Product Brief: AMD Ryzen™ Embedded V1000 Processor Family


Product Overview

The AMD Ryzen™ Embedded V1000 processor family brings together the breakthrough performance of the pioneering AMD “Zen” CPU and “Vega” GPU architectures in a seamlessly-integrated SoC solution that sets a new standard in processing power for next-generation embedded designs. Delivering superior graphics and multimedia processing, and compute performance up to 3.6 TFLOPS with thermal design power (TDP) as low as 12W and as high as 54W, AMD Ryzen™ Embedded V1000 SoCs equip system designers to achieve new levels of processing efficiency and design versatility. With a comprehensive set of advanced, integrated security features, AMD Ryzen™ Embedded V1000 SoCs enable sophisticated system protections complemented by an expansive breadth of I/O interconnect options.

The AMD Ryzen™ Embedded V1000 simplifies the design, form factor and thermal management challenges inherent to discrete CPU and GPU configurations, enabling system designers targeting digital casino gaming, medical displays, thin clients, industrial PCs and other applications to easily and elegantly scale their graphics and compute performance for advanced, feature-rich system designs. A single, small-footprint AMD Ryzen™ Embedded V1000 SoC powers up to four independent displays in brilliant 4K resolution, delivering stunningly rich and immersive visual experiences.

Outstanding Performance for Wide Applications

| 4C/8T “Zen” Cores 14nm | 3.6 TFLOPS | 4 4K Displays | 4K60 VP9 Decode Support | Dual 10GE | Leading Edge Security SME/SEV | Scalability 12W - 54W |
New Levels of Graphics and Compute Performance

AMD Ryzen™ Embedded V1000 SoCs provide an ultra-high-performance complement to the AMD Embedded R-Series and G-Series SoC portfolios, delivering up to a 52% IPC boost at the CPU\(^3\) and up to a 107% improvement in GPU performance\(^5\). Utilizing a 14nm FinFET process, the AMD Ryzen™ Embedded V1000 enables scalability to higher performance at comparable TDPs as legacy SoC offerings, or sustained performance levels with significantly reduced thermal budgets\(^3\). Up to 4 CPU cores/8 threads and 11 GPU compute units\(^1\) can be harnessed to achieve breakthrough processing throughput for the most demanding graphics and compute workloads.

Seamless Integration

Integrating a high-performance CPU and GPU on a single die, the AMD Ryzen™ Embedded V1000 SoC enables significant space savings, smaller board designs and more efficient cooling architectures than can be achieved with heterogeneous CPU and GPU chipsets – with attendant CAPEX and OPEX savings opportunities. New hardware support for VP9 10-bit decode and H.265 10-bit decoding and 8-bit encoding\(^2\). Robust I/O support spans new and established embedded interconnects spanning PCIe®, Ethernet, and USB support including USB-C.

Uncompromising Security Features

AMD Ryzen™ Embedded V1000 SoCs leverage an onboard AMD Secure Processor for Crypto Co-processing that encrypts data before it feeds to the I/O, complemented with Platform Secure Boot capabilities to ensure systems are booted from trusted software, with one-time programmable (OTP) capabilities enabling system designers to manage their own keys. Advanced capabilities include Secure Memory Encryption (SME) for defending against unauthorized memory access, and Secure Encrypted Virtualization (SEV) for securely isolating hypervisors and virtual machines (VMs) – with no application code changes required.
Additional Key Benefits

- AMD Ryzen™ Embedded V1000 SoCs can power up to four independent displays in crisp 4K resolution via DisplayPort/eDP and/or HDMI™, and support for High Dynamic Range (HDR) displays.

- Equipped with dual-channel 64-bit DDR4 with performance up to 3200 MT/s, AMD Ryzen™ Embedded V1000 SoCs provide up to 16 PCIe lanes, dual Ethernet, up to four USB 3.1 Gen 2 interconnects, with additional USB, SATA and NVMe support.

- Planned product availability extends up to 10 years, providing customers with a long-lifecycle support roadmap.
**Performance**

**Next-generation x86 “Zen” Core**
- Up to four cores / eight threads with up to 2MB of shared L2 plus 4MB of shared L3 total

**Dual-channel 64-bit DDR4 Up to 3200 MT/s**
- ECC support
- 1 DIMM / channel (Dual-Rank on FPS 32GB total)

**Security**

**Next-generation AMD Secure Processor (PSP)**
- fTPM2.0, crypto-offload, platform secure boot, integrated DRM
- Field Programmable Keys
- SEV, SME Secure Memory Support

---

### AMD Ryzen™ Embedded V1000 Processor Family

**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 V1000 Processor Family, visit [www.amd.com/ryzenembedded](http://www.amd.com/ryzenembedded)**

---

### AMD.com/embedded

---

1. AMD Radeon™ and FirePro™ GPUs based on the Graphics Core Next architecture consist of multiple discrete execution engines known as a Compute Unit (“CU”). Each CU contains 64 shaders (“Stream Processors”) working together. GI-78

2. HEVC (H.265), H.264, and VP9 acceleration are subject to and not operable without inclusion/installation of compatible HEVC players. GD-81

3. Updated Feb 28, 2017: Generational IPC uplift for the “Zen” architecture vs. “Piledriver” architecture is +52% with an estimated SPECint base2006 score compiled with GCC 4.6 –O2 at a fixed 3.4GHz. Generational IPC uplift for the “Zen” architecture vs. “Excavator” architecture is +64%, as measured with Cinebench R15 1T, and also +64% with an estimated SPECint base2006 score compiled with GCC 4.6 –O2, at a fixed 4.0GHz. System configs: AMD reference motherboard(s), AMD Radeon™ RX 390 GPU, 8GB DDR4-2666 (“Zen”)/ 8GB DDR3-1866 (“Excavator”) GPU CU [SIMD] Displays Ind. Displays L2 Cache Package Max DDR4 Rate Base Freq. GHz 1T Boost Freq. GHz GPU Freq. GHz Dual Ethernet Ports

<table>
<thead>
<tr>
<th>Model</th>
<th>TDP Range</th>
<th>Core/Thread Count</th>
<th>GPU CU [SIMD]</th>
<th>Ind. Displays</th>
<th>L2 Cache</th>
<th>Package</th>
<th>Max DDR4 Rate</th>
<th>Base Freq. GHz</th>
<th>1T Boost Freq. GHz</th>
<th>GPU Freq. GHz</th>
<th>Dual Ethernet Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1807B</td>
<td>35-54W</td>
<td>4/8</td>
<td>11</td>
<td>4</td>
<td>2M</td>
<td>FPS</td>
<td>3200</td>
<td>3.35</td>
<td>3.8</td>
<td>1.3</td>
<td>10Gb</td>
</tr>
<tr>
<td>V1756B</td>
<td>35-54W</td>
<td>4/8</td>
<td>8</td>
<td>4</td>
<td>2M</td>
<td>FPS</td>
<td>3200</td>
<td>3.25</td>
<td>3.6</td>
<td>1.1</td>
<td>10Gb</td>
</tr>
<tr>
<td>V1605B</td>
<td>12-25W</td>
<td>4/8</td>
<td>8</td>
<td>4</td>
<td>2M</td>
<td>FPS</td>
<td>2400</td>
<td>2.0</td>
<td>3.6</td>
<td>1.1</td>
<td>10Gb</td>
</tr>
<tr>
<td>V1202B</td>
<td>12-25W</td>
<td>2/4</td>
<td>3</td>
<td>4</td>
<td>1M</td>
<td>FPS</td>
<td>2400</td>
<td>2.3</td>
<td>3.2</td>
<td>1.0</td>
<td>10Gb</td>
</tr>
</tbody>
</table>

4. FP16. The equation for FLOPS on the GPU is the following making the assumptions for clock and using 16-bit floating point operands is shown here: FLOPS = 11 CU * 4 SIMD/CU * 4 Shaders/Ind. Displays + 4MB of shared L3 total


6. As of June 2017. Product is based on the DisplayPort 1.4 Specification published February 28, 2016, and has passed VESA’s compliance testing process (excluding HDR) in June 2017. GD-123

7. Default TDP = 45W

8. Default TDP = 15W

©2018 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, Ryzen, and combinations thereof are trademarks of Advanced Micro Devices, Inc. PCIe and PCIe Express are registered trademarks of PCISI Corporation. HDMII the HDMI logos and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing, LLC in the United States and other countries. Other product names used in this publication are for identification purposes only and may be trademarks of their respective companies. P041 18B701C-