



## Asus KGPE-D16 Dual Socket G34/ AMD SR5690/ V&2GbE/ SSI EEB Server Motherboard KGPED16ASMB4IKVM

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### How fast are dual AMD Opteron 6128 G34 processors in the ASUS KGPE-D16?

Written: Jun 07 '11

**Pros:** Dual G34 Sockets On SR5690 chipset with triple 16x PCI-express slots in a E-ATX motherboard

**Cons:** Onboard graphics card is the weakest part of the motherboard.

**The Bottom Line:** The ASUS KGPE-D16 Dual G34 Socket motherboard is a powerful computing platform that is quietly waiting to unleash its true abilities as AMD readies its next wave of Interlagos processors.

The ASUS KGPE-D16 Dual G34 Socket motherboard offers the ideal suite of expansion options for the AMD Opteron line of processors today. In this review, we will examine all the features that this motherboard offers as well as see how it performs in real world computing situations.

As of June, 2011, the future looks incredibly bright for the AMD G34 processor line. In August, we are supposed to see the release of the highly anticipated Interlagos server chips which will bring a total of 16 cores per processor along with some micro-architecture updates will increase floating point performance and overall efficiency of the processors. Hence, my deep interest in beating the rush to move to the dual socket G34 motherboard standard in home user workstations. Buying one of these motherboards today is an investment for anyone wanting a high performance workstation for programming or database management that can support 32 cores in a single computer!

Here are just a few of the questions that will be answered in this review:

What kind of benchmark results can you get with two baseline AMD Opteron 6128 processors?

How will 16 DDR3 memory slots perform once fully populated with RAM?

Read On To Find Out!

The motherboard discussed in this review is considered server grade computer hardware. To accurately cover this product, I must discuss its various features in a deeply technical manner. Most home computer users do not have a need for this type of computer equipment and instead should consider an [ASUS M4A89GTD Motherboard](#) or [ASUS P5QL-VM DO/CSM Motherboard](#) which both have just one cpu socket and a much simpler installation.

#### Heatsink Options For The AMD G34 Socket

Assuredly one of the hardest tasks about just ordering your new ASUS KGPE-D16 server motherboard will be finding an appropriate heatsink for the dual G34 sockets. Five days after receiving my motherboard from Amazon, I was left waiting for both of my heatsinks to arrive, due to a lack of hardware vendors. The reason is simple; They are hard to find for sale online in the active role that an enthusiast builder would use. The reason for this is because the AMD G34 socket coolers are mostly designed for passive installations on 1U or 2U server chassis. In this configuration, air blows across the heatsink fins but it has no fan installed on the part itself. For desktop computers, we want active coolers. The Thermaltake CLS0017 G34 cpu cooler has a copper base and four heatpipes. I used two of these mostly because they offered 70MM fans with up to 46 CFM of air flow to help keep my eight core processors cool while running BOINC distributed computing projects.

#### Integrated Graphics

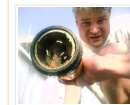
Whether using Remote Desktop or on the local console for my ASUS KGPE-D16, the onboard graphics card takes a long time to repaint the screen during intensive operations in Microsoft SQL Server 2005 64bit. The 8Mb of memory on the integrated Aspeed AST2050 video card does not help the situation at all. You will also find it severely limits your desktop screen size to a maximum of 1280x1024. I suggest you add your own video card if you ever wish to use this computer in a casual setting for web browsing or when using [Microsoft Word 2010](#).

#### PCI Express x16 Graphics And Hardware Raid Expansion Options

First, to prove that this motherboard would work with two graphics cards, I installed a pair of Galaxy GeForce GTX 550 Ti 1 GB DDR5 55NGH8HX4NXX Video Cards. After installation of the NVIDIA Windows XP x64 drivers, which took just 10 minutes with download, the graphics speed of the computer was completely different. I could open multiple windows and manage multiple Terminal Services sessions without any perceptible lag.

Last, to get more CUDA processing cores for PrimeGrid, I installed the Evga GeForce GT 430 1 GB DDR3 PCI-Express 2.0 Graphics Card 01G-P3-1430-LR in the PCIe4 slot on the KGPE-D16. Windows Server 2003 64bit effortlessly detected the new video card upon boot and BOINC was able to use it immediately to begin crunching workunits.

#### About the Author



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The ASUS PIKE 2008 is a hardware raid expansion card that will activate the second set of SATA/SAS ports on this motherboard. The add-in card which requires no software installation has a PowerPC 440 chip embedded inside. If you want extreme data transfer performance, then get this card for your ASUS KGPE-D16.

While everyone may caution you about this, please make sure you have a power supply that can handle the demands of these processors and video cards. I used a Cooler Master 1000W Silent Gold which had no problems and has yet to cause me any stability issues.

#### Dual Onboard Intel 82574L Gigabit LAN controllers

The ASUS KGPE-D16 has two Intel 82574L Gigabit LAN controllers to help you transmit a high volume of data with low latency. The Gigabit 82574L uses the PCI Express (PCIe) architecture. There is also an IPMI feature through the dedicated LAN or share LAN. A Gigabit network adapter is only as powerful as the file system behind it. This simple fact makes your choice of hard drives or SSD equipment even more important if you want to transfer files quickly.

#### The Flexible DDR3 Memory Options Will Save You Money!

The ASUS KGPE-D16 comes ready to hold up to 16 DDR3 1600Mhz memory sticks! Not only does it support ECC but it will also take unbuffered DDR3 memory as well so you do not have to purchase the more expensive sticks. For the purposes of this review, I tested two different types of desktop DDR3 in the ASUS KGPE-D16 and had no significant problems with them. I used just two sticks of RAM in this motherboard for the first week.

#### ASUS KGPE-D16 Instruction Manual

The instruction manual for the ASUS KGPE-D16 motherboard is really quite impressive. Version 2.0 of the document is 148 pages long in PDF format and is filled with valuable technical information about your purchase.

#### Installation And Configuration Of The ASUS KGPE-D16

The official size of this motherboard is SSI EEB 3.61 12" x 13". Now this is essentially a extended ATX motherboard which means it will fit in most full size computer cases like the Cooler Master HAF 932 Advanced. You should be careful when choosing the right computer case for your new E-ATX motherboard. Take notice of the location of the second G34 cpu socket since it rests close to front of the Cooler Master HAF 932 Advanced. Many computer cases use this location to hold 3.5" hard drives and they could block the heat sink for the processor.

The hole pattern on this motherboard is very different. The area where the cpu sockets are has no central bolt holes and one of the front bolt holes did not follow the standard E-ATX pattern so it could not be secured. To keep the motherboard from over flexing while installing the DDR3 memory chips, I strongly suggest placing a few rubber pads on the tray to absorb any strain.

The motherboard would not initially post with the main power 24pin and both 12V1, 12V2 connectors plugged in. Only two DDR3 DIMM slots were populated with Crucial Ballistix Tracer 1600Mhz 1.65V 2Gb memory. The Thermaltake G34 heatsink was securely in position with its 4 pin power connector plugged in. The problem turned out to be how I connected the PWRSW or power switch to the system panel connector. Please note that there is an unused pin between the Reset Switch and the power switch on the ASUS KGPE-D16 Dual Socket G34 motherboard.

#### How To Overclock The ASUS KGPE-D16 Motherboard

First, before you proceed you need to know that neither ASUS or AMD support overclocking any Socket G34 processor. I also disclaim any responsibility for damage that may occur as a result of using the following advice. The KGPE-D16 is intended for use in an office setting and as a result has overclocking disabled to increase stability.

The great news is that there are options for increasing the OEM performance of the ASUS KGPE-D16 motherboard through practical tweaking methods. My investigations were very difficult since it seems that I am the first person to publish tweaks for the Socket G34. The hardware recommended below was tested in my machine but only briefly since I have access to a wide variety of peripherals and other high end equipment through my job as an integration engineer for a multinational company.

#### Disable The On-Board Graphics Card And Get A PCI-e x16 Video Card!

The onboard graphics card in the ASUS KGPE-D16 is dog for so many reasons. First, it only has 8Mb of cache which means it cannot display high resolution graphics in Windows 7 x64. Second, the video card seems to interfere with the booting of the dual G34 motherboard and also consumes a lot of power. When I place my finger on the chip, it is scalding to the touch. Not a good situation since this motherboard is already starving for 12VDC rail power with its two massive processors.

#### Install PCI-e x8 Hardware SATA Raid Card

One of the oldest problems that have plagued motherboards and processors is the need to dedicate cpu resources to the management of data drive I/O operations. You can see this on your desktop computer right now if you initiate a large file transfer between two folders. The cpu usage will go up but at a hardware level even more resources are consumed transparently that are robbing the peak potential of your computer.

To solve this problem and increase the peak performance of the AMD G34 socket, I recommend installing a PCI-e x16 hardware raid card or simply an ASUS Pike 2008 card and run all your hard or SSD drives from it. In my brief product testing of the HighPoint RocketRAID 4320 PCI-Express x8 Eight-Port SATA and SAS HARDWARE RAID Controller Card, the ASUS KGPE-D16 showed solid improvement the categories of file transfer and SMP file processing. You should not be tempted by imitators like the 3WARE 9650SE-2LP which only has one PCI-e channel. Go for it all on this upgrade and you will be very pleased with the results.

#### ASUS KGPE-D16, CPU Benchmarks

##### Super Pi With The AMD Opteron 8 Core 6128 Processor

Super Pi V1.1 is an application that extrapolates the specified digits of Pi into a text file. Since the task is both processor and file system intensive it can give you an idea of how fast your cpu is. Processors with large on-die cache sizes and high bus speeds tend to do better in this benchmark. The problem is the calculation is single threaded in this version so you only see the performance of one cpu core.

In this test, I analyzed the performance using the 1,000,000 digits of Pi calculation.  
AMD Opteron 6128 2.0 Ghz: 34 seconds

Comparison results for other processors:

[Intel Xeon E5450 3.0Ghz 12Mb cache four core processor:](#) 15 seconds

[Intel 920 Socket 1366 processor 2.667Ghz:](#) 14 seconds

[Intel Core 2 Duo E8600 3.33Ghz processor:](#) 13 seconds

The weakness of the current lineup of AMD G34 processors is their single core performance. Additionally, the benchmark was compiled for Intel processors.

#### POV-Ray 3.7 RC3 64Bit

A new version of the freeware 3D animation utility has been released that offers SSE2 enhanced processing extensions. POV-Ray stresses the floating point unit and memory bandwidth of the processor to render stunning 2D images. The raytracing software package also makes use of all available logical cpu cores in your computer system to render images. For this reason, POV is my processor benchmarking package of choice!

For this test, I am using the benchmark.pov file with QuickRes.ini value of 512x384 NO AA since it is provided with all new installations of POV.

AMD Opteron 6128 2.0 Ghz, 8 cores, one physical processor: 1 minute 24 seconds  
 AMD Opteron 6128 2.0 Ghz, 16 cores, two physical processors: 48 seconds

For a quick comparison, take a look at what these AMD and Intel processors can do with the same benchmark.  
[AMD Sempron 140 Socket AM3 2.7Ghz Processor](#): 13 minutes 11 seconds  
[Intel E1400 Celeron Dual Core 2.0 Ghz, \*stock speed\*](#): 5 minutes 51 seconds  
[Intel Celeron Dual-Core E3300, 2.5 Ghz \(BX80571E3300\) Processor](#): 4 minutes 0 seconds  
[AMD 1090T 3.2Ghz Phenom II X6 Six-Core Processor](#): 3 minutes 53 seconds  
[Intel Core 2 Extreme QX9650 Processor EU80569XJ080NL](#): 1 minute 41 seconds

*CPU Performance Comparisons To The HP ProLiant DL165 G7*  
 Using a 64bit Windows Operating System and the 64bit version of POV-Ray on both machines, I received the following results from the benchmark when run at 1920x1080 with AA 0.3.

HP DL165 G7, 2x AMD Opteron 6172; 24 cores 2.1Ghz; 14 minutes 50 seconds  
 ASUS KGPE-D16, 2x AMD Opteron 6128; 16 cores 2.0Ghz; 14 minutes 33 seconds

The HP ProLiant DL165 G7 only had half its memory banks populated. You can clearly see that this affected its peak efficiency by bottlenecking the memory operations between clock cycles. Also, ECC memory has higher latency than its non-ECC counterpart. All these factors combine to make a 16 core system beat 24 cores any day. Given the fact that HP equipment is overpriced, proprietary and its tech support is even worse, I recommend ASUS over HP ProLiant servers everyday.

#### ASUS KGPE-D16 Memory Performance

Make no mistake, the longest section of this review will be the memory discussion. 16 memory slots and a server grade BIOS offers plenty of configuration opportunities for the Socket G34 tweaker. The AMD G34 Opteron processor utilizes a total of four memory channels. The AMD AM3 processor only uses a total of two memory channels. The memory controller, which is built into the Socket G34 processors, can support up to 1333 Mhz DDR3 memory chips. Rumors have it that the upcoming Interlagos or Bulldozer cpus will offer a memory controller that can support 1600 Mhz DDR3 memory. Since they will be compatible with the existing Socket G34 motherboards, as seen in a leaked benchmark for an Supermicro H8DGU motherboard, the ASUS KGPE-D16 is assumed to work with these new processors as well.

As a result, it will pay huge performance dividends if you can manage the memory settings in the BIOS of this highly advanced motherboard. In the discussion that follows, we will examine the effects of DDR3 memory in configurations from 4 to 16 memory chips. Bank Interleaving, Channel Interleaving, Node Interleaving, CS Sparing Enable and Bank Swizzle Mode are just a taste of the various memory configuration options available in the ASUS KGPE-D16. All Dual Socket G34 motherboards use these settings so if you own a Tyan S8230GM4NR or have the SR5670, SR5690 chipset in your system then this review will likely help you as well.

As noted earlier in this review, two types of desktop, cheap DDR3 memory were used in KGPE-D16 dual socket G34 motherboard. First, Crucial Technology BL25664BN1608 2 GB Ballistix Tracer 240-pin DIMM DDR3 PC3-12800 8-8-24 Unbuffered NON-ECC DDR3-1600 1.65V 256Meg x 64 Memory was used because of its integrated LED lights. Second, were four Corsair XM3 1600Mhz 9-9-9-24 1.65V CMX8GX3M4A 1600C9 2Gb DDR3 memory sticks.

Using MBench ver 1.0, I ran the following tests on the ram. MBench has been my benchmark of choice since RAMBUS memory was first released to find the peak data rate of server memory. The benchmark is self contained in a command line executable file so it can still be run on may Windows servers today. The results vary wildly depending mostly on the heat inside your computer case and the I/O operations occurring within your computer. To save space, only the peak results are shown.

#### 4x 2 GB Crucial Technology Ballistix Tracer In CPU1 Configuration

Access latency 61.5 ns (123 clocks)  
 Read data rate (INT) 4195 Mb/s  
 Write data rate (INT) 3271 Mb/s  
 Read data rate (MMX) 5609 Mb/s  
 Write data rate (MMX) 3903 Mb/s  
 Read data rate (SSE) 5823 Mb/s  
 Write data rate (SSE) 5434 Mb/s

#### 4x 2Gb Corsair XM3 1600Mhz In CPU1 Configuration

Access latency 61.5 ns (123 clocks)  
 Read data rate (INT) 4214 Mb/s  
 Write data rate (INT) 3530 Mb/s  
 Read data rate (MMX) 5663 Mb/s  
 Write data rate (MMX) 4223 Mb/s  
 Read data rate (SSE) 5872 Mb/s  
 Write data rate (SSE) 5041 Mb/s

Just these first few tests, conclusively show that the data rate bandwidth available on the ASUS KGPE-D16 motherboard is quite remarkable. You can expect these numbers to increase as more memory is added to the motherboard and a second cpu is installed to activate even more channels. In the following test, I added four more memory sticks to the CPU1 bank on the ASUS KGPE-D16 motherboard.

#### 8x 2 GB Crucial Technology Ballistix Tracer In CPU1 Configuration

Access latency 63.0 ns (127 clocks)  
 Read data rate (INT) 4240 Mb/s  
 Write data rate (INT) 4001 Mb/s  
 Read data rate (MMX) 5671 Mb/s  
 Write data rate (MMX) 5076 Mb/s  
 Read data rate (SSE) 5818 Mb/s  
 Write data rate (SSE) 5575 Mb/s

#### Two AMD Opteron 6128 Processors With 8x 2Gb Ballistix In Recommended Configuration

The memory bandwidth plummeted to its lowest level yet with the addition of the second physical AMD Opteron 6128 cpu. The memory was split into two sets of eight sticks per cpu memory bank. Here are the results after just placing the memory in the motherboard and booting up into Windows Server 2003 x64 Standard Edition:

#### 16x 2 GB Crucial Technology Ballistix Tracer In CPU1 And CPU2 Configuration

Access latency 102.0 ns (127 clocks)  
 Read data rate (INT) 3039 Mb/s  
 Write data rate (INT) 2658 Mb/s  
 Read data rate (MMX) 3977 Mb/s  
 Write data rate (MMX) 3544 Mb/s  
 Read data rate (SSE) 3884 Mb/s  
 Write data rate (SSE) 3965 Mb/s

The memory tests were very disappointing. In frustration, I started tweaking the settings in the BIOS. I soon discovered that you should shut off the following under the Memory Configuration screen in your KGPE-D16 bios: Channel Interleaving, Bank Swizzle Mode, Node Interleaving, CS Sparing Enable. With these options disabled, I was able to get the following peak performance results:

16x 2 GB Crucial Technology Ballistix Tracer In CPU1 And CPU2 Configuration With

Access latency 63.0 ns (127 clocks)  
 Read datarate (INT) 4205 Mb/s  
 Write datarate (INT) 3003 Mb/s  
 Read datarate (MMX) 5639 Mb/s  
 Write datarate (MMX) 3378 Mb/s  
 Read datarate (SSE) 5847 Mb/s  
 Write datarate (SSE) 5711 Mb/s

As a result of this aggressive memory setup, this computer system was able to reach a ranking of number 2 on the Top Computers List for the BOINC project called Yoyo@Home. In fact, this computer even beat several dual processor Xeon X5680 based servers for over two weeks. Each Xeon X5680 processor cost more than the total cost of this particular dual AMD Opteron computer!

#### Comparing The ASUS KGPE-D16 To The TYAN And Other Similar Motherboards

The TYAN S8230GM4NR Dual G34 motherboard may be a tempting purchase but it cannot compare to the ASUS KGPE-D16 for the simple fact that it only supports one PCI Express 2.0 x16 graphics card expansion slot. The SUPERMICRO MBD-H8SGL-O may be tempting for its rather low price but it only has one PCIe x16 slot and only one AMD G34 cpu socket.

#### Conclusions

The ASUS KGPE-D16 Dual G34 Socket motherboard is a powerful computing platform that is quietly waiting to unleash its true abilities as AMD readies its next wave of Interlagos, 16 core microprocessors which will feature even faster memory speeds and floating point capabilities. Nested within the network of hyperlinks on this motherboard are at least 3 usable PCIe x16 ports that can deliver nearly unmatched performance when combined with the power of dual processors onboard. To round off the suite of computing capabilities, ASUS gave us eight embedded SAS ports that when activated can deliver remarkable file system transfer throughputs.

I am very pleased with the performance of this motherboard after having installed just two \$279, bottom of the barrel 8 core AMD Opteron 6128 processors. The ASUS KGPE-D16 will be my primary software development motherboard for years to come and I envision doing great things with its computing abilities.

**Recommended:** Yes

**Amount Paid (US\$):** 445

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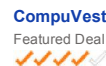


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