AMD EMBEDDED G-SERIES PLATFORM

The world's first combination of low-power CPU and advanced GPU integrated into a single embedded device.

PRODUCT OVERVIEW

The AMD Embedded G-Series processor is the world's first integrated circuit to combine a low-power CPU and a discrete-level GPU into a single embedded Accelerated Processing Unit (APU). This unprecedented level of graphics integration builds a new foundation for high performance multi-media content delivery in a small form factor and power efficient platform for a broad range of embedded designs. Based on a brand new power-optimized core, the AMD Embedded G-Series platform delivers new levels of performance in a compact BGA package that is ideal for low power designs in embedded applications such as Digital Signage, x86 Set-Top-Box (xSTB), IP-TV, Thin Client, Information Kiosk, Point-of-Sale, Casino Gaming, media servers, and industrial control systems.

LOW POWER, EXCEPTIONAL PERFORMANCE

The AMD G-Series platform is a flexible solution that in the same package offers scalable choices for the level of CPU performance, power efficiency, and visual experience. APU configurations are available with single or dual x86 cores, at 5.5W, 9W or 18W thermal design power (TDP), and two levels of graphics and video performance. Each APU supports single or dual-independent high resolution displays and exceptional multi-media capability with hardware decode support for H.264, VC-1, MPEG2, WMV, DivX and Adobe Flash. When paired with the A50M I/O controller hub with support for advanced interfaces such as 6Gb/s SATA, Generation 2 PCI Express®, and HD Audio, the AMD G-Series platform delivers a low power, value oriented solution for applications requiring a better balance of CPU and multimedia performance. For high-end, full-featured platforms, the A55E I/O controller hub is an alternative paring choice with added features of Gigabit Ethernet MAC, RAID (0/1/5/10) support with FIS-based switching, and PCI Local bus support.

HEADLESS EMBEDDED SYSTEMS

For deeply embedded headless systems, the AMD Embedded G-Series CPU models T48L and T30L enable whisper-quiet media servers and model T24L enables fanless design for factory control system.

FEATURES AND BENEFITS

A flexible platform that in one package offers many choices for power efficiency, visual experience with high resolution, and fully connected Internet experience with maximum multi-media capability. Delivering unprecedented high definition visual experience while still maintaining a low power design.

> DirectX® 11 support lets you enjoy awesome graphics performance, stunning 3D visual effects and dynamic interactivity

> Advanced discrete-level GPU with OpenGL 4.0 and OpenCL™ 1.1 support in an integrated device provides support to build the designs of tomorrow, today

> Unprecedented graphics performance/watt thru advanced graphics and hardware acceleration delivering over 3X performance per watt of previous generation[1].

> Selective models, T56N and T40N, have additional boost capability enabled by AMD Turbo Core technology without additional power draw.

Enabling Innovative Small Form Factor Designs - Smaller foot print and low power solution reduces overall system costs.

> The integration of the APU reduces the foot print of a traditional three-chip platform to two chips, the APU and its companion controller hub. This simplifies the design, requiring fewer board layers and a smaller power supply, further driving down system costs.

Reduced Costs over the Product Life Cycle - A single, scalable platform design that allows OEMs to reduce development costs, optimize solutions and increase product stability.

> A single APU architecture with an array of performance options, AMD Embedded G-Series platform lets OEMs utilize a single board design to enable solutions that span from entry-level to high-end. The commonality of the scalable platform design across multiple product variants can help reduce development costs, simplify the supply chain and reduce operational complexity.

> AMD's embedded lifecycle, with planned availability of at least 5 years, helps to ensure a long life for an OEM design.

Note 1: When comparing the AMD G-Series T44R Platform to the AMD Sempron™ 210U/780E platform running 3DMark06.

AMD

Key Architecture Benefits

APU FEATURES
- High speed device interconnect
- High performance integrated x86 core(s)
- Integrated cutting edge graphics processor
- High-bandwidth, low-latency integrated memory controller
- Low-latency platform interface

x86 CORE ARCHITECTURE
- Single or Dual x86 Processor
- Advanced Branch Predictor
- Out-of-Order Instruction Execution
  - Full OOO Instruction Execution
  - Full OOO Load/Store Engine
- High Performance Floating Point
- AMD64 64-bit ISA
- SSE1,2,3, SSSE3 ISA, SSE4A, MMX
- Secure Advanced Virtualization

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 4.0 support
- Motion Video Acceleration
  - Dedicated hardware (UVD 3) for H.264, VC-1 and MPEG2 decode
  - HD HQV and SD HQV support: noise removal, detail enchantment, color enhancement, cadence detection, sharpness, and advanced de-interlacing
  - Super up-conversion for SD to HD resolutions

INTEGRATED DDR3 MEMORY CONTROLLER
- Support for solder-down, SODIMM and DIMM memory, two slots, non-ECC type
- 64-bit DDR3 SDRAM controller operating at frequencies up to 1333 MT/s (667 MHz)

LARGE HIGH-PERFORMANCE ON-CHIP CACHE
- 32KB I-Cache, 32KB D-Cache
- 512KB L2 per Core

INTEGRATED DISPLAY INTERFACES
- Dual independent display support
- Dual-link or dual single-link DVI
- HDMI™
- Dual DisplayPort
- LVDS
- Analog VGA

**AMD VIRTUALIZATION™ TECHNOLOGY (AMD-V™)**
- SVM lock and unlock
- Nested paging
- Next RIP
- LBR virtualization
- 8 address space identifiers
- Performance counter guest/host bit
- Nested page table fault info

I/O
- 4x1 or 1x4 PCI Express interface on APU
- See controller hub table for detail I/O features of A50M and A55E

PACKAGE
- APU
  - 413-pin lidless micro BGA
  - 19mm x 19mm
- Controller Hub
  - 605-pin lidless FCBGA
  - 23mm x 23mm
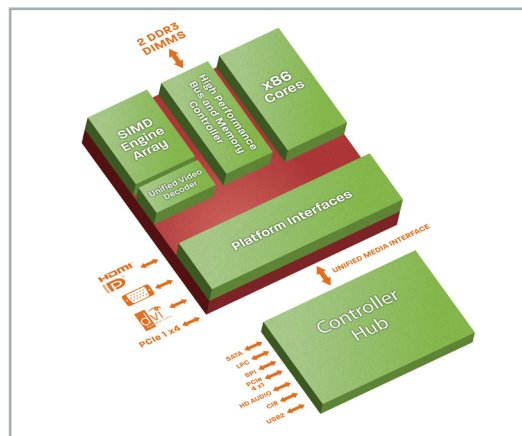
AMD Embedded G-Series APU Models and Key Features

Model	Graphics	Clock Speed	Cores	Cache	DDR3 Speed	Max TDP
T56N[3]	AMD Radeon™ HD 6320	1.65GHz	2	L1: 64KB L2: 512KB x2	DDR3-1333	18W
T52R	AMD Radeon™ HD 6310	1.5GHz	1	L1: 64KB L2: 512KB	DDR3-1333	18W
T48N	AMD Radeon™ HD 6310	1.4GHz	2	L1: 64KB L2: 512KB x2	DDR3-1066	18W
T40N[3]	AMD Radeon™ HD 6290	1.0GHz	2	L1: 64KB L2: 512KB x2	LVDDR3-1066[2]	9W
T44R	AMD Radeon™ HD 6250	1.2GHz	1	L1: 64KB L2: 512KB	LVDDR3-1066[2]	9W
T40E	AMD Radeon™ HD 6250	1.0GHz	2	L1: 64KB L2: 512KB x2	LVDDR3-1066[2]	6.4W
T40R	AMD Radeon™ HD 6250	1.0GHz	1	L1: 64KB L2: 512KB	LVDDR3-1066[2]	5.5W
T48L	N/A	1.4GHz	2	L1: 64KB L2: 512KB x2	DDR3-1066	18W
T30L	N/A	1.4GHz	1	L1: 64KB L2: 512KB	DDR3-1066	18W
T24L	N/A	1.0GHz	1	L1: 64KB L2: 512KB	LVDDR3-1066[2]	5W

AMD Embedded G-Series Platform Controller Hubs

Model	PCI Express	PCI	Gigabit Ethernet MAC	RAID	SATA	USB	Additional Interfaces/Features
A55E	4x1 or 1x 4 PCIe Generation 2 UMI connection to APU	33MHz with support for 4 masters	Yes	0/1/5/10 support with FIS-based switching	6x 6Gbps ports	14x v2.0 Ports	SPI, LPC, SMBus, CIR, HD Audio, up to 102 GPIO, Fan control, Integrated Clock Generation, pin compatible for A50M and A55E
A50M	4x1 or 1x 4	No	No	No			

www.amd.com/embedded