

VIA EPIA M-Series Mini-ITX Mainboard Operation Guidelines

Dream Catalyst

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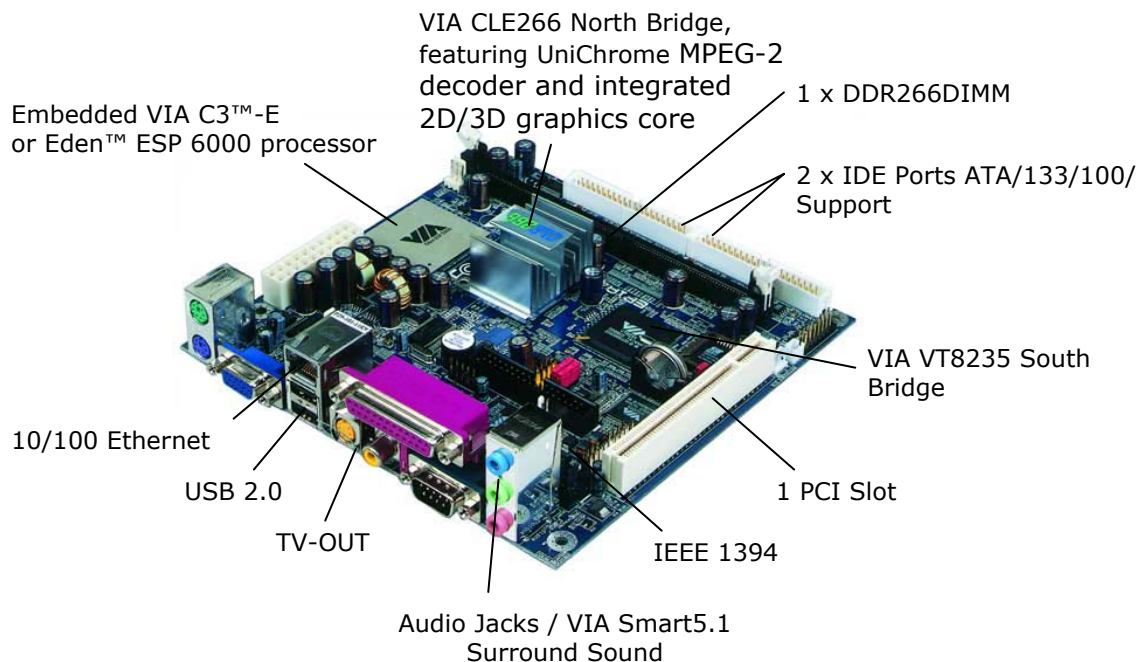
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EPIA M-Series Overview

Optimized for today's killer digital media applications such as watching DVD movies and listening to music, the 17cm x 17cm VIA EPIA M-Series includes a growing range of feature rich and highly versatile solutions for building a complete range of connected multimedia entertainment devices that meet the technical, ergonomic and aesthetic requirements of this emerging but highly demanding market.

In addition to an integrated VIA C3 or fanless VIA Eden processors running at speeds of up to 1GHz, the VIA EPIA M-Series features the VIA Apollo CLE266 chipset with embedded UniChrome MPEG-2 decoder and integrated 2D/3D graphics core to ensure smooth DVD playback and a rich overall entertainment experience. With the sizable memory bandwidth of DDR266 SDRAM and the high data transfer speeds of ATA/133, the VIA EPIA M-Series ensures the high performance levels required of today's most popular digital media and productivity applications. The user's digital media experience is further enhanced by support for 5.1 surround sound, courtesy of the onboard VIA Six-TRAC 6 Channel AC'97 codec. The latest in high-bandwidth connectivity is supported with IEEE 1394 and USB 2.0 connections provided, as well as S-Video and RCA TV-Out (NTSC & PAL) and 10/100 Ethernet for seamless broadband connectivity. The VIA EPIA M-Series also offers support for a growing number of LVDS embedded LCD panels, has a PCI slot for expandability options, and is compatible with a full range of Mini-ITX chassis as well as FlexATX and MicroATX enclosures. It is also fully compatible with Microsoft® and Linux-based operating systems.

EPIA M-Series Layout



EPIA M Processor SKUs

The EPIA M-Series is available in two different speed grades. The EPIA ME6000 utilizes VIA's ultra low power Eden processor while the EPIA M10000 utilizes the robust VIA C3 processor.

EPIA ME6000




- **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 M10000



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



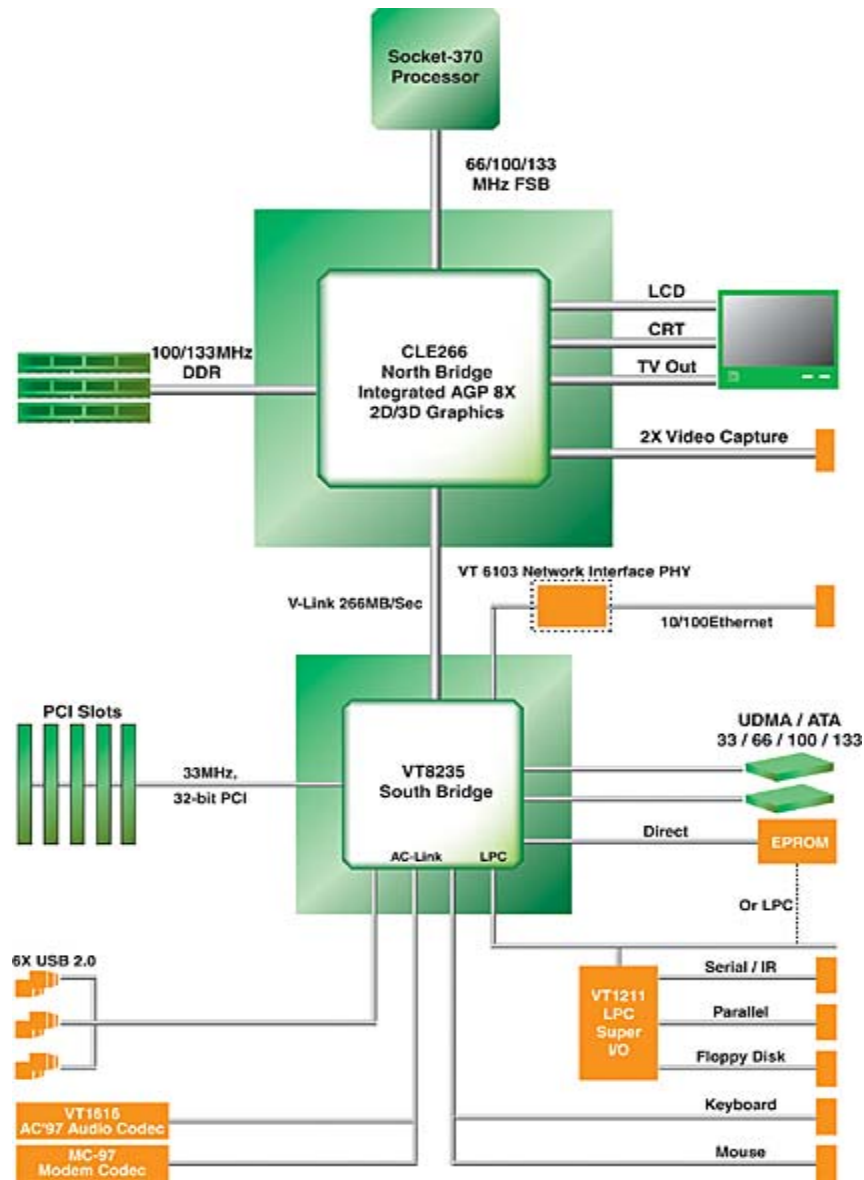
Suitable for compact, low noise, power efficient systems running Multimedia & productivity applications

EPIA M-Series Specifications

Processor	- VIA C3/Eden EPGA Processor
Chipset	- VIA CLE266 North Bridge - VT8235 South Bridge
System Memory	- 1 DDR266 DIMM socket - Up to 1GB memory size
VGA	- Integrated UniChrome graphics
Expansion Slots	- 1 PCI
Onboard IDE	- 2 X ATA 133/100/66 Connectors
Onboard Floppy	- 1 x FDD Connector
Onboard LAN	- VIA VT6103 10/100 Base-T Ethernet PHY
Onboard Audio	- VIA VT1616 6 channel AC'97 Codec
Onboard TV Out	- VIA VT1622 TV out (Optional)
Onboard 1394	- VIA VT6307S Firewire
Onboard I/O Connectors	- 1 USB connectors for 2 additional USB 2.0 ports - 2 1394 connectors for 2 1394 ports - Front-panel audio connectors (Mic and Line Out) - CD Audio-in connector - FIR connector - PS2 connector - Wake-on-LAN, Wake-on-Ring - CPU/Sys FAN/FAN3 - System intrusion connector - 1 I ² C connector - 1 connector for LVDS transmitter module (Optional) - Serial port connector for second com port
Back Panel I/O	- 1 PS2 mouse port - 1 PS2 keyboard port - 1 Parallel - 1 RJ-45 LAN port - 1 Serial 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; can be switched to 6 channel output with Smart5.1
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

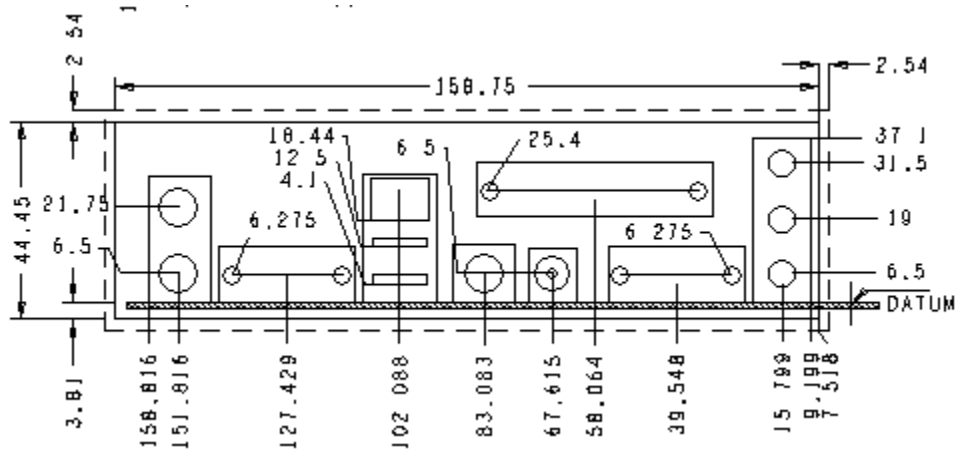
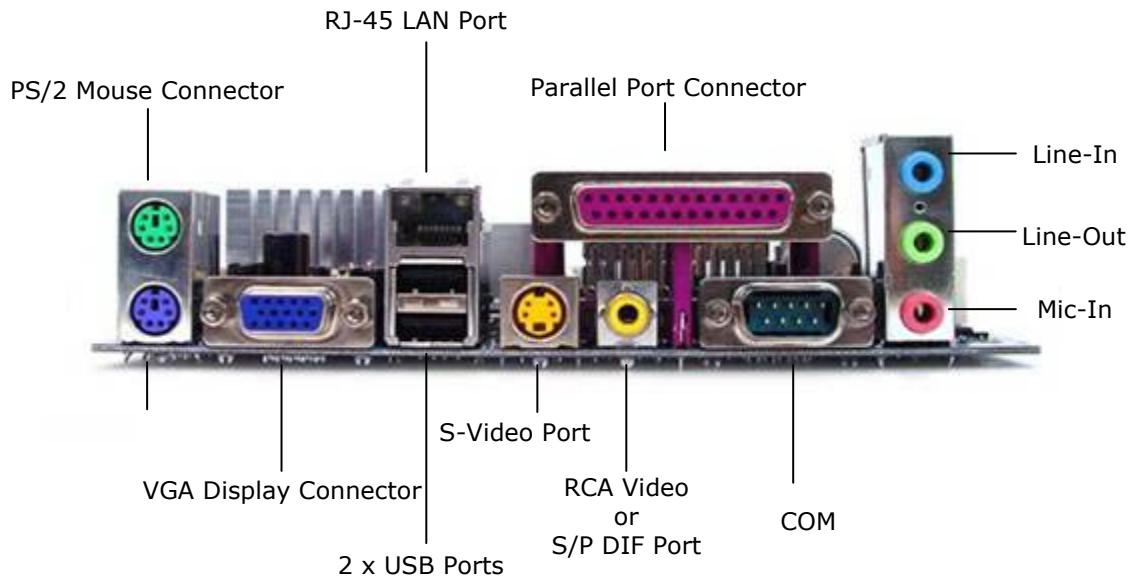
VIA CLE266 Chipset Overview

The VIA Apollo CLE266 Chipset is designed to enable high quality digital video streaming and DVD playback in a new generation of fanless, small form factor PCs and IA devices. The CLE266 features the embedded UniChrome MPEG-2 decoder and integrated 2D/3D graphics core as well as DDR266 support to ensure a rich overall entertainment experience. Outstanding connectivity features include USB 2.0, IEEE 1394, TV Out, 10/100 LAN and ATA/133. For more information on the VIA CLE266 visit the VIA website at www.via.com.tw/en/apollo/cle266.jsp.

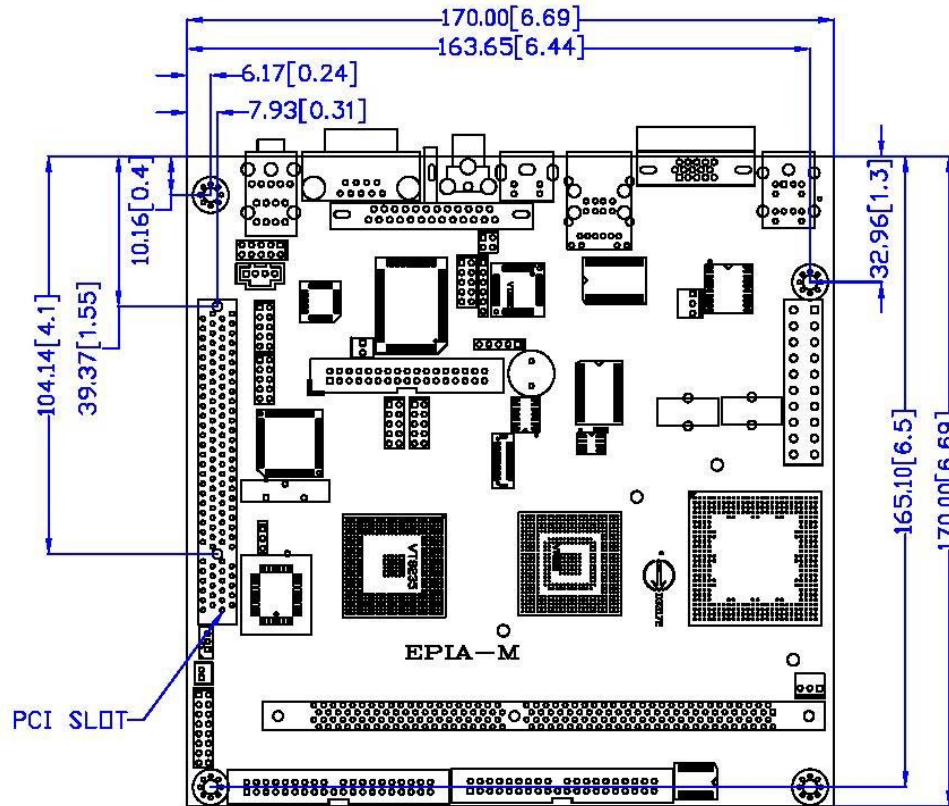


EPIA M-Series I/O Back Panel Layout

The EPIA M's ultra compact 17cm x 17cm integrated design supports all the standard legacy x86 connectivity options as well as Ethernet LAN, USB 2.0, IEEE 1394 (onboard headers) and VIA Six-TRAC 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 M-Series Layout Diagram & Mounting Holes



Noise Level Data

VIA and the EPIA series have been at the forefront of the quiet computing initiative. The EPIA M-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 ME6000 to 25dBA for the EPIA M10000, 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 ME6000	0 dBA
Normal breathing	10 dBA
Whispering at 1 meter	20 dBA
EPIA M10000	25 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.

DVD Payback Test

The table below compares VIA C3™ processor and CLE266 chipset DVD playback performance to that of a powerful Intel® Pentium 4 1.7 GHz and 845 chipset with Leadtek Geforce 4 MX440 VGA card. Despite giving away 1.167 GHz of processor speed and competing with Geforce4 graphics the VIA CLE266 platform delivers equivalent performance at a fraction of the cost and required space and cooling. Note that this is a comparison of only the DVD playback performance, not a of overall system performance, as digital media performance is what counts for the lifestyle PC.

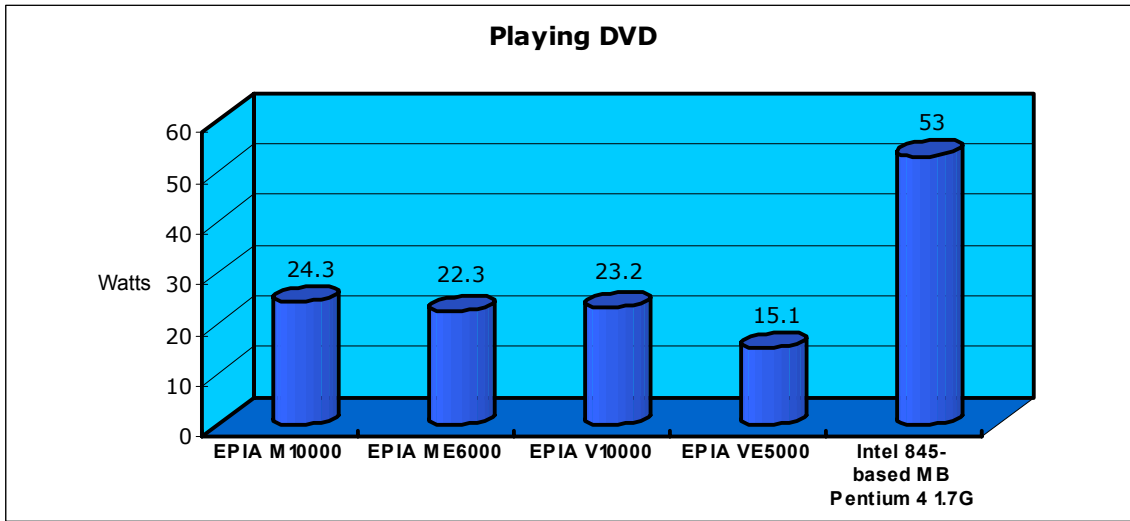
CPU	VIA C3™ 533MHz		Intel® Pentium 4 1.7GHz	
Platform	VIA Apollo CLE266		Intel 845 with Leadtek Geforce 4 MX440	
Vendor	Cyberlink		Cyberlink	
Player	PowerDVD4.0-(DxVA)		PowerDVD4.0-(DxVA)	
Performance	CPU usage	Frame Rate	CPU Usage	Frame Rate
Windows ME	10—12	29.78	8--25	29.96

This table also shows that both platforms have achieved the magical figure of 30 frames per second that indicates smooth or flawless DVD playback.

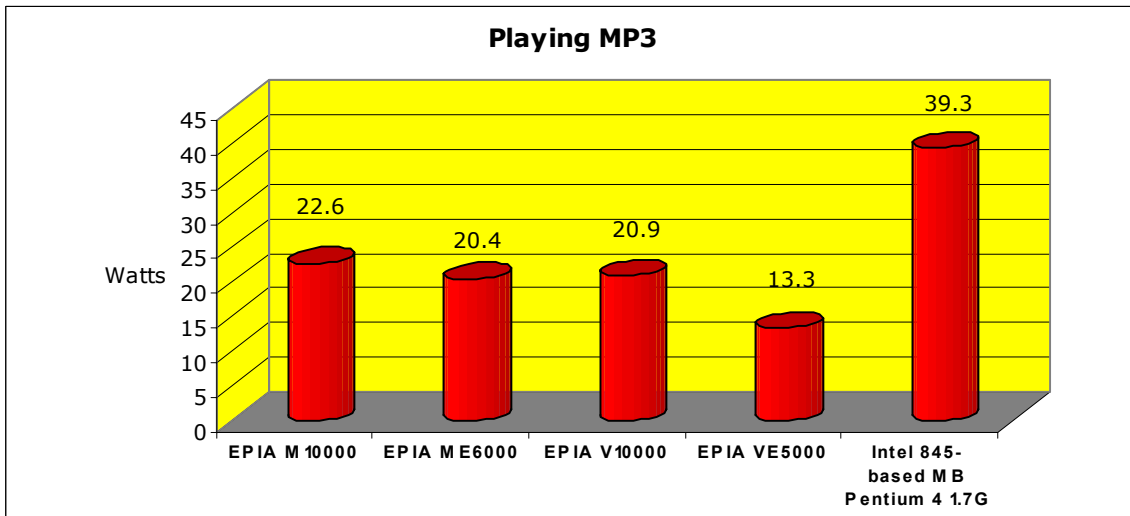
Power Consumption Tests

As the DVD playback performance is comparable in the table above, we will also look at the different power consumption results for a range of typical home PC activities with the VIA EPIA M-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 low power VIA EPIA-Series Mini-ITX mainboards as a frame of reference. Where the VIA EPIA M-Series mainboards are aimed at the living room space, the VIA EPIA 800 and fanless VIA EPIA 5000 are aimed at the thin-client, small footprint desktop and education PC markets, although they are also being used as 1u server, Personal Video Recorder and car PC platforms amongst others.

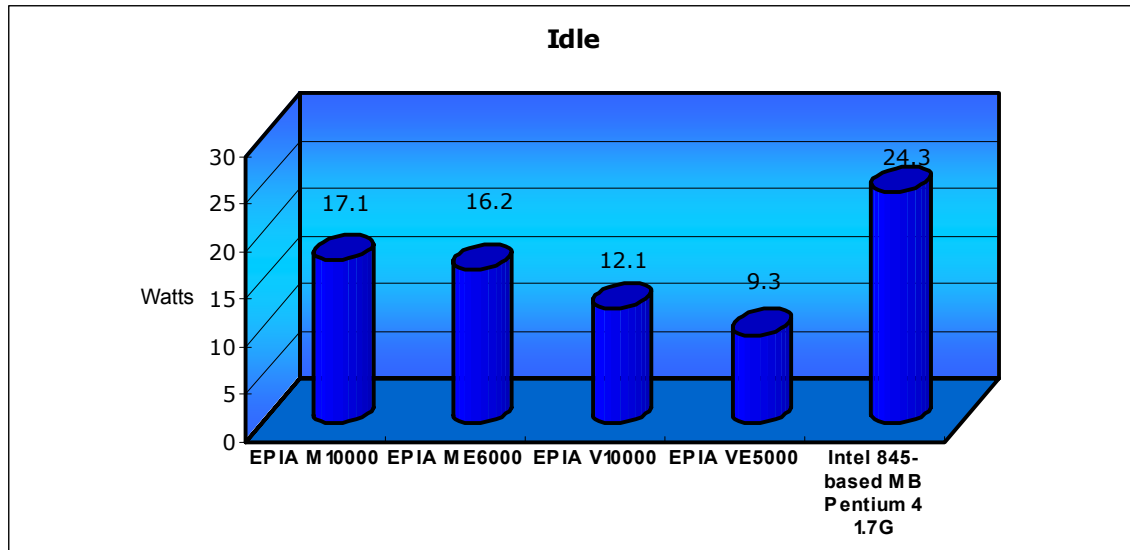
The “one size fits all” system that we are using as a reference platform is an Intel 845-based Pentium 4 platform and we are comparing the power consumption to that of the VIA EPIA M-Series Mini-ITX mainboards. Some of the tests are not aimed solely at Digital Media performance, so they also include the power consumption numbers for the VIA EPIA Mini-ITX mainboards. All tests were conducted using the Microsoft Windows® 2000 operating system and include the wattage consumed by the total platforms. The table below each diagram uses the Intel platform as a frame of reference for the accompanying calculations.



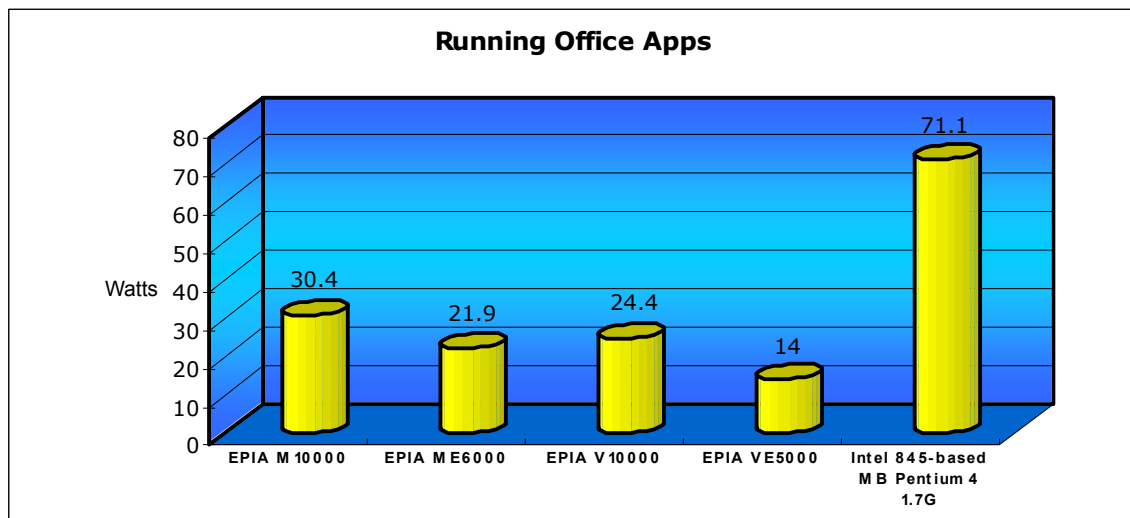
DVD playback performance of these two platforms is not only flawless but the scores are also very close to each other. In figure 2, the power consumption of the EPIA M10000 and the Fanless EPIA ME6000 is less than half of that of the reference platform.



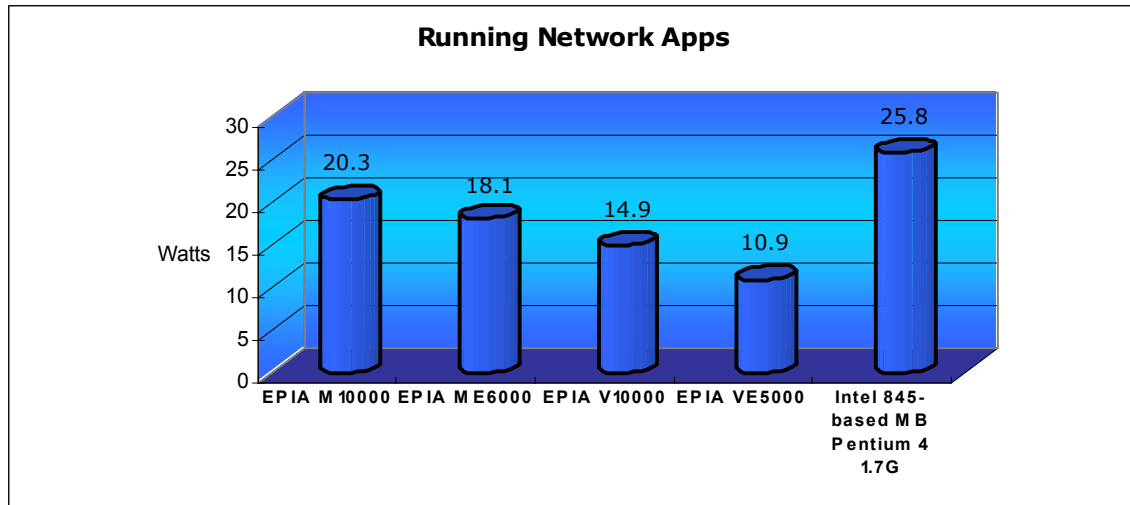
Power consumption of the fanless VIA EPIA ME6000 is around half of that of the reference platform at 51.9%. It is interesting to note that for MP3 playback the fanless VIA EPIA VE5000 only uses around 30% of the power that the reference platform uses. This is significant power sensitive systems like car MP3 players are gaining in popularity.



In this comparison, the power consumed while standing idle is compared and the VIA EPIA M-Series mainboards draw around 60% of the power that the reference platform draws.



Lifestyle PC systems will be used most for digital media applications but they will also be able to be used as fully functional PCs. The comparison above uses CC Winstone 2001 to compare power consumption while carrying out standard office tasks like word processing, manipulating spreadsheets and web browsing. In this comparison, the fanless VIA EPIA ME6000 mainboard uses less than 30% of the power used by the reference platform. It is interesting to note that the fanless VIA EPIA5000 uses less than 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 series of Mini-ITX mainboards.

The following table is a comprehensive breakdown of the EPIA platform's voltage, Amp and Wattage values while running common system applications

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			

EPIA ME6000			
Playing DVD			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.37V	3.36A	11.3232W
+5V	4.92V	1.69A	8.3317W
5VSB	5.02V	0.14A	0.7028W
+12V	12.40V	0.164A	2.0336W
Total Watts: 22.3913W			
Playing MP3			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.37V	3.06A	10.3122W
+5V	4.92V	1.50A	7.395W
5VSB	5.02V	0.14A	0.7028W
+12V	12.40V	0.164A	2.0336W
Total Watts: 20.4436W			
Running Network Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.37V	2.99A	10.0763W
+5V	4.92V	1.08A	5.3676W
5VSB	5.02V	0.14A	0.7028W
+12V	12.40V	0.163A	2.0212W
Total Watts: 18.1679W			
Idle			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.37V	2.79A	9.4023W
+5V	4.92V	0.83A	4.0919W
5VSB	5.02V	0.14A	0.7028W
+12V	12.40V	0.162A	2.0088W
Total Watts: 16.2058W			
Running Office Applications			
Test Voltage	Real Voltage	Tested Amp.	Watts
+3.3V	3.37V	3.10A	10.447W
+5V	4.92V	1.77A	8.7261W
5VSB	5.02V	0.14A	0.7028W
+12V	12.40V	0.164A	2.0336W
Total Watts: 21.9095W			

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			

Compatible Chassis'









Ultra small footprint cases designed specifically for the Mini-ITX platform.

Users don't want loud, hot, beige tin boxes in their living room

- Size and Appearance playing and increasingly important role in consumer's choices
- Consumer Electronics Design Values
- Small footprints, low power, low noise
 - Devices that can take pride of place in the living room
- Compact designs enabled by low power VIA processors
- Low power VIA C3™-E Series processor
 - Fanless VIA Eden™ ESP

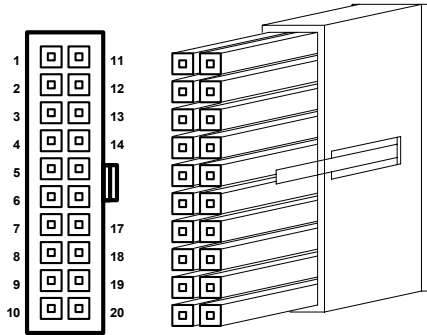
EPIA M-Series Compatible Chassis

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	VIA Mainboard Sereniti	CaseTek CK10101	G-Alantic GA610i	Chyang Fun CF7989C3	ATCS-TEK Slim	ATCS-TEK 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 M utilizes an industry standard 20-pin ATX main connector to the power supply. Due to the EPIA M 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



The system management suite from VIA Mainboard. FliteDeck empowers the user by enabling full system control through an easy to use Windows®-based control suite. FliteDeck comprises four utilities, SysProbe, MissionControl, JetStream, and FlashPort. FliteDeck is a value-added accessory bundled with all EPIA M-Series mainboards.



Track and monitor mission critical system data such as voltage values, temperature, and component speeds to maximize system life and minimize downtime caused by system overloads and failure. MissionControl features remote system management capabilities as well as local management.



Manage BIOS specification information, version backups, and flashing procedures through FlashPort's easy to use GUI interface. No more system restarts and DOS mode operation when updating the system BIOS. FlashPort enables seamless Live Windows®-based BIOS updates.



Obtain comprehensive system hardware and software information quickly and easily through SysProbe's easy to navigate GUI interface. Information available at your fingertips includes system capabilities as well as complete operational and installation status of hardware system components.



SMART5.1™

VIA's Smart5.1, a no-hassle, cost effective method of implementing 6 channels of surround sound audio through a standard VIA Mainboard platform. In a nutshell,

Smart5.1 enables a mainboard's standard three jack game/audio port to accept the three speaker plugs that are required for 6 channel surround sound audio i.e. front left/right, rear left/right, and center/subwoofer speakers.

Standard motherboard three jack game/audio port

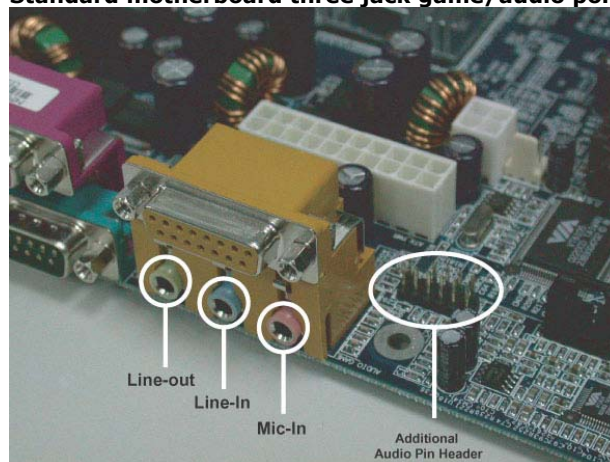


Fig 1.1

Fig 1.1 above shows a VIA Mainboard with standard three jack game/audio port configuration. The three jacks are dedicated to Line-Out, Line-In, and Mic-In usage. The **Line-Out** jack is predominately used to plug in standard two channel speakers while the **Line-In** jack can be used to transfer data from devices such as Mini Disks to your PC. The **Mic-In** jack is used to plug in a microphone for online chatting or conferencing. The additional onboard audio pin header is used to plug in an external audio bracket which is the traditional method of implementing 6 channel surround sound audio.

Smart5.1 three jack game/audio port configuration

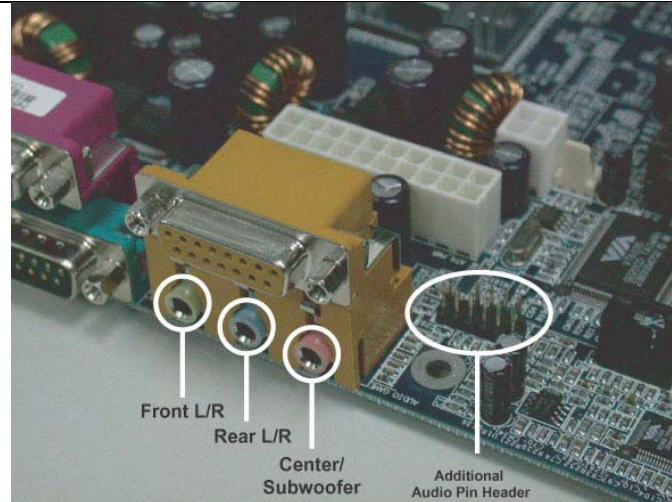


Fig 1.2

Fig 1.2 above shows VIA's Smart5.1 technology implemented onboard. Smart5.1 requires no additional hardware to implement 6 channel surround sound audio on a standard VIA Mainboard platform. With Smart5.1 implemented, the left jack becomes the Front left/right speaker port. The middle jack is for Rear left/right speakers and the center/subwoofer speaker plugs into the right jack.

The traditional method of implementing 6 channel audio

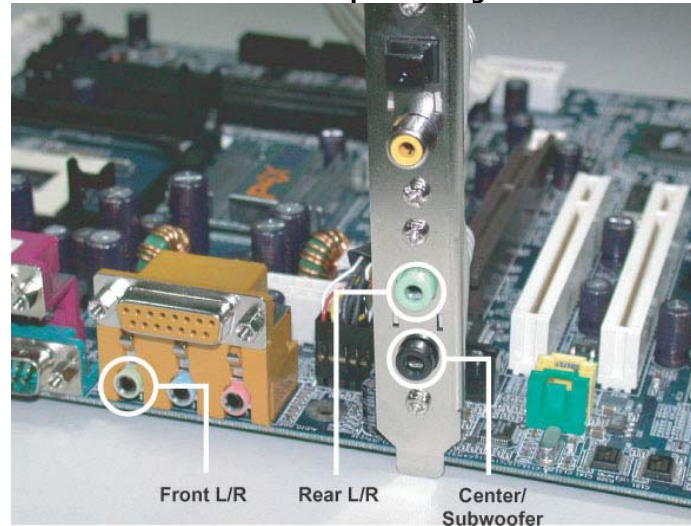


Fig 1.3

Fig 1.3 shows the traditional method of implementing 6 channel surround sound audio by using a combination of the left Line-Out jack for Front left/right speaker and the bottom two jacks on the audio bracket for Rear left/right and center/subwoofer speakers. The downside to this method is the extra cost associated with the audio bracket and the extra complexity associated with having the three audio jacks in two separate places. The audio bracket also places serious restrictions on the design of entertainment devices, especially small form factor designs because the audio bracket needs to occupy a PCI bay at the back of a chassis.

Smart5.1 - The Technology Behind The Feature

Implementing Smart5.1 on a VIA Mainboard is made possible through a combination of hardware and software. On the hardware side, Smart5.1 circuitry has been designed into the latest VIA Mainboards that utilize the VIA VT1616 six channel audio codec onboard. The VIA VT1616 is a high performance six channel audio codec designed to meet the demands of today's PC-based multimedia entertainment applications such as DVD audio, MP3s and computer gaming. The software that enables Smart5.1 is embedded into the VIA audio driver so when a technician or system integrator is setting up a VIA Mainboard he will simply choose to enable Smart5.1 when proceeding through the driver installation and feature selection process. To setup a set of six channel surround sound audio speaker system becomes as seamless as plugging the three speaker plugs in the three jack game/audio port on the back of a VIA Mainboard.

EPIA M-Series Linux & Microsoft Driver Support**Linux Driver Support**

The EPIA M-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 M offers full support for the complete range of Microsoft operating systems.

A Windows XP Embedded support package for EPIA M 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 CLE266 and Northbridge as well as integrated audio on the VT8235 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 M mainboard are also supported in Service Pack 1 (SP1).

Contact

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

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