

EBC77 Series Single Board Computer (SBC)

datasheet

Features

EIC7700X

- Triple-issue Out-of-order 64-bit execution pipeline
- Quad-core 64-bit SiFive P550
 - RV64GC
 - L1-Cache 32 KB(I) + 32KB(D)(private)
 - L2-Cache 256KB(private)
 - L3-Cache 4MB(shared)
- Cache Supports ECC (Support SECDED)
- NPU Up to 20 TOPS INT8, 10 TOPS INT16, 10 FTOPS FP16
- Integrated DSP, GPU, VI, VO, DE, etc.

On-board 64-bit LPDDR5 @ 6400MT/s

On-board 8MB SPI NOR Flash

1x x4 PCI-express GEN3 FPC Con

2x USB3.2 GEN1

2x USB2.0

1x Micro HDMI Out

1x 4Lane MIPI DSI TX or 4Lane MIPI CSI RX

1x 4Lane MIPI CSI RX

1x Gigabit Ethernet

1x Micro SD Card slot

802.11ac Dual band Wi-Fi

I2C, I2S, UART, PWM, General I/O port (map on 40pin header)

Description

The SBC board from ESWIN is a RISC-V platform board, using a self-developed chip EIC7700X, powered by ESWIN. The EIC7700X with 64-bit RISC-V processor and self-developed neural network computing unit, it supports full stack floating point computing, and generative LLM. The product has rich interfaces, strong audio/video processing capabilities, highly adaptable in computer vision(CV) applications.

The SBC board features of 64-bit LPDDR5 memory up to 6400MHz. High-speed interconnectors with PCIE Gen3, and external connectors with USB3.2 Gen1. Support storage expansion with Micro SD Card.

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1. System Description

Table 1 SBC key features

Item	Parameters
CPU	<ul style="list-style-type: none">• RISC-V RV64GC Quad-core• Clock frequency running up to 1.8GHz• L1 Cache 32KB(I) + 32KB(D) (private)• L2 Cache 256KB (private)• L3 Cache 4MB (shared)• Support ECC (Support SECEDED)
AI Processor	<ul style="list-style-type: none">• Up to 20TOPS in INT8, 10 TOPS in INT16, and 10 TFLOPS in FP16
Vision DSP	<ul style="list-style-type: none">• Multiple DSPs, support 512INT8MA
Memory	<ul style="list-style-type: none">• 64-bit LPDDR5@6400Mbps• Optional Inline ECC(support SECEDED)
Flash	<ul style="list-style-type: none">• 8MB SPI flash• Micro SD Card slot, SDIO3.0
RAS	<ul style="list-style-type: none">• SRAM DDR support parity check and ECC
Video Encoder	<p>Up to 8K@25fps or 16-channel 1080p@25fps</p> <p>H.265 (HEVC):</p> <ul style="list-style-type: none">• ITU-T Rec. H.265 (04/2013), ISO/IEC 23008-2• Main Profile, Level 5.1, High Tier• Main10 profile, Level 5.1, High Tier• Main Still Profile <p>H.264 (AVC):</p> <ul style="list-style-type: none">• Spec Version 12:ISO/IEC 14496-10 / ITU-T Rec. H.264 (03/2010)• Baseline Profile, levels 1 - 5.2• Main Profile, levels 1 - 5.2• High Profile, levels 1 - 5.2• High 10 Profile, levels 1 - 5.2
Video Decoder	<p>Up to 8K@56fps or 36-channel 1080p@25fps</p> <p>H.265 (HEVC):</p> <ul style="list-style-type: none">• ITU-T Rec. H.265 (04/2013), ISO/IEC 23008-2• Main Profile, up to Level 5.1, High Tier• Main10 profile, up to Level 5.1, High Tier• Main Profile, Level 6, High Tier• Main10 profile, Level 6, High Tier• Main Still Profile <p>H.264 (AVC):</p> <ul style="list-style-type: none">• Spec Version 12:ISO/IEC 14496-10 / ITU-T Rec. H.264 (03/2010)

	<ul style="list-style-type: none"> • Baseline Profile, Levels 1 – 5.2 (up to 4K) • Main Profile, Levels 1 – 5.2 (up to 4K) • High Profile, Levels 1 – 5.2 (up to 4K) • Constrained Baseline, levels 1 – 5.2 (up to 4K) • Progressive High profile, levels 1 – 5.2 (up to 4K) • High 10 profile (progressive only), levels 1 – 5.2 (up to 4K) • High 10 Intra profile (progressive only), levels 1 – 5.2 (up to 4K) • Constrained Baseline, level 6 (up to 8K) • Progressive High profile, level 6 (up to 8K) • High 10 profile (progressive only), level 6 (up to 8K) • High 10 Intra profile (progressive only), level 6 (up to 8K)
JPEG Codec	<p>JPEG ISO/IEC 10918-1, ITU-T T.81.</p> <ul style="list-style-type: none"> • Up to 32K x 32K • Baseline process (support Huffman coding Interleaved YUV420, YUV422, Monochrome) • Lossless process (support 8-bit with Huffman coding Interleaved YUV420, Monochrome) • MJPEG format (T.81 Annex H) in AVI container
Vision Engine	<ul style="list-style-type: none"> • HAE (2D Blit, Crop, Resize, Normalization)
GPU	<ul style="list-style-type: none"> • 3D GPU (OpenGL-ES 3.2、 EGL 1.4、 OpenCL 1.2/2.1 EP2、 Vulkan 1.2、 Android NN HAL)
Display	<ul style="list-style-type: none"> • OSD (3-layer)
LLC	<ul style="list-style-type: none"> • 4MB (128Bytes cache line, 16 ways associativity) • ECC(support SECDED)
Security	<ul style="list-style-type: none"> • TEE, TRNG, ECDSA, ECC, RSA, AES, SM3/4, SHA256, DES, HMAC, CRC32 • 16KB OTP
40 PIN IO Header	<ul style="list-style-type: none"> • UART ,SPI ,GPIOs, 2x I2C
USB port	<ul style="list-style-type: none"> • 2XUSB3.0 • 2XUSB2.0
ETHERNET	<ul style="list-style-type: none"> • Gigabit Ethernet with RJ45 connector
HDMI	<ul style="list-style-type: none"> • Micro HDMI , HDMI2.0 • HDCP1.4/2.2
Keys	<ul style="list-style-type: none"> • System Reset Key • Force Recovery Mode Key
Debug	<ul style="list-style-type: none"> • Micro USB
Power Supply	<ul style="list-style-type: none"> • Type-C USB PD
WIFI	<ul style="list-style-type: none"> • 802.11ac 2.4GHz&5.1GHz&5.8GHz • 2.4GHz with 20MHz bandwidth • 5.1GHz&5.8GHz with 20MHz,40MHz and 80MHz bandwidth
FAN	<ul style="list-style-type: none"> • 4PIN 1.0mm connector • PWM speed control

	<ul style="list-style-type: none"> • Tach meter
CSI	<ul style="list-style-type: none"> • 2x MIPI CSI 4 lane(1x CSI Shares the physical interface with DSI)
DSI	<ul style="list-style-type: none"> • 1x MIPI DSI 4 lane(Shares the physical interface with CSI2/3)
PCIE	<ul style="list-style-type: none"> • 1x PCIe3.0 X4 FPC connector
RTC	<ul style="list-style-type: none"> • Integrated RTC IC, with VBAT connector
Power Consumption	<ul style="list-style-type: none"> • Depends on the application scenario and application load.
Operation Temperature	<ul style="list-style-type: none"> • 0~40°C
Dimension	<ul style="list-style-type: none"> • 85x56mm

1.1 Block Diagram

Figure 1 illustrate the core components on SBC

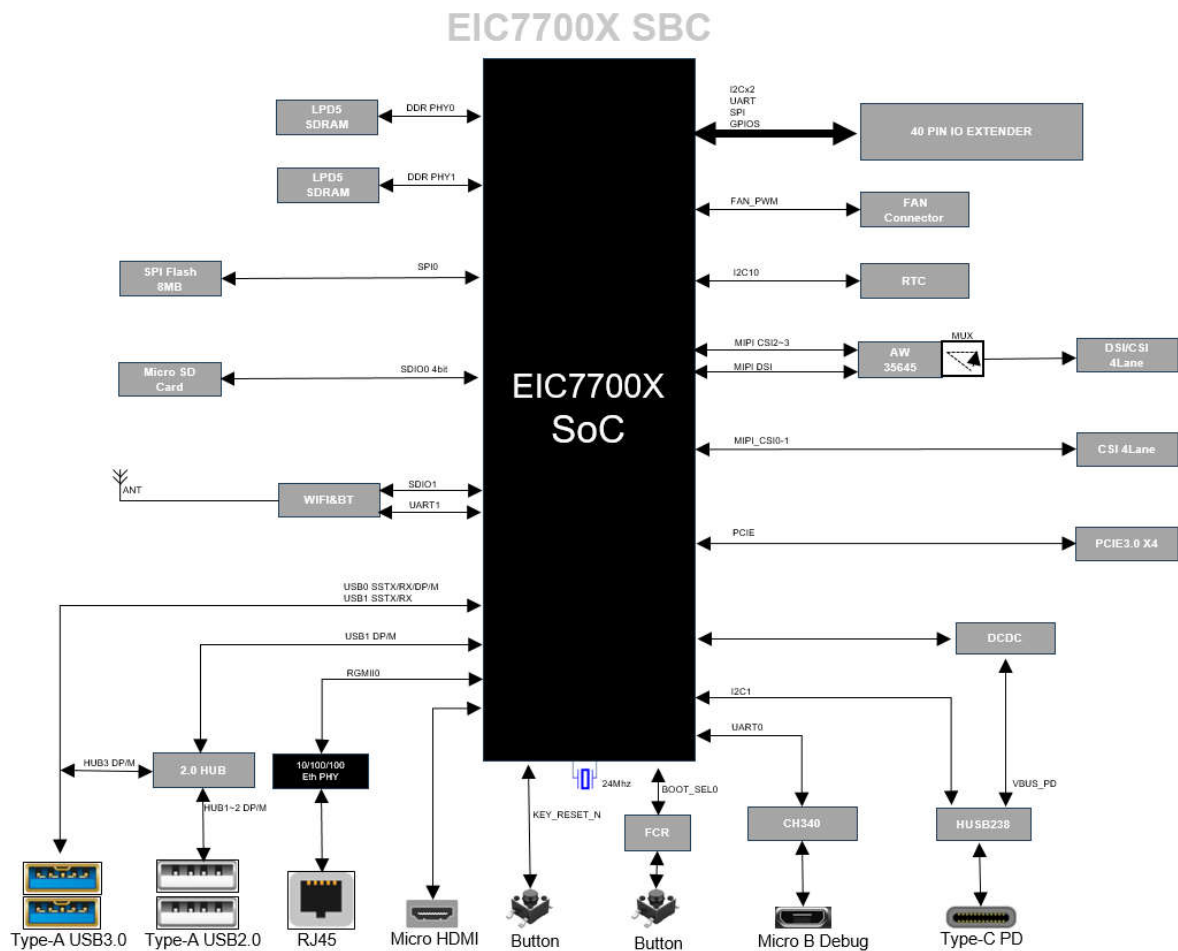


Figure 1 SBC Functional Block Diagram

Note: Various I/O interfaces are multiplexed on the 40PIN Header and may not be available simultaneously

1.2 EIC7700X SoC

The architecture of the SBC is built around the ESWIN EIC7700X SoC that combines the Quad SiFive P500 RISC-V processor cores with two SiFive E31 RISC-V co-processor cores as well as a wide range of the integrated peripheral controllers.

1.3 System Reset

The following types of reset are implemented.

- Power-on reset. This type of reset occurs when the power is initially applied to the SBC. As the supply last power rail voltage rises, the POR reset IC hold the EIC7700X in reset status and release after 240ms (typ.).
- Brown-out reset. This type of reset occurs when the power of the core rail falls below the Vth of the POR IC, after the brown-out reset has occurred, the POR IC hold the EIC7700X SoC in reset until the power supplies recovery.
- Software reset. This type of reset is activated by software running on the SBC through performing the software reset sequence.
- Watch Dog reset. This type of reset is activated by watch dog running on the EIC7700X SoC
- External reset. To activate this type of reset, a baseboard drives low the KEY_RESETN signal on the SBC.

1.4 System Clock

The SBC provides 24MHz quartz crystal as the reference to the internal oscillators of the EIC7700X SoC

1.5 BOOT MODE

The EIC7700X supports two BOOT MODE which selected by FORCE_RECOVERYN signals on the SBC.

Table 2 BOOT MODE Description

FORCE_RECOVERYN	Boot Mode
Floating	Boot from SPI NOR Flash(Default)
0	Boot from USB0

There are two ways to let SBC entering into USB boot mode:

1. Hold the FCR key and power on or push the reset key, SBC will enter into USB boot mode;
2. Connect the USB Host to the USB0 port of SBC, then power on or push the reset key;

1.6 Debug ports

The SBC provides a standard JTAG interface (4 wires, TCK, TMS, TDI, TDO) for the EIC7700X SoC on the 40 PIN header (IO mux function).

The SBC also provides a debug UART interface (UART0) for the EIC7700X SoC on the SBC board.

1.7 POWER Supply

The SBC is powered by a standard PD adapter through the type C connector, supports 5V,9V,12V,15V DC voltage. Different power provides different performance, please contact ESWIN support team to get more info.

1.8 SDRAM

The SBC provides LPDDR5 SDRAM, data width is 64bits, speed up to 6400Mbps.
please contact ESWIN support team to get more info.

1.9 Micro SD

The SBC provides a micro SD card slot that supports on-board flash memory expansion.

1.10 Network

The SBC integrates a wireless network card with onboard antenna, supports 802.11a /b/g/n/ac SISO.
The SCB also integrates a wired network card with RJ45 interface, supports 10/100/1000mbps rates.

1.11 Display ports

The SBC integrates two Display ports,

1. micro HDMI 2.0/1.4b TX, support 1080P@120Hz,4Kx2K,3D (340MHz TMDS clock)
2. 4Lane MIPI DSI TX, resolution up to 1080P@60hZ

1.12 Data ports

The SBC integrates 4x USB ports and 1x PCIE 3.0 port

1. 2x USB3.2 Gen1 with Type A connector
2. 2x USB2.0 with Type A connector
3. 1x PCIE 3.0 x4 FPC connector for customer expansion peripheral.

1.13 40 PIN header

The 40 PIN header signal Description please refer to the below table

I **Input**
O **Output**
A **Analog**
P **Power supply**
G **Ground**

Table 3 40PIN Header Signal Description

Pin Name	Type	Voltage	Description
1	P	3.3V	3.3V Power supply
2	P	5V	5V Power supply
3	IO	3.3V	I2C5_SDA, IO mux GPIO55
4	P	5V	5V Power supply
5	IO	3.3V	I2C5_SCL, IO mux GPIO54
6	G		GND
7	IO	3.3V	I2S_MCLK, IO mux GPIO22
8	IO	3.3V	UART3_TX, IO mux GPIO92
9	G		GND
10	IO	3.3V	UART3_RX, IO mux GPIO93
11	IO	3.3V	JTAG1_TDI, IO mux GPIO09
12	IO	3.3V	I2S1_BCLK, IO mux GPIO30
13	IO	3.3V	JTAG0_TCK, IO mux SPI2_CLK and GPIO1
14	G		GND
15	IO	3.3V	JTAG1_TMS, IO mux GPIO8
16	IO	3.3V	JTAG1_TDO, IO mux GPIO10

17	P		3.3V Power supply
18	IO	3.3V	JTAG0_TDO, IO mux SPI2_D2 and GPIO4
19	IO	3.3V	SPI1_D0, IO mux GPIO37
20	G		GND
21	IO	3.3V	SPI1_D1, IO mux GPIO38
22	IO	3.3V	JTAG0_TDI, IO mux SPI2_D1 and GPIO3
23	IO	3.3V	SPI1_CLK, IO mux GPIO36
24	IO	3.3V	SPI1_CS0_N, IO mux GPIO35
25	G		GND
26	IO	3.3V	SPI1_CS1_N, IO mux GPIO41, PWM2
27	IO	3.3V	I2C4_SDA, IO mux GPIO53
28	IO	3.3V	I2C4_SCL, IO mux GPIO52
29	IO	3.3V	JTAG1_TCK, IO mux GPIO7
30	G		GND
31	IO	3.3V	GPIO62
32	IO	3.3V	SPI1_D2, IO mux GPIO39
33	IO	3.3V	GPIO63
34	G		GND
35	IO	3.3V	I2S1_WCLK, IO mux GPIO31
36	IO	3.3V	SPI1_D3, IO mux GPIO40, PWM1
37	IO	3.3V	JTAG0_TMS, IO mux SPI2_D0 and GPIO2
38	IO	3.3V	I2S1_SDI, IO mux GPIO32
39	G		GND
40	IO	3.3V	I2S1_SDO, IO mux GPIO33

2. Mechanical Dimensions

Table 5 SBC Mechanical Dimensions

Measurement	Value
Size	56 x 85 mm
Weight	60g

Figure 2 illustrates all of the SBC's dimensions.

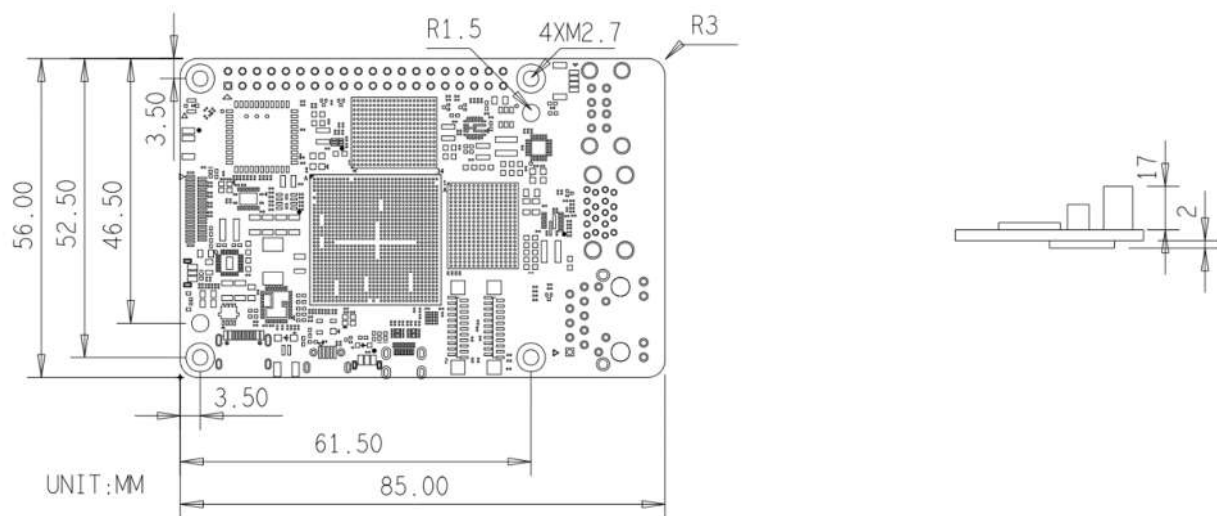


Figure 2 SBC Top Components View and Dimensions

Figure 3 illustrates the bottom of the SBC's components.

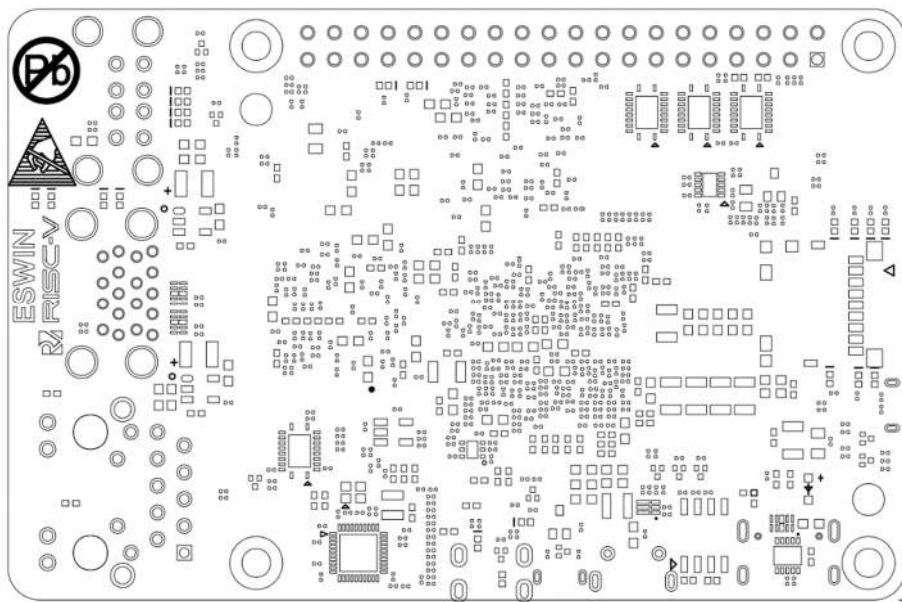
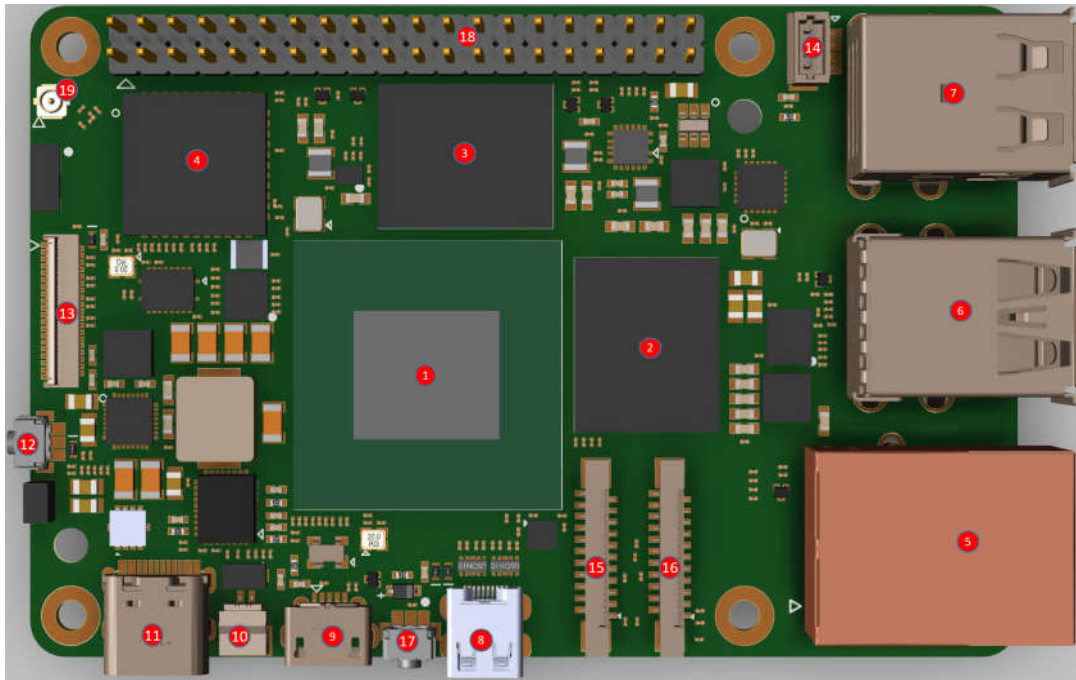
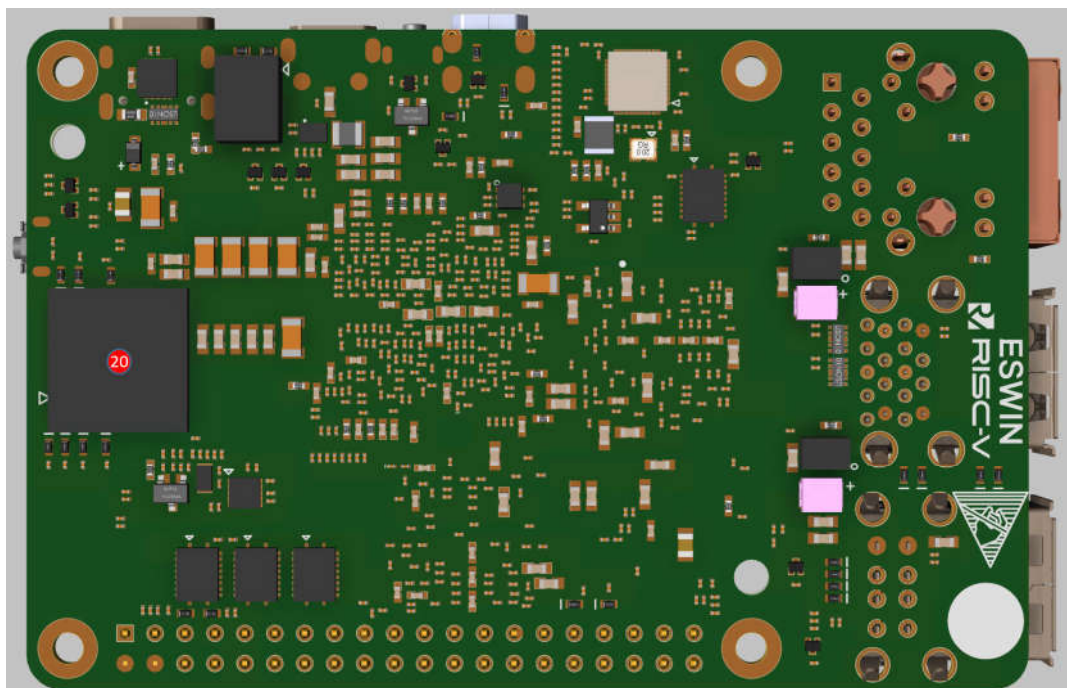


Figure 3 SBC Bottom Components View

3. SBC Appearance view



SBC TOP View



SBC BOTTOM View

Table 6 SBC main components and interface

No.	Part Name	No.	Part Name
1	EIC7700X SoC	11	Type C PD
2	LPDDR5 SDRAM	12	Reset Key
3	LPDDR5 SDRAM	13	PCIE3.0 x4 FPC
4	WIFI module	14	FAN connector
5	Gigabit Ethernet	15	MIPI DSI/CSI FPC
6	2x USB3.0 Type A	16	MIPI CSI FPC
7	2x USB2.0 Type A	17	FCR Key
8	Micro HDMI2.0	18	40PIN IO Header
9	Micro USB(debug port)	20	Micro SD Card slot
10	RTC BAT connector		