ForceWare Drivers
Release Notes

Version 52.16 for Windows

NVIDIA Corporation
October 20, 2003

Notice

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

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

Trademarks

NVIDIA, the NVIDIA logo, 3DFX, 3DFX INTERACTIVE, the 3dfx Logo, STB, STB Systems and Design, the STB Logo, the StarBox Logo, NVIDIA nForce, GeForce, NVIDIA Quadro, NVDVD, NVIDIA Personal Cinema, NVIDIA Soundstorm, Vanta, TNT2, TNT, RIVA, RIVA TNT, VOODOO, VOODOO GRAPHICS, WAVEBAY, Accuview Antialiasing, the Audio & Nth Superscript Design Logo, CineFX, the Communications & Nth Superscript Design Logo, Detonator, Digital Vibrance Control, DualNet, FlowFX, ForceWare, GIGADUDE, Glide, GOFORCE, the Graphics & Nth Superscript Design Logo, Intellisample, M-BUFFER, nfiniteFX, NV, NVChess, nView, NVKeystone, NVOptimizer, NVPinball, NVRotate, NVSensor, NVSync, the Platform & Nth Superscript Design Logo, PowerMizer, Quincunx Antialiasing, Sceneshare, See What You've Been Missing, StreamThru, SuperStability, T-BUFFER, The Way It's Meant to be Played Logo, TwinBank, TwinView and the Video & Nth Superscript Design Logo are registered trademarks or trademarks of NVIDIA Corporation in the United States and/or other countries. Other company and product names may be trademarks or registered trademarks of the respective owners with which they are associated.

Intel, Indeo, and Pentium are registered trademarks of Intel Corporation. Microsoft, Windows, Windows NT, Direct3D, DirectDraw, and DirectX are trademarks or registered trademarks of Microsoft Corporation. OpenGL is a registered trademark of Silicon Graphics Inc.

Other company and product names may be trademarks or registered trademarks of the respective owners with which they are associated.

Copyright

Table of Contents

List of Tables

C H A P T E R

1

INTRODUCTION TO RELEASE NOTES

This edition of Release Notes describes the Release 50 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 50 Driver Issues" on page 2 gives a summary of issues that are open
  in this version, and gives detailed descriptions of issues that have been
  resolved in this version.

- "The Release 50 Driver" on page 6 describes the NVIDIA products
  supported by the driver, and the supported languages, system requirements,
  and known limitations of the driver.

- "NVIDIA Driver History" on page 18

- "Mode Support for Windows" on page 33

Changes in this Edition

This edition of Release Notes includes information about version 52.16 of the
Release 50 driver. It discusses changes made to the driver since version 44.03.
These changes are discussed beginning with the chapter "Release 50 Driver
Issues" on page 2.

CHAPTER

2

RELEASE 50 DRIVER ISSUES

This chapter describes open issues for version 52.16, and resolved issues and driver enhancements for versions of the Release 50 driver up to version 52.16. The chapter contains these sections:

Open Issues in Version 52.16

As with every released driver, version 52.16 of the Release 50 driver has open issues and enhancement requests associated with it. What follows is a list 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, as is the case with most of the issues in this section.

- Clone mode may be set for the GeForce FX 5600 although only one display is connected.

  This setting causes a drop in the performance of 3D applications. The workaround is to use the NVIDIA control panel to reset the system to standard mode from clone mode.

- GeForce FX 5950 Ultra: When 4x FSAA is enabled, half of the screen is black in Tiger Woods 2004 introductory video.

- GeForce4 MX 440 and GeForce4 Ti 4400, Windows XP: Blue-screen crash during Battlefield 1942 Desert Combat.

  A fix for this issue will be included in the next driver release.

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

  This is a known issue with the application. NVIDIA is working with the developer to address it.

- GeForce FX 5950 Ultra and GeForce4 Ti 4400, Windows XP: Rendering corruption in Battlefield 1942 Desert Combat.

  A fix for this issue will be included in the next driver release.

- GeForce FX 5950 Ultra, Windows XP: "X2: The Threat" benchmark is choppy or jerky in some places.

  A fix for this issue will be included in the next driver release.

- Windows XP: Antialiasing doesn't appear to be working in Final Fantasy XI benchmark.

  This is a known issue with the application. NVIDIA is working with the developer to address it.

- All GeForce FX: Intermittently, Warcraft III videos are not displayed properly on some systems.

  A fix for this issue will be included in the next driver release.

Issues Resolved in Version 52.16

Significant issues resolved in driver version 52.16 are listed below:

- Selecting application mode from the control panel gives you application-controlled anisotropic filtering.

  By design, no other filtering is enabled by this selection.

- Warcraft 3: Exiting game can result in wrong orientation and corruption.

- Quadro2 EX, Windows 2000 and Windows XP: Only VGA after "Large Model CAD" or "I-deas Masters Series" selected.

- Shaded detail drawing views rendered in wrong color.

- Continued model rotation results in increased memory usage in Unigraphics 18.05.2 and NX 1.02.3.

- Rise of Nations gives intermittent blue-screen result when played.

- Personal Cinema GeForce FX 5200, Windows XP: There is flickering when previewing with WinDVR.

- All GeForce FX, Windows XP: Corruption around mouse in Dungeon Siege when antialiasing is enabled.

- GeForce FX 5200, Windows XP: Abnormal light-green texture on wall in Game 3 of 3DMark03.

- GeForce4 MX 440, Windows XP: Blue-screen crash in Flight Simulator 2004 when display settings selected during a flight with 2x or Quincunx antialiasing enabled.

- GeForce FX Go5200, Windows XP: Setting PAL on TV still reboots to NTSC.

- Quadro FX 3000, Window 2000: I-deas 9 hangs at start-up.

- All GeForce FX, Windows XP: Blue-screen crash in Breed demo mission just before the landing craft lands.

- All GeForce FX, GeForce3, and GeForce4 Ti; Windows XP: Midnight Club 2 loading screen is not rendered when antialiasing is enabled.

- GeForce FX 5900: Big Mutha Truckers returns to a corrupted desktop with antialiasing enabled.

- GeForce2 MX and GeForce2 GTS, Windows 2000 and Windows XP: Cannot switch TV format to PAL if resolution is set to 720x480 or to NTSC if it is set to 720x576.

- GeForce FX 5200, Windows XP: Reflection corruption occurs in Aquanox 2.
- Quadro4 980 XGL: The display exhibits corruption in the Unigraphics 18.0.5.2 in drafting application.

C H A P T E R

3

THE RELEASE 50 DRIVER

This chapter covers the following main topics:

-
-
-
-

About the Release 50 Driver

The Release 50 driver includes drivers designed for the following Microsoft® operating systems:

- Microsoft Windows® XP
    - Windows XP Media Center Edition 2004
    - Windows XP Media Center Edition
    - Windows XP Professional
    - Windows XP Home Edition
    - Windows XP 64-Bit Edition
- Microsoft Windows 2000 and Windows NT® 4.0
- Microsoft Windows 95, Windows 98, and Windows Millennium Edition (Me), collectively called Windows 9x in this document

Table 3.1 and Table 3.2 list the NVIDIA products supported by the Release 50 driver. The products are listed in the approximate order of their performance.

Note: Some Release 50 features support only certain NVIDIA graphics cards, which are specified in the features list in "Release 50 Enhancements" on page 19.

Table 3.1 Supported NVIDIA GPU-Based Products

NVIDIA Desktop Products	NVIDIA Workstation Products	Number of Displays Supported Per Card
nForce™2 S nForce2 ST nForce2 G nForce2		**2**— applies to all GPUs in this category.
nForce 420/420D nForce 220/220D		**1**— applies to all GPUs in this category.
GeForce FX 5950 Ultra		**2** — applies to all GPUs in this category.
GeForce FX 5700 Ultra GeForce FX 5700 GeForce FX Go5700 GeForce FX Go5750	Quadro FX 1100	**2** — applies to all GPUs in this category.
GeForce FX 5900 GeForce FX 5900 Ultra GeForce FX 5950	Quadro FX 3000	**2** — applies to all GPUs in this category.
GeForce FX 5200 Ultra GeForce FX 5200 GeForce FX Go5100 GeForce FX Go5200	Quadro FX 500 Quadro NVS 280 PCI	**2** — applies to all GPUs in this category.
GeForce FX 5600 Ultra GeForce FX 5600 GeForce FX 5600 SE GeForce FX Go5600	Quadro FX Go700	**2** — applies to all GPUs in this category.
GeForce FX 5800 Ultra GeForce FX 5800	Quadro FX 2000 Quadro FX 1000	**2** — applies to all GPUs in this category.
GeForce4 Ti 4800 GeForce4 Ti 4800 SE GeForce4 Ti 4200 GeForce4 4200Go	Quadro4 980 XGL Quadro4 780 XGL Quadro4 Go700	**2** — applies to all GPUs in this category.
GeForce4 Ti 4600 GeForce4 Ti 4400 GeForce4 Ti 4200 GeForce4 440 Go GeForce4 420 Go GeForce4 410 Go	Quadro4 900 XGL Quadro4 750 XGL Quadro4 700 XGL	**2** — applies to all GPUs in this category.
GeForce3 GeForce3 Ti 500 GeForce3 Ti 200	Quadro DCC	**1** — applies to all GPUs in this category.
GeForce4 MX 440 GeForce4 MX 440 SE GeForce4 MX 420 x	Quadro4 580 XGL Quadro NVS 280 Quadro4 380 XGL	**2** — applies to all GPUs in this category.

Table 3.1   Supported NVIDIA GPU-Based Products (continued)

NVIDIA Desktop Products	NVIDIA Workstation Products	Number of Displays Supported Per Card
GeForce4 MX 460 GeForce4 MX 440 GeForce4 MX 440-SE GeForce4 MX 420	Quadro4 550 XGL Quadro NVS 200	**2** — applies to all GPUs in this category.
	Quadro NVS 400	**4** — applies to all GPUs in this category.
GeForce2 Ti GeForce2 Ultra GeForce2 Pro GeForce2 GTS	Quadro2 Pro	**1** — applies to all GPUs in this category.
GeForce2 MX GeForce2 MX400 GeForce2 MX200 GeForce2 MX100 GeForce2 Go	Quadro2 MXR Quadro2 EX Quadro2 Go	**2** — applies to all GPUs in this category
GeForce 256	Quadro	**1** — applies to all GPUs in this category.
NVIDIA RIVA TNT2™ Ultra NVIDIA RIVA TNT2 Pro NVIDIA RIVA TNT2 NVIDIA RIVA TNT2 M64 NVIDIA Vanta™ NVIDIA Vanta LT	---	**1** — applies to all GPUs in this category.
NVIDIA RIVA TNT™	---	**1** — applies to all GPUs in this category.

Table 3.2   Supported NVIDIA Integrated Products

NVIDIA Integrated Products	Graphics Core
nForce™	GeForce2 MX
nForce2	GeForce4 MX

Supported Languages

Languages Supported in the Main Driver Control Panel

The Release 50 Drivers for Windows 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)	

System Requirements

-
-

Minimum Hard Disk Space

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

Table 3.3   Hard Disk Space Requirements—English

Operating System	Minimum Hard Disk Space
Windows XP (all editions)	19.2 MB
Windows 2000	19.2 MB
Windows NT 4.0	15.2 MB
Windows Me	19.3 MB
Windows 98	19.3 MB
Windows 95	19.3 MB

Table 3.4   Hard Disk Space Requirements—Non-English Languages

Operating System	Minimum Hard Disk Space
Windows XP (all editions)	24.9 MB
Windows 2000	24.9 MB
Windows NT 4.0	24.8 MB
Windows Me	24.8 MB
Windows 98	24.8 MB
Windows 95	24.8 MB

Table 3.5   Hard Disk Space Requirements—Full International Package

Operating System	Minimum Hard Disk Space
Windows XP (all editions)	44.1 MB
Windows 2000	44.1 MB
Windows NT 4.0	40.0 MB
Windows Me	44.1 MB
Windows 98	44.1 MB
Windows 95	44.1 MB

Additional Operating System Requirements

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

Table 3.6   Additional Operating System Requirements

Operating System	Additional Requirements
Windows NT 4.0	Service Pack 4
Windows 98	Microsoft DirectX™ 5
Windows 95	OSR2 (OEM Service Release 2) with USB supplement for AGP Microsoft OPENGL32.DLL Microsoft DirectX 5

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:

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 2000 Issue with Settings Tab Monitor Positioning

- **Problem**

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

- **When the Problem Occurs**

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

- **Cause and Workaround**

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

  1 Under the Tools tab in the Desktop Manager windows, make sure Automatically Align Displays is checked.

  2 In the Settings tab, position the appropriate monitor icon above monitor #1, then click **Apply**.

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

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

Gigabyte GA-6BX Motherboard

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

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

Controlling Windows 9*x* TV Tuner Scaling Artifacts

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

Quake III Arena `malloc()` Error on TNT2

On a system with Windows 98 Second Edition and a TNT2 installed, running Quake III Arena in a loop results in a `malloc() failed` error after several hours.

This was caused by a memory leak in Quake III Arena. It has been fixed in version 1.16m of Quake III.

Media Player Hangs Playing MPEG Files

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

There are two ways to work around this problem:

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

- Uninstall the WinDVD player.

This is not an NVIDIA bug.

AVI Playback Problems With Older Intel Indeo Codecs

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

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

Antialiasing Problems With Certain Applications

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

VIA KX133 and 694X Chipsets With AGP 2X

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

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

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

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

- On **Windows NT 4.0** and **Windows 2000** systems, the registry key is

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

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

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

Irongate Chipsets With AGP 1X

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

Poor Quality S-Video Output on Some TVs

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

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

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

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

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

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

GLQuake Crash and Version 5.16 (or Later) Drivers

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

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

Additional Properties Button Not Working in Windows 95

The Additional Properties button found under the NVIDIA product tab in the Display Properties Control Panel may not function in certain Windows 95

systems. The problem occurs because these systems have an outdated version of the 32-bit common controls library (COMCTL32.DLL) from Microsoft.

Starting with the RIVA TNT, the Control Panel interface for NVIDIA processors requires version 4.70 or later of COMCTL32.DLL. Appropriate versions of COMCTL32.DLL are in Windows 98 or later and Internet Explorer 4.0 or later. The library can also be obtained from the Microsoft Web site.

Windows 98 and Windows Me MultiMon Support

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

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

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

AGP Programs May Hang With Athlon Processor

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

The solution is to edit the registry to prevent the Memory Manager from using the processor's Page Size Extension feature. For a more complete explanation see

    http://support.microsoft.com/support/kb/articles/Q270/7/15.ASP

Desktop Manager Does Not Re-Center Logon Screen

On Windows NT 4.0, Windows 2000, and Windows XP multi-display systems that are set to nView Span mode, the Windows logon screen is centered on the extended desktop. This usually causes it to be split across two displays, which users may find annoying. Although users can normally use the Desktop Manager to restrict a window's appearance to one display, security restrictions in the operating systems prevent this in the case of the logon screen.

Issues with Video Mirror

Table 3.7 lists current known issues with NVIDIA Video Mirror functionality.

Table 3.7   Known Issues with Video Mirror

Issues	Windows XP/2000	Windows NT 4.0	Windows 9x
Video Mirror is not yet implemented for applications using Video Port Extensions (VPE).	x		x
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.	x		x
Video Mirror requires some extra memory to run. Try closing other DirectX or OpenGL applications that may be running.	x		x
You may need to close and restart your video application for Video Mirror enabling or disabling to take effect.	x		x
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.	x		x

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 50 is the latest NVIDIA driver available. Table 4.1 contains a summary of 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 50	ForceWare	50.xx–52.xx	Releases ongoing
Release 40	Detonator FX	44.03–45.xx	Releases ongoing

Table 4.1   NVIDIA Drivers for Windows (continued)

Driver	Name	Versions	Comments
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 6	Detonator 3	6.09–8.*xx*	
Release 5	Detonator 2	5.00–5.*xx*	
Release 4	Detonator	3.00–3.*xx*	
Release 3	Detonator	1.83–2.42	
Release 2		1.05–1.31	

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[1] 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.

---

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

New Graphical User Interface

- Media Center Tray application

  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 9x/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[2]

---

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

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.

- 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

Release 6 Enhancements

The Release 6 driver adds features in the following areas:

- TwinView
- Digital Vibrance Control
- OpenGL
- Direct3D
- Cursor Trails Support
- Control Panels

TwinView

TwinView is a Release 6 feature that supports connecting dual displays using a single graphics card (such as the GeForce2 MX or Quadro2 MXR) based on the NV11 chipset.TwinView includes major features such as the *Virtual Desktop*, *Video Mirror*, and *Desktop Manager* features.

TwinView supports a variety of display options, such as digital flat panels, red-green-blue (RGB) monitors, TVs, and analog flat panels. TwinView features the following display modes: Standard, Extended Desktop (Span), and Clone.

Virtual Desktop

Virtual Desktop is a TwinView feature that is useful for panels and monitors with limited resolution. Virtual Desktop is used to set a larger than viewable area on the second display, which supports full pan-and-scan of the entire desktop area. Currently, Virtual Desktop functionality is available under

• Windows NT 4.0 and Windows 2000 in TwinView Standard or Clone mode

• Windows 9*x* in TwinView Clone mode

Video Mirror

Video Mirror is a TwinView feature that allows a video or DVD application to mirror its playback in full-screen mode on any one of the connected display devices. In other words, Video Mirror allows video data that's displayed on a hardware overlay to be displayed at full-screen on a secondary display. Currently, Video Mirror functionality is available under

• Windows 2000 in TwinView Clone mode

• Windows 9*x* in TwinView Clone or Span mode

• Windows 95 in TwinView Clone mode

Desktop Manager

Desktop Manager allows the user to run an application on one or both monitors. This configuration may be useful for entertainment applications, such as DVD playback and digital video editing.

Desktop Manager functions under the TwinView Extended Desktop (Span) mode and, in addition to being supported by the NV11 chipset (i.e, the GeForce2 MX or the Quadro2 MXR graphics card), is also supported by any two NVIDIA graphics cards running in multi-monitor mode.

Digital Vibrance Control

NVIDIA *Digital Vibrance Control*™(DVC), a mechanism for controlling color separation and intensity, boosts the color saturation of an image. DVC is supported by the NV11 chipset (i.e., the GeForce2 MX or Quadro2 MXR graphics card).

OpenGL

The NVIDIA OpenGL Settings control panel contains the following changes:

- Improved full-scene anti-aliasing methods
- Additional options for Windows 2000 and Windows NT 4.0
    - Force 16-bit Depth Buffer
    - Enable Advanced Multiple Monitors

Direct3D

The NVIDIA Direct3D Settings control panel contains the following changes:

- Improved full-scene anti-aliasing methods not previously available
- Removed certain obsolete options

Cursor Trails Support

Release 6 for Windows provides support for cursor trails in Windows 9*x*.

Control Panels

TwinView, Digital Vibrance Control, OpenGL, and Direct3D features have associated NVIDIA-specific windows (control panels) from which these features can be configured. These control panels are normally accessed by following one of these procedures from the Windows active desktop:

- Click **Start** > **Settings** > **Control Panel** > **Display** > **Settings** > **Advanced**

    or

- Click the right mouse button and select **Properties** > **Settings** > **Advanced**.

Release 5 Enhancements

The Release 5 driver adds capabilities in the following areas:

- OpenGL
- Direct3D
- Control Panel

OpenGL

Changes have been made to the core, extensions, performance, and available features of OpenGL.

OpenGL 1.2 Core

Release 5 adds all the features that constitute the OpenGL 1.2 core capabilities:

- BGRA pixel formats
- Packed pixel formats (plus R5_G6_B5 formats and reversed formats)
- Rescaling vertex normals
- Specular highlights after texturing
- Level-of-detail control for mipmapped textures (supported in software on TNT2)
- Texture coordinate edge clamping
- 3-D textures (performed in software on all platforms)
- Vertex array subranges for optimizing vertex array processing (`glDrawRangeElements()` retains the performance of `glDrawElements()`.)

OpenGL Extensions

The OpenGL extensions in Table 4.2 were added or changed in Release 5.

Table 4.2   OpenGL Extensions Modified in Release 5

Extension	Status	Comment
`ARB_texture_cube_map`	New	Same as `EXT_texture_cube_map`
`ARB_texture_env_add`	New	Same as `EXT_texture_env_add`
`ARB_transpose_matrix`	New	
`GL_ARB_texture_compression`	New (5.16)	To replace `S3_s3tc`
`NV_blend_square`	New	
`S3_s3tc`	New	Deprecated

Table 4.2   OpenGL Extensions Modified in Release 5 (continued)

Extension	Status	Comment
EXT_clip_volume_hint	Removed	
EXT_cull_vertex	Removed	
GL_NV_light_max_exponent	Renamed	Was GL_EXT_light_max_exponent

OpenGL Performance Enhancements

A number of features are significantly improved in Release 5.

• For RIVA TNT and TNT2, polygon offset is faster.

• For GeForce 256 and Quadro, a number of improvements have been made:

  • glDrawPixels() and glReadPixels() have been made faster.

  • Display lists use AGP memory for better performance.

  • Large texture sets are handled more efficiently by the texture manager.

  • Vertex arrays with two-sided lighting are faster.

  • Compiled vertex arrays are faster for primitives that use multitextured TexCoord2f+Color4ub+Vertex3f.

  • Vertex array range extension is fully functional.

• Control Panel enables accelerated full-scene anti-aliasing (GeForce, Quadro, GeForce2).

• Multi-monitor hardware is accelerated on Windows 2000.

• GL_WGL_swap_interval extension can change V-sync behavior.

• V-sync is on by default (default behavior is selectable with the Control Panel).

• Default anisotropic filtering can be triggered by checking the anisotropic filtering box on the Control Panel.

• Enabling GL_POLYGON_SMOOTH no longer forces software rendering, resulting in much better performance at some cost in visual quality.

Direct3D

Release 5 contains the following Direct3D changes:

• Accelerated full-scene anti-aliasing is enabled (GeForce, Quadro, GeForce2).

• Limited three-stage setup is now possible.

- `D3DVTXPCAPS_MATERIALSOURCE7` capability bit is now disabled (leaving the driver with DirectX 6 material source capabilities).

The following Registry keys are useful for applications that do not blit correctly:

- `FLUSHAFTERBLITENABLE` is a new Registry key that controls the wait-after-blit condition when the `DDBLT_WAIT` flag is set.

  (Default is `DISABLED`—do not wait.)

  Note: This Registry key was formerly named `WAITAFTERBLITENABLE`.

- `FORCEBLITWAITFLAGENABLE` is a new Registry key that forces the `DDBLT_WAIT` flag to be set for all blits, which prevents applications that do not check the return value from unexpectedly losing blits.

  (Default is `DISABLED`.)

- `LIMITMAXQUEUEDFBBLITSENABLE` is a new Registry key that limits the maximum number of queued blits to the front buffer to a value set by the `PRERENDERLIMIT` Registry key, which is 3 by default.

  (Default is `DISABLED`.)

Control Panel

NVIDIA now provides Control Panel tabs for Windows NT 4.0 and Windows 2000.

A

MODE SUPPORT FOR WINDOWS

This chapter details the Windows modes supported by the Release 50 driver for NVIDIA products. It contains these sections:

NV30–NV35 Mode Support

GeForce FX Products

Table A.1 lists the Windows modes supported by the Release 50 driver for the GeForce FX product families.

Table A.1   GeForce FX Modes

Resolution[i]	Bitdepth	Supported Rates (Hz)
320x200	*8, 16, 32*	*60, 70, 72, 75*
320x240	*8, 16, 32*	*60, 70, 72, 75*
400x300	*8, 16, 32*	*60, 70, 72, 75*
480x360[ii]	*8, 16, 32*	*60, 70, 72, 75*
512x384	*8, 16, 32*	*60, 70, 72, 75*
640x400	*8, 16, 32*	*60, 70, 72, 75*
640x480	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
720x480	8, 16, 32	60
720x576	8, 16, 32	60
800x600	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
848x480	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
960x720[ii]	*8, 16, 32*	*60, 70, 72, 75, 85, 100, 120*
1024x768	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
	32	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200**
1152x864	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200**
	32	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
1280x720	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150**
1280x768	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150**
1280x960	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32[iii]	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150**
1280x1024	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32[iii.]	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150**
1360x768	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150**
1600x900	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150**
	32[iii.]	**60, 70, 72, 75, 85, 100, 120**
1600x1024	**8, 16**	**60, 70, 72, 75, 85, 100, 120**
	32[iii.]	**60, 70, 72, 75, 85, 100**

Table A.1   GeForce FX Modes (continued)

Resolution[i]	Bitdepth	Supported Rates (Hz)
1600x1200	**8, 16**	**60, 70, 72, 75, 85, 100, 120**
	32[iii.]	**60, 70, 72, 75, 85, 100**
1920x1080	**8, 16[III.]**	**30, 60, 70, 72, 75, 85, 100**
	32[iv v]	**30, 60, 70, 72, 75, 85**
1920x1200	**8, 16[III.]**	**60, 70, 72, 75, 85, 100**
	32[iv. v.]	**60, 70, 72, 75, 85**
1920x1440	**8, 16[III.], 32[IV. v.]**	**60, 70, 72, 75, 85**
2048x1536	**8, 16[III.], 32[IV. v.]**	**60, 70, 72, 75, 85**

i.   Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop. Bolded entries indicate supported spanning modes which are obtained by doubling either the horizontal or the vertical resolution.
ii.   DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.
iii.   Requires at least a 16-MB framebuffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).
iv.   Requires at least a 32-MB frame buffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).
v.   Requires a 16-MB framebuffer for the Windows desktop. 3D applications generally require more than 16 MB.

Quadro FX Products

Table A.2 lists the Windows modes supported by the Release 50 driver for the Quadro FX product families.

Table A.2   Quadro FX Modes

Resolution[i]	Bitdepth	Supported Rates (Hz)
320x200	*8, 16, 32*	*60, 70, 72, 75*
320x240	*8, 16, 32*	*60, 70, 72, 75*
400x300	*8, 16, 32*	*60, 70, 72, 75*
480x360[II]	*8, 16, 32*	*60, 70, 72, 75*
512x384	*8, 16, 32*	*60, 70, 72, 75*
640x400	*8, 16, 32*	*60, 70, 72, 75*
640x480	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
720x480	8, 16, 32	60
720x576	8, 16, 32	60
800x600	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
848x480	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
960x1200[iii]	**8, 16, 32**	**60**
960x720[II]	*8, 16, 32*	*60, 70, 72, 75, 85, 100, 120*
1024x768	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
	32	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200**

Table A.2 Quadro FX Modes (continued)

Resolution[i]	Bitdepth	Supported Rates (Hz)
1152x864	8, 16	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200
	32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
1280x720	8, 16	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
	32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150
1280x768	8, 16	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
	32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150
1280x960	8, 16	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
	32[iv]	60, 70, 72, 75, 85, 100, 120, 140, 144, 150
1280x1024	8, 16	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
	32[iii.]	60, 70, 72, 75, 85, 100, 120, 140, 144, 150
1360x768	8, 16	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170
	32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150
1600x900	8, 16	60, 70, 72, 75, 85, 100, 120, 140, 144, 150
	32[iii.]	60, 70, 72, 75, 85, 100, 120
1600x1024	8, 16	60, 70, 72, 75, 85, 100, 120
	32[iii.]	60, 70, 72, 75, 85, 100
1600x1200	8, 16	60, 70, 72, 75, 85, 100, 120
	32[iii.]	60, 70, 72, 75, 85, 100
1920x1080	8, 16[iii.]	30, 60, 70, 72, 75, 85, 100
	32[v vi]	30, 60, 70, 72, 75, 85
1920x1200	8, 16[iii.]	41, 60, 70, 72, 75, 85, 100
	32[iv. v.]	41, 60, 70, 72, 75, 85
1920x1440	8, 16[iii.], 32[iv. v.]	60, 70, 72, 75, 85
1920x2400[iii.]	8, 16[iii.], 32[iv. v.]	20, 24, 25
2048x1536	8, 16[iii.], 32[iv. v.]	60, 70, 72, 75, 85
3840x1200[vii]	8, 16[iii.], 32[iv. v.]	21, 24
3840x2400	8, 16[iii.], 32[iv. v.]	13

i. Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop. Bolded entries indicate supported spanning modes which are obtained by doubling either the horizontal or the vertical resolution.
ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.
iii. Vertical Spanning mode not supported
iv. Requires at least a 16-MB frame buffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).
v. Requires at least a 32-MB frame buffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).
vi. Requires a 16-MB frame buffer for the Windows desktop. 3D applications generally require more than 16 MB.
vii. Horizontal Spanning mode not supported

NV25 and NV28 Mode Support

GeForce4 Ti Products

Table A.6 lists the Windows modes supported by the Release 50 driver for the GeForce4 Ti product families.

Table A.3   GeForce4 Ti Modes

Resolution[i]	Bitdepth	Supported Rates (Hz)
320x200	*8, 16, 32*	*60, 70, 72, 75*
320x240	*8, 16, 32*	*60, 70, 72, 75*
400x300	*8, 16, 32*	*60, 70, 72, 75*
480x360[ii]	*8, 16, 32*	*60, 70, 72, 75*
512x384	*8, 16, 32*	*60, 70, 72, 75*
640x400	*8, 16, 32*	*60, 70, 72, 75*
640x480	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
720x480	8, 16, 32	60
720x576	8, 16, 32	60
800x600	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
848x480	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
960x720[ii]	*8, 16, 32*	*60, 70, 72, 75, 85, 100, 120*
1024x768	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
	32	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200**
1152x864	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200**
	32	**60, 70, 72, 75, 85, 100, 120, 140, —, 150, 170**
1280x720	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32	**60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1280x768	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32	**60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1280x960	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32[iii]	**60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1280x1024	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32[iii.]	**60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1360x768	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32	**60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1600x900	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150**
	32[iii.]	**60, 70, 72, 75, 85, 100, 120**
1600x1024	**8, 16**	**60, 70, 72, 75, 85, 100, 120**
	32[iii.]	**60, 70, 72, 75, 85, 100**

Table A.3 GeForce4 Ti Modes (continued)

Resolution[i]	Bitdepth	Supported Rates (Hz)
1600x1200	8, 16	60, 70, 72, 75, 85, 100, 120
	32[iii.]	60, 70, 72, 75, 85, 100
1920x1080	8, 16[iii.]	30, 60, 70, 72, 75, 85, 100
	32[iv v]	30, 60, 70, 72, 75, 85
1920x1200	8, 16[iii.]	60, 70, 72, 75, 85, 100
	32[iv. v.]	60, 70, 72, 75, 85
1920x1440	8, 16[iii.]	60, 70, 72, 75, 85
	32[iv. v.]	60, 70, —, 75
2048x1536	8, 16[iii.]	60, 70, 72, 75
	32[iv. v.]	60

i. Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop. Bolded entries indicate supported spanning modes which are obtained by doubling either the horizontal or the vertical resolution.

ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.

iii. Requires at least a 16-MB framebuffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).

iv. Requires at least a 32-MB frame buffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).

v. Requires a 16-MB framebuffer for the Windows desktop. 3D applications generally require more than 16-MB.

NVIDIA Corporation

Quadro4 9xx/7xx XGL Products

Table A.6 lists the Windows modes supported by the Release 50 driver for the following products:

• Quadro4 900 XGL

• Quadro4 750 XGL

• Quadro4 700 XGL

• Quadro4 980 XGL

• Quadro4 780 XGL

Table A.4   Quadro4 9xx/7xx XGL Modes

Resolution[i]	Bitdepth	Supported Rates (Hz)
320x200	*8, 16, 32*	*60, 70, 72, 75*
320x240	*8, 16, 32*	*60, 70, 72, 75*
400x300	*8, 16, 32*	*60, 70, 72, 75*
480x360[ii]	*8, 16, 32*	*60, 70, 72, 75*
512x384	*8, 16, 32*	*60, 70, 72, 75*
640x400	*8, 16, 32*	*60, 70, 72, 75*
640x480	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
720x480	8, 16, 32	60
720x576	8, 16, 32	60
800x600	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
848x480	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
960x720[ii]	*8, 16, 32*	*60, 70, 72, 75, 85, 100, 120*
1024x768	**8, 16** **32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240** **60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200**
1152x864	**8, 16** **32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200** **60, 70, 72, 75, 85, 100, 120, 140, —, 150, 170**
1280x720	**8, 16** **32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170** **60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1280x768	**8, 16** **32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170** **60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1280x960	**8, 16** **32[iii]**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170** **60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1280x1024	**8, 16** **32[iii.]**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170** **60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1360x768	**8, 16** **32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170** **60, 70, 72, 75, 85, 100, 120, 140, —, 150**

Table A.4 Quadro4 9xx/7xx XGL Modes (continued)

Resolution[i]	Bitdepth	Supported Rates (Hz)
1600x900	8, 16	60, 70, 72, 75, 85, 100, 120, 140, 144, 150
	32[iii.]	60, 70, 72, 75, 85, 100, 120
1600x1024	8, 16	60, 70, 72, 75, 85, 100, 120
	32[iii.]	60, 70, 72, 75, 85, 100
1600x1200	8, 16	60, 70, 72, 75, 85, 100, 120
	32[iii.]	60, 70, 72, 75, 85, 100
1920x1080	8, 16[iii.]	60, 70, 72, 75, 85, 100
	32[iv v]	60, 70, 72, 75, 85
1920x1200	8, 16[iii.]	60, 70, 72, 75, 85, 100
	32[iv. iv.]	60, 70, 72, 75, 85
1920x1440	8, 16[iii.]	60, 70, 72, 75, 85
	32[iv. iv.]	60, 70, —, 75
1920x2400	8, 16[iii.], 32[iv. v.]	20, 24, 25
2048x1536	8, 16[iii.]	60, 70, 72, 75
	32[iv. v.]	60
3840x1200	8, 16[iii.], 32[iv. v.]	21, 24
3840x2400	8, 16[iii.], 32[iv. v.]	13

i. Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop. Bolded entries indicate supported spanning modes which are obtained by doubling either the horizontal or the vertical resolution.

ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.

iii. Requires at least a 16-MB framebuffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).

iv. Requires at least a 32-MB frame buffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).

v. Requires a 16-MB framebuffer for the Windows desktop. 3D applications generally require more than 16 MB.

NV11, NV17, and NV18 Mode Support

Table A.6 lists the Windows modes supported by the Release 50 driver for the following product families:

- GeForce4 MX, GeForce2 MX
- Quadro4 580/380 XGL, Quadro NVS, Quadro2 MXR/ER

Table A.5 NV11, NV17, and NV18 Modes

Resolution[i]	Bitdepth	Supported Rates (Hz)
320x200	*8, 16, 32*	*60, 70, 72, 75*
320x240	*8, 16, 32*	*60, 70, 72, 75*
400x300	*8, 16, 32*	*60, 70, 72, 75*
480x360[ii]	*8, 16, 32*	*60, 70, 72, 75*
512x384	*8, 16, 32*	*60, 70, 72, 75*
640x400	*8, 16, 32*	*60, 70, 72, 75*
640x480	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
720x480	8, 16, 32	60
720x576	8, 16, 32	60
800x600	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
848x480	**8, 16, 32**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
960x720[ii]	*8, 16, 32*	*60, 70, 72, 75, 85, 100, 120*
1024x768	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240**
	32	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200**
1152x864	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200**
	32	**60, 70, 72, 75, 85, 100, 120, 140, —, 150, 170**
1280x720	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32	**60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1280x768	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32	**60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1280x960	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32[iii]	**60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1280x1024	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32[iii.]	**60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1360x768	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170**
	32	**60, 70, 72, 75, 85, 100, 120, 140, —, 150**
1600x900	**8, 16**	**60, 70, 72, 75, 85, 100, 120, 140, 144, 150**
	32[iii.]	**60, 70, 72, 75, 85, 100, 120**
1600x1024	**8, 16**	**60, 70, 72, 75, 85, 100, 120**
	32[iii.]	**60, 70, 72, 75, 85, 100**

Table A.5 NV11, NV17, and NV18 Modes (continued)

Resolution[i]	Bitdepth	Supported Rates (Hz)
1600x1200	**8, 16**	**60, 70, 72, 75, 85, 100, 120**
	32[iii.]	**60, 70, 72, 75, 85, 100**
1920x1080	**8, 16[iii.]**	**30, 60, 70, 72, 75, 85, 100**
	32[iv v]	**30, 60, 70, 72, 75, 85**
1920x1200	**8, 16[iii.]**	**60, 70, 72, 75, 85, 100**
	32[iv. v.]	**60, 70, 72, 75, 85**
1920x1440	**8, 16[iii.]**	**60, 70, 72, 75, 85**
	32[iv. v.]	**60, 70, —, 75**
2048x1536	**8, 16[iii.]**	**60, 70, 72, 75**
	32[iv. v.]	**60**

i.   Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop. Bolded entries indicate supported spanning modes which are obtained by doubling either the horizontal or the vertical resolution.

ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.

iii. Requires at least a 16-MB framebuffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).

iv. Requires at least a 32-MB frame buffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).

v.   Requires a 16-MB framebuffer for the Windows desktop. 3D applications generally require more than 16 MB.

NV10, NV15, NV16, and NV20 Mode Support

Table A.6 lists the Windows modes supported by the Release 50 driver for the following product families:

- GeForce3, GeForce2, GeForce

- QuadroDDC, Quadro2, Quadro

Table A.6   NV10, NV15, NV16, and NV20 Modes

Resolution[i]	Bitdepth	Supported Rates (Hz)
320x200	*8, 16, 32*	*60, 70, 72, 75*
320x240	*8, 16, 32*	*60, 70, 72, 75*
400x300	*8, 16, 32*	*60, 70, 72, 75*
480x360[ii]	*8, 16, 32*	*60, 70, 72, 75*
512x384	*8, 16, 32*	*60, 70, 72, 75*
640x400	*8, 16, 32*	*60, 70, 72, 75*
640x480	8, 16, 32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
720x480	8, 16, 32	60
720x576	8, 16, 32	60
800x600	8, 16, 32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
848x480	8, 16, 32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240
960x720[ii]	*8, 16, 32*	*60, 70, 72, 75, 85, 100, 120*
1024x768	8, 16 32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240 60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200
1152x864	8, 16 32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200 60, 70, 72, 75, 85, 100, 120, 140, —, 150, 170
1280x720	8, 16 32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170 60, 70, 72, 75, 85, 100, 120, 140, —, 150
1280x768	8, 16 32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170 60, 70, 72, 75, 85, 100, 120, 140, —, 150
1280x960	8, 16 32[iii]	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170 60, 70, 72, 75, 85, 100, 120, 140, —, 150
1280x1024	8, 16 32[iii.]	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170 60, 70, 72, 75, 85, 100, 120, 140, —, 150
1360x768	8, 16 32	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170 60, 70, 72, 75, 85, 100, 120, 140, —, 150
1600x900	8, 16 32[iii.]	60, 70, 72, 75, 85, 100, 120, 140, 144, 150 60, 70, 72, 75, 85, 100, 120
1600x1024	8, 16 32[iii.]	60, 70, 72, 75, 85, 100, 120 60, 70, 72, 75, 85, 100

Table A.6 NV10, NV15, NV16, and NV20 Modes (continued)

Resolution[i]	Bitdepth	Supported Rates (Hz)
1600x1200	8, 16	60, 70, 72, 75, 85, 100, 120
	32[iii.]	60, 70, 72, 75, 85, 100
1920x1080	8, 16[iii.]	30, 60, 70, 72, 75, 85, 100
	32[iv]	30, 60, 70, 72, 75, 85
1920x1200	8, 16[iii.]	60, 70, 72, 75, 85, 100
	32 [iv.]	60, 70, 72, 75, 85
1920x1440	8, 16[iii.]	60, 70, 72, 75, 85
	32 [iv.]	60, 70, —, 75
2048x1536	8, 16[iii.]	60, 70, 72, 75
	32 [iv.]	60

i.   Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop.
ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.
iii. Requires at least a 16-MB framebuffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).
iv. Requires a 16-MB framebuffer for the Windows desktop. 3D applications generally require more than 16 MB.

NV1A and NV1F Mode Support

Table A.7 lists the Windows modes supported by the Release 50 driver for the nForce and nForce2 products.

Table A.7   NV1A and NV1F Modes

Resolution[i]	Bitdepth	Supported Rates (Hz)
320x200	*8, 16, 32*	*60, 70, 72, 75*
320x240	*8, 16, 32*	*60, 70, 72, 75*
400x300	*8, 16, 32*	*60, 70, 72, 75*
480x360[ii]	*8, 16, 32*	*60, 70, 72, 75*
512x384	*8, 16, 32*	*60, 70, 72, 75*
640x400	*8, 16, 32*	*60, 70, 72, 75*
640x480	**8, 16, 32**	**60, —, 72, 75, 85, 100**
720x480	8, 16, 32	60
720x576	8, 16, 32	60
800x600	**8, 16, 32**	**60, —, 72, 75, 85, 100**
960x720[ii]	*8, 16, 32*	*60, —, 72, 75, 85, 100*
1024x768	**8, 16, 32**	**60, —, 72, 75, 85, 100**
1280x1024	**8, 16, 32[iii]**	**60, —, 72, 75, 85, 100**
1600x900	**8, 16, 32[iii.]**	**60, —, 72, 75, 85, 100**
1600x1200	**8, 16, 32[iii.]**	**60, —, 72, 75, 85, 100**
1920x1080	**8, 16, 32[iv.v.]**	**30**
1920x1200	**8, 16[iii.], 32[iv v]**	**60, —, 72, 75, 85, 100**
1920x1440	**8, 16[iii.]**	**60, —, 72, 75, 85, 100**
	32[iv. v.]	**60, —, 72, 75**
2048x1536	**8, 16[iii.]**	**60, —, 72, 75, 85, 100**
	32[iv. v.]	**60, —, 72**

i. Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop. Bolded entries indicate supported spanning modes (applies to NV1F products only) which are obtained by doubling either the horizontal or the vertical resolution.
ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.
iii. Requires at least a 16-MB framebuffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).
iv. Requires at least a 32-MB frame buffer for spanning modes (obtained by doubling either the horizontal or vertical resolution).
v. Requires a 16-MB framebuffer for the Windows desktop. 3D applications generally require more than 16 MB.

NV5 Mode Support

Table A.8 lists the Windows modes supported by the Release 50 driver for TNT2, TNT2 Pro, TNT2 Ultra, and M64-based products.

Note: For Vanta and Vanta LT modes, see "NV4 and Vanta Mode Support" on page 53.

For Aladdin TNT modes, see "Aladdin TNT Mode Support" on page 48.

Table A.8   NV5 Modes

Resolution[i]	Supported Rates (Hz)	Bitdepth	Maximum Refresh Rate	
				With Video Overlay
320x200	*—, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
320x240	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
400x300	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
480x360[ii]	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
512x384	*60, 70, 72, 75, 85, 100*	*8, 16, 32*	*100*	*N/A*
640x400	*—, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
640x480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240	8, 16	240	200
		32	240	150
800x600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240	8, 16	240	170
		32	240	144
960x720[ii]	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
1024x768	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200	8, 16	200	150
		32	170	100: M64, M64 Pro, TNT2
				120: TNT2 Pro, TNT2 Ultra
1152x864	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170	8, 16	170	144
		32	150	85: M64, M64 Pro, TNT2
				100: TNT2 Pro, TNT2 Ultra
1280x960	60, 70, 72, 75, 85, 100, 120, 140, 144, 150	8, 16	150	140
		32	120	70: M64
				75: M64 Pro, TNT2, TNT2 Pro
				85: TNT2 Ultra

Table A.8   NV5 Modes (continued)

Resolution[i]	Supported Rates (Hz)	Bitdepth	Maximum Refresh Rate	
				With Video Overlay
1280x1024	60, 70, 72, 75, 85, 100, 120, 140, 144, 150	8, 16	150	120
		32	120	60: M64
				72: TNT2
				75: M64 Pro, TNT2 Pro
				85: TNT2 Ultra
1600x900	60, 70, 72, 75, 85, 100, 120	8, 16	120	100
		32	85	60: Except TNT2 Ultra
				75: TNT2 Ultra
1600x1200	60, 70, 72, 75, 85, 100	8, 16	100	85
		32	85	N/A: Except TNT2 Ultra
				60: TNT2 Ultra
1920x1080	60, 70, 72, 75, 85, 100	8, 16	100	N/A
		32[iii]	75	N/A
1920x1200	60, 70, 72, 75, 85	8, 16	85	N/A
		32[iii]	70	N/A
1920x1440	60, 70, 72, 75	8, 16	75	N/A
		32[iii]	60	N/A
2048x1536	60	8, 16	60	N/A

i.   Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop.
ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.
iii. Requires a 16-MB framebuffer for the Windows desktop. 3-D applications generally require more than 16 MB.

Aladdin TNT Mode Support

Starting with Release 5, version 5.19, NVIDIA drivers offer mode support for Aladdin TNT2. This section contains the following sections:

Mode Support for Aladdin TNT2

Table A.9 lists the Windows modes supported by the NVIDIA driver for Aladdin TNT2.

Table A.9   Aladdin TNT2 Modes

Resolution[i]	Supported Rates (Hz)	Bitdepth	Maximum Refresh Rate	
				With Video Overlay
320x200	—, 70, 72, 75, 85, 100, 120	8, 16, 32	120	N/A
320x240	60, 70, 72, 75, 85, 100, 120	8, 16, 32	120	N/A
400x300	60, 70, 72, 75, 85, 100, 120	8, 16, 32	120	N/A
480x360[ll]	60, 70, 72, 75, 85, 100, 120	8, 16, 32	120	N/A
512x384	60, 70, 72, 75, 85, 100	8, 16, 32	100	N/A
640x400	—, 70, 72, 75, 85, 100, 120	8, 16, 32	120	N/A
640x480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240	8, 16	240	200
		32	240	170
800x600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240	8, 16	240	170
		32	240	144
960x720[ll]	60, 70, 72, 75, 85, 100, 120	8, 16, 32	120	N/A
1024x768	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200	8, 16	200	150
		32	170	100
1152x864	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170	8, 16	170	120
		32	150	85
1280x960	60, 70, 72, 75, 85, 100, 120, 140, 144, 150	8, 16	150	100
		32	120	60
1280x1024	60, 70, 72, 75, 85, 100, 120, 140, 144, 150	8, 16	150	100
		32	120	60
1600x900	60, 70, 72, 75, 85, 100, 120	8, 16	120	85
		32	85	60

Table A.9 Aladdin TNT2 Modes (continued)

Resolution[i]	Supported Rates (Hz)	Bitdepth		Maximum Refresh Rate	
					With Video Overlay
1600x1200	60, 70, 72, 75, 85, 100	8, 16	100	75	
		32	85	N/A	
1920x1080	60, 70, 72, 75, 85, 100	8, 16	100	70	
		32[iii]	75	N/A	
1920x1200	60, 70, 72, 75, 85	8, 16	85	60	
		32[iii]	70	N/A	
1920x1440	60, 70, 72, 75	8, 16	75	N/A	
		32[iii]	60	N/A	
2048x1536	60	8, 16	60	N/A	

i. Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop.
ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.
iii. Requires a 16-MB framebuffer for the Windows desktop. 3-D applications generally require more than 16 MB.

Mode Support for Aladdin TNT2: SMA 133/133

Table A.10 lists the Windows modes supported by the NVIDIA driver for Aladdin TNT2 in the SMA 133/133 configuration.

Table A.10 Aladdin TNT2 Modes: SMA 133/133

Resolution[i]	Supported Rates (Hz)	Bitdepth		Maximum Refresh Rate	
					With Video Overlay
320x200	*—, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*	
320x240	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*	
400x300	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*	
480x360[ii]	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*	
512x384	*60, 70, 72, 75, 85, 100*	*8, 16, 32*	*100*	*N/A*	
640x400	*—, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*	
640x480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170	8, 16	170	170	
		32	170	150	
800x600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170	8, 16	170	170	
		32	170	100	
960x720[ii]	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*	
1024x768	60, 70, 72, 75, 85, 100, 120, 140, 144, 150	8, 16	150	100	
		32	120	60	
1152x864	60, 70, 72, 75, 85, 100, 120, 140, 144	8, 16	144	85	
		32	100	N/A	

Table A.10 Aladdin TNT2 Modes: SMA 133/133 (continued)

Resolution[i]	Supported Rates (Hz)	Bitdepth	Maximum Refresh Rate	
				With Video Overlay
1280x960	60, 70, 72, 75, 85, 100, 120	8, 16	120	75
		32	85	N/A
1280x1024	60, 70, 72, 75, 85, 100, 120	8, 16	120	72
		32	85	N/A
1600x900	60, 70, 72, 75, 85, 100, 120	8, 16	120	60
		32	75	N/A
1600x1200	60, 70, 72, 75, 85, 100	8, 16	100	N/A
		32	60	N/A
1920x1080	60, 70, 72, 75, 85	8, 16	85	N/A
1920x1200	60, 70, 72, 75, 85	8, 16	85	N/A
1920x1440	60, 70, 72, 75	8, 16	75	N/A
2048x1536	60	8, 16	60	N/A

i.   Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop.
ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.

Mode Support for Aladdin TNT2: SMA 100/100

Table A.11 lists the Windows modes supported by the NVIDIA driver for Aladdin TNT2 in the SMA 100/100 configuration.

Table A.11 Aladdin TNT2 Modes: SMA 100/100

Resolution[i]	Supported Rates (Hz)	Bitdepth	Maximum Refresh Rate	
				With Video Overlay
320x200	*—, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
320x240	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
400x300	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
480x360[ii]	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
512x384	*60, 70, 72, 75, 85, 100*	*8, 16, 32*	*100*	*N/A*
640x400	*—, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
640x480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170	8, 16	170	170
		32	170	150
800x600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170	8, 16	170	144
		32	170	100
960x720[ii]	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
1024x768	60, 70, 72, 75, 85, 100, 120, 140, 144, 150	8, 16	150	85
		32	100	60

Table A.11 Aladdin TNT2 Modes: SMA 100/100 (continued)

Resolution[i]	Supported Rates (Hz)	Bitdepth	Maximum Refresh Rate	
				With Video Overlay
1152x864	60, 70, 72, 75, 85, 100, 120, 140, 144	8, 16	144	75
		32	85	N/A
1280x960	60, 70, 72, 75, 85, 100, 120	8, 16	120	60
		32	70	N/A
1280x1024	60, 70, 72, 75, 85, 100, 120	8, 16	120	60
		32	60	N/A
1600x900	60, 70, 72, 75, 85, 100	8, 16	100	N/A
		32	60	N/A
1600x1200	60, 70, 72, 75, 85	8, 16	85	N/A
1920x1080	60, 70, 72, 75	8, 16	75	N/A
1920x1200	60, 70, 72, 75	8, 16	75	N/A
1920x1440	60	8, 16	60	N/A

i.   Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop.
ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.

Mode Support for Aladdin TNT2: SMA 66/66

Table A.12 lists the Windows modes supported by the NVIDIA driver for
Aladdin TNT2 in the SMA 66/66 configuration.

Table A.12 Aladdin TNT2 Modes: SMA 66/66

Resolution[i]	Supported Rates (Hz)	Bitdepth	Maximum Refresh Rate	
				With Video Overlay
320x200	*—, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
320x240	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
400x300	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
480x360[ii]	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
512x384	*60, 70, 72, 75, 85, 100*	*8, 16, 32*	*100*	*N/A*
640x400	*—, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
640x480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170	8, 16	170	120
		32	170	120
800x600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170	8, 16	170	85
		32	120	75
960x720[ii]	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
1024x768	60, 70, 72, 75, 85, 100, 120, 140, 144, 150	8, 16	120	N/A
		32	75	N/A

Table A.12 Aladdin TNT2 Modes: SMA 66/66 (continued)

Resolution[i]	Supported Rates (Hz)	Bitdepth	Maximum Refresh Rate	
				With Video Overlay
1152x864	60, 70, 72, 75, 85, 100, 120, 140, 144	8, 16	100	N/A
		32	60	N/A
1280x960	60, 70, 72, 75, 85, 100, 120	8, 16	85	N/A
1280x1024	60, 70, 72, 75, 85, 100, 120	8, 16	85	N/A
1600x900	60, 70, 72, 75, 85, 100	8, 16	75	N/A
1600x1200	60, 70, 72, 75, 85	8, 16	60	N/A

i.   Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop.
ii. DirectDraw modes 480x360 and 960x720 are not supported for flat panel displays.

NV4 and Vanta Mode Support

Table A.13 lists the Windows modes supported by the NVIDIA driver for TNT, Vanta, and Vanta LT.

Table A.13 NV4 and Vanta Modes

Resolution[i]	Supported Rates (Hz)	Bitdepth	Maximum Refresh Rate	
				With Video Overlay
320x200	*—, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
320x240	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
400x300	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
480x360	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
512x384	*60, 70, 72, 75, 85, 100*	*8, 16, 32*	*100*	*N/A*
640x400	*—, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
640x480	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240	8, 16, 32	240	150
800x600	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170, 200, 240	8, 16, 32	240	140
960x720	*60, 70, 72, 75, 85, 100, 120*	*8, 16, 32*	*120*	*N/A*
1024x768	60, 70, 72, 75, 85, 100, 120, 140, 144, 150, 170	8, 16, 32	170	85
1152x864	60, 70, 72, 75, 85, 100, 120, 140, 144, 150	8, 16	150	100
		32	140	72: Vanta, Vanta LT
				100: TNT
1280x1024	60, 70, 72, 75, 85, 100, 120	8, 16	120	85
		32[ii]	100	75: TNT only
1600x1200	60, 70, 72, 75, 85	8, 16	85	60: TNT
				75: Vanta, Vanta LT
		32[iii]	75	N/A
1920x1080	60, 70, 72, 75	8, 16	75	N/A
		32[iii]	72	N/A
1920x1200	60, 70, 72, 75	8, 16	75	N/A
		32[iii]	60	N/A

i.   Italicized entries are DirectDraw modes and cannot be selected as a Windows desktop.
ii. Requires a 8-MB framebuffer for the Windows desktop. 3-D applications generally require more than 8 MB.
iii. Requires a 16-MB framebuffer for the Windows desktop. 3-D applications generally require more than 16 MB.

External DAC Mode Support

Fairchild FMS3815 Modes Supported

Table A.14 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.14 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.15 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.15 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
1280x1024	60, 70, 72, 75, 85
1360x768	60, 70, 72, 75, 85, 100
1600x900	60, 70, 75
1600x1200	—

TV-Out Mode Support

Table A.16 lists the NTSC and PAL TV-Out modes supported by the NVIDIA driver.

Table A.16 Mode Support for TV-Out

Resolution	Bitdepth	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

The NVIDIA driver supports these HDTV resolutions: 480p, 720p, and 1080i.