

*Product Brief: AMD Ryzen™ Embedded V3000 Series*

## Next-Generation V-Series Processors Deliver Performance, Integration, Enterprise Reliability and Power Efficiency Advantages for, 'Always On' Storage and Networking Systems

### Product Overview

AMD Ryzen™ Embedded V3000 processors bring the high-performance "Zen 3" CPU core architecture to the V-Series processor portfolio, and deliver new levels of processing power, thermal efficiency and high-speed I/O connectivity in a compact, cost effective BGA footprint. Providing seamlessly scalable processing performance for a wide range of enterprise and industrial storage and networking systems, the V3000 processor family is optimized for high reliability in 24x7 operating environments with demanding workload requirements.

The Ryzen Embedded V3000 processor family provides up to 2X the core count<sup>1</sup> and delivers an estimated 338% better CPU integer performance<sup>2</sup> and 177% CPU floating performance uplift<sup>3</sup> over the legacy Ryzen™ Embedded V1000 Series, with improved power efficiency, memory transfer speeds and I/O connectivity. Scalable up to 8 cores/16 threads with pin and footprint compatibility across the V3000 family, AMD Ryzen™ Embedded V3000 processors enable Cloud storage, NAS and networking OEMs to flexibly scale their product portfolios across multiple performance and price points to meet their customers' unique needs.

### Versatile Performance, Simpler Designs

AMD Ryzen™ Embedded V3000 processors are available in 4, 6 and 8 core configurations with low thermal design power (TDP) profiles spanning from 10W to 54W for storage and networking systems designed for an exacting balance of performance and power efficiency in a compact footprint. With AMD Ryzen™ Embedded V3000 processors, system designers can leverage a single board design targeting a wide range of system configurations, with BGA integration agility and low thermal dissipation at the CPU layer for simpler designs and lowered BOM costs.

## Target Applications



**Networking**



**Cloud Storage**



**NAS**



**Edge**

## Enterprise-Class Reliability and Security Features

AMD Ryzen™ Embedded V-Series V3000 processors provide enterprise-grade reliability with planned manufacturing availability up to ten years to support long product lifecycles. Storage systems, networking control planes and switches designed with AMD Ryzen™ Embedded V3000 processors can be optimized for rack space utilization, power efficiency, and low heat dissipation in space-constrained environments. Available security capabilities include AMD Memory Guard for helping defend against unauthorized memory access, and AMD Platform Secure Boot to mitigate for firmware advanced persistent threats (APTs).

## Memory and I/O Connectivity Enhancements

AMD Ryzen™ Embedded V3000 processors are optimized to deliver improved memory agility and expanded I/O connectivity compared to legacy V-Series V1000 processors. Equipped with the latest and fastest (up to 4,800 MT/s) DDR5 dual-channel memory support, AMD Ryzen™ Embedded V3000 processors support rapid memory transfer speeds. These processors provide support for up to 20 lanes of PCIe® Gen4 and dual 10Gb ethernet MAC connectivity to accommodate a broad range of I/O requirements for onboard ASICs, NICs, controllers and more.

## Additional Key Benefits

- AMD “Zen 3” x86 CPU cores with support for up to 8 Cores/ 16 Threads
- Ryzen™ Embedded V3C18I processor (25W) delivers up to 124% better single thread CPU performance than Ryzen™ Embedded V1500 processor (25W) in CoreMark<sup>4</sup>
- DRAM Error correcting code (ECC) for single-bit memory repair
- Broad set of high-speed peripheral and interface support, including 2X SATA 3.0 or 2x4 NVMe, 2X USB 4.0 (up to 20Gb/s per channel, 40Gb/s per port), 2x USB 3.2 Gen2 (up to 10Gb/s) and 4X USB 2.0.
- BGA package FP7r2 (25x35mm, 0.65mm pitch)
- Linux® OS support with upstreamed Ubuntu® and Yocto drivers

### Next-generation x86 “Zen 3” CPU Core

- Up to Eight cores / Sixteen threads
- Up to 4MB of L2\$ cache, plus up to 16MB of shared L3\$

### Infrastructure/Package

- FP7r2 (DDR5): Lidless BGA 0.65mm pitch, 25x35mm, 1.38mm height

### Memory Controllers

- Dual 64-bit DDR5 up to 4,800 MT/s w/ ECC support

### Enhanced I/O

- Up to 20L PCIe Gen4: one x8 and three x4
- 2x SATA 3.0 / SATA Express / 2x4 NVMe
- 2x 10 Gb Ethernet MAC capable of 1, 2.5 or 10Gbps speeds
- 2x USB 4.0 (20Gb/s per channel, 40Gb/s per port)
- 2x USB 3.2 Gen2 (10Gb/s)
- 4x USB 2.0
- UART, Secure I2C, SMBus, Secure SPI/eSPI, GPIO

### Security

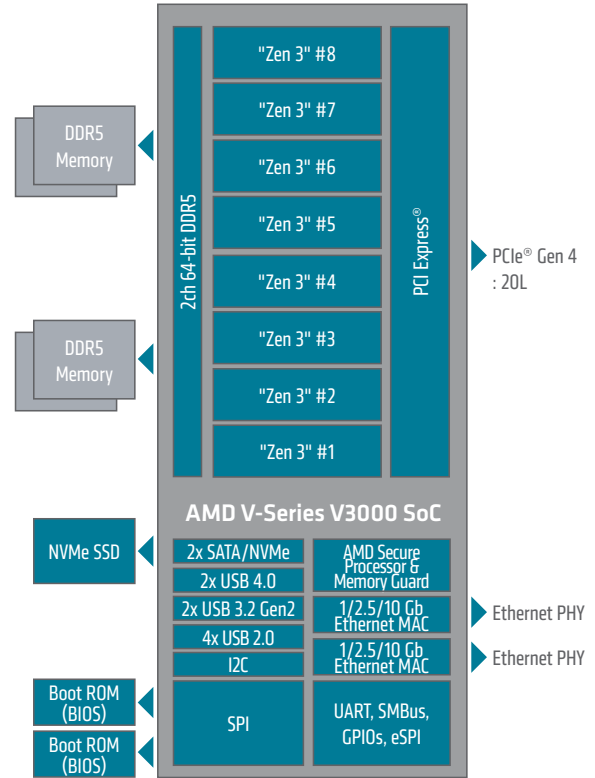
- AMD Memory Guard
- AMD Secure Processor
- Pre- and post-boot DMAR
- Dual SPI ROM + Secure FW loading from ROM1

### Range of Performance/Power SKU

- cTDP: 10-25W and 35-54W

### OS drivers & firmware

- Ubuntu & Yocto drivers
- Embedded-FP7r2 PI



Model	Nominal TDP (W)	cTDP (W)	x86 CPU Core/ Thread Count	CPU Base Freq. (GHz) (up to)	CPU 1T Boost Freq. (GHz) (up to)	L2 CPU Cache (MB)	L3 CPU Cache (MB)	Max DDR5 Rate (MT/s) (up to)	PCIe® Gen4 Lanes	Ethernet Ports	Junction Temp.
V3C48	45W	35-54W	8 / 16	3.3	3.8	4	16	4,800	20L	2x 10 Gb	0 - 105C
V3C44	45W	35-54W	4 / 8	3.5	3.8	2	8	4,800	20L	2x 10 Gb	0 - 105C
V3C181	15W	10-25W	8 / 16	1.9	3.8	4	16	4,800	20L	2x 10 Gb	-40 - 105C
V3C18	15W	10-25W	8 / 16	1.9	3.8	4	16	4,800	20L	2x 10 Gb	0 - 105C
V3C16	15W	10-25W	6 / 12	2.0	3.8	3	16	4,800	20L	2x 10 Gb	0 - 105C
V3C14	15W	10-25W	4 / 8	2.3	3.8	2	8	4,800	20L	2x 10 Gb	0 - 105C

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 V3000 Processor Family, visit [www.amd.com/ryzen-embedded-v3000](http://www.amd.com/ryzen-embedded-v3000)

## AMD.com/embedded

1. Ryzen™ Embedded V3000 processor family offers up to 8 “Zen 3” x86 CPU cores. Ryzen™ Embedded V1000 processor family offers up to 4 “Zen” x86 CPU cores. EMB-189

2. Testing conducted by AMD Performance Labs as of July 2022 on the Ryzen™ Embedded V3C181 and January 2022 on the Ryzen Embedded V1500 processor both at 25W Watts TDP (STAMP mode disabled) using SPEC CPU®2017\_int\_base (configuration : compiler v11.1.0, GCC rate, harness cpu2017-11.8, INT int Base sub score), on a test system comprising: - Ryzen™ Embedded V3C181 processor: AMD Reference FOX Motherboard, 2x16GB DDR5-4800 Micron RAM, Samsung PM9A1 M.2 NVMe PCIe Gen4 512GB storage, Linux Ubuntu 22.04.3 with Kernel 5.18, Insyde BIOS RFX1001A, AMD package drivers 2022.20 - Ryzen™ Embedded V1500 processor: AMD Reference BILBY Motherboard, 2x8GB DDR4-3200 Micron RAM, Samsung SSD EVO M.2 M.2 256GB storage, Linux Ubuntu 20.04.2 with Kernel 5.15, Insyde BIOS RBB1208A, AMD package driver 2021.40. PC manufacturers may vary configurations, yielding different results. The Ryzen Embedded V3C181 scored 46.0 (est.) and V1500 10.5 (est.) using SPEC CPU®2017\_int\_base (configuration: compiler v11.1.0, GCC rate, harness cpu2017-11.8, int Base sub score), (46.0 / - 10.5)= / 10.5= 438% the estimated performance or 3.38x (338%) better. OEM published scores will vary based on system configuration and determinism mode used (default performance profile). SPEC® and SPECrate® are registered trademarks of the Standard Performance Evaluation Corporation. See [www.spec.org](http://www.spec.org) for more information. EMB-192

3. Testing conducted by AMD Performance Labs as of July 2022 on the Ryzen™ Embedded V3C181 and January 2022 on the Ryzen Embedded V1500 processor both at 25W Watts TDP (STAMP mode disabled) using SPEC CPU®2017\_fp\_base (configuration : compiler v11.1.0, GCC rate, harness cpu2017-11.8, fp Base sub score), on a test system comprising: Ryzen™ Embedded V1500 processor: AMD Reference BILBY Motherboard, 2x8GB DDR4-3200 Micron RAM, Samsung SSD EVO M.2 M.2 256GB storage, Linux Ubuntu 20.04.2 with Kernel 5.15, Insyde BIOS RBB1208A, AMD package driver 2021.40. PC manufacturers may vary configurations, yielding different results. The Ryzen Embedded V3C181 scored 41.3 (est.) and V1500 14.9 (est.) using SPEC CPU®2017\_fp\_base (configuration: compiler v11.1.0, GCC rate, harness cpu2017-11.8, fp Base sub score), (41.3/14.9)= 277% the estimated performance or 1.77x (177%) better. OEM published scores will vary based on system configuration and determinism mode used (default performance profile). SPEC® and SPECrate® are registered trademarks of the Standard Performance Evaluation Corporation. See [www.spec.org](http://www.spec.org) for more information. EMB-196

4. Ryzen™ Embedded V1500 processor: AMD Reference BILBY Motherboard, 2x8GB DDR4-3200 Micron RAM, Samsung SSD EVO M.2 M.2 256GB storage, Linux Ubuntu 20.04.2 with Kernel 5.15, Insyde BIOS RBB1208A, AMD package driver 2021.40. PC manufacturers may vary configurations, yielding different results. The Ryzen Embedded V3C181 scored 34,906 iterations / second and V1500 15,526 iterations / second using CoreMark (compiler option: v1.0 binaries gcc610\_03\_1T preset), (34,906/15,525)= 224% the performance or 1.24x (124%) better. EMB-191

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