Thin Client Market: Small Footprint, Low-Power Solutions
Advanced Power Management Improves Performance
Scalable, Enterprise-Class Storage and Networking
AMD Innovation Continues

Introducing the 2nd Generation AMD Embedded R-Series APU

The 2nd generation AMD Embedded R-Series APU (previously codenamed “Bald Eagle”) delivers breakthrough graphics performance and power efficiency for a new generation of embedded systems designed to provide ultra-immersive HD multimedia experiences and parallel processing compute performance. The AMD R-Series APU offers next-generation performance-per-watt compute efficiency in the x86 product category by allowing system designers to take advantage of Heterogeneous System Architecture (HSA).

AMD’s 2nd generation AMD Embedded R-Series APU is a revolutionary leap in processing performance, power efficiency and multimedia immersion for embedded gaming, medical imaging and digital signage applications.
In September 2013, AMD publically unveiled our embedded product roadmap for 2014, previewing a host of exciting new processors that promised to push performance, power and price boundaries and introduce new features that would give embedded system designers more options than ever before to meet their unique design requirements.

It was an ambitious roadmap that put AMD’s competitors on notice of our aggressive pace of innovation in the embedded processor market. This was reflected in the codenames that we assigned to these new processors, each of which was named after a type of eagle – nature’s most formidable birds of prey, capable of extraordinary speed and agility.

Today, we’re proud to tell you that AMD’s eagles have landed.

In May at the G2E event in Macao, we introduced our “Bald Eagle” platform – the second generation of our AMD Embedded R-Series APUs – breaking new performance barriers for compute and graphics intensive applications spanning digital gaming, medical imaging and beyond, and enabling system designers to take full advantage of the Heterogeneous System Architecture (HSA). Based on AMD’s “Steamroller” CPU architecture, these new solutions deliver from 2.2 to 3.6 GHz CPU frequency with max boost, and 533 to 686 MHz GPU frequency thanks to AMD’s latest Graphics Core Next (GCN) architecture.

At Computex in June, we announced “Steppe Eagle” – the newest additions to our AMD Embedded G-Series SoC portfolio – featuring improved performance and power profiles, and enhanced security and dynamic power management capabilities targeted at applications including industrial control and automation (IC&A) and thin clients. The new entries in this portfolio support thermal design profiles (TDP) as low as 5W while delivering up to 53% more overall performance compared to previous G-Series SoC solutions.

Computex also saw the debut of “Crowned Eagle” – AMD Embedded G-Series CPUs – optimized to provide superior single-threaded performance for storage, networking and other x86 IT systems. The new AMD G-Series CPUs deliver 1.2 to 2.0 GHz and a robust feature set including integrated PCI-E Gen 2.0, USB3.0, SATA ports, and single-channel DDR3-1600 memory with error correction code (ECC) support.

All of these new products have a planned availability of 10 years. This unprecedented commitment gives our customers added confidence in the longevity of our embedded product families, enabling customers to “go with AMD, and stay with AMD.”

And that’s not all that the AMD Embedded Solutions Group has been up to so far in 2014.

We’re expanding our workforce and growing our expert team of field application engineers, and we’re increasing our embedded-focused R&D investment across both systems and software. We’re also strengthening our presence in the embedded software ecosystem, working closely with partners like Mentor Graphics and increasing our participation in initiatives like the Yocto Project to drive greater industry collaboration in the open source and Linux domains.

All of these initiatives – from the introduction of our new “Eagle” codenamed processors, to our accelerating growth, innovation and ecosystem engagement – are aimed at helping our customers spread their wings and achieve their most ambitious embedded design goals. Enjoy the flight!

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1. Overall performance was measured using a suite of industry benchmarks consisting of 3DMark06, 3DMark11, POVRay v3.7, Passmark v7, PCMark8 v2.0, and BasemarkCL 1.0. The CX-412HC’s TDP is 7W and CX-210HA’s TDP is 9W. The performance delta of 53% was calculated based on GX-412HC’s geometric mean of 555.3 and GX-210HA’s geometric mean of 363.6. The performance-per-watt delta of 96% was calculated based on GX-412HC’s performance-per-watt ratio of 79.3 and CX-210HA’s performance-per-watt ratio of 40.4. The AMD Steppe Eagle CX-412HC and G-5 SOC CX-210HA used an AMD Larne motherboard with 4GB DDR3-1333 memory and 320GB Toshiba HDD. The system ran Windows® 7 Ultimate. EMB-104
SMALL FOOTPRINT, LOW-POWER, GRAPHIC-RICH EMBEDDED SOLUTIONS MEET THE NEEDS OF THIN CLIENT MARKET

AMD THIN CLIENT SOLUTIONS
AMD has an extensive history of leadership in the thin client market, offering solutions that provide reduced operating costs and power consumption, higher durability and increased longevity over personal computers. Industries such as healthcare, education and government can get high levels of performance without compromise, empower IT staff, protect client/patient data, and manage tight budgets.

AMD BASED THIN CLIENTS PROVIDE THE FOLLOWING BENEFITS FOR OEMS AND END-USERS:

High-definition, high quality video display
Hardware-assisted, high-definition video decode for H.264, VC-1, MPEG-2, MPEG-4 Part 2, and DivX 1. Multiple video streams supported include Decode HD + SD on select APU models, SD + SD on all models, plus additional SD streams in the CPU. AMD Radeon™ Dual Graphics technology can combine the processing power of 2nd Generation AMD R-Series APUs with an AMD Embedded Radeon™ E8860 discrete GPU to provide up to 64% more 3D graphics performance than a standalone 2nd Generation AMD R-Series APU.

Discrete-level GPU performance
Features the latest DirectX® 11 and OpenGL 4.2 graphics with 80 shader processors; easily handles graphics overlays on top of HD video, including videos found on sites such as YouTube and Hulu.

Scalability
Models range from 3W (expected average power) dual-core (AMD G-Series SOC) to 35W quad-core APUs (AMD R-Series APU). Because each product family is all in the same ball grid array (BGA) package, AMD offers the option for OEMs to use a one-board design for the entire range.

Industry-leading display support
Offers high-resolution on two independent displays and a variety of display formats, including DisplayPort 1.2, HDMI™, DVI, LVDS.

Key embedded features
Small form factor designs for smaller footprints and thermals as low as 3W with a dual CPU core.

Longevity
5-year, 7-year and 10-year support offered, depending upon the AMD product. Please contact your AMD representative for more details.

Broad software support
Compatible with VMware and Citrix; supports Windows® XPe, Windows 7, Windows Embedded Standard 7, Windows Embedded Compact 7, Linux®, Android, and others.

1. The AMD RX-427BB scored 2,051, and the AMD Radeon™ E8860 paired with RX-427BB at dual-graphics mode scored 3,359 when running 3DMark® 11P benchmark. The AMD Bald Eagle RX-427BB used an AMD Ballina motherboard with 8GB DDR3 3D-HMM memory and 256GB SanDisk HDD. The AMD Radeon E8860 used an AMD DB-532/2 motherboard with 8GB DDR3 memory, 64GB Crucial M4 HDD, and RX-427BB. The system ran Windows® 7 Ultimate.

2. The average power for the AMD GX-210HA SOC is approximately 3 watts, determined by extrapolating the average of the results of the measured average power of the GX-210HA 9W SOC running the following benchmarks: 3DMark® 11, AMD Sys Stress Test CPU, AMD Sys Stress Test CPU GPU, AMD Sys Stress Test CPU Winbench® 99, CoreMark, Game: Meat Boy, PCMark® 7, PVY-Ray, Sandra 2011, Game: Street Fighter. Testing was performed on an AMD E1-2100 (Rev A1) that is equivalent to the AMD GX-210HA SOC. System configuration: AMD E1-2100 @ 70°C, “Larne” development platform, 4GB RAM, Windows® 7 Ultimate. Please see AMD Publication ID 53395A for more information. EMB-48

For more information on AMD Embedded Solutions for Thin Client, please visit www.amd.com/us/products/embedded/Pages/thin-client.aspx
**AMD EMBEDDED G-SERIES SYSTEM-ON-CHIP (SOC)**

The embedded evolution continues with x86 CPU, integrated discrete-class GPU and I/O controller on the same die.

The AMD Embedded G-Series SOC platform is a high-performance, low-power System-on-Chip (SOC) design, featured with enterprise-class error-correction code (ECC) memory support, dual and quad-core variants, integrated discrete-class GPU and I/O controller on the same die.

The AMD G-Series SOC achieves superior performance per watt in the low-power x86 microprocessor class of products when running multiple industry standard benchmarks. This helps enable the delivery of an exceptional HD multimedia experience and provides a heterogeneous computing platform for parallel processing. The small-footprint, ECC-capable SOC sets the new foundation for a power-efficient platform for content-rich multimedia processing and workload processing that is well-suited for a broad variety of embedded applications.

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**Model** | **Opn** | **# Of x86 cores** | **Tdp** | **Shared L2 cache** | **Cpu freq.** | **GPU freq. (Graphics)** | **Ddr speed** | **Tjc**
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**w/GPU** | | | | | | | | |
GX-420CA | GE420CIA44HM | 4 | 25W | 2MB | 2.0GHz | 600MHz (HD 8400E) | DDR3-1600 | 0-90°C |
GX-415CA | GE415CIB44HM | 4 | 15W | 2MB | 1.5GHz | 500MHz (HD 833E) | DDR3-1600 | 0-90°C |
GX-217CA | GE217CIB23HM | 2 | 15W | 1MB | 1.65GHz | 1.6GHz 450MHz (HD 8280E) | DDR3-1600 | 0-90°C |
GX-210HA | GE210HIA23HM | 2 | 9W | 1MB | 1.0GHz | 300MHz (HD 820E) | DDR3-1333 | 0-90°C |
GX-210JA | GE210JIA23HM | 2 | 6W | 1MB | 1.0GHz | 225MHz | DDR3-1066 | 0-90°C |
GX-424CC | GE424CIXJ44JB | 4 | 25W | 2MB | 2.4GHz | 497MHz | DDR3-1600 | 0-90°C |
GX-412HC | GE412HJYJ44JB | 4 | 7W | 2MB | 1.2GHz | 300MHz | DDR3-1333 | 0-90°C |
GX-212JC | GE212JIYJ23JB | 2 | 6W | 1MB | 1.2GHz | 300MHz | DDR3-1333 | 0-90°C |
GX-411GA | GE411GIR44HM | 4 | 15W | 2MB | 1.0GHz | 300MHz | DDR3-1066 | -40-105°C |
GX-210JC | TBD | 2 | 6W | 1MB | 1.0GHz | TBD | DDR3-1600 | -40-105°C |
GX-209HA | GE209HIS23HM | 2 | 9W | 1MB | 1.0GHz | 225MHz | DDR3-1066 | -40-105°C |
**w/o GPU** | | | | | | | | |
GX-416RA | GE416RIB44HM | 4 | 15W | 2MB | 1.6GHz | N/A | DDR3-1600 | 0-90°C |
GX-420MC | GE420MIX44JB | 4 | 17.5W | 2MB | 2.0GHz | N/A | DDR3-1600 | 0-90°C |
GX-412TC | GE412THY44JB | 4 | 6W | 2MB | 1.2GHz | N/A | DDR3-1600 | 0-90°C |

1. The low-power x86 microprocessor class includes: GX-420CA @ 25W TDP (scored 19); GX-415CA @ 15W (25), GX-217CA @ 15W (17), GX-210HA @ 9W (20), G-T56N @ 18W (12), G-T52R @ 18W (7), G-T40N @ 9W (14), G-T16R @ 4.5W (19), Intel Atom N270 @ 2.5W (20), Intel Atom D525 @ 13W (9), Intel Atom D2700 @ 10W (12) & Intel Celeron G440 @ 35W (5). Performance score based on an average of scores from the following benchmarks: Sandra Engineering 2011 Dhrystone ALU, Sandra Engineering 2011 Whetstone iSSE3, 3DMark® 06 (1280 x 1024), PassMark Performance Test 7.0 2D Graphics Mark, and EEMBC CoreMark Multi-thread. All systems running Windows® 7 Ultimate for Sandra Engineering, 3DMark® 06 and PassMark. All systems running Ubuntu version 11.10 for EEMBC CoreMark. All configurations used DirectX 11.0. AMD C-Series APU system configurations were tested using Windows® 7 with 3DMark® 06 and PassMark. All systems running Ubuntu version 11.10 for EEMBC CoreMark. All configurations used DirectX 11.0.

Note: Always refer to the processor/chipset data sheets for technical specifications. Feature information in this document is provided for reference only.
**COM Express Compact**

**COM-KB**

- **AMD Embedded G-Series SOC**
- **DDR3/DDR3L 1600Mhz support up to 8GB**
- **PCI-Express x16**
- **24-bit Single channel LVDS**
- **High Definition Audio Interface**
- **Communications, Industrial Controllers, Medical, Single Board Computers, Networking, Point Of Sale**

**Aaeon**

PHONE (714) 996-1800  
FAX (714) 996-1811  
EMAIL info@aaeon.com  
WEB www.aaeon.com

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**EPIC Board**

**EMB-KB1**

- **AMD Embedded G-Series SOC**
- **DDR3 1600Mhz SODIMM x 2, Up to 16GB**
- **USB3.0 x 2 and SATA 6.0 Gb/s x 2**
- **Realtek 8111F, Gigabit Ethernet**
- **Dual Independent Display: VGA, DVI-D, LVDS**
- **Rich Expansion: PCI-E(x4) x 1, Mini Card x 2**
- **Industrial Controllers, Medical, Single Board Computers**

**Aaeon**

PHONE (714) 996-1800  
FAX (714) 996-1811  
EMAIL info@aaeon.com  
WEB www.aaeon.com

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**Pico-ITX**

**MIO-2270**

- **AMD Embedded G-Series SOC**
- **DDR3/DDR3L 1600Mhz support up to 8GB**
- **DirectX®11.1 support, dual independent display by 18-bit LVDS + VGA or 18-bit LVDS + HDMI**
- **2 COM, 1 SATA, USB-D, PCIe Mini Card and mSATA**
- **Supports SUSIAccess and Embedded Software APIs**

**Advantech**

PHONE (949) 789-7178  
FAX (949) 789-7179  
EMAIL ECGInfo@advantech.com  
WEB www.advantech.com/embcore

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**3.5” SBC**

**EM-6335**

- **AMD Embedded G-Series SOC**
- **SODIMM, 4GB, DDR3, 1x 1600/1333/1066**
- **2x TypeA USB 3.0; 4x Header USB 2.0**
- **1x Mini-PCIe w/USB signal, full-size; 1x Mini-PCIe w/ USB & SATA signal, half-size**
- **1x SATA, 6.0Gb/s, 3.0 compliant**
- **Gaming, Information Appliance, Industrial Controllers, Storage, Digital Set Top Boxes, Single Board Computers, Digital Signage, Point Of Sale, Thin Clients**

**AEEWIN Technologies Co., Ltd.**

PHONE +886-2-8692 6677  
FAX +886-2-8692 6655  
EMAIL sales@aewin.com.tw  
WEB www.aewin.com.tw

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**Industrial Computer**

**SEM-6335**

- **AMD Embedded G-Series SOC**
- **SODIMM, 4GB, DDR3, 1x 1600/1333/1066**
- **x USB 3.0: 2x USB 2.0**
- **1x Mini-PCIe w/USB Signal, full-size; 1x Mini-PCIe w/ USB & SATA Signal, half-size**
- **1x SATA, 6.0Gb/s, 3.0 compliant, 2.5" drive bay**
- **Fanless operation**
- **Gaming, Information Appliance, Industrial Controllers, Digital Signage, Point Of Sale, Thin Clients**

**AEEWIN Technologies Co., Ltd.**

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FAX +886-2-8692 6655  
EMAIL sales@aewin.com.tw  
WEB www.aewin.com.tw

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**Custom Board**

**KCGX210**

- **AMD Embedded G-Series SOC**
- **1x SODIMM DDR3 1333/1066/800 MHz, Max up to 4GB**
- **2x TypeA USB 3.0 Host, 6x TypeA USB 2.0 Host, 1x Header USB 2.0 Host**
- **1x HDMI**
- **2x SATA 6.0Gb/s**
- **1x Mini-PCIe**
- **Digital Signage**

**Albatron**

PHONE 886-2-8227-3277  
FAX 886-2-8227-3266  
EMAIL DarrylChan@albatron.com.tw  
WEB www.albatron.com.tw
**Custom Board**  
**KCGX210J**  
- AMD Embedded G-Series SDC  
- 1x SODIMM DDR3 1066/800 MHz, Max up to 4GB  
- 2x TypeA USB 3.0 Host, 6x TypeA USB 2.0 Host, 1x TypeA  
- 1x HDMI  
- 2x SATA 6.0Gbps, 3.0 compliant  
- 1x Mini-PCIe  
- Digital Signage

**Albatron**  
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EMAIL DarrylChan@albatron.com.tw  
WEB www.albatron.com.tw

**Custom Board**  
**KCGX210J-LV**  
- AMD Embedded G-Series SDC  
- 1x SODIMM DDR3 1333/1066/800 MHz, Max up to 4GB  
- 2x TypeA USB 2.0, 2x TypeA USB 3.0  
- 1x HDMI  
- 2x SATA 6.0Gbps, 3.0 compliant, 1x mSATA slot  
- Digital Signage

**Albatron**  
PHONE 886-2-8227-3277  
FAX 886-2-8227-3266  
EMAIL DarrylChan@albatron.com.tw  
WEB www.albatron.com.tw

**Custom Board**  
**KCGX217-DH**  
- AMD Embedded G-Series SDC  
- 1x SODIMM DDR3 1600/1333/1066 MHz, Max up to 4GB  
- 2x TypeA USB 3.0, 6x TypeA USB 2.0, 1x Header USB 2.0  
- 1x HDMI  
- 2x SATA 6.0Gbps, 3.0 compliant  
- 1x Mini-PCIe  
- Digital Signage

**Albatron**  
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EMAIL DarrylChan@albatron.com.tw  
WEB www.albatron.com.tw

**Custom Board**  
**KCGX415-DH**  
- AMD Embedded G-Series SDC  
- 1x SODIMM DDR3 1600/1333/1066 MHz, Max up to 4GB  
- 2x TypeA USB 3.0, 6x TypeA USB 2.0, 1x Header USB 2.0  
- 2x HDMI  
- 2x SATA 6.0Gbps  
- 1x Mini-PCIe  
- Digital Signage

**Albatron**  
PHONE 886-2-8227-3277  
FAX 886-2-8227-3266  
EMAIL DarrylChan@albatron.com.tw  
WEB www.albatron.com.tw

**Custom Board**  
**BioDigitalPC 7 Family**  
- AMD Embedded G-Series SDC  
- 2GB, 4GB or 8GB of DDR3 RAM  
- 4 USB 2.0 Ports, 1 USB 3.0 Port, DisplayPort, 2 PCIe x1 Gen 2  
- Size: 84mm x 52mm x 6mm  
- Epoxied for Rugged Design and Harsh Environmental Conditions, Waterproof  
- Information Appliance, Medical, Digital Set Top Boxes, Single Board Computers, Digital Signage, Point Of Sale, Thin Clients

**Arnouse Digital Devices Corp.**  
PHONE 1 (516) 673-4444  
EMAIL dgallic@addc.net  
WEB http://arnousedigitaldevices.com/newsite/home.php

**Mini-ITX Motherboard**  
**IMB-A180-H**  
- AMD Embedded G-Series SDC  
- Supports DDR1600MHz  
- 1x VGA, 2 x HDMI  
- 24 bit dual channel UDS (optional)  
- 6 x CDM ports, 6 x USB 2.0, 2 x USB 3.0  
- 1x PCIe x4, 1 x SATA 3.0, 1x mSATA  
- Industrial Controllers, Single Board Computers, Digital Signage

**ASRock Inc.**  
PHONE (909) 590-8308  
FAX (909) 590-1026  
EMAIL sales@asrockamerica.com  
WEB www.asrock.com
### 3.5" Micro Module
**ECM-KA**
- AMD Embedded G-Series SOC
- One 204-pin DDR3 SODIMM Socket Supports Up to 8GB DDR3 1600 SDRAM
- 1 x Mini PCIe (mSATA Supported)
- 2 x USB 3.0, 6 x USB 2.0
- Supports HDMI and LVDS
- Industrial Controllers, Single Board Computers

#### Avalue Technology Inc.
- PHONE: +886-2-8226-2345
- EMAIL: sales@avalue.com.tw
- WEB: www.avalue.com.tw

### SMARC
**CSB1690SM1-D10**
- AMD Embedded G-Series SOC
- Industry Standard SMARC, 82mm x 50mm
- 32KByte Instruction and Data Caches; 1MByte L2 Cache
- 4GByte 64-Bit Wide DDR3L-1066 Memory
- Three x1 GEN II (5G/s) Ports
- Dual Simultaneous Display via HDMI and eDP/LVDS
- Gaming, Information Appliance, Communications, Industrial Controllers, Storage, Medical, Digital Set Top Boxes

#### Deciso B.V.
- PHONE: +31187744020
- EMAIL: contact@deciso.com
- WEB: www.deciso.com

### COM Express Module
**CSB1890T10-Q15**
- AMD Embedded G-Series SOC
- Excellent choice for size restricted, low power, ruggedized embedded applications
- 4GByte 64-Bit Wide DDR3-1600 Memory with 8-Bit ECC
- PCIe: One x4 and Two x1 GEN II (5G/s) Ports
- Dual Simultaneous Display via HDMI, DisplayPort 1.2, eDP or LVDS
- Gaming, Information Appliance, Communications, Industrial Controllers, Storage, Medical, Digital Set Top Boxes, Networking, Digital Signage, Point Of Sale, Thin Clients

#### Cogent Computer Systems, Inc.
- PHONE: 1-401-349-3999
- EMAIL: sales@cogcomp.com
- WEB: http://www.cogcomp.com/

### COM Express Compact/Type 6
**conga-TCG**
- AMD Embedded G-Series SOC
- Max. 8 GByte DDR3L 1600 MHz
- 4 x PCIe 2.0
- 2 x USB 3.0; 8 x USB 2.0
- 1 x HDMI; VGA; LVDS; 1x DisplayPort
- Gaming, Information Appliance, Communications, Industrial Controllers, Medical, Digital Set Top Boxes, Networking, Digital Signage, Point Of Sale, Thin Clients

#### Cogent Computer Systems, Inc.
- PHONE: 1-401-349-3999
- EMAIL: sales@cogcomp.com
- WEB: http://www.cogcomp.com/

### Network Appliance
**Netboard A10**
- AMD Embedded G-Series SOC
- SODIMM, max. 8GB, DDR3 non-ECC, 1x 1600/1333/1066
- 1 x PCIe x4 Edge Connector
- 5x USB 2.0
- 2x SATA 3 + mini power header (JST)
- 1x Display Port + **, 1x VGA
- Communications, Networking

#### Deciso B.V.
- PHONE: +31187744020
- EMAIL: contact@deciso.com
- WEB: www.deciso.com

### Proprietary Network Board
**Netboard A10**
- AMD Embedded G-Series SOC
- 185mm x 125mm
- SODIMM, max. 8GB, DDR3 non-ECC, 1x 1600/1333/1066
- 1 x PCIe x4 Edge Connector
- 5x USB 2.0
- 2x SATA 3 + mini power header (JST)
- 1x Display Port + **, 1x VGA
- Communications, Storage, Single Board Computers, Networking, Digital Signage, Point Of Sale, Thin Clients

#### Deciso B.V.
- PHONE: +31187744020
- EMAIL: contact@deciso.com
- WEB: www.deciso.com
Mini-ITX
KB160/161 Series
- AMD Embedded G-Series SOC
- 2 DDR3L 500/533/667 up to 8GB
- 1 PCIe x4, 1 Mini PCIe 1 DFI Proprietary
  Extension Bus (optional), 1 DFI ECX interface
- 1 USB 3.0, 3 USB 2.0
- 1 VGA, 1 LVDS
- Information Appliances, Communications, Industrial Controllers, Medical, Single Board Computers, Networking

DFI
PHONE (916) 568-1234
FAX (916) 568-1233
EMAIL sales@dfitech.com
WEB www.dfi.com
Desktop Thin Client
t520 Flexible Thin Client
- AMD GX-212JC Dual-Core SOC APU
- AMD Radeon HD Graphics (1.2 GHz)
- DDR3L -1600 SDRAM, Max up to 8 GB
- 2x DisplayPort 1.2, 1x VGA
- 2x USB 3.0, 2x USB 2.0
- Thin Clients

Digital Signage Player
SI-22
- AMD Embedded G-Series SOC
- Operating Temp: 0 ~ 45 C
- 256MB, 8GB, DDR3, 1x 1600/1333/1066
- 2x, Mini-Pcie, X1, including mSATA
- 2x, HDMI, 1920 x 1080
- 2x TypeA, USB 3.0, Host; 1x TypeA, USB 2.0, Host
- iSMART for EuP/EP power saving, auto-scheduler and power resume
- Single Board Computers, Digital Signage, Thin Clients

Hewlett-Packard
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WEB www.IBASE-usa.com

Digital Signage Player
SI-22
- AMD Embedded G-Series SOC
- Operating Temp: 0 ~ 45 C
- 256MB, 8GB, DDR3, 1x 1600/1333/1066
- 2x, Mini-Pcie, X1, including mSATA
- 2x, HDMI, 1920 x 1080
- 2x TypeA, USB 3.0, Host; 1x TypeA, USB 2.0, Host
- iSMART for EuP/EP power saving, auto-scheduler and power resume
- Single Board Computers, Digital Signage, Thin Clients

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iBASE
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EMAIL sales@IBASE.com.tw
WEB www.IBASE-usa.com

COM Express Compact
MSC C6C-GX
- AMD Embedded G-Series SOC
- Up to 16GB DDR3 SDRAM, dual-channel
- 2x SATA 3Gb/s mass storage interfaces
- 2x USB 3.0 and 6x USB 2.0 interfaces
- 1x Digital Display Interface (DP 1.2, DVI, HDMI 1.4a)
- 1x Embedded DisplayPort 1.3 (shared with UVDS 24 bit, dual channel )
- Gaming, Information Appliance, Communications, Industrial Controllers, Medical, Digital Signage, Point Of Sale

MSC Vertriebs GmbH
PHONE 49-8165-906-240
EMAIL boards@msc-ge.com
WEB www.msc-ge.com

3.5" Single Board Computer
IB903
- AMD Embedded G-Series SOC
- 1x DDR3 SO-DIMM, Max. 8GB
- Supports DDR1 and 24-bit dual channel LVDS
- 2x Realtek RTL8111G PCI-E Gigabit LAN
- Watchdog timer: Digital I/O, mSATA, iSMART
- Ex USB, 4x COM, 2x SATA III
- 2x Mini PCI-E (half-sized)
- Gaming, Single Board Computers, Digital Signage, Thin Clients

IBASE
PHONE +886-2-2655-7588
FAX +886-2-2655-7388
EMAIL sales@IBASE.com.tw
WEB www.IBASE-usa.com

COM Express Compact
MSC C6C-GX
- AMD Embedded G-Series SOC
- Up to 16GB DDR3 SDRAM, dual-channel
- 2x SATA 3Gb/s mass storage interfaces
- 2x USB 3.0 and 6x USB 2.0 interfaces
- 1x Digital Display Interface (DP 1.2, DVI, HDMI 1.4a)
- 1x Embedded DisplayPort 1.3 (shared with UVDS 24 bit, dual channel )
- Gaming, Information Appliance, Communications, Industrial Controllers, Medical, Digital Signage, Point Of Sale

MSC Vertriebs GmbH
PHONE 49-8165-906-240
EMAIL boards@msc-ge.com
WEB www.msc-ge.com

Digital Gaming System
QXi-300
- AMD Embedded G-Series SOC
- 2x DDR3-1600 (PC3-12800) SODIMM sockets
- 4x USB 2.0 ports
- Advanced PCI Express gaming logic and NVRAM
- Meets the requirements of GLI-11 and all major global gaming jurisdictions
- Fanless operation
- Cost-effective “all-in-one” two-screen gaming platform

Quixant
PHONE +44 (0) 1223 89296
FAX +44 (0) 1223 892401
EMAIL sales@quixant.com
WEB www.quixant.com

Digital Gaming System
QXi-300
- AMD Embedded G-Series SOC
- 2x DDR3-1600 (PC3-12800) SODIMM sockets
- 4x USB 2.0 ports
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Mini-ITX Motherboard
IPC-FT3GS
- AMD Embedded G-Series SOC
- AMD Radeon 8000 series graphic
- Dual Memory DIMMs Non-ECC
- Dual simultaneous displays
- 4 SATA ports, 8 USB ports
- 2x DDR3 DIMMs up to 1600
- 1x PCI-E (x16 at x4 BW); 1x Mini PCI-E
- Gaming, Single Board Computers, Digital Signage, Point Of Sale, Thin Clients

Sapphire Technology Limited
PHONE 886226270685
EMAIL embedded@sapphiretech.com
WEB www.sapphiretech.com

Digital Signage Player
SI-22
- AMD Embedded G-Series SOC
- Operating Temp: 0 ~ 45 C
- 256MB, 8GB, DDR3, 1x 1600/1333/1066
- 2x, Mini-Pcie, X1, including mSATA
- 2x, HDMI, 1920 x 1080
- 2x TypeA, USB 3.0, Host; 1x TypeA, USB 2.0, Host
- iSMART for EuP/EP power saving, auto-scheduler and power resume
- Single Board Computers, Digital Signage, Thin Clients

Hewlett-Packard
PHONE 800-334-5144
WEB http://www.hp.com
EMAIL Deniece.mon.washington@hp.com

iBASE
PHONE +886-2-2655-7588
FAX +886-2-2655-7388
EMAIL sales@IBASE.com.tw
WEB www.IBASE-usa.com

COM Express Compact
MSC C6C-GX
- AMD Embedded G-Series SOC
- Up to 16GB DDR3 SDRAM, dual-channel
- 2x SATA 3Gb/s mass storage interfaces
- 2x USB 3.0 and 6x USB 2.0 interfaces
- 1x Digital Display Interface (DP 1.2, DVI, HDMI 1.4a)
- 1x Embedded DisplayPort 1.3 (shared with UVDS 24 bit, dual channel )
- Gaming, Information Appliance, Communications, Industrial Controllers, Medical, Digital Signage, Point Of Sale

MSC Vertriebs GmbH
PHONE 49-8165-906-240
EMAIL boards@msc-ge.com
WEB www.msc-ge.com

3.5" Single Board Computer
IB903
- AMD Embedded G-Series SOC
- 1x DDR3 SO-DIMM, Max. 8GB
- Supports DDR1 and 24-bit dual channel LVDS
- 2x Realtek RTL8111G PCI-E Gigabit LAN
- Watchdog timer: Digital I/O, mSATA, iSMART
- Ex USB, 4x COM, 2x SATA III
- 2x Mini PCI-E (half-sized)
- Gaming, Single Board Computers, Digital Signage, Thin Clients

IBASE
PHONE +886-2-2655-7588
FAX +886-2-2655-7388
EMAIL sales@IBASE.com.tw
WEB www.IBASE-usa.com

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- 4 SATA ports, 8 USB ports
- 2x DDR3 DIMMs up to 1600
- 1x PCI-E (x16 at x4 BW); 1x Mini PCI-E
- Gaming, Single Board Computers, Digital Signage, Point Of Sale, Thin Clients

Sapphire Technology Limited
PHONE 886226270685
EMAIL embedded@sapphiretech.com
WEB www.sapphiretech.com
### Panel PC

**Thinlabs TL8500/8600**  
19" POE AiO Touch Computer  
- AMD Embedded G-Series SOC  
- 2x DDR3, 1600/1333/1066, Max up to 16GB  
- 1x LVDS 2 Channel 1920 x 1080  
- 2x USB 3.0, 4x USB 2.0, Host  
- 3x SATA 3.0Gbps, 2.0 compliant  
- Digital Signage, Point Of Sale, Thin Clients

**Thinlabs**  
PHONE 44 (0) 20 33 22 60 50  
EMAIL sachit.baliga@thinlabs.com  
WEB thinlabs.com

### Fanless System

**PL-60830**  
- AMD Embedded G-Series SOC  
- DDR3 1600 up to 4GB  
- Support 1 x 2.5" SATA HDD and 1 x Half-size mSATA  
- 3 x COM, USB3.0, Audio  
- 2 x Mini-PCIe sockets, DC 8V~32V input  
- Gaming, Industrial Controllers, Digital Set Top Boxes, Networking, Digital Signage, Point Of Sale

**Win Enterprises**  
PHONE (978) 688-2000  
EMAIL info@win-ent.com  
WEB www.win-ent.com

### QSeven

**Q7-GX**  
- AMD Embedded G-Series SOC  
- Soldered Down, 8GB, DDR3, 1600/1333/1066  
- 1x DisplayPort, 2560 x 1600, 1x HDMI, 1920 x 1200  
- 1x USB 3.0, Host, 6x USB 2.0, Host  
- 2x SATA 6.0Gbps, 3.0 compliant  
- Industrial Controllers, Point Of Sale, Thin Clients

**Seco**  
PHONE +39 0575 26979  
EMAIL info@seco.com  
WEB www.seco.com

### Panel PC

**Thinlabs TL2300/2400**  
22" POE AiO Touch Computer  
- AMD Embedded G-Series SOC  
- 2x DDR3, 1600/1333/1066, Max up to 16GB  
- 1x LVDS 2 Channel 1920 x 1080  
- 2x USB 3.0, 4x USB 2.0, Host  
- 3x SATA 3.0Gbps, 2.0 compliant  
- Digital Signage, Point Of Sale, Thin Clients

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- Gaming, Industrial Controllers, Digital Set Top Boxes, Networking, Digital Signage, Point Of Sale

**Win Enterprises**  
PHONE (978) 688-2000  
EMAIL info@win-ent.com  
WEB www.win-ent.com

### Pico-ITX

**SECOpITX-GX**  
- AMD Embedded G-Series SOC  
- Reduced space, with low power consumption and high performance  
- Up to 8GB on DDR3 1600MHz 50 DMEM (FPG)  
- 18 bit single channel LVDS or embedded Display Port internal connector  
- VGA Interface (requires external optional Video Adapter)  
- 2 x standard USB 3.0 Type A connectors; 4 x internal USB 2.0 ports  
- Gaming, Medical, Digital Set Top Boxes, Single Board Computers, Digital Signage, Point Of Sale, Thin Clients

**Seco**  
PHONE +39 0575 26979  
EMAIL info@seco.com  
WEB www.seco.com

### Panel PC

**Thinlabs TL2300/2400**  
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**Thinlabs**  
PHONE 44 (0) 20 33 22 60 50  
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WEB thinlabs.com
Advancement power management helps bring improved performance to highly integrated x86 processors.

Complex heterogeneous processors have the potential to leave a large amount of performance headroom untapped when workloads don’t utilize all cores. Advanced power management techniques for x86 processors are designed to reduce the power of underutilized cores while allowing for dynamic allocation of the thermal budget between cores for improved performance.

The importance of power management
Those with experience implementing microprocessors know the importance of proper power management. Whether for simple applications processors or high-end server processors, the ability to down-clock, clock-gate, power-off, or in some manner disable unused or underused hardware blocks is crucial in limiting power consumption.

Better power management benefits range from energy savings within the data center to improved battery life in mobile devices. But don’t underestimate the value of reducing power and increasing efficiency. In fact, power reduction and increased efficiency is even more important today, as processors integrate more and varied functional blocks.

The x86 example
Typical x86 processors widely used in both consumer and embedded applications are a perfect example: Integration of network and security engines, memory controllers, graphics processing units (GPUs), and video encode/decode engines has effectively turned them into heterogeneous compute units that excel at a wide variety of workloads.

The notable thing about traditional reduction-based power management is that a particular functional block is only turned off when unused, or down clocked when higher performance is not needed by the application. What about applications that desire more performance? Shouldn’t saving power in one area allow you to utilize it in another?

Specifying power usage is complex, particularly with highly integrated processors. If the worst-case power for each individual hardware block in a heterogeneous processor were added together, the resulting total could be several times the achievable worst-case power for the device. The fact that it is nearly impossible to write software that will simultaneously utilize all functional blocks to their fullest extent is one reason. Simply feeding the various compute engines and I/O ports with enough data to keep them all 100% utilized would likely exceed the available bandwidth of internal buses. Central processing unit (CPU) cores manage data movement, and time spent there is less time spent executing higher power instructions.

Another issue is that different instruction sequences can incur vastly different power usage, which can further complicate specifying processor power. For instance, complex floating-point instructions burn much more power than a simple I/O data read due to the significant difference in transistor logic they activate during execution. The combination of varying instruction types and utilized hardware blocks makes the actual power usage of the processor highly workload-dependent, and explains why it is rare to see a “typical” power specification for this device type. Still, implementers expect a maximum power specification on which to base their design.

Establish a realistic worst-case for power
The pragmatic approach for silicon providers is to survey real-world application software to establish a more realistic worst-case power and add some guard-band for safety. Both AMD and Intel use this type of methodology and specify it as thermal design power (TDP). TDP is essentially the maximum sustained power a processor can draw with “real world” software while operating under defined temperature and voltage limits.

Power limits can translate to performance limits
Most embedded x86-based systems are power-constrained...
Integration of large GPU cores, as done in AMD R-Series APUs, increases the potential for unused power budget.

in some way. Designers will look for the best performance they can get in a given power envelope, at a price they can afford. The worst-case power limit can translate directly into a performance limit for a given processor product by effectively defining the maximum operating frequency. Using TDP as a worst-case power specification instead of the cumulative per-block maximum power helps to increase that operating frequency, but it’s also based on an assumption of the software workload. Applications using fewer hardware blocks, or using them to a lesser extent, use less power and effectively leave performance headroom on the table.

AMD's recent move to integrate discrete-class GPUs with x86 processor cores in accelerated processing units (APUs) underscores this power management challenge. Some APUs contain a GPU that accounts for more than half of the silicon die and a proportional amount of the power budget. A much larger potential for under-utilization of the APU’s power envelope exists in this scenario if the software workload is highly CPU centric or GPU-centric. The trend toward integration of these complex, heterogeneous cores is likely to continue and necessitates a means of harnessing the excess thermal headroom.

**AMD TACKLES THE UNDERUSED TDP HEADROOM ISSUE**

AMD Turbo CORE technology was launched several years ago to address underutilized TDP headroom. AMD Turbo CORE began with a simple core-counting mechanism that allowed some CPU cores to use higher-frequency “boost” states while other CPU cores were idle. This approach only affected the CPU cores, and was primarily targeted at accelerating single-threaded applications that didn’t leverage a multi-core architecture.

Generational improvements have increased the granularity and effectiveness of the technology by adding more boost states for CPU and GPU cores, real-time power and temperature monitors, and enabling dynamic power budget allocation between cores.

Increasing performance by boosting to higher frequencies is relatively simple, since the use of multiple performance states (voltage and frequency operating points) has been around for a while. However, the complexity lies in determining when and which cores to boost. For AMD Embedded R-Series APUs, the process starts by dividing the processor into separate thermal entities: one for each CPU core-pair and one for the GPU. I/O power is small by comparison, so it is defined as a fixed value based on characterization to reduce complexity.

An integrated microcontroller manages AMD Turbo CORE calculations, allowing a more complex and therefore more effective algorithm. In deciding whether boosting a given core is possible, the power usage of each thermal entity must be determined. On-die analog power measurement at many amps is not practical in a 32nm silicon on insulator (SOI) process, and external measurement is not possible because the various cores share power rails. Alternatively, proprietary activity monitors that are integrated throughout the processor architecture model current logic activity as an AC capacitance (CAC). The CAC monitors effectively profile the running application to determine if it is one of those “worst-case” workloads that defines TDP or something less laborious. Static power of the core is determined by transistor leakage at a given voltage and temperature which can be characterized for the device and hard-coded into the algorithm as a function of temperature. A calculated temperature value from a previous iteration is used for reasons that will be explained later. Total instantaneous power of the thermal entity can then be calculated by $P = CAC \times V^2 \times f + P_{\text{static}}$, and total power for the APU equals the summation of the power for each thermal entity and the I/O power offset. The instantaneous power calculation result is compared to an allocated power budget for the thermal entity, as well as the device’s thermal design current specification to ensure that current demand does not exceed what the voltage regulator can provide. If either value is too close to the limit, firmware can impose throttling by reducing the core’s performance state. The ability to boost the performance state is maintained when headroom exists on both parameters.

**GOING ABOVE TDP**

Even if an application with a high CAC drives the APU to consume the full TDP, operation at this level may occur in bursts...
or be preceded by idle time such that the die temperature at the start of the high CAC period is far below the maximum specification. The latest version of AMD Turbo CORE also takes the opportunity to boost in this scenario by allowing brief excursions above TDP when there is adequate temperature headroom. After all, the purpose of a TDP limit is only to ensure die temperature stays in check.

Real-time temperature values from around the thermal entity provide a scaling factor to the power calculation so they influence the boost decision without controlling it directly. Derivation of a calculated temperature comes from application of the calculated power to a reference thermal solution model. Reducing the influence of actual die temperature on the boost algorithm is an intentional tradeoff to increase deterministic performance of the device. The calculated temperature is then combined with temperature data from other thermal entities to determine if thermal headroom exists.

Other thermal entities can act as heat sources or sinks, depending on their temperature state, and therefore must be considered. Temperature offsets are also included to account for sensor tolerance and help make sure that the maximum junction temperature is never exceeded. The calculated temperature is compared to predefined thresholds to determine the amount of boost that is possible.

**INTELLIGENT BOOST**

The final stage of AMD Turbo CORE technology is called Intelligent Boost; it uses a proprietary algorithm that helps improve efficiency by only allowing a core to boost if it can translate that higher frequency to increased performance. If each thermal entity control loop operated independently under a demanding workload, all cores would attempt to boost until they reach their maximum performance state or until the device thermal limit is reached. It is very unlikely that the application will be perfectly balanced, but rather limited by one core type (CPU or GPU) being saturated.

Intelligent Boost examines the workload at a very high frequency to give more thermal budget to the core that needs it the most by preventing the other cores from boosting more than necessary, maximizing efficiency without affecting overall processor performance.

With an understanding of how boost technologies work, designers should consider where it could affect their application or design practices. A common concern is that designers may have become accustomed to the idea that the power draw of their software application doesn’t come close to driving a processor near its TDP, leading them to design to a lower specification. Historically, this may have been safe, but boost technologies will tend to drive the processor closer to TDP than before by allowing the active cores to consume more power.

Operating closer to TDP may sound like a bad thing, but keep in mind that performance can be gained with the increase in power. An example could be a machine vision application achieving higher frame rates for faster recognition. Total processor power might increase in that scenario, but doesn’t materially increase with applications such as media playback in a digital signage player. Fixed, periodic workloads may complete faster at a higher power level, but when the burst of activity is over, cores then spend more time in lower-power idle states, so the average power is approximately the same. Applications like this can still benefit from boosted performance through better responsiveness.

**CONFIGURABLE TDP**

Beyond performance benefits, the ability of AMD Turbo CORE algorithms to control average power consumption of the processor also enables a new and interesting feature on the latest generation of AMD APUs, called configurable TDP. It essentially provides the system designer a knob to modify the processor TDP to better fit the needs of the application.

A useful example might be a system design with a thermal budget for a 20W processor but vendor offerings that only include 15W and 25W options. Configurable TDP enables flexibility so the designer isn’t forced to choose a lower-performing 15W option in order to remain within the 20W power budget. Instead, the 25W processor might be used but configured for 20W.

**SUMMARY**

AMD Turbo CORE technology will help to dynamically provide the processor’s best available performance while keeping thermal dissipation under the specified amount. Support for configurable TDP and the level of configurability varies by processor model, but it can be a very useful feature for those that support it. System designers should keep these new concepts in mind when choosing and implementing embedded x86 processors. Power management isn’t just about saving power anymore. 

---

1. AMD Turbo CORE technology is available only with select AMD APUs and GPUs.
AMD EMBEDDED G-SERIES
APU PLATFORM

AMD's original combination of low-power CPU and advanced GPU integrated into a single embedded device.

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 multimedia content delivery in a small form factor and power-efficient platform for a broad range of embedded designs. Based on a new power-optimized core, the AMD Embedded G-Series platform delivers 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.

### AMD Embedded G-Series APU – FT1 413-pin

<table>
<thead>
<tr>
<th>Model</th>
<th>x86 Core Clock Speed Base/Boost</th>
<th>L2 Cache</th>
<th>GPU</th>
<th>DDR3 Speed</th>
<th>x86 Cores</th>
<th>UVD 1 3</th>
<th>Display Outputs4</th>
<th>Max TDP</th>
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<tbody>
<tr>
<td>T56N</td>
<td>1.65GHz</td>
<td></td>
<td>AMD Radeon™ HD 6320</td>
<td>DDR3-1333</td>
<td>2</td>
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<tr>
<td>T40R</td>
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<td></td>
<td>AMD Radeon™ HD 6250</td>
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<td>DDR3-1066</td>
<td>2</td>
<td>Yes</td>
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<td>2</td>
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<td>1x HDMI</td>
<td>18W</td>
</tr>
</tbody>
</table>

1. Unified Video Decoder (UVD 3) for hardware decode of high-definition video.
2. 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.
3. Low voltage (1.35V) DDR3 is assumed for the 5W TDP processors. The use of 1.5V DDR3 will incur a power adder.
4. Other resolutions available that do not oversubscribe link bandwidth. Display resolutions limited by available memory bandwidth.

Note: Always refer to the processor/chipset data sheets for technical specifications. Feature information in this document is provided for reference only.
<table>
<thead>
<tr>
<th><strong>Gaming System</strong></th>
<th><strong>Mini-ITX</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACE-S7400</strong></td>
<td><strong>A55E-IF</strong></td>
</tr>
<tr>
<td>AMD Embedded G-T56N APU</td>
<td>AMD Embedded G-Series APU</td>
</tr>
<tr>
<td>with AMD Radeon™ HD 6320 Graphics</td>
<td>AMD AS5 Controller Hub</td>
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<tr>
<td>Digital inputs and digital outputs with Micro fit 3.0 connector</td>
<td>1x DDR3 1066 SODIMM, Max up to 4GB</td>
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<td>2 x ccTalk</td>
<td>1x PCIe x 4 Gen.2, 1x Mini PCIe, 1x CFs</td>
</tr>
<tr>
<td>2MB Battery back up SRAM</td>
<td>5 SATA 3.0 (6Gb/s)</td>
</tr>
<tr>
<td>Timer &amp; Meter pulse generator, counters</td>
<td>6x USB 2.0 (4 Rear, 4 Internal)</td>
</tr>
<tr>
<td>Intrusion Logger</td>
<td>Storage, Single Board Computers, Digital Signage, Point Of Sale, Thin Clients, Gaming</td>
</tr>
<tr>
<td>Storage: 2 x CF connectors</td>
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</tr>
</tbody>
</table>

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| FAX | (714) 903 5629 |
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| WEB | www.acrosser.com |

**Advansus**

| PHONE | 886-2-8177-7089 |
| FAX | 886-2-2794-7306 |
| EMAIL | sales@advansus.com.tw |
| WEB | www.advansus.com.tw |

**PICMG 1.0**

**PCA-6763**

<table>
<thead>
<tr>
<th><strong>Advantech</strong></th>
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<tbody>
<tr>
<td><strong>Industrial Tablet WA-10</strong></td>
</tr>
<tr>
<td>AMD Embedded G-T56N APU</td>
</tr>
<tr>
<td>with AMD Radeon™ HD 6320 Graphics</td>
</tr>
<tr>
<td>Memory: SODIMM, 2GB, DDR3</td>
</tr>
</tbody>
</table>

**American Portwell Technology, Inc.**

| PHONE | (510) 403-3399 |
| FAX | (510) 403-3184 |
| EMAIL | info@portwell.com |
| WEB | www.portwell.com |

**Desktop Network Security Appliance CAF-1000**

<table>
<thead>
<tr>
<th><strong>Portwell</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Fanless Box PC ARES-1500-A10</strong></td>
</tr>
<tr>
<td>AMD Embedded G-Series APU</td>
</tr>
<tr>
<td>AMD AS50M Controller Hub</td>
</tr>
<tr>
<td>5xSATA, 8GB, DDR3, 1x, 1066/800</td>
</tr>
<tr>
<td>6x USB 2.0</td>
</tr>
<tr>
<td>1x SATA, 3.0Gb/s, 2.0 compliant</td>
</tr>
<tr>
<td>200(W) x 112(D) x 52(H) mm</td>
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</tbody>
</table>

**Advansus**

| PHONE | 886-2-8177-7089 |
| FAX | 886-2-2794-7306 |
| EMAIL | sales@advansus.com.tw |
| WEB | www.advansus.com.tw |

**Industrial Controllers, Single Board Computers**

**Industrial Tablet WA-10**

<table>
<thead>
<tr>
<th><strong>Amtek System Company</strong></th>
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<tbody>
<tr>
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</table>

**Arbor Technology Corp.**

| PHONE | (866) 270-2617 |
| FAX | (408) 452-8909 |
| EMAIL | info1@arborsolution.com |
| WEB | www.arbor.com.tw |

**Desktop Network Security Appliance CAF-1000**

<table>
<thead>
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**Fanless Box PC ARES-1500-A10**

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**Arbor Technology Corp.**

| PHONE | (866) 270-2617 |
| FAX | (408) 452-8909 |
| EMAIL | info1@arborsolution.com |
| WEB | www.arbor.com.tw |
Thin Client
A9S/A9SD
- AMD Embedded G-Series APU
- AMD A55M Controller Hub
- 512MB, 2GB (for A9S), DDR3, 1x1066/800
- Dual Video (DVI + DFP) Support
- 6x USB 2.0
- Supports DirectX 11 and 3D Visual Effect
- Low power consumption

Astec Technology Co., Ltd.
PHONE +886-2-86983077 Ext. 108
EMAIL nick.huang@astec-tech.com
WEB www.astec-tech.com

3.5" Single Board Computer
ECM-A50M
- AMD Embedded G-Series APU
- with AMD Radeon™ HD 6290 Graphics
- AMD A50M Controller Hub
- One 204-pin DDR3 SODIMM Socket Supports Up to 4GB DDR3 1066 SDRAM
- Dual View, 2-CH LVDS, CRT, HDMI
- 7.1-CH Audio, Dual GbE
- 1CF, 2 SATA, 2 COM, 7 USB, 16-bit GPIO

Avalue Technology Inc.
PHONE +886-2-8226-2345
EMAIL sales@avalue.com.tw
WEB www.avalue.com.tw

5.25" Single Board Computer
EBM-A50M
- AMD Embedded G-T40E APU
- with AMD Radeon™ HD 6250 Graphics
- Fan-less (Optional G-T50N APU/ with fan)
- With AMD Radeon™ HD 6250 Graphics or Optional AMD Radeon™ HD 6230 Graphics
- AMD A50M Controller Hub
- Onboard 2GB DDR3 1333 SDRAM, One 204-pin DDR3 SODIMM up to 4GB DDR3 1333 SDRAM
- Dual View, 2-CH LVDS, HDMI
- 7.1-CH Audio, Dual GbE, 2W Amplifier
- Two mini PCIe Slots, Optional Supports mSATA

Avalue Technology Inc.
PHONE +886-2-8226-2345
EMAIL sales@avalue.com.tw
WEB www.avalue.com.tw

COM Express Module
ERS-A50M
- AMD Embedded G-Series APU
- with AMD Radeon™ HD 6250 Graphics
- AMD A50M Controller Hub
- One 204-pin DDR3 SODIMM up to 4GB DDR3 1066 SDRAM
- 1mSATA, 1CF, 1 SSD
- Dual GbE, 7.1-CH Audio
- 1VGA, 1 HDMI, 2 COM, 6 USB
- Service Windows, Easy to Install HDD/ SSD and Memory
- Operating Temperature -10 ~ 50°C, Ambient w/ Air Flow

Avalue Technology Inc.
PHONE +886-2-8226-2345
EMAIL sales@avalue.com.tw
WEB www.avalue.com.tw

Mini-ITX
EMX-A55E
- AMD Embedded G-Series APU
- AMD A55E Controller Hub
- 1x 512MB/1GB DDR3 1066/800, Max up to 4GB
- 1x Mini-PCIe, 1x PCIe, X4
- 5 SATA 3.0 Gbps
- 8x USB 2.0
- Accelerated Parallel Processing, Gaming, Medical, Networking, Digital Signage, Point Of Sale, Thin Clients

Avalue Technology Inc.
PHONE +886-2-8226-2345
EMAIL sales@avalue.com.tw
WEB www.avalue.com.tw

Panel PC
APC-18W4
- AMD Embedded G-Series APU
- with AMD Radeon™ HD 6250 Graphics
- 18" Projected Capacitive Multitouch Screen
- 1Gbe, 2W Amplifier
- 1CF, 2 USB, 1 COM, 1 Mini PCIe
- Wide Voltage 12V-28V Input, EEP Power
- Over Current & Surge Protection
- Backlight controlled by PWM, Timer-Power-on
- Programmable Function Key

Avalue Technology Inc.
PHONE +886-2-8226-2345
EMAIL sales@avalue.com.tw
WEB www.avalue.com.tw
Panel PC
FPC-08WA4
- AMD Embedded G-Series APU
- AMD A50M Controller Hub
- 1x SODIMM DDR3, Max up to 4GB
- 1x HDMI
- 1x RS-232, 1x RS-232 or Optional RS-422/485
- 3x USB 2.0
- Communications, Point Of Sale, Thin Clients

Avalue Technology Inc.
PHONE +886-2-8226-2345
FAX +886-8226-2777
EMAIL sales@avalue.com.tw
WEB www.avalue.com.tw

Ultra Slim Industrial Computer
ASM-AS0M-40E
- AMD Embedded G-T40E APU
- with AMD Radeon™ HD 6250 Graphics
- AMD A50M Controller Hub Chipset
- Onboard 2GB DDR3 1066 SDRAM and One 204-pin SODIMM Up to 6GB
- Dual Display Output: VGA, HDMI
- 7.1CH Audio, Dual GbE
- 1CF, 1 SATA, 2 COM, 4 USB
- ErP/EuP 2.0 compliant

Avalue Technology Inc.
PHONE +886-2-8226-2345
FAX +886-8226-2777
EMAIL sales@avalue.com.tw
WEB www.avalue.com.tw

COM Express Module
ESM-A50
- AMD Embedded G-T56N APU
- with AMD Radeon™ HD 6220 Graphics
- Also supports AMD G-T40E APU with AMD Radeon™ HD 6250
- AMD A50M Controller Hub
- Two 204-pin DDR3 SODIMM Up to 8GB DDR3 1066/1333 SDRAM
- Dual View, Dual-Channel 18/24-bit LVDS
- GbE
- 4 SATA, 8 USB, 8-bit GPIO
- Pin-out Type 6

Avalue Technology Inc.
PHONE +886-2-8226-2345
FAX +886-8226-2777
EMAIL sales@avalue.com.tw
WEB www.avalue.com.tw

Industrial Panel PC
LPC-10/12/15/17
- AMD Embedded G-T40E APU
- with AMD Radeon™ HD 6250 Graphics
- 9"/10"/12"/15"/17" 5-wire Resistive Touch Screen
- VGA/HDMI, Audio, GbE, optional WiFi
- 1CF, 2 COM, 4 USB
- Fanless operation, VESA Compliance
- IP-65 Compliant Front Panel
- High Brightness, Anti-scratch Panel (option)
- Compatible installation/mounting Accessories

Avalue Technology Inc.
PHONE +886-2-8226-2345
FAX +886-8226-2777
EMAIL sales@avalue.com.tw
WEB www.avalue.com.tw

Custom Board
GA690-2r
- AMD Embedded G-Series APU
- AMD A50M Controller Hub
- 1x SODIMM DDR3 1066/80, Max up to 4GB
- 1x SATA, 3.0Gbps, 3.0 compliant
- 5x TypeA USB 2.0
- Thin Clients

Centerm Information Co., Ltd.
PHONE 0591-28053888-8757
FAX 0591-83057710
EMAIL ctsales@centerm.com
WEB www.centerm.com.cn

Industrial Computer
Modular Thin Platform DT135D
- AMD Embedded G-Series APU Platform
- High performance with low power consumption
- Support for Linux, Microsoft® Windows® XP Embedded or Windows® Embedded Standard 7
- 7 video-out ports: 1 DVI-I connector and 1 VGA Port
- Fanless design; no moving parts
- Integrates major thin-client/server computing protocols (Citrix ICA, Microsoft RDP) and web browsers
- Comprehensive remote device administration through server-based WebDT Device Manager software

DT Research, Inc.
PHONE (408) 934-6220
FAX (408) 934 6222
EMAIL info@dtresearch.com
WEB www.dtresearch.com
Mini-ITX Single Board Computer D3003-S
- AMD Embedded G-Series APU
- HD Audio on board
- Dual GbE LAN on board
- Serial ATA III RAID on board
- mSATA socket support (for Embedded OS) onboard
- USB 2.0 onboard
- 8 Bit GPIO onboard
- Intel® TPM V1.2 onboard
- Designed for fanless operation
- Mainboard ready for EuP

Fujitsu
PHONE +49 821 804 3387
WEB www.ts.fujitsu.com
EMAIL Thomas.Stanik@ts.fujitsu.com

Custom Board FUTRO X913
- AMD Embedded G-Series APU
- 2x SODIMM DDR3 1600/1333/1066 MHz, Max up to 4GB
- 2x Left side USB 2.0, 2x Rear USB 2.0, 2x Internal USB 2.0
- 1x DVI-I 1920 x 1200
- Thin Clients

Fujitsu
PHONE +49 821 804 3387
WEB www.ts.fujitsu.com
EMAIL Thomas.Stanik@ts.fujitsu.com

Custom Board FUTRO X913-T
- AMD Embedded G-Series APU
- 2x SODIMM DDR3 1600/1333/1066 MHz, Max up to 4GB
- 2x Left side USB 2.0, 2x Rear USB 2.0, 2x Internal USB 2.0
- 1x DVI-I 1920 x 1200
- Thin Clients

Fujitsu
PHONE +49 821 804 3387
WEB www.ts.fujitsu.com
EMAIL Thomas.Stanik@ts.fujitsu.com

Industrial Computer JBC361F35
- AMD Embedded G-Series APU
- AMD AS50M Controller Hub
- Support DirectX 11 3D Graphics Acceleration
- Support 2 * Gigabit LAN
- Equipped with 802.11 b/g/n WiFi card & Internal Antenna (JBC361F35W-B only)
- Support 2.5" SATA HDD
- Small size and provide VESA mount bracket
- Gaming, Digital Set Top Boxes, Digital Signage, Point Of Sale, Thin Clients

Fujitsu
PHONE +49 821 804 3387
WEB www.ts.fujitsu.com
EMAIL Thomas.Stanik@ts.fujitsu.com

Mini-ITX Single Board Computer NF81-T56N
- AMD Embedded G-T56N APU with AMD Radeon™ HD 6320 Graphics
- Silent fan, silent drivers
- 6x SATA, 6.0Gb/s, 3.0 compliant, 1 port is m-SATA connector
- Designed for Digital Signage and Gaming machine applications

Fujitsu
PHONE +49 821 804 3387
WEB www.ts.fujitsu.com
EMAIL Thomas.Stanik@ts.fujitsu.com

Digital Gaming System QXI-200
- AMD Embedded G-Series APU
- AMD AS55 Controller Hub
- 2x DDR3-1333 (PC3-10600) SODIMM sockets
- 1x DVI-I (Analogue or digital), 1x DVI-D (digital)
- 2x PCI Express® Gigabit LAN controllers
- 4x USB 2.0 ports
- Cost effective, compact “all-in-one” gaming platform

Fujitsu
PHONE +49 821 804 3387
WEB www.ts.fujitsu.com
EMAIL Thomas.Stanik@ts.fujitsu.com

JETWAY Information Co., Ltd
PHONE +886 2 89132711
EMAIL louis.chang@jetway.com.tw
WEB www.jetway.com.tw

JETWAY Information Co., Ltd
PHONE +886 2 89132722
EMAIL louis.chang@jetway.com.tw
WEB www.jetway.com.tw

Quixant UK Ltd
PHONE +44 (0) 1223 892350
EMAIL sales@quixant.com
WEB www.quixant.com

Quixant UK Ltd
PHONE +44 (0) 1223 892401
EMAIL sales@quixant.com
WEB www.quixant.com
Big Data analytics and cloud storage have emerged as core applications in the enterprise IT domain, enabling users to harness huge data sets across a distributed network of servers and storage arrays for a wide range of business purposes. With this decentralization of hardware infrastructure, new approaches to storage networking and the underlying processing platforms are needed.

Conventional storage arrays and servers are typically architected around centralized controllers or boards that process the aggregate storage I/O via general purpose CPUs. In these systems, the processor is the main bottleneck of data flows to and from the system, so system vendors design in the highest performing CPUs they can, adding significant expense and power consumption in the process.

Silvercor’s approach is to decentralize storage hardware infrastructure, giving IT administrators the flexibility to deploy storage resources incrementally in ‘building block’ fashion wherever these resources are needed in the distributed network. By equipping each individual Silvercor disk drive with a high-performance, power efficient multicore AMD Embedded APU, the aggregate number of processor cores in the storage network can exceed the amount of cores within legacy storage systems, allowing users to process more data at the same rate or faster - at less cost, and with lower power consumption.

Utilizing AMD Embedded G-Series Accelerated Processing Units (APUs), Silvercor has pioneered a new category of enterprise storage with the introduction of a new class of hard disk drives (HDDs) and solid state drives (SSDs) that harness the full capabilities of a Storage Area Network (SAN) in a single 3.5” drive. With integrated Ethernet connectivity, native virtualization support, outstanding energy efficiency and a high performance AMD-enabled multicore processing platform, Silvercor’s family of Refugio, Vulcan and Magnum disk drives enables users to implement a full-featured, ultra-scalable SAN with minimal upfront investment.

A SAN IN THE PALM OF YOUR HAND
From expensive, monolithic storage arrays to commodity servers with direct attach storage (DAS) architectures, legacy enterprise storage systems can add considerable cost, management complexity and power consumption to Big Data and cloud storage-optimized IT infrastructure. With AMD Embedded G-Series APUs (Accelerated Processing Units) at the heart of its disk drive portfolio, Silvercor is helping storage administrators achieve enterprise-class storage performance and versatility via a highly scalable and extremely cost effective platform. Among the many benefits offered with this solution:

**Extreme Flexibility and Affordability** – Start implementing a SAN with a single disk drive and add additional drives as storage performance and capacity requirements evolve – with little or no downtime or disruption – helping to provide a low total cost of ownership.
AMD EMBEDDED SOLUTIONS FOR ENTERPRISE STORAGE

AMD Embedded APUs are well-suited for enterprise storage systems and components requiring an optimal balance of processing performance, scalability, and low power consumption in a small footprint. For SAN, NAS, DAS and next generation networked storage architectures in physical, virtual and cloud-based computing environments, AMD APUs provide a powerful, reliable processing platform that maximizes storage IO with minimal design complexity.

Low Power Consumption – Utilizing Power over Ethernet (PoE), Silvercor disk drives use less power than comparable solutions without sacrificing processing performance.

Built-in Virtualization Support – The ability to run virtual machines (VMs) natively on a Silvercor disk drive helps enable granular provisioning at the disk drive level for diverse workloads and/or multi-tenant usage.

Simplified Management and Interoperability – Offering iSCSI VM compliant and out-of-the-box Windows Server® and Linux® support, Silvercor disk drives require no specialized training to get started. Users can configure and provision storage, and manage and monitor logical volumes and LUNs, using standard cloud management tools to deploy VMs on a large scale.

Optimized Support for Big Data and Cloud Storage Applications – With a multicore AMD G-Series processor embedded locally in each individual Silvercor drive, optimal performance is virtually assured for distributed, scale-out computing architectures. Hadoop and OpenStack Swift run natively on the disk drive, minimizing performance degradation of the cluster when adding or replacing nodes. Additionally, Silvercor’s innovative caching solution helps enable operators to achieve challenging performance and service level objectives.

AMD APUS FOR NEXT-GENERATION STORAGE SYSTEM ARCHITECTURES

AMD Embedded G-Series APUs enabled Silvercor’s design team to achieve aggressive design and functionality goals, at a lower cost than other processing platforms that perform comparably. Offering seamless interoperability with the rich ecosystem of industry-standard x86 software, drivers and tools, and supported by AMD’s expert technical support team, AMD Embedded G-Series APUs provide Silvercor with a host of benefits:

High Performance Processing – The combination of a general purpose CPU and discrete-class GPU on a single silicon die assists in high-speed parallel processing that dramatically improves the performance of each individual Silvercor disk drive ‘node.’

Ultra Compact Form Factor – The AMD G-Series APU’s two-chip architecture – the APU and the companion controller hub – simplifies design complexity through a reduction in board layers, allowing Silvercor’s designers to architect extremely dense 3.5” disk drive systems that can be configured 12 across in a standard 19” rack.

Low Power Consumption – Supporting thermal design power (TDP) profiles from 5.5 W to 18 W, AMD G-Series APUs are an optimal fit for Silvercor’s advanced POE power distribution approach, and help to lower system-level heat generation considerably.

The information presented in this document is for informational purposes only and may contain technical inaccuracies, omissions and typographical errors. AMD reserves the right to revise this information and to make changes from time to time to the content hereof without obligation of AMD to notify any person of such revisions or changes.

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Mini PC Solution
SP-FT1M1
- AMD Embedded G-Series APU
- AMD ASOM Controller Hub
- 500MB, 6GB, DDR3, 1x 1033/1066/800
- 320 GB SATA 2.5” Hard Drive (Optional)
- 1x HDMI, 1x VGA
- 0.5L: 19.3 x 14.8 x 2.2cm (L / W / H)
- Digital Signage, Point Of Sale, Thin Clients

Sapphire Technology Limited
PHONE 88622670685
EMAIL embedded@sapphinetech.com
WEB www.sapphirotech.com

Nano-ITX Single Board Computer
K-A8HD
- AMD Embedded G-Series APU
- Able to drive two independent monitors using VGA/HDMI/LVDS
- Support 3G and onboard SIM interface
- Support 1*Mini PCIe+1*DDR3-500MM
- Small size and full function
- Communications, Industrial Controllers, Medical, Digital Signage, Thin Clients

Shenzhen Comstar Technology Co., Ltd.
PHONE (86) (0) 13590253820
EMAIL Frank.yuan@cst-tek.com
WEB www.cst-tek.com

Custom Board
IM-AMD-Ontario
- AMD Embedded G-Series APU
- AMD ASOM Controller Hub
- 500MB, 4GB, DDR3, 1x 1033/1066/800
- 2x TypeA, USB 2.0, Host, Front
- 3x TypeA, USB 2.0, Host, Back
- 1x Header, USB 2.0, Host, Internal
- 3x SATA, 3.0Gbps, 3.0 compliant
- Information Appliance, Industrial Controllers, Medical, Digital Set Top Boxes, Digital Signage, Point-of-Sale, Thin Clients

Shenzhen i-long Business Machine Co., Ltd.
PHONE 86-755-8287013
FAX 86-755-82874781
WEB i-long.en.gongchang.com

Giada Mini PC A51
- AMD Embedded G-Series APU
- AMD ASOM Controller Hub
- 1x SO DIMM DDR3 1066/800, Max up to 2GB
- 4x TypeA USB 2.0, 1 x TypeA USB 3.0
- 1x HDMI 1366 x 76
- Server, Information Appliance, Storage, Medical, Digital Signage, Point Of Sale, Thin Clients, Other

Shenzhen JIEHE TECHNOLOGY DEVELOPMENT
PHONE (408) 235-8582
EMAIL eric.chang@giadatech.com
WEB www.giadatech.com

Mini-ITX
ITX-AF2X21B
- AMD Embedded G-Series APU
- AMD ASOM Controller Hub
- 1x DIMM DDR3 1066/800, Max up to 8GB
- 4x TypeA USB 2.0 Host, 2x Header USB 2.0 Host
- 5x SATA 3.0 Gbps
- 2x Mini-PCIE X1, 1x PCIE X1
- 1x DVI 1280 x 720
- Accelerated Parallel Processing, Gaming, Medical, Networking, Digital Signage, Point Of Sale, Thin Clients

Shenzhen XINZHIXIN ENTERPRISE DEVELOPMENT CO., LTD
PHONE 86 0755 83663196
EMAIL sale@kzz.net.cn
WEB www.micputer.com

Mini-ITX
ITX-AF2X62A
- AMD Embedded G-Series APU
- AMD ASOM Controller Hub
- 2x SO DIMM DDR3 1333/1066/800, Max up to 8GB
- 4x TypeA USB 2.0 Host, 4x Header USB 2.0 Host
- 6x SATA 3.0 Gbps, 2.0 compliant
- 2x Mini-PCIE X1
- 1x HDMI 2560 x 1600
- Gaming, Storage, Medical, Digital Set Top Boxes, Single Board Computers, Digital Signage, Point Of Sale, Thin Clients

Shenzhen XINZHIXIN ENTERPRISE DEVELOPMENT CO., LTD
PHONE 86 0755 83663196
EMAIL sale@kzz.net.cn
WEB www.micputer.com
Mini-ITX Motherboard
ITX-AF2X62B
- AMD Embedded G-Series APU
- AMD AS50M Controller Hub
- 2x desk pc DDR3 1066MHz, Max up to 8GB
- 5x SATA 3Gb/s
- 2x MINI PCI-E slot, 1x PCI-E 1x
- 8x USB 2.0
- 1x VGA port, 1x HDMI port
- Industrial Controllers, Storage, Digital Set Top Boxes, Digital Signage, Thin Clients

Mini-ITX Motherboard
ITX-AF2X62B
- AMD Embedded G-Series APU
- AMD AS50M Controller Hub
- 2x desk pc DDR3 1066MHz, Max up to 8GB
- 5x SATA 3Gb/s
- 2x MINI PCI-E slot, 1x PCI-E 1x
- 8x USB 2.0
- 1x VGA port, 1x HDMI port
- Industrial Controllers, Storage, Digital Set Top Boxes, Digital Signage, Thin Clients

Mini-ITX Motherboard
ITX-AF2E21C
- AMD Embedded G-Series APU
- AMD AS50M Controller Hub
- 2x SD DIMM DDR3 1066/1333MHz, Max up to 8GB
- 2x SATA 3Gb/s
- 2x MINI PCI-E slot (1 pcs for wifi, 1 pcs for SSD)
- 8x USB 2.0
- 1x VGA port, 1x DVI port

Mini-ITX Motherboard
ITX-A35E21A
- AMD Embedded G-Series APU
- AMD AS50M Controller Hub
- 2x SD DIMM DDR3 1066/1333MHz, Max up to 8GB
- 2x SATA 3Gb/s
- 2x MINI PCI-E slot (1 pcs for wifi, 1 pcs for SSD)
- 8x USB 2.0
- 1x VGA port, 1x DVI port
- Gaming, Digital Set Top Boxes, Single Board Computers, Digital Signage, Point Of Sale, Thin Clients

SHENZHEN XINZHIXIN ENTERPRISE DEVELOPMENT CO.,LTD
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EMAIL sale@xzx.net.cn

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WEB www.micputer.com
EMAIL sale@xzx.net.cn

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WEB www.micputer.com
EMAIL sale@xzx.net.cn

SHENZHEN XINZHIXIN ENTERPRISE DEVELOPMENT CO.,LTD
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WEB www.micputer.com
EMAIL sale@xzx.net.cn

SHENZHEN XINZHIXIN ENTERPRISE DEVELOPMENT CO.,LTD
PHONE 86 0755 83663196
WEB www.micputer.com
EMAIL sale@xzx.net.cn
Mini-ITX Motherboard
**ITX-AF2X21D**

- AMD Embedded G-Series APU
- AMD A50M Controller Hub
- 1x SO DIMM DDR3 1066/1333MHz, Max up to 4GB
- 2x SATA 3Gb
- 2x MINI PCIe-E slot (1 pcs for wifi, 1 pcs for SSD)
- 6x USB 2.0
- 1x VGA port, 1x HDMI port
- Industrial Controllers, Digital Set Top Boxes, Digital Signage, Thin Clients

_Nano-ITX Single Board Computer NANO-AF2S1A_

- AMD Embedded G-Series APU
- AMD A50M Controller Hub
- 1x SO DIMM DDR3 1066/800, Max up to 4GB
- 4x TypeA USB 2.0 Host, 1x Header USB 2.0 Host
- 1x SATA 3.0 Gbps, 2.0 compliant
- 1x Mini-PCIe X1
- 1x HDMI 1920 x 1080, 1x HDMI 1280 x 1024
- Digital Set Top Boxes, Single Board Computers, Digital Signage, Point Of Sale, Thin Clients

_Shenzen Xinzhixin Enterprise Development Co., Ltd._

**Phone**: 86 0755 83663196  
**Email**: sale@xz.net.cn  
**Web**: www.micputer.com

NANO-AITX Single Board Computer

**UMB-AFEI01**

- AMD Embedded G-Series APU
- AMD A50M Controller Hub
- 1x SO DIMM DDR3 1066/1333MHz, Max up to 4GB
- 4x SATA 3.0Gbps, 2.0 compliant
- 1x Mini-PCIe X1
- 1x HDMI 1920 x 1080, 1x HDMI 1280 x 1024
- Digital Set Top Boxes, Single Board Computers, Networking, Digital Signage, Point Of Sale, Thin Clients

_Shenzen Xinzhixin Enterprise Development Co., Ltd._

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**Email**: sale@xz.net.cn  
**Web**: www.micputer.com

3.5”

**Refugio/Vulcan/Magnum Series**

- AMD Embedded G-Series APU
- Ethernet Flash drive with iSCSI protocol built in.
- POE powered from standard Network switch.
- Single 1G, dual 1 Gigan and dual 10 Gig.
- Flash capacities up to 1TB/byte.
- Management software
- SAN, NAS, Object Storage and Hadoop

_Silvercor_

**Phone**: (408) 426-4428  
**Email**: info@silvercor.com  
**Web**: www.silvercor.com

_Suzhou UET Electronics Co. Ltd._

**Phone**: 0512 87185616 13962146197  
**Email**: dm@uetcn.com.br  
**Web**: www.uetcn.com

_PAGE 24 | JULY 2014 AMD EMBEDDED SOLUTIONS GUIDE_
The 2nd Generation AMD Embedded R-Series APU (previously codenamed “Bald Eagle”) delivers breakthrough graphics performance and power efficiency for a new generation of embedded systems designed to provide ultra-immersive HD multimedia experiences and parallel processing compute performance. The AMD R-Series APU offers next-generation performance-per-watt compute efficiency in the x86 product category by allowing system designers to take advantage of Heterogeneous System Architecture (HSA).

2nd Generation AMD Embedded R-Series APUs enable stunningly crisp 3D, 4K, and HD video content and offer support for up to four independent displays (4096 x 2160 resolution per display output). The AMD Dual Graphics configuration allows you to combine the power of the 2nd Generation AMD R-Series APU with an AMD Embedded Radeon™ E8860 discrete GPU to provide up to 64% more 3D graphics performance than a standalone 2nd Generation AMD R-Series APU.

AMD’s 2nd Generation AMD Embedded R-Series APU is a revolutionary leap in processing performance, power efficiency and multimedia immersion, well-suited for embedded gaming, medical imaging, digital signage and other embedded applications.

### Model Specifications

<table>
<thead>
<tr>
<th>Model#</th>
<th>OPN</th>
<th># x86 Cores</th>
<th># GPU CU</th>
<th>TDP</th>
<th>L2 Cache (MBytes)</th>
<th>CPU Frequency (GHz) Max/Base</th>
<th>GPU (MHz) Max/Base</th>
<th>Memory</th>
<th>Max DDR3 Rate</th>
<th>CTDP Range</th>
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<tr>
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<td>RE427BDGH44JA</td>
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<td>2133</td>
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<td>6</td>
<td>35W</td>
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<td>3.4/2.5</td>
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<td>1866</td>
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<td>2133</td>
<td>30W-35W</td>
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<tr>
<td>RX-219NB</td>
<td>RE219NECH23JA</td>
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<td>0</td>
<td>17W</td>
<td>1</td>
<td>3.0/2.2</td>
<td>-</td>
<td>DDR3</td>
<td>1600</td>
<td>15W-17W</td>
</tr>
</tbody>
</table>

1. AMD Dual Graphics technology combines the 3D graphics rendering resources of the APU’s discrete-class graphics processor with the discrete graphics processor to accelerate the Microsoft® Direct3D function for software applications using Microsoft DirectX® 10 or DirectX 11 technology.
2. The AMD RX-427BB scored 2,051, and the AMD Radeon™ E8860 paired with RX-427BB at dual-graphics mode scored 3,359 when running 3DMark®11P benchmark. The AMD Bald Eagle RX-427BB used an AMD Ballina motherboard with 8GB DDR3 SO-DIMM memory and 256GB SanDisk HDD. The AMD Radeon E8860 used an AMD DB-FS1r2 motherboard with 8GB DDR3 memory, 64GB Crucial M4 HDD, and RX-427BB. The system ran Windows® 7 Ultimate. EMB-97.

Note: Always refer to the processor/chipset data sheets for technical specifications. Feature information in this document is provided for reference only.
**Advantech**

**micro-ATX Motherboard**  
**GMB-A75**  
- AMD Embedded R-Series APU  
- AMD Radeon™ HD 7000G Series Graphics integrated  
- AMD A75 Controller Hub  
- DDR3 Dual channel - support up to 4GB  
- USB 3.0 x 4, 2 x USB 2.0  
- Dual SATA 3.0 Gb/s  
- Built-in RAID 0,1,5,10  
- 3 independent displays: HDMI, DVI-D, VGA  
- Gaming, Information Appliance, Digital Signage, Point of Sale

**Advantech-Innocore**

**Digital Gaming SBC**  
**DPX-S430**  
- AMD Embedded R-Series APU  
- AMD Radeon™ HD 7000G Series Graphics integrated  
- AMD A75 Controller Hub  
- Quad and Dual Core APUs  
- Comprehensive Gaming features  
- High performance integrated on PCI-Express graphics  
- Up to 4 independent displays from the chipset  
- Low power consumption  
- Small format

**AEWIN Technologies Co., Ltd.**

**Industrial Computer**  
**GA-5010**  
- AMD Embedded R-Series APU  
- AMD A75 Controller Hub  
- PCIe x16 slot + mini PCIe/mSATA slot  
- USB 3.0 x 4 + USB 2.0 x 8  
- Two SATA 3.0 + one SD, or optional onboard NANDrive  
- Up to 4 digital displays: HDMI + 3 x DVI-D  
- Optional ODM module memory 6 GB  
- expansion for specific applications  
- Gaming, Industrial Controllers, Single Board Computers

**Aopen Inc.**

**MiniITX Single Board Computer**  
**MANO111**  
- AMD Embedded R-Series APU  
- AMD Radeon™ HD 7000G Series Graphics integrated  
- AMD A75 Controller Hub  
- DDR3 Dual channel 50 - DIMM  
- 1333/1600 max. up to 16 GB  
- 4 SATA - 600 support RAID 0,1,5,10  
- 4 USB 3.0 supported  
- 3 independent displays  
- DisplayPort 2 supports multi-stream  
- Gaming, Communications, Industrial Controllers, Medical, Digital Signage, Point Of Sale

**Axiomtek**

**Digital Engine**  
**DE6140**  
- AMD Embedded R-Series APU  
- AMD A70 Controller Hub  
- USB 2.0 Port: + 2  
- DDR3 600 - DIMM x 2  
- HDMI Port: x 4  
- GbEATA port: x 2  
- Purpose-built for powering video walls and displaying dynamic content on multiple displays

**Axiontek-Innocore**

**COM Express / Type 6 congA-TFS**  
- AMD Embedded R-Series APU  
- AMD Radeon™ HD 7000G Series Graphics integrated  
- AMD A70 Controller Hub  
- 500MM, 16GB, DDR3, 2x 1066/800  
- 7 x PCI Express™  
- 4 x SATA  
- 4 x USB 3.0, 4 x USB 2.0  
- High performance DirectX™11 GPU supports OpenGL® 4.2  
- Gaming, Server, Information Appliance, Communications, Industrial Controllers, Medical, Digital Signage

**Congatec Inc.**
COM Express Compact R2.0, Type 6 CM901-B
- AMD Embedded R-Series APU
- AMD Radeon™ HD 7000G Series Graphics integrated
- AMD A70 Controller Hub
- 2 DDR3 512MB up to 8GB
- VCA, LVDS, DDI (DisplayPort, LVDS, VGA)
- 1 PCl-e x16, 7 PCl-e x1 (first 4 PCl-e support PCl-e x4)
- 4 SATA 3.0
- 8 USB 2.0 (first 4 USB ports support up to USB 3.0)
- Gaming, Information Appliance, Industrial Controllers, Medical, Digital Signage, Point Of Sale

Mini-ITX Motherboard CM100-C
- AMD Embedded R-Series APU
- AMD Radeon™ HD 7000G Series Graphics integrated
- AMD A70 Controller Hub
- 2 DDR3 512MB up to 8GB
- HDMI 2DVI (supports DVI-D signal), 1LVDS
- 1 PCl-e x16, 2 PCl-e x1 gold fingers, 1 Mini PCl-e
- 4x SATA 3.0
- 4x USB 3.0, 6x USB 2.0
- Gaming, Industrial Controllers, Medical, Digital Signage, Point Of Sale

DFI
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WEB www.dfi.com

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EMAIL sales@dfitech.com
WEB www.dfi.com

Mini-ITX Motherboard MI959
- AMD Embedded R-Series APU
- AMD Radeon™ HD 7000G Series Graphics integrated
- AMD A75 Controller Hub
- 2 x DDR3-1600 Memory, up to 16GB Dual Channel
- 1 x DVI-, DVI-D, Display Port & LVDS
- 2 x Mini PCI-E(x1), PCI-E(x16)
- 4 x USB 3.0 + 8 USB 2.0
- Server, Communications, Industrial Controllers, Medical, Networking, Digital Signage, Point of Sale

Digital Signage Player SI-38
- AMD R-Series Quad-Core / Dual-Core APU, up to 35W
- Integrated AMD Radeon™ 384/240 Cures
- DirectX® 11 GPU in Processor
- Winner of Computex 2012 Design & Innovation Award
- Dual independent 1080p Hybrid DVI-I display outputs
- Supports DDR3 memory up to 16GB
- iSMART - for EuP/ErP power saving, auto-scheduler and power resume
- Dual Mini PCI-E(x1) slots for WiFi and TV tuner options
- 2x USB 3.0 and serial port (RS232)

iBASE
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FAX +886-2-2655-7388
EMAIL sales@iBASE.com.tw
WEB www.iBASE-usa.com

IBASE
PHONE +886-2-2655-7588
FAX +886-2-2655-7388
EMAIL sales@iBASE.com.tw
WEB www.iBASE-usa.com

COM Express Compact Module MSC C6C-A7
- AMD Embedded R-Series APU
- AMD A75 Controller Hub
- Up to 16GB DDR3-1333 SDRAM, dual channel
- 4X SATA 3.0 mass storage interfaces
- 1x, LVDS 2 Channel
- 1x, DVI/HDMI/DisplayPort, 4096 x 2560
- 4X USB 3.0, 4X USB 2.0
- Gaming, Information Appliance, Industrial Controllers, Medical, Digital Signage, Point Of Sale

JETWAY Information Co., Ltd.
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FAX +886 2 89132722
EMAIL louis.chang@jetway.com.tw
WEB www.jetway.com.tw

MSC Vertriebs GmbH
PHONE 49-8165-906-240
FAX 49-72-49-79-93
EMAIL boards@msc-ge.com
WEB www.msc-ge.com
**Multi-Display Embedded Computer**

**NDiS B862**

- AMD Embedded R-Series APU
- AMD A70 Controller Hub
- Slim and compact design
- 6 x HDMI
- 2 x USB3.0 support
- WLAN and TV tuner support
- Removable Fan Module
- Designed for Digital Signage

**Nexcom**

PHONE (510) 656-2248  
FAX (510) 656-2158  
EMAIL marketing@nexcom.com  
WEB www.nexcom.com

---

**Digital Gaming System**

**QX-40**

- AMD Embedded R-Series APU
- AMD Radeon™ HD 6650 Graphics integrated
- AMD A75 Controller Hub
- SODIMM, 8GB, DDR3, 2x 1600/1333/1066
- OpenCL 1.1, DirectX 11, OpenGL 4.1, NVIDIA® 11 compatible
- Advanced PCI Express® gaming logic 6 SRAM / MRAM
- Support for up to 10 independent monitors
- 2x DisplayPort, 2x DVI
- 1x HDMI
- 4x USB 2.0, Host
- 4x USB 2.0, Host
- 4x SATA, 6.0Gbps, 3.0 compliant, 2 x CFast sockets

**Quixant**

PHONE +44 (0) 1223 89296  
FAX +44 (0) 1223 892401  
EMAIL sales@quixant.com  
WEB www.quixant.com

---

**Digital Gaming System**

**QX-50**

- 2nd Generation AMD Embedded R-Series APU
- 4x DDR3-1333 (PC3-10600), Max up to 16GB
- 2x USB 3.0, 1x USB 2.0 (4 internal, 7 on BP board)
- 1x DisplayPort, 1x DVI, 1x HDMI
- 4x SATA, 6.0Gbps, 1x SATA, 6.0Gbps
- 4x PCIe
- Gaming

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FAX +44 (0) 1223 892401  
EMAIL sales@quixant.com  
WEB www.quixant.com

---

**Digital Gaming System**

**QXI-4000**

- AMD Embedded R-Series APU
- AMD Radeon™ HD 7000 Series Graphics integrated
- AMD A70 Controller Hub
- Fanless all-in-one PC-based gaming controller for slot machines
- Supports up to four independent HD monitors
- Advanced PCI Express® gaming logic 5 SRAM / MRAM
- 4x DisplayPort, 2560 x 1600
- 4x DisplayPort, 1920 x 1080
- 5x TypeA USB 2.0, Host
- 4x SATA, 6.0Gbps, 3.0 compliant, 2 x CFast sockets

**Quixant**

PHONE +44 (0) 1223 89296  
FAX +44 (0) 1223 892401  
EMAIL sales@quixant.com  
WEB www.quixant.com

---

**Embedded System**

**SP-FP2M3**

- AMD Embedded R-Series APU
- AMD A70 Controller Hub
- SODIMM, 4-16GB, DDR3, 2x 1333/1066/800
- 1x HDMI, 1x DP, 1x DVI, 1x HDMI
- 500GB SATA 2.5” Hard Drive (Optional)
- 8.7” x 7.2” x 1.2” 197.5 x 182.5 x 31.6mm (L / W / H)
- Digital Signage, Point Of Sale, Thin Clients

**Sapphire Technology Limited**

PHONE 886226270685  
EMAIL embedded@sapphiretech.com  
WEB www.sapphiretech.com

---

**Mult-Display Embedded Computer**

**NDiS B842**

- AMD Embedded R-Series APU
- AMD A70 Controller Hub
- Slim and compact design
- 4 x HDMI
- 2 x USB3.0 support
- WLAN and TV tuner support
- Removable Fan Module
- Designed for Digital Signage

**Nexcom**

PHONE (510) 656-2248  
FAX (510) 656-2158  
EMAIL marketing@nexcom.com  
WEB www.nexcom.com

---

**Digital Gaming System**

**QX-40**

- AMD Embedded R-Series APU
- AMD Radeon™ HD 6650 Graphics integrated
- AMD A75 Controller Hub
- SODIMM, 8GB, DDR3, 2x 1600/1333/1066
- OpenCL 1.1, DirectX 11, OpenGL 4.1, NVIDIA® 11 compatible
- Advanced PCI Express® gaming logic 6 SRAM / MRAM
- Support for up to 10 independent monitors
- 2x DisplayPort, 2x DVI
- 1x HDMI
- 4x USB 2.0, Host
- 4x SATA, 6.0Gbps, 3.0 compliant, 2 x CFast sockets

**Quixant**

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FAX +44 (0) 1223 892401  
EMAIL sales@quixant.com  
WEB www.quixant.com

---

**Digital Gaming System**

**QX-50**

- 2nd Generation AMD Embedded R-Series APU
- 4x DDR3-1333 (PC3-10600), Max up to 16GB
- 2x USB 3.0, 1x USB 2.0 (4 internal, 7 on BP board)
- 1x DisplayPort, 1x DVI, 1x HDMI
- 4x SATA, 6.0Gbps, 1x SATA, 6.0Gbps
- 4x PCIe
- Gaming

**Quixant**

PHONE +44 (0) 1223 89296  
FAX +44 (0) 1223 892401  
EMAIL sales@quixant.com  
WEB www.quixant.com
**Mini-ITX**
**IPC-F512A75**
- AMD Embedded R-Series APU
- AMD A75 Controller Hub
- 2x DDR3 SO-DIMM, Max. 16GB (Non-ECC)
- 2x Type A USB 3.0, 4x Type A USB 2.0, 2x Header USB 2.0
- 1x PCI-E(x4), 2x Mini PCI-E(x1), (one with mSATA)
- 4x HDMI, 5x DisplayPort
- Accelerated Parallel Processing, Gaming, Information Appliance, Digital Signage, Other

**Sapphire Technology Limited**
**PHONE** 886226270685  
**EMAIL** embedded@sapphiretech.com  
**WEB** www.sapphiretech.com

---

**Mini-ITX**
**WTM-A4**
- AMD Embedded R-Series APU
- AMD A70 Controller Hub
- 2x DIMM DDR3 1600/1333/1066, Max up to 8GB
- 8x USB 2.0, 3x USB 3.0
- 1x Mini-PCIe
- 4x DVI
- Gaming, Digital Signage

**Shenzhen IPCWTM Technology Co., Ltd.**
**PHONE** +8613927447156  
**EMAIL** cy@ipcwtm.com  
**WEB** www.ipcwtm.com

---

**Mini-ITX**
**SECOMExp-Rseries**
- AMD Embedded R-Series APU
- AMD A70 Controller Hub
- Up to 8GB of 1600MHz DDR3 on two SO-DIMMs
- Able to drive up to 4 independent monitors using the LVDS / CRT / Digital Display interfaces
- Offering a PCI Express Graphics x8 interface
- 4x 5-ATA Channels 6Gb/s
- 8x USB 2.0 ports; 4 x USB 3.0 ports
- Gaming, Digital Signage

**Seco**
**PHONE** +39 0575 26979  
**EMAIL** info@seco.com  
**WEB** www.seco.com

---

**Mini-ITX**
**IPC-FS1r2A75**
- AMD Embedded R-Series APU
- AMD A75 Controller Hub
- 2x DDR3 SO-DIMM, Max. 16GB (Non-ECC)
- 2x TypeA USB 3.0, 4x TypeA USB 2.0, 2x Header USB 2.0
- 1x PCI-E(x4), 2x Mini PCI-E(x1), (one with mSATA)
- 4x HDMI, 5x DisplayPort
- Accelerated Parallel Processing, Gaming, Information Appliance, Digital Signage, Other

**Shenzhen Xinzhixin Enterprise Development Co.,Ltd**
**PHONE** 86 0755 83663196  
**EMAIL** sale@xzx.net.cn  
**WEB** www.micputer.com

---

**Mini-ITX**
**ITX-AT2X21B and ITX-AT2X21B-1**
- AMD Embedded R-Series APU
- AMD A70 Controller Hub
- 1x SO DIMM DDR3 1066/1333MHz, Max up to 8GB
- 2x SATA 3Gb/s with power
- 2x MINI PCI-E slot (1 pcs for wifi, 1 pcs for SSD)
- 4x USB 2.0
- 1x HDMI port, 3x DVI port
- Industrial Controllers, Digital Set Top Boxes, Digital Signage, Point Of Sale, Thin Clients

**Shenzhen Xinzhixin Enterprise Development Co.,Ltd**
**PHONE** 86 0755 83663196  
**EMAIL** sale@xzx.net.cn  
**WEB** www.micputer.com

---

**Mini-ITX**
**ITX-AT2X21E, ITX-AT2X21F**
- AMD Embedded R-Series APU
- AMD A70 Controller Hub
- 1x SO DIMM DDR3 1066/1333MHz, Max up to 8GB
- 4x SATA 3Gb/s with power
- 2x MINI PCI-E slot (1 pcs for wifi, 1 pcs for SSD)
- 2x SIM slot
- Supports USB 3.0, 6x USB 2.0
- Supports HDMI and DVI
- Gaming, Storage, Digital Set Top Boxes, Single Board Computers, Point Of Sale

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**PHONE** 86 0755 83663196  
**EMAIL** sale@xzx.net.cn  
**WEB** www.micputer.com

---

**Mini-ITX**
**ITX-AT2X21D**
- AMD Embedded R-Series APU
- AMD A70 Controller Hub
- 1x SO DIMM DDR3 1066/1333MHz, Max up to 8GB
- 2x SATA 3Gb/s with power
- 2x MINI PCI-E slot (1 pcs for wifi, 1 pcs for SSD)
- 1x SIM slot
- Supports USB 3.0, 6x USB 2.0
- 1x HDMI port, 1x DVI port
- Gaming, Industrial Controllers, Digital Set Top Boxes, Printers, Point Of Sale, Thin Clients

**Shenzhen Xinzhixin Enterprise Development Co.,Ltd**
**PHONE** 86 0755 83663196  
**EMAIL** sale@xzx.net.cn  
**WEB** www.micputer.com

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**AMD EMBEDDED SOLUTIONS GUIDE**
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**Mini-ITX Motherboard**
**ITX-AT2X21A**
- AMD Embedded R-Series APU
- AMD A75 Controller Hub
- 1x 50 DIMM DDR3 1066/1333Mhz, Max up to 8GB
- 2x SATA 3Gb/s with power
- 2x MINI PCI-E slot (1 pcs for wifi, 1 pcs for SSD)
- 8x USB 2.0
- 1x HDMI port, 1x DVI port
- Gaming, Industrial Controllers, Single Board Computers, Digital Signage, Thin Clients

**Follow AMD Embedded Solutions on Twitter! @AMDembedded**
The AMD Embedded Radeon™ E8860 discrete GPU – the first embedded GPU developed on the groundbreaking Graphics Core Next (GCN) architecture – pushes AMD Radeon graphics and parallel processing performance to unprecedented new heights while increasing power efficiency. The AMD Radeon E8860 GPU delivers industry-leading 3D video graphics performance, enabling stunning, multi-display visual experiences for a range of embedded applications spanning digital gaming, digital signage, medical imaging, avionics, and more.

The AMD Radeon E8860 GPU supports DirectX® 11.1, OpenGL 4.2, and OpenCL™ 1.2, enabling high-performance graphics and massive parallel processing. Supporting thermal design power of 37 watts, the AMD Radeon E8860 GPU provides the optimal performance-per-watt profile for embedded applications that require outstanding multi-display experiences, superior visual quality, and massive parallel compute but have exacting power efficiency and heat dissipation requirements.

The AMD Embedded Radeon™ E8860 GPU is available in the following formats:

<table>
<thead>
<tr>
<th>OPN</th>
<th>MODEL</th>
<th>OUTPUT</th>
<th>COOLING</th>
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</thead>
<tbody>
<tr>
<td>100-CG2514</td>
<td>AMD E8860 GPU</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>100-K00190</td>
<td>AMD E8860 MXM 3.0 Type A</td>
<td>5 DisplayPort</td>
<td>Fansink</td>
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<tr>
<td>100-K00189</td>
<td>AMD E8860 MXM 3.0 Type A</td>
<td>5 DisplayPort</td>
<td>Heatpipe</td>
</tr>
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<td>100-438110</td>
<td>AMD E8860 PCIe®</td>
<td>2x DVI + mini DisplayPort</td>
<td>Fansink</td>
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<tr>
<td>100-438111</td>
<td>AMD E8860 PCIe</td>
<td>2x DVI + mini DisplayPort</td>
<td>Heatpipe</td>
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<td>AMD E8860 PCIe</td>
<td>5x mini DisplayPort</td>
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<td>100-438117</td>
<td>AMD E8860 PCIe</td>
<td>4x mini DisplayPort LPX</td>
<td>Low-power Heatsink</td>
</tr>
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</table>

1. AMD Radeon™ E8860 scored 2689 and AMD Radeon E6760 scored 1327 when running 3DMark® 11P benchmark paired with the AMD R-464L APU. AMD Radeon E8860 and AMD Radeon E6760 used an AMD DB-FS1r2 motherboard with 8GB DDR3 memory, 64GB Crucial M4 SSD, and the AMD R-464L APU. The system ran Windows® 7 Ultimate (EMB-79).
AMD

**ATX tE8860RFA**
- AMD Embedded Radeon™ E8860 GPU
- 2GB of high-speed GDDR5
- 4 Displayport outputs
- DirectX® 11.1 and Shader Model 5.0 support
- Decode support of H.264 and VC-1
- 825MHz 640 stream processors
- 128-bit GDDR5 memory, Max up to 2GB

**Sapphire E8860 4mDP-2**
- AMD Embedded Radeon™ E8860 GPU
- DirectX® 11.1 and Shader Model 5.0 support
- Dual stream HD content decoding
- H.264 encoding support
- 3.25GHz 640 stream processors
- 128-bit GDDR5 memory, Max up to 2GB

**MXM3.0 54631A**
- AMD Embedded Radeon™ E8860 GPU
- 2GB of GDDR5
- OpenCL™ 1.2, DirectCompute 11.1
- VCE (video encode), UVD4 (video decode)
- 768 / 48 GFLOPS single / double precision peak (600x/4.5Gbps)
- DP1.2, HDMI™ 1.4, Wireless Display, Stereo 3D

**TechSource**

**Condor 4000x**
- AMD Embedded Radeon™ E8860 GPU
- 2GB of high-speed GDDR5
- DirectX® 11.1, OpenCL™ 1.2, OpenGL 4.2
- 768/48 GFLOPS
- DVI-I and DisplayPort++

**TUL Corporation**

**VPX3U E8860-H264**
- AMD Embedded Radeon™ E8860 GPU
- Dedicated H.264 encoder with UDP output over GigE
- Encoder Input from GPU output or from SDI source
- 2xHD-SDI 1080p30 inputs, or 1x3G-SDI 1080p60 input
- 1xGigE Port
- RTOS drivers available
- No drivers required for H.264 encoder

**Wolf**

PHONE 905-852-1163
EMAIL sales@wolf.ca
WEB www.wolf.ca
The AMD Radeon™ E6460 embedded discrete graphics processor unit (GPU) is AMD’s entry-level embedded graphics processor, enabling rich 3D graphics and outstanding HD multimedia. The advanced 3D graphics engine and programmable shader architecture support Microsoft® DirectX® 11 technology and OpenGL 4.1 for superior graphics rendering. The third generation unified video decoder enables dual HD decode of H.264, VC-1, MPEG4 and MPEG2 compressed video streams.

Speed time to market, reduce inventory costs, and enable multiple product categories. The AMD Radeon™ E6460 GPU ball grid array (BGA) is a subset of the AMD Radeon™ E6760 GPU BGA enabling embedded system designers to develop one system for both the AMD Radeon™ E6460 GPU and the high-performance AMD Radeon™ E6760 GPU.

AMD understands the unique requirements of the embedded market. With the graphics memory integrated onto the same BGA package, the AMD Radeon™ E6460 GPU saves development time plus AMD manages memory device obsolescence. The performance, flexibility, and easy design of the AMD Radeon™ E6460 GPU provides system designers with an exciting and innovative solution for their embedded graphics applications.

### AMD Embedded GPU Specifics

<table>
<thead>
<tr>
<th>AMD Radeon™ E6460</th>
<th><strong>AMD Radeon™ E6460</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package Dimensions</strong></td>
<td>GPU + memory, 33 mm x 33 mm BGA</td>
</tr>
<tr>
<td><strong>Thermal Design Power (TDP)</strong></td>
<td>~20W</td>
</tr>
<tr>
<td><strong>Process Technology</strong></td>
<td>40 nm</td>
</tr>
<tr>
<td><strong>Graphics Engine Operating Frequency (max)</strong></td>
<td>600 MHz</td>
</tr>
<tr>
<td><strong>CPU Interface</strong></td>
<td>PCI Express® 2.1 (x1, x2, x4, x8, x16)</td>
</tr>
<tr>
<td><strong>Shader Processing Units</strong></td>
<td>2xAMD engines x 80 processing elements = 160 shaders</td>
</tr>
<tr>
<td><strong>Floating Point Performance (single precision, peak)</strong></td>
<td>192 GFLOPS</td>
</tr>
<tr>
<td><strong>3DMark™ “Vantage” Score</strong></td>
<td>2195</td>
</tr>
<tr>
<td><strong>Display Engine</strong></td>
<td>AMD App Acceleration, AMD Eyefinity &amp; AMD HD3D technologies</td>
</tr>
<tr>
<td><strong>DirectX™ capability</strong></td>
<td>DirectX® 11</td>
</tr>
<tr>
<td><strong>Shader Model</strong></td>
<td>Shader Model 5.0</td>
</tr>
<tr>
<td><strong>OpenGL</strong></td>
<td>OpenGL 4.1</td>
</tr>
<tr>
<td><strong>Compute</strong></td>
<td>AMD App Acceleration2, OpenGL™ 1.1, DirectCompute 11</td>
</tr>
<tr>
<td><strong>Unified Video Decoder (UVD)</strong></td>
<td>UVD3 for H.264, VC-1, MPEG-2, MPEG-4 part 2 decode</td>
</tr>
<tr>
<td><strong>Operating Frequency (max)</strong></td>
<td>800 MHz / 3.2 Gbps</td>
</tr>
<tr>
<td><strong>Configuration type</strong></td>
<td>64-bit wide, 512 MB, GDDR5, 25.6 GB/s</td>
</tr>
<tr>
<td><strong>Analog RGB</strong></td>
<td>1x Triple 10-bit DAC, 400 MHz</td>
</tr>
<tr>
<td><strong>Analog TV</strong></td>
<td>NA</td>
</tr>
<tr>
<td><strong>Single / Dual-Link DVI</strong></td>
<td>4x Single-Link DVI / 1x Dual-Link DVI</td>
</tr>
<tr>
<td><strong>DisplayPort 1.1a</strong></td>
<td>2x</td>
</tr>
<tr>
<td><strong>DisplayPort 1.2</strong></td>
<td>3x</td>
</tr>
<tr>
<td><strong>Single / Dual-Link LVDS</strong></td>
<td>1 x Single-Link / Dual-Link</td>
</tr>
<tr>
<td><strong>HDMI™</strong></td>
<td>1x HDMI 1.4a</td>
</tr>
<tr>
<td><strong>Number Independent Displays (max)</strong></td>
<td>Up to 2 display outputs from VGA, Single / Dual-Link DVI, Single / Dual-Link LVDS, HDMI 1.4a, DisplayPort 1.1a / 1.2 + up to 2 display outputs from DisplayPort 1.1a / 1.2</td>
</tr>
<tr>
<td><strong>HD Audio Controller (Azalia)</strong></td>
<td>1x</td>
</tr>
<tr>
<td><strong>HDCP Keys</strong></td>
<td>4x</td>
</tr>
<tr>
<td><strong>DVO</strong></td>
<td>12-bit DDR or 24-bit SDR / DDR</td>
</tr>
</tbody>
</table>

1System configuration: 1280x1024, E2400: 600e/700m, 128MB GDDR3, E6460: 600e/800m, 512MB GDDR5, E6760: 600e/800m, 1 GB GDDR5, AMD: AMD Athlon™ II X4 620 @ 2.6GHz, MSI Gigabyte GA-MA770T-UD3P, Corsair XMS3 4GB (2x2GB) 1333MHz 9-9-9-24 (T伟X34G1333C9A D), Windows® 7 64-bit Ultimate
2Not all display interfaces available at same time. Maximum resolution dependent on link bit-rate and available memory bandwidth.
3Two internal PLLs + an integrated DisplayPort reference clock can support (1) two legacy display outputs + two DisplayPort outputs, (2) one legacy display output + three DisplayPort outputs or (3) four DisplayPort outputs. Legacy display output includes VGA, single / dual-link DVI, single / dual-link LVDS and HDMI 1.4a.
MCM BGA
**AMD Radeon™ E6460 GPU**
- AMD Embedded Radeon™ 6460 GPU
- PCIe x16 Gen 2
- DVI, 2560 x 1600
- HDMI, 1920 x 1080
- DisplayPort, 2560 x 1600
- LVDS, 2048 x 1536

**Also available with fan or heatpipe**

ATX - 4x DVI
**AMD Radeon™ E6460 GPU**
- AMD Embedded Radeon™ 6460 GPU
- PCIe x16 Gen 2
- 4x DVI, 1600 x 1200
- Fanless (heatsink)

ATX - 4x mDP
**AMD Radeon™ E6460 GPU**
- AMD Embedded Radeon™ 6460 GPU
- PCIe x16 Gen 2
- 4x mDP, 2560 x 1600
- Fanless (heatsink)

Rugged Graphics Mezzanine Card
**XMCGA7**
- AMD Embedded Radeon™ 6460 GPU
- 512 MB GDDR5 SDRAM
- x8 PCI Express (Gen 2 capable)
- Two independent output channels (Dual Head)
- Front and rear I/O options
- Air- and conduction-cooled variants

**GE Intelligent Platforms**
PHONE 1-800-433-2682
WEB http://defense.ge-ip.com/

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FAX +886-2-2655-7388
EMAIL sales@IBASE.com.tw
WEB www.IBASE-usa.com

**MXM v3.0**
**AMD Radeon™ E6460 GPU**
- AMD Embedded Radeon™ 6460 GPU
- PCIe x16 Gen 2
- HDMI, 1920 x 1080
- DisplayPort, 2560 x 1600
- LVDS, 2048 x 1536
- Also available with fan or heatpipe

**AMD**
PHONE 408-749-4000
EMAIL embedded@amd.com
WEB www.amd.com/embedded

**Graphic Card PCIe-6460**
- AMD Embedded Radeon™ 6460 GPU
- Gaming, Digital Signage
- 2x DVI-I Connectors
- Support Active and passive dangle
- Heatsink + 2-BB Fan (1 x slot)
- PCI Express® 2.1 (x1, x2, x4, x8, x16)
SMALL FOOTPRINT, LARGE IMPACT.
AMD has an extensive history of leadership in the thin client market, offering solutions that provide reduced operating costs and power consumption, higher durability and increased longevity over personal computers. Industries such as healthcare, education and government can get high levels of performance without compromise, empower IT staff, protect client/patient data, and manage tight budgets.

Learn more at www.amd.com/embedded

WHAT YOU DON’T SEE IS AS IMPRESSIVE AS WHAT YOU DO.