



**VIA Embedded Platform**  
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# **Operating Guide**

## **EPIA NL-Series Nano-ITX Mainboard**

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## VIA EPIA NL-Series Overview

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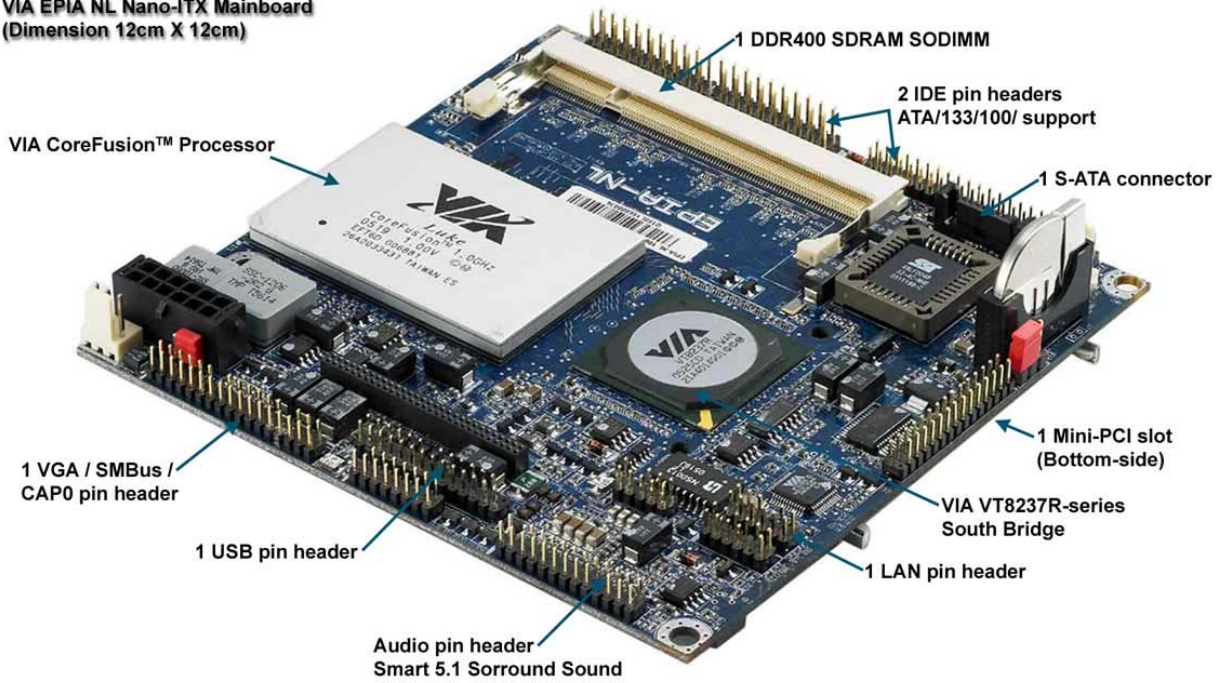
The VIA EPIA NL-Series Nano-ITX Mainboard is an ultra compact x86 motherboard using pin headers design for low profile with unprecedented expandability and versatility for today's ever-growing need of embedded applications. The mainboard is based on the VIA Luke CoreFusion™ processor featuring an embedded 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 NL-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 pin header, as well as an COM / LPC / SIR pin header and one 10/100 Fast Ethernet pin header for extended broadband connectivity. The VIA EPIA NL-Series also offers support for a number of LVDS embedded LCD panels, TV-out, S-Video, Video interface port, CRT VGA / SMBus / CAP0 and has one Mini-PCI slot for expandability options. The VIA EPIA NL-Series is compatible with a full range of Nano-ITX chassis as well as FlexATX and MicroATX enclosures and power supplies.

The VIA EPIA NL-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 NL-Series Layout

**VIA EPIA NL Nano-ITX Mainboard**  
(Dimension 12cm X 12cm)



## VIA EPIA NL-Series Specifications

<b>Core Logic</b>	<ul style="list-style-type: none"> <li>- VIA Luke CoreFusion™ processor</li> <li>- VIA VT8237R-series South Bridge</li> </ul>
<b>System Memory</b>	<ul style="list-style-type: none"> <li>- 1 DDR400/333/266 SODIMM socket</li> <li>- Up to 1GB memory size</li> </ul>
<b>VGA</b>	<ul style="list-style-type: none"> <li>- Integrated VIA UniChrome™ Pro AGP Graphics with MPEG-2 Decoding / MPEG-4 Acceleration</li> </ul>
<b>Expansion Slot</b>	<ul style="list-style-type: none"> <li>- 1 Mini-PCI</li> </ul>
<b>Onboard IDE</b>	<ul style="list-style-type: none"> <li>- 2 UltraDMA 133/100/66 connectors (Secondary 2.0mm 44-pin header)</li> </ul>
<b>Onboard S-ATA</b>	<ul style="list-style-type: none"> <li>- 1 Serial ATA connector</li> </ul>
<b>Onboard LAN</b>	<ul style="list-style-type: none"> <li>- VIA VT6103L 10/100 Base-T Ethernet PHY</li> </ul>
<b>Onboard Audio</b>	<ul style="list-style-type: none"> <li>- VIA VT1617A 6 channel AC'97 Codec</li> </ul>
<b>Onboard TV Out</b>	<ul style="list-style-type: none"> <li>- VIA VT1625 HDTV Encoder</li> </ul>
<b>Onboard I/O Connectors</b>	<ul style="list-style-type: none"> <li>- 1 USB pin header for 8 additional USB 2.0 ports</li> <li>- 1 SIO pin header (including COM port, SIR and LPC support)</li> <li>- 1 KBMS pin header (Switchable for KB/MS connector)</li> <li>- 2 FAN connectors (CPU FAN and SYS FAN)</li> <li>- 1 LVDS / DVI connector (an add-on card is required)</li> <li>- 1 Audio pin header for Line-out, Line-in, Mic-in, CD-in and S/PDIF out</li> <li>- 1 TV Out pin header for S-Video, Composite, and Component (YPbPr/Scart/D-Terminal)</li> <li>- 1 LAN pin header for 10/100 Ethernet LAN port</li> <li>- 1 CRT pin header (including VGA port, SMBUS and CAP0)</li> <li>- 1 Front-Panel pin header</li> <li>- 1 +12V Nano-ITX power connector</li> </ul>
<b>BIOS</b>	<ul style="list-style-type: none"> <li>- Award BIOS</li> <li>- 4/8Mbit flash memory</li> </ul>
<b>System Monitoring &amp; Management</b>	<ul style="list-style-type: none"> <li>- CPU temperature monitoring</li> <li>- CPU voltage monitoring</li> <li>- Wake-on-LAN, Keyboard-Power-on, Timer-Power-on Watch Dog Timer, FAN control</li> <li>- System power management</li> <li>- AC power failure recovery</li> </ul>
<b>Operating Temperature</b>	<ul style="list-style-type: none"> <li>- 0°C up to 47°C ~ 50°C (by different product items)</li> </ul>
<b>Operating Humidity</b>	<ul style="list-style-type: none"> <li>- 0% ~ 95% (relative humidity; non-condensing)</li> </ul>
<b>Form Factor</b>	<ul style="list-style-type: none"> <li>- Nano-ITX (8 Layer)</li> <li>- 12 cm x 12 cm</li> </ul>

\* The specification is subject to change without prior notice.

## VIA EPIA NL Processor SKUs

The VIA EPIA NL-Series is available in 533MHz, 800MHz and 1.0GHz speed grades. The VIA EPIA NL 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.

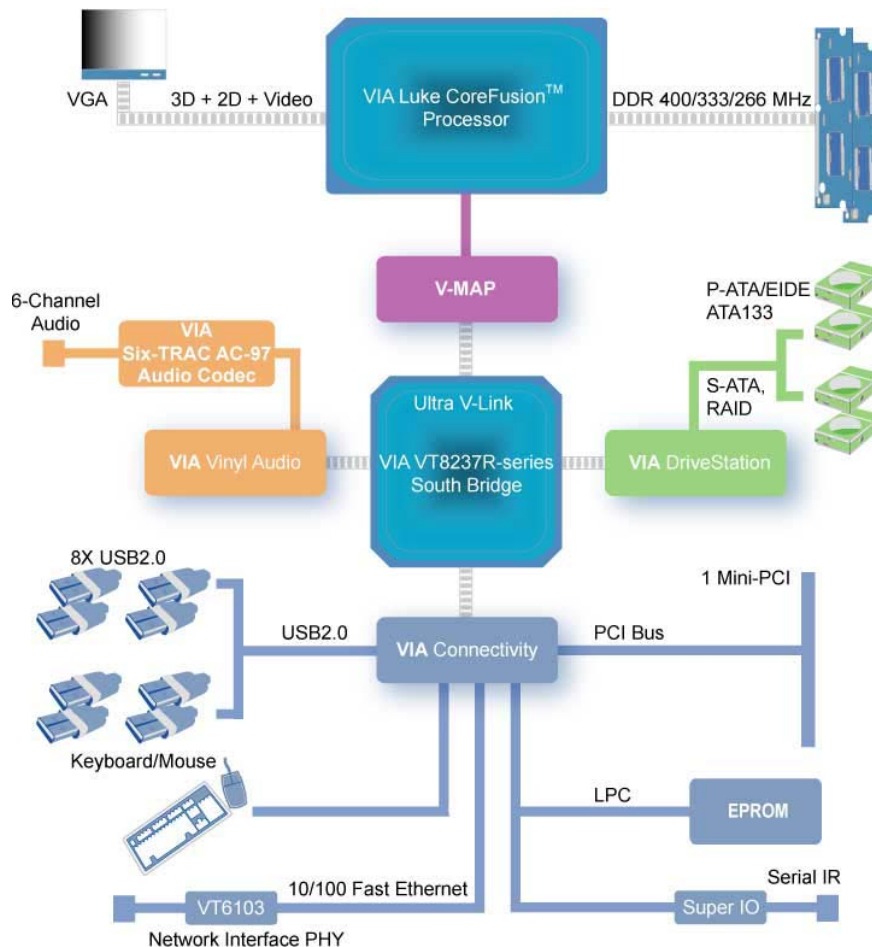


The VIA FLiteDeck™ Suite, an advanced system management suite that enables to user to effortlessly track and monitors mission critical system data and enable seamless live Windows®-based BIOS updates as well as comprehensive BIOS status information.

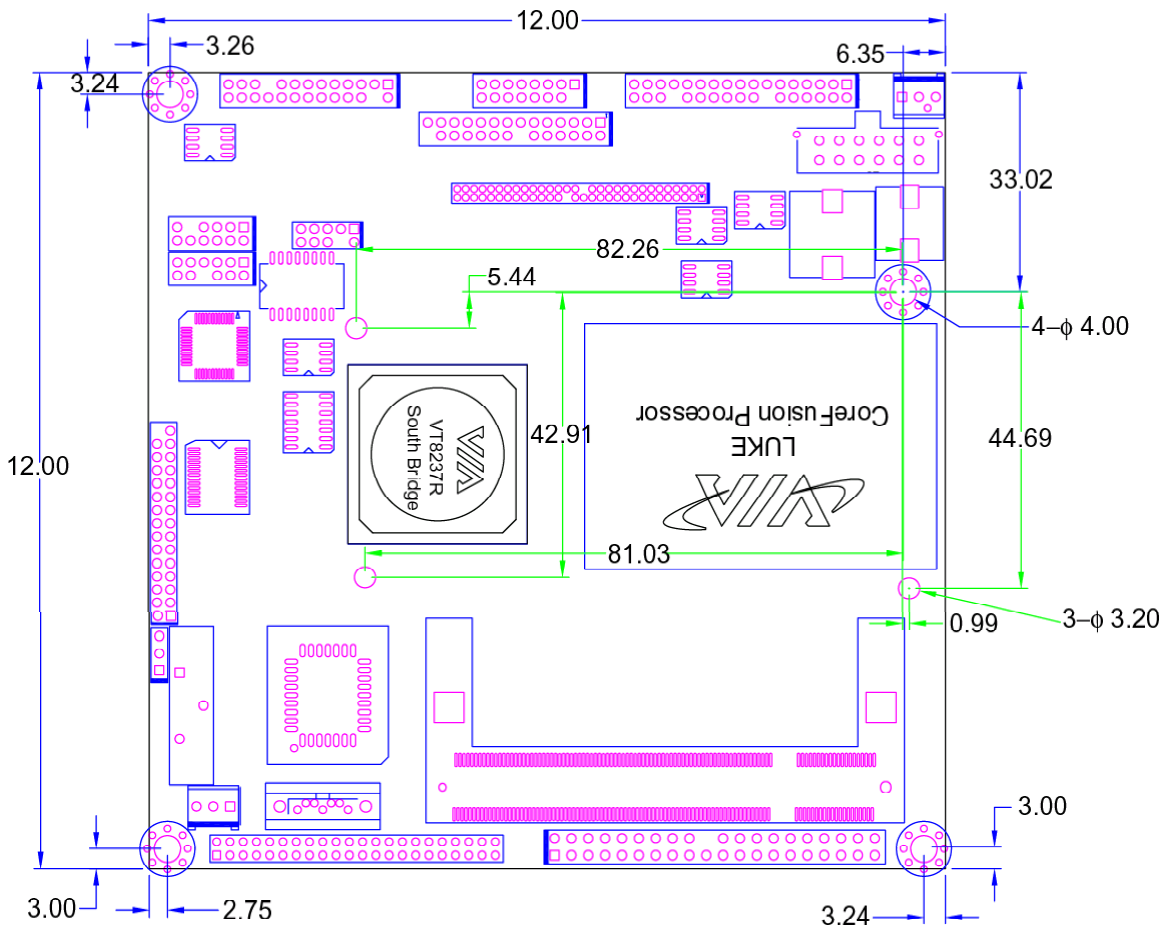
## VIA Luke CoreFusion™ Overview

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 South Bridge 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.

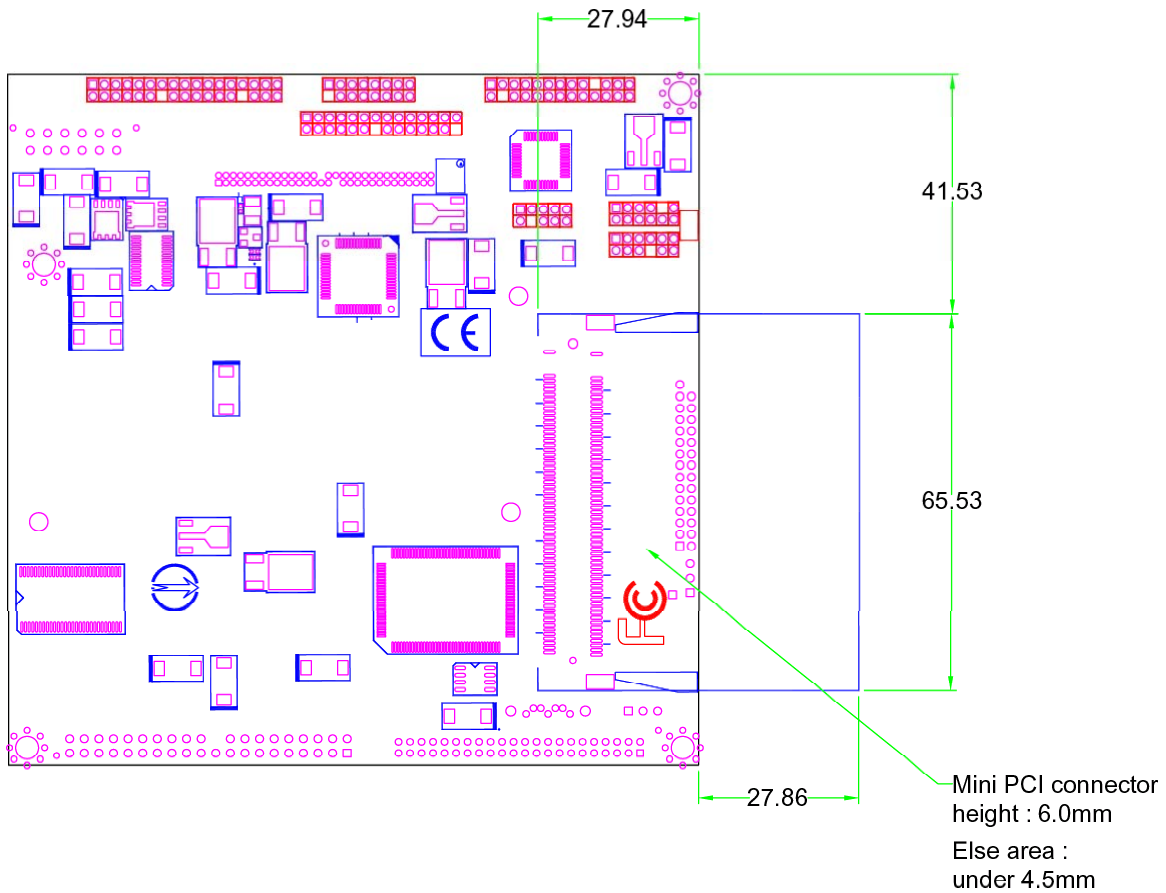
The complete system consists of the Luke CoreFusion™ Processor and the VT8237R-series V-Link South Bridge on the EPIA NL board.



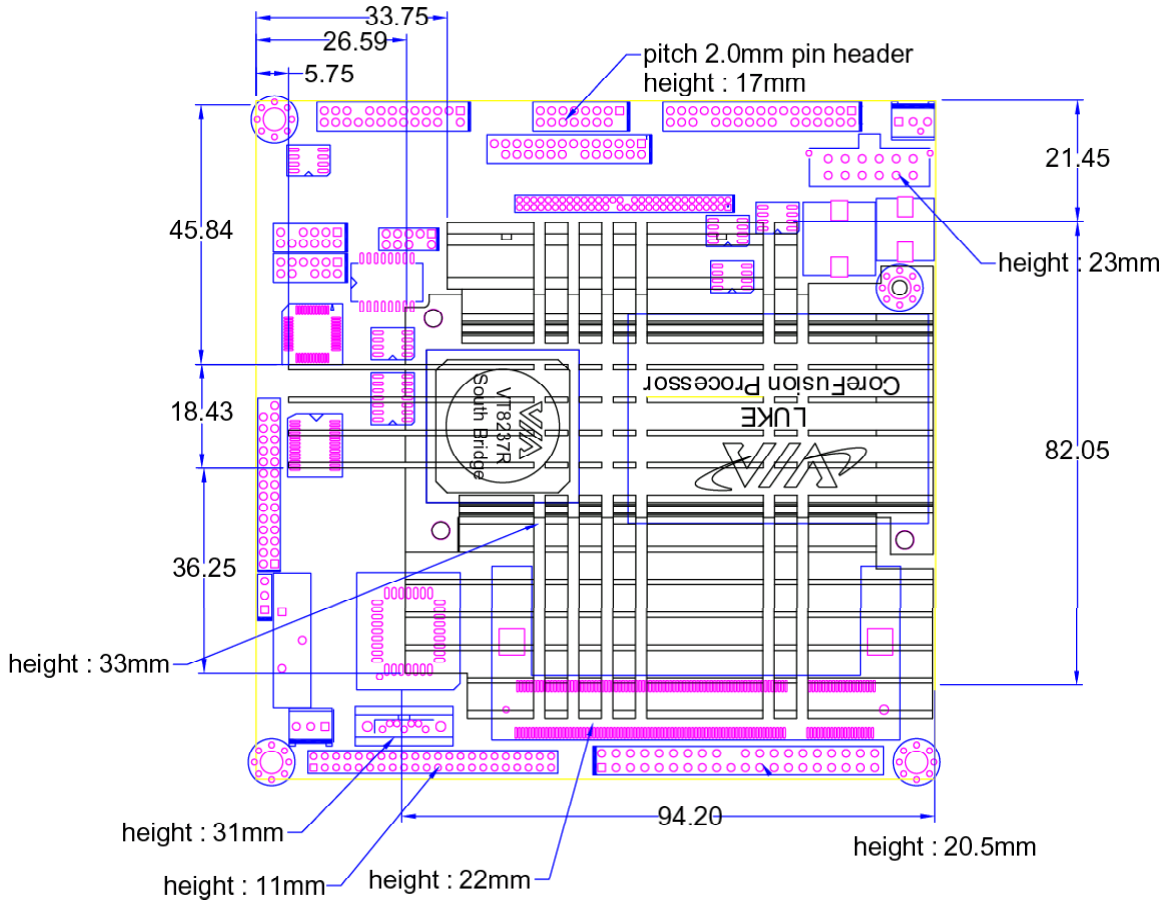
## VIA EPIA NL-Series Layout Diagram & Height Distribution (Top)



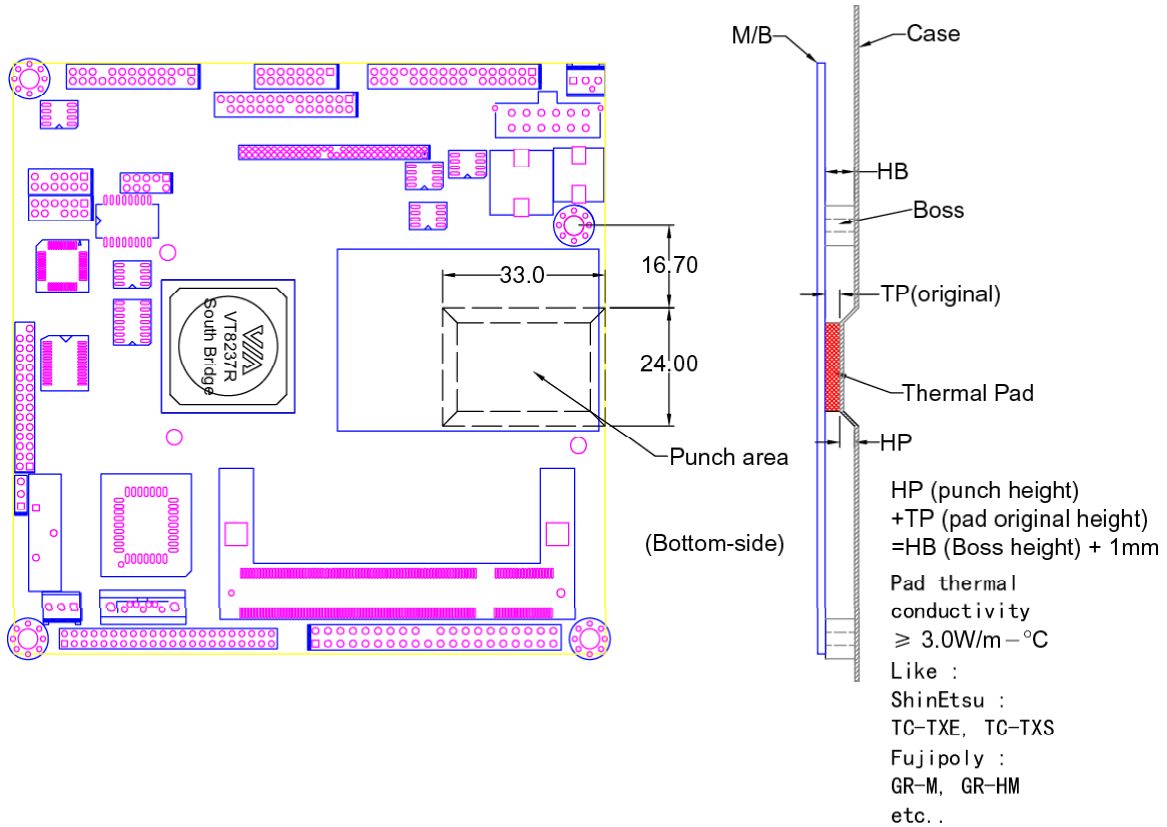
## VIA EPIA NL-Series Layout Diagram & Height Distribution (Bottom)



## VIA EPIA NL-Series Heat Sink Layout & Height Distribution



## VIA EPIA NL-Series Board Cooling Method & Height Distribution



## Noise Level Data

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VIA and the EPIA series have been at the forefront of the quiet computing initiative. The VIA EPIA NL-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 NL10000, VIA EPIA NL8000E, and VIA EPIA NL5000E, 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.

<b>Common Sounds</b>	<b>dBA Level</b>
Threshold of hearing	0 dBA
VIA EPIA NL5000E	0 dBA
VIA EPIA NL8000E	0 dBA
VIA EPIA NL10000	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 NL10000 (running the 1.0GHz VIA CoreFusion™ processor), VIA EPIA NL8000E (running the 800MHz VIA CoreFusion™ processor) and the VIA EPIA NL5000E (running the 533MHz 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 NL 10000

#### A. Playing DVD – Power DVD 4.0

	Voltage	Measured Amp.	Watts
Main Board +3.3V	3.279	3.087	10.122
Main Board +5V	4.935	1.822	8.992
Main Board 5VSB	5.014	0.054	0.271
Main Board +12V	11.815	0.163	1.926
<b>Main Board Power Consumption</b>			<b>21.310</b>

#### B. Playing MP3 – Media Player

	Voltage	Measured Amp.	Watts
Main Board +3.3V	3.305	2.826	9.340
Main Board +5V	4.957	1.875	9.294
Main Board 5VSB	5.040	0.055	0.277
Main Board +12V	11.866	0.168	1.993
<b>Main Board Power Consumption</b>			<b>20.905</b>

#### C. Running Network Application – File Copy

	Voltage	Measured Amp.	Watts
Main Board +3.3V	3.282	2.799	9.186
Main Board +5V	4.935	1.759	8.681
Main Board 5VSB	5.017	0.065	0.326
Main Board +12V	11.829	0.167	1.975
<b>Main Board Power Consumption</b>			<b>20.169</b>

#### D. Idle

	Voltage	Measured Amp.	Watts
Main Board +3.3V	3.318	2.396	7.950
Main Board +5V	4.973	0.522	2.596
Main Board 5VSB	5.053	0.056	0.283
Main Board +12V	11.874	0.169	2.007
<b>Main Board Power Consumption</b>			<b>12.836</b>

**E. Run C.C. Winstone 2001**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.292	3.068	10.100
Main Board +5V	4.944	1.910	9.443
Main Board 5VSB	5.026	0.055	0.276
Main Board +12V	11.845	0.164	1.943
<b>Main Board Power Consumption</b>			<b>21.762</b>

**F. S3 Mode**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	0.000	0.000	0.000
Main Board +5V	0.000	0.000	0.000
Main Board 5VSB	5.108	0.176	0.899
Main Board +12V	0.000	0.000	0.000
<b>Main Board Power Consumption</b>			<b>0.899</b>

**VIA EPIA NL 8000E**
**A. Playing DVD – Power DVD 4.0**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.265	2.934	9.580
Main Board +5V	4.923	1.242	6.114
Main Board 5VSB	5.000	0.054	0.270
Main Board +12V	11.796	0.106	1.250
<b>Main Board Power Consumption</b>			<b>17.214</b>

**B. Playing MP3 – Media Player**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.283	2.495	8.191
Main Board +5V	4.937	1.294	6.388
Main Board 5VSB	5.017	0.056	0.281
Main Board +12V	11.838	0.111	1.314
<b>Main Board Power Consumption</b>			<b>16.175</b>

**C. Running Network Application – File Copy**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.278	2.533	8.303
Main Board +5V	4.932	1.089	5.371
Main Board 5VSB	5.014	0.065	0.326
Main Board +12V	11.832	0.109	1.290
<b>Main Board Power Consumption</b>			<b>15.290</b>

**D. Idle**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.286	2.235	7.344
Main Board +5V	4.941	0.437	2.159
Main Board 5VSB	5.021	0.056	0.281
Main Board +12V	11.840	0.114	1.349
<b>Main Board Power Consumption</b>			<b>11.134</b>

**E. Run C.C. Winstone 2001**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.282	3.119	10.237
Main Board +5V	4.936	1.320	6.516
Main Board 5VSB	5.017	0.058	0.291
Main Board +12V	11.834	0.110	1.302
<b>Main Board Power Consumption</b>			<b>18.345</b>

**F. S3 Mode**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	0.000	0.000	0.000
Main Board +5V	0.000	0.000	0.000
Main Board 5VSB	5.104	0.175	0.893
Main Board +12V	0.000	0.000	0.000
<b>Main Board Power Consumption</b>			<b>0.893</b>

**VIA EPIA NL 5000E**
**A. Playing DVD – Power DVD 4.0**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.229	2.947	9.516
Main Board +5V	4.892	0.911	4.457
Main Board 5VSB	4.964	0.061	0.303
Main Board +12V	11.758	0.113	1.329
<b>Main Board Power Consumption</b>			<b>15.604</b>

**B. Playing MP3 – Media Player**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.256	2.478	8.068
Main Board +5V	4.910	0.927	4.552
Main Board 5VSB	4.991	0.062	0.309
Main Board +12V	11.804	0.115	1.357
<b>Main Board Power Consumption</b>			<b>14.287</b>

**C. Running Network Application – File Copy**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.251	2.446	7.952
Main Board +5V	4.907	0.895	4.392
Main Board 5VSB	4.987	0.068	0.339
Main Board +12V	11.801	0.114	1.345
<b>Main Board Power Consumption</b>			<b>14.028</b>

**D. Idle**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.260	2.217	7.227
Main Board +5V	4.916	0.565	2.778
Main Board 5VSB	4.995	0.060	0.300
Main Board +12V	11.807	0.116	1.370
<b>Main Board Power Consumption</b>			<b>11.674</b>

**E. Run C.C. Winstone 2001**

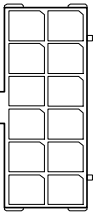
	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	3.246	2.824	9.167
Main Board +5V	4.901	0.945	4.631
Main Board 5VSB	4.980	0.062	0.309
Main Board +12V	11.798	0.113	1.333
<b>Main Board Power Consumption</b>			<b>15.440</b>

**F. S3 Mode**

	<b>Voltage</b>	<b>Measured Amp.</b>	<b>Watts</b>
Main Board +3.3V	0.000	0.000	0.000
Main Board +5V	0.000	0.000	0.000
Main Board 5VSB	5.104	0.176	0.898
Main Board +12V	0.000	0.000	0.000
<b>Main Board Power Consumption</b>			<b>0.898</b>

## Power Specifications

The EPIA NL utilizes an industry standard 12-pin ATX main connector to the power supply. Due to the EPIA NL 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		2			
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			7		
			8		
			9		
			10		
			11		
			12		

## VIA EPIA NL-Series Microsoft and Linux Driver Support

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### Microsoft Driver Support

VIA EPIA NL-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](http://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](http://www.viaarena.com).

### Linux Driver Support

VIA EPIA NL 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](http://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

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For more information on the VIA EPIA NL-Series Nano-ITX Mainboard contact your sales representative or visit our website at [www.viaembedded.com](http://www.viaembedded.com)

### **USA**

440 Mission Court, Suite 220  
Fremont, CA 94539  
Tel: (510) 683 3300  
Fax: (510) 687 4654  
Email: [vpsd\\_sales@viatech.com](mailto:vpsd_sales@viatech.com)

### **Germany**

Mottmann Strasse 12  
53842 Troisdorf-Oberlar  
Tel: 2241 397780  
Fax: 2241 3977819  
Email: [sales@via-tech.de](mailto:sales@via-tech.de)

### **Taiwan**

1F, 531, Chung Cheng Road  
Hsin Tien, Taipei  
Tel: (02) 2218 5452  
Fax: (02) 2218 5453  
Email: [mkt@via.com.tw](mailto: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](mailto:vpsdbj@viatech.com.cn)