ForceWare Graphics Drivers
Release 95 Notes

Version 97.46

**For Windows Vista x86
and Windows Vista x64**

**NVIDIA Corporation
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INTRODUCTION TO *RELEASE 95 NOTES*

This edition of *Release 95 Notes* describes the Release 95 ForceWare Graphics Drivers 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 95 Driver Changes" on page 3 gives a summary of changes, and fixed and open issues in this version.

- "The Release 95 Driver" on page 18 describes the NVIDIA products and languages supported by this driver, the system requirements, and how to install the driver.

- "Mode Support for Windows" on page 24 lists the default resolutions supported by the driver.

Changes in this Edition

This edition of the *Release 95 Notes* for Windows Vista includes information about NVIDIA ForceWare graphics driver version 97.46, and lists changes made to the driver since version 88.61. These changes are discussed beginning with the chapter "Release 95 Driver Changes" on page 3.

C H A P T E R

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RELEASE 95 DRIVER CHANGES

This chapter describes open issues for version 97.46, and resolved issues and driver enhancements for versions of the Release 95 driver up to version 97.46. The chapter contains these sections:

Version 97.46 Highlights

This section provides highlights of version 97.46 of the NVIDIA Release 95 Driver for Windows Vista.

What's New in Version 97.46

• **Protected Content Playback Support**

This driver verson supports playback of protected content through the Windows Vista PVP-OPM (Protected Video Path - Output Protection Management), such as

  • Microsoft Digital Rights Management (DRM) restricted content, or

  • Blu-ray™ discs and HD DVDs on players using PVP-OPM.

• **The NVIDIA Control Panel Access Method**

The NVIDIA Control Panel can now be accessed in the same way as under Windows XP:

  • Right-click the desktop and then click **NVDIA Control Panel** from the pop-up menu, or

  • Click **Advanced Settings** from the Windows Vista Display Settings window, then click the NVIDIA product tab.

• **NVIDIA Control Panel Video & Television Page**

The NVIDIA Control Panel now includes the Video & Television category page (TV must be connected and enabled) for changing the TV signal format. This includes support for HDMI and HD-over-DVI connections.

• See "Changes in Version 97.46" on page 1 for a list of resolved issues.

Limitations in This Release

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

- **Refresh Rate Precision**

  The current driver programs the hardware timing for a 59.94 Hz refresh rate to be the same as the timing used for a 60 Hz refresh rate.

- **Pan & Scan**

  This driver does not support the Pan & Scan feature. (Pan & Scan is the process of panning across the desktop in order to display a desktop on a monitor with lower resolution).

- **DirectX Antialiasing**

  The NVIDIA Control Panel does not offer full antialiasing support for DirectX applications. NVIDIA Control Panel antialiasing should be set to *Application-controlled* to ensure compatibility with all DirectX applications.

- **Full-featured HDMI Support**

  The following are known problems that will be fixed in a future driver version:

  - There are some known image quality issues.
  - Noise and pixel corruption occur under Clone or Dualview modes.
  - Only stereo audio is supported; 5.1 surround is not supported.

- **INF Support for Restricted Timings**

  This driver version does not support the use of Restricted Timing settings (R&T strings) in the INF to control mode validation and/or mode setting for custom mode/adapter/monitor combinations. This capability is planned for a later driver release.

- **Display rotation**

  The NVIDIA Control Panel does not include display rotation controls.

- **Overscan/Underscan Support**

  The ability to display the entire desktop on a TV is not supported—the desktop will be masked instead.

- **Advanced Timings, Custom Resolutions**

  This driver does not support adding arbitrary resolutions and timings.

- **Mode Filtering for Custom Policies**

  This driver does not support defining advanced timings and resolution settings.

- **SDI**

  This driver does not support the Serial Display Interface (a standard for driving high color depth displays).

- **Genlock/Frame Lock**

  This driver does not support the ability to synchronize multiple display outputs with an external signal.

- **NVIDIA SLI Technology**

  This release is intended to serve as a functional preview for application porting purposes, and not as a performance driver.

- **NVIDIA TurboCache**

  The driver is capping Shared System Memory at 255 MB on systems with 1 GB of system memory, and at 271 MB on systems with 2 GB or more of system memory. An upcoming driver will increase this amount of memory.

  Optimum performance will not be achieved with low frame buffer TurboCache graphics cards.

Features Not Yet Available in the NVIDIA Control Panel

Support for the following control panel features is under development and not yet available under Windows Vista:

- **Display Category**
  - Run display optimization wizard
  - Change resolution attributes
  - Move CRT screen position
  - Manage custom timings
  - Run multiple display wizard
  - Change flat panel scaling
  - Rotate display
  - Adjust desktop color settings

- **Video & Television Category**
  - Adjust video color settings
  - Run television setup wizard
  - Adjust television color settings
  - Adjust screen size and position

- **3D Settings Category**
  - Set SLI configuration
  - Set multi-GPU configuration

Changes in Version 97.46

The following sections list the changes made and issues resolved since driver version 96.85.

- "Fixed Issues–Windows Vista x86" on page 1

- "Fixed Issues–Windows Vista x64" on page 2

The NVIDIA bug number and driver module are provided for reference.

Fixed Issues–Windows Vista x86

- NVIDIA Control Panel: The Identify Display function does not work.

- The main controls in the Display->Change display configuration page are inaccessible using the tab key.

- DDC/CI compatibility issues exist with DFPs using MStar LCD controller ICs.

- In Clone mode, resolutions higher than what the displays support are available.

- Display settings are not kept for each user when Fast User Switching.

- The NVIDIA Control Panel stops responding after selecting Dualview mode.

- GeForce 7800/7900 GTX, NVIDIA Control Panel: The user cannot switch to Dualview mode when TV is selected as the primary display.

- GeForce 7800/7900 GTX, NVIDIA Control Panel: Cannot switch to Dualview mode when a TV is selected as the primary display.

- GeForce 7300GT, HDMI: There is desktop corruption (black dots) at 1080i mode.

- GeForce 6100/6150: On 512MB systems, the total available memory reported by the NVIDIA Control Panel differs from that reported by the Windows Vista Control Panel.

- GeForce 6200 128 MB: The Windows Media Player 11 taskbar constantly flickers while playing a video file in full-screen mode.

- GeForce 6150/6100: When using Windows Vista Aero color scheme, there is no video with some HD MPEG and HD WMV files.

Fixed Issues–Windows Vista x64

- The main controls in the Display->Change display configuration page are inaccessible using the tab key.

- Display settings are not kept for each user when Fast User Switching.

- GeForce 7800/7900 GTX, NVIDIA Control Panel: The user cannot switch to Dualview mode when TV is selected as the primary display.

- GeForce 6100/6150: On 512MB systems, the total available memory reported by the NVIDIA Control Panel differs from that reported by the Windows Vista Control Panel.

- GeForce 7800/7900 GTX, NVIDIA Control Panel: Cannot switch to Dualview mode when a TV is selected as the primary display.

Changes in Version 96.85

This section lists the changes made and issues resolved in driver version 96.85. The NVIDIA bug number and driver module are provided for reference.

New Features

- **This driver has passed the Microsoft WHQL certification.**

- **Mobile Persistence**

  Persistence of nView multimonitor modes as well as display modes on notebook systems is supported in this driver for pre-logon events.

  Note: Mobile persistence for post logon events is handled by the Windows Vista Transient Multimon Manager (TMM) based on trigger-event reporting by the driver.

- **Beta DPPE Brightness Control**

  This driver includes beta-level support for activating the brightness control in the Windows Mobility Center (DPPE brightness control), subject to the following requirements[1]:

  - The NVIDIA hardware must control the LCD backlight brightness, and

  - The system BIOS must implement brightness control ACPI methods according to the NVIDIA ACPI Display Extensions.

Fixed Issues—Windows Vista x86

- Bottom-field-first interlaced WMV playback shows corruption.

- Color range is reversed in YUV to RGB, resulting in a lack of full color in videos.

- Clone mode does not work when the external display resolution is less than the internal panel resolution.

- The display turns blank after copying files during the NVIDIA driver installation.

- Desktop corruption occasionally occurs after switching to Clone or Dualview mode.

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1. Please also refer to the Microsoft document Brightness Control in WDDM, at http://www.microsoft.com/whdc/device/display/aero/brightness.mspx.

- When rotating the desktop with Desktop Window Manager on, the screen turns black.

- During the Microsoft tool Pwrtest, the system requires more than two seconds to resume from power-saving modes. .

- Bubbles screensaver is corrupt on the secondary Dualview display.

- Unable to enter system suspend or standby mode.

- GeForce 7 Series, NVIDIA Control Panel: The CRT flashes several times when opening the NVIDIA Control Panel.

- GeForce 7 Series: When booting with a DVI connection, there is no display.

- GeForce 7900 GTX: World of Warcraft renders only a stretched version of 2 or 1 quadrants of the screen with application antialiasing enabled.

- GeForce 7800 GTX: Media Center Edition restarts when playing an AVI file.

- GeForce 7300 GT/7600 GT: When playing videos using Windows Media Player 11, there is a green bar at the bottom of the video.

- GeForce 6600: NVIDIA Control Panel–Clone and Dualview mode options are available even though only one display is connected.

- GeForce 6600: The desktop is corrupt when switching Media Center Edition from full-screen to windowed mode.

- GeForce 5200/5700: Video playback using Windows Media Player 11 is slow and choppy.

- NVIDIA Quadro cards, Workstation: AutoStudio 12 application window is black or gray after maximizing. A black screen and occasional application hang also occurs with Quake4.

Fixed Issues–Windows Vista x64

- Bottom-field-first interlaced WMV playback shows corruption.

- Color range is reversed in YUV to RGB, resulting in a lack of full color in videos.

- GeForce 7 Series: When booting with a DVI connection, there is no display.

- GeForce 7900 GTX: World of Warcraft renders only a stretched version of 2 or 1 quadrants of the screen with application antialiasing enabled.

- GeForce 7300 GT/7600 GT: When playing videos using Windows Media Player 11, there is a green bar at the bottom of the video.

- GeForce 6600: NVIDIA Control Panel–Clone and Dualview mode options are available even though only one display is connected.

- Workstation: Maya 8.0 - 8.5B1 - Objects which are deselected cannot be reselected.

Changes in Version 96.33

This section lists the changes made and issues resolved in driver version 96.33. The NVIDIA bug number and driver module are provided for reference.

New Features

- **OpenGL ICD**

  This driver includes the OpenGL ICD.

- **OpenGL Antialiasing**

  Antialiasing control is available through the NVIDIA Control Panel for OpenGL applications.

Fixed Issues—Windows Vista x86

- Display blinks during hot-plug detection.

- A small portion of the right edge of any MPEG video clip is cut off when rotated 90 or 270 degrees.

- Cannot go into standby or hibernate mode: bugcheck 0x9F_IMAGE_nvlddmkm.sys_DATE_8_1_2006.

- GeForce 7300 GT: Get the error "3D Text Screen Saver Stopped Working" at rotations of 90, 180, and 270 degrees.

- Screen corruption occurs during boot a few seconds before the transfer to the Winlogon Perl animation.

- GeForce 7800 GTX: Device Manager lists three monitors after a second monitor is hot plugged.

- 1080i resolution over DVI causes UI corruption (flashing dots).

- OpenGL applications stop responding after changing the display mode.

- GeForce 7300: HDTV is out of sync when Dualview is set (CRT+HDTV with DVI connection).

- NVIDIA Control Panel: The Save function doesn't work in the System Information menu.

- GeForce 7300, GeForce 6600: Blue-screen crash occurs - 1000008e. KERNEL_MODE_EXCEPTION_NOT_HANDLED_M (1000008e) occurs during the system reboot following a driver installation.

Fixed Issues–Windows Vista x64

- GeForce 7300 GT: Get the error "3D Text Screen Saver Stopped Working" at rotations of 90, 180, and 270 degrees.

Changes in Version 96.00

This section lists the changes made and issues resolved in driver version 96.00. The NVIDIA bug number and driver module are provided for reference.

New Features

Display Rotation
This driver supports display rotation.

Fixed Issues—Windows Vista x86

- GeForce 7300, GeForce 6150/6100: Windows desktop is corrupted after new driver installation.

- When rotating the desktop with Desktop Window Manager on, the screen turns black.

- Overlay support needed for Windows Vista.

Fixed Issues—Windows Vista x64

- GeForce 7300, GeForce 6150/6100: Windows desktop is corrupted after new driver installation.

Changes in Version 95.92

This section lists the changes made and issues resolved in driver version 95.92. The NVIDIA bug number and driver module are provided for reference.

Fixed Issues—Windows Vista x86

- Media Center Edition doesn't work when using display #2 on S-Video.

Changes in Version 95.90

This section lists the changes made and issues resolved in driver version 95.90. The NVIDIA bug number and driver module are provided for reference.

Fixed Issues—Windows Vista x86

- GeForce t Series: 3DMark05/06 experiences graphics corruption in GT2 FireFly Forest and HDR 1 Canyon Flight segments.

- In the game Sid Meier's Pirates, islands and surrounding water have missing textures which are displayed as white.

Fixed Issues—Windows Vista x64

- GeForce 7 Series: 3DMark05/06 experiences graphics corruption in GT2 FireFly Forest and HDR 1 Canyon Flight segments.

- In the game Sid Meier's Pirates, islands and surrounding water have missing textures which are displayed as white.

Changes in Version 95.80

This section lists the changes made and issues resolved in driver version 95.80. The NVIDIA bug number and driver module are provided for reference.

Fixed Issues—Windows Vista x86

- Glitching occurs with NTSC TV and WMV.

- NVIDIA Quadro cards: Corruption occurs during Maya 7.0 certification test 24 (shader test).

- GeForce 7900 GTX: Bugcheck 124 occurs driver during installation.

- Video plays green upon resume from Standby.

- While playing Star Wars:Battlefront 2, various sections of the screen flash black.

Fixed Issues—Windows Vista x64

- Glitching occurs with NTSC TV and WMV.

- NVIDIA Quadro cards: Corruption occurs during Maya 7.0 certification test 24 (shader test).

Changes in Version 95.70

This section lists the changes made and issues resolved in driver version 95.70. The NVIDIA bug number and driver module are provided for reference.

Fixed Issues—Windows Vista x86

- GeForce 6600: False device detection (30" Apple Cinema is detected as analog)
- Previewing an HD DVR-MS file with a transition crashes Movie Maker.
- The system crashes during playback of MPEG video using Windows Media Player.
- GeForce 6150/6100 (Notebook): SMU power features do not function under Windows Vista
- GeForce FX Series: Oblivion Elder Scrolls IV crashes.

Open Issues in Version 97.46

As with every released driver, version 97.46 of the Release 95 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 may have workaround solutions.

Windows Vista x86 Issues

• The screen turns blank after enabling rotation in Dualview mode.

• Resuming from system suspend or standby mode while in rotation mode results in a corrupt Windows login screen or a blank screen with only the mouse cursor visible.

• The NVIDIA Control Panel antialiasing does not work.

• GeForce 7 Series: With TMM enabled, the driver does not detect a hot-plugged VGA (dongle) or DVI connection.

• GeForce 7 Series: 3DMark03/05/06 fails to run due to INVALIDCALL or DEVICELOST, etc. messages.

• GeForce 7900 GTX: World of Warcraft renders only a stretched version of 2 or 1 quadrants of the screen with application antialiasing enabled.

• GeForce 7300: Black & White 2 shows flashing corruption.

• GeForce 6100/6150: Digital Dualview display is blank upon resume from system standby.

Windows Vista x64 Issues

• The screen turns blank after enabling rotation in Dualview mode.

• GeForce 7 Series: With TMM enabled, the driver does not detect a hot-plugged VGA (dongle) or DVI connection.

• GeForce 7 Series: 3DMark03/05/06 fails to run due to INVALIDCALL or DEVICELOST, etc. messages.

Not NVIDIA Issues

This section lists issues that are not due to the NVIDIA driver as well as features that are not meant to be supported by the NVIDIA driver for Windows Vista.

Unsupported Features

The following are features and functionality that were available in driver releases supporting Windows XP, but are not available in driver releases for Windows Vista:

- **High resolution scaling desktop (HRSD)**

- **MultiView Display Mode** (for NVIDIA Quadro NVS graphics cards)

- **NVKeystone**

- **Unified back buffer (UBB) controls**

- **Video Overlays**

  This is an operating system limitation.

  Vista window manager features will provide new ways of accomplishing overlays, but will require application porting.

- **Overclocking**

  GPU overclocking is no longer supported in the default GPU driver control panel. This feature will be available in a separate downloadable utility.

- **GPU Temperature Monitoring**

  Temperature monitoring is no longer supported in the default GPU driver control panel. This feature will be available in a separate downloadable utility.

- **AGP Settings Adjustment**

- **Full-screen Video Mirror**

- **Video Zoom**

- **nView Span Modes**

- **Edge Blending**

- **Display/Connection Wizard** (such as was provided with Windows Media Center Edition)

- **DVD/MPEG Extensions** (such as was provided with Windows Media Center Edition)

- **Audio Extensions** (such as was provided with Windows Media Center Edition)

- **Windowed quad-buffered stereo**

This is an operating system limitation.

OpenGL Application Issues

The following are known compatibility issues for OpenGL applications developed under Windows XP:

• Mixed GDI and OpenGL rendering does not work.

   A number of applications use GDI to render UI components and object highlighting. This is not supported in the Windows Vista driver model.

   NVIDIA recommends converting GDI rendering to OpenGL.

   The following are some applications that are known to have this issue:

   ○ Maya 7.01

   ○ SolidEdge 18.0

   ○ OneSpace Designer Modeling

• Applications, Tools, and Benchmarks not Supported Under Windows Vista

   ○ GLperf

   ○ 3ds max 8 (later releases may be supported)

   ○ CATIA V5R15 (V5R16 is supported)

   ○ PTC's CDRS 2001

• Front buffered rendering may be slow, especially when DWM is enabled.

   Flushing the rendering queue while rendering to the front buffer may cause the window manager to recomposite. Applications should therefore minimize the frequency with which they flush the rendering queue.

Video Performance

• Be sure to use the latest Windows Vista build to take advantage of NVIDIA's improved video playback performance.

• The default video decoders in Windows Vista do not yet take advantage of hardware acceleration.

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:

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.

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.

2

THE RELEASE 95 DRIVER

This chapter covers the following main topics:

Hardware and Software Support

Supported Operating Systems

The Release 95 driver, version 97.46, has been tested with the following Microsoft® operating systems:

• Microsoft Windows® Vista RC2 OS builds version 5744 or higher.

Supported NVIDIA Products

Table 2.1 lists the NVIDIA products supported by the Release 95 driver.

Table 2.1   Supported NVIDIA Products

Consumer Products	Workstation Products
GeForce 7950 GX2	NVIDIA Quadro FX 5500
GeForce 7950 GT	NVIDIA Quadro FX 5500 SDI
GeForce 7900 GTX	NVIDIA Quadro FX 4500 X2
GeForce 7900 GT	NVIDIA Quadro FX 4500
GeForce 7900 GS	NVIDIA Quadro FX 4500 SDI
GeForce 7800 GTX 512	NVIDIA Quadro FX 4400
GeForce 7800 GTX	NVIDIA Quadro FX 4400G
GeForce 7800 GT	NVIDIA Quadro FX 4000 SDI
GeForce 7800 GS	NVIDIA Quadro FX 3500
GeForce 7600 GT	NVIDIA Quadro FX 3450
GeForce 7600 LE	NVIDIA Quadro FX 3400
GeForce 7600 GS	
GeForce 7500 LE	NVIDIA Quadro FX 1500
GeForce 7300 LE	NVIDIA Quadro FX 1400
GeForce 7300 GS	
GeForce 7300 GT	NVIDIA Quadro FX 560
GeForce 7300 SE	NVIDIA Quadro FX 550
GeForce 7100 GS	NVIDIA Quadro FX 540
GeForce 6800 XT	
GeForce 6800 XE	NVIDIA Quadro NVS 285
GeForce 6800 Ultra	NVIDIA Quadro NVS 440
GeForce 6800 LE	
GeForce 6800 GT	
GeForce 6800 LE	
GeForce 6800 GS	
GeForce 6800	
GeForce 6700 XL	
GeForce 6610 XL	
GeForce 6600 VE	
GeForce 6600 LE	
GeForce 6600 GT	
GeForce 6600	
GeForce 6500	
GeForce 6200SE with TurboCache	
GeForce 6200 with TurboCache	

Table 2.1   Supported NVIDIA Products (continued)

Consumer Products	Workstation Products
GeForce 6200 LE	
GeForce 6200	
GeForce 6150 LE	
GeForce 6150	
GeForce 6100	
GeForce 6100 nForce 400	
GeForce 6100 nForce 405	
GeForce 6100 nForce 420	

Supported Languages

The Release 95 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

Minimum Hard Disk Space

The hard disk space requirement is minimum 36.6 MB.

Installation Instructions

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

2 Click the driver download link.

3 The license agreement dialog box appears.

4 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.

5 Extract the zip files to a temporary folder on your PC.

6 Open the NVIDIA driver installation .EXE file to launch the NVIDIA InstallShield Wizard.

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

Note: After the driver installation, Windows may default to 16-bpp color and disable the Desktop Window Manager (DWM). To work around this issue, set the color to 32-bpp and then reboot the PC.

NVIDIA Driver History

Release 95 is the latest NVIDIA driver available. Table 2.1 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 2.1 NVIDIA Drivers for Windows Vista

Windows Vista Build	NVIDIA ForceWare Driver
RC2 OS Builds 5744 or higher	Release 95: Version 96.85, Version 97.46
RC1 OS Builds 5520.RC1_16384.060812-2235 or higher	Release 95: Version 96.33
Build 5472.WinMain_idx01_5.060713-1900 or higher	Release 95: Versions 95.60–96.00
Windows Vista Beta2	NVIDIA Driver version 88.61
February 06 CTP build 5308.FebCTP_Final.060217-2200 or higher	NVIDIA Drivers 87.15, 87.45
July 05 Vista Beta1	NVIDIA Driver included 'in the box'.
December 05 CTP build 5270.Winmain.051214-1910	NVIDIA Driver included 'in the box'.

A

MODE SUPPORT FOR WINDOWS

This chapter details the Windows modes supported by the Release 95 driver for NVIDIA products. It contains these sections:

- "General Mode Support Information" on page 25
- "Default Modes Supported by GPU" on page 26
- "Modes Supported by DACs and TV Encoders" on page 32

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 26.

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 @ 48 Hz	• All high-end NVIDIA Quadro FX graphics solutions.
Apple 30" Cinema HD Display (Dual link DVI)	2560x1600 @ 60 Hz	• All high-end NVIDIA Quadro FX graphic solutions. • 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 graphic solutions. • 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:

- "GeForce 7 Series, GeForce 6 Series, and NVIDIA Quadro FX Family of High End GPUs" on page 27

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 7 Series, GeForce 6 Series, and 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 GeForce 7950 GX2 /GT
- NVIDIA GeForce 7900 GS / GT / GTX
- NVIDIA GeForce 7800 GS / GT / GTX / GTX 512
- NVIDIA GeForce 7600 GT / GS
- NVIDIA GeForce 7500 LE
- NVIDIA GeForce 7300 GS / LE / GT / SE
- NVIDIA GeForce 6800 GT / GS / LE / XT/ XE
- NVIDIA GeForce 6800 Ultra
- NVIDIA GeForce 6800
- NVIDIA GeForce 6700 XL
- NVIDIA GeForce 6610 XL
- NVIDIA GeForce 6600 GT / LE / VE
- NVIDIA GeForce 6600
- NVIDIA GeForce 6500
- NVIDIA GeForce 6200 LE
- NVIDIA GeForce 6200 w/TurboCache™
- NVIDIA GeForce 6200SE w/TurboCache™
- NVIDIA GeForce 6200
- NVIDIA GeForce 6150
- NVIDIA GeForce 6150 LE
- NVIDIA GeForce 6100
- NVIDIA Quadro FX 4500 X2
- NVIDIA Quadro FX 4500
- NVIDIA Quadro FX 3500
- NVIDIA Quadro FX 3400 / Quadro FX 4400
- NVIDIA Quadro FX 3450 / Quadro FX 4000 SDI
- NVIDIA Quadro FX 1400

- NVIDIA Quadro FX 3000 / Quadro FX 1300
- NVIDIA Quadro FX 700
- NVIDIA Quadro FX 600
- NVIDIA Quadro FX 560
- NVIDIA Quadro FX 550
- NVIDIA Quadro FX 540
- 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       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
```

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 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
```

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.