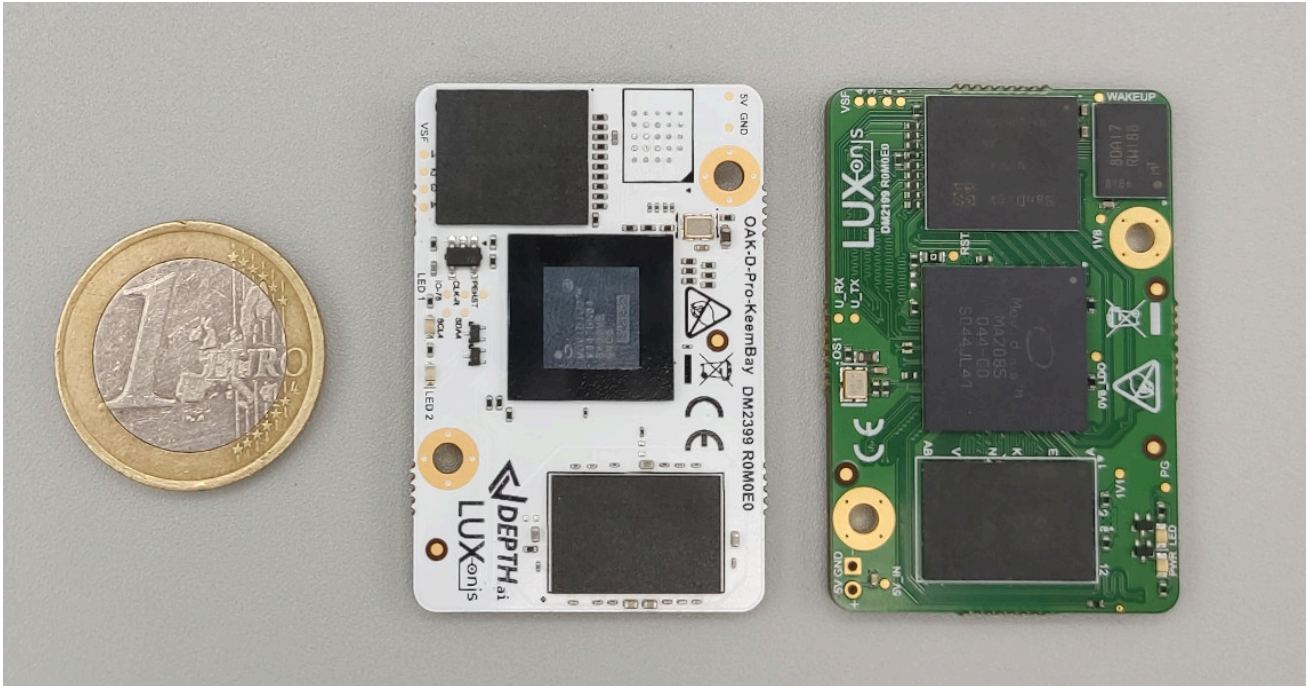


OAK-SoM-Pro

[Buy it on Luxonis shop](#)



left: OAK-SoM-Pro-S3 (RVC3), right: OAK-SoM-Pro (RVC2)

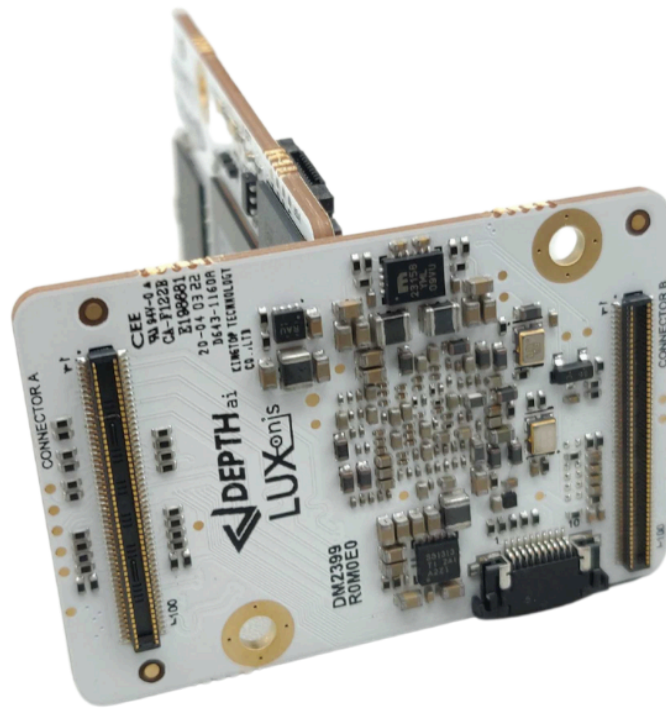
Overview

The **OAK-SoM-Pro** is a System on Module (SoM) designed for integration into top-level systems with a need for a low-power, high performance, real-time AI, and depth perception. It is ideal for use in industrial automation, robotics, and security systems. The OAK-SoM-Pro interfaces with the system through two 10-Gbps-rated 100-pin board-to-board mezzanine connector which carries all signal I/O as well as 5v input. The on-board SMPS system regulates the 5V input and provides all necessary digital and analog power. An auxiliary power port is offered to interface without connection to a baseboard.

OAK-SoM-Pro comes in two variants: Robotics Vision Core 2 (RVC2) based and Robotics Vision Core 3 (RVC3) based SoM. Robotics Vision Core 3 (RVC3) provides quadcore ARM CPU, INT8 quantization, and enhanced stereo depth perception compared to the Robotics Vision Core 2 (RVC2).

[OAK-SoM-Pro \(RVC2, BW2099\)](#)

[OAK-SoM-Pro-S3 \(RVC3, DM2399\)](#)



OAK-SoM-Pro-S3 has an **Robotics Vision Core 3 (RVC3)** and **quadcore ARM CPU** on board. It was designed to have the same dimensions and pinout as the **OAK-SoM-Pro**, so it can easily replace the **OAK-SoM-Pro** on OAK cameras that use it ([list here](#)).

Note that for **OAK POE devices** ([OAK-D-PoE](#), [OAK-1-PoE](#)) this **won't work**, as S1/S2 OAK POE devices use an PCIe to ETH bridge which isn't (yet) supported by RVC3 (kernel). RVC3 has ETH PHY already on the SoC, so S3 PoE devices won't use the same bridge.

It was primarily designed for evaluation and backwards compatibility. For new products, we would suggest using [OAK-SoM MAX](#) (differences below).

RVC3 inside

This OAK device is built on top of the RVC3. Main features:

- **3.0 TOPS** for AI with [INT8 quantization support](#)
- [Quad-core ARM A53](#) @ 1.5GHz, running Yocto Linux, acting as a host computer
- **Imaging:** ISP, max 6 cameras, 500 MP/s HDR, 3A
- **Run any AI model**, even custom architected/built ones - models need to be converted.
- **Cloud platform** - [RoboHub](#) - connectivity out-of-the-box
- On-device [SLAM / VIO](#) support
- **Encoding:** H.264, H.265, MJPEG - 4K/75FPS, **Decoding:** 4K/60FPS
- **Computer vision:** warp/dewarp, resize, crop via ImageManip node, edge detection, feature tracking. You can also run custom CV functions
- **Stereo depth** perception with filtering, post-processing, RGB-depth alignment, and high configurability
- **Object tracking:** 2D and 3D tracking with ObjectTracker node

OAK-SoM-Pro-S3 vs OAK-SoM-Max

These are both our initial SoMs that have on-board **RVC3** (Robotics Vision Core 3 (RVC3)). The **OAK-SoM-Pro-S3** was designed first for evaluation and **backwards compatibility** with the **OAK-SoM-Pro**. The **OAK-SoM MAX** was designed later for **maximum performance and extensibility**.

- **Compatibility with existing models**

- **Pro-S3** is compatible with boards that have **OAK-SoM-Pro** integrated (list here). This allowed us for quicker evaluation of the new **Robotics Vision Core 3 (RVC3)**.
- **Max** is not yet compatible with any boards.

- **Connectors**

- **Pro-S3** has 2x 100-pin mezzanine connector, with the exact same pinout as **SoM-Pro**.
- **Max** has 3x 100-pin mezzanine connector, which exposes additional **MIPI RX/TX** lines.

- **MIPI lines**

- **Pro-S3** has 2x 4-lane and 2x 2-lane **MIPI RX** lines.
- **Max** has 6x 2-lane **MIPI RX** and 2x 2-lane, 1x 4-lane **MIPI TX** lines.

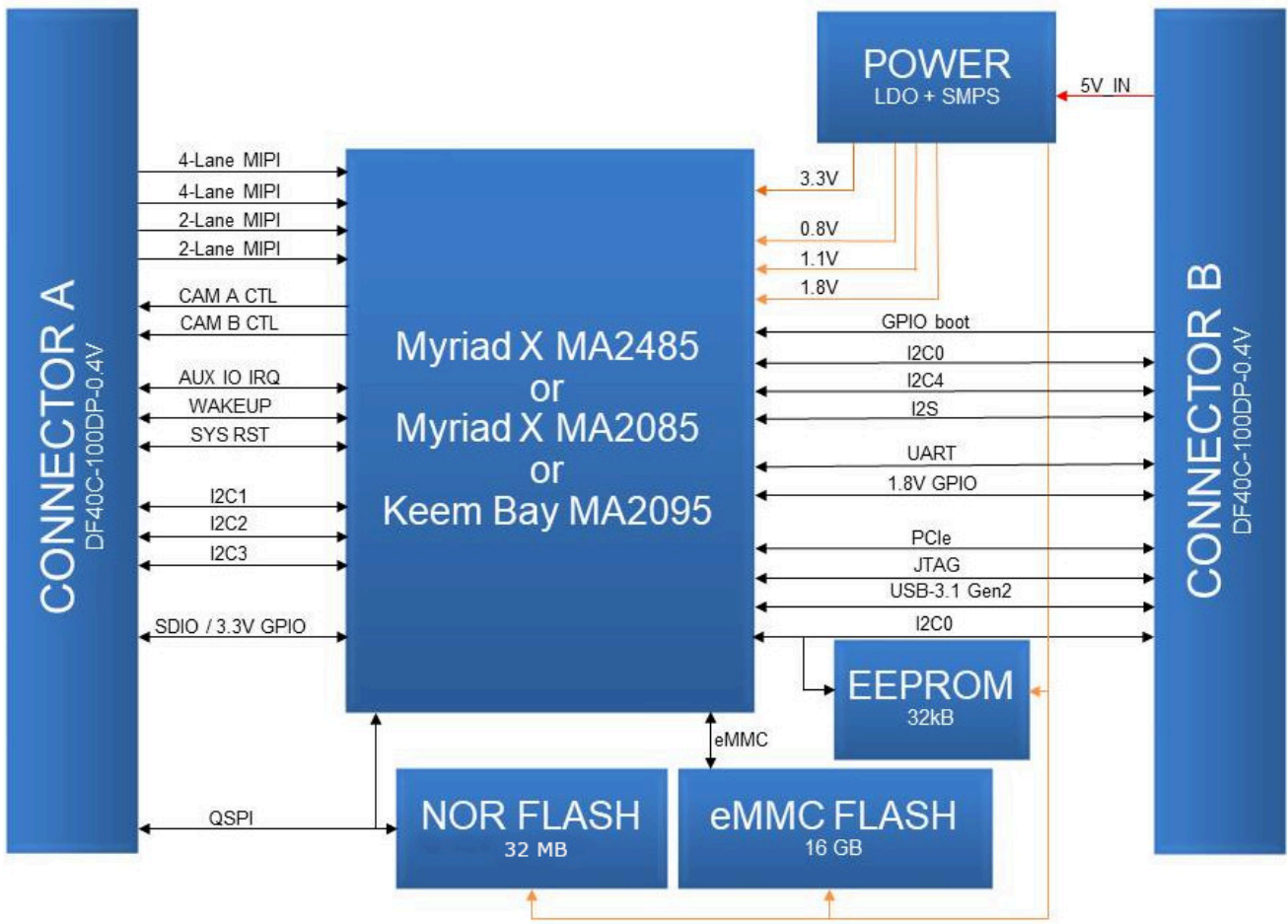
- **RAM**

- **Pro-S3** has 1x 2GB **DDR RAM** due to size/shape constraints, even though **Robotics Vision Core 3 (RVC3)** supports dual channel **RAM**.
- **Max** has 2x 2GB **DDR RAM** on-board, which provides maximum performance, as **Robotics Vision Core 3 (RVC3)** supports dual channel **RAM**.

- **Size**

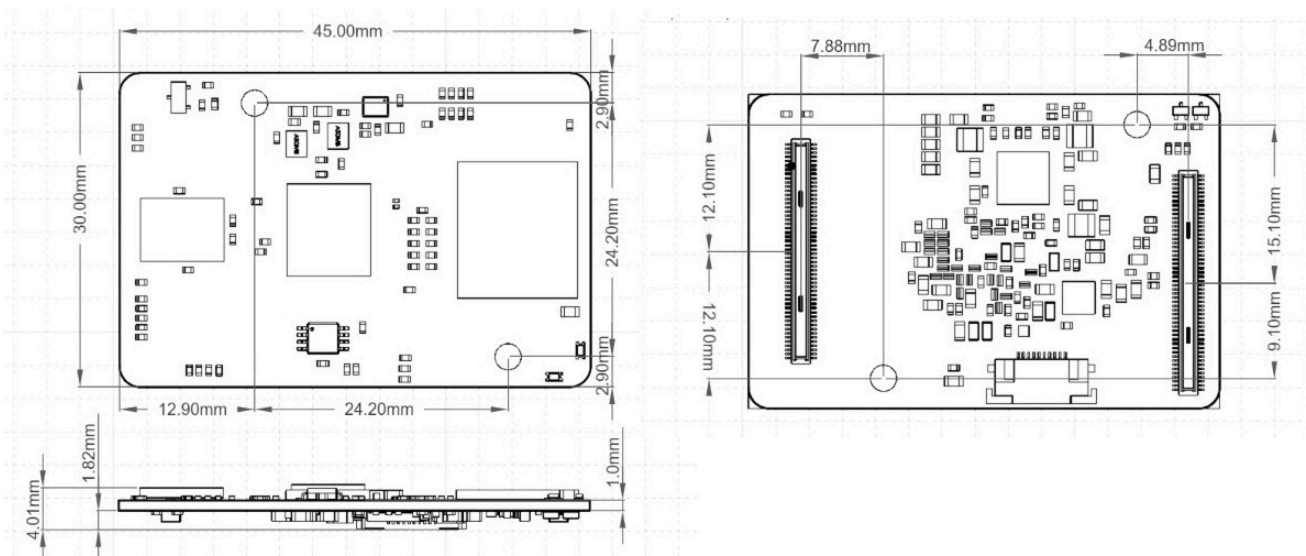
- **Pro-S3**: 30mm x 45mm
- **Max**: 40mm x 40mm

Board Layout



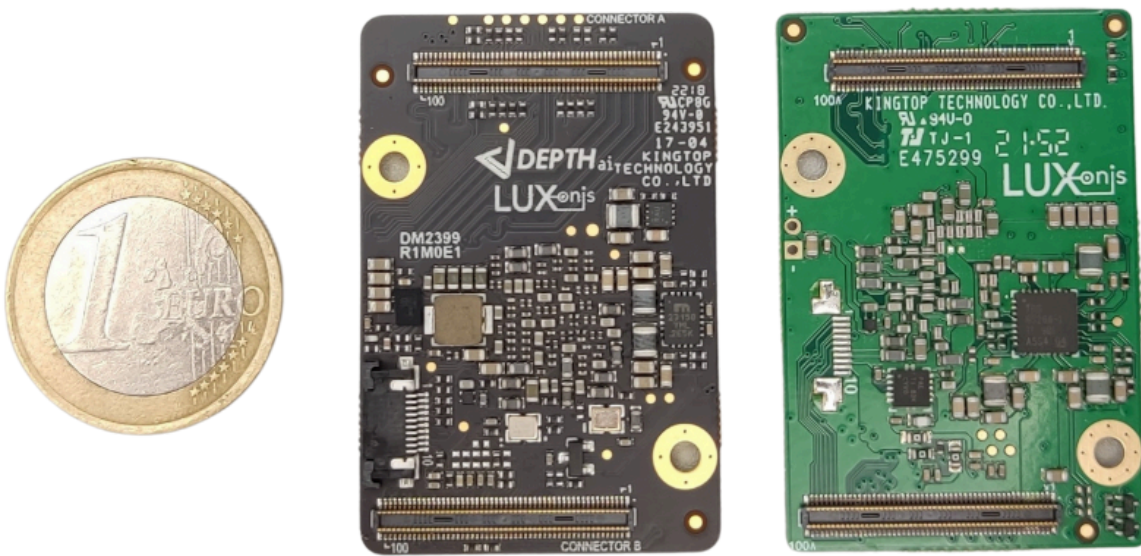
Dimensions and Weight

- Width: 30 mm
- Height: 45 mm
- Length: 4 mm
- Weight: 5g



General information

- Robotics Vision Core 3 (RVC3) **unique features:** 2 GB RAM (16GBit)
- Robotics Vision Core 2 (RVC2) **unique features:** 512 MB RAM (4GBit)
- Interfaces with the system through two 10-Gbps-rated 100-pin connectors (DF40C-100DP-0.4V(51))
- 2 x 2-lane MIPI channels
- 2 x 4-lane MIPI channels (for multiple camera inputs)
- USB 3.1 Gen 2
- Multiple Boot Modes supported: NOR, USB, Ethernet (EEPROM), or eMMC
- SD-card supported
- Design files produced with Altium Designer 20



left: OAK-SoM-Pro-S3 (RVC3), right: OAK-SoM-Pro (RVC2)

Power consumption

Most of the power is consumed by the RVC2, so the power consumption mostly depends on the workload of the VPU:

- Base consumption + camera streaming: 2.5W - 3W
- AI subsystem consumption: Up to 1W
- Stereo depth pipeline subsystem: Up to 0.5W
- Video Encoder subsystem: Up to 0.5W

So the total power consumption can be up to ~5W if you are using all the features at 100% at the same time. To reduce the power consumption, you can reduce FPS of the whole pipeline - that way, subsystems won't be utilized at 100% and will consume less power.

Operating temperature

The ambient operating temperature of RVC2 based devices is between **-20°C and 50°C** when fully utilizing the VPU.

Similarly to the [Power consumption](#), max operating temperature depends on VPU utilization. The higher the VPU utilization, the more heat the VPU will generate. The RVC2 VPU can continuously operate at 105 °C, after which the depthai library will automatically shut down the device (to avoid chip damage).

To find out more, see our [Operative temperature range](#) documentation.

Datasheets

- [Datasheet](#)

3D Models

- OAK-SoM-Pro board STEP files [here](#)
- OAK-SoM-Pro-S3 [files here](#)

Altium Design Files

- OAK-SoM-Pro files [here](#)
- OAK-SoM-Pro-S3 [files here](#)

Got questions?

Head over to [Discussion Forum](#) for technical support or any other questions you might have.