AMD Embedded: The Next Generation of Embedded Computing
AMD helps deliver the right balance of CPU, GPU and chipset capabilities, to give designers the solutions they need to create the next generation of embedded applications. Along with a broad range of varied solutions, AMD supports the x86 embedded marketplace with design tools and technology partnerships that offer simplicity and flexibility to help create high-performance, feature-rich, and customer-driven products. AMD has long been a leader in innovation with its continued focus on improving both x86 processor and graphics processor designs. AMD's embedded products offer designers a balanced foundation for overall system performance with the quick time-to-market typically offered by commercial off-the-shelf components. AMD embedded solutions give designers ample flexibility to design scalable, x86-based, cost-efficient and feature-rich products, and help drive energy conservation into their systems without compromising application performance or compatibility, graphics performance or features. AMD technology-based products are leading edge from enterprise-class servers and consumer systems to traditional embedded markets.

This brochure presents the full array of AMD's embedded solutions that help deliver maximum performance with low overall system power consumption and are supported by longer than standard availability[1], a full library of x86 software development applications, and hardware tools. It's time to design and produce the next-generation embedded systems your customers demand — quickly, easily, and efficiently.

AMD's unique processor designs help deliver high performance and balanced system design.
AMD's range of embedded solutions provides flexible features and a balanced performance approach for the overall system.

FEATURES INCLUDE

> Integrated low power processor and GPU[2]

> Industry-leading performance-per-watt

> Native eight-core processor design provides highly scalable performance gains within a consistent thermal envelope

> Lead-free, four-layer processes with maximum on-board space

> Efficient heat dissipation reduces or eliminates the need for heat sinks and reduces ambient cooling requirements

> Range of available packaging and pin counts meets variety of design requirements

Along with these and other technical features, embedded designers can enjoy long-term component availability, comprehensive design support, and AMD's commitment to continue offering new, customer-oriented products.

Tools and support for developers
AMD offers:

> A full range of RDK (Reference Design Kit) products designed to enable designers to go from concept to finished product quickly

> A broad array of development boards for creating efficient x86 system designs

> Industry collaborations with leading software and hardware specialists, fostering maximum choice for your unique design

Get to market faster with superior products
Ready to create high-performance, low-power embedded designs that give your innovative new products an edge in the marketplace.

The AMD Accelerated Processing Unit (APU) Family
AMD APUs are a new approach to processor design and software development, delivering powerful CPU and GPU capabilities for HD, 3D and data-intensive workloads in a single-die processor called an APU. APUs combine high-performance serial and parallel processing cores with other special-purpose hardware accelerators, enabling breakthroughs in visual computing, security, performance-per-watt and device form factor. The first introduction of this technology for embedded applications is the AMD Embedded G-Series Family of APUs, targeted at delivering the ideal combination of price, power and performance for applications such as integrated digital signage, x86 set-top box (xSTB), xIETV, thin client, point-of-sale, infotainment, and casino gaming, home media servers, industrial control and automation system markets. The new 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 AMD64 embedded family: leading-edge technology for high-end embedded systems

AMD64 embedded solutions are each uniquely matched to a defined set of product applications. These solutions include high-performance quad-, six- and sixteen-core AMD Opteron™ processors and dual-core AMD Turion™ II Neo processors with Direct Connect Architecture for enterprise-class telecom, networking and storage equipment. The ASB1 (BGA) family of processors are designed with unique computing features and a thin, compact form factor to help enable new and uncompromising designs. The ASB2 processors are the second generation BGA platform and are designed to deliver exceptional performance while maintaining low average solution power draw with greater levels of performance and power efficiency over the previous generation ASB1 processor family.

The AMD64 solutions are each uniquely equipped to provide the processing needs for a large number of target markets. These solutions enable unique high-performance, smaller form factor products, with maximum versatility, and minimum design challenge.

AMD Geode™ LX processors: optimized for low-power, high-performance applications

AMD Geode™ LX processors are configured to deliver developers a versatile and flexible suite of x86 solutions that enable fast design cycles and short time-to-market roadmaps. Ideal for applications ranging from thin client and set-top boxes to point-of-sale devices and kiosks. AMD has also introduced technology that allows the AMD Geode LX family to use DDR2 memory modules in an existing design. With a minor change in the memory voltage and an updated BIOS, a current AMD Geode LX processor based design can use a DDR2 memory module from AStint which helps ensure memory longevity and results in system level power efficiency. In addition to processors, the family includes a broad range of design tools including Development Boards (DBs) and Reference Design Kits (RDKs) to empower designers to make maximum use of the established world of x86 software applications.

The AMD Radeon™ embedded graphics family: game-changing graphics for embedded systems.

AMD Radeon™ graphics for embedded applications are designed to deliver exciting, desktop-level visual experiences to embedded systems. Built with advanced 3D graphics engines supporting Microsoft® DirectX® and OpenGL graphics APIs, AMD graphics solutions enable market-leading, rich, immersive images. Outstanding multimedia capabilities are supported by an integrated multi-standard video decoder delivering enhanced video quality from MPEG-2, H.264 or VC-1 video streams. The ultimate in display flexibility is provided by dual display controllers driving high-resolution displays through VGA, DVI, DisplayPort or HDMI™ interfaces. AMD graphics solutions are designed to perform, engineered to lead and built to win. With a product portfolio including AMD chipsets, discrete graphics processors, MXM modules and PC add-in boards, AMD provides system designers with exciting and innovative graphics solutions for their embedded systems.

AMD Embedded Solutions

AMD Opteron™ 6200 Series Embedded Processors - Socket G34 Sixteen-Core

Model	OPN	Multi-CPU Scalability	Core Frequency	Cache	TDP	Memory Interface	HyperTransport™ Interface	Product Release
6274[1]	OS6274WKTGGGUS	16 cores up to 4 sockets	2.2/3.1GHz	L2 2MB x8; L3 16MB	115W	DDR3-1600 4-ch Registered ECC & Chipkill	Four 16-lane @ up to 6400MT/s, Full Duplex	Q4-11
6262HE[1]	OS6262VATCGGUS	16 cores up to 4 sockets	1.6/2.9GHz	L2 2MB x8; L3 16MB	85W	DDR3-1600 4-ch Registered ECC & Chipkill	Four 16-lane @ up to 6400MT/s, Full Duplex	Q1-12

1. Server SKUs. Please contact your AMD sales representative to discuss longevity extensions.

AMD Opteron™ 6100 Series Embedded Processors - Socket G34 Eight-Core

Model	OPN	Multi-CPU Scalability	Core Frequency	Cache	TDP	Memory Interface	HyperTransport™ Interface	Product Release
61KS[1]	OE61KSWKT8EGO	up to 4	2.0GHz	L2 512KB x8; L3 12MB	115W	DDR3-1333 4-ch Registered ECC & Chipkill	Four 16-lane @ up to 3.2GHz, Full Duplex	Q2-10
61QS[1]	OE61QSWKT8EGOE	up to 4	2.3GHz	L2 512KB x8; L3 12MB	115W	DDR3-1333 4-ch Registered ECC & Chipkill	Four 16-lane @ up to 3.2GHz, Full Duplex	Q2-10

1. Server SKUs. Please contact your AMD sales representative to discuss longevity extensions.

AMD Opteron™ 4200 Series Embedded Processors - Socket C32 Eight-Core and Four-Core

Model	OPN	Multi-CPU Scalability	Core Frequency	Cache	TDP	Memory Interface	HyperTransport™ Interface	Product Release
4280[1]	OS4280WLU8KGUS	8 cores up to 2 sockets	2.8/3.5GHz	L2 2MB x4; L3 8MB	95W	DDR3-1600 4-ch Registered ECC & Chipkill	Two 16-lane @ up to 6400MT/s, Full Duplex	Q4-11
42MX HE	OE42MXOHU8KGUE	8 cores up to 2 sockets	2.2/3.3GHz	L2 2MB x4; L3 8MB	65W	DDR3-1600 4-ch Registered ECC & Chipkill	Two 16-lane @ up to 6400MT/s, Full Duplex	Q4-11
42DX EE	OE42DXHKU4KGUE	4 cores up to 2 sockets	2.2/3.6GHz	L2 2MB x2; L3 8MB	40W	DDR3-1600 4-ch Registered ECC & Chipkill	Two 16-lane @ up to 6400MT/s, Full Duplex	Q4-11
4256 EE[1]	OS4256HJU8KGUS	8 cores up to 2 sockets	1.6/2.8GHz	L2 2MB x4; L3 8MB	35W	DDR3-1600 4-ch Registered ECC & Chipkill	Two 16-lane @ up to 6400MH/z, Full Duplex	Q4-11

1. Server SKUs. Please contact your AMD sales representative to discuss longevity extensions.

AMD Opteron™ 4100 Series Embedded Processors - Socket C32 Six-Core and Four-Core

Model	OPN	Multi-CPU Scalability	Core Frequency	Cache	TDP	Memory Interface	HyperTransport™ Interface	Product Release
41KX HE	OE41KXOHU6DGOE	6 cores up to 2 sockets	2.2GHz	L2 512K x6; L3 6MB	65W	DDR3-1333 2-ch Registered ECC & Chipkill	Two 16-lane @ 2.2GHz, Full Duplex	Q2-10
41QS HE	OE41QSOHU4DGOE	4 cores up to 2 sockets	2.5GHz	L2 512K x4; L3 6MB	65W	DDR3-1333 2-ch Registered ECC & Chipkill	Two 16-lane @ 2.2GHz, Full Duplex	Q2-10
41LE HE	OE41LEOHU4DGOE	4 cores up to 2 sockets	2.3GHz	L2 512K x4; L3 6MB	65W	DDR3-1333 2-ch Registered ECC & Chipkill	Two 16-lane @ 2.2GHz, Full Duplex	Q2-10
41GL EE	OE41GLHKU6DGOE	6 cores up to 2 sockets	1.8GHz	L2 512K x6; L3 6MB	40W	DDR3-1333 2-ch Registered ECC & Chipkill	Two 16-lane @ 2.2GHz, Full Duplex	Q2-10

AMD Embedded Solutions, cont.

Six-Core AMD Opteron™ Processors - Socket F (1207)

Model	OPN	Multi-CPU Scalability	Core Frequency	Cache	TDP	Memory Interface	HyperTransport™ Interface	Product Release
84QS[1]	OE84QSWJS6DGNE	up to 8	2.4GHz	L2 512KB x6; L3 6MB	115W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@2.2GHz Full Duplex	Q1-10
84KS HE[1]	OE84KSPDS6DGNE	up to 8	2.0GHz	L2 512KB x6; L3 6MB	79W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@2.2GHz Full Duplex	Q1-10
24QS[1]	OE24QSWJS6DGNE	up to 2	2.4GHz	L2 512KB x6; L3 6MB	115W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@2.2GHz Full Duplex	Q1-10
24KS[1]	OE24KSPDS6DGNE	up to 2	2.0GHz	L2 512KB x6; L3 6MB	79W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@2.2GHz Full Duplex	Q1-10
14KS[1]	OE14KSPDS6DGNE	up to 1	2.0GHz	L2 512KB x6; L3 6MB	79W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@2.2GHz Full Duplex	Q1-10

1. Temperature is server part.

Quad-Core AMD Opteron™ Processors - Socket F (1207)

Model	OPN	Multi-CPU Scalability	Core Frequency	Cache	Peak Power (worst case) TDP	Memory Interface	HyperTransport™ Technology	Product Release
83VS	OE83VSWHP4DGIE	Up to 8	2.8GHz	L2: 512KB x4 L3: 6MB	115W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@2.2GHz Full Duplex	Q3-09
83QS HE	OE83QSMAP4DGIE	Up to 8	2.4GHz		71W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@2.0GHz Full Duplex	Q3-09
23VS	OE23VSWHP4DGIE	Up to 2	2.8GHz		115W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@2.2GHz Full Duplex	Q3-09
23QS HE	OE23QSMAP4DGIE	Up to 2	2.4GHz		71W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@2.0GHz Full Duplex	Q3-09
23KS EE	OE23KSFLP4DGIE	Up to 2	2.0GHz		50W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@1.8GHz Full Duplex	Q3-09
13QS HE	OE13QSMAP4DGIE	Up to 1	2.4GHz		71W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@2.0GHz Full Duplex	Q3-09
13KS EE	OE13KSFLP4DGIE	Up to 1	2.0GHz		50W	DDR2-800 2-ch Registered ECC & Chipkill	Three 16-lane@1.8GHz Full Duplex	Q3-09

AMD G-Series Accelerated Processing Units

Model	OPN	Package	CPU Cores	L2 Cache /Core	Memory Interface	CPU Core Frequency	Discrete Class Graphics	GPU Core Frequency	Hardware Video Acceleration[12]	Graphics	Display Outputs[13]	Display Resolutions	Thermal Design Power	Tdie	Product Release
T56N	GET56NGBB22GVE		2	512KB	DDR3-1333, Unbuffered	1.65GHz[17]	AMD Radeon™ HD 6320	500MHz	UVD 3 for H.264, VC-1 and MPEG2 with Blu-ray support				18W	90°C	Q2-11
T56E	GET56EGBB22GVE		2	512KB	DDR3-1333, Unbuffered	1.65GHz[17]	AMD Radeon™ HD 6250	275MHz	UVD 3 for H.264, VC-1 and MPEG2				18W	90°C	Q2-12
T52R	GET52RGBB12GVE		1	512KB	DDR3-1333, Unbuffered	1.5GHz	AMD Radeon™ HD 6310	500HMz	UVD 3 for H.264, VC-1 and MPEG2 with Blu-ray support			VGA: 2560x1600 (HD 6320, HD 6310) or 1920x1200 (HD 6290, HD 6250) 30 bpp Single link DVI: 1920x1200 24 bpp HDMI™: 1920x1080p 36 bpp Single link LVDS[14]: 1400x1050 18 bpp DisplayPort 1.1a: 2560x1600 (HD 6310) or 1920x1200 (HD 6250) @ 30 bpp	18W	90°C	Q2-11
T48E	GET48EGBB22GVE		2	512KB	DDR3-1066, Unbuffered	1.4GHz	AMD Radeon™ HD 6250	280MHz	UVD 3 for H.264, VC-1 and MPEG2	DirectX® 11 Shader Model 5 OpenCL™ 1.1 OpenGL 4.0	Dual independent display controllers 2 active outputs from: 1x VGA 2x single link DVI 1x single link LVDS 2x DisplayPort 1.1a 1x HDMI 1x DVO		18W	90°C	Q2-12
T44R	GET44RFPB12GVE		1	512KB	DDR3-1066,[15] Unbuffered	1.2GHz	AMD Radeon™ HD 6250	280MHz					9W	90°C	Q2-11
T40N	GET40NFPB22GVE	FT1 413-pin µBGA 19mm²	2	512KB	DDR3-1066,[15] Unbuffered	1.0GHz[17]	AMD Radeon™ HD 6290	280MHz					9W	90°C	Q2-11
T48N	GET48NGBB22GVE		2	512KB	DDR3-1066, Unbuffered	1.4GHz	AMD Radeon™ HD 6310	520MHz					18W	90°C	Q2-11
T40E	GET40EFSB22GVE		2	512KB	DDR3-1066,[15] Unbuffered	1.0GHz	AMD Radeon™ HD 6250	280MHz	UVD 3 for H.264, VC-1 and MPEG2				6.4W	90°C	Q2-11
T40R	GET40RFSB12GVE		1	512KB	DDR3-1066,[15] Unbuffered	1.0GHz	AMD Radeon™ HD 6250	280MHz					5.5W	90°C	Q2-11
T16R	GET16RFWB12GVE		1	512KB	LVDDR3-1066	615MHz	AMD Radeon™ HD 6250	276MHz				VGA: 1920x1200 (HD 6290, HD 6250) 30 bpp Single link DVI: 1920x1200 24 bpp DisplayPort 1.1a: 1920 x 1200 (HD 6250) @ 30 bpp	4.5W	90°C	Q2-12
T48L	GET48LGBB22GVE		2	512KB	DDR3-1066, Unbuffered	1.4GHz	N/A	N/A	N/A	N/A	N/A	N/A	18W	90°C	Q2-11
T30L	GET30LGBB12GVE		1	512KB	DDR3-1066, Unbuffered	1.4GHz	N/A	N/A	N/A	N/A	N/A	N/A	18W	90°C	Q2-11
T24L	GET24LFQB12GVE		1	512KB	DDR3-1066,[15] Unbuffered	1.0GHz	N/A	N/A	N/A	N/A	N/A	N/A	5W	90°C	Q2-11

12. Refer to the *Brazos Platform Minimum System Recommendations for HD Video Playback*, order# 48826 to view the minimum system configurations required to enable HD playback and the maximum resolution supported for each advanced video quality feature.
13. Other resolutions available that do not oversubscribe link bandwidth. Display resolutions limited by available memory bandwidth.
14. eDP translator option supporting 2048x1536 (HD 6310) or 1920x1200 (HD 6250) at 18 or 24 bpp.
15. Low voltage (1.35V) DDR3 is assumed for the 9W TDP processors. The use of 1.5V DDR3 will incur a power adder.
17. Models enabled by AMD Turbo CORE technology, up to 10% clock speed increase is planned. For CPU boost, only one processor core of a dual-core has boost enabled.

AMD Embedded Solutions, cont.

AMD G-Series Platform Controller Hubs

Model	OPN	CPU Interface	Package	PCI Express®	PCI	SATA	FIS-Based Switching	Ethernet MAC	USB	HD Audio	LPC SPI SMBus	Max GPIOs	APU Fan Control	APU Clock Gen	Power[16]
A50M	100-CG2198	1x4 Gen 1	FCBGA 605-pin lidless μBGA 2mm²	4x1 Gen 2	No	6x 6Gb/s	No	No	14 v2.0 2 v1.1	Up to 4-channels	Yes	102	Yes	Yes	2.7W-5.9W
A55E	100-CG2293	1x4 Gen 2	FCBGA 605-pin lidless μBGA 2mm²	4x1 Gen 2	33MHz 4 Slots	6x 6Gb/s with RAID 0,1,5,10	Yes	Yes (non-EEE PHY only)	14 v2.0 2 v1.1	Up to 4-channels	Yes	102	Yes	Yes	2.7W-5.9W

16. Configuration dependent. See product databook for configurations.

AMD Embedded R-Series APU – FS1r2 PGA

Model	OPN	Package	CPU Cores	L2 Cache	Memory Interface	CPU Core Frequency Nominal/ Boost	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 and 64-bit organized as two channels: DDR3 (1.5V), LVDDR3 (1.35V), ULVDDR3 (1.25V) up to DDR3-1600	2.3/3.2GHz	AMD Radeon™ HD 7660G	686/497MHz	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		1.9/2.8GHz	AMD Radeon™ HD 7640G	655/497MHz	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		2.7/3.2GHz	AMD Radeon™ HD 7520G	686/497MHz	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		3.0/2.5GHz	AMD Radeon™ HD 7420G	640/470MHz	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 Nominal/ Boost	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 and 64-bit organized as two channels: DDR3 (1.5V), LVDDR3 (1.35V), ULVDDR3 (1.25V) up to DDR3-1333	2.0/2.8GHz	AMD Radeon™ HD 7620G	497/360MHz	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		1.6/2.4GHz	AMD Radeon™ HD 7600G	424/327MHz	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	1MB		2.1/2.6GHz	AMD Radeon™ HD 7500G	424/327MHz	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		1.9/2.4GHz	AMD Radeon™ HD 7400G	415/333MHz	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 Embedded Solutions, cont.

AMD R-Series Platform Controller Hubs

Model	OPN	CPU Interface	Package	PCI Express®	PCI	SATA	RAID	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 600mm^2	4 x1 or 1x4 Gen 2	No	6x 6Gb/s	0/1	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 600mm^2	4 x1 or 1x4 Gen 2	33MHz 3 Slots	6x 6Gb/s	0/1/10 with FIS-based Switching	4 v3.0 10 v 2.0 2 v1.1	Up to 4-channels	Yes	32	Yes	Yes	7.8W

16. Configuration dependent. See product databook for configurations.

Socket AM3/AM2[1]

Model	OPN	Number of Cores	Core Frequency	Cache	Thermal Design Power[3]	Memory Interface	HyperTransport™ Interface	Package	Product Release
AMD Phenom™ II XLT Q54L	HEQ54LOEK4DGME	4	2.2/0.8GHz^2	L2 512K x4; L3 6MB	65/36.5W^2	DDR3-1333, 2-ch Unbuffered ECC	One 16-lane@1.8GHz Full Duplex	AM3	Q2-10
AMD Athlon™ II XL - V66C	AEV66CHDK23GME	2	2.8GHz	1MB x2	45W	DDR3-1066, 2-ch Unbuffered ECC	One 16-lane@2GHz Full Duplex	AM3	Q2-10
AMD Athlon™ II XLT - V64L	AEV64LHFK23GME	2	2.7GHz	1MB x2	45W	DDR3-1066, 2-ch Unbuffered ECC	One 16-lane@2GHz Full Duplex	AM3	Q2-10
AMD Athlon™ II XLT - V50L	AEV50LSFK23GME	2	2.2/0.8GHz^2	1MB x2	25/13.8W^2	DDR3-1066, 2-ch Unbuffered ECC	One 16-lane@2GHz Full Duplex	AM3	Q2-10
AMD Athlon™ X2 4200+	ADD4200IAA5DOE	2	2.2GHz	512KB x2	35W	DDR2-800, 2-ch nbuffered ECC	One 16-lane@1000MHz Full Duplex	AM2	Q2-08
AMD Athlon™ X2 3600+	ADD3600IAA5DOE	2	1.9GHz	512KB x2	35W	DDR2-800, 2-ch Unbuffered ECC	One 16-lane@1000MHz Full Duplex	AM2	Q2-08
AMD Athlon™ X2 3400e	ADJ3400IAA5DOE	2	1.8/1.0GHz^2	512KB x2	22/10.8W^2	DDR2-800, 2-ch Unbuffered ECC	One 16-lane@1000MHz Full Duplex	AM2	Q2-08
AMD Athlon™ X2 3400+	ADD3400IAA5CUE	2	1.8GHz	512KB x2	35W	DDR2-800, 2-ch Unbuffered ECC	One 16-lane@1000MHz Full Duplex	AM2	Q2-08
AMD Athlon™ 3100+	ADS3100IAR4DRE	1	2.0GHz	512KB	25W	DDR2-667, 2-ch Unbuffered ECC	One 16-lane@1000MHz Full Duplex	AM2	Q4-07
AMD Athlon™ 3000+	ADD3000IAA4CNE	1	1.8GHz	512KB	35W	DDR2-667, 2-ch Unbuffered ECC	One 16-lane@1000MHz Full Duplex	AM2	Q4-07
AMD Athlon™ 2600+	ADG2600IAV4DRE	1	1.6GHz	512KB	15W	DDR2-667, 2-ch Unbuffered ECC	One 16-lane@800MHz Full Duplex	AM2	Q4-07
AMD Athlon™ 2000+	ADF2000IAV4DRE	1	1.0GHz	512KB	8W	DDR2-667, 2-ch Unbuffered ECC	One 16-lane@1000MHz Full Duplex	AM2	Q4-07

1. Socket AM3 processors can operate in Socket AM2 board designs with DDR2 memory. Socket AM2 processors cannot operate in Socket AM3 board designs with DDR3 memory.
2. While operating at the max/min P-States which can be dynamic or fixed through BIOS.
3. TDP specified in dual-plane platform.

Socket S1

Model	OPN	Number of Cores	Core Frequency	L2 Cache/Core	Thermal Design Power	Memory Interface	HyperTransport™ Technology	Tcase	Product Release
AMD Turion™ 64 X2 TL-62	TMDTL62HAX5DME	2	2.1GHz	512KB x2	35W	DDR2-800, 2-ch Unbuffered	One 16-lane@800MHz Full Duplex	95℃	Q4-07
AMD Turion™ 64 X2 TL-56	TMDTL56HAX5DME	2	1.8/0.8GHz^1	512KB x2	31/9.4W^1	DDR2-800, 2-ch Unbuffered	One 16-lane@800MHz Full Duplex	95℃	Q4-07
AMD Sempron™ 3700+	SMS3700HAX4DQE	1	2.0GHz	512KB	25W	DDR2-800, 2-ch Unbuffered	One 16-lane@800MHz Full Duplex	95℃	Q4-07
AMD Sempron™ 2100+	SMF2100HAX3DQE	1	1.0GHz	256KB	8W	DDR2-800, 2-ch Unbuffered	One 16-lane@800MHz Full Duplex	95℃	Q4-07

1. While operating at the max/min P-States which can be dynamic or fixed through BIOS.

AMD Embedded Solutions, cont.

ASB2 BGA

Model	OPN	Number of Cores	Core Frequency	L2 Cache/Core	Thermal Design Power	Memory Interface	HyperTransport™ Technology	Tdie	Product Release
AMD Turion™ II Neo - N54H	TEN54HSDV23GME	2	2.2GHz	1MB x2	25W	DDR3-1333, 2-ch Unbuffered ECC	One 16-lane@1.6GHz Full Duplex	95°C	Q4-10
AMD Turion™ II Neo - N54L	TEN54LSDV23GME	2	2.2GHz	1MB x2	25W	DDR3-800, 2-ch Unbuffered ECC	One 16-lane@1.6GHz Full Duplex	95°C	Q2-10
AMD Turion™ II Neo - N40H	TEN40HGAV23GME	2	1.5GHz	1MB x2	15W	DDR3-1333, 2-ch Unbuffered ECC	One 16-lane@1.6GHz Full Duplex	95°C	Q4-10
AMD Turion™ II Neo - N40L	TEN40LGAV23GME	2	1.5GHz	1MB x2	15W	DDR3-800, 2-ch Unbuffered ECC	One 16-lane@1.6GHz Full Duplex	95°C	Q2-10
AMD Athlon™ II Neo - N36L	AEN36LLAV23GME	2	1.3/0.8GHz[1]	1MB x2	12/8W[1]	DDR3-800, 2-ch Unbuffered ECC	One 16-lane@1GHz Full Duplex	95°C	Q2-10
AMD Athlon™ II Neo - R44L	AER44LLAV13GME	1	1.7GHz	1MB	12W	DDR3-800, 2-ch Unbuffered ECC	One 16-lane@1GHz Full Duplex	95°C	Q2-10
AMD Athlon™ II Neo - R34L	AER34LFCV13GME	1	1.0GHz	1MB	8W	DDR3-800, 2-ch Unbuffered ECC	One 16-lane@1GHz Full Duplex	95°C	Q2-10

1. While operating at the max/min P-States which can be dynamic or fixed through BIOS.

ASB1 BGA

Model	OPN	Number of Cores	Core Frequency	L2 Cache/Core	Thermal Design Power	Memory Interface	HyperTransport™ Technology	Tdie	Product Release
AMD Turion™ Neo X2 L625	TMZL625OAX5DYE	2	1.6/0.8GHz[1]	512KB x2	18/10.1W[1]	DDR2-667, 2-ch Unbuffered ECC	One 16-lane@800MHz Full Duplex	95°C	Q3-09
AMD Athlon™ Neo X2 L325	AMZL325OAX5DYE	2	1.5GHz[1]	512KB x2	18W[1]	DDR2-667, 2-ch Unbuffered ECC	One 16-lane@800MHz Full Duplex	95°C	Q3-09
AMD Sempron™ 210U	SMG210UOAX3DVE	1	1.5GHz	256KB	15W	DDR2-400, Unbuffered	One 16-lane@800MHz Full Duplex	95°C	Q4-08
AMD Sempron™ 208U	SML208UOAX3DVE	1	1.4GHz	256KB	12W	DDR2-400, Unbuffered	One 16-lane@800MHz Full Duplex	95°C	Q4-08
AMD Sempron™ 200U	SMF200UOAX3DVE	1	1.0GHz	256KB	8W	DDR2-400, Unbuffered	One 16-lane@800MHz Full Duplex	95°C	Q4-08

1. While operating at the max/min P-States which can be dynamic or fixed through BIOS.

AMD Embedded Discrete Graphics

Model	Process	Package	TDP	# Shaders	Interface	Memory	Engine/ Memory Clock (MHz)	OS	Compute	Graphics	Video	Display Outputs	Display Resolutions[1]	Product Release
ATI Radeon™ E2400 dGPU		GPU + memory 31x31 mm BGA	13W			64-bit wide 128MB GDDR3				DirectX® 10 Shader Model 3.0 OpenGL 3.3 3DMark™ 05 4061		Avivo™ Display System Dual independent display controllers 2 active outputs from: 2x VGA 1x Comp/YC/YPbPr 2x single-link DVI 1x dual-link DVI 1x single / dual-link LVDS 1x HDMI™ 1x DVO	VGA: 400MHz pixel clk Comp/YC: NTSC, PAL YPbPr: 480i/p, 576i/p, 720p, 1080i	Q1-08
ATI Radeon™ E2400 MXM	65 nm	MXM 2.1a Type II module 73x78 mm	18W	40	PCIe® 1.1 (x1, x2, x4, x8, x16)	64-bit wide 256MB GDDR3	600/700	Windows® XP/XPe/7, Windows Vista® Linux® (x86 32/64)	Single Precision FP Performance: 48 GFLOPs	DirectX® 10 Shader Model 3.0 OpenGL 3.3	Unified Video Decoder (UVD) for H.264, VC-1 MPEG 1/2/4 decode & encode acceleration	Avivo™ Display System Dual independent display controllers Available on MXM 2.1a connector 2 active outputs from: 2x VGA 1x Comp/YC/YPbPr 2x single-link DVI 1x dual-link DVI 1x single / dual-link LVDS 1x HDMI™ 1x DVO on header	Single-link DVI: 1600x1200 60Hz 24bpp Dual-link DVI: 2048x1536 60Hz 24bpp Single-link LVDS: 1280x1024 60Hz 24bpp Dual-link LVDS: 2048x1536 60Hz 24bpp HDMI™: 1920x1080i 60Hz 24bpp	Q2-08
ATI Radeon™ E2400 PCIe® Add-in Board		PCIe® Add-in Board 16x11 cm	18W			64-bit wide 128MB GDDR3						Avivo™ Display System Dual independent display controllers Available on dual DVI-I connectors 2 active outputs from: 2x VGA 2x single-link DVI 1x dual-link DVI 1x HDMI™	DVO: 220MHz pixel clk	Q2-10

AMD Embedded Solutions, cont.

AMD Embedded Discrete Graphics

Model	Process	Package	TDP	# Shaders	Interface	Memory	Engine/Memory Clock (MHz)	OS	Compute	Graphics	Video	Display Outputs	Display Resolutions[1]	Product Release
ATI Radeon™ E4690 dGPU	55 nm	GPU + memory 35x35 mm BGA	25W	320	PCIe® 2.0 (x1, x2, x4, x8, x16)	128-bit wide 512MB GDDR3	600/700	Windows® XP/XPe/7, Windows Vista® Linux® (x86 32/64)	Single Precision FP Performance: 384 GFLOPs	DirectX® 10.1 Shader Model 4.0 OpenGL 3.3 3DMark™ 06 6686	2nd Generation Unified Video Decoder (UVD2) for H.264, VC-1, MPEG2 decode SD & HD HQV™ processing Blu-ray	Avivo™ Display System Dual independent display controllers 2 active outputs from: 2x VGA 1x Comp/YC/YPbPr 5x single-link DVI 3x dual-link DVI 1x single / dual-link LVDS 5x DisplayPort 1.1a 1x HDMI™ 1x DVO	VGA: 400MHz pixel clk Comp/YC: NTSC, PAL YPbPr: 480i/p, 576i/p, 720p, 1080i/p Single-link DVI: 1600x1200 60Hz 24bpp Dual-link DVI: 2048x1536 60Hz 24bpp Single-link LVDS: 1280x1024 60Hz 24bpp Dual-link LVDS: 2048x1536 60Hz 24bpp DisplayPort 1.1a: 2560x1600 60Hz 24bpp HDMI™: 1920x1080p 60Hz 24bpp DVO: 220MHz pixel clk	Q2-09
ATI Radeon™ E4690 MXM		MXM 3.0 Type A Module 70x82 mm	32W							DirectX® 10.1 Shader Model 4.0 OpenGL 3.3		Avivo™ Display System Dual independent display controllers Available on MXM 3.0 connector 2 active outputs from: 2x VGA 4x single-link DVI 2x dual-link DVI 1x single / dual-link LVDS 4x DisplayPort 1.1a 1x HDMI™		Q1-10
ATI Radeon™ E4690 PCIe® Add-in Board		PCIe® Add-in Board 18x11 cm	34W									Avivo™ Display System Dual independent display controllers Available on dual DVI-I connectors 2 active outputs from: 2x single / dual-link DVI 1x HDMI™ 2x VGA		Q1-10

Model	Process	Package	TDP	# Shaders	Interface	Memory	Engine/Memory Clock (MHz)	OS	Compute[2]	Graphics[3]	Video[3]	Display Outputs[4,5]	Display Resolutions[1]	Product Release
AMD Radeon™ E6460 dGPU	40nm	GPU + memory 33x33mm BGA	~20W	160	PCIe® 2.1 (x1, x2, x4, x8, x16)	64-bit wide, 512MB GDDR5, 25.6GB/s	600 MHz/ 3.2Gbps	Windows®7 Windows® 7 Embedded Linux® (x86 32/64)	AMD Accelerated Parallel Processing (APP) OpenCL™ 1.1 DirectCompute 11 Single Precision FP Performance: 192 GFLOPs	DirectX® 11 Shader Model 5.0 OpendGL 4.1 AMD HD3D Stereo 3D for gaming 3DMark™ Vantage (P) 2195 AMD CrossFireX™ multi-GPU technology	AMD Accelerated Parallel Processing (APP) 3rd Generation Unified Video Decoder (UVD3) SD & HD HQV™ processing Dual HD decode (up to 40 Mbps per stream) AMD HD3D Blu-ray 3D Integrated HD Audio Decoder 7.1 channel surround sound	ATI Eyefinity multi-display technology Up to 2 display outputs from: 1x VGA, 4x Single / 1x Dual-Link DVI 1x Single / Dual-Link LVDS 1x HDMI™ 1.4a 2x DisplayPort 1.1a 3x DisplayPort 1.2 1x DVO Up to 2 display outputs from: 1x DisplayPort 1.1a 3x DisplayPort 1.2	VGA: 400MHz pixel clk Single-link DVI: 1600x1200 60Hz 24bpp Dual-link DVI: 2048x1536 60Hz 24bpp Single-link LVDS: 1280x1024 60Hz 24bpp Dual-link LVDS: 2048x1536 60Hz 24bpp DisplayPort 1.2: 2560x2048 60Hz 30bpp DisplayPort 1.1a: 2560x1600 60Hz 24bpp HDMI™ 1.4: 1920x1080p 60Hz 30bpp DVO: 220MHz pixel clk	Q3-11
AMD Radeon™ E6460 MXM		MXM 3.0 Type A Module 70x82mm	TBD							DirectX® 11 Shader Model 5.0 OpenGL 4.1 AMD HD3D Stereo 3D for gaming 3DMark™ Vantage (P) 2195		ATI Eyefinity multi-display technology Subject to limitations on MXM 3.0 connector Up to 2 display outputs from: 1x VGA, 4x Single / 1x Dual-Link DVI 1x Single / Dual-Link LVDS 1x HDMI™ 1.4a 2x DisplayPort 1.1a 3x DisplayPort 1.2 Up to 2 display outputs from: 2x DisplayPort 1.1a 3x DisplayPort 1.2		Q4-11
AMD Radeon™ E6460 PCIe® Add-in Board		PCIe® Add-in Board TBDx TBDcm	TBD									AMD Eyefinity multi-display technology Two board variations with: (1) 1x single-link DVI 1x dual-link DVI-I 1x DisplayPort 1.2 (2) 4x DisplayPort 1.2		Q4-11

Model	Process	Package	TDP	# Shaders	Interface	Memory	Engine/Memory Clock (MHz)	OS	Compute[2]	Graphics[3]	Video[3]	Display Outputs[4,6]	Display Resolutions[1]	Product Release
AMD Radeon™ E6760 dGPU	40nm	GPU + memory 37.5x37.5 mm BGA	35W	480	PCIe® 2.1 (x1, x2, x4, x8, x16)	128-bit wide 1GB GDDR5 51.2GB/s	600 MHz/ 3.2G bps	Windows®7/ Windows® 7 Embedded Linux® (x86 32/64)	AMD Accelerated Parallel Processing (APP) OpenCL™ 1.1 DirectCompute 11 Single Precision FP Performance: 576 GFLOPs	DirectX® 11 Shader Model 5.0 OpenGL 4.1 AMD HD3D Stereo 3D for gaming 3DMark™ Vantage (P) 5870 AMD CrossFireX™ multi-GPU technology	AMD Accelerated Parallel Processing (APP) 3rd Generation Unified Video Decoder (UVD3) SD & HD HQV™ processing Dual HD decode (up to 40 Mbps per stream) AMD HD3D Blu-ray 3D Integrated HD Audio Decoder 7.1 channel surround sound	AMD Eyefinity multi-display technology Up to 2 outputs from: 1x VGA 4x single-link DVI 1x dual-link DVI 1x single / dual-link LVDS 1x HDMI™ 1.4a 1x DVO Up to 4 outputs from: 4x DisplayPort 1.2 2x DisplayPort 1.1a	VGA: 400MHz pixel clk Single-link DVI: 1600x1200 60Hz 24bpp Dual-link DVI: 2048x1536 60Hz 24bpp Single-link LVDS: 1280x1024 60Hz 24bpp Dual-link LVDS: 2048x1536 60Hz 24bpp DisplayPort 1.2: 2560x2048 60Hz 30bpp DisplayPort 1.1a: 2560x1600 60Hz 24bpp HDMI™ 1.4a: 1920x1080p 60Hz 30bpp DVO: 220MHz pixel clk	Q2-11
AMD Radeon™ E6760 MXM		MXM 3.0 Type A Module 70x82 mm	TBD							DirectX® 11 Shader Model 5.0 OpenGL 4.1 AMD HD3D Stereo 3D for gaming 3DMark™ Vantage (P) 5870		AMD Eyefinity multi-display technology Available on MXM 3.0 connector Up to 2 outputs from: 1x VGA 4x single-link DVI 1x dual-link DVI 1x single / dual-link LVDS 1x HDMI™ 1.4a Up to 4 outputs from: 4x DisplayPort 1.2 2x DisplayPort 1.1a		Q3-11
AMD Radeon™ E6760 PCIe® Add-in Board		PCIe® Add-in Board TBDxTBD cm	TBD									AMD Eyefinity multi-display technology Two board variations with: (1) 1x single-link DVI 1x dual-link DVI-I 1x DisplayPort 1.2 (2) 6x DisplayPort 1.2		Q3-11

AMD Embedded Solutions, cont.

AMD Embedded Discrete Graphics

Model	Process	Package	TDP	# Shaders	Interface	Memory	Engine/Memory Clock (MHz)	OS	Compute[2]	Graphics[3]	Video[3]	Display Outputs[4,6]	Display Resolutions[1]	Product Release
ATI Radeon™ HD 5770 Graphics Board		PC Add-in Board 23.5x11.2 cm	108W	800	PCIe® 2.1 (x1, x2, x4, x8, x16)	128-bit wide 1GB GDDR5	850/4.8Gbps	Windows® XP/XPe/7, Windows Vista® Linux® (x86 32)	ATI Stream Technology OpenCL™ 1.1 DirectCompute 11 Single Precision FP Performance: 1.36 TFLOPs	DirectX® 11 Shader Model 5.0 OpenGL 3.2 OpenCL™ 1.0 3DMark™ Vantage (P) 10141	2nd Generation Unified Video Decoder (UVD2) for H.264, VC-1, MPEG4, MPEG2 decode Dual HD 1080p decode HQV Benchmark 2.0 score 175[26]	ATI Eyefinity Avivo™ Display System 1x DisplayPort 1.1a + 2 displays from 2x dual-link DVI & 1x HDMI™ 1.3	VGA: 2048x1536 Dual-link DVI: 2560x1600 DisplayPort 1.1a: 2560x1600 HDMI 1.3: 1920x1200p	Q2-10
AMD Radeon™ HD 6970M MXM	40nm	MXM 3.0 Type B module 105x82 mm	95W	960	PCIe® 2.1 (x1, x2, x4, x8, x16)	256-bit wide 2GB GDDR5 115.2GB/s	680MHz / 3.6Gbps	Windows®7 / Windows® 7 Embedded Linux® (x86 32/64)	AMD Accelerated Parallel Processing (APP) OpenCL™ 1.1 DirectCompute 11 Single Precision FP Performance: 1.3 TFLOPs	DirectX® 11 Shader Model 5.0 OpenGL 4.1 AMD HD3D Stereo 3D for gaming 3DMark™ Vantage (P) 10,059	AMD Accelerated Parallel Processing (APP) 3rd Generation Unified Video Decoder (UVD3) SD & HD HQV™ processing Dual HD decode (up to 40 Mbps per stream) AMD HD3D Blu-ray 3D Integrated HD Audio Decoder, 7.1 channel surround sound	AMD Eyefinity multi-display technology Subject to limitations on MXM 3.0 connector Up to 2 outputs from: 1x VGA 4x single-link DVI 1x dual-link DVI 1x single / dual-link LVDS 1x HDMI™ 1.4a Up to 4 outputs from: 4x DisplayPort 1.2 2x DisplayPort 1.1a	VGA: 400MHz pixel clk Single-link DVI: 1600x1200 60Hz 24bpp Dual-link DVI: 2048x1536 60Hz 24bpp Single-link LVDS: 1280x1024 60Hz 24bpp Dual-link LVDS: 2048x1536 60Hz 24bpp DisplayPort 1.2: 2560x2048 60Hz 30bpp DisplayPort 1.1a: 2560x1600 60Hz 24bpp HDMI™ 1.4a: 1920x1080p 60Hz 30bpp	Q2-11

1. Display resolutions limited by available memory bandwidth. Other resolutions available that do not oversubscribe link bandwidth.
2. AMD APP technology is designed to improve video quality and enhance application performance. Full enablement of some features requires support for OpenCL™ or DirectCompute (including AMD's Universal Video Decoder (UVD)). Not all products have all features and full enablement of some capabilities may require complementary products.
3. AMD HD3D is a technology designed to enable stereoscopic support for 3D graphics and video. Additional hardware (e.g., 3D-enabled panels, 3D-enabled glasses/emitter, Blu-ray 3D drive) and/or software (e.g., Blu-ray 3D discs, 3D middleware, games) are required for the enablement of stereoscopic 3D.
4. AMD Eyefinity technology can support multiple displays limited by display output clock dependencies. Microsoft® Windows® 7, Windows Vista®, or Linux® is required in order to support more than two displays. SLS ("Single Large Surface") functionality requires an identical display resolution on all configured displays.
5. Subject to limitations on display output clocks. Two internal display PLLs + an integrated DisplayPort reference clock can support: (1) any two legacy displays + up to two DisplayPorts, or (2) One legacy display + up to three DisplayPorts, or (3) four DisplayPorts.
6. Subject to limitations on display output clocks. Two internal display PLLs + an integrated DisplayPort reference clock can support: (1) any two legacy displays + up to four DisplayPorts, or (2) One legacy display + up to five DisplayPorts, or (3) six DisplayPorts.

AMD Geode™ Processors

Processor Family	Device Number	Chipset	Package/Operating Case Temp.	Core Freq. (Perform. Rating)	Core Volt	Thermal Design Power	Power Mgmt./Rating	FPU	Memory Support	PCI	Ethernet	IDE	USB	LPC	Audio	UART/IR	Serial/Parallel Interfaces	RTC	Max. GPIOs	Security	Display: Max Res.
AMD Geode™ LX Processors (Integrated North Bridge/Graphics)	LX900@1.5W	AMD CS5536	BGU481 0°C to 80°C	600MHz (900)	1.4V	5.1W	ACPI v2.0	MMX™, 3DNow!™ Technology	DDR-400	v2.2	No	1 Ch., UDMA-100	4 Ports, v2.0	1 LDRQ	AC97 v2.3	2/1	ACCESS.bus w/2 Ports	1	32	28-Bit AES w/Optional In-package EEPROM	CRT: 1920x1440 TFT: 1600x1200 VIP/VOP = 1.1, 2.0
	LX800@0.9W		BGU481 0°C to 85°C and -40°C to 85°C[2]	500MHz (800)	1.25V	3.6W			DDR-400												
	LX700@0.8W		BGU481 0°C to 85°C	433MHz (700)	1.2V	3.1W			DDR-333												
	LX600@0.7W		BGU481 0°C to 85°C	366MHz (600)	1.2V	2.8W			DDR-266												

AMD Geode™ Solutions Based Reference Design Kits

Name	Processor	Companion Device	Form Factor (Inches)	Video Output	OS[1]			I/O Connectors												
					Windows® XP/XPe	Windows CE	Linux®	Audio Out Channels	USB	PCI Slots	LPC Slots or Headers	Super I/O on Board	Ethernet on Board	Power Input	Serial ATA	IDE UDMA	Serial Ports	PS/2 Keyboard/Mouse	Parallel Port	IrDA
LX ETX	AMD Geode™ LX 800@0.9W[2]	AMD CS5536	3.7x4.5	CRT/TFT	•	5.0	•		4				1	SVDC thru ETX conn.						
LX Ultra Value Client	AMD Geode™ LX 800@0.9W[2]	AMD CS5536	5.5x5	CRT	•	•	•	1	4		1		1	12VDC		•				
LX EPIC Single Board Computer	AMD Geode™ LX 800@0.9W or LX 700@0.8W[2]	AMD CS5536	4.5x6.5	CRT/TFT/LVDS	•	5.0	•	2	4	Mini PCI		•	1	Mini-ITX		•	2	•	•	
LX Network Attached Storage Processor	AMD Geode™ LX 800@0.9W or LX 700@0.8W[2]	AMD CS5536	Mini-ITX	CRT for debug only	•		•		3				1	ATX	1	•	2			

1. OS support typically includes BIOS and drivers for audio, display, and bootloader if required.
2. The Geode LX 800@0.9W processor operates at 500MHz and the Geode LX 700@0.8W processor operates at 433MHz. Model numbers reflect performance as described here: http://www.amd.com/connectivitysolutions/geodelxbenchmark

AMD Embedded Solutions, cont.

AMD Embedded Chipsets

Model	Devices	CPU Interface	Package	PCI Express®	PCI	Graphics	AMD CrossFireX™	DVI/ HDMI™	Display Port	LVDS	TV	DVO	SATA 2.x	IDE	Power	Ethernet MAC	USB	Audio	LPC SPI SMBus	Max GPIOs	Display: Max Resol.[1]
AMD M690T	M690T/ SB600	1.0GHz HyperTransport™	465-FCBGA 21x23mm/ 465-FCBGA 21x23mm	1x8, 4x1 Gen 1	v2.3	DirectX® 9.0 WMV9	No	1 @ 1080i[2]	No	24-bit Dual-Channel	Yes	DVI & LVDS Transmitter Support[3]	4, RAID 0, 1, 10 meets 1.0a spec	ATA 133	8W	No	10 v2.0	HD Audio, AC97 v2.3	Yes	73	2048x1536
AMD M690E	M690E/ SB600	1.0GHz HyperTransport™	465-FCBGA 21x23mm/ 465-FCBGA 21x23mm	1x8, 4x1 Gen 1	v2.3	DirectX® 9.0 WMV9	No	2 @ 1080i[4]	No	24-bit Dual-Channel	No	DVI & LVDS Transmitter Support[3]	4, RAID 0, 1, 10 meets 1.0a spec	ATA 133	8W	No	10 v2.0	HD Audio, AC97 v2.3	Yes	73	2048x1536
AMD 780E	780E/ SB710	2.6GHz HyperTransport™ 3.0	528-FCBGA 21x23mm/ 528-FCBGA 21x23mm	2x8 or 1x16, 6x1 Gen 2	v2.3	DirectX® 10.0 OpenGL 2.0, UVD 2.0	Yes	2@ 1080P[4]	Yes	24-bit Dual-Channel	No	No	6, RAID 0, 1, 10 meets 2.5 spec	ATA 133	13W	No	12 v2.0, 2 v1.1	HD Audio, AC97 v2.3	Yes	73	2560x1600
AMD 785E	785E/ SB8xx	2.6GHz HyperTransport™ 3.0	528-FCBGA 21x23mm/ 605-FCBGA 21x23mm	2x8 or 1x16, 6x1 Gen 2, 2x1 Gen 1	v2.3	DirectX® 10.1 OpenGL 2.0, UVD 2.0	Yes	2@ 1080P[4]	Yes	24-bit Dual-Channel	No	No	6, RAID 0, 1, 5[5], 10[5], 6GBPS	No	6.4 - 13W	Yes[5]	14 v2.0, 2 v1.1	HD Audio, AC97 v2.3	Yes	73	2560x1600
AMD SR5690, SR5670, SR5650	SR56x0/ SP5100	HyperTransport™ 3.0 (5.2GT/s) Backward Compatible with HT 1.0	692-FCBGA 29x29mm/ 528-FCBGA 21x21mm	Gen 2 v1.0; SR5690: 42 lanes/ 11 engines SR5670: 30 lanes/ 9 engines SR5650: 22 lanes/ 8 engines	v2.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6, RAID 0, 1, 10 meets 2.5 spec	ATA 133	SR5690: 18W SR5670: 17W SR5650: 13W SP5100: 4W	No	12 v2.0, 2 v1.1	HD Audio, AC97 v2.3	Yes	73	N/A

1. Capable display resolutions are influenced by the operating system driver, processor and memory selection.
2. The PCI Express® x8 interface is multiplexed with a TMDS interface, enabling DVI or HDMI™ 1.2 with HDCP 1.1 support.
3. The sideport memory interface of the M690T and M690E can be configured as a DVO to attach to an additional DVI, LVDS, or CRT transmitter.
4. The LVDS interface of the M690E and 780E is multiplexed with a TMDS interface, enabling DVI or HDMI™ 1.2 (for the M690E) or HDMI™ 1.3b (for the 780E) with HDCP 1.1 support. This enables support for native dual DVI; however, only one HDMI™ interface may be enabled at a time.
5. Available on the SB850.

AMD64 Reference Design Kits

| Name	Processor Support	Chipset	Form Factor	Topology	OS		I/O Connectors									Electrical/Mechanical		
					Windows®	Linux®	Display	Ethernet	Aux Slots	IDE	SAS/SATA	Audio	USB	Serial	Standard	NEBS	Compliance
FT1 Processor with A55E Controller Hub NAS	AMD Embedded G-Series APU	A55E	170mm x 132mm (custom form factor)	N/A	Windows	•	Headless	1Gb	1x Mini-PCIe	No	6 Internal SATA 6Gb/s	No	2x USB 2.0 External 2x USB 2.0 Heade	No	Custom	N/A	RoHS Compliant
AMD FT1 Processor with A50M Controller Hub xSTB	AMD Embedded G-Series APU	A50M	170mm x 130mm (custom form factor)	N/A	Windows XP/e, Windows 7/e	•	HDMI™	1Gb	2x Mini-PCIe, 1x Half Mini-PCIe	No	2 Internal SATA 3Gb/s	2 RCA L/R 1 RCA S/PDIF 1 Optical TOS-Link	2x USB 2.0 External 6x USB 2.0 Header	No	Custom	N/A	RoHS Compliant
AMD ASB1 Processor with 780E/SB710 Chipset xSTB	AMD Turion™ II Neo and AMD Athlon™ II Neo Processors	SR5650, SP5100 and RS780E/ SB710	4" (Width: 102mm) x 5.83" (Length: 148mm)	N/A	Windows XP/e, Windows 7/e	•	HDMI™, VGA	1Gb	1x Mini-PCIe, 1 MXM 3.0b	No	3 Internal SATA 3Gb/s	1 Mini RCA L/R 1 RCA S/PDIF	2x USB 2.0 External 6x USB 2.0 Header	No	Custom	N/A	RoHS Compliant
AMD ASB2 with SR5650/ SP5100 Chipset SOHO/ SMB RDK	AMD Turion™ II Neo and AMD Athlon™ II Neo Processors	SR5650, SP5100	4" (Width: 102mm) x 5.83" (Length: 148mm)	N/A	Windows® Server 2008 R2	•	Headless	1Gb	Sage IDE Debug Header	No	4 Internal SATA 3Gb/s; 1 External SATA 2.x 3Gbps	No	4	•	Custom	N/A	RoHS Compliant
High Performance Embedded Graphics RDK	AMD Athlon™ II XL/XLT Processors AMD Phenom™ II XLT Processors	780E, SB710, and ATI Radeon™ E4690 GPU	203mm x 122mm custom form factor	N/A	•	•	4 HDMI™ connectors, Supports CES-861B video modes, including 4800, 720p, 1980i and 1080p	1Gb	None	No	2 Internal SATA 2.x, 3Gbps; 1 External eSATA 3Gb/s	2 channel HD audio: 1 analog line in, 1 analog line out	2	2	Custom	N/A	RoHS Compliant
Second-Generation AMD Opteron™ Processor-based AdvancedTCA® Blade	AMD Opteron™ Model 2210 EE Processor	Broadcom HT-2100, HT-1000	ATCA® Blade	Dual Star Backplane or 5 slot Full Mesh	•	•	•	Dual 1G to Fabric, Dual 1G to Base	AMC® x2 Half Height	No	•	•	2	1	Core Specification PICMG 3.0	NEBS Level-3 and ETSI Installations	RoHS Compliant
AMD Socket S1 Processor COM Express	AMD Turion™ 64 X2, Mobile AMD Sempron™ Processors	M690T/E with ATI Radeon™ X1250 Graphics	COM Express Type 2	N/A	•	•	DVI, LVDS, Analog VGA, TV	1Gb	3x1 PCIe®, 1x8 PCIe, PCI	2Ch	•	HD	8	•	COM.0	N/A	RoHS Compliant
AMD Sempron™ 210U/200U Processor Mini-DTX	ABS1 BGA Processors	M690E with ATI Radeon™ X1250 Graphics	Mini-DTX	N/A	•	•	DVI VGA	1Gb	2x1 PCIe	•	•	HD	6	•	Mini-DTX	N/A	RoHS Compliant

AMD Embedded Solutions, cont.

AMD64 Development Boards

Name	Processor (* Denotes Processor shipped in Kit)	Chipset	Form Factor	Display Output	Windows 7 / Windows Embedded Standard 7	Windows Embedded Standard 2009	Windows XP/XPe	Windows CE 5.0	Windows CE 6.0	Linux®	Audio Out Channels	USB	PCI Express® Slots	PCI Express Mini Card	PCI Slots	Mini-PCI	LPC Slots or Headers	Super I/O on Board	Ethernet on Board	Power	Serial/ATA	IDE UDMA	Serial Ports	PS/2 Keyboard/Mouse	Parallel Port	IrDA	DVI/HDMI Adapter Board	CD-ROM/Std. Documentation
AMD DB-FS1r2	AMD R-Series APU R-464L * R-460H R-272F R-268D	A75	microATX	- 2x Dual-mode Display Port (DP++) - 1x VGA	•	•	•	•	•	•	2	- 2x USB 3.0 - 4x USB 2.0 connector - 2x USB 2.0 header (4 ports)	- 1x X16 (PCIe Gen2) - 1x X1 (PCI Gen2)	2	2	•	1		1x RJ45 1GbE	24-pin ATX + 4-pin ATX 12V	- 1x eSATA - 5x SATA (6Gb/s)	•	•			IR receiver	•	•
AMD DB-FT1	G-Series T56N (DBFT1-00-E1-EVAL-KT) G-Series T40N (DBFT1-01-E1-EVAL-KT) G-Series T40E (DBFT1-02-EVAL-KT)	A55E	Mini-ITX	VGA, single-link DVI-D support, LVDS	•	•	•	•	•	•	2	8x USB 2.0	1 x1 (requires riser card)	•	1	•	•	1	1x RJ45 1GbE	ATX	4x, (3Gbp/s)	•	4	•	•		•	•
S1 DBM690T/E	Mobile AMD Sempron™ 3500+* and 2100+, AMD Turion™ 64 X2 TL-52, AMD Sempron™ 2100+	AMD M690T or M690E, SB600	ATX	CRT, DVI/HDMI, LVDS	•	•	•	•	•	•	7.1	9x USB 2.0	1x16² 1x1	1x	3	1	1	1	1x RJ45 1GbE	ATX	4x, (3Gbp/s)	•	1	1	1		•	•
AM2+ DB780E	AMD Athlon™ X2 4200+ and 3400e, AMD Athlon™ 3100+ and 2000+, AMD Athlon™ II XLT, AMD Phenom™ II XLT	AMD 780E, SB710	ATX	CRT, DVI	•	•	•	•	•	•	7.1	12x USB 2.0	2x X16 (x16 connector with a x8 electrical interface) 1x X4	•	1	•	•	1	1x RJ45 1GbE	ATX	1x eSATA 5x SATA (3Gb/s)	•	2	•	•	•	•	•

1. OS support typically includes BIOS and drivers for audio, display, and bootloader if required.
2. The S1 DBM690T/E has one x16 PCI Express® slot that is supported by a 1x8 PCI Express interface.
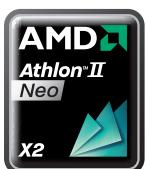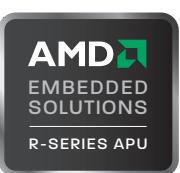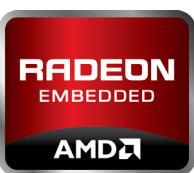
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