NVIDIA Quadro Frame Synchronization Drivers *Release 90 Notes*

Version 91.36

For Windows XP / 2000
Windows XP Professional x64 Edition
Windows Server 2003 x64 Edition

NVIDIA Corporation
August 2006

Published by
NVIDIA Corporation
2701 San Tomas Expressway
Santa Clara, CA 95050

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CHAPTER 1

INTRODUCTION TO *RELEASE 90 NOTES*

This edition of *Release 90 Notes* describes the Release 90 Drivers for Microsoft® Windows® and provides information applicable to all NVIDIA® drivers. 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 90 Driver Issues" on page 2 gives a summary of
  - Issues that have been resolved in this version.
  - Issues that are open in this version
  - Known limitations of the driver
- "The Release 90 Driver" on page 23 describes the NVIDIA products and languages supported by this driver, the system requirements, and how to install the driver.
- "NVIDIA Driver History" on page 29 describes the new features included in the Release 90 driver as well as information on previous driver releases.
- "Mode Support for Windows" on page 55

Changes in this Edition

This edition of *Release 90 Notes* includes information about version 91.36 of the Release 90 driver. It discusses changes made to the driver since version 84.26. These changes are discussed beginning with the chapter "Release 90 Driver Issues" on page 2.

CHAPTER 2

RELEASE 90 DRIVER ISSUES

This chapter describes open issues for version 91.36, and resolved issues and driver enhancements for versions of the Release 90 driver up to version 91.36. The chapter contains these sections:

Issues Resolved in Version 91.36

The following are changes made and issues resolved since driver version 84.26:

- NVIDIA Ex Support

  This is a performance optimization for nForce 590 motherboards. This optimization can be enabled through a BIOS setting on the nForce 590 motherboard. The GPU Ex setting should only be enabled with Optimized NVIDIA Ex ForceWare Release 90 drivers.

Single-GPU Issues Resolved

- Display anomaly occurs while running Inventor 11 on multiple display configuration.
- Added a profile for PolyWorks.
- NVIDIA Quadro FX Family: Corrupted fringe plots occur with MSC Patran.
- NVIDIA Quadro FX Family: There is choppy movement with the model position graph editor in Lightwave 8.5 Layout
- NVIDIA Quadro FX Family: Grid position in 3ds max 8 changes when resizing the viewport.
- NVIDIA Quadro FX 4500/5500: 3D windows are mismatched when spanning across two 30″ Dell monitors.
- NVIDIA Quadro FX 4500: Images flash in Dassault Catia V5R16 due to issue with OpenGL threading.
- NVIDIA Quadro FX 4500: Autodesk Inventor SlopeScaleDepthBias setting does not work with Direct3D mode.

Open Issues in Version 91.36

As with every released driver, version 91.36 of the Release 90 driver has open issues and enhancement requests associated with it. This section includes lists of issues that are either not fixed or not implemented in this version. Some problems listed may not have been thoroughly investigated and, in fact, may not be NVIDIA issues. Others will have workaround solutions.

They are listed in the following sections:

NVIDIA Recommendations

- Single display modes such as TV only, DFP/LCD only or CRT only provide the best performance and quality from Windows Media Center Edition.

  Dual display modes such Dualview and nView Clone and Span modes are not recommended.

- When using the trial version of WinDVD 6 from InterVideo.com, you may experience TV or DVD playback problems in Windows Media Center if you change resolutions during video playback. This is most often seen when switching from windowed to full screen mode.

  This problem does not occur with the latest full OEM versions of WinDVD or with other Windows Media Center qualified DVD decoders.

- If you perform a clean driver installation (no previous NVIDIA drivers installed), ***you must reboot your computer***. If you do not reboot, the predefined application profiles will not be activated and you may experience application stability problems.

NVIDIA Issues—Single GPU

This section includes issues that occur under the Windows XP or Windows 2000:

- NVIDIA Control Panel->Workstation-> Frame Sync: After removing the Server/Client settings and then restarting the system, the Server/Client settings remain.
- NVIDIA Control Panel->Workstation-> Frame Sync: Two Servers can appear on the same system after switching between dual and single display modes.
- NVIDIA Control Panel->Workstation-> Frame Sync: The View Status Page does not detect which is the first and which is the second display attached to the GPU.
- NVIDIA Control Panel->Workstation-> Frame Sync: Server/Client settings are lost after restarting the system.
- NVIDIA Quadro G-Sync, NVIDIA Control Panel: The Framesync server machine hangs if the signal generator is switched on after setting the server.
- Memory clocks displayed do not reflect DDR multiplier.

  The memory clocks themselves are running at the correct speeds.
- The NVIDIA Control Panel-> Workstation-> Frame Sync-> View system topology page is corrupted after the page is redrawn several times.
- The NVIDIA Control Panel-> Workstation-> Frame Sync page crashes after disabling Dualview mode or when setting the resolution to 1280x1024.
- NVIDIA Control Panel Category Pages: Foreign language text exceeds the boundary of category windows.
- There may be intermittent application compatibility issues with dual core CPUs.

  If you experience this issue, you can work around it by toggling off multi-thread optimizations using the following instructions:

  1 Launch **regedit** and determine the current primary display card by looking in

  `HKey_Local_Machine\Hardware\DeviceMap\Video`

and note the GUID (global unique identifier assigned by Windows), which is the long string in brackets { } at the end of the entry

"**\device\video0**".

2. Look in

HKey_Local_Machine\SYSTEM\CurrentControlSet\Control\Video\{GUID}\0000

where {GUID} is the number derived from the previous step.

3. Open the "**0000**" directory and create a new DWORD called **OGL_ThreadControl** and give it a value of **2**.

This will disable multithreading in the driver for all OpenGL applications.

4. If you want to disable driver multithreading for all Direct3D applications–

In the same "**0000**" directory, create a new DWORD called **WTD_EXECMODEL** and give it a value of **0**.

- All GPUs: When adding Custom Resolutions, the user is not allowed to select the "monitor scaling" option.
- Windows XP: The system crashes after enabling NVKeystone with antialiasing enabled.
- Video color-space range for DVI-only[1] outputs is erroneously set to standard mode (16-235) instead of extended mode (0-255).

A new detection feature to apply Standard CSC mode to TV outputs (including NTSC, PAL, 480i, and 576i), included DVI-only outputs by mistake.

Note: *The driver correctly applies extended mode to analog outputs, and standard mode to TV outputs (including NTSC, PAL, 480i, and 576i).*

A future driver release will correct this and apply the extended-mode color space to DVI-only outputs.

You can work around this issue by forcing either standard or extended mode as follows:

1. Launch **regedit** and determine the current primary display card by looking in

HKey_Local_Machine\Hardware\DeviceMap\Video

and note the GUID (global unique identifier assigned by Windows), which is the long string in brackets { } at the end of the entry

"**\device\video0**".

2. Look in

1. "DVI-only" means only one display is connected, and it is to the DVI output.

HKey_Local_Machine\SYSTEM\CurrentControlSet\Control\Video\{GUID}\0000

where {GUID} is the number derived from the previous step.

3 Open the "**0000**" directory and create a new DWORD called **VMRCCCSStatus** and give it a value of

0x3 - to force use of the standard YUV range of 16-235

0x1 - to force use of the extended YUV range of 0-255

- NVIDIA Quadro FX 4500, Windows Media Center Edition 2005: After changing the refresh rate, the Yes button does not work in the confirmation dialog box.
- NVIDIA Quadro FX 4500, NVIDIA Control Panel: When enabling nView Clone mode for the first time, each monitor is set to a different resolution.
- NVIDIA Quadro G-Sync, NVIDIA Control Panel: The Framesync server machine hangs if the signal generator is switched on after setting the server.

NVIDIA Issues–Single GPU, Windows XP x64

The following issues occur under the Windows XP Professional x64 and Windows Server 2003 x64 OS:

- NVIDIA Quadro FX 4500 X2, Window XP x64: The Classic NVIDIA Control Panel->Edge Blending page is missing.

NVIDIA Issues—SLI Mode

This section includes SLI technology related issues that occur under the Windows XP, Windows 2000, or Windows Media Center Edition OS:

- NVIDIA Quadro FX 4500, SLI System: With two displays connected, in the NVIDIA Control Panel-> 3D Settings-> Set SLI Configuration page, the “Select the display to view SLI rendered content on” combo box sometimes shows more than two displays.
- NVIDIA Quadro FX 5500, SLI System: With SLI mode enabled, GPU load balancing does not work with AutoCAD 2007.

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:

SLI Connector Requirement on NVIDIA Quadro SLI Cards

The SLI connector that links two SLI cards is needed for proper SLI operation. However, the connector can be removed if you do not intend to enable SLI mode. If you remove the connector, then you must make sure that SLI mode is disabled from the NVIDIA control panel. Enabling SLI mode without the SLI connector installed will result in video corruption.

VIA and ATI AGP 3.0 Chipsets

- **Problem**

  The use of AGP-protocol cycles for coherent access to regular system memory results in data corruption on systems based on VIA and ATI AGP 3.0-compatible chipsets.

  AGP-protocol cycles to the AGP aperture are not affected.

- **Workaround**

  To correct the data corruption problem, the Release 75 driver exclusively uses PCI-protocol cycles to access regular system memory when it detects a VIA or ATI AGP 3.0-compatible chipset.

DVD Playback Issues with Dual NVIDIA Quadro NVS Cards

With both AGP and PCI NVIDIA Quadro NVS cards installed in the system, when attempting to play DVDs in full-screen mode on the display connected to the PCI card, the screen is blank.

This is not an NVIDIA bug, but rather a problem with older point releases of PowerDVD and WinDVD.

PowerDVD 5.0 Does Not Display Correctly in nView Span Mode

With nView Horizontal Span mode enabled, when the PowerDVD 5.0 playback window is dragged to the second display and then stretched to fill the display, the right area of the display is corrupted.

This is not an NVIDIA bug, but a problem with PowerDVD.

DirectX Fails When Detaching/Reattaching Displays in Dualview Mode

This problem can be duplicated as follows:

1. Enable both displays in Dualview mode.
2. Detach monitor 2 and apply settings.
3. Reattach monitor 2 and apply settings.

   DirectX runtime fails on monitor 1.

This is not an NVIDIA bug, but a limitation in the operating system where DirectX does not enumerate the second device. DirectX can be restored to both displays by rebooting the system

OpenGL Viewport Scaling Problem in Horizontal Span Mode

With nView Horizontal Span mode enabled, when opening an OpenGL model in a viewport, the model image is scaled too large to fit in the viewport. The problem occurs with such applications as Maya 5.0 and 3D Studio MAX 4.26.

This is not an NVIDIA bug, but a limitation in the application's ability to properly maintain the aspect ratio in Horizontal Span mode.

Driver Reports 256 MB Memory on NVIDIA Quadro FX 330 Cards

- **Problem**

  When a 64 MB NVIDIA Quadro FX 330 card is installed, the driver reports that the card needs 256 MB, causing 256 MB of address space to be consumed.

- **Explanation**

  This is not a bug but a product limitation.

  The NVIDIA Quadro FX 330 GPU has some limitations that prevent the card from addressing less than 256 MB of system memory.

Video Playback in nView Clone and Span Modes

- **Problem**

  With nView Clone or Span mode enabled, video playback appears on only one display under the following conditions:

  - Under nView Clone mode, when fullscreen video mirror is not used.

- Under nView Span mode, when fullscreen video mirror is not used and the video is positioned to span across both monitors.

- **Explanation**

  With applications that render using the hardware overlay—such as DirectX applications—the default driver behavior for Release 60 is to enable the hardware overlay when nView Clone or Span mode is enabled.

  Because the driver supports only one hardware overlay, the video appears on only one display.

Monitor Ordering in the Windows Settings Page

Monitor Ordering on a Single GPU

- **Issue**

  The monitor order in the Display Properties Settings page is not consistently matched with the connectors on the graphics card.

- **Explanation**

  The driver does not distinguish connector positions, but instead distinguishes the display type, and consequently assigns monitor numbers according to the display type and not according to the connector.

Monitor Ordering on a Multiple GPU System

- **Issue**

  When four monitors are connected to a system with multiple PCI GPUs, such as a NVIDIA Quadro NVS 400 graphics card, and enabled in Dualview or Multiview mode, many customers expect the monitor ordering in the Display Properties Settings page to conform to the following:

Connector Position	Monitor Number
Primary GPU—Output 1	1
Primary GPU—Output 2	2
Secondary GPU—Output 1	3
Secondary GPU—Output 2	4

  The monitor ordering, in fact, does not conform to this scheme.

- **Explanation**

  The monitor ordering is not controlled by the driver, but rather by the Windows OS method of enumerating PCI devices. The Windows enumeration results in the following monitor numbering:

Connector Position	Monitor Number
Primary GPU—Output 1	1
Seconday GPU—Output 1	2
Primary GPU—Output 2	3
Secondary GPU—Output 2	4

  Considerations for nView Span Modes: Outputs from the same GPUs are grouped together in nView Span modes, resulting in the desktop spanning across monitors 1 and 3, or across 2 and 4.

DirectX Applications Run Only on Single Display Even in Multiview Mode

- **Problem**

  When running DirectX applications in fullscreen mode on an NVIDIA Multiview system, the application appears on only one display instead of all the displays.

  A Multiview system consists of a NVIDIA Quadro NVS series graphics card with multiple monitors connected and multiview mode enabled.

- **Explanation**

  The problem occurs only with DirectX /Direct3D applications that use full-screen exclusive mode. In order to support these applications, the driver must switch to single display mode and blank out the other displays.

  In scenarios that require multiview functionality—such as when using screen savers—NVIDIA recommends using non-DirectX/Direct3D applications.

Applying Workstation Application Profiles

- **Background**

  The workstation application profiles are software settings used by the NVIDIA Display Drivers to provide optimum performance when using a selected application. The profile also works around known application issues and bugs.

  If there is an available setting for an application, it should be used, otherwise incorrect behavior or reduced performance is likely to occur.

- **Issues**

  Configuration changes require the application to restart.

  Running applications do not receive notification of configuration changes, Therefore, if you change the configuration while the application is running, you must exit and restart the application for the configuration changes to take effect.

Advanced Timing Adjustment Limitations

- **Problem**

  The Advanced Timing page—accessed from the NVIDIA Display Properties Change Resolution page—is not available for some cards using the DVI connector.

- **Explanation**

  DVI timing adjustment is supported for NV3x-based cards only if they have an external TMDS, such as the SiliconImage 164.

If the card uses the internal TMDS, then the page is not accessible. However, cards with an internal TMDS can support refresh rates less than 60 Hz in this driver.

No Antialiasing of 3DMark03 Image Quality Screen Captures

- **Problem**

  After enabling antialiasing from the NVIDIA Properties page, 3DMark03 screen captures—obtained using the application's screen capture function—might not be antialiased.

- **Explanation**

  This is not an NVIDIA bug, but rather a result of different methods used to render antialiased images.

  Depending on a combination of factors, the driver may take advantage of the NVIDIA hardware's ability to bypass the front buffer while rendering an antialiased image. In this case, the front buffer does not contain antialiased data, so if an application takes data from the front buffer—as is the case with 3DMark03's Image Quality screen captures—then the resulting image is not antialiased.

  To accommodate applications that request use of the front buffer, the NVIDIA software can provide the antialiased data in a buffer to the application. Since this negates the advantages of the NVIDIA hardware capability, this support is enabled only when antialiasing is enabled within the application, and not from the NVIDIA control panel.

  In all cases when antialiasing is enabled, screen images as well as screen captures obtained using the Print Screen key are always antialiased.

Hide Modes Check Box Cannot be Cleared

- **Background**

  One of the NVIDIA display property page dialog boxes contains the check box labelled "Hide modes that this monitor cannot display". It is checked by default, indicating that only the refresh rates supported by the monitor are listed in the refresh rate drop down list.

  The check box appears in the Device Adjustments->Monitor Settings page.

- **Problem**

  If you clear the check box, click **Apply**, and then close the dialog box, the check box is still checked when the page is re-opened.

- **Explanation**

  This function is no longer controlled by the NVIDIA driver, but has not been removed from the control panel in order to maintain consistency with driver designs that are currently being shipped to OEMs.

Windows XP/2000 Issue with Settings Tab Monitor Positioning

- **Problem**

  In the Windows **Display Properties** > **Settings** tab, the secondary monitors cannot be positioned directly above monitor #1 without snapping horizontally to a position diagonal to monitor #1.

- **When the Problem Occurs**

  The problem occurs when four monitors are connected to the graphics adapter card, but only two of them are enabled.

- **Cause and Workaround**

  This is a Microsoft—not an NVIDIA—bug, and there is no workaround to correct the positioning of the monitor icons. However, the actual positioning of the displays on the desktop can be corrected using the nView Desktop Manager window as follows:

  1. Under the Tools tab in the Desktop Manager windows, make sure Automatically Align Displays is checked.
  2. In the Settings tab, position the appropriate monitor icon above monitor #1, then click **Apply**.

     The mouse cursor movement between monitor desktops will correspond to a vertical orientation of the monitors, even though the monitor icons in the Settings tab are diagonal to each other.

  Note: This will be the case even if the monitor icons are deliberately positioned diagonal to each other.

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.

Windows Media Player Hangs Playing MPEG Files

On systems using the InterVideo WinDVD player (including ones that don't contain NVIDIA components), Windows Media Player 6.4 halts if the slider is adjusted while an MPEG clip is playing. The problem also occurs if Active Movie or the Movie Player on the Windows 98 CD is used instead of Media Player 6.4.

There are two ways to work around this problem:

- **Under Display Properties > Settings > Advanced… > Performance, set Graphics Hardware acceleration to None.**
- **Uninstall the WinDVD player.**

This is not an NVIDIA bug.

Antialiasing Problems With Certain Applications

Antialiasing in the NVIDIA Direct3D driver requires each new frame to be rendered from scratch. This requirement adversely affects applications that render only that portion of the content that has changed since the last frame. A common symptom of this problem is geometric structures that incorrectly disappear and re-appear as the scene shifts.

VIA KX133 and 694X Chipsets With AGP 2X

On Athlon motherboards with the VIA KX133 or 694X chipset, such the ASUS K7V motherboard, NVIDIA drivers default to AGP 2X mode to work around insufficient drive strength on one of the signals.

- **To force NVIDIA drivers to use AGP 4X transfers, the registry key is**

  `HKLM\System\CurrentControlSet\Services\nv4\DeviceN\ EnableVia4X`

  where the `N` in `DeviceN` is the system-determined number indicating the current NVIDIA device. This number is normally `0`.

These registry keys should only be used if there is reason to believe that the motherboard has the appropriate drive strength.

Irongate Chipsets With AGP 1X

AGP 1X transfers are used on Athlon motherboards with the Irongate chipset to work around a problem with the signal integrity of the chipset.

Poor Quality S-Video Output on Some TVs

NVIDIA drivers differentiate an S-video TV from a composite TV by searching for 75-Ohm loads on the chrominance and luminance lines. If the driver detects only one such load, it assumes that it has a composite TV and drives both chroma and luma onto that line. This approach allows both types of TV to display in color.

Unfortunately, some S-video TVs do not apply the correct load to both lines, causing the driver to detect an S-video TV as a composite. The driver, in turn, sends the lower quality signal to the S-video TV. To work around this problem, use the Control Panel to override the "Auto-select" feature. This can be done following these steps:

1. In the Settings tab of the Display Properties Control Panel, click Advanced.
2. In the nView tab, click Device Settings and click Select Output Device.
3. In the Device Selection tab, click the TV option.
4. Change the "Video output format" to S-video.

AGP and PCI-E Programs May Hang With AMD K7 and K8 Processors

- **Issue**

  Microsoft® Windows® 2000 and Windows XP systems using AMD K7 and K8 processors can hang when an AGP or PCI-E program is used.

- **Root Cause**

  There is a known problem with Microsoft® Windows® 2000 and Windows XP systems using AMD K7 and K8 CPUs that results in the Microsoft operating system allocating overlapping 4M cached pages with 4k write-combined pages. This condition results in undefined behavior and data corruption, and is explicitly disallowed by the AMD CPU manual.

  This problem can affect any device driver in the system that allocates write-combined system memory, but is usually most easily reproduced with graphics drivers since graphics drivers generally make heavy use of write-combined system memory for performance reasons.

- **Resolution**

  Microsoft has a knowledge base article on the issue, the text of which is unfortunately quite outdated. While the article only mentions Windows 2000, AGP, and K7, both the root cause and resolution also apply to Windows 2000 or WindowsXP, AGP or PCI-E, and AMD K7 or K8. The article can be found at http://support.microsoft.com/?id=270715.

  The issue is resolved by applying an operating system registry key as described in the referenced article that instructs the Microsoft operating system to not use the 4M pages, thus avoiding the conflict.

  The registry key is automatically applied by installation of the latest NVIDIA nForce platform driver package (including 4.57 SMBUS or later). It is imperative for the package to be installed or for the registry key to be applied before the NVIDIA graphics driver or any other device drivers are installed. The registry key takes effect only after an operating system reboot.

Desktop Manager Does Not Re-Center Logon Screen

On Windows NT 4.0, Windows 2000, and Windows XP multi-display systems that are set to nView Span mode, the Windows logon screen is centered on the extended desktop. This usually causes it to be split across two displays, which users may find annoying. Although users can normally use the Desktop

Manager to restrict a window's appearance to one display, security restrictions in the operating systems prevent this in the case of the logon screen.

Issues with Video Mirror–Windows XP/2000

Table 2.1 lists current known issues with NVIDIA Video Mirror functionality.

Table 2.1 Known Issues with Video Mirror

Issues
Video Mirror is not yet implemented for applications using Video Port Extensions (VPE).
If Video Mirror is enabled but a full-screen display does not appear, one of the following problems may have occurred:
Video Mirror can only function when overlay is being used. The video player may not be able to create an overlay if another application is using the overlay, or the desktop display resolution is too high. You can lower the desktop resolution, pixel depth, or refresh rate.
Video Mirror requires some extra memory to run. Try closing other DirectX or OpenGL applications that may be running.
You may need to close and restart your video application for Video Mirror enabling or disabling to take effect.
Some video players that cannot detect the presence of Video Mirror stop playing if they are minimized or completely obscured by another window. For example, Media Player can exhibit this problem.

CHAPTER 3

THE RELEASE 90 DRIVER

This chapter covers the following main topics:

See the section "Release 90 Enhancements" on page 31 for a summary of Release 90 features and enhancements.

Hardware and Software Support

Supported Operating Systems

This Release 90 driver includes drivers designed for the following Microsoft® operating systems:

- Microsoft Windows® XP
  - Windows XP Professional
  - Windows XP Home Edition
  - Windows XP Professional x64 Edition
- Microsoft Windows Server 2003 x64 Edition
- Microsoft Windows 2000

Supported NVIDIA Products

Table 3.1lists the NVIDIA products supported by Version 91.36 of the Release 90 driver.

Table 3.1 Supported NVIDIA Workstation Products

Product	Windows XP 32-bit Windows 2000	Windows XP Professional x64
NVIDIA Quadro FX 5500	X	X
NVIDIA Quadro FX 4500 X2	X	X
NVIDIA Quadro FX 4500	X	X

Supported Languages

The Release 90 ForceWare 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 (Brazil)
Portuguese (Euro/Iberian)
Russian
Slovak
Slovenian
Spanish
Spanish (Latin America)
Swedish
Thai
Turkish

Driver Installation

System Requirements

The minimum hard disk space requirement for each operating system are listed in Table 3.2, Table 3.3, and Table 3.4:

Table 3.2 Hard Disk Space Requirements—English

Operating System	Minimum Hard Disk Space
Windows XP (all editions)	41.1 MB
Windows 2000	41.1 MB

Table 3.3 Hard Disk Space Requirements—Non-English Languages

Operating System	Minimum Hard Disk Space
Windows XP (all editions)	26.66 MB
Windows 2000	26.66 MB

Table 3.4 Hard Disk Space Requirements—Full International Package

Operating System	Minimum Hard Disk Space
Windows XP (all editions)	67.76 MB
Windows 2000	67.76 MB

Installation Instructions

Before You Begin

- If you do not have System Administrator access privileges, it is assumed that the appropriate person with System Administrator access in your organization will set up and install the NVIDIA graphics driver software on your computer.
- The installation process copies all necessary files for operation into the appropriate directories.
- The nView system files are copied to your **`Windows\System`** directory.
- nView Desktop Manager Profile files (*.**tvp**) are saved in the **`Windows\Nview`** directory.

  Depending on the version of the NVIDIA driver previously installed, profiles may also be located in the **`Documents and Settings\All Users\Application Data\nView_Profiles`** directory.
- As part of the install process, an uninstall is registered in your system.
- Under Windows Me and Windows XP, the NVIDIA driver is installed in "Dualview mode" display. However, note that the second display is not activated by default, but must be enabled.
- Under Windows 2000, the NVIDIA Display Driver is installed in Span mode. See the instructions in the *ForceWare Graphics Drivers User's Guide* for instructions on how to install nView DualView mode.

Preserving Settings Before Upgrading Your Software

Before uninstalling or installing software, your can preserve your nView Desktop Manager and/or NVIDIA Display settings by using the nView Desktop Manager Profiles features.

Note: Follow the steps below and/or refer to the *NVIDIA nView Desktop Manager User's Guide* for details. Under Windows XP/2000 and Windows NT 4.0, you must have, at least, **Power User** access privileges in order to create or save a profile. (Refer to Windows Help if you need an explanation of Power User access rights.)

Follow the steps below and/or refer to the *NVIDIA nView Desktop Manager User's Guide* for details.

1. Open the nView Desktop Manager Profiles page (Figure 4.1).
2. To preserve your current settings, you can use either the **Save** or the **New** option from the nView Desktop Manager Profiles page:
   - If you want to overwrite the currently loaded profile with your changed settings, use the **Save** option. Notice that a warning message indicates that you are about to overwrite the selected profile.
   - If you want to retain the currently loaded profile and want to save your changed settings to a new file, click the **New** option. Enter a name and description of the profile in the New Profile dialog box. For example, you can name this profile **`My Settings`**.
3. If you are an "advanced" user and want to customize certain settings in the saved profile, click **Advanced** << to expand the dialog box (Figure 4.2).
4. To customize the settings, you can select or clear any of the settings check boxes.
5. Click **Save** to return to the main Profiles page.

   If you created a new profile, you will see the name of the newly created profile in the profiles list.

   If you overwrote a current profile, the same profile name is retained in the list.

   Note: nView Desktop Manager profile (**`.tvp`**) files are saved in the **`Windows\nView`** directory. Depending on the version of the NVIDIA driver previously installed, profiles may also be saved in the **`Documents and Settings\All Users\Application Data\ nView_Profiles`** directory.
6. Now you can uninstall your current driver for a driver upgrade.
7. After you restart your computer following an NVIDIA new driver install, you can easily load the saved profile from the Profiles page of nView Desktop Manager.

About Using Saved Profiles in Another Computer

You can easily use any saved profile (**`.tvp`** file in the **`Windows\nView`** directory) from one computer and use it in another computer, if you want. You'll need to copy it to the **`Windows\nView`** directory of a computer that has the NVIDIA ForceWare graphics display driver, etc. installed properly. Then this profile can be loaded from another computer from the nView Desktop Manager Profiles page just as it can from your original computer.

Uninstalling the NVIDIA Display Driver Software

Note: *It is highly recommended that you follow the steps in this section to completely uninstall the NVIDIA Display Driver software before updating to a new version of the software.*

To uninstall the nView software, follow these steps:

1. From the Windows taskbar, click **Start** > **Settings** > **Control Panel** to open the Control Panel window.
2. Double-click the **Add/Remove Programs** item.
3. Click the **NVIDIA Display Driver** item from the list.
4. Click **Change/Remove**.
5. Click **Yes** to continue.

   A prompt appears asking whether you want to delete all of the saved nView profiles.

   - If you click **Yes**, all of the nView software and all of your saved profiles will be deleted.
   - If you click **No**, the nView software is removed, but the profile files are saved in the `Windows\nView` directory on your hard disk.

   Your system now restarts.

Installing the NVIDIA ForceWare Graphics Drivers

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. Click the driver download link.

   The license agreement dialog box appears.
3. Click **Accept** if you accept the terms of the agreement, then either open the file or save the file to your PC and open it later.

   Opening the EXE file launches the NVIDIA InstallShield Wizard.
4. Follow the instructions in the NVIDIA InstallShield Wizard to complete the installation.

CHAPTER 4

NVIDIA DRIVER HISTORY

This chapter provides the driver release history and summarizes the features and enhancements that have been introduced in each release. It contains these sections:

Driver Release History

Release 90 is the latest NVIDIA driver available. Table 4.1 contains a summary of some previous driver releases and the versions associated with them. Some versions listed may not have been released outside of NVIDIA.

Table 4.1 NVIDIA Drivers for Windows

Driver	Name	Versions	Comments
Release 90	ForceWare	91.36,	
Release 80	ForceWare	81.67, 84.26,	
Release 75	ForceWare	77.37, 77.56	
Release 70	ForceWare	71.84, 71.89	
Release 65	ForceWare	66.77, 66.93, 67.02, 67.03, 67.66	
Release 60	ForceWare	61.76, 61.77	
Release 55	ForceWare	56.64, 56.72, 57.30	
Release 50	ForceWare	52.16, 53.04	
Release 40	Detonator FX	44.03–45.xx	
Release 40	Detonator 40	40.60–44.02	
Release 35	Detonator 35	35.60–37.80	
Release 25	Detonator 25	26.00–32.90	
Release 20	Detonator XP	21.83–23.xx	
Release 10	Detonator 3 v1x.xx	10.00–17.xx	

Release 90 Enhancements

Release 90 provides these new features and improvements:

- Establishes the new NVIDIA Control Panel as the recommended user interface.
- Includes several PureVideo improvements.
- Increased stability and performance.

OpenGL

The following extensions have been added:

- `WGL_NV_gpu_affinity`

Video

Release 90 includes the following new PureVideo features and improvements:

Video Processing Improvements

Release 90 includes several PureVideo technology improvements[1]:

- Added noise reduction post processing
- Added image sharpening post processing
- Improved inverse telecine algorithm
- Improved de-interlacing algorithm
- Improved compatibility with third party MPEG-2 decoders

New Features—Available Only in the New NVIDIA Control Panel

- Color Temperature Correction
  - Allows users to compensate for monitor gamut differences
  - Enhances color correctness of video
- Video Gamma Enhancement to include RGB gamma adjustment
  - RGB Gamma for VMR9
  - Allows users to tweak gamma in channels separately

1. Video processing improvements are seen in higher HQV benchmark scores.

- For both Overlay and VMR9

Control Panel

Release 90 introduces the new NVIDIA Control Panel as the recommended interface. The new interface provides intuitive navigation of NVIDIA display property controls, and will be the interface for other NVIDIA software.

While the Classic Control panel is still available, no changes or new features will appear in that interface.

Release 80 Enhancements

NVIDIA SLI™ Enhancements

- Dynamic Enable/Disable Capability

  System reboot is no longer required after enabling or disabling SLI from the control panel.

- Cross-card compatibility

  SLI no longer requires that graphics cards be identical, but they must still have the same core GPU.

- SLI performance without an SLI (bridge) connector on select graphics cards for the mainstream market
- Improved SLI performance and a streamlined list of application profiles for OpenGL
- Changing application profiles never requires a system reboot.
- TV/HDTV support under SLI
- Ability to select which display to use for the output.
- Additional SLI Support

  Release 80 adds support for the following combinations of PCI Express graphics cards & chipsets:

Chipset	PCI-Express Graphics Cards
NVIDIA nForce4 SLI	

Chipset	PCI-Express Graphics Cards
NVIDIA nForce4 SLI—Intel Edition	GeForce 7800 GT + GeForce 7800 GT GeForce 6800 XT + GeForce 6800 XT GeForce 6800 XE + GeForce 6800 XE
NVIDIA nForce Professional 2200	
NVIDIA nForce Professional 2200 + NVIDIA nForce Professional 2050	

NVIDIA PureVideo™ Enhancements

- Improved inverse 3:2 and 2:2 pulldown
- Improved adaptive deinterlacing

Support for the Next Generation of NVIDIA GPUs

Additional Details by Driver Module

DirectX

- Support for the next generation of GPUs
- Support for dual-core CPUs

OpenGL

- New Extensions
  - NV_packed_depth_stencil
  - ARB_pixel_buffer_object
  - GL_NV_timer_query
- Improved performance under Dualview
- Improved memory management for multiple open applications on Quadro workstation cards
- Improved performance with multiple overlapping windows
- Improved SLI performance
- Support for dual core CPUs
- Support for the next generation of GPUs

Video

Release 80 includes the following new PureVideo features and improvements:

- Improved inverse 3:2 implementation
- Improved inverse 2:2 implementation
- Adaptive Deinterlacing for HD content on GeForce 6600 and high GPUs
- PureVideo support for the next generation of GPUs

Classic NVIDIA Control Panel

- HDTV Overscan compensation support

  Includes X-Y adjustment, and independent front-end timing adjustment features
- Dynamic SLI enable/disable capability

Release 75 Enhancements

The NVIDIA ForceWare graphics driver, Release75, supports the latest family of NVIDIA GPUs as well as dual-core CPUs. The following are more detailed changes in the driver:

OpenGL Enhancements

- Support for OpenGL 2.0 Specification
- New extensions:
  - ARB_draw_buffers
  - ARB_color_buffer_float
  - ARB_half_float_pixel
  - ARB_texture_float
  - EXT_framebuffer_object

SLI Support Improvements

- New SLI Antialiasing Feature
- SLI support for OpenGL workstation applications with NVIDIA Quadro-based PCI-Express graphics cards.
- Additional SLI Support

Release 75 adds support for the following combinations of PCI Express graphics cards & chipsets:

Chipset	PCI-Express Graphics Cards
NVIDIA nForce4 SLI	GeForce 7800 GTX + GeForce 7800 GTX GeForce 6600 + GeForce 6600 GeForce 6600LE + GeForce 6600LE
NVIDIA nForce4 SLI—Intel Edition	
NVIDIA nForce Professional 2200	
NVIDIA nForce Professional 2200 + NVIDIA nForce Professional 2050	NVIDIA QuadroFX 4500 + NVIDIA QuadroFX 4500 NVIDIA QuadroFX 4400 + NVIDIA QuadroFX 4400 NVIDIA QuadroFX 3450 + NVIDIA QuadroFX 3450 NVIDIA QuadroFX 3400 + NVIDIA QuadroFX 3400 NVIDIA QuadroFX 1400 + NVIDIA QuadroFX 1400

- Improved SLI performance for DirectX and OpenGL applications.
- Improved control of SLI profiles and rendering modes.

System-Wide Desktop Manager Settings

Control Panel Interface Changes

- Added a Triple Buffering control option for improved frame rates.
- Added Transparency Antialiasing Control (for GeForce 7800 GTX)
- Added Gamma Correct Antialiasing Control (for GeForce 7800 GTX)
- Combined DirectX and OpenGL application profiles on one page

Additional Details by Driver Module

Display Driver

- Improved high-resolution scalable desktop functionality
- Improved support for custom timings, including non-divisible by 8 resolutions on TMDS/LVDS panels, control of back-end and front-end timings, and variable overscan shift values.

  The driver can also present underscan modes on demand, and supports variable underscan ratios.
- Off-screen 2D Memory Management Optimization
- Efficient synchronization between clients allows for sharing of off-screen resources with DirectX applications. This avoids potential performance

issues with applications that use DirectX rendered surfaces in ways that conflicted with 2D caching.

- VESA Coordinated Video Timing (CVT) Support
  - Support via control panel option for analog monitors
  - Support for CVT/CVT-RB timing restriction using R&T strings
- Color compression support
- SLI Enhancements
- SLI screen capture support
- Improved performance

DirectX

Improved driver stability and performance, including the following areas:

- UMA support
- 2D operations
- SLI

NVIDIA Display Control Panel

Release 75 includes enhancement to the following sections of the NVIDIA display control panel user interface:

- **Application Profiles** — All application profiles, including workstation applications, are combined onto the same application profiles page.
- **Underscan Support** – Underscan support is added for full screen overlay and full screen video mirror outputs.

nView Desktop Manager

Release 75 no longer supports the nView Display Wizard for Windows NT 4.0, and NVKeystone for Windows 98/Me. The driver does include enhancement to the following nView Desktop Manager sections:

- **TV/Display Wizard** is enhanced to make HDTV setup easier. Each high-definition mode can be previewed to determine the capabilities of the flat panel.
- **Desktop Manager setting** — Release 75 lets you create system-wide nView Desktop Manager settings that apply across all users.
- **Per-display desktops** — Release 75 brings support for independent per-monitor virtual desktops to nView Span mode and Multiview environments.

Release 70 Enhancements

Support for Newest GeForce 6 Series GPUs

All driver modules within Release 70 support the latest GPUs from the NVIDIA GeForce 6 Series.

Additional SLI Support

Release 70 adds support for the following combinations of PCI Express graphics cards & chipsets:

Chipset	PCI-Express Graphics Cards
NVIDIA nForce4 SLI	GeForce 6800 LE + GeForce 6800 LE
NVIDIA nForce Professional 2200	
NVIDIA nForce Professional 2200 + NVIDIA nForce Professional 2050	

Improved Video Functionality

- Improved video scaling for the newest GeForce 6 Series GPUs
- Improved de-interlacing
- Windows Media Video 9 (WMV9) Video Acceleration
  - Includes support for hardware acceleration decoding of WMV9 video files on GeForce 6 series GPUs.
  - A software update from Microsoft is required to enable this feature.

Desktop Manager Wizard Improvements

- Improved Setup Wizard for Display Monitor, TV, and HDTV.
- New Hot Keys—Toggle Stereo 3D Display and Transparent Desktop Lock

Control Panel Interface Improvements

- Improved HDTV-over-DVI User Interface, and support for arbitrary overscan/underscan for HDTV-over-DVI
- Improved pages—Driver Information Screen, Advanced Timings, Change Resolutions
- New property pages - SLI (available with NVIDIA SLI graphics cards) and Tools.

New features—**Play On My Display**, **Best fit scaling** option, and ability to rename the monitors in the display menu on the nView Page.

Release 65 Enhancements

SLI Support

Release 65 supports the new Scalable Link Interface (SLI) technology for improved performance using dual high-end graphics cards[2] that support SLI technology.

The following combinations of PCI Express graphics cards & chipsets are supported in this release of the driver:

Chipset	PCI-Express Graphics Cards
Intel(R) E7525	GeForce 6800 Ultra + GeForce 6800 Ultra
	GeForce 6800 GT + GeForce 6800 GT
NVIDIA nForce4 SLI	GeForce 6800 Ultra + GeForce 6800 Ultra
	GeForce 6800 GT + GeForce 6800 GT
	GeForce 6800 + GeForce 6800
	GeForce 6600 GT + GeForce 6600 GT
NVIDIA nForce Professional 2200	GeForce 6800 Ultra + GeForce 6800 Ultra
	GeForce 6800 GT + GeForce 6800 GT
	GeForce 6800 + GeForce 6800
	GeForce 6600 GT + GeForce 6600 GT
NVIDIA nForce Professional 2200 + NVIDIA nForce Professional 2050	GeForce 6800 Ultra + GeForce 6800 Ultra
	GeForce 6800 GT + GeForce 6800 GT
	GeForce 6800 + GeForce 6800
	GeForce 6600 GT + GeForce 6600 GT

512 MB Frame Buffer Support

ForceWare Release 65 graphics drivers provide memory management techniques for supporting 512 MB versions of the new generation of NVIDIA graphics cards, such as the GeForce 6800 or Quadro FX 4000 and later.

OS Support

Release 65 supports Windows XP SP2 and will support the next version of Windows XP Media Center Edition—"Symphony".

2. Cards must be of the same vendor and model number.

Enhancements in Driver Performance

Improved Robustness

The ForceWare Release 65 graphics driver offers improved stability and robustness in DirectX and 2D graphics.

Video Enhancements

Video enhancements in Release 65 include

- Optimized motion compensation and video processing to take advantage of the capabilities of the newest generation of NVIDIA GPUs.
- Support for Microsoft's Certified Output Protection Protocol (COPP)
- Improved media capture interface
- Inverse Telecine (3:2 pulldown detection and correction)

  Inverse telecine extracts the original 24 fps of film-sourced video for encoding, and prevents encoding of unnecessary frames, eliminating artifacts. To enable this feature, you must download the NVIDIA DVD Decoder, for use with Windows Media Player or Windows Media Center Edition.

3D Graphics API Enhancements

- **DirectX Enhancements**
  - DirectX 9.0c Compatibility
  - Supports the capabilities of the newest generation of NVIDIA GPUs for improved DirectX shader handling and reduced CPU overhead
- **OpenGL Enhancements**
  - Improved and more efficient vertex_buffer_object (VBO) handling
  - More efficient memory management for improved performance under DualView

HDTV Support Enhancements

Release 65 offers improved HDTV over DVI underscan support, exposed through the NVIDIA control panel.

Desktop Manager and Control Panel Improvements

Release 65 includes the following improvements in the Desktop Manager and control panel:

- New Negative LOD Bias control page (effective with version 67.03)
- High Resolution Scalable Desktop Performance

- Desktop Manager Wizards
- Desktop Manager Hot Keys, Toolbars, and Gridlines
- Application Profiles
- Control Panel User Interface

Release 60 Enhancements

Latest GPU Support

The ForceWare Release 60 graphics drivers support the newest generation of NVIDIA GPUs, including

- Improved vertex and pixel compilers
- Video shaders

PCI Express Support

ForceWare Release 60 offers 2D and 3D graphics driver support for the PCI Express I/O, including

- DirectX support
- Enhanced OpenGL support

  Improved texture memory management and bandwidth utilization

Enhancements in Driver Performance

- Enhanced Robustness

  The ForceWare Release 60 graphics driver offers more robust stability and compatibility in DirectX support, antialiasing, and desktop rotation.
- Reduction of OCA issues
- Dynamic Video Memory

  Streamlines OS system resources for large frame buffer configurations

3D Graphics API Enhancements

Direct3D

- DirectX 9.0c Support

OpenGL

- New drivers for the OpenGL ARB shading language (GLSL)
- Enhanced support for Windows XP 64-Bit Edition and IA32-E.
- New extensions
  - GL_NV_fragment_program2
  - GL_EXT_blend_equation_separate
  - NV_vertex_program3
  - ATI_draw_buffers
  - ATI_texture_float
  - ATI_texture_mirror_once
  - GL_ARB_texture_non_power_of_two
  - GL_NVX_centroid_sample
  - GL_NVX_conditional_render

Release 55 Enhancements

The Release 55 driver offers new features not found in previous releases of the NVIDIA Driver for Windows. The following highlights the new features in Release 55:

PCI Express Support

2D and 3D graphics drivers support the PCI Express I/O.

PAE Support

2D and 3D graphics driver support systems that utilize physical address extensions (PAE)[3].

nView Desktop Manager Enhancements

- Seamless nView support between 32-bit and 64-bit processes on Windows 64-bit Edition
- Dual NVKeystone support for independent keystone trapezoids under nView Span modes.
- Per-display Desktop Management

User Interface Enhancements

- New application profiles capability lets you associate a collection of driver settings—such as antialiasing and display quality settings—with an application.
- Easy access standalone panel, independent of the Microsoft Display Properties window.
- Improved multi-adapter support.
- Improved TV and HDTV Controls

Video Support Enhancements

- Advanced de-interlacing and inverse 3:2 pull-down capability
- Enhanced HDTV and Media Center support

3. PAE is an extension that enables Intel compatible computers to address more than 4 GB of physical memory.

3D Graphics API Enhancements

Direct3D

- Improved antialiasing performance
- Improved shaders

OpenGL

New extension: `GL_NV_pixel_buffer_object`

Release 50 Enhancements

The Release 50 driver offers new features not found in previous releases of the NVIDIA Driver for Windows.

64-Bit Support

Driver Release 50 offers AMD64 and IA64 OS support.

Dynamic Memory Mapping

Dynamic memory mapping adds support for 256 MB graphics cards for video, display, and OpenGL drivers.

NVIDIA Unified Compiler

As today's GPUs become more and more programmable they are entering a similar era to that of the CPU. For CPUs, it is common for developers to implement code paths specifically optimized for AMD or Intel (e.g MMX and 3DNow!). Programmable GPUs are no different. Because architectures vary, it makes sense that one common assembly language can't cover all the nuances of specific GPU micro-architectures. In fact, different code paths make different GPUs go faster. As a result with the GeForce FX architecture, NVIDIA has implemented a GPU-specific compiler that can be used to optimize application performance.

Display Driver Changes and New Features

- **Rotation support**

  Added to Windows Me/9x.
- **Custom resolutions**

Provides the user with the ability to construct new modes via the NVIDIA control panel.

- Screen editing

  Allows removing infrequently used screens by dragging them from the NVIDIA screen menu to a list. Screens can be restored by simply clicking the **Restore Defaults** option or by dragging them back to the menu.

- **Dynamic EDIDs**

  Updates the master mode list with new modes contained in the connected device's EDID.

- **Support for special panels and devices**
  - Large panels
  - Wide panels
  - Seamless Span modes in the mode list to support T221 style large panels
  - Interlaced modes for HDTV
  - DVI device hot plugging

- **Frame Lock functionality**

  Enables synchronizing applications across multiple displays for Quadro FX series of GPUs.

- **Edge Blend functionality**

  Enables blending the adjacent edges of overlapped displays on projection systems for Quadro FX series of GPUs.

Video—New Features

Video Mixing Renderer (VMR) support

VMR support is provided for full-screen video and Microsoft's DirectX Video Acceleration (DXVA).

PowerMizer—New Features

- Dynamic peak power control
- Thermal Protection version 2.0

User Interface Changes

New Features

- **Dualview**

This feature is available and supported as a single-step process from the nView Display Modes panel and APIs. Switching in and out of all driver modes is possible with several choices for display device pairs:

  - Analog display + digital display
  - Digital display + analog display
  - TV + digital display
  - Other combinations

- Change Resolution panel
- Improved Color Correction panel with enhanced Gamma
- HDTV support

Improvements

- Menus for NVIDIA user components
- Easy access to nView Display Mode or Windows Display Properties Settings through the NVIDIA Settings taskbar utility
- Panel access for non-administrator users
- Tool tips for the scroll bar on the NVIDIA menu
- Improved Performance and Quality Settings panel
- Improved TV-Out settings panel
- Improved device selection (display pairs)
- Separate Overlay Controls panel
- Separate Full Screen Video settings panel

nView

- Action Toolbar
- Kinematic mouse actions
- Resolution per Desktop support
- Application monitor exclusions and inclusions
- Internet Explorer pop-up prevention
- Monitor grids
- Keystone luma compensation
- Multiview support
- nViewCmd

- NVManagement
- Faster Desktop switching
- Integrated control panels
- New Setup Wizard
- Driver independence

DirectX Graphics

- Floating point render targets
- Multi-element textures
- Improved antialiasing compatibility
- Improved shader handling and stability
- Improved render-to-texture performance

OpenGL

- Windows 9x Rotation support
- New supported extension: `GL_ARB_occlusion_query`
- Faster Vertex Processing Pipeline
  Improved geometry processing and display list support provided.
- Faster vertex and fragment program compilers
- Improved support for `ARB_vertex_buffer_object` extension (vbo)
- Improved stability during mode switches, antialiasing, and UBB
- Faster texture downloads

Release 40 Enhancements

The Release 40 driver offers new features not found in previous releases of the NVIDIA Driver for Windows.

Enhanced Display Driver, DirectX, and Video Capabilities

- Windows XP SP1
  - Release 40 supports Windows XP SP1, Windows Media Center edition, and Windows XP Tablet PC.
  - Release 40 provides support for bugcheck EA callbacks, enabling OCA EA failures to be resolved more quickly while assisting to identify failure causes—such as due to chip instability or overclocking.
- Rotation support

  Release 40 supports the NVRotate™ desktop rotation[4] feature, which allows the user to rotate the desktop by 90, 180, or 270 degrees.
- DirectX 9 support

  With Microsoft's release of DirectX 9 runtime, Release 40 version 42.51 and later provides support for DirectX 9, which includes the new vertex shaders, antialiasing modes, and multi-display device support.
- Video enhancements
  - Flip Sync functionality support
  - Support for multiple Macrovision clients
  - Simplified Video Mirror controls
- TV Overscan support

  Depending on the TV encoder used, Release 40 supports TV overscan—allowing the user to eliminate the black borders around the TV display screen. This option is accessible through the NVIDIA display properties control panel.

New Graphical User Interface

- Media Center Tray application

4. Rotation is not supported on graphics cards based on the TNT, TNT2 or Vanta product families.

The Media Center Tray is a new application that replaces QuickTweak, and contains menu items that provide access to all NVIDIA user interface software applications.

- New Display Properties panel

  The NVIDIA control panel has been redesigned to make navigating easier and to improve control over the display adapter settings.

Enhanced nView Desktop Manager Features

- Additional OS support

  NVIDIA nView supports Windows NT 4.0, Windows 9*x*/Me, and Windows 2000/XP.

- Zoom support

  New fixed-frame zoom and bi-directional zoom editing capability added.

- NV-Switcher

  Improved ALT+TAB switcher which also supports Desktop switching and is expandable to other NVIDIA features.

- Color-keyed windows

  Allows the user to color key windows for easy identification when activating them on the desktop.

- Taskbar and menu transparency
- New window actions and application settings.
- Keystone support[5]

OpenGL Enhancements

- OpenGL 1.4 ICD with NVIDIA extensions

  New extension includes ARB_vertex_program, which co-exists with NV_vertex_program.

- Enhancements for workstation applications
  - NV1x line stipple enhancements, and NV2x 2-sided lighting optimizations
  - Immediate mode optimizations for Solid Edge, and display list tuning for UGv17.
- Multi-monitor improvements

  New accelerated spanning mode is enabled by default.

5. Keystone is not supported on graphics cards based on the TNT, TNT2 or Vanta product families.

- Reduced power consumption

  Release 40 utilizes CPU cycles more efficiently, resulting in reduced power consumption without sacrificing performance.

- Dynamic AGP/Video memory management

Release 35 Enhancements

The Release 35 driver offers new features not found in previous releases of the NVIDIA Driver for Windows.

- NVRotate™

  The NVRotate feature lets you view your Windows desktop in Landscape or Portrait mode. You can rotate desktop by 90, 180 and 270 degrees.

- Improved and expanded NVIDIA nView Desktop Manager application

  nView Desktop Manager has now been redesigned with a convenient user interface and many new features and utilities designed to solve specific problems for users. Utilities such as anti-keystoning support and flat panel monitor calibration screens and utilities have been designed to improve windows multi-display usability.

  For example, NVKeystone can be set to compensate for keystoning effects on your windows display, allowing you to fix distorted projection images. This feature is primarily for laptop (mobile) computers.

  Note: For further details on NVKeystone and many new nView Desktop Manager features, see the *NVIDIA nView Desktop Manager User's Guide.*

Release 25 Enhancements

The Release 25 driver offers new features not found in previous releases of the NVIDIA Driver for Windows.

- nView

  The latest multi-monitor technology encompassing driver support, multi-monitor GPU architecture, and desktop management support. nView consists of two main modules:

  - nView Display Manager

    New support for multi-monitor functionality, including Clone modes, and Horizontal and Vertical spanning modes.

  - nView Desktop Manager

    A control panel and desktop management engine for application window management and extension of functions, and support for multiple desktops.

- Dualview support for Windows 2000
- Improved DirectX Video Acceleration (DXVA)
- Special support for NVIDIA NV25 capabilities
  - IDCT support for DirectX VA
  - Improved antialiasing compatibility and performance
  - Support for NV25 hardware overlays under OpenGL
- Enhanced 3D stereo functionality
  - Support for lenticular lenses on LCDs
  - Stereo DIN connector support
  - VSYNC Off with 3D Stereo
  - Stereo API for developers
- OpenGL enhancement
  - New `render_to_texture` extension

Release 20 Enhancements

The Release 20 driver offers new features not found in previous releases of the NVIDIA Driver for Windows.

- OpenGL 1.3 ICD with NVIDIA extensions
- OpenGL performance optimizations
- Optimized DirectX pipeline with NVIDIA pixel and vertex shaders
- Full support for Windows XP, including
  - Full hardware acceleration for Windows XP GUI features
  - Accelerated Windows XP 3D performance through the NVIDIA XPress Link technology

Release 10 Enhancements

The Release 10 driver offers new features not found in previous releases of the NVIDIA Driver for Windows.

- Support for Microsoft DirectX 8
- Support for Microsoft DirectX VA 1.0
- NVIDIA 3D Stereo (requires installation of the optional Stereoscopic driver)

  The driver provides stereoscopic viewing capabilities for games and still images.
- Special support for NVIDIA GeForce3 capabilities:
  - Pixel and Vertex Shader support for DirectX 8 and OpenGL®
  - Quincunx antialiasing option for enhanced image quality and performance
- AMD® Athlon™ Processor and Intel Pentium® 4 Processor optimizations
- Improved TwinView™ interface

APPENDIX

A

MODE SUPPORT FOR WINDOWS

This chapter details the Windows modes supported by the Release 90 driver for NVIDIA products. It contains these sections:

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 55.

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

Display	Maximum Resolution	Hardware Requirements
IBM T221 (Dual Link DVI)	3840x2400 @ 48Hz	• All High-end NVIDIA Quadro FX (see list of products in "NVIDIA Quadro FX Family of High End GPUs" on page 56.)
Apple 30" Cinema HD Display (Dual link DVI)	2560x1600 @ 60Hz	• All High-end NVIDIA Quadro FX (see list of products in "NVIDIA Quadro FX Family of High End GPUs" on page 56.) •

Table A.2 Non-standard Modes Supported

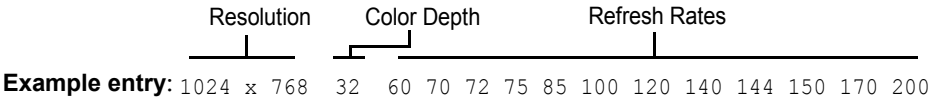
Resolution
1680 x 1050
1366 x 768

Default Modes Supported by GPU

This section lists the modes that are included by default in the driver INF for the supported products.

Understanding the Mode Format

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



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

Figure A.1 Mode Format

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.
-

NVIDIA Quadro FX Family of High End GPUs

This sections lists the supported display resolutions, color depths, and refresh rates for the following products:

- NVIDIA Quadro FX 5500
- NVIDIA Quadro FX 4500 X2
- NVIDIA Quadro FX 4500

Standard Modes

```
 320 x  200   8          60    70 72 75
 320 x  240   8          60    70 72 75
 400 x  300   8          60    70 72 75
 480 x  360   8          60    70 72 75
 512 x  384   8          60    70 72 75
 640 x  400   8          60    70 72 75
 640 x  480   8          60    70 72 75 85 100 120 140 144 150 170 200 240
 720 x  480   8          60
 720 x  576   8          60
 800 x  600   8       50 60    70 72 75 85 100 120 140 144 150 170 200 240
 848 x  480   8          60    70 72 75 85 100 120 140 144 150 170 200 240
 960 x  600   8          60    70 72 75 85 100 120 140 144 150 170 200 240
 960 x 1200   8             61
1024 x  768   8       50 60    70 72 75 85 100 120 140 144 150 170 200 240
1088 x  612   8          60    70 72 75 85 100 120 140 144 150 170 200 240
1152 x  864   8          60    70 72 75 85 100 120 140 144 150 170 200
1280 x  720   8          60    70 72 75 85 100 120 140 144 150 170
1280 x  768   8          60    70 72 75 85 100 120 140 144 150 170
1280 x  800   8          60    70 72 75 85 100 120 140 144 150 170
1280 x  960   8          60    70 72 75 85 100 120 140 144 150 170
1280 x 1024   8       50 60    70 72 75 85 100 120 140 144 150 170
1360 x  768   8          60    70 72 75 85 100 120 140 144 150 170
1600 x  900   8          60    70 72 75 85 100 120 140 144 150
1600 x 1024   8          60    70 72 75 85 100 120
1600 x 1200   8       50 60    70 72 75 85 100 120
1920 x 1080   8   30i    60    70 72 75 85 100
1920 x 1154   8       50
1920 x 1200   8       50 60    70 72 75 85 100
1920 x 1440   8          60    70 72 75 85
```

```
2048 x 1536   8          60    70 72 75 85
-------------------------------------------------------------------
 320 x  200  16          60    70 72 75
 320 x  240  16          60    70 72 75
 400 x  300  16          60    70 72 75
 480 x  360  16          60    70 72 75
 512 x  384  16          60    70 72 75
 640 x  400  16          60    70 72 75
 640 x  480  16          60    70 72 75 85 100 120 140 144 150 170 200 240
 720 x  480  16          60
 720 x  576  16          60
 800 x  600  16       50 60    70 72 75 85 100 120 140 144 150 170 200 240
 848 x  480  16          60    70 72 75 85 100 120 140 144 150 170 200 240
 960 x  600  16          60    70 72 75 85 100 120 140 144 150 170 200 240
 960 x 1200  16             61
1024 x  768  16       50 60    70 72 75 85 100 120 140 144 150 170 200 240
1088 x  612  16          60    70 72 75 85 100 120 140 144 150 170 200 240
1152 x  864  16          60    70 72 75 85 100 120 140 144 150 170 200
1280 x  720  16          60    70 72 75 85 100 120 140 144 150 170
1280 x  768  16          60    70 72 75 85 100 120 140 144 150 170
1280 x  800  16          60    70 72 75 85 100 120 140 144 150 170
1280 x  960  16          60    70 72 75 85 100 120 140 144 150 170
1280 x 1024  16       50 60    70 72 75 85 100 120 140 144 150 170
1360 x  768  16          60    70 72 75 85 100 120 140 144 150 170
1600 x  900  16          60    70 72 75 85 100 120 140 144 150
1600 x 1024  16          60    70 72 75 85 100 120
1600 x 1200  16       50 60    70 72 75 85 100 120
1920 x 1080  16   30i    60    70 72 75 85 100
1920 x 1154  16       50
1920 x 1200  16       50 60    70 72 75 85 100
1920 x 1440  16          60    70 72 75 85
2048 x 1536  16          60    70 72 75 85
-------------------------------------------------------------------
 320 x  200  32          60    70 72 75
 320 x  240  32          60    70 72 75
 400 x  300  32          60    70 72 75
 480 x  360  32          60    70 72 75
 512 x  384  32          60    70 72 75
 640 x  400  32          60    70 72 75
```

```
 640 x  480  32          60    70 72 75 85 100 120 140 144 150 170 200 240
 720 x  480  32          60
 720 x  576  32          60
 800 x  600  32       50 60    70 72 75 85 100 120 140 144 150 170 200 240
 848 x  480  32          60    70 72 75 85 100 120 140 144 150 170 200 240
 960 x  600  32          60    70 72 75 85 100 120 140 144 150 170 200 240
 960 x 1200  32             61
1024 x  768  32       50 60    70 72 75 85 100 120 140 144 150 170 200
1088 x  612  32          60    70 72 75 85 100 120 140 144 150 170 200
1152 x  864  32          60    70 72 75 85 100 120 140 144 150 170
1280 x  720  32          60    70 72 75 85 100 120 140 144 150
1280 x  768  32          60    70 72 75 85 100 120 140 144 150
1280 x  800  32          60    70 72 75 85 100 120 140 144 150
1280 x  960  32          60    70 72 75 85 100 120 140 144 150
1280 x 1024  32       50 60    70 72 75 85 100 120 140 144 150
1360 x  768  32          60    70 72 75 85 100 120 140 144 150
1600 x  900  32          60    70 72 75 85 100 120
1600 x 1024  32          60    70 72 75 85 100
1600 x 1200  32       50 60    70 72 75 85 100
1920 x 1080  32   30i    60    70 72 75 85
1920 x 1154  32       50
1920 x 1200  32       50 60    70 72 75 85
1920 x 1440  32          60    70 72 75 85
2048 x 1536  32          60    70 72 75 85
```

Horizontal Spanning Modes

```
1280 x  480   8          60    70 72 75 85 100 120 140 144 150 170 200 240
1600 x  600   8       50 60    70 72 75 85 100 120 140 144 150 170 200 240
1696 x  480   8          60    70 72 75 85 100 120 140 144 150 170 200 240
1920 x  600   8          60    70 72 75 85 100 120 140 144 150 170 200 240
1920 x 1200   8             61
2048 x  768   8       50 60    70 72 75 85 100 120 140 144 150 170 200 240
2176 x  612   8          60    70 72 75 85 100 120 140 144 150 170 200 240
2304 x  864   8          60    70 72 75 85 100 120 140 144 150 170 200
2560 x  720   8          60    70 72 75 85 100 120 140 144 150 170
2560 x  768   8          60    70 72 75 85 100 120 140 144 150 170
2560 x  800   8          60    70 72 75 85 100 120 140 144 150 170
```

```
2560 x  960   8          60    70 72 75 85 100 120 140 144 150 170
2560 x 1024   8       50 60    70 72 75 85 100 120 140 144 150 170
2720 x  768   8          60    70 72 75 85 100 120 140 144 150 170
3200 x  900   8          60    70 72 75 85 100 120 140 144 150
3200 x 1024   8          60    70 72 75 85 100 120
3200 x 1200   8       50 60    70 72 75 85 100 120
3840 x 1080   8   30i    60    70 72 75 85 100
3840 x 1154   8       50
3840 x 1200   8       50 60    70 72 75 85 100
3840 x 1440   8          60    70 72 75 85
4096 x 1536   8          60    70 72 75 85
------------------------------------------------------------------
1280 x  480  16          60    70 72 75 85 100 120 140 144 150 170 200 240
1600 x  600  16       50 60    70 72 75 85 100 120 140 144 150 170 200 240
1696 x  480  16          60    70 72 75 85 100 120 140 144 150 170 200 240
1920 x  600  16          60    70 72 75 85 100 120 140 144 150 170 200 240
1920 x 1200  16             61
2048 x  768  16       50 60    70 72 75 85 100 120 140 144 150 170 200 240
2176 x  612  16          60    70 72 75 85 100 120 140 144 150 170 200 240
2304 x  864  16          60    70 72 75 85 100 120 140 144 150 170 200
2560 x  720  16          60    70 72 75 85 100 120 140 144 150 170
2560 x  768  16          60    70 72 75 85 100 120 140 144 150 170
2560 x  800  16          60    70 72 75 85 100 120 140 144 150 170
2560 x  960  16          60    70 72 75 85 100 120 140 144 150 170
2560 x 1024  16       50 60    70 72 75 85 100 120 140 144 150 170
2720 x  768  16          60    70 72 75 85 100 120 140 144 150 170
3200 x  900  16          60    70 72 75 85 100 120 140 144 150
3200 x 1024  16          60    70 72 75 85 100 120
3200 x 1200  16       50 60    70 72 75 85 100 120
3840 x 1080  16   30i    60    70 72 75 85 100
3840 x 1154  16       50
3840 x 1200  16       50 60    70 72 75 85 100
3840 x 1440  16          60    70 72 75 85
4096 x 1536  16          60    70 72 75 85
------------------------------------------------------------------
1280 x  480  32          60    70 72 75 85 100 120 140 144 150 170 200 240
1600 x  600  32       50 60    70 72 75 85 100 120 140 144 150 170 200 240
1696 x  480  32          60    70 72 75 85 100 120 140 144 150 170 200 240
1920 x  600  32          60    70 72 75 85 100 120 140 144 150 170 200 240
```

1920 x 1200	32			61										
2048 x 768	32		50	60	70	72	75	85	100	120	140	144	150	170	200
2176 x 612	32			60	70	72	75	85	100	120	140	144	150	170	200
2304 x 864	32			60	70	72	75	85	100	120	140	144	150	170	
2560 x 720	32			60	70	72	75	85	100	120	140	144	150		
2560 x 768	32			60	70	72	75	85	100	120	140	144	150		
2560 x 800	32			60	70	72	75	85	100	120	140	144	150		
2560 x 960	32			60	70	72	75	85	100	120	140	144	150		
2560 x 1024	32		50	60	70	72	75	85	100	120	140	144	150		
2720 x 768	32			60	70	72	75	85	100	120	140	144	150		
3200 x 900	32			60	70	72	75	85	100	120					
3200 x 1024	32			60	70	72	75	85	100						
3200 x 1200	32		50	60	70	72	75	85	100						
3840 x 1080	32	30i		60	70	72	75	85							
3840 x 1154	32		50												
3840 x 1200	32		50	60	70	72	75	85							
3840 x 1440	32			60	70	72	75	85							
4096 x 1536	32			60	70	72	75	85							

Vertical Spanning Modes

640 x 960	8			60	70	72	75	85	100	120	140	144	150	170	200	240
800 x 1200	8		50	60	70	72	75	85	100	120	140	144	150	170	200	240
848 x 960	8			60	70	72	75	85	100	120	140	144	150	170	200	240
960 x 1200	8			60	70	72	75	85	100	120	140	144	150	170	200	240
1024 x 1536	8		50	60	70	72	75	85	100	120	140	144	150	170	200	240
1088 x 1224	8			60	70	72	75	85	100	120	140	144	150	170	200	240
1152 x 1728	8			60	70	72	75	85	100	120	140	144	150	170	200	
1280 x 1440	8			60	70	72	75	85	100	120	140	144	150	170		
1280 x 1536	8			60	70	72	75	85	100	120	140	144	150	170		
1280 x 1600	8			60	70	72	75	85	100	120	140	144	150	170		
1280 x 1920	8			60	70	72	75	85	100	120	140	144	150	170		
1280 x 2048	8		50	60	70	72	75	85	100	120	140	144	150	170		
1360 x 1536	8			60	70	72	75	85	100	120	140	144	150	170		
1600 x 1800	8			60	70	72	75	85	100	120	140	144	150			
1600 x 2048	8			60	70	72	75	85	100	120						
1600 x 2400	8		50	60	70	72	75	85	100	120						
1920 x 2160	8	30i		60	70	72	75	85	100							

```
1920 x 2308   8        50
1920 x 2400   8        50 60    70 72 75 85 100
1920 x 2880   8           60    70 72 75 85
2048 x 3072   8           60    70 72 75 85
-------------------------------------------------------------------
 640 x  960  16           60    70 72 75 85 100 120 140 144 150 170 200 240
 800 x 1200  16        50 60    70 72 75 85 100 120 140 144 150 170 200 240
 848 x  960  16           60    70 72 75 85 100 120 140 144 150 170 200 240
 960 x 1200  16           60    70 72 75 85 100 120 140 144 150 170 200 240
1024 x 1536  16        50 60    70 72 75 85 100 120 140 144 150 170 200 240
1088 x 1224  16           60    70 72 75 85 100 120 140 144 150 170 200 240
1152 x 1728  16           60    70 72 75 85 100 120 140 144 150 170 200
1280 x 1440  16           60    70 72 75 85 100 120 140 144 150 170
1280 x 1536  16           60    70 72 75 85 100 120 140 144 150 170
1280 x 1600  16           60    70 72 75 85 100 120 140 144 150 170
1280 x 1920  16           60    70 72 75 85 100 120 140 144 150 170
1280 x 2048  16        50 60    70 72 75 85 100 120 140 144 150 170
1360 x 1536  16           60    70 72 75 85 100 120 140 144 150 170
1600 x 1800  16           60    70 72 75 85 100 120 140 144 150
1600 x 2048  16           60    70 72 75 85 100 120
1600 x 2400  16        50 60    70 72 75 85 100 120
1920 x 2160  16   30i     60    70 72 75 85 100
1920 x 2308  16        50
1920 x 2400  16        50 60    70 72 75 85 100
1920 x 2880  16           60    70 72 75 85
2048 x 3072  16           60    70 72 75 85
-------------------------------------------------------------------
 640 x  960  32           60    70 72 75 85 100 120 140 144 150 170 200 240
 800 x 1200  32        50 60    70 72 75 85 100 120 140 144 150 170 200 240
 848 x  960  32           60    70 72 75 85 100 120 140 144 150 170 200 240
 960 x 1200  32           60    70 72 75 85 100 120 140 144 150 170 200 240
1024 x 1536  32        50 60    70 72 75 85 100 120 140 144 150 170 200
1088 x 1224  32           60    70 72 75 85 100 120 140 144 150 170 200
1152 x 1728  32           60    70 72 75 85 100 120 140 144 150 170
1280 x 1440  32           60    70 72 75 85 100 120 140 144 150
1280 x 1536  32           60    70 72 75 85 100 120 140 144 150
1280 x 1600  32           60    70 72 75 85 100 120 140 144 150
1280 x 1920  32           60    70 72 75 85 100 120 140 144 150
1280 x 2048  32        50 60    70 72 75 85 100 120 140 144 150
```

1360 x 1536	32		60	70 72 75 85 100 120 140 144 150
1600 x 1800	32		60	70 72 75 85 100 120
1600 x 2048	32		60	70 72 75 85 100
1600 x 2400	32		50 60	70 72 75 85 100
1920 x 2160	32	30i	60	70 72 75 85
1920 x 2308	32		50	
1920 x 2400	32		50 60	70 72 75 85
1920 x 2880	32		60	70 72 75 85
2048 x 3072	32		60	70 72 75 85

Modes Supported by DACs and TV Encoders

This section listes the supported modes and formats for the following:

External DAC Mode Support

Fairchild FMS3815 Modes Supported

Table A.3 shows the refresh rates for various resolutions of the Fairchild FMS3815 external DAC, which is commonly used on GeForce2 MX and Quadro2 MXR boards to drive a secondary CRT.

Table A.3 External DAC Modes (Fairchild FMS3815)

Resolution	Supported Rates (Hz)
640x480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
800x600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
1024x768	60, 70, 72, 75, 85, 100, 120
1152x864	60, 70, 72, 75, 85
1280x720	60, 70, 72, 75, 85, 100
1280x960	60, 70, 72, 75
1280x1024	60, 70, 72, 75
1360x768	60, 70, 72, 75, 85
1600x900	60, 70
1600x1200	—

Analog Devices ADV-7123 Modes Supported

Table A.4 shows the refresh rates for various resolutions of the Analog Devices ADV-7123 external DAC, which is commonly used on the GeForce2 MX and the Quadro2 MXR boards to drive a secondary CRT.

Table A.4 External DAC Modes (Analog Devices ADV-7123)

Resolution	Supported Rates (Hz)
640x480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
800x600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
1024x768	60, 70, 72, 75, 85, 100, 120
1152x864	60, 70, 72, 75, 85, 100
1280x720	60, 70, 72, 75, 85, 100
1280x960	60, 70, 72, 75, 85, 90

Table A.4 External DAC Modes (Analog Devices ADV-7123) (continued)

Resolution	Supported Rates (Hz)
1280x1024	60, 70, 72, 75, 85
1360x768	60, 70, 72, 75, 85, 100
1600x900	60, 70, 75
1600x1200	—

TV-Out Mode Support

Table A.5 and Table A.6 list the NTSC, PAL, and HDTV TV-Out modes supported by the NVIDIA driver.

Table A.5 Mode Support for S-Video and Composite Out

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

Table A.6 Mode Support for Component YPrPb Out and DVI Out

Resolution	Comments
480i (SDTV)	Supported on graphics boards with Conexant 875 or Philips 7108 TV encoders and compatible connectors, and compatible GeForce 6 Series and GeForce 7 Series GPUs.
480p (EDTV)	
720p (HDTV)	
1080i (HDTV)	
576i (PAL)	
576p (PAL)	

The driver supports manual overscan correction for component and DVI outputs. See the *ForceWare Graphics Driver User's Guide* for instructions on how to use the overscan correction features in the control panel.