

Radxa Orion 06

Product Introduction

安谋科技
arm CHINA

×

此芯科技

×
radxa®



**Excellent Abilities of the Technical Team
Profound Understanding of Open Source
Ambitious Goals**

2024.7.30

Official Project Initiation

2024.9.29

First Prototype Boot OS

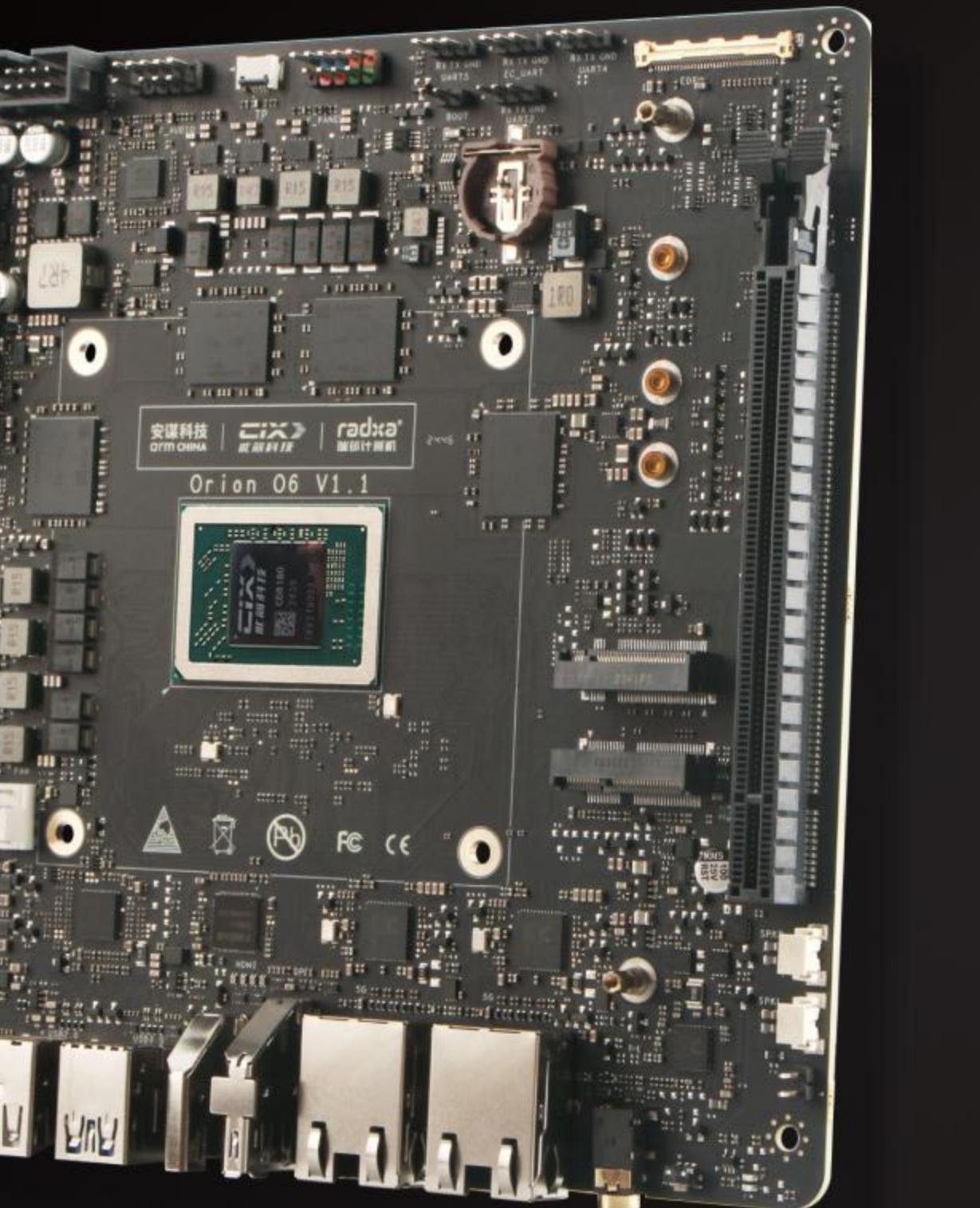
Today

Mass Production



Radxa Orion 06

WORLD'S FIRST



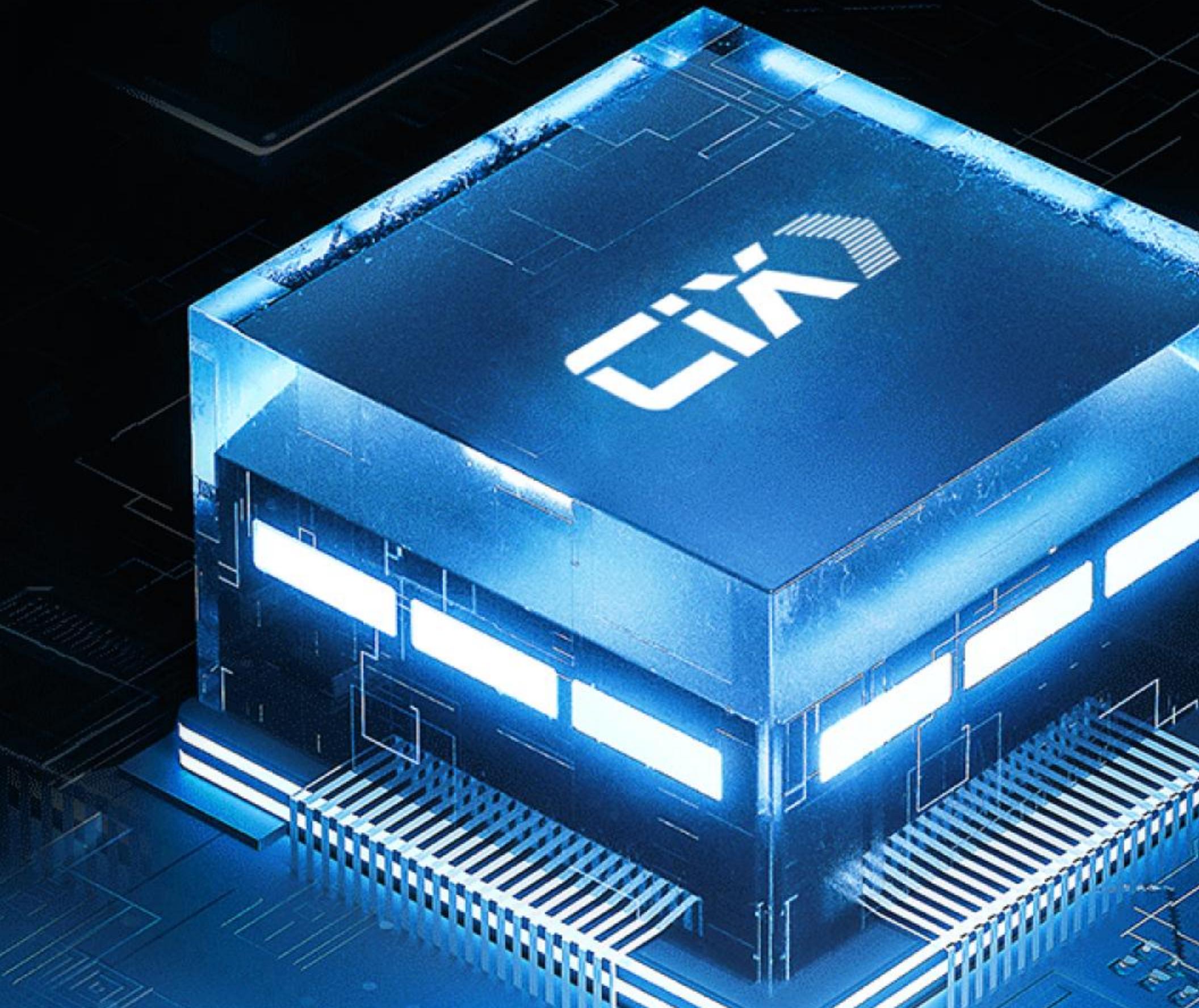
Open Source
ARM V9 Motherboard

**RICH INTERFACES
POWERFUL PERFORMANCE**

CPU
12 Cores

GPU
Desktop

NPU
30 Tops



CPU

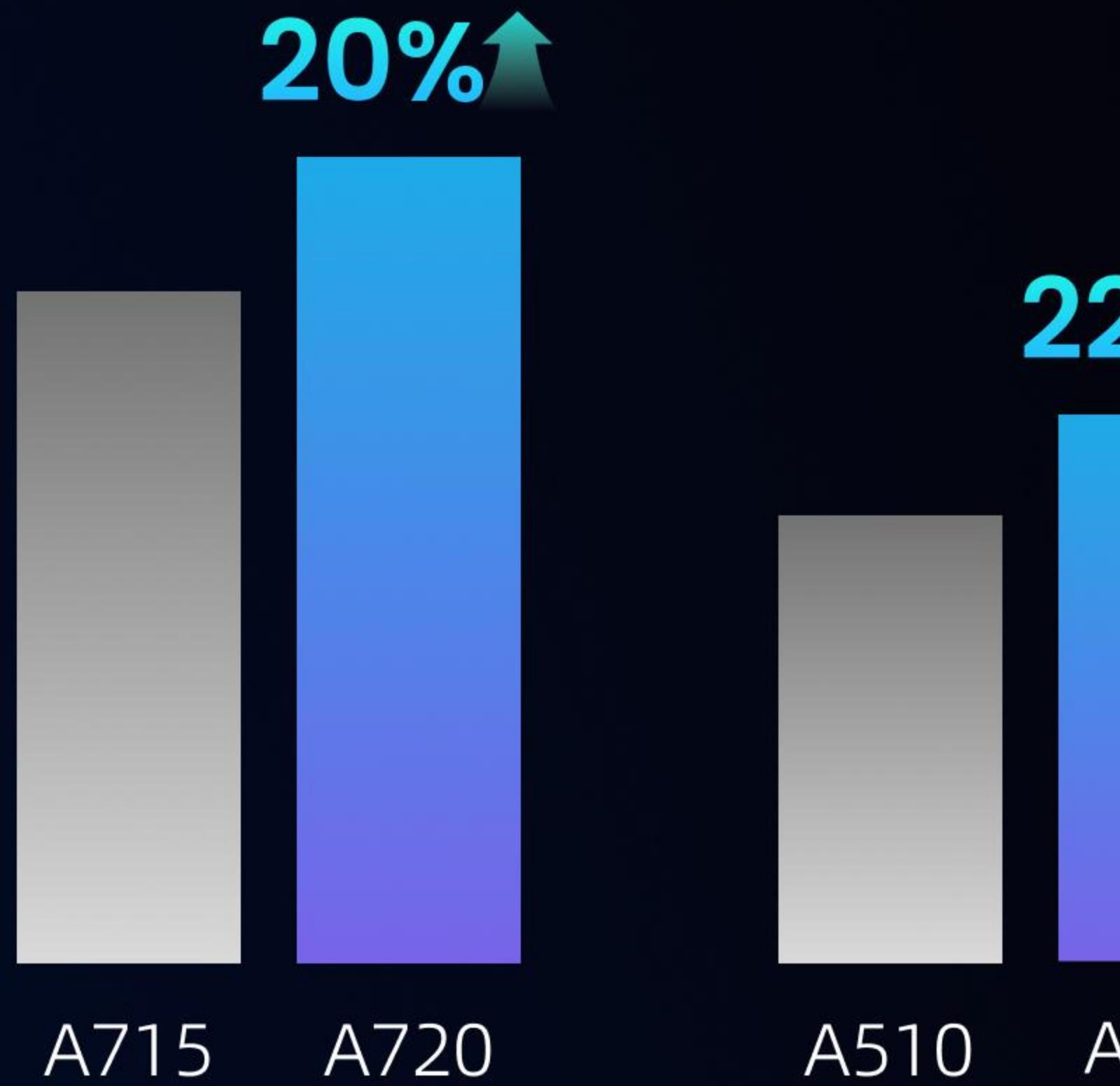
ARMv9.2 Architecture



CPU

ARMv9.2 Architecture

Energy Efficiency Ratio

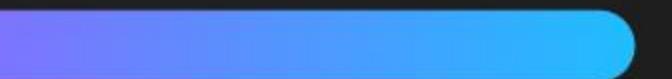


CIX P1 VS Apple M1 VS Qualcomm 8CX Gen3

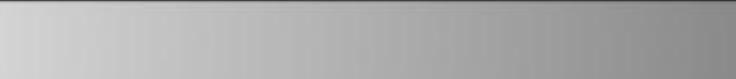


Single Threaded

Orion O6(CD8180)



Apple M1 3196 MHz (8 cores)

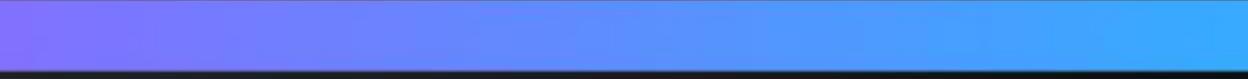


Qualcomm 8CX Gen3

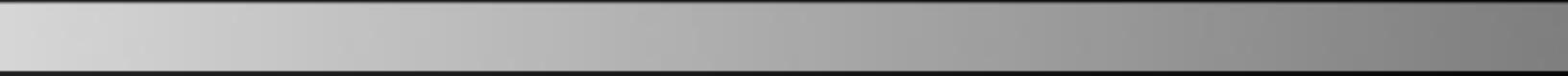


Multi-Core Score

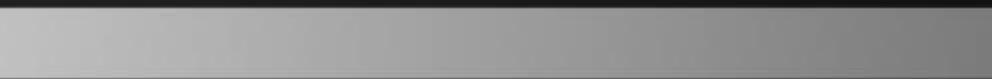
Orion O6(CD8180)



Apple M1 3196 MHz (8 cores)



Qualcomm 8CX Gen3





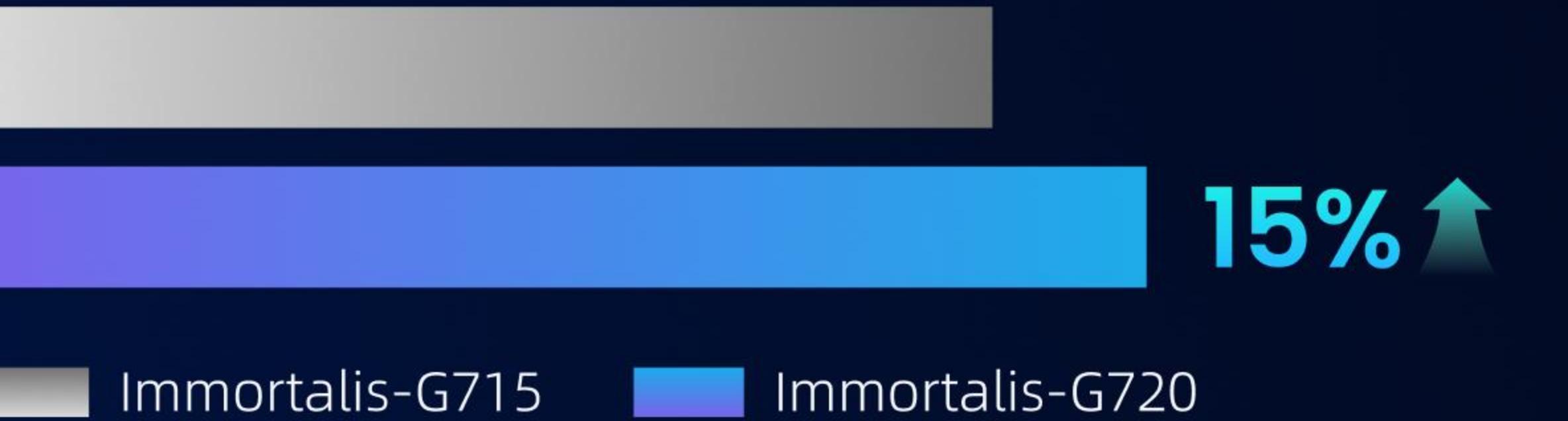
GPU

Immortalis-G720

- High-performance Desktop-grade GPU
- Meet the Demands of Extreme Graphics Rendering and General AI Computing



Energy Efficiency Ratio/Performance



GPU

Immortalis-G720

- High-performance Desktop-grade GPU
- Meet the Demands of Extreme Graphics Rendering and General AI Computing



Radxa Orion 06

**Heterogeneous AI Computing Power
is up to 45 TOPs**

Meeting AI PC computing power requirements

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Supported AI Large Models

- Can Successfully Run Large Models within 10 Billion Parameters
- The Maximum Performance Can Reach up to 30 Tokens per Second (Based on Qwen 2 - 1.5B)



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Multimedia

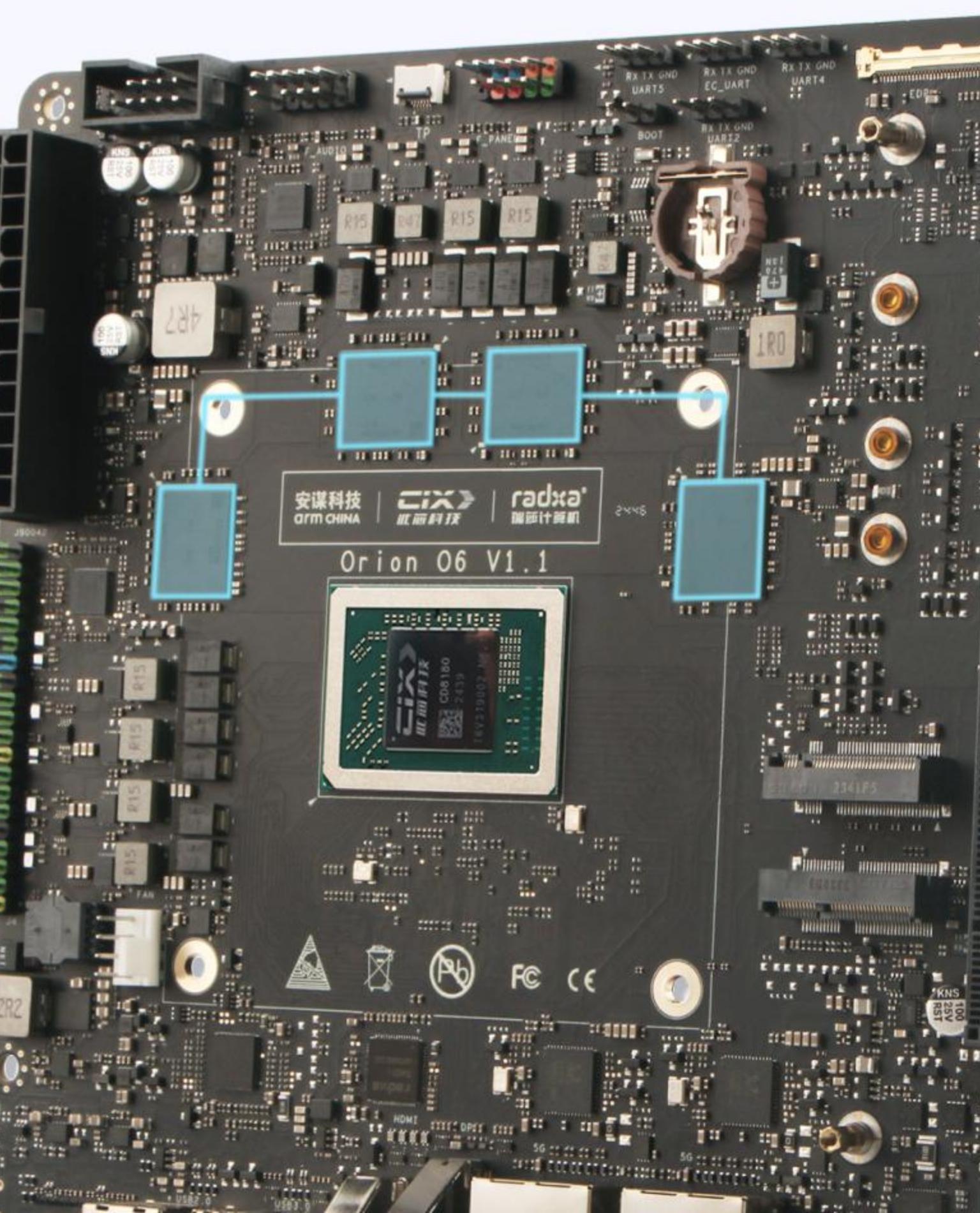
- Hardware Decoder:
 - Resolution: Up to 8K@60fps
 - Formats: AV1, H.265, H.264, VP9, VP8, H.263, MPEG-4, MPEG-2
- Hardware Encoder:
 - Resolution: Up to 8K@30fps
 - Formats: H.265, H.264, VP9, VP8



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LPDDR5

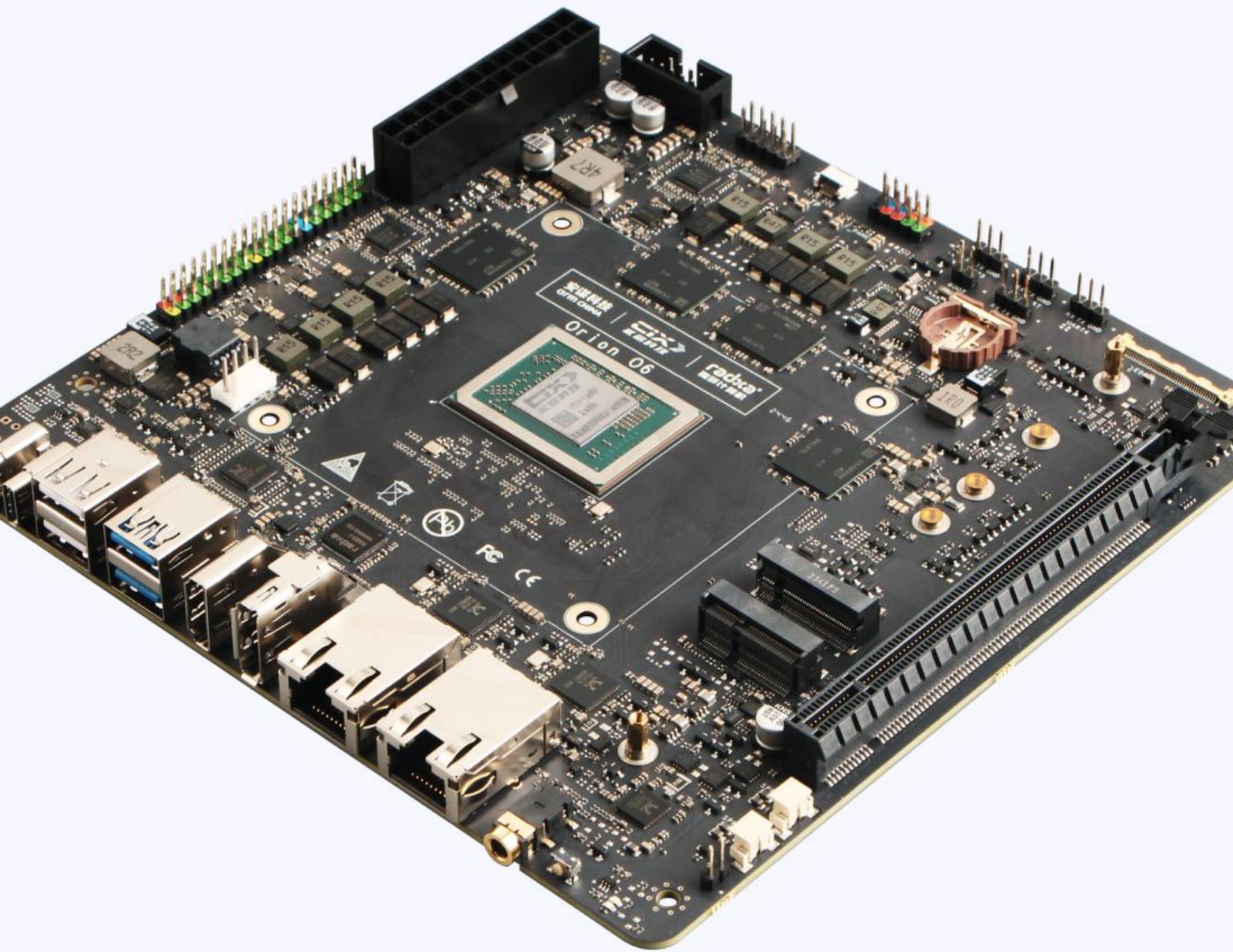
Memory Bus Width: 128 bit
Bandwidth > 100GB/s
Frequency > 5500MT/s
Maximum Capacity of 64GB



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Interfaces

- 1 x HDMI 2.0 up to 4K@60Hz
- 2 x 5 Gigabit Ethernet Ports
- 1 x DP 1.4 up to 4K@120Hz
- 1 x PCIe Gen4 X16 Slot with PCIe Gen4x8
- 1 x eDP up to 4K@60Hz
- 1 x M.2 M KEY Connector with PCIe Gen4x4
- 2 x USB Type-C(1xFull-featured)
- 1 x M.2 E KEY Connector with PCIe Gen4x2 + USB for Wi-Fi 7
- 2 x USB2.0
- 2 x USB3.2 Gen2 (10Gbps)
- 40 Pin GPIO Header



Display

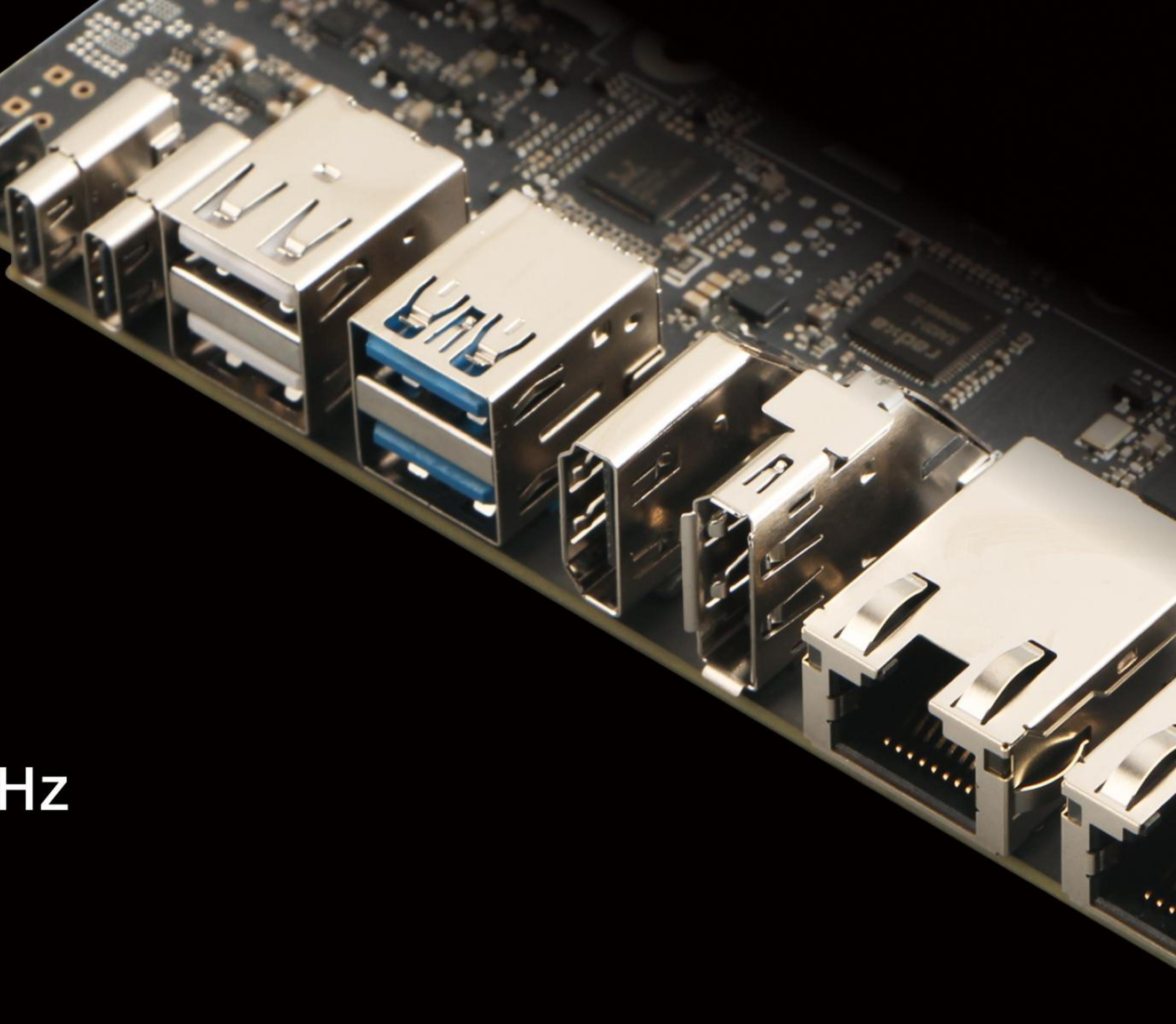
1 x HDMI 2.0 up to 4K@60Hz

1 x DP 1.4 up to 4K@120Hz

1 x eDP up to 4K@60Hz

1 x USB Type-C

Up to 4x Display, DP Display Up to 4K@120Hz





PCIe Expansion

PCIe 4.0

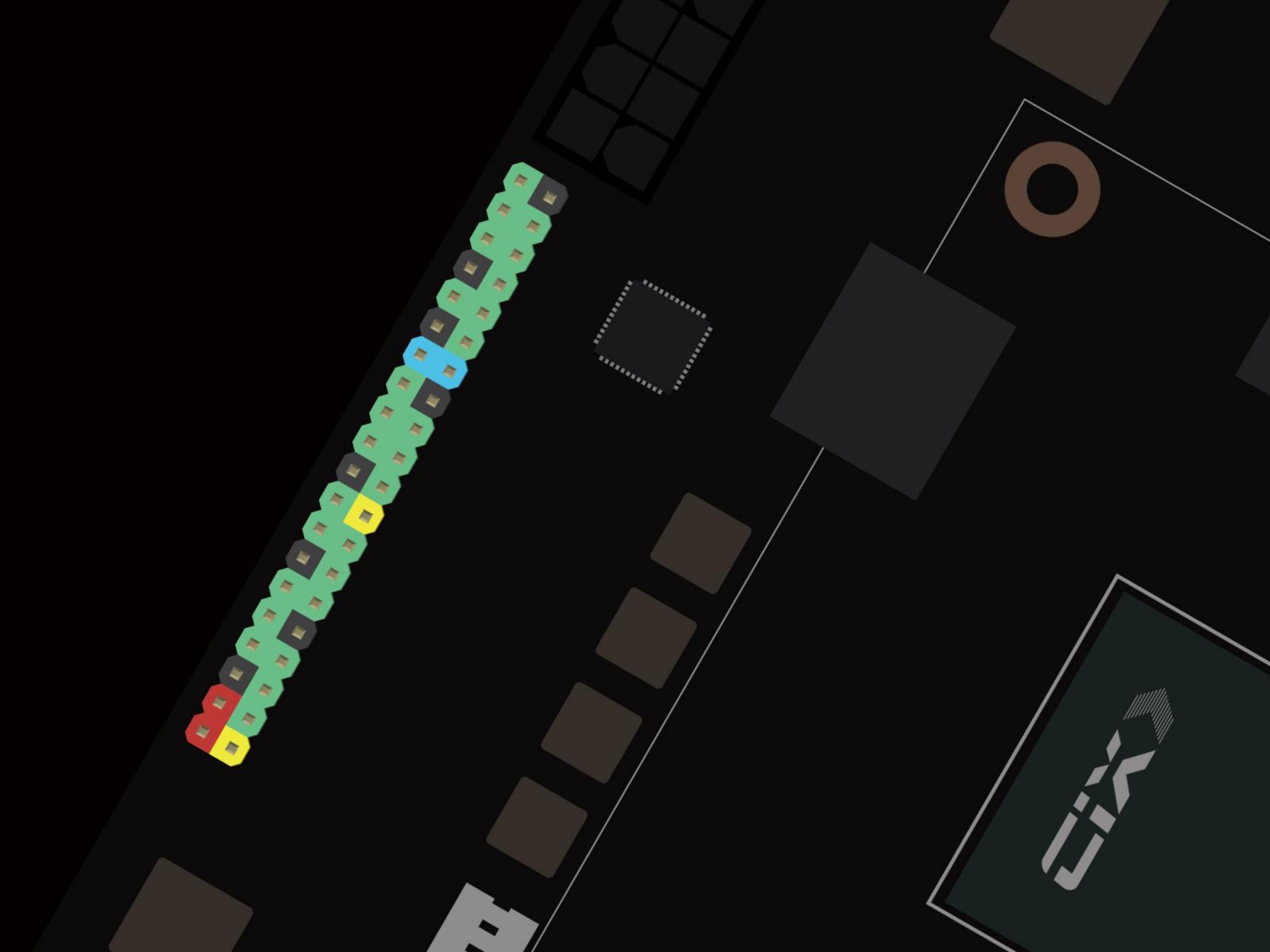
1 x PCIe Gen4 X16 Slot with PCIe Gen4x8

1 x M.2 M KEY Connector with PCIe Gen4x4

1 x M.2 E KEY Connector with PCIe Gen4x2 + USB

40 Pin GPIO Header

- 3 x UART
- 3 x I2C
- 2 x I2S
- 2 x PWM
- 1 x SPI
- 10+ x GPIO
- ...



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**Native Linux / Debian support
with UEFI / BIOS**

Supported OS:



Upcoming Support OS:





Power Supply

24-Pin ATX Power Connector
Type C PD Power Supply

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Designing ARM Motherboards with PC Architecture

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How We Build ARM Motherboard with PC Architecture

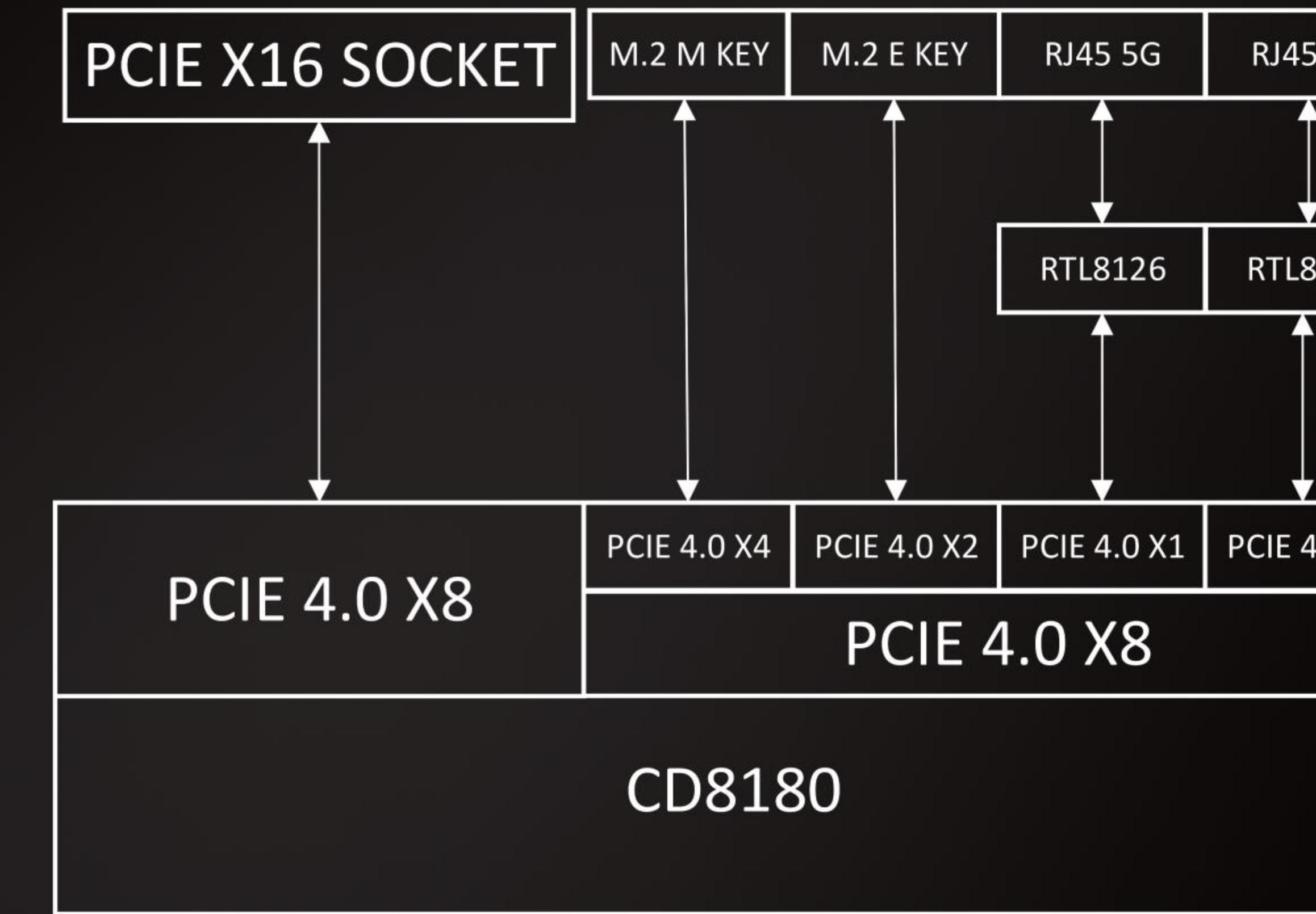
Hardware

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High Speed I/O

PCIe Gen4

X8 + X4 + X2 + X1 + X1



Hardware

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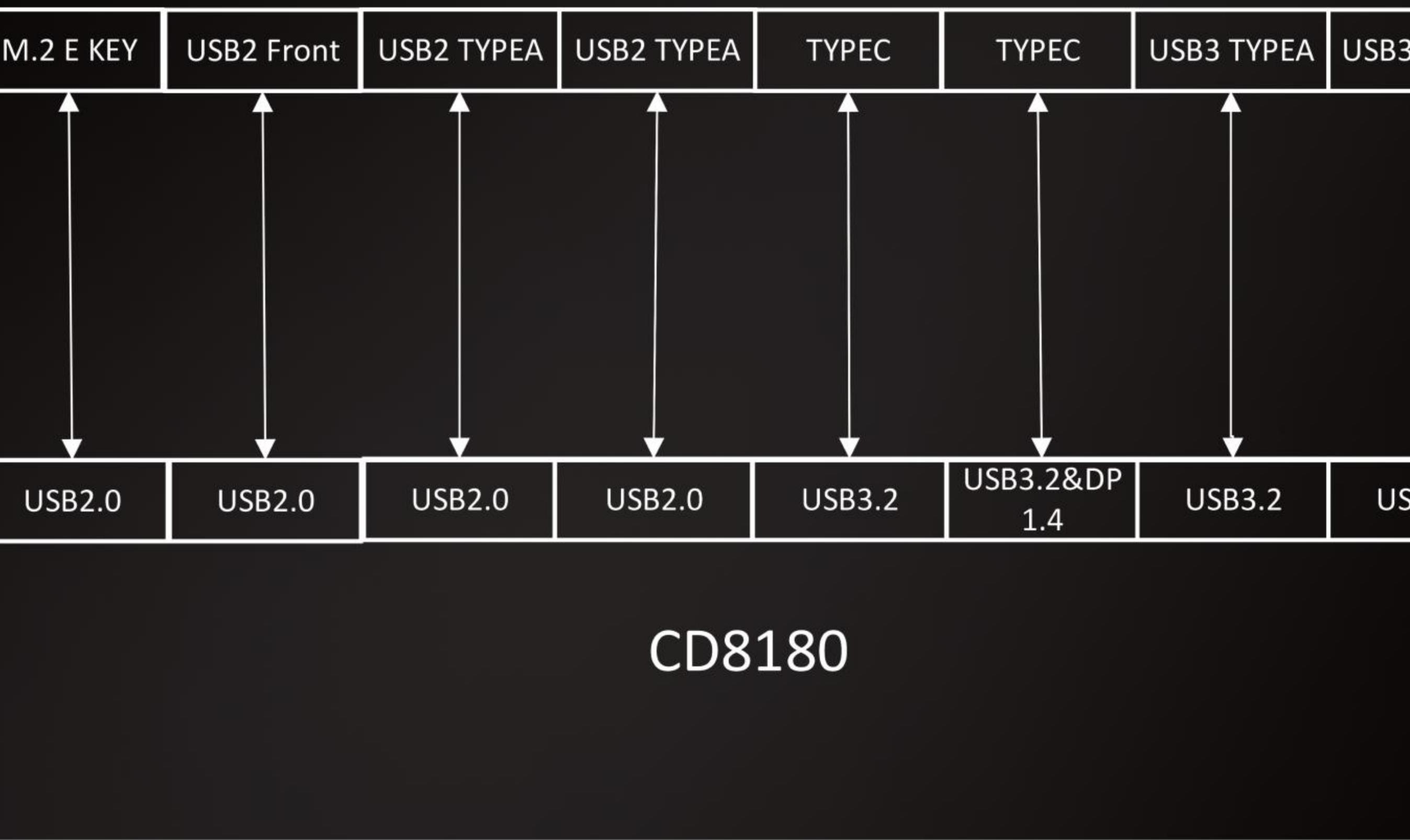
USB

-Front_USB

-USB3.2/2 Type-A

-Full Mode Type-C

-E-Key

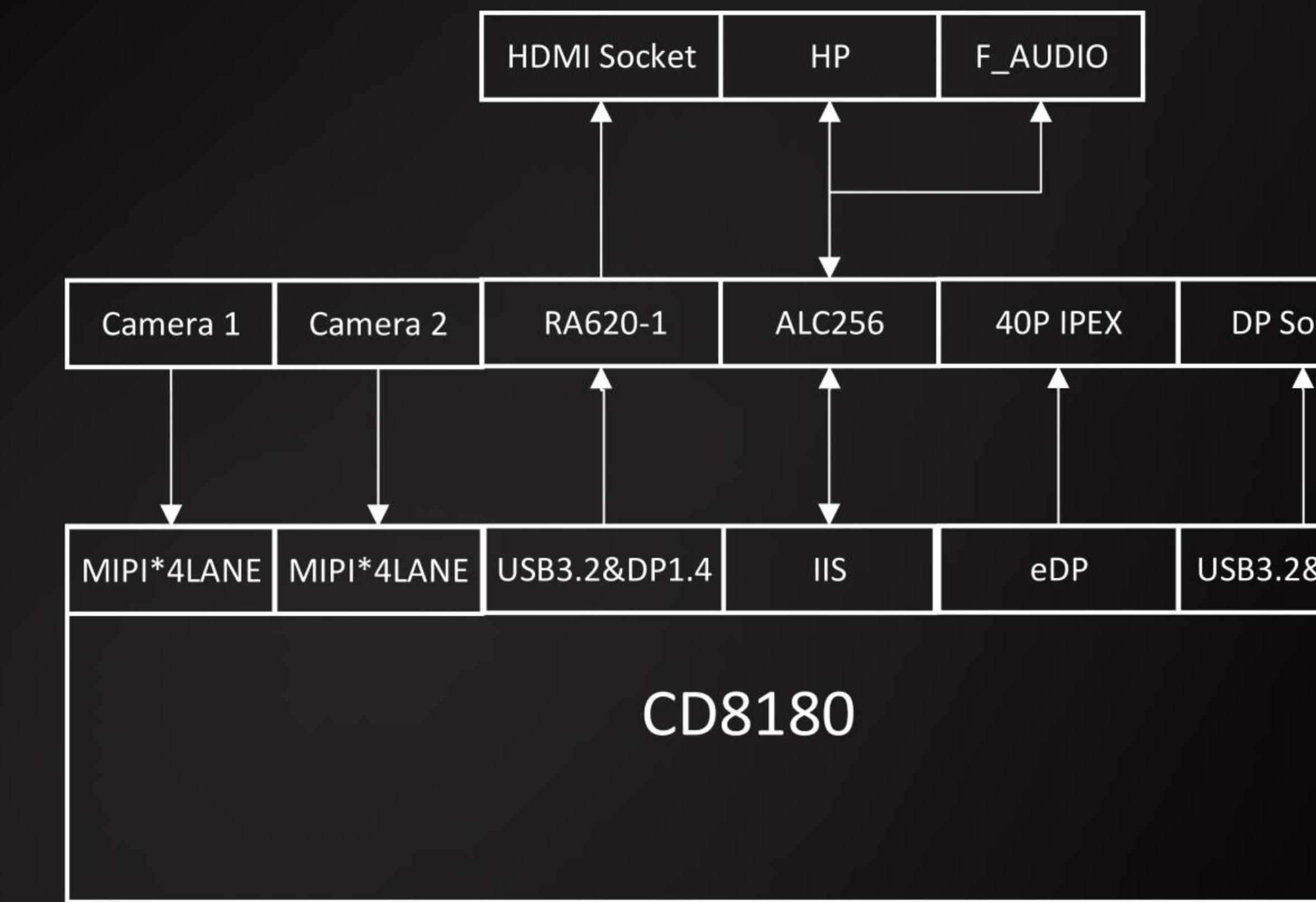


Hardware

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Video Output / Input

- HDMI
- DP
- eDP
- USB-C with DP
- Camera
- F_Audio

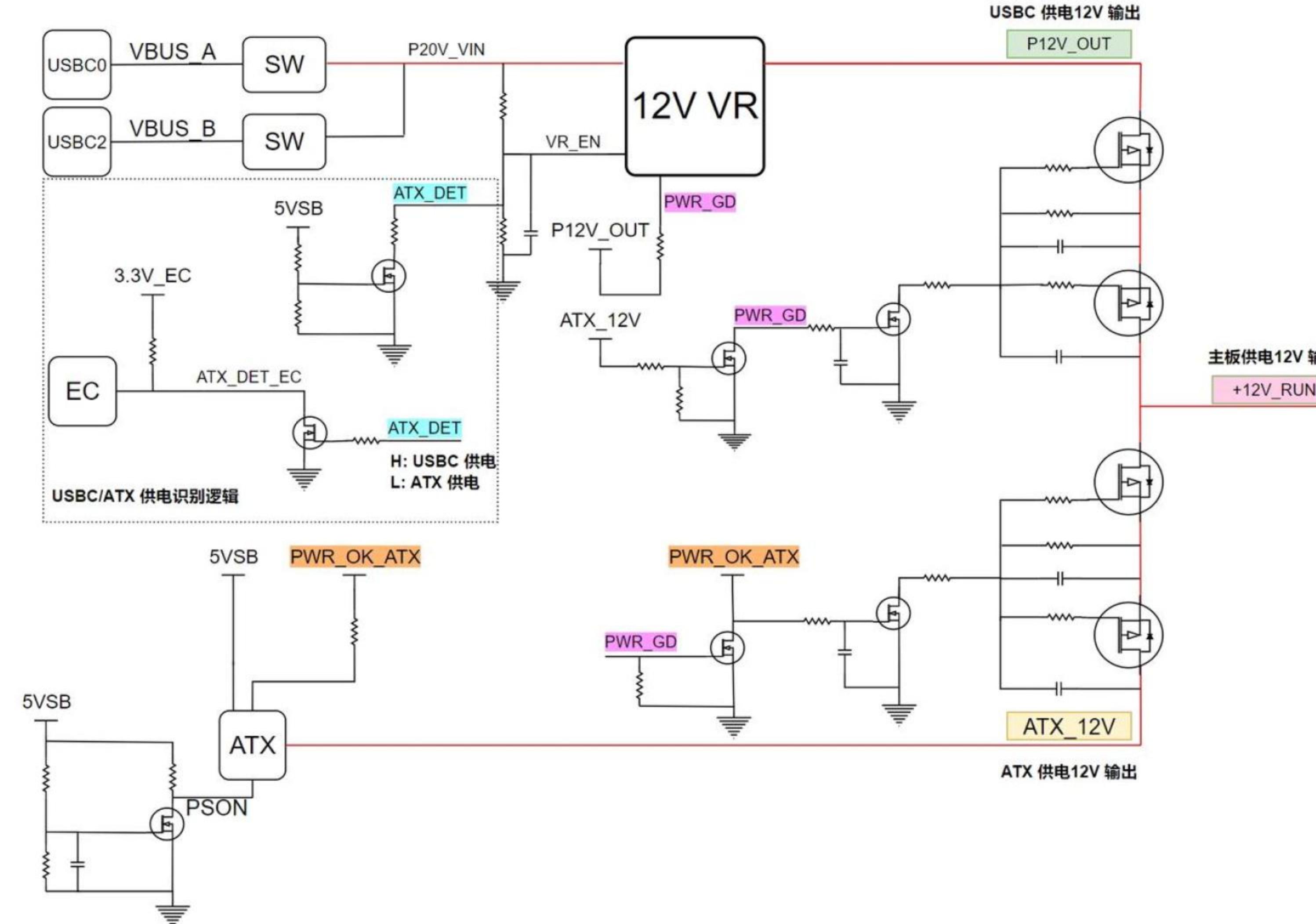


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Power Supply Priority Management

ATX > Type-C

Stable Power Supply Without Backflow



Power Supply Design

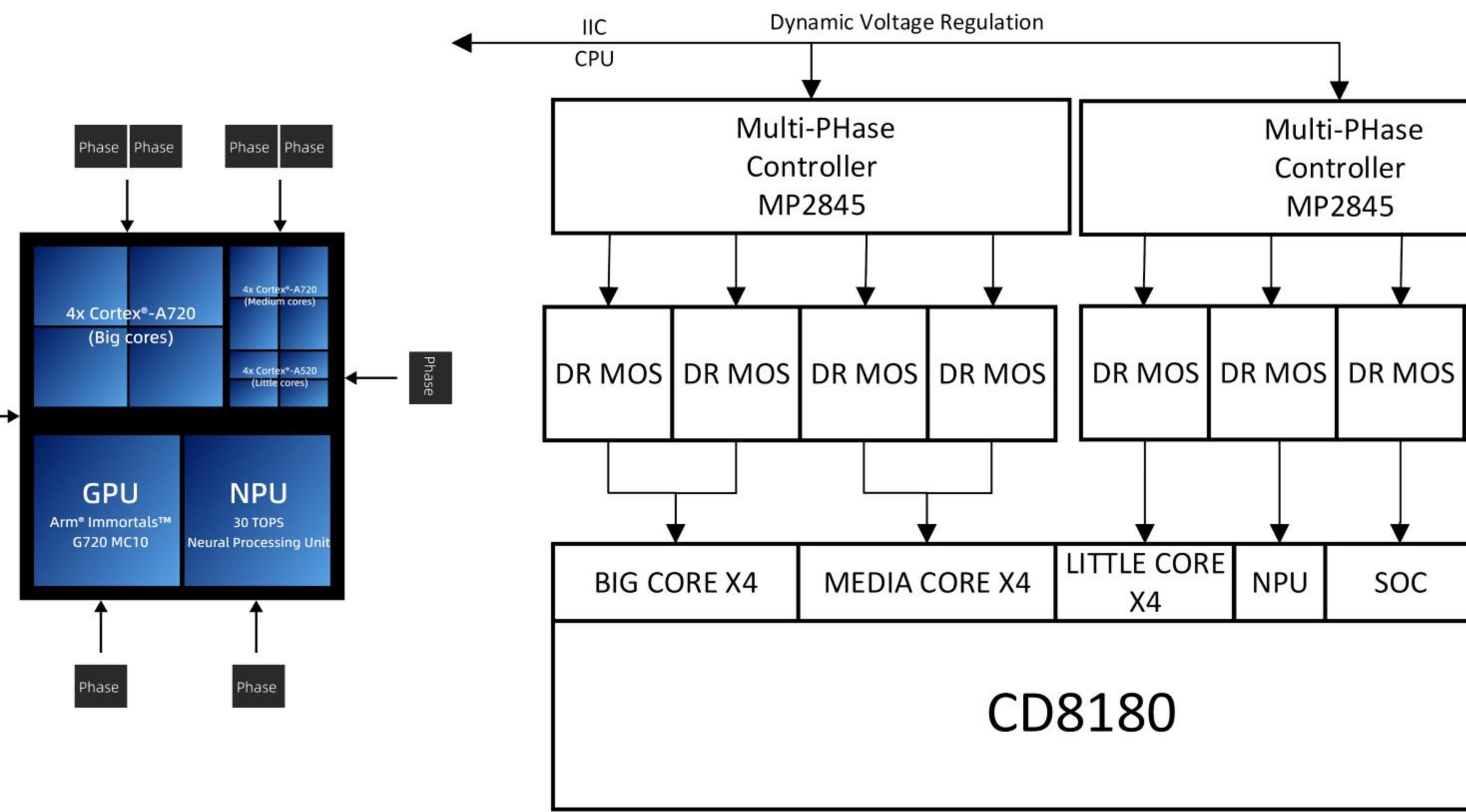
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8-Phase

Peak Current of Up to 37A per Phase

Meet the Transient High Current for Core Power Supply

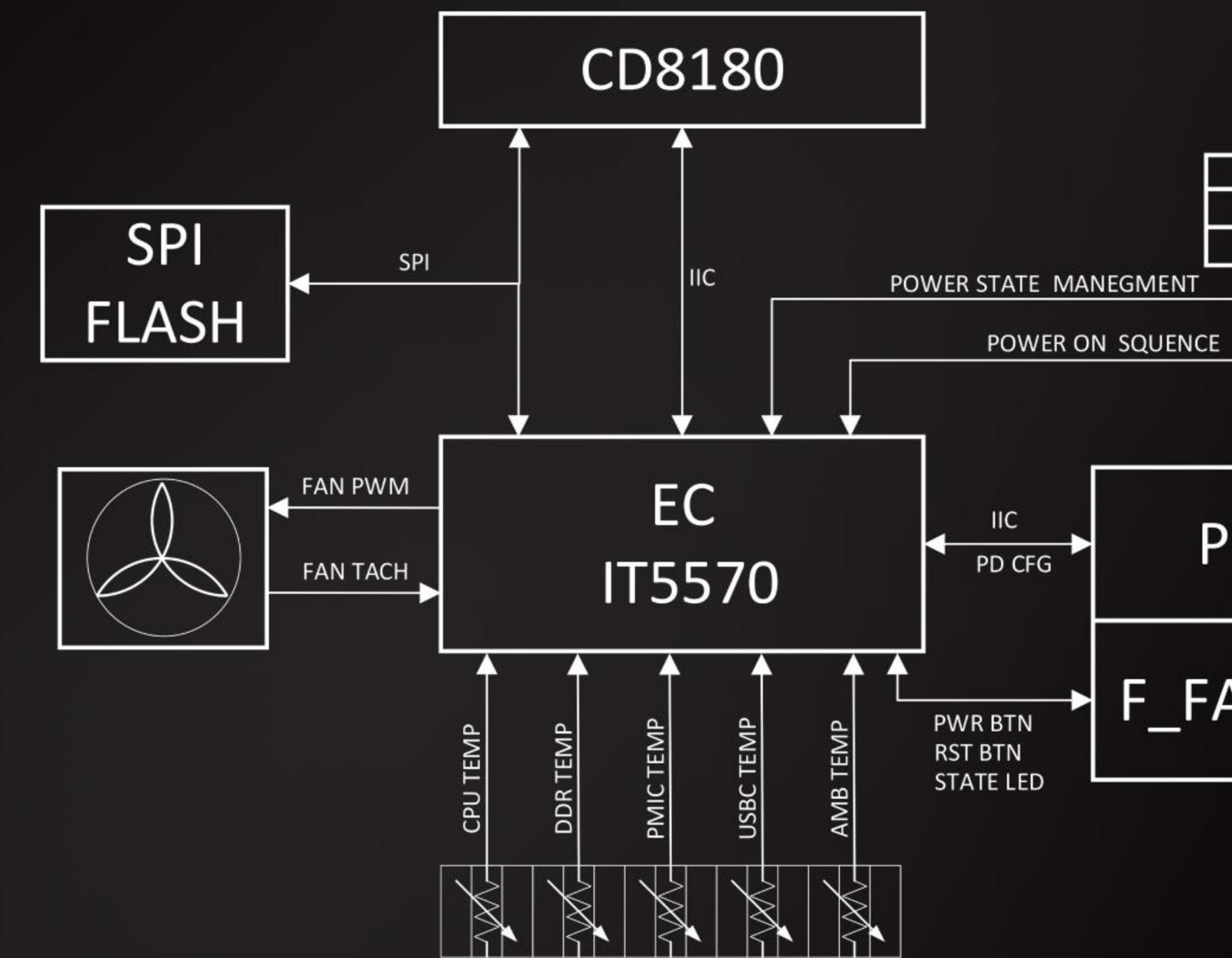
Dynamic Power Consumption Management



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EC Motherboard Manager

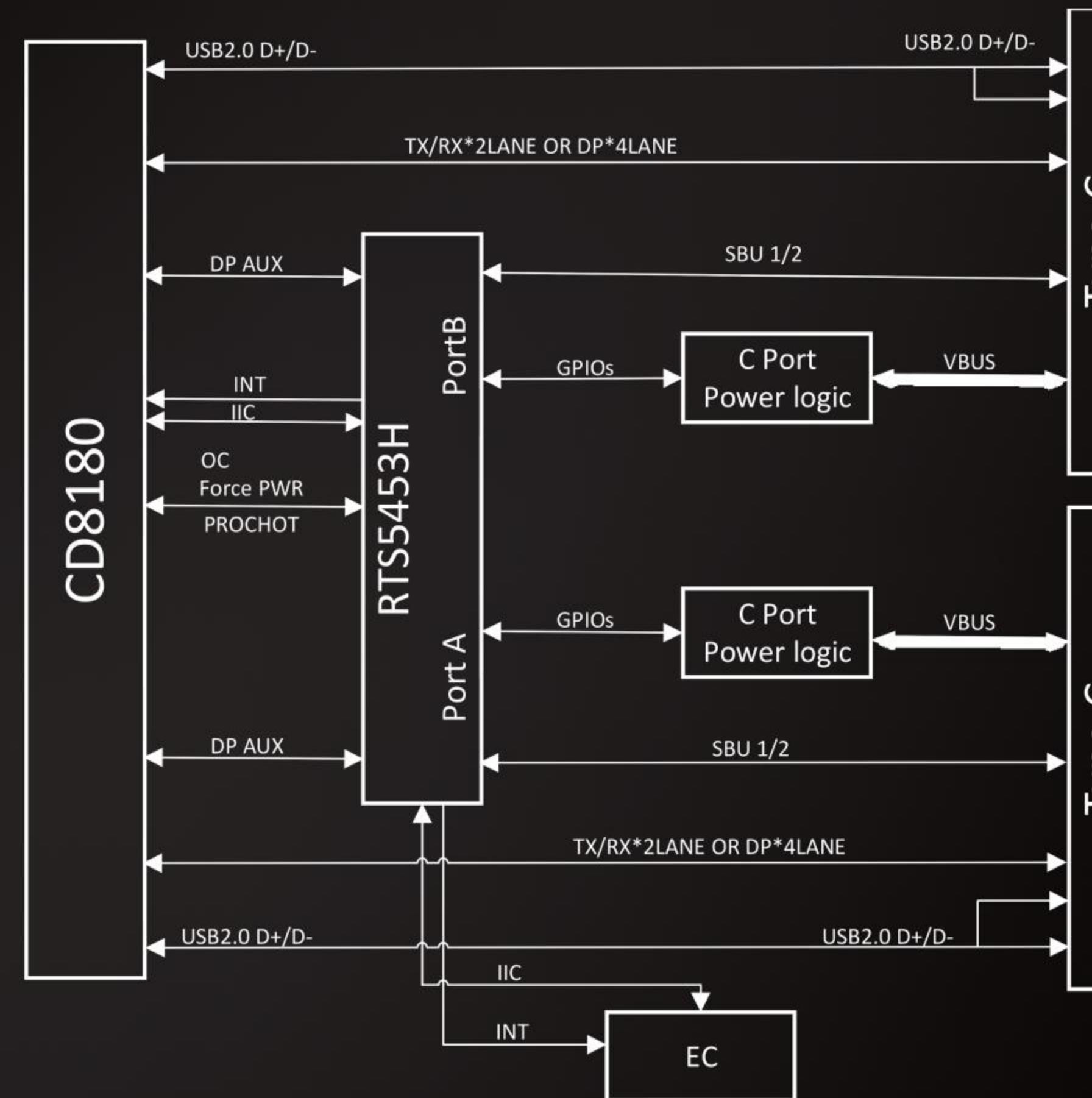
Fan Management, Temperature Detection,
Voltage Monitoring of Key Parts, Board ID
Management, Power Management,
Power-on Sequence Control, Reset
Control, S0/S3/S5 State Control



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Full-featured Type-C

- Power Supply and External Power Supply
- Priority Management
- Dual Type-C Design
- USB/DP Switching



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Open Hardware Schematics

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An Easy-to-Develop Platform

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BSP Development

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We Are the First Users of Our Products



Radxa Orion O6 Software Development Role Configuration

Embedded Systems
Development Role



BSP Engineer

Radxa Orion O6 Development Role Configuration



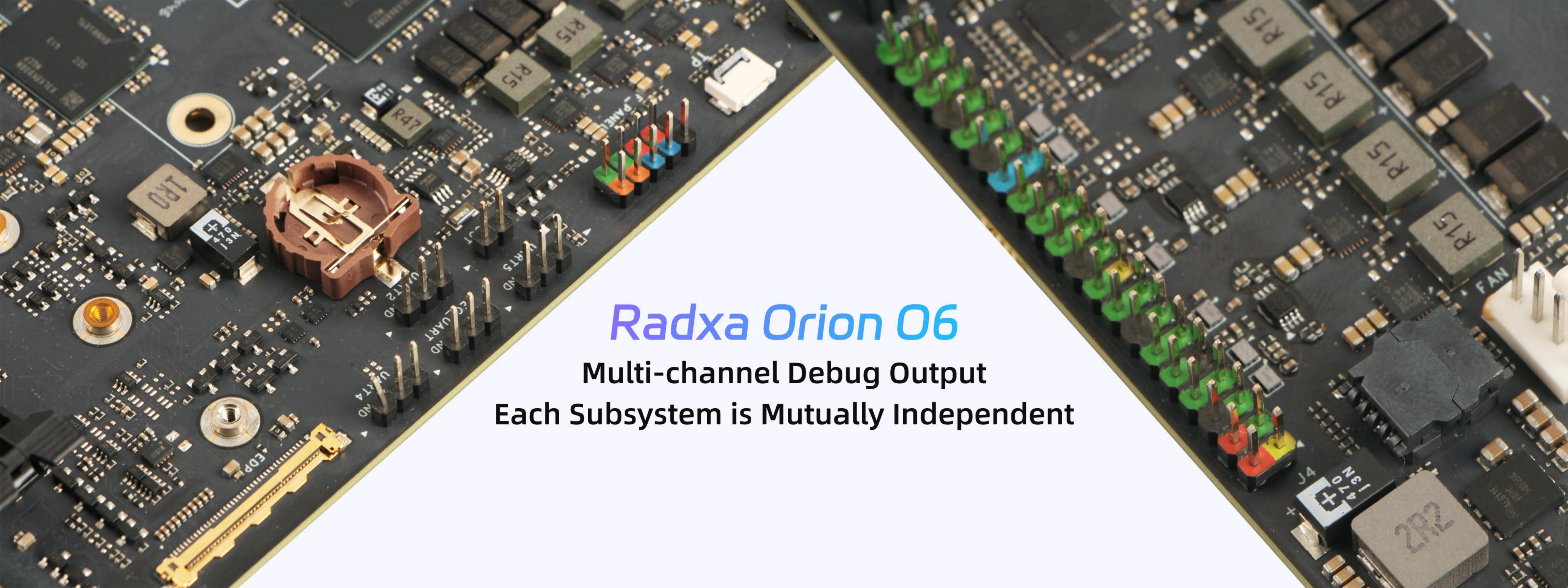
EC Development
Engineer



BIOS Development
Engineer



OS Development
Engineer

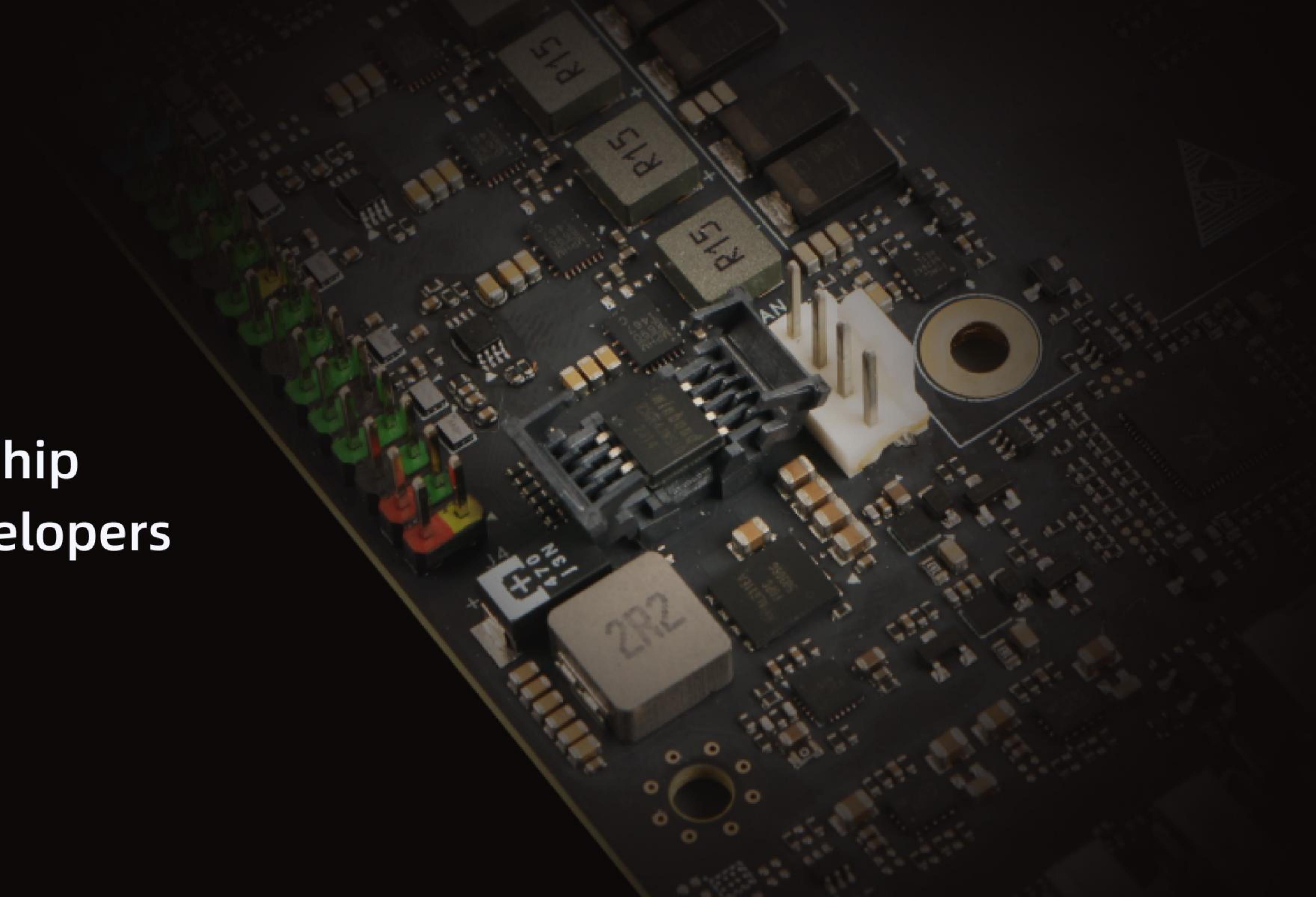


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Multi-channel Debug Output
Each Subsystem is Mutually Independent

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Replaceable BIOS SPI Flash Memory Chip

Reduce the Cost of Trial and Error for Developers



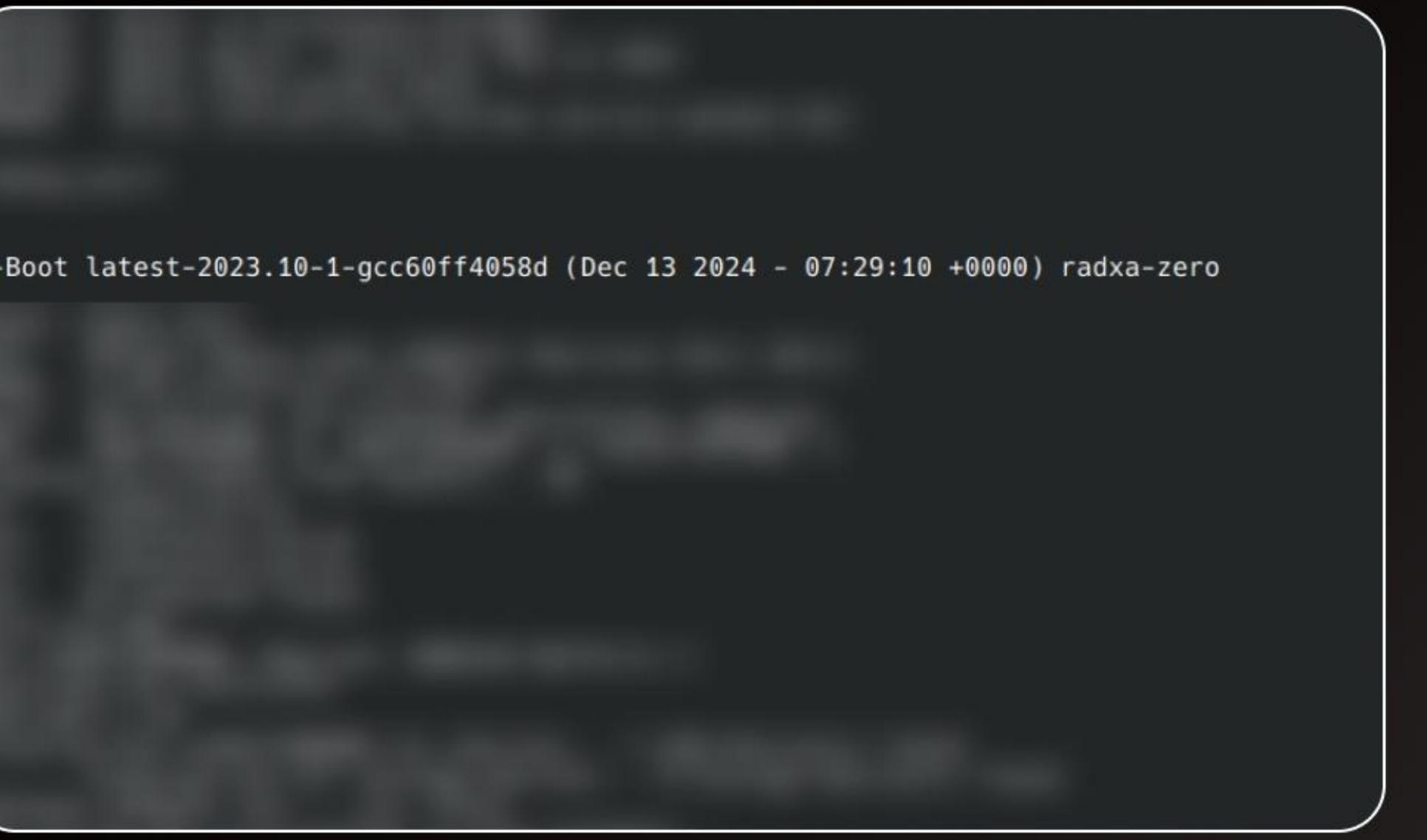
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Operating System Development

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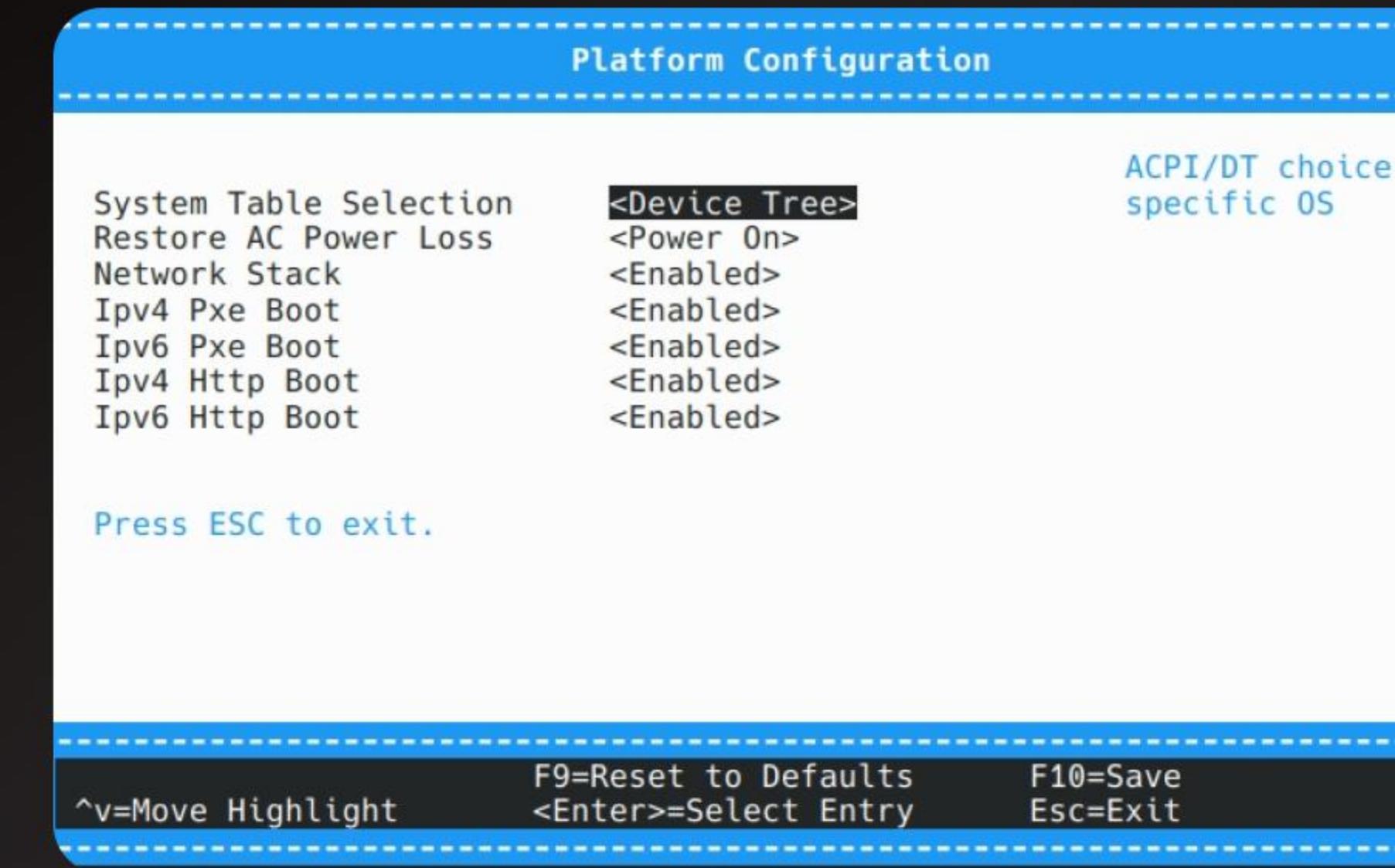
Boot Chain Based on EDK2

U-Boot



EDK2



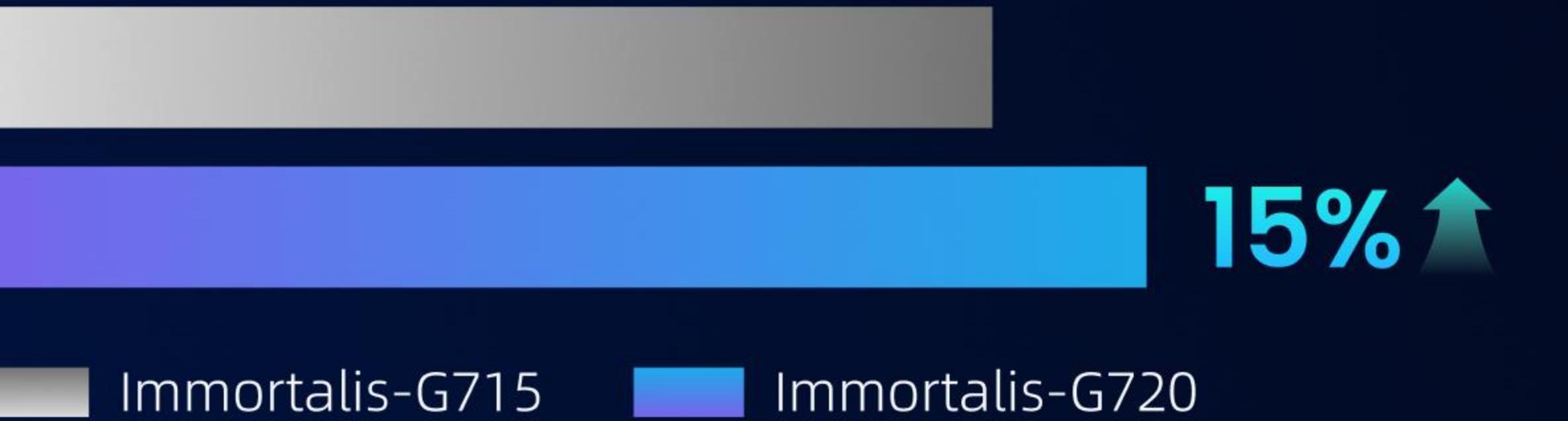


Configuration Options of Orion 06

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Upper-layer Application Development

Energy Efficiency Ratio/Performance



GPU

Immortalis-G720

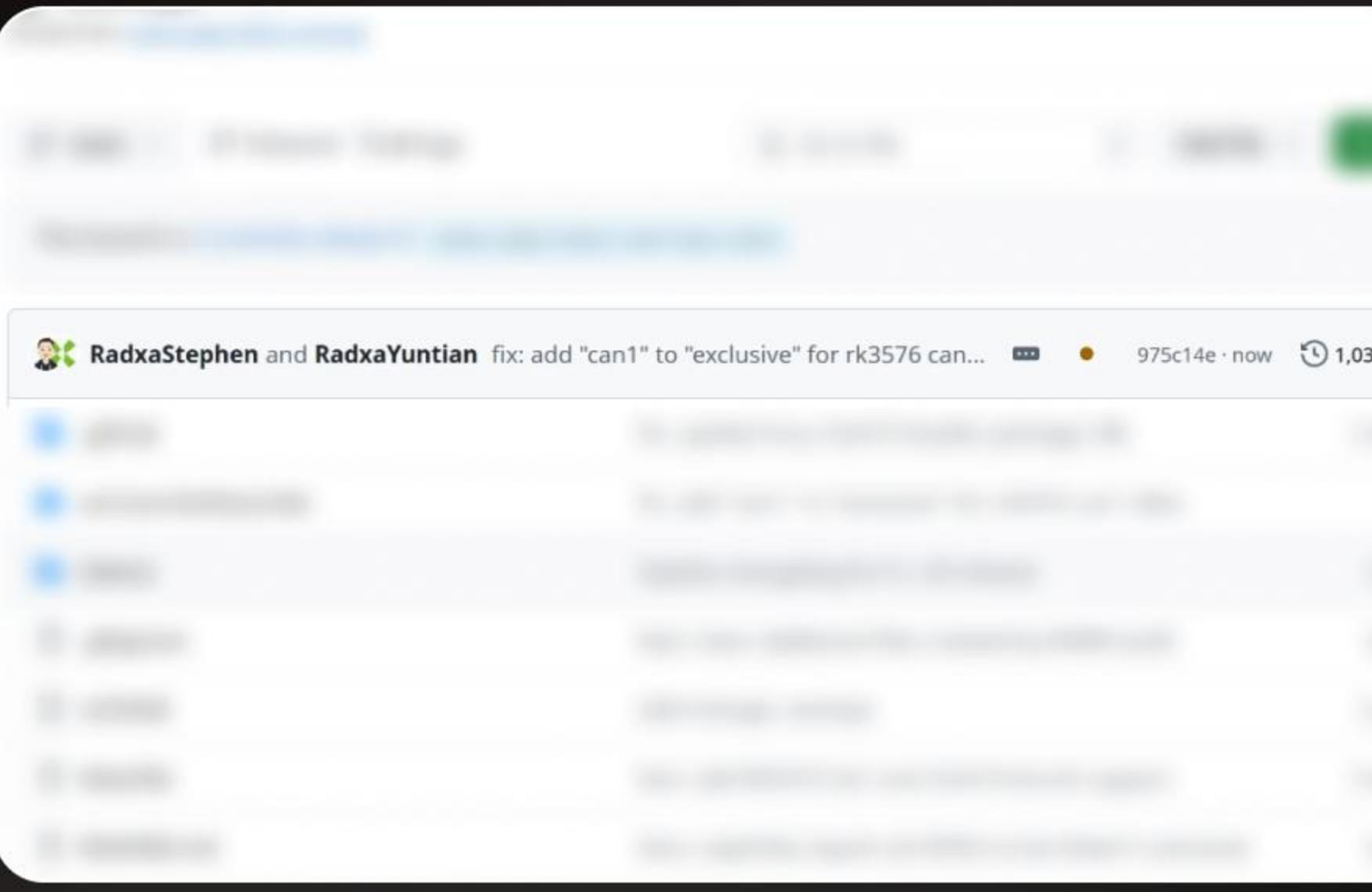
- High-performance Desktop-grade GPU
- Meet the Demands of Extreme Graphics Rendering and General AI Computing



Radxa Orion O6

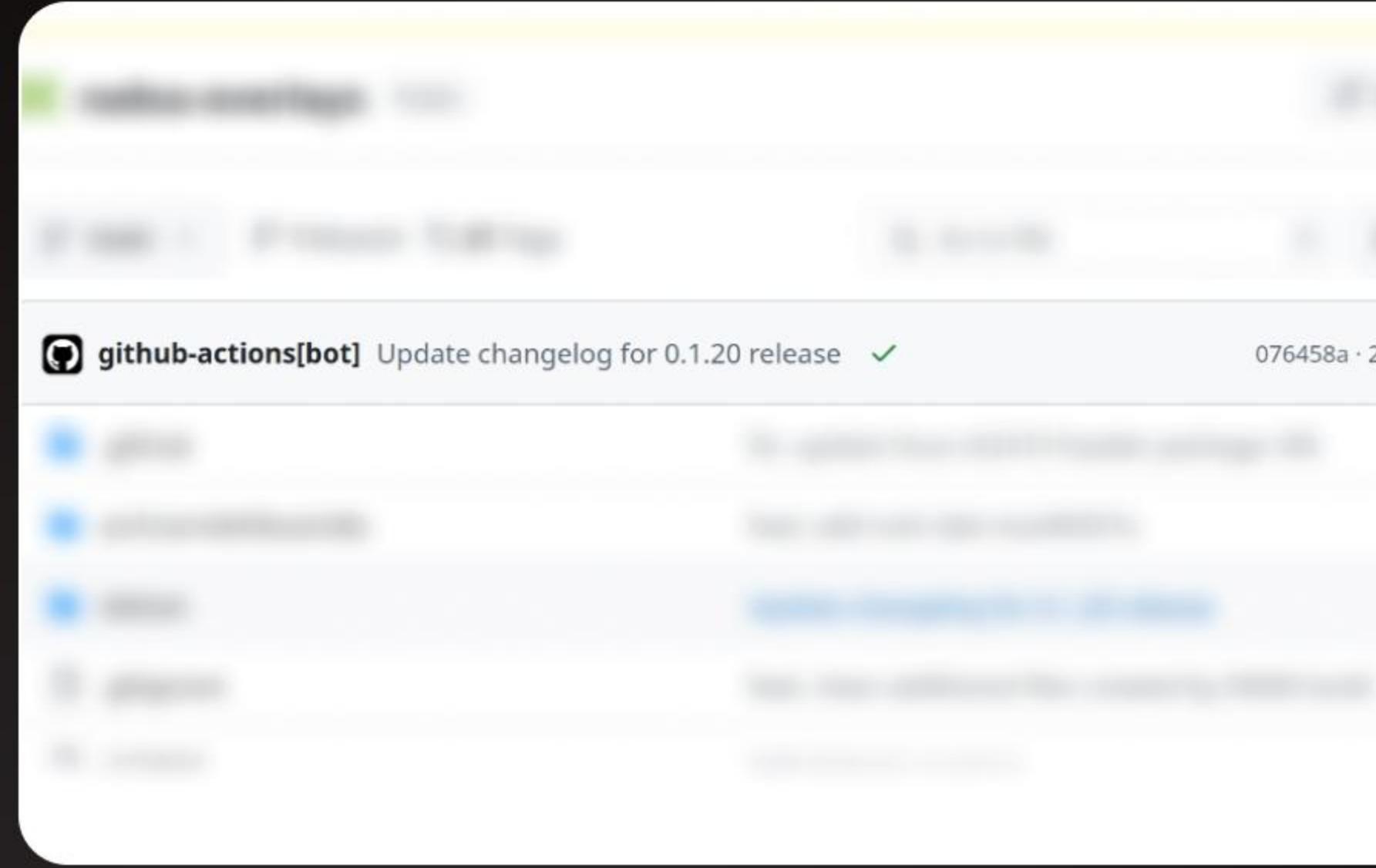
Sustainable Software Delivery

```
overlays on ↵ pr384:main [$†] via C v14.2.1-gcc took 13s
at 20:38:22 > git push stephen HEAD:main
warning: not sending a push certificate since the receiving end does not support
Enumerating objects: 60, done.
Counting objects: 100% (60/60), done.
Delta compression using up to 20 threads
Compressing objects: 100% (28/28), done.
Writing objects: 100% (32/32), 3.00 KiB | 1023.00 KiB/s, done.
Total 32 (delta 25), reused 0 (delta 0), pack-reused 0 (from 0)
remote: Resolving deltas: 100% (25/25). completed with 23 local objects.
```

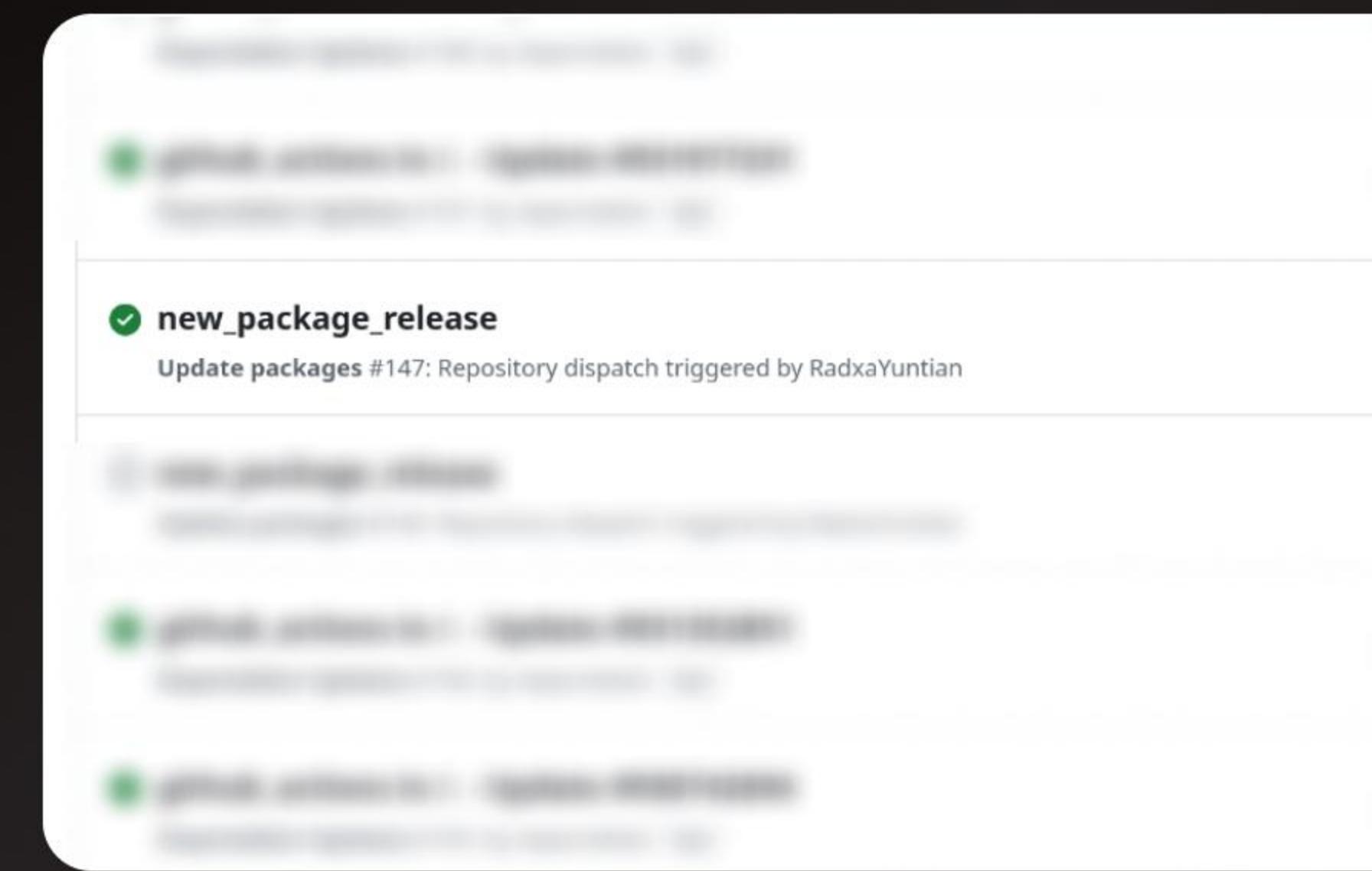


Trigger Code CI for Submission

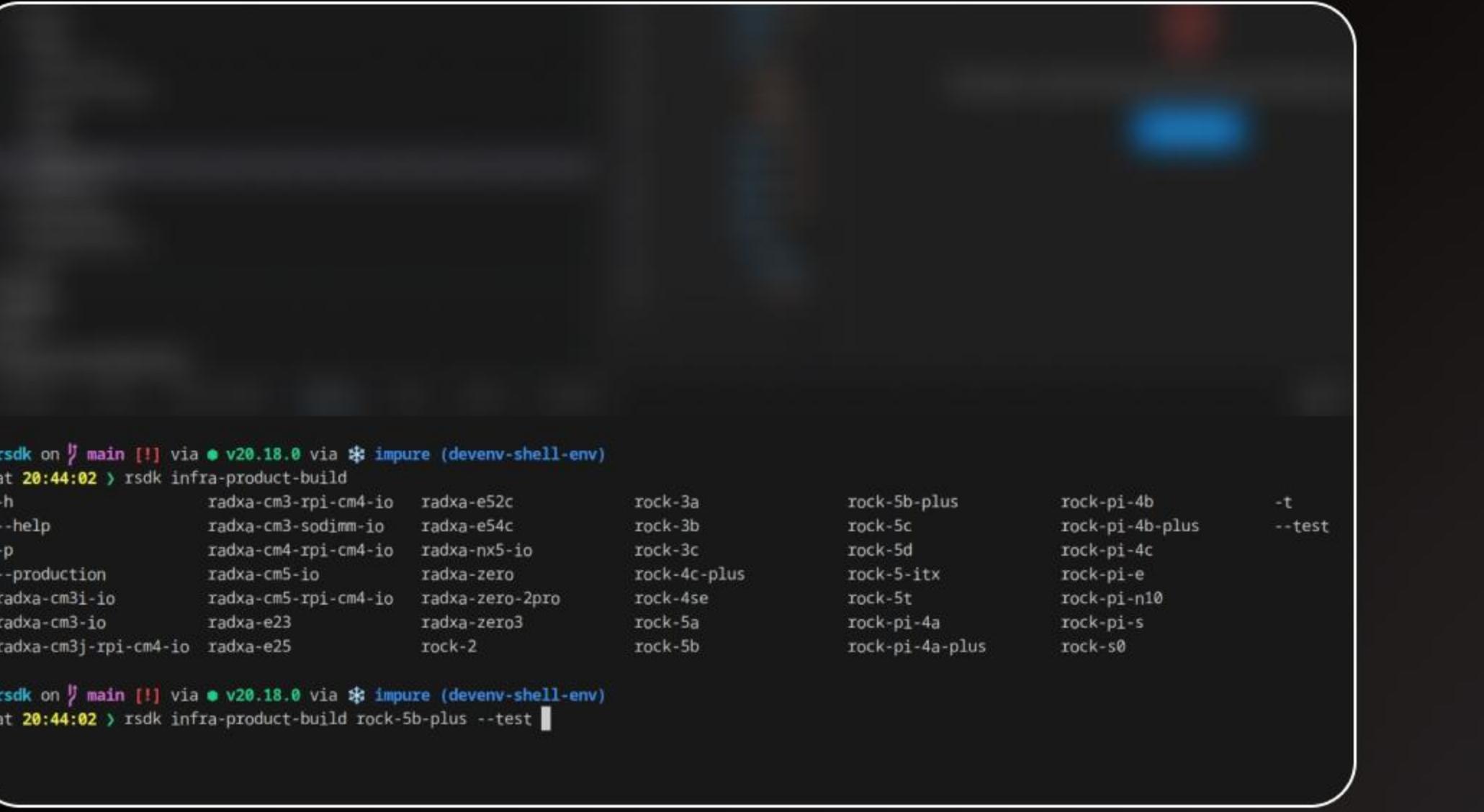
```
overlays on ↵ main [?] via C v14.2.1-gcc
at 20:19:24 > make release
```



Automatically Complete Version Release via Command Line Locally

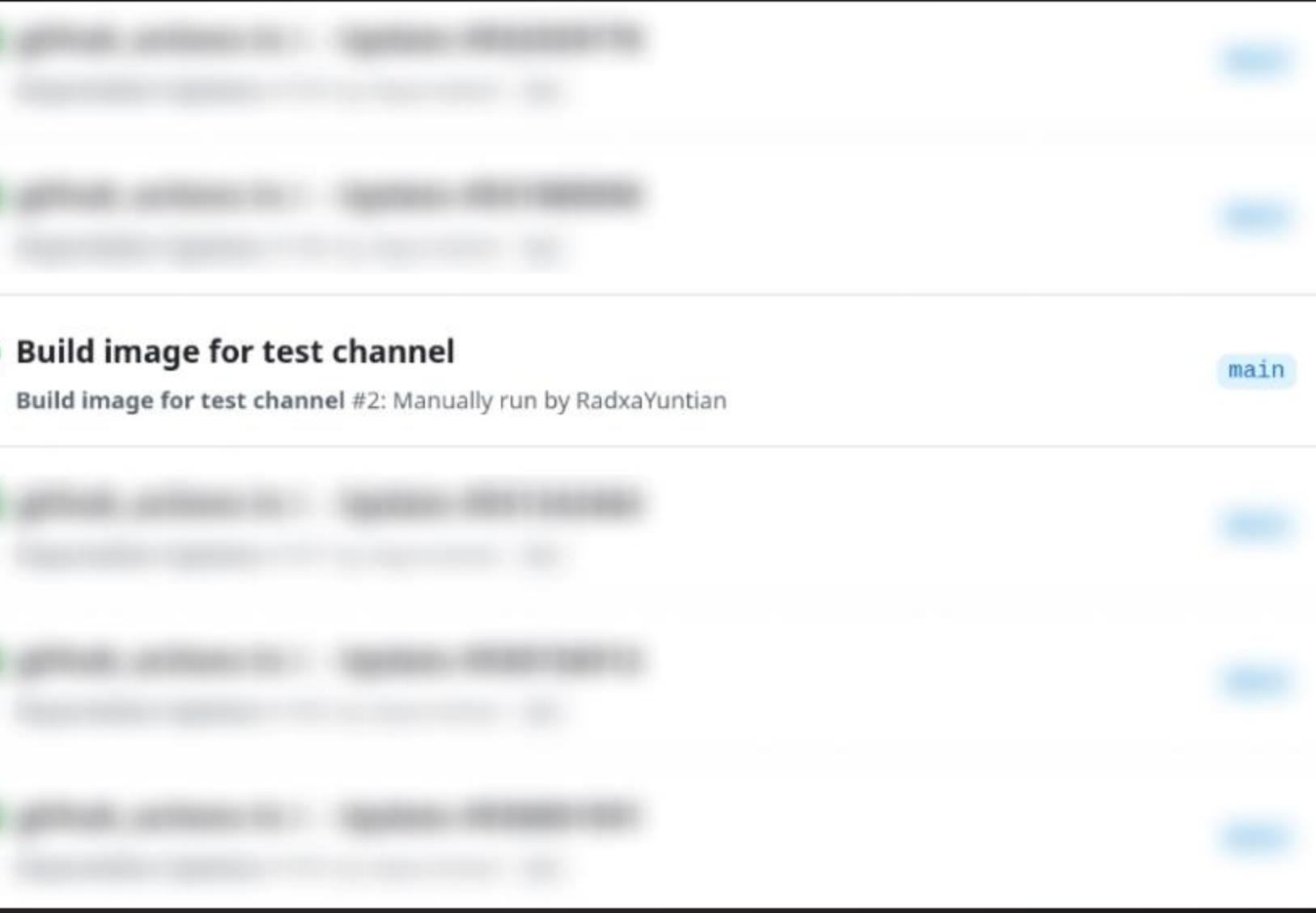


Successfully Released Software Triggers Software Source Updates



```
rsdk on 20:44:02 via v20.18.0 via impure (devenv-shell-env)
at 20:44:02 > rsdk infra-product-build
-h      radxa-cm3-rpi-cm4-io  radxa-e52c      rock-3a      rock-5b-plus   rock-pi-4b      -t
--help   radxa-cm3-sodimm-io  radxa-e54c      rock-3b      rock-5c        rock-pi-4b-plus --test
-p      radxa-cm4-rpi-cm4-io  radxa-nx5-io    rock-3c      rock-5d        rock-pi-4c
--production  radxa-cm5-io     radxa-zero      rock-4c-plus  rock-5-itx    rock-pi-e
radxa-cm3j-io  radxa-cm5-rpi-cm4-io  radxa-zero-2pro  rock-4se     rock-5t        rock-pi-n10
radxa-cm3-io   radxa-e23       radxa-zero3     rock-5a      rock-5a        rock-pi-4a
radxa-cm3j-rpi-cm4-io  radxa-e25       rock-2        rock-5b      rock-5b        rock-pi-4a-plus
                                         rock-s0

rsdk on 20:44:02 via v20.18.0 via impure (devenv-shell-env)
at 20:44:02 > rsdk infra-product-build rock-5b-plus --test
```



Generate the Final Image from the Continuously Updated Software Source

Radxa Orion O6

Code Release Schedule

BIOS and Operating System Binary Images

Release on January 15th, 2025

BIOS and Operating System Binary Images

Release on January 15th, 2025

BIOS and Linux Kernel Source Code

Open source in Q1 of 2025.

BIOS and Operating System Binary Images

Release on January 15th, 2025

BIOS and Linux Kernel Source Code

Open source in Q1 of 2025.

Tools for Building Images

Available in Q1 2025.

Radxa Orion 06 AI PC Kit

Radxa Orion O6 AI PC

Kits





Radxa Orion 06 AI PC

Kits

- Aluminum Alloy Integral Die-Casting
- CNC-Crafted
- Titanium Gold Baking Finish Combined
- Logo Highlight Laser Engraving Technology
- 184mm x 184mm



Radxa Orion 06 AI PC Kits

Efficient Heat Dissipation

Fully Concealed Air Outlet Design



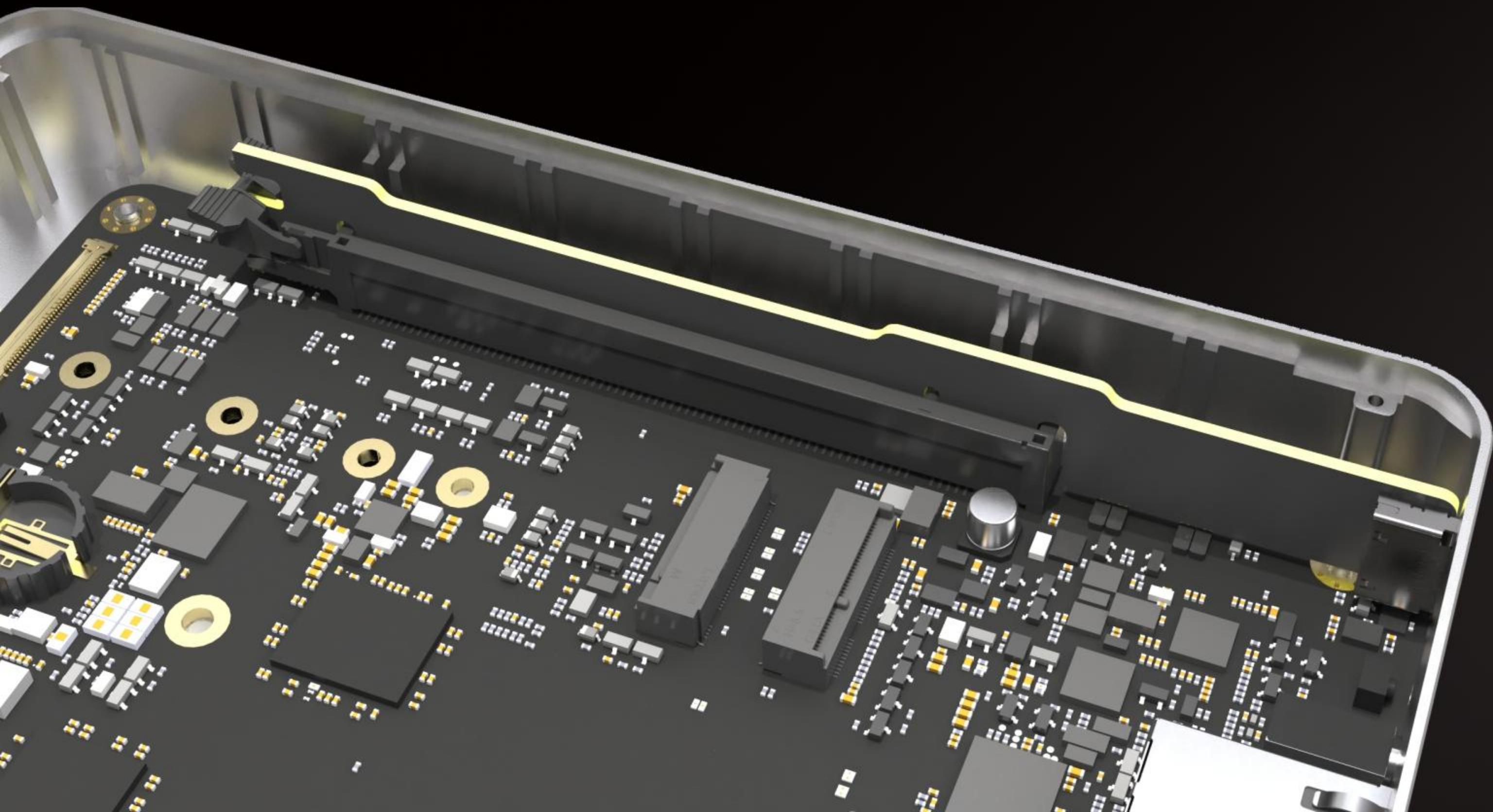
Customized Integrated High-end
Graphics Card Level Cooling



Radxa Orion O6 AI PC

Kits

PCIe Expansion



Radxa Orion O6 AI PC

开发套件

Provided in kit form

Enjoy the fun of assembly

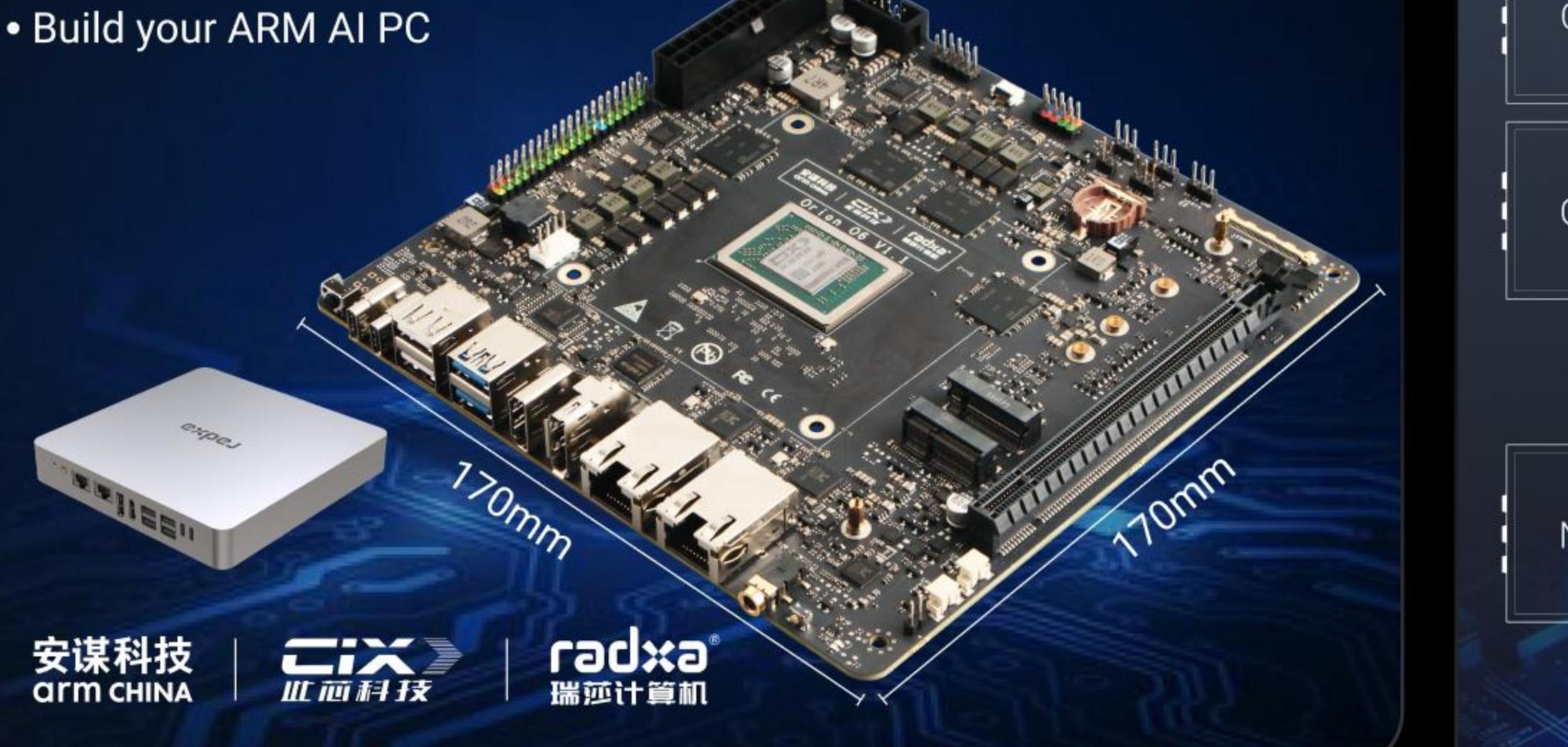
Tutorials provided by the official docs



Radxa Orion O6

World's First Open Source ARM V9 Motherboard

- Build your ARM AI PC



安谋科技
arm CHINA

CIX
瑞西科技

radxa®
瑞莎计算机

128bit LPDDR5
Up to 64GB
> 100GB/s bandwidth

Impressive 8K Video Codec Capabilities

H.265 HEVC H.264 MPEG-4 AVC AV1 VP9

Powered by the Cix CD8180 SoC



- Quad Big Cortex®-A720
- Quad Medium Cortex®-A720
- Quad Little Cortex®-A520
- 12MB L3 shared across all cores



- Arm® Immortals™ G720 MC10 GPU
- Hardware-based Ray-Tracing
- OpenGL® ES3.2
- OpenCL® 3.0
- Vulkan® 1.3



NPU
30 TOPs



Native Linux support with BIOS/UEFI



Dual 5 Gigabit Ethernet Ports

- 1x HDMI 2.0 Output
- 1x DP with MST
- 1x USB C with DP Alt mode
- eDP with Touch Panel Interface

Up to 4x Display, Up to 4K@120Hz



PCIe x16 Physical Slot with PCIe Gen4 8-lane

2x MIPI CSI(4-lane)

2x USB 3.2 10Gbps

M.2 E Key Connector

M.2 E Key Connector

M.2 M Key Connector with PCIe Gen4x4

Headphone Jack with Microphone Input

Radxa Orion 06

Official Pre-sale Launch

December 18, 2024

Radxa Orion 06

Starting from

\$ 289

Radxa Orion 06

World's First Open Source ARM V9 Motherboard
Official Retail Price

8GB

\$ 289

16GB

\$ 329

32GB

\$ 389

64GB

\$ 539

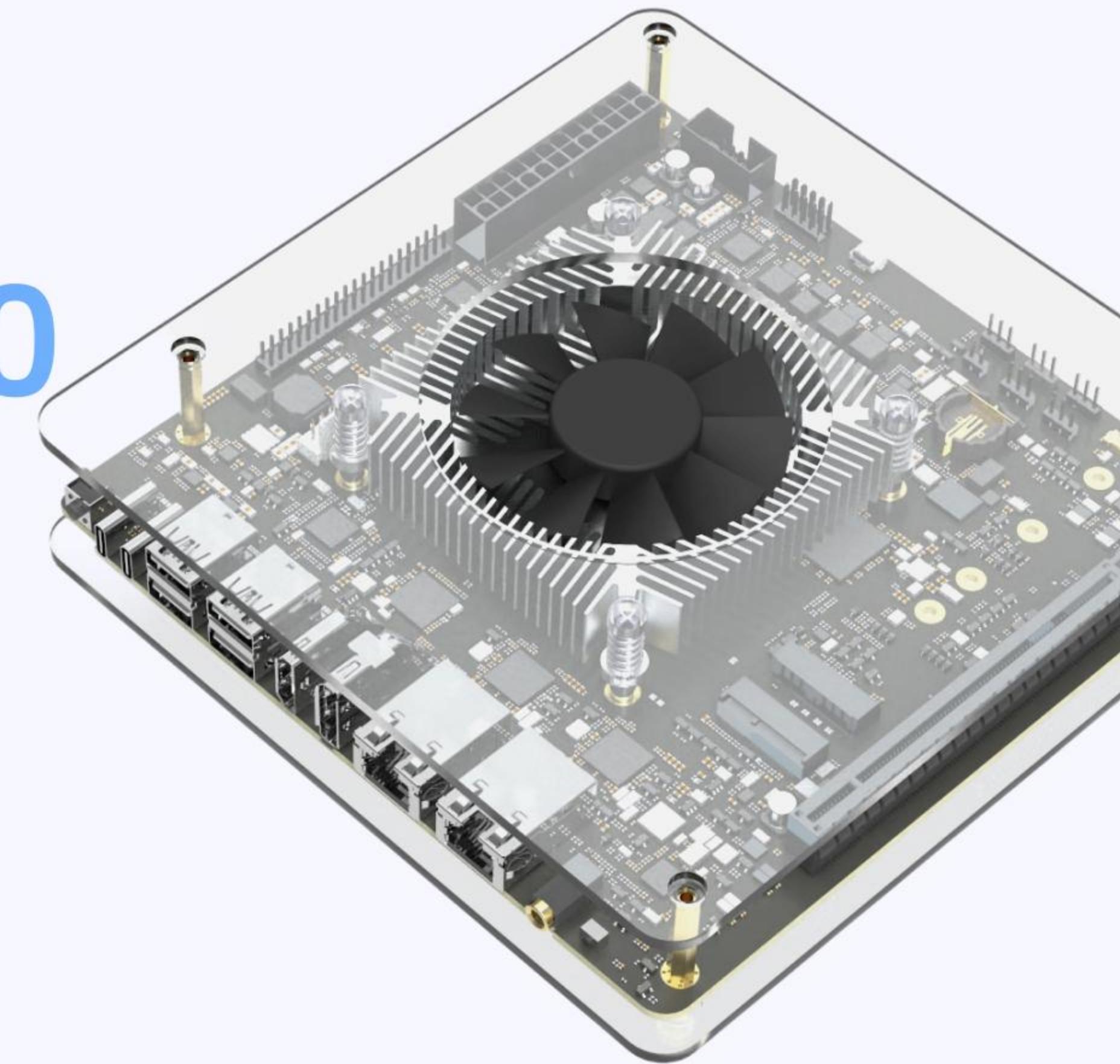
First-launch Discount

Booking Before December 31, 2024

Instant Discount of \$90

Free Acrylic Case

Free Heatsink 8420B



Deadline: December 31, 2024

Radxa Orion 06

World's First Open Source ARM V9 Motherboard
Official Early Bird Price

8GB

\$289

\$ 199

16GB

\$329

\$ 239

32GB

\$389

\$ 299

64GB

\$539

¥ 449

Radxa Orion O6 VS ROCK 5 ITX

Radxa Orion O6 (P1)

12-core Arm V9

128bit LPDDR5 Up to 64GB

dual 5GbE

Desktop-grade GPU

8 lane PCIe 4.0 slot

30Tops NPU

ROCK 5 ITX (RK3588)

8-core Arm V8

64bit LPDDR5 Up to 32GB

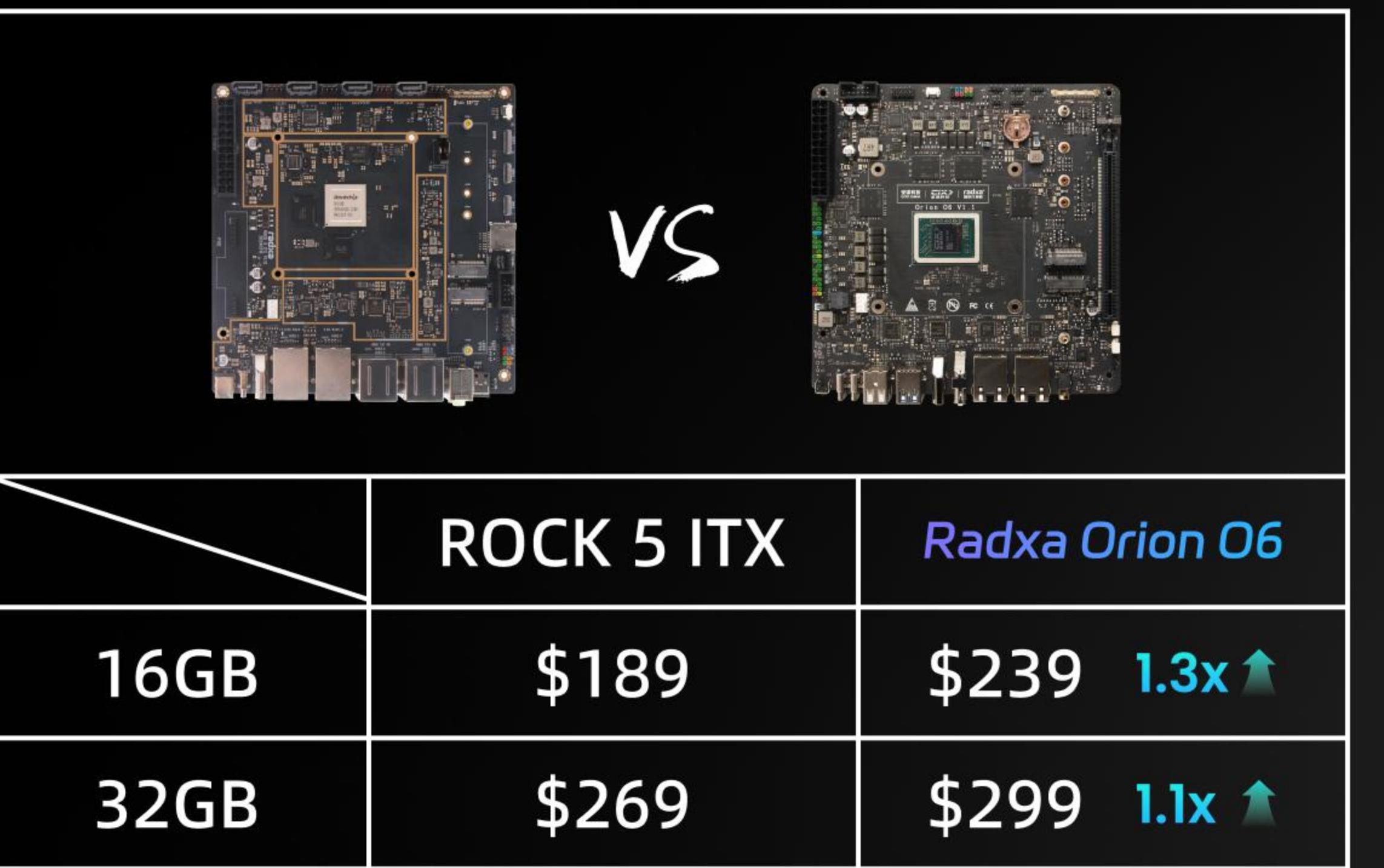
dual 2.5GbE

Embedded GPU

N/A

6Tops NPU

Radxa Orion 06 VS ROCK 5 ITX

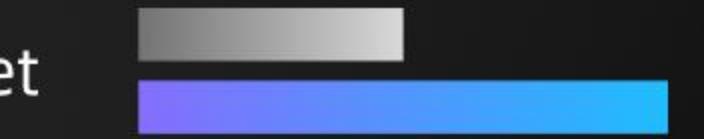


Improved Cost-effectiveness of Hardware and
Better Software Ecosystem

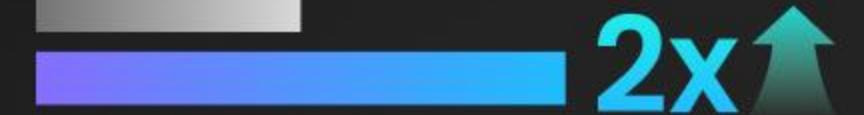
CPU Core



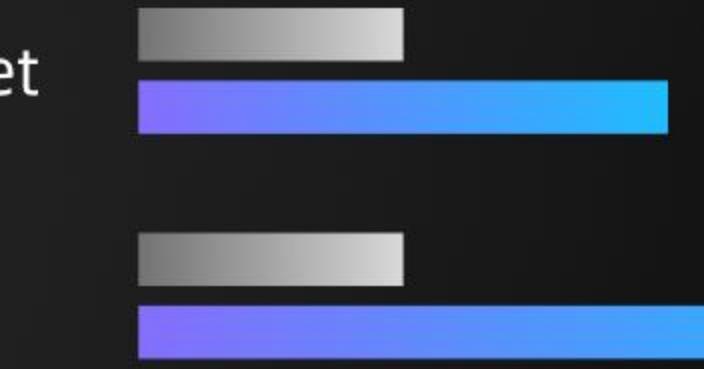
Ethernet



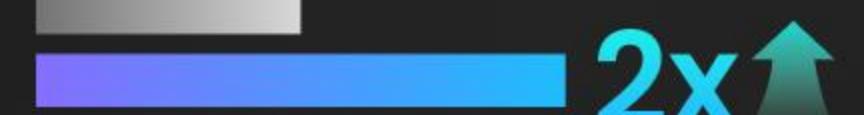
CPU



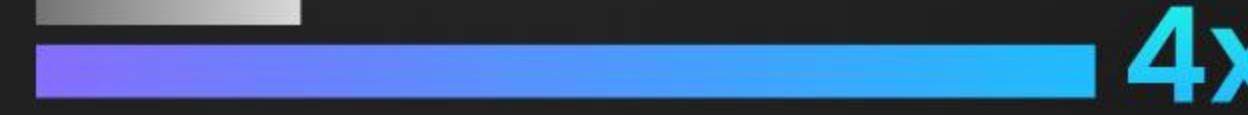
GPU



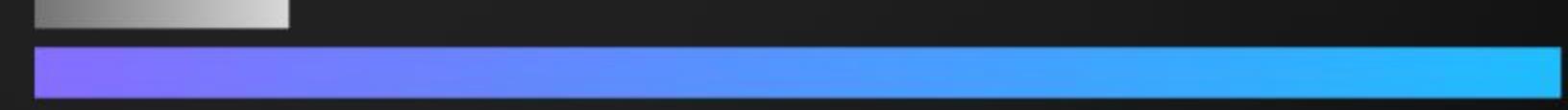
Max RAM



PCIe



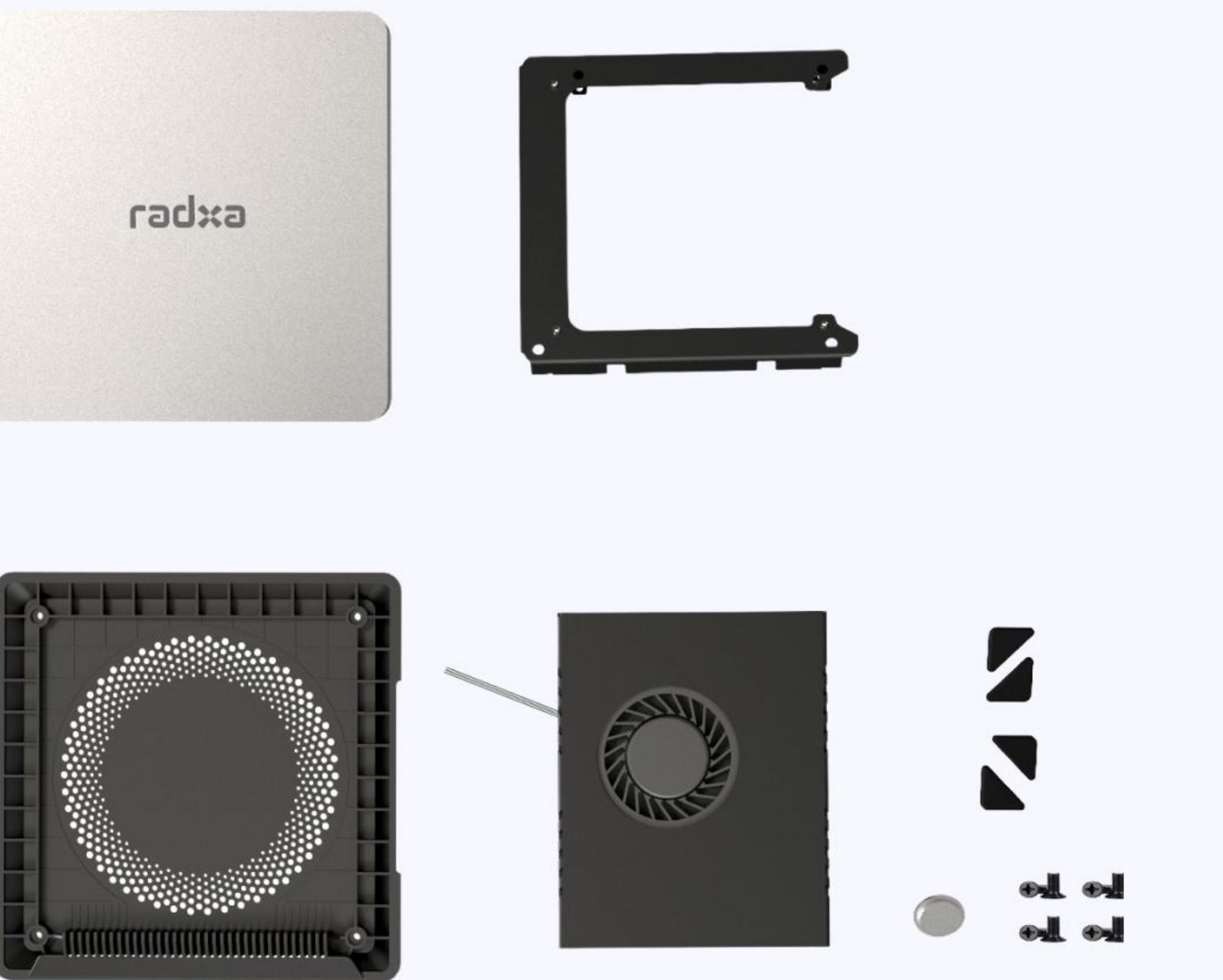
NPU



Radxa Orion 06

Order before December 31, 2024.

Shipment before January 27, 2025.



Radxa Orion 06 AI PC

Kits

\$39

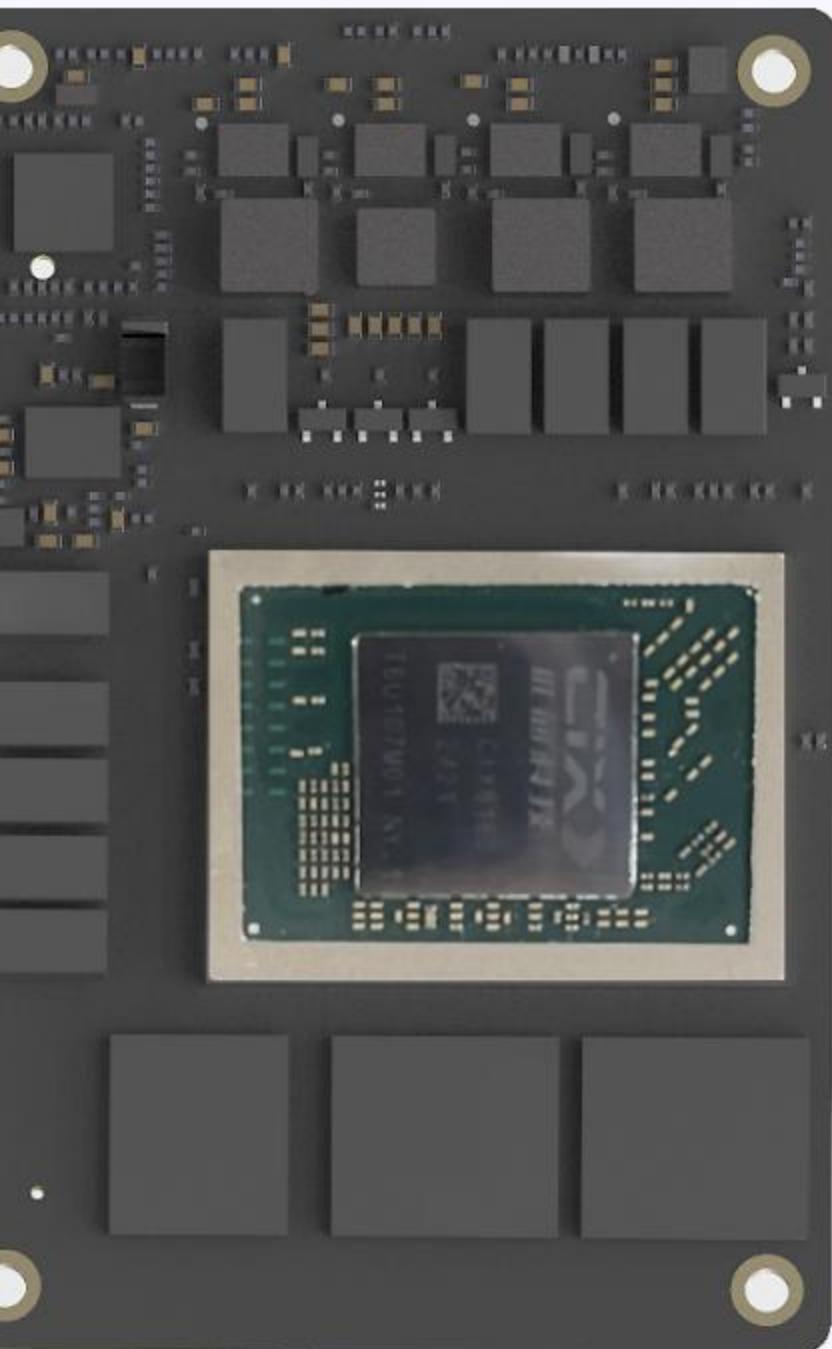
Shipment after February 5, 2025.

Expected before March 18, 2025.

Radxa Orion O6 CoM

- CD8180 Industrial Grade
- 128bit LPDDR5
- 16 lane PCIe 4.0
- Compliant with CoM Express Protocol Specifications

Stay tuned!



Contact Us
Sales@radxa.com