

# AMD Embedded Solutions Product Selection Guide

## A rich mix of high-performance, low power processors to meet the fast time-to-market demands of today's embedded systems

Along with a range of varied processors, AMD supports the x86 embedded marketplace with design tools, support, and partnerships that offer simplicity and flexibility to create high-performance, feature-rich, and customer-driven products.

AMD is an innovation leader in x86 processor design. AMD's embedded products offer designers processor-level features and a balanced foundation for overall system performance, with the quick time to market offered by commercial off-the-shelf components. Customers using AMD processor-based systems can experience remarkable application performance with scalability, ease of management, and low total cost of ownership. AMD processor-based products are category leaders from enterprise-class servers and cutting-edge consumer systems to traditional embedded markets.

This brochure presents the full array of AMD's embedded processor solutions that deliver maximum performance with low overall system power consumption and are supported by longer than standard availability, 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 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:

- Industry-leading performance per watt
- Highest available I/O throughput with HyperTransport™ technology
- Integrated memory controller offers low latency and reduced chip count, improving reliability
- Native dual-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 features and other technical features, embedded designers can count on long-term component availability, comprehensive design support, and AMD's commitment to continue offering new, customer-oriented products. Get to market faster, with more effective products.

### 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. Ranging from high-performance single- and dual-core AMD Opteron™ and AMD Athlon™ 64 processors with Direct Connect Architecture for enterprise-class storage and networking equipment to highly versatile and efficient Mobile AMD Sempron™ processors and AMD Turion™ 64 mobile technology for unique high-performance, smaller form factor applications, the AMD64 family provides high performance, maximum versatility, and minimum design challenge.

### AMD Geode™ Processors: Optimized for Low-Power, High-Performance Applications

The complete family of AMD Geode™ processors is configured to give 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 printers and personal media players, AMD Geode processors can deliver the highest performance per watt in the industry. 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.

### Tools and Support for Developers

AMD offers:

- A full range of Reference Design Kit (RDK) products that enable designers to go from concept to finished product quickly
- A broad array of Development Boards for creating efficient x86 system designs
- Industry partnerships with leading software and hardware specialists, fostering maximum choice for your unique design

### Get Better Systems to Market Faster With AMD Embedded Solutions

Ready to create high-performance, low-power embedded designs that give your innovative new products an edge in the marketplace? Take a close look and experience the AMD advantage.

For more information,  
please visit [www.amd.com/embedded](http://www.amd.com/embedded)

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please visit [www.amd.com/embedded](http://www.amd.com/embedded)

#### About AMD

AMD (NYSE:AMD) designs and produces innovative microprocessors and low-power processor solutions for the computer, communications, and consumer electronics industries. AMD is dedicated to delivering standards-based, customer-focused solutions for technology users, ranging from enterprises and governments to individual consumers.

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#### Literature Ordering

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### AMD Embedded Processors

Model	AMD64	Multi-CPU Scalability	Core Frequency	L2 Cache/Core	Thermal Design Power	Memory Controller	Memory Interface	HyperTransport™ Technology	AMD Digital Media Xpress™ Technology	AMD PowerNow!™ Technology	AMD Virtualization™ Technology	EVP (Note 1)	Tcase	Socket	Package
<b>AMD Opteron™ Processors</b>															
852	Yes	up to 8	2.6GHz	1MB	93W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	Var.	940	Lidded 940-pin oµPGA
848 HE	Yes	up to 8	2.2GHz	1MB	55W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	78° C	940	Lidded 940-pin oµPGA
252	Yes	up to 2	2.6GHz	1MB	93W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	Var.	940	Lidded 940-pin oµPGA
248 HE	Yes	up to 2	2.2GHz	1MB	55W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	78° C	940	Lidded 940-pin oµPGA
244 EE	Yes	up to 2	1.8GHz	1MB	30W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	71° C	940	Lidded 940-pin oµPGA
240 EE	Yes	up to 2	1.4GHz	1MB	30W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	71° C	940	Lidded 940-pin oµPGA
152	Yes	1	2.6GHz	1MB	93W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	Var.	940	Lidded 940-pin oµPGA
148 HE	Yes	1	2.2GHz	1MB	55W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	78° C	940	Lidded 940-pin oµPGA
144 EE	Yes	1	1.8GHz	1MB	30W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	71° C	940	Lidded 940-pin oµPGA
<b>AMD Opteron Dual-Core Processors</b>															
8214 HE	Yes	up to 8	2.2GHz	1MB x2	68W	Yes, 128-bit + ECC	Dual 64/72 DDR2-667 Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	Yes	Yes	83° C	F(1207)	Lidded 1207 pad LGA
8210 HE	Yes	up to 8	1.8GHz	1MB x2	45W	Yes, 128-bit + ECC	Dual 64/72 DDR2-667 Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	Yes	Yes	80° C	F(1207)	Lidded 1207 pad LGA
865 HE	Yes	up to 8	1.8GHz	1MB x2	55W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	83° C	940	Lidded 940-pin oµPGA
865	Yes	up to 8	1.8GHz	1MB x2	95W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	Var.	940	Lidded 940-pin oµPGA
2214 HE	Yes	up to 2	2.2GHz	1MB x2	68W	Yes, 128-bit + ECC	Dual 64/72 DDR2-667 Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	Yes	Yes	83° C	F(1207)	Lidded 1207 pad LGA
2210 EE	Yes	up to 2	1.8GHz	1MB x2	45W	Yes, 128-bit + ECC	Dual 64/72 DDR2-667 Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	Yes	Yes	80° C	F(1207)	Lidded 1207 pad LGA
265 HE	Yes	up to 2	1.8GHz	1MB x2	55W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	83° C	940	Lidded 940-pin oµPGA
265	Yes	up to 2	1.8GHz	1MB x2	95W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	Var.	940	Lidded 940-pin oµPGA
1214 HE	Yes	1	2.2GHz	1MB x2	68W	Yes, 128-bit + ECC	Dual 64/72 DDR2-667 Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	Yes	Yes	83° C	F(1207)	Lidded 1207 pad LGA
1210 EE	Yes	1	1.8 GHz	1MB x2	45W	Yes, 128-bit + ECC	Dual 64/72 DDR2-667 Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	Yes	Yes	80° C	F(1207)	Lidded 1207 pad LGA
165 HE	Yes	1	1.8GHz	1MB x2	55W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	83° C	940	Lidded 940-pin oµPGA
165	Yes	1	1.8GHz	1MB x2	95W	Yes, 128-bit + ECC	Dual 64/72 DDR Registered DIMMs, ECC & Chip Kill	Three 16-lane@1GHz Full Duplex	No	Yes	No	Yes	Var.	940	Lidded 940-pin oµPGA
<b>Mobile AMD Sempron™ Processors</b>															
3500+	Yes	1	1.8GHz	512KB	25W	Yes, 128-bit	Dual 64 NON ECC DDR2-667, Unbuffered	One 16-lane@800MHz Full Duplex	Yes	Yes	No	Yes	Tj =95° C	S1	Lidless 638-pin S1 oµPGA
3300+	No	1	2.0GHz	128KB	25W	Yes, 64-bit + ECC	Single 64/72 ECC DDR, Unbuffered	One 16-lane@800MHz Full Duplex	Yes	Yes	No	Yes	Tj =95° C	754	Lidded 754-pin oµPGA
3000+	No	1	1.8GHz	128KB	25W	Yes, 64-bit + ECC	Single 64/72 ECC DDR, Unbuffered	One 16-lane@800MHz Full Duplex	Yes	Yes	No	Yes	Tj =95° C	754	Lidded 754-pin oµPGA
<b>AMD Turion™ 64 Mobile Technology</b>															
MT-37	Yes	1	2.0GHz	1MB	25W	Yes, 64-bit + ECC	Single 64 ECC DDR, Unbuffered	One 16-lane@800MHz Full Duplex	Yes	Yes	No	Yes	Tj =95° C	754	Lidless 754-pin oµPGA
<b>AMD Turion™ 64 X2 Dual-Core Mobile Technology</b>															
TL-52	Yes	1	1.6GHz	512KB x2	31W	Yes, 128-bit	Dual 64 NON ECC DDR2-667, Unbuffered	One 16-lane@800MHz Full Duplex	Yes	Yes	Yes	Yes	Tj =95° C	S1	Lidless 638-pin S1 oµPGA
<b>AMD Athlon™ 64 Processors</b>															
3000+	Yes	1	1.8GHz	512KB	35W	Yes, 128-bit + ECC	Dual 64 ECC DDR2-667, Unbuffered	One 16-lane@1000MHz Full Duplex	Yes	Yes	Yes	Yes	Var.	AM2	Lidded 940-pin AM2 oµPGA
<b>AMD Athlon™ 64 X2 Dual-Core Processors</b>															
3400+	Yes	1	1.8GHz	512KB x2	35W	Yes, 128-bit + ECC	Dual 64 ECC DDR2-800, Unbuffered	One 16-lane@1000MHz Full Duplex	Yes	Yes	Yes	Yes	Var.	AM2	Lidded 940-pin AM2 oµPGA

Note 1. Enhanced Virus Protection: Enhanced Virus Protection (EVP) is only enabled by certain operating systems including the current versions of Microsoft® Windows®, Solaris, and BSD Unix. After properly installing the appropriate operating system, users must enable the protection of their applications and associated files from buffer overrun attacks. Contact your application software vendor for information regarding use of the application in conjunction with EVP. AMD strongly recommends that users continue to use third party anti-virus software as part of their security strategy.

## AMD Embedded Processors Continued

Processor Family	Device Number	Companion Device(s)	Package/Operating Case Temperature	Core Freq. (Perform. Rating)	Core Volt	Thermal Design Power	Power Management/ Rating	FPU	Memory Support	PCI	Ethernet	IDE	USB	LPC	Audio	UART/IR	Serial/ Parallel Interfaces	RTC	Max GPIOs	Security	Video: Max Resolution
AMD Geode™ NX Processors*	Geode NX 1750@14W (Mobile AMD Athlon™ Processor Technology) (Note 1)	SIS 741CX/963L or 964	OPGA - Socket A 0°C to 95°C	1.4GHz (1750)	1.05V to 1.25V	25W	ACPI v1.0b/v2.0, AMD PowerNow!™ technology	MMX™, 3DNow!™ technology	DDR333	v2.2/v2.3	1 10/100 MAC Controller	2 Ch., UDMA-133, 2 S-ATA (964)	6/8 Ports, v2.0/1.1	2 LDRQs	AC97 v2.2/v2.3	No	No	1	25	No	CRT: 2048x1536 TFT: 1600x1200
	Geode NX 1500@6W (Mobile AMD Athlon Processor Technology) (Note 1)	SIS 741CX/963L or 964	OPGA - Socket A 0°C to 95°C	1.0GHz (1500)	1.0V	9W	ACPI v1.0b/v2.0, AMD PowerNow!™ technology	MMX, 3DNow! technology	DDR333	v2.2/v2.3	1 10/100 MAC Controller	2 Ch., UDMA-133, 2 S-ATA (964)	6/8 Ports, v2.0/1.1	2 LDRQs	AC97 v2.2/v2.3	No	No	1	25	No	
	Geode NX 1250@6W (Mobile AMD Athlon Processor Technology) (Note 1)	SIS 741CX/963L or 964	OPGA - Socket A 0°C to 95°C	667MHz (1250)	1.1V	9W	ACPI v1.0b/v2.0, AMD PowerNow!™ technology	MMX, 3DNow! technology	DDR333	v2.2/v2.3	1 10/100 MAC Controller	2 Ch., UDMA-133, 2 S-ATA (964)	6/8 Ports, v2.0/1.1	2 LDRQs	AC97 v2.2/v2.3	No	No	1	25	No	
AMD Geode™ LX Processors	Geode LX 900@1.5W (Integrated North Bridge/Graphics) (Note 2)	AMD CS5536	BGU481 0°C to 80°C	900MHz	1.4V	5.1W	ACPI v2.0	MMX, 3DNow! technology	DDR400	v2.2	No	1 Ch., UDMA-100	4 Ports, v2.0	Yes	AC97 v2.3	2/1	ACCESS.bus w/2 Ports	1	32	128-Bit AES w/ Optional In-package EEPROM	CRT: 1920x1440 TFT: 1600x1200 VIP/VOP = 1.1, 2.0
		AMD CS5535																			
	Geode LX 800@0.9W (Integrated North Bridge/Graphics) (Note 2)	AMD CS5536	BGU481 0°C to 85°C	800MHz	1.2V or 1.25V	3.9W	ACPI v2.0	MMX, 3DNow! technology	DDR400	v2.2	No	1 Ch., UDMA-100	4 Ports, v2.0	Yes	AC97 v2.3	2/1	ACCESS.bus w/2 Ports	1	32	128-Bit AES w/ Optional In-package EEPROM	
AMD CS5535																					
Geode LX 700@0.8W (Integrated North Bridge/Graphics) (Note 2)	AMD CS5536	BGU481 0°C to 85°C	700MHz	1.2V	3.1W	ACPI v2.0	MMX, 3DNow! technology	DDR333	v2.2	No	1 Ch., UDMA-100	4 Ports, v2.0	Yes	AC97 v2.3	2/1	ACCESS.bus w/2 Ports	1	32	128-Bit AES w/ Optional In-package EEPROM		
	AMD CS5535																				
AMD Geode™ GX Processors	Geode GX 533@1.1W (Integrated North Bridge/Graphics) (Note 3)	AMD CS5536	BGD368 0°C to 85°C	400MHz (533)	1.5V	3.5W	ACPI v2.0	MMX, 3DNow! technology	DDR266	v2.2	No	1 Ch., UDMA-100	4 Ports, v2.0	1 LDRQ	AC97 v2.1	2/1	ACCESS.bus w/2 Ports	1	32	No	CRT: 1600x1200 TFT: 1280x1024
		AMD CS5535	BGU396 0°C to 85°C									1 Ch., UDMA-66	4 Ports, v1.1								
	Geode GX 500@1.0W (Integrated North Bridge/Graphics) (Note 3)	AMD CS5536	BGD368 0°C to 85°C	366MHz (500)	1.5V	3.5W	ACPI v2.0	MMX, 3DNow! technology	DDR244	v2.2	No	1 Ch., UDMA-100	4 Ports, v2.0								
		AMD CS5535	BGU396 0°C to 85°C									1 Ch., UDMA-66	4 Ports, v1.1								
	Geode GX 466@0.9W (Integrated North Bridge/Graphics) (Note 3)	AMD CS5536	BGD368 0°C to 85°C	333MHz (466)	1.5V	3.5W	ACPI v2.0	MMX, 3DNow! technology	DDR222	v2.2	No	1 Ch., UDMA-100	4 Ports, v2.0								
		AMD CS5535	BGU396 0°C to 85°C									1 Ch., UDMA-66	4 Ports, v1.1								
AMD Geode™ SC Processors*	Geode SC1200 (System On Chip)	N/A	BGU481 0°C to 85°C	266MHz	1.8V	3.3W	ACPI v1.0	MMX	SDR100	v2.1	No	2 Ch., UDMA-33	3 Ports, v1.0	1 LDRQ	AC97 v2.0	3/1	ACCESS.bus w/2 Ports, 1 Parallel Port	1	27	No	CRT, TFT: 1280x1024 TV: NTSC/PAL
	Geode SC2200 (System On Chip)	N/A	BGU481 0°C to 85°C	300MHz	2.1V	4.1W	ACPI v1.0	MMX	SDR100	v2.1	No	2 Ch., UDMA-33	3 Ports, v1.0	1 LDRQ	AC97 v2.0	3/1	ACCESS.bus w/2 Ports, 1 Parallel Port	1	27	No	TFT: 1280x1024
				266MHz	1.8V	3.1W															
				233MHz	1.8V	2.9W															
	Geode SC3200 (System On Chip)	N/A	BGU481 0°C to 85°C	266MHz	1.8V	3.0W	ACPI v1.0	MMX	SDR100	v2.1	No	2 Ch., UDMA-33	3 Ports, v1.0	1 LDRQ	AC97 v2.0	3/1	ACCESS.bus w/2 Ports	1	27	No	TFT: 1280x1024
				233MHz	1.8V	2.8W															

Note 1. The Geode NX 1750@14W processor operates at 1.4GHz, the Geode NX 1500@6W processor operates at 1.0GHz, and the Geode NX 1250@6W processor operates at 667MHz. Model numbers reflect performance as described here: <http://www.amd.com/connectivitysolutions/geodenxbenchmark>

Note 2. The Geode LX 900@1.5W processor operates at 600MHz, 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>

Note 3. The Geode GX 533@1.1W processor operates at 400MHz, the Geode GX 500@1.0W processor operates at 366MHz, and the Geode GX 466@0.9W processor operates at 333MHz. Model numbers reflect performance as described here: <http://www.amd.com/connectivitysolutions/geodegxbenchmark>

\*Not recommended for new design

For system and board level products utilizing AMD processors, please visit [www.amd.com/embedded](http://www.amd.com/embedded)

