



ITX86M User Manual

Issue 1.1

www.CoreIPC.com

Security Guidance

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- To help you use the CoreIPC motherboard, please read the [User Manual] carefully.
- For product-related information, please be sure to read these safety instructions carefully.
- Identifying the Product Version
You can find the version of this motherboard labeled [Issue:X.X] on the motherboard itself. X.X represents a number; for example, a label reading [Issue1.0] indicates that the version of this motherboard is 1.0. Please note the product version when updating the motherboard's BIOS or drivers, or when referring to other technical documentation.

Basic Safety Tips

1. Before using this product, please be sure to read the product manual carefully.
2. Any cards not yet ready for installation should be stored in anti-static bags.
3. Before removing the board from the antistatic bag, place your hand on a grounded metal object for a moment (such as 10 seconds) to discharge any static electricity from your body and hands.
4. When handling circuit boards, you must wear anti-static gloves and make it a habit to touch only the edges.
5. To prevent electric shock or damage to the product, be sure to turn off the AC power before inserting, removing, or reconfiguring the board.
6. Before moving a board or the entire unit, you must first turn off the AC power.
7. For complete systems, be sure to turn off the AC power before adding or removing any boards.
8. Before connecting or disconnecting any device, you must first turn off the AC power.
9. To avoid unnecessary damage to the product caused by frequent power cycles, wait at least 30 seconds after turning it off before turning it back on.

Ordering Information

No.	Model	Chipset	DDR	HDMI	VGA	LVDS	LAN	USB	PS2	LPT	COM/ 485	POWER
1	ITX86M-L12 VER1.1	HM86	DDR3L	1	1	1	1	10	1	1	2/1	12V
2	ITX86M-L16 VER1.1	HM86	DDR3L	1	1	1	1	10	1	1	6/2	12V
3	ITX86M-L26 VER1.1	HM86	DDR3L	1	1	1	2	8	1	1	6/2	12V

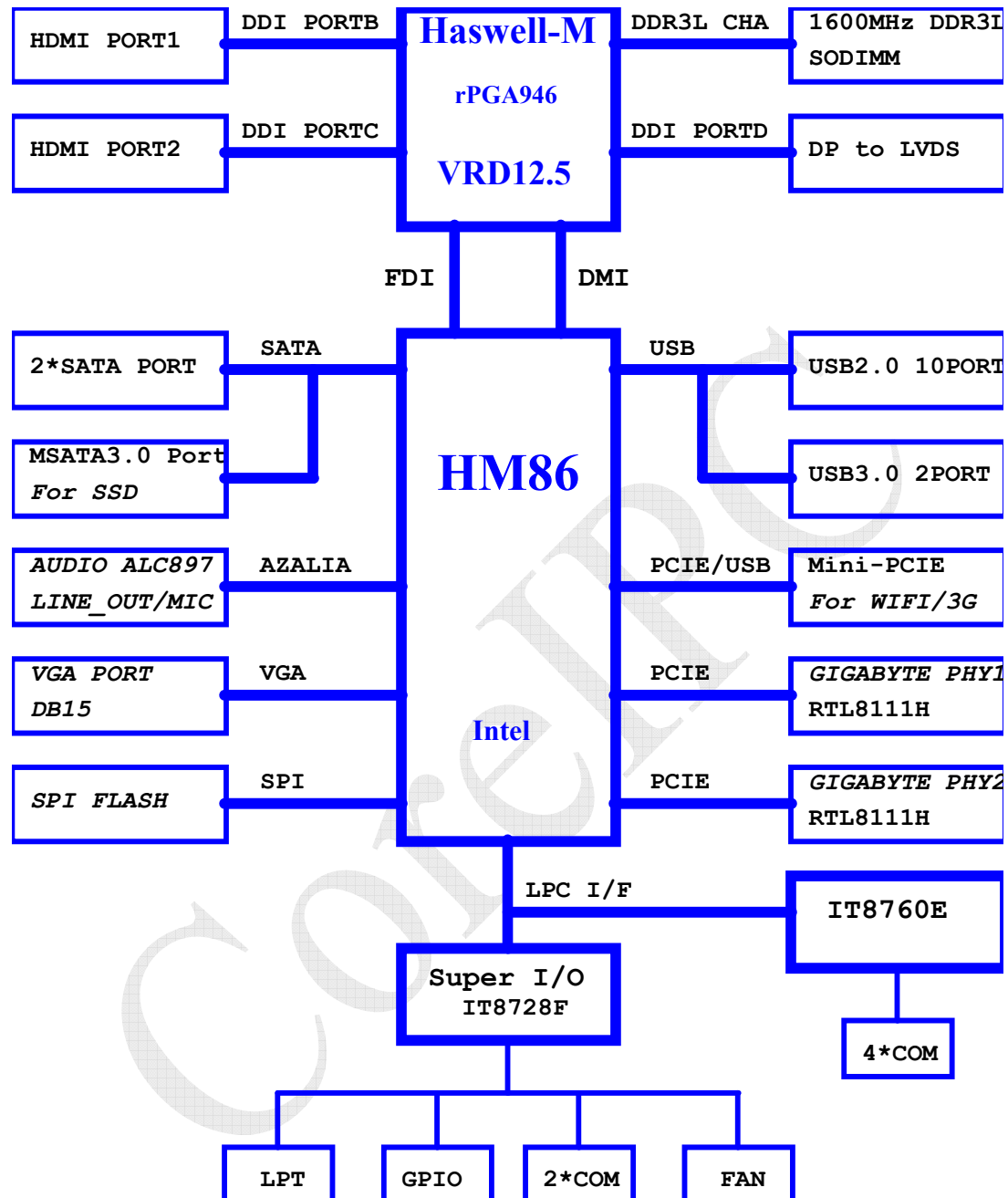
1. Product Description

ITX86M is a CoreIPC ITX-series industrial motherboard supporting the full range of Intel® Haswell-M processors. It is widely applicable to commercial displays, machine vision, medical instruments, industrial control, financial equipment, cloud terminals, and other applications.

The main features of the ITX86M motherboard are as follows:

- Supports 4th Generation Intel® Haswell rPGA946 Pentium®, Celeron®, Core™ i3/i5/i7 M-series processors;
- Supports single-channel 1600/1333 MHz DDR3L SO-DIMM memory, up to 16 GB;
- Supports VGA or HDMI, LVDS, and HDMI display outputs for asynchronous triple-display operation; dual HDMI is optional;
- Supports up to two Gigabit Ethernet ports;
- Supports one Mini PCIe slot for Wi-Fi/4G and one mSATA slot;
- Supports 8 or 10 USB ports;
- Provides six onboard RS-232 serial ports, with support for two RS-485 ports;

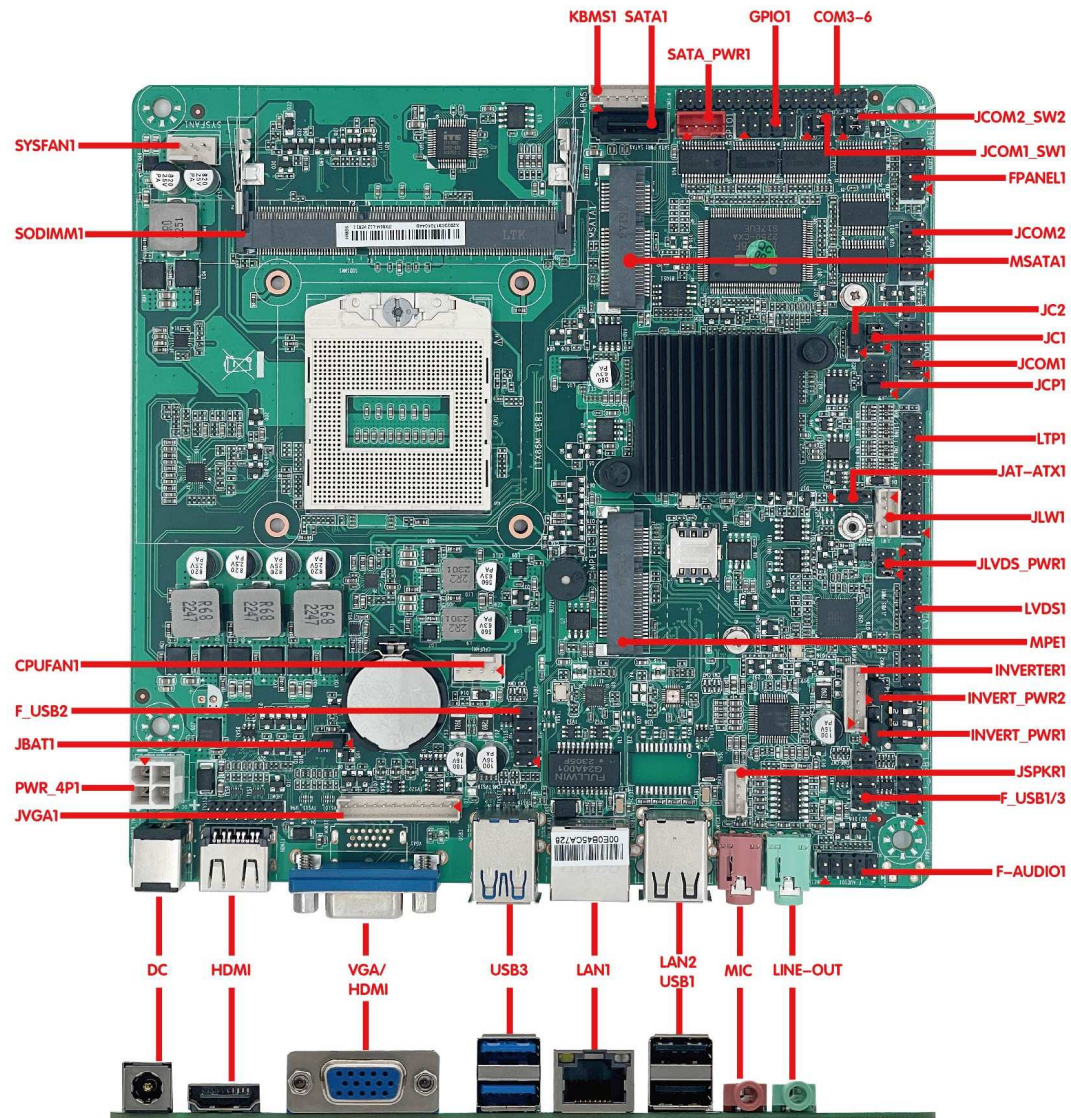
2. Motherboard Block Diagram



3. Motherboard Specifications

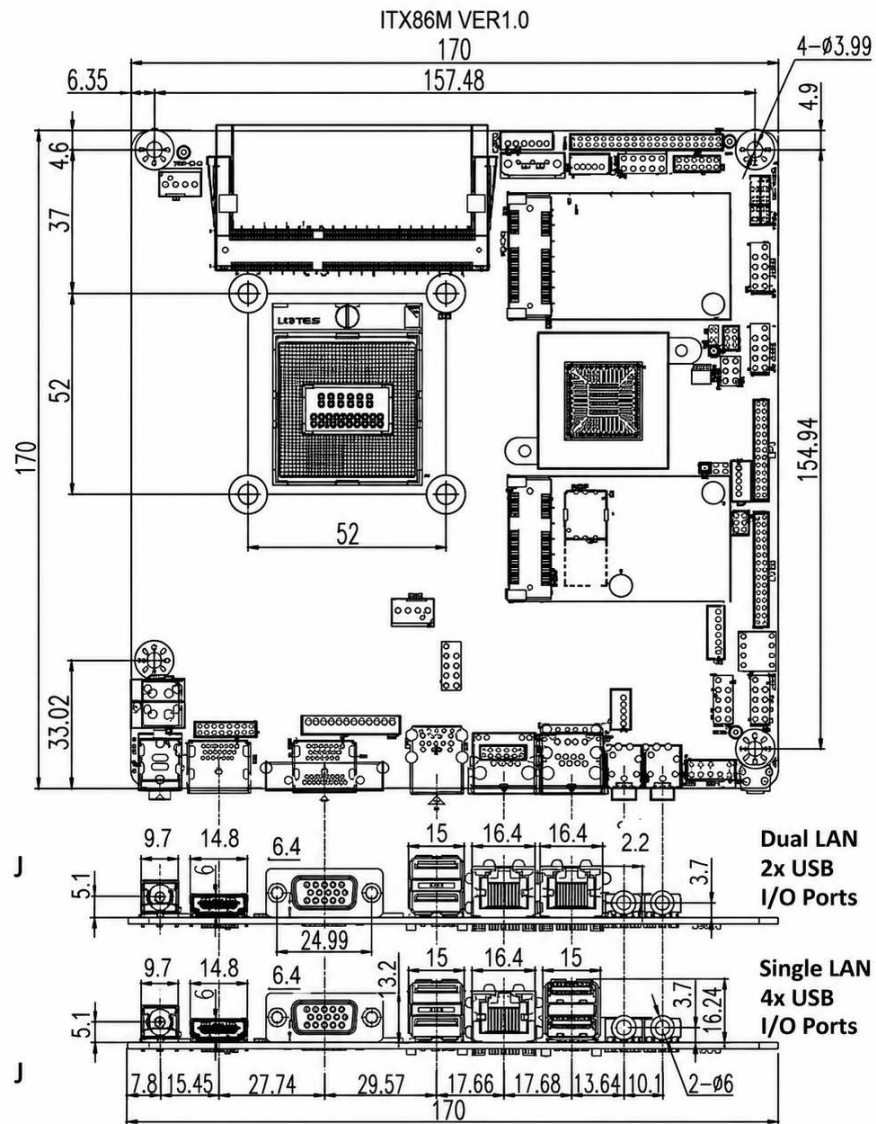
Item	Description
Processor	Supports 4th Generation Intel® Haswell rPGA946 Pentium®, Celeron®, Core™ i3/i5/i7 M-series processors
Chipset	Intel® HM86 or HM87 high-speed chipset
Memory	1 × SO-DIMM slot supporting 1600/1333 MHz DDR3L 1.35 V memory, up to 16 GB
Display	Integrated Intel® HD Graphics
	1 × VGA or HDMI port, 1 × HDMI port, and 1 × LVDS interface
	Supports synchronous/asynchronous triple display via VGA, HDMI, and LVDS; optional dual-HDMI display
LAN	1 × Realtek RTL8111H Gigabit Ethernet controller; a second LAN is optional; supports Wake-on-LAN and PXE boot
Storage	1 × SATA 3.0 interface
	1 × full-size mSATA 3.0 slot
Audio	Onboard ALC662/ALC897 6-channel HD audio controller supporting MIC, Line-out, and dual-channel 5 W amplifier output at 2 ohms
Expansion Slots	1 × Mini PCIe slot supporting half-size and full-size cards for Wi-Fi/4G modules
Rear I/O Ports	1 × HDMI display port
	1 × VGA display port; VGA and HDMI2 are mutually exclusive. Selecting HDMI2 enables dual-HDMI display output.
	2 × USB 3.0 ports
	2 × USB 2.0 ports; these ports and the RJ-45 port are mutually exclusive
	1 × RJ-45 Gigabit Ethernet port; LAN2 and two USB 2.0 ports are mutually exclusive; dual LAN is optional
	1 × Line-out port (green) and 1 × MIC port (red)
	1 × 12 V DC power input connector
Onboard I/O Headers	1 × 2 × 8-pin JHDMI header carrying the same signals as HDMI1
	1 × 1 × 12-pin JVGA header carrying the same signals as DB15
	1 × 2 × 15-pin LVDS header supporting dual-channel 24-bit output
	1 × 1 × 6-pin LCD backlight power connector
	6 × USB 2.0 ports via 2 × 5-pin headers
	1 × 2 × 5-pin front-audio header
	1 × 1 × 4-pin amplifier connector
	6 × COM ports; COM1 and COM2 support RS-485, Pin 9 of COM1/COM2 supports selectable power output, and COM1 RS-422 support requires a hardware modification
	1 × 2 × 13-pin LPT header

	1 × 1 × 6-pin PS/2 header
	1 × drive power connector
	1 × 4-pin ATX power connector
	1 × 2 × 5-pin front-panel switch and LED header
Fan Headers	1 × 4-pin CPU fan header and 1 × 4-pin system fan header
GPIO	Supports four GPIO inputs and four GPIO outputs
BIOS	64Mb Flash ROM
Watchdog	Supports hardware reset with 256 levels from 0 to 255 seconds
Operating System	Windows 7/Windows 10/Linux
Power Input	12 V DC power input
Operating Temperature	-10°C~60°C
Storage Temperature	-20°C~70°C
Operating Humidity	5%-95% relative humidity, non-condensing
Dimensions	170mm x 170mm



The image can be enlarged for viewing. Pin 1 of each header is marked with a red triangle.

The image above shows the ITX86M-L12 VER1.1 motherboard and is for reference only.



The diagram above shows the I/O interface layout of the ITX86M V1.1.

4. Board Installation

Safety Precautions:

Before installing the motherboard, please read and follow the safety precautions below:

- Do not remove or damage the serial number label, distributor warranty label, or any other warranty-related labels on the motherboard before installation. Otherwise, it may affect the warranty validation.
- Before installing or removing the motherboard or any other hardware devices, make sure the power is turned off and the power cord is unplugged from the power outlet.
- When installing hardware devices into the motherboard connectors or slots, make sure the connectors are firmly and properly seated.
- When handling the motherboard, avoid touching the metal contacts or circuit areas to prevent short circuits.
- When handling the motherboard, CPU, or memory module, it is recommended to wear an anti-static wrist strap. If an anti-static wrist strap is not available, make sure your hands are dry and touch a grounded metal object first to discharge static electricity.
- Before installation, place the motherboard on an anti-static mat or inside an anti-static bag.
- Before unplugging the power connector from the motherboard, make sure the power supply is turned off.
- Before turning on the power, make sure the power supply voltage is set according to the local voltage standard.
- Before turning on the power, make sure all hardware cables and power cables are correctly connected.
- Do not allow screws to contact the circuits or components on the motherboard, as this may cause damage or malfunction.
- Make sure no screws or metal objects are left on the motherboard or inside the computer chassis.
- Do not place the computer system on an unstable surface.
- Do not place the computer system in a high-temperature environment.
- Turning on the power during installation may cause damage to the motherboard, other devices, or personal injury.
- If you are not familiar with the installation process, or if you encounter any technical problems while using this product, please consult qualified technical personnel.

Memory Installation

This motherboard provides **1 × 204-pin DDR3L SO-DIMM memory slot**.

Before installing the memory module, please note the following:

- 1) Make sure the memory module you purchased is compatible with the specifications supported by this motherboard.
- 2) Before installing or removing the memory module, make sure the computer power is turned off to prevent damage.
- 3) The memory module is designed with a foolproof notch. If the insertion direction is incorrect, the module cannot be inserted. In this case, please change the insertion direction immediately.

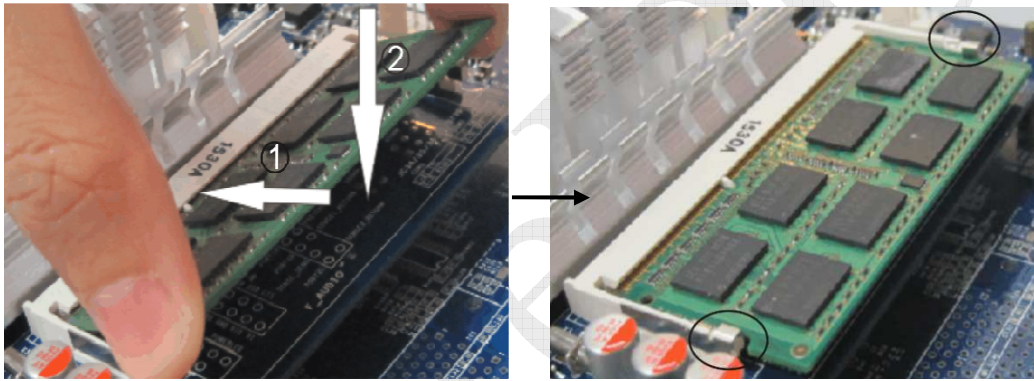
Memory Installation Steps:

- 1) Before installing or removing the memory module, turn off the power and unplug the AC power cord.
- 2) Carefully hold the memory module by both edges. Do not touch the metal contacts.
- 3) Align the gold fingers of the memory module with the memory slot. Make sure the notch on the memory module matches the key in the slot.
- 4) Insert the memory module into the slot at an angle of approximately 30 degrees, then gently press it down until you hear a “click” sound. This indicates that the memory module has been properly installed and is ready for use.

Note: Do not apply excessive force when pressing down the memory module to avoid damage.

- 5) To remove the memory module, push the retaining clips on both sides of the DIMM slot outward at the same time, then remove the memory module carefully.

Note: The installation diagram is for reference only.

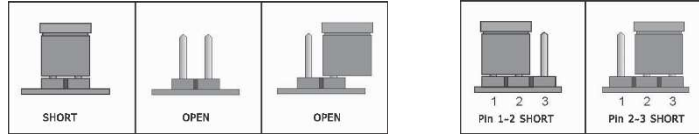


5. Jumper Settings

Jumper Description

For a **2-pin header**, installing a jumper cap on the two pins will close the circuit, creating a short connection.

For a **3-pin header**, the jumper cap can be installed on **Pin 1–2** or **Pin 2–3** to close the corresponding circuit and create a short connection.



How to Identify Pin 1 of a Jumper?

- 1) Carefully check the motherboard. The pin marked with “1” or indicated by a thick white line is usually Pin 1.
- 2) Check the solder pads on the back side of the motherboard. In most cases, the square solder pad indicates Pin 1.

Clear CMOS Jumper:

The motherboard provides 1 × 1×3-pin Clear CMOS header JBAT1 for clearing or retaining CMOS settings.

Pin pitch: 2.54 mm

The CMOS is powered by the onboard button battery. Clearing the CMOS will permanently erase the previous system configuration and restore the system settings to the default factory values.

To clear the CMOS, follow the steps below:

- 1) Turn off the computer and disconnect the power supply.
- 2) Short Pin 2–3 of JBAT1 for approximately 5 seconds.
- 3) Power on the computer.
- 4) During startup, follow the on-screen prompt to enter BIOS Setup, then load the optimized default settings.
- 5) Save the settings and exit BIOS Setup.

Pin definition is shown below:

JBAT1 Definition:

Function	JBAT1 Setting
Normal operation	Pin 1–2 shorted
Clear CMOS and restore all BIOS settings to factory defaults	Pin 2–3 shorted

AT/ATX Power Mode Jumper

The motherboard provides 1 × 1×3-pin **AT-ATX1 jumper** for selecting the power-on mode.

Pin pitch: 2.54 mm

The power-on behavior can be configured by the jumper setting.

AT-ATX1 Definition:

Function	AT-ATX1 Setting
Disable Auto Power-on	1-2Pin
Enable Auto Power-on	2-3Pin

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6. Pin Definitions

6.1. The motherboard provides two standard 2×5 -pin COM headers (pitch: 2.54 mm).

The standard JCOM1 and JCOM2 pin definitions are as follows:

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

JCOM1 and JCOM2 Pin 9 voltage-selection jumper (pitch: 2.0 mm), JCP1 settings:

Interface	Function	JCP1 Setting	Interface	Function	JCP1 Setting
COM1	RI	Pins 1-2 (default)	COM2	RI	Pins 7-8 (default)
	5V	3-4Pin		5V	9-10Pin
	12V	5-6Pin		12V	11-12Pin

6.2. The motherboard provides one 2×3 -pin RS-485 wiring header (pitch: 2.54 mm). When JCOM1 or JCOM2 is configured for RS-485, connect the cable directly to Pins 1-2 of the corresponding COM1/COM2 header and configure the function using JC1, JC2, JCOM1_SW1, and JCOM2_SW2.

The RS-485 function settings for the COM1 header are as follows:

JCOM1_SW1 and JC1 settings:

Port	Function	JCOM1_SW1 Setting	JC1 Setting	Remarks
COM1	RS232	Pins 1-3 and 2-4 (default)	Pins 1-2 (default)	
-6	RS485	3-5 Pin 4-6 Pin	3-4 Pin	The RS-485 function is available on the COM1 header: Pin 1 is COM A and Pin 2 is COM B.

The RS-485 function settings for the COM2 header are as follows:

JCOM2_SW2 and JC2 settings:

Port	Function	JCOM2_SW2 Setting	JC2 Setting	Remarks
COM2	RS232	Pins 1-3 and 2-4 (default)	Pins 1-2 (default)	
	RS485	3-5 Pin 4-6 Pin	2-3 Pin	The RS-485 function is available on the COM2 header: Pin 1 is COM A and Pin 2 is COM B.

6.3. The motherboard provides one standard 2×20 -pin header for four serial ports (pitch: 2.0 mm).

The COM3-COM6 pin definitions are as follows:

PIN	Signal Name	PIN	Signal Name
1	COM3 DCD	2	COM3 RXD
3	COM3 TXD	4	COM3 DTR
5	GND	6	COM3 DSR
7	COM3 RTS	8	COM3 CTS
9	COM3-RI	10	NC
11	COM4 DCD	12	COM4 RXD

13	COM4_TXD	14	COM4_DTR
15	GND	16	COM4_DSR
17	COM4_RTS	18	COM4_CTS
19	COM4-RI	20	NC
21	COM5_DCD	22	COM5_RXD
23	COM5_TXD	24	COM5_DTR
25	GND	26	COM5_DSR
27	COM5_RTS	28	COM5_CTS
29	COM5-RI	30	NC
31	COM6_DCD	32	COM6_RXD
33	COM6_TXD	34	COM6_DTR
35	GND	36	COM6_DSR
37	COM6_RTS	38	COM6_CTS
39	COM6-RI	40	NC

6.4. The motherboard provides one 2×13 -pin LPT1 parallel-port header (pitch: 2.0 mm).

The LPT1 pin definition is as follows:

PIN	Signal Name	PIN	Signal Name
1	STB-	2	AFD-
3	PD0	4	ERR-
5	PD1	6	INIT-
7	PD2	8	SLIN-
9	PD3	10	GND
11	PD4	12	GND
13	PD5	14	GND
15	PD6	16	GND
17	PD7	18	GND
19	ACK-	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	NC

6.5. The motherboard provides one 2×15 -pin LVDS header (pitch: 2.0 mm). The LVDS1 pin definition is as follows:

PIN	Signal Name	PIN	Signal Name
1	LCDVDD	2	LCDVDD
3	LCDVDD	4	NC
5	GND	6	GND
7	LVDS_A0-	8	LVDS_A0+
9	LVDS_A1-	10	LVDS_A1+
11	LVDS_A2-	12	LVDS_A2+
13	GND	14	GND
15	LVDSA_CLK-	16	LVDSA_CLK+
17	LVDS_A3-	18	LVDS_A3+
19	LVDS_B0-	20	LVDS_B0+
21	LVDS_B1-	22	LVDS_B1+
23	LVDS_B2-	24	LVDS_B2+
25	GND	26	GND
27	LVDSB_CLK-	28	LVDSB_CLK+
29	LVDS_B3-	30	LVDS_B3+

The board provides 3.3 V, 5 V, and 12 V LCD operating-voltage options, as well as 5 V and 12 V

backlight power options.

Before using LVDS, verify the required rated operating voltage. The selected LCD voltage must match the voltage required by the LCD panel for normal operation. The settings are as follows:

INVERTER1 (backlight power connector) definition:

PIN	Signal Name
1	12 V/5 V (set by INVERT_PWR1)
2	12 V/5 V (set by INVERT_PWR1)
3	Backlight Enable
4	Backlight Brightness Control
5	GND
6	GND

INVERT_PWR1 (LCD backlight power) settings:

Interface	Function	INVERT_PWR1 Setting
LVDS1	12 V (default)	1-2Pin
	5V	2-3Pin

INVERT_PWR2 (LCD PWM polarity inversion) settings:

Interface	Function	INVERT_PWR2 Setting
LVDS1	High Level	Pins 1-2 (default)
	Low Level	2-3Pin

JLVDS_PWR1 (LCD operating voltage) settings:

Interface	Function	JLVDS_PWR1 Setting
LVDS1	3.3 V (default)	1-2Pin
	5V	3-4Pin
	12V	5-6pin

JLW1 (LCD brightness control connector) definition:

Pin	Signal Name
1	BLU+ Brightness Increase
2	BLU- Brightness Decrease
3	Backlight Enable
4	GND

The motherboard provides one SW1 DIP switch for setting the LVDS resolution. Detailed settings are shown below:

N o.	DIP Switch Setting	Resolution / Bit Depth	N o.	DIP Switch Setting	Resolution / Bit Depth	N o.	DIP Switch Setting	Resolution / Bit Depth
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1		800 × 600, Single-channel 6-bit	2		1024 × 768, Single-channel 6-bit	3		1280 × 768, Single-channel 6-bit
4		1280 × 800, Single-channel 6-bit	5		1280 × 960, Single-channel 6-bit	6		1280 × 1024, Dual-channel 8-bit
7		1366 × 768, Single-channel 6-bit	8		1366 × 768, Single-channel 8-bit	9		1440 × 900, Dual-channel 8-bit
10		1024 × 600, Single-channel 6-bit	11		1920 × 1080, Dual-channel 6-bit, 15.6-inch	12		1920 × 1080, Dual-channel 8-bit, 21.5-inch
13		1920 × 1080, Dual-channel 8-bit, 42-inch	14		1280 × 1024, Dual-channel 8-bit	15		1280 × 800, Single-channel 8-bit
16		1024 × 768, Single-channel 8-bit	17			18		

6.6. The motherboard provides one onboard 1 × 12-pin JVGA1 connector (pitch: 2.0 mm), which carries the same signals as VGA1.

JVGA1 definition:

Pin	Signal Name	Pin	Signal Name
1	NC	2	VSYNC
3	HSYNC	4	GND
5	R	6	GND
7	G	8	GND
9	B	10	GND
11	DDC_SDA	12	DDC_SCL

6.7. The motherboard provides one 2 × 8-pin JHDMI header (pitch: 2.0 mm). JHDMI1 carries the same signals as the standard HDMI port.

The JHDMI1 pin definition is as follows:

Pin	Signal Name	Pin	Signal Name
1	TMDS Data2+	2	SCL
3	TMDS Data2-	4	SDA
5	TMDS Data1+	6	NC
7	TMDS Data1-	8	Hot Plug Detect
9	TMDS Data0+	10	+5V Power
11	TMDS Data0-	12	GND
13	TMDS Clock+	14	GND

15	TMD5 Clock-	16	GND
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6.8. The motherboard provides one 2×5 -pin front-audio header (pitch: 2.54 mm). The F_AUDIO1 pin definition is as follows:

Pin	Signal Name	Pin	Signal Name
1	MIC-L	2	GND
3	MIC-R	4	NC
5	Line out-R	6	Sense Return1
7	GND	8	NC
9	Line OUT-L	10	Sense Return2

6.9. The motherboard provides one onboard 1×4 -pin amplifier connector (pitch: 2.0 mm), supporting dual-channel 5 W output at 2 ohms. The JSPKR1 pin definition is as follows:

Pin	Signal Name	Pin	Signal Name
1	SPKL-	2	SPKL+
3	SPKR-	4	SPKR+

6.10. The motherboard provides three 2×5 -pin USB 2.0 headers (pitch: 2.54 mm), supporting six USB 2.0 ports. The single-LAN version supports up to 10 USB ports, while the dual-LAN version supports up to 8 USB ports. The F_USB1, F_USB2, and F_USB3 pin definitions are as follows:

Pin	Signal Name	Pin	Signal Name
1	+5V	2	+5V
3	Data0-	4	Data1-
5	Data0+	6	Data1+
7	GND	8	GND
9		10	GND

6.11. The motherboard provides one 1×6 -pin PS/2 keyboard and mouse header (pitch: 2.0 mm). The KBMS1 pin definition is as follows:

Pin	Signal Name	Pin	Signal Name
1	+5V(standby)	2	KB_DT
3	KB_CK	4	MS_DT
5	MS_CK	6	GND

6.12. The board provides two 1×4 -pin smart-fan headers. The CPUFAN1 and SYSFAN1 pin definitions are as follows:

Pin	Signal Name
1	GND
2	+12V
3	DET
4	PWM

Note: DET is the fan-speed pulse output; PWM controls the fan speed.

6.13. The board provides one red 1×4 -pin SATA drive power connector (pitch: 2.0 mm). The SATA_PWR1 pin definition is as follows:

Pin	Signal Name
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1	+12V
2	GND
3	GND
4	+5V

Make sure the position of Pin 1 on SATA_PWR1 is correctly identified; incorrect connection may damage the drive. Use only the supplied CoreIPC power cable.

6.14. The board provides one 2 × 5-pin FPANEL1 header (pitch: 2.54 mm).

The chassis power switch, reset switch, HDD LED, and power LED can be connected to this header. The FPANEL1 pin definition is as follows:

Pin	Signal Name	Pin	Signal Name
1	HDDLED+	2	PWRLED+
3	HDDLED-	4	PWRLED-
5	GND	6	PWRBTN#
7	RESETBTN#	8	GND
9	NC	10	

6.15. The motherboard provides one 2 × 5-pin GPIO header (pitch: 2.54 mm). The GPIO1 pin definition is as follows:

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