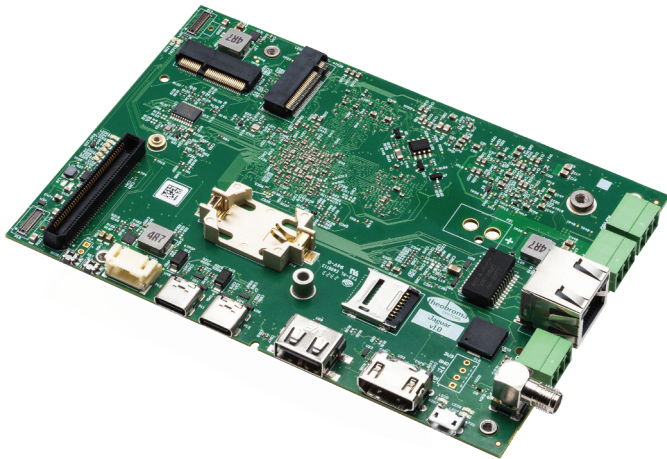# JAGUAR SBC-RK3588-AMR

SINGLE-BOARD COMPUTER FOR AUTONOMOUS MOBILE ROBOTS

featuring Rockchip RK3588 cutting-edge processor

135 x 93 mm

Secure Element

64 ARMv8

4x 2.4 GHz
4x 1.8 GHz

NPU up to 6 TOPs

up to 16 GB LPDDR4x

4x MIPI-CSI

1x TMDS (HDMI 1.2)

Gigabit Ethernet

PCIe 3.0

2x USB 3.1
1x USB 2.0

CAN

Cutting-edge performance for autonomous mobile robots (AMR)

Based on Rockchip's cutting edge RK3588 processor, JAGUAR SBC-RK3588-AMR features Simultaneous Localization and Mapping (SLAM) and obstacle detection. Top CPU performance together with the GPU and NPU means that algorithms can be based on rules, statistical methods, and neural learning.

The Rockchip RK3588 is a low-power, octa-core processor for Internet of Things (IoT) devices with Artificial Intelligence (AI). It features four ARM Cortex-A76 and four ARM Cortex-A55 cores, a Mali G610 GPU, and a NPU with up to 6 TOPs. The 64-bit-capable ARMv8 cores support both ARM Cryptographic Extension (for wire-rate AES cryptography) and AdvSIMD vector processing.

JAGUAR SBC provides up to 16 GB of LPDDR4X memory and up to 256 GB of eMMC storage on board and interfaces for optional external storage media such as NVMe/SSD, and SD card.

Native support of six high-resolution cameras

The JAGUAR board has four MIPI-CSI interfaces for high-resolution cameras. Using a MIPI-CSI interface not only reduces the costs of camera modules, but also provides a continuous stream of raw video data into the processor – regardless of USB or Ethernet protocol. The four cameras can be grouped into two pairs that are synchronized (vsync), enabling their data to be easily combined into an accurate, three-dimensional point cloud.

In addition to the video input signal, the two camera ports can also receive the signals of Inertial Measurement Units (IMU) integrated in the cameras, which allows tracking accelerations and turns.

Two SuperSpeed USB 3.1 interfaces with USB-C ports enable connecting additional sensors such as 2D and 3D LIDAR as well as ToF sensors, stereo cameras or two additional high-speed cameras.

Simple integration into the design of your robot

JAGUAR comes with common ports for the various interfaces, which provides both simple interfacing to the robotic device and low connector costs for the overall product. Additional interfaces can be utilized by an optional extension board that plugs into a specific connector known as a "mezzanine" connector because it adds a second floor.

The JAGUAR board operates from a single power input with a voltage range of 12 to 24 V. While its consumption under load is a moderate 18 W, it provides up to 35 W for devices attached via PCIe and USB. It also routes the voltage input to an optional extension board on a mezzanine connector.

The RK3588 processor is located on the bottom of the PCBA as the highest element on this side, which means that heat can be easily dissipated by simply connecting the RK3588 and the chassis using a thermal conductor.

State-of-the-art security for your assets

The JAGUAR Single-Board Computer features a Secure Element in addition to the capability to enable a Secure Boot mechanism. This Secure Element is based on the GlobalPlatform 2.2.1-compliant JavaCard environment. Secure Boot guarantees that only signed images can run on the device.
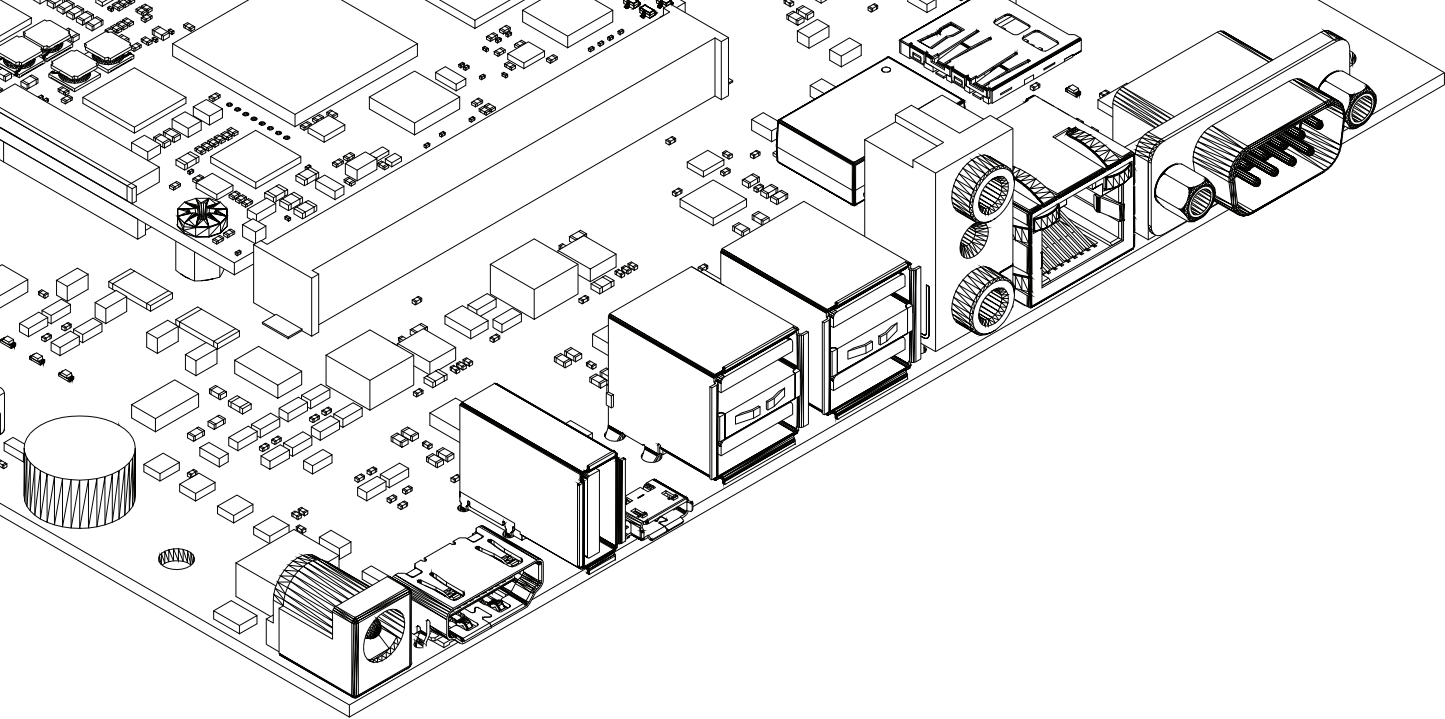
Enjoy the peace of mind that comes with a government-grade security solution for all identification, key-storage and asset-protection requirements. The Common Criteria (EAL6+) certified security module ensures that you never have to sacrifice security for performance again.

Designed and supported in Vienna, Austria

Every module we design is based on our expertise in system-level design, embedded software engineering and performance engineering. Our experienced engineering team provides engineering services to complement your in-house design resources and shorten your time to

Technical Summary

Form Factor	Specific

Processor	Rockchip RK3588
	Octa-Core ARM Cortex-A76/A53 up to 2.4 GHz
	    4x Cortex-A76 (4x 64 KB + 64 KB L1 cache + 512 KB L2 cache)
	    4x Cortex-A55 (4x 32 KB + 32 KB L1 cache + 128 KB L2 cache)
	3x Cortex-M0 co-processors

GPU	ARM Mali-G610 MP4 GPU
VPU	Video decoder: H.264, H.265 & VP9 up to 8K / 60 fps Video encoder: H.264 & H.265 up to 8K / 30 fps
NPU	up to 6 TOPs
Memory	LPDDR4X, up to 16 GB on-module
Storage	up to 256 GB eMMC on-module, SD Card slot
Ethernet	10/100/1000 Mbps with an on-module triple-speed GbE PHY, via RJ45 connector RGMII via Mezzanine connector
WiFi / Bluetooth	optionally via PCIe M.2 2230 Key E connector
USB	2x USB 3.1 SuperSpeed OTG via Type C connector 1x USB 2.0 host via Type A connector
Display	1x TMDS (HDMI 1.2) via HDMI connector
Camera	2x MIPI CSI with 2 lanes, 2.5 Gb/s each lane, via slim rectangular 34 pin connector 2x MIPI CSI with 2 lanes, 2.5 Gb/s each lane, via Mezzanine connector
CAN	1x CAN via terminal block connector
PCI-Express	1x PCIe 3.0, 4 lanes with 8 GB/s per lane, via M.2 2280 Key M connector 1x PCIe 2.1, 1 lane with 5 GB/s, via M.2 2230 Key E connector 1x PCIe 2.1, 1 lane with 5 GB/s via Mezzanine connector (shared with SATA)
Additional Interfaces	UART, GPIO, I2S, I2C, SMBus, SPI, FAN, RTC RS485 UART via terminal block connector; 1x PPS Input via SMA connector; Debug UART serial as USB via micro USB connector
Security	ARMv8 Cryptography Extensions Secure Element with Global Platform 2.2.1 compliant JavaCard environment (EAL6+ certified)
Operating System	Linux (Debian and Yocto)
Power Management	Dynamic frequency and voltage scaling for thermal and power management
Power Supply	Single 12-24 V supply
Consumption	Board consumption (idle): 2.3 W Board consumption (in operation): ≤18 W Max. supply to attached devices: 35 W
Operating Environment	Commercial 0ºC to +60ºC Industrial -20ºC to +85ºC
Dimensions	135 mm x 93 mm (5,31" x 3,66")