



Building a Great Living Room PC

NVIDIA GPU Motherboard Solutions

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Introduction

This paper provides guidelines, recommendations, and additional resources for system builders, OEMs, ODMs, and others who want to design and deploy innovative living room PC based on NVIDIA GPU Motherboard Solutions. NVIDIA's second-generation living room PC design reduces expense, chassis size, and noise, while improving video quality and performance. System manufacturers can deliver the best quality home digital media experiences at affordable prices by using NVIDIA GPU Motherboard Solutions and the recommendations in this paper.

NVIDIA GPU Motherboard Solutions: Featuring NVIDIA GeForce 6 Series GPUs and NVIDIA nForce4 MCPs

If you are looking to build a great living room PC in a consumer electronics living room form factor for a low price, consider NVIDIA GPU Motherboard Solutions featuring an NVIDIA® GeForce® 6 Series graphics processing units (GPU), an NVIDIA® PureVideo™ HD video processor, and an NVIDIA nForce®4 media and communications processor (MCP). This unique combination creates a single motherboard featuring a world-class Microsoft® DirectX® 9.0 Shader Model 3.0 GPU, a high-definition video processing engine, and the industry's most highly demanded core logic solution.

The NVIDIA GeForce 6 Series GPUs provide a groundbreaking feature set for computing, including full support for Microsoft® DirectX® 9.0 Shader Model 3.0 that provides outstanding graphics effects. Delivering a revolutionary superscalar architecture, and an advanced on-chip video processor, GeForce 6 Series GPUs power the ultimate PC experiences.

NVIDIA PureVideo technology is a combination of the GeForce 6 Series GPU's high-definition video processor and the NVIDIA PureVideo decoder software that delivers unprecedented picture clarity, smooth video, accurate color, and precise image scaling for all video content on any display.

NVIDIA nForce4 MCPs include cutting-edge technology featuring; NVIDIA® ActiveArmor™ secure networking, NVIDIA® MediaShield™ storage, NVIDIA native Gigabit Ethernet, SATA 3Gb/s drive support, and more. NVIDIA nForce4 MCPs are designed to deliver world-class system performance.

Advantages of NVIDIA GPU Motherboard Solutions

NVIDIA's second-generation living room PC is an all-in-one digital media device that resides in the living room for home entertainment and uses a form factor that looks and works just like a consumer electronics device.

Industry's First Motherboard Featuring High-Definition Video—Experience Crisp, Vibrant Video

NVIDIA PureVideo technology allows you to experience lifelike HD playback on your PC or HDTV without the expense of additional home theater devices. With dedicated hardware to accelerate MPEG-2/DVD as well as the new Microsoft® Windows Media® HD Video (WMV HD) standard, your DVDs come to life! Using NVIDIA PureVideo technology, the GPU offloads video decoding from the CPU, resulting in smooth, stutter-free, high-definition video playback. And, since PureVideo supports most current and future HD formats, you can be assured that a PC powered by PureVideo technology will keep up with the pace of tomorrow's video technologies and continue to deliver HD content well into the future.

Award-Winning GeForce 6 Series GPUs—Play the Latest Games with Microsoft DirectX 9.0 Shader Model 3.0

The NVIDIA GeForce 6150 and 6100 GPUs feature a revolutionary design that delivers best-in-class performance on today's digital media and graphics applications. The only GPUs available on a motherboard to support Microsoft DirectX 9.0 Shader Model 3.0, the GeForce 6150 and 6100 GPUs power cutting-edge effects without compromising performance.

NVIDIA ActiveArmor—Unmatched PC Security

NVIDIA ActiveArmor Firewall includes secure networking features integrated into NVIDIA nForce 430 MCPs to protect your PC from sophisticated spyware and hacker intrusions. ActiveArmor Firewall is activated the moment you turn on your PC, inspecting at the deepest levels the data packets that flow in and out of your network connection.

NVIDIA MediaShield—Confidently Store Your Digital Assets

Through a simple user interface, NVIDIA MediaShield storage lets you easily manage multiple hard disk drives so you can safely store your digital assets. With support for a variety of hard disk drive configurations, including the latest SATA 3Gb/s hard drives, MediaShield offers one of the most advanced storage solutions available for desktop PCs. MediaShield's unique interface allows you to easily configure or modify your multidisk arrays.

Designing a Cool and Quiet NVIDIA Living Room PC

Designing a reliable, high-performance living room PC that meets the high-quality standards of consumer electronics requires smart design choices and a well-planned system architecture. NVIDIA's second-generation living room PC design reduces the size of the chassis for the entry model by incorporating a GPU on the motherboard. Chassis size is streamlined by using components that produce less heat and can be packed more densely, and by selecting a special, low-profile chassis that accepts the standard micro ATX footprint. NVIDIA's reference design makes perhaps the biggest improvements over the first generation of living room PCs in the areas of heat, power consumption, and noise reduction.

Noise and Heat Management

As the primary device for home entertainment, living room PCs should run quietly and remain cool, just like any other consumer electronics device. Acoustic levels should be estimated early in the design process to ensure a high-quality user experience.

NVIDIA recommends 20 decibels of emitted sound power in idle mode and fewer than 26 decibels when the PC is in active mode.

NVIDIA nForce Advantage

Besides the NVIDIA's second-generation living room PC design, the NVIDIA GPU Motherboard Solution offers more choices to make a cool and quiet living room PC.

- **On-Board Graphics Solution**
Eliminates one of the major heat sources inside the living room PC.
- **NVIDIA nForce Chipsets**
 - NVIDIA nTune™ software automatically adjusts settings to find the coolest, quietest operation of CPU, GPU, MCP, RAM, voltage and fans (based on the user's current activity).
 - The hardware firewall offloads CPU for media-centric tasks.
- **NVIDIA DualTV (Additional Equipment)**
NVIDIA DualTV delivers a better TV experience than your television.

Designing for the NVIDIA Living Room Media Center Experience—System Configurations

CPU and Memory

NVIDIA GPU Motherboard Solutions support AMD64 processors including AMD Athlon 64, AMD Athlon 64 X2 processors, and Sempron, which deliver powerful desktop performance for unique digital experience. The AMD Athlon 64 advanced HyperTransport™ technology, integrated DDR memory controller, and Cool'n'Quiet™ technology are capable of handling various multimedia tasks with efficient power consumption.

NVIDIA recommends using the combination of AMD Athlon 64 3500+ and 512M PC-3200 DDR RAM for a living room PC.

Motherboard Form Factor

NVIDIA recommends using the standard micro ATX form factor for the living room environment.

Home Theater Quality Video

Movie and video display quality is one of the most compelling features of the NVIDIA living Room PC. NVIDIA GPU Motherboard Solutions provide unique features: PureVideo technology and NVIDIA Media Center software.

- **PureVideo Technology**
NVIDIA GeForce GPUs, featuring hardware dedicated to video processing, deliver high-definition video, superb picture clarity, and full-resolution video

enhancement to the living room PC. PureVideo eliminates the stuttering, double images, blurring, and "noise" commonly associated with playing movies on a PC, while delivering precise, vivid colors on any display.

- **NVIDIA Media Center Software**

NVIDIA provides a host of software designed to enhance the video and TV experience for Microsoft Media Center Edition 2005. Custom settings for media center systems allow you to control the color scheme, brightness, contrast, hue, saturation, gamma, and digital vibrance of live TV and DVD movies—all from the simple-to-use Microsoft Media Center remote control. The NVIDIA PureVideo Decoder delivers rich Dolby® Digital surround sound audio and crisp TV and video playback. Additionally, an easy-to-use wizard makes setting up a high-definition or digital TV a breeze, bringing a truly cinematic experience to your home PC.

NVIDIA DualTV Tuner

NVIDIA brings hardware MPEG-2 encoding to the living room PC through the "Designed for Media Center Edition" certified NVIDIA DualTV tuner card. Unlike software encode-based solutions that rely on the CPU, NVIDIA's DualTV delivers superior quality TV and PVR on a PC with hardware MPEG-2 encode, advanced 3D comb filter, and 3D noise reduction technology. DualTV allows flexible TV viewing and recording options. With dual tuner support, you can record two different shows at once or watch one show while recording another, without sacrificing PC performance. NVIDIA recommends using a single tuner for an entry-level living room PC.

Photo Display

Built on the award-winning GeForce display architecture, NVIDIA GPU Motherboard Solutions bring high-quality RAMDACs to living room PC for crisp image quality and high-resolution photo presentations. NVIDIA Digital Vibrancy Control® (DVC) technology provides color control settings so you can easily adjust the levels of digital vibrance, brightness, contrast, and gamma in your photos.

Audio

NVIDIA GPU Motherboard Solutions support all the major multichannel audio (5.1, 7.1) solutions, including high-definition audio (HDA), to deliver a Dolby-quality surround sound entertainment experience into the living room PC.

NVIDIA MediaShield Storage

NVIDIA GPU Motherboard Solutions provide MediaShield storage technology to safely store digital media assets. MediaShield offers a unique management interface that lets consumers easily configure or change their multidisk arrays under RAID technology's protection. MediaShield can supply four different modes of RAID protection—including RAID 0, RAID 1, RAID 0+1, or RAID 5—to meet different consumers' requirements. NVIDIA recommends using high-performance hard drives with generous storage space and fast data transfer rates in living room PC.

For entry-level systems, NVIDIA recommends using two 160GB 7200 rpm SATA hard disks with RAID 1 to help back up digital assets.

NVIDIA PureVideo Decoder—Optical Storage

A recordable DVD drive helps consumers transfer personal photos, recorded TV shows, and other multimedia files into DVD. DVD writing capability is supported

through the addition of third-party software. NVIDIA GPU Motherboard Solutions provide the NVIDIA PureVideo Decoder, the first software decoder to receive the “Designed for Media Center Edition” certification. NVIDIA PureVideo Decoder delivers unmatched color fidelity and smooth DVD, video, and TV viewing and is the best way to experience PureVideo on a living room PC.

Internet Connectivity and Security

NVIDIA GPU Motherboard Solutions provide Gigabit Ethernet technology for high-speed internet connection and ActiveArmor Firewall technology for hardware-based optimized protection.

Gigabit Ethernet

By providing a dedicated Gigabit Ethernet port and integrating the Media Access Control (MAC) technology into the high-performance NVIDIA nForce media and communications processors (MCPs), NVIDIA delivers the industry’s fastest Gigabit Ethernet desktop solution. Gigabit Ethernet handles the increasingly large files, and speeds up any operation that involves moving data over a network. Consumers can take advantage of it to share and transfer multimedia files much faster than before.

NVIDIA ActiveArmor Firewall

NVIDIA ActiveArmor firewall protects your PC from malicious spyware and hacker attacks with ‘instant on’ protection for network connections.

Input Devices

NVIDIA recommends using a remote control or wireless keyboard and mouse to control the living room PC.

Remote Control

The Media Center interface is designed for control from a distance using a remote control and infrared (IR) receiver. The remote control keeps all entertainment on the computer within easy reach and complements the keyboard and mouse.

The NVIDIA MCE control settings enable end users to access the advanced NVIDIA graphics driver and PureVideo Decoder settings using the remote control device. The remote control device makes it much more convenient to configure optimal listening and viewing conditions regardless of location.

Keyboard and Mouse

A good wireless keyboard and mouse are important for living room PC users. The wireless range, the size, compact form factors, ergonomic consideration, and customized features are key to choosing the right product.

Software Applications

The software application package is important for demonstrating the multimedia power of living room PCs. A customized software and control interface will improve the efficiency and differentiate the living room PCs. NVIDIA recommends system builders to include the following software categories as a basic software package and detail combination will depend on the different price point.

Operation System: Microsoft Windows XP Media Center 2005 version

Office Productivity: Microsoft Works 8

Adobe Acrobat Reader

Finance: Microsoft Money 2005

Media: Microsoft Media Player 10
RealPlayer
Apple iTunes

Game: WildTangent Game Channel
Selected 2D/3D game

NVIDIA Software: NVIDIA nView multi-display software
NVIDIA nTune V3
NVIDIA NVMixer 5
NVIDIA PureVideo Decoder
NVIDIA ActiveArmor Firewall
NVIDIA MediaShield

Antivirus: Symantec Norton Antivirus 2005

Premium Application: Adobe Premiere Standard Edition
Adobe Photoshop Album Starter Edition
Adobe Photoshop Elements 2.0
Greeting Card Factory Deluxe
DigitalMedia Plus:Burn,Copy CD ,Backup,Label
Microsoft Plus! Digital Media Edition
Roxio - Easy Media Creator 7
Symantec Ghost
Norton System Works 2005

Summary of Hardware Specifications for Living Room PCs

The following table lists the recommended hardware configurations and options. NVIDIA strongly encourage system builders to differentiate Living Room PCs at the chassis and front panel design, noise and heat controls, and hardware configurations.

	Recommendations	Other Choices
Processor	AMD Athlon 64 3500+ 2.2 GHz	AMD Athlon 64 3000+ ~ 3800+
Core logic	NVIDIA nForce 430	NVIDIA nForce 430
Memory	512 MB PC-3200 RAM 2 DIMMs; 128-bit interface	512 MB ~ 2G PC-3200 RAM 2 DIMMs; 128-bit interface
Memory expansion	2 DIMMs, up to 2 GB	2 DIMMs, up to 2 GB
Graphics card	Integrated NVIDIA GeForce 6150	NVIDIA GeForce 6600 passive
TV tuner*	Single TV Tuner with PVR and FM Tuner	NVIDIA DualTV Tuner with PVR and FM Tuner
Hard disk	Two 160 GB 7200 rpm (RAID 1)	2X120 GB ~ 2X250 GB 7200 rpm (RAID 1)
Optical driver	Slim 16x DVD+/-R/RW	8x or 16x DVD+/-R/RW
Sound	HD 7.1 audio	HD 7.1 audio
Speakers	5.1 system	Other 5.1 or 7.1 audio system
Mouse and keyboard	Wireless	Other wireless brand
Chassis	Micro ATX	Micro ATX
Power	250 W	250 W
Expansion slots	(2) PCI x 1 (1) PCI Express x16	(2) PCI x 1 (1) PCI Express x16
Front	2 USB 2.0	2 USB 2.0
Productivity	9-in-1 card reader	9-in-1 card reader
	Audio connector	Audio connector
Network	10/100/1000M	10/100/1000M
Case	Consumer electronics form factor	Consumer electronics form factor
Noise spec	<26 db	<26 db

*Choose a TV standard appropriate to your region.