AMD RYZEN™ EMBEDDED 8000 SERIES PROCESSORS

## A NEW CLASS OF INDUSTRIAL PROCESSING WITH LEADERSHIP PERFORMANCE, INTEGRATION AND ONBOARD AI ACCELERATION

PRODUCT OVERVIEW

AMD Ryzen™ Embedded 8000 Series processors set a new standard for processing performance, graphics delivery and I/O connectivity among AMD industrial processing solutions, and are the first AMD Embedded devices to integrate XDNA™ architecture.

For industrial PCs and automation, machine vision, and robotics applications, the performance-per-watt profile enabled with AMD Ryzen™ Embedded 8000 Series processors is a major step forward in industrial computing efficiency for AI. The AMD Ryzen Embedded 8000 Series processors deliver a range of thermal design power (TDP) profiles, spanning from 15W to 54W. Within this range, the processors boast a top maximum performance of 16 trillion operations per second (TOPS) delivered by the NPU. Additionally, the full processor performance scales up to 39 TOPS, making it a powerful profile suited for demanding and diverse industrial computing workloads.

Onboard NPU integration is an evolution beyond GPU-driven AI acceleration in processors architectures. NPUs enable targeted, efficient AI acceleration for improved computational agility and reduced power consumption compared to conventional parallel/matrix GPU coprocessing. This is achieved via an open, royalty-free software ecosystem of libraries and inferencing models, and a software development kit (SDK) to streamline development and deployment flexibility at lower costs.

RYZEN EMBEDDED 8000 SERIES – OVERVIEW
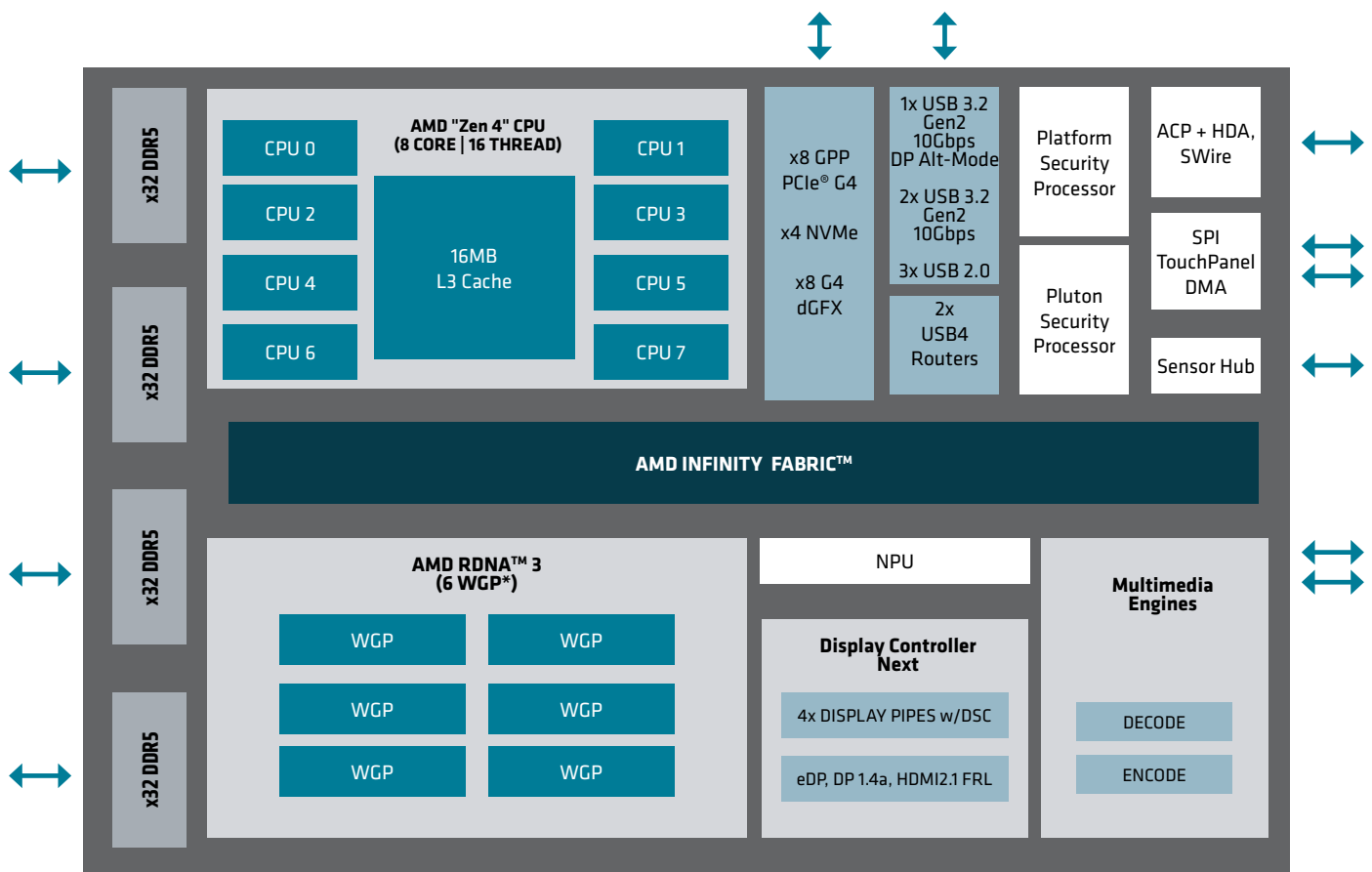
*WORK GROUP PROCESSORS

INTEGRATED AND EFFICIENT

AMD Ryzen™ Embedded 8000 Series processors harness the next-generation "Zen 4" core architecture and AMD RDNA™ 3 graphics, combining powerful CPU processing with integrated AMD Radeon™ graphics in a BGA (FP7r2) package for performant, efficient industrial systems.

The onboard XDNA™ architecture—a new capability for AMD embedded solutions—helps enable fast, smooth AI inferencing and decision making at the industrial edge. This approach maximizes processing and design efficiencies, while delivering specialized AI inferencing at the processor layer to support use cases for machine vision, robotics, monitoring, and human-machine machine interfaces (HMI). These new capabilities extend the performance-per-watt value achieved with earlier Ryzen Embedded Series processors, enabling powerful AI inferencing in a nearly identical power envelope.

RICH I/O AND GRAPHICS

Delivering 20 lanes of on-chip PCIe® Gen4, AMD Ryzen™ Embedded 8000 Series processors provide ample I/O flexibility for specialized accelerators and other add-ons. AMD Ryzen™ Embedded 8000 Series Processors also feature the latest dual-channel memory support (DDR5 up to 5600MT/s) with support for error-correcting code (ECC) for efficient and reliable memory transfer.

AMD Ryzen™ Embedded 8000 Series processors provide powerful x86 CPU compute up to 8 "Zen 4" cores (16 threads), with integrated AMD Radeon-class graphics featuring the newest generation AMD RDNA™ 3 technology to optimize visual processing and multimedia performance.

A single, small-footprint AMD Ryzen™ Embedded 8000 Series processors can power up to four independent displays at 4K resolution, leveraging hardware decoding and encoding for popular video codecs including AV1 and H.265. For industrial systems leveraging graphical consoles and status panels, the AMD Ryzen™ Embedded 8000 Processors help enable versatile display and HMI configurations in space-and thermally-constrained environments.

SCALABLE AND OPEN

The performance and power scalability afforded with AMD Ryzen™ Embedded 8000 Series processors make them an ideal fit for industrial system OEMs expanding their AI support capabilities and product portfolios across a range of performance, power and graphics-optimized options. Planned product availability up to 10 years helps support long-term design lifecycles.

An open AI software ecosystem for designers, helps support faster development cycles with easy access to royalty-free libraries and inferencing models. The included software development kit supports Microsoft Windows operating system. It also supports popular AI frameworks including PyTorch and TensorFlow, featuring pretrained models available on HuggingFace.

ADDITIONAL KEY FEATURES

CPU Architecture	"Zen 4"
CPU Cores/Threads	Up to 8 Cores, 16 Threads
L1 Cache	L1 Instruction Cache = 32 KB, L1 Data Cache = 32 KB (per core)
L2 Cache	L2 Cache = Up to 8 MB (total)
L3 Cache	L3 Cache = Up to 16 MB unified
Graphics	RDNA 3 graphics with up to 6 WGPs (Work Group processors)
Memory	128b DDR5-5600 with ECC
NPU	16 TOPS
Security Processor	Microsoft Security processor to provide fTPM 2.0 and additional security features
PCIe®	x20 PCIe® Gen4
USB	2x USB4 Type-C with DP Alt-mode 1x USB3.2 Gen2 10Gb/s Type-C DP Alt-mode 1x USB3.2 Gen2 10Gb/s 3x USB2.0 1x USB2.0 (SecureBio dedicated)
Process Technology	TSMC 4nm
Package Type	Lidless BGA, 0.64mm min ball pitch; FP7r2 (DDR5)
Package Size	FP7r2 – 25 x 35 mm
Max Z-height	1.38 mm
Ball Count	1140 (FP7r2)

Model	Embedded OPN	TDP (TDP Range)	CPU Core/ Thread Count	CPU Base Freq. (GHZ)	CPU Boost Freq. (GHZ) (Up to)	L2 CPU Cache (MB)	L3 CPU Cache (MB)	Graphics Model	Graphics WGPs	DDR Max Rate (MT/S) (Up to)	Longevity
8845HS	100-000001316E	45W (35-54W)	8/16	3.8	5.1	8	16	RDNA 3	6 WGPs	5600	Extended 10-Years
8645HS	100-000001315E	45W (35-54W)	6/12	4.3	5.0	6	16	RDNA 3	4 WGPs	5600	Extended 10-Years
8840U	100-000001317E	28W (15-30W)	8/16	3.3	5.1	8	16	RDNA 3	6 WGPs	5600	Extended 10-Years
8640U	100-000001318E	28W (15-30W)	6/12	3.5	4.9	6	16	RDNA 3	4 WGPs	5600	Extended 10-Years

Boost Clock Frequency is the maximum frequency achievable on the CPU running a bursty workload. Boost clock achievability, frequency, and sustainability will vary based on several factors, including but not limited: thermal conditions and variation in applications and workloads. GD-150.

For more information about the specific features and specifications supported by select products in AMD's solutions portfolio, or to learn more about AMD's Ryzen™ Embedded 8000 Series processor family. Visit www.amd.com/embedded-r8000