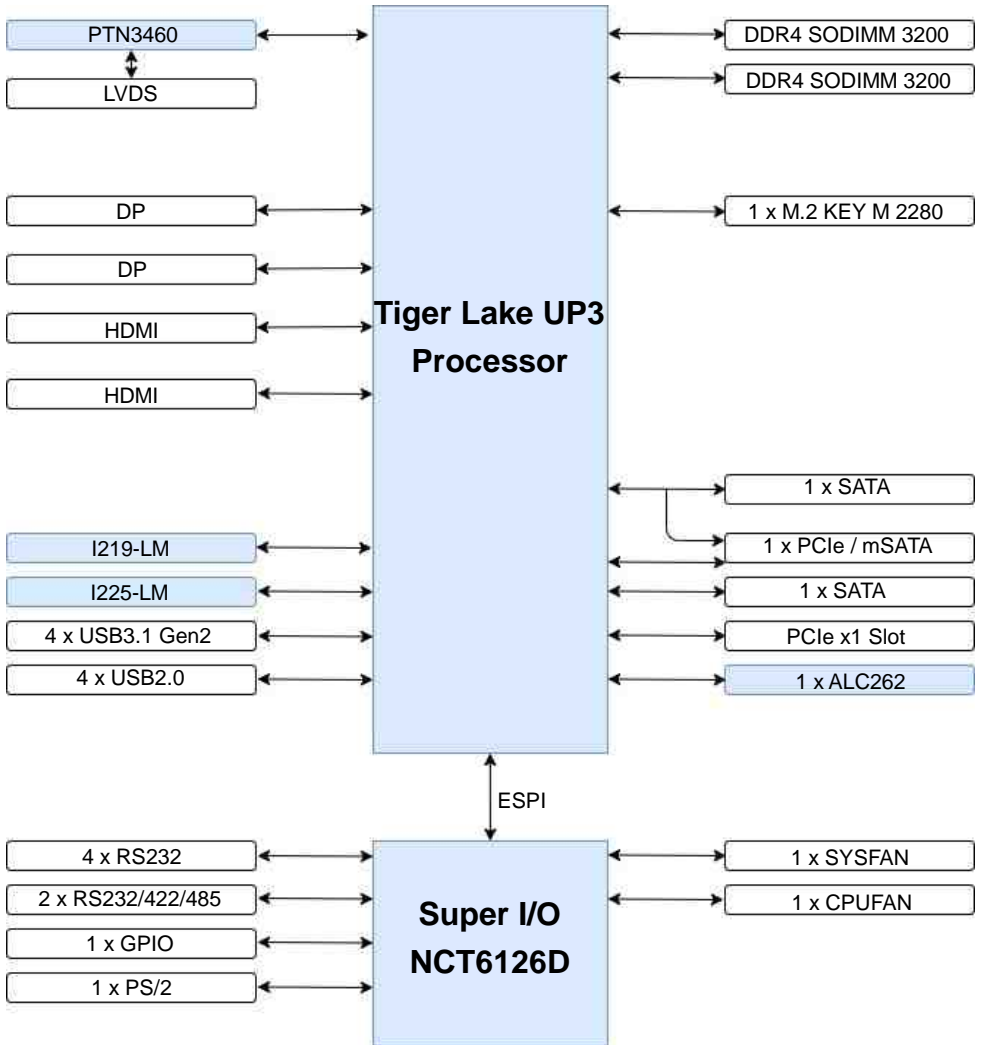
### Mechanical & Environmental

Power Requirement	Standard 24-pin ATX power supply, or 4-pin DC 9~35V
Size	170mm x 170mm (L x W)
Temperature	Operating within 0°C~60°C (32°F~140°F) Storage within -20°C~80°C (-4°F~176°F)
Relative Humidity	10%~90%, non-condensing

Note1: mSATA and SATA3-2 can't use at the same time

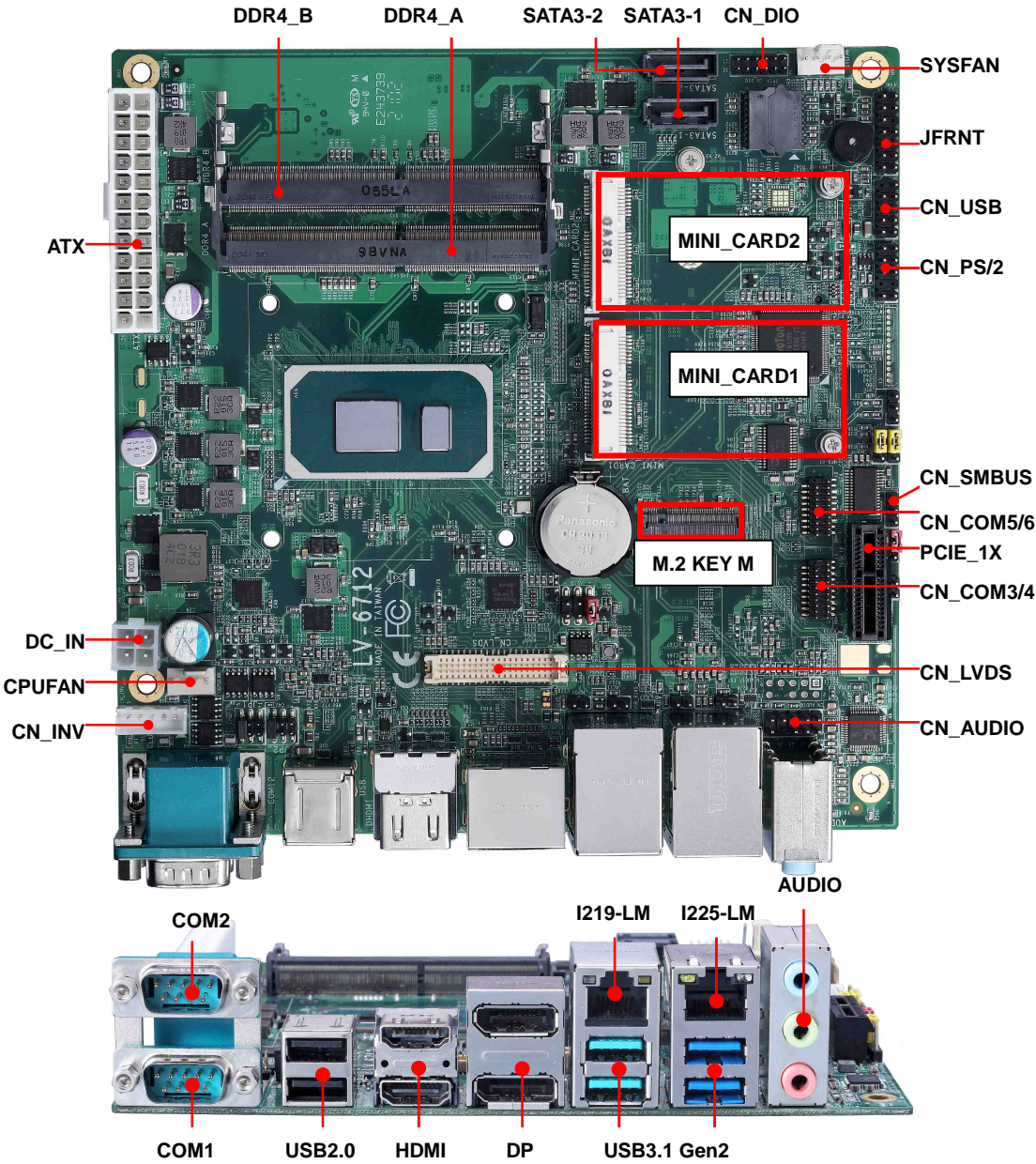
Note2: Intel Iris Xe Graphics has to install two memory cards. The Chipset in i3-1115GRE, i3-1115G4E, Celeron® 6305E are Intel® UHD Graphics.

# 1.3 <Block Diagram>



# Chapter 2 <Hardware setup>

## 2.1 <Connector Location and Reference>





## 2.1.1 <Internal connectors list>

Connector	Function
DDR4_A/B	260-pin DDR4 SO-DIMM slot
SATA3-1/2	7-pin SATA3 connector
CN_AUDIO	5 x 2-pin audio pin header
CN_LVDS	20 x 2-pin LVDS connector
CN_INV	5-pin LCD inverter connector
CN_SMBUS	3-pin SMBus connector
CN_COM 3/4/5/6	20-pin RS232 connector
CN_USB	5 x 2-pin USB2.0 pin header
CN_PS2	5 x 2-pin PS/2 pin header
CN_DIO	6 x 2-pin digital I/O connector
CPUFAN	4-pin CPU fan connector
SYSFAN	4-pin system fan connector
JFRNT	14-pin front panel switch/indicator connector
PCIE_1X	36-pin x1 PCIE slot
MINI_CARD1	52-pin MiniPCle card slot
MINI_CARD2	52-pin MiniPCle card slot (Support mSATA)
M2_M	75-pin M.2 Key M 2280 slot (Support PCle Gen4)
ATX	24-pin power supply connector
DC_IN	4-pin power input Terminal Block

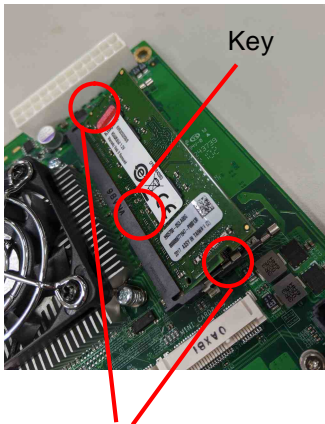
## 2.1.2 <External connectors list>

Connector	Function
DDP	Dual DisplayPort connector
DHDMI	Dual HDMI connector
USB_RJ45_1	USB3.2 Gen2 and RJ45 connector (i219-LM)
USB_RJ45_2	USB3.2 Gen2 and RJ45 connector (i225-LM)
USB	USB2.0 connector
AUDIO	Audio connector
COM12	DB9 Serial port connector

## 2.2 <Memory Setup>

**In the process, the board must be powered off.**

1. Put the memory tilt into the slot. Note the Memory notch key aligned slot key.
2. Then press down till lock into the mounting notch.

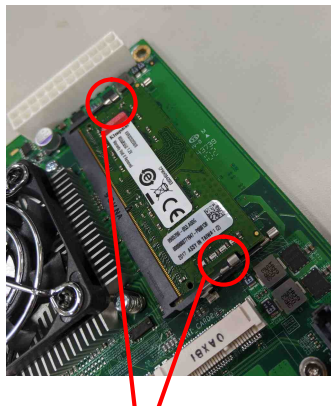


→  
Press down



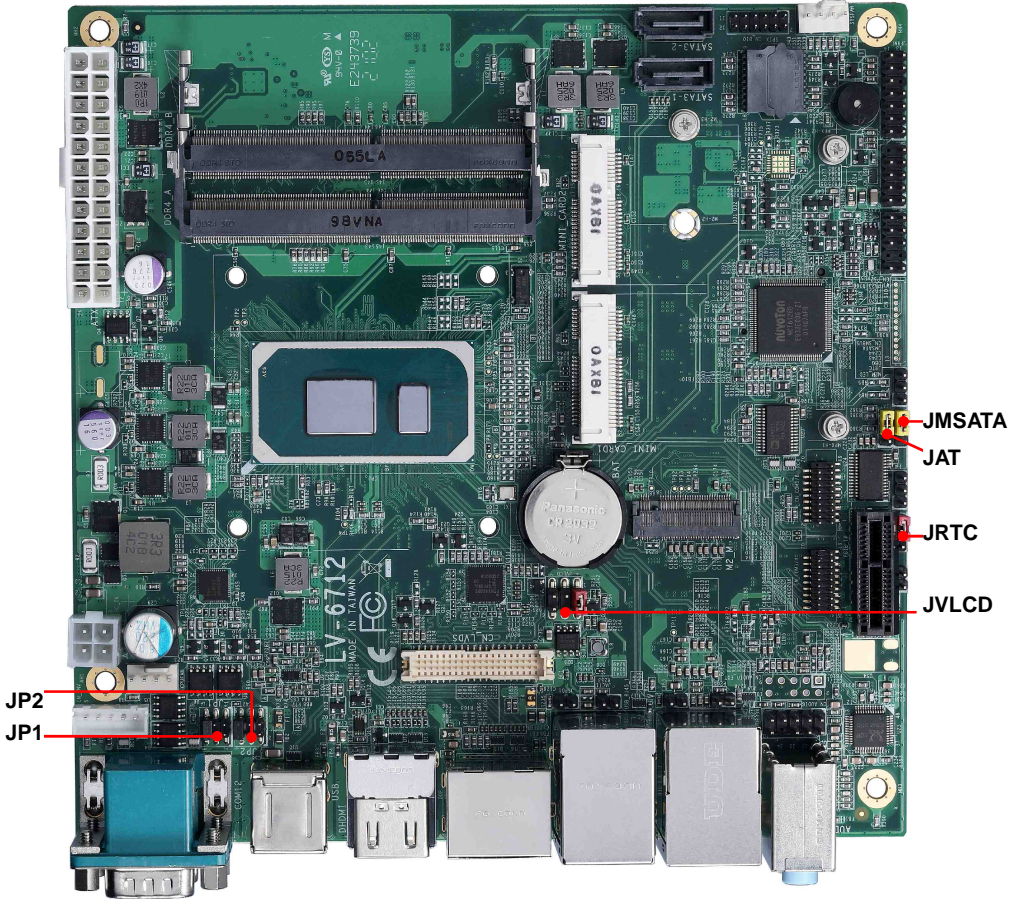
Mounting notch

3. To remove the memory, push outward on both sides of the latch.



Latch

## 2.3 <Jumper Location and Reference>



### 2.3.1 <Jumper list>

Jumper	Function
JAT	Power mode select
JRTC	CMOS Normal/Clear Setting
JVLCD	Panel Voltage Setting
JMSATA	MiniCard mSATA Setting
JP1	COM1 Voltage Setting (For Pin 9)
JP2	COM2 Voltage Setting (For Pin 9)

### 2.3.2 <Clear CMOS and Power on type selection>

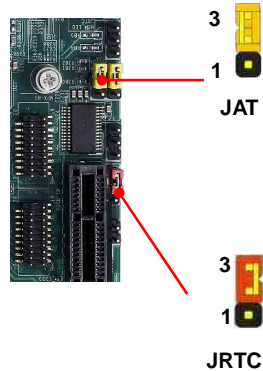
The board's data of CMOS can be setting in BIOS. If the board refuses to boot due to inappropriate CMOS settings, here is how to proceed to clear (reset) the CMOS to its default values.

**JAT:** AT/ATX mode select jumper

Jumper settings	Function
1-2	AT mode
2-3	ATX mode (Default)

**JRTC:** Clear CMOS data jumper

Jumper settings	Function
1-2	Clear CMOS
2-3	Normal (Default)

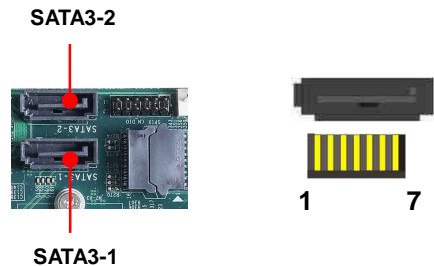


## 2.4 <I/O interface>

### 2.4.1 <Serial ATA interface>

**SATA 1/2:** SATA3 7-pin connector

Pin	Signal
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

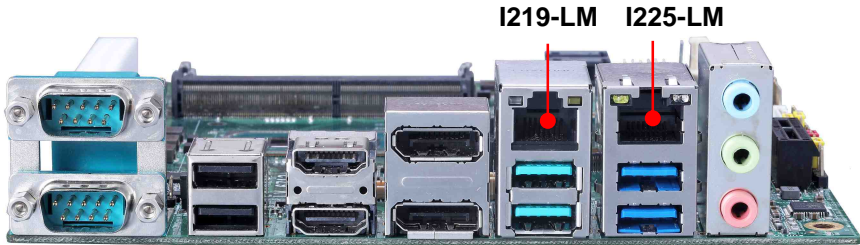


mSATA and SATA3-2 can't use at the same time

## 2.4.2 <Ethernet interface>

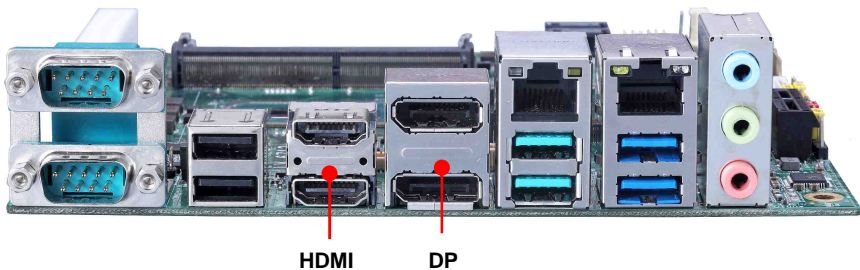
The board provides I219-LM and I225-LM Gigabit Ethernet which supports WOL on rear I/O. It supports Intel® AMT 15.0 feature on I219-LM.

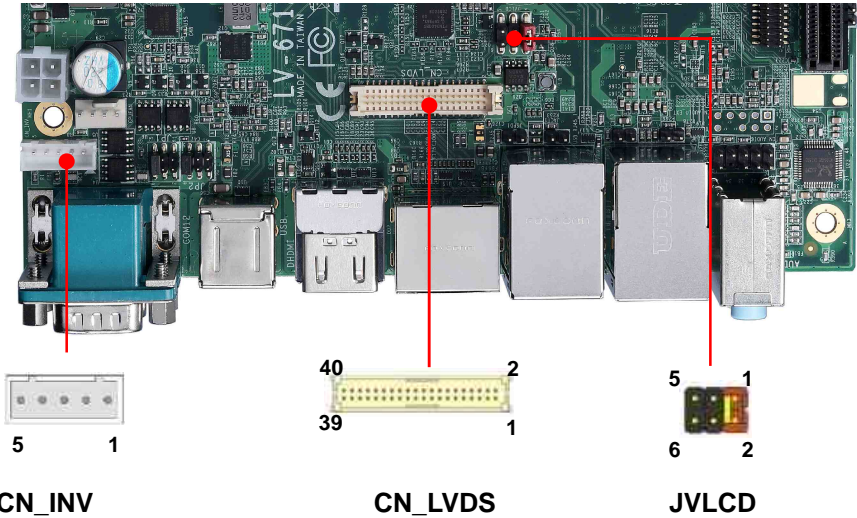
(Note that the CPU must support vPro technology.)



## 2.4.3 <Display interface>

Based on the 11th Gen CPU with built-in Intel® Iris® Xe Graphics, the DisplayPort resolution up to 3840x2160 @ 60Hz or 4096x2304 @ 60Hz, the HDMI up to 4096x2304 @ 24Hz and LVDS up to 1920x1200 @ 60Hz supports single bus or dual bus LVDS signaling with color depths of 18 bits or 24 bits. About select LCD Panel Type in BIOS, please refer [Appendix B](#). The built-in HD Graphics support Quad display function with clone mode and extended mode.





**CN\_LVDS**: LVDS 40-pin connector (Model: HIROSE DF13-40DP-1.25V compatible)

Pin	Signal	Pin	Signal
2	Set by JVLCD	1	Set by JVLCD
4	Detect (Active low)	3	GND
6	A_LVDS_0-	5	B_LVDS_0-
8	A_LVDS_0+	7	B_LVDS_0+
10	GND	9	GND
12	A_LVDS_1-	11	B_LVDS_1-
14	A_LVDS_1+	13	B_LVDS_1+
16	GND	15	GND
18	A_LVDS_2-	17	B_LVDS_2-
20	A_LVDS_2+	19	B_LVDS_2+
22	GND	21	GND
24	A_LVDS_CLK-	23	B_LVDS_3-
26	A_LVDS_CLK+	25	B_LVDS_3+
28	GND	27	GND
30	A_LVDS_3-	29	B_LVDS_CLK-
32	A_LVDS_3+	31	B_LVDS_CLK+
34	GND	33	GND
36	LVDS_DDCSCL	35	NC
38	LVDS_DDCSDA	37	NC
40	NC	39	NC

**Pin4 only need to be connected to GND**



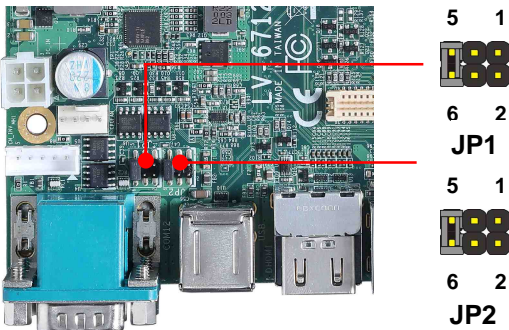
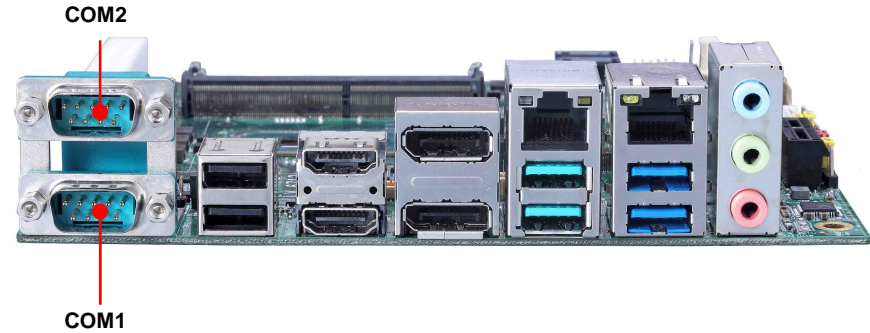
**CN\_INV:** LVDS 5-pin Backlight power connector

Pin	Signal
1	12V
2	Backlight Control
3	GND
4	GND
5	Enable Backlight

**JVLCD:** LVDS panel power select jumper

Jumper settings	Function
1-2	3.3V (Default)
3-4	5V
5-6	12V

### 2.4.4 <Serial Port interface>



**COM1:** RS232/422/485 DB9 connector

Pin	Signal	Pin	Signal
1	DCD/ 422TX-/ 485-	2	RXD/ 422TX+/ 485+
3	TXD	4	DTR
5	GND	6	DSR/ 422RX+
7	RTS	8	CTS/ 422RX-
9	Set by JP1		

**COM2:** RS232/422/485 DB9 connector

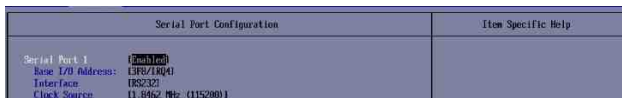
Pin	Signal	Pin	Signal
1	DCD/ 422TX-/ 485-	2	RXD/ 422TX+/ 485+
3	TXD	4	DTR
5	GND	6	DSR/ 422RX+
7	RTS	8	CTS/ 422RX-
9	Set by JP2		

**COM1 & COM2**

RS-232/422/485 can set by BIOS.

You can find the setting from

Advanced-> Motherboard Advanced menu-> Super IO configuration-> Serial Port configuration->Interface



**If you want to use RS485, please follow below step before connection. .**

- COM1 RTX- Data- : short Pin1& Pin8
- COM1 RTX+ Data+ : short Pin2& Pin6
- COM2 RTX- Data-: short Pin1& Pin8
- COM2 RTX+ Data+: short Pin2& Pin6

**JP1, JP2:** COM1, COM2 pin-9 setting

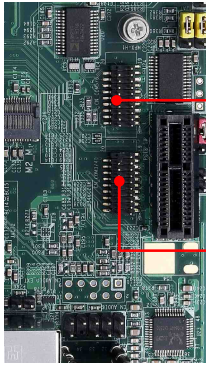
Jumper settings	Function
1-2	5V
3-4	12V
5-6	RI (Default)

Effective patterns of connection:

1-2 / 3-4 / 5-6

Other may cause damage



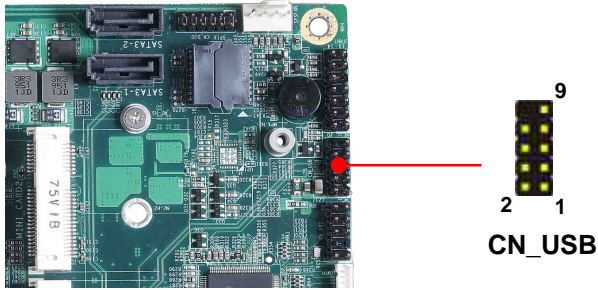
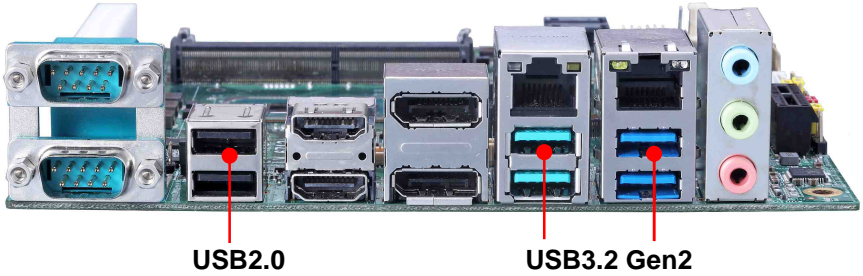

**COM3/4:** COM 20-pin header (Pitch 2.54 x 1.27mm)

Pin	Signal	Pin	Signal
1	DCD1	2	RXD1
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	RI1	10	NC
11	DCD2	12	RXD2
13	TXD2	14	DTR2
15	GND	16	DSR2
17	RTS2	18	CTS2
19	RI2	20	Key

**COM5/6:** COM 20-pin header (Pitch 2.54 x 1.27mm)

Pin	Signal	Pin	Signal
1	DCD1	2	RXD1
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	RI1	10	NC
11	DCD2	12	RXD2
13	TXD2	14	DTR2
15	GND	16	DSR2
17	RTS2	18	CTS2
19	RI2	20	Key

## 2.4.5 <USB interface>



**CN\_USB:** USB2.0 10-pin header (Pitch 2.54 mm)

Pin	Signal	Pin	Signal
1	5VSB	2	5VSB
3	DATA0-	4	DATA1-
5	DATA0+	6	DATA1+
7	GND	8	GND
9	GND	10	Key

## 2.4.6 <Audio interface>

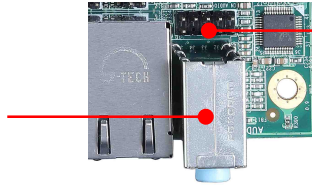
### Rear Audio Jack



Line in

Line out

Mic in



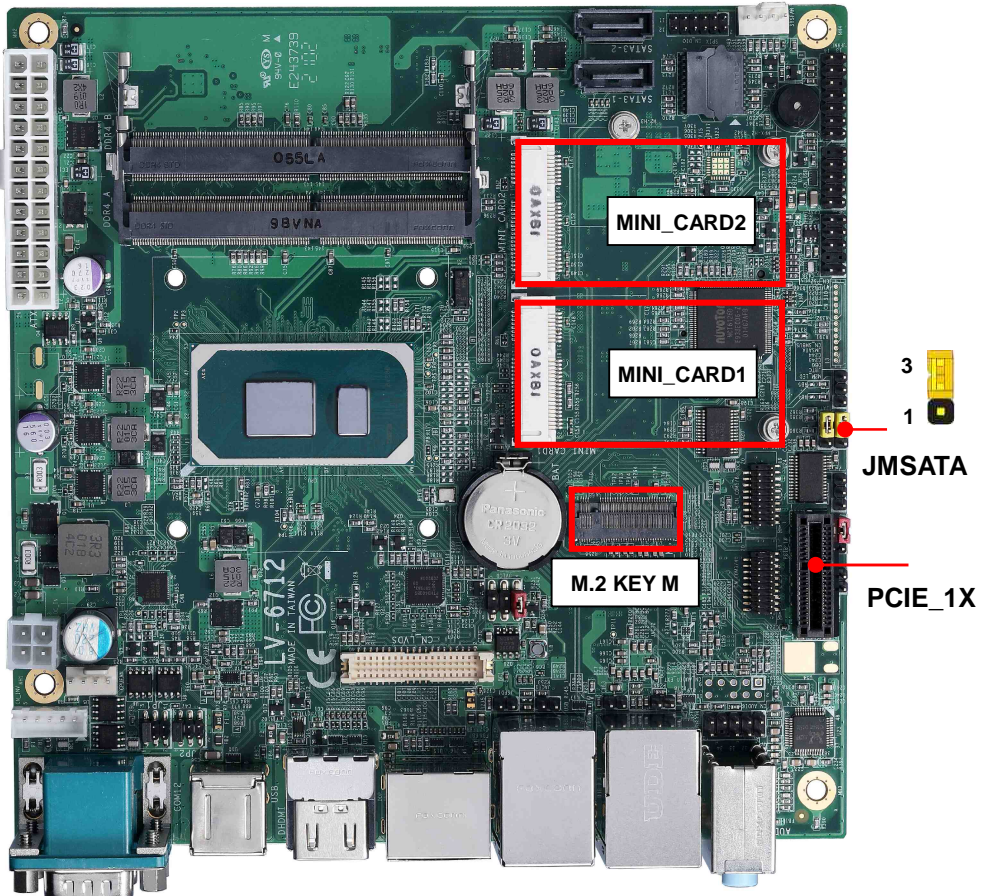
10 2

CN\_AUDIO

**CN\_AUDIO:** Front panel audio 10-pin header (Pitch 2.54mm)

Pin	Signal	Pin	Signal
1	MIC_L	2	GND
3	MIC_R	4	NC
5	FP_OUT_R	6	MIC_DETECT
7	SENSE	8	Key
9	FP_OUT_L	10	FP_OUT_DETECT

## 2.4.7 <Expansion slot>



MINI\_CARD2 support mSATA by JMSATA

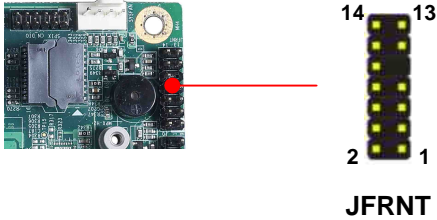
**JMSATA:** Setting MINI\_CARD to support PCIe/mSATA

Jumper settings	Function
1-2	Support mSATA
2-3	Normal operation (Default)

mSATA and SATA3-2 can't use at the same time

Please notice the space limitation for install M.2 heatsink if using M.2 NVMe SSD and MiniPCIe simultaneously.

## 2.4.8 <Front panel switch and indicator>

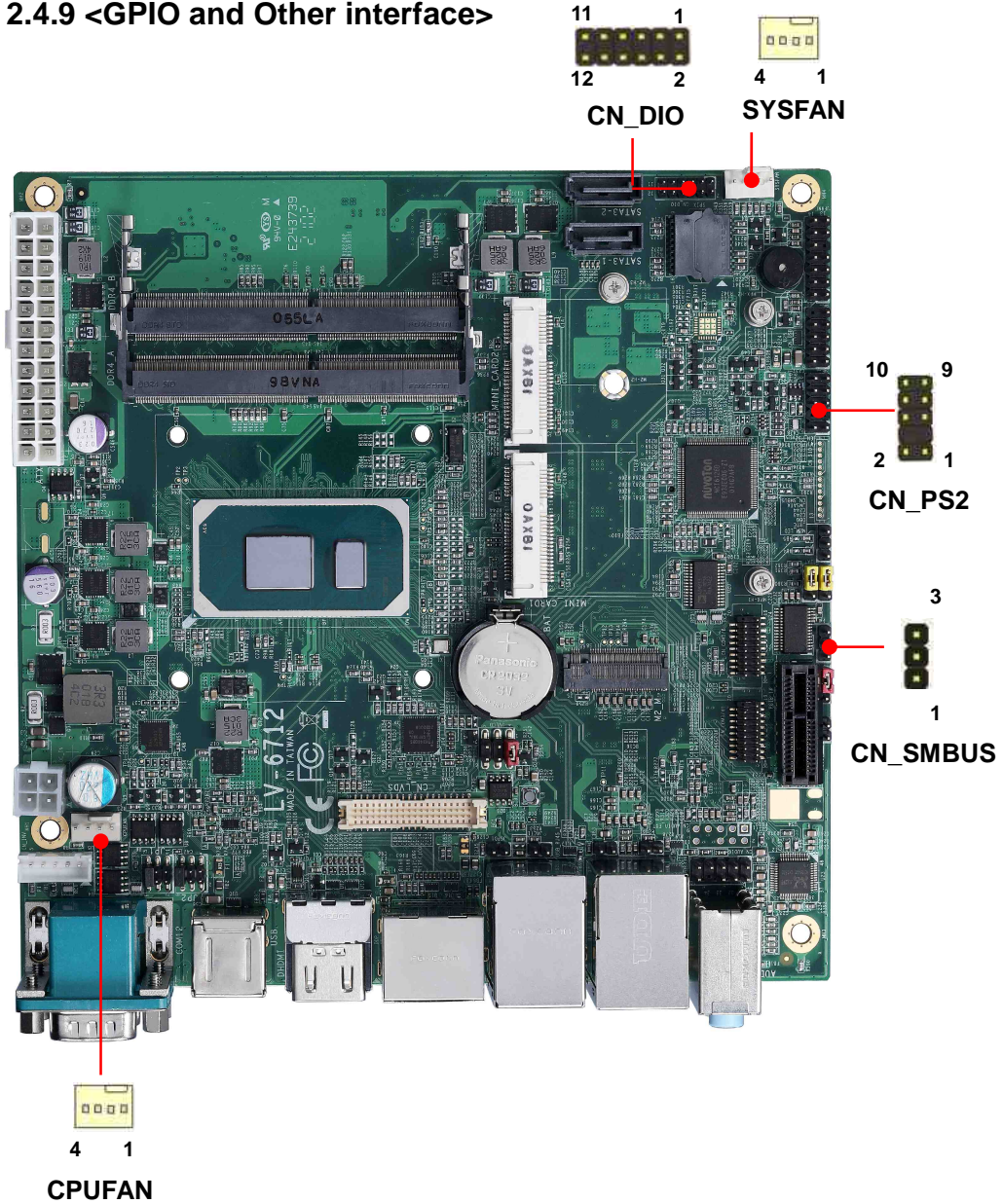


**JFRNT:** Front panel switch and indicator 14-pin header (Pitch 2.54mm)

Pin	Signal	Pin	Signal
1	HDD_LED+	2	Power_LED+
3	HDD_LED-	4	NC
5	Reset+	6	Power_LED-
7	Reset-	8	Speaker+
9	Key	10	NC
11	Power_ON+	12	NC
13	Power_ON-	14	Speaker-



### 2.4.9 <GPIO and Other interface>



When using GPIO function, please note:

As Output: **Open-drain**, most applications need use an external pull up resistor.

(If not may cause damage)

As Input: **TTL-level**.

### GPIO DC characteristics (open drain mode)

Parameter	SYM	MIN	TYP	MAX	UNIT	Conditions
Input Low Voltage	V <sub>IL</sub>			0.8	V	
Input High Voltage	V <sub>IH</sub>	2.0			V	
Output Low Voltage	V <sub>OL</sub>			0.4	V	I <sub>OL</sub> =12mA
Input High Leakage	I <sub>LIH</sub>			+10	μA	V <sub>IN</sub> =3.3V
Input Low Leakage	I <sub>LIL</sub>			-10	μA	V <sub>IN</sub> =0V

Please refer to [Appendix E](#) to program the configuration register

### CN\_DIO: GPIO 12-pin header (Pitch 2.00mm)

Pin	Signal	Pin	Signal
1	GND	2	GND
3	GP40	4	GP44
5	GP41	6	GP45
7	GP42	8	GP46
9	GP43	10	GP47
11	5V	12	12V

### CN\_PS2: PS/2 10-pin header (Pitch 2.54mm)

Pin	Signal	Pin	Signal
1	KB_DATA	2	M_DATA
3	NC	4	NC
5	GND	6	GND
7	VCC	8	VCC
9	KB_CLK	10	M_CLK

### CN\_SMBUS: SMBus 3-pin connector (Pitch 2.54mm)

Pin	1	2	3
Signal	SMBCLK	GND	SMBDAT

**CPUFAN:** CPU cooler fan 4-pin connector

Pin	1	2	3	4
Signal	GND	12V	Sensor	Control

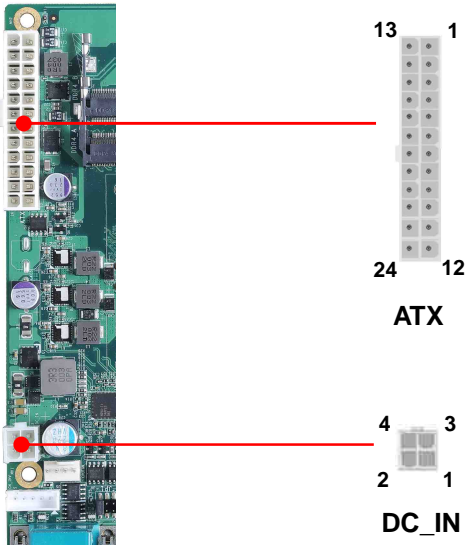
**SYSFAN:** System cooler fan 4-pin connector

Pin	1	2	3	4
Signal	GND	12V	Sensor	Control



## 2.5 <Power supply>

### 2.5.1 <Power input>



**DC\_IN:** 4-pin 9~35V connector

Pin	Signal	Pin	Signal
1	GND	2	GND
3	9~35V	4	9~35V

**ATX:** main power 24-pin connector (**DC\_IN and ATX can't use at the same time**)

Pin	Signal	Pin	Signal
1	3.3V	13	3.3V
2	3.3V	14	NC
3	GND	15	GND
4	5V	16	-PSON
5	GND	17	GND
6	5V	18	GND
7	GND	19	GND
8	Power_OK	20	NC
9	5VSB	21	5V
10	12V	22	5V
11	12V	23	5V
12	3.3V	24	GND

## 2.5.2 <Power Output>

It is supply to the HDD, CD-ROM or other device.

**If using DC\_IN as input, that ATX will be the output.**

**ATX:** main power 24-pin connector (As output)

Pin	Signal	Pin	Signal
1	3.3V	13	3.3V
2	3.3V	14	
3	GND	15	GND
4	5V	16	
5	GND	17	GND
6	5V	18	GND
7	GND	19	GND
8		20	
9		21	5V
10	12V	22	5V
11	12V	23	5V
12	3.3V	24	GND

# Appendix A <Flash BIOS>

## A.1 <Flash tool>

The board is based on Phoenix BIOS and can be updated easily by the BIOS auto flash tool. You can download the tool online at the address below:

[FPT Tool](#)

The tool's file name is "FPT.exe", it's the utility that can write the data into the BIOS flash chip and update the BIOS.

## A.2 <Flash BIOS process>

1. Extract the zip file(re-flash tool and BIOS file) to root of the USB flash drive.
2. Insert your USB flash drive in USB port of the board and power on the system.
3. Press F5 in the Phoenix Logo screen
4. Click the Internal Shell, then input the "fs0:" command to switch to the root of the USB flash drive.
5. Type the " fpt -savemac -f xxx.bin" command to start flash BIOS processes. ( xxx.bin means the BIOS file that you want to update)
6. When it finished all update processes, restart the system.

```

BIOS Interaction Shell v2.2
SYS: 11
BIOS v2.70 (Phoenix Technologies Ltd., 0x12345670)
Mapping table
FS0: 011ms(6) /HD(0x65535a1):BLK2:
    P:Root(0x0) /P:1(0xL,0x0) /Sata(0x2,0xFFFF,0x0) /HD(1,0DT,955F6B01 1EE4 436E 9CF4 31CDB90E39F,0x80,0x10000)
BLK0: 011ms(6)
    P:Root(0x0) /P:1(0xL,0x0) /Sata(0x1,0xFFFF,0x0)
BLK1: 011ms(6)
    P:Root(0x0) /P:1(0xL,0x0) /Sata(0x2,0xFFFF,0x0)
BLK2: 011ms(6)
    P:Root(0x0) /P:1(0xL,0x0) /Sata(0x2,0xFFFF,0x0) /HD(2,5ET,47E45D01 0006 4F3F 100E 130E100C088,0x100000,0x763F000)
Press ESC in 2 seconds to skip startup menu or any other key to continue.
Shell)
Shell)
Shell) fs0:
FS0-> fpt -savemac -f 671210_bin_
    
```

## Appendix B <LCD Panel Type select>

According to your panel, it needs to select the correct resolution in the BIOS. If there is no fit for your panel type, please feedback for us to make an OEM model.

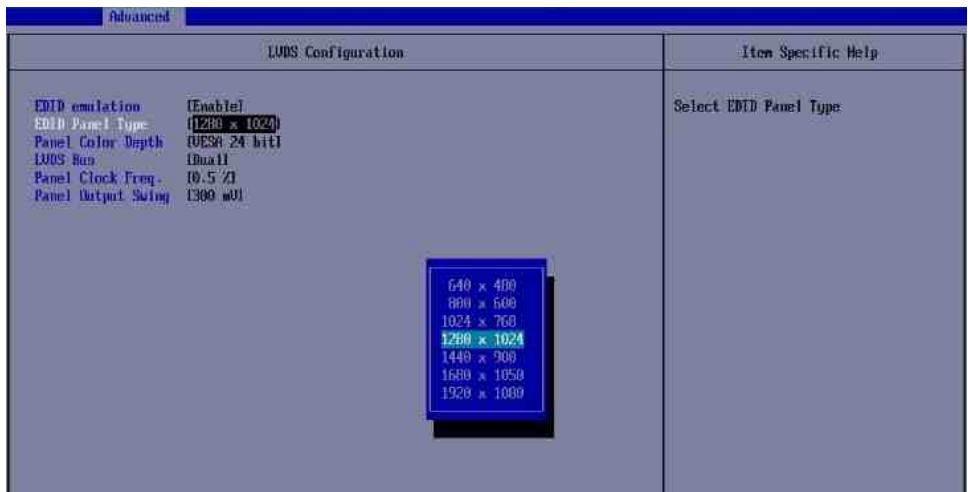
Find the setting from

Advanced->Motherboard Advanced menu->LVDS Configuration

**EDID Panel type:** There are 7 resolutions in LCD Panel Type, if your panel is not in the list, please contact [tech@commell.com.tw](mailto:tech@commell.com.tw)

**LVDS Bus:** Select Single / Dual channel

**Panel Color Depth:** Select VESA 24 bit / JEIDA 24 bit / VESA and JEIDA 18 bit



## Appendix C <Programmable Watch Dog Timer>

The watchdog timer makes the system auto-reset while it stops to work for a period. The integrated watchdog timer can be setup as system reset mode by program. You can select Timer setting in the BIOS, after setting the time options, the system will reset according to the period of your selection.

Find the setting from

Advanced → Motherboard Advanced Menu → Power Advanced menu →

Watch dog timer select



## Program sample

Watchdog timer setup as system reset with 5 second of timeout

```
-o 4E 87      ;enter configuration
-o 4E 87
-o 4E 07
-o 4F 08      ;select Logical Device
-o 4E 30
-o 4F 01      ; activate WDTO# function
-o 4E F0
-o 4F 00      ;set "00" is second mode, set "08" is minute mode
-o 4E F1
-o 4F 05      ;00h: Timeout Disable
                ;01h: Timeout occurs after 1 minute only
                ;02h: Timeout occurs after 2 second/minute
                ;03h: Timeout occurs after 3 second/minute
                ;
                ;FFh: Timeout occurs after 255 second/minute
                (The deviation is approx 1 second.)
```

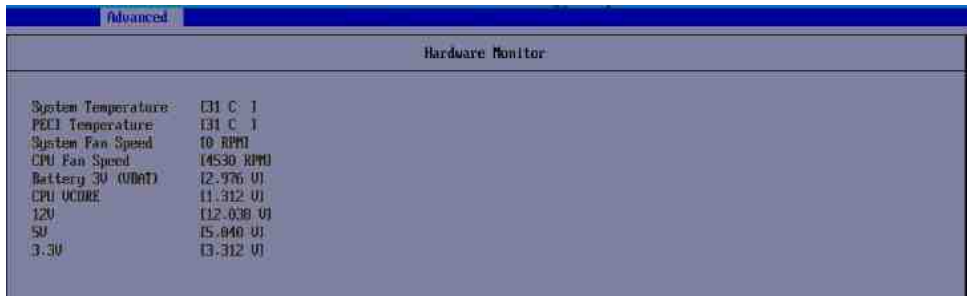
For further information, please refer to Nuvoton NCT6126D datasheet

## Appendix D <Hardware Monitor>

Find the setting from

Advanced-> Motherboard Advanced menu-> Super IO configuration->

└ Hardware Monitor



The screenshot shows the 'Hardware Monitor' screen within the BIOS. The title bar at the top is blue with the word 'Advanced' in white. Below the title bar, the text 'Hardware Monitor' is centered. The main area contains a list of hardware status items with their current values and units.

System Temperature	E31 C 1
PECI Temperature	E31 C 1
System Fan Speed	10 RPM
CPU Fan Speed	14530 RPM
Battery SV (VBAT)	12.976 V
CPU VCCORE	11.312 V
12V	12.038 V
5V	5.040 V
3.3V	3.312 V

## Appendix E <Programmable GPIO>

The GPIO can be programmed with the MS-DOS debug program using simple IN/OUT commands.

GPIO	0	1	2	3	4	5	6	7
bit	0	1	2	3	4	5	6	7

- o 4E 87 ;enter configuration
- o 4E 87
- o 4E 07
- o 4F 07 ;select Logical Device
- o 4E 30
- o 4F 10 ;activate GPIO function (The board use GPIO4)
- o 4E F0
- o 4F XX ;set "01" GPIO as input, set "00" GPIO as output
- o 4E F1
- o 4F XX ;if set GPIO as output, this register's value can be set "00~ FF"

### Optional

- o 4E F2
- o 4F XX ;set "01", the respective bit are inverted (Both input and output)
- ;set "00", the respective bit are normal

For further information, please refer to Nuvoton NCT6126D datasheet



## Appendix F <RAID Setting>

When use RAID function, it need to enter the BIOS set RAID mode first.

Advanced  $\cup$  Intel Advanced menu  $\cup$  SA Configuration  $\cup$  VMD Configuraion  $\cup$

1. Find VMD controller, and set to enable
2. Set "Map this Root port under VMD" to enable.
3. Set "Intel Optane memory to disabled
4. Press F10 to save.
5. In Misc page, you can find Intel® Rapid Storage Technology,
6. You can see "Create RAID Volume", then choose two disks to create.



## Contact information

Any advice or comment about our products and service, or anything we can help you please don't hesitate to contact with us. We will do our best to support you for your products, projects and business.

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