ASRock

iBOX-220

User Manual

Version 1.0
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(1) this device may not cause harmful interference, and
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CALIFORNIA, USA ONLY

The Lithium battery adopted on this motherboard contains Perchlorate, a toxic substance controlled in Perchlorate Best Management Practices (BMP) regulations passed by the California Legislature. When you discard the Lithium battery in California, USA, please follow the related regulations in advance.
"Perchlorate Material-special handling may apply, see www.dtsc.ca.gov/hazardouswaste/perchlorate"

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Replaceable batteries

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If you need to contact ASRock or want to know more about ASRock, you're welcome to visit ASRock's website at www.ASRock.com; or you may contact your dealer for further information.

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Taipei City 112, Taiwan (R.O.C.)

Contents

Chapter 1 Introduction

Thank you for purchasing iBOX-220, a reliable embedded box PC produced under ASRock's consistently stringent quality control. It delivers excellent performance with robust design conforming to ASRock's commitment to quality and endurance.

Because the hardware specifications might be updated, the content of this documentation will be subject to change without notice. In case any modifications of this documentation occur, the updated version will be available on ASRock's website without further notice. If you require technical support related to this product, please visit our website for specific information about the model you are using.
ASRock's Website: www.asrock.com

The illustrations shown in this manual are examples only, the actual system may differ slightly .

1.1 Package Contents

- iBOX-220
- SBC-220 (pre-installed motherboard)
- 1 x SATA 1 to 1 Power Cable
- 4 x HDD Screws (M3x4)
- 2 x Screw for mini-PCIe/mini-SATA slot (M2x3)
- Power Adapter
- User Manual

If any items are missing or appear damaged, contact your authorized dealer.

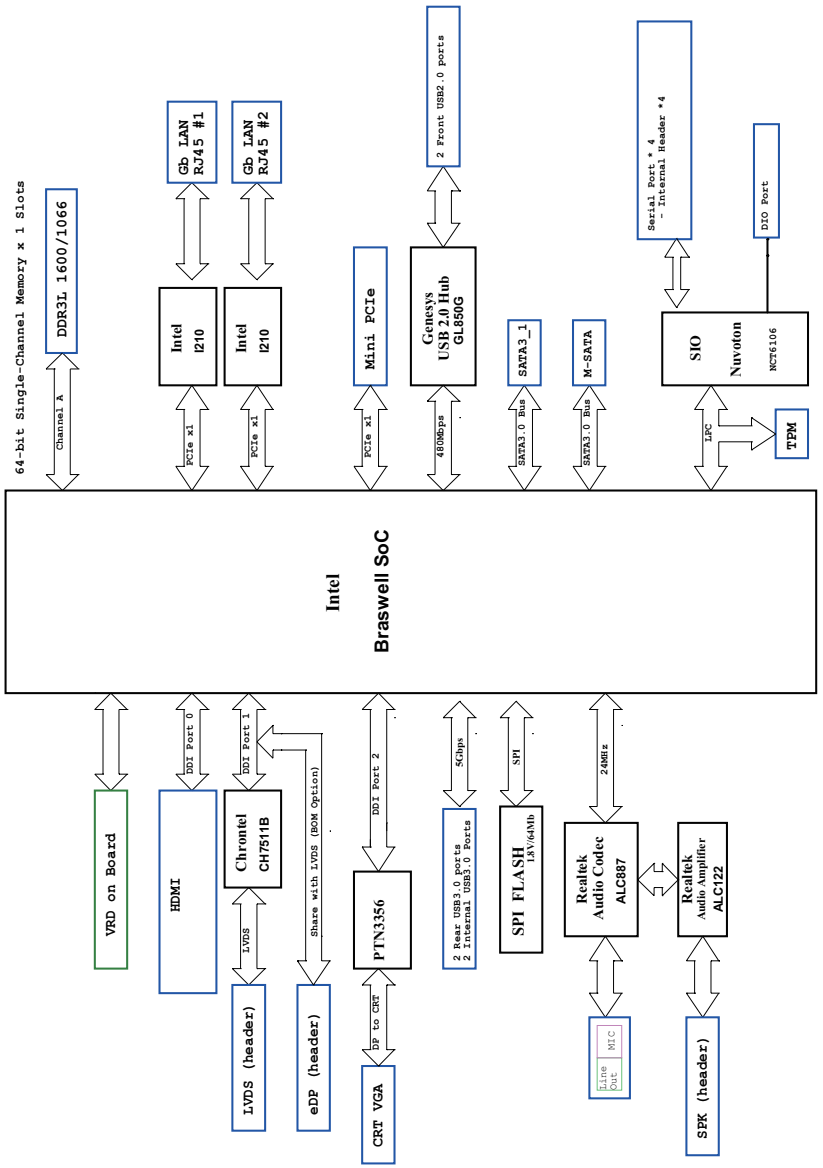
1.2 Product Specifications

iBOX-220	
Processor System	
CPU	Intel® Pentium/Celeron Braswell SoC Default N3150 Quad core 6W processor
Memory	1 x DDR3L 1333/1600MHz SO-DIMM up to 8GB
Chipset	N/A
Graphic	Intel® Gen8 Graphic
LAN Chipset	2 x Intel i210
Watch Dog	256 Segments,0,1,2,…255sec/min
Rear I/O	
Serial Port	1 x RS-232/485/422 / 1 x RS-232
USB	2 USB 3.0 ports / 2 USB2.0 ports
LAN	2 x RJ45 for GbE
Video output	1 x VGA output/1 x HDMI
Audio	1 x Line- out / 1 x MIC-in
Expansion	1 x mini PCIe / 1 x mSATA
Storage	
Type	1 x 2.5" HDD/SSD
OS Support	
Windows 8.1/10, Linux	
Certifications	
CE, FCC, Class A	
Environmental	
Operating Temp	0°C~50°C
Storage Temp	-20°C~80°C
Humidity	10%~90%
Mechanical	
Material	Top cover -aluminum extrusion/ Base- metal
Dimension	200 x 134.5 x 39mm
Weight	1.8 Kg
Mounting	mounting bracket (optional)

** For detailed product information, please visit our website: http://www.asrock.com*

English

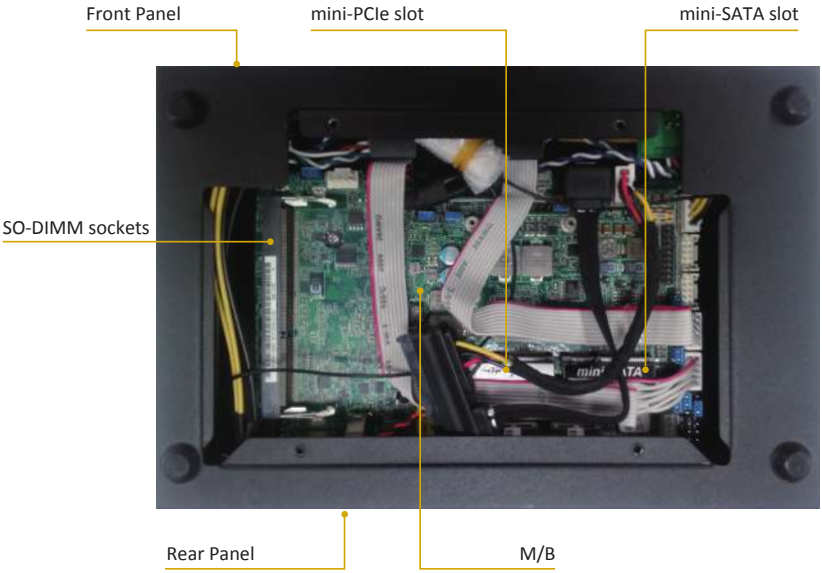
1.3 Block Diagram



Chapter 2 Product Overview

This chapter provides diagrams showing the location of important components of the iBOX-220.

2.1 Inside View



English

2.2 Front View

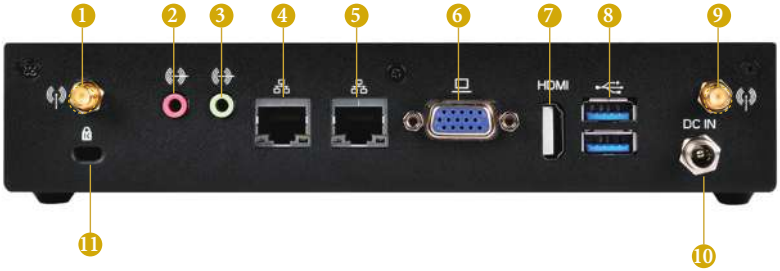
No.	Description
1	On-/off Switch
2	HDD LED
3	Power LED
4	2 x COM Ports
5	2 x USB 2.0 Ports

Status LED Definitions

Power LED	
Status	**Description**
Solid Green	Power on
Off	Power off

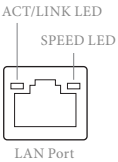
HDD Status LED	
Status	**Description**
Red	HDD installed
Off	HDD uninstalled

2.3 Rear View



No.	Description	No.	Description
1	Antenna Port	7	HDMI Port (HDMI1)
2	Microphone (Pink)	8	2 x USB 3.0 Ports (USB3_0_1)
3	Line out (Lime)	9	Antenna Port
4	LAN RJ-45 Port (LAN1)*	10	DC Jack (DC IN)
5	LAN RJ-45 Port (LAN2)*	11	Kenshington Lock
6	VGA Port (VGA1)		

** There are two LEDs on each LAN port. Please refer to the table below for the LAN port LED indications.*



Activity / Link LED		Speed LED	
Status	Description	Status	Description
Off	No Link	Off	10Mbps connection
Off	Data Activity	Orange	100Mbps connection
On	Link	Green	1Gbps connection

English

Chapter 3 Hardware Installation

This chapter provides step-by-step procedures on how to install components.

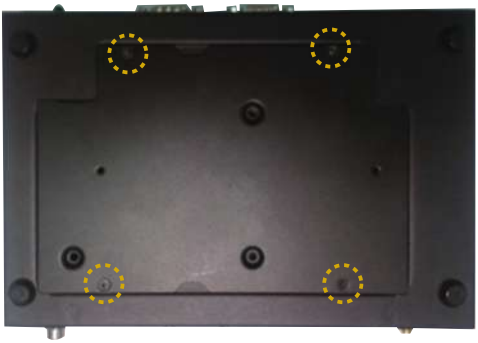
Installation Procedures

1. Removing the chassis bottom cover
2. Installing the memory modules (SO-DIMM)
3. Installing the 2.5-inch hard drive
4. Installing the WiFi module and the WiFi antennas **(Optional)**
5. Replacing the chassis top cover

After making sure that you have properly connected the power supply and all the necessary peripherals, power on the system.

3.1 Removing the Chassis Bottom Cover

1. Remove the four screws on the bottom case.
2. Lift up and remove the top cover.



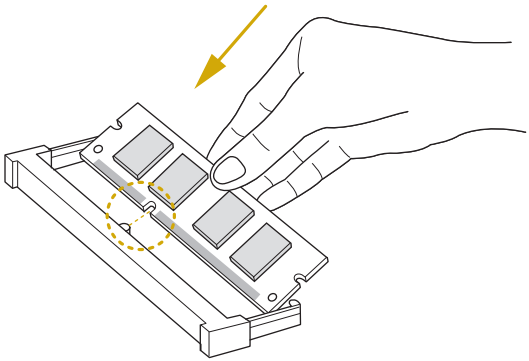
3.2 Installing Memory Modules (SO-DIMM)

This motherboard provides one 204-pin DDR3 (Double Data Rate 3) SO-DIMM slots.

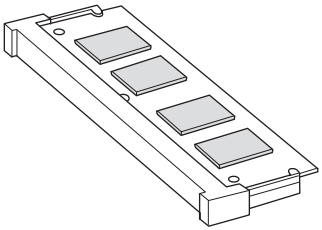
It is not allowed to install a DDR or DDR2 memory module into a DDR3 slot; otherwise, this motherboard and SO-DIMM may be damaged.

The SO-DIMM only fits in one correct orientation. It will cause permanent damage to the motherboard and the SO-DIMM if you force the SO-DIMM into the slot at incorrect orientation.

1



2

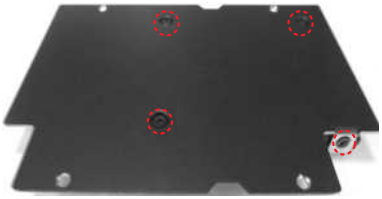


3.3 Installing the 2.5-inch Hard Drive

1. Attach the HDD onto the bottom cover with the printed circuit board side facing down. Carefully align the mounting holes in the hard drive and the bottom cover.
2. Secure the hard drive into the place using the four screws.
3. Attach one end of the SATA 1 to 1 Power Cable to the hard drive.

1

2



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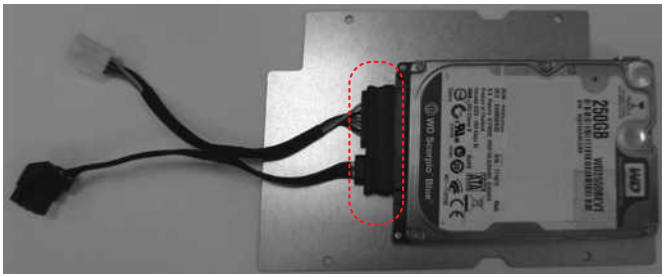
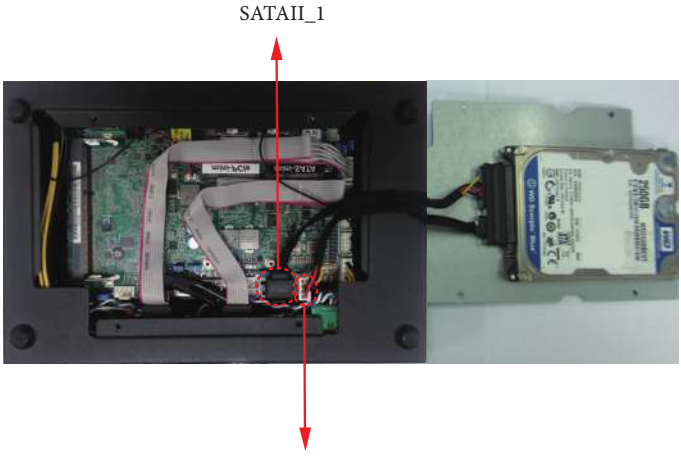


4. Attach the SATA data cable and power cable to the motherboard.

4



3.4 Installing the WiFi module and the WiFi antennas (Optional)

1. Insert the WiFi Module Card into the mini PCI Express slot (MINI_PCIE1).
2. Tighten the screw that holds the card in place.
3. Attach the SMA Wi-Fi Antenna Cables to the WiFi Module.

1

2

3

English

4. Insert the RP-SMA Wi-Fi Antenna Connectors to the antenna ports on the rear panel. Then fasten the screw nuts to secure the antenna connectors.
5. Connect the two WiFi 2.4/5 GHz Antennas to the antenna connectors. Turn the antenna clockwise until it is securely connected.
6. Set the WiFi 2.4/5 GHz Antenna at 90-degree angle.
   *You may need to adjust the direction of the antenna for a stronger signal.

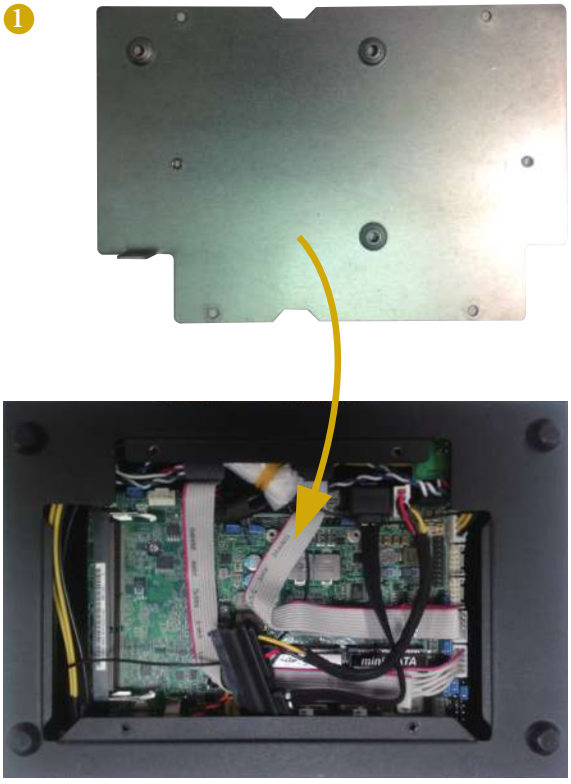
4

5

6

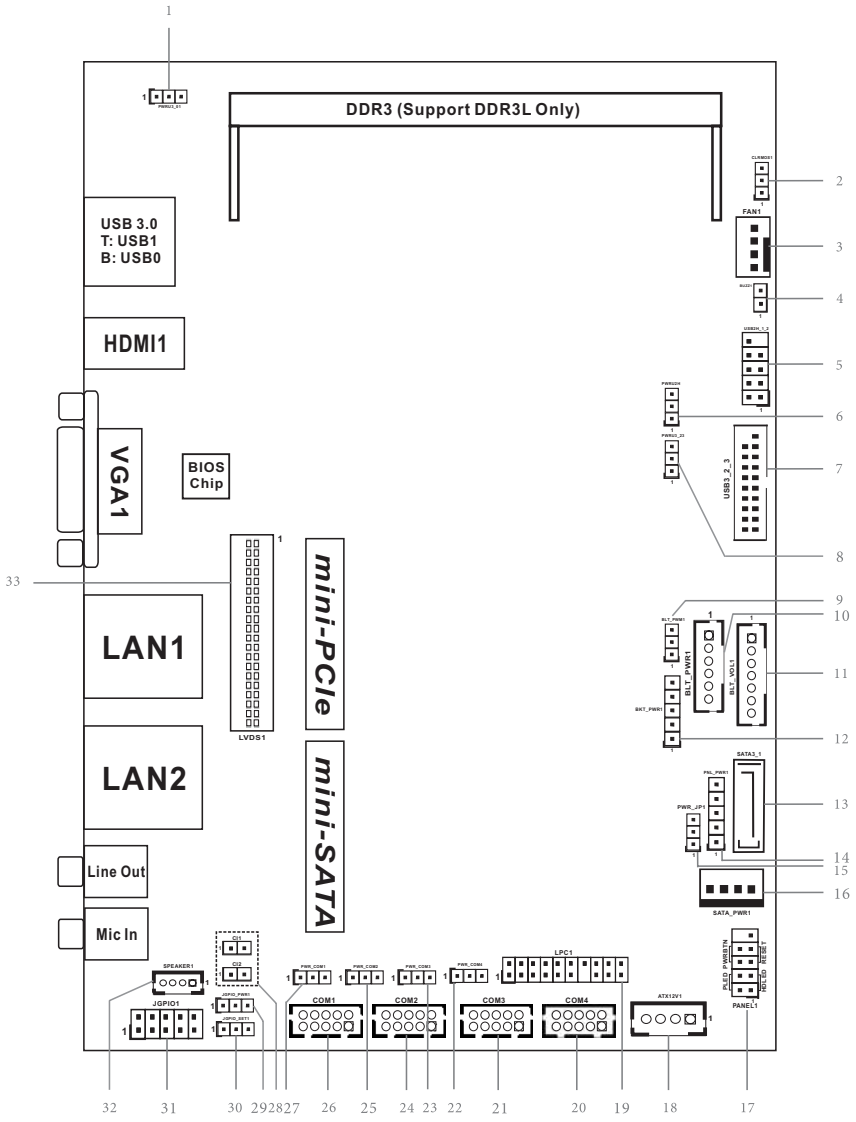
3.5 Replacing the Chassis Bottom Cover

1. Replace the top cover.
2. Secure the four screws at the bottom.



Chapter 4 Motherboard

4.1 Motherboard Layout



No.	Description
1	USB3 Power Setting Jumper (for USB3_0_1)
2	Clear CMOS Header
3	4-Pin FAN Connector (+12V)
4	2-Pin Buzzer Header
5	USB2.0 Header (USB2H_1_2)
6	USB2 Power Setting Jumper (for USB2H_1_2)
7	USB3.0 Header (USB3_2_3)
8	USB3 Power Setting Jumper (for USB3_2_3)
9	Backlight Control Level (BLT_PWM1)
10	Inverter Power Control Wafer (BLT_PWR1)
11	Backlight & Amp Volume Control (BLT_VOL1)
12	Backlight Power Select (LCD_BLT_VCC) (BKT_PWR1)
13	SATA3 Connector (SATA3_1)
14	Panel Power Selection (LCD_VCC) (PNL_PWR1)
15	ATX/AT Mode Select
16	SATA Power Output Connector
17	System Panel Header
18	ATX Power Connector (Input 12V)
19	LPC Header
20	COM Port Header (COM1)
21	COM Port Header (COM2)
22	COM Port Pin9 PWR Setting Jumper (PWR_COM4 (For COM Port4))
23	COM Port Pin9 PWR Setting Jumper (PWR_COM3 (For COM Port3))
24	COM Port Header (COM3)
25	COM Port Pin9 PWR Setting Jumper (PWR_COM2 (For COM Port2))
26	COM Port Header (COM4)
27	COM Port Pin9 PWR Setting Jumper (PWR_COM1 (For COM Port1))
28	Chassis Intrusion Headers (CI1, CI2)
29	Digital Input / Output Power Select
30	GPIO Default Setting
31	Digital Input / Output Pin Header
32	3W Audio AMP Output Wafer
33	LVDS Panel Connector

4.2 Motherboard Specifications

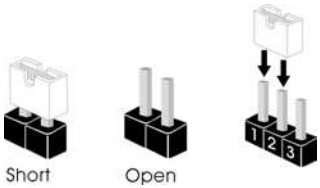
Form Factor	Dimensions	3.5” SBC (5.8-in x 4.0-in) / (146 x 102 mm)
Processor System	CPU	Intel® Pentium/Celeron Braswell SoC Supports Hyper-Threading Technology Default N3150 Quad core 6W processor
	Core Number	(By CPU, Max 4)
	Max Speed	(By CPU)
	L3 Cache	(By CPU)
	Chipset	(By CPU)
	BIOS	UEFI
Expansion Slot	PCI	0
	Mini-PCIe	1 x Full/half size mini-PCIe slot
	mSATA	1
	PCIe	0
	CFast Card Socket	0
Memory	Technology	Single Channel DDR3L 1333/1600 MHz SDRAM
	Max.	8GB
	Socket	1 x SO-DIMM
Graphics	Controller	Intel® Gen8 Intel® Graphics DX 11, OGL3.2
	VRAM	Shared Memory
	VGA	Supports max. resolution 1920x1200
	LVDS	Dual channel 24-bit co-lay with eDP, max resolution 1920x1200 @ 60Hz
	HDMI	Supports HDMI 1.4a, max resolution 1920x1200
	DVI	0
	DisplayPort	0
	Multi Display	Yes (Triple Display)
Ethernet	Interface	10/100/1000 Mbps
	Controller	2 x Intel® i210
	Connector	2 x RJ45
SATA	Max Data Transfer Rate	SATA3 (6.0Gb/s)

Rear I/O	VGA	1
	DVI	0
	HDMI	1
	DisplayPort	0
	Ethernet	2
	USB	4 (USB 3.0)
	Audio	2 (Mic-in, Line-out)
	Serial	0
	eSATA	0
	PS/2	0
Internal Connector	USB	4 (2 x 2.54 pitch header USB 2.0 compliant)
	LVDS/ Inverter	1/1
	VGA	0
	Serial	4 x 2.0 pitch header RS-232 (COM1 support RS-232/RS-422/485)
	SATA	1 x SATA3 (6.0Gb/s)
	mPCIe	1
	Parallel	0 (Co-lay with 4in/4out DIO)
	mSATA	1
	IrDA	0
	GPIO 8-bit	4 x GPI + 4 x GPO
	SATA PWR Output Con	1
	Speaker Header	1
Watchdog Timer	Output	Output from super I/O to drag RESETCON#
	Interval	256 Segments, 0,1,2…255 Sec/Min
Power Requirements	Input PWR	12~24V DC-in
	Power On	AT/ATX Supported AT: Directly PWR on as power input ready ATX: Press button to PWR on after power input ready
Environment	Temperature	0ºC – 60ºC

** For detailed product information, please visit our website: http://www.asrock.com*

4.3 Jumpers Setup

The illustration shows how jumpers are setup. When the jumper cap is placed on the pins, the jumper is “Short”. If no jumper cap is placed on the pins, the jumper is “Open”. The illustration shows a 3-pin jumper whose pin1 and pin2 are “Short” when a jumper cap is placed on these 2 pins.



Clear CMOS Jumper (CLRCMOS1) (see p.15, No. 13)	 Default	 Clear CMOS

CLRCMOS1 allows you to clear the data in CMOS. To clear and reset the system parameters to default setup, please turn off the computer and unplug the power cord from the power supply. After waiting for 15 seconds, use a jumper cap to short pin2 and pin3 on CLRCMOS1 for 5 seconds. However, please do not clear the CMOS right after you update the BIOS. If you need to clear the CMOS when you just finish updating the BIOS, you must boot up the system first, and then shut it down before you do the clear-CMOS action. Please be noted that the password, date, time, and user default profile will be cleared only if the CMOS battery is removed.

Digital Input/Output PWR Select (3-pin JGPIO_ PWR1) (see p.15, No. 29)		1-2 : +12V 2-3 : +5V

ATX/AT Mode Selection (3-pin PWR_JP1) (see p.15, No. 15)		1-2: AT Mode 2-3: ATX Mode

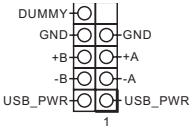
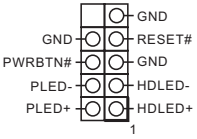
English

Panel Power Select (LCD_VCC) (5-pin PNL_PWR1) (see p.15, No. 14)		Use this to set up the VDD power of the LVDS connector. 1-2: +3V 2-3: +5V 3-4: +5V 4-5: +12V
Backlight Power Select (LCD_BLT_VCC) (5-pin BKT_PWR1) (see p.15 No. 12)		Use this to set up the backlight power of the LVDS connector. 1-2: +5V 2-3: +12V 3-4: +12V 4-5: DC_IN Power
Backlight Control Level (3-pin BLT_PWM1) (see p.15 No. 9)		1-2: +3V 2-3: +5V
COM1 Pin9 PWR Setting Jumpers (3-pin PWR_COM1) (see p.15 No. 27) (3-pin PWR_COM2) (see p.15 No. 25) (3-pin PWR_COM3) (see p.15 No. 23) (3-pin PWR_COM4) (see p.15 No. 22)		1-2: +5V 2-3: +12V
GPIO Default Setting (3-pin JGPIO_SET1) (see p.15 No. 30)		1-2: Pull-High 2-3: Pull-Low
USB2 Power Setting Jumper (3-pin PWRU2H, for USB2H_1_2) (see p.15 No. 6)		1-2: +5V 2-3: +5VSB

USB3 Power Setting Jumpers (3-pin PWRU3_01, for USB3_0_1) (see p.15 No. 1) (3-pin PWRU3_23, for USB3_2_3) (see p.15 No. 8)	 	1-2: +5V 2-3: +5VSB

4.4 Onboard Headers and Connectors

Onboard headers and connectors are NOT jumpers. Do NOT place jumper caps over these headers and connectors. Placing jumper caps over the headers and connectors will cause permanent damage to the motherboard.

SATA3 Connector (SATA3_1: see p.15, No. 13)		This Serial ATA3 connector supports SATA data cables for internal storage devices. The current SATA3 interface allows up to 6.0 Gb/s data transfer rate.
USB 2.0 Header (9-pin USB2H_1_2) (see p.15 No. 5)		There is one USB 2.0 header on this motherboard.
System Panel Header (9-pin PANEL1) (see p.15 No. 17)		This header accommodates several system front panel functions.

PWRBTN (Power Switch):
Connect to the power switch on the chassis front panel. You may configure the way to turn off your system using the power switch.

RESET (Reset Switch):
Connect to the reset switch on the chassis front panel. Press the reset switch to restart the computer if the computer freezes and fails to perform a normal restart.

PLED (System Power LED):
Connect to the power status indicator on the chassis front panel. The LED is on when the system is operating. The LED keeps blinking when the system is in S3 sleep state. The LED is off when the system is in S4 sleep state or powered off (S5).

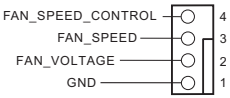
HDLED (Hard Drive Activity LED):
Connect to the hard drive activity LED on the chassis front panel. The LED is on when the hard drive is reading or writing data.

The front panel design may differ by chassis. A front panel module mainly consists of power switch, reset switch, power LED, hard drive activity LED, speaker and etc. When connecting your chassis front panel module to this header, make sure the wire assignments and the pin assignments are matched correctly.

3W Audio AMP Output Wafer
(4-pin SPEAKER1)
(see p.15 No. 32)

PIN	Signal Name
1	SPK L-
2	SPK L+
3	SPK R+
4	SPK R-

Fan Connector
(4-pin FAN1)
(see p.15 No. 3)

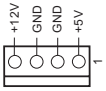


Please connect the fan cable to the fan connector and match the black wire to the ground pin.

ATX Power Connector
(Input 12V)
(4-pin ATX12V1)
(see p.15 No. 18)

Please connect a DC power supply (12V) to this connector.
1-4 : GND
2-3 : DC Input

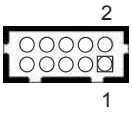
SATA Power Output Connector
(4-pin SATA_PWR1)
(see p.15 No. 16)



Inverter Power Control Wafer
(6-pin BLT_PWR1)
(see p.15 No. 10)

PIN	Signal Name
1	GND
2	GND
3	CON_LBKLT_CTL
4	CON_LBKLT_EN
5	LCD_BLT_VCC
6	LCD_BLT_VCC
7	GND

COM Port Headers
(10-pin COM1)
(see p.15 No. 20)



(10-pin COM2)
(see p.15 No. 21)

(10-pin COM3)
(see p.15 No. 24)

(10-pin COM4)
(see p.15 No. 26)

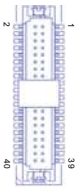
PIN	Signal Name	PIN	Signal Name	PIN	Signal Name	PIN	Signal Name	PIN	Signal Name
10	DUMMY	8	CCTS#	6	DDSR#	4	DDTR#	2	RRXD
9	DUMMY	7	RRTS#	5	GND	3	TTXD	1	DDCD#

This motherboard supports RS232/422/485 on COM1 port. Please refer to below table for the pin definition. In addition, COM1 port (RS232/422/485) can be adjusted in BIOS setup utility > Advanced Screen > Super IO Configuration. You may refer to page 29 for details.

COM1 Port Pin Definition

PIN	RS232	RS422	RS485
1	DCD	TX-	RTX-
2	RXD	RX+	N/A
3	TXD	TX+	RTX+
4	DTR	RX-	N/A
5	GND	GND	GND
6	DSR	N/A	N/A
7	RTS	N/A	N/A
8	CTS	N/A	N/A
9	NA/+5V/+12V	N/A	N/A

LVDS Panel
Connector
(40-pin LVDS1)
(see p.15, No. 33)

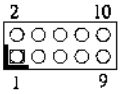


PIN	Signal Name	PIN	Signal Name
2	LCD_VCC	1	LCD_VCC
4	LDDC_CLK	3	+3V
6	LVDS_A_ DATA0#	5	LDDC_DATA
8	GND	7	LVDS_A_ DATA0
10	LVDS_A_ DATA1	9	LVDS_A_ DATA1#
12	LVDS_A_ DATA2#	11	GND

English

PIN	Signal Name	PIN	Signal Name
14	GND	13	LVDS_A_ DATA2
16	LVDS_A_ DATA3	15	LVDS_A_ DATA3#
18	LVDS_A_CLK#	17	GND
20	GND	19	LVDS_A_CLK
22	LVDS_B_ DATA0	21	LVDS_B_ DATA0#
24	LVDS_B_ DATA1#	23	GND
26	GND	25	LVDS_B_ DATA1
28	LVDS_B_ DATA2	27	LVDS_B_ DATA2#
30	LVDS_B_ DATA3#	29	DPLVDD_EN
32	GND	31	LVDS_B_ DATA3
34	LVDS_B_CLK	33	LVDS_B_CLK#
36	CON_LBKLT_ EN	35	GND
38	LCD_BLT_VCC	37	CON_LBKLT_ CTL
40	LCD_BLT_VCC	39	LCD_BLT_VCC

Digital Input/Output Pin Header
(10-pin JGPIO1)
(see p.15 No. 31)



PIN	Signal Name	PIN	Signal Name
1	SIO_GP24	2	SIO_GP20
3	SIO_GP25	4	SIO_GP21
5	SIO_GP26	6	SIO_GP22
7	SIO_GP27	8	SIO_GP23
9	JGPIO_PWR	10	GND

Backlight & Amp Volume Control
(7-pin BLT_VOL1)
(see p.15 No. 11)

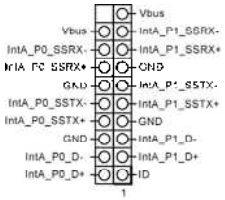
PIN	Signal Name
1	GPIO_VOL_UP
2	GPIO_VOL_DW
3	PWRDN
4	GPIO_BLT_UP
5	GPIO_BLT_DW
6	GND
7	GND

Chassis Intrusion Headers
(2-pin CI1, CI2)
(see p.15 No. 28)

This motherboard supports CASE OPEN detection feature that detects if the chassis cover has been removed. This feature requires a chassis with chassis intrusion detection design.

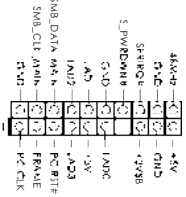
Buzzer Header
(2-pin BUZZ1)
(see p.15 No. 26)

USB 3.0 Header
(19-pin USB3_2_3)
(see p.15 No. 7)



There is one USB 3.0 header on this motherboard.

LPC Header
(19-pin LPC1)
(see p.15 No. 19)



This connector supports Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.

4.5 Expansion Slots (mini-PCIe and mini-SATA Slots)

There is 1 mini-PCIe slot and 1 mini-SATA slot on this motherboard.

Before installing an expansion card, please make sure that the power supply is switched off or the power cord is unplugged. Please read the documentation of the expansion card and make necessary hardware settings for the card before you start the installation.

mini-PCIe slot:

MINI_PCIE1 (mini-PCIe slot; half size) is used for WiFi module.

mini-SATA slot:

MINI_PCIE2 (mini-SATA slot; full size) is used for mSATA cards.