

# ITX-Z3588 Mainboard Specification

|         |            |
|---------|------------|
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# Changelog

|       |            |                                     |
|-------|------------|-------------------------------------|
| 1.0.0 | 2023-10-24 | Chinese and English merged version. |
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# 1 RK3588 Brief

RK3588 chip has the characteristics of high performance and high expansion application. At present, it is the most cost-effective chip in the Rockchip product line, and its hardware specifications are in a leading position in the industry.

- CPU: Octa-core 64-bit size core architecture, quad-core Cortex-A76 + quad-core Cortex-A55, based on high-end 8nm technology, the main frequency is up to 2.4GHz.
- GPU: ARM Mali-G610 MC4, support OpenGL ES 1.1/2.0/3.1/3.2, OpenCL 1.1,1.2,2.0, Vulkan 1.1,1.2, Embedded high performance 2D image acceleration module.
- NPU: 6 tops AI work force, three nuclear architecture, support int4/int8/int16/FP16/BF16/TF32.
- Multimedia: Support H.265/H.264/AV1/VP9/AVS2 video decoding, up to 8K@60FPS; Support H.264/H.265 video encoding, up to 8K@30FPS.
- Display: Support multiple screen display, up to 8K@60FPS; Supports EDP/DP/HDMI2.1/MIPI display interfaces \*
- Video input: Supports multiple camera input (4\*4lanes or 4\*2lanes+2\*4Lanes) MIPI CSI-2 and DVP interface; 32MP ISP, support HDR and 3DNR; Supports HDMI2.0 input, up to 4K@60FPS \*
- High speed interface: Support PCIe3.0/PCIe2.0/SATA3.0/RGMII/TYPER-C/USB3.1/USB2.0\*



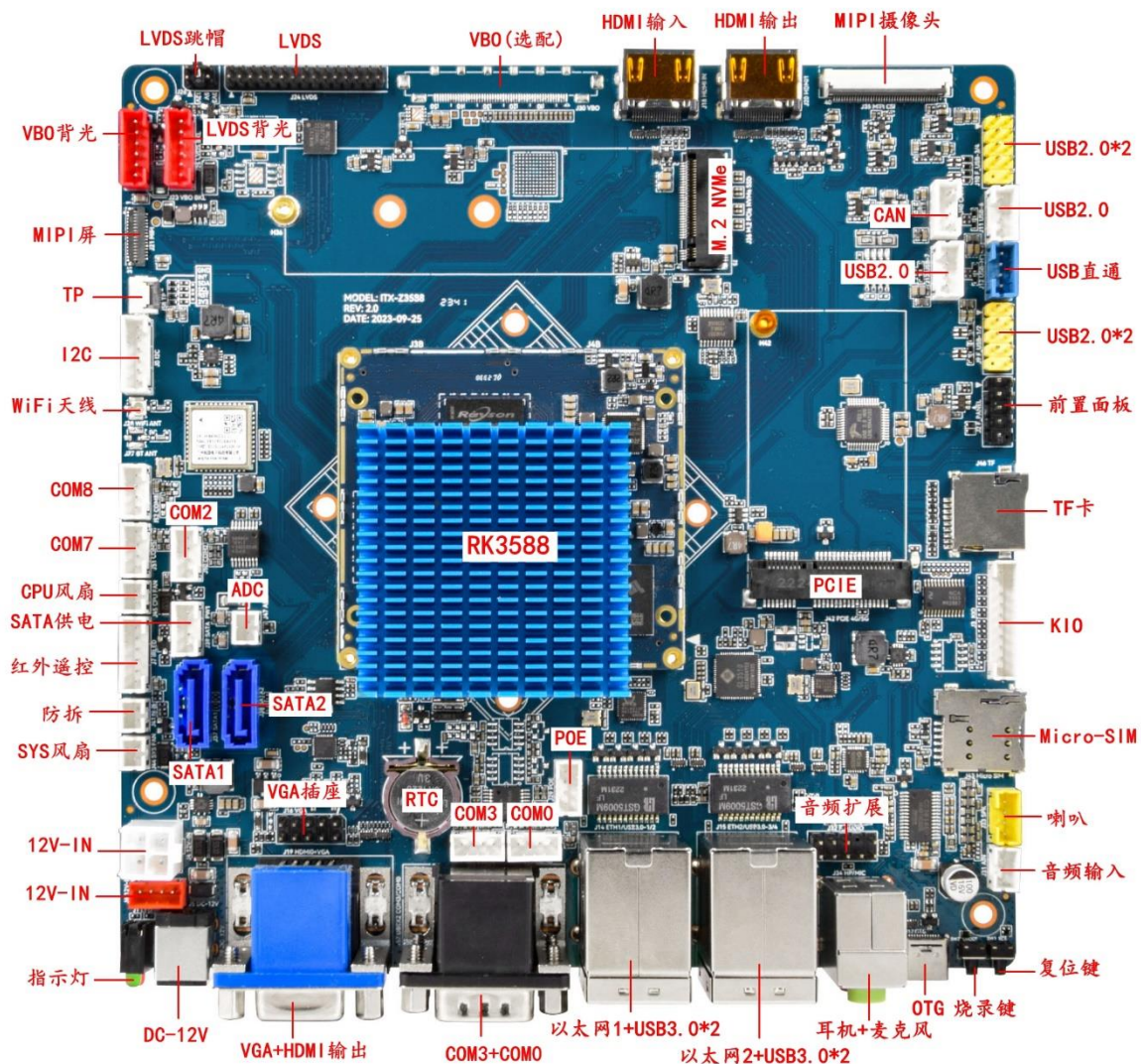
**\* Related functions are internal features of the CPU. For details about whether the mainboard supports these functions, see the corresponding interface descriptions.**

## 2 Product Overview

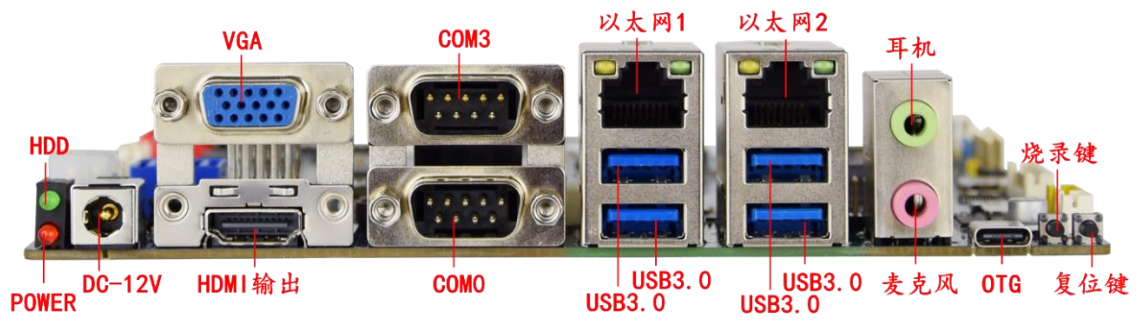
ITX-Z3588 mainboard is based on Rockchip RK3588 high-performance application processor platform. RK3588 is a low power, high performance processor for computing, personal mobile internet devices and other smart device applications. It integrates quad-core Cortex-A76 , quad-core Cortex-A55, and Mali-G610 MC4 high-performance GPUs clocked at up to 2.4GHz, with superior computing performance, 2D/3D graphics processing capabilities and Full HD video codec capabilities. It perfectly supports 8K@60fps decoding and 8K@60fps output.

This mainboard is specially designed for **Self-Service Terminal** applications with strict material selection and design. The compact size and rich interface facilitate its integration into the complete machine, bringing a smooth experience and superior performance to the final product. It can be applied to digital signage, touch interactive, consumer electronics, entertainment systems and other industries.

ITX-Z3588 V2.0 mainboard actual interface diagram as shown below.



Top view



Front view

### 3 Specification List

ITX-Z3588's system functions and interface features are shown in the following table. It is composed of Z-3588 core board and ITX-Z3588 base board.

Z-3588 core board features are listed below.

| Function & Interface    | Detailed Description  |
|-------------------------|---|
| <b>CPU</b>              | RK3588 Quad-core Cortex-A76 and Quad-core Cortex-A55, up to 2.4GHz        |
| <b>DDR</b>              | LPDDR4 4GB (8GB 16GB 32GB optional)                                       |
| <b>Storage</b>          | The default comes with an 32GB EMMC NAND chip that can scale up to 128GB  |
| <b>Operating System</b> | Recommended Android 12.0, Linux Buildroot/Debian 11/Ubuntu-20.04 optional |

ITX-Z3588's system functions and interface features are shown in the following table.

| Function & Interface     | Detailed Description   |
|--------------------------|--|
| <b>LVDS</b>              | 30-pin industry-standard dual LVDS supporting VESA/JEITA format up to 1080P output   |
| <b>MIPI-DSI</b>          | 31-Pin FPC MIPI-DSI display port supporting up to 1920x1200  |
| <b>HDMI Output</b>       | 2-way HDMI 2.1 standard display interface supports up to 8K output   |
| <b>VGA Output</b>        | Industry-standard DB-15 and 9-pin header VGA output up to 1080P  |
| <b>4K LCD</b>            | Industry-standard 51-Pin 4K LCD cable VBO display interface (optional)   |
| <b>HDMI Input</b>        | HDMI 2.0/1.4b standard video input interface supports 720P and 1080P signals   |
| <b>Amplifier output</b>  | 8 Ohm 6W Dual Audio Amplifier Output   |
| <b>Headphone Output</b>  | Stereo Headphone Output (Audio Jack)   |
| <b>MIC Input</b>         | Differential MIC input (Audio Jack)  |
| <b>PCIE 4G/5G</b>        | 1 Industry standard m-PCIE 4G module interface with <b>Micro-SIM</b> card socket   |
| <b>eSIM</b>              | Onboard eSIM chip (optional), supports network communication of the PCIE 4G/5G module  |
| <b>USB Interface</b>     | 4 horizontal connectors (USB Host 3.0x4), 3 pin headers (USB Hub 2.0x2 and USB Host 2.0x1 direct), 2 sets of USB front (USB Hub 2.0x4)         |
| <b>Serial Port</b>       | 2 TTL/232/485 DB-9 serial port, with signal & power isolation ( <b>reuse</b> ); 2 TTL/RS-232/RS-485 compatible, 2 TTL/RS-232 compatible, 1 TTL |
| <b>USB Camera</b>        | Support USB camera within 8 million pixels   |
| <b>Dual MIPI Camera</b>  | 40-Pin FPC Dual MIPI HD camera port, binocular LED_5V controls IO=#108(E.g. SV-ZI16-90 REV1.1)   |
| <b>WiFi</b>              | Built-in high performance SDIO interface WiFi6 module, support IEEE 802.11 a/b/g/n/ac/ax   |
| <b>Bluetooth</b>         | Built-in high performance serial interface BT module with support for V2.1+EDR/BT v3.0/BT v3.0+HS/BT v4.0/BT v5.0                              |
| <b>Ethernet</b>          | 2 port 10/100/1000M Adaptive Ethernet RJ45 connector <b>with 4-Pin PoE PD header</b>   |
| <b>Backlight Control</b> | 2 ways Industry standard LCD backlight control header, support for backlight switch and brightness adjustment                                  |
| <b>Infrared RC</b>       | Standard infrared receiver pin header  |
| <b>GPIO Signals</b>      | 8-way GPIO signals for such as GPIO buttons and/or 3.3V digital input/output   |



| <b>Function &amp; Interface</b> | <b>Detailed Description</b>   |
|---------------------------------|---|
| <b>CAN Bus</b>                  | 1 CAN pin header for CAN Bus peripherals  |
| <b>Tamper Port</b>              | 1 Tamper control port   |
| <b>SATA HD</b>                  | 2-way Standard SATA 3.0 hard disk port with power supply header                   |
| <b>M.2 PCIE NVME Port</b>       | 1 Supports M.2 PCIE NVME SSDS, support for M.2 NVME 2242/2260/2280 SSDS           |
| <b>TF Card</b>                  | Self-elastic TF card socket, up to 256GB capacity                                 |
| <b>I2C Bus</b>                  | I2C pin header with FPC for I2C capacitive screen and etc                         |
| <b>Front Panel</b>              | 1 F_PANEL port for connecting to the double-row pins on the front panel           |
| <b>Audio Extension</b>          | 1 F_AUDIO port used to connect the front earphone to the microphone               |
| <b>Real Time Clock</b>          | Ultra-low-power RTC circuit (CR1220 battery) with timer and alarm functionalities |
| <b>LED Indicator</b>            | Red LED indicator for standby and green LED indicator for running                 |
| <b>Buttons</b>                  | Recovery mode button and reset button   |
| <b>Gravity Induction</b>        | Support gravity sensing function to achieve automatic screen rotation (optional)  |
| <b>Face Authorization</b>       | Support for Megvii face chip, provide algorithm hardware authorization (optional) |
| <b>DC Input</b>                 | Supports 9~15V wide voltage DC power input  |
| <b>Ambient Requirement</b>      | Working temperature -20°C ~ 70°C, working humidity 0%~95% (non-condensing)        |
| <b>Physical Size</b>            | Length*Width*Height (170mm*170mm*32.2mm), <b>PCB top side height 30.7mm</b>       |

## 4 Interface definition

### ➤ J1 Dual-Tier LED

[J1] User defined dual-tier LED. Lower power LED light (on the power); Upper level LED lights (flicker controlled by software after turning on).

### ➤ J2 Front Panel Header

[J2] Front Panel Header (DIP 2.54mm-Square pad is pin 1).

| Pin# | Definition | Note            | Pin# | Definition | Note                   |
|------|------------|-----------------|------|------------|------------------------|
| 1    | HDD+       | Running light + | 2    | LED+       | Power indicator light+ |
| 3    | HDD-       | Running light - | 4    | LED-       | Power indicator light- |
| 5    | RES-       | Reset-          | 6    | PW-        | Power switch-          |
| 7    | RES+       | Reset+          | 8    | PW+        | Power switch+          |
| 9    | GND        | Digital Ground  | 10   | Null       | Null                   |

### ➤ J3 KIO Keypad Header

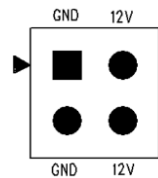
[J3] KIO Keypad Header (SIP 2.0mm-Square pad is pin 1).

| Pin# | Definition | Note                           |
|------|------------|--------------------------------|
| 1    | 3V3        | 3.3V Supply                    |
| 2    | K1         | Keypad/IO[Software number 493] |
| 3    | K2         | Keypad/IO[Software number 494] |
| 4    | K3         | Keypad/IO[Software number 495] |
| 5    | K4         | Keypad/IO[Software number 496] |
| 6    | K5         | Keypad/IO[Software number 497] |
| 7    | K6         | Keypad/IO[Software number 498] |
| 8    | K7         | Keypad/IO[Software number 499] |
| 9    | K8         | Keypad/IO[Software number 500] |
| 10   | GND        | Digital Ground                 |

Note: All KIO signals can be adjusted to regular GPIO via a separated software version (level is 3.3V).

### ➤ J4 ATX 12V-IN Power Header

[J4] ATX 12V-IN Power Header (SIP 4.2mm-Square pad is pin 1), it is the same to J5/J6 Jack.



| Pin# | Definition | Note                   |
|------|------------|------------------------|
| 1    | GND        | Power GND              |
| 2    | GND        | Power GND              |
| 3    | 12V        | DC Power Input (9~15V) |
| 4    | 12V        | DC Power Input (9~15V) |

### ➤ J5 DC-12V Jack

[J5] DC-12V power socket, positive outer and negative inner, inner pin diameter 2.0mm, outer ring diameter 5.5mm.

### ➤ J6 DC-12V Input Header

[J6] DC-12V Input Header (SIP 2.0mm-Square pad is pin 1).

| Pin# | Definition | Note                   |
|------|------------|------------------------|
| 1    | 12V        | DC Power Input (9~15V) |
| 2    | 12V        | DC Power Input (9~15V) |
| 3    | GND        | Power Ground           |
| 4    | GND        | Power Ground           |

### ➤ J7 Remote Control & LED Header

[J7] Remote Control & LED Header (SIP 2.0mm-Square pad is pin 1).

| Pin# | Definition | Note                                      |
|------|------------|---|
| 1    | 5VS        | Power output 5V standby                   |
| 2    | GND        | Digital Ground                            |
| 3    | IR         | 5V level Irda remote control input signal |
| 4    | IO         | 3.3V level GPIO input signal              |
| 5    | GREEN      | Running indicator for external green LED  |
| 6    | RED        | Standby indicator for external red LED    |

### ➤ J8 I2C Bus Header

[J8] I2C Bus Header (SIP 2.0mm-Square pad is pin 1).

| Pin# | Definition | Note                                |
|------|------------|-------------------------------------|
| 1    | GND        | Digital Ground                      |
| 2    | INT        | Interrupt input (3.3V level)        |
| 3    | SDA        | I2C Bus data signal                 |
| 4    | SCL        | I2C Bus clock signal                |
| 5    | RST        | Mainboard reset output (3.3V level) |
| 6    | 3V3        | Power output supply 3.3V            |

### ➤ J9 USB 2.0 DIP Header

[J9] USB 2.0 header (DIP 2.54mm-Square pad is pin 1).

| Pin# | Definition | Note                   | Pin# | Definition | Note                   |
|------|------------|------------------------|------|------------|------------------------|
| 1    | 5V         | Power output 5V        | 2    | 5V         | Power output 5V        |
| 3    | D-         | USB Differential Data+ | 4    | D-         | USB Differential Data+ |
| 5    | D+         | USB Differential Data- | 6    | D+         | USB Differential Data- |
| 7    | GND        | Digital Ground         | 8    | GND        | Digital Ground         |
| 9    | Null       | Null                   | 10   | GND        | Digital Ground         |

**Note:** This port is the main chip USB20\_HOST1 port Hubx7 expansion port.

### ➤ J10 USB 2.0 DIP Header

[J10] USB 2.0 header (DIP 2.54mm-Square pad is pin 1).

| Pin# | Definition | Note                   | Pin# | Definition | Note                   |
|------|------------|------------------------|------|------------|------------------------|
| 1    | 5V         | Power output 5V        | 2    | 5V         | Power output 5V        |
| 3    | D-         | USB Differential Data+ | 4    | D-         | USB Differential Data+ |
| 5    | D+         | USB Differential Data- | 6    | D+         | USB Differential Data- |
| 7    | GND        | Digital Ground         | 8    | GND        | Digital Ground         |
| 9    | Null       | Null                   | 10   | GND        | Digital Ground         |

**Note:** This port is the main chip USB20\_HOST1 port Hubx7 expansion port.

### ➤ J11 USB 2.0 Host Header

[J11] USB 2.0 Host Header (SIP 2.0mm-Square pad is pin 1)

| Pin# | Definition | Note                   |
|------|------------|------------------------|
| 1    | GND        | Digital Ground         |
| 2    | D+         | USB Differential Data+ |
| 3    | D-         | USB Differential Data- |
| 4    | 5V         | Power output 5V        |

**Note:** This port is the main chip USB20\_HOST1 port Hubx7 expansion port.

### ➤ J12 USB 2.0 Host Direct Header

[J12] USB 2.0 Host Direct Header (SIP 2.0mm- Square pad is pin 1).

| Pin# | Definition | Note                   |
|------|------------|------------------------|
| 1    | GND        | Digital Ground         |
| 2    | D+         | USB Differential Data+ |
| 3    | D-         | USB Differential Data- |
| 4    | 5V         | Power output 5V        |

**Note: This port is directly connected to the USB port of the main chip USB20\_HOST0.**

### ➤ J13 USB 2.0 Host Header

[J13] USB 2.0 Host Header (SIP 2.0mm-Square pad is pin 1)

| Pin# | Definition | Note                   |
|------|------------|------------------------|
| 1    | GND        | Digital Ground         |
| 2    | D+         | USB Differential Data+ |
| 3    | D-         | USB Differential Data- |
| 4    | 5V         | Power output 5V        |

**Note: This port is the main chip USB20\_HOST1 port Hubx7 expansion port.**

### ➤ J14 RJ45 Ethernet + Double USB Socket

[J14] Extended RJ45 Ethernet + Double USB Socket. Three-layer combination socket. From top to bottom, they are extended RJ45 Gigabit Ethernet Jack, USB host 3.0 and USB host 3.0. **Note: This port USB is the main chip USB3\_HOST1 port Hubx4 expansion port.**

### ➤ J15 RJ45 Ethernet + Double USB Socket

[J15] RJ45 Ethernet + Double USB Socket. Three-layer combination socket. From top to bottom, they are RJ45 Gigabit Ethernet Jack, USB host 3.0 and USB host 3.0. **Note: This port USB is the main chip USB3\_HOST1 port Hubx4 expansion port.**

### ➤ J16 VGA Output Header

[J16] VGA Output Header (DIP 2.54mm-Square pad is pin 1).

| Pin# | Definition | Note              | Pin# | Definition | Note           |
|------|------------|-------------------|------|------------|----------------|
| 1    | RED        | Red analog signal | 2    | GND        | Digital Ground |

|   |      |                                   |    |      |                     |
|---|------|-----------------------------------|----|------|---------------------|
| 3 | GRN  | Green analog signal               | 4  | GND  | Digital Ground      |
| 5 | BLUE | Blue analog signal                | 6  | GND  | Digital Ground      |
| 7 | HS   | Horizontal synchronization signal | 8  | DATA | Serial data signal  |
| 9 | VS   | Vertical synchronization signal   | 10 | CLK  | Serial clock signal |

### ➤ J17 USB OTG Header

[J17] USB 3.0 Type-C Socket, **this port should only be used as system burn or ADB connection.**

### ➤ J18 HDMI Input Jack

[J18] Standard HDMI Input Socket.

### ➤ J19 VGA + HDMI 0 Output Socket

[J19] Standard DB-15 VGA and HDMI 2.0 Output Sockets.

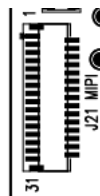
### ➤ J20 HDMI Output Socket 1

[J20] Standard HDMI 2.0 Output Socket 1.

**Note: J20 and J30 VBO are the same signal source and cannot be used at the same time.**

### ➤ J21 MIPI Panel FPC Connector

[J21] MIPI Panel FPC Connector (FPC-0.3mm 31-Pin **Bottom Contact**).



| Pin# | Definition | Note          |
|------|------------|---------------|
| 1    | LED+       | LED Anode     |
| 2    | LED+       | LED Anode     |
| 3    | LED+       | LED Anode     |
| 4    | NC         | Not Connected |
| 5    | LED-       | LED Cathode   |
| 6    | LED-       | LED Cathode   |
| 7    | LED-       | LED Cathode   |
| 8    | LED-       | LED Cathode   |

|    |          |   |
|----|----------|---|
| 9  | GND      | Digital Ground  |
| 10 | GND      | Digital Ground  |
| 11 | MIPI_D2P | +MIPI differential lane2  |
| 12 | MIPI_D2N | -MIPI differential lane2  |
| 13 | GND      | Digital Ground  |
| 14 | MIPI_D1P | +MIPI differential lane1  |
| 15 | MIPI_D1N | -MIPI differential lane1  |
| 16 | GND      | Digital Ground  |
| 17 | MIPI_CKP | +MIPI differential clock output                                       |
| 18 | MIPI_CKN | -MIPI differential clock output                                       |
| 19 | GND      | Digital Ground  |
| 20 | MIPI_D0P | +MIPI differential lane0  |
| 21 | MIPI_D0N | -MIPI differential lane0  |
| 22 | GND      | Digital Ground  |
| 23 | MIPI_D3P | +MIPI differential lane3  |
| 24 | MIPI_D3N | -MIPI differential lane3  |
| 25 | GND      | Digital Ground  |
| 26 | VDD-1V8  | Power Supply 1.8V (Not connected by default, need to solder R9232 0R) |
| 27 | RESET    | Reset Signal in 1.8V  |
| 28 | GND      | Digital Ground  |
| 29 | VDD-1V8  | Power Supply 1.8V   |
| 30 | VDD-3V3  | Power Supply 3.3V   |
| 31 | VDD-3V3  | Power Supply 3.3V   |

### ➤ J23 VBO Backlight Control Header

[J23] VBO Backlight Control Header (SIP 2.0mm-Square pad is pin 1).

| Pin# | Definition | Note   |
|------|------------|--|
| 1    | 12V        | If the current exceeds 2A, external 12V is recommended                               |
| 2    | 12V        | If the current exceeds 2A, it is recommended to connect an external 12V power supply |
| 3    | EN         | The default output is 5V   |
| 4    | ADJ        | 3.3V square wave (1KHz Freq.)  |
| 5    | GND        | Power Ground   |
| 6    | GND        | Power Ground   |

### ➤ J24 LVDS Header

[J24] Dual LVDS header (DIP 2.0mm-Triangle tag is pin 1).

| Pin# | Definition | Pin# | Definition |
|------|------------|------|------------|
| 1    | VLCD       | 2    | VLCD       |

|    |       |    |       |
|----|-------|----|-------|
| 3  | VLCD  | 4  | GND   |
| 5  | GND   | 6  | GND   |
| 7  | RX00- | 8  | RX00+ |
| 9  | RX01- | 10 | RX01+ |
| 11 | RX02- | 12 | RX02+ |
| 13 | GND   | 14 | GND   |
| 15 | RX0C- | 16 | RX0C+ |
| 17 | RX03- | 18 | RX03+ |
| 19 | RXE0- | 20 | RXE0+ |
| 21 | RXE1- | 22 | RXE1+ |
| 23 | RXE2- | 24 | RXE2+ |
| 25 | GND   | 26 | GND   |
| 27 | RXEC- | 28 | RXEC+ |
| 29 | RXE3- | 30 | RXE3+ |

### ➤ J25 LVDS Backlight Control Header

[J25] LVDS Backlight Control Header (SIP 2.0mm-Square pad is pin 1).

| Pin# | Definition | Note   |
|------|------------|--|
| 1    | 12V        | If the current exceeds 2A, external 12V is recommended |
| 2    | 12V        | If the current exceeds 2A, external 12V is recommended |
| 3    | EN         | The default output is 5V                               |
| 4    | ADJ        | 3.3V square wave (1KHz Freq.)                          |
| 5    | GND        | Power Ground   |
| 6    | GND        | Power Ground   |

**Note: If the external DC input power supply exceeds 12V, be sure to confirm that the backlight of the LCD screen can withstand the corresponding voltage.**

### ➤ J26 LVDS Voltage Header

[J26] LVDS Voltage Header (DIP 2.0mm-Triangle tag is pin 1). If pin 1 and 2 are jumper shorted, the VLCD of J24 is 12V. If pin 3 and 4 are jumper shorted, the VLCD of J24 is 5V. If pin 5 and 6 are jumper shorted, the VLCD of J24 is 3.3V. Please adjust the jumper position according to the actual logic voltage of the LCD screen. Be careful not to jumper to the wrong position or it may damage the LCD screen and the motherboard circuit.

**Note: If the external DC input power supply exceeds 12V, be sure to confirm that the logic part of the LCD screen can withstand the corresponding voltage.**



### ➤ J28 WiFi Antenna IPEX

[J28] Standard IPEX 3dBi antenna connector (Φ2.0mm).

### ➤ J29 POE PD Header

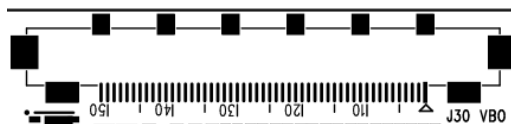
[J29] POE PD Header (SIP 2.0mm-Square pad is pin 1)

| Pin# | Definition | Note                |
|------|------------|---------------------|
| 1    | CT1        | Transformer Center1 |
| 2    | CT2        | Transformer Center2 |
| 3    | CT3        | Transformer Center3 |
| 4    | CT4        | Transformer Center4 |

**Note:** The power supply of the POE powered interface comes from the J15 Ethernet port. This interface is connected to the POE powered conversion board for 12V power supply conversion. The current size of the 12V power supply is affected by the power supply capability of the POE switch and the conversion capability of the adapter board. The typical current is 2.1 A. This interface supports POE power supply equipment with 1/2 wires of the network cable being positive and 3/6 wires being negative. It can also be connected to POE power supply equipment with 4/5 wires of the network cable being positive and 7/8 wires being negative.

### ➤ J30 VBO 4K LCD Socket

[J30] 4K LCD socket (I-PEX -0.5mm 51-Pin **Bottom** Contact-Square pad is pin 1).



**Note:** J30 and J20 HDMI1 are the same signal source and cannot be used at the same time.

### ➤ J31 Audio Input Header

[J31] Audio input header (SIP 2.0mm-Square pad is pin 1).

| Pin# | Definition | Note                     |
|------|------------|--------------------------|
| 1    | RIN        | Line input right channel |
| 2    | GND        | Audio Ground             |
| 3    | LIN        | Line input left channel  |

## ➤ J32 Audio Extension Interface

[J32] Audio Line Output (DIP 2.54mm-Square pad is pin 1).

| Pin# | Definition | Note                                  | Pin# | Definition | Note                           |
|------|------------|---------------------------------------|------|------------|--------------------------------|
| 1    | MIC-L      | Analog left channel microphone input  | 2    | GND        | Audio Ground                   |
| 3    | MIC-R      | Analog right channel microphone input | 4    | SENSE      | Front audio induction signal   |
| 5    | HP-R       | Analog stereo output right channel    | 6    | MIC-DEL    | Front microphone detect signal |
| 7    | GND        | Audio Ground                          | 8    | null       | null                           |
| 9    | HP-L       | Analog stereo output left channel     | 10   | HP-DEL     | Front headphone detect signal  |

## ➤ J33 Speaker Header

[J33] Speaker Header (SIP 2.0mm-Square pad is pin 1).

| Pin# | Definition | Note                    |
|------|------------|-------------------------|
| 1    | OUTP_R+    | Speaker right channel + |
| 2    | OUTN_R-    | Speaker right channel - |
| 3    | OUTN_L-    | Speaker left channel -  |
| 4    | OUTP_L+    | Speaker left channel +  |

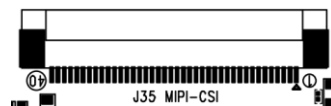
## ➤ J34 Headphones + MIC IN Jack

[J34] The upper layer is 3-Pole 3.5mm Headphone Jack (CTIA Standard jack). It supports insert detection for speaker mute. The lower level is 3.5mm Microphone Jack. Support for 2 and 3 segment microphones.



## ➤ J35 Dual MIPI Camera FPC Connector

[J35] Dual MIPI Camera FPC Connector (FPC-0.5mm 40-Pin **Top/Bottom Contact Triangle Pin-1**).



| Pin# | Definition   | Note                         |
|------|--------------|------------------------------|
| 1    | IR_AVDD_2V8  | 2.8V IR Camera Power Supply  |
| 2    | RGB_AVDD_3V3 | 3.3V RGB Camera Power Supply |
| 3    | IR_PWDN      | IR Camera Power Down         |

|    |               |  |
|----|---------------|--|
| 4  | IR_RST        | IR Camera Reset  |
| 5  | I2C_SCL       | I2C Clock  |
| 6  | I2C_SDA       | I2C Data   |
| 7  | GND           | Digital Ground   |
| 8  | IR_MCLK       | IR Camera Main Clock                                   |
| 9  | GND           | Digital Ground   |
| 10 | IR_MCP        | IR Camera MIPI Clock Positive                          |
| 11 | IR_MCN        | IR Camera MIPI Clock Negative                          |
| 12 | GND           | Digital Ground   |
| 13 | IR_MDPO       | IR Camera MIPI Data0 Positive                          |
| 14 | IR_MDNO       | IR Camera MIPI Data0 Negative                          |
| 15 | GND           | Digital Ground   |
| 16 | IR_MDP1       | IR Camera MIPI Data1 Positive                          |
| 17 | IR_MDN1       | IR Camera MIPI Data1 Negative                          |
| 18 | GND           | Digital Ground   |
| 19 | DOVDD_1V8     | 1.8V Power Supply                                      |
| 20 | <b>FSIN</b>   | <b>Control sensor synchronization, control IO=#107</b> |
| 21 | <b>LED_IO</b> | <b>Binocular LED_5V, control IO=#108</b>               |
| 22 | IR_DVDD_1V2   | 1.2V Power Supply                                      |
| 23 | RGB_DVDD_1V2  | 1.2V Power Supply                                      |
| 24 | RGB_PWDN      | RGB Camera Power Down                                  |
| 25 | RGB_RST       | RGB Camera Reset                                       |
| 26 | GND           | Digital Ground   |
| 27 | RGB_MCLK      | RGB Camera Main Clock                                  |
| 28 | GND           | Digital Ground   |
| 29 | RGB_MCP       | RGB Camera MIPI Clock Positive                         |
| 30 | RGB_MCN       | RGB Camera MIPI Clock Negative                         |
| 31 | GND           | Digital Ground   |
| 32 | RGB_MDPO      | RGB Camera MIPI Data0 Positive                         |
| 33 | RGB_MDNO      | RGB Camera MIPI Data0 Negative                         |
| 34 | GND           | Digital Ground   |
| 35 | RGB_MDP1      | RGB Camera MIPI Data1 Positive                         |
| 36 | RGB_MDN1      | RGB Camera MIPI Data1 Negative                         |
| 37 | GND           | Digital Ground   |
| 38 | VCC_5V        | 5V Power Supply  |
| 39 | VCC_5V        | 5V Power Supply  |
| 40 | VCC_5V        | 5V Power Supply  |

### ➤ J36 M.2 PCIE NVME Socket

[J36] M.2 PCIE NVME Socket with supports M.2 PCIE NVME SSDS.

### ➤ J37 SATA Hard Disk Socket 1

[J37] SATA Hard Disk Standard 7-Pin Data Cable Socket 1.

### ➤ J38 SATA Hard Disk Socket 2

[J38] SATA Hard Disk Standard 7-Pin Data Cable Socket 2.

### ➤ J39 SATA Power Supply Header

[J39] SATA Power Supply Header (SIP 2.0mm-Square pad is pin 1)

| Pin# | Definition | Note             |
|------|------------|------------------|
| 1    | 12V        | Power output 12V |
| 2    | GND        | Power Ground     |
| 3    | GND        | Power Ground     |
| 4    | 5V         | Power output 5V  |

**Note: The maximum output current of 12V and 5V of this interface does not exceed 1A. For 3.5-inch large hard drives, if the power supply is insufficient, it is recommended to use an external power supply!**

### ➤ J40 CAN Header 1

[J40] CAN Header 1 (SIP 2.0mm-Square pad is pin 1)

| Pin# | Definition | Note                                   |
|------|------------|--|
| 1    | GND        | Digital Ground                         |
| 2    | L1         | L Data                                 |
| 3    | H1         | L Data                                 |
| 4    | VCC        | Power output (Default 3.3V, 5V option) |

**Note: The corresponding interface of the CAN1 port software is can0; if you need to use this interface, please solder the U9840 chip; if you need a CAN channel, please solder this chip by default.**

### ➤ J41 Tamper-proof Header

[J41] Tamper-proof header (SIP 2.0mm-Triangle pad is pin 1).

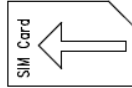
| Pin# | Definition | Note  |
|------|------------|---|
| 1    | 1-         | Line Cathode  |
| 2    | 1+         | Input high/low level, read 0 or 1 [Software GPIO number 10] |

### ➤ J42 PCIE 4G/5G Socket

[J42] Standard PCIE 4G/5G Socket.

### ➤ J43 Micro-SIM Card Socket

[J43] Micro-SIM Card Socket.



**Note:** The SIM card holder is a conventional medium card slot. When inserting the card, please make sure that the SIM card is inserted with the notch facing outwards.

### ➤ J44 SYS Fan Power Header

[J44] SYS fan power header (SIP 2.0mm-Square pad is pin 1). It is controlled by GPIO #76 (Low active)

| Pin# | Definition | Note                          |
|------|------------|-------------------------------|
| 1    | GND        | Digital Ground                |
| 2    | 12V        | 12V output with on/off switch |

### ➤ J45 CPU Fan Power Header

[J45] CPU fan power header (SIP 2.0mm-Square pad is pin 1). It is controlled by GPIO #150 (Low active)

| Pin# | Definition | Note                          |
|------|------------|-------------------------------|
| 1    | GND        | Digital Ground                |
| 2    | 12V        | 12V output with on/off switch |

### ➤ J46 TF Card Socket

[J46] Standard TF Card Socket.

### ➤ J47 ADC Input Header

[J47] ADC input header (SIP 2.0mm-Square pad is pin 1).

| Pin# | Definition | Note                 |
|------|------------|----------------------|
| 1    | GND        | Audio Ground         |
| 2    | ADC        | 1.8V Level ADC input |

### ➤ J48 Data Serial Port 0

[J48] Built-in Serial Port 0 (SIP 2.0mm-Square pad is pin 1). The output level is RS-232 by default and it could be setup to TTL/RS-485 if required (RS-232 if U45 mounted, RS-485 if U47 mounted). **The related software device node name is ttyS0.**

| Pin# | Definition | Note  |
|------|------------|---|
| 1    | GND        | Digital Ground                                |
| 2    | RX         | Data receive (TTL or RS-232 or RS-485 level)  |
| 3    | TX         | Data transmit (TTL or RS-232 or RS-485 level) |
| 4    | VCC        | Power output (Default 3.3V, 5V option)        |

**Note: J48 COM0 and J57 DB-9 COM0 are reused, and they cannot be used at the same time.**

### ➤ J49 Data Serial Port 3

[J49] Built-in Serial Port 3 (SIP 2.0mm-Square pad is pin 1). The output level is RS-232 by default and it could be setup to TTL/RS-485 if required (RS-232 if U45 mounted, RS-485 if U44 mounted). **The related software device node name is ttyS3.**

| Pin# | Definition | Note  |
|------|------------|---|
| 1    | GND        | Digital Ground                                |
| 2    | RX         | Data receive (TTL or RS-232 or RS-485 level)  |
| 3    | TX         | Data transmit (TTL or RS-232 or RS-485 level) |
| 4    | VCC        | Power output (Default 3.3V, 5V option)        |

**Note: J49 COM3 and J57 DB-9 COM3 are reused, and they cannot be used at the same time.**

### ➤ J50 Data Serial Port 2

[J50] Built-in Serial Port 2 (SIP 2.0mm-Square pad is pin 1). The output level is TTL only. **The related software device node name is ttyS2**

| Pin# | Definition | Note                                   |
|------|------------|--|
| 1    | GND        | Digital Ground                         |
| 2    | RX         | Data receive TTL level                 |
| 3    | TX         | Data transmit TTL level                |
| 4    | VCC        | Power output (Default 3.3V, 5V option) |

**Note:** If you need to use the debugging serial port as a data serial port, please contact the supplier to obtain the customized software; this serial port will output the startup information in the first 5 seconds of power on (the upper or lower machine should handle this kind of data fault tolerance).

### ➤ J51 Data Serial Port 7

[J51] Built-in Serial Port 7 (SIP 2.0mm-Square pad is pin 1). The output level is TTL by default and it could be setup to RS-232 if required (RS-232 if U46 mounted). **The related software device node name is ttyS7.** **Note: The motherboard silk screen COM5 of this interface is incorrectly marked.**

| Pin# | Definition | Note                                   |
|------|------------|--|
| 1    | GND        | Digital Ground                         |
| 2    | RX         | Data receive (TTL or RS-232 level)     |
| 3    | TX         | Data transmit (TTL or RS-232 level)    |
| 4    | VCC        | Power output (Default 3.3V, 5V option) |

### ➤ J52 Data Serial Port 8

[J52] Built-in Serial Port 8 (SIP 2.0mm-Square pad is pin 1). The output level is TTL by default and it could be setup to RS-232 if required (RS-232 if U46 mounted). **The related software device node name is ttyS8.**

| Pin# | Definition | Note                                   |
|------|------------|--|
| 1    | GND        | Digital Ground                         |
| 2    | RX         | Data receive (TTL or RS-232 level)     |
| 3    | TX         | Data transmit (TTL or RS-232 level)    |
| 4    | VCC        | Power output (Default 3.3V, 5V option) |

### ➤ J57 Double DB-9 Serial Port

[J57] Double DB-9 male built-in Serial Port COM3/COM0. The upper layer is COM3, the output level is RS-232 by default and it could be setup to TTL/RS-485 if required (RS-232 if U45 mounted, RS-485 if U44 mounted). **The related software device node name is ttyS3.** The lower level is COM0, the output level is RS-232 by default and it could be setup to TTL/RS-485 if required (RS-232 if U45 mounted, RS-485 if U47 mounted). **The related software device node name is ttyS0.**

| Pin# | Definition | Note                         |
|------|------------|------------------------------|
| 1    | NC         | Not Connected                |
| 2    | <b>RX</b>  | Data receive (RS-232 level)  |
| 3    | <b>TX</b>  | Data transmit (RS-232 level) |
| 4    | NC         | Not Connected                |
| 5    | <b>GND</b> | Digital Ground               |
| 6    | NC         | Not Connected                |
| 7    | NC         | Not Connected                |

|   |    |               |
|---|----|---------------|
| 8 | NC | Not Connected |
| 9 | NC | Not Connected |

**Note:** This port is completely isolated from signal and power supply and can be used in industrial environments. DB-9 COM3 and J49 COM3 are multiplexed, and DB-9 COM0 and J48 COM0 are multiplexed. The multiplexed serial ports cannot be used at the same time.

### ➤ J58 I2C FPC Header

[J58] I2C Bus Header (FPC-0.5mm **Top/Bottom Contact** Triangle Pin-1).



| Pin# | Definition | Note                                |
|------|------------|-------------------------------------|
| 1    | GND        | Digital Ground                      |
| 2    | INT        | Interrupt input (3.3V level)        |
| 3    | SDA        | I2C Bus data signal                 |
| 4    | SCL        | I2C Bus clock signal                |
| 5    | RST        | Mainboard reset output (3.3V level) |
| 6    | 3V3        | Power output supply 3.3V            |

### ➤ J59 DC-12V Input Header

[J59] DC-12V Input Header (SIP 3.81mm-Square pad is pin 1), it is the same to J4/J6 Jack.

| Pin# | Definition | Note                   |
|------|------------|------------------------|
| 1    | 12V        | DC Power Input (9~15V) |
| 2    | GND        | Power Ground           |

### ➤ SW1 System Reset Button

[SW1] On-board reset mode button. Click to restart the system.

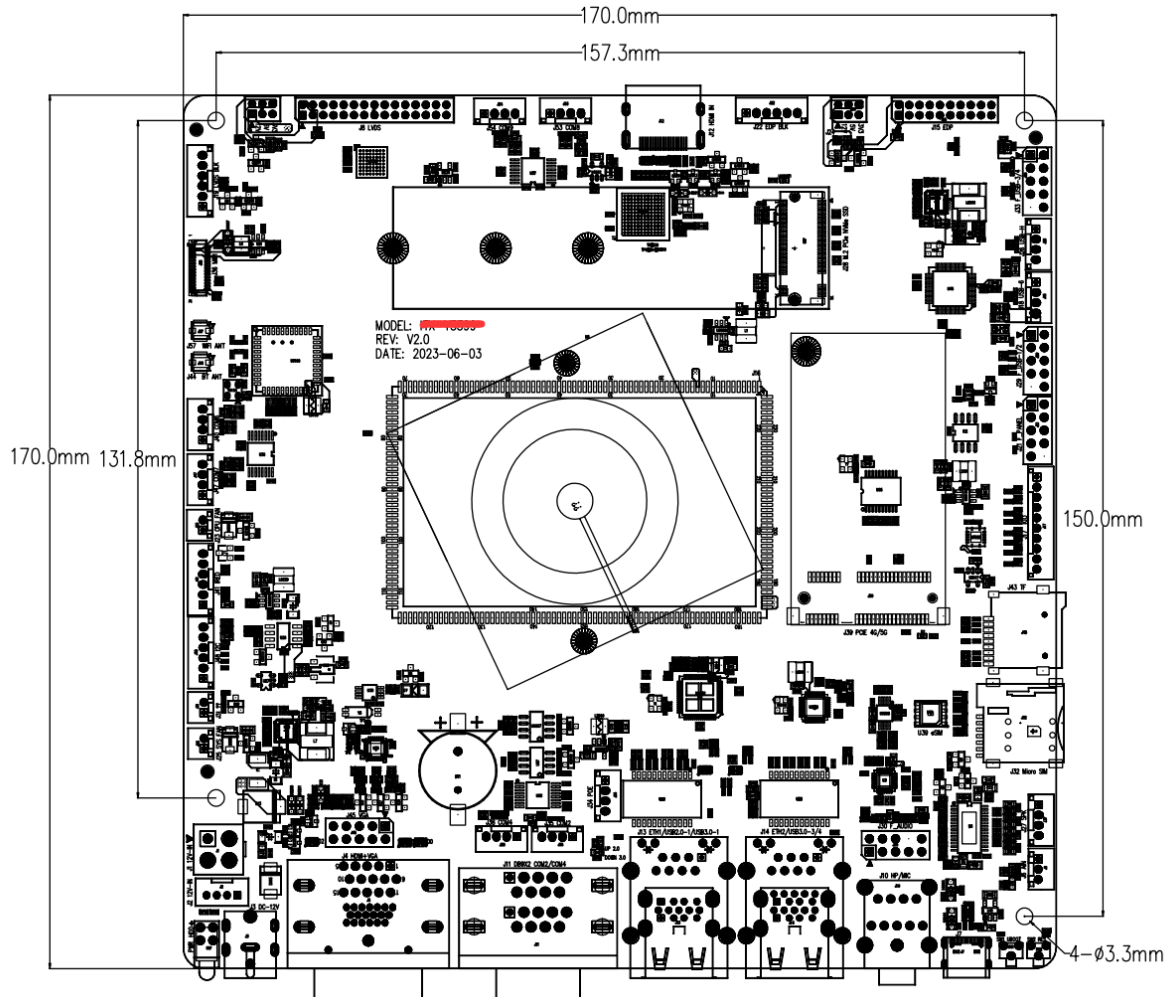
### ➤ SW2 Recovery Mode Button

[SW2] On-board recovery mode button. First press and then hold for about 3-second while power on will enter the recovery mode.



## 5 Physical Size

The PCB size is 170mm\*170mm, PCBA height is 30.7mm, fixed hole diameter is 3.3mm. The corresponding physical size parameters are shown in the figure below. For detailed size information, please consult the manufacturer for DXF file. (The structural hole size is the same as ITX-Y3399)



## 6 Assemble Precautions

Please note the following key points when using the ITX-Z3588 mainboard:

1. Relative humidity of this product: 10% to 90%, no condensation.
2. The working temperature of this product: -20°C ~ 70°C.
3. This storage temperature of this product: -40°C ~ 70°C.
4. Anti-static treatment is required during assembly and transportation of this product.
5. The board interface connection cable must not be too long. Otherwise, the signal quality may be affected.
6. Never allow the board to be distorted or heavily stressed during assembly.
7. Do not short circuit between mainboard and other peripherals.
8. When connecting to external LVDS or eDP LCD screen, pay attention to whether the screen voltage and current meet the requirements, and pay attention to the screen connector pin-1 direction.
9. When connecting to external LVDS or eDP LCD screen, pay attention to whether the backlight voltage and current meet the requirements. **If the LCD backlight power is above 20W, it is recommended to use a separate power board for backlight power supply.**
10. When connecting to peripherals using USB, GPIO, Serial, I2C, SPI, HDMI, etc., pay attention to whether the IO voltage level and current of the peripheral meet the requirements. **When using the power pin on these connectors to supply power to the external circuit, the regular power pin must not exceed 100mA, and the USB power pin must not exceed 500mA.** When the serial port is connected to peripherals, level matching (3.3V TTL level, RS-232 level and RS-485 level) is also required.
11. Please connect the power to the power input socket or connector, and evaluate whether the current of the whole board meets the requirements according to the total peripherals. **It is strictly forbidden to directly supply power from the backlight connector.**
12. The communication module should be mounted at least 5mm away from the metal housing to avoid signal interference.

## 7 Software Guide

The ITX-Z3588 motherboard supports dual-screen differential display combinations of any two outputs of LVDS/MIPI/HDMI/VGA! For relevant output combinations, please consult the manufacturer to provide corresponding abnormal display patches.

The internal serial port and extended serial port software port numbers of the ITX-Z3588 motherboard are as follows:

| Port | Software Device Node                             |
|------|--|
| J48  | /dev/ttyS0                                       |
| J49  | /dev/ttyS3                                       |
| J50  | /dev/ttyS2                                       |
| J51  | /dev/ttyS7                                       |
| J52  | /dev/ttyS8                                       |
| J57  | /dev/ttyS0(lower levels)+/dev/ttyS3(upper layer) |