

RADEON™ 9800 PRO MAC EDITION User's Guide

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Introduction

The RADEON 9800 PRO MAC EDITION represents the next generation in 3D and video acceleration for your Power Macintosh® computer. It includes flexible dual-display support for multiple combinations of CRT and Digital Flat Panel monitors. Your new graphics accelerator provides:

- Flexible dual-display support enabling many combinations utilizing VGA, and DVI connectors for analog and digital displays.
- OpenGL® accelerator providing superior 3D rendering performance and advanced imaging and filtering techniques.
- Industry leading DVD acceleration for High Bitrate, low CPU usage playback, of the latest movies at any resolution.
- QuickTime® playback accelerator for full screen, full motion, DVD quality video.
- TV-Out support via S-Video connector.

What You'll Need

The RADEON 9800 PRO MAC EDITION runs with the following minimum system requirements:

- Any Power Macintosh[®] computer with an AGP 4x/2x expansion slot.
- Mac OS X version 10.2.5 or higher.
- VGA-style monitor (*see note below*), DVI style digital flat panel, Apple[®] ADC style digital flat panel (using a third party powered adapter) or Apple[®] multi-frequency monitor.
- QuickTime[®] 6 or higher.
- Minimum 128MB of system memory required for Mac OS X version 10.x.





Connecting a second VGA monitor requires a DVI-to-VGA adapter (included) to connect to the RADEON 9800 PRO MAC EDITION graphics accelerator.



Future references to Mac OS X in this manual are intended to be generic and inclusive of their respective versions of the Macintosh[®] operating systems.

Related Documentation

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

Help is available by clicking on the  button in the ATI Displays control panel or through the Apple® Help Center . You can browse through the Help or search for a specific topic.

Multimedia Features

Your RADEON 9800 PRO MAC EDITION turns your Mac computer into a 3D and 2D graphics powerhouse. You can use your new graphics accelerator card to:

- Enjoy true-color 32-bit 2D or 3D graphics up to 2048 x 1536.
- Watch full screen, full motion, DVD quality video using the Apple® DVD Player or QuickTime® playback acceleration.
- Output your Mac's display to digital flat panels and digital projectors.
- Output your Mac's display to a TV.

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

Viewing 3D Graphics

RADEON 9800 PRO MAC EDITION's 3D Acceleration features supports the following advanced 3D graphics capabilities:

- 8 Pipeline architecture.
- 256 bit memory interface.
- 4 parallel vertex pipelines.
- 128 bit floating point shader pipelines.
- 350 million triangles per second transform rate.
- Single Pass multi-texturing for up to 16 textures.
- Full Scene Antialiasing (gamma corrected, up to 6x, Super-Sampling or Multi-Sampling).
- Bilinear, Trilinear, and 16x Anisotropic filtering.
- Shadow acceleration.

In addition, the RADEON 9800 PRO MAC EDITION brings new and exciting graphics technologies to the Macintosh® platform:

SMOOTHVISION™ is an anti-aliasing solution that raises the bar for image quality using programmable multi-sampling methods to post-process graphics before they are displayed.

SMARTSHADER™ is a new technology which revolutionizes the graphics pipeline by making both the geometry processing and pixel processing stages more programmable than ever before. Developers can easily create amazing new graphics effects while maintaining a high level of performance.

HYPER Z™ makes Z-buffer bandwidth usage more efficient by decreasing the amount of information sent to the frame buffer.

RADEON 9800 PRO MAC EDITION only displays 3D graphics in thousands and millions of colors. When you set your display to 256 colors, this will affect Finder, OpenGL, Quartz Extreme, and QuickTime® acceleration.

ATI Displays Control Panel

The ATI Displays control panel provides access to the advanced features that RADEON 9800 PRO MAC EDITION has to offer. To open the ATI Displays control panel using Mac OS X:

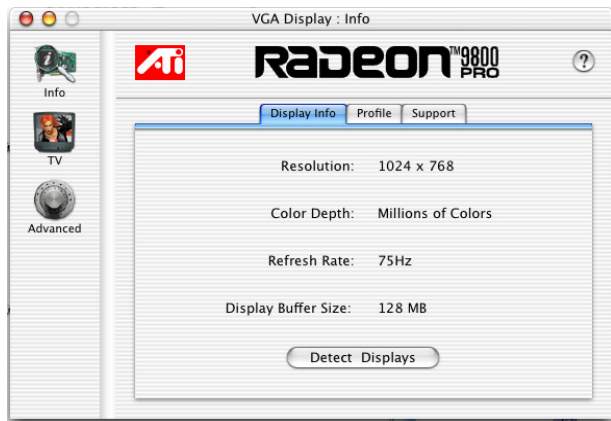
- 1 Open the Apple® System Preferences.
- 2 Click



or

- 1 Click the **Hard Disk** icon.
- 2 Click **Applications** folder.
- 3 Click **Utilities** folder.
- 4 Click **ATI Utilities** folder.
- 5 Double-click **ATI Displays**.

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



Display Info dialog shows the current display settings of the specific monitor ATI Displays is running on.

Detect Displays button detects all connected displays. This feature is useful when a second VGA monitor is connected to your graphics adaptor. Detect Display removes the need to restart your computer.

Note: Your display will momentarily go blank while the displays are being detected.

The **Profile** dialog presents information on the specific **RADEON** graphics card and video driver installed in your computer. Even if the ATI Displays cannot identify your ATI product it will still provide display configuration, driver version and other related information. A warning dialog will display if no ATI product is installed in your computer.

The **Support** dialog provides an internet link to specific ATI Technologies' web pages such as product information, warranty registration, and FAQs.

Click **Create Apple® System Profiler Report** button to generate a detailed report of the computer's installed hardware and software.

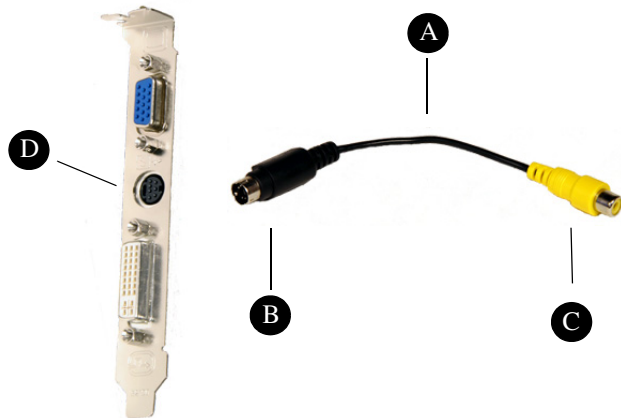
Using Mac2TV™ Video Out

The RADEON 9800 PRO MAC EDITION's Mac2TV Video Out feature allows you to output your computer's display to your TV or VCR. Anything you can display on your monitor can be output to TV.

- View computer output directly on your television with advanced flicker reduction and artifact suppression.
- Connect using Composite or S-Video output capabilities.
- RADEON 9800 PRO MAC EDITION provides a big-screen experience for playing games, giving presentations, and browsing the Internet.

To connect your computer to a TV/VCR

- 1 Turn off your computer and TV/VCR.
- 2 Ensure your RADEON 9800 PRO MAC EDITION is installed correctly.
- 3 Determine if your TV/VCR has an S-Video or Composite video input connection.
- 4 Looking at the back of your Mac, locate your RADEON 9800 PRO MAC EDITION.



A. Video Out Adapter
C. Composite Connector

B. S-Video Out Connector
D. S-Video Input

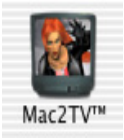
- 5 If you are using S-Video connection to the TV/VCR, attach one end of an S-Video cable to the S-Video Out connection of the RADEON 9800 PRO MAC EDITION and the other end to the S-Video In connector of your TV/VCR. If you are using Composite, connect the supplied Video Out Adapter to the S-Video connector of the RADEON 9800 PRO MAC EDITION. Then attach one end of your Composite cable to the Composite connector and the other end to the Composite In of your TV/VCR (see diagram above).
- 6 Turn on your TV/VCR then your computer.



If you are connecting your RADEON 9800 PRO MAC EDITION to a VCR, make sure that your VCR is connected to a television that you can use as your computer's display. For information about connecting a television to your VCR, see the documentation supplied with your VCR.



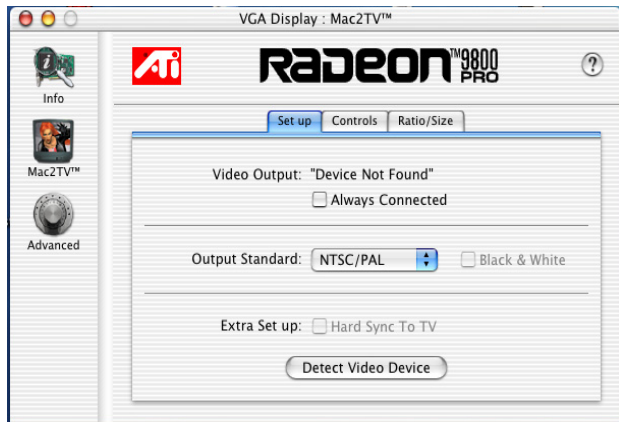
Using ATI Displays "Detect Displays" or "Detect Video Device" allows you to connect a TV while the computer is on without having to restart.



Enabling Mac2TV

Open the ATI Displays control panel. The TV Set-up dialog will open automatically on the TV. (This default can be changed in the ATI Displays Preferences. For more information see [“ATI Displays Preferences”](#) on page 14).

Set Up Tab



Video Output shows whether a TV or VCR has been detected. Select **Always Connected** to over-ride this feature and force TV detection. Video Output will display **Device Detected (Off)** or **Device Detected (On)** depending on whether TV mode is selected.

Output Standard allows you to select and restrict the TV standard for your country. The default settings is NTSC/PAL which allows both standards.

Black & White, when enabled, forces Black & White output. The video card produces greys instead of colors in the output signal producing sharper images and text.

Extra Set up: Hard Sync to TV, when enabled, removes a black line that may appear at the bottom of the screen of high end TV equipment. This process slightly alters the color across the screen. This color alteration may or may not be visible.

Unless you notice a black line on your TV screen, it is recommended to leave Hard Sync to TV disabled.

Detect Video Device allows you detect a TV or VCR without restarting your computer. This option is only present when no TV is detected

Turn Video On/Off button allows you to enable or disable TV output without using Apple®'s Displays panel. This option only appears when running a merged mode list or you have two displays plus TV connected.



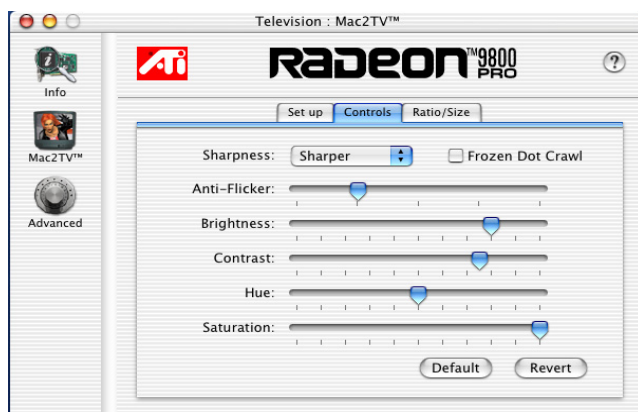
Your display will momentarily go blank when enabling/disabling any of the above features.

Optimizing Mac2TV

You can optimize your TV display using the video out preferences. Viewing images on your TV can be improved by changing the contrast, brightness, or size of your display.

To set the video out preferences, click the Mac2TV icon on the ATI Displays Control Panel then click the **Controls** tab.

Controls Tab



Sharpness makes details on the TV screen sharper. Use this setting to make blurry text readable.

Frozen Dot Crawl, when enabled, removes the undesirable characteristic of many Composite televisions that is seen as thin, jagged edges moving around objects on the screen. It is especially useful for viewing pictures or stills. S-Video equipment does not exhibit this effect.

Anti-Flicker reduces the amount of display flicker. Display flicker is both a distraction and tiring to your eyes, and is most pronounced when text is being displayed.

Brightness is related to the amount of light emitted by your display or reflected from an object.

Contrast is a ratio of how far the whitest whites are from the blackest blacks. If the contrast is too high, the image may look stark, like pure white squares on a jet-black background. If the contrast is too low, the image may look gray or washed out.

Hue is generally not adjusted. Depending on the TV, however, it may be necessary or desirable to adjust the hue to approximate the monitor's display.

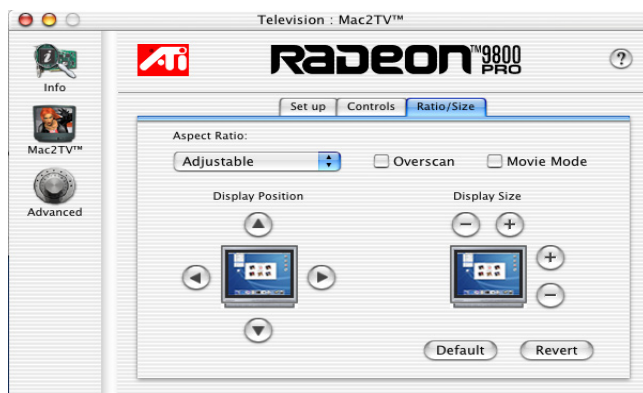
Hue, saturation, and brightness are the three qualities which constitute what we normally refer to as "color".

- **Hue**, often used as a synonym for "color", is the quality that distinguishes among red, green, yellow, and so on.
- **Saturation** is the amount of color present that distinguishes pale or washed-out colors from vivid ones. Extreme settings, will produce black & white (greyscale) output.

Default button undoes all changes and sets everything to the factory default settings.

Revert button undoes all changes and sets everything to the original state or last known good setting.

Ratio/Size Tab



The **Ratio/Size** tab allows you to adjust the Aspect Ratio and change the display size and position.

Aspect Ratio allows you to select between a fully adjustable display or one locked to a specific aspect ratio. 4:3 Standard, 16:9 Widescreen, and Current screen resolution are all fixed modes.

Overscan increases the vertical and horizontal size to fill your TV.

Movie Mode gives you the best results viewing TV or DVDs.

Display Position allows you to move the TV/VCR image on your display. Use the arrow buttons to locate the image to the desired position.

Display Size allows you to increase or decrease the size of the TV/VCR image on your display.

Default button undoes all changes and sets everything to the factory default settings.

Revert button undoes all changes and sets everything to the original state or last known good setting.

Using a TV as your only display

If you are using television display only, disconnect your monitor from your RADEON 9800 PRO MAC EDITION. The RADEON 9800 PRO MAC EDITION detects that you have a TV attached and automatically starts with Mac2TV display enabled.



Your TV may display a black image while starting your computer for a longer period of time than a CRT or DVI display.

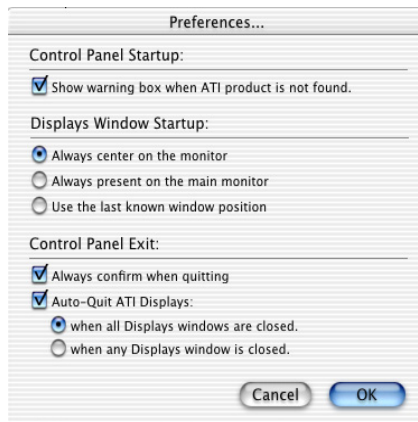
Viewing Text on Television

Due to the different technology used in the manufacturing of televisions and monitors, standard text may look too small on your television. You can compensate for this by using larger fonts.

To change your font size

- 1 Click the Apple® menu.
- 2 Select System Preferences.
- 3 Select General.
- 4 Choose a larger font size.

ATI Displays Preferences



From the ATI Displays drop down menu you can set the Preferences for the ATI Displays control panel. Here you can configure how the ATI Displays control panel starts and exits.



ADVANCED DISPLAY OPTIONS

Advanced adds even more functionality, giving you complete control over your display.

To access the Advanced feature open the ATI Displays control panel and click the ADVANCED button.

VERSAVISION™ Tab



VERSAVISION allows you to rotate your display while maintaining the full feature set of other ATI 2D and 3D technologies. ATI's hardware accelerated display rotation and scaling technology allows for rotation left or right by 90 degrees or turn it upside down to a full 180 degree rotation.

Relative Rotation allows you to rotate the contents of your display. Hovering the mouse cursor over a direction button will show you a preview of the change. Clicking the desired rotation button will cause the display to refresh and rotate.

Full 3D support is maintained regardless of rotation selected.

Default button disables Relative Rotation.

Revert button undoes all changes and sets everything to the original state or last known good setting.

Display Control Tab



Force Single Display Operation, when using a dual display video card, causes all display modes to appear as a single list of supported resolutions in the Apple® Displays Properties.

Only one display is on when this feature is enabled. The default setting is Disabled.

Enable GTF Modes for CRT provides a list of all available modes for your monitor based on the Generalized Timing Formula standard. This feature is enabled by default.

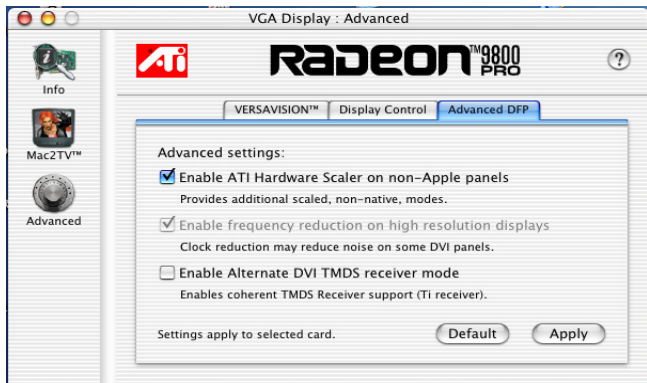
Enable ATI "Valid" and "Safe" flags in mode list, when enabled, allows the video card to determine which video modes are valid and safe.

Enable Hot Plug Detection allows the operating system to automatically detect when a display is connected to the computer and allows the use of "Detect Displays" button for other devices. This removes the need to restart the computer after attaching a secondary display.

Default button undoes all changes and sets everything to the factory default settings.

Apply button causes all the selected options to be enabled at one time.

Advanced DFP Tab



The features on this tab are intended to support Digital Flat Panels (DFP) only.

Enable ATI Hardware Scaler on non-Apple panels can be used with flat panels with fixed resolutions. Enabled, this feature allows you to change video modes using the ATI Scaler.


Enable frequency reduction on high resolution displays allows higher resolution displays to be supported. (This feature is not required for the RADEON 9800 PRO MAC EDITION.)

Enable Alternate DVI TMDS receiver mode enables coherent TMDS Receiver support. This only impacts non-Apple® panels running at a resolution of 1600 x 1200 or higher.

Default button undoes all changes and sets everything back to the original factory settings.

Apply button enables all the selected options at one time.

ATI HELP

ATI HELP is an additional source of information when you are using the ATI Displays control panel. To access the ATI HELP, click on the  icon on the ATI Displays control panel.

Using DVD and QuickTime® Playback

The RADEON 9800 PRO MAC EDITION's QuickTime® playback acceleration allows you to stretch even the smallest movies to full screen size without compromising frame rate or image quality. RADEON 9800 PRO MAC EDITION's hardware scaler maintains the original quality of your DVD or QuickTime® movie when scaling to a larger size – even full screen.

When playing movies in thousands or millions of colors, the ATI card utilizes the 3D engine's capabilities to scale and accelerate playback. When scaling video, the RADEON 9800 PRO MAC EDITION uses special hardware techniques (bilinear filtering) to enhance the video quality instead of just repeating pixels.

Using Digital Flat Panel (DVI)

RADEON 9800 PRO MAC EDITION's DVI support feature allows you to output your computer's display to your DVI digital flat panel, providing you with:

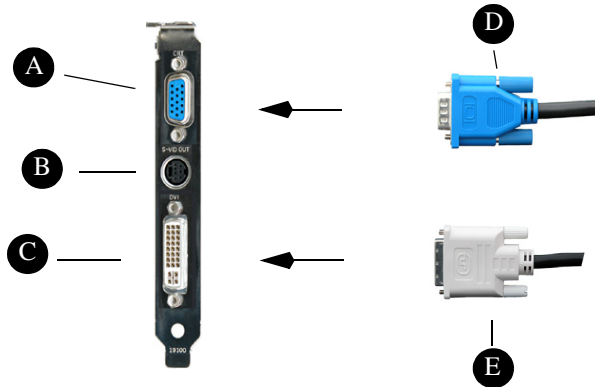
- Crisper, clearer images.
- A true flat screen.
- Virtually no eye strain from prolonged viewing.

Using RADEON 9800 PRO MAC EDITION DVI Connector

Your RADEON 9800 PRO MAC EDITION includes support for DVI allowing you to connect to a digital flat panel display.

To output your computer's display to a DVI digital flat panel

- 1 Looking at the back of your Mac, locate your ATI Graphics Accelerator.
- 2 Attach one end of your DVI cable to the DVI connector on your RADEON 9800 PRO MAC EDITION and the other end to the DVI connector on your DVI flat panel.



A. VGA Monitor Port
C. DVI Monitor Port
E. DVI Connector

B. TV Out Port
D. VGA Connector

- 3 Turn on your DVI flat panel and your Mac.



The DVI connector is hot swappable. You no longer need to shut down your computer before attaching a digital flat panel.

Specifications

Video Mode Table

The video mode table below lists the color depth capabilities for the supported resolutions on your RADEON 9800 PRO MAC EDITION.

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

Supported Modes

Display Resolution	Maximum Refresh Hz
640 x 480	200
720 x 480	200
800 x 600	200
832 x 624	75
1024 x 768	200
1152 x 864	200
1152 x 870	75
1280 x 960	200
1280 x 1024	150
1600 x 900	150
1600 x 1024	150
1600 x 1200	120
1792 x 1344	75
1856 x 1392	75
1920 x 1080	120
1920 x 1200	100
1920 x 1440	90
2048 x 1152	100
2048 x 1280	100
2048 x 1536	85

The minimum refresh rate for the above modes is 60Hz.

Digital Flat Panel

Digital Display Mode (at any Bit Depth)	1920 x 1200*
--	--------------

**Using a reduced blanking interval compatible with Apple®'s Cinema HD ADC Display. This timing is not compatible with VESA's 1920 x 1200.*



The RADEON 9800 PRO MAC EDITION has been used successfully, without modification, set as high as 3840 x 2400 at 15Hz on Digital Flat Panels that support this resolution.

Specifications

System Requirements

- Power Macintosh® computer with an AGP expansion slot.

Operating System

- Mac® OS X version 10.2.5 or higher.

Graphics Controller

- ATI RADEON 9800 PRO — graphics and multimedia accelerator chip.

Video Display Buffer

- 128MB memory.
- 256-bit memory interface.

Bus

- AGP 2X and 4X.

Sync Signals

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

Video Memory Address

- Supports 128MB relocatable memory aperture.

Display Connectors

- DVI connector.
- VGA connector.
- S-Video connector.

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.

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.
Anisotropic Filtering	This filtering technique uses a rectangular filtering pattern to render smoother, crisper images.
Aspect Ratio	The proportions of a display expressed as a ratio of width and height. Common ratios include 4:3 for TV and CRTs, 5:4 for LCDs and 16:9 for widescreen displays.
Back buffer	<p>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.</p> <p>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.</p> <p>In order to increase performance, all memory used for back buffers are on your ATI graphics accelerator card.</p>
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). 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.
HYPER Z™ III	A memory bandwidth saving technology that boosts rendering performance.
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.
Offscreen 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.
SMARTSHADER™ 2.1	An advanced programmable pixel and vertex shader technology which delivers complex and realistic textures and lighting without slowing performance.
SMOOTHVISION™ 2.1	Full Screen Anti-Aliasing technology designed to minimize jagged edges resulting in smooth images.
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.
VERSAVISION™	ATI’s hardware accelerated display rotation and scaling technology. Any desktop can now be rotated 90 degrees left or right, or even 180 degrees, while maintaining the full feature set of other ATI 2D and 3D technologies, such as SMOOTHVISION. VERSAVISION works with single or multiple displays.
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 of other 3D objects. The larger the 3D window, the larger the z-buffer is in memory.

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