Operating Guide

EPIA N-Series Nano-ITX Mainboard

May 23, 2006 Version 1.1

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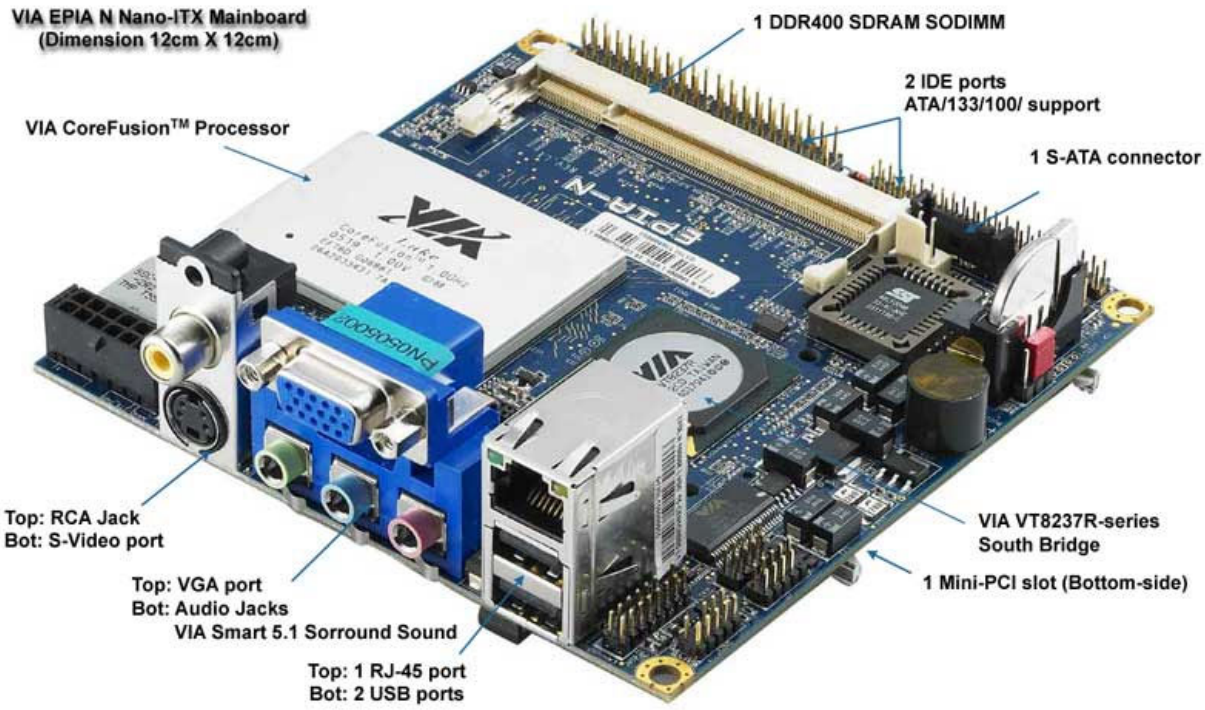
VIA EPIA N-Series Overview

The VIA EPIA N-Series Nano-ITX Mainboard is an ultra compact x86 motherboard design with unprecedented expandability and versatility for today's ever-growing need of embedded applications. The mainboard is based on the VIA Luke CoreFusion™ processor featuring an embedded hardware MPEG-2 decoder / MPEG-4 accelerator and integrated VIA UniChrome™ Pro 2D/3D graphics for rich digital media performance. With the sizable memory bandwidth of DDR400 SDRAM SODIMM, the high data transfer speeds of ATA-133 and Serial ATA and further enhanced by support of 6-Channel AC'97 codec for Smart 5.1 surround sound, the VIA EPIA N-Series delivers the increased performance levels required of today's embedded digital media applications.

The latest in high-bandwidth connectivity is supported with up to eight USB 2.0 ports, as well as an 10/100 Fast Ethernet port for extended broadband connectivity. The VIA EPIA N-Series also offers support for a number of LVDS embedded LCD panels, TV-out, S-Video, Video interface port and has one Mini-PCI slot for expandability options. The VIA EPIA N-Series is compatible with a full range of Nano-ITX chassis as well as FlexATX and MicroATX enclosures and power supplies.

The VIA EPIA N-Series is fully compatible with Microsoft® and Linux operating systems and is available in a variety of configurations, including the fanless VIA Luke CoreFusion™ processor for silent system designs.

VIA EPIA N-Series Layout



VIA EPIA N-Series Specifications

Core Logic	- VIA Luke CoreFusion™ processor - VIA VT8237R-series South Bridge
System Memory	- 1 DDR400/333/266 SODIMM socket - Up to 1GB memory size
VGA	- Integrated VIA UniChrome™ Pro AGP Graphics with MPEG-2 Decoding / MPEG-4 Acceleration
Expansion Slot	- 1 Mini-PCI
Onboard IDE	- 2 UltraDMA 133/100 connectors (Secondary 2.0mm 44-pin header)
Onboard S-ATA	- 1 Serial ATA port
Onboard LAN	- VIA VT6103 10/100 Base-T Ethernet PHY
Onboard Audio	- VIA VT1617A 6 channel AC'97 Codec
Onboard TV Out	- VIA VT1625 TV Encoder
Onboard I/O Connectors	- 2 USB pin headers for 4 additional USB 2.0 ports - 1 VIP pin header - 1 SIO pin header (including SIR and LPC support) - 1 YPbPr pin header (Component TV output connector) - 1 Front-Panel pin header - 1 KBMS pin header (Switchable for KB/MS connector) - 1 FAN connector (CPU FAN) - 1 LVDS / DVI connector (an add-on card is required) - 1 +12V Nano-ITX power connector
Back Panel I/O	- 1 RJ-45 LAN port - 2 USB 2.0 ports - 1 VGA port - 1 RCA port (SPDIF or TV out) - 1 S-Video port - 3 Audio jacks: line-out, line-in and mic-in (Horizontal, Smart 5.1 support)
BIOS	- Award BIOS - 4/8Mbit flash memory
System Monitoring & Management	- CPU temperature monitoring - CPU voltage monitoring - Fan control - Wake-on-LAN, Keyboard-Power-on, Timer-Power-on - System power management - AC power failure recovery
Operating Temperature	- 0°C up to 47°C ~ 50°C (by different product items)
Operating Humidity	- 0% ~ 95%
Form Factor	- Nano-ITX (8 Layer) - 12 cm x 12 cm

* The specification is subject to change without prior notice.

VIA EPIA N Processor SKUs

The VIA EPIA N-Series is available in 533MHz, 800MHz and 1.0GHz speed grades. The VIA EPIA N utilizes VIA's ultra low power VIA Luke Core Fusion™ processor.

PadLock ACE US government approved Advanced Encryption Standard (AES), performing cryptographic functions for securing e-mails, personal files, online transactions, and networks.

PowerSaver 3.0 technology, extends battery life by dynamically altering the voltage and clock frequency to reduce power consumption when the processor is not required to run at full speed.

The VIA FliteDeck™ Suite, an advanced system management suite that enables to user to effortlessly track and monitors mission critical system data and enable seamless live Windows®-based BIOS updates as well as comprehensive BIOS status information.

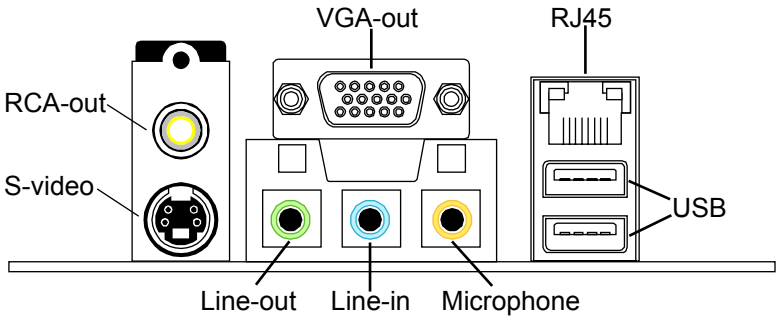
VIA Luke CoreFusion™ Overview

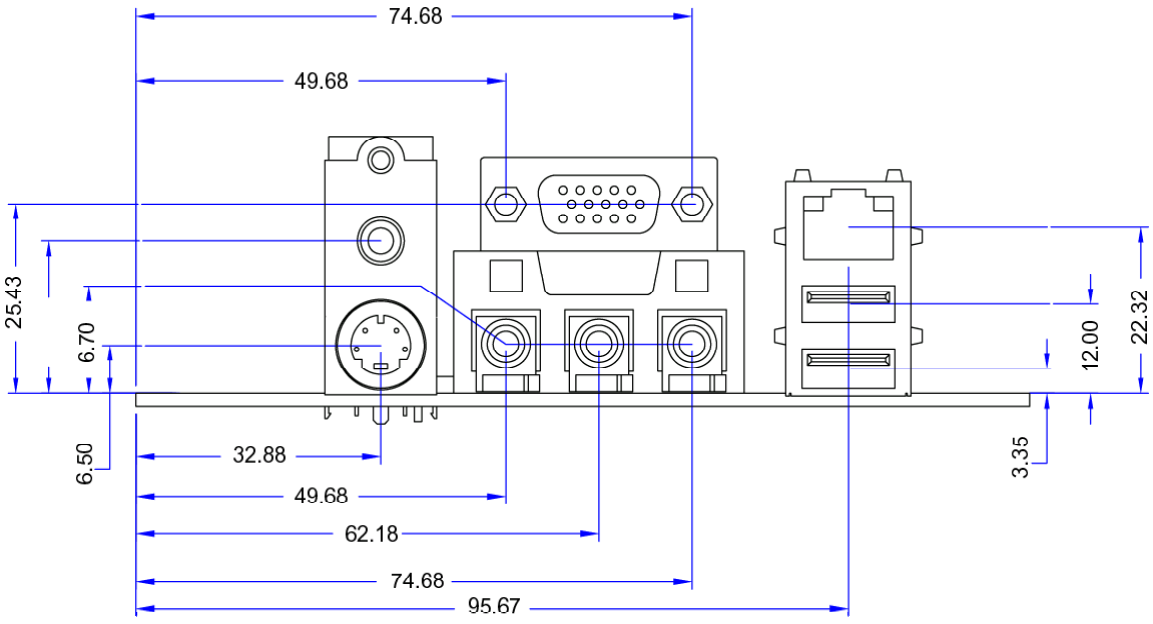
The Luke CoreFusion™ Processor is a high performance, cost-effective and energy efficient processor with integrated UniChrome Pro graphics / video controller. The Luke CoreFusion™ Processor integrates VIA's most advanced system controller with high-performance UniChrome Pro 3D / 2D graphics and video controller, DVI monitor and TV-Out interfaces. And provides superior performance between the DRAM, V-Link and internal or external AGP 8x graphics controller with pipelined, burst and concurrent operation. The VT8237R-series is a highly integrated peripheral controller which includes Serial ATA, Ultra DMA IDE, USB 2.0, 10/100 MB networking MAC, AC'97 and system power management controllers.

The complete system consists of the Luke CoreFusion™ Processor and the VT8237R-series V-Link South Bridge on the EPIA N board.

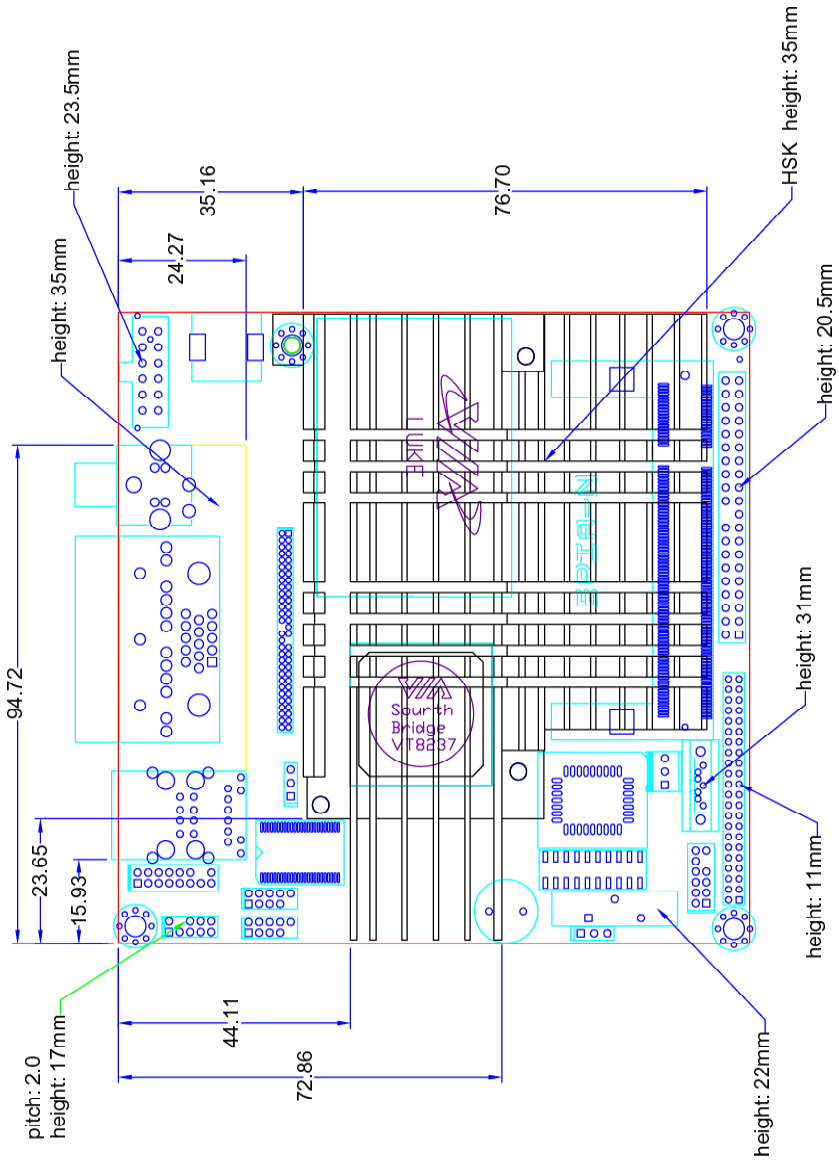
VIA EPIA N-Series I/O Back Panel Layout

The EPIA N's ultra compact 12cm x 12cm, integrated design supports all the standard legacy x86 connectivity options as well as USB 2.0, VGA port, RJ45 LAN port and VIA 6 channel AC'97 audio.

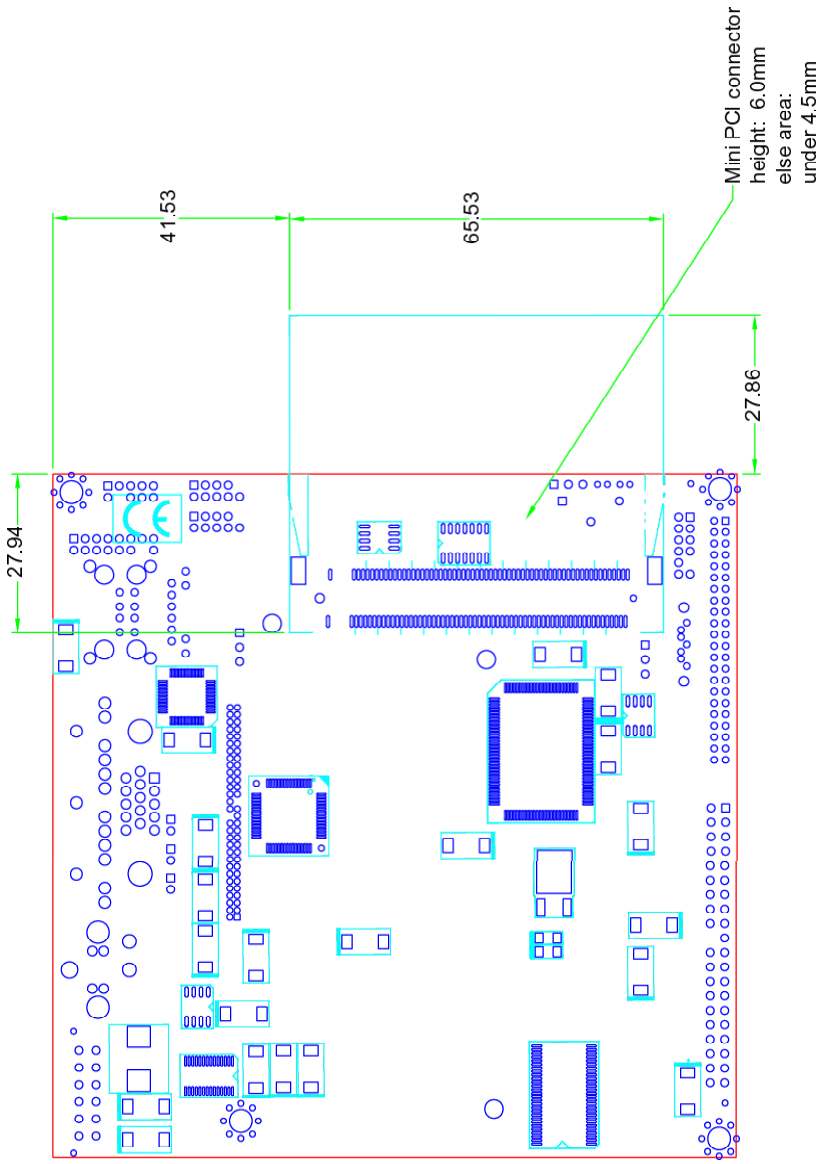




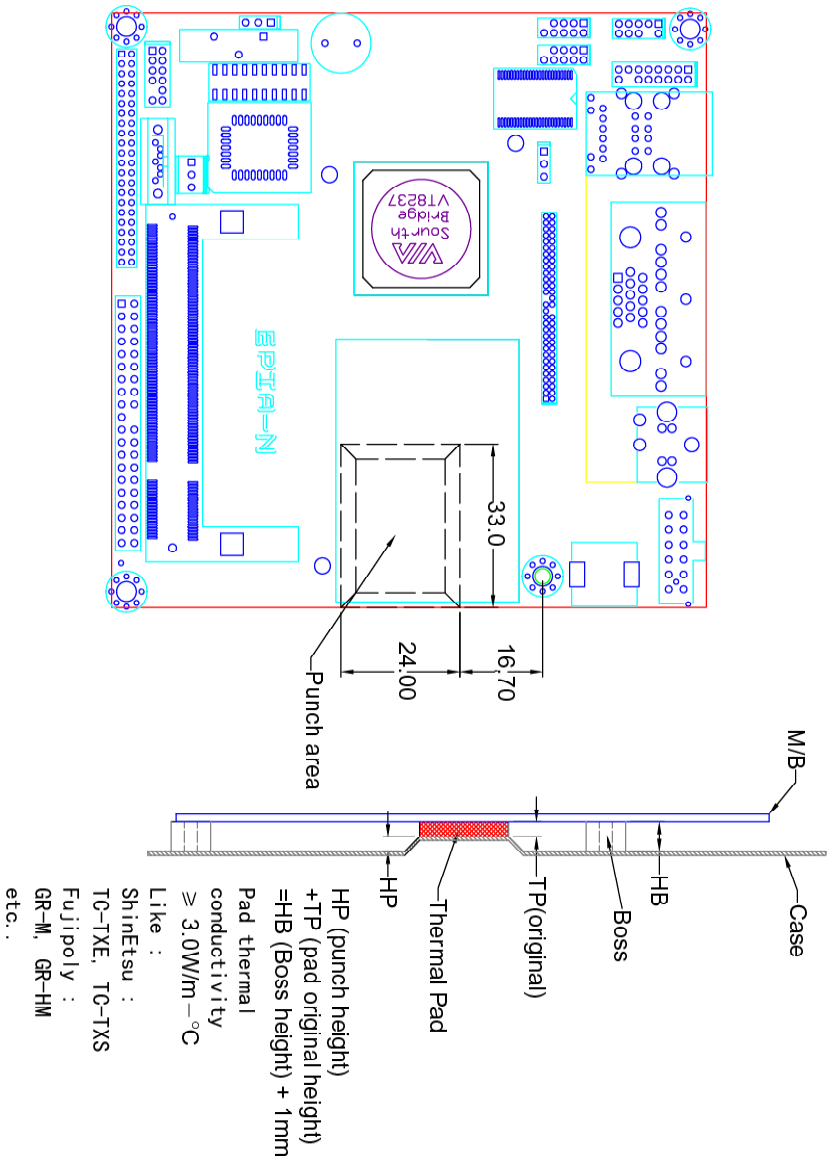
VIA EPIA N-Series Layout Diagram & Height Distribution



VIA EPIA NL-Series Layout Diagram & Height Distribution (Bottom)



VIA EPIA NL-Series Thermal Layout & Height Distribution



Noise Level Data

VIA and the EPIA series have been at the forefront of the quiet computing initiative. The VIA EPIA N-Series has been designed to be totally non-obtrusive with noise levels equivalent to a person whispering. With noise levels ranging from the totally silent VIA EPIA N10000, VIA EPIA N8000E, and VIA EPIA N5000E, a new wave of system design innovation and exciting opportunities are being created in an almost limitless number of emerging new market segments - ranging from fanless thin clients, flat panel small form factor desktop replacement systems, LCD PCs and a host of other space and power saving systems.

Common Sounds	dBA Level
Threshold of hearing	0 dBA
VIA EPIA N5000E	0 dBA
VIA EPIA N8000E	0 dBA
VIA EPIA N10000	20 dBA
Normal breathing	10 dBA
Whispering at 1 meter	20 dBA
Conventional PC	35 – 50 dBA
Rainfall	50 dBA
Normal speech	60 dBA

The dBA scale is logarithmic, i.e. 10 dBA represents a doubling in volume. dBA values are measured at a distance of one meter.

Power Consumption

Power consumption tests were carried out comparing the VIA EPIA N5000E (running the 533MHz VIA CoreFusion™ processor), VIA EPIA N8000E (running the 800MHz VIA CoreFusion™ processor) and VIA EPIA N10000 (running the 1.0GHz VIA CoreFusion™ processor). The following tables are a comprehensive breakdown of the EPIA platform's voltage, amp and wattage values while running common system applications.

VIA EPIA N 5000E

A. Playing DVD – Power DVD 5.0

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.222	2.992	9.640
Main Board +5V	5.044	0.928	4.681
Main Board 5VSB	4.915	0.058	0.285
Main Board +12V	11.993	0.095	1.139
Main Board Power Consumption			15.745

B. Playing MP3 – Media Player

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.238	2.820	9.131
Main Board +5V	5.055	0.783	3.958
Main Board 5VSB	4.924	0.058	0.286
Main Board +12V	12.005	0.096	1.152
Main Board Power Consumption			14.527

C. Running Network Application – File Copy

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.243	2.663	8.636
Main Board +5V	5.064	0.512	2.593
Main Board 5VSB	4.928	0.060	0.296
Main Board +12V	11.992	0.097	1.163
Main Board Power Consumption			12.688

D. Idle

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.252	2.589	8.419
Main Board +5V	5.066	0.439	2.224
Main Board 5VSB	4.930	0.060	0.296
Main Board +12V	11.992	0.099	1.187
Main Board Power Consumption			12.126

E. Run C.C. Winstone 2001

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.234	2.750	8.894
Main Board +5V	5.051	0.897	4.531
Main Board 5VSB	4.922	0.059	0.290
Main Board +12V	12.004	0.097	0.000
Main Board Power Consumption			13.715

F. S3 Mode

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	0.000	0.000	0.000
Main Board +5V	0.000	0.000	0.000
Main Board 5VSB	4.963	0.160	0.794
Main Board +12V	0.000	0.000	0.000
Main Board Power Consumption			0.794

VIA EPIA N 8000E

A. Playing DVD – Power DVD 5.0

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.216	2.970	9.552
Main Board +5V	5.039	1.067	5.377
Main Board 5VSB	4.913	0.055	0.270
Main Board +12V	11.992	0.084	1.007
Main Board Power Consumption			16.206

B. Playing MP3 – Media Player

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.228	2.871	9.268
Main Board +5V	5.047	1.035	5.224
Main Board 5VSB	4.921	0.056	0.276
Main Board +12V	12.004	0.087	1.044
Main Board Power Consumption			15.811

C. Running Network Application – File Copy

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.240	2.626	8.508
Main Board +5V	5.063	0.579	2.931
Main Board 5VSB	4.928	0.059	0.291
Main Board +12V	11.990	0.093	1.115
Main Board Power Consumption			12.846

D. Idle

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.244	2.575	8.353
Main Board +5V	5.062	0.491	2.485
Main Board 5VSB	4.927	0.059	0.291
Main Board +12V	11.996	0.093	1.116
Main Board Power Consumption			12.245

E. Run C.C. Winstone 2001

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.224	2.764	8.911
Main Board +5V	5.043	1.164	5.870
Main Board 5VSB	4.918	0.057	0.280
Main Board +12V	12.006	0.086	0.000
Main Board Power Consumption			15.062

F. S3 Mode

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	0.000	0.000	0.000
Main Board +5V	0.000	0.000	0.000
Main Board 5VSB	4.963	0.160	0.794
Main Board +12V	0.000	0.000	0.000
Main Board Power Consumption			0.794

VIA EPIA N 10000

A. Playing DVD – Power DVD 5.0

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.219	2.974	9.573
Main Board +5V	5.041	1.086	5.475
Main Board 5VSB	4.910	0.064	0.314
Main Board +12V	11.982	0.170	2.037
Main Board Power Consumption			17.399

B. Playing MP3 – Media Player

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.232	2.877	9.298
Main Board +5V	5.049	1.045	5.276
Main Board 5VSB	4.918	0.063	0.310
Main Board +12V	11.994	0.170	2.039
Main Board Power Consumption			16.923

C. Running Network Application – File Copy

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.239	2.654	8.596
Main Board +5V	5.058	0.606	3.065
Main Board 5VSB	4.923	0.066	0.325
Main Board +12V	11.992	0.171	2.051
Main Board Power Consumption			14.037

D. Idle

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.249	2.594	8.428
Main Board +5V	5.064	0.508	2.573
Main Board 5VSB	4.925	0.064	0.315
Main Board +12V	11.983	0.170	2.037
Main Board Power Consumption			13.353

E. Run C.C. Winstone 2001

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	3.228	2.763	8.919
Main Board +5V	5.044	1.148	5.791
Main Board 5VSB	4.915	0.062	0.305
Main Board +12V	11.990	0.171	0.000
Main Board Power Consumption			15.014

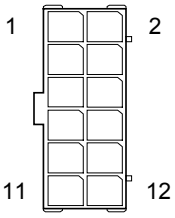
F. S3 Mode

	Measured Voltage	Measured Amp.	Watts
Main Board +3.3V	0.000	0.000	0.000
Main Board +5V	0.000	0.000	0.000
Main Board 5VSB	4.955	0.164	0.813
Main Board +12V	0.000	0.000	0.000
Main Board Power Consumption			0.813

Power Specifications

The EPIA N utilizes an industry standard 12-pin ATX main connector to the power supply. Due to the EPIA N platform's ultra low power requirements, a 90 – 120 Watt ATX power supply is ample for even the heaviest of multimedia system applications.

Nano-ITX PWR



1	+3.3V	**7**	-PSON
2	+3.3V	**8**	+5V
3	+3.3V	**9**	GND
4	+5VSUS	**10**	+5V
5	GND	**11**	GND
6	+12V	**12**	PWRGD

VIA EPIA N-Series Microsoft and Linux Driver Support

Microsoft Driver Support

VIA EPIA N-Series offer full support for the complete range of Microsoft operating systems.

For standard operating systems, Windows 98/Me/2000/XP latest drivers downloads can be found in the VEPD website at www.viaembedded.com.

For embedded operating systems, Windows CE.NET and XP Embedded related driver supports can be found in the VIA Arena website at www.viaarena.com.

Linux Driver Support

VIA EPIA N mainboards have a very high degree of support under Linux.

Support and drivers are provided through various methods including:

- Drivers provided by VIA
  - Using a driver built into a distribution package
  - Visiting VIA Arena website at www.viaarena.com for latest updates on a monthly basis
- Installing a third party driver (such as the ALSA driver from the Advanced Linux Sound Architecture project for integrated audio)

For OEM clients and system integrators developing a product for long-term production, other code and resources may also be made available. You can submit a request either through the Developers portal on VIA Arena, or through your VEPD support contact. Alternatively, VIA can work further towards providing additional drivers to suite your specific needs.

Contact

For more information on the VIA EPIA N-Series Nano-ITX Mainboard contact your sales representative or visit our website at **www.viaembedded.com**

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