

NEXUS 128™

User's Guide



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Getting Started

Introduction

NEXUS 128 represents the next generation in 2D and 3D rendering and graphic acceleration for your PCI-based Mac OS computer. Equipped with all the 3D hardware drawing capabilities in demand by designers, your new graphics accelerator provides:

- QuickDraw 3D acceleration providing superior 3D rendering performance and advanced imaging and filtering techniques
- QuickDraw acceleration supporting 2D resolutions up to 1920x1200 in millions of colors.
- QuickTime playback accelerator for full screen, full motion, TV quality video
- OpenGL[®] support using Conix OpenGL[®] software

The easy-to-access, easy-to-use ATI Config Menu, on the menu bar, provides access to ATI Guide, providing instant access to help, and the ATI Displays control panel, which provides quick access to all of NEXUS 128's easy-to-use features.



A glossary of the bold terms used throughout this manual is available in Appendix D, “[Glossary](#)” on page 39 of this user guide and also in the ATI Guide.

What You'll Need

The NEXUS 128 card runs with the following minimum system requirements:

- Power Macintosh or Mac OS compatible computer, with a PCI expansion slot
- Mac OS 8.0 or later software
- Apple monitor or VGA-style monitor (*see note below*)
- QuickDraw 3D 1.5.4 or later
- QuickTime 3.0 or later (*see note below*)
- Minimum 16MB of system memory (QuickDraw 3D requires 16MB of system memory)



Apple monitors without a VGA connector must use the included adapter to connect to the NEXUS 128 graphics card.

Supports both QuickTime 3.0 and QuickTime 3.0 Pro

Related Documentation

The README file summarizes the latest product revisions. Double-click the README icon on the installation disk to open this file.

The NEXUS 128 card comes with ATI Guide, which provides online help for making the best use of your card's features. There are two methods of accessing the ATI Guide. From the Mac OS menu bar under the ATI icon  choose ATI Guide. From the ATI Displays control panel, you can also access the ATI Guide by clicking on the Apple Guide  icon.



Installing Your Hardware

NEXUS 128 fits into connectors called expansion slots, inside your computer.

Your Mac OS computer has one or more slots, each designed to accept Peripheral Component Interconnect (PCI) cards.



WARNING

- The manufacturer assumes no liability for any damage, caused directly or indirectly, by improper installation of components by unauthorized service personnel. **If you do not feel comfortable performing the installation, consult a qualified technician.**
- Make sure power is off during installation; otherwise, damage to system components, the graphics accelerator card, and injury to yourself may result.



The following procedure details the installation of a card in a typical Mac OS PCI-based tower computer. If your computer does not match this configuration, please refer to the expansion card installation instructions that came with your computer.

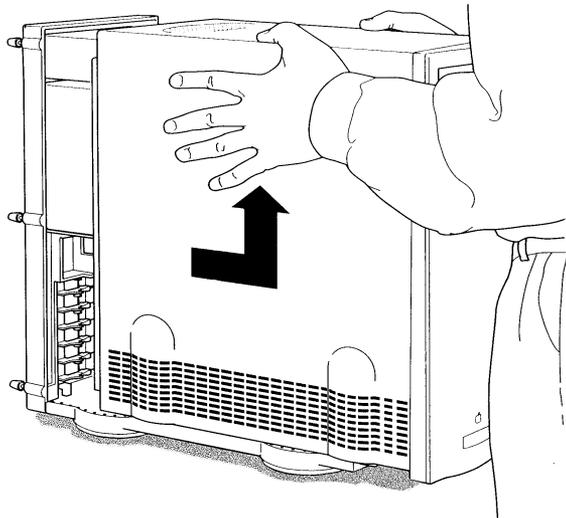


IMPORTANT

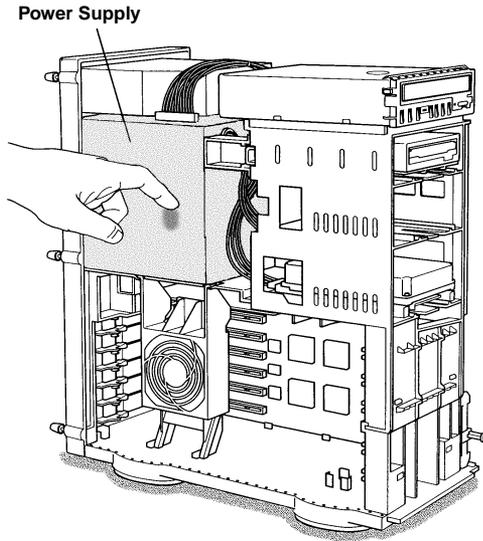
- If your computer stops responding (hangs) after installing the NEXUS 128 card, you may have an incompatible graphics accelerator extension. This can occur when the Mac OS software was installed, or other ATI accelerator graphic accelerator cards were installed.
- Restart your computer and hold down the SHIFT key during startup. This disables all extensions from loading. After disabling extensions, you can update the graphics accelerator extension by installing the software included with your card. For more information about installing the software, see [“Installing Software” on page 12](#).

Installing your NEXUS 128

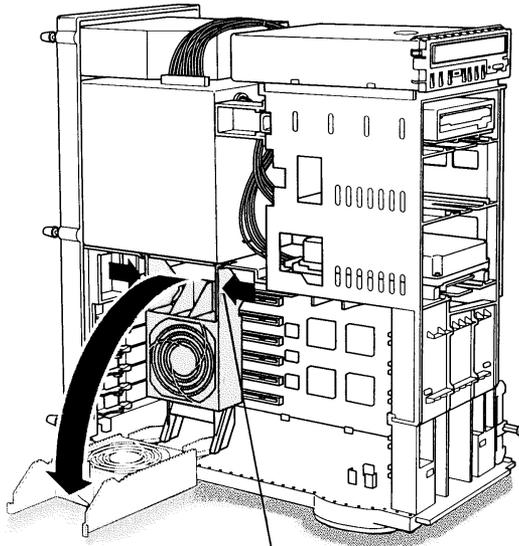
- 1** Turn off your computer, and disconnect the monitor cable.
- 2** Remove the computer cover. If necessary, consult your computer system manual for removal instructions.



- 3 Choose the PCI expansion slot you wish to use.
- 4 Touch the metal part of the power supply case.
Touching the grounded portion of the power supply case discharges your body's static electricity.



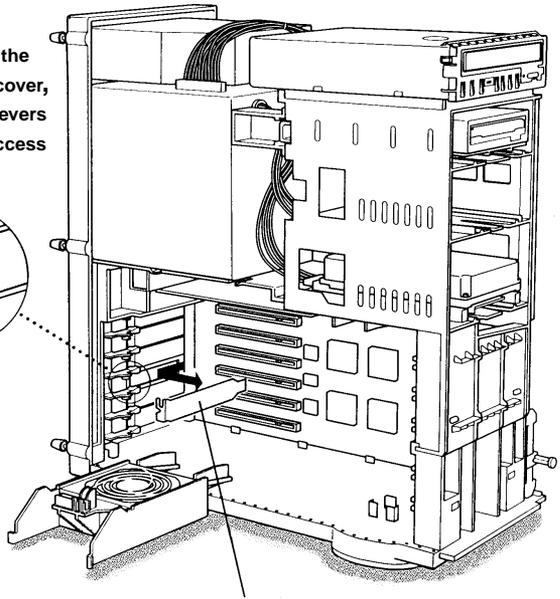
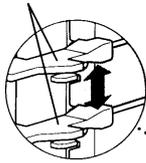
- 5 Lower the auxiliary fan.



To lower the fan, squeeze the sides to unlatch it.

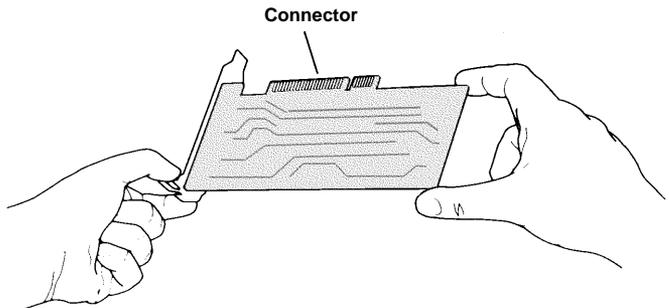
- 6** Remove the metal access cover from the expansion slot you want to use.

1. To release the access port cover, pull the two levers next to the access port apart

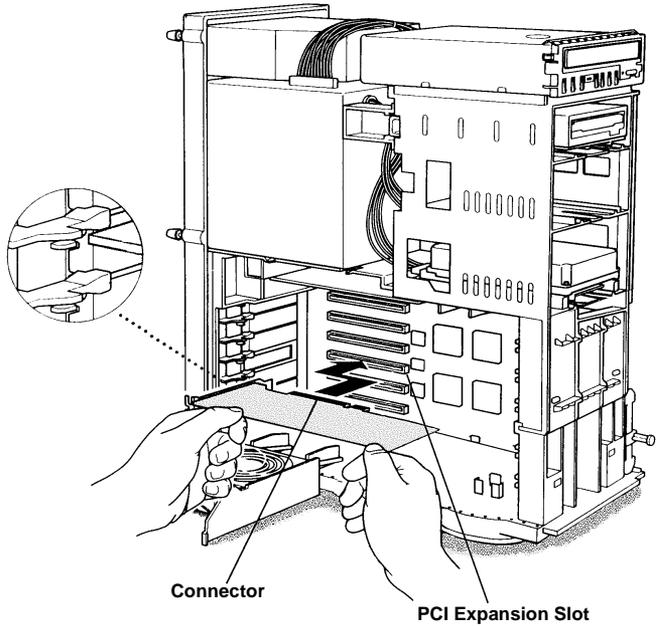


2. Slide the access port cover out and away from the access port.

- 7** Align the connector on the card with the PCI expansion slot and press firmly until fully seated.



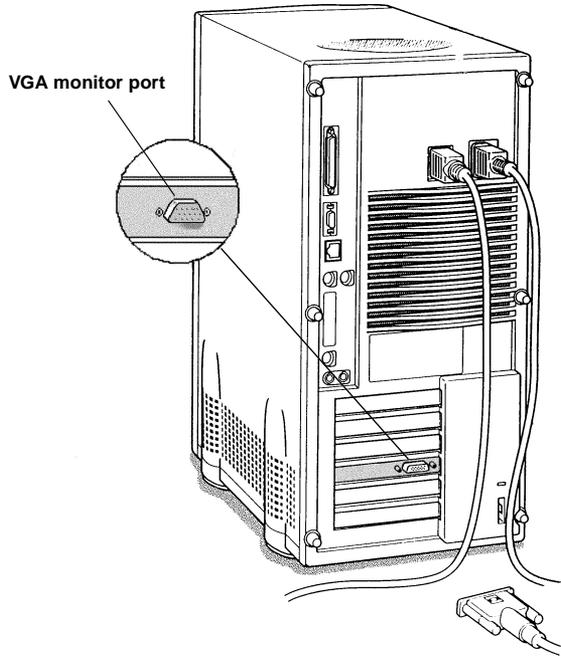
Do not force the card. The card should fit snugly into the expansion slot.



If you plan to use multiple displays, you must install a card for each monitor. Repeat steps 6 and 7 for each card.

- 8** Replace the auxiliary fan.
- 9** Replace the computer cover.

- 10 Connect the monitor cable to the card.



If you have an Apple monitor, use the supplied Apple-to-VGA adapter to connect the Apple monitor to the VGA port. If you have a VGA monitor, connect it directly to the VGA monitor port.

Installation of your NEXUS 128 card is now complete and you are ready to install the software. See [“Installing Software” on page 12.](#)

About Monitor Sensing

Apple's Monitor Sensing specification allows video display cards to identify the attached monitor. The NEXUS 128 auto-configures itself according to the monitor sense code detected and enables all resolutions supported by the monitor. Since NEXUS 128 relies on this sense code to correctly auto-configure during startup, the monitor must supply the appropriate sense code.

On VGA monitors, the NEXUS 128 card uses the Display Data Channel (DDC) protocol, which is similar to Apple's Monitor Sensing specification, to determine the possible resolutions and frequencies. All possible resolutions are shown in the Monitors & Sound control panel and the Apple control strip.

When using older VGA monitors without DDC, you must choose the resolutions supported by your VGA monitor in the VGA Monitors section of the ATI Displays control panel. See "VGA Monitors" on page 18 for additional information.

If you are using a display adapter which supplies only the sense code information for one resolution, then only one resolution will be available, even if the monitor supports multiple resolutions. The default resolution is typically 640 x 480. Therefore, when using an adapter to supply the sense code, it must be designed to supply the proper code for your monitor; otherwise, the NEXUS 128 card cannot correctly auto-configure itself for the attached monitor.

Although the NEXUS 128 card does not output Sync-on-Green (SOG) signals, adapters are available to overlay the Composite Synchronization Signal and send it through the Green video signal line so that you can use an SOG monitor. Monitors requiring an SOG signal usually have only three BNC connectors (RGB).

For more information about obtaining a sense code or synchronization signal adapter, contact ATI Customer Support or a computer retailer. For information about how to contact ATI Customer Support, select the Support button on the ATI Displays control panel.

3

Installing Your Software

About ATI Software

NEXUS 128 requires that several components be added to your System folder. The ATI Installer does this for you, installing the following components:

ATI Displays Control Panel



The ATI Displays control panel lets you configure your card and access software and hardware features. These features are described in the section “ATI Displays Control Panel” on page 15.

ATI Multimedia Components



ATI’s Multimedia Components are placed in the System folder. They enable all of the advanced features of your card, including 3D and 2D acceleration.

ATI Guide File



The ATI Guide file is the online help for the ATI Displays control panel. It is placed in the Extensions folder within the System folder. For more information about using the ATI Guide, see “ATI Guide” on page 22.

Installing Software

- 1 Insert the ATI Installation CD.
- 2 Double-click on the ATI Universal  Installer icon.

The ATI splash and legal notice screens appears.

- 3 Follow the instructions that appear on the screen.

Under most circumstances, you should click Standard Install. However, if you only want to install certain parts of the ATI multimedia software, click Custom Install.

Upon completion of the installation process, a file containing a list of installed files and their location on your hard disk is created allowing you to locate any file installed during the installation process.



The installer application checks your system to determine if you have the latest versions of the required software. If you do not have the appropriate Apple software, a dialog appears explaining what software needs to be installed.

- 4 When you see a message that the installation was successful, click Restart.

To complete the installation, you must restart your



Your computer restarts.

or

To perform further installations, click Continue.
The NEXUS 128 Standard Install window appears.

or

To return to Finder, click Quit.
You need to manually restart your computer to complete the installation of NEXUS 128's software.



Multimedia Features

Your NEXUS 128 turns your PCI-based Mac OS computer into a 3D and 2D graphics powerhouse. You can use your new graphics accelerator card to:

- Appreciate true-color, high performance 2D and 3D graphics in resolutions up to 1920x1200.
- Create full-page, full color layouts on a single screen without having to scroll.
- Render 3D worlds and animation in real time, using embedded 3D hardware with support for both QuickDraw 3D and OpenGL.
- Watch full screen, full motion, TV-quality video using QuickTime playback acceleration

The following information describes these new 3D features in more detail and suggests ways you can optimize your computer to get the most out of your new card.

Viewing 3D Graphics

- NEXUS 128's QuickDraw 3D Acceleration supports the following advanced 3D graphics capabilities:
- QuickDraw 3D RAVE Support
- OpenGL Support
- True color (32-bit rendering)
- Perspectively correct texture mapping functions
- Single pass Bilinear/Trilinear filtering
- 16-bit or 32-bit z-buffering (a process that removes hidden surfaces)
- 8-bit stencil buffer
- Flat and Gouraud shading
- Floating-point setup engine
- Mip-Mapping
- Alpha blending and fog effects
- Specular Highlights
- Shadows and Spotlights
- Texture lighting

These features make it possible to quickly render 3D graphics, produce atmospheric effects, calculate light and color shading, and determine which objects are in the foreground and which are in the background.

NEXUS 128 only displays 3D graphics in thousands and millions of colors. When you use 256 colors, there are too few colors to display complex 3D textures, so 3D acceleration is not supported.

You can use the 3D Memory Monitor to see how memory on your NEXUS 128 is allocated when displaying 3D graphics. This allows you to optimize 3D performance.

ATI Displays Control Panel

The ATI Displays control panel provides access to the advanced 3D features that NEXUS 128 has to offer. To open the ATI Displays control panel, choose Control Panels from the Apple menu, then choose ATI Displays.

For detailed instructions on how to set up and use these features, please refer to the ATI Guide, which can be accessed through the ATI Displays control panel.



Status Area



Look in the Status Area to determine your current monitor, screen resolution, and color depth. To change these settings, use the Monitors feature to open the Monitors & Sound control panel. You can also change the monitor depth and resolution at any time using the Apple control strip, if installed.



Identify Displays

If you have more than one display connected to your computer, you can identify and configure each display. The ATI Displays control panel identifies all the displays connected to your computer, but only configures displays that are connected to ATI cards.

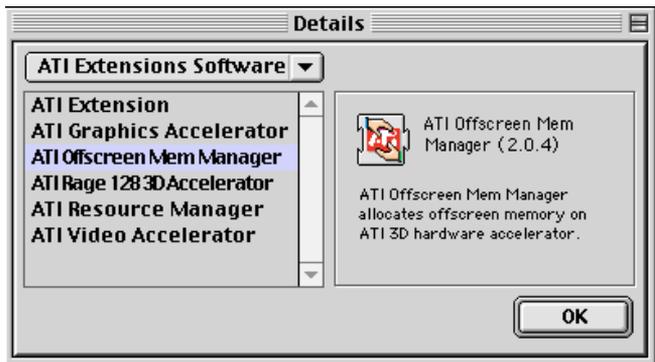


If you are using multiple monitors and using one display with the built-in video, or a non-ATI video card, a generic video card icon is displayed in the ATI Displays control panel. However, you cannot make any changes to the generic video card using ATI Displays.



Display Details

The Details window gives you information about specific software components needed to enable each of NEXUS 128's features. Check the Details window to determine the files and version numbers of the software components installed in your system folder during the installation process. Using the pull-down menu, the Details window also lists the Mac OS multimedia software required for NEXUS 128, such as QuickDraw 3D.





Monitors

The Monitors feature provides access to the standard Mac OS Monitors & Sound control panel. You can use this panel to select color depths and resolutions, and set up multiple monitors. For more information on the Monitors & Sound control panel refer to the Mac OS Guide that comes with your computer.



Keyboard Shortcuts

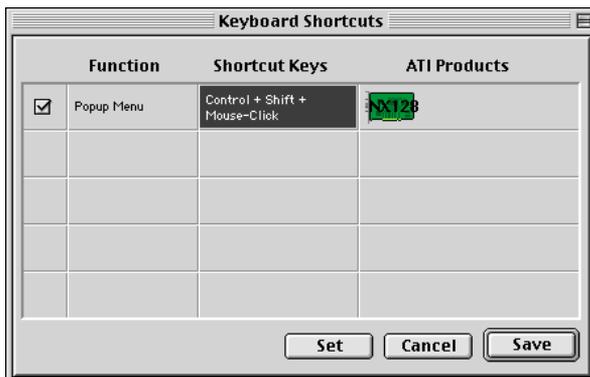
This feature allows you to use a pop-up menu to change your desktop settings without exiting your current application. You can configure, enable or disable shortcut features when you click the Shortcut icon in the control panel.

The ATI Popup Menu only displays the valid and safe modes available for the attached monitor(s). Additional modes may be accessed through the Monitors & Sound control panel or the Control Strip.



Different ATI cards offer distinct keyboard shortcut options, so not all shortcuts appear on every ATI card.

Popup Menu and Hot Keys remain inactive when dialogs appear on the screen. For example, while using the Monitors & Sound control panel, the Popup Menu and Hot Keys are disabled.





VGA Monitors

If you have a non-DDC compliant VGA monitor connected to your NEXUS 128 card, the VGA icon may be active. Some VGA monitors use a Display Data Channel (DDC), allowing NEXUS 128 to automatically determine the resolutions the monitor supports. The DDC technology works like the Apple Sense Code protocol; you do not have to do anything extra to select the supported resolutions. Your NEXUS 128 card uses the DDC information to automatically provide the supported resolutions in the Monitors & Sound control panel and the Control Strip. If your VGA monitor doesn't use DDC, the VGA Monitors icon is active and you must use it to select your monitor from a list of standard monitors.



If the VGA icon is dimmed, your computer has detected an Apple-type monitor, or a DDC compliant VGA monitor connected to your NEXUS 128 card. You do not have to make a selection.

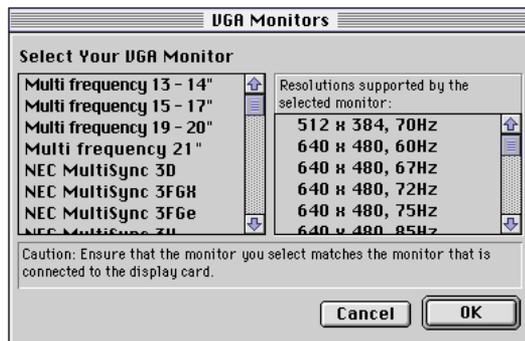
To Select a VGA Monitor

- 1 Select VGA Monitors from the ATI Displays control panel.
- 2 Select your VGA model from the list of monitors in the left panel of the VGA Monitors dialog box.

A list of resolutions supported by your VGA monitor appears in the right panel of the VGA Monitors dialog.



You cannot select the monitor resolution using the VGA Monitors dialog box. You must use the standard Mac OS Monitors & Sounds control panel.





3D Memory Monitor

NEXUS 128 supports advanced 3D features including **mip-mapping**, **Gouraud shading**, **fog effects**, and **texture mapping**. The 3D Memory Monitor shows how available memory in the accelerator card is allocated when displaying 3D graphics.

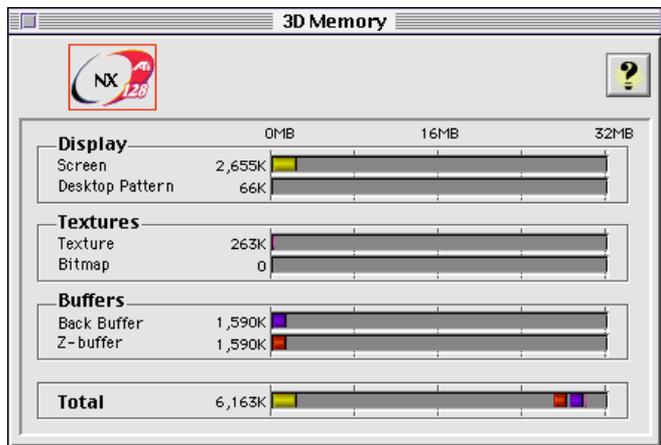
Using the 3D Memory Monitor

When you open 3D graphics on your Mac OS computer, run the 3D Memory Monitor to see how your NEXUS 128 has allocated 3D memory.

To open the 3D Memory Monitor

- 1 Choose Control Panels from the Apple Menu, or ATI Config Menu and skip to step 3.
- 2 Select ATI Displays.
- 3 Click on the 3D Memory icon.
When you open a 3D application window, you can see how the additional memory required for 3D graphics is allocated.

The 3D Memory Monitor shows you how the memory on your NEXUS 128 has been allocated between display, textures, and buffers. If you use all the available memory on the NEXUS 128 card, your Mac OS computer drops 3D textures and substitutes Gouraud shading.



Display

Screen indicates the amount of graphics memory allocated to the display's resolution and color depth. Desktop Pattern indicates the amount of memory used by your desktop pattern.

To reduce the memory allocated to Display memory:

- change the color depth from millions to thousands
- decrease your screen resolution

Textures

Texture indicates the number and size of texture maps loaded by 3D applications to add realism to 3D models and environments. **Bitmap** indicates the memory allocated to non-3D elements like 2D graphics. To reduce the memory allocated to Texture memory, reduce the amount of textures in your 3D graphic.

Buffers

Back Buffer and **z-buffer** are directly related to the size of the 3D window.

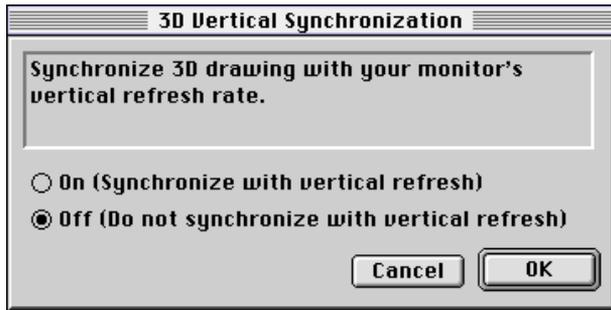
To reduce the memory allocated to Buffer memory:

- reduce the size of the display window containing 3D graphics
- reduce the number of the display windows containing 3D graphics



3D Sync

Your NEXUS 128 graphics accelerator provides superior 3D performance by performing many tasks in **offscreen memory** including graphic rendering. Depending on the 3D scene, the refresh rate of your computer monitor, and the game or application, you may notice some slight horizontal flickering or “tearing”. This flicker is caused by the different rates at which the display performs a complete screen redraw, and when the NEXUS 128 moves images located in offscreen memory to display buffer. Synchronizing the redraw and the write to the display buffer provides a flicker-free 3D window.



- **On (Synchronize with vertical refresh)** - Provides a flicker-free 3D window. The display is synchronized with the vertical refresh, so there isn't any flickering or “tearing” in the 3D window.
- **Off (Do not synchronize with vertical refresh)** - Provides a boost in performance, but in some games and applications it can introduce flickering or “tearing” in the 3D window.

You should experiment with these settings to find the proper setting for your application.



ATI Guide

The ATI Guide is an additional source of information when you are using the ATI Displays control panel. It behaves similarly to the Mac OS Guide that comes with your computer.

Access the ATI Guide by clicking on the Apple Guide  icon on the ATI Displays control panel, or the ATI Config Menu. The ATI Guide stays in front of other windows on the screen so the instructions are always visible. To move the ATI Guide window to another location, drag it by the title bar.

Select a topic from the main ATI Guide window to get detailed instructions for a specific task. To return to the main ATI Guide window, click the Topics icon in the lower-left corner of the Guide window. When you're finished using ATI Guide, click the close box.



Customer Support

You can obtain Customer Support information by clicking the ATI icon in the ATI Displays control panel. You can also generate a problem report.



Please refer to the ATI Guide for additional instructions on generating a problem report.

Before calling about a suspected problem, please complete the problem report, and have the report file either on-screen or printed out for reference during your call. Important information about your computer is automatically included when you generate the report.

Using QuickTime Playback

NEXUS 128's QuickTime playback acceleration allows you to stretch even the smallest movies to full screen size without compromising frame rate or image quality. NEXUS 128's hardware scaler maintains the original quality of your QuickTime movie when scaling to a larger size – even full screen.

NEXUS 128's QuickTime playback acceleration displays in millions of colors, even if the current color depth setting is 256 colors. When the monitor is set to display in grayscale, QuickTime movies are accelerated in grayscale, they are not converted to color. When scaling video, NEXUS 128 uses special hardware techniques (alpha blending and chroma interpolation) to enhance the video quality instead of just repeating pixels.



To use NEXUS 128's playback acceleration, you must have QuickTime version 3.0 or greater installed on your computer.

Optimizing Video Playback

When you scale a movie, your computer switches from QuickTime's software scaler to NEXUS 128's hardware scaler to produce better results. However, QuickTime will not switch to hardware scaling in the following situations:

- playing video in double size
Try manually scaling the video slightly off exactly double the size.
- pausing the video
- using single frame advance
- watching the video in reverse
- playing a video that has not been saved in Cinepak, Indeo, or MPEG-1 compressed format

QuickTime clips must be in Cinepak (the most common QuickTime movie format), Indeo, or MPEG-1 format to be scaled by NEXUS 128. To determine if a video will be accelerated using NEXUS 128's hardware scaler, check the video format.

To check the format of a video

- 1 Open the movie using Apple Movie Player.
- 2 Choose Get Info, from the Movie menu.
- 3 From the 1st pull down menu, select Video Track.
- 4 From the 2nd pull down menu, select Format.
- 5 Read the format type. Remember, only Cinepak, Indeo, and MPEG-1 formats use NEXUS 128's QuickTime acceleration and hardware scaler.



Some multimedia titles on CD-ROM incorporate QuickTime clips that do not allow movies to be stretched during playback. These QuickTime clips cannot be accelerated while viewing the multimedia title.



Troubleshooting Tips

Before Contacting Customer Support

If you have a general question, or encounter problems with your card, please review this information completely before contacting Customer Support.

You can create a problem report from the ATI Displays control panel. Please refer to the ATI Guide for instructions on generating this problem report, and for general troubleshooting tips not covered in this section.

Before calling about a suspected problem, please complete the problem report, and have the report file either on-screen or printed out for reference during your call. Important information about your system is automatically included when you generate the report.

Solutions to Common Problems

Why can't I get a resolution higher than 640x480?



If the monitor is connected to the VGA monitor port on your NEXUS 128 card...

- go to the ATI Displays control panel, click “VGA Monitors”, and select a monitor type which matches the specifications of your monitor. This allows more resolutions to be available for selection in the standard Mac OS Monitors & Sounds control panel.

I have a monitor with three BNC connectors. Why won't it work with my NEXUS 128 card?

- Monitors that only have three BNC connectors require a synchronization (“sync”) signal to be sent down the green line. This is called Sync-on-Green (SOG). ATI accelerator cards do not output an SOG signal. Adapters are available for your Mac OS computer to convert the separate sync signal from the ATI card to an SOG signal for the monitor. Check with an Apple retailer for availability of SOG adapters.

I have a monitor with five BNC connectors. Why won't it work with my NEXUS 128 card?

- For a cable with five BNC connectors, ensure that all the cables are all connected to the monitor. If only the red, green, and blue cables are connected, the monitor is expecting a Sync-on-Green (SOG) signal.
- Some monitors may have a switch to set the monitor to either SOG or separate sync. If the switch is set to SOG, the monitor will show a scrambled display. Setting the switch to separate/composite sync may resolve the problem.
- A number of BNC cables, even though they are designed for Mac OS computers, do not supply the sense code needed by the graphics card. Using an adapter which sets the appropriate sense code should solve the problem.

After selecting a VGA monitor type in the VGA Monitors dialog, I couldn't change the resolution in the Resolutions Supported scroll list.

- This scroll list in the ATI Displays control panel only shows the available resolutions for the monitor type selected, and will not allow you to select and change resolutions. Changing resolutions can only be done through the standard Monitors & Sound control panel, or by using the Popup Menu supplied with the NEXUS 128 card.

Does the NEXUS 128 work in all Power Macintosh computers?

- No, the NEXUS 128 only works with PCI-based Power

Macintosh computers. The minimum requirements are listed in [“What You'll Need” on page 2](#).

After installing NEXUS 128, I noticed some sound distortion. Why?

- Disabling Virtual Memory in the Memory Control Panel may resolve this problem. Certain Mac OS computers may experience sound corruption while using QuickDraw 3D accelerated applications even with Virtual Memory turned off.
- Installing the ATI Sound Catalyst extension corrects sound corruption in certain Macintosh computers. Additional information on the Sound Catalyst extension is available in the Read Me document in the Sound Catalyst folder.
- If you still have sound related problems, check with the manufacturer of your Mac OS computer for any sound related software updates they may have available.



Specifications

Video Mode Table

The video mode table below lists the supported resolutions on your NEXUS 128 card. All video resolutions, regardless of memory configuration, have a maximum color depth of 32 bits per pixel, also referred to as millions of colors.

Please consult your monitor's specifications to determine which resolutions are available with your display.

Mac OS 2D Resolutions

Display Resolution	Vertical Refresh Hz	Horizontal Refresh kHz	Fixed Mac OS Monitor Size
512 x 384	60	24.48	12-in.
640 x 480	67	35.00	13-in./14-in.
832 x 624	75	49.72	16-in./17-in.
1024 x 768	75	60.24	19-in./20-in.
1152 x 870	75	68.68	21-in.

Supported VESA/VGA 2D Modes

Display Resolution	Vertical Refresh Hz	Horizontal Refresh kHz
512 x 384	70	31.48
640 x 480	60	31.47
	72	37.50
	75	37.50
	85	43.27
	90	47.97
	100	52.95
	120	63.66
640 x 870	75	68.85

Display Resolution	Vertical Refresh Hz	Horizontal Refresh kHz
800 x 600	56	35.16
	60	37.88
	72	48.08
	75	46.87
	85	53.67
	90	56.64
	100	63.92
	120	76.13
1024 x 768	60	48.36
	70	56.48
	85	68.68
	90	72.67
	100	80.41
	120	96.73
1280 x 960	75	75.00
1280 x 1024	60	63.98
	75	79.98
	85	91.15
1600 x 1024	76	81.32
1600 x 1200	60	75.00
	65	81.25
	70	87.50
	75	93.75
	85	106.25
1792 x 1344	60	83.64
1856 x 1392	60	86.33
1920 x 1080	60	70.31
	72	84.37
1920 x 1200	76	95.00
1920 x 1440	60	90.00

3D Mode Table

The 3D mode table measures the number of full screen 3D windows that are possible to display at a given resolution. For example, a value of 2.75 means that there is enough memory left over in the current mode to run 2 full screen 3D windows and another at 3/4 the size of full screen. A value of 0.40 means that largest 3D window will be just less than 1/2 the size of full screen. In the following table, 3D windows are considered to use a **back buffer** and **z-buffer**.



3D acceleration is not supported when your color depth is 256 colors. In this color depth, there are too few colors to display complex 3D textures.

Resolution	Colors	Full screen 3D windows possible	
		32 MB 16-bit z--buffer	32 MB 32-bit z-buffer
512 x 384	Thousands	42.00	28.00
	Millions	27.50	20.00
640 x 480	Thousands	26.50	17.75
	Millions	17.25	13.00
800 x 600	Thousands	16.75	11.25
	Millions	10.75	8.00
832 x 624	Thousands	15.50	10.25
	Millions	10.00	7.50
1024 x 768	Thousands	10.00	6.75
	Millions	6.25	4.75
1152 x 870	Thousands	7.75	5.00
	Millions	4.75	3.50
1280 x 1024	Thousands	5.75	3.75
	Millions	3.50	2.50
1600 x 1200	Thousands	3.75	2.50
	Millions	2.00	1.50
1920 x 1080	Thousands	3.50	2.25
	Millions	2.00	1.50
1920 x 1200	Thousands	3.00	2.00
	Millions	1.75	1.25
1920 x 1440	Thousands	2.50	1.50
	Millions	1.25	1.00

Specifications

System Requirements

- Power Macintosh or Mac OS compatible computer with a PCI slot

Operating System

- Mac OS software (version 8.0 or higher)
- QuickTime (version 3.0 or higher)
- QuickDraw 3D (version 1.5.4 or higher)

ATI Multimedia components are Mac OS 8 and Mac OS 8.5 compatible



Graphics Controller

- ATI RAGE 128 — 128-bit graphics and multimedia accelerator chip

Video Display Buffer

- 32MB SDRAM memory
- 128-bit memory interface

Bus

- 32-bit PCI local bus compliant with PCI version 2.1 specification

Sync Signals

- Separate horizontal and vertical sync at TTL levels
- Composite sync at TTL levels

Video Memory Address

- Supports PCI Multimedia Standard
- Supports 32MB relocatable memory aperture

Display Connector

- VGA Connector - Standard VGA
Monitors with Apple Connectors are supported with the included Apple-to-VGA video adapter.

Video Interrupt

- PCI interrupt request enabled; interrupt is auto configured by system

Power

- +5V $\pm 5\%$, @ 1.3A typical

Environment

- Ambient Temperature: 50° to 122° F (10° to 50° C) operation. 32° to 162° F (0° to 70° C) storage
- Relative Humidity: 5% to 90% non-condensing operation
0% to 95% storage

MTBF

- 120,000 hours

EMC Certification

- FCC Class B

Safety

- PCB made from UL-listed flame retardant material



Compliance Information

FCC Compliance Information

This device is in conformity with part 15 of the FCC Rules. Operation of this product is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced technician for help.

- The use of shielded cables for connection of the monitor to the graphics card is required to ensure compliance with FCC regulations.
- Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Industry Canada Compliance Statement

ICES-003 This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe B Respecte toutes les exigences du Règlement sur le matériel brouiller du Canada.

CE Compliance Information

EMC Directive 89/336/EEC and Amendment 92/31/EEC, Class B Digital Device

EN 50081-1, Generic Emissions Standard for Residential, Commercial and Light Industrial Products

(EN 55022/CISPR 22, Limits and Methods of Measurement of Radio Interference Characteristics Information Technology Equipment) *Warning: This is a Class B product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.*

EN 50082-1, Generic Immunity Standard for Residential, Commercial and Light Industrial Products

(IEC 801-2, IEC 801-3, IEC 801-4)

Directive EMC 89/336/CEE et amendement 92/31/CEE, dispositif numérique de Classe B

EN 50081-1, Norme sur les émissions génériques pour les produits domestiques, commerciaux et industriels légers

(EN 55022/CISPR 22, Limites et méthodes de mesure des caractéristiques d'interférences radiophoniques, Matériel des technologies de l'information) *Mise en garde: ceci est un*

produit de Classe B. Il risque produire des interférences radiophoniques dans un environnement domestique auquel cas l'utilisateur peut se voir demandé de prendre des mesures adéquates.

EN 50082-1, Norme sur l'immunité générique pour produits domestiques, commerciaux et industriels légers.

(CEI 801-2, CEI 801-3, CEI 801-4)

EMC Richtlinie 89/336/EEC und Änderung 92/31/EEC, Digitales Gerät der Klasse B

EN 50081-1, Allgemeiner Emissions-Standard für Haushalt- und kommerzielle Produkte sowie Erzeugnisse der Leichtindustrie

(EN 55022/CISPR 22, Beschränkungen und Verfahren der Messung von informationstechnischen Ausrüstungen mit Funkstörmerkmalen)

Warnung: Dies ist ein Erzeugnis der Klasse B. Dieses Erzeugnis kann Funkstörungen im Wohnbereich verursachen; in diesem Fall können entsprechende Maßnahmen seitens des Benutzers erforderlich sein.

EN 50082-1. Allgemeiner Unempfindlichkeits-Standard für Haushalt- und kommerzielle Produkte sowie Erzeugnisse der Leichtindustrie

(IEC 801-2, IEC 801-3, IEC 801-4)



Glossary

Alpha blending

When an image has an alpha value for each pixel, this tells how much to blend the colors from the image with the background colors. The lower the alpha values the more transparent the image looks.

Anti-aliasing

Method used to remove the jaggedness of an image. When anti-aliasing is used, the edges of an image appear smooth and usually somewhat blurry.

Back buffer

A type of **offscreen memory** used to provide smooth video and 2D graphics acceleration. This technique uses two frame buffers, often referred to as "double-buffering". While one buffer is being displayed, a second buffer of the same size, the "back" buffer, holds the frame being worked on.

Once a new frame is ready in the back buffer it is copied to the front buffer - the display screen. In this way, you will only see complete, smooth frames, and not the operations performed on them.

In order to increase performance, all memory used for back buffers are on your ATI graphic accelerator card.

Bilinear Filtering

When texture mapping is performed an image can become very "blocky" or "pixelated" when the texture is viewed close up. Bilinear filtering samples four texture pixels, takes the weighted average of these pixels and applies the average of these "texels". This blended color is used to provide a smoother looking texture.

Bitmap

A bitmap is a graphics or character representation composed of individual pixels, arranged horizontally in rows. A monochrome bitmap uses one bit per pixel (bpp). Color bitmaps may use up to 32-bpp, depending on the number of colors desired.

Buffers

Your ATI accelerator card includes on-board memory which is used in a number of ways. Buffers are portions of this memory used as temporary storage on your card. One large buffer is always used to display the screen you see; this is the "display buffer". The rest of **offscreen** memory is used by applications as **back buffers**, **z-buffers**, and texture buffers.

Color Depth	Color depth is the number of color shades available on your display. The color depth of your monitor usually includes; 256 colors (8-bpp), Thousands of colors (16-bpp), and Millions of colors (32-bpp), and is also measured in bits per pixel (bpp). You can switch your color depth using the ATI Popup Menu, Apple's Control Strip, or the Monitors & Sound control panel. Higher bit-depths require more display buffer memory.
	Note: The ATI 3D Accelerator only functions in Thousands and Millions of colors modes.
Fog	The blending of an object with a fixed color as objects or pixels increase distance away from the viewer.
Frame Buffer	Memory buffer used to store the image being displayed.
Gouraud Shading	One of the more sophisticated shading methods used to produce a smooth lighting effect across a 3D object. A specific color is used at each vertice of a triangle or polygon, and interpolated across the entire face.
MIP Map	Multum In Parvum (Latin) means "many in one." It is a method of increasing quality of a texture map by storing multiple resolutions of the same image and dynamically switching between them depending on the size and depth of the object being textured.
Off-screen Memory	An area of memory used to preload and place images so that they can be quickly drawn on the screen. Offscreen memory refers to all the memory on your ATI accelerator card that is not taken up by the front buffer, which holds the display screen that you see.
Pixel, Pel	Picture element. Smallest addressable area of the computer screen. Pixels on computer displays are square; pixels on NTSC televisions have a 4:3 aspect ratio.
Refresh Rate	Also referred to as "vertical refresh rate". The rate at which a monitor or television can redraw the screen from top to bottom. NTSC television systems have a refresh rate of approximately 60 Hz (but only draw one-half of the video frame in one pass); computer displays typically have refresh rates of 75 Hz or more. At a refresh rate of 70 Hz and lower, screen flicker is often noticeable.
Specular Highlight	The bright, usually small, intense light reflected from a 3-D surface with a high refraction value.

Texture Mapping

Mapping, or placing, an image onto an object. Images of realistic surfaces are placed on 3D models to create a richer and more complex visual effect.

Trilinear Filtering

Sampling method used to produce the most realistic looking 3D objects. Trilinear filtering averages one of the bilinear filter MIP Map levels along with the standard MIP Map samples.

z-buffer

A z-buffer is an area of off-screen memory used to hold “depth” information. For each dot, or pixel, in the display buffer, there is a corresponding dot in the z-buffer which holds the depth (z) value for the display pixel. The depth data helps the ATI accelerator card decide what 3D objects are in front off other 3D objects.

The larger the 3D window, the larger the z-buffer is in memory.



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