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, and Casino Gaming.

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 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.

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 multimedia 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™ 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 generation¹.

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: ATI Avivo HD is a technology platform that includes a broad set of capabilities offered by certain AMD Radeon graphics processors. Full enablement of some ATI Avivo HD capabilities may require complementary products.
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
- 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 3.2 and 2.1 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 1066 MT/s (533MHz)

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 RfP
- LBR virtualization
- 8 address space identifiers
- Performance counter guest/host bit
- Nested page table fault info

I/O
- 4x1, or 1x4 PCI Express (On APU)
- 4x1, or 1x4, PCI Express (On Controller Hub)
- 6X SATA 6Gbps
- 14X USB 2.0
- SPI, LPC and SMBus Interfaces
- CIR
- HD Audio
- Integrated clock generation
- Fan Control
- Up to 102 GPI/O
- Pin compatible options for A50M and A55E I/O Controller Hubs
- Additional I/O on A55E
  - Gigabit Ethernet MAC
  - RAID (0/1/5/10) support with FIS-based switching
  - PCle® Generation 2 UMI connection to APU
  - 33MHz PCI Interface with support for 4 Masters

PACKAGE
- APU
  - 413-pin lidless micro BGA
  - 19mm x 19mm
- Controller Hub
  - 605-pin lidless FCBGA
  - 23mm x 23mm

Model | Clock Speed | Cores | Cache | Graphics | DDR3 Speed | Max TDP |
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T56N | 1.6GHz | 2 | L1: 64KB L2: 512KB x2 | AMD Radeon™ HD 6310 | DDR3-1066 | 18W |
T48N | 1.4GHz | 2 | L1: 64KB L2: 512KB x2 | AMD Radeon™ HD 6310 | DDR3-1066 | 18W |
T40N | 1.0GHz | 2 | L1: 64KB L2: 512KB x2 | AMD Radeon™ HD 6250 | LVDDR3-1066 | 9W |
T52R | 1.5GHz | 1 | L1: 64KB L2: 512KB x1 | AMD Radeon™ HD 6310 | DDR3-1066 | 18W |
T44R | 1.2GHz | 1 | L1: 64KB L2: 512KB x1 | AMD Radeon™ HD 6250 | LVDDR3-1066 | 9W |


2: Low voltage (1.35V) DDR3 is assumed for the 9W TDP processors. The use of 1.5V DDR3 will incur a power adder. Always refer to the processor/chipset data sheets for technical specifications. Feature information in this document is provided for reference only.

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