VIA Apollo KT266A Chipset

Modular, highly scalable Socket A DDR chipset featuring Performance Driven Design

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The VIA Apollo KT266A: Modular, highly scalable Socket A chipset featuring Performance Driven Design.

VIA Technologies Inc., the leader in Socket A chipset development, has again raised the performance, feature set, and stability bar for the AMD Athlon™ processor platform with the introduction of the VIA Apollo KT266A modular DDR chipset. The first VIA chipset produced under the Performance Driven Design philosophy, the VIA Apollo KT266A provides blistering memory performance for today and tomorrow's demanding applications.

The launch of the VIA Apollo KT266A solidifies VIA's role as the leader in DDR platform development. It also builds upon previous VIA chipset technology, ensuring a stable, reliable, and scalable platform. Both new and proven technologies that combine to form the VIA Apollo KT266A platform are detailed below:

- **Enhanced Memory Controller With Performance Driven Design:** The VIA Apollo KT266A features an enhanced memory controller, designed with exceptionally high performance in mind. Supporting DDR200/266 memory, the VIA Apollo KT266A provides lightning fast access to system memory. Timings have been improved, resulting in faster transfers between the synchronized Front Side Bus and Memory Bus. Also, the new memory controller with Performance Driven Design can burst up to eight Quad Words of data per clock, up from four in previous designs. Data queues have also been deepened, allowing faster and more efficient access to buffered data. The end result is the industry's fastest DDR memory controller.

- **V-MAP:** The VIA Apollo KT266A is part of the family of VIA Modular Architecture Platforms (V-MAP). As a modular solution, the North and South bridge of VIA Apollo KT266A are completely pin compatible with current and future products, such as the VT8233C South Bridge with integrated 3Com® Ethernet MAC, and the upcoming KM266 North Bridge with integrated S3 graphics. V-MAP allows flexibility when designing a system around the VIA Apollo KT266A chipset, enabling OEMs and System Integrators to reach different market segments with a single platform.

- **High-Speed V-Link Hub Architecture:** The VIA Apollo KT266A makes use of VIA's V-Link Hub Architecture, which provides a dedicated 266MB/s bus between the North and South Bridge. Less advanced chipsets use the 132MB/s PCI bus as a link, which must be shared with all PCI peripherals.

- **200/266MHz DDR Front Side Bus Support:** The VIA Apollo KT266A supports the AMD Athlon™/Duron™ S2K system bus, running at up to an effective 266MHz. Offering up to 2.1GB/s of bandwidth, the 266MHz

system bus perfectly complements the high performance DDR memory subsystem and V-Link bus.

- **AGP4X/2X Support:** Providing up to 1GB/s in graphics bandwidth with AGP4X technology, the VIA Apollo KT266A supports the latest in video card technology. Additionally, it does not sacrifice AGP2X compatibility like less advanced chipsets, allowing low cost graphics products to be paired with low priced Athlon™/Duron™ systems.

This white paper describes the features of the VIA Apollo KT266A chipset, as well as the performance benefits that enable next generation computing for high-performance desktops, workstations, and servers based on the AMD Athlon™ and Duron™ processors

VIA Apollo KT266A Product Overview

The VIA Apollo KT266A consists of two separate chips: The 552-pin VT8366A DDR North Bridge, and the 376-pin VT8233 or VT8233C V-Link South Bridge. Both use standard PGA packaging to reduce the cost of production and allow the use of standard heatsink solutions. The VT8366A is also a drop-in replacement for the previous VT8366, allowing cost effective and seamless upgrading of current motherboard designs. Future pin compatible products featuring integrated graphics and other features will also become available, enabling different market segments to be reached with a single platform design. The following diagram outlines some of the basic features of the VIA Apollo KT266A chipset.
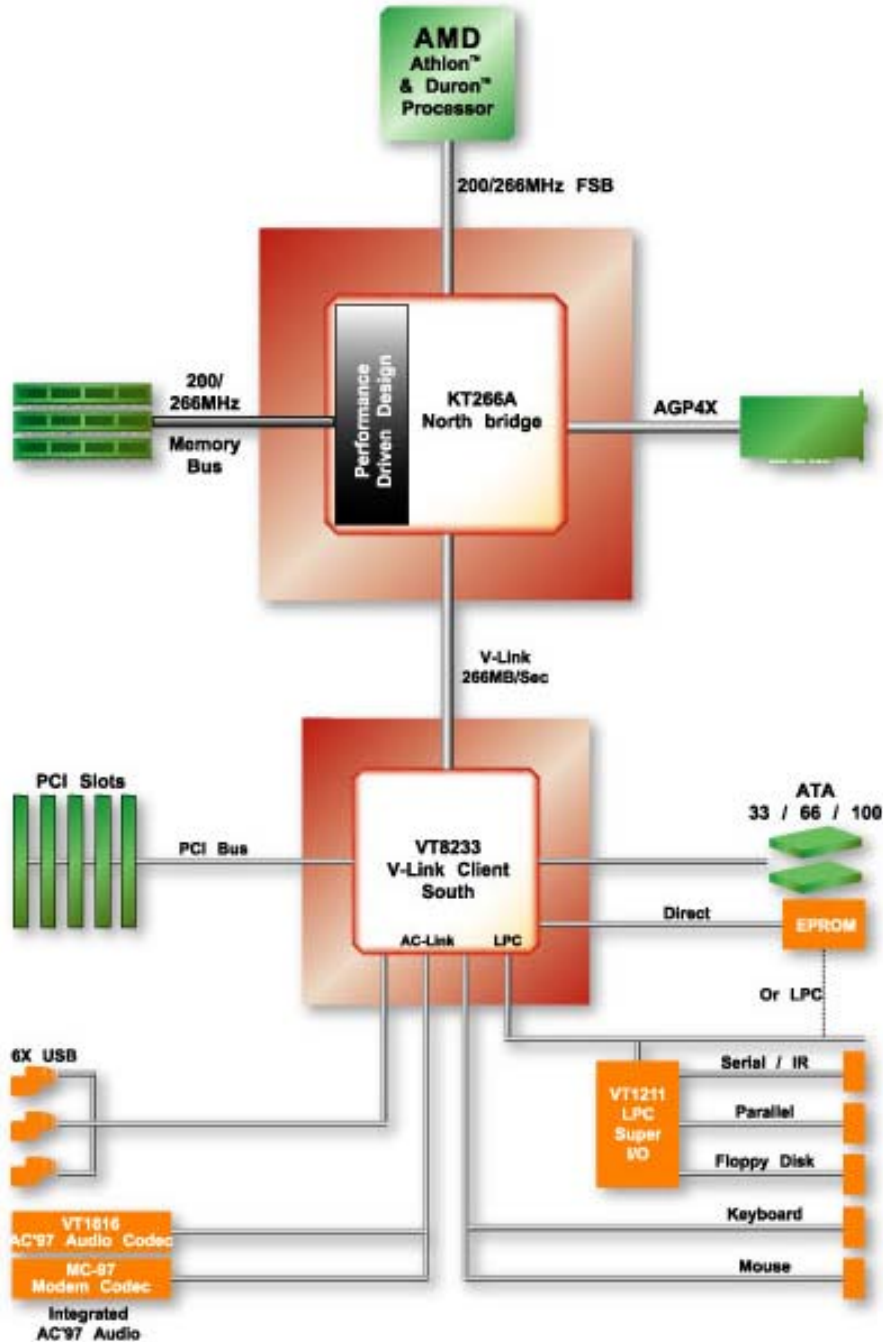
VIA Apollo KT266A North Bridge

The North Bridge of VIA Apollo KT266A (model number VT8366A) is the first VIA product with Performance Driven Design. As such, it includes new features and technology that assure the world's highest memory performance for the Socket A platform. Enhancements include tightened timings on the S2K front side bus, deeper instruction and data queuing, and the unique ability to burst up to eight Quad Words per clock.

In addition to offering the fastest DDR memory controller available, the VT8366A is also extremely flexible. Up to 4GB of DDR200 or DDR266 is supported, including ECC and Registered modules. Also, PC100 and PC133 are supported, enabling platforms built upon the VIA Apollo KT266A to reach very competitive price points. The VIA Apollo KT266A provides OEMs and System Integrators with maximum flexibility and scalability to build a full spectrum of high-performance and cost effective systems from mainstream consumer and commercial desktops to high-end workstations and servers.

The VT8366A also supports the latest generation of AGP4X graphics cards, providing up to 1GB/s of graphics bandwidth. For true workstation capability, support for AGP Pro is included, providing additional voltage to high-end CAD/CAM graphics cards. Despite these advanced features, the VT8366A does not sacrifice support for older AGP2X models, enabling extremely low graphics price points.

VIA Apollo KT266A South Bridge
The VIA Apollo KT266A is capable of interfacing, through its modular V-MAP design, to any VIA V-Link South Bridge, including the VT8233 and VT8233C, as well as future South Bridge designs. The VT8233 and VT8233C are highly integrated network-ready South Bridges that feature two high-speed ATA-100 IDE controllers (four IDE devices total), six USB ports, six PCI slots, Low Pin Count (LPC) interface, and an I/O Advanced Programmable Interrupt Controller (APIC). Advanced Configuration and Power Interface (ACPI) and Advanced Power Management (APM) are also integrated into both the VT8233 and VT8233C. VT8233C adds an integrated 3Com Ethernet MAC controller, providing high quality 10/100 network support.

All VIA V-Link South Bridges feature high quality, 6 channel AC/97 2.2 sound support, as well as an MC/97 software modem interface. These features, along with 10/100 Ethernet and HomePNA support, can be harnessed through the use of an ACR (advanced communication riser) slot, or can be integrated directly onto the system board.

The enhanced IDE controllers on the VT8233/C support all Ultra-DMA 33/66/100 devices including as CD-ROMS, DVD-ROMs, and hard disk drives. ATA-100 is the fastest IDE standard currently available on the market, and allows each separate IDE controller on the VT8233/C to burst up to 100MB/s, for a total of 200MB/s of bandwidth. Each controller also supports up to two devices, for a total of four ATA-100 capable drives.

The three USB hubs on the VT8233/C provide additional flexibility by allowing the user to add up to six USB devices to the system, such as keyboards, mice, drives, digital cameras, scanners, speakers, modems, joysticks, and MP3 players.

<u>VIA V-Link Hub Architecture</u>

VIA has developed V-Link technology to remove the PCI bus as the bottleneck in inter-chip communication. In less advanced chipsets, the PCI bus is responsible for connecting both the north and South Bridge, as well as providing a bus for most add-in peripherals. VIA V-Link technology provides a dedicated 66MHz quad-pumped bus between the North and South Bridge, freeing up the PCI bus to deal strictly with peripheral devices.

DDR SDRAM Overview

DDR-SDRAM technology is the result of an industry-wide collaboration to develop the next generation memory standard. It is designed to provide a high performance, high value upgrade path from previous PC133 technology. As the driving force behind PC133, VIA Technologies, Inc. has embraced DDR, and currently offers the widest range of DDR chipsets for the AMD Athlon™ and Intel® Pentium® III and 4 processor platforms.

Available in two different speed grades, DDR enables memory performance to be scaled to fit the performance and cost requirements of a given platform. DDR200 (also known as PC1600) runs at a 100MHz clock speed, and transfers data on both the rising and falling edges of the clock for an effective 200MHz clock rate. DDR266 (or PC2100) uses the same clock doubling technology, but runs at a 133MHz core speed, for an effective 266MHz clock rate.

With this clock doubling technology, DDR200 is able to transfer up to 1.6GB/s, and DDR266 a staggering 2.1GB/s. Also, due to its evolutionary, parallel technology, the latency of DDR is quite low compared to competing serial memory technologies.

All grades of DDR operate at 2.5 volts, as opposed to 3.3V for PC100 and PC133. This lowered voltage allows DDR to penetrate power sensitive applications, such as notebooks and 1U servers. Lowered power consumption translates directly to lowered heat dissipation, again increasing DDR's effectiveness in mobile and server applications.

DDR leverages the existing PC133 manufacturing infrastructure, allowing manufacturers to produce DDR266 for roughly the same cost as PC133. This price parity with SDRAM will rapidly drive the adoption of DDR as memory bandwidth limitations become more constricting.

VIA & DDR SDRAM

Starting with PC133 SDRAM, VIA Technologies, Inc has worked very closely with the world's leading DRAM manufacturers, motherboard markers, and OEMS and System Integrators to enable rapid industry wide transitions to higher bandwidth memory technologies that deliver enhanced system

performance at an affordable cost. As one of the leading proponents of DDR SDRAM, VIA has developed the most comprehensive range of chipsets supporting this high-bandwidth memory technology covering all processor platforms, including:

- **VIA Apollo Pro266:** The first DDR SDRAM chipset to be launched onto the global market, the VIA Apollo Pro266 supports a full range of Socket 370 Intel® Pentium® III, Intel® Celeron™, and VIA C3™ processors. It also supports dual Intel® Pentium® III processors for high performance, low power workstation and server applications.
- **VIA Apollo KT266:** The VIA Apollo KT266 was the first DDR SDRAM chipset solution to go into volume production for the AMD Athlon™ processor.
- **VIA Apollo P4X266:** The first DDR SDRAM chipset for the Intel® Pentium® 4 processor, the VIA Apollo P4X266 continues VIA's leadership in developing high performance, modular, scalable DDR chipsets for every market segment.

VIA Apollo KT266A Chipset Performance

As the first VIA chipset to feature Performance Driven Design, the VIA Apollo KT266A provides blistering performance for today's and tomorrows demanding applications. Performance Driven Design offers tangible benefits in terms of overall system responsiveness. Memory performance, in particular, is greatly improved over previous designs.
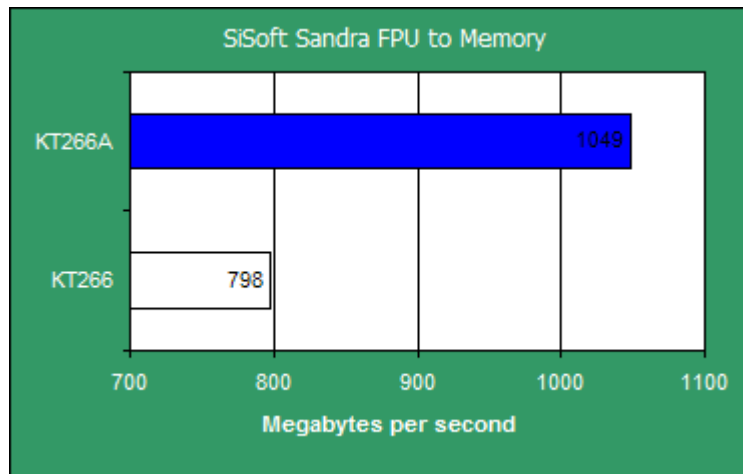

SiSoft's Sandra is the world's most popular tool for measuring the memory performance of a platform. Sandra uses standard Stream benchmarks to gauge the average bandwidth a particular memory controller can deliver. The VIA Apollo KT266A provides over 30% faster memory performance than the VIA Apollo KT266 using identical components.
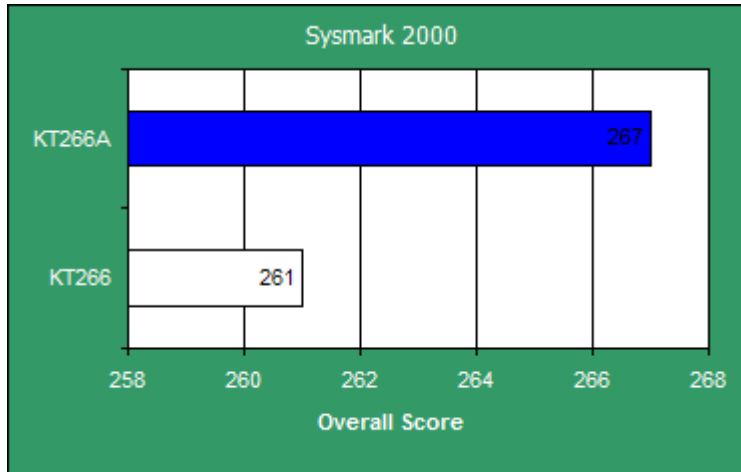
BAPCo is the leading developer of 2D Business and Content Creation benchmarks, and their popular Sysmark 2000 has become the industry standard.

In popular business and content creation applications, the VIA Apollo KT266A improves upon its predecessor by 2.6%. In memory intensive portions of Sysmark, such as Windows Media Encoder, the VIA Apollo KT266A holds a lead of over 10%.
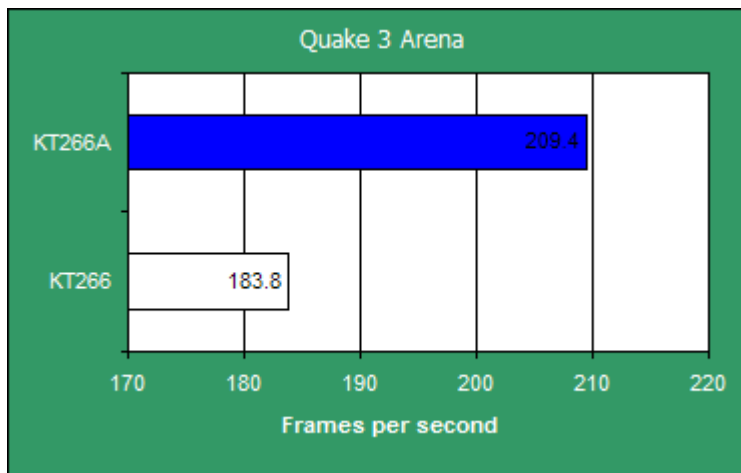
Good 3D performance relies heavily on the memory bandwidth available to a platform. The Performance Driven Design of VIA Apollo KT266A allows it to excel over its predecessor, the Apollo KT266.

Conclusion

As a pin compatible replacement for Apollo KT266, VIA Apollo KT266A leverages the many existing motherboard designs already on the market. Thus, the VIA Apollo KT266A is the only mature, high performance Socket A DDR chipset available today.

The first chipset designed under the mantra of Performance Driven Design, the VIA Apollo KT266A provides the responsiveness users expect from a high performance chipset, and then some. As part of the V-MAP family of DDR chipsets, the VIA Apollo KT266A also offers the modularity and reliability OEMs and System Integrators demand from an advanced platform.

Appendix

The two reference systems were based on the following configurations:

Chipset	VIA Apollo KT266A	VIA Apollo KT266
Processor	AMD Athlon 1.4GHz	AMD Athlon 1.4GHz
Memory	256MB DDR266	256MB DDR266
Graphics	Nvidia GeForce 3 64MB DDR	Nvidia GeForce 3 64MB DDR
HDD	IBM 307030 30GB ATA-100	IBM 307030 30GB ATA-100
Operating System	Windows 98 SE	Windows 98 SE

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