PCP SOLUTIONS

RK88 / RK88DX

Embedded ARM Computer
Product Introduction

Project code: AB499

PRO3 team | July 08, 2026

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Product Outlook

0.82 Litre

110.8mm

45.0mm

164.0mm

USB-C DP port
Firmware update port

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Highlight Features

- Rugged. Silent. Intelligent. The Ultimate Fanless Edge AI Computer powered by Rockchip RK3588 and DeepX DX-M1 AI accelerator
- Combined AI performance of 31 TOPS (6 TOPS by RK3588 + 25 TOPS by DX-M1) for enhanced computer vision.
- Industrial grade fanless metal case for 24/7 operation
- Multi-display outputs: 2x HDMI 2.1, 1x USB-C DP, max 8K 60Hz
- Dual Gigabit Ethernet ports
- Multi-IO port with 8-bit GPIO, RS232, RS422, RS425
- External IO ports on 2 sides for convenient installation.
- Support Debian Linux, Ubuntu (community support), Android 15
- Rockchip and DeepX software toolchain to convert AI models from popular frameworks like TensorFlow and PyTorch to the proprietary formats
- 10 years product supply life-cycle
- 2 years limited warranty

Specification	
Processor	Rockchip RK3588 ARM SoC with 4x Cortex-A76 @, and 4x Cortex-A55 @1.8GHz (efficient core)
Integrated GPU	ARM Mali-G610 MC4. H.265, H.264, VP9, AV1, AVS2 decoding up to 8K@60fps, H.264/H.265 encoding up to 8K@30fps
Integrated NPU	Total 6 TOPS (3-core architecture), INT8 precision support INT4/INT8/INT16/BF16/TF32 quantization
NPU Module	Optional DeepX DX-M1 M.2 module, 25 TOPS (INT8) performance
System memory	Onboard 4GB, 8GB, 16GB 64-bit LPDDR5
OS Storage	128GB, 256GB, 512GB eMMC 5.1. External microSD card slot
Video-out	2 x HDMI 2.1, 1 x USB-C DP (max 8K 60Hz)
Hi-Speed IO	2x USB-A 3.0, 2x USB-A 2.0, 1x USB Type C DP
Legacy IO	RS232, RS422, RS485, 8-bit GPIO, +3.3V, GND
Networking	Dual Gigabit Ethernet LAN ports Wi-Fi 6, Bluetooth 5.2 based on Telit WE310K6-P M.2
Dimension	164.0(W) x 110.8(D) x 45.0(H) mm^3 , 0.82 Litres
Weight	Main unit net weight = 940g. Packing box G.W. = 1.81Kg Carton box G.W. = 10.1Kg (total 5 units/box)
Operating Temp	-20°C - +55°C
Power Input	DC 12V ~ 24V. Power consumption: Idle=5W, Maximum=15W. Bundled universal power adapter with DC19V 65W output CR2032 coin battery for RTC
OS	Debian Linux (*factory default*) Option: Android 15, Ubuntu (community support)
Software Stack	Rockchip: RKNN SDK, RKLLM SDK. DeepX DXNN SDK

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Multi-IO Connector

Multi-I/O connector:
GND, RS485[B,A], RS232[Rx,Tx], RS422[Rx-,Rx+,Tx-,Tx+]
GPIO[0,1,2,3,4,5,6,7], +3.3V

RS232 (Point-to-Point, Short Distance)
- Computer Peripherals: modems, mouse devices, barcode scanners, and printers..
- Industrial Equipment Debugging: Used for configuration, diagnostics, and firmware updates
- Medical Equipment: Connecting bedside patient monitoring devices to computers.
- Legacy Systems: Communicating with older PLC (Programmable Logic Controller) systems.

RS422 (Long Distance, Full-Duplex)
- Industrial Automation: Point-to-multipoint communication (e.g., controlling a bank of display units).
- Broadcast Equipment: Controlling video routing switchers and cameras in television studios.
- Factory Automation: Long-range, noise-immune communication for sensors and actuators.
- Transportation: Signaling systems in railways.

RS485 (Multi-point, Robust Network)
- Factory Automation/SCADA: Linking PLCs, sensors, and motor drives in manufacturing plants.
- Building Automation: Managing HVAC systems, lighting, and access control (card readers).
- Energy Management: Communicating with smart meters and power plant controllers.
- Event Lighting: Controlling stage lighting using the DMX512 protocol.

GPIO (General Purpose Input/Output)
- Digital Input (Sensor Reading): Reading the status of switches, motion sensors, or photoresistors.
- Digital Output (Device Control): Toggling LEDs, driving relays, or turning on/off external devices.

Features Summary

Standard	Type	Supply voltage	Distance	Duplex	Max devices	Key features
RS232	TTL	3.3V	~ 15 M (50 ft)	Full	1	Simple common computer port
RS422	Balanced	3.3V	~ 1200 M (4000 ft)	Full	10+ (Rx)	Fast, long distance
RS485	Balanced	3.3V	~ 1200 M (4000 ft)	Half	32+ (notes)	Multi-drop, high noise immunity
GPIO	TTL	3.3V	Short (chip level)	n/a	1 per pin	Direct control, simple ON/OFF

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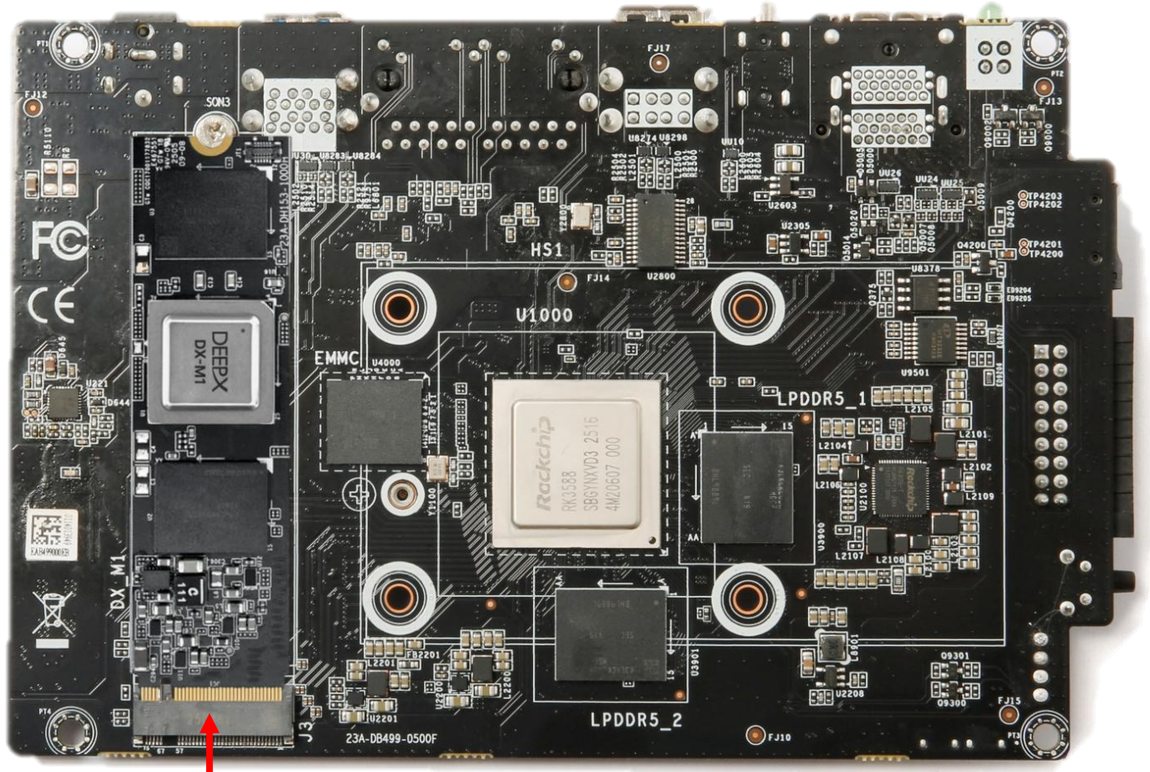
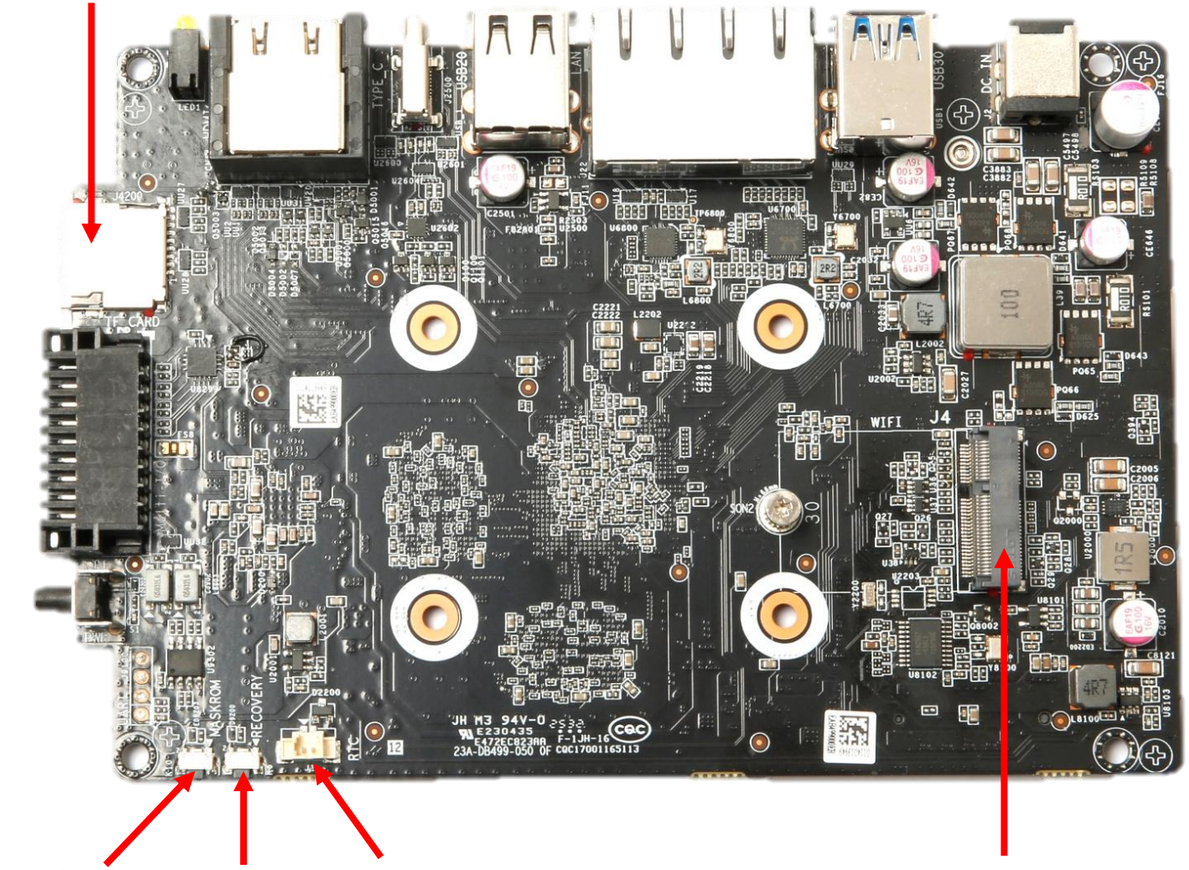
PCBA View



M.2 2280 Key-M Gen3 x4-lane socket
for SSD or AI module

Top Side



MaskRom
Tact Sw

Recovery
Tact Sw

RTC battery
connector

M.2 2242 Key-E
for Wi-Fi module

Bottom Side

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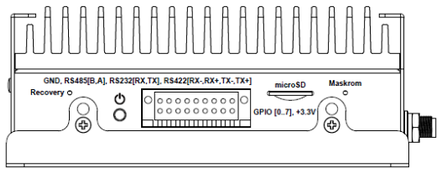
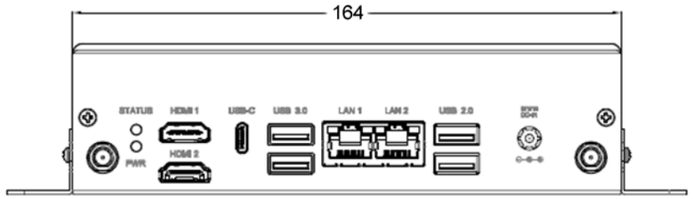
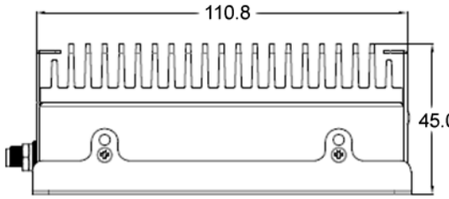
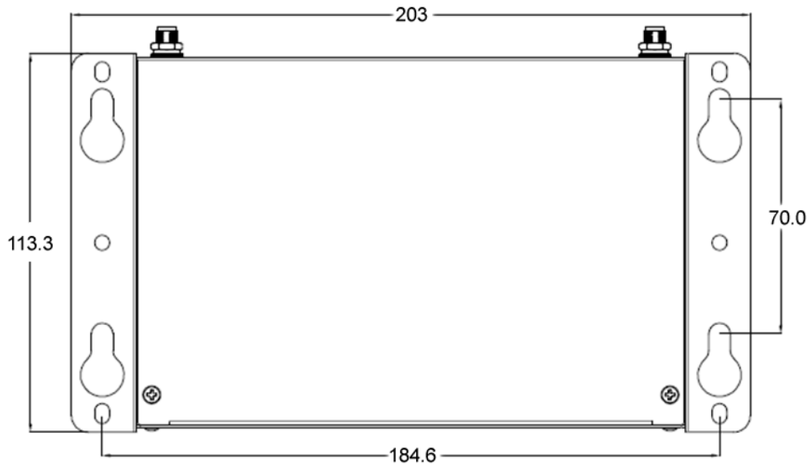
Mechanical Drawing









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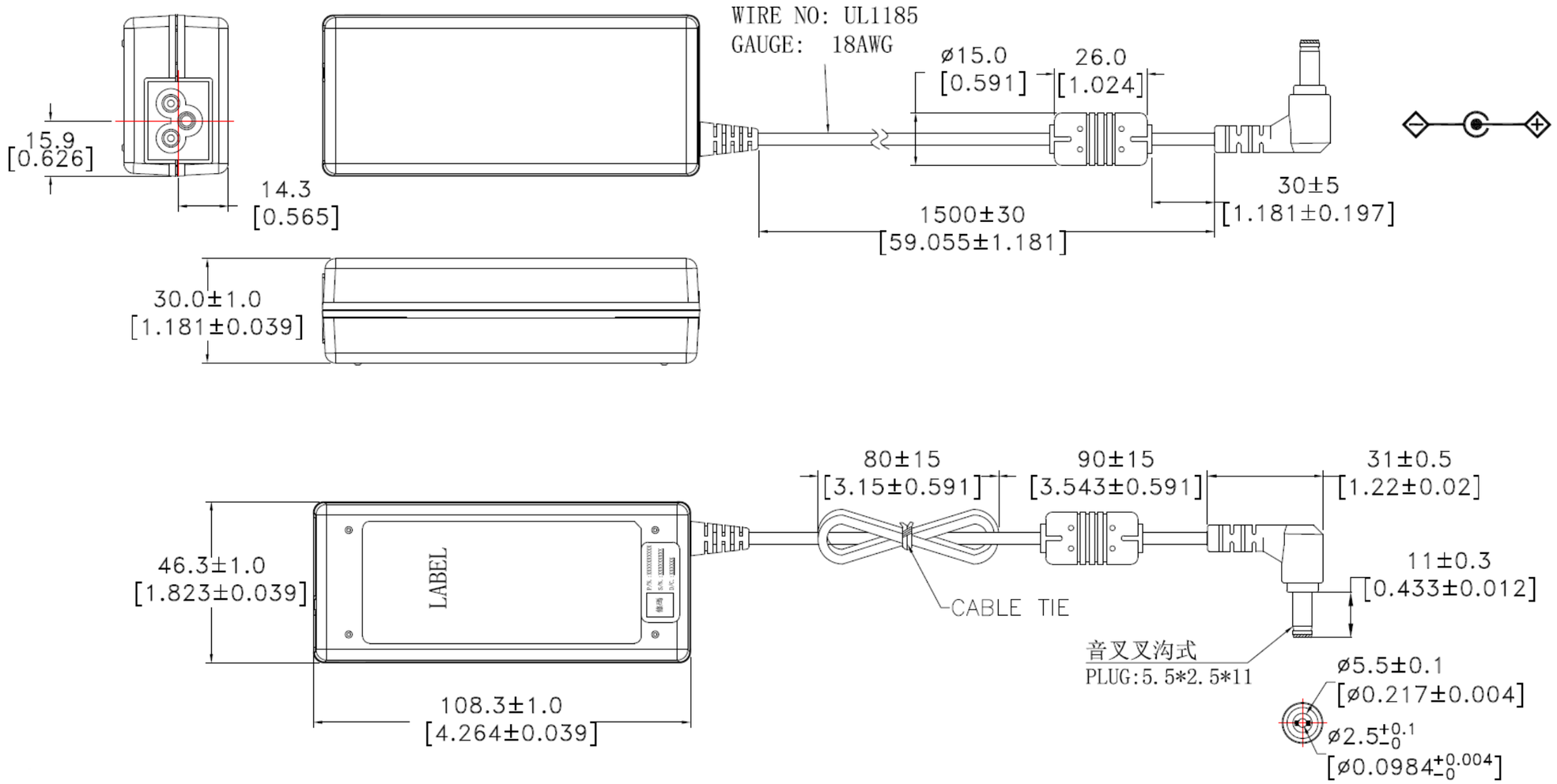
Mechanical Drawing

FSP065-RBBN3 AC Adapter (MPN: 9NA06578AB)



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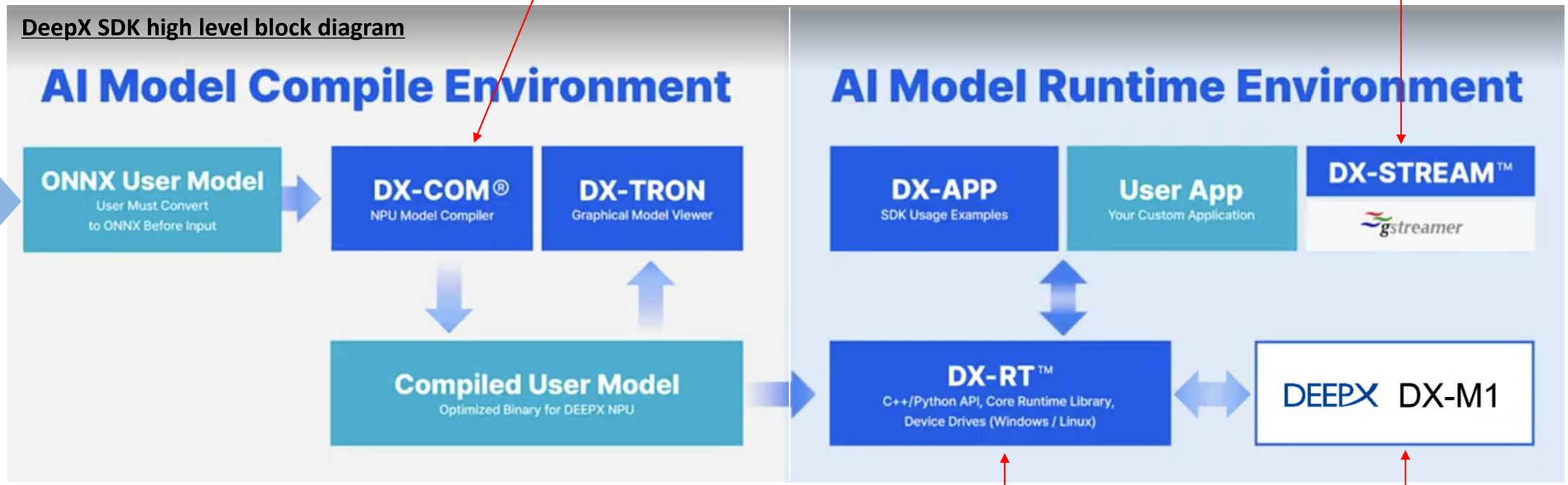
DXNN SDK introduction

Frameworks & Models

- Pytorch
- Tensorflow
- YOLO
- Keras
- Caffe
- PP-OCRv5
- MobileNet V3-Large
- ResNet50
- EfficientNet-B0

DX-Compiler:
Support x86_64 hardware only.
Debian-based Linux environment
such as Ubuntu 20.04, 22.04, 24.04

DX-Stream:
A set of GStreamer and sample programs for controlling the NPU within multimedia pipelines.



DXNN SDK: https://deepx.ai/products/dxnn-sdk
DX-ALL-Suite repository: https://github.com/DEEPX-AI
V2.2.1 supports YOLO(v3 ~ v26)

DX-Runtime:
Support ARM64, x86_64 hardware.
Debian-based Linux environment
such as Ubuntu 20.04, 22.04, 24.04

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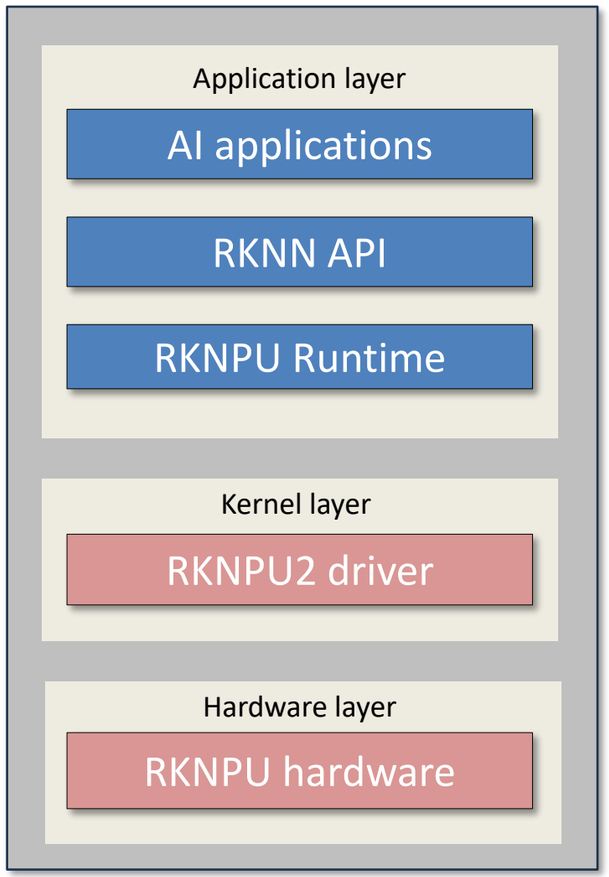
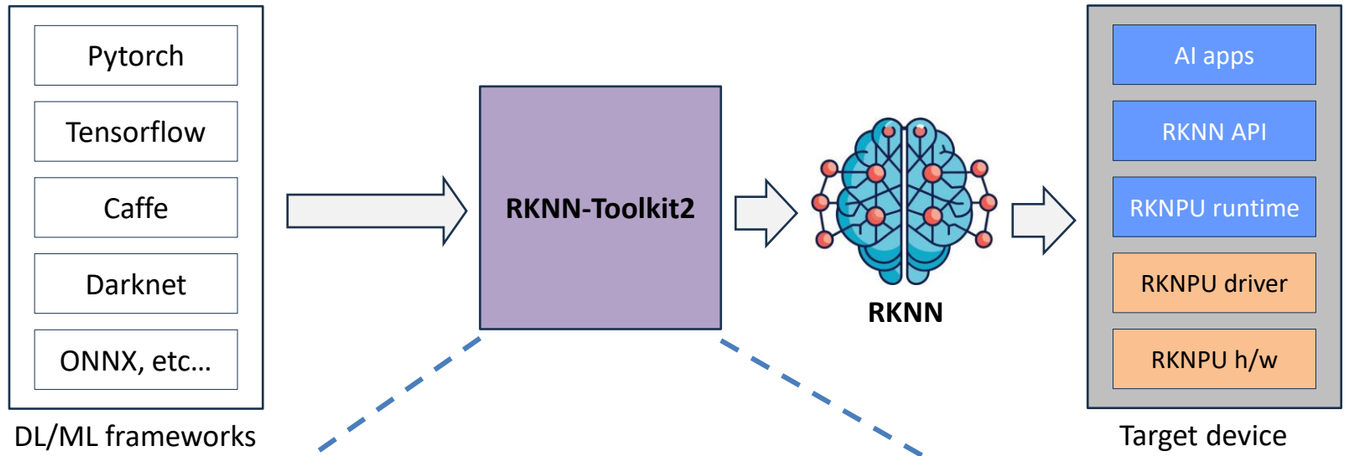
RKNN Software Stack Introduction

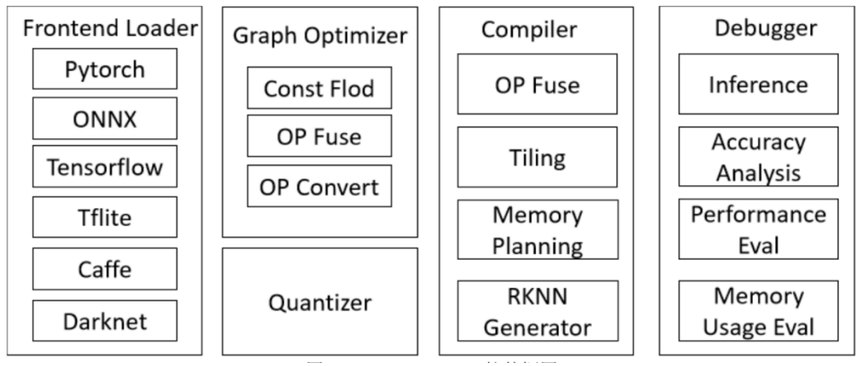
AI Device on the Edge



RKNN (Rockchip Neural Network) toolchain overview



RKNN-Toolkit2 block diagram



Rockchip RKNPU repository: https://github.com/airockchip

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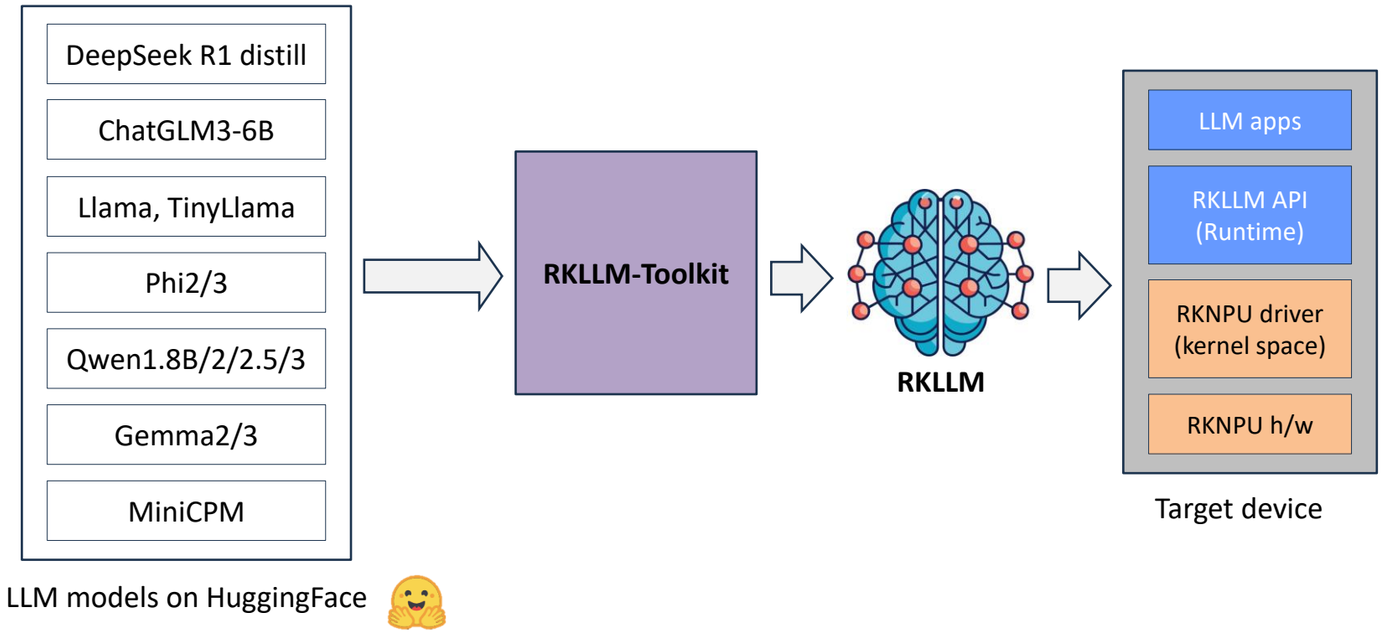
RKLLM Software Stack Introduction

RKLLM (Rockchip Large Language Model) toolchain overview



Rockchip RKNPU repository: https://github.com/airockchip

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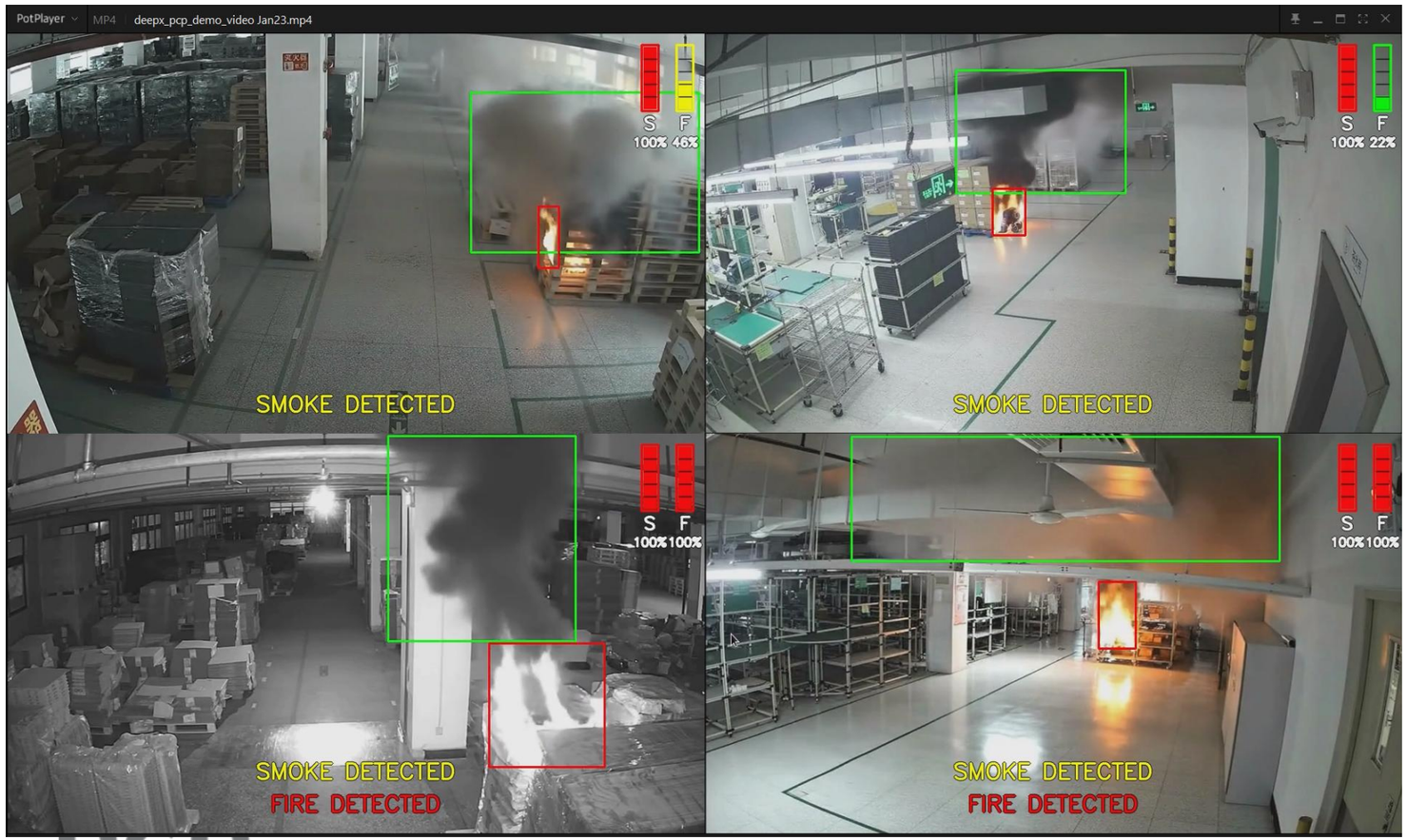
Application Demo: Video-Based Fire Detection (VBFD)

Key use cases: Multi-camera fire detection in manufacturing facilities, warehouses, Outdoor storage, wildfire & forest surveillance, construction sites, data centers & energy stations, transportation infrastructure.



AI-powered visual detection of fire accidents offers a proactive approach to fire safety, providing significant advantages over traditional sensors by utilizing computer vision to analyze live video feeds for early signs of smoke and flames, integrating with existing traditional CCTV infrastructure.

This technology is transforming fire safety by offering faster detection, higher accuracy, and reduced false alarms, particularly in challenging environments.

Features	AI Video Analytics	Traditional fire detector
Detection Speed	1–30 seconds (fast)	3–6+ minutes (slow)
Detection Basis	Visual confirmation (smoke/flame)	Heat/smoke reaches sensor
Coverage	Large, open, or high-ceiling areas	Limited to specific zones
False Alarms	Very low	High (dust, steam, cooking)
Information	Real-time video/exact location	Basic alert

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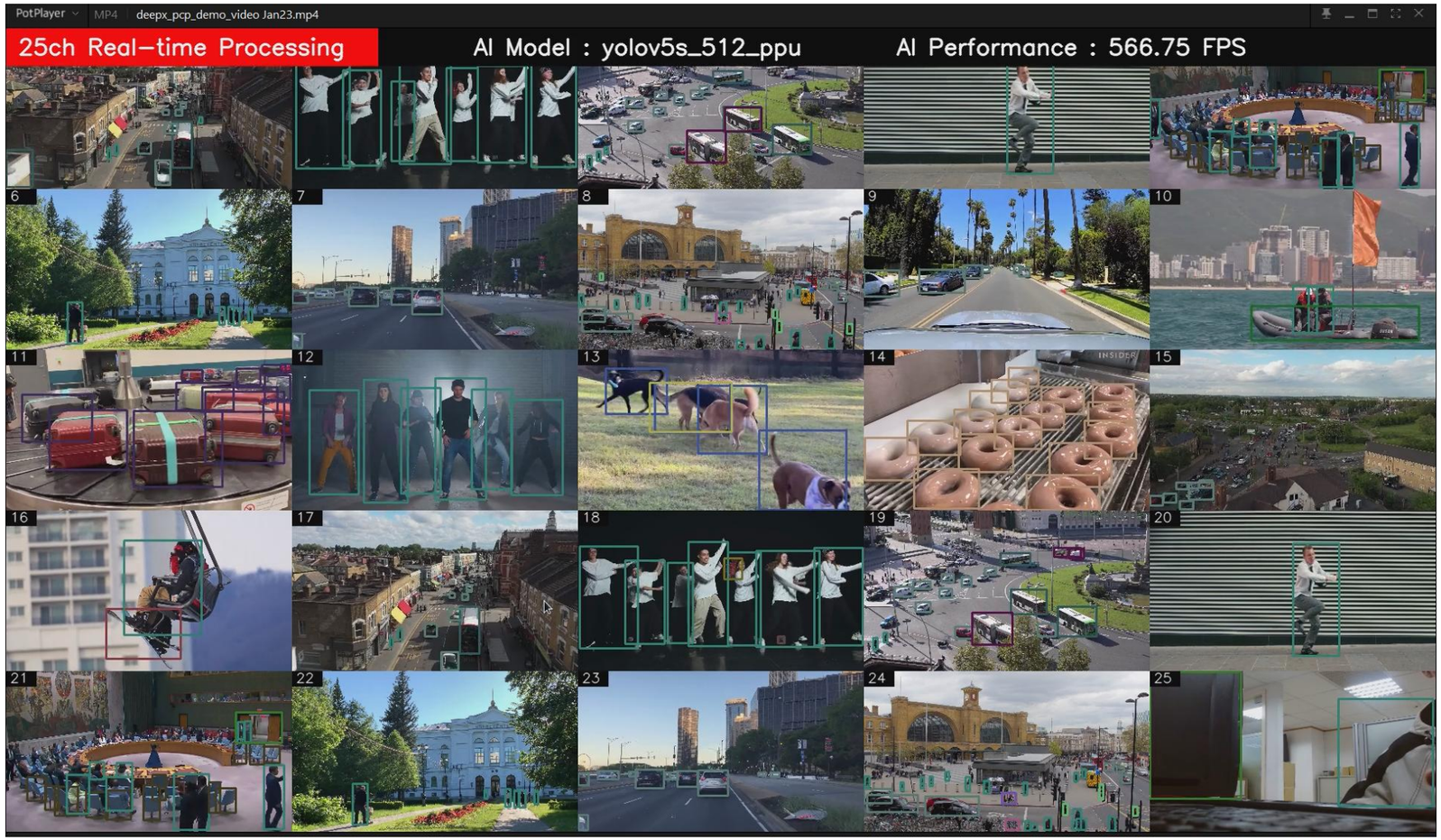
Application Demo: Multi-channel real-time object detection, pose estimation, face recognition

Use cases: Multi-camera analytics for surveillance, inspection, smart buildings



The hardware platform demonstrates high-performance, real-time computer vision capabilities – Multi channel processing of object detection model YOLOv5 and YOLOv7.

Key features:

- Ability to handle multiple video streams simultaneously, with testing conducted on 25 video streams using a single 25-TOPS DX-M1 AI accelerator.
- High efficiency: The DX-M1 runs these models consuming only 2W ~ 5W power.
- Ability to handle high-resolution, multi-channel inputs - demonstrations also show YOLOv7 running at over 147 FPS (640x640) with 50.9% mAP (mean Average Precision)
- Multi-Model Operations: The DX-M1 supports running multiple AI models at once, such as running YOLOv5 for object detection alongside other models (e.g., DDRnet for segmentation) in a single demo.

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Product model name & Configurations

Base model	LPDDR5	eMMC	M.2 PCIe Device	microSD	Wireless	AC adapter	AC plug
EMB-RK88	4GB (min)	None	None	None	None	None	None
	8GB	64GB	128GB NVMe SSD	32GB	Wi-Fi 6, BT 5	DC12V/60W	US
	16GB (max)	128GB	256GB NVMe SSD	64GB		DC19V/65W	EU
		256GB	512GB NVMe SSD	128GB			UK
		512GB	1TB NVMe SSD	512GB			JP
							AUS
Base model	**LPDDR5**	**eMMC**	**M.2 NPU**	**microSD**	**Wireless**	**AC adapter**	**AC plug**
EMB-RK88DX	4GB (min)	64GB	**DeepX DX-M1**	None	None	None	None
	8GB	128GB		32GB	Wi-Fi 6, BT 5	DC12V/60W	US
	16GB (max)	256GB		64GB		DC19V/65W	EU
		512GB		128GB			UK
				512GB			JP
							AUS

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Available Ordering Part Number

SKU	BOM	Description	Remark
EMB-RK88-B0-EU	**250-AB499-401EB**	EMBEDDED PC RK3588, 16GB LPDDR5, 128GB EMMC, M.2 2280 M-KEY, 2x HDMI, GLAN, 5x USB, WIFI, MULTI-IO, DC19V, US/EU PLUGS	
EMB-RK88-A0-EU	**250-AB499-201EB**	EMBEDDED PC RK3588, 8GB LPDDR5, 128GB EMMC, M.2 2280 M-KEY, 2x HDMI, GLAN, 5x USB, WIFI, MULTI-IO, DC19V, EU/US PLUG	
EMB-RK88-C0-EU	**250-AB499-301EB**	EMBEDDED PC RK3588, 8GB LPDDR5, 64GB EMMC, M.2 2280 M-KEY, 2x HDMI, GLAN, 5x USB, WIFI, MULTI-IO, DC19V, EU/US PLUGS	

Production OS and Login Credentials

OS version	Login name	Login password
B499_RK3588_linux6-1_v1-1-0_20241220_PCP-V2	linaro	linaro

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