ForceWare Graphics Drivers
Release 90 Notes

Version 93.71

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

NVIDIA Corporation
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Notice

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INTRODUCTION TO *RELEASE 90 NOTES*

This edition of *Release 90 Notes* describes the Release 90 Drivers for Microsoft®
Windows® and provides information applicable to all NVIDIA® drivers.
NVIDIA provides these notes to describe performance improvements and bug
fixes in each documented version of the driver.

Structure of the Document

This document is organized in the following sections:

- "Release 90 Driver Issues" on page 2 gives a summary of

  - Issues that have been resolved in this version.

  - Issues that are open in this version

  - Known limitations of the driver

- "The Release 90 Driver" on page 53 describes the NVIDIA products and
  languages supported by this driver, the system requirements, and how to
  install the driver.

- "NVIDIA Driver History" on page 63 describes the new features included in
  the Release 90 driver as well as information on previous driver releases.

- "Mode Support for Windows" on page 87

Changes in this Edition

This edition of *Release 90 Notes* includes information about version 93.71 of the
Release 90 driver. It discusses changes made to the driver since version 84.43.
These changes are discussed beginning with the chapter "Release 90 Driver
Issues" on page 2.

C H A P T E R

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RELEASE 90 DRIVER ISSUES

This chapter describes open issues for version 93.71, and resolved issues and driver enhancements for versions of the Release 90 driver up to version 93.71. The chapter contains these sections:

Issues Resolved in Version 93.71

The following are changes made and issues resolved since driver version 91.45:

Resolved Issues for 32-bit Operating Systems

Single-GPU Issues Resolved

- Error message occurs when running the NVIDIA Control Panel Television Setup Wizard.

- NVIDIA Quadro FX 4400: After changing the color settings from the NVIDIA Control panel, the settings revert to the default.

- GeForce 7950 GX2, NVIDIA Control Panel: The Multi-GPU performance mode default is set to Custom when initially creating a new application profile.

- GeForce 7950 GX2: In the NVIDIA Control Panel, Multi-GPU antialiasing modes are available when Multi-Display rendering mode is selected.

- GeForce 7900 GT: The new NVIDIA Control Panel lists the product name as GeForce 7900 GT/GTO, instead of the correct GeForce 7900 GT.

- GeForce 7600 GS, NVIDIA Control Panel/Classic Control Panel: HDTV component-out output is split vertically when applying the 1080i resolution.

- GeForce 7600 GS, GeForce 6150/6100: During video playback in VMR mode, video is corrupt and shaky when noise reduction is enabled.

- GeForce 6800 GT 256MB: Windows Media Player 10 video becomes corrupt when rotating the screen while playing a video.

- GeForce 6600 128MB: Windows Media Player 10 crashes when changing the resolution while playing a DVD.

- GeForce 6600 128MB: The secondary Dualview monitor flickers while playing any NTSC DVD.

- GeForce 6600 128MB: The NVIDIA Control Panel crashes while changing the desktop configuration after changing the video color settings.

- GeForce 6600, Windows XP Media Center Edition: While playing MCE Live TV in Clone mode with full-screen video mirror, the mirrored display is corrupted when resizing the application.

- GeForce 7300 GT, GeForce 6150/6100: HQV objects flutter and the test bar splits when noise reduction is enabled.

SLI Issues Resolved

- GeForce 7950 GX2 Quad NVIDIA SLI, NVIDIA Control Panel: Enabling or disabling "Show SLI Visual Indicators" when "Adjust Image Settings with Preview" page is open causes the NVIDIA Control Panel to crash.

- GeForce 7950 GX2, Quad NVIDIA SLI, NVIDIA Control Panel: Unable to preserve Custom AA setting for Direct3D application profiles.

- GeForce 7950 GX2 512MB, Quad NVIDIA SLI: EverQuest–blue-screen crash occurs when exiting the game.

- GeForce 7950 GX2, SLI: After enabling and then disabling SLI mode, Display # 4 loses sync.

- GeForce 7950 GX2, GeForce 6600, SLI: Spellforce 2–flickering corruption occurs during game play.

- GeForce 7900 GTX, SLI System: Dungeon Siege 2–with SLI mode enabled, there is graphics corruption when 8x antialiasing is enabled.

- GeForce 7900, GeForce 6800, SLI System: World of Warcraft–with SLI mode enabled, there are missing character portraits.

- GeForce 7600 GT 256MB, SLI: TimeShift–corruption occurs at the start of the game when the resolution is set to 1280x1024.

- GeForce 7300 GT, SLI: Spellforce 2– flickering, multicolored triangles appear in the terrain when SLI is enabled.

Resolved Issues for 64-bit Operating Systems

Single-GPU Issues Resolved

- 233027 VFA 91.47 Quadro FX4500 X2, Window XP x64: The Classic NVIDIA Control Panel->Edge Blending page is missing.

- 233172 still open in 91_21 GeForce 7950 GX2, Windows XP x64: The NVIDIA Control Panel Application-Preferred antialiasing setting leaves antialiasing unchanged and overrides the application settings.

- 232364 GeForce 7950 GX2, Windows XP x64: You cannot switch from CRT to DFP using the NVIDIA Control Panel.

- 225618 GeForce 6150/6100 64 MB, Windows XP x64: Corruption occurs when running the Direct Draw test from the DirectX Diagnostic tool.

- 226631 GeForce 6100/6150, Windows XP x64: Video is corrupted if MPEG2 HD transport/program streams are played in lower screen resolutions.

Issues Resolved in Version 91.47

The following are changes made and issues resolved since driver version 91.45:

Single-GPU Issues Resolved

- NVIDIA Control Panel: The 3D->Monitor GPU Temperatures: graph time line shows invalid time markers.

- Full screen video control does not work properly under nView Clone mode.

- NVIDIA Control Panel: Control panel dialog forces the user to apply changes when leaving the "Change display configuration" page.

- A blue-screen crash occurs when starting Microsoft Flight Simulator 04 after enabling 2x antialiasing from the NVIDIA panel.

- Quadro FX 3450: Textures become corrupt when moving around Google Earth.

- NVIDIA Quadro NVS 285: Video is corrupted under Full-Screen Video Mirror.

- GeForce 7950 GX2, Windows XP x64, NVIDIA Control Panel: The Adjust Image Settings preview animation stops after one rotation.

- GeForce 7950 GX2, NVIDIA Control Panel: The primary display changes color if color changes are made on the secondary display.

- GeForce 7900 GTX, GeForce 6800 GT: Civilization 4–a white, transparent, flickering layer appears when zooming out.

- GeForce 7900/7800 GTX: Far Cry–HDR light sources are visible through solid objects.

- GeForce 7600 GT: Video is corrupt when playing a DVD in VMR mode.

- GeForce 7600 GT: Video is corrupt when playing a file in overlay mode at low resolutions.

- GeForce 7300/7600: A white line appears at the bottom of the Media Center Edition screen when viewed at 1080i with component-out.

- GeForce 7300 GS: When playing a video using Windows Media Player in VMR mode, full-screen video mirror does not work.

- GeForce 7300 GT: When running the HQV benchmark on Windows Media Player 10, there is fluttering playback.

- GeForce 6800, NVIDIA Control Panel: The NVIDIA Control Panel crashes when trying to change nView modes.

- GeForce 6800, NVIDIA Control Panel: Display mode changes are not applied after switching from Advance view to Standard view.

- 238345 GeForce 6200 64MB, Windows XP x64: nView Wizard error message appears after installing the driver and rebooting the system.

SLI Technology Issues resolved

- SLI: Hitman Blood Money–glasses on the roulette playing tables flicker.

- GeForce 7950 GX2 Quad NVIDIA SLI, NVIDIA Control Panel: The Performance and Quality images in the Adjust Images Settings with Preview page disappear when the Classic Navigation Pane is enabled.

- GeForce 7950 GX2 Quad NVIDIA SLI: The system hangs when launching Nascar: SimRacing with 8xS antialiasing enabled.

- GeForce 7950 GX2 Quad NVIDIA SLI: Game screens exhibit vertical jumping lines on large displays such as the Apple 30" Cinema Display, and 1900x1200 Sony and Samsung LCDs.

- GeForce 7950 GX2 Quad NVIDIA SLI: Prince of Persia: Warrior Within–the Intro logos do not display.

- GeForce 7950 GX2 Quad NVIDIA SLI: Prey demo–flickering occurs when pressing <ESC> to return to the menu.

- GeForce 7950 GX2, SLI: Tom Clancy's Ghost Recon Advanced Warfighter–corruption occurs on bottom half of the screen when loading the game with SLI mode enabled.

- GeForce 7900 GTX, SLI: The NVIDIA Geoforms demo shows flickering and corruption in bright areas with SLI enabled.

- GeForce 7900 GTX, SLI: Half-Life 2 Lost Coast–shadows flicker.

- GeForce 7800 GTX, SLI System: DinoBones demo runs at 3 fps when a second display is attached.

- GeForce 6800, SLI: Stuttered rendering occurs during test 3 in 3DMark05 at 1600x1200 4xAA with SLI enabled.

Issues Resolved in Version 91.45

The following are changes made and issues resolved since driver version 91.37:

Single-GPU Issues Resolved

• NVIDIA Quadro FX 1500: With the DVI as the primary display and a CRT as the secondary, the NVIDIA Display Optimization Wizard fails to run.

SLI Technology Issues Resolved

• GeForce 7950 GX2 Quad NVIDIA SLI, NVIDIA Control Panel: After setting SLI16x AA on a custom or predefined profile, the setting reverts to SLI8x when reopening the panel.

• GeForce 7950 GX2 Quad NVIDIA SLI, NVIDIA Control Panel: The Profile list box stops rendering when attempting to add a profile executable name that is already listed.

• GeForce 7950 GX2 Quad NVIDIA SLI, NVIDIA Control Panel: Custom profiles cannot be removed.

• GeForce 7950 GX2 Quad NVIDIA SLI, NVIDIA Control Panel: Selecting SLI8x and then selecting SLI32x will display 16x when running a 3D application.

• GeForce 7950 GX2 Quad NVIDIA SLI: The system crashes and reboots when minimizing or maximizing the Media Center player while playing live or recorded TV.

• GeForce 7950 GX2 Quad NVIDIA SLI: There is occasional texture dropout in World of Warcraft when flying over the landscape.

• GeForce 7950 GX2 Quad NVIDIA SLI: There is corruption in Counter-strike v1.6.

• GeForce 7950 GX2 Quad NVIDIA SLI: The bottom half of the loading screen fails to render in Ghost Recon: Advanced Warfighter when SLI is enabled.

• GeForce 7950 GX2 Quad NVIDIA SLI : There is flickering at the bottom half of the screen in Elder Scrolls: Oblivion when the inventory screen is open.

- GeForce 7950 GX2 Quad NVIDIA SLI: The screen shakes when running World of Warcraft at a resolution of 1920x1200.

- GeForce 7950 GX2 Quad NVIDIA SLI: A black line bisects the screen after entering 3D mode in World of Warcraft and Eve Online.

- GeForce 7950 GX2 Quad NVIDIA SLI: The screen vibrates up and down by several pixels and there is a black line running through the screen in various 3D applications on Dell 2407 WFP, Dell 2405 WFP, Dell 2007 WFP, Dell 2005 WFP, and Phillips 230W monitors.

- GeForce 7900 GTX: Several games (The Chronicles of Riddick, Quake 4, and Dinobones) display a ghosting effect when running with 8x SLI AA enabled.

- GeForce 7950 GX2 Quad NVIDIA SLI: There are blurred/double vision effects in Knights of the Old Republic 2 when 16x or greater SLI AA is enabled.

Issues Resolved in Version 91.37

The following are changes made and issues resolved since driver version 91.33:

Single-GPU Issues Resolved

- GeForce 7950 GX2: There is corruption in the top third of the playback window when playing WMV9 content.

- GeForce 7800 GTX: Primary and secondary display assignments can't be changed when one of the displays is rotated.

- GeForce 6600 128MB: The NVIDIA Control Panel crashes when previewing a screen saver while previewing the settings in the Adjust Image Settings Preview page.

- GeForce 6200: The system crashes after overlapping OpenGL demos over Windows Media Player 10.

SLI Mode Issues Resolved

- GeForce 7950 GX2 Quad NVIDIA SLI: With SLI mode enabled, the "Create a Flight" box in Microsoft Flight Simulator 2004 does not render when SLI 8x AA is enabled.

- GeForce 7950 GX2 Quad NVIDIA SLI, NVIDIA Control Panel: After selecting either 16x SLIAA or 32x SLIAA mode and then selecting Application Controlled, the interface shows 16x antialiasing when running 3D applications.

Issues Resolved in Version 91.33

The following are changes made and issues resolved since driver version 91.31:

Single-GPU Issues Resolved

• GeForce 7950 GX2: Blue-screen crash occurs when running 3D Mark 06 with an Intel i955XBK motherboard.

SLI Technology Issues Resolved

• GeForce 6 and 7 Series: Added an SLI profile for Prey.

• NVIDIA Control Panel: "SLI multi-GPU rendering has been disabled" pop-up message appears on non-SLI capable systems.

• NVIDIA Control Panel: The digital display cannot be set to its native resolution when the analog display is set as the primary display under nView Clone or Spanning modes.

• NVIDIA Quadro FX 5500: With four monitors connected, from the NVIDIA Control Panel->Workstation->Synchronize Displays page, the server cannot be set.

• NVIDIA Quadro FX 4400: Under the NVIDIA Control Panel->Workstation->Synchronize Displays, the secondary display is unable to be set as the client.

Issues Resolved in Version 91.31

The following are changes made and issues resolved since driver version 91.28:

Single-GPU Issues Resolved

• NVIDIA Control Panel: SLI Antialiasing option is erroneously visible at the 3D Settings->Manage 3D Settings page.

  SLI AA settings are now available in the Antialiasing Settings control. Selecting SLI AA will override the predefined SLI rendering mode for applications with a profile.

• NVIDIA Control Panel: The 3D preview image in the Adjust Image Settings with Preview page does not update when "Balanced" is selected on the slider.

• NVIDIA Control Panel: The Red/Green/Blue Color settings are not saved when closing and then re-opening the panel.

• Improved mouse performance on Oblivion.

• GeForce 7950 GX2, NVIDIA Control Panel: 8x and 16xS antialiasing settings on application profiles are not saved when closing and reopening the control panel.

• GeForce 7950 GX2, Windows XP Professional x64, NVIDIA Control Panel: An error message appears when opening the Adjust Image Setting with Preview page.

• GeForce 7950 GX2, NVIDIA Control Panel: After selecting "Alternate frame 2" from the Multi-GPU performance mode list box, the setting reverts to "Alternate frame rendering" when reopening the panel.

• GeForce 7900 GTX: WMV content is corrupted when played in overlay mode.

• GeForce 7900 GT/GS: Model position graph editor response is slow in the Lightwave 8.5 Layout workbench.

• GeForce 7800, NVIDIA Control Panel: "Always run fan at highest speed" option in the Adjust Overclock Settings page is not accessible.

• GeForce 7300 LE/GS: The HD file "PBS - Omaha Zoo RR.mpg" shows corruption when played after playing an inverse-telecine clip.

- GeForce 6600 GT: "Cannot play file" error occurs when attempting to play an MPEG file with Full-screen Video Mirror enabled under nView Clone mode.

- GeForce 5200 FX: 709 colorspace not properly displayed on high-definition content.

SLI Technology Issues Resolved

- SLI performance is evident on bridgeless boards only if antialiasing is enabled using the driver control panel.

- Cold War, protected with Star Force, does not respond to SLI multi-GPU mode.

- NVIDIA Quadro FX 4500 X2, SLI: After enabling SLI, the SLI menu disappears from the classic NVIDIA control panel.

- Windows XP Professional x64, NVIDIA Quadro FX 4500, SLI: The system freezes after enabling SLI and Frame Sync.

- NVIDIA Quadro FX 4400, SLI Workstation: There is no video when running the Sleeper test.

- GeForce 7950 GX2, SLI: Oblivion hangs with SLI mode enabled.

Issues Resolved in Version 91.28

The following are changes made and issues resolved since driver version 84.43:

• NVIDIA Ex Support

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

Single GPU Issues Resolved

• GeForce 7600 GT/GS, GeForce 7900 GT: With LCD and HDTV enabled under Clone mode and the HDTV set to any mode other than 480i, the HDTV mode switches to 480i upon reboot.

• Windows XP: Corruption occurs when running the Timburry Buglooker demo.

• GeForce 6800, Windows XP Media Center Edition: While Windows Media Player 10 is playing a video file, MCE shows a blank screen when launched.

• GeForce 6800: Shadow corruption occurs in the game Lineage II.

SLI Technology Issues Resolved

• GeForce 7800 GTX, SLI: There is graphics corruption when playing IL2: Forgotten battles.

• GeForce 7800 GTX/GT, SLI: Stuttering occurs in NHL2006 with SLI AA enabled.

• Windows XP, GeForce 7800 GTX, SLI: F.E.A.R. may not run on the AMD FX-60 with Asus A8MSLI32.

To work around this issue, adjust the hypertransport settings in the BIOS as follows:

• *K8 to NB frequency: 5x*

• *NB to NB LinkWidth: 16/16*

• *SB to NB frequency: 5x*

• *SB to NB LinkWidth: 16/16*

- GeForce 6800, SLI: The audio is corrupt during the intro videos in Flat Out when SLI is enabled.

- GeForce 6600, SLI, Windows XP: Double image of the scene appears when running Star Wars Republic Commando.

- GeForce 6600, SLI, Windows XP: Corruption occurs along the SLI split line when playing Grand Theft Auto: San Andreas.

- GeForce 6600, SLI, Windows XP: With antialiasing enabled from the NVIDIA panel, car textures are corrupted in Need for Speed Most Wanted, and ghosting occurs in FIFA 2006.

- GeForce 6600, SLI, Windows XP: Gameplay and menu performance drops when running Kohan 2: Kings of War in SLI mode with 4x antialiasing enabled.

Open Issues in Version 93.71 for 32-bit Operating Systems

As with every released driver, version 93.71 of the Release 90 driver has open issues and enhancement requests associated with it. This section includes lists of issues that are either not fixed or not implemented in this version. Some problems listed may not have been thoroughly investigated and, in fact, may not be NVIDIA issues. Others will have workaround solutions.

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

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 non-native 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 as Dualview and nView Clone and Span modes are not recommended.

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

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

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

NVIDIA Issues—Single GPU

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

All GPUs

- Dark Messiah of Might and Magic–light flickers on the weapons and characters, and the system freezes after a period of gameplay.

- FEAR–reflection in the puddle flickers.

- Lock On: Modern Air Combat–graphics corruption occurs.

- With an HDTV connected to the component-out, the driver does not detect the HDTV setting and instead sets the TV format to NTSC.

- There is no display in Clone mode when TV is switched from Component to Composite.

- NVIDIA Control Panel: The S-Video-NTSC/HD Component format is not preserved after switching the primary displays.

- NVIDIA Control Panel: Unable to run the NVIDIA Multiple Display wizard with any nView multi-display mode enabled.

- Memory clocks displayed do not reflect DDR multiplier.

  The memory clocks themselves are running at the correct speeds.

- NVIDIA Control Panel Category Pages: Foreign language text exceeds the boundary of category windows.

- NVIDIA Control Panel Category Pages: Japanese translation issues exist in the menu options.

- Interlaced HDTV formats cannot be set in the NVIDIA Control panel.

- The NVIDIA Control Panel: After selecting HD Component 480i / 576P/720 format, the Color Quality slider in the Change Resolution page is grayed out.

- There may be intermittent application compatibility issues with dual core CPUs.

  *If you experience this issue, first make sure you have downloaded and installed the dual core patches from your CPU manufacturer and from Microsoft. The Microsoft knowledge base article is available at:*http://support.microsoft.com/?id=896256.

  If you still experience problems you can attempt to work around these by toggling off NVIDIA's multithread optimizations using the following instructions:

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

     `HKey_Local_Machine\Hardware\DeviceMap\Video`

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

     "`\device\video0`".

  2 Look in

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

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

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

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

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

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

- Video color-space range for DVI-only[1] outputs is erroneously set to standard mode (16-235) instead of extended mode (0-255).

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

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

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

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

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

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

   `HKey_Local_Machine\Hardware\DeviceMap\Video`

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

   "`\device\video0`".

2 Look in

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

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

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

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

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

NVIDIA Quadro Series GPUs

• NVIDIA Quadro FX 4500, G-Sync: Setting the Frame Sync Server to 70 Hz causes the system to lose sync with the monitor.

• NVIDIA Quadro FX 4500 SDI: SDI output does not broadcast PSF signal formats under nView Dualview mode.

• NVIDIA Quadro FX 4500, NVIDIA Control Panel: When enabling nView Clone mode for the first time, each monitor is set to a different resolution.

• NVIDIA Quadro FX 4400: The NVIDIA Control Panel->Workstation->Desktop Overlap-> Overlap size values in the drop-down list change after selecting a value.

• NVIDIA Quadro FX 1500: The NVIDIA Control Panel crashes when you attempt to launch it by right-clicking the desktop.

• NVIDIA Quadro FX 540, GeForce 6200 with TurboCache: DVD playback problems occur when viewing at low resolutions.

• NVIDIA Quadro NVS 285: Windows Media Player 10 screen disappears when hot key switching the command prompt back and forth between full screen and windowed mode.

• NVIDIA Quadro NVS 440: ThenView Control Panel crashes after changing the View multi-display mode with NVKeystone activated.

- NVIDIA Quadro NVS 440: NVIDIA control panel error occurs while switching between nView Spanning and Dualview mode with Keystone activated.

- Quadro NVS 285 64 MB: The NVIDIA Control Panel crashes after resuming from 3D screen saver.

GeForce 7 Series GPUs

- GeForce 7 Series: 709 color space is not present during playback of Blu-ray discs or HD DVDs.

- GeForce 7 Series: Video playback using PowerDVD shows a green line at the bottom of the screen.

- GeForce 7950 GX2, GeForce 7600 GT, NVIDIA Control Panel: When starting playback of a Blue-ray disc or HD DVD while the Adjust Video Color Settings page is open, the 'Incompatible graphics driver' warning message appears.

- GeForce 7950 GX2, NVIDIA Control Panel: "Restore Default" doesn't affect some options in the Manage Custom Timing page.

- GeForce 7950 GT, GeForce 7900 GT/GS, GeForce 7600 GT: Dragging the Cyblerlink application between the primary and secondary Dualview displays results in Cyberlink error message.

- GeForce 7950 GX2: Pirates of the Caribbean: The Legend of Jack Sparrow–edge of the screen glows when antialiasing is enabled.

- GeForce 7950 GX2, GeForce 7900 GTX, NVIDIA Control Panel: The Overclocking Configuration slider values do not always restore to their default values.

- GeForce 7950 GX2: Occasionally the HDTV desktop resize screen does not pop up after clicking the Resize Desktop tab.

- GeForce 7950 GX2: The Age of Empires intro video has a vertical sliver on the right side.

- GeForce 7900 GTX 512M : The NVIDIA Control panel Run Multiple Display wizard link does not work.

- GeForce 7900 GT/GS 256 MB, NVIDIA Control Panel: The Adjust Video Color Settings test image remains on the primary display after dragging the NVIDIA Control Panel to the secondary display.

- GeForce 7900 GTX: Medal of Honor: Spearhead and Breakthrough expansions crash to the desktop when started.

- GeForce 7900 GT: World of Warcraft–there is flickering during the cinematics.

- GeForce 7900 GX2, NVIDIA Control panel: The Transparency AA and Gamma Correct AA settings do not restore to their default values.

- GeForce 7900 GTX: Extended Desktop can be enabled without two displays attached.

- GeForce 7800 GTX 512 MB: Windows Media Player 10 crashes after playing a DVD for a few minutes.

- GeForce 7800 GT 256MB: 3DMark03–slow performance and video corruption occurs when running 3DMark03.

- GeForce 7800/7900, 3D Stereo: 3DMark05–in the first test, return to proxycon, there is texture corruption in the tunnel.

- GeForce 7800 GTX: Splinter Cell: Chaos Theory renders mostly black with unnatural blue highlights when HDR & Tone mapping are enabled.

- GeForce 7800 GTX, Windows XP Media Center Edition 2005: The desktop goes blank while changing resolutions.

- GeForce 7800 GT/GTX, Windows XP Media Center Edition: Video skips intermittently when playing HD network transport streaming clips.

- 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 MCE 2005: Some artifacts appear when de-interlacing is enabled on 1920x1080i video clips.

- GeForce 7600 GT: "The Battle Of The Middle Earth II"–corruption occurs when loading the game.

- GeForce 7600 GT, NVIDIA Control Panel: Desktop Color seettings are getting applied even after clicking **Cancel**.

- GeForce 7600 GT, Dual-link display: When playing a Blu-ray disc at resolutions greater than 1280x800 on a dual-link display, the Cyberlink warning message erroneously appears saying to reduce the resolution to less than 1920x1080.

- GeForce 7600 GT: Several HD-DVD titles do not display the PiP feature–"Charlie and the Chocolate Factory", "Batman Begins", and "Terminator 3".

- GeForce 7600 GT: "Troy" HD-DVD title doesn't play using the Cyberlink application.

- GeForce 7600 GT: "Constantine" HD-DVD VC-1 title shows corruption on the secondary stream.

- GeForce 7600 GT, NVIDIA Control Panel: There is a red tint on video playback of Blu-ray discs or HD DVDs after changing the nView modes.

- GeForce 7600/7300 GT: When resuming from a screen saver while playing a media file with Windows Media Player 10, the file plays fast forward.

- GeForce 7600 GT: A gray strip appears in the full-screen video mirror when playing a DVD as an overly with subtitles enabled.

- GeForce GeForce 7600 GS, NVIDIA Control Panel: DVD video does not display in overlay mode with the Adjust Video Color Settings page opened.

  This issue may occur because the NVIDIA Control Panel is rendering video. To correct, close the NVIDIA Control Panel and restart the DVD.

- GeForce 7300 256MB: Error message appears on Windows Media Player 10 when changing the refresh rate of the secondary monitor.

- GeForce 7300 GT 256MB: File corruption occurs in the Windows Media Player playlist when a 3D screen saver is launched.

- GeForce 7300 LE: NVIDIA Control panel fails to switch modes depending on the starting and target modes.

- GeForce 7300 LE/GS 128M: Display mode changes even after selecting **No** from the Revert Back dialog box.

GeForce 6 Series GPUs

- GeForce 6600 128MB: The Screen Resolution and Refresh rate page for the secondary Dualview display shows the wrong display mode information.

- GeForce 6600 256MB: After unplugging a Dualview display from the DVI or component output, the nView multi-display settings are still available.

- GeForce 6600 128MB: Full-screen video mirror is corrupted when playing a DVRMS format file using Windows Media Player 10.

- GeForce 6600, Windows XP Media Center Edition 2005 Update Rollup2: The system restarts while playing a video using MCE.

- GeForce 6600: There is corruption in the water in the Painkiller benchmark.

- GeForce 6600, Windows XP Media Center Edition 2005: MCE application goes blank while playing a video file.

- GeForce 6600 GT: After hot unplugging a DVI monitor, the monitor is still recognized by the NVIDIA Control Panel.

- GeForce 6600: The 3D Pipes screen saver crashes when previewed with the desktop rotated 90 degrees and then switched back to 0 degrees (no rotation).

- GeForce 6200 128 MB: Quick Time video files cannot be played in Clone mode with 720p HDTV.

- GeForce 6200 with TurboCache, Windows Media Edition 2005 Update Rollup2: Color-quality setting in the Display Wizard is applied incorrectly.

- GeForce 6200 128MB: The Television Setup wizard erroneously lets you change the display mode while playing a video file.

- GeForce 6150/6100: The Cyberlink Power DVD - HQV Film detail test fails.

- GeForce 6150/6100: Battlefield 2 has high frequency flicker of horizontal bands scanning across the screen on bright backgrounds.

NVIDIA Issues—SLI Mode

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

All GPUs

- SLI System: With two displays connected, in the NVIDIA Control Panel-> 3D Settings-> Set SLI Configuration page, the "Select the display to view SLI rendered content on" combobox sometimes shows more than two displays.

- The NVIDIA Control Panel prompts you to reboot the system after enabling SLI while in Dualview mode.

- With SLI mode enabled, the game Haze plays slowly.

- With SLI mode enabled, switching from DVI to analog display results in the wrong refresh rate being set.

NVIDIA Quadro Series GPUs

- NVIDIA Quadro cards, SLI: Unigraphics NX 4.0 certification test– some parts of the sample image are missing.

- NVIDIA Quadro FX5500, SLI System: With SLI mode enabled, GPU load balancing does not work with AutoCAD 2007.

GeForce 7 Series GPUs

- GeForce 7950 GX2 512MB Quad NVIDIA SLI: Battlefield 2– green pixel corruptions appear after enabling SLI mode.

- GeForce 7950 GX2 512MB Quad NVIDIA SLI: Civilization 4– white area of corruption with flickering appears while zooming out.

- GeForce 7950 GX2, GeForce 7900 GX2: Grand Theft Auto: San Andreas–intro videos are slightly darker when SLI AA is enabled.

- GeForce 7950 GX2, GeForce 7900 GTX, SLI: Call of Duty 2–occasional corruption appears when Optimize for SLI is enabled.

- GeForce 7900 GX2 Quad NVIDIA SLI: Tomb Raider: Legend– video playback is warped within an inch of the SLI mode split line.

- GeForce 7950 GX2, Quad NVIDIA SLI: The control panel Temperature page detects only two GPUs (instead of four) with Quad SLI mode enabled.

  The correct functionality is available with the utility NVIDIA nTune 5.0

- GeForce 7950 GX2, Quad NVIDIA SLI, NVIDIA Control Panel: The SLI performance mode option is visible for individual application profiles after SLI is disabled.

- GeForce 7950 GX2, Quad NVIDIA SLI, NVIDIA Control Panel: SLI performance mode setting on an application profile will not reset to defaults once a different option is selected.

- GeForce 7950 GX2 Quad NVIDIA SLI, NVIDIA Control Panel: "Use these settings only until I restart my computer" option on the Overclocking page does not work.

- GeForce 7950 GX2 Quad NVIDIA SLI, NVIDIA Control Panel: The "Continue to log temperature" option does not work.

  This functionality is available with NVIDIA nTune 5.0.

- GeForce 7950 GX2 Quad NVIDIA SLI:Displays that are connected to the secondary card in a Quad SLI configuration are not visible in the NVIDIA Control Panel or nView pages.

- GeForce 7950 GX2, Quad NVIDIA SLI: Selecting the numbered display in the "Select Display" drop-down list in the NV control panel produces a black screen and resets the display resolution.

- GeForce 7950/7900 GX2, Quad NVIDIA SLI: F.E.A.R.– the UI text occasionally remains on the screen after exiting the game when 16x SLIAA is enabled.

- GeForce 7950 GX2, Quad NVIDIA SLI: Prince of Persia: Warrior Within–the intro movie does not display after restarting a level if SLI and antialiasing are enabled.

- GeForce 7950 GX2, Quad NVIDIA SLI: Counter-Strike–with SLI mode enabled, a blue-screen crash occurs when changing the rendering mode from Direct 3D to OpenGL.

  To avoid this issue, always run the game using the Direct3D rendering mode.

- GeForce 7950 GX2, Quad NVIDIA SLI: Serious Sam II–some shadows flicker when Dynamic Shadow is set to high.

- GeForce 7950 GX2, Quad NVIDIA SLI: Chronicles of Riddick–– VSync tear occurs when SLIAA8x is enabled.

- GeForce 7900 GX2, SLI: The control panel Temperature page detects only one GPU (instead of two) with SLI mode enabled.

    The correct functionality is available with the utility NVIDIA nTune 5.0

- GeForce 7950/7900 GT 256MB, SLI: Spellforce 2– flickering corruption appears in the frame with SLI mode enabled.

- GeForce 7950/7900 GX2, SLI, Quad NVIDIA SLI: The Quake 4 custom color profiles are not effective and are not labeled correctly.

- GeForce 7950 GX2 Quad NVIDIA SLI: Sid Meier's Pirates– video overlays are corrupt when SLI SFR mode is used.

- GeForce 7950 GX2 Quad NVIDIA SLI: Rome:Total War–there is flickering and slow performance when playing the game.

- GeForce 7950 GX2 Quad NVIDIA SLI: The Godfather–the intro videos flash.

    You can correct the problem by disabling VSync.

- GeForce 7950 GX2 Quad NVIDIA SLI: Lock On– slow performance in the game.

- GeForce 7950 GX2 Quad NVIDIA SLI: Black and White 2–there is flickering and water corruption.

- GeForce 7950 GX2 Quad NVIDIA SLI , GeForce 7900, GeForce 6800: NHL 2006–with SLI mode enabled, the screen flickers several times when exiting back to the menu from gameplay.

- GeForce 7900 GTX/GeForce 7950 GX2 Quad NVIDIA SLI: Civilization 4– game creation screens have text rendering artifacts with 8xS AA or 16x SLI AA enabled.

- GeForce 7950 GX2 Quad NVIDIA SLI: Prince of Persia: Warrior Within–with SLI mode enabled, there is a block of corruption.

- GeForce 7950 GX2 Quad NVIDIA SLI Need for Speed: Most Wanted– with SLI mode enabled, textures on vehicles flicker.

- GeForce 7950 GX2 Quad NVIDIA SLI: Everquest 2–with SLI mode enabled, water ripples flicker.

- GeForce 7950 GX2 Quad NVIDIA SLI: Thief 3–the bottom half of the screen does not display when starting a new game.

- GeForce 7950 GX2, GeForce 6800/6600, SLI: X3 Demo–Flickering occurs while running the X3 demo as a benchmark.

- GeForce 7800 GT, SLI: Unable to change the SLI-output display.

- GeForce 7 and 6 Series, SLI: Evolution GT–with SLI mode enabled under any AFR mode, flickering occurs.

- GeForce 7 and 6 Series, SLI: Tomb Raider–with SLI mode enabled, there is stuttering and banding corruption.

GeForce 6 and GeForce FX Series GPUs

- GeForce 7 and 6 Series, SLI: With SLI mode enabled, Evolution GT flickers under any AFR mode.

- GeForce 7 and 6 Series, SLI: With SLI mode enabled, there is stuttering and banding corruption in Tomb Raider.

- GeForce 6800 256MB, SLI: Counter-Strike–text in the in-game control panel is corrupt when NVIDIA Control Panel antialiasing settings are enabled.

- GeForce 6800, SLI: The character portrait in Dungeon Siege 2 is corrupted.

- GeForce 6800 Ultra, SLI: There are intermittent application failures when using nForce4 SLI/SLI X16 motherboards.

- 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: With SLI mode enabled, there are corrupt shadows in the Lost Coast benchmark when the application 2x antialiasing is enabled.

- GeForce 6600, SLI: with SLI mode enabled, horizontal segments of terrain in World of Warcraft are shifted out of position, and in other cases the foreground terrain intermittently fails to hide background objects.

- GeForce 6600, SLI: The **Select display output** option is not available for NVIDIA SLI without the SLI connector.

  This is a known limitation of NVIDIA SLI when the SLI connector is not used.

- GeForce 6600, SLI, Windows XP: Lock On: Modern Air Combat has lower than expected performance at high resolutions with antialiasing enabled.

- GeForce 6600, SLI: City of Heroes–when SLI mode is enabled without the SLI connector connected, the screen is dark and textures in the clothing do not load.

- GeForce FX 5700: Error message appears after enabling NVKeystone with NVRotate enabled in 1600x1200 mode.

Open Issues in Version 93.71 for 64-bit Operating Systems

As with every released driver, version 93.71 of the Release 90 driver has open issues and enhancement requests associated with it. This section includes lists of issues that are either not fixed or not implemented in this version. Some problems listed may not have been thoroughly investigated and, in fact, may not be NVIDIA issues. Others will have workaround solutions.

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

- "NVIDIA Issues–Single GPU" on page 30
- "NVIDIA Issues–SLI Technology" on page 31

NVIDIA Issues–Single GPU

GeForce 7 Series GPUs

- 230292 GeForce 7950 GX2, Windows XP x64: The NVIDIA Control Panel crashes when trying to restore defaults in the 3D Settings pages.
- 232405 GeForce 7950 GX2, Windows XP x64: The displays lose sync when hot plugging a display and then enabling Clone mode.
- GeForce 7900 GTX, Windows XP x64 Edition: 3D FlowerBox screensaver flickers and displays a double image.
- 234649 GeForce 7600 GT, Windows XP x64: Video corruption occurs while playing WMV9 HD files.

GeForce 6 Series

- 233678 GeForce 6600 GT, Windows XP x64: There is corruption when dragging the Windows Media Player 10 window from the primary to the secondary display.
- 232829 GeForce 6100/6150, Windows XP x64: The nView Display Settings page in the Classic NVIDIA Control Panel disappears.
- 232813 GeForce 6100/6150, Windows XP x64: The nView Display Settings page in the Classic NVIDIA Control Panel does not detect HDTV displays properly.

- 227210 GeForce 6100/6150, Windows XP x64: The video in Windows Media Player is not rotated when the desktop is rotated.

GeForce FX Series GPUs

- 234046 GeForce FX 5200, Windows XP x64: Display Properties Window corruption occurs while playing a .vob file in Windows Media Player, previewing 3D Flower Box screen saver, and then reverting from the preview.

NVIDIA Issues–SLI Technology

GeForce 7 Series GPUs

- 244685 GeForce 7950 GX2 Quad NVIDIA SLI, Windows XP Professional Edition x64: The stained glass window in Elder Scrolls: Oblivion is corrupted when SLI is enabled.

- 193487 GeForce 7800 GTX, SLI, Windows XP x64: Half-Life 2 Day of Defeat does not run.

Not NVIDIA Issues

This section lists issues that have been determined to not be due to the NVIDIA driver. They are organized in the following sections:

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Not NVIDIA Issues—Single GPU

All GPUs

- Dual Core CPU: Counter Strike 1.6 hangs if you play Cheating Death 4.33.4 at same time.

  This application does not properly recognize dual-core CPUs.

- Counter-Strike Source frame rate is jumpy.

  Jittery/lagging movement has been seen when starting a game after running the Video Stress Test.

  Smooth movement is restored after exiting and then restarting the application. The issue does not appear when creating a new game, disconnecting, and then creating another new game.

GeForce 7 Series GPUs

- GeForce 7900 256MB: WinDVD video is corrupt when playing a DivX file.

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

- GeForce 7 and 6 Series: Prey has non-functioning application antialiasing when the desktop color depth is at 16 bpp.

  This is an application issue and not an NVIDIA bug. Enabling 32-bpp desktop color depth fixes this problem.

- GeForce 7 Series, GeForce 6 Series GPUs: Textures are not rendered in Age of Empires 3 at 1600x1200 and higher resolutions.

  This is an issue with the application.

- GeForce 7950 GX2, Quad NVIDIA SLI: World of Warcraft–Changing antialiasing modes in the NVIDIA control panel does not improve image quality.

This is not a bug, but an issue with the application's "Glow" effect. When the Glow effect is enabled, the NVIDIA Control Panel antialiasing settings do not work. Please use in-game antialiasing.

- GeForce 7950 GX2, NVIDIA Control Panel: The Overclocking Configuration - Test button does not appear to have any effect.

This is not a bug. The test is being performed, but there is no visual indicator.

- GeForce 7800 GTX/GT: The Chronicles of Riddick does not render correctly at 2560x1600 on the Apple 30" Cinema display.

This is an issue with the application.

- GeForce 7800 GTX, Windows XP Media Center Edition 2005 Update2: When running in window mode, there is tearing in the video on the top of the screen when playing MPEG-2 high definition clips on HDTV output.

This is an application issue with Media Center and does not occur if you run Media Center in Fullscreen mode.

- GeForce 7800 GTX/GT: Transparency antialiasing does not work with Grand Theft Auto San Andreas.

The driver does not apply Transparency antialiasing to triangles that are alpha-blended. Applications with alpha blending do not benefit from Transparency antialiasing.

- GeForce 7800 GT/GTX: Graphics are corrupted at the title screen in Age of Empires 3.

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

- GeForce 7800 GT/GTX: F.E.A.R. Demo has blocky explosion effects.

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

- GeForce 7800 GTX: Age of Empires 3 demo fails to run when connected to a DVI flat panel.

This is not an NVIDIA bug, but an issue with the application. Demo versions of the application attempt to set a mode that is not supported on the flat panel. To work around the issue, locate the file newprofile.xml and change the resolution setting to 1024x768.

This is fixed in final versions of the game.

- GeForce 7800 GTX/GT, GeForce 6800: Textures are not rendered in Age of Empires 3 at 1600x1200 and higher resolutions.

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

• GeForce 7800/GeForce 6800 GT: Shadow corruption/soft shadows appear after changing video settings in F.E.A.R.

This is an issue with the application and is documented as such in the demo's release notes.Disabling antialiasing fixes the soft shadow corruption.

• 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 7800 GTX / GeForce 6800 Ultra: Age of Empires 3 demo v1.0 has corruption on the title screen when running at high resolutions (1600x1200) with antialiasing set to Medium or High, Shader Quality set to Very High, and Shadow Quality set to Very High.

This is an issue with the application.

GeForce 6 Series GPUs

• GeForce 6600 128MB, Windows XP Media Center Edition 2005:The MCE screen does not appear when switched to full-screen mode.

This is an issue with the application.

• GeForce 7 Series, GeForce 6 Series GPUs: Textures are not rendered in Age of Empires 3 at 1600x1200 and higher resolutions.

This is an issue with the application.

• GeForce 7800 GT/GTX, GeForce 6800/6800 Ultra/GT: When selecting Detect Optimal Frequencies in the control panel, the desktop refresh rate switches to 60Hz.

• GeForce 7800 GTX/GT, GeForce 6800: Shadows fail to render in Splinter Cell 1.

- GeForce 7800 GTX/GT, GeForce 6800/6600: Ground and water textures are corrupted when zooming out in Civilization 4.

- GeForce 6800 PCI-E: The top of the video tears when watching a transport stream clip in VMR mode with Windows Media Player.

- GeForce 6800: Corruption occurs on certain vehicles in Joint Operations: Typhoon Rising.

- GeForce 6800: Command and Conquer Generals: Zero Hour displays green tint.

- GeForce 6800: Flickering corruption appears around the mouse cursor in Dungeon Siege 2.

- GeForce 6800, Windows XP Media Center Edition: Blue-screen crash occurs when dragging Windows Media Player 10 window from the primary to the secondary display.

- GeForce 6800 PCI-E: When played in Overlay mode, there is an initial hesitation during the Galaxy Quest menu ship flyby.

- GeForce 7800 GTX / GeForce 6800 Ultra: Age of Empires 3 demo v1.0 has corruption on the title screen when running at high resolutions (1600x1200) with antialiasing set to Medium or High, Shader Quality set to Very High, and Shadow Quality set to Very High.

  This is an issue with the application.

- GeForce 6800 / 6200: Battlefield 1942 has shimmering textures.

  Battlefield 1942 uses negative LOD intensively in the game, but this should not be used in conjunction with anisotropic filtering.

  To reduce shimmering, set the advanced option "negative LOD bias" to CLAMP, and then the image settings slider to High Quality.

- GeForce 7800/GeForce 6800 GT: Screen corruption may occur with F.E.A.R. when antialiasing and soft shadows are enabled.

  This is an issue with the application and is documented as such in the demo's release notes.Disabling antialiasing fixes the soft shadow corruption.

- 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 6800: Shadows are not rendering correctly in Ground Control 2.

  This is not an NVIDIA bug, but 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 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 6800 Ultra PCI-E: Shadows are not rendering correctly in Ground Control 2.

- 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 6600 GT: Antialiasing doesn't work with Serious Sam II Demo.

  This is not a bug. HDR in Serious Sam II is not supported by the NVIDIA control panel antialiasing.

- GeForce 6600 (128 MB): The game Hitman—Contracts refuses to start with graphics options set to the maximum (1600x1200, 4x antialiasing, 16x anisotropic filtering).

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

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

  A patch for this issue is available from Microsoft.

- 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 6200 256 MB: Windows Media Player 10 hangs when the desktop is rotated.

  This is an application issue and not an NVIDIA bug.

- 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 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 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 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 FX Series GPUs

- GeForce FX 5950 Ultra: Call of Duty 2 crashes when "optimal system settings" is chosen in the game options menu.

  This is not an NVIDIA bug, but an issue with the application. It is fixed with the full retail version of Call of Duty 2.

- 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 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.

GeForce2 and GeForce4 GPUs

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

  This is not an NVIDIA bug.

Not NVIDIA Issues—SLI Mode

- GeForce 7900 GT/GS, Dual-Core System, SLI: With SLI mode enabled, the game Flat Out stops responding after starting a game.

  This is not an NVIDIA bug, but an issue with the OS. To resolve the issue, install the Windows Dual-Core patches.

- GeForce 7800 GTX/GT, SLI: The load balancing line is corrupted when playing Civilizations 4 at 2560x1600.

  This is not an NVIDIA bug, but a visual effect resulting from the interraction between the frame rate and the update rate of the split line.

- SLI mode does not appear capable of being enabled with City of Villains.

  This issue occurs because City of Heroes and City of Villains share the same executable name.

  You can work around this issue by either

- *modifying the City of Heroes application profile (this will create a second City of Heroes profile) to enable SLI AFR mode, or*

- *set AFR as the rendering mode in Global Profile.*

For more information on customizing SLI profiles, visit www.slizone.com and navigate to Learn More->How-to Guides.

- GeForce 6 and 7 Series, SLI: SLI does not work with OpenGL applications when the SLI control panel page is open.

  This is the correct behavior with SLI rendering. If you need to adjust SLI settings for an OpenGL application you must adjust the NVIDIA control panel settings with the application closed, then close the control panel and open the application.

- GeForce 6 and 7 Series, SLI, Windows XP: With SLI enabled, Call of Duty 2 performance appears to be slow.

  For optimal SLI performance in Call of Duty 2, you must select 'YES' for 'Optimize for SLI' in the Graphics section of System Settings.

- GeForce 6 and 7 Series, SLI, Windows XP: After selecting 'YES' for 'Optimize for SLI' in the Graphics section of System Settings when playing Call of Duty 2, the setting resets to 'No' every time you restart the game.

  The problem is that the setting does not get saved to the player's config file. You must make sure 'YES' is selected each time you launch the application or you can ensure the setting gets written to the config file in one of the following ways:

  - *Type "seta r_multiGpu 1" in the console, or*

  - *Add "seta r_multiGpu 1" to the shortcut, or*

  - *Add "seta r_multiGpu 1" directly to your config.cfg and config_mp.cfg files in your directory under the "main/players" folder.*

- GeForce 6800, SLI: If SLI antialiasing is enabled, the regular antialiasing modes are not available after disabling SLI.

  The regular antialiasing modes will be available if you disable SLI antialiasing before disabling SLI. This works as it is designed.

- With SLI enabled, the SLI split line does not appear when VSync is forced on.

  This is not a bug, and the applications are, in fact, running in SLI mode. The SLI split line/load bar is not supposed to appear when Vsync is enabled in SLI mode.

• 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

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

VIA and ATI AGP 3.0 Chipsets

- **Problem**

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

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

- **Workaround**

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

DVD Playback Issues with Dual NVIDIA Quadro NVS Cards

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

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

PowerDVD 5.0 Does Not Display Correctly in nView Span Mode

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

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

DirectX Fails When Detaching/Reattaching Displays in Dualview Mode

This problem can be duplicated as follows:

1 Enable both displays in Dualview mode.

2 Detach monitor 2 and apply settings.

3 Reattach monitor 2 and apply settings.

   DirectX runtime fails on monitor 1.

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

OpenGL Viewport Scaling Problem in Horizontal Span Mode

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

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

Driver Reports 256 MB Memory on NVIDIA Quadro FX 330 Cards

• **Problem**

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

• **Explanation**

   This is not a bug but a product limitation.

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

Video Playback in nView Clone and Span Modes

• **Problem**

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

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

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

- **Explanation**

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

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

Monitor Ordering in the Windows Settings Page

Monitor Ordering on a Single GPU

- **Issue**

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

- **Explanation**

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

Monitor Ordering on a Multiple GPU System

- **Issue**

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

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

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

- **Explanation**

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

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

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

DirectX Applications Run Only on Single Display Even in Multiview Mode

- **Problem**

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

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

- **Explanation**

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

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

Applying Workstation Application Profiles

- **Background**

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

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

- **Issues**

  Configuration changes require the application to restart.

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

Advanced Timing Adjustment Limitations

- **Problem**

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

- **Explanation**

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

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

No Antialiasing of 3DMark03 Image Quality Screen Captures

- **Problem**

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

- **Explanation**

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

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

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

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

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.

Windows Media Player Hangs Playing MPEG Files

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

There are two ways to work around this problem:

• **Under Display Properties > Settings > Advanced… > Performance, set Graphics Hardware acceleration to None.**

• **Uninstall the WinDVD player.**

This is not an NVIDIA bug.

Antialiasing Problems With Certain Applications

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

VIA KX133 and 694X Chipsets With AGP 2X

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

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

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

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

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

Irongate Chipsets With AGP 1X

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

Poor Quality S-Video Output on Some TVs

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

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

1 In the Settings tab of the Display Properties Control Panel, click Advanced.

2 In the nView tab, click Device Settings and click Select Output Device.

3 In the Device Selection tab, click the TV option.

4 Change the "Video output format" to S-video.

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

- **Issue**

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

- **Root Cause**

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

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

- **Resolution**

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

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

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

Desktop Manager Does Not Re-Center Logon Screen

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

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

Issues with Video Mirror—Windows XP/2000

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

Table 2.1   Known Issues with Video Mirror

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

3

THE RELEASE 90 DRIVER

This chapter covers the following main topics:

- "Hardware and Software Support" on page 53

- "Driver Installation" on page 58

See the section "Release 90 Enhancements" on page 65 for a summary of Release 90 features and enhancements.

Hardware and Software Support

Supported Operating Systems

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

- Microsoft Windows® XP
  - Windows XP Media Center Edition 2005 Update Rollup2
  - 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

Supported NVIDIA Products

Table 3.1 and Table 3.2 lists the NVIDIA products supported by Version 93.71 of the Release 90 driver.

Table 3.1   Supported NVIDIA Consumer Products

Product	Windows XP 32-bit Windows 2000	Windows XP Professional x64
GeForce 7950 GX2 (PCI-E)	X	X
GeForce 7950 GT (PCI-E)	X	X
GeForce 7900 GTX (PCI-E)	X	X
GeForce 7900 GTO (PCI-E)	X	X
GeForce 7900 GT (PCI-E)	X	X
GeForce 7900 GS (PCI-E)	X	X
GeForce 7800 GTX 512 (PCI-E)	X	X
GeForce 7800 GTX (PCI-E)	X	X
GeForce 7800 GT (PCI-E)	X	X
GeForce 7800 GS (AGP and PCI-E)	X	X
GeForce 7600 GT (PCI-E)	X	X
GeForce 7600 GS (AGP and PCI-E)	X	X
GeForce 7500 LE (PCI-E)	X	X
GeForce 7300 GT (PCI-E)	X	X
GeForce 7300 SE (PCI-E)	X	X
GeForce 7300 LE (PCI-E)	X	X
GeForce 7300 GS (PCI-E)	X	X
GeForce 7100 GS (PCI-E)	X	X
GeForce 6800 (AGP and PCI-E)	X	X
GeForce 6800 XT (AGP and PCI-E)	X	X
GeForce 6800 XE (AGP and PCI-E)	X	X
GeForce 6800 Ultra (AGP and PCI-E)	X	X
GeForce 6800 LE (AGP and PCI-E)	X	X
GeForce 6800 GT (AGP and PCI-E)	X	X
GeForce 6800 GS (AGP and PCI-E)	X	X
GeForce 6700 XL (PCI-E)	X	X
GeForce 6610 XL (PCI-E)	X	X
GeForce 6600 VE (AGP and PCI-E)	X	X
GeForce 6600 LE (AGP and PCI-E)	X	X
GeForce 6600 GT (AGP and PCI-E)	X	X
GeForce 6600 (AGP and PCI-E)	X	X
GeForce 6500 (PCI-E)	X	X
GeForce 6200 LE (PCI-E)	X	X
GeForce 6200SE with TurboCache (PCI-E)	X	X
GeForce 6200 with TurboCache (PCI-E)	X	X
GeForce 6200 (AGP and PCI-E)	X	X
GeForce 6150 LE	X	X
GeForce 6150 nForce 430	X	X
GeForce 6100 nForce 430	X	X

Table 3.1   Supported NVIDIA Consumer Products (continued)

Product	Windows XP 32-bit Windows 2000	Windows XP Professional x64
GeForce 6100 nForce 405	X	X
GeForce 6100 nForce 400	X	X
GeForce 6100 nForce 420	X	X
GeForce PCX 5900	X	X
GeForce PCX 5750	X	X
GeForce PCX 5300	X	X
GeForce FX 5950 Ultra	X	X
GeForce FX 5900ZT	X	X
GeForce FX 5900XT	X	X
GeForce FX 5900 Ultra	X	X
GeForce FX 5900	X	X
GeForce FX 5800 Ultra	X	X
GeForce FX 5800	X	X
GeForce FX 5700VE	X	X
GeForce FX 5700LE	X	X
GeForce FX 5700 Ultra	X	X
GeForce FX 5700	X	X
GeForce FX 5600XT	X	X
GeForce FX 5600SE	X	X
GeForce FX 5600 Ultra	X	X
GeForce FX 5600	X	X
GeForce FX 5500	X	X
GeForce FX 5200LE	X	X
GeForce FX 5200 Ultra	X	X
GeForce FX 5200	X	X
GeForce FX 5100	X	X
GeForce4 Ti 4800 SE	X	
GeForce4 Ti 4800	X	
GeForce4 Ti 4600	X	
GeForce4 Ti 4400	X	
GeForce4 TI 4200 with AGP8X	X	
GeForce4 Ti 4200	X	
GeForce4 MX440SE with AGP8X	X	X
GeForce4 MX Integrated graphics	X	X
GeForce4 MX 460	X	X
GeForce4 MX 440-SE	X	X
GeForce4 MX 440 with AGP8X	X	X
GeForce4 MX 440	X	X
GeForce4 MX 420	X	X
GeForce4 MX 4000	X	X
GeForce3 Ti 500	X	
GeForce3 Ti 200	X	
GeForce3	X	
GeForce2 MX Integrated graphics	X	
GeForce2 MX 400	X	
GeForce2 MX 200	X	

Table 3.1   Supported NVIDIA Consumer Products (continued)

Product	Windows XP 32-bit Windows 2000	Windows XP Professional x64
GeForce2 MX 100	X	
GeForce2 MX	X	

Table 3.2   Supported NVIDIA Workstation Products

Product	Windows XP 32-bit Windows 2000	Windows XP Professional x64
NVIDIA Quadro FX 5500 SDI	X	X
NVIDIA Quadro FX 5500	X	X
NVIDIA Quadro FX 4500 X2	X	X
NVIDIA Quadro FX 4500	X	X
NVIDIA Quadro FX 4500 SDI	X	X
NVIDIA Quadro FX 4400	X	X
NVIDIA Quadro FX 4400G	X	X
NVIDIA Quadro FX 4000	X	X
NVIDIA Quadro FX 4000 SDI	X	X
NVIDIA Quadro FX 3500	X	X
NVIDIA Quadro FX 3450	X	X
NVIDIA Quadro FX 3400	X	X
NVIDIA Quadro FX 3000	X	X
NVIDIA Quadro FX 3000G	X	X
NVIDIA Quadro FX 2000	X	X
NVIDIA Quadro FX 1500	X	X
NVIDIA Quadro FX 1400	X	X
NVIDIA Quadro FX 1300	X	X
NVIDIA Quadro FX 1100	X	X
NVIDIA Quadro FX 1000	X	X
NVIDIA Quadro FX 700	X	X
NVIDIA Quadro FX 600	X	X
NVIDIA Quadro FX 560	X	X
NVIDIA Quadro FX 550	X	X
NVIDIA Quadro FX 540	X	X
NVIDIA Quadro FX 500	X	X
NVIDIA Quadro FX 350	X	X
NVIDIA Quadro FX 330	X	X
NVIDIA Quadro4 980 XGL	X	X
NVIDIA Quadro4 900 XGL	X	X
NVIDIA Quadro4 780 XGL	X	X
NVIDIA Quadro4 750 XGL	X	X
NVIDIA Quadro4 700 XGL	X	X
NVIDIA Quadro4 580 XGL	X	X
NVIDIA Quadro4 550 XGL	X	X

Table 3.2   Supported NVIDIA Workstation Products (continued)

Product	Windows XP 32-bit Windows 2000	Windows XP Professional x64
NVIDIA Quadro4 500 XGL	X	X
NVIDIA Quadro4 400 NVS	X	X
NVIDIA Quadro4 380 XGL	X	X
NVIDIA Quadro4 200 NVS	X	X
NVIDIA Quadro NVS 440	X	X
NVIDIA Quadro NVS 400	X	X
NVIDIA Quadro NVS 285 PCI-E	X	X
NVIDIA Quadro NVS 280 PCI	X	X
NVIDIA Quadro NVS 280	X	X
NVIDIA Quadro NVS 280 SD	X	X
NVIDIA Quadro NVS 210s	X	X
NVIDIA Quadro NVS 200	X	X
NVIDIA Quadro NVS 50 PCI	X	X
NVIDIA Quadro NVS with AGP8X	X	X
NVIDIA Quadro NVS	X	X
NVIDIA Quadro2 MXR	X	
NVIDIA Quadro DCC	X	

Supported Languages

The Release 90 ForceWare Graphics Drivers supports the following languages in the main driver Control Panel:

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

Driver Installation

System Requirements

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 (32-bit editions)	40.3 MB
Windows XP (64-bit editions)	47.9 MB
Windows 2000	40.3 MB

Table 3.4   Hard Disk Space Requirements—Non-English Languages

Operating System	Minimum Hard Disk Space
Windows XP (32-bit editions)	20.8 MB
Windows XP (64-bit editions)	20.8 MB
Windows 2000	20..8 MB

Table 3.5   Hard Disk Space Requirements—Full International Package

Operating System	Minimum Hard Disk Space
Windows XP (32-bit editions)	61.1 MB
Windows XP (64-bit editions)	68.7 MB
Windows 2000	61.1 MB

Installation Instructions

Before You Begin

- If you do not have System Administrator access privileges, it is assumed that the appropriate person with System Administrator access in your organization will set up and install the NVIDIA graphics driver software on your computer.

- The installation process copies all necessary files for operation into the appropriate directories.

- The nView system files are copied to your **`Windows\System`** directory.

- nView Desktop Manager Profile files (*.**tvp**) are saved in the **`Windows\Nview`** directory.

  Depending on the version of the NVIDIA driver previously installed, profiles may also be located in the **`Documents and Settings\All Users\ Application Data\nView_Profiles`** directory.

- As part of the install process, an uninstall is registered in your system.

- Under Windows Me and Windows XP, the NVIDIA driver is installed in "Dualview mode" display. However, note that the second display is not activated by default, but must be enabled.

- Under Windows 2000, the NVIDIA Display Driver is installed in Span mode. See the instructions in the *ForceWare Graphics Drivers User's Guide* for instructions on how to install nView DualView mode.

Preserving Settings Before Upgrading Your Software

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

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

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

1 Open the nView Desktop Manager Profiles page (Figure 4.1).

2 To preserve your current settings, you can use either the **Save** or the **New** option from the nView Desktop Manager Profiles page:

- If you want to overwrite the currently loaded profile with your changed settings, use the **Save** option. Notice that a warning message indicates that you are about to overwrite the selected profile.

- If you want to retain the currently loaded profile and want to save your changed settings to a new file, click the **New** option. Enter a name and description of the profile in the New Profile dialog box. For example, you can name this profile **My Settings**.

3 If you are an "advanced" user and want to customize certain settings in the saved profile, click **Advanced** << to expand the dialog box (Figure 4.2).

4 To customize the settings, you can select or clear any of the settings check boxes.

5 Click **Save** to return to the main Profiles page.

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

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

Note: nView Desktop Manager profile (**.tvp**) files are saved in the **Windows\ nView** directory. Depending on the version of the NVIDIA driver previously installed, profiles may also be saved in the **Documents and Settings\All Users\Application Data\ nView_Profiles** directory.

6 Now you can uninstall your current driver for a driver upgrade.

7 After you restart your computer following an NVIDIA new driver install, you can easily load the saved profile from the Profiles page of nView Desktop Manager.

About Using Saved Profiles in Another Computer

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

Uninstalling the NVIDIA Display Driver Software

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

To uninstall the nView software, follow these steps:

1 From the Windows taskbar, click **Start** > **Settings** > **Control Panel** to open the Control Panel window.

2 Double-click the **Add/Remove Programs** item.

3 Click the **NVIDIA Display Driver** item from the list.

4 Click **Change/Remove**.

5 Click **Yes** to continue.

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

- If you click **Yes**, all of the nView software and all of your saved profiles will be deleted.

- If you click **No**, the nView software is removed, but the profile files are saved in the `Windows\nView` directory on your hard disk.

Your system now restarts.

Installing the NVIDIA ForceWare Graphics Drivers

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

2 Click the driver download link.

The license agreement dialog box appears.

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

Opening the EXE file launches the NVIDIA InstallShield Wizard.

4 Follow the instructions in the NVIDIA InstallShield Wizard to complete the installation.

4

NVIDIA DRIVER HISTORY

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

Driver Release History

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

Table 4.1   NVIDIA Drivers for Windows

Driver	Name	Versions	Comments
Release 90	ForceWare	91.28, 91.31, 91.33, 91.37,91.45, 91.47, 93.71	
Release 80	ForceWare	81.82, 81.84, 81.85, 81.87, 81.94, 81.95, 81.98, 82.12, 82.14, 83.40 84.12, 84.20, 84.21, 84.25, 84.43	
Release 75	ForceWare	77.56 77.72, 77.76, 77.77, 78.01, 78.05	
Release 70	ForceWare	71.84, 71.89	
Release 65	ForceWare	66.77, 66.93, 67.02, 67.03, 67.66	
Release 60	ForceWare	61.76, 61.77	
Release 55	ForceWare	56.64, 56.72, 57.30	
Release 50	ForceWare	52.16, 53.04	
Release 40	Detonator FX	44.03–45.xx	
Release 40	Detonator 40	40.60–44.02	
Release 35	Detonator 35	35.60–37.80	
Release 25	Detonator 25	26.00–32.90	
Release 20	Detonator XP	21.83–23.xx	
Release 10	Detonator 3 v1x.xx	10.00–17.xx	

Release 90 Enhancements

Release 90 provides these new features and improvements:

• Establishes the new NVIDIA Control Panel as the recommended user interface.

• Includes several PureVideo improvements.

• Increased stability and performance.

OpenGL

The following extensions have been added:

• WGL_NV_gpu_affinity

Video

Release 90 includes the following new PureVideo features and improvements:

Video Processing Improvements

Release 90 includes several PureVideo technology improvements[1]:

• Added noise reduction post processing

• Added image sharpening post processing

• Improved inverse telecine algorithm

• Improved de-interlacing algorithm

• Improved compatibility with third party MPEG-2 decoders

New Features—Available Only in the New NVIDIA Control Panel

• Color Temperature Correction

   • Allows users to compensate for monitor gamut differences

   • Enhances color correctness of video

• Video Gamma Enhancement to include RGB gamma adjustment

   • RGB Gamma for VMR9

   • Allows users to tweak gamma in channels separately

---

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

    • For both Overlay and VMR9

Control Panel

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

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

Release 80 Enhancements

NVIDIA SLI™ Enhancements

- Dynamic Enable/Disable Capability

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

- Cross-card compatibility

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

- SLI performance without an SLI (bridge) connector on select graphics cards for the mainstream market

- Improved SLI performance and a streamlined list of application profiles for OpenGL

- Changing application profiles never requires a system reboot.

- TV/HDTV support under SLI

- Ability to select which display to use for the output.

- Additional SLI Support

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

Chipset	PCI-Express Graphics Cards
NVIDIA nForce4 SLI	

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

NVIDIA PureVideo™ Enhancements

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

Support for the Next Generation of NVIDIA GPUs

Additional Details by Driver Module

DirectX

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

OpenGL

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

Video

Release 80 includes the following new PureVideo features and improvements:

- Improved inverse 3:2 implementation

- Improved inverse 2:2 implementation

- Adaptive Deinterlacing for HD content on GeForce 6600 and high GPUs

- PureVideo support for the next generation of GPUs

Classic NVIDIA Control Panel

- HDTV Overscan compensation support

  Includes X-Y adjustment, and independent front-end timing adjustment features

- Dynamic SLI enable/disable capability

Release 75 Enhancements

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

OpenGL Enhancements

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

SLI Support Improvements

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

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

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

- Improved SLI performance for DirectX and OpenGL applications.

- Improved control of SLI profiles and rendering modes.

System-Wide Desktop Manager Settings

Control Panel Interface Changes

- Added a Triple Buffering control option for improved frame rates.

- Added Transparency Antialiasing Control (for GeForce 7800 GTX)

- Added Gamma Correct Antialiasing Control (for GeForce 7800 GTX)

- Combined DirectX and OpenGL application profiles on one page

Additional Details by Driver Module

Display Driver

- Improved high-resolution scalable desktop functionality

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

  The driver can also present underscan modes on demand, and supports variable underscan ratios.

- Off-screen 2D Memory Management Optimization

- Efficient synchronization between clients allows for sharing of off-screen resources with DirectX applications. This avoids potential performance

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

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

DirectX

Improved driver stability and performance, including the following areas:

- UMA support
- 2D operations
- SLI

NVIDIA Display Control Panel

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

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

nView Desktop Manager

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

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

Release 70 Enhancements

Support for Newest GeForce 6 Series GPUs

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

Additional SLI Support

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

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

Improved Video Functionality

- Improved video scaling for the newest GeForce 6 Series GPUs

- Improved de-interlacing

- Windows Media Video 9 (WMV9) Video Acceleration

  - Includes support for hardware acceleration decoding of WMV9 video files on GeForce 6 series GPUs.

  - A software update from Microsoft is required to enable this feature.

Desktop Manager Wizard Improvements

- Improved Setup Wizard for Display Monitor, TV, and HDTV.

- New Hot Keys—Toggle Stereo 3D Display and Transparent Desktop Lock

Control Panel Interface Improvements

- Improved HDTV-over-DVI User Interface, and support for arbitrary overscan/underscan for HDTV-over-DVI

- Improved pages—Driver Information Screen, Advanced Timings, Change Resolutions

- New property pages - SLI (available with NVIDIA SLI graphics cards) and Tools.

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

Release 65 Enhancements

SLI Support

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

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

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

512 MB Frame Buffer Support

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

OS Support

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

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

Enhancements in Driver Performance

Improved Robustness

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

Video Enhancements

Video enhancements in Release 65 include

- Optimized motion compensation and video processing to take advantage of the capabilities of the newest generation of NVIDIA GPUs.

- Support for Microsoft's Certified Output Protection Protocol (COPP)

- Improved media capture interface

- Inverse Telecine (3:2 pulldown detection and correction)

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

3D Graphics API Enhancements

- **DirectX Enhancements**
  - DirectX 9.0c Compatibility
  - Supports the capabilities of the newest generation of NVIDIA GPUs for improved DirectX shader handling and reduced CPU overhead

- **OpenGL Enhancements**
  - Improved and more efficient vertex_buffer_object (VBO) handling
  - More efficient memory management for improved performance under DualView

HDTV Support Enhancements

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

Desktop Manager and Control Panel Improvements

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

- New Negative LOD Bias control page (effective with version 67.03)

- High Resolution Scalable Desktop Performance

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

Release 60 Enhancements

Latest GPU Support

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

- Improved vertex and pixel compilers
- Video shaders

PCI Express Support

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

- DirectX support
- Enhanced OpenGL support

  Improved texture memory management and bandwidth utilization

Enhancements in Driver Performance

- Enhanced Robustness

  The ForceWare Release 60 graphics driver offers more robust stability and compatibility in DirectX support, antialiasing, and desktop rotation.

- Reduction of OCA issues
- Dynamic Video Memory

  Streamlines OS system resources for large frame buffer configurations

3D Graphics API Enhancements

Direct3D

- DirectX 9.0c Support

OpenGL

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

Release 55 Enhancements

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

PCI Express Support

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

PAE Support

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

nView Desktop Manager Enhancements

- Seamless nView support between 32-bit and 64-bit processes on Windows 64-bit Edition

- Dual NVKeystone support for independent keystone trapezoids under nView Span modes.

- Per-display Desktop Management

User Interface Enhancements

- New application profiles capability lets you associate a collection of driver settings—such as antialiasing and display quality settings—with an application.

- Easy access standalone panel, independent of the Microsoft Display Properties window.

- Improved multi-adapter support.

- Improved TV and HDTV Controls

Video Support Enhancements

- Advanced de-interlacing and inverse 3:2 pull-down capability

- Enhanced HDTV and Media Center support

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

3D Graphics API Enhancements

Direct3D

- Improved antialiasing performance
- Improved shaders

OpenGL

New extension: `GL_NV_pixel_buffer_object`

Release 50 Enhancements

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

64-Bit Support

Driver Release 50 offers AMD64 and IA64 OS support.

Dynamic Memory Mapping

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

NVIDIA Unified Compiler

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

Display Driver Changes and New Features

- **Rotation support**

  Added to Windows Me/9x.

- **Custom resolutions**

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

- Screen editing

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

- **Dynamic EDIDs**

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

- **Support for special panels and devices**

  - Large panels

  - Wide panels

  - Seamless Span modes in the mode list to support T221 style large panels

  - Interlaced modes for HDTV

  - DVI device hot plugging

- **Frame Lock functionality**

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

- **Edge Blend functionality**

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

Video—New Features

Video Mixing Renderer (VMR) support

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

PowerMizer—New Features

- Dynamic peak power control
- Thermal Protection version 2.0

User Interface Changes

New Features

- **Dualview**

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

- Analog display + digital display

- Digital display + analog display

- TV + digital display

- Other combinations

• Change Resolution panel

• Improved Color Correction panel with enhanced Gamma

• HDTV support

Improvements

• Menus for NVIDIA user components

• Easy access to nView Display Mode or Windows Display Properties Settings through the NVIDIA Settings taskbar utility

• Panel access for non-administrator users

• Tool tips for the scroll bar on the NVIDIA menu

• Improved Performance and Quality Settings panel

• Improved TV-Out settings panel

• Improved device selection (display pairs)

• Separate Overlay Controls panel

• Separate Full Screen Video settings panel

nView

• Action Toolbar

• Kinematic mouse actions

• Resolution per Desktop support

• Application monitor exclusions and inclusions

• Internet Explorer pop-up prevention

• Monitor grids

• Keystone luma compensation

• Multiview support

• nViewCmd

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

DirectX Graphics

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

OpenGL

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

Release 40 Enhancements

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

Enhanced Display Driver, DirectX, and Video Capabilities

- Windows XP SP1

  - Release 40 supports Windows XP SP1, Windows Media Center edition, and Windows XP Tablet PC.

  - Release 40 provides support for bugcheck EA callbacks, enabling OCA EA failures to be resolved more quickly while assisting to identify failure causes—such as due to chip instability or overclocking.

- Rotation support

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

- DirectX 9 support

  With Microsoft's release of DirectX 9 runtime, Release 40 version 42.51 and later provides support for DirectX 9, which includes the new vertex shaders, antialiasing modes, and multi-display device support.

- Video enhancements

  - Flip Sync functionality support

  - Support for multiple Macrovision clients

  - Simplified Video Mirror controls

- TV Overscan support

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

New Graphical User Interface

- Media Center Tray application

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

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

- New Display Properties panel

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

Enhanced nView Desktop Manager Features

- Additional OS support

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

- Zoom support

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

- NV-Switcher

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

- Color-keyed windows

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

- Taskbar and menu transparency

- New window actions and application settings.

- Keystone support[5]

OpenGL Enhancements

- OpenGL 1.4 ICD with NVIDIA extensions

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

- Enhancements for workstation applications

  - NV1x line stipple enhancements, and NV2x 2-sided lighting optimizations

  - Immediate mode optimizations for Solid Edge, and display list tuning for UGv17.

- Multi-monitor improvements

  New accelerated spanning mode is enabled by default.

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

- Reduced power consumption

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

- Dynamic AGP/Video memory management

Release 35 Enhancements

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

- NVRotate™

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

- Improved and expanded NVIDIA nView Desktop Manager application

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

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

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

Release 25 Enhancements

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

- nView

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

  - nView Display Manager

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

  - nView Desktop Manager

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

- Dualview support for Windows 2000

- Improved DirectX Video Acceleration (DXVA)

- Special support for NVIDIA NV25 capabilities

  - IDCT support for DirectX VA

  - Improved antialiasing compatibility and performance

  - Support for NV25 hardware overlays under OpenGL

- Enhanced 3D stereo functionality

  - Support for lenticular lenses on LCDs

  - Stereo DIN connector support

  - VSYNC Off with 3D Stereo

  - Stereo API for developers

- OpenGL enhancement

  - New `render_to_texture` extension

Release 20 Enhancements

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

- OpenGL 1.3 ICD with NVIDIA extensions

- OpenGL performance optimizations

- Optimized DirectX pipeline with NVIDIA pixel and vertex shaders

- Full support for Windows XP, including

  - Full hardware acceleration for Windows XP GUI features

  - Accelerated Windows XP 3D performance through the NVIDIA XPress Link technology

Release 10 Enhancements

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

- Support for Microsoft DirectX 8

- Support for Microsoft DirectX VA 1.0

- NVIDIA 3D Stereo (requires installation of the optional Stereoscopic driver)

  The driver provides stereoscopic viewing capabilities for games and still images.

- Special support for NVIDIA GeForce3 capabilities:

  - Pixel and Vertex Shader support for DirectX 8 and OpenGL®

  - Quincunx antialiasing option for enhanced image quality and performance

- AMD® Athlon™ Processor and Intel Pentium® 4 Processor optimizations

- Improved TwinView™ interface

A

MODE SUPPORT FOR WINDOWS

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

General Mode Support Information

The NVIDIA graphics driver includes a standard list of display modes that are supported by default. These modes are listed in the section "Default Modes Supported by GPU" on page 89.

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 98.)
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 98.)
		• All GeForce 7 Series GPUs
		• GeForce 6800 Ultra 512
		• GeForce 6800 with 512 MB
Dell WFP 3007 (Dual Link DVI)	2560x1600 @ 60 Hz	• All High-end NVIDIA Quadro FX (see list of products in "NVIDIA Quadro FX Family of High End GPUs" on page 98.)
		• All GeForce 7 Series GPUs
		• GeForce 6800 Ultra 512
		• 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:

-

-

-

-

-

-

Understanding the Mode Format

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

	Resolution	Color Depth	Refresh Rates

Example entry: `1024 x 768   32   60 70 72 75 85 100 120 140 144 150 170 200`

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
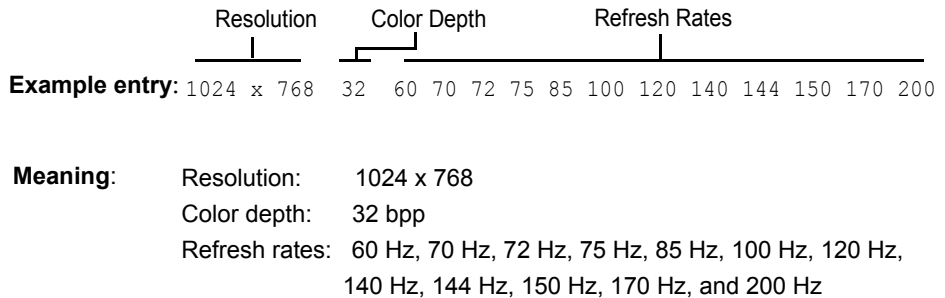
Figure A.1   Mode Format

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 7950 GX2 / GT

- NVIDIA GeForce 7900 GT / GTX / GS / GTO

- NVIDIA GeForce 7800 GT / GTX / GTX 512

- NVIDIA GeForce 7600 GT

- NVIDIA GeForce 7500 LE

- NVIDIA GeForce 7300 GT

- NVIDIA GeForce 7300 GS

- NVIDIA GeForce 7300 SE

- NVIDIA GeForce 7300 LE

- NVIDIA GeForce 7100 GS

- NVIDIA GeForce 6800 GS

- NVIDIA GeForce 6800 / 6800 Ultra

- NVIDIA GeForce 6800LE / 6800GT

- NVIDIA GeForce 6800 XT

- NVIDIA GeForce 6610 XL

- NVIDIA GeForce 6600 / 6600 GT / 6600LE / 6600VE

- NVIDIA GeForce 6500

- NVIDIA GeForce 6200

- NVIDIA GeForce 6200 w/TurboCache™

- NVIDIA GeForce 6200SE w/TurboCache™

- NVIDIA GeForce 6150 (nForce 430)

- NVIDIA GeForce 6150 LE

- NVIDIA GeForce 6100 (nForce 430/405/400/420)

- 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 5900 Ultra
- NVIDIA GeForce FX 5900/GeForce PCX 5900
- 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 5500
- NVIDIA Quadro FX 5500 SDI
- NVIDIA Quadro FX 4500 X2
- NVIDIA Quadro FX 4500
- NVIDIA Quadro FX 4500 SDI
- NVIDIA Quadro FX 3400 / Quadro FX 4400
- NVIDIA Quadro FX 4400G
- NVIDIA Quadro FX 4000
- NVIDIA Quadro FX 4000 SDI
- NVIDIA Quadro FX 3500
- NVIDIA Quadro FX 3450 / Quadro FX 4000 SDI
- NVIDIA Quadro FX 1500
- NVIDIA Quadro FX 1400
- NVIDIA Quadro FX 560
- NVIDIA Quadro FX 550
- NVIDIA Quadro FX 540
- NVIDIA Quadro FX 3000 / Quadro FX 1300
- NVIDIA Quadro FX 3000G
- NVIDIA Quadro FX 700
- NVIDIA Quadro NVS 440
- NVIDIA Quadro NVS 285

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
```

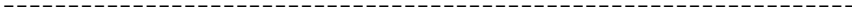## Vertical Spanning Modes

```
 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 440 with AGP8x / GeForce PCX 4300
- NVIDIA GeForce MX 4000
- 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 280
- NVIDIA Quadro NVS 280 SD
- NVIDIA Quadro NVS 210s
- 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
```

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

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 lists the supported modes and formats for the following:

External DAC Mode Support

Fairchild FMS3815 Modes Supported

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

Table A.3 External DAC Modes (Fairchild FMS3815)

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

Analog Devices ADV-7123 Modes Supported

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

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

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

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

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

TV-Out Mode Support

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

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

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

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

Resolution	Comments
480i (SDTV)	
480p (EDTV)	
720p (HDTV)	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.
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.