VIA EPIA V-Series Mini-ITX Mainboard Operation Guidelines

Dream Catalyst

Contents

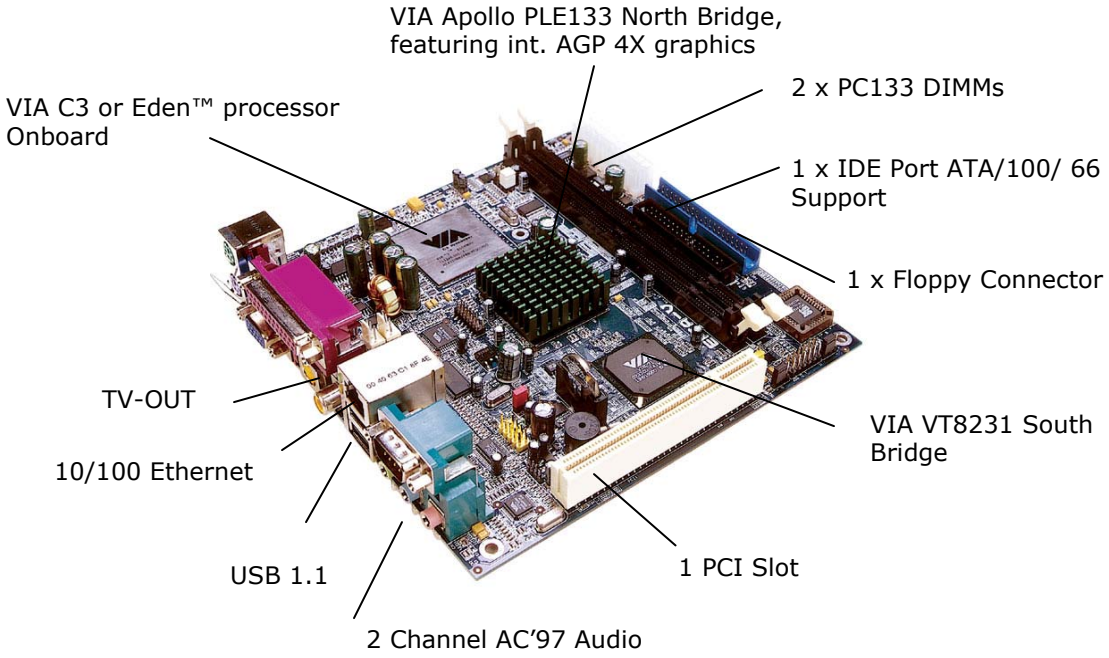
EPIA V-Series Overview

The VIA EPIA V-Series Mainboard is the latest edition to the Mini-ITX family, the world's smallest integrated mainboard platform at the forefront of silent x86 computing. Gone is the traditional platform noise that is unacceptable for entertainment or productivity applications key to your success in the living room, office and classroom environments. The EPIA V provides system designers and enthusiasts with a 17cm x 17cm, optionally fanless, computing platform for building the attractive lifestyle and productivity devices that are pioneering the age of ubiquitous computing. Applications for this dream catalyst platform are limited only by the scope of your imagination.

The EPIA V is available in both fan-cooled and fanless versions due to its ultra low power/heat characteristics. A fanless EPIA V platform is completely silent with no moving parts. Fan-cooled versions are virtually silent with a noise rating of 25dBA @ one meter, the equivalent to a person whispering from one meter away. Compare this to today's average PC platform with a rating of 45dBA @ one meter or the equivalent of two people having a normal conversation @ one meter. Running at an average of 18 watts, the EPIA V platform consumes around 35% of the power required to run today's average PC thus increasing system reliability and longevity as well as reducing total cost of ownership over the lifetime of the platform. Examples of the lifestyle and productivity devices being built using the EPIA V platform include home network gateways and servers, automated home security and lighting systems, education PCs and terminals, in-car PCs, and solar powered PCs. EPIA V is rewriting the x86 platform design rules, so let your imagination run wild and join the revolution.

Featuring the proven VIA Apollo PLE133-T chipset with an advanced integrated AGP 2D/3D graphics engine and a choice of onboard VIA C3 or fanless VIA Eden processors running at speeds of up to 1GHz, the VIA EPIA V-Series offers a wide variety of highly integrated platforms for building a broad spectrum of quiet running, affordable mini PCs and servers for the home, corporate, and educational markets. Other features include support for up to 1GB PC133 SDRAM, dual channel audio, an extensive set of connectivity features such as USB1.1, TV Out, and a 10/100 Mbps Ethernet controller, one PCI slot, and an FDD connector.

EPIA V-Series Layout



EPIA V Processor SKUs

The EPIA V-Series is available in three different speed grades. The EPIA VE5000 utilizes VIA's ultra low power Eden processor while the EPIA V10000 and V8000 utilize the robust VIA C3 processor.

EPIA VE5000

- **VIA Eden™ ESP Processor**
- **Fanless Operation**
- **1.2v Operating Voltage**
- **128KB L1 Cache & 64KB L2 Cache**
- **MMX and 3DNow!**

Suitable for fanless systems where silent, ultra low power operation is the priority

EPIA V10000 V8000

- **VIA C3-E™ Processor**
- **1.35v Operating Voltage**
- **128KB L1 Cache & 64KB L2 Cache**
- **MMX and 3DNow!**

Suitable for compact, low noise, power efficient systems running robust productivity applications

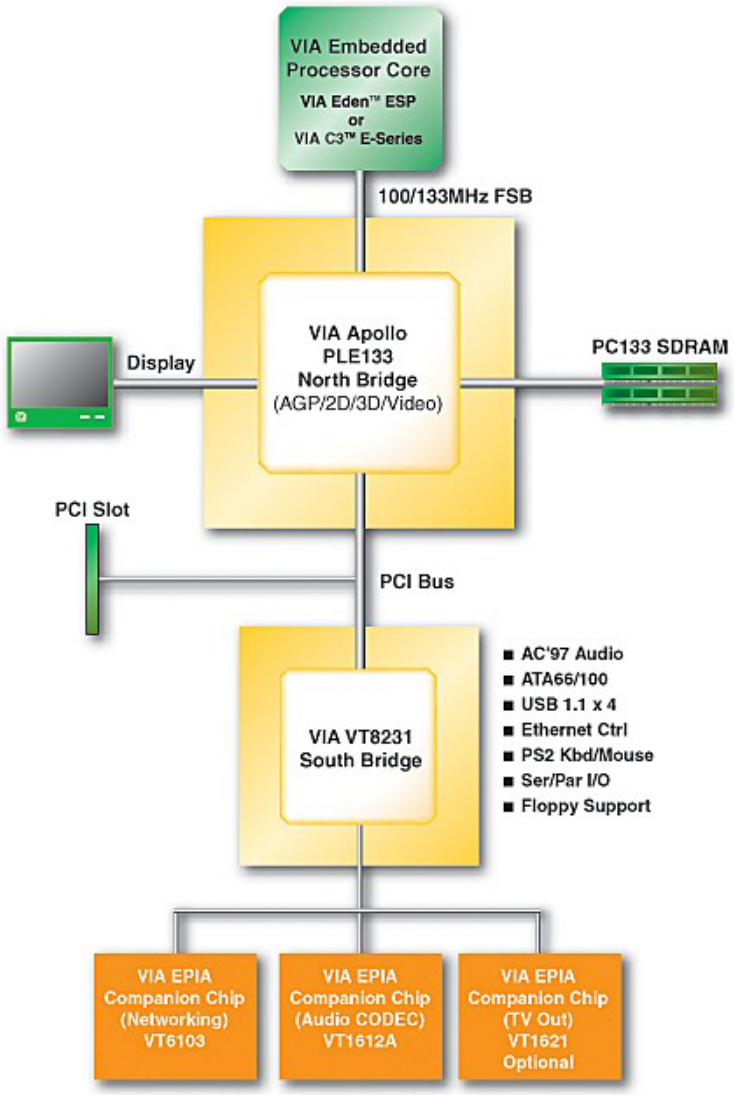
EPIA V-Series Specifications

Processor	- VIA C3/Eden EBGA Processor Onboard
Chipset	- VIA PLE133 North Bridge - VT8231 South Bridge
System Memory	- 2 PC133 DIMM Sockets - Up to 1GB Memory Size
VGA	- Integrated AGP 4X Graphics
Expansion Slots	- 1 PCI Slot
Onboard IDE	- 1 X ATA 100/66 Connectors
Onboard Floppy	- 1 x FDD Connector
Onboard LAN	- VIA VT6103 10/100 Base-T Ethernet PHY
Onboard Audio	- VIA VT1612A 2 Channel AC'97 Codec
Onboard TV Out	- VIA VT1621 TV out (optional)
Onboard I/O Connectors	- 1 USB 1.1 Connector for 2 additional ports - CD Audio-in Connector - SIR connector - CIR connector - Wake-on-LAN, Wake-on-Ring - CPU/Sys Fan - System intrusion connector
Back Panel I/O	- 1 PS2 mouse port - 1 PS2 keyboard port - 1 RJ-45 LAN port - 2 USB 1.1 ports - 1 VGA Port - 1 Serial port - Parallel port - 1 RCA port (SPDIF or TV out) - 1 S-Video port - 3 audio jacks: line-out, line-in and mic-in
BIOS	- Award BIOS - 2/4Mbit flash memory
System Monitoring & Management	- CPU temperature monitoring - CPU voltage monitoring - Wake-on-LAN, Keyboard-Power-on, Timer-Power-on - System power management - AC power failure recovery
Form Factor	- Mini ITX (4 layer) - 17 cm x 17 cm

EPIA V-Series Chipset Architecture

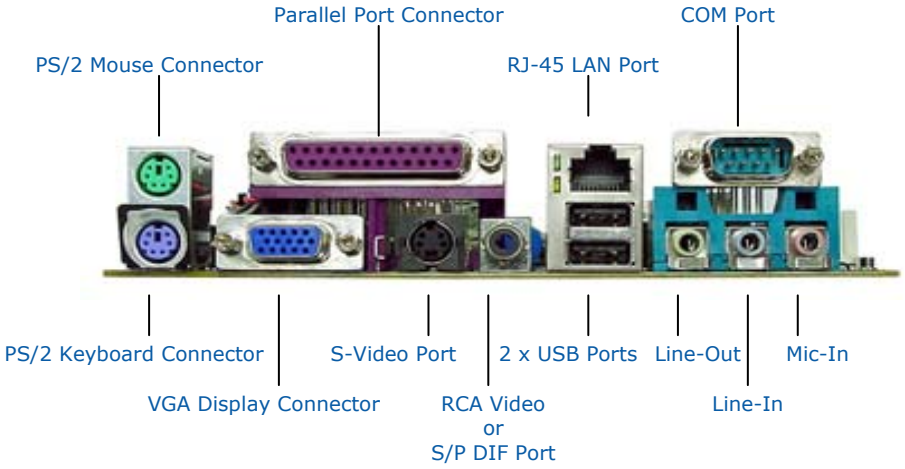
Optimized for both the VIA C3 and Eden processor range, the VIA EPIA-V features the PLE133-T integrated chipset with rich built-in AGP 4X graphics and PC133 SDRAM support. Other chipset features include AC'97 dual channel audio, and USB1.1, as well as support for TV Out, 10/100 Mbps Ethernet controller, and PCI and Floppy connectors. The PLE133-T provides the EPIA V-Series with the optimal balance of performance, low power and connectivity options for building a broad

spectrum of quiet running, affordable mini PCs and servers for the home, corporate, and educational markets.



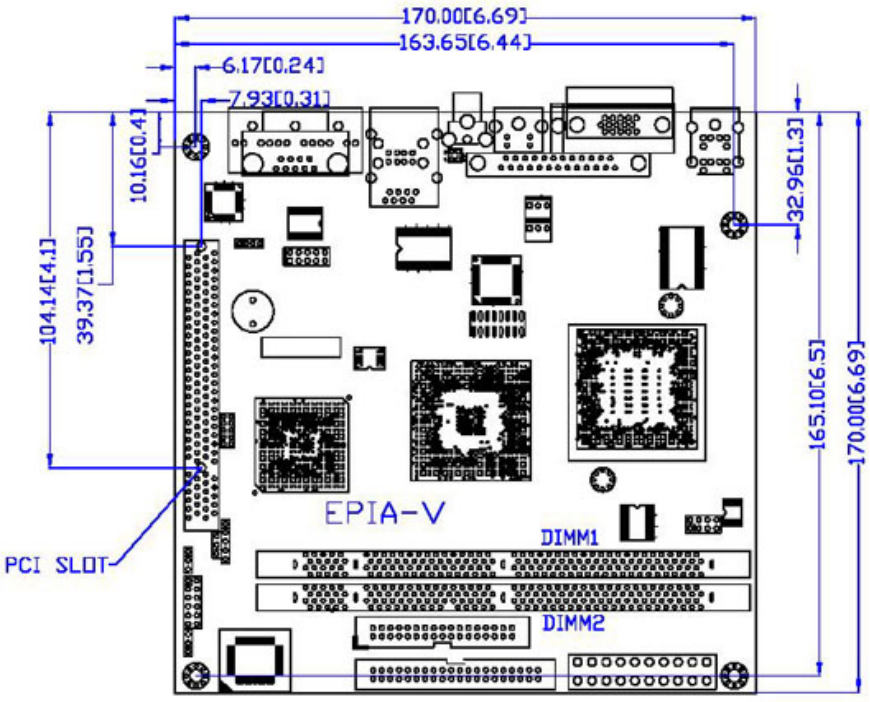
EPIA V-Series I/O Back Panel Layout

The EPIA V's ultra compact 17cm x 17cm integrated design supports all the standard legacy x86 connectivity options as well as Ethernet LAN, USB 1.1, and AC'97 audio. Video connectivity options are second to none and include a VGA port, RCA port (SPDIF or TV Out), and S-Video port.



EPIA V-Series Layout Diagram & Mounting Holes

EPIA platform Chassis' and power supplies are now widely available in a myriad of designs, shapes and sizes to accommodate even the most unique projects. For increased convenience and options, VIA has designed the mounting holes to be completely compatible with Flex ATX and Micro ATX form factors. See the diagram below for a comprehensive list of mounting hole and component placement dimensions.



Noise Level Data

VIA and the EPIA series have been at the forefront of the quiet computing initiative. The EPIA V–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 EPIA VE5000 to 25dBA for the EPIA V10000, 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 silent running mini-PCs and living room digital media entertainment centers to Car PCs and a host of embedded applications such as Kiosk, POS, and Industrial Control machines.

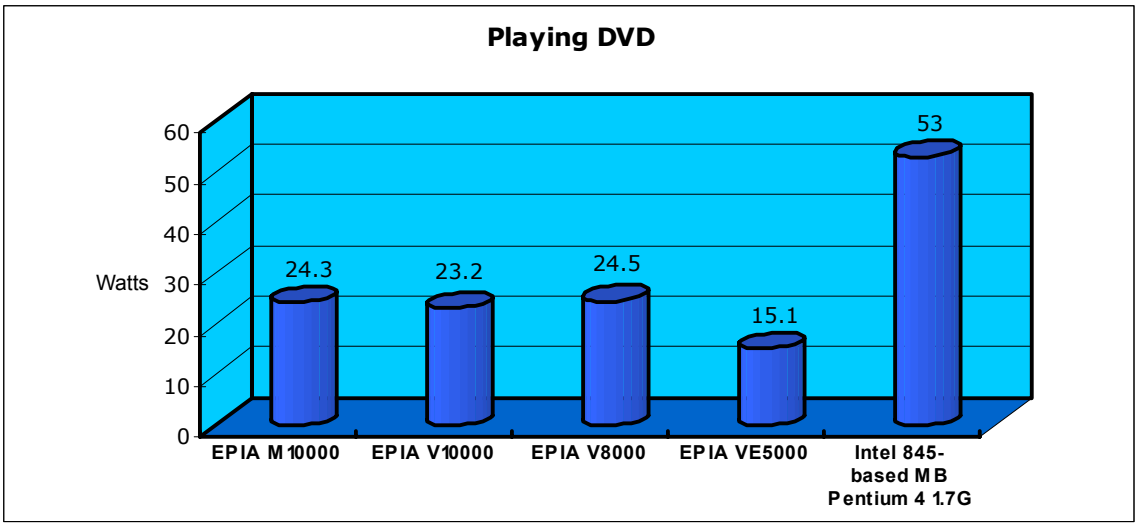
Common Sounds	dBA Level
Threshold of hearing	0 dBA
EPIA VE5000	**0 dBA**
Normal breathing	10 dBA
Whispering at 1 meter	20 dBA
EPIA V10000	**25 dBA**
EPIA V8000	**35 dBA**
Conventional PC	35 – 50 dBA
Rainfall	50 dBA
Normal speech	60 dBA

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

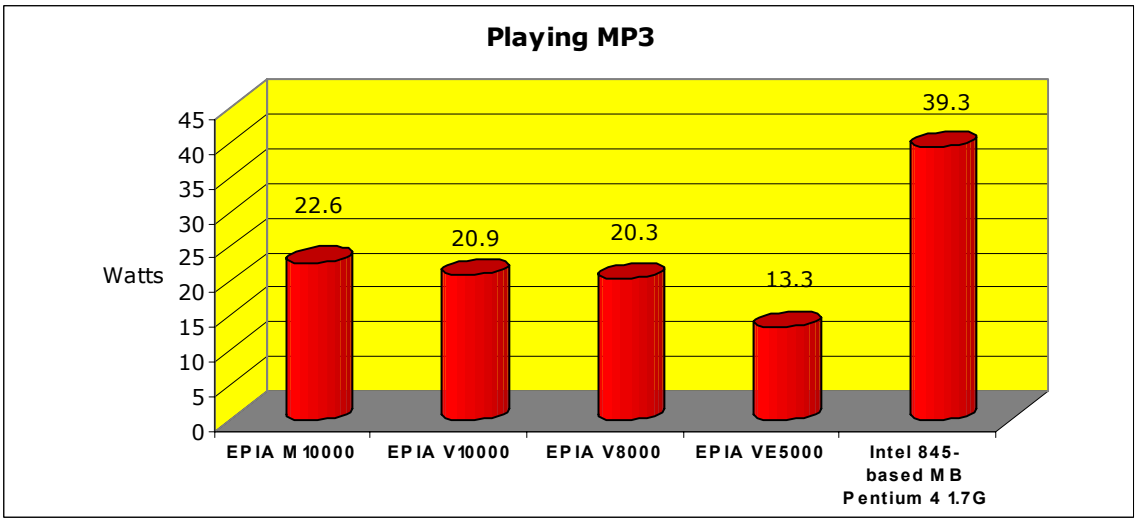
Power Consumption Data

The following graphs are a comprehensive comparison of power consumption results for a range of typical PC applications with the VIA EPIA V-Series mainboards compared to the typical "one size fits all" platform that is being promoted by others in the PC industry. We have also included the EPIA M10000 mainboard as a frame of reference.

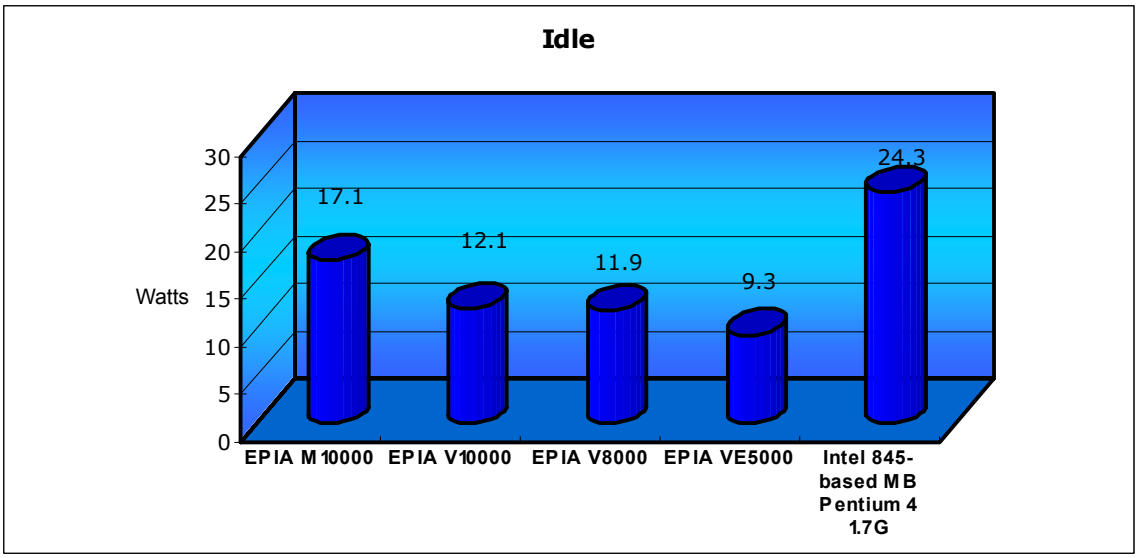
The "one size fits all" system that we are using as a reference platform is an Intel 845-based Pentium 4 platform and we are comparing the power consumption to that of the VIA EPIA V-Series Mini-ITX mainboards. All tests were conducted using the Microsoft Windows® 2000 operating system and include the wattage consumed by the total platforms.



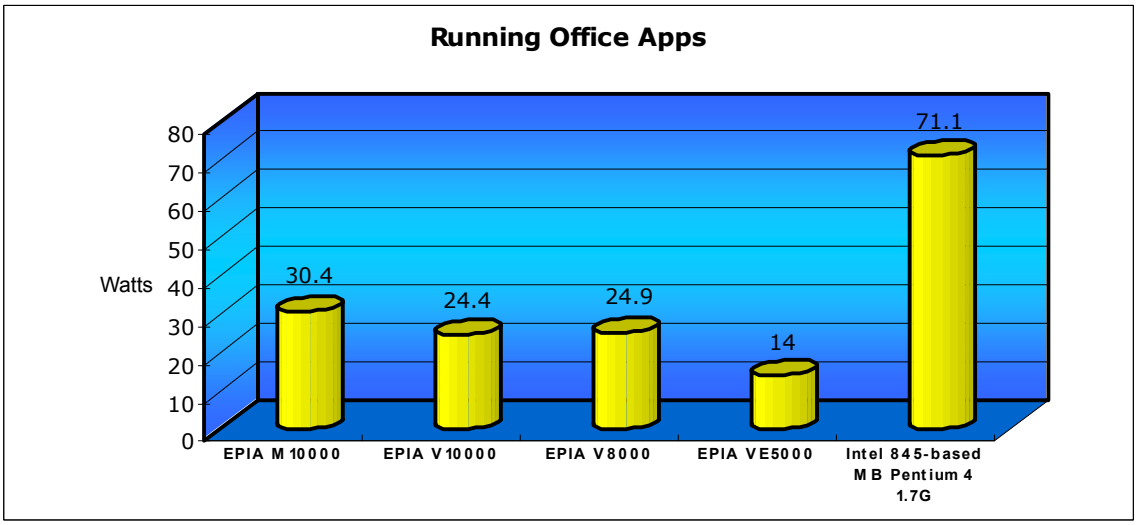
The EPIA V platform offers flawless DVD playback performance at between 27% - 50% of the power of the reference system. Low power silent operation is essential design elements for living room DVD and entertainment devices.



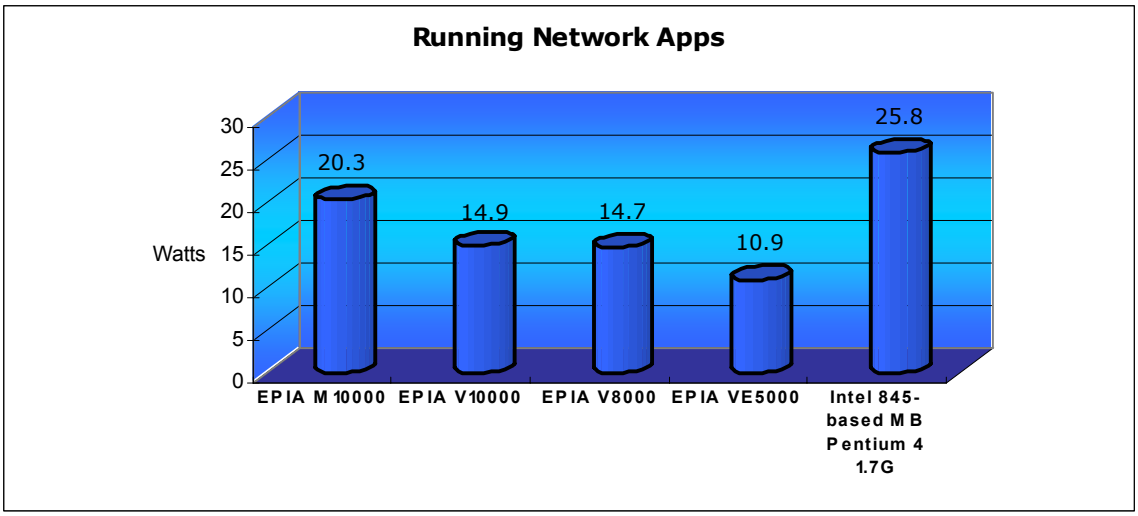
Power consumption of EPIA V's flagship V10000 is only half of that of the reference platform. The fanless VIA EPIA VE5000 uses a meager 33% of the power that the reference platform. This is significant as power sensitive systems like in-car MP3 systems are gaining in popularity.



In this comparison, the power consumed while standing idle is compared and the VIA EPIA V-Series mainboards draw around 35% of the power that the Intel reference platform draws.



The comparison above uses CC Winstone 2001 to compare power consumption while carrying out standard office tasks like word processing, manipulating spreadsheets and database work. In this comparison, the fanless VIA EPIA VE5000 mainboard uses around 20% of the power used by the reference platform.



The power consumption comparison for network applications was run while transferring large data files over a standard 10 Base T network. Here again the power consumption of the Intel reference platform is considerably more than that of the VIA EPIA V-Series with the EPIA VE5000 drawing less than 40% of the power of the reference platform.

The following table is a comprehensive breakdown of the EPIA V platform's voltage, Amp and Wattage values while running the same system applications as the graphs above.

EPIA V10000 (Nehemiah)			
	Playing DVD		
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.767A	9.319W
+5V	5.083V	2.306A	11.721W
5VSB	5.046V	0.198A	0.999W
+12V	11.894V	0.104A	1.237W
Total Watts: 23.276W			
	Playing MP3		
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.227A	7.501W
+5V	5.083V	2.160A	10.979W
5VSB	5.046V	0.183A	0.923W
+12V	11.894V	0.129A	1.534W
Total Watts: 20.937W			
	Running Network Applications		
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.091A	7.042W
+5V	5.083V	1.032A	5.246W
5VSB	5.046V	0.186A	0.939W
+12V	11.894V	0.143A	1.701W
Total Watts: 14.928W			
	Idle		
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.014A	6.783W

+5V	5.083V	0.527A	2.679W
5VSB	5.046V	0.186A	0.939W
+12V	11.894V	0.149A	1.772W
Total Watts: 12.173W			
Running Office Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.319A	7.810W
+5V	5.083V	2.723A	13.841W
5VSB	5.046V	0.191A	0.964W
+12V	11.894V	0.151A	1.796W
Total Watts: 24.410W			

EPIA V8000			
Playing DVD			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.421A	8.154W
+5V	5.083V	2.591A	13.170W
5VSB	5.046V	0.230A	1.161W
+12V	11.894V	0.174A	2.070W
Total Watts: 24.555W			
Playing MP3			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.222A	7.484W
+5V	5.083V	1.922A	9.770W
5VSB	5.046V	0.226A	1.140W
+12V	11.894V	0.167A	1.986W
Total Watts: 20.380W			
Running Network Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.022A	6.810W
+5V	5.083V	1.015A	5.617W
5VSB	5.046V	0.179A	0.903W
+12V	11.894V	0.119A	1.415W
Total Watts: 14.745W			
Idle			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	1.919A	6.463W
+5V	5.083V	0.467A	2.373W
5VSB	5.046V	0.224A	1.130W
+12V	11.894V	0.166A	1.974W
Total Watts: 11.940W			
Running Office Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.331A	7.851W
+5V	5.083V	2.871A	14.593W
5VSB	5.046V	0.185A	0.934W
+12V	11.894V	0.130A	1.546W
Total Watts: 24.924W			

EPIA VE5000			
Playing DVD			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.641A	8.895W
+5V	5.083V	0.865A	4.397W
5VSB	5.046V	0.185A	0.994W
+12V	11.894V	0.075A	0.892W
Total Watts: 15.178W			
Playing MP3			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.300A	7.746W
+5V	5.083V	0.743A	3.777W
5VSB	5.046V	0.185A	0.994W
+12V	11.894V	0.073A	0.868W
Total Watts: 13.385W			
Running Network Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.079A	7.002W
+5V	5.083V	0.419A	2.130W
5VSB	5.046V	0.183A	0.923W
+12V	11.894V	0.076A	0.934W
Total Watts: 10.989W			
Idle			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	1.991A	6.706W
+5V	5.083V	0.159A	0.808W
5VSB	5.046V	0.185A	0.934W
+12V	11.894V	0.074A	0.880W
Total Watts: 9.326W			
Running Office Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.276A	7.666W
+5V	5.083V	0.902A	4.585W
5VSB	5.046V	0.185A	0.934W
+12V	11.894V	0.073A	0.868W
Total Watts: 14.053W			

The EPIA M10000 was added for comparison purposes.

EPIA M10000 (Nehemiah)			
Playing DVD			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	3.276A	11.034W
+5V	5.083V	1.864A	9.475W
5VSB	5.046V	0.193A	0.974W
+12V	11.894V	0.238A	2.831W
Total Watts: 24.314W			

Playing MP3			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	3.001A	10.107W
+5V	5.083V	1.722A	8.753W
5VSB	5.046V	0.199A	1.004W
+12V	11.894V	0.237A	2.819W
Total Watts: 22.683W			
Running Network Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.924A	9.848W
+5V	5.083V	1.323A	6.725W
5VSB	5.046V	0.190A	0.959W
+12V	11.894V	0.239A	2.843W
Total Watts: 20.375W			
Idle			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	2.776A	9.350W
+5V	5.083V	0.776A	3.944W
5VSB	5.046V	0.194A	0.979W
+12V	11.894V	0.240A	2.855W
Total Watts: 17.128W			
Running Office Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.368V	3.046A	10.259W
+5V	5.083V	3.215A	13.342W
5VSB	5.046V	0.195A	0.984W
+12V	11.894V	0.237A	2.819W
Total Watts: 30.404W			

An Intel Pentium 4 1.7GHz based PC was used as the reference PC platform

Intel 845 chipset-based mainboard - Pentium 4 1.7G			
Playing DVD			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.37V	2.82A	9.5034W
+5V	5.06V	0.77A	3.8962W
5VSB	5.04V	0.058A	0.2923W
+12V	11.96V	0.179A	2.1408W
CPU12V	11.99V	3.10A	37.169W
Total Watts: 53.0017W			
Playing MP3			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.37V	2.62A	8.8294W
+5V	5.06V	0.77A	3.8962W
5VSB	5.04V	0.058A	0.2923W
+12V	11.96V	0.179A	2.1408W
CPU12V	11.99V	2.015A	24.1599W
Total Watts: 39.3186W			

Running Network Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.37V	2.55A	8.5935W
+5V	5.06V	0.77A	3.8962W
5VSB	5.04V	0.058A	0.2923W
+12V	11.96V	0.18A	2.1528W
CPU12V	11.99V	0.91A	10.9109W
Total Watts: 25.8457W			
Idle			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.37V	2.53A	8.5261W
+5V	5.06V	0.76A	3.8456W
5VSB	5.04V	0.058A	0.2923W
+12V	11.96V	0.18A	2.1528W
CPU12V	11.99V	0.796A	10.9109W
Total Watts: 24.3608W			
Running Office Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.37V	2.61A	8.7957W
+5V	5.06V	0.77A	3.8962W
5VSB	5.04V	0.058A	0.2923W
+12V	11.96V	0.178A	2.1289W
CPU12V	11.99V	4.67A	55.9933W
Total Watts: 71.1064W			

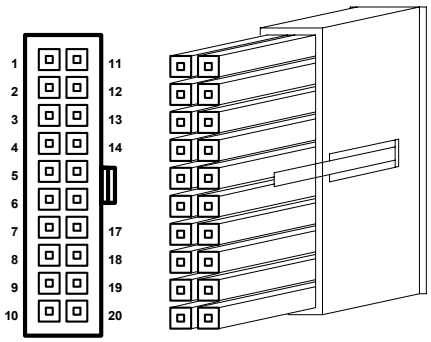
EPIA V-Series Compatible Chassis

A growing number of chassis are available from leading case manufacturers in a variety of different cube and consumer electronics styles. The table below provides a list of the key features of a selection of ultra small footprint chassis designed for the VIA EPIA Mini-ITX platform.

	Morex Cupid 2699	SkyHawk IPX8201	CaseTek CK10101	G-Alantic GA610i	Chyang Fun CF7989C3	Cooler Master Slim	Cooler Master Cupid	Lian Li PC-402A
Drive Bays								
CDROM	5.25" Slim	5.25" Std.	5.25" Std.	5.25" Std.	5.25" Std.	5.25" Slim	5.25" Std.	2 x 5.25" Std.
Hard Drive	3.5"	3.5"	3.5"	3.5"	3.5"	3.5"	3.5"	3.5"
Floppy	No	Yes	No	Yes	No	No	Yes	Yes
Accessories								
1 to 1 riser	Optional	Optional	No	Optional	Yes	Optional	Optional	Optional
Front USB	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Front 1394	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Front Audio	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Power Supply	12V AC adaptor	150W	150W	150W	150W	150W	150W	Not included
Photos								
Contact	Tel: 886 2 29858063	Tel: 886 2 82187088	Tel: 886 3 3116570	Tel: 886 2 2270 1895	Tel: 886 3 3631521	Tel: 886 2 32340220	Tel: 886 2 32340220	Tel: 886 2 24513000

Power Specifications

The EPIA V utilizes an industry standard 20-pin ATX main connector to the power supply. Due to the EPIA V platform's ultra low power requirements a 90 – 120 Watt ATX power supply is ample for even the heaviest of multimedia system applications.



1	+3V	**11**	+3V
2	+3V	**12**	-12V
3	Gnd	**13**	Gnd
4	+5V	**14**	PWR_ON-
5	Gnd	**15**	Gnd
6	+5V	**16**	Gnd
7	Gnd	**17**	Gnd
8	PWR_GD	**18**	NC
9	5V_SB	**19**	+5V
10	+12V	20	+5V

Note: NC = no connection

EPIA V-Series Linux & Microsoft Driver Support

Linux Driver Support

The EPIA V-series 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
- Installing VIA's pre-compiled driver binary
- Compiling VIA's driver source code
- Installing a third party driver (such as the ALSA driver from the Advanced Linux Sound Architecture project for integrated audio)

Full instructions for the most popular distribution packages are updated monthly and are available for free download from the Linux Arena on www.viaarena.com The Linux Application notes on VIA Arena also contains further useful information to optimize system performance, such as increasing IDE performance beyond the capabilities of an in-built driver, measuring hard disk performance, enabling hardware monitoring features and other practical guides such as installing CD re-writers, enabling the USB 2.0 controller, and much more.

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

The Linux Arena is updated at least once per month. Other information, notes and links to specific areas of interest can also be found on the EPIA Mainboards driver page. Many OEMs and system integrators also find it valuable to discuss their

development with other Linux users in the dedicated Linux Category of the VIA Arena Forums, which is monitored by VIA staff.

Microsoft Driver Support
EPIA V offers full support for the complete range of Microsoft operating systems.

A Windows XP Embedded support package for EPIA V mainboards is available on the WinXP Embedded Applications Notes page, to facilitate evaluation and development. OEMs and System Integrators should, however, customize their own binary images according to their actual product specifications and application requirements. Sample component implementation for the PLE133 and Northbridge as well as integrated audio on the VT8231 Southbridge is also provided to assist in development. Updates to this support page are made on a monthly basis and further sample components will be released. Components of the VIA EPIA V mainboard are also supported in Service Pack 1 (SP1).

Contact

For more information on the EPIA V-Series Mini ITX Mainboard contact your sales representative or visit our website at www.viamainboard.com

USA 440 Mission Court, Suite 220 Fremont, CA 94539 Tel: (510) 683 3300 Fax: (510) 687 4654 Email: vpsd_sales@viatech.com **Germany** Mottmann Strasse 12 53842 Troisdorf-Oberlar Tel: 2241 397780 Fax: 2241 3977819 Email: sales@via-tech.de	**Taiwan** 8F, 533, Chung Cheng Road Hsin Tien, Taipei Tel: (02) 2218 5452 Fax: (02) 2218 5453 Email: mkt@via.com.tw **China** 6F, DAscom Tower 9 Shangdi East Road Haidian District Beijing, 100085 Tel: 10 6296 3088 Fax: 10 6297 2929 Email: vpsdbj@viatech.com.cn