# TABLE OF CONTENTS

1 Introduction to Release Notes .......................................................... 1
   Structure of the Document .......................................................... 1
   Changes in this Edition ............................................................ 1

2 Release 343 Driver Changes .......................................................... 2
   Version 344.16 Highlights .......................................................... 2
      What’s New in Version 344.16 ................................................ 3
      What’s New in Release 343 ..................................................... 5
   Limitations in This Release ....................................................... 7
   Advanced Driver Information .................................................... 9
   Changes and Fixed Issues in Version 344.16 ................................ 14
   Known Product Limitations ...................................................... 15
      GPU Temperature Reported Incorrectly on Optimus Systems .... 16
      Damaged or Missing WMI Service Will Prevent NVIDIA Driver Installation 16
   Screen Turns Black When Performing Clean Overinstall of NVIDIA Drivers on Windows 8.1 Optimus Notebook ........................................ 17
   Flickering Black Screen Occurs After Installing the NVIDIA Drivers on Windows 8 ......................................................... 17
   Total Available Graphics Memory Reported Incorrectly ............... 19
   Increasing 4-way SLI/Multi-GPU Performance ............................ 20
   3D Vision USB Driver Does Not Get Installed ............................ 20
   No PhysX Acceleration Using the GPU ...................................... 21
   NVIDIA PhysX System Software Cannot be Installed or Uninstalled in Windows Safe Mode ..................................................... 21
   3DMark 11 Does not Run in Stereoscopic 3D Mode .................... 21
   Do not Use Windows Rollback for Graphics Drivers .................... 22
   Uninstalling Drivers Using Device Manager is not Supported ...... 22
   Changing the Primary Display Across SLI GPUs Takes Longer than Expected 22
   Understanding the DirectX Version Shown in the NVIDIA System Information Window ...................................................... 23
   Using HDMI Audio with Displays that have a High Native Resolution ... 23
   Using HDMI Displays that do not Support Audio ....................... 24
   Using HDMI/DisplayPort Audio in Dualview or Clone Mode Configurations 25
   Flat Panel Scaling Controls are Non-functional for Some TV Modes for Some
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays</td>
<td>25</td>
</tr>
<tr>
<td>GPU Runs at a High Performance Level (full clock speeds) in Multi-display Modes</td>
<td>26</td>
</tr>
<tr>
<td>GeForce GTX 295 Fan Control Does not Function With NVIDIA Control Panel Performance Group version 6.03.06.00</td>
<td>26</td>
</tr>
<tr>
<td>1280x1024 @ 60 Hz not Available on BenQ FP241W Monitors</td>
<td>26</td>
</tr>
<tr>
<td>Image Sharpening Control not Available with GeForce 8 Series and later GPUs</td>
<td>26</td>
</tr>
<tr>
<td>Gigabyte GA-6BX Motherboard</td>
<td>27</td>
</tr>
<tr>
<td>2 The Release 343 Driver</td>
<td>28</td>
</tr>
<tr>
<td>About the Release 343 Driver</td>
<td>28</td>
</tr>
<tr>
<td>Hardware and Software Support</td>
<td>29</td>
</tr>
<tr>
<td>Supported Operating Systems</td>
<td>29</td>
</tr>
<tr>
<td>Supported NVIDIA Desktop Products</td>
<td>29</td>
</tr>
<tr>
<td>Supported Languages</td>
<td>30</td>
</tr>
<tr>
<td>Driver Installation</td>
<td>30</td>
</tr>
<tr>
<td>Minimum Hard Disk Space</td>
<td>30</td>
</tr>
<tr>
<td>Before You Begin</td>
<td>31</td>
</tr>
<tr>
<td>Installation Instructions</td>
<td>31</td>
</tr>
<tr>
<td><strong>Appendix A: Mode Support for Windows</strong></td>
<td>33</td>
</tr>
<tr>
<td>General Mode Support Information</td>
<td>34</td>
</tr>
<tr>
<td>Understanding the Mode Format</td>
<td>35</td>
</tr>
<tr>
<td>GeForce 900 GPUs</td>
<td>36</td>
</tr>
<tr>
<td>Modes Supported by TV Encoders</td>
<td>38</td>
</tr>
</tbody>
</table>
Table 2.1  Supported NVIDIA Desktop GPUs ................................................ 29
Table A.1  Modes Supported for High Resolution Displays ............................... 34
Table A.2  Non-standard Modes Supported.................................................... 34
Table A.3  Mode Support for S-Video and Composite Out............................... 38
Table A.4  Mode Support for Component YPrPb Out and DVI Out....................... 38
INTRODUCTION TO RELEASE NOTES

This edition of Release Notes describes the Release 343 family of graphics drivers (versions 343.xx to 345.xx) for Microsoft® Windows® Vista and later1. NVIDIA provides these notes to describe performance improvements and bug fixes in each documented version of the driver.

Structure of the Document

This document is organized in the following sections:

- “Release 343 Driver Changes” on page 2 gives a summary of changes, and fixed and open issues in this version.
- “The Release 343 Driver” on page 28 describes the NVIDIA products and languages supported by this driver, the system requirements, and how to install the driver.
- “Mode Support for Windows” on page 33 lists the default resolutions supported by the driver.

Changes in this Edition

This edition of the Release Notes for Windows Vista and later1 includes information about NVIDIA graphics driver version 344.16, and lists changes made to the driver since the Release 340 driver version 340.52. These changes are discussed beginning with the chapter “Release 343 Driver Changes” on page 2.

1. Includes Windows Vista, Windows 7, Windows 8, and Windows 8.1
This chapter describes open issues for version 344.16, and resolved issues and driver enhancements for versions of the Release 343 driver up to version 344.16.

The chapter contains these sections:
- “Version 344.16 Highlights” on page 2
- “Changes and Fixed Issues in Version 344.16” on page 14
- “Known Product Limitations” on page 15

Version 344.16 Highlights

This section provides highlights of version Version 344.16 of the NVIDIA Release 343 Driver for Windows Vista/Windows 7/Windows 8/Windows 8.1.

- What’s New in Version 344.16
- What’s New in Release 343
- Limitations in This Release
- Advanced Driver Information
What’s New in Version 344.16

The new GeForce Game Ready driver, release 344.16 WHQL, allows GeForce owners to continue to have the ultimate gaming experience. This driver is aligned with today’s launch of the world’s most advanced GPUs—the GeForce GTX 980 and GTX 970. In addition, this Game Ready WHQL driver ensures you’ll have the best possible gaming experience for the latest new blockbuster titles including Borderlands: The Pre-Sequel, The Evil Within, F1 2014, and Alien: Isolation.

See also “What’s New in Release 343” on page 5.

Software Modules


NVIDIA GPU PhysX acceleration is available only on systems with GeForce 8-series and later GPUs with a minimum of 256 MB dedicated graphics memory.

NVIDIA GPU PhysX acceleration is not available if there is a non-NVIDIA graphics processor in the system, even if it is not used for rendering.

► HD Audio Driver - version 1.3.32.1

► GeForce Experience - 16.13.42.0

Game Ready

► Best gaming experience for Borderlands: The Pre-Sequel, The Evil Within, F1 2014, and Alien: Isolation.

Gaming Technology

► Supports NVIDIA G-SYNC™ technology and NVIDIA G-SYNC Surround™ configurations.

Application Profiles

Added or updated the following profiles:

• Alien: Isolation
• Borderlands The Pre-Sequel
• Castlevania: Lords of Shadow 2
• Dead Rising 3 - SLI disabled;
• Divinity: Original Sin
• Dragon Age: Inquisition
• F1 2014
• Gauntlet - SLI disabled
• GRID Autosport
• IL-2: Sturmovik: Battle of Stalingrad
• Metro Redux
• Sid Meier’s Civilization: Beyond Earth
• Skyforge
• Strife - *SLI disable*
• TitanFall

### 3D Vision Profiles

Added or updated the following profiles:

• Borderlands: The Pre-Sequel - rated as *Fair*
• Dead Rising 3 - *Not recommended*
• F1 2014 - rated as *Good*
• GRID Autosport - rated as *Excellent*
• Strife - rated as *Fair*

### 3D Compatibility Mode Support

Support for 3D Compatibility Mode has been added for the following games:

• Assassin’s Creed: Freedom City - rated as *Excellent*
• Halo: Spartan Assault - rated as *Excellent*
• Murdered Soul Suspect - rated as *Excellent*
• Sniper Elite 3 - rated as *Excellent*

### Fixed Issues

▶ See “Changes and Fixed Issues in Version 344.16” on page 14 for a list of other changes and resolved issues in this driver version.
What’s New in Release 343

The section summarizes the driver changes in Release 343, including previous Release 343 drivers:

**Product Support**

- Added support for GeForce GTX 980 and GTX 970 GPUs.
  These GPUs are from the second generation Maxwell architecture, and provide exceptional power efficiency and performance per watt.

**3D Stereo - NVIDIA Control Panel**

- Added 3D Compatibility mode with separate ratings information

**Surround - NVIDIA Control Panel**

- Added support for up to 5 displays
- Added support for G-SYNC displays

**NVIDIA G-SYNC**

- Added support for cloned G-SYNC displays as well as cloned G-SYNC/non-G-SYNC displays
- Added support for G-SYNC displays in a Surround configuration

**NVIDIA Miracast**

- Enabled NVIDIA Miracast on Windows (8.1 and later) PCs
  NVIDIA Miracast streams video and graphics over Wi-Fi to Miracast displays.
  Supports Maxwell and later generation of GPUs

**Dynamic Super Resolution**

- Implemented *Dynamic Super Resolution* for improved image quality in games.
  *Dynamic Super Resolution* produces smoother images by rendering a game at a higher resolution and then downscaling it to the native resolution of the display using advanced filtering. Controls are available on the NVIDIA Control Panel->Manage3D Settings page.

**Legacy Product Support**

- See Legacy Support for Tesla architecture GPUs.
Chapter 02 : RELEASE 343 DRIVER CHANGES

Application Profiles

Added or updated the following profiles:

- Alien: Isolation
- Borderlands The Pre-Sequel
- Castlevania: Lords of Shadow 2
- Dead Rising 3 - SLI disabled;
- Divinity: Original Sin
- Dragon Age: Inquisition
- F1 2014
- Gauntlet - SLI disabled
- GRID Autosport
- IL-2: Sturmovik: Battle of Stalingrad
- Metro Redux
- Sid Meier's Civilization: Beyond Earth
- Skyforge
- Strife - SLI disable
- TitanFall

3D Vision Profiles

- Borderlands: The Pre-Sequel - rated as Fair
- Dead Rising 3 - Not recommended
- F1 2014 - rated as Good
- GRID Autosport - rated as Excellent
- Strife - rated as Fair

3D Compatibility Mode Support

Support for 3D Compatibility Mode has been added for the following games:

- Assassin’s Creed: Freedom City - rated as Excellent
- Halo: Spartan Assault - rated as Excellent
- Murdered Soul Suspect - rated as Excellent
- Sniper Elite 3 - rated as Excellent

These games must be run in DirectX 10/11 mode to see improvements. Not compatible with 3D Vision Surround mode. See “3D Compatibility Mode” on page 9 for more information.
Limitations in This Release

The following are features that are not currently supported or have limited support in this driver release:

- **Surround Gaming with 3-way SLI**
  Surround gaming is not supported on a 3-way SLI system using GeForce GTX 200 series GPUs. [681228/683943]

- **NVIDIA Control Panel Display Category**
  The Graph tab on the Adjust Desktop Color Settings page is not available.

- **Negative LOD Bias Clamp**
  Negative LOD bias clamp for DirectX applications is not supported on Fermi-based GPUs and later.

- **Hybrid Power**
  Support for Hybrid Power, a Hybrid SLI technology, is discontinued and not available with this driver.

- **Legacy Support for GeForce 6-series and GeForce 7-series GPUs**
  GeForce 6-series and GeForce 7-series GPUs have moved to legacy support with the GeForce Release 304 drivers. These products are no longer supported beginning with the GeForce Release 310 drivers.

- **3D Vision Legacy Support Notification for Windows Vista**
  Support for 3D Vision under Windows Vista is discontinued beginning with the Release 313 drivers. 3D Vision and 3DTV Play functionality will not be available with these drivers.
  
  NVIDIA will continue to support basic 3D Vision and 3DTV Play functionality for Windows Vista with Release 310 or earlier drivers. Basic functionality includes full-screen viewing of 3D games, pictures, and movies on 3D Vision monitors, notebooks, and 3D TVs (with 3DTV Play software installed).

- **Legacy Support for Tesla architecture GPUs**
  Beginning with Release 343, the NVIDIA graphics drivers no longer support the Tesla generation of NVIDIA GPUs. These products are identified in the section Supported NVIDIA Desktop Products and Supported NVIDIA Notebook Products.
  
  The Release 340 drivers will continue to support these products until April 1, 2016, and the NVIDIA support team will continue to address driver issues for these products in driver branches up to and including Release 340. However, future driver enhancements and optimizations in driver releases after Release 340 will not support these products.

  The following is a summary of legacy products beginning with Release 343 drivers:
  - GeForce 8 & 9 Series Desktop Products
  - GeForce 100/200/300 Series Desktop Products
  - GeForce 7/8/9 Series Notebook Products
• GeForce 100/200/300 Series Notebook Products
• Quadro FX/CX/VX Workstation products
• Select Quadro NVS Workstation products
• Quadro FX and NVS Notebook Products
• Quadro Plex 2200

See the section Supported NVIDIA Desktop Products and Supported NVIDIA Notebook Products for specific products.
Advanced Driver Information

This section contains the following additional information about the driver:

- 3D Compatibility Mode
- Help for Resizing Your HDTV Desktop
- Dynamic GPU Performance Mode
- Power Efficiency Optimizations
- Understanding the DirectX Information Shown in the NVIDIA System Information Window

3D Compatibility Mode

3D Compatibility Mode is an NVIDIA proprietary rendering mode for 3D Vision that improves the 3D experience for many key DirectX 10 and 11 games. NVIDIA continues to add game support with new driver versions.

Requirements and Compatibility

- Games must be run in DirectX 10 or DirectX 11 mode.
- Not compatible with 3D Vision Surround.

Switching Compatibility Modes

Games with 3D Compatibility Mode will launch in this mode by default. You can switch between 3D Compatibility mode and standard 3D Vision mode as follows:

1. Before starting the game, enable Advanced In-game Settings in the NVIDIA Control Panel:
   a. Open the NVIDIA Control Panel and navigate to the Stereoscopic 3D->Set up stereoscopic 3D page and click Set Keyboard Shortcuts.
   b. Click the Show advanced in-game settings arrow if the section is not expanded, then select Enable advanced in-game settings.
   c. Click OK.

2. Press Ctrl+Alt+F11 during the game to toggle between 3D Compatibility mode and standard 3D Vision mode.
Help for Resizing Your HDTV Desktop

The best way to resize the screen in order to view the entire content is to use the controls provided by the display hardware. Click the link on the Size tab to view a guide to changing the settings on your display hardware.

The resize controls on the NVIDIA Control Panel are provided in case satisfactory results cannot be achieved using the controls on the display.

After resizing the HDTV desktop using the NVIDIA Control Panel Resize controls, the new custom resolution created is now added to the list of available resolutions for that display, and also added to the resolution list within the game or application.

In Release 190 and later drivers, the method for resizing the HDTV desktop has changed to provide better image quality when applying underscan. This method results in a new custom resolution being created which needs to be selected from games or applications to apply the resizing. In the example displayed in the following screen shot, the underscan has created a new resolution (1216x682). Although this resolution looks different, it is still
in HD format. Remember to select this resolution in your game or other application in order to take advantage of it.

**Dynamic GPU Performance Mode**

With the Release 280 drivers, NVIDIA GPU clock speeds will increase more quickly in response to increased graphics demands. Conversely, with lower graphics use the GPU clock speed slows down more quickly, conserving as much power as possible.

In the Release 280 drivers, some users reported a noticeable fluctuation in clock speeds while engaging in various tasks on the PC. With the Release 285 and later drivers, adjustments have been made to reduce the sensitivity to levels similar to the R275 driver.
Power Efficiency Optimizations

Release 310 drivers introduced power-optimizing enhancements. As a result of these enhancements, you may notice that GPU core clock speeds are different with this driver. For example, the GPU core clock might be faster when the GPU is in idle mode than in previous drivers. Or you may notice higher GPU core clock speeds after closing or opening certain games than in previous drivers.

This is because the reported GPU core clock frequency is no longer correlated to GPU power-saving states. Instead of lowering the GPU core clock frequency, the hardware and software use other methods to put the GPU into a low power state when the GPU is idle or in response to changing application requirements. This ensures optimum power use while continuing to provide high graphics performance.

Understanding the DirectX InformationShown in the NVIDIA System Information Window

The System Information window—accessed by clicking System Information at the bottom left corner of the NVIDIA Control Panel—provides technical information about the NVIDIA graphics cards and driver installed in the system.

It also provides the following system information:

- **Operating system**: For example, “Windows 7 Enterprise, 64-bit”
- **DirectX runtime version**: For example, “11.0”

*In order to use the version of DirectX reported in the System Information window, the NVIDIA GPU and graphics driver must also support that DirectX version.*

This information is provided in the Graphics card information section of the System Information window as follows:

- **DirectX support**
  (Provided in previous driver versions)
  This is the DirectX version that is supported by the NVIDIA graphics hardware and driver.

- **Direct3D API version**
  (Provided in later driver versions, for Windows 7 and later)
  This is the Direct3D version that is supported by the NVIDIA graphics hardware and driver. The API version is expressed in terms of Direct3D – the graphics subsystem component of DirectX.

- **Direct3D feature level**
  (Provided in later driver versions, for Windows 7 and later)
  Direct3D feature levels describe a subset of features within the Direct3D API version that are supported by the NVIDIA graphics hardware and driver.
Changes and Fixed Issues in Version 344.16

The following sections list the important changes and the most common issues resolved since version 344.11. This list is only a subset of the total number of changes made in this driver version. The NVIDIA bug number is provided for reference.

Windows Vista/Windows 7/Windows 8/Windows 8.1 Fixed Issues

- [GeForce GTX 980/970][ASUS Rampage Black MB]: Code 49 error occurs with the GPU in Device Properties. [1549389]
- [GeForce GTX 970][Asrock x79 MB]: Code 43 error occurs with the GPU in Device Properties. [1555504]
Known Product Limitations

This section describes problems that will not be fixed. Usually, the source of the problem is beyond the control of NVIDIA. Following is the list of problems and where they are discussed in this document:

- “GPU Temperature Reported Incorrectly on Optimus Systems” on page 16
- “Damaged or Missing WMI Service Will Prevent NVIDIA Driver Installation” on page 16
- “Screen Turns Black When Performing Clean Overinstall of NVIDIA Drivers on Windows 8.1 Optimus Notebook” on page 17
- “Flickering Black Screen Occurs After Installing the NVIDIA Drivers on Windows 8” on page 17
- “Total Available Graphics Memory Reported Incorrectly” on page 19
- “Increasing 4-way SLI/Multi-GPU Performance” on page 20
- “3D Vision USB Driver Does Not Get Installed” on page 20
- “No PhysX Acceleration Using the GPU” on page 21
- “NVIDIA PhysX System Software Cannot be Installed or Uninstalled in Windows Safe Mode” on page 21
- “3DMark 11 Does not Run in Stereoscopic 3D Mode” on page 21
- “Do not Use Windows Rollback for Graphics Drivers” on page 22
- “Uninstalling Drivers Using Device Manager is not Supported” on page 22
- “Changing the Primary Display Across SLI GPUs Takes Longer than Expected” on page 22
- “Understanding the DirectX Version Shown in the NVIDIA System Information Window” on page 23
- “Using HDMI Audio with Displays that have a High Native Resolution” on page 23
- “Using HDMI Displays that do not Support Audio” on page 24
- “Using HDMI/DisplayPort Audio in Dualview or Clone Mode Configurations” on page 25
- “Flat Panel Scaling Controls are Non-functional for Some TV Modes for Some Displays” on page 25
- “GPU Runs at a High Performance Level (full clock speeds) in Multi-display Modes” on page 26
- “GeForce GTX 295 Fan Control Does not Function With NVIDIA Control Panel Performance Group version 6.03.06.00” on page 26
- “1280x1024 @ 60 Hz not Available on BenQ FP241W Monitors” on page 26
- “Image Sharpening Control not Available with GeForce 8 Series and later GPUs” on page 26
**Known Product Limitations**

- “Gigabyte GA-6BX Motherboard” on page 27

## GPU Temperature Reported Incorrectly on Optimus Systems

### Issue

On Optimus systems, temperature-reporting tools such as Speccy or GPU-Z report that the NVIDIA GPU temperature is zero when no applications are running.

### Explanation

On Optimus systems, when the NVIDIA GPU is not being used then it is put into a low-power state. This causes temperature-reporting tools to return incorrect values.

Waking up the GPU to query the temperature would result in meaningless measurements because the GPU temperature change as a result.

These tools will report accurate temperatures only when the GPU is awake and running.

## Damaged or Missing WMI Service Will Prevent NVIDIA Driver Installation

### Issue

“Install failed” or “Install Failed, could not find compatible graphics hardware” message may appear during installation, even if the system has a compatible graphics card. This can occur when installing the NVIDIA driver or GeForce Experience software.

### Cause

This issue could be the result of a corrupt WMI service on your system. The NVIDIA Installer requires the WMI service to properly install the driver or other NVIDIA software.

### Resolution

You must repair the WMI service on your system in order to successfully install NVIDIA drivers. A future driver release will alert the user during installation that there is a problem with the WMI service on the system.
Screen Turns Black When Performing Clean Overinstall of NVIDIA Drivers on Windows 8.1 Optimus Notebook

Issue

After installing a Release 325 driver earlier than version 326.09 on an Optimus notebook running Windows 8.1, a subsequent clean overinstall of a later driver results in a black screen. The screen turns black when the driver uninstalls the older driver.

Typically, you may encounter this when attempting to upgrade the NVIDIA driver after installing Windows 8.1. While installing Windows 8.1, Windows Update installs NVIDIA driver version 326.01, then during the clean overinstall the black screen occurs as the older driver is uninstalled.

Workaround - Prevention

To avoid the issue during the initial installation of Windows 8.1, do not reboot the system after Windows Update installs the NVIDIA driver. Then perform the custom clean overinstall of the newer driver.

Resolution

This issue does not occur after installing an NVIDIA driver version 326.09 or later for Windows 8.1. When driver version 326.09 or later is installed, performing a clean overinstall with a newer driver will not result in a black screen.

Flickering Black Screen Occurs After Installing the NVIDIA Drivers on Windows 8

Issue

After installing the NVIDIA drivers on Windows 8, the subsequent reboot results in a black or flickering screen.

Root Cause

This occurs because Windows Update performed a background installation of a Release 304 driver, which requires a reboot to complete the installation. After installing the Release 313 driver and then rebooting the system, installation of both the Release 304 as well as the Release 313 is completed, resulting in conflicting driver binaries and the black/flickering screen.
**Workaround - Prevention**

To avoid the issue, reboot the system before installing the Release 313 driver.

Alternately, you can check the driver status under the Device Manager and perform the reboot if the Device Manager indicates that a restart is needed. Then install the driver.

**Workaround - Recovery**

If you did not perform the necessary reboot prior to installing the driver and now encounter the black screen, do the following:

1. Reboot in Safe Mode.
2. Uninstall the driver.
3. Disconnect from the internet and then restart the system.
4. In normal mode, install the new driver.
Total Available Graphics Memory Reported Incorrectly

Background-TAG Memory

In the Windows Display Driver Model (WDDM), Total Available Graphics (TAG) memory is reported as the sum of

- Dedicated Video Memory (video memory dedicated for graphics use)
- Dedicated System Memory (system memory dedicated for graphics use), and
- Shared System Memory (system memory shared between the graphics subsystem and the CPU).

The values for each of these components are computed according to WDDM guidelines when the NVIDIA Display Driver is loaded.

Issue

Some TAG-reporting APIs represent video memory using 32-bits instead of 64-bits, and consequently do not properly report available graphics memory when the TAG would otherwise exceed 4 gigabytes (GB). This results in under reporting of available memory and potentially undesirable behavior of applications that rely on these APIs to report available memory.

The under reporting can be extreme. For example, 6 GB might be reported as 454 MB, and 8 GB might be reported as 1259 MB.

Driver Action for GeForce-based Graphics Systems

On graphics systems with less than 2.75 GB of advertised physical memory, the NVIDIA display driver typically limits the Shared System Memory to maintain a TAG memory value of less than 4 GB\(^1\).

- This results in reliable reporting of sub-4 GB TAG memory on systems with less than 2.75 GB of advertised physical memory.
- On systems with 2.75 GB or more of advertised physical memory, you may see different reported TAG memory values between the NVIDIA Control Panel and other reporting APIs.

---

1. The WDDM guidelines dictate minimum and maximum values for the components, but the display driver may further constrain the values that are reported (within the allowed minimum and maximum).
Increasing 4-way SLI/Multi-GPU Performance

**Issue**

With some games and applications, you may experience little to no performance gain or even a performance drop with 4-way SLI or multi-GPU configurations.

**Resolution**

1. Open the NVIDIA Control Panel, then click **Manage 3D Settings** from the navigation pane.
2. Click the **Global Settings** tab, then scroll to the **Power management mode** feature, click the corresponding list arrow and select **Prefer maximum performance**, then click **Apply**.

3D Vision USB Driver Does Not Get Installed

**Issue**

After installing the NVIDIA graphics driver, if the 3D Vision USB emitter was not plugged in, the 3D Vision USB Controller driver does not get installed. If you plug in the emitter after installing the driver, the indicator light on the emitter will flash red and will not turn green.

**Resolution**

To fix this issue, NVIDIA recommends performing a driver re-install with the 3D Vision USB emitter connected. Please download the latest drivers and follow these steps:

1. Plug in the 3D Vision USB emitter.
2. Re-install the NVIDIA driver.
   - Select **Custom (Advanced)** and then select **Perform a clean Installation** during the driver installation.
3. Reboot.
**Known Product Limitations**

**No PhysX Acceleration Using the GPU**

If after installing the PhysX System Software you find that there is no PhysX acceleration on supported applications, repeat the PhysX setup as follows:

1. Reboot the PC.
2. Open the NVIDIA Control Panel and then, under 3D Settings, click **Set PhysX configuration** to open that page.
3. Under **Select a PhysX processor**, verify that either **auto-select** or a specific NVIDIA GPU is selected.
4. Click **Apply**.

**NVIDIA PhysX System Software Cannot be Installed or Uninstalled in Windows Safe Mode**

**Issue**

Beginning with Release 280, the NVIDIA PhysX System Software is not included in the NVIDIA driver installation/uninstallation under safe mode.

**Explanation**

The NVIDIA PhysX System Software installer is not compatible with Microsoft’s policy for Windows safe Mode. Consequently, installation or uninstallation of the PhysX System Software under safe mode would fail. To allow installation or uninstallation of the graphics driver under safe mode, the NVIDIA PhysX System Software is blocked from the process.

**3DMark 11 Does not Run in Stereoscopic 3D Mode**

**Issue**

When attempting to run 3DMark 11 with NVIDIA 3D Vision enabled, the benchmark may hang, present a black screen, or in other ways not appear correctly.

**Explanation**

3DMark 11 is not compatible with running in stereoscopic 3D. To facilitate running the benchmark, recent drivers will run it in monoscopic mode, even with 3D Vision enabled.
Known Product Limitations

Do not Use Windows Rollback for Graphics Drivers

To reinstall a previous or older NVIDIA graphics driver, do not use the Windows rollback feature. This method will not reliably restore all the previous driver files.

Instead, use the Windows Add and Remove programs to remove the current driver, and then install the older driver using setup.exe.

Uninstalling Drivers Using Device Manager is not Supported

Issue

On all supported versions of Microsoft Windows, uninstalling the NVIDIA driver using the Windows Device Manager may not remove associated files or applications.

Explanation

Microsoft has confirmed that this behavior is by design. If you wish to uninstall the NVIDIA driver, it is recommended that you do so using Add and Remove programs.

See the Microsoft KB article 2278714.

Changing the Primary Display Across SLI GPUs Takes Longer than Expected

Issue

On an SLI system, switching the primary (or SLI focus) display when each display in the SLI group is connected to a different GPU takes longer than expected.

Explanation

On an SLI system with each SLI GPU driving a display, the display connected to the slave GPU is the primary display (also the SLI focus display). In order to switch the primary display to the one connected to the other GPU, the master and slave GPU configuration must also switch. In order to reassign which GPU is the master and which is the slave, the driver must be reloaded. It the process of reloading the driver that takes the additional time.
Understanding the DirectX Version Shown in the NVIDIA System Information Window

The System Information window—accessed by clicking System Information at the bottom left corner of the NVIDIA Control Panel—provides technical information about the NVIDIA graphics cards and driver installed in the system.

It also provides information about the Windows version as well as the DirectX version that is installed.

However, in order to use the version of DirectX reported in the System Information window, the NVIDIA GPU and graphics driver must also support that DirectX version.

For example, driver version 197.45 and Windows Vista (with available patch) support DirectX 11. But only NVIDIA graphics cards based on the Fermi architecture released in 2010 support DirectX 11. So your system must have one of these cards installed in order to take advantage of DirectX 11 performance.

Using HDMI Audio with Displays that have a High Native Resolution

To use HDMI audio with some displays that have a native resolution higher than 1920x1080, you must set the display to a lower HD resolution.

Some HDMI displays have a native resolution that exceeds the maximum supported HD mode. For example, displays with a native resolution of 1920x1200 exceed the maximum supported HD mode of 1920x1080.

Applying this native mode results in display overscan which cannot be resized using the NVIDIA Control Panel since the mode is not an HD mode.

To avoid this situation and provide a better user experience, the driver treats certain TVs—such as the Viewsonic VX2835wm and the Westinghouse LVM-37w3—as a DVI monitor when applying the native mode. Because the driver does not treat the TV as an HDMI in this case, the HDMI audio is not used.
Using HDMI Displays that do not Support Audio

Some HDMI displays do not support audio, or have issues with GeForce 9 series and earlier, and GeForce GTX 200-series NVIDIA graphics cards.

The NVIDIA driver attempts to identify such displays and automatically disables the audio. For example, the NVIDIA driver disables HDMI audio for all Philips HDMI TVs, as these have been identified as having issues with GeForce 9 series and earlier, and GeForce GTX 200-series NVIDIA graphics cards.

There may be cases where either the driver disables audio even though there is no problem, or does not disable the audio when in fact the audio does not work. The following sections describe these situations and provides guidance for handling them.

Corrupted video and no audio

The driver has not disabled audio and the display’s audio signal is incompatible with the graphics card, causing video corruption.

With a different display connected in order to establish video, disable audio for the HDMI display using the NVIDIA Control Panel-> Set Up Digital Audio page. Click the arrow for the problem display and then click Turn off audio.

Video but no audio

- Check the display list for the problem connection on the NVIDIA Control Panel->Set Up Digital Audio page.
- If Turn off audio is selected and you want to test whether your HDMI audio does, in fact, work, then click the list arrow and select the name of the display.
  The driver will prompt you with instructions for testing HDMI audio with that display.
- If the display name is selected, then the driver has not successfully detected that an incompatible display is connected.

  Future drive versions will properly identify such displays and disable audio.
Using HDMI/DisplayPort Audio in Dualview or Clone Mode Configurations

**Two Audio-enabled Ports**

In a multi-display configuration where both HDMI/DisplayPort audio ports are enabled, only the primary display will provide the audio.

**One Audio-enabled Port**

In a multi-display configuration where only one audio port is enabled, such as when one display is a DVI display, then the HDMI/DisplayPort display can provide the audio whether it is the primary or secondary display.

**Flat Panel Scaling Controls are Non-functional for Some TV Modes for Some Displays**

The NVIDIA Control Panel flat panel scaling controls on the “Adjust Size & Position” page are not intended to be used for TV modes, and normally the controls are not available for TV or HDTV displays.

However, Microsoft requires that certain TV/HDTV modes be available for all digital displays, including DVI and HDMI, even if they are not HDTV.

While the NVIDIA flat panel scaling controls are available for those displays, they will not be functional for the TV modes that appear in compliance with the Microsoft requirements. The affected modes are as follows:

- 1920x1080i @50/59.94/60 Hz
- 1280x720p @50/59.94/60 Hz
- 720x480p @ 59.94/60 Hz
- 720x576p @ 50 Hz
Known Product Limitations

GPU Runs at a High Performance Level (full clock speeds) in Multi-display Modes

This is a hardware limitation with desktop and older notebook GPUs, and not a software bug. When multiple displays are connected and active, the GPU will always operate with full clock speeds in order to efficiently drive multiple displays–even when no 3D programs are running.

Note: NVIDIA notebook GeForce 5xxM series and later GPUs do not have this limitation. For those GPUs the driver can adjust the performance level, depending on demand, even when driving multiple displays.

GeForce GTX 295 Fan Control Does not Function With NVIDIA Control Panel Performance Group version 6.03.06.00

The GeForce GTX 295 fan control does not function properly when using the NVIDIA Control Panel Performance Group version 6.03.06.00. For proper fan control, use version 6.03.12.00 or later.

1280x1024 @ 60 Hz not Available on BenQ FP241W Monitors

Even though the monitor EDID lists 1280x1024 @ 60 Hz, the screen turns blank when using an HDMI connection. This is an issue with the monitor and not the NVIDIA driver.

Because of this issue with the monitor, the NVIDIA driver blocks the problem mode (1280x1024 @ 60 Hz) and makes it unavailable.

Image Sharpening Control not Available with GeForce 8 Series and later GPUs

With GeForce 8 Series and later graphics cards, the Image sharpening slider on the NVIDIA Control Panel-> Display->Adjust Desktop Color Settings page is grayed out.

This control is intentionally disabled because image sharpening is not supported on GeForce 8 series and later GPUs.
Gigabyte GA-6BX Motherboard

This motherboard uses a LinFinity regulator on the 3.3-V rail that is rated to only 5 A—less than the AGP specification, which requires 6 A. When diagnostics or applications are running, the temperature of the regulator rises, causing the voltage to the NVIDIA chip to drop as low as 2.2 V. Under these circumstances, the regulator cannot supply the current on the 3.3-V rail that the NVIDIA chip requires.

This problem does not occur when the graphics board has a switching regulator or when an external power supply is connected to the 3.3-V rail.
This chapter covers the following main topics:

► “About the Release 343 Driver” on page 28
► “Hardware and Software Support” on page 29
► “Driver Installation” on page 30

About the Release 343 Driver

This driver release is from the Release 343 family of drivers (versions 343.xx to 345.xx). See “Supported NVIDIA Desktop Products” on page 29 for the list of specific products supported in this release.
Hardware and Software Support

- “Supported Operating Systems” on page 29
- “Supported NVIDIA Desktop Products” on page 29
- “Supported Languages” on page 30

Supported Operating Systems

This Release 343 driver includes drivers designed for the following Microsoft® operating systems:

- Microsoft Windows® 8.1, and supports both 32-bit and 64-bit versions.
- Microsoft Windows® 8, and supports both 32-bit and 64-bit versions.
- Microsoft Windows® 7, and supports both 32-bit and 64-bit versions.
- Microsoft Windows® Vista, and supports both 32-bit and 64-bit versions.

Supported NVIDIA Desktop Products

The following table lists the NVIDIA products supported by the Release 343 driver, version 344.16:

Table 2.1 Supported NVIDIA Desktop GPUs

<table>
<thead>
<tr>
<th>Consumer Products</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GeForce GTX 980</td>
<td></td>
</tr>
<tr>
<td>GeForce GTX 970</td>
<td></td>
</tr>
</tbody>
</table>
Supported Languages

The Release 343 Graphics Drivers supports the following languages in the main driver Control Panel:

- English (USA)
- English (UK)
- Arabic
- Chinese (Simplified)
- Chinese (Traditional)
- Czech
- Danish
- Dutch
- Finnish
- French
- German
- Greek
- Hebrew
- Hungarian
- Italian
- Japanese
- Korean
- Norwegian
- Polish
- Portuguese (Euro/Iberian)
- Portuguese (Brazil)
- Russian
- Slovak
- Slovenian
- Spanish
- Swedish
- Thai
- Turkish

Driver Installation

Minimum Hard Disk Space

Desktop

The hard disk space requirement for 32-bit is minimum 220 MB for English-only, and 300 MB for International.

The hard disk space requirement for 64-bit is minimum 320 MB for English-only, and 400 MB for International.

Notebook

The hard disk space requirement for 32-bit is minimum 300 MB.

The hard disk space requirement for 64-bit is minimum 400 MB.
Before You Begin

nTune

If you have previously installed NVIDIA nTune, NVIDIA recommends that you uninstall nTune before installing this driver. After the driver install is complete, you can reinstall NVIDIA nTune.

Installation Instructions

1. Follow the instructions on the NVIDIA .com Web site driver download page to locate the appropriate driver to download, based on your hardware and operating system.

2. From the driver download page, click the Download button.
   The Download Confirmation page appears.

3. If you agree to the “License For Customer Use of NVIDIA Software”, click the Agree & Download button to begin the download.
   The File Download dialog appears.

4. Either click Save to save the file and then run it from your PC, or click Run.
   An extraction path dialog appears prompting you to specify where on your PC you want the driver files to be installed.

5. Click OK to use the default location, or click the folder icon and specify an alternate location to install the driver files.
   The files are extracted and then the NVIDIA Installer is launched automatically.

6. At the License Agreement page of the Installer, click Agree and Continue.

7. Follow the instructions in the NVIDIA Installer to complete the installation.

Note: The driver presents game screenshots while the driver is installing. If you are not connected to the internet during the installation, you may see a “Navigation to the webpage was cancelled” message instead. The message can be ignored and does not affect the installation. The message won’t appear if the browser cache is cleared.

Note: The NVIDIA PhysX System Software will not be included in the installation if the same version or a later version is already installed.
**Note:** After the driver installation, Windows may default to 16-bpp color and disable the Desktop Window Manager (DWM). To work around this issue, set the color to 32-bpp and then reboot the PC.
This chapter details the Windows modes supported by the Release 343 driver for NVIDIA products. It contains these sections:

► “General Mode Support Information” on page 34
► “Default Modes Supported by GPU” on page 35
► “Modes Supported by TV Encoders” on page 38
General Mode Support Information

The NVIDIA graphics driver includes a standard list of display modes that are supported by default. These modes are listed in the section “Default Modes Supported by GPU” on page 35.

The actual modes available depend on the capabilities of the display. In addition, the NVIDIA graphics driver has a “dynamic EDID detection” capability and will make available additional modes that are listed in the display EDID, provided the graphics hardware can support it.

The NVIDIA graphics driver also supports the high resolutions available with the displays listed in Table A.1 as well as the non-standard modes listed in Table A.2.

Table A.1  Modes Supported for High Resolution Displays

<table>
<thead>
<tr>
<th>Display</th>
<th>Maximum Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple 30” Cinema HD Display (Dual link DVI)</td>
<td>2560x1600 @ 60 Hz</td>
</tr>
<tr>
<td>Dell WFP 3007 (Dual Link DVI)</td>
<td>2560x1600 @ 60 Hz</td>
</tr>
<tr>
<td>HP LP3065 dual-link DVI flat panel</td>
<td>2560x1600 @ 60Hz.</td>
</tr>
</tbody>
</table>

Table A.2  Non-standard Modes Supported

<table>
<thead>
<tr>
<th>Resolution</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1680 x 1050</td>
<td></td>
</tr>
<tr>
<td>1366 x 768</td>
<td></td>
</tr>
</tbody>
</table>
Default Modes Supported by GPU

This section lists the modes that are included by default in the driver INF for the following product families:

► “GeForce 900 GPUs” on page 36

Understanding the Mode Format

Figure A.1 gives an example of how to read the mode information presented in this section.

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Color Depth</th>
<th>Refresh Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1024 x 768</td>
<td>32</td>
<td>60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200</td>
</tr>
</tbody>
</table>

Meaning:
- Resolution: 1024 x 768
- Color depth: 32 bpp
- Refresh rates: 60 Hz, 70 Hz, 72 Hz, 75 Hz, 85 Hz, 100 Hz, 120 Hz, 140 Hz, 144 Hz, 150 Hz, 170 Hz, and 200 Hz

Note:
- Horizontal spanning modes of 3840x1080 and above, and vertical spanning modes of 1920x2160 and above generally require at least 32 MB of video memory at 32 bpp.
- An “i” next to the refresh rate indicates an interlaced refresh rate.
GeForce 900 GPUs

This sections lists the supported display resolutions, color depths, and refresh rates for the products listed in “Supported NVIDIA Desktop Products” on page 29.

### Standard Modes

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Color Depth</th>
<th>Refresh Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>640 x 480</td>
<td>8</td>
<td>60 70 72 75 85 100 120 140 144 150 170 200 240</td>
</tr>
<tr>
<td>720 x 480</td>
<td>8</td>
<td>60</td>
</tr>
<tr>
<td>720 x 576</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td>800 x 600</td>
<td>8</td>
<td>60 70 72 75 85 100 120 140 144 150 170 200 240</td>
</tr>
<tr>
<td>1024 x 768</td>
<td>8</td>
<td>60 70 72 75 85 100 120 140 144 150 170 200 240</td>
</tr>
<tr>
<td>1152 x 864</td>
<td>8</td>
<td>60 70 72 75 85 100 120 140 144 150 170 200</td>
</tr>
<tr>
<td>1280 x 720</td>
<td>8</td>
<td>60</td>
</tr>
<tr>
<td>1280 x 768</td>
<td>8</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1280 x 800</td>
<td>8</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1280 x 960</td>
<td>8</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1280 x 1024</td>
<td>8</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1360 x 768</td>
<td>8</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1600 x 900</td>
<td>8</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1600 x 1024</td>
<td>8</td>
<td>60 70 72 75 85 100 120</td>
</tr>
<tr>
<td>1600 x 1200</td>
<td>8</td>
<td>60 70 72 75 85 100 120</td>
</tr>
<tr>
<td>1680 x 1050</td>
<td>8</td>
<td>60</td>
</tr>
<tr>
<td>1920 x 1080</td>
<td>8</td>
<td>60</td>
</tr>
<tr>
<td>1920 x 1200</td>
<td>8</td>
<td>60 70 72 75 85 100</td>
</tr>
<tr>
<td>1920 x 1440</td>
<td>8</td>
<td>60 70 72 75 85</td>
</tr>
<tr>
<td>2048 x 1536</td>
<td>8</td>
<td>60</td>
</tr>
</tbody>
</table>

------------------------------------------------------------------

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Color Depth</th>
<th>Refresh Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>640 x 480</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150 170 200 240</td>
</tr>
<tr>
<td>720 x 480</td>
<td>16</td>
<td>60</td>
</tr>
<tr>
<td>720 x 576</td>
<td>16</td>
<td>50</td>
</tr>
<tr>
<td>800 x 600</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150 170 200 240</td>
</tr>
<tr>
<td>1024 x 768</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150 170 200 240</td>
</tr>
<tr>
<td>1152 x 864</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150 170 200</td>
</tr>
<tr>
<td>1280 x 720</td>
<td>16</td>
<td>60</td>
</tr>
<tr>
<td>1280 x 768</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1280 x 800</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1280 x 960</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1280 x 1024</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1360 x 768</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1600 x 900</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150 170</td>
</tr>
<tr>
<td>1600 x 1024</td>
<td>16</td>
<td>60 70 72 75 85 100 120 140 144 150</td>
</tr>
<tr>
<td>1600 x 1200</td>
<td>16</td>
<td>60 70 72 75 85 100 120</td>
</tr>
<tr>
<td>1680 x 1050</td>
<td>16</td>
<td>60</td>
</tr>
<tr>
<td>1920 x 1080</td>
<td>16</td>
<td>60</td>
</tr>
<tr>
<td>1920 x 1200</td>
<td>16</td>
<td>60 70 72 75 85 100</td>
</tr>
<tr>
<td>1920 x 1440</td>
<td>16</td>
<td>60 70 72 75 85</td>
</tr>
</tbody>
</table>

------------------------------------------------------------------
<table>
<thead>
<tr>
<th>Resolution</th>
<th>Bits</th>
<th>Refresh Rate</th>
<th>Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920 x 1440</td>
<td>16</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>2048 x 1536</td>
<td>16</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>640 x 480</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>720 x 480</td>
<td>32</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>720 x 576</td>
<td>32</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>800 x 600</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1024 x 768</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1152 x 864</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1280 x 720</td>
<td>32</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>1280 x 768</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1280 x 800</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1280 x 960</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1280 x 1024</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1360 x 768</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1600 x 900</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1600 x 1024</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1600 x 1200</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1680 x 1050</td>
<td>32</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>1920 x 1080</td>
<td>32</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>1920 x 1200</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>1920 x 1440</td>
<td>32</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>2048 x 1536</td>
<td>32</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>
Modes Supported by TV Encoders

Table A.3 and Table A.4 list the NTSC, PAL, and HDTV TV-Out modes supported by the NVIDIA driver.

**Table A.3 Mode Support for S-Video and Composite Out**

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Bit depth</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>320x200</td>
<td>8, 16, 32</td>
<td>DirectDraw mode; not selectable as a Windows desktop</td>
</tr>
<tr>
<td>320x240</td>
<td>8, 16, 32</td>
<td>DirectDraw mode; not selectable as a Windows desktop</td>
</tr>
<tr>
<td>640x400</td>
<td>8, 16, 32</td>
<td>DirectDraw mode; not selectable as a Windows desktop</td>
</tr>
<tr>
<td>640x480</td>
<td>8, 16, 32</td>
<td></td>
</tr>
<tr>
<td>720x480</td>
<td>8, 16, 32</td>
<td>Overscans (for video)</td>
</tr>
<tr>
<td>720x576</td>
<td>8, 16, 32</td>
<td>Overscans (for video)</td>
</tr>
<tr>
<td>800x600</td>
<td>8, 16, 32</td>
<td></td>
</tr>
<tr>
<td>1024x768</td>
<td>8, 16, 32</td>
<td>Conexant 25871 only</td>
</tr>
</tbody>
</table>

**Table A.4 Mode Support for Component YPrPb Out and DVI Out**

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>480i (SDTV)</td>
<td></td>
</tr>
<tr>
<td>480p (EDTV)</td>
<td></td>
</tr>
<tr>
<td>720p (HDTV)</td>
<td>Supported on graphics boards with Conexant 875 or Philips 7108 TV encoders and compatible connectors, and compatible GeForce 8 Series and later GPUs.</td>
</tr>
<tr>
<td>1080i (HDTV)</td>
<td></td>
</tr>
<tr>
<td>576i (PAL)</td>
<td></td>
</tr>
<tr>
<td>576p (PAL)</td>
<td></td>
</tr>
</tbody>
</table>

The driver supports manual overscan correction for component and DVI outputs. See the online NVIDIA Control Panel Help for instructions on how to use the overscan correction features.
Notice

ALL NVIDIA DESIGN SPECIFICATIONS, REFERENCE BOARDS, FILES, DRAWINGS, DIAGNOSTICS, LISTS, AND OTHER DOCUMENTS (TOGETHER AND SEPARATELY, “MATERIALS”) ARE BEING PROVIDED “AS IS.” NVIDIA MAKES NO WARRANTIES, EXPRESSED, IMPLIED, STATUTORY, OR OTHERWISE WITH RESPECT TO THE MATERIALS, AND EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE.

Information furnished is believed to be accurate and reliable. However, NVIDIA Corporation assumes no responsibility for the consequences of use of such information or for any infringement of patents or other rights of third parties that may result from its use. No license is granted by implication of otherwise under any patent rights of NVIDIA Corporation. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all other information previously supplied. NVIDIA Corporation products are not authorized as critical components in life support devices or systems without express written approval of NVIDIA Corporation.

HDMI

HDMI, the HDMI logo, and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC.

Macrovision Compliance Statement

NVIDIA Products that are Macrovision enabled can only be sold or distributed to buyers with a valid and existing authorization from Macrovision to purchase and incorporate the device into buyer’s products.

Macrovision copy protection technology is protected by U.S. patent numbers 5,583,936; 6,516,132; 6,836,549; and 7,050,698 and other intellectual property rights. The use of Macrovision’s copy protection technology in the device must be authorized by Macrovision and is intended for home and other limited pay-per-view uses only, unless otherwise authorized in writing by Macrovision. Reverse engineering or disassembly is prohibited.

OpenCL Notice

Portions of the NVIDIA system software contain components licensed from third parties under the following terms:

Clang & LLVM:

Copyright (c) 2003-2008 University of Illinois at Urbana-Champaign.

All rights reserved.

Portions of LLVM’s System library:

Copyright (C) 2004 eXtensible Systems, Inc.

Developed by:

LLVM Team

University of Illinois at Urbana-Champaign

http://llvm.org

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the “Software”), to deal with the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:
Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimers.

Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimers in the documentation and/or other materials provided with the distribution.

Neither the names of the LLVM Team, University of Illinois at Urbana-Champaign, nor the names of its contributors may be used to endorse or promote products derived from this Software without specific prior written permission.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE CONTRIBUTORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS WITH THE SOFTWARE.

Trademarks

NVIDIA, the NVIDIA logo, NVIDIA nForce, GeForce, NVIDIA Quadro, NVDVD, NVIDIA Personal Cinema, NVIDIA Soundstorm, Vanta, TNT2, TNT, RIVA, RIVA TNT, VOODOO, VOODOO GRAPHICS, WAVEBAY, Accuview Antialiasing, Detonator, Digital Vibrance Control, ForceWare, NVRotate, NVSensor, NVSync, PowerMizer, Quincunx Antialiasing, Scenshare, See What You’ve Been Missing, StreamThru, SuperStability, T-BUFFER, The Way It’s Meant to be Played Logo, TwinBank, TwinView and the Video & Nth Superscript Design Logo are registered trademarks or trademarks of NVIDIA Corporation in the United States and/or other countries. Other company and product names may be trademarks or registered trademarks of the respective owners with which they are associated.

Copyright

© 2013, 2014 NVIDIA Corporation. All rights reserved.