

VIA Eden-N Processor

1 VIA Eden™ Processors

1.1 Low Power Fanless Processing

With its signature fanless operation, the VIA Eden™ processor family targets personal, business, industrial and commercial embedded computing devices that require ultra low power consumption, rock solid reliability and compatibility with standard x86 operating systems and software applications. VIA Eden processors are scalable from 400MHz to 1.5GHz all within a maximum thermal envelope of 7.5 watts, and are available with a diverse range of feature sets that enable PC functionality and connectivity from traditionally single function devices.

The VIA Eden processor family is available in nanoBGA, nanoBGA2 and EBGA packaging, using 150nm, 130nm and the latest 90nm SOI manufacturing process to deliver leading performance per watt and in fully RoHS compliant packages.

1.2 Available Models

Please click on the processor name for more information on each processor:

Process Technology	Processor Name VIA	Core Architecture	Clock Speed Range Hz	FSB MHz	Package	Size mmxmm
90nm	Eden	Esther	400M-1.2G	400	NanoBGA2	21x21
90nm	Eden ULV	Esther	1.0G, 1.5G	400	NanoBGA2	21x21
0.13um	Eden-N	Nehemiah	533M-1.0G	133	NanoBGA	15x15
0.13um	Eden ESP	Nehemiah	667M-1.0G	133	EBGA	35x35
0.15um	Eden ESP	Samuel 2	300M-600M	66/100/133	EBGA	35x35

Please contact your local VIA sales representative for information regarding availability of VIA Eden processors, or send an email to VIA at mkt@via.com.tw

1.3 VIA Eden Processor Applications

The low power consumption, excellent heat dissipation and leading power efficiency makes the VIA Eden processor ideal for a wide range of compact, quiet devices for the home, office, car, shops, hospitals, public institutions, industrial plants and much, much more; below are just some of the key applications in which the VIA Eden processor has already gained market momentum:

- Thin-Clients
- VoIP/Video Conferencing

- Industrial Cards for digital media designs
- Set Top Box
- POS
- Panel PC

1.4 Secure by Design

VIA Eden processors are helping to herald an era of practical pervasive security thanks to the VIA PadLock Security Engine, the world's fastest x86 security engine in the world featuring the most comprehensive suite of tools for key cryptographic operations.

Over the last couple of processor core generations, VIA has expanded the hardware security suite integrated directly onto the processor die, starting with the world's best random number generator (RNG) and AES Encryption Engine in the C5P (Nehemiah) processor core to SHA-1 and SHA-256 hashing for secure message digests, and a hardware based Montgomery Multiplier supporting key sizes up to 32K in length to accelerate public key cryptography, such as RSA™ in the latest C5J (Esther) core. This latest generation also provides NX Execute Protection, providing protection from malicious software such as worms and viruses, and is used in Microsoft® Windows® XP with SP2. Integrating security directly onto the processor die ensures speeds and efficiency many times that available in software, yet with negligible impact on processor performance.

1.4.1 VIA Eden Processors: Security Feature Comparison

Secure Hash

- World's fastest x86 Secure Hash engine
- Data integrity and origin authentication in data transfer
- Availability:
 - VIA Eden 0.13, 0.15um: none
 - VIA Eden 90nm: Full SHA-1 & SHA-256 20Gbps peak

Virus Protection

- Protects against worm attacks and propagation
- Availability:
 - VIA Eden 0.13, 0.15um: none
 - VIA Eden 90nm: NX Bit

Encryption

- World's fastest x86 encryption
- Military-grade
- Data encryption acceleration for RSA Public Key Security
- Availability:
 - VIA Eden 0.13, 0.15um: Full AES Encryption ECB, CBC, CFB, OFB hardware modes 25Gbps peak@2GHz
 - VIA Eden 90nm: + RSA hardware assist (Montgomery Multiplier)

Hardware RNG

- World's fastest x86 Quantum RNG
- Superior to software based generation
- World's highest level of x86 based entropy
- Availability:

- VIA Eden 0.13, 0.15um: 2 hardware RGNs
- VIA Eden 90nm: + enhanced performance + feeds to SHA

2 VIA Eden-N Processor

This product is available fully ROHS-compliant.

The VIA Eden™-N is the world's smallest, lowest power and most secure native x86 processor and is opening up exciting new possibilities for innovation in an almost unlimited variety of compact Personal Electronics and mobile device designs. Based on the C5P Nehemiah core, the VIA Eden-N delivers enhanced digital media performance with the industry's most advanced embedded hardware-based security technologies and is designed to operate with passive cooling due to its ultra low power consumption.

2.1 World's Smallest Native x86 Processor

Featuring the tiny nanoBGA package measuring a mere 15mm x 15mm, the VIA Eden-N is the world's smallest native x86 processor.

Approximately the same size as a penny and less than half the size of the Intel® Pentium® M processor, the VIA Eden-N significantly reduces required board real estate, enabling smaller, more highly integrated platforms such as the 12cm x 12cm VIA EPIA N Nano-ITX mainboard.

Integrating a complete set of advanced computing, multimedia and connectivity features into an incredibly small form factor, the ground-breaking VIA EPIA N Nano-ITX mainboard is set to expand the reach of the x86 architecture to a new wave of Personal Electronics and commercial devices that require full compatibility with PC hardware and software.

2.2 World's Lowest Power Native x86 Processor

Based on the C5P Nehemiah core architecture, the VIA Eden-N processor delivers the industry's lowest levels of power consumption resulting in enhanced thermal characteristics that allow it to achieve a maximum Thermal Design Power (TDP) of only 2.5 watts at 533MHz, 5 watts at 800 MHz and 7 watts at 1GHz.

The low power consumption of the VIA Eden-N means that it needs minimal cooling, enabling fanless operation and also ensuring increased reliability for systems that need to run 24/7. This also means that it can operate with small, fanless 12V DC power boards and less or even no case fans, providing system designers with increased freedom for innovation with quiet, aesthetically pleasing systems for the living room.

Catering for mobile and battery operated applications, the VIA Eden-N includes support for VIA PowerSaver 3.0 technology. This feature dynamically alters the voltage and clock frequency to reduce power consumption when the processor is not required to run at full speed.

The following table shows the maximum power consumption of the VIA Eden-N processor:

VIA Eden-N Processor Power Consumption

TDP	speed
2.5W	533MHz
5W	800MHz
7W	1GHz

Note: TDP (Thermal Design Power) is the maximum core power consumption

2.3 World's Fastest x86 Security Engine

To address the growing need among corporate, government and home users to protect sensitive data on their connected devices, the C5P Nehemiah core of the VIA Eden-N processor incorporates the VIA PadLock Security Engine¹, featuring the military-grade VIA PadLock ACE (Advanced Cryptography Engine) and the quantum-based VIA PadLock RNG (Random Number Generator) for generating highly quality random numbers, the basis of unshakeable security.

Security applications that leverage the capabilities of the VIA PadLock Security Engine can be deployed quickly and easily across a broad range of devices including PCs, thin clients, set top boxes, home digital entertainment centers, point of sale terminals, and intelligent network routers in a wide variety of wired and wireless networking environments. Potential usage scenarios include Virtual Private Networks (VPNs), Corporate Peer to Peer Networks with restricted access for sensitive projects, and Home Wireless Networks.

2.4 Proven Digital Media Performance

The VIA Eden-N processor employs VIA's advanced CoolStream™ architecture that is packed with digital media performance features, including support for sixteen pipeline stages, SSE and MMX multimedia instructions, StepAhead™ Advanced Branch Prediction, an efficiency-enhanced 64KB Full-Speed Exclusive L2 cache with 16-way associativity, and a full-speed FPU.

When coupled with the VIA CN400 digital media chipset and VIA Vinyl™ Audio, the VIA Eden-N processor delivers exceptional performance for all the most critical entertainment, data streaming, Internet and productivity applications, including MPEG4 and MPEG2 video playback, MP3 audio playback, Voice over IP and video conferencing applications, multimedia slideshows and web browsing.

2.5 VIA Eden-N Processor Specifications

The VIA Eden™-N processor is optimized for compact fanless and mobile devices that require industrial strength security with native x86 compatibility and performance. Download the VIA Eden-N processor datasheet for more details.

¹ Elements of the VIA PadLock Security Engine have been evaluated by various leading information security specialists. View the evaluation reports here.

2.5.1 VIA Eden-N Processor Features and Benefits

NanoBGA package: World's smallest x86 processor (15mm x 15mm)

Fanless operation: Ultra reliable, silent and low power

VIA PadLock Hardware Security Suite: Power efficient industrial strength hardware encryption/decryption

Ultra low power consumption: Industry leading max power consumption of a mere 7 watts at 1GHz

PowerSaver™ 3.0: Helps extend battery life by dynamically altering the processor voltage and clock frequency

Highly efficient CoolStream™ architecture: Increased performance and ultra low power consumption

Clock speeds up to 1GHz: Superior digital media and productivity application performance

16 pipeline stages: Faster CPU speed and efficiency

StepAhead™ Advanced Branch Prediction: Looks ahead and gathers the data needed to optimally run applications

Efficiency enhanced 64KB Full-Speed Exclusive L2 cache with 16-way associativity: Greater memory optimization for enhanced digital media streaming and over all performance

SSE Instructions: Enhanced 3D and multimedia perform

Full Speed FPU: Additional processing power for 3D graphics, multimedia, and streaming functions

Ultra low heat: Requires less cooling and less space, enabling greater innovation in small form factor system design

Full x86 Operating System & software application compatibility: Leverages the richest and most cost-effective software development platforms, including Microsoft® Windows®, Linux and Open BSD

0.13 micron manufacturing process: Minimizes power consumption and heat generation while allowing smaller, lighter processor coolers and maximizing total system power efficiency