



VIA VX700 Mobile Chipset

**Single-Chipset IGP Solution for the
VIA Ultra Mobile Platform**



Making Your World Portable

Technology Brief

VIA Technologies, Inc.

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Introduction

UMPCs (Ultra Mobile PCs) is an exciting new category of devices that can fit comfortably into a pocket or handbag, enabling users to access and interact with their entire digital world wherever they go. Continuing VIA's philosophy of "Small is Beautiful", the VIA VX700 chipset is a crucial building block in the VIA Ultra Mobile platform ideally complementing the VIA C7[®]-M processor to inspire an exciting new category of UMPC (Ultra Mobile PC) devices.

Creating exciting opportunities for entertainment, productivity, and communication focused products the VIA VX700 chipset enables reduction of mobile form factors by up to 40%. As the first single chip implementation of its kind for ultra mobile devices, the VIA VX700 continues VIA's history of chipset innovation and blazes a strong path for a new breed of digital companions.



By integrating the traditional chipset North Bridge and South Bridge into a single-chip solution a number of advantages can be realized including:

- Smaller form factors
- Reduced power consumption
- Less heat and easier cooling
- Better performance



Enabling Smaller Form Factors

The VIA VX700 is a highly compact single chip solution designed specifically for today's ultra mobile devices designed to fit comfortably into a pocket or handbag enabling users to access and interact with their entire digital world wherever they go.. Combining the full functionality of a traditional North Bridge and South Bridge into a Flip Chip BGA package measuring just 35mmx35mm, the VIA VX700 represents a saving of more than 42% in silicon real estate, enabling for more simplified board layouts and more room for additional onboard features. The host of leading digital media, memory and connectivity technologies packed into the single-chip package of the VIA VX700 also limits the need for additional add-on chips by system builders, reducing complexity and cost.

Solution Provider	VIA	Intel
Platform Solution	VIA C7-M ULV + VX700	Pentium-M ULV + 915GMS + ICH6-M
CPU Size	21x21mm ²	35x35mm ²
North Bridge Size	35x35mm ²	27x27mm ²
South Bridge Size	-	31x31mm ²
Total Silicon Real Estate	1666mm ²	2915mm ²

Reduced Power Consumption

Ultra portability requires extreme levels of power efficiency, unprecedented performance per watt and advanced power management to enable efficient battery usage, and cool handling, while still retaining good performance. The VIA VX700 features VIA's signature power efficiency technologies that are further complemented by the VIA C7-M processor.

Power Efficiency

With its highly integrated single chip architecture, the VIA VX700 was designed specifically to utilize less power than most dual chip solutions available today. With a maximum power use TDP (Thermal Design Power) of just 3.5 watts, the VIA VX700 truly enables slim and light mobile system designs with extended battery life.



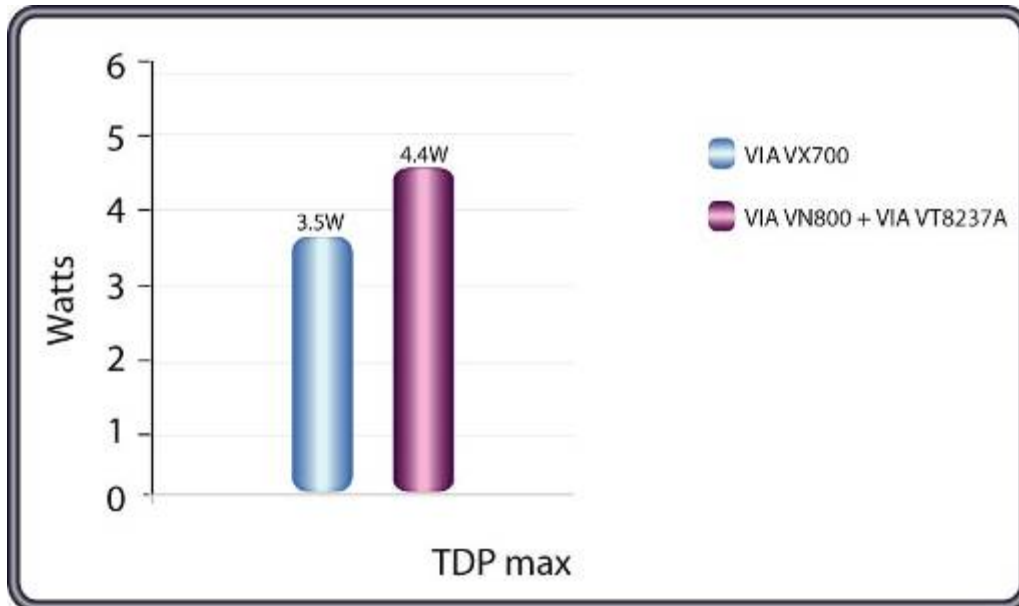


Figure 1: Power Comparison VIA VX700 vs. VIA VN800 + VT8237A

Advanced Power Management Features

The VIA VX700 provides additional power savings with support for a wide range of sophisticated power management features including:

- Dynamic clock gating control on functional blocks to turn off part of the chip not in use
- Support for the latest power management specifications including ACPI 3.0 and APM v1.2
- Support for CPU clock throttling and clock stop during ACPI C2/C3/C4 reduced activity states
- Support for multiple system suspend types all with hardware automatic wake-up
 - Power-on Suspend (POS) with flexible CPU/PCI bus reset options
 - Suspend to DRAM (STR)
 - Suspend to Disk (soft-off)
- Dedicated input pins for power and sleep buttons, and external modem ring indicator



Reduced Heat

As mobile devices are becoming increasingly smaller in size, heat dissipation becomes an ever greater challenge. The low power draw of the VIA VX700 means that less heat is generated and the package of the chipset exudes excellent thermal characteristics for more efficient heat dissipation.

Easier Cooling

The single chip design of the VIA VX700 allows for greater flexibility in design for today's ultra mobile devices by requiring less heat dissipation and easier cooling solutions than a comparative two chip solution. The VIA VX700's single chip design means the overall system is much easier to cool with solutions such as fans or heat sinks. This results in devices that run cooler allowing ultra quiet or even silent devices, devices that are lighter, and reduced system cost.

Increased Performance

The VIA VX700 builds on VIA's industry-leading core logic technology in delivering enhanced performance and a rich feature set.

Advanced Single Chip Architecture

The single-chip architecture of the VIA VX700 provides an underlying performance advantage over traditional dual-chip implementations of similar functionality. By bypassing the conventional link between the North Bridge and South Bridge, the VIA VX700 is able to reduce overall latency, provide shorter cycle time and raise system/memory bus utilization.

High Levels of Feature Integration

The hardware WMV9, MPEG-4, and MPEG-2 video accelerators integrated into the VIA VX700 enables performance benefits by enabling an offset of decoding computations from the CPU, enabling ultra smooth, real-time digital video playback with little or no performance degradation. By offloading multimedia tasks onto the VX700, the CPU utilization can be reduced by as much as 10%, freeing up system resources for handling other tasks.



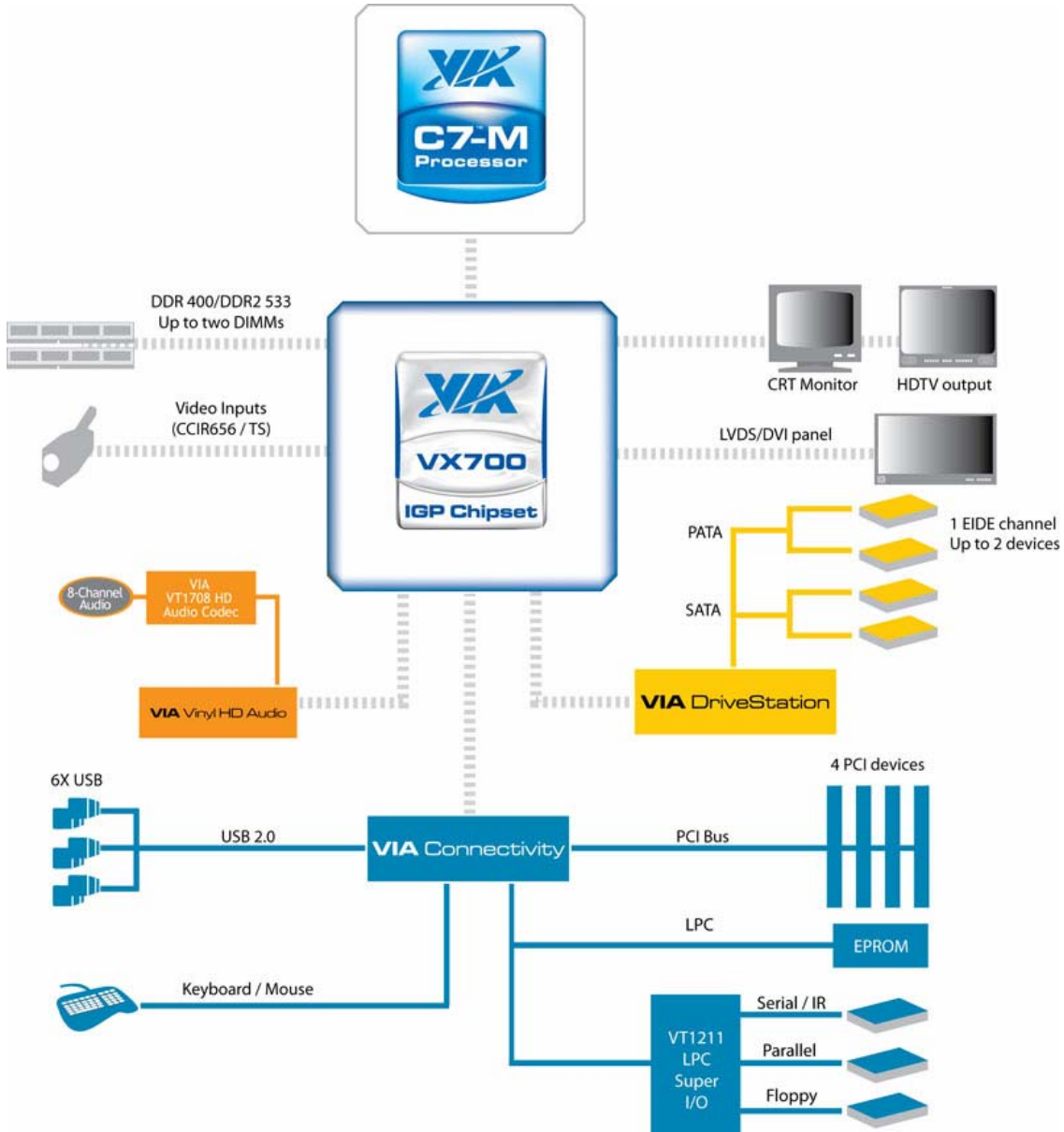


Figure 2: VIA Ultra Mobile System Architecture



VIA VX700 Core Logic Overview

The VIA VX700 integrates all the cutting-edge features of a modern chipset's North and South Bridges, including rich graphics, audio, memory and storage support into a single, compact and highly power-efficient package.

Advanced Multimedia Features

VIA UniChrome™ Pro II IGP Graphics Core

At the heart of the VIA VX700 lies the VIA UniChrome™ Pro II Graphics core, featuring the Chromotion™ video engine with powerful image enhancement technology to improve video quality from all kinds of sources, from streaming and downloaded videos to the latest DVDs and high definition content.



2D/3D Engine

With internal data flow equivalent to what is available to the latest AGP 8x graphics cards. A 200MHz Graphics engine has separate 128-bit data paths, one for frame buffer access, and the other for texture/command access.

2D/3D Acceleration

A 128-bit 2D graphics engine supports acceleration of high quality graphics features that will allow applications to run with the best appearance possible without sacrificing system performance. With dual pixel rendering pipes and a 1228-bit 3D graphics engine, the VIA VX700 also supports advanced 3D rendering capable of two textures per pass with a triangle rate up to 4.5 million triangles per second, a pixel rate up to 200 million pixels per second, and a texel bilinear fill rate up to 400 million texels per second.

Chromotion Video Engine

The Chromotion Video Engine reduces load on the CPU by providing hardware acceleration for many forms of compression, such as MPEG-2, WMV-9 and WMV-HD. With its advanced video scaling engine and broad support for HDTV output, Chromotion provides a wide range of display options to deliver high quality images on many kinds of devices.





MPEG-2/MPEG-4 Decoding Acceleration

A great visual experience starts with the smooth delivery of content. Most video today is encoded using algorithms that reduce the file sizes for faster delivery. For a device such as the PC to play such content, it must be decoded in real time; however, a busy system's processor is overloaded with multiple tasks, the system will drop video frames, resulting in a less than satisfactory viewing experience. As part of VIA's Distributed Performance platform strategy, VIA UniChrome Pro II comes equipped with hardware MPEG-4/MPEG-2 decoder to provide full playback of video such as DVDs, while freeing the processor for other tasks. VIA UniChrome Pro II MPEG-4/MPEG-2 decoder is fully compatible with all popular DVD playback software including WinDVD, PowerDVD, and Windows Media Player.

Windows Media Video 9 (WMV9) Decoding Acceleration

The Windows Media Video 9 (WMV9) encoding process allows a higher compression ratio than traditional MPEG-2 encoding processes. This efficient compression algorithm enables consumer-quality video both over the internet and within applications.

As with most encoding processes, WMV9 also produces some inherent visual artifacts. Therefore a decoder must perform a number of advanced processes to be able to produce an image which results in a good viewing experience for a user. These decoding processes can be done either in hardware or software or with a combination of both. When done in software, CPU utilization increases dramatically, performance decreases, and the result is often less than high quality video. For example, on a mainstream platform using a 2.7GHz CPU, the WMV9 decoding process done through software will utilize as much as 40% more CPU resources than when the decode is done utilizing graphics hardware. This process frees the CPU to be used for other processes while playing WMV9 files, which will give the viewer a fuller viewing experience.

By efficiently performing WMV9 advanced motion compensation decode in hardware, Chromotion dramatically reduces CPU utilization, increases performance, and improves the viewing of WMV9 videos on high quality HDTV displays.





Outputs: Delivering the Hi-Def™ Experience

The Chromotion video engine provides an extensive range of video outputs that will enable a user to connect virtually any display.

For viewing on standard PC monitors, VIA VX700 provides support for displaying content on CRT monitors up to 2048x1536 or LCD panel resolutions up to 1600x1200. To support displays on other types of devices, especially for multimedia applications, UniChrome Pro II enables TV-Out and DVI connections to standard televisions, projectors, and HDTV screens.

HDTV Support

The VIA VX700 and its Hi-Def output opens up a world of opportunities for enabling the use of crisp and clear high resolutions up to 1920x1080i on your living room big screen HDTV enabled television set. With its integrated HDTV encoder, the VIA VX700 utilizes the VIA Advance ProScale Technology enabling studio grade HDTV output.

LVDS/DVI Support

The VIA VX700 is equipped with an integrated LVDS/DVI transmitter which allows a single LVDS display [supported resolutions from VGA through UXGA (1600 x 1200)] as well as a single DVI display [VGA through UXGA (1600 x 1200)] to be connected at the same time.

Video Capture

The VIA VX700 features video capture support for conversion of analog video signals into a digital format that can be stored for later viewing. The VIA VX700 supports three different configurations for video capture including Dual Transport Stream inputs, dual 8-bit or one 16-bit CCIR656/601 input. The VIA VX700 also features playback tear free auto flipping and external Hsync/Vsync support.

DuoView+™

DuoView is a unique combination of hardware and software support that allows the easy display of images on two monitors. Enabling support in Microsoft Windows® 98, Windows ME, and Windows XP operating systems, VIA UniChrome Pro II allows independent resolution and color depth for a secondary display, with full media capabilities on both displays.





VIA Vinyl HD Audio

The VIA VX700 when combined with VIA's HD codec solutions delivers a rich, warm surround sound experience at resolutions as high as 32-bit/192kHz through up to six- or eight-channel outputs. VIA Vinyl Audio enable users to enjoy music, watch the latest DVD movies, play games, record and create content, and connect to the latest devices with crisp, clear performance, representing the highest levels of audio quality in a mainstream integrated or onboard solution.



Advanced Memory Controller

VIA's renowned memory controller technology has been incorporated into the VIA VX700, with support for DDR and DDR2 memory (up to 533MHz). The VIA VX700 supports up to 2 memory modules for a total of up to 4GB of total system memory of 64-bit as well as 32-bit support in order to extend performance, design and cost flexibility to designers.

High Performance CPU Interface

The VIA VX700 delivers high-speed 533/400MHZ FSB connections through the VIA V4 bus to the latest VIA C7-M and C7-M ULV processors.

VIA DriveStation™ Controller Suite



The VIA DriveStation™ Controller Suite in the VIA VX700 provides a comprehensive set of high-performance integrated storage interface technologies. It not only enables high-speed 300MB/s dual channel connections to new generation Serial ATA II Hard Drives including Serial ATA II Drives while retaining support for today's Parallel ATA-133 IDE devices, but also combines exceptionally fast disk data transfer rates and optimal data integrity.

VIA DriveStation™ Serial ATA Controller

The VIA VX700 offers full support for the latest SATA specification enhancements as defined by SATA-IO, including support for 3Gb/s transfer rates.





Multiple SATA Ports

The VIA VX700 features two SATA ports for direct connection to up to two SATA devices featuring the latest 3Gb/s transfer rates while remaining backwards compatible with devices featuring 1.5Gb/s data transfer rates. It is also possible to configure devices in two separate master/slave connections, with the master drive data transfer rate of 3Gb/s, and a slave drive at 1.5Gb/s.

DriveStation™ Parallel ATA-133 Controller

The VIA DriveStation™ Controller Suite also includes an enhanced IDE controller with a dual channel DMA engine and interlaced dual channel commands, allowing for full backwards compatibility with up to two Parallel ATA 133/100/66 devices delivering data transfer rates of up to 133 MB/s.

Advanced Connectivity Suite

USB 2.0

The VIA VX700 enhances connectivity options with its support for six high-speed USB2.0 ports, delivering forty times the bandwidth of USB 1.1. The VIA VX700 includes four root hubs supporting a full range of USB 2.0 and USB1.1 devices, and achieve data transfer rates of up to 480Mb/s. The USB controller allows hot plug and play and isochronous peripherals to be inserted into the system with universal driver support. The controller also implements legacy keyboard and mouse support so legacy software can run transparently in a non-USB-aware OS environment.

PCI Interface & LPC Bus

Featuring a PCI 2.3 compliant PCI controller, the VIA VX700 offers support for up to four PCI masters, and supports a full range of legacy controllers, including Serial and Parallel ports, Keyboard and PS2 mouse.





VIA Ultra Mobile Platform

Power efficiency of the VIA VX700 is further optimized when paired with the VIA C7[®]-M ULV processor as part of the VIA Ultra Mobile Platform.



Featuring the best performance-per-watt operation in the industry, the VIA C7-M ULV processor was developed from the ground up based on the VIA CoolStream™ architecture, enabling frequencies from 1.0-1.5GHz while boasting power consumption as low as 3.5 watts.

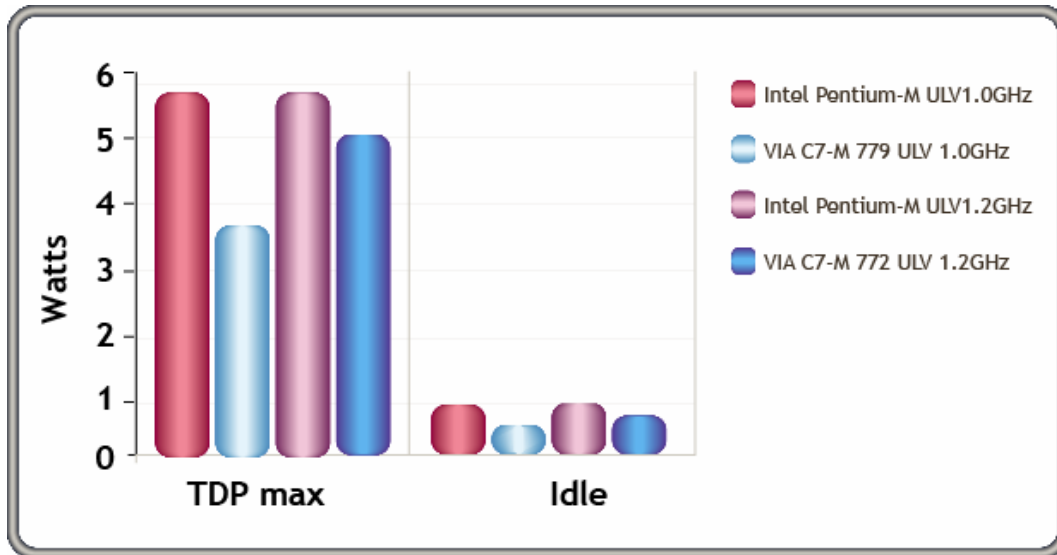


Figure 3: Lowest Power Consumption in the Industry

The VIA C7-M ULV also features VIA PowerSaver™ technology that further reduces power consumption by dynamically adjusting the frequency and the voltage of the VIA C7-M ULV processor as the system requires. This innovative technology can reduce power consumption by as much as 50% while still ensuring seamless mobile operation.





Conclusion

Continuing VIA's trend in setting new standards for high levels of integration and performance for today's core logic solutions, the VIA VX700 pushes the technology envelope to deliver a remarkable all-round feature set. As our world becomes increasingly more portable with the introduction of a new wave of ultra compact x86 computing devices, the need for high levels of integration found in the VIA VX700 becomes essential.

Leveraging the advanced multimedia features of the VIA UniChrome Pro II IGP Graphics core with its Chromotion display engine and support for multiple display options including native support for HDTV as well as support for HD audio, the VIA VX700 packs in the latest digital media capabilities allowing users to get the most out of their mobile entertainment experience. In conjunction with the advanced connectivity options including Serial ATA II support and USB2.0 connectivity allowing convenient transfer of digital content from peripheral devices, the VIA VX700 is helping to define a new breed of devices with the power to combine productivity, entertainment and communication together in a single, ultra mobile device.

