Welcome to E-XFL.COM

Understanding Embedded - Microprocessors

Embedded microprocessors are specialized computing chips designed to perform specific tasks within an embedded system. Unlike general-purpose microprocessors found in personal computers, embedded microprocessors are tailored for dedicated functions within larger systems, offering optimized performance, efficiency, and reliability. These microprocessors are integral to the operation of countless electronic devices, providing the computational power necessary for controlling processes, handling data, and managing communications.

Applications of Embedded - Microprocessors

Embedded microprocessors are utilized across a broad spectrum of applications, making them indispensable in

Details	
Product Status	Active
Core Processor	AMD R-460H
Number of Cores/Bus Width	4 Core, 64-Bit
Speed	1.9GHz
Co-Processors/DSP	-
RAM Controllers	-
Graphics Acceleration	-
Display & Interface Controllers	-
Ethernet	-
SATA	-
USB	-
Voltage - I/O	-
Operating Temperature	-
Security Features	-
Package / Case	-
Supplier Device Package	-
Purchase URL	https://www.e-xfl.com/product-detail/advantech/96mpar-1-9g-4mfst

AMD EMBEDDED SOLUTIONS
R-SERIES APU

AMD EMBEDDED R-SERIES PLATFORM

Delivering exceptional performance in a power efficient platform

PRODUCT OVERVIEW

The AMD Embedded R-Series platform delivers high-performance processing coupled with a premium high-definition visual experience in a solution that is still power efficient. Enabling unprecedented integrated graphics and multi-display capabilities in embedded applications that can be compact and low power.

The AMD R-Series APU (Accelerated Processing Unit) is designed to efficiently handle your advanced multimedia and computational workloads. With average power below 13 Watts[5] and discrete-class AMD Radeon™ graphics performance integrated into the AMD R-Series APU, applications that previously required a discrete graphics card can be developed in smaller form factors with lower power and cost. The third generation Unified Video Decoder the AMD R-Series APU enables the delivery of crisp and clear video for ad content, instructional materials, or live teleconferencing. For more demanding graphics applications, AMD Radeon™ Dual Graphics technology[2] can combine the processing power of AMD R-Series APUs and AMD Radeon™ Embedded 6000 Series GPUs to more than double graphics performance[3] compared to using discrete graphics alone.

The Innovative CPU architecture integrates dedicated resources that deliver exceptional performance, with shared resources that reduce power consumption and die space. And through AMD Turbo CORE 3 technology the power being consumed by the APU is allocated to accomplish the work at hand, helping to minimize unnecessary system optimization by automatically delivering an optimized balance between performance and power consumption.

With between 128 and 384 compute units delivering a calculated 172 to 563 SP GFLOPs[7] of performance, the AMD R-Series APUs help enable a wide range of compute intensive applications to be built that are low power and fit into small form factors. It's support for Open CL™ helps make it easier to take advantage of a substantial increase in performance, for applications that can leverage parallel processing.

FEATURES AND BENEFITS

Exceptional Performance in a Power-efficient Solution

> Innovative CPU architecture integrates a combination of dedicated and shared resources to deliver exceptional performance while minimizing power consumption and cost.

> AMD Turbo CORE 3 Technology automatically delivers an optimized balance between performance and power consumption.

> APU Thermal Design Power (TDP) ranging from 17 to 35 Watts and average power below 13 Watts.[5]

Unprecedented Integrated Graphics Performance

> Discrete-class AMD Radeon™ HD 7000G Series graphics.

> AMD Radeon™ Dual Graphics technology can more than double graphics performance compared to using discrete graphics alone.[3]

> Hardware Video Compression Engine enables efficient encoding and fast video conversion.

> Secure Asset Management Unit lowers power/CPU overhead when dealing with protected content.

> A wide range of parallel compute capabilities offered to suit the requirements of many embedded applications.

Enabling Innovative Multi-display Designs

> Drive up to 4 displays[1] from a single highly integrated processor.

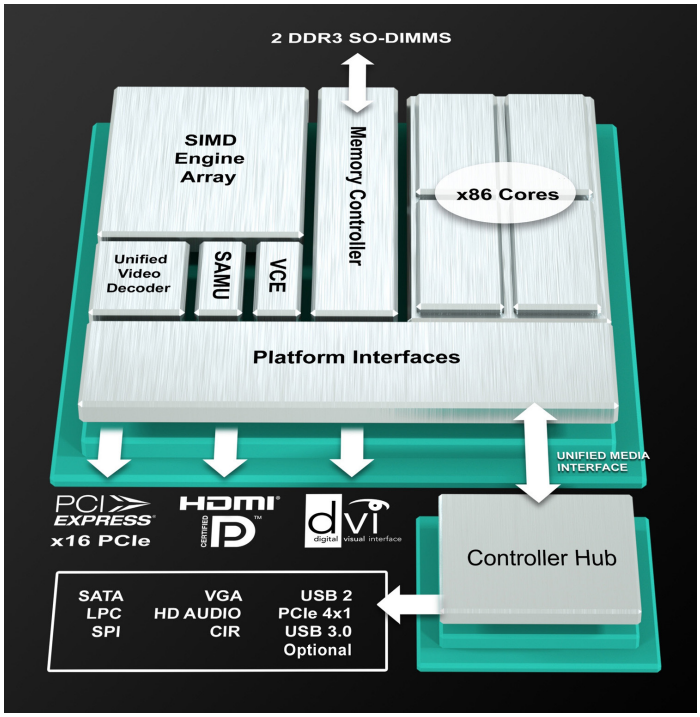
> Drive multiple displays simultaneously as independent displays, or as a single large surface with AMD Eyefinity technology.[4]

> Display resolutions of up to 4k x 2k @ 30 Hz utilizing a single display output.

> Drive up to 10 independent displays by pairing an AMD R-Series APU with an AMD Radeon™ Embedded 6000 Series discrete graphics processor or card.[1,4]

AMD

KEY ARCHITECTURE BENEFITS



APU FEATURES

> High performance integrated x86 cores

> AMD Radeon™ HD 7000G Series graphics

> Unified North Bridge

> High-bandwidth, low-latency integrated memory controller

> Low-latency platform interface

X86 CORE ARCHITECTURE

> Dual or quad-core x86 processor

> 2nd Generation "Bulldozer" core architecture

- Combination of dedicated and shared resources

> 256-bit shared or two dedicated 128-bit floating-point units (FPU)

- Shared between two cores

> AMD64 64-bit ISA

> SSE, SSE2, SSE3, SSE4a, SSE4.1, SSE4.2, SSSE3, ABM, AVX, AVX1.1, AES, BMI, XSAVE/XRSTOR, XGETBV/XSETBV, PCLMULQDQ, FMA, FMA4, TBM, XOP, MMX™, and legacy x86 instructions

GPU CORE ARCHITECTURE

> Dedicated graphics memory controller

- High efficiency ring bus memory controller
- Direct connection to memory

> 2D Acceleration

- Highly-optimized 128-bit engine, capable of processing multiple pixels per clock

> 3D Acceleration

- Full DirectX® 11 support, including full speed 32-bit floating point per component operations
- Shader Model 5
- OpenCL™ 1.1 support
- OpenGL 4.2 support

> UVD 3.2 dedicated hardware video decoder

- H.264, MPEG4 Part 2, VC-1 and MPEG2 decode[6]
- Simultaneous dual HD source decode

> VCE (Video Compression Engine) 1.0

- Hardware assisted encoding of HD video streams
- H.264 (baseline + CABAC) 1080p at 60 fps
- Real time transcoding

DISPLAY INTERFACES

> Multiple DisplayPort 1.2, DVI and HDMI™

> Up to 4 independent displays[1]

INTEGRATED DDR3 MEMORY CONTROLLER

> Two 64-bit DDR3 SDRAM controllers operating at frequencies up to 1600 MT/s (800 MHz)

> Two single-rank SO-DIMMs or unbuffered DIMMs

> Support for 1.5V/1.35V/1.25V DDR3

AMD VIRTUALIZATION™ TECHNOLOGY (AMD-V™)

> SVM pause count capability

> SVM disable and lock

> Rapid virtualization indexing (nested paging)

> Improved world-switch speed

I/O

> Gen2 PCI Express® x16 Interface (x8 on FP2 packaged APUs)

> Additional 4x1 or 1x4 Gen2 PCI Express® interface on APU

> See controller hub table for detail I/O features of A70M and A75

PACKAGE

> APU FS1r2

- 722-pin lidless μ PGA
- 35mm x 35mm
- 1.2192-mm pin pitch

> APU FP2

- 827-ball lidless μ BGA
- 27mm x 31mm
- .8mm to 1.2-mm ball pitch

> Controller Hub

- 656-ball lidless μBGA
- 24.5mm x 24.5mm
- .8mm ball pitch

AMD EMBEDDED R-SERIES APU MODELS AND KEY FEATURES

AMD Embedded R-Series APU – FS1r2 PGA

Model	OPN	Package	CPU Cores	L2 Cache	Memory Interface	CPU Core Frequency - P2/P0	Discrete Class Graphics	GPU Core Frequency Max/Base	Hardware Video Accelerations	Graphics	Display Outputs[1]	Display Resolutions (Maximums)	Thermal Design Power	Tdie (Max)	Product Release
R-464L	RE464LDEC44HJE	1225mm² 722-PGA	4	2MBx2	128 Bit organized as two 64 bit channels: DDR3 (1.5V), LVDDR3 (1.35V), ULVDDR3 (1.25V) up to DDR3-1600	2.3/3.2 GHz	AMD Radeon™ HD 7660G	686MHz/ 497MHz	H.264 Decode (HD+HD up to 1080p and 1080i) H.264 encode (baseline+CABAC) 1080p@60Hz H/W security including AES Decryption	DirectX® 11 Shader Model 5 OpenCL™ 1.1 OpenGL 4.2	Quad independent display controllers providing 4 active outputs: 4x single link DVI 4x DisplayPort 1.2 (Requires MST Hub) 1x HDMI™ 1x VGA	DisplayPort/eDP: 4096x2160@30Hz 18/24/32 bpp Single Link DVI: 1920x1200@60Hz 24 bpp Dual Link DVI: 2560x1600@60Hz 1920x1200@60Hz 24/30 bpp Native HDMI: 1920x1080@60Hz 24/30/36 bpp 1920x1200@60Hz 24 bpp Type 1 Dual Mode DisplayPort to HDMI Adaptor: 1280x720@60Hz 24/30/36 bpp 1920x1200@60Hz 24 bpp Type 2 Dual Mode DisplayPort to HDMI Adaptor: 1920x1080@60Hz 24/30/36 bpp 1920x1200@60Hz 24 bpp	35W	100°C	Q2-12
R-460H	RE460HDEC44HJE		4	2MBx2		1.9/2.8 GHz	AMD Radeon™ HD 7640G	655MHz/ 497MHz	H.264 Decode (HD+HD up to 1080p and 1080i) H.264 encode (baseline+CABAC) 1080p@60Hz H/W security including AES Decryption				35W	100°C	Q2-12
R-272F	RE272FDEC23HJE		2	1MB		2.7/3.2 GHz	AMD Radeon™ HD 7520G	686MHz/ 497MHz	H.264 Decode (HD+HD up to 1080p and 1080i) H.264 encode (baseline+CABAC) 1080p@60Hz H/W security including AES Decryption				35W	100°C	Q2-12
R-268D	RE268DDEC23HJE		2	1MB		3.0/2.5 GHz	AMD Radeon™ HD 7420G	640MHz/ 470MHz	H.264 Decode (HD+HD up to 1080p and 1080i) H/W security including AES Decryption				35W	100°C	Q2-12

AMD Embedded R-Series APU – FP2 BGA

Model	OPN	Package	CPU Cores	L2 Cache	Memory Interface	CPU Core Frequency - P2/P0	Discrete Class Graphics	GPU Core Frequency Max/Base	Hardware Video Accelerations	Graphics	Display Outputs[1]	Display Resolutions (Maximums)	Thermal Design Power	Tdie (Max)	Product Release
R-460L	RE460LSIE44HJE	837mm² 827-BGA	4	2MBx2	128 Bit organized as two 64 bit channels: DDR3 (1.5V), LVDDR3 (1.35V), ULVDDR3 (1.25V) up to DDR3-1333	2.0/2.8 GHz	AMD Radeon™ HD 7620G	497MHz/ 360MHz	H.264 Decode (HD+HD up to 1080p and 1080i) H.264 encode (baseline+CABAC) 1080p@60Hz H/W security including AES Decryption	DirectX® 11 Shader Model 5 OpenCL™ 1.1 OpenGL 4.2	Quad independent display controllers 4 active outputs from: 4x single link DVI 4x DisplayPort 1.2 (Requires MST Hub) 1x HDMI™	DisplayPort/eDP: 4096x2160@30Hz 18/24/32 bpp Single Link DVI: 1920x1200@60Hz 24 bpp Dual Link DVI: 2560x1600@60Hz 1920x1200@60Hz 24/30 bpp Native HDMI: 1920x1080@60Hz 24/30/36 bpp 1920x1200@60Hz 24 bpp Type 1 Dual Mode DisplayPort to HDMI Adaptor: 1280x720@60Hz 24/30/36 bpp 1920x1200@60Hz 24 bpp Type 2 Dual Mode DisplayPort to HDMI Adaptor: 1920x1080@60Hz 24/30/36 bpp 1920x1200@60Hz 24 bpp	25W*	100°C	Q2-12
R-452L	RE452LSHE44HJE		4	2MBx2		1.6/2.4 GHz	AMD Radeon™ HD 7600G	424MHz/ 327MHz	H.264 Decode (HD+HD up to 1080p and 1080i) H.264 encode (baseline+CABAC) 1080p@60Hz H/W security including AES Decryption				19W*	100°C	Q2-12
R-260H	RE260HSHE24HJE		2	2MB		2.1/2.6 GHz	AMD Radeon™ HD 7500G	424MHz/ 327MHz	H.264 Decode (HD+HD up to 1080p and 1080i) H.264 encode (baseline+CABAC) 1080p@60Hz H/W security including AES Decryption				17W*	100°C	Q2-12
R-252F	RE252FSHE23HJE		2	1MB		1.9/2.4 GHz	AMD Radeon™ HD 7400G	415MHz/ 333MHz	H.264 Decode (HD+HD up to 1080p and 1080i) H/W security including AES Decryption				17W*	100°C	Q2-12

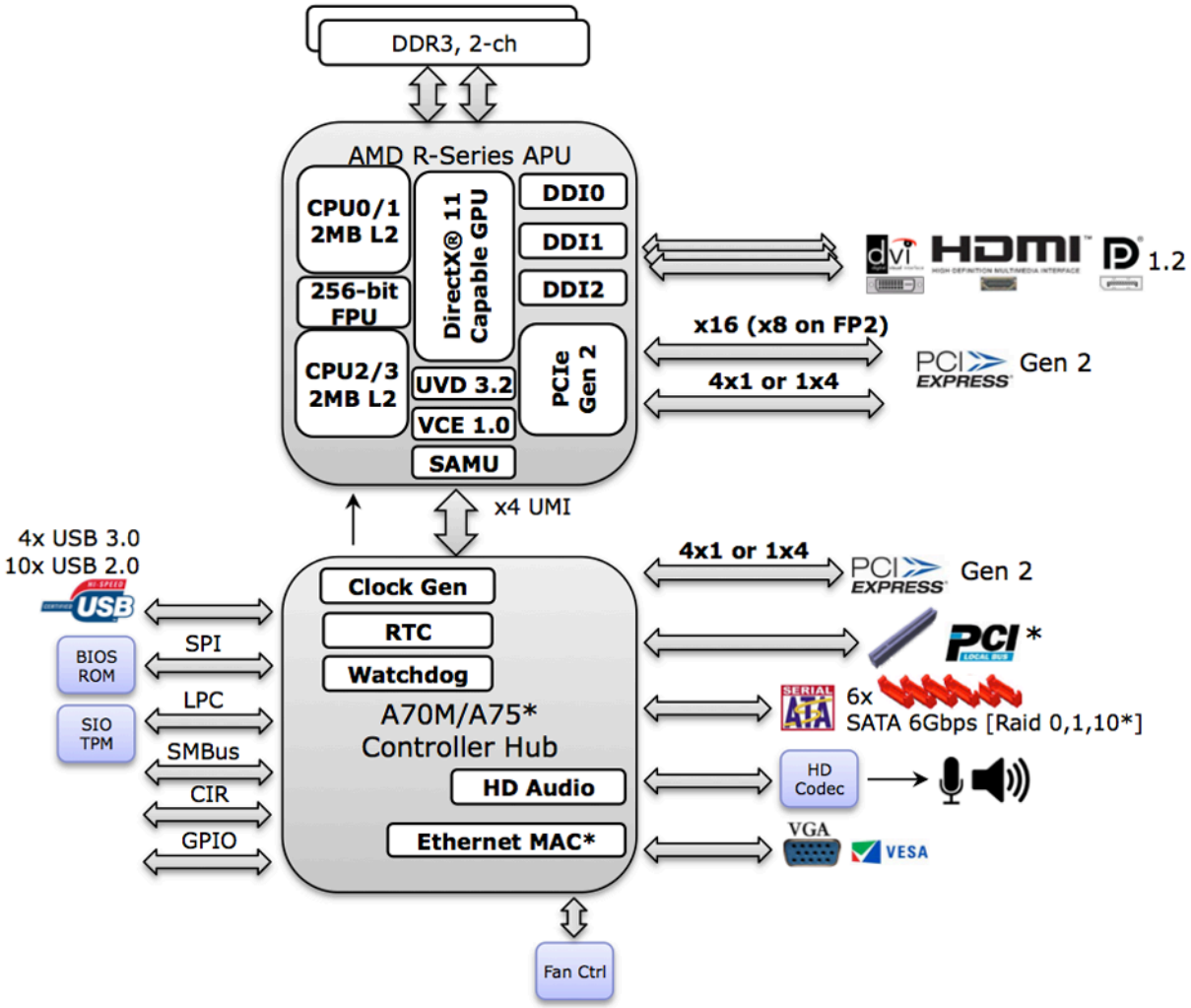
*Note: PCIe Gen2 operation adds ~1W to TDP

1.Support for the 4th Display Port output requires the use of DisplayPort 1.2 multi-streaming technologies with compatible monitors and/or hubs. The number and types of supported displays may vary by board design.

AMD R-Series Platform Controller Hubs

Model	OPN	CPU Interface	Package	PCI Express®	PCI	SATA	FIS-Based Switching	USB	HD Audio	LPC SPI SMBus	Max GPIOs	APU Fan Control	APU Clock Gen	Power[16]
A70M	100-CG2389	Unified Media Interface (UMI) x4 Gen1 +DP	656-BGA 600mm²	4 x1 or 1x4 Gen2	No	6x 6Gb/s Raid 0,1	No	4 v3.0 10 v 2.0 2 v1.1	Up to 4-channels	Yes	32	Yes	Yes	Configuration Specific
A75	100-CG2386	Unified Media Interface (UMI) x4 Gen1 +DP	656-BGA 600mm²	4 x1 or 1x4 Gen2	33MHz 3 Slots	6x 6Gb/s Raid 0,1,10	Yes with RAID 0,1,10	4 v3.0 10 v 2.0 2 v1.1	Up to 4-channels	Yes	32	Yes	Yes	7.8W

AMD EMBEDDED R-SERIES PLATFORM BLOCK DIAGRAM



1 Support for the 4th display requires the use of DisplayPort 1.2 multi-streaming technologies with compatible monitors and/or hubs. The number and types of supported displays may vary by board design.
2 AMD Radeon™ Dual Graphics technology combines the processing power of select AMD APUs and select AMD Radeon GPUs and can support displays connected to either the APU or the discrete GPU. Windows Vista® or Windows® 7 operating system required.
3 3DMark™ Vantage P score for AMD Radeon E6460 alone is 2162. The combined 3DMark Vantage P score for the E6460+R-464L is 4538. System configuration: AMD R-464L APU, "Parmer" development platform, AMD Radeon E6760 6XMDP graphics adapter, 4 GB RAM, Windows 7 Home Premium.
4 AMD Eyefinity technology works with applications that support non-standard aspect ratios, which is required for panning across multiple displays. AMD Eyefinity technology can support up to 4 displays using a single enabled AMD R-Series APU or up to 6 displays using a single enabled AMD graphics card with Windows Vista or Windows 7 operating systems – the number and type of displays may vary by board design. Some implementations may require DisplayPort 1.2 multi-streaming technologies with compatible monitors and/or hubs. SLS ("Single Large Surface") functionality requires an identical display resolution on all configured displays.
5 The 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.
6 AMD 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.
7 Calculated SP GFLOPs = (# of x86 cores x (128 bit (FPUs) / 32-bit (SP Operation)) * CPU Base Frequency) + (# of shader units * (64 bit (shader) / 32-bit (SP Operation)) * GPU Max Frequency)

www.amd.com/embedded

AMD