



EFPC-6000 media player harnesses up to 563 GFLOPs of processing performance in passively-cooled, ultra compact chassis

EMTs Breaks Performance and Power Efficiency Barriers with Fanless 4K Ultra HD Video and Display PC Built with AMD Embedded R-Series APUs

Designers of multimedia PCs for HD video and display applications are continuously challenged to strike the ideal balance of processing performance, power and cooling efficiency, and form factor optimization. A significant compromise in any one of these design parameters can render an otherwise well-designed system too slow, too power hungry and/or too bulky for exacting, graphics-intensive applications. The recent emergence of 4K Ultra HD video, which delivers as much as 4X better resolution than traditional 1080p HD, is compounding these design challenges even further by putting additional strain on the underlying processor and attendant cooling mechanisms.

The key to overcoming these design issues lies in the selection of a processing platform that can achieve requisite performance and power goals while precluding the need for fan cooling within the system. Eliminating the mechanical fan from a media player design opens up a host of benefits for designers and users alike, reducing overall system size considerably while helping to ensure higher reliability and quieter operation through a reduction of moving parts within the system. Fanless systems can also be packaged in sealed, ventless enclosures that can help prevent the ingress of airborne particulates and debris into the system, providing an opportunity for greater ruggedness in harsh environmental conditions.

South Korea-based EMTs (www.emts.kr) weighed these design considerations carefully during the development of its new 4K Ultra HD-capable EFPC-6000 media player, and was ultimately able to harness up to 563 GFLOPs of graphics processing performance in an ultra compact 260 x 203 x 33mm system enclosure thanks to the AMD Embedded R-Series Accelerated Processing Unit (APU) at the heart of the system. Powering the EFPC-6000's 4K Ultra HD video playback capability and enabling multi-display support across four independent monitors¹, AMD R-Series APUs equipped EMTs' system designers to achieve ambitious design goals. Among their impressive achievements, the EFPC-6000 is passively cooled – no fan required.

¹Support for the fourth display by AMD R-Series APU requires the use of DisplayPort 1.2 multi-streaming technologies with DisplayPort 1.2 multi-streaming-enabled monitors and/or hubs. The number and types of supported displays may vary by board design.

Blazing Performance Across Multiple Displays

With between 128 and 384 compute units providing a calculated 172 to 563 SP GFLOPs² of performance, and average power as low as 13W³, AMD R-Series APUs help enable compute-intensive video and display systems to deliver stunning visual experiences without sacrificing power efficiency. AMD R-Series APUs feature high-performance dual- or quad-core x86 processors built on AMD's second generation 'Bulldozer' core architecture, complemented by AMD Radeon™ HD 7000G Series graphics and a host of advanced GPU-enabled capabilities.

The single-chip combination of CPU and advanced HD-caliber GPU that comprises the AMD R-Series processor architecture is designed to maximize processing throughput, helping EMTs' design team to break the performance barriers imposed by competing processing platforms. These conventional graphics-integrated chipset architectures rely on the CPU to interface with the GPU via a North Bridge connection, sending calls to the GPU to invoke code running on the co-processor that then sends results back to the CPU. This serial data processing approach adds considerable memory latency, consumes system power, and sacrifices board space.

With the integrated AMD R-Series APU architecture, the CPU is tasked with scalar processing including storage, networking, and memory processing, while simultaneously running the operating system, applications and user interface. Meanwhile the on-die GPU offloads graphics and multimedia processing using SIMD parallel processing, driving HD displays with great efficiency. Data parallel processing, including multimedia streaming, can be offloaded from the CPU to the GPU, freeing up the CPU for compute, memory and I/O requests. This fully optimized data path, further boosted via shared access to the memory controller, reduces processing latency and helps to improve real-time video and graphics processing performance.

The AMD R-Series APUs within EMTs' EFPC-6000 media players deliver a host of additional features designed to optimize multimedia processing and playback. These capabilities include 2D and 3D acceleration, with seamless DirectX® 11, OpenCL™ 1.1 and OpenGL 4.2 support. The onboard UVD 3.2 dedicated hardware video decoder supports H.264, MPEG4, MPEG2 and VC-1 decode⁴ and also enables simultaneous dual HD source

decode, while the Video Compression Engine (VCE 1.0) performs hardware-assisted encoding of HD video streams and allows real-time transcoding. Altogether these capabilities help provide ultra-efficient multimedia processing that yields stunningly immersive visual experiences.

The EFPC-6000's 4K Ultra HD video playback capability – an impressive achievement in itself for this class of small form factor media players – is complemented by powerful, DisplayPort-enabled multi-display capabilities spanning up to four independent screens in a host of different layout configurations, including layout as a single large surface. This ability to feed up to four displays with crisp HD video and graphics, powered by AMD's advanced Eyefinity technology⁵, is a key differentiator for the EFPC-6000 media player. Where competing media players often require one controller to feed each individual screen – compromising system size, and power and cost efficiencies in the process – the EFPC-6000 provides the processing muscle, highly efficient video and graphics rendering, and multi-output connectivity support to power four screens from a single system, including a 4K Ultra HD feed. This ultimately gives users the flexibility to implement their EFPC-6000 systems in a wide range of display configurations for diverse applications such as digital signage, human machine interfaces (HMI), digital gaming, and medical equipment.

Cool and Quiet

The processor- and system-level power efficiency afforded by AMD R-Series APUs was an important enabler for EMTs' expert design team as they strove to achieve a passively-cooled system design. To accomplish this ambitious feat, EMTs employed a unibody aluminum chassis to help dissipate system heat evenly across every available centimeter of exposed surface area, in conjunction with advanced heat piping mechanisms to further cool the system.

This sophisticated cooling methodology enabled a fanless design that preserves valuable space within the system, reduces system weight, and eliminates a potentially critical point of failure. This, in turn, allowed for the use of a sealed/ventless system enclosure that minimizes the system's vulnerability to dust, moisture, and other potentially damaging environmental

¹Calculated SP GFLOPs = (# of x86 cores x (128 bit (FPU) / 32-bit (SP Operation)) * CPU Base Frequency) + (# of shader units * (64 bit (shader) / 32-bit (SP Operation)) * GPU Max Frequency). EMB 21

²The average power for the 35W TDP AMD R-464L APU when system is running one iteration of 3DMark 06 default run was 12.861 Watts. R-464L testing was performed on an equivalent A10 Series APU. System configuration: AMD A10 2.3GHz 4/1/D, "Pumori" development platform, 4 GB RAM, Windows 7 Ultimate. EMB 20

³AMD does not provide a license/sublicense to any intellectual property rights relating to any to any standards, including but not limited to any audio and/or video codec technologies such as AVC/H.264/MPEG-4, AVC, VC-1, MPEG-2, and DivX/xVid.

⁴AMD Eyefinity technology supports up to six DisplayPort™ monitors on an enabled graphics card. Supported display quantity, type and resolution vary by model and board design; confirm specifications with manufacturer before purchase. To enable more than two displays, or multiple displays from a single output, additional hardware such as DisplayPort-ready monitors or DisplayPort 1.2 MST-enabled hubs may be required. A maximum of two active adapters is recommended for consumer systems. See www.amd.com/eyefinityfaq for full details.

elements. As a result, EFPC-6000 media players can be used in challenging environmental conditions – for example, on dusty factory floors, in high-traffic pedestrian walkways, and within vehicle cabins for commercial and/or municipal transport over harsh terrain.

The EFPC-6000's fanless design also helps reduce noise operation – an important feature for many applications. From schools and libraries, to hospitals and research facilities, the EFPC-6000 is optimized for whisper-quiet settings for which the drone of a system fan would be distracting. This benefit is compounded in environments where multiple media players may be clustered together – for digital signage installations in casinos, or banks of arrival/departure monitors and/or kiosks in transportation terminals, for example. In these settings, the resulting aggregate reduction in ambient noise can be considerable.

Elegance by Design

Eliminating fan cooling from the EFPC-6000 media player design was a significant first step in the effort to minimize system form factor, and enabled EMTs' designers to reclaim valuable space inside the system enclosure within which they could build in additional value-add functionality, such as RAID 0/1 with additional HDD to maximize media content read/write speed for multiple streams of content playing at the same time. The AMD R-Series APU architecture contributed to the overall space savings via its combination of CPU and GPU on a single die, with a companion controller hub rounding out a simple two chip solution. Where ad hoc disparate chip sets and discrete, right edge-connected graphics cards can add significant size to a system – as well as greater susceptibility to shock and vibration – AMD R-Series APUs provide a tightly integrated processing platform that conserves system space while reducing board layers and power needs.

Ultimately, the 260 x 203 x 33mm EFPC-6000 is small enough to tuck inconspicuously behind or under a single display monitor,

enabling a clean-looking multimedia installation that also minimizes direct exposure to potentially harmful environmental conditions. Coupled with a widescreen 4K Ultra HD video display, the EFPC-6000 is hardly noticeable but for its sleek blue industrial enclosure.

The Future of Video and Display PCs

Where previously power-hungry multicore CPUs, ad hoc chipsets, and discrete graphics cards dominated the landscape of media player processing platforms, AMD Embedded R-Series APUs are helping to enable a new generation of higher-performing, smaller form factor systems. Among these systems, EMTs' fanless EFPC-6000 media player sets a new standard for processing, power, and cooling efficiency, delivering high-impact multimedia experiences in 4K Ultra HD with multi-screen display flexibility.

About EMTs

EMTs is a leading provider of multimedia video and display PCs, embedded boards and modules. For more information about EMTs, visit www.emts.kr.

About AMD

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