AIO-3576JD4
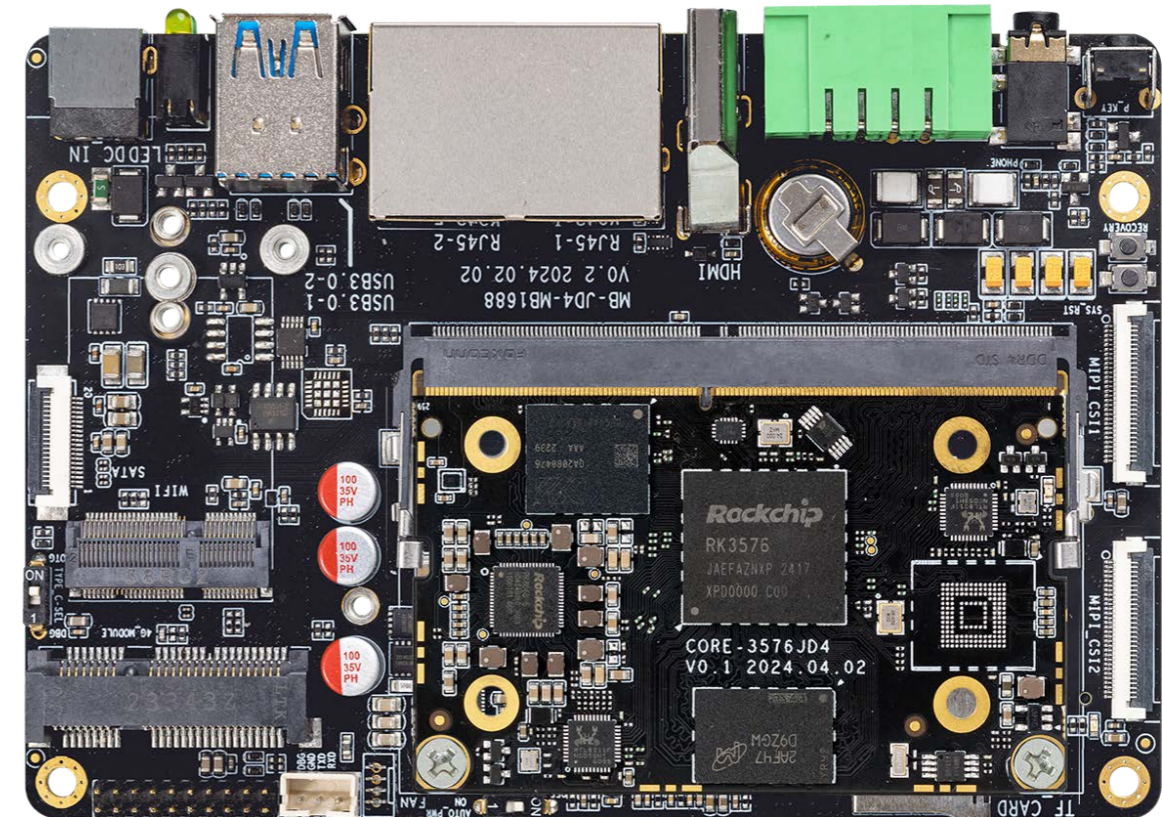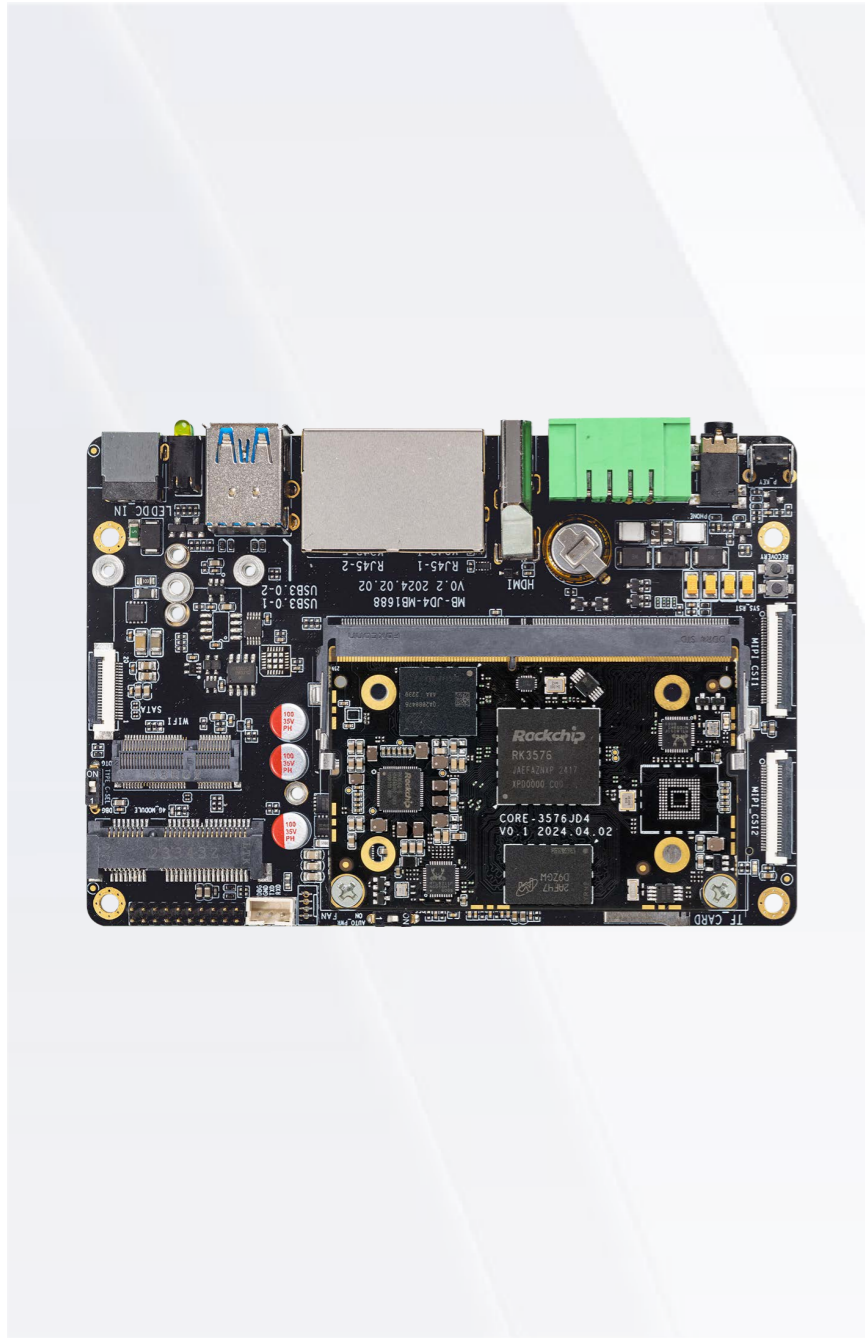
Low-power Large-model Mainboard

V0.2 2024-6-24

Product features

High-performance Octa-core 64-bit AIOT processor, RK3576

RK3576, the new octa-core 64-bit AIOT processor, features a big.LITTLE architecture (4×A72 +4×A53), an advanced lithography process, and a frequency of up to 2.2 GHz. It ensures strong support for high-performance computing and multitasking.

4K@120fps high frame rate video decoding

It supports 4K@120fps decoding (H.265/HEVC, VP9, AVS2, and AV1), 4K@60fps decoding (H.264/AVC), and 4K@60fps encoding (H.265/HEVC and H.264/AVC).

### Powerful ISP image processing performance

Built-in 16 million pixel ISP, support low-light noise reduction, support RGB-IR sensor, support up to 120dB HDR, AI-ISP to improve low-noise image effect. Support 3 MIPI-CSI D-PHY inputs (1*4Lanes or 2*2Lanes).

The private deployment of large language models

Support the private deployment of ultra-large-scale parameter models under the Transformer architecture, including large language models such as Gemma-2B, LlaMa2-7B, Qwen1.5-1.8B. Support Docker container management technology.

Product features
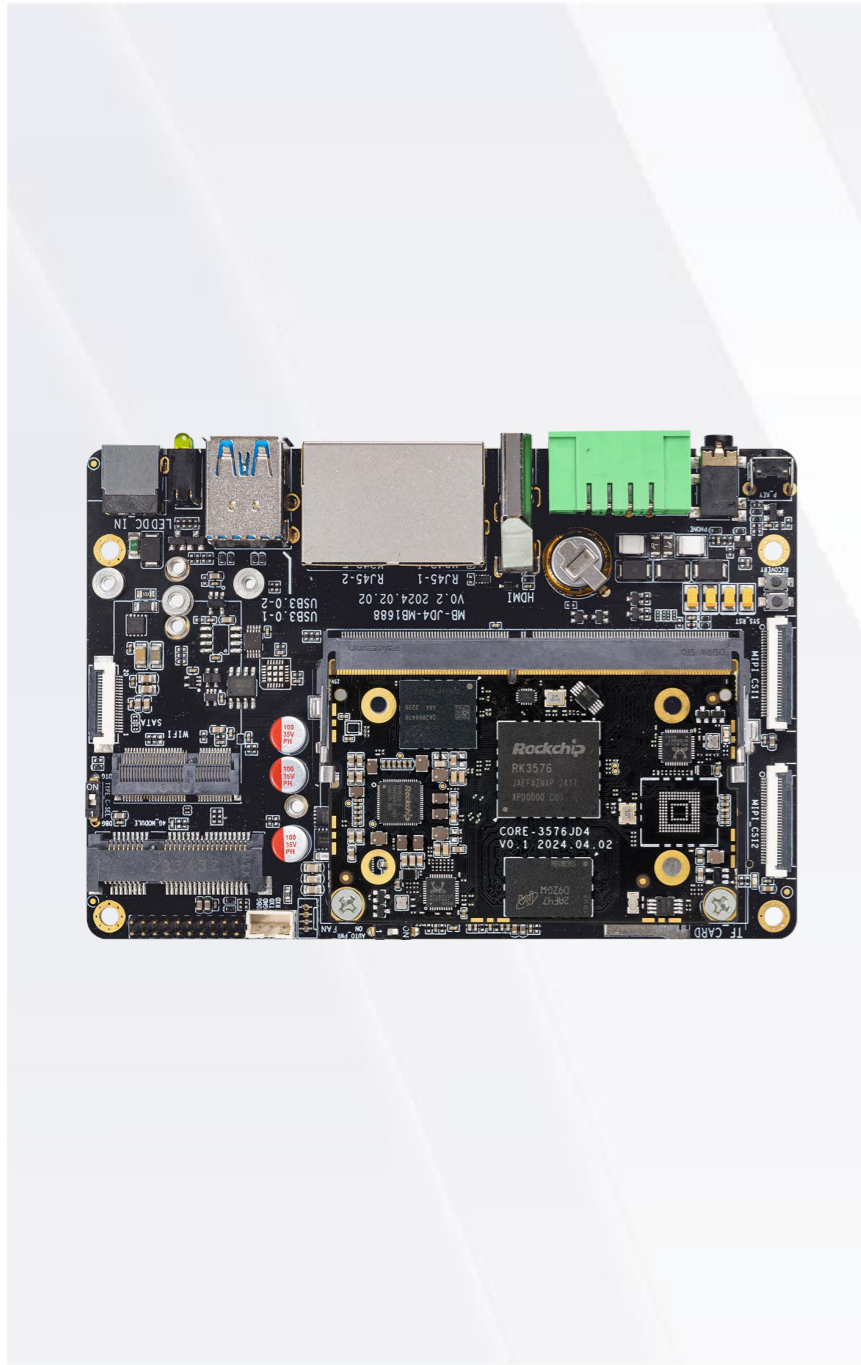
Multiple deep learning frameworks

Support traditional network architectures such as CNN, RNN, and LSTM;
a variety of deep learning frameworks, including TensorFlow, PyTorch, MXNet, PaddlePaddle, and ONNX, as well as custom operator development.

Various operating systems and abundant resources

Support Android 14, Linux OS, and Buildroot. These provide safe and stable systems for product research and production. We offer SDKs, tutorials, technical documentation, and development tools to streamline and improve the development process.
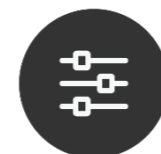
Abundant expansion interfaces

It provides a rich array of expansion interfaces such as PCIe 2.1, SATA 3.1, SAI, I2C, I3C, CAN, UART, SPDIF, SDIO 3.0, MIPI-CSI, USB 3.0, USB 2.0, SPI, and GPIO to meet peripheral expansion needs for various applications.
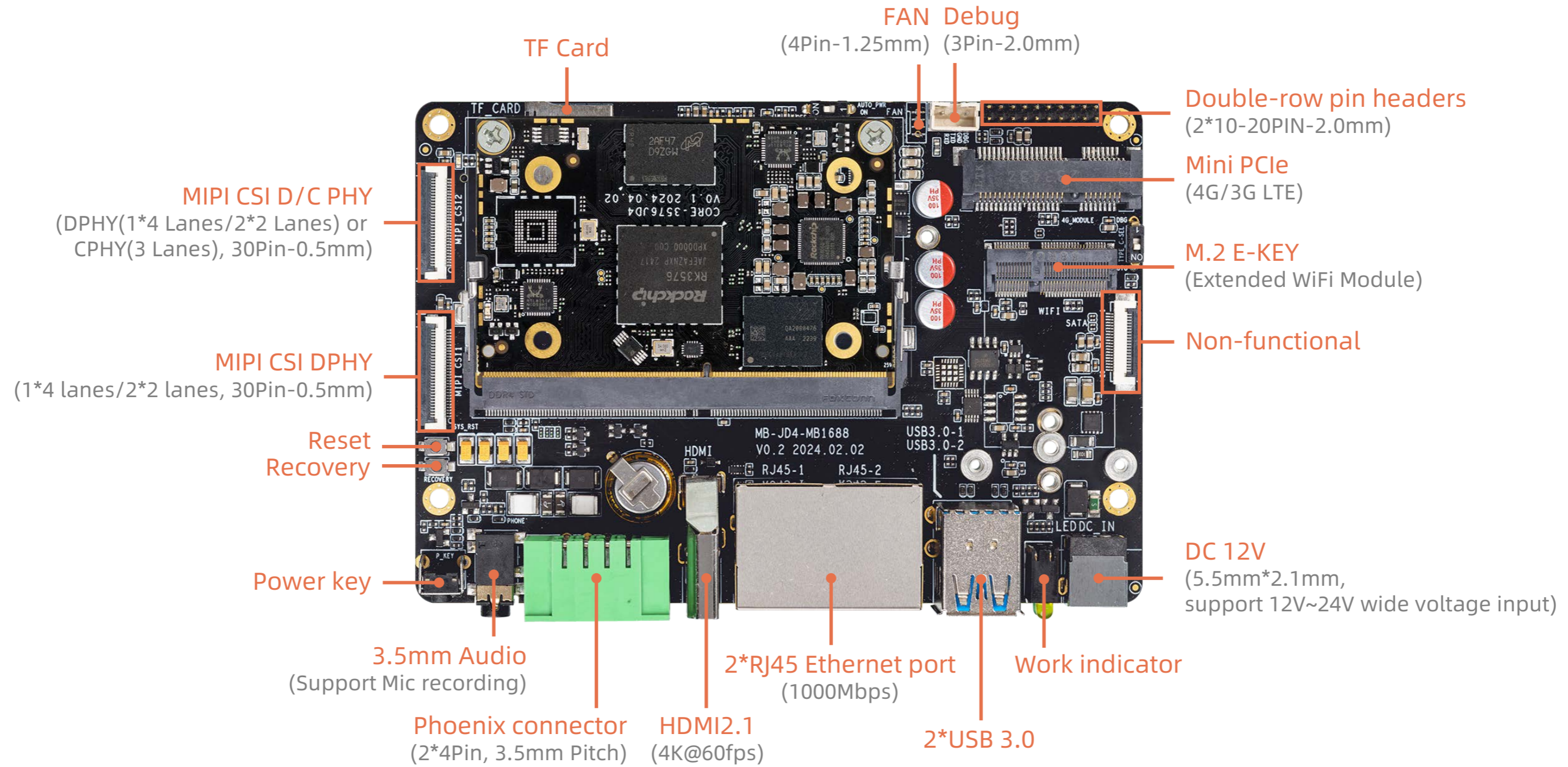
Wide range of application scenarios

It is widely used in edge computing, local deployment of large models, intelligent digital signage, cloud terminal products, industrial PCs, automotive electronics, and more.
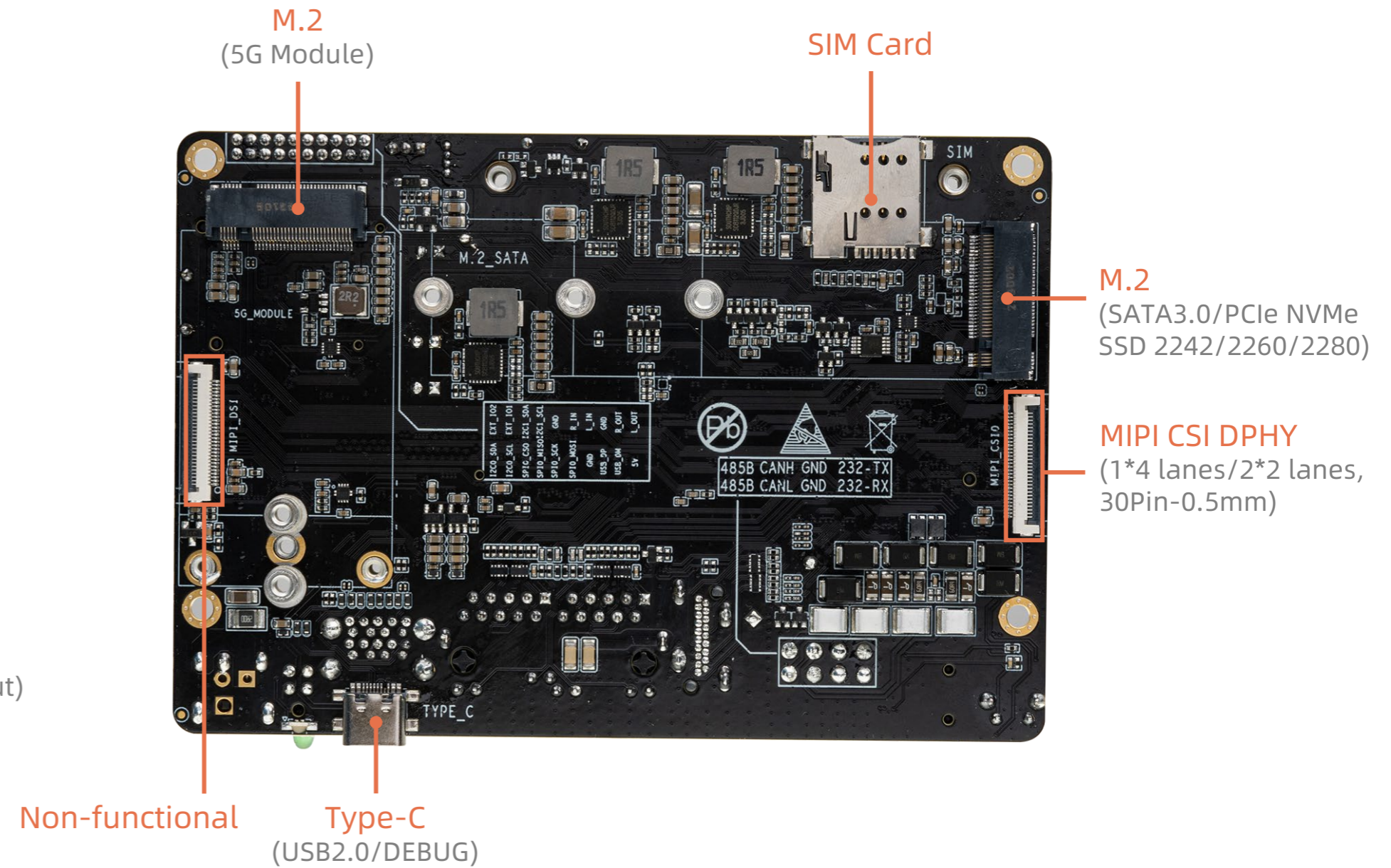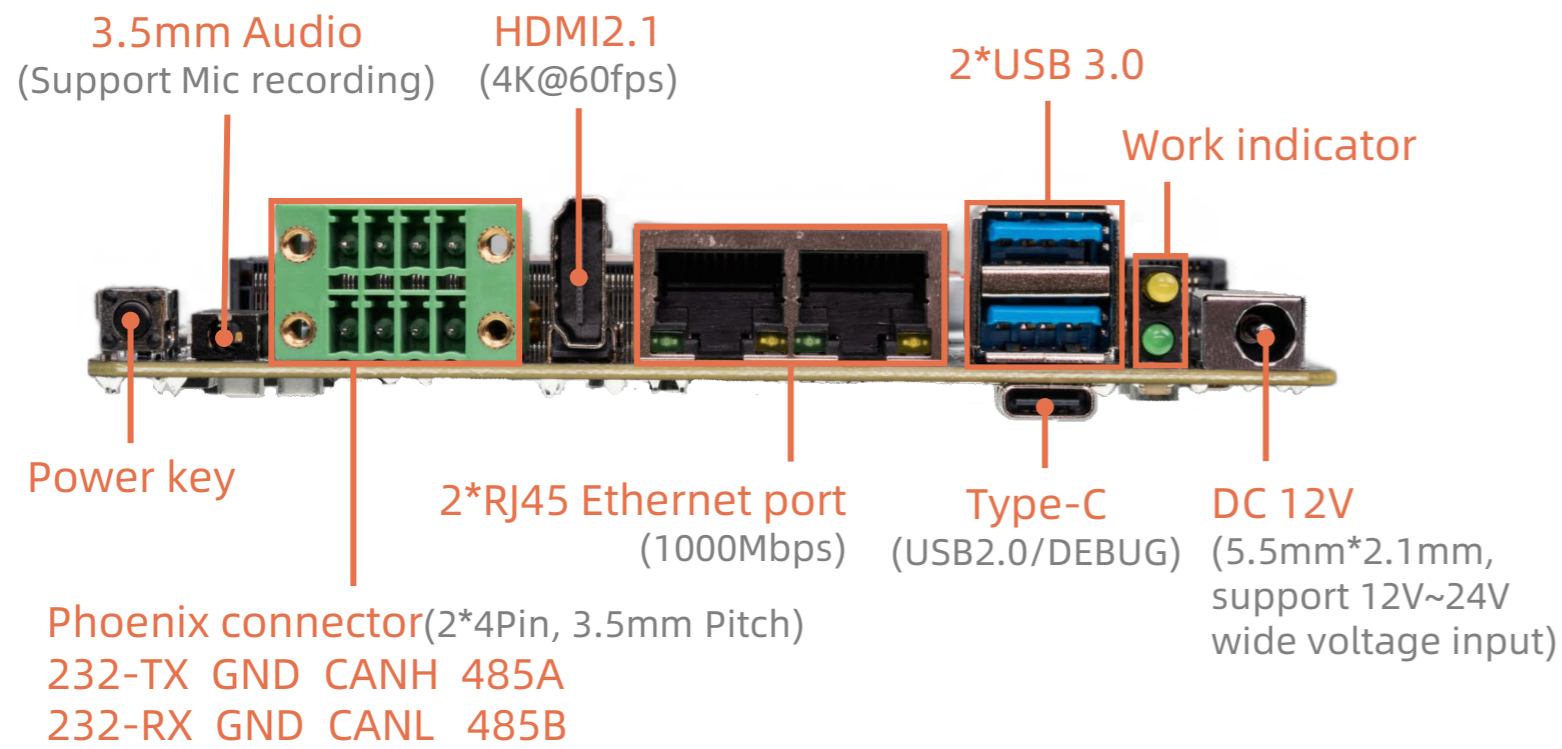
Specifications

Specifications		
Basic Specifications	SOC	Rockchip RK3576
	CPU	Octa-core 64-bit processor (4×A72 + 4×A53) with a maximum frequency of 2.2GHz
	GPU	G52 MC3@1GHz, support OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, Vulkan 1.1, embedded with high-performance 2D acceleration hardware
	NPU	6 TOPS NPU, support mixed operations of INT4/8/16/FP16/BF16/TF32
	ISP	Built-in 16 million pixel ISP, support low-light noise reduction, support RGB-IR sensor, support up to 120dB HDR, AI-ISP to improve low-noise image effect.
	Decoding/ Encoding	Decoding: 4K@120fps (H.265/HEVC, VP9, AVS2, AV1), 4K@60fps (H.264/AVC) Encoding: 4K@60fps (H.265/HEVC, H.264/AVC)
	RAM	LPDDR4/LPDDR4x (4GB/8GB optional)
	Storage	eMMC (16GB/32GB/64GB/128GB/256GB optional), UFS2.0 (Optional)
	Expansion interface	1 * M.2 (Scalable SATA3.0/PCIE NVMe SSD, supports 2242/2260/2280 specifications)
	Power	DC 12V (5.5mm * 2.1mm, support 12V~24V wide voltage input)
	Power consumption	Max: 7.8W(12V/650mAh) Normal: 1.92W(12V/150mAh) Min: 0.54W(12V/45mAh)
	OS	Android14, Linux OS, Buildroot
	Software Support	· The private deployment of ultra-large-scale parameter models under the Transformer architecture, including large language models such as Gemma-2B、LlaMa2-7B、ChatGLM3-6B、Qwen1.5-1.8B. · Traditional network architectures such as CNN, RNN, and LSTM; a variety of deep learning frameworks, including TensorFlow, PyTorch, MXNet, PaddlePaddle, and ONNX, as well as custom operator development. · Docker container management technology
	Size	122.89mm * 85.04mm * 22.7mm
	Weight	≈120g
	Environment	Operating Temperature: -20℃- 60℃ Storage Humidity: 10% ~ 90%RH (non-condensing)
Interface Specifications	Internet	Ethernet: 2 * RJ45(1000Mbps) WiFi: Extend WiFi/BT module through M.2 E-KEY (2230) interface, supporting 2.4GHz/5GHz dual band WiFi 6 (802.11a/b/g/n/ac/ax) and BT5.2 4G: Expanding 4G LTE through Mini PCIe (multiplexing with 5G) 5G: Expanding 5G through M.2 interface (multiplexing with 4G)
	Video input	2 * MIPI CSI DPHY (1*4 Lanes or 2*2 Lanes) 1 * MIPI CSI D/C PHY (MIPI DPHY (1*4 Lanes or 2*2 Lanes) or MIPI CPHY (3 Lanes))
	Video output	1 * HDMI2.1(4K@120fps)
	Audio output	1 * 3.5mm Audio jack, supports MIC recording, American standard CTIA
	Watch Dogs	External watchdogs
	USB	2 * USB3.0, 2 * USB2.0
	Other interfaces	1 * Type-C (USB2.0/DEBUG), 1 * FAN (4Pin-1.25mm), 1 * SIM Card 1 * Double-row pin headers (2*10-20PIN-2.0mm): USB2.0, SPI, 2*I2C, Line in, Line out, GPIO 1 * Phoenix connector (2*4Pin, 3.5mm pitch): 1 * RS485, 1 * RS232, 1 * CAN 2.0

Interface description

TF Card

FAN
(4Pin-1.25mm)

Debug
(3Pin-2.0mm)

Double-row pin headers
(2*10-20PIN-2.0mm)

Mini PCIe
(4G/3G LTE)

M.2 E-KEY
(Extended WiFi Module)

Non-functional

MIPI CSI D/C PHY
(DPHY(1*4 Lanes/2*2 Lanes) or
CPHY(3 Lanes), 30Pin-0.5mm)

MIPI CSI DPHY
(1*4 lanes/2*2 lanes, 30Pin-0.5mm)

Reset
Recovery

Power key

DC 12V
(5.5mm*2.1mm,
support 12V~24V wide voltage input)

3.5mm Audio
(Support Mic recording)

Phoenix connector
(2*4Pin, 3.5mm Pitch)

HDMI2.1
(4K@60fps)

2*RJ45 Ethernet port
(1000Mbps)

2*USB 3.0

Work indicator

Interface description

3.5mm Audio
(Support Mic recording)

HDMI2.1
(4K@60fps)

2*USB 3.0

Work indicator

Power key

2*RJ45 Ethernet port
(1000Mbps)

Type-C
(USB2.0/DEBUG)

DC 12V
(5.5mm*2.1mm,
support 12V~24V
wide voltage input)

Phoenix connector(2*4Pin, 3.5mm Pitch)
232-TX GND CANH 485A
232-RX GND CANL   485B

M.2
(5G Module)

SIM Card

M.2
(SATA3.0/PCIe NVMe
SSD 2242/2260/2280)

MIPI CSI DPHY
(1*4 lanes/2*2 lanes,
30Pin-0.5mm)

Non-functional

Type-C
(USB2.0/DEBUG)

Interface description

● Compatible with Mainstream Edge Computing Modules

The mainstream edge computing module's interface standard (260-pin standard SODIMM) ensures compatibility with the following product series for flexible combination and replacement. This meets the needs for customization and is suitable for various edge computing deployment scenarios.
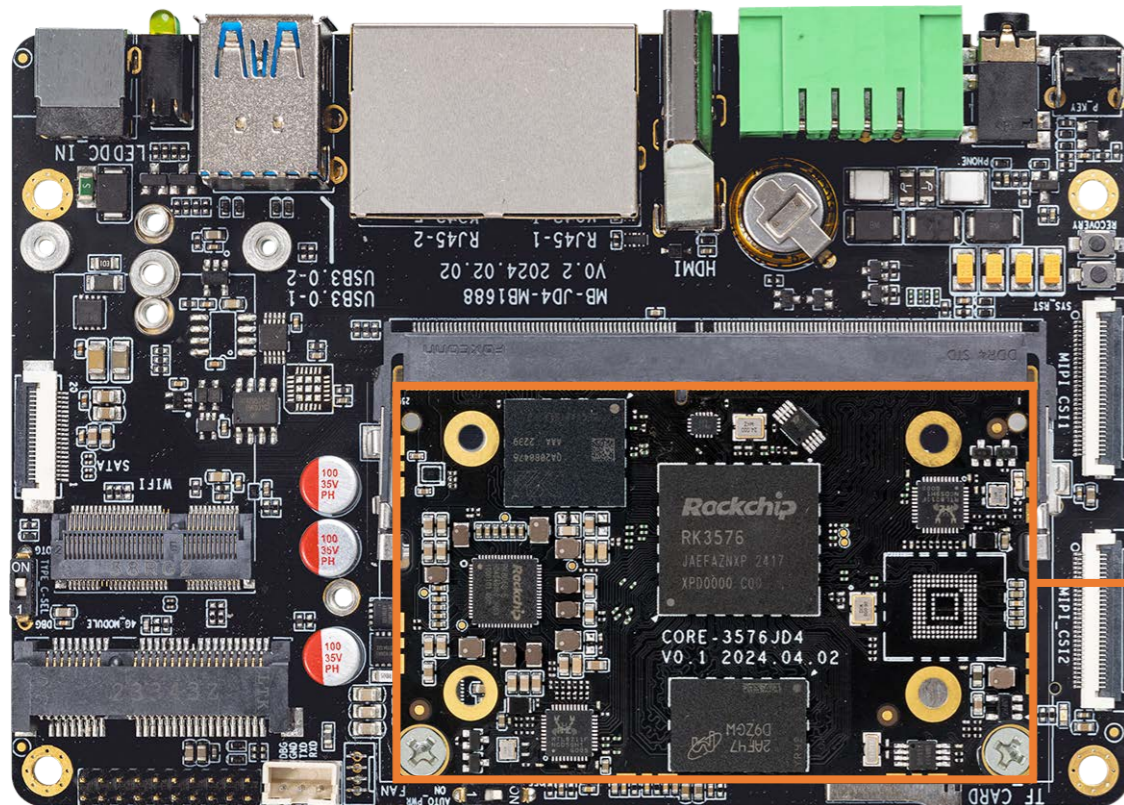
Core Board (Module)	AI Performance	Manufacturer
Core-1688JD4	16 TOPS	Firefly
Core-3576JD4	6 TOPS	Firefly
Core-3588JD4	6 TOPS	Firefly
NVIDIA Jetson Orin Nano	20~40 TOPS	NVIDIA
NVIDIA Jetson Orin NX	70~100 TOPS	NVIDIA

Dimension
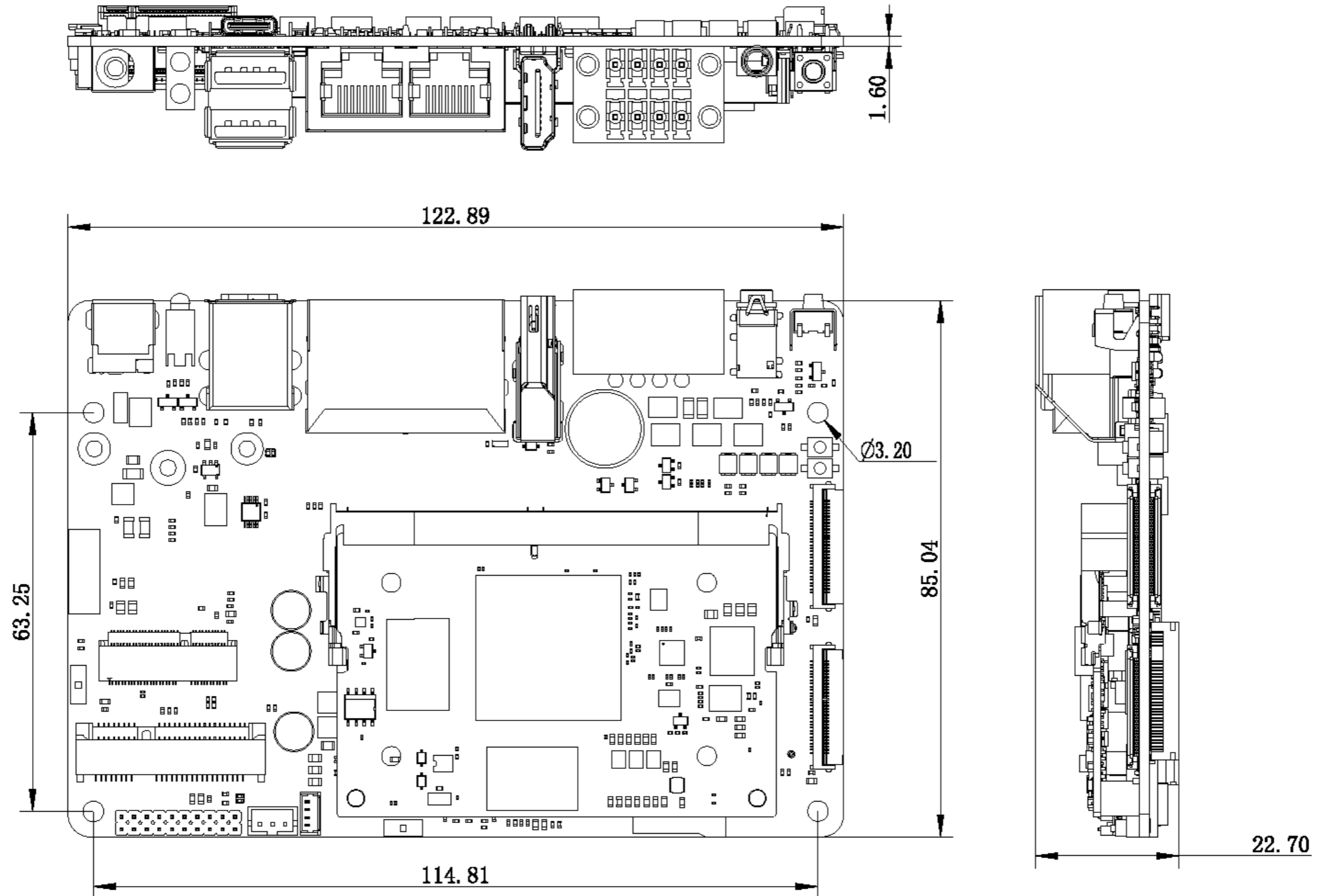
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