

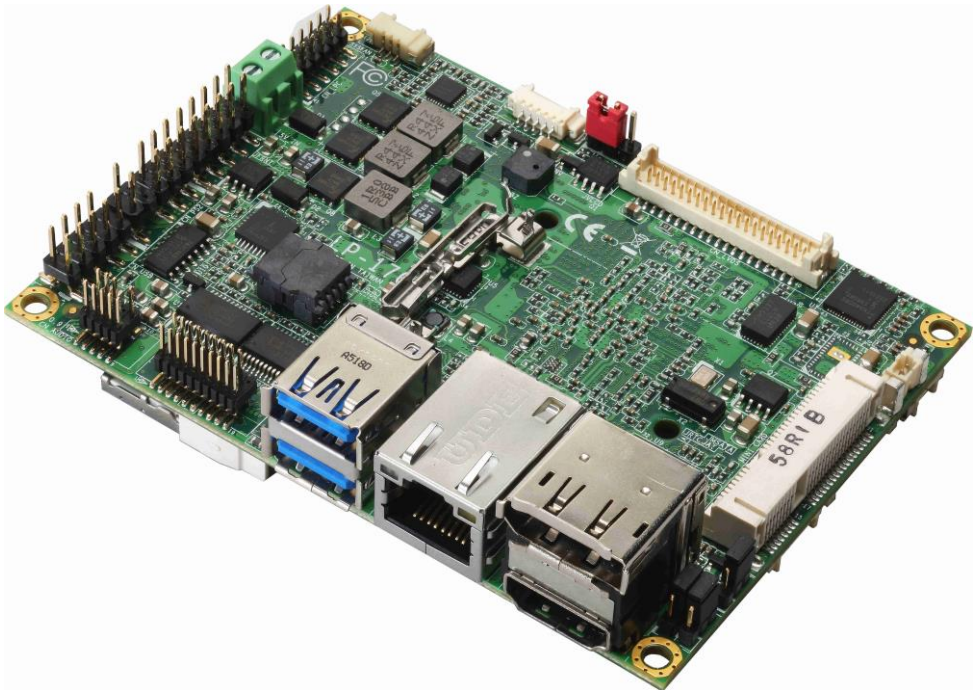
# LP-176

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## Pico-ITX Motherboard

### User's Manual

Edition 1.7  
2018/09/18



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## Packing List:

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



1 x LP-176 Motherboard



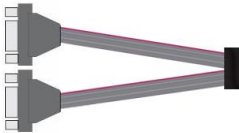
1 x SATA Cable  
(OALSATA22B-PM15SH15) / (1040512)



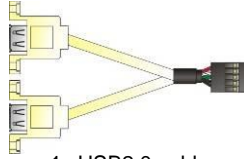
1 xDC Input Power Cable  
(OALDC-B / 1040513)



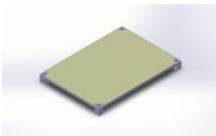
1 x PS/2 Keyboard & Mouse cable  
(OALPS2/KM / 1040131)



1 x Dual COM cable  
(OALES-BKU2NB / 1040090)



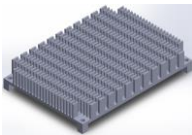
1 xUSB2.0 cable  
(OALUSBA-3 / 1040173)



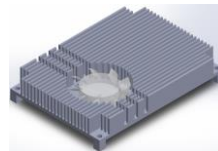
1 x Heat spreader  
(OHS-176 / 2181110015)



1 x Audio cable  
(OALPJ-HDUNB / 1040123)



1 x Heatsink **(Optional)**  
(OHS-176-01 / 2181110026)



1 x Cooler fan **(Optional)**  
(OHSF-176 / 2181010025)



1 x Driver CD  
(Including User's Manual)



1 x DDR3L SO-DIMM **(Optional)**  
(DSDM4GB-DDR3L-1600-SO-1.35V / 1140091)  
(DSDM8GB-DDR3L-1600-SO-1.35V / 1140092)

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# Chapter 1 <Introduction>

## 1.1 <Product Overview>

**LP-176** is pico Motherboard which is design based on Intel® Pentium® Processor N3000 Series Processor (Braswell SoC), delivering outstanding compute, graphical, and media performance while operating in an extended range of thermal conditions. The SoC bases on the Silvermont microarchitecture, utilizing Intel's industry-leading 14nm process technology with 3-D Tri-Gate transistors, which deliver significant improvements in computational performance and energy efficiency.

### **New features**

The Intel® Pentium® N3000 Series Processor and Atom™ x5 Processor Series have a lower TDP 6W, it provides new HD Graphics to support triple display, 4K resolution, maximum memory size is up to 8GB of DDR3L, and more enhanced security that is suitable for a variety of intelligent systems the ideal choice.

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

The board provides high performance onboard graphics, 18/24-bit single/dual channel LVDS interface, DisplayPort, HDMI, and High Definition Audio, to meet the very requirement of the multimedia application.

### **Flexible Expansion Interface**

The board provides one MiniPCIe and support mSATA.

### **Braswell remove EHCI, all USB ports are xHCI**

When you install Windows7 with USB device(CDROM, Keyboard, Mouse...), Windows7 can not identify your usb device. You can use SATA CD-ROM and PS/2 to install Windows7.

## 1.2 <Product Specification>

### System

Processor	Intel® Braswell Series Processor N3710/X5-E8000, FCBGA1170 package
Chipset	Braswell SoC
Memory	1 x DDR3L DIMM 1600 MHz up to 8GB, Support Non-ECC, unbuffered memory only
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	1 x MiniPCle (support mSATA)

### Graphics

Chipset	Intel® HD Graphics
Display Interface	1 x LVDS, 1 x HDMI, 1 x DisplayPort/VGA(Optional)

### LAN

Chip	1 x Intel® I210-AT Gigabit LAN
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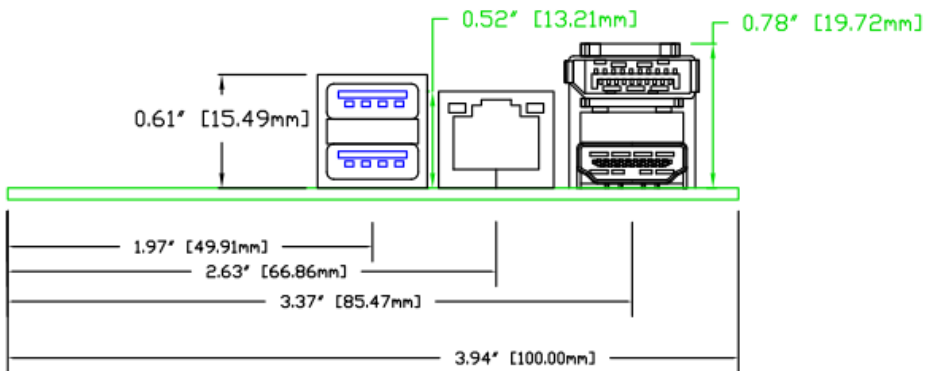
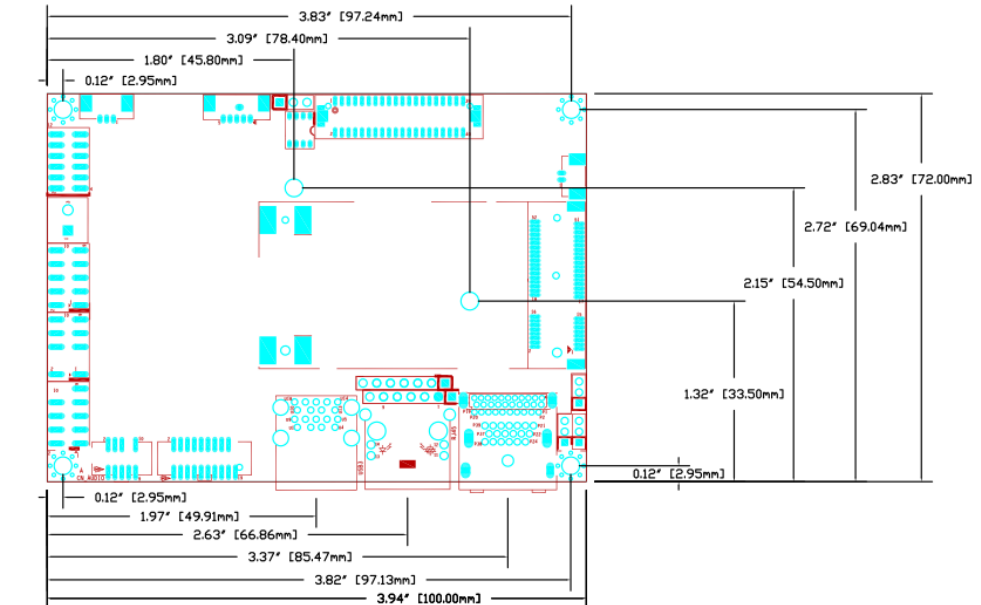
### I/O

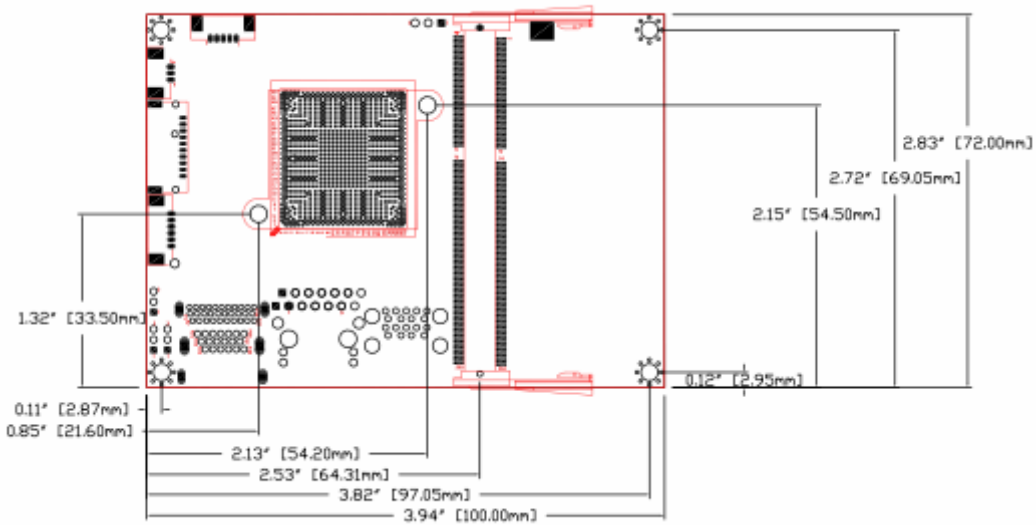
Serial ATA	1 x SATA3
Audio	Realtek ALC262 HD Audio
Internal I/O	1 x SATA3, 2 x RS232, 2 x USB2.0, 1 x LPC, 1 x PS/2, 1 x SMBUS, 1 x LVDS, 1 x LCD inverter, 1 x Audio, 1 x VGA(Optional).
Rear I/O	2 x USB3.0, 1 x LAN, 1 x HDMI, 1 x DisplayPort(Optional).

### Mechanical & Environmental

Power Requirement	DC INPUT 5V
Size & Thickness	100mm x 72mm (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

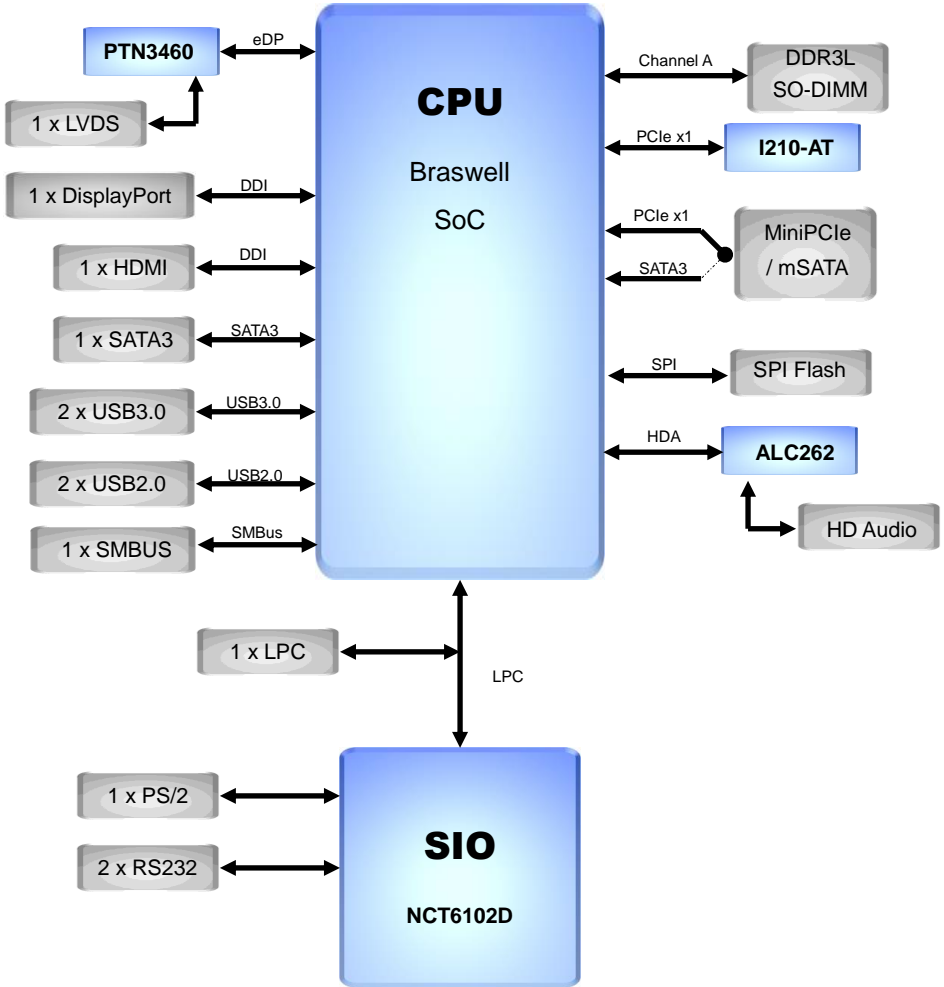
# 1.3 <Mechanical Drawing>





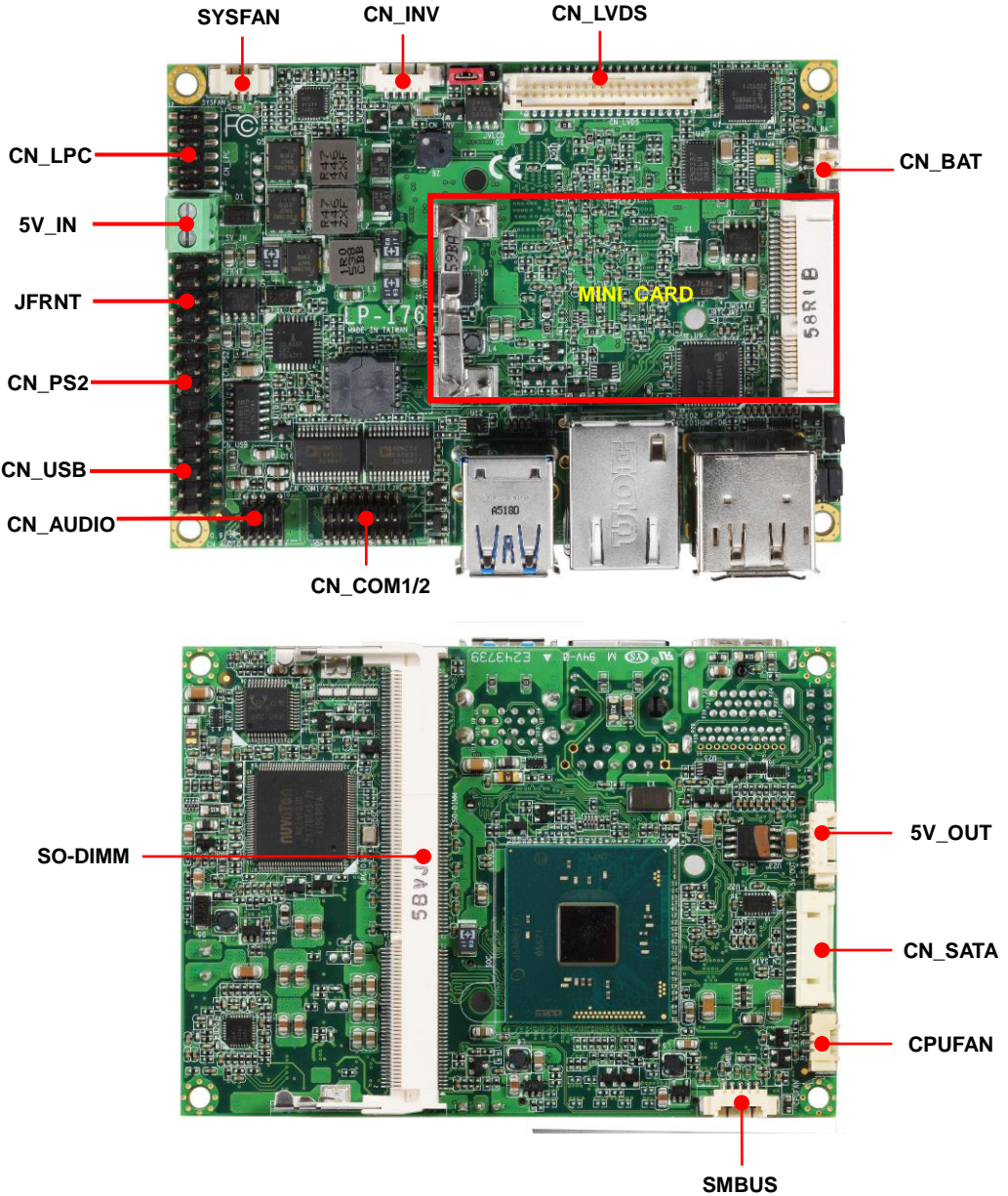


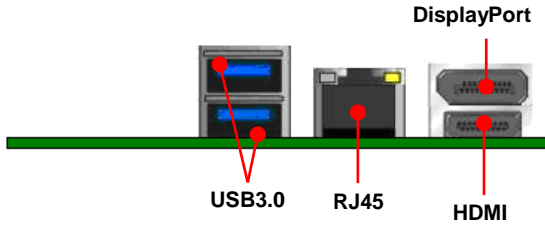
# 1.4 <Block Diagram>



# Chapter 2 <Hardware setup>

## 2.1 <Connector Location and Reference>





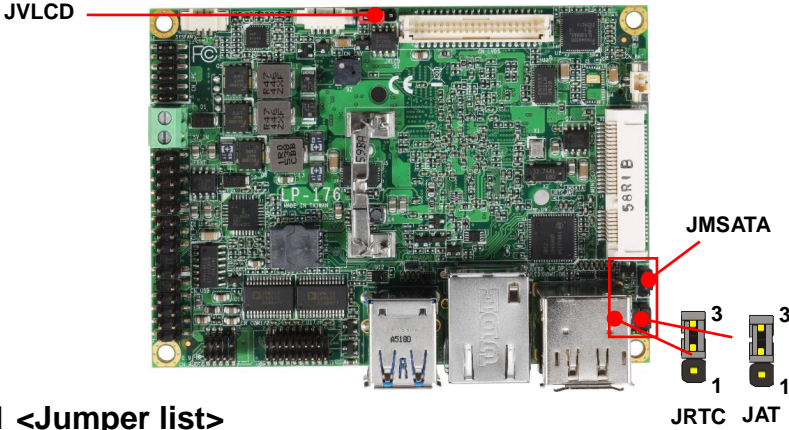
## 2.1.1 <Internal connectors list>

Connector	Function
SO-DIMM	204-pin DDR3L SO-DIMM slot
CN_SATA	10-pin Serial ATA3 connector
CN_AUDIO	5 x 2-pin audio pin header
CN_LPC	6 x 2-pin LPC pin header
CN_LVDS	20 x 2-pin LVDS connector
CN_INV	5-pin LCD inverter connector
CN_SMBUS	5-pin SMBus connector
CN_COM 1/2	19-pin RS232 connector
CN_USB	5 x 2-pin USB2.0 pin header
CN_PS2	5 x 2-pin PS/2 pin header
CPUFAN	3-pin CPU fan connector
SYSFAN	3-pin system fan connector
JFRNT	5 x 2-pin front panel switch/indicator pin header
MINI_CARD	52-pin MiniPCIe card slot
5V_OUT	6-pin SATA Power connector
5V_IN	2-pin power input Terminal Block (5V Only)

## 2.1.2 <External connectors list>

Connector	Function
DisplayPort	DisplayPort connector
HDMI	HDMI connector
USB3	2 x USB3.0 connector
RJ45	RJ45 LAN connector

## 2.2 <Jumper Location and Reference>



### 2.2.1 <Jumper list>

Jumper	Function
JAT	Power mode select
JRTC	CMOS Normal/Clear Setting
JVLCD	Panel Voltage Setting
JMSATA	MiniCard mSATA Setting

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

JRTC: Clear CMOS data jumper

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

JAT: AT/ATX mode select jumper

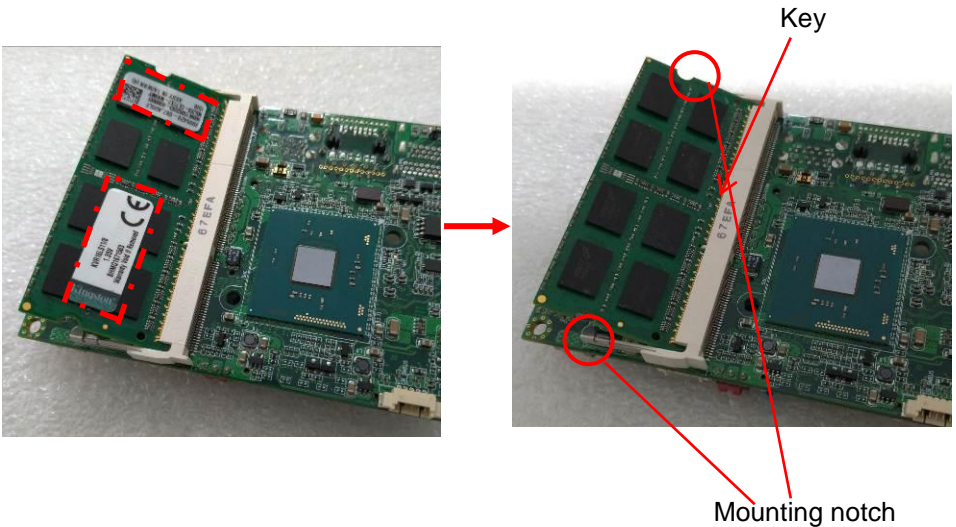
Jumper settings	Function
1-2	AT mode
2-3	ATX mode (Default)

## 2.3 <Installing the Memory>

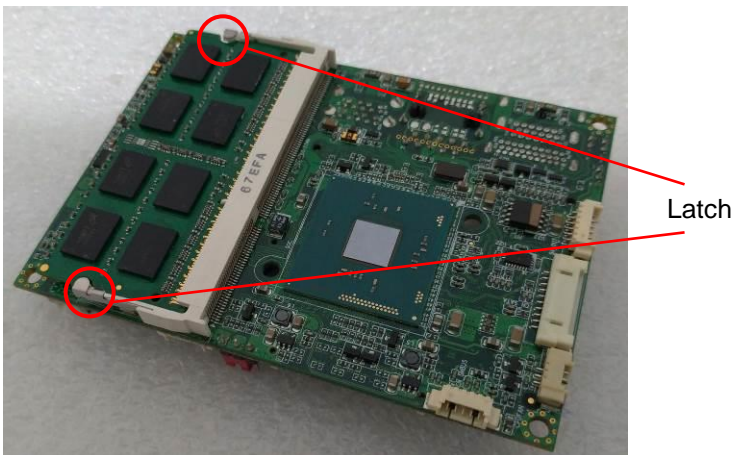
**In the process, the board must be powered off.**

1. In order to enhance the Heat dissipation when installed Heat Sink, We recommend to change the Memory sticker to another side.
2. Put the memory tilt into the slot. Note the Memory notch key aligned slot key.
3. Then press down till lock into the mounting notch.

Mounting notch

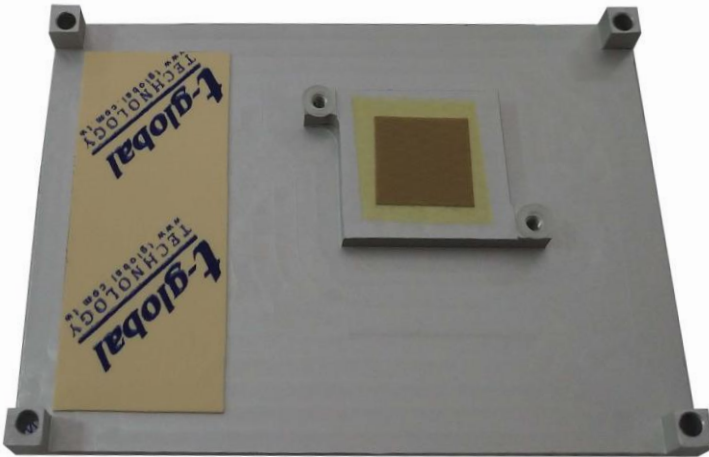


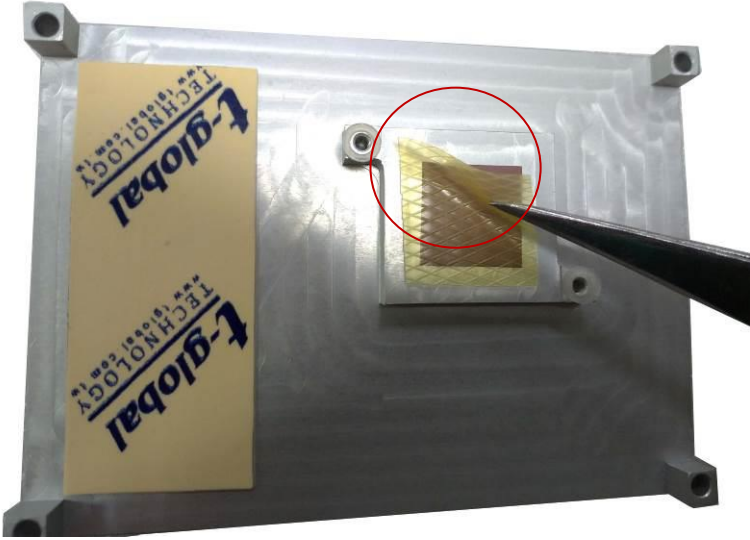
4. To remove the memory, push outward on both sides of the latch.



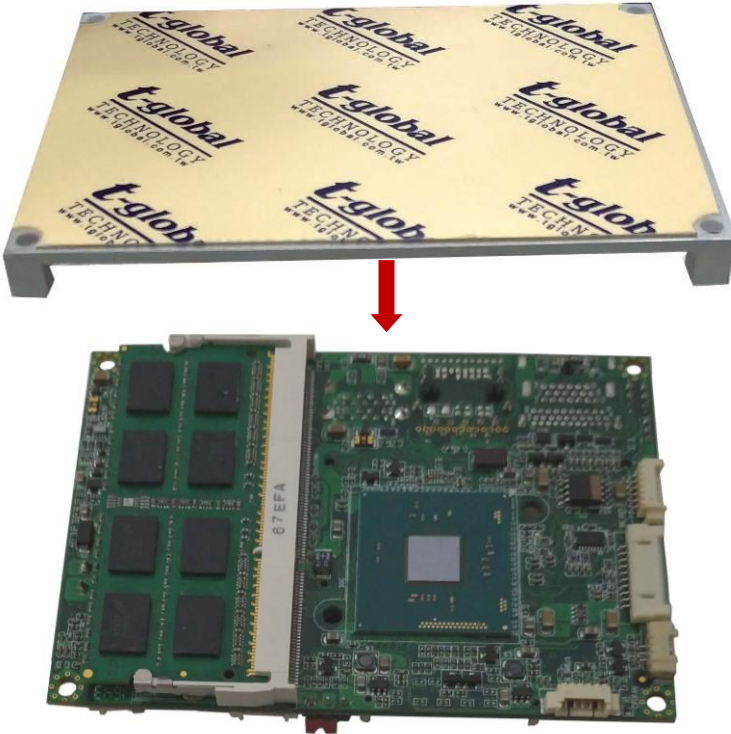
## 2.4 <Installing Heat Spreader/ Cooler fan>

1. Tears the films on the Thermal Pad of Heat Spreader/ Cooler Fan.





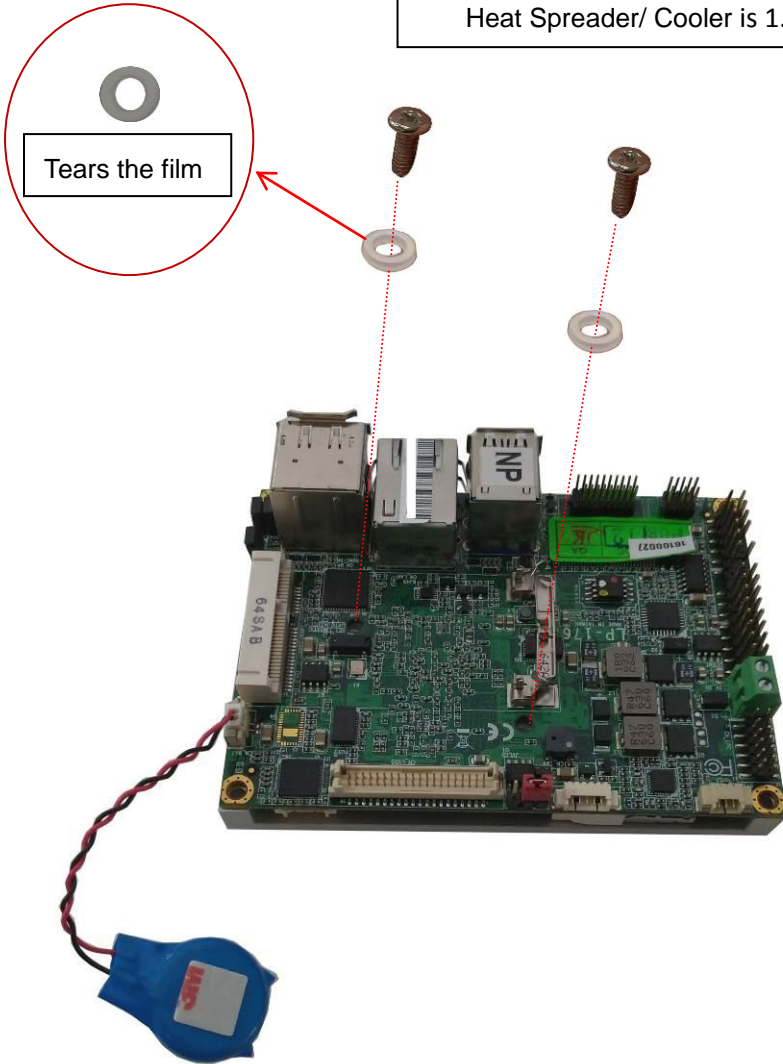
2. Install Heat Spreader/ Cooler Fan on LP-176.





3. Place two washers and tighten two screws.

The suggestion screw torque of the Heat Spreader/ Cooler is 1.3KGf-cm

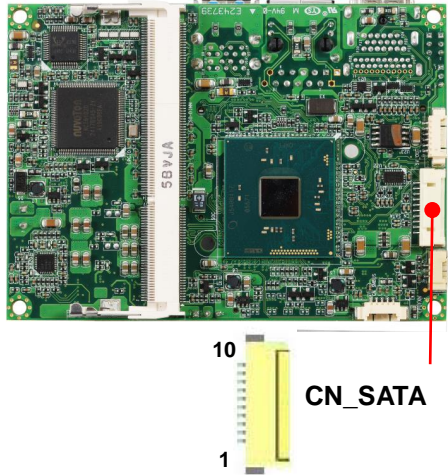


## 2.5 <I/O interface>

### 2.5.1 <Serial ATA interface>

CN\_SATA: SATA3 10-pin connector

Pin	Signal
1	GND
2	TX+
3	TX-
4	GND
5	NC
6	NC
7	GND
8	RX-
9	RX+
10	GND

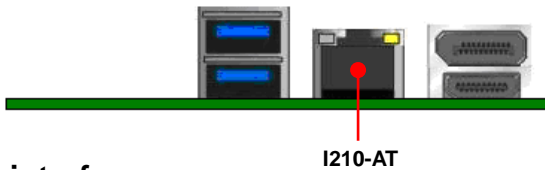


### 2.5.2 <Ethernet interface>

The board provide I210-AT Gigabit Ethernet which supports WOL on rear I/O.

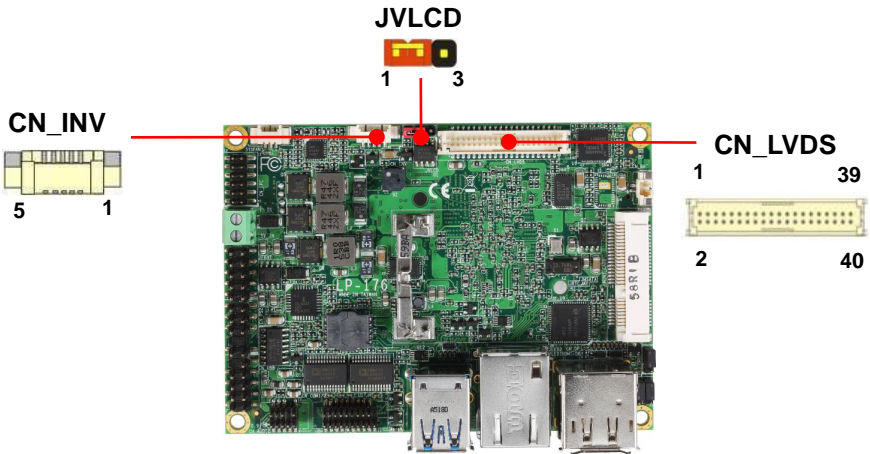
Find the setting from

Advanced-----> Power Management--> Wake on LAN Enable [Disable] (default)



### 2.5.3 <Display interface>

Based on the Braswell SoC with built-in HD Graphics, the DisplayPort up to **3840x2160 @ 30Hz** on rear I/O.About the internal Display, the HDMI resolution up to **3840x2160 @ 30Hz** and LVDS (PTN3460) up to **1920x1200 @ 60Hz** support 18/24-bit color depth and single/dual channel. About select LCD Panel Type in BIOS, please refer **Appendix B**.The built-in HD Graphics support triple display function with clone mode and extended mode.



**JVLCD:** LVDS panel power select jumper

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

**Effective patterns of connection: 1-2 / 2-3**

**Other may cause damage**

**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

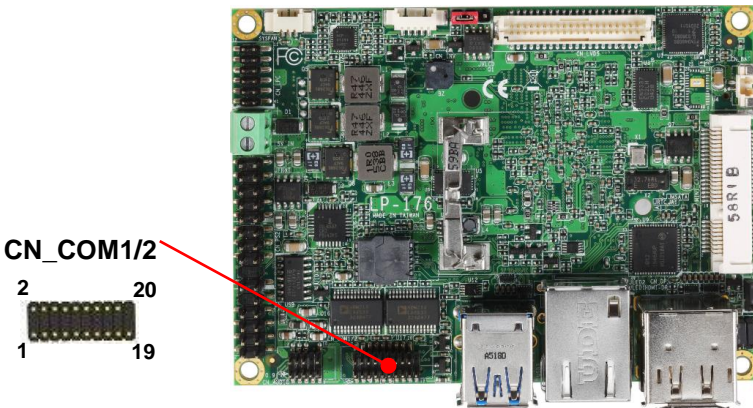
36	LVDS_DDCSCL	35	NC
38	LVDS_DDCSDA	37	NC
40	NC	39	NC

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

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

Pin	Signal
1	3.3V
2	Backlight Control
3	5V
4	GND
5	Enable Backlight

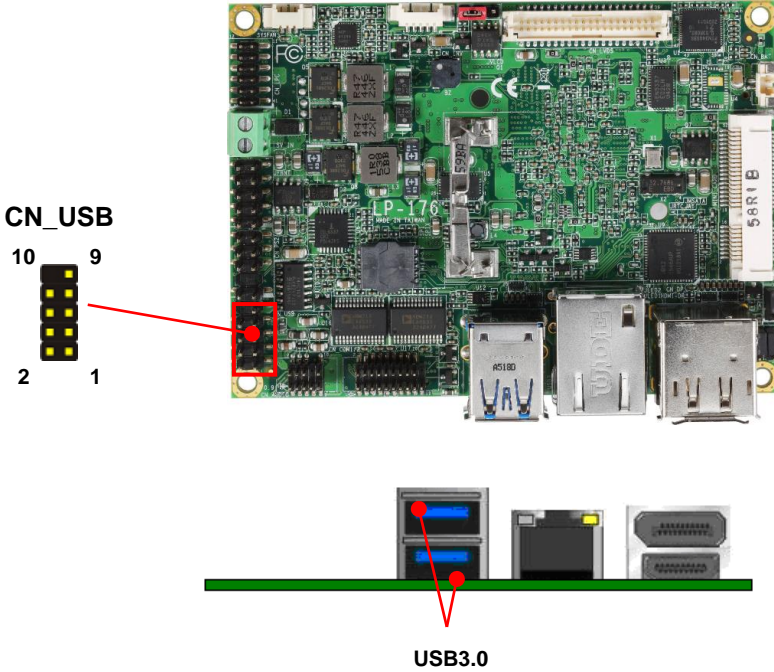
### 2.5.4 <Serial Port interface>



**CN\_COM1/2:** RS232 20-pin header (Pitch 1.27mm x 2.54mm)

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

### 2.5.5 <USB interface>

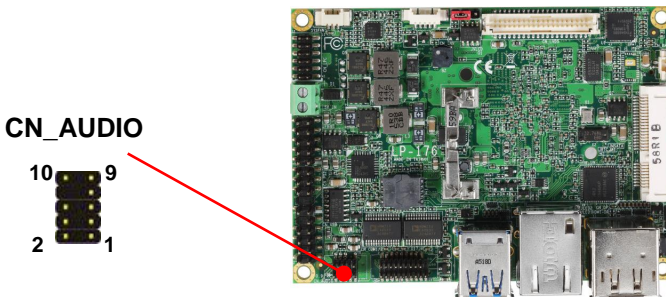


**CN\_USB:** Front panel USB2.0 10-pin header (Pitch 2.54mm)

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

Install USB3.0 Driver If you want to use CN\_USB in Windows7.

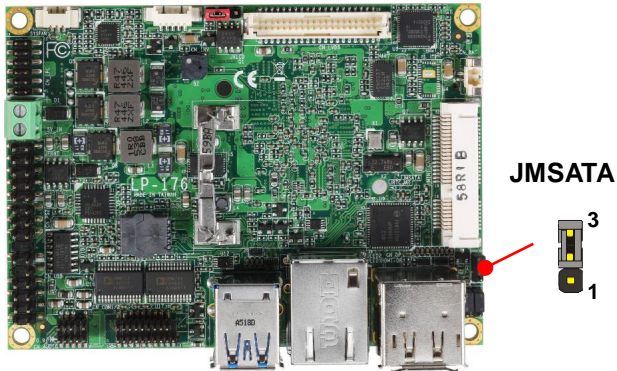
### 2.5.6 <Audio interface>



**CN\_AUDIO:** Front panel audio 10-pin header (Pitch 1.27mm x 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

### 2.5.7 <Expansion slot>



MINI\_CARD support mSATA by JMSATA

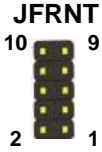
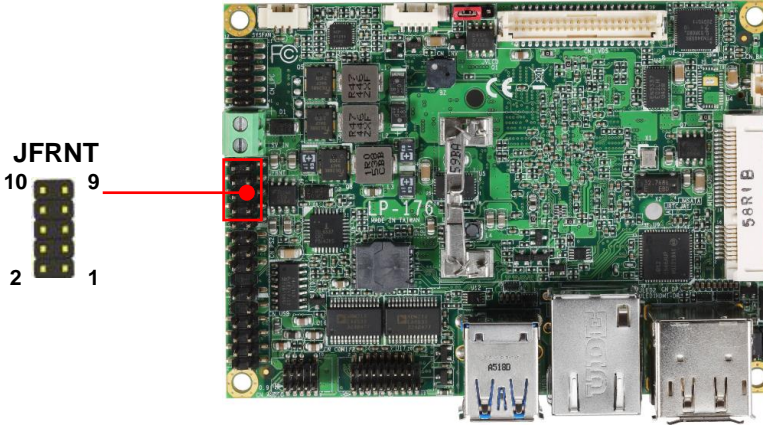
MINI\_CARD have some special design to compatible our mini-PCIe card.

(ex: MPX-574D2, MPX-210D2 etc)

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

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

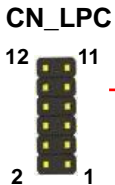
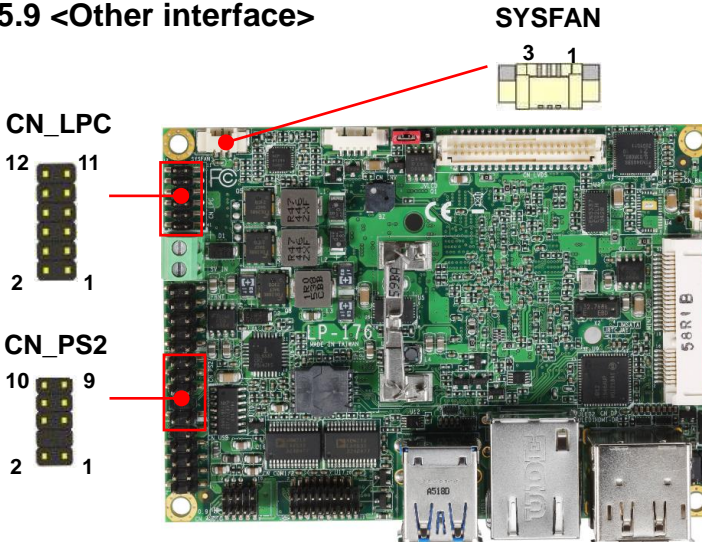
## 2.5.8 <Front panel switch and indicator>

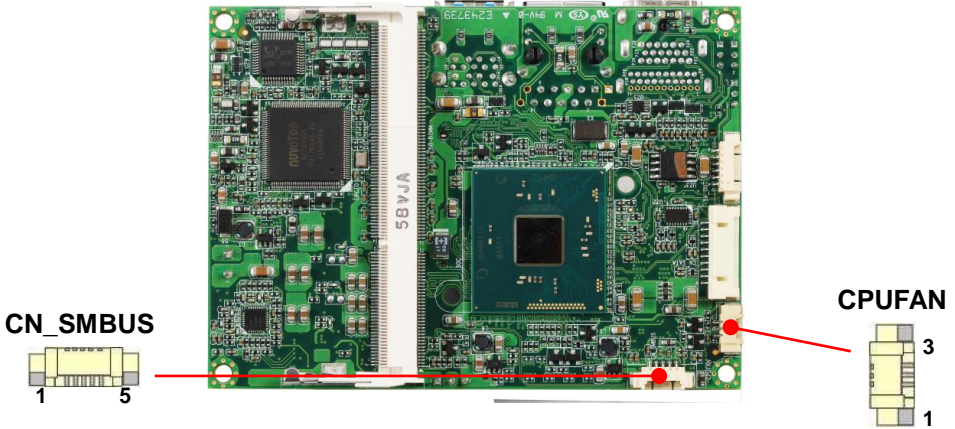


**JFRNT:** Front panel switch and indicator 10-pin header (Pitch 2.54mm)

Pin	Signal	Pin	Signal
1	Power_ON-	2	Power_ON+
3	Speaker-	4	Speaker+
5	HDD_LED-	6	HDD_LED+
7	Power_LED-	8	Power_LED+
9	Reset+	10	Reset-

## 2.5.9 <Other interface>





**CN\_LPC:** LPC 12-pin header (Pitch 2.00mm)

Pin	Signal	Pin	Signal
1	CLK	2	RST
3	-LFRAME	4	LAD3
5	LAD2	6	LAD1
7	LAD0	8	3.3V
9	SERIRQ	10	GND
11	3.3VSB	12	NC

**CN\_PS/2:** 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 5-pin connector

Pin	Signal
1	5V
2	NC
3	SMBDAT
4	SMBCLK
5	GND



**CPUFAN:** CPU cooler fan 3-pin connector

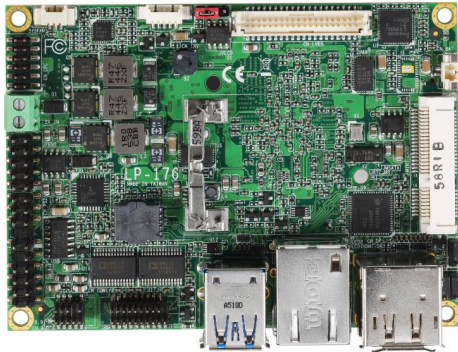
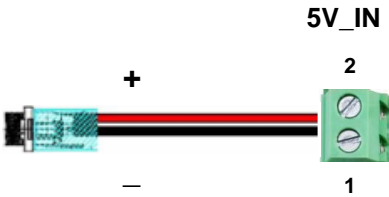
Pin	1	2	3
Signal	GND	5V	Sensor

**SYSFAN:** System cooler fan 3-pin connector

Pin	1	2	3
Signal	GND	5V	Sensor

## 2.6 <Power supply>

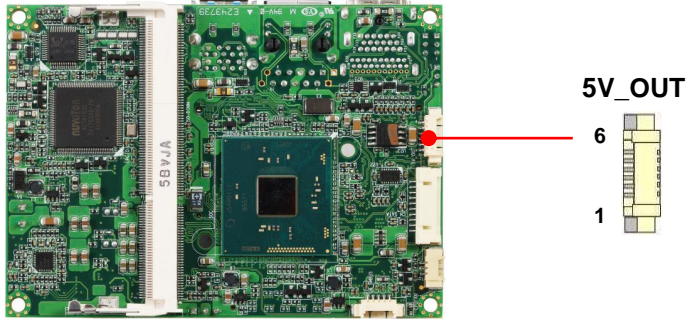
### 2.6.1 <Power input>



**5V\_IN:** Terminal Block 2-pin power connector

Pin	Signal	Pin	Signal
1	GND	2	Power in (5V ONLY)

## 2.6.2 <Power output>



**5V\_OUT:** SATA power 6-pin connector

Pin	Signal
1	NC
2	NC
3	GND
4	GND
5	5V
6	5V

# Appendix A <Flash BIOS>

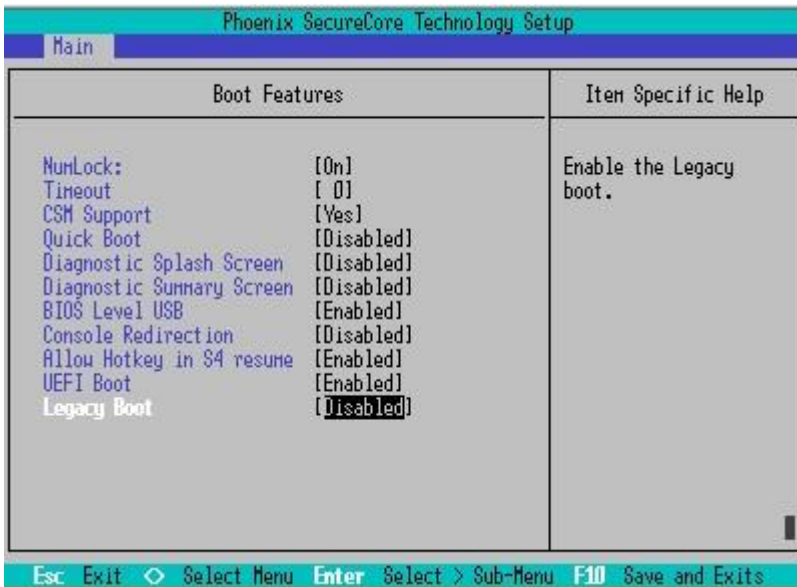
## A.1 BIOS Auto Flash Tool

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:

[LP-176 reflash tool](#)

## A.2 Flash Method

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. Boot to EFI-Shell mode (**UEFI Boot Enable, Legacy Boot Disable**)



then input the “**fs0:**” command to switch to the root of the USB flash drive.

```
InitialDevice mapping tableAgent SE v1.4.02
fs0  :Renovable HardDisk - Alias hdz310b blk0
      Acpi(PNPDR03,0)/Pci(1410)/Usb(8,0)/Hdt(Part1,Sig002B4588)
blk0  :Renovable HardDisk - Alias hdz310b fs0
      Acpi(PNPDR03,0)/Pci(1410)/Usb(8,0)/Hdt(Part1,Sig002B4588)
blk1  :Renovable BlockDevice - Alias (null)
      Acpi(PNPDR03,0)/Pci(1410)/Usb(8,0)

Press ESC in 1 seconds to skip startup.nsh, any other key to continue.

Shell> fs0:
fs0:\> fpt64.efi -y -f xxxxx.bin
```

4. Type the “**fpt64.efi -y -f xxxxx.bin**” command to start flash BIOS processes. ( xxx.bin means the BIOS file that you want to update)

5. When it finished all update processes, restart the system.

Any question about the BIOS re-flash please contact your distributors or visit the web-site at below:

[http://www.commell.com.tw/contact/contact\\_info.htm](http://www.commell.com.tw/contact/contact_info.htm)

## 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 provide feedback for us to make an OEM model.

Find the setting from

Advanced-----> Uncore Configuration----->LCD Panel Type

BIOS panel type selection form (BIOS Version:1.0)			
Single / Dual channel		Single / Dual channel	
NO.	Type	NO.	Type
1	Auto	9	1366 x 768
2	640 x 480	10	1680 x 1050
3	800 x 600	11	1920 x 1200
4	1024 x 768	12	1400 x 900
5	1280 x 1024	13	1600 x 900
6	1400 x 1050 Reduced Blanking	14	1024 x 768
7	1400 x 1050 non-Reduced Blanking	15	1280 x 800
8	1600 x 1200	16	1920 x 1080
		17	OEM keep

## Appendix C <Programmable Watch Dog Timer>

### Timeout value range

1 to 255 Minute and Second

### 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 NCT6102D datasheet

## Appendix D <Setup ADP-3355>

LP-176NXIT and LP-176EXIT series has a VGA, it's no need install extra driver.

Here is ADP-3355 Setup manual [Link](#)

### 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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