ForceWare Graphics Drivers
Release 75 Notes

Version 78.01

For Windows XP / 2000
Windows XP Media Center Edition
Windows 98 / ME
Windows NT 4.0

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CHAPTER 1

INTRODUCTION TO *RELEASE 75 NOTES*

This edition of *Release 75 Notes* describes the Release 75 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 75 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 75 Driver" on page 31 describes the NVIDIA products and languages supported by this driver, the system requirements, and how to install the driver.
- "NVIDIA Driver History" on page 41 describes the new features included in the Release 75 driver as well as information on previous driver releases.
- "Mode Support for Windows" on page 61

Changes in this Edition

This edition of *Release 75 Notes* includes information about version 78.01 of the Release 75 driver. It discusses changes made to the driver since version 71.89. These changes are discussed beginning with the chapter "Release 75 Driver Issues" on page 2.

CHAPTER 2

RELEASE 75 DRIVER ISSUES

This chapter describes open issues for version 78.01, and resolved issues and driver enhancements for versions of the Release 75 driver up to version 78.01. The chapter contains these sections:

- "Changes in Version 78.01" on page 3
- "Issues Resolved in Version 77.77" on page 3
- "Issues Resolved in Version 77.76" on page 4
- "Issues Resolved in Version 77.72" on page 6
- "Open Issues in Version 78.01" on page 8
- "Known Product Limitations" on page 17

Changes in Version 78.01

This following are changes made and issues resolved since driver version 77.77:

- Added support for GeForce 6500

Issues Resolved in Version 77.77

This following are changes made and issues resolved since driver version 77.76:

- GeForce 7800 GTX, SLI: Using Half-Life 2's screen capture function causes the screen to jitter within the game.

  The problem would disappear if you reloaded the save point or changed video settings to cause a video restart.

- GeForce 7800 GTX, SLI : Using the built-in screenshot function of third party applications may cause errors.

  This was seen in FRAPS and Hypersnap.

- GeForce 7800 GTX, SLI : SLI AA does not work with Half-Life 2

Issues Resolved in Version 77.76

This following are changes made and issues resolved since driver version 77.72:

Single GPU Issues

- GeForce 7800 GTX: At extremely cold temperatures (less than -10 degrees C), the GPU clock speed enters “high temperature” slowdown mode.
- GeForce 7800 GTX, Windows XP: Enabling gamma-correct antialiasing causes poor perfomance in Far Cry.
- GeForce 7800 GTX, Windows XP: When playing Half-Life 2 with Transparency Antialiasing set to supersampled, the grate texture is too bright.
- GeForce 7800 GTX, Windows XP: When playing Battlefield 2 with Transparency Antialiasing set to supersampled, the fences are not rendered.
- GeForce 6800/6800GT/6800 Ultra, GeForce FX 5700/5600, Windows XP, Windows XP Professional x64: NVIDIA Overlay gamma controls under Standard mode do not work properly, resulting in overly dark or overly bright video.
- GeForce 6800/6600, GeForce FX 5700/5600, Windows XP: Half-Life 2 does not render properly when antialiasing is enabled from the NVIDIA control panel.
- GeForce 6800 Ultra, Windows XP: The wave splash particle effect in the game Silent Hunter 3 does not render correctly.
- GeForce FX series, Windows XP: In the game Halo, tank cannon projectile trails fail to render and smoke clouds either fail to render or flicker.
- GeForce 5950/5900/5700, Windows XP MCE 2005: DivX files show corruption when played with MCE.

SLI Related Issues

- GeForce 780 GTX, SLI, Windows XP: There is no video when playing WMV9 high-definition content with SLI.
- GeForce 7800 GTX, GeForce 6800 Ultra, SLI, Windows XP: There is a Z-fighting/texture loss in EverQuest II when using the extreme quality level.
- GeForce 7800 GTX / GeForce 6800 Ultra, SLI, Windows XP: Adding five new application profiles may cause a memory overflow and cause some applications to crash, such as Splinter Cell 3.
- GeForce 7800 GTX, SLI, Windows XP: When disabling the "overclocking" feature, the GPU performance speeds become artificially low.
- GeForce 6600, SLI, Windows XP: Flickering occurs below the split line in the game Far Cry when 3D stereo is activated.
- GeForce 6600 GT, SLI, Windows XP: Textures flicker in the game Everquest II if antialiasing or anisotropic filtering is enabled within the NVIDIA Control Panel. The issue does not occur if using application controlled antialiasing and anisotropic filtering.
- GeForce 6600, SLI, Windows XP: Corruption occurs in the game Rome Total War during loads if when the NVIDIA Control Panel is used to enable 2x antialiasing and anisotropic filtering is set to application controlled or off.

General Issues

- All GPUs: Fixed a memory allocation issue that caused general instability in a variety of games.

Issues Resolved in Version 77.72

This following are changes made and issues resolved since driver version 71.89:

Single GPU Issues

- GeForce 6 Series: Stuttering occurs in different portions of the game EverQuest2.
- GeForce 6800 Ultra, Windows XP: The opening videos are corrupted in the game Silent Hunter 3.
- GeForce 6800: Slow performance in the game Star Wars Lego when played at a resolution of 1600x12200.
- GeForce 6800 Ultra: Stuttering occurs in the game World of Warcraft.
- GeForce 6800: White flashing appears across the screen in the game Joint Operations—Typhoon Rising.
- GeForce 6200 32MB with TurboCache, Windows XP Media Center Edition 2005, HDTV: Setting HD modes, such as 720p or 1080i, does not take effect until after you restart the computer.
- GeForce 6200 with TurboCache, Windows XP: The left side of Half Life 2 is blacked out when 2x or 4x antialiasing is enabled.
- GeForce 6200: There is screen corruption when antialiasing is enabled within 3DMark05.
- GeForce FX 5900 Ultra, Windows XP Media Center Edition 2005, NVTV: Live TV hangs the system when run in full screen mode.
- GeForce FX 5950: The game Ultra Battle for Middle-earth crashes to the desktop with a Direct3D error.
- GeForce FX 5200: There is corruption on the water in the 3DMark05 Canyon Flight Game test.

SLI Related Issues

- GeForce 6800 GT/Ultra, SLI: Half Life 2 crashes when switching the aspect ratio from 4:3 to wide-screen on a wide-screen LCD panel.
- GeForce 6800 GT, SLI: Flickering corruption occurs with several games when played with 2x antialiasing enabled and using SLI SFR mode.
- GeForce 6800 Ultra, SLI: The computer crashes when setting a widescreen flat panel resolution to the native 1900x1200 with SLI mode enabled.
- Dual GeForce 6600 GT, SLI, Windows XP: There is texture corruption in the game Toca Race Driver 2 when played at 1600x1200 resolution, with 4x antialiasing and SLI mode enabled.
- GeForce 6600 GT, SLI, Windows XP: Frame skipping occurs in the game PainKiller with SLI mode enabled.
- GeForce 6600, SLI: Screen goes black momentarily during Tomb Raider—Angel of Darkness with SLI mode enabled.
- GeForce 6 Series, SLI, Windows XP: Light sources show through solid objects in the game Halo with SLI mode enabled.
- Quadro FX 4400, SLI, Windows XP: There is corruption in the Splinter Cell: Chaos Theory menu when changing video options.

General Issues

- Desktop corruption occurs with VIA KT880 chipset.

  This was not an NVIDIA bug. See "VIA and ATI AGP 3.0 Chipsets" on page 18 *for further explanation.*

Open Issues in Version 78.01

As with every released driver, version 78.01 of the Release 75 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" on page 8
- "NVIDIA Issues—Single GPU" on page 9
- "NVIDIA Issues—SLI" on page 11
- "Not NVIDIA Issues—Single GPU" on page 13
- "Not NVIDIA Issues—SLI" on page 16

NVIDIA Recommendations

- The GeForce 6800 Ultra 512MB works in single card mode with Apple 30 inch HD Cinema panel. However, an issue has been discovered when running the GeForce 6800 Ultra 512MB card in SLI mode with an Apple 30 inch HD Cinema display. This is due to an interaction between the GPU, the application, and the ability to scale to nonnative panel resolutions of the Apple display.

  All GeForce 6 series GPUs will work with Apple 23 and 20 inch HD Cinema displays in single GPU mode.

  NVIDIA recommends using the GeForce 6800 Ultra 512MB with the Apple 30 inch HD Cinema Display line only in non-SLI modes.

- 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

- NVIDIA Control Panel: Some application profile settings do not override the global settings.

  To make sure that a setting will work for your application, change the settings using the global profiles.

GeForce 7 Series

- GeForce 7800 GTX, Windows XP: When changing to a resolution higher than 1024x768 in Need for Speed Underground 2 on a 1920x1200 widescreen flat panel, the application attempts to select the next resolution it has above 1024x768, which is 1280x960 and not supported by most flat panels.

  A known workaround is to manually add the mode 1280x960 from NVIDIA's Custom Timings control panel and then continue to select the resolution needed.

- GeForce 7800 GTX, Windows XP: The desktop becomes shaky when changing the resolution to 1920x1080 on a Viewsonic VP231wb.

- GeForce 7800 GTX Windows XP MCE 2005: Some artifacts appear when de-interlacing is enabled on 1920x1080i video clips.

- GeForce 7800 GTX, Windows XP MCE 2005: NVIDIA PureVideo Decoder inverse telecine does not work correctly in 480p and 1080i output mode.

- GeForce 7800 GTX, Windows XP MCE 2005: Changing the video acceleration while using Windows Media Player 10 to play "PBS - Omaha Zoo RR.mpg" crashes the application.

GeForce 6 Series

- GeForce 6 Series/GeForce FX Series, AGP, Windows XP: Audio sync problems occur playing WMV9 files using Windows Media Player 10 with the Microsoft patch for DirectX VA WMV9 acceleration.

  The problem occurs only in VMR mode and not in overlay mode.

- GeForce 6 Series, Windows XP: Some animated characters in World of Warcraft have black or missing textures.
- GeForce 6800: Shadow corruption occurs in the game Lineage II.
- GeForce 6600 (128 MB): The game Hitman—Contracts refuses to start with graphics options set to the maximum (1600x1200, 4x antialiasing, 16x anisotropic filtering).
- GeForce 6600, Windows XP: De-interlacing issue when playing The Big Lobowski DVD.
- GeForce 6200 with TurboCache (16 MB), Windows XP: Everquest 2 crashes or hangs when run at 1600x1200.
- GeForce 6200 with TurboCache, Windows XP: Unreal Tournament 2004 has intermittent grayed-out screen with antialiasing enabled.
- GeForce 6200 with TurboCache, Windows Media Center 2005: After switching DVD playback to full-screen mode, the screen turns blank and then the desktop corrupts when returning to windowed mode.
- GeForce 6200 with TurboCache (16MB): The system crashes when resizing applications.
- GeForce 6200 with TurboCache (16MB), Windows XP Media Center Edition 2005: Full-screen video mirroring is not supported.

GeForce FX Series

- GeForce 6 Series/GeForce FX Series, AGP, Windows XP: Audio sync problems occur playing WMV9 files using Windows Media Player 10 with the Microsoft patch for DirectX VA WMV9 acceleration.

  The problem occurs only in VMR mode and not in overlay mode.

- GeForce FX 5950: Ultra Age of Mythology has screen flicker with certain special effects.

- GeForce FX 5200: There is corruption in the Far Cry heads up displays.
- GeForce FX 5200 Ultra, Windows Media Center Edition 2005, NVTV: Live TV hangs when running in DualView mode with Video Mirror enabled.

NVIDIA Issues—SLI

- GeForce products, SLI: With SLI AA rendering enabled, there is corruption while the flight-loading dialog box is opened in Flight Sim 2004.

GeForce 7 Series

- GeForce 7 Series, GeForce 6 Series, SLI: Turning on Gamma Corrected AA disables SLI 8x AA and causes the display to fall back to 4x AA.

  It is recommended to run SLI AA with Gamma Corrected AA disabled for proper operation.

- GeForce 7800 GTX, SLI:The PrintScreen function does not capture 8xS AA, 8x SLI AA, and 16xS SLI AA correctly in Half-Life 2
- GeForce 7800 GTX, SLI, Windows XP: Using the option "Detect Optimal Frequencies" under the 3D Performance setting could result in a system crash.

  It is recommended that you use manual overclocking when running SLI. This issue does not occur with SLI disabled or in single GPU mode.

- GeForce 7800 GTX, SLI, Windows XP: The NVIDIA Control Panel overclocking test fails intermittently at any frequency above the default while in SLI mode.

  It is recommended that you use manual overclocking when running SLI. This issue does not occur with SLI disabled or in single GPU mode.

- GeForce 7800 GTX, SLI, Windows XP: The computer crashes intermittently when changing the desktop resolution to 1920x1080 on a Viewsonic VP231wb.
- GeForce 7800 GTX, GeForce 6800/6600/6200, SLI, Windows XP: Introduction videos do not render in Tiger Woods 2005 in AFR mode.

GeForce 6 Series

- GeForce 6800, Windows XP, SLI: There is a large performance drop in Far Cry when 8x SLI antialiasing is enabled, compared to 4x antialiasing.
- GeForce 7 Series, GeForce 6 Series, SLI: Turning on Gamma Corrected AA disables SLI 8x AA and causes the display to fall back to 4x AA.

  It is recommended to run SLI AA with Gamma Corrected AA disabled for proper operation.
- GeForce 6600, Windows XP, SLI: The system occasionally hangs when playing Everquest 2.
- GeForce 6600, Windows XP, SLI: When the quality level is set to Exteme Quality, EverQuest 2 does not render correctly with 4x antialiasing enabled at 1600x1200.

  The problem does not occur at any other resolution, or with 2x antialiasing enabled, or when a lower quality level is set in the game.
- Quadro FX 3400, SLI: With SLI AA rendering enabled, there is poor performance and occasional system hang with OpenGL applications.
- GeForce 6800 Ultra, SLI: Apple 30 inch display does not run with 512 MB graphics boards in SLI mode. You must switch to single GPU mode to work.
- GeForce 6600, SLI, Windows XP: Gameplay and menu performance drops when running Kohan 2: Kings of War in SLI mode with 4x antialiasing enabled.
- GeForce 6600, SLI, Windows XP: Lock On: Modern Air Combat has lower than expected performance at high resolutions with antialiasing enabled.
- GeForce 6600, SLI, Windows XP: Corruption occurs in the game Painkiller when setting the resolution to wide screen formats.
- GeForce 6600, SLI, Windows XP: The entire display blacks out briefly when attempting to bring up the NVIDIA Control Panel.
- GeForce 6600, SLI: Corruption occurs in the game Painkiller when setting the resolution to widescreen formats.

Not NVIDIA Issues—Single GPU

GeForce 7 Series

- GeForce 7800 GTX / GeForce 6 Series: The Chronicles of Riddick: Escape from Butcher Bay does not run under OpenGL.

  This issue is resolved by downloading and installing the game's 1.1 patch available at http://www.vugames.com/file_list.do?gamePlatformId=1839. This problem occurs as a result of the application checking the NVIDIA OpenGL driver for a version 1.5 instead of 2.0.

- GeForce 7800 GTX, GeForce 6800/6800 Ultra, GeForce 6600 GT: Explosion effects in the game Pariah result in full-screen corruption.

  *This is an issue with the application. To work around the issue, set the variable **`HasNvidiaTexM32Tex`** in the file **`pariah.ini`** to (1). ((0) is the default.)*

GeForce 6 Series

- GeForce 7800 GTX, GeForce 6800/6800 Ultra, GeForce 6600 GT: Explosion effects in the game Pariah result in full-screen corruption.

  *This is an issue with the application. To work around the issue, set the variable **`HasNvidiaTexM32Tex`** in the file **`pariah.ini`** to (1). ((0) is the default.)*

- GeForce 6200 (16MB/32MB): Game-loading errors occur with Tomb Raider Angel of Darkness.

  This is an issue with the application. You can work around this issue by switching off the video using the command line switch "`-no_fmv`".

- GeForce FX 5600 Ultra, GeForce 6600: There is intermittent corruption on the first warning screen of some DVD titles.

  A patch for this issue is available from Microsoft.

- GeForce 6 Series: Stuttering occurs in the game EverQuest II.

  NVIDIA has optimized performance in the 77.72 drivers to reduce stuttering related to the GPU and drivers. However, in-game stuttering can still occur as the result of the following system conditions:

  - Using high-quality/maximum-visual game settings on a PC with less than 1.5 GB of system memory—EverQuest II's highest quality settings are extremely hardware intensive (graphics, memory, and CPU).
  - Misconfigured AGP aperture settings and fragmented hard disks can also contribute to in-game stuttering.

- GeForce 6800 Ultra, Windows XP: Movies are choppy in Prince of Persia Warrior Within. However, gameplay is not affected.

  This is not an NVIDIA bug, but rather an issue with the application.

- GeForce 6 Series, Windows XP: There is no difference in lighting after turning the flashlight on and off a few times in Half-Life 2, resulting in darkness even with the flashlight on.

  This is not an NVIDIA bug, but rather an issue with the application.

- Geforce 6800: Half-Life 2 fog is different when using ATI hardware.

  This is not an NVIDIA bug, but rather an issue with the application.

- GeForce 6800: Aspect ratio is incorrect when movie transitions from 4:3 to 16:9 playback using PowerDVD5 Trail (download from the Cyberlink Web site).

  This is an application issue, and does not occur with other DVD players.

- GeForce 6600/6800 (128MB): 3D Mark 2003 demo mode results in an out of memory error at 1600x1200x32 with 4x antialiasing enabled.

  This is not a bug. The problem occurs because there is not enough memory to run 3D Mark03 in this mode with a 128MB board.

- GeForce 6200 with TurboCache (16MB): A Direct3D out-of-memory error occurs in Unreal Tournament 2003 when using the HardOCP Benchmark Utility version 2.1.

  This is not an NVIDIA bug.

- GeForce 6600: Artifacts appear in the introduction videos and during game play in Tomb Raider: Angel of Darkness at 1600x1200 and with 4x antialiasing enabled.

  This is not an NVIDIA bug.

GeForce FX Series

- GeForce FX 5600 Ultra, GeForce 6600: There is intermittent corruption on the first warning screen of some DVD titles.

  A patch for this issue is available from Microsoft.

- GeForce FX Series: Stuttering occurs in the game EverQuest II.

  NVIDIA has optimized performance in the 77.72 drivers to reduce stuttering related to the GPU and drivers. However, in-game stuttering can still occur as the result of the following system conditions:

  - Using high-quality/maximum-visual game settings on a PC with less than 1.5 GB of system memory

    EverQuest II's highest quality settings are extremely hardware intensive (graphics, memory, and CPU).

  - Misconfigured AGP aperture settings and fragmented hard disks can also contribute to in-game stuttering.

- GeForce FX 5950 Ultra, Windows ME: CodeCult benchmark does not run properly.

  This is not an NVIDIA bug.

- Windows XP, GeForce FX 5950 Ultra: Homeworld2 antialiased performance is slow.

  This is not an NVIDIA bug, but is a known issue with the application. A game patch 1.1 is available at ftp://ftp.sierra.com/pub/sierra/homeworld2/updates/homeworld2_update_en_10_11.exe .

- GeForce FX, Windows ME: Gunmetal Demo introduction movie does not display properly.

  This is not an NVIDIA bug.

GeForce2 and GeForce4

- GeForce2, GeForce4 MX, Windows XP: City of Heroes crashes to the desktop intermittently.

  This is not an NVIDIA bug.

Not NVIDIA Issues—SLI

- GeForce 6800/6600 GT: Slow performance with World of Warcraft in SLI mode.

  This is not an NVIDIA bug, but instead the result of a recent patch for World of Warcraft to reduce mouse lag on slower computers by synchronizing the GPU(s). This change is unnecessary for NVIDIA users, and particularly for users with SLI configurations.

  For optimal performance when playing World of Warcraft in SLI mode:

  - Disable vertical sync within the World of Warcraft in-game video options.
  - Enable "hardware mouse" acceleration and disable "smooth mouse" within the World of Warcraft in-game video options.

    "Smooth mouse" reduces mouse lag when the frame rate is low and "hardware mouse" is disabled.

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" on page 18
- "VIA and ATI AGP 3.0 Chipsets" on page 18
- "DVD Playback Issues with Dual NVIDIA Quadro NVS Cards" on page 18
- "PowerDVD 5.0 Does Not Display Correctly in nView Span Mode" on page 19
- "DirectX Fails When Detaching/Reattaching Displays in Dualview Mode" on page 19
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- "Issues with Video Mirror–Windows XP/2000" on page 30

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**

  Application profile changes are subject to the following conditions:

  - **Configuration Changes Require Application 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.

  - **Some Profiles Release DirectDraw**

    Some profiles release DirectDraw. If you change the configuration while the application is running, the application will not continue to run. You must exit and restart the application. See the table below for a list of application profiles that release DirectDraw.

  - **Some Profiles Require System Reboot**

See the table below for a list of application profiles that require system reboot for the configuration changes to take effect.

Table 2.1 Workstation Application Profile Issues

Application Profile Name	Releases Direct Draw	Requires a Reboot to take effect
Ansys	X	
Cadcentre PDMS	X	
CATIA	X	
CDRS	X	
ESPRi	X	
Exceed	X	
I-DEAS Master Series	X	
ICEM Surf	X	
IronCAD	X	
Large Model CAD	X	X
Microstation	X	
NADAMS	X	
NASTRAN, Patran	X	
OneSpace Designer	X	
OneSpace Designer-Large Model	X	X
Plant Designer, Imagineer	X	
Pro/ENGINEER	X	
Pro/ENGINEER Wildfire	X	
PTC DIVISION Mockup	X	
OneSpace Designer Modeling	X	
Solid Edge	X	
Solidworks	X	
ThinkDesign	X	
TOGO POST	X	
Unigraphics	X	

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.

Medal of Honor Under Windows XP / Windows 2000

- **Problem**

  The Electronic Arts game Medal of Honor uses a hard coded buffer to parse the OpenGL extension string. This can cause a system crash under Windows XP and Windows 2000.

- **Workaround**

  NVIDIA has implemented Medal of Honor application detection to work around this extension string crash.

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.

Controlling Windows 9*x* TV Tuner Scaling Artifacts

Bus-mastering TV tuners that do not flip leave artifacts when they are scaled. On Windows 9*x*, this problem is addressed by setting the local DirectDraw™ registry value `VideoBusMasterMode` to `1`. This setting causes the DirectDraw driver to look for flips occurring within half-second intervals. If none are found, an overlay automatically starts flipping at 30 fps. This setting works with only Windows 9*x*.

Quake III Arena `malloc()` Error on TNT2

- **Problem**

  Running the application Quake III Arena in a continuous loop results in an application failure after several hours.

  Typical failure modes include either a `malloc()` error (such as `Z_malloc: failed on allocation of xxxxxxx bytes`) or the Microsoft error dialog stating that "the application has experienced a problem and must now be closed".

- **Explanation**

  The problem is not an NVIDIA bug, but is caused by a memory leak in Quake III Arena. The extent of the problem depends on the method used for looping the application:

  - **Using a .CFG File**

    Using a **`.cfg`** file actually performs an infinite recursion, which causes a memory leak in Quake III Arena, leading to the failure.

  - **Running Quake III as a Local Server**

    Another method for using Quake III Arena as an OpenGL stress test is to run Quake III as a local server and then either follow or spectate a bot server. The failure can also occur using this method, depending on the Quake III Arena version. For example, the problem has been seen with point release 1.15c but not with point release 1.17.

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.

AVI Playback Problems With Older Intel Indeo Codecs

Some Intel Indeo® video codecs prior to 5.*x* (notably 3.2) do not correctly play AVI files that contain IF09 (YUV9) data. Symptoms include distorted images and the failure of the Overlay Color Control function. These codecs come installed on many Windows 9*x* and Windows NT 4.0 systems.

The problem can be resolved by downloading a release 5.*x* or later Indeo codec from the Intel Web site.

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.

- **On Windows 9*x* systems, the registry key**

  `HKEY_LOCAL_MACHINE\Software\NVIDIA Corporation\Global\System\ EnableVia4X`

  can be created to force NVIDIA drivers to use AGP 4X transfers.

- **On Windows NT 4.0 and Windows 2000 systems, 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.

GLQuake Crash and Version 5.16 (or Later) Drivers

`GLQUAKE.EXE` crashes when it is run with the `-condebug` command-line option on a GeForce 256 or a GeForce2 GTS that uses NVIDIA driver version 5.16 or later.

GLQuake uses `glGetString(GL_EXTENSIONS)` to find the NVIDIA OpenGL extensions string and tries to dump the result into a fixed-length, 1024-byte buffer. With the advent of NVIDIA driver version 5.16 and its additional OpenGL capabilities, the extensions string now exceeds 1024 bytes. GLQuake does not truncate the OpenGL extensions string to the length of the buffer, thereby writing past the end of the buffer. The data lost in this process eventually causes the application to crash.

Windows 98 and Windows Me MultiMon Support

When running in MultiMon configuration, the Windows 98 and Windows Me operating systems force resolutions to be multiples of eight; for example, a resolution of 1600x900 pixels is changed to 1600x896.

Prior to setting a mode on the secondary display under MultiMon, these operating systems first validate the mode on the primary display and change the resolution of the primary display to 1600x896. Because the 1600x896 resolution is not in the NVIDIA master mode list, the NVIDIA driver would normally reject this resolution, which would prevent the operating systems from validating it and would prevent them from setting the secondary display's mode.

To work around this problem, the driver silently accepts the 1600x896 resolution, allowing this resolution to be validated by the operating systems in MultiMon configuration.

AGP Programs May Hang With Athlon Processor

Windows 2000 systems using AMD Athlon processors can hang when an AGP program such as 3D WinBench 2000 is used. The problem can occur whether or not an NVIDIA video adaptor is installed.

The solution is to edit the registry to prevent the Memory Manager from using the processor's Page Size Extension feature. For a more complete explanation see http://support.microsoft.com/support/kb/articles/Q270/7/15.ASP

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 75 DRIVER

This chapter covers the following main topics:

- "Hardware and Software Support" on page 31
- "Driver Installation" on page 36

See the section "Release 75 Enhancements" on page 42 for a summary of Release 75 features and enhancements.

Hardware and Software Support

Supported Operating Systems

This Release 75 driver includes drivers designed for the following Microsoft® operating systems:

- Microsoft Windows® XP
  - Windows XP Media Center Edition 2005
  - Windows XP Media Center Edition 2004
  - Windows XP Professional
  - Windows XP Home Edition
  - Windows XP Professional x64 Edition
- Microsoft Windows Server 2003 x64 Edition
- Microsoft Windows 2000 and Windows NT® 4.0
- Microsoft Windows 98 and Windows Millennium Edition (Me), collectively called Windows 9x in this document

Supported NVIDIA Products

Table 3.1 and Table 3.2 lists the NVIDIA products supported by the Release 75 driver.

Table 3.1 Supported NVIDIA Consumer Products

Product	Windows XP 32-bit Windows 2000	Windows XP Professional x64	Windows 98/Me	Windows NT4
GeForce 7800 GT	X	X		
GeForce 7800 GTX	X	X		
GeForce 6800 Ultra	X	X	X	X
GeForce 6800 LE	X	X	X	X
GeForce 6800 GT	X	X	X	X
GeForce 6800	X	X	X	X
GeForce 6610 XL	X			X
GeForce 6600 LE	X	X	X	X
GeForce 6600 GT	X	X	X	X
GeForce 6600	X	X	X	X
GeForce 6500	X	X	X	X
GeForce 6200SE with TurboCache	X	X	X	X
GeForce 6200 with TurboCache	X	X	X	X
GeForce 6200	X	X	X	X
GeForce FX 5950 Ultra	X	X	X	X
GeForce FX 5900ZT	X	X	X	X
GeForce FX 5900XT	X	X	X	X
GeForce FX 5900 Ultra	X	X	X	X
GeForce FX 5900	X	X	X	X
GeForce FX 5800 Ultra	X	X	X	X
GeForce FX 5800	X	X	X	X
GeForce FX 5700VE	X	X	X	X
GeForce FX 5700LE	X	X	X	X
GeForce FX 5700 Ultra	X	X	X	X
GeForce FX 5700	X	X	X	X
GeForce FX 5600XT	X	X	X	X
GeForce FX 5600SE	X	X	X	X
GeForce FX 5600 Ultra	X	X	X	X
GeForce FX 5600	X	X	X	X
GeForce FX 5500	X	X	X	X
GeForce FX 5200LE	X	X	X	X

Table 3.1 Supported NVIDIA Consumer Products

Product	Windows XP 32-bit Windows 2000	Windows XP Professional x64	Windows 98/Me	Windows NT4
GeForce FX 5200 Ultra	X	X	X	X
GeForce FX 5200	X	X	X	X
GeForce FX 5100	X	X	X	X
GeForce PCX 5900	X	X		X
GeForce PCX 5750	X	X		X
GeForce PCX 5300	X	X		X
GeForce4 MX 4000	X	X	X	X
GeForce4 Ti 4800SE	X	X	X	X
GeForce4 Ti 4800	X	X	X	X
GeForce4 Ti 4600	X	X	X	X
GeForce4 Ti 4400	X	X	X	X
GeForce4 TI 4200 with AGP8X	X	X	X	X
GeForce4 Ti 4200	X	X	X	X
GeForce4 MX440SE with AGP8X	X	X	X	X
GeForce4 MX Integrated graphics	X	X	X	X
GeForce4 MX 460	X	X	X	X
GeForce4 MX 440 with AGP8X	X	X	X	X
GeForce4 MX 440-SE	X			
GeForce4 MX 440	X	X	X	X
GeForce4 MX 420	X	X	X	X
GeForce3 Ti 500	X	X	X	X
GeForce3 Ti 200	X	X	X	X
GeForce3	X	X	X	X
GeForce2 MX Integrated graphics	X	X		X
GeForce2 MX 400	X	X	X	X
GeForce2 MX 200	X	X	X	X
GeForce2 MX 100	X	X	X	X
GeForce2 MX	X	X	X	X

Table 3.2 Supported NVIDIA Workstation Products

Product	Windows XP 32-bit Windows 2000	Windows XP Professional x64	Windows NT4	Windows 98/Me
NVIDIA Quadro FX 4500	X	X		
NVIDIA Quadro FX 4400	X		X	
NVIDIA Quadro FX 4000 SDI	X		X	

Table 3.2 Supported NVIDIA Workstation Products

Product	Windows XP 32-bit Windows 2000	Windows XP Professional x64	Windows NT4	Windows 98/Me
NVIDIA Quadro FX 4000		X		X
NVIDIA Quadro FX 3450	X	X	X	
NVIDIA Quadro FX 3400	X	X	X	
NVIDIA Quadro FX 330	X		X	
NVIDIA Quadro FX 3000G	X		X	
NVIDIA Quadro FX 3000	X	X	X	X
NVIDIA Quadro FX 2000	X	X	X	X
NVIDIA Quadro FX 1400	X		X	
NVIDIA Quadro FX 1300	X		X	
NVIDIA Quadro FX 1100	X	X	X	X
NVIDIA Quadro FX 1000	X	X	X	X
NVIDIA Quadro FX 700	X	X	X	X
NVIDIA Quadro FX 600	X	X	X	X
NVIDIA Quadro FX 540	X		X	
NVIDIA Quadro FX 500	X	X	X	X
NVIDIA Quadro4 980 XGL	X	X	X	X
NVIDIA Quadro4 900 XGL	X	X	X	X
NVIDIA Quadro4 780 XGL	X	X	X	X
NVIDIA Quadro4 750 XGL	X	X	X	X
NVIDIA Quadro4 700 XGL	X	X	X	X
NVIDIA Quadro4 580 XGL	X		X	
NVIDIA Quadro4 550 XGL	X	X	X	X
NVIDIA Quadro4 500 XGL	X		X	
NVIDIA Quadro4 400 NVS	X		X	
NVIDIA Quadro4 380 XGL	X	X	X	X
NVIDIA Quadro4 200 NVS	X		X	
NVIDIA Quadro NVS 400	X		X	
NVIDIA Quadro NVS 285 PCI	X	X	X	
NVIDIA Quadro NVS 280 PCI	X	X	X	
NVIDIA Quadro NVS 280	X		X	X
NVIDIA Quadro NVS 200	X		X	
NVIDIA Quadro NVS with AGP8X	X	X		
NVIDIA Quadro NVS	X		X	X
NVIDIA Quadro2 MXR	X		X	
NVIDIA Quadro DCC	X		X	X

Supported Languages

The Release 75 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

- "Minimum Hard Disk Space" on page 36
- "Additional Operating System Requirements" on page 37

Minimum Hard Disk Space

The minimum hard disk space requirement for each operating system are listed in Table 3.3, Table 3.4, and Table 3.5:

Table 3.3 Hard Disk Space Requirements—English

Operating System	Minimum Hard Disk Space
Windows XP (all editions)	27.56 MB
Windows 2000	27.56 MB
Windows NT 4.0	21.44 MB
Windows Me	24.20 MB
Windows 98	24.20 MB

Table 3.4 Hard Disk Space Requirements—Non-English Languages

Operating System	Minimum Hard Disk Space
Windows XP (all editions)	21.09 MB
Windows 2000	21.09 MB
Windows NT 4.0	21.09 MB
Windows Me	21.13 MB
Windows 98	21.13 MB

Table 3.5 Hard Disk Space Requirements—Full International Package

Operating System	Minimum Hard Disk Space
Windows XP (all editions)	48.65 MB
Windows 2000	48.65 MB
Windows NT 4.0	42.53 MB
Windows Me	45.33 MB
Windows 98	45.33 MB

Additional Operating System Requirements

The operating systems in Table 3.6 require the additional packages listed in order to be supported by NVIDIA.

Table 3.6 Additional Operating System Requirements

Operating System	Additional Requirements
Windows NT 4.0	Service Pack 4
Windows 98	Microsoft DirectX™ 5

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" on page 42
- "Release 75 Enhancements" on page 42
- "Release 70 Enhancements" on page 45
- "Release 65 Enhancements" on page 46
- "Release 60 Enhancements" on page 48
- "Release 55 Enhancements" on page 50
- "Release 50 Enhancements" on page 51
- "Release 40 Enhancements" on page 55
- "Release 35 Enhancements" on page 57
- "Release 25 Enhancements" on page 58
- "Release 20 Enhancements" on page 59
- "Release 10 Enhancements" on page 59

Driver Release History

Release 75 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 75	ForceWare	77.56,77.72, 77.76, 77.77, 78.01	
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 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[1] 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

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

Chipset	PCI-Express Graphics Cards
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".

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)[2].

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

2. 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[3] 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

3. 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[4]

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.

4. 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 75 driver for NVIDIA products. It contains these sections:

- "General Mode Support Information" on page 62
- "Default Modes Supported by GPU" on page 63
- "Modes Supported by DACs and TV Encoders" on page 103

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 63.

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 71.)
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 71.) • GeForce 6800 with 512 MB

Table A.2 Non-standard Modes Supported

Resolution
1680 x 1050
1366 x 768

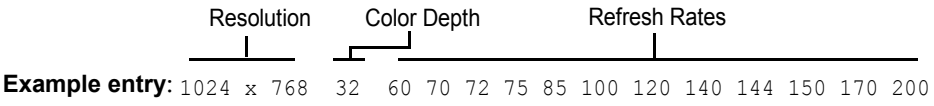
Default Modes Supported by GPU

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

- "GeForce FX Family, GeForce 6 Series, and GeForce 7 Series" on page 64
- "NVIDIA Quadro FX Family of High End GPUs" on page 71
- "GeForce3 Series of GPUs and NVIDIA Quadro DCC" on page 78
- "GeForce2 MX, GeForce4 MX, GeForce4 Ti Series, GeForce4 MX Integrated GPU, NVIDIA Quadro4, NVIDIA Quadro2, and NVIDIA Quadro NVS Series GPUs" on page 81
- "GeForce2 Integrated GPU" on page 87
- "NVIDIA Quadro4 9xx / 7xx XGL Products" on page 90
- "NVIDIA Quadro FX Family and NVIDIA Quadro NVS Series GPUs" on page 96

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.

GeForce FX Family, GeForce 6 Series, and GeForce 7 Series

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

- NVIDIA GeForce 7800 GT / GTX
- NVIDIA GeForce 6800 / 6800 Ultra
- NVIDIA GeForce 6800LE / 6800GT
- NVIDIA GeForce 6600 / 6600 GT / 6600LE
- NVIDIA GeForce 6610 XL
- NVIDIA GeForce 6500
- NVIDIA GeForce 6200
- NVIDIA GeForce 6200 w/TurboCache™
- NVIDIA GeForce 6200SE w/TurboCache™
- NVIDIA Quadro NVS 285
- NVIDIA GeForce FX 5800 / 5800 Ultra
- NVIDIA GeForce FX 5600 / 5600 Ultra
- NVIDIA GeForce FX 5600XT
- NVIDIA GeForce FX 5200 / 5200 Ultra
- NVIDIA GeForce FX 5200/GeForce PCX 5300
- NVIDIA GeForce FX 5200LE
- NVIDIA GeForce FX 5500
- NVIDIA GeForce FX 5100
- NVIDIA GeForce FX 5900 Ultra
- NVIDIA GeForce FX 5900/GeForce PCX 5900
- NVIDIA GeForce FX 5900XT
- NVIDIA GeForce FX 5950 Ultra
- NVIDIA GeForce FX 5900ZT
- NVIDIA GeForce FX 5700 Ultra/GeForce PCX 5750
- NVIDIA GeForce FX 5700
- NVIDIA GeForce FX 5700LE
- NVIDIA GeForce FX 5700VE

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       50 60
 800 x  600   8          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
1024 x  768   8          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          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          60 70 72 75 85 100 120
1920 x 1080   8   30i    60 70 72 75 85 100
1920 x 1200   8          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       50 60
 800 x  600  16          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
1024 x  768  16          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          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          60 70 72 75 85 100 120
1920 x 1080  16   30i    60 70 72 75 85 100
1920 x 1200  16          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       50 60
 800 x  600  32          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
1024 x  768  32          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          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          60 70 72 75 85 100
1920 x 1080  32   30i    60 70 72 75 85
1920 x 1200  32          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          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
2048 x  768   8          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          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          60 70 72 75 85 100 120
3840 x 1080   8   30i    60 70 72 75 85 100
3840 x 1200   8          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          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
```

```
2048 x  768  16          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          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          60 70 72 75 85 100 120
3840 x 1080  16   30i    60 70 72 75 85 100
3840 x 1200  16          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          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
2048 x  768  32          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          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          60 70 72 75 85 100
3840 x 1080  32   30i    60 70 72 75 85
3840 x 1200  32          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          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          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          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          60 70 72 75 85 100 120
1920 x 2160   8   30i    60 70 72 75 85 100
1920 x 2400   8          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          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          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          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          60 70 72 75 85 100 120
```

```
1920 x 2160  16   30i    60 70 72 75 85 100
1920 x 2400  16          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          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          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          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          60 70 72 75 85 100
1920 x 2160  32   30i    60 70 72 75 85
1920 x 2400  32          60 70 72 75 85
1920 x 2880  32          60 70 72 75 85
2048 x 3072  32          60 70 72 75 85
```

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 4500
- NVIDIA Quadro FX 3400 / Quadro FX 4400
- NVIDIA Quadro FX 4000
- NVIDIA Quadro FX 3450 / Quadro FX 4000 SDI
- NVIDIA Quadro FX 1400
- NVIDIA Quadro FX 540
- NVIDIA Quadro FX 3000 / Quadro FX 1300
- NVIDIA Quadro FX 700

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
```

GeForce3 Series of GPUs and NVIDIA Quadro DCC

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

- NVIDIA GeForce3
- NVIDIA GeForce3 Ti 200
- NVIDIA GeForce3 Ti 500
- NVIDIA Quadro DCC

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								

GeForce2 MX, GeForce4 MX, GeForce4 Ti Series, GeForce4 MX Integrated GPU, NVIDIA Quadro4, NVIDIA Quadro2, and NVIDIA Quadro NVS Series GPUs

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

- NVIDIA GeForce2 MX/MX 400
- NVIDIA GeForce2 MX 100/200
- NVIDIA GeForce4 MX 460
- NVIDIA GeForce4 MX 440
- NVIDIA GeForce4 MX 420
- NVIDIA GeForce4 MX 440SE
- NVIDIA GeForce4 MX 440SE with AGP8X
- NVIDIA GeForce4 MX 440 with AGP8x / GeForce PCX 4300
- NVIDIA GeForce MX 4000
- NVIDIA GeForce4 MX Integrated GPU
- NVIDIA GeForce4 Ti 4800
- NVIDIA GeForce4 Ti 4800 SE
- NVIDIA GeForce4 Ti 4600
- NVIDIA GeForce4 Ti 4400
- NVIDIA GeForce4 Ti 4200
- NVIDIA GeForce4 Ti 4200 with AGP8X
- NVIDIA Quadro4 550 XGL
- NVIDIA Quadro2 MXR/EX
- NVIDIA Quadro NVS
- NVIDIA Quadro NVS with AGP8X
- NVIDIA Quadro NVS 50 PCI
- NVIDIA Quadro4 580 XGL
- NVIDIA Quadro4 380 XGL

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       50 60
 800 x  600   8          60 70 72 75 85 100 120 140 144     170 200 240
 848 x  480   8          60 70 72 75 85 100 120 140 144     170 200 240
 960 x  600   8          60 70 72 75 85 100 120 140 144     170 200
1024 x  768   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          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          60 70 72 75 85 100 120
1920 x 1080   8   30i    60 70 72 75 85 100
1920 x 1200   8          60 70 72 75 85 100
1920 x 1440   8          60 70 72 75 85
2048 x 1536   8          60 70 72 75
--------------------------------------------------------------------
 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       50 60
 800 x  600  16          60 70 72 75 85 100 120 140 144     170 200 240
```

```
 848 x  480  16          60 70 72 75 85 100 120 140 144     170 200 240
 960 x  600  16          60 70 72 75 85 100 120 140 144     170 200
1024 x  768  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          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          60 70 72 75 85 100 120
1920 x 1080  16   30i    60 70 72 75 85 100
1920 x 1200  16          60 70 72 75 85 100
1920 x 1440  16          60 70 72 75 85
2048 x 1536  16          60 70 72 75
-----------------------------------------------------------------
 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       50 60
 800 x  600  32          60 70 72 75 85 100 120 140 144     170 200 240
 848 x  480  32          60 70 72 75 85 100 120 140 144     170 200 240
 960 x  600  32          60 70 72 75 85 100 120 140 144     170 200
1024 x  768  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     150 170
1280 x  720  32          60 70 72 75 85 100 120 140     150
1280 x  768  32          60 70 72 75 85 100 120 140     150
1280 x  800  32          60 70 72 75 85 100 120 140     150
1280 x  960  32          60 70 72 75 85 100 120 140     150
1280 x 1024  32          60 70 72 75 85 100 120 140     150
1360 x  768  32          60 70 72 75 85 100 120 140     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          60 70 72 75 85 100
1920 x 1080  32   30i    60 70 72 75 85
1920 x 1200  32          60 70 72 75 85
1920 x 1440  32          60 70    75
2048 x 1536  32          60
```

Horizontal Spanning Modes

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

Vertical Spanning Modes

```
 640 x  960   8          60 70 72 75 85 100 120 140 144 150 170 200 240
 800 x 1200   8          60 70 72 75 85 100 120 140 144     170 200 240
 848 x  960   8          60 70 72 75 85 100 120 140 144     170 200 240
 960 x 1200   8          60 70 72 75 85 100 120 140 144     170 200
1024 x 1536   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          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          60 70 72 75 85 100 120
1920 x 2160   8   30i    60 70 72 75 85 100
1920 x 2400   8          60 70 72 75 85 100
1920 x 2880   8          60 70 72 75 85
2048 x 3072   8          60 70 72 75
------------------------------------------------------------------
 640 x  960  16          60 70 72 75 85 100 120 140 144 150 170 200 240
 800 x 1200  16          60 70 72 75 85 100 120 140 144     170 200 240
 848 x  960  16          60 70 72 75 85 100 120 140 144     170 200 240
 960 x 1200  16          60 70 72 75 85 100 120 140 144     170 200
1024 x 1536  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          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          60 70 72 75 85 100 120
1920 x 2160  16   30i    60 70 72 75 85 100
1920 x 2400  16          60 70 72 75 85 100
1920 x 2880  16          60 70 72 75 85
2048 x 3072  16          60 70 72 75
------------------------------------------------------------------
 640 x  960  32          60 70 72 75 85 100 120 140 144 150 170 200 240
 800 x 1200  32          60 70 72 75 85 100 120 140 144     170 200 240
 848 x  960  32          60 70 72 75 85 100 120 140 144     170 200 240
 960 x 1200  32          60 70 72 75 85 100 120 140 144     170 200
```

1024 x 1536	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		150	170	
1280 x 1440	32		60	70	72	75	85	100	120	140		150		
1280 x 1536	32		60	70	72	75	85	100	120	140		150		
1280 x 1600	32		60	70	72	75	85	100	120	140		150		
1280 x 1920	32		60	70	72	75	85	100	120	140		150		
1280 x 2048	32		60	70	72	75	85	100	120	140		150		
1360 x 1536	32		60	70	72	75	85	100	120	140		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		60	70	72	75	85	100						
1920 x 2160	32	30i	60	70	72	75	85							
1920 x 2400	32		60	70	72	75	85							
1920 x 2880	32		60	70		75								
2048 x 3072	32		60											

GeForce2 Integrated GPU

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

- NVIDIA GeForce2 Integrated GPU

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		72	75	85	100
720 x 480	8		60					
720 x 576	8	50	60					
800 x 480	8		60		72	75	85	100
800 x 600	8		60		72	75	85	100
1024 x 768	8		60		72	75	85	100
1280 x 768	8		60		72	75	85	100
1280 x 1024	8		60		72	75	85	100

```
1600 x  900   8          60    72 75 85 100
1600 x 1200   8          60    72 75 85 100
1920 x 1080   8   30i
1920 x 1200   8          60    72 75 85 100
1920 x 1440   8          60    72 75 85 100
2048 x 1536   8          60    72 75 85 100
-------------------------------------------------------------------
 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    72 75 85 100
 720 x  480  16          60
 720 x  576  16       50 60
 800 x  480  16          60    72 75 85 100
 800 x  600  16          60    72 75 85 100
1024 x  768  16          60    72 75 85 100
1280 x  768  16          60    72 75 85 100
1280 x 1024  16          60    72 75 85 100
1600 x  900  16          60    72 75 85 100
1600 x 1200  16          60    72 75 85 100
1920 x 1080  16   30i
1920 x 1200  16          60    72 75 85 100
1920 x 1440  16          60    72 75 85 100
2048 x 1536  16          60    72 75 85 100
-------------------------------------------------------------------
 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    72 75 85 100
 720 x  480  32          60
 720 x  576  32       50 60
 800 x  480  32          60    72 75 85 100
 800 x  600  32          60    72 75 85 100
```

```
1024 x  768  32          60    72 75 85 100
1280 x  768  32          60    72 75 85 100
1280 x 1024  32          60    72 75 85 100
1600 x  900  32          60    72 75 85 100
1600 x 1200  32          60    72 75 85 100
1920 x 1080  32   30i
1920 x 1200  32          60    72 75 85 100
1920 x 1440  32          60    72 75
2048 x 1536  32          60    72
```

NVIDIA Quadro4 9xx / 7xx XGL Products

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

- NVIDIA Quadro4 900 XGL
- NVIDIA Quadro4 750 XGL
- NVIDIA Quadro4 700 XGL
- NVIDIA Quadro4 980 XGL
- NVIDIA Quadro4 780 XGL

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       50 60
 800 x  600   8          60    70 72 75 85 100 120 140 144     170 200 240
 848 x  480   8          60    70 72 75 85 100 120 140 144     170 200 240
 960 x  600   8          60    70 72 75 85 100 120 140 144     170 200 240
 960 x 1200   8             61
1024 x  768   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          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          60    70 72 75 85 100 120
1920 x 1080   8   30i    60    70 72 75 85 100
1920 x 1200   8          60    70 72 75 85 100
```

```
1920 x 1440   8          60    70 72 75 85
2048 x 1536   8          60    70 72 75
-------------------------------------------------------------------
 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       50 60
 800 x  600  16          60    70 72 75 85 100 120 140 144     170 200 240
 848 x  480  16          60    70 72 75 85 100 120 140 144     170 200 240
 960 x  600  16          60    70 72 75 85 100 120 140 144     170 200 240
 960 x 1200  16             61
1024 x  768  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          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          60    70 72 75 85 100 120
1920 x 1080  16   30i    60    70 72 75 85 100
1920 x 1200  16          60    70 72 75 85 100
1920 x 1440  16          60    70 72 75 85
2048 x 1536  16          60    70 72 75
-------------------------------------------------------------------
 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       50 60
 800 x  600  32          60    70 72 75 85 100 120 140 144     170 200 240
 848 x  480  32          60    70 72 75 85 100 120 140 144     170 200 240
 960 x  600  32          60    70 72 75 85 100 120 140 144     170 200 240
 960 x 1200  32             61
1024 x  768  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     150 170
1280 x  720  32          60    70 72 75 85 100 120 140     150
1280 x  768  32          60    70 72 75 85 100 120 140     150
1280 x  800  32          60    70 72 75 85 100 120 140     150
1280 x  960  32          60    70 72 75 85 100 120 140     150
1280 x 1024  32          60    70 72 75 85 100 120 140     150
1360 x  768  32          60    70 72 75 85 100 120 140     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          60    70 72 75 85 100
1920 x 1080  32   30i    60    70 72 75 85
1920 x 1200  32          60    70 72 75 85
1920 x 1440  32          60    70    75
2048 x 1536  32          60
```

Horizontal Spanning Modes

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

2560 x 1024	32		60	70 72 75 85 100 120 140 150
2720 x 768	32		60	70 72 75 85 100 120 140 150
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		60	70 72 75 85 100
3840 x 1080	32	30i	60	70 72 75 85
3840 x 1200	32		60	70 72 75 85
3840 x 1440	32		60	70 75
4096 x 1536	32		60	

Vertical Spanning Modes

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

NVIDIA Quadro FX Family and NVIDIA Quadro NVS Series GPUs

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

- NVIDIA Quadro FX 2000
- NVIDIA Quadro FX 1000
- NVIDIA Quadro NVS 280 PCI / Quadro PCI-E Series
- NVIDIA Quadro FX 500
- NVIDIA Quadro FX 600
- NVIDIA Quadro FX 1100

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	50	60											
800 x 600	8		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		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		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		60		70	72	75	85	100	120						

```
1920 x 1080   8   30i    60    70 72 75 85 100
1920 x 1200   8          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       50 60
 800 x  600  16          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          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          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          60    70 72 75 85 100 120
1920 x 1080  16   30i    60    70 72 75 85 100
1920 x 1200  16          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       50 60
 800 x  600  32          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          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          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          60    70 72 75 85 100
1920 x 1080  32   30i    60    70 72 75 85
1920 x 1200  32          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          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          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		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		60	70	72	75	85	100	120				
3840 x 1080	8	30i	60	70	72	75	85	100					
3840 x 1200	8		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		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		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		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		60	70	72	75	85	100	120						
3840 x 1080	16	30i	60	70	72	75	85	100							
3840 x 1200	16		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		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		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		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		60	70 72 75 85 100
3840 x 1080	32	30i	60	70 72 75 85
3840 x 1200	32		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		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		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		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		60	70 72 75 85 100 120
1920 x 2160	8	30i	60	70 72 75 85 100
1920 x 2400	8		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          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          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          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          60    70 72 75 85 100 120
1920 x 2160  16   30i    60    70 72 75 85 100
1920 x 2400  16          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          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          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          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          60    70 72 75 85 100
```

1920 x 2160	32	30i	60	70 72 75 85
1920 x 2400	32		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" on page 103
- "TV-Out Mode Support" on page 104

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.