

The Oxygen™ GMX Graphics Accelerator User's Guide

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4. Consult 3Dlabs or an experienced radio/TV technician for assistance.

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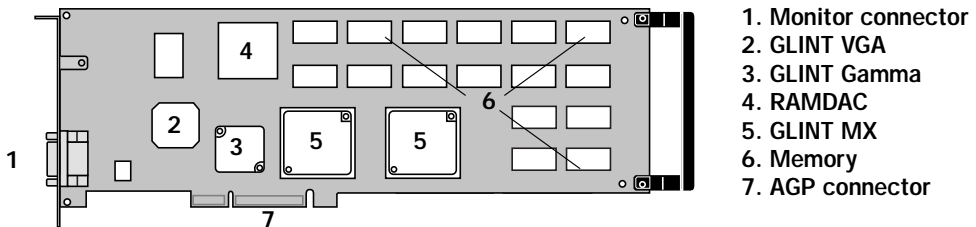
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Introduction

Welcome to 3Dlabs!

Thank you for selecting a 3Dlabs® Oxygen™ GMX 3D graphics accelerator card! Oxygen delivers a high-performance power boost to 3D graphics applications running on Windows NT systems. The huge design files – with millions of triangles, created with these applications can challenge even multiple-processor systems. Oxygen GMX off-loads the geometry-related calculations needed to display these triangles from the system processor to an integrated hardware solution on the card itself, dramatically increasing the performance of your 3D applications. Optimized software drivers support the OpenGL 1.1 specification in order to accelerate animation, MCAD and visualization applications based on the OpenGL standard.

Overview



Oxygen GMX is the fastest Oxygen card yet, featuring the GLINT® Gamma hardwired geometry engine and dual MX rasterization engines. Oxygen GMX delivers 32-bit professional, high-precision, 2D and 3D graphics through your AGP system, including:

- **GLINT Gamma geometry processing**
The 2GFlop GLINT Gamma chip makes Oxygen GMX the first 3Dlabs card to accelerate the 3D geometry pipeline fully in hardware, performing all vertex transformation and lighting calculations required by OpenGL applications.
- **Dual GLINT MX rasterization engines**
Two GLINT MX rasterization engines accelerate tasks — like true-color shading, texture mapping, anti-aliasing, and transparency — in parallel.
- **GLINT VGA chip**
3Dlabs' GLINT VGA chip provides on-board VGA support.

- **96 MB memory**
96 MB of on-board memory drives super-high resolution, true-color displays, with over 24 MB of available texture memory.
- **1920 x 1080 True-color maximum resolution**
Oxygen GMX supports resolutions from 640 x 480 to 1920 x 1080 at a variety of refresh rates and color depths.
- **Full precision 32-bit Z-buffer**
The Oxygen GMX Z-buffer provides the highest level of depth-precision, even at the highest resolutions.
- **16 light sources**
Sixteen light sources increase your viewing flexibility, letting you see models the way you imagine them.
- **Full AGP sideband addressing**
Sideband addressing ensures high-performance 3D acceleration through the advanced features of the AGP bus.

System Requirements

Your system must have the following features in order to support your card:

- **Pentium II® (or later) based system**
- **Windows® NT 4.0 (or later) operating system**
- **128 MB RAM (Random Access Memory)**
- **512 K level 2 cache minimum**
- **3 MB minimum available hard drive space**
- **AGP slot**
- **VGA multisync monitor**

Software Partners

Your Oxygen GMX card has been tested with a variety of graphics software packages, several of which are listed below. As testing continues and performance optimizations are made, the results and techniques are posted on the 3Dlabs, as well as the appropriate software partner's, web site.

Software Application	Web Site Address
3D Studio MAX	http://www.ktx.com
Lightscape	http://www.lightscape.com
LightWave 3D	http://www.newtek.com
Maya	http://www.aw.sgi.com
MicroStation	http://www.bentley.com
Pro/ENGINEER	http://www.ptc.com
SDRC I-DEAS	http://www.sdrc.com
Softimage 3D	http://www.softimage.com
SolidWorks	http://www.solidworks.com
Unigraphics	http://www.ug.eds.com/ug/

Chapter 1 - Installation

Getting Ready

Whether you install your new card or driver software first depends on whether a video card is already present in your system.

If there is a video card in your system: Install the drivers first. Once the drivers are loaded, remove the old card and install the Oxygen GMX card. The driver installation instructions begin on page 5.

If not: Install your new card as described in the Installing Hardware section, below, then install the drivers.

► Before You Start

- Take every possible precaution against static electricity as you prepare to install the card: static can damage components. We have included an anti-static wrist strap for you to wear while installing the hardware: you should also try to work in a static free area (such as on a tile floor rather than carpet). You might even consider wearing special ESD, or at least rubber-soled, shoes.
- Save any work in progress and exit any open applications. Always back up your system before you install new hardware or software.
- Have your anti-static strap and a Philips-head screwdriver ready.

Installing Hardware

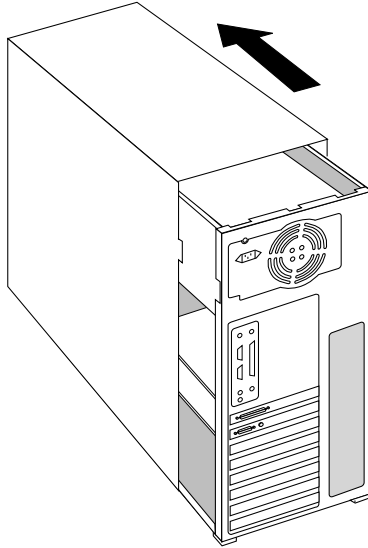
Oxygen GMX cards have AGP connectors and must be installed in your system's AGP slot. Since the location of expansion slots varies, please see your system documentation for the AGP slot location in your machine.

► To remove an old card from your system

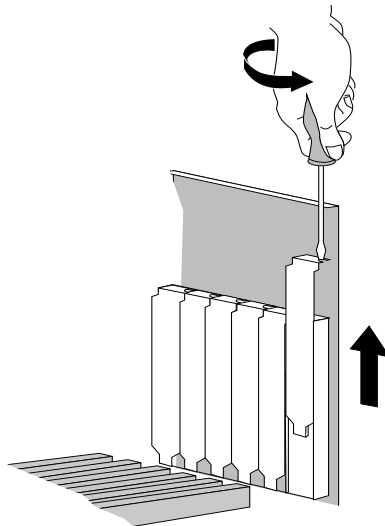
1. Turn off and unplug the power source for your system and each of its peripherals.
2. Unplug the monitor cable from the old card.
3. Remove any screws securing the card to the chassis.
4. Lift the card out of the slot.

► **To install your Oxygen GMX card**

1. Turn off and unplug the power source for your system and each of its peripherals, if you have not already done so.
2. Remove the cover from your system so you can access the AGP expansion slot. (See your system documentation for details.)

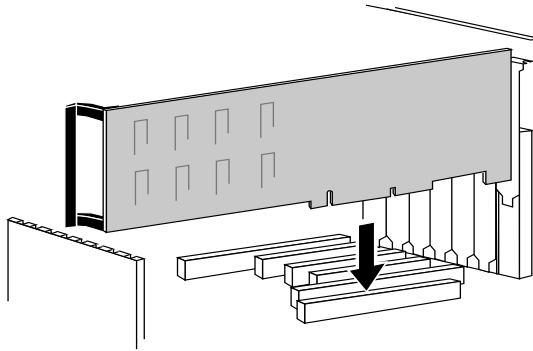


3. Determine which slot you are going to use and remove its back panel cover. You must use the AGP slot: AGP cards will not fit in PCI slots.

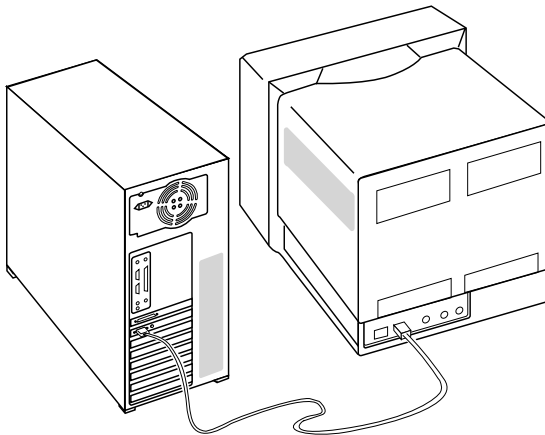


Installing Hardware

4. Attach the anti-static strap to your wrist, and attach the other end to a bare, conductive (as opposed to painted or sticker-covered) area of your system's chassis.
5. Remove the card from its anti-static packaging. Write down the serial number for registration and future use.
6. Place the card into the AGP slot, and seat it firmly. See your system documentation for instructions on securing the card to the chassis. Loose cards and connections can cause grounding and operating problems.



7. Remove the anti-static strap and replace the cover on your system.
8. Connect the video cable from your monitor to the video connector on the card.



9. Plug in and start up your system, including peripherals, and log in to Windows NT.

Installing Software

Your Oxygen GMX card includes video driver software, which you must install and configure. This OpenGL driver allows your system to harness the acceleration potential of your Oxygen card, and set image quality and performance preferences.

This section describes the installation process for Windows NT 4.0 and later.

► To install your Oxygen software

1. Log in to Windows NT using any account that has administrator privileges.
2. Place the Oxygen CD-ROM in your CD-ROM drive. When the installation window opens, choose the Oxygen GMX installation.
3. Follow the instructions that appear on your screen. (Be sure to read the software license agreement.)
4. Restart your system at the prompt. You have installed your Oxygen software successfully!

Registering Oxygen GMX

When you register your Oxygen card you:

- **Activate your warranty**
- **Receive notification of software updates**
- **Qualify for technical support**

You can complete the registration card and return it to us in the mail, or register on-line once your hardware and software installations are complete.

► To register on-line

1. Click the Start button on the taskbar.
2. Point to Programs, Oxygen GMX, Register Online.
3. Follow the instructions that appear on your screen.

Chapter 2 - Software Configuration

The Oxygen GMX Driver

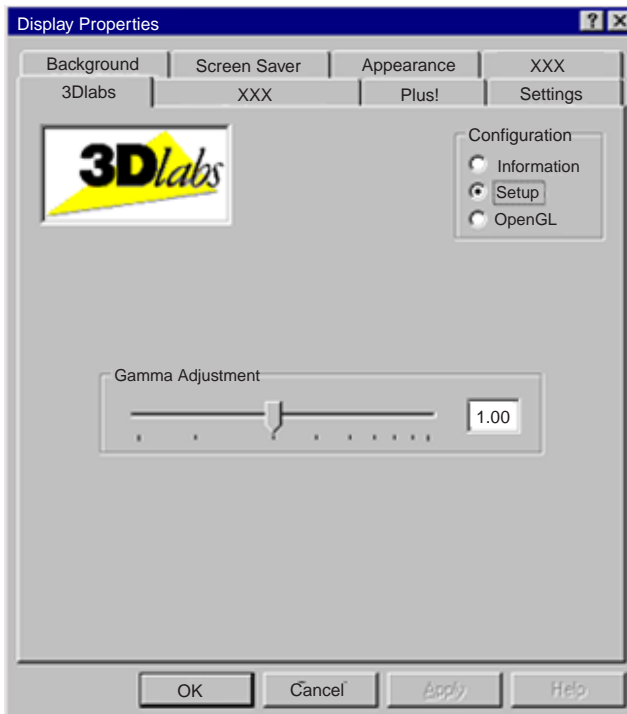
Oxygen GMX accelerates the entire OpenGL graphics pipeline in hardware, completely freeing your system processors for more application-specific operations.

The Information screen appears first when you choose the 3Dlabs page in the Display Properties control panel, and provides useful information if you should need to communicate with 3Dlabs technical support. It is also the “point-of-entry” to the Setup screen and the OpenGL screen.



Setup Screen

The Gamma Adjustment slider on the Setup screen lets you simultaneously adjust RGB color curves and define the color output for your display. You can also enter a precise Gamma value, rather than use the slider, when you know which value is appropriate for your monitor and ambient lighting conditions.



OpenGL Screen

The OpenGL screen provides these Advanced and Application Support options.



- Number of DMA Sub Buffers controls partitioning of data (primitives) sent to the graphics card from your system's CPU. "3" is the optimal setting. If you choose a number less than 3, you may experience a significant performance impact. If you choose a number larger than 3 (and particularly larger than 5), your results will vary depending on your system configuration and the application you are using.
- Checking Wait for VBlank synchronizes double-buffering with screen refresh to prevent tearing in your 3D images. This setting is the default. Unchecking this can result in higher frame rates and benchmark scores, especially the OPC Viewperf benchmark. The slight performance penalty associated with using this feature can be well worth the image quality enhancement.
- Check Softimage versions 3.51 and 3.7 when working with these versions of the application to get the best results from your Oxygen GMX card. Uncheck the box when you use another application.

Chapter 3 - Troubleshooting & Technical Support

Troubleshooting

If you have trouble using your Oxygen GMX card or a 3D application, you may find the answer to your problem in the following sections. Always start your problem solving efforts with the simplest solution and work up to the more complex ones.

Monitors and Display Resolutions

Question: My monitor is either blank, or the displayed image is distorted, scrambled or smaller than I expected.

Solution: If the monitor is blank, be sure that your system and monitor are plugged in and turned on. Is the monitor's power cord attached securely? Check each component's documentation for the location and use of power connectors and switches.

Solution: Make sure that your video cable is connected securely to the monitor *and* to the monitor connector on your Oxygen GMX card. See your monitor documentation and Chapter 1 - Installation, in this document.

Solution: Your card might not be seated properly in the AGP slot. Remove and reinstall your card as described in Chapter 1 - Installation. Remember to use the anti-static wrist strap when opening your system and handling the card.

Question: The performance of and/or the available resolutions for my Oxygen GMX card are not what I expected.

Solution: The Oxygen driver may not have installed fully, or a file may have been corrupted. Try installing the driver again.

Solution: You may have selected a display setting that is incompatible with accelerated 3D graphics applications. See *Appendix A - Oxygen GMX Specifications*, for a list of compatible resolutions.

Question: When I restart my system, an “Invalid Display Settings” message appears on-screen, followed by “The default display resolution has been temporarily used by the system.”

Solution: Within a few seconds, the error messages should be replaced by a window that allows you to set a display resolution. Pick your preferred resolution from the list and you should get the sharp results you expected.

Systems and Networks

Question: Since installing the Oxygen card, my system either hangs or crashes to a blue screen when I try to start up, or the system starts up but VGA graphics don't display.

Solution: Try to disable “VGA Palette Snoop.” Follow these steps.

1. Remove the Oxygen card and reinstall your old graphics card. See *Chapter 1 - Installation*, for instructions.
2. Restart your system and enter Setup at the on-screen prompt. The key command to enter Setup can differ with each BIOS, so consult your system documentation if you do not see the command displayed as the system boots.
3. Disable VGA Palette Snoop, again consulting your system documentation for its specific location in your BIOS.
4. Choose Exit and Save Settings.
5. Shut down, remove your old graphics card, and reinstall your Oxygen card.

Solution: Make sure that you are not using an old graphics board driver, and that you have uninstalled any graphics drivers other than Oxygen GMX — particularly those drivers provided by other companies using 3Dlabs chipsets.

Solution: Please see the System Integration Guide in the FAQ section at <http://www.3Dlabs.com>.

Solution: You may need to update your BIOS. See your system documentation for BIOS upgrade information.

Question: I'm experiencing network problems since I installed my Oxygen card.

Solution: If your Ethernet adapter is ISA-based, there may be a conflict between it and your Oxygen card. To resolve a conflict:

1. Go to Start/Programs/Administrative Tools and open Windows NT Diagnostics.
2. Click the Resources tab and select the IRQ button at the bottom of the panel.
3. If the same IRQ address (found in the IRQ column) is assigned to the Ethernet adapter and the Oxygen card, go on to step 4. If they are different, see the next solution.
4. Open the Network control panel and click the Adapters tab.
5. Select your network adapter and click the Properties button. A setup box appears.
6. Enter an unused address in the setup box (check your system documentation for a list of valid IRQ addresses) and click OK twice. The control panel will close and a restart prompt appears.
7. Click Yes to restart your system.

Solution: You may need to reinstall or update your Ethernet driver. See your system or Ethernet adapter documentation for more information.

Reaching Technical Support

If you cannot find the problem you are experiencing, or the solution to a problem, listed in this chapter, check the 3Dlabs web site for additional help. To contact 3Dlabs Technical Support, send an e-mail to:

support@3dlabs.com

Be sure to include a description of your system and the exact steps required to recreate the problem.

Chapter 4 - Glossary

Terms and Definitions

AGP

Advanced Graphics Port.

Alpha Blending

This means to create transparent objects by allowing for the blending of pixels to simulate the transparency characteristics of an object. With alpha information, an object can be designed from being totally transparent to opaque.

Alpha Buffer

A portion of the frame buffer used to define the transparency value of a pixel in the frame buffer. This data can be used to blend the frame buffer pixel with the pixel to be drawn to create a composite pixel.

Anti-Aliasing

A technique employed to remove any jagged edges from an object to appear smooth. This is accomplished by gradually modifying the hue and saturation of pixels.

API

Application Programming Interface. The API translates the instructions from the application program into device commands that are specific to the screen's display controller, the graphics board.

Atmospheric Effects

The effect derived from adding one or more layers around an object.

Bilinear Sampling

The process whereby texture mapping is done through filtering.

Bit Depth

Bit depth is another way of expressing the numbers of colors available. A color bit depth of 8 is equivalent to 256 colors, a bit depth of 16 (15 bit of color plus a 1 bit overlay) yields 32768 colors, and a bit depth of 32 (24 bit RGB plus 8 bit of overlays) equals 16.7 million colors. The latter is often referred to as true color.

Clipping

Removal of elements or sections not contained within the active viewing area.

DAC

Digital to Analog Converter.

Depth Cueing

A technique used to give the illusion of depth. With depth cueing, the part of an object that is farther away is displayed with a lower intensity to give the effect of depth.

Dithering

The process of converting an image with a certain bit depth to one with a lower bit depth. Dithering enables the application to convert an image's colors that it cannot display into two or more colors that closely resemble the original. Dithering works because the mind is tricked by the pattern of colors into thinking it's a different color.

Double Buffering

With double-buffering, images are rendered in the back buffer and then displayed on the screen once the drawing is completed. This results in the smooth, flicker-free rotation and animation of 3D models and scenes.

Driver

A driver is a special interface program that is developed to perform the communication between the application program, the device (i.e., graphics peripheral) and the operating system.

EVGA

Extended Video Graphics Array. EVGA runs at 1024 x 768.

Flat Shading

The simplest method of shading. Each triangle is assigned one single color, resulting in a faceted appearance of the surface.

Floating Point

The portion of the mathematics execution unit of a processor generally associated with multiply and divide operations.

Frame Buffer

A 24-bit, true-color frame buffer provides 8 bit for each red, green and blue primary display color. This results in 16.8 million color combinations. A second, or double, buffer enables system to calculate pixels one step ahead of the screen display for smooth, distortion free images.

Geometry

The intermediate stage of the 3D pipeline, geometry determines the location of the object and the frame of reference of the viewer in relation to the object.

Gouraud Shading

This method of shading, more complex than flat shading, shows subtle color changes across an object. Gouraud Shading is accomplished by adding pixels in a graduated scale of colors.

Graphics Accelerator Card

A graphics accelerator performs 3D functions in the hardware, thereby relieving the CPU of repetitive, complex and intensive calls. This results in enhanced performance and speed.

Heidi

The API developed by Autodesk to work with its products, such as 3D Studio MAX and AutoCAD.

MIP-Mapping (for texture processing)

A feature that delivers photo-realistic images by wrapping 2D bitmaps around 3D objects closely matching the texture to the object. MIP-Mapping allows different versions of a texture to be used for objects of different sizes. It also enables faster performance as textures do not need to be scaled in real time.

MMX

Multi Media eXtension, a set of 57 instructions, to be added to the x86 processor, to accelerate signal processing operations for multimedia.

Multiple Resolution Support

The ability to support multiple resolutions on the screen.

OpenGL

The industry standard library of advanced 3D graphics functions developed by Silicon Graphics, Inc.

Perspective Correction

A function that allows an object to maintain its 3D textural features as it moves away from the viewer, into the background.

Pipelining

A basic hardware tool for accelerating processes.

Pixel

The smallest addressable element of a cathode ray tube display. More simply put, the individual dots that make up the screen image.

Point Sampling

The basic method of adding texture to an object. Point sampling does not include any filtering of textures.

RAMDAC

The final component in the graphics subsystem that translates a digital image into an analog representation.

Rasterization

A method to fill in colors for all pixels bound by vertices.

Rendering

The final and most rigorous stage in the 3D pipeline where an object undergoes shading, texturing, etc.

RISC

Reduced Instruction Set Computing.

SDRAM

Synchronous DRAM is a cost-effective solution to improve bandwidth to and from memory, resulting in increased graphics performance.

SDTP

Super Desktop Publishing. SDTP runs at 1600 x 1200.

Stencil Buffer

Similar to stipple masking, the stencil buffer assists with the creation of transparent effects.

Stipple masking

A technique that spatially creates transparent effects by rendering an object through various patterns.

SVGA

Super Video Graphics Array. SVGA runs at 800 x 600.

Tessellation

The initial part of the 3D pipeline where the object is described by a set of triangles.

Texture Mapping

A technique that enables 2D graphic images to be “wrapped” around or “pasted” on to a 3D primitive. Perspective correction and lighting calculations allow for added realism.

Transformation

The change in rotation, size and perspective of an object in 3D space.

Transparency

A function that refers to the rendering of transparent (non-opaque) objects. Transparency is generally accomplished on a polygon rendering system using either screen-door transparency or alpha blending.

Vectors/second

Lines drawn per second.

VGA

Video Graphics Array. VGA runs at 640 x 480.

VHR

Very High Resolution. VHR runs at 1280 x 1024.

VRAM

Video Random Access Memory is an expensive, fast type of RAM that is used as display memory on high-end graphics boards.

VRML

Virtual Reality Modeling Language.

Z-Buffer

Z-Buffering is used to better define objects from the perspective of the third, or z, axis by allotting a depth coefficient to every pixel and sorting objects in real times or by using a dedicated z-buffer to hold objects not in view.

Appendix A - Oxygen GMX Specifications

General Specifications

Feature/Function	Implementation
Card size	Full-length AGP
Power requirement	5V @ 10W, 3.3V @ 15W
Geometry processing	Hardware: GLINT Gamma processor
Rasterizer	2 GLINT MX rasterization engines
RAMDAC chip	TI TVP 4030
Pixel frequency	220 MHz
Memory	96 MB

Supported Resolutions

Display Resolution	Color Depth	Vertical Refresh
640 x 480	True Color	60, 75, 85, 100 Hz
800 x 600	True Color	60, 75, 85, 100 Hz
1,024 x 768	True Color	60, 75, 85, 100 Hz
1,280 x 1,024	True Color	60, 75, 85, 100 Hz
1,600 x 1,200	True Color	60, 75, Hz
1,920 x 1,080	True Color	60 Hz

Appendix B - Warranty and Licenses

Three (3) Year Parts and Labor Limited Warranty

3Dlabs warrants that the Product will be free from defects in materials and/or workmanship for a period of three (3) years from the date of purchase. During the warranty period, 3Dlabs will correct any defects in material or workmanship, or any failure of the product to conform to hardware specifications, at no-charge for in-house labor and materials. Shipping costs must be pre-paid by Buyer. Any replacements parts/products will be new or serviceably used, and are warranted for the remainder of the original warranty or thirty (30) days from the date of shipment of the parts/products, whichever is longer. The warranty period is not extended as a result of purchasing any additional parts/products from 3Dlabs. Buyer must notify 3Dlabs in writing if there is a defect in material or workmanship. Written notice in all events must be received by 3Dlabs before expiration of the warranty period. This warranty is non-transferable. A purchase receipt or other proof of date of original purchase will be required before warranty is rendered. This warranty only covers failures due to defects in materials or workmanship that occur during normal use. It does not cover damage that occurs in shipment or failures that are result from, but are not limited to, accident, misuse, abuse, neglect, mishandling, misapplication, alteration, modification, fire, flood, earthquake, explosion, lightning, line power surge, introduction of sand, dust, humidity and liquids, or service by anyone other than 3Dlabs or an authorized 3Dlabs service center, or damage that is attributable to acts of God.

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Appendix C - Declaration of Conformity

We, 3Dlabs, Incorporated,
480 Potrero Avenue
Sunnyvale, CA 94086
Phone 408-436-3455
Fax 408-436-3458
United States of America

declare under our sole responsibility that the product

3Dlabs® Oxygen™ GMX

to which this declaration relates are in conformance with the following standards:

EN55022:1987
EN50082-1:1992
IEC801-2:1984
IEC801-3:1984
IEC801-4:1987

following the provisions of the 89/336/EEC Directive.
San Jose, California, September 30, 1998
3Dlabs, Inc.

We, 3Dlabs, Incorporated,
480 Potrero Avenue
Sunnyvale, CA 94086
Phone 408-436-3455
Fax 408-436-3458
United States of America

declare under our sole responsibility that the product

3Dlabs® Oxygen™ GMX

comply with Part 15 of FCC Rules. Operation 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 interferences that may cause undesired operation.

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