



EPIA **DP-SERIES** **Mini-ITX**

Dream Catalyst

**Power-Saving Dual Processing:
The Latest Breakthrough for the
VIA EPIA Mini-ITX**

VIA Technologies, Inc.
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Introduction

Current trends in corporate IT environments – the consolidation of departmental and workgroup servers in corporate-wide server rooms and the proliferation of always-on network services – are putting new pressures on and opening up new challenges for data center managers. IT management departments are required to run a growing number of services on dedicated hardware platforms and to offer ubiquitous services to all users within the corporate network. This in turn presents new requirements for server system design: they need to offer higher performance levels and the option of creating high density server farms while maintaining low power consumption and a small form factor as physical space in the server room becomes increasingly scarce.

Power-saving dual processor server systems are perfectly suited to meet those new challenges, breathing new vitality into the market and offering a compelling alternative to fulfill these new and diverse computing requirements. Dual processing adds value, increases performance, and opens up new market opportunities. However, to enable multi-processing beyond its current domain of expensive servers and workstations, multi-processing technology must become more compact and quieter, consume less power, generate less heat, and cost less.

Target Markets for Power-Saving Dual Processing

Within the new model for corporate IT environments, two types of devices stand out and are gaining new levels of importance: high density server solutions for hosting consolidated workgroup services; and unobtrusive small form factor appliance servers for delivering always-on network services to company employees.

Perhaps surprisingly, the hardware platform requirements for these two product groups are very similar, and the challenges faced by hardware vendors all too familiar in meeting them: appropriate levels of performance, quiet or fanless design, low power consumption, small physical dimensions and low cost.

High Density Server Solutions

High density server solutions include cluster servers and blade server systems, as well as standard 1U or ½U rack server subsystems. Within the new corporate network architecture, high density servers play an important role of consolidating the services that were previously delivered by workgroup servers in remote physical locations. The high density server approach substantially lowers the TCO by reducing the support costs and delivering higher uptime. Depending on the network architecture, each server within the high density server farm delivers application or network services to a single user, a group of users, or an entire department.

High density server solutions also play an important role at ISPs and ASPs, whose customers often require their website, application or transaction services to be hosted on a dedicated hardware platform. High density servers enable ISPs/ASPs to accommodate service hosting for hundreds of customers within one rack, therefore substantially saving on floor space in the server room.



With Power-Saving Dual Processing platforms, corporations and ISPs can accommodate even more processor power per square meter of the server room while avoiding issues and troubles related to expensive cooling systems that are difficult to design and manage.

Appliance Server Solutions

Appliance server solutions are network-enabled, service-dedicated devices designed to deliver a single service or function across the corporation or a workgroup. The most common functionality of appliance servers includes web caching, security functions (firewall, anti-virus, VPN, encryption), file and print services, personal storage and backup, and Internet access. Appliance servers are usually fully pre-configured and non-programmable devices, with remote (web-based or text console-based) management functions, thereby ensuring minimal installation and support cost. Appliance servers are usually designed on the "plug-and-participate paradigm": they offer a certain service immediately after being attached to the network without requiring any configuration.

Most appliance servers need to secure 24/7 access to the service and must be offered at a reasonable price level. As opposed to the regular servers that are located in the server room, appliance servers are usually installed within the working (or living) environment, and therefore need to combine their primary functionality with quasi consumer electronics design values: small form factor, nice-looking design, and quiet operation. In order to achieve those aesthetic and ergonomic values, appliance servers need to be based on low-power hardware platforms.

The growing number of appliance servers within the network might soon require the system integrators to combine the functionality of multiple devices into one multifunctional unit, e.g. combining the security/firewall client with the file/print server. Power-saving dual processing platforms - with support for multitasking, multithreading and load balancing - form a viable alternative as the hardware base for multifunctional appliance servers.

VIA EPIA Mini-ITX: Power-Saving Dual Processing Available Now

Since the year 2000, VIA has been working on the development of a cool and quiet x86 platform infrastructure that will allow PC technology to find its way into new places, new users, and new environments. From this was born VIA's low power processor strategy and the VIA EPIA Mini-ITX platform, which have enabled many new applications and markets for PC technology that were previously impossible.

The VIA EPIA Mini-ITX platform has been adopted in numerous embedded applications, small form factor PCs, small scale high density servers, education and entertainment systems, and become a tool for innovation among PC enthusiasts across the globe.

To meet the opportunities arising from the need for inexpensive and low-power multiprocessing, VIA has introduced the first in a family of new **VIA EPIA DP-Series Mini-ITX mainboards**, making power-saving dual processing advantages available to



corporate system integrators, embedded application developers, enthusiasts, and other small form factor system builders.

The **VIA EPIA DP-310 mainboard** is a dual processor Mini-ITX system board that features dual 1GHz VIA Eden™-N NanoBGA processors with the integrated VIA PadLock Hardware Security Suite and VIA PowerSaver 3.0 technology, as well as an impressive array of I/O features and high speed storage and connectivity options.

The VIA CN400 chipset features an integrated 128-bit 2D/3D UniChrome Pro graphics engine and hardware MPEG-2/-4 acceleration, up to 200MHz CPU front side bus, Ultra V-Link at 1066MB/s to interface to the South Bridge and a memory controller with two DIMM slots for a maximum 2GB of DDR266/333/400 SDRAM.

Peripheral features of the board include one Gigabit Ethernet port, dual 10/100Mbps Ethernet ports, one PCI slot, one Mini-PCI Type IIIA connector (underneath), ATA-133, Serial-ATA with RAID & JBOD support, up to four USB 2.0, VIA Vinyl™ Six-TRAC audio, and keyboard/mouse and serial ports. System management features include ASF 1.0, WMX protocol support, ACPI 2.0, console redirection, remote power cycling, and an array of hardware monitoring capabilities.

Figure 1: VIA EPIA DP Mainboard – Primary Components and Connectors

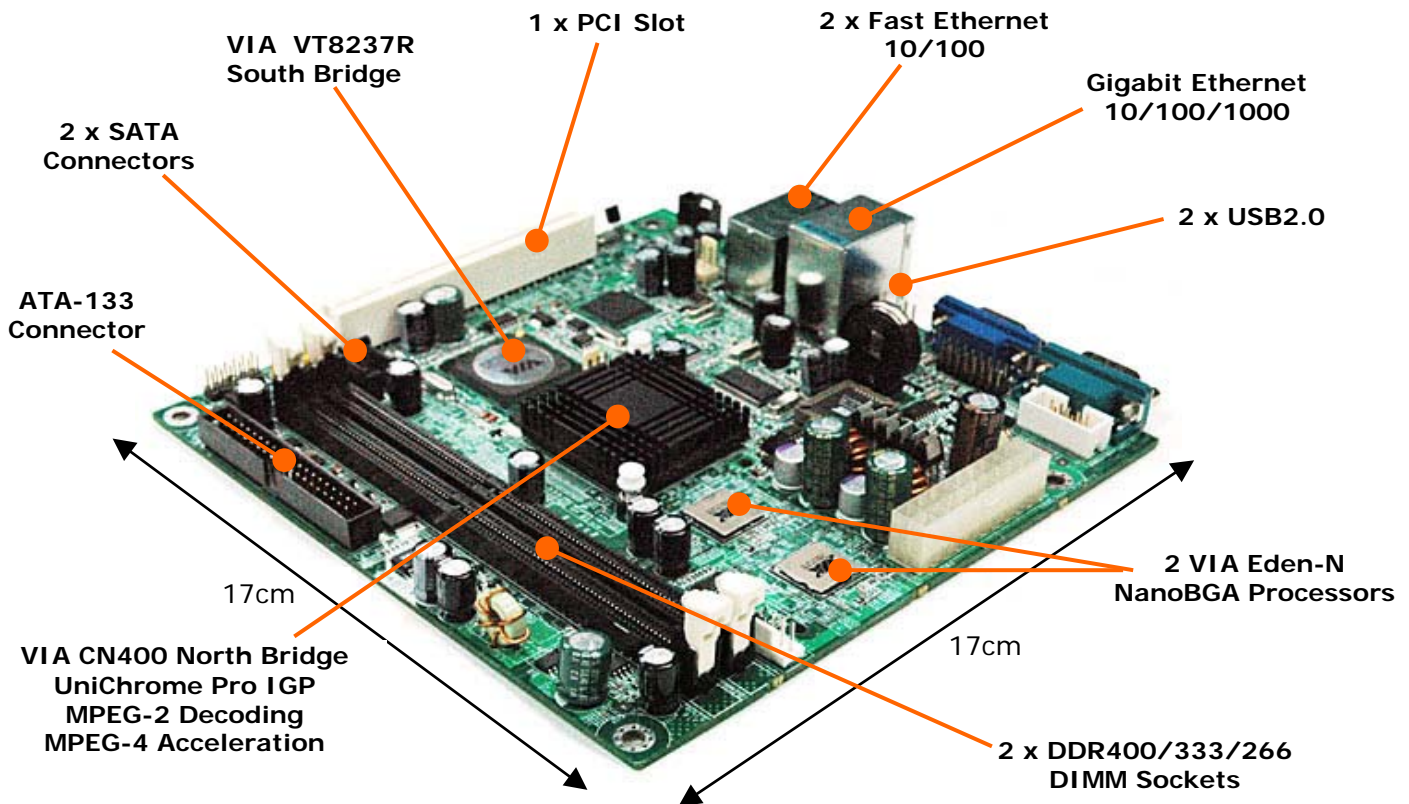
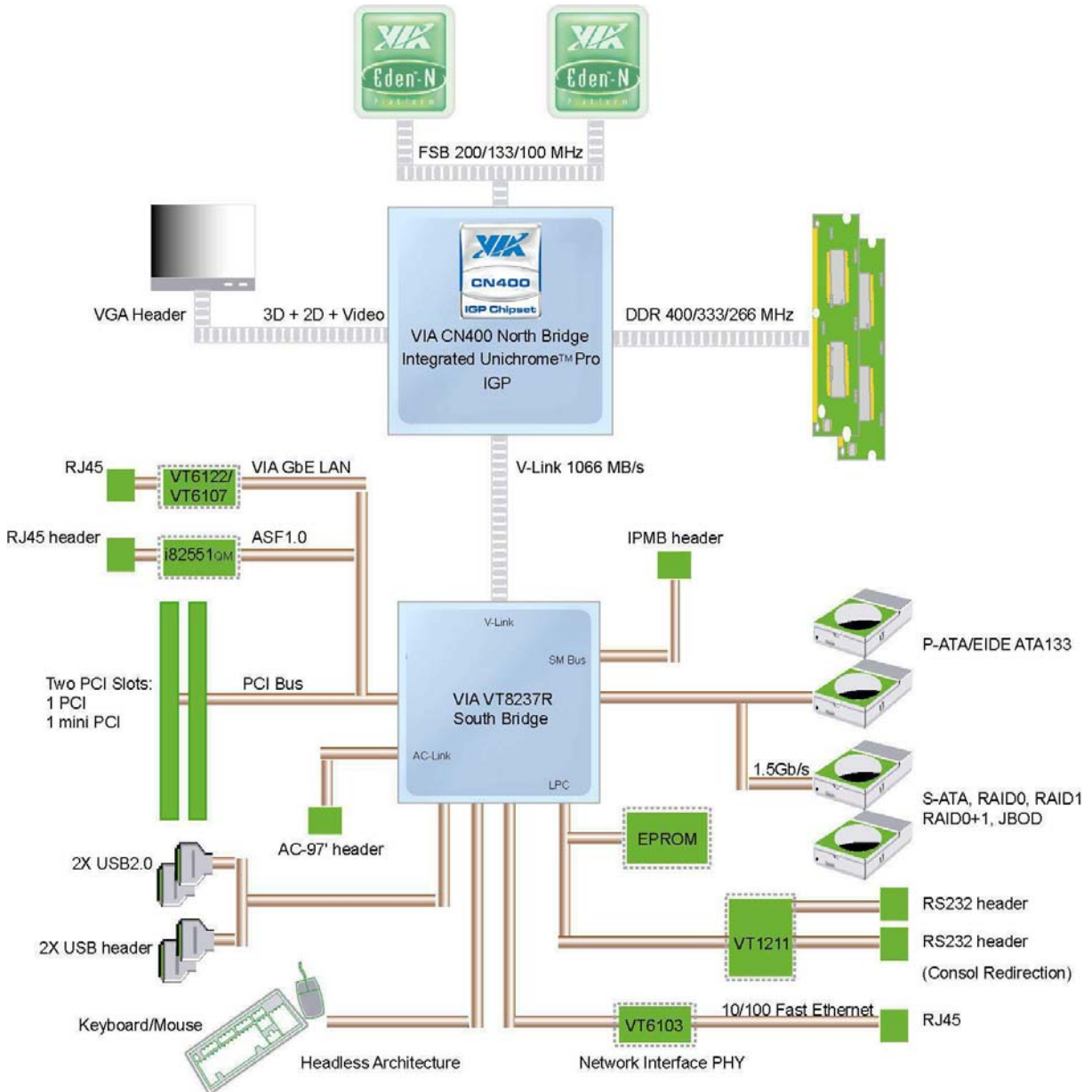


Figure 2: VIA EPIA DP-310 Mainboard Block Diagram



With this rich feature set, the VIA EPIA DP-310 system board is configured specifically to satisfy the requirements of high performance embedded applications, high density server systems, appliance server, communications intensive applications, and others that require additional computing horsepower and advanced communications in a very small, low power package.



VIA PadLock Hardware Security Suite

The VIA Eden-N processors boast industry-leading on-die security features that hold significant benefits for server applications. As part of the VIA PadLock Security Initiative, a holistic approach to system security, all the latest VIA processors feature a hardware random number generator that harvests oscillations across the die for an extremely high degree of entropy, and the Advanced Cryptography Engine for ultra fast AES encryption of sensitive data.



For the creation of secure Virtual Private Networks and digital certificates to on-the-fly data encryption and decryption and encoding of locally stored information, the VIA PadLock Hardware Security Suite enables almost transparent encryption with minimal impact on system performance.

VIA EPIA DP-Series Benefits for High Density Servers

Cooling issues are becoming a major concern for IT organizations implementing high density server solutions. With as much as 20kW of power to cool down in the single rack, cooling of the server room is increasingly complex and extremely expensive.

The VIA EPIA DP-310 mainboard, with an approximate maximum power consumption of only 30W¹, enables system integrators to build a truly high density server environment. In addition, the very small board dimensions of only 17cm x 17cm enable even smaller server form factors, allowing two Mini-ITX mainboards to be located on one rack level. Mini-ITX server chasses available on the market today enable the installation of two VIA EPIA DP-310 mainboards in a single 1U chassis, or two ½U chassis back-to-back on one rack level, thereby further increasing computing density to four processors per rack level and up to 168 processors in a fully-configured rack using only around 2.5kW of power.

Table 1: High Density Server Solutions Based on VIA EPIA DP-310

Chassis Type	CPUs/1U	CPUs/Rack	Approx. Power
Single board, 1U	2	84	1.3kW
Dual board, 1U	4	168	2.5kW
Single board, ½U	4	168	2.5kW

¹ Note: Power estimate based on a diskless VIA EPIA DP-310 motherboard



While retaining all the advantages of a low power consuming platform, VIA EPIA DP dual processor systems offer unique performance benefits for computing intensive environments thanks to their enhanced multitasking efficiency. In dual processing embedded environments or in the case of small scale servers, multitasking occurs when the system must respond to, and process stimuli from multiple independent sources, then store or disseminate results or messages to various destinations. Response time may be critical, and processor resource clashes can occur. Dual Processing can be a big part of the solution.

With two integrated 10/100Mbps Ethernet interfaces and one 10/100/1000Mbps Gigabit Ethernet port, the VIA EPIA DP-310 mainboard can also be applied in a cluster solution. With the ability to interconnect ½U servers within one rack, an 84-node cluster would constitute a very high performance massively parallel computing system.

The VIA PadLock Hardware Security Suite integrated in the VIA Eden-N processor enables very high levels of performance for encryption and decryption of sensitive data. Software solutions built around VIA PadLock can be used to enable the encoding of information stored within a datacenter, and the creation of secure Virtual Private Networks as well as on-the-fly encrypting/decrypting of data sent over the network with exceptional speed, without degrading system performance for the primary tasks of the server.

Compared to traditional rack-mount or proprietary platforms, VIA EPIA DP-310 Mini-ITX based dual processing solutions dramatically lower system cost and increase rack utilization and efficiency. From lower initial investment costs, through lower support costs and easy to replace components, to the lack of moving parts and fans, which are the most common point of failure, VIA EPIA DP-310 Mini-ITX based servers simplify all the basic datacenter management processes and reduce costs across all dimensions of ownership.

VIA EPIA DP-Series Benefits for Appliance Servers

Appliance servers stand out among all server devices, due to their unique mechanical design requirements, aesthetics and ergonomics, and their very aggressive price points. With its small form factor, ultra low power consumption, and fanless operation, the VIA EPIA DP mainboard constitutes a perfect platform to develop innovative appliance servers, designed to blend in with a variety of office and home environments.

The VIA EPIA DP-310 introduces dual processing to the appliance server platform, enabling multithreading and allowing individual threads to be divided between two processors. With appliance server processing, where multiple requests are made simultaneously by several users, such as data encrypting, media processing, parsing, rendering, compression, and other unique algorithms, load balancing techniques can prioritize chosen types of request or certain users or user groups and assign/reserve processor power for those requests.

With security devices constituting an important segment of the market for appliance servers, the integrated VIA PadLock Hardware Security Suite is an important part of the platform. It can be used in network access devices for VPN functionality and in the



storage and backup devices for encrypting information stored in the local storage subsystem. In that case, even with the physical appliance server being compromised or stolen, data stored on the local storage can not be decrypted without the required password.

Featuring two integrated 10/100 Ethernet interfaces and one 10/100/1000 Gigabit Ethernet port, the VIA EPIA DP-310 mainboard is perfectly suited for network applications, with two 10/100 interfaces processing user requests and a Gigabit interface communicating with other network services or the data center. With this kind of setup, communications bottlenecks can be avoided.

Integrated storage interfaces – one IDE133 channel for up to two mass storage devices and two high speed SATA channels with the option for RAID 0, RAID 1 or RAID 0+1 functionality – enable a variety of storage options. Integrated connectivity options include a USB 2.0 interface, which can support up to four external peripheral devices, such as printers and external mass storage systems, and deliver peripheral functionality to network users.

VIA EPIA DP-Series Benefits for the System Builder

The new VIA EPIA DP-310 mainboard makes power-saving dual processing available to all types of Mini-ITX based designs, offering an unprecedented performance and scalability upgrade path while conforming to Mini-ITX physical and thermal design constraints. It is still small, cool and quiet, but offers an exciting performance boost for new and existing VIA EPIA designs, providing a new flagship platform for embedded systems, small form factor PCs, new and innovative server designs, and other environments and applications never before thought possible.

The rich integration of the VIA EPIA DP-310 mainboard allows system integrators to design server systems based on a single processor design without any additional add-on cards. This in turn streamlines support needs and limits system maintenance to the unlikely replacement of the complete mainboard. Furthermore, the fanless mainboard design with no moving components removes the most common point of failure.

With the power-saving dual processing platform, system integrators can differentiate their high density server and appliance server products from the existing multi-processor market offerings and create new market opportunities.



VIA EPIA Mini-ITX Server and Appliance Server Devices

VIA EPIA Mini-ITX mainboards have been adopted by a growing number of manufacturers of high density server solutions and appliance server devices. With the arrival of power-saving dual processing architecture, these devices can achieve new levels of performance and functionality.



Mirra Personal Server

Based on the 1GHz VIA C3™ processor and VIA EPIA M10000 mainboard, this is a plug-and-participate personal storage and backup device, with a web interface for local network access, as well as remote access from the web.



Bleu Jour Appliance Server

This appliance server for SOHO market has been designed as a backup and storage device. It is based on the VIA EPIA PD12000 mainboard featuring a 1.2GHz VIA C3™ processor and can accommodate up to four mass storage devices.



IPC2U EPIA 1/2U Rack Server System

This is a high density server device integrating the VIA EPIA Mini-ITX mainboard, one mass storage device, and one optical drive within an ultra compact 1/2U rack enclosure. Two of those servers can fit on one level of the rack, in a back-to-back setup.



ICP EPIA Blade Rack Server

This is an ultra-high density server system, allowing for 16 VIA EPIA Mini-ITX blades to be included in one 5U enclosure. The full-sized rack can include up to 128 blades.



Tragant Dual-EPIA Rack Server

This unique 1U chassis design allows two VIA EPIA Mini-ITX boards to be installed in one enclosure. This allows 84 Mini-ITX mainboards to be installed in one rack.



ICP Rack-Mount Panel PC

6U touch panel display for rack monitoring and control based on the VIA EPIA Mini-ITX mainboard.

Exciting New Prospects for the VIA EPIA Mini-ITX Market

Power-saving dual processing delivers a new level of performance scalability for the VIA EPIA Mini-ITX form factor, expanding the market and driving new interest in and enthusiasm for the range of possibilities enabled by the Mini-ITX platform. Embedded system designers have adopted the platform, satisfying many diverse application requirements. Enthusiasts use it to deliver PC functionality in a wide range of environments never before thought possible. Market opportunities abound, limited only by the creativity and resourcefulness of system builders.

That spectrum of opportunities is now wider than ever for the development of small form factor systems that perform server-oriented functions. These might range from small application specific diskless enclosures to small full function stand alone systems, home servers, media servers, NAS, and even compact multifunction rack systems. The specific balance of performance, compactness and power dissipation makes it possible to contemplate totally new and unique concepts, such as small scale rack clusters for experimental or research purposes in academic environments, multi-user applications, scientific, workgroup computing, data centers, and many more.

Advantages of VIA EPIA DP-310 Mainboard

As the new flagship of the VIA EPIA Mini-ITX Series, the VIA EPIA DP-310 system board delivers tremendous benefits to the system builder and to the user:

Processing Power for Complex Tasks: Delivers new levels of multitasking efficiency & multithreaded software performance, leveraging the advanced architecture of VIA Eden-N processors.

Thermal Efficiency: Cool running, low power operation and effective heat dissipation enables higher density configurations, scalable system set-ups and smaller, quieter form factors for more aesthetic system design.

Extensive I/O Bandwidth: Provides three separate Ethernet ports, one delivering Gigabit performance for flexible networked device configuration

Infrastructure: Fully conforms to Mini-ITX physical and thermal constraints to fit expanding system infrastructure, while the standard x86 architecture ensures complete compatibility with mature hardware and software infrastructure

Full Peripheral Integration: Offers full peripheral integration including accelerated graphics, advanced audio, USB2.0, PCI, ATA133, S-ATA and more.

Effective Security: Ultra fast, highly efficient on-die security features provide almost transparent encryption and decryption of data traveling at high speed, enables scaling of servers without security degradation.

System Management Capability: Supports a wide range of industry standard system management protocols with hardware monitoring, and allows for headless operation for server environments.



Summary

Packing power-saving dual processing capabilities into such a small but flexible industry standard form factor creates a breakthrough opportunity for system builders to craft new and exciting solutions for high density servers, appliance servers and other types of innovative devices. Dual processing is no longer just for expensive and difficult to manage servers or workstations, it can now find its way into a broader range of embedded applications, small form factor PCs, small scale application specific servers, even consumer PC and personal electronics applications thanks to the VIA EPIA DP-310 Mini-ITX system board.

