

A decorative graphic element consisting of several overlapping, wavy lines in shades of teal and blue, flowing from the left side of the page towards the right, positioned above the main title.

# Seagate® Nytro™ XP6209 Application Acceleration Card

User Guide

XP6209-4A1024

XP6209-4B2048

Version 1.0  
September 2014

DB15-001166-00

## Legal Notices

### Electromagnetic Compatibility Notices



This device complies with Part 15 of the 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 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 the 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:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables for SCSI connection external to the cabinet are used in the compliance testing of this Product. Seagate is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Seagate. The correction of interferences caused by such unauthorized modification, substitution, or attachment will be the responsibility of the user.

The Seagate Nytro XP6209 Application Acceleration Card is tested to comply with FCC standards for home or office use.

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 brouilleur du Canada.

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取扱説明書に従って正しい取り扱いをして下さい。

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction guide.

**Email**

support@seagate.com

**Website**

www.seagate.com

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# Chapter 1: Introduction

## 1.1 Overview

The Seagate® Nytro™ XP6209 Acceleration Application Card is a block storage device. The card presents to the operating system through a Fusion-MPT™ interface as multiple drives that require minimal user configuration. You can use the cards for either nonpersistent (for example, cache) or persistent (for example, database files) data.

The card has Flash ROM for storing the BIOS and firmware, and NVRAM for storing nonvolatile user data. The card has three LEDs on the PCI bracket to indicate activity, drive life, and status.

The card has a PCI Express® (PCIe®) interface that complies with the *PCI Express Specification 2.0* or *PCI Express Specification 3.0*.

The card functions through a SAS2008 I/O controller with Seagate Nytro WarpDrive firmware that runs on the internal processor.

## 1.2 Related Documents

Refer to the following documents for more information on the Seagate Nytro XP6209 card and related tools.

- *Seagate® Nytro™ WarpDrive® and Nytro XP6000 Application Acceleration Card r112.00.51.00 Release Notes*
- *Seagate® Nytro™ WarpDrive® and Nytro XP6000 Application Acceleration Card Management Utility User Guide*
- *Seagate® Nytro™ XP6209 Application Acceleration Card Quick Installation Guide*

## 1.3 Features

This section lists the features of the Seagate Nytro XP6209 card.

- Proven enterprise firmware stack
- Best-in-class read and write performance
- Average latency of less than 50 ms
- Low host burden – No static CPU and memory overhead
- Support for Windows® and Linux® operating systems
- Support for VMware® and FreeBSD® operating systems
- Bootable
- PCIe 2.0, x8
- PCIe standard or low-profile bracket
- LEDs for data activity, drive life, and drive status
- High reliability with block-level, page-level, and die-level failure protection

## 1.4 Seagate Nytro XP6209 Card Characteristics Summary

The Seagate Nytro XP6209 cards contain Flash ROM for storing the BIOS and firmware. Three LEDs are located on the PCI bracket to indicate activity, drive life, and status.

The following table shows the characteristics of each Seagate Nytro XP6209 card models.

**Table 1 Seagate Nytro XP6209 Card Characteristics Summary**

Device Name	Model Name	Usable Capacity	Connector	Flash Controller	NAND Type	Card Style	Controller
Seagate Nytro XP6209	XP6209-4A1024	930 GB	X8 PCIe 2.0	SF2582	MLC	HHHL	SAS2008
Seagate Nytro XP6209	XP6209-4B2048	1796 GB	X8 PCIe 2.0	SF2582	MLC	HHHL	SAS2008

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## Chapter 2: Installation

### 2.1 Quick Installation Instructions

You can use the quick installation instructions to install your Seagate Nytro XP6209 card, or you can see the next section if you need more detailed installation instructions.

To quickly install your Seagate Nytro XP6209 card, follow these instructions.

1. Unpack the Seagate Nytro XP6209 card and inspect it for damage.
2. Turn off the server, and remove the power cord.
3. Remove the cover from the server.
4. Insert the card in an available PCIe slot.
5. Secure the bracket to the system's chassis.
6. Replace the cover and the power cord, then turn on the server.

The Seagate Nytro XP6209 card hardware installation is complete.

### 2.2 Hardware Installation Instructions

#### 2.2.1 Card Retention, Shipping, and the PCIe Specification

The PCIe specification requires that add-in cards with a mass of greater than 350 grams must have additional card retention at the server level. Neither the connector nor the optional *hockey stick* feature described in the PCIe specification provides the required retention.

Server OEMs and ODMs are solely responsible for choosing and qualifying their own server and rack shipping solution. Seagate does not qualify the server and rack shipping solution and is not responsible for such solution or any impact to Seagate products.

Seagate will make available mechanical design collateral for its products, which may be used by server OEMs and ODMs to design retention features for their server products. Seagate information is provided AS IS only and Seagate does not certify any design retention features used by OEMs and ODMs.

Seagate does not perform server and rack shock and vibration testing of OEM and ODM products. OEMs and ODMs are solely responsible for any server and rack shock and vibration testing.

#### 2.2.2 Hardware Installation for the Seagate Nytro XP6209 Cards

1. **Unpack the Seagate Nytro XP6209 card and inspect it for damage.** Unpack the card in a static-free environment and follow good antistatic grounding procedures. Remove the Seagate Nytro XP6209 card from the antistatic bag, and carefully inspect it for damage. If you notice any damage, contact Seagate, or your reseller support representative.

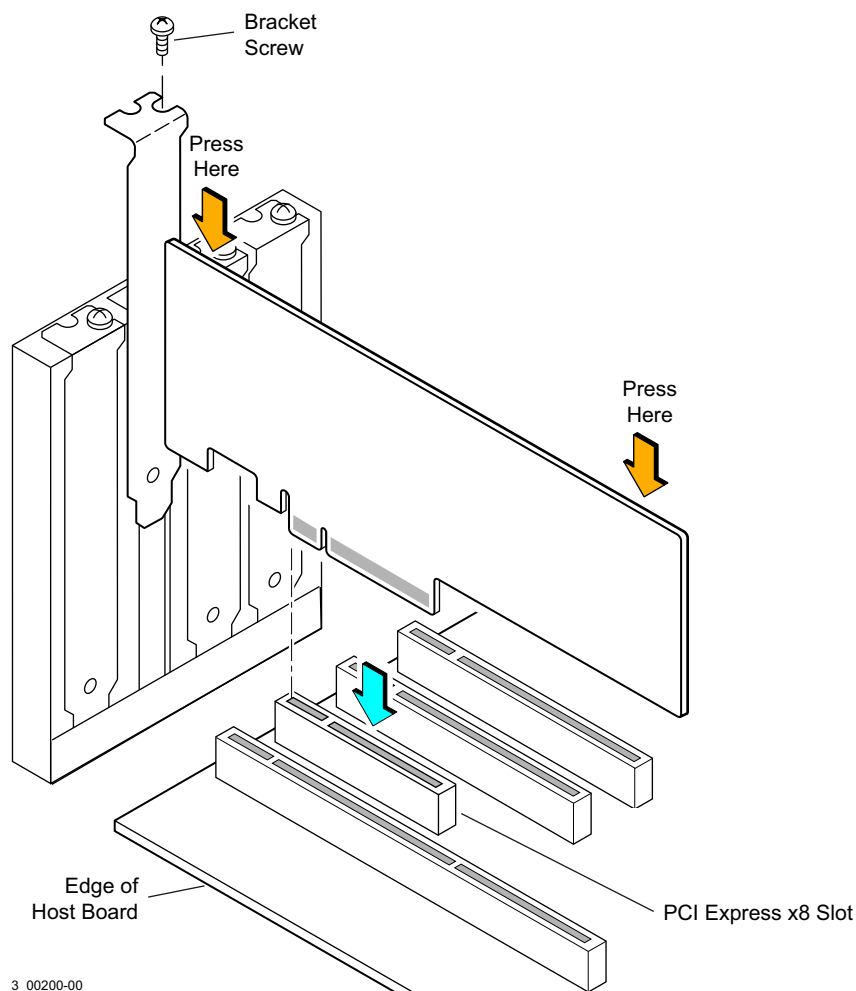
**NOTE** Back up your data before changing your system configuration.

2. **Prepare the computer.** Turn off the server, and disconnect the power cords from the power supply. Remove the cover from the chassis.

**WARNING** To avoid electrical shock, disconnect the server from the main power and from any networks before you install the card.

3. **Replace the PCI mounting bracket (system dependent).** If required for your system, replace the shorter PCI mounting bracket that ships on the Seagate Nytro XP6209 card with the full-height bracket supplied. Save the two screws from the short bracket and use the screws to attach the full-height bracket.
4. **Insert the Seagate Nytro XP6209 card in an available PCIe slot.** Locate an empty PCIe slot. Remove the blank bracket panel on the server chassis that aligns with the empty PCIe slot. Save the bracket screw, if applicable. Align the card to the PCIe slot. Press down gently, but firmly, to properly seat the card in the slot. The following figure shows how to insert the card in a PCIe slot.

**Figure 1 Card Installation for the Seagate Nytro XP6209 Cards**



3\_00200-00

**NOTE** The shape, size, and locations of components on your Seagate Nytro XP6209 card might vary from this illustration.

5. For highest performance, make sure that the PCIe slot is PCIe 2.0 and make sure that it has an active width of dedicated eight lanes. The Seagate Nytro XP6209 card functions with an active width of four lanes or two lanes, but with reduced performance.

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## 2.3 Software Installation Instructions

### 2.3.1 New Windows Driver Installation

The Seagate drivers for Windows Server® 2012 (x86, x64, or IA64), and Windows Server 2008 (x86, x64, or IA64) are available online at the link listed in step 1.

To load the Seagate driver during a new Windows system installation, you can boot directly from the Microsoft® installation CD-ROM.

To install a new Windows operating system and its appropriate device driver, follow these steps:

1. Follow the links on the Seagate USB drive to download the Windows driver from the Seagate website at <http://www.seagate.com/support/downloads/>

**NOTE** On the website, to enter a product name, use the model name from Table 1 in this document.

2. Copy the appropriate driver files to installation media, such as a USB device. You will be prompted for the driver during the Windows installation.
3. Open the file and follow the directions in the `seagate_sss_[OperatingSystemName].txt` file.

Consult the `ReadMe.txt` file available online with the driver for more information. To open the readme file, click the plus sign next to the title of the driver.

### 2.3.2 Existing Windows Driver Installation

The following steps contain a sample driver installation for Windows Server 2008. Seagate Nytro WarpDrive cards have inbox driver support at Windows. Additional versions of Windows drivers are available online. Consult the `ReadMe.txt` file for each driver. To open the readme file, click the plus sign next to the title of the driver. For Seagate downloads, go to:

<http://www.seagate.com/support/downloads/>

The Seagate drivers for Windows Server 2012 (x86, x64, or IA64) and Windows Server 2008 (x86, x64, or IA64) are available online. Use the following procedure to install or upgrade the driver onto an existing Windows Server 2008 system.

1. Boot Windows Server 2008 and log on as a user with Administrator privileges.
2. Click the **Start** button, then right-click the **My Computer** entry in the menu.
3. Click the **Properties** selection.
4. Click the **Hardware** tab, then click the **Device Manager** button.
5. Click the + to the left of the SCSI and RAID controllers line. Find the adapter desired for the driver upgrade and double-click the entry. Click on the **Driver** tab.
6. Information on the currently installed driver is displayed, and you can view additional driver details by clicking the **Driver Details** button.
7. Click the **Update Driver** button to update the existing driver. The Hardware Update Wizard begins.
8. Click the **Install from a list or specific location** button to select it, then click the **Next** button.
9. Click the **Don't search, I will choose the driver to install** button to select it, then click the **Next** button.
10. Click the **Have Disk** button and type the path to the driver, or click the **Browse** button. Select the location for the driver package that matches the processor architecture of the system (x86, IA64, or x64). After the path to the driver has been established, click the **OK** button.
11. Select the driver from the list and click the **Next** button.



- Click the **Next** button again to start the driver update. In some cases, a message displays indicating that this driver has not passed logo testing. This message informs you that a nonsigned driver is being installed.

**NOTE**

Drivers are digitally signed by the Microsoft Windows Hardware Quality Lab (WHQL) on completion of logo testing. Because of the time lag between the general customer release by Seagate of Windows drivers and the completion of WHQL logo testing, some drivers distributed with adapters or downloaded from the [www.seagate.com](http://www.seagate.com) website might not be digitally signed.

- Click the **STOP Installation** button to cancel the installation if a nonsigned driver is not desired. You will not be able to install the Seagate Nytro XP6209 card.

*or*

Click the **Continue Anyway** button to continue the installation.

The system loads the driver. A message box might display that indicates that the target (existing) driver is newer than the source (upgrade) driver.

- Click **No** to cancel the driver upgrade at this point.

*or*

Click **Yes** to continue the installation.

The system copies the driver to the system disk. For any adapter other than the boot adapter, the updated driver becomes active immediately. For the boot adapter, a message box displays that indicates that you must reboot your system for the new driver to take effect.

- Click the **Finish** button to complete the driver upgrade.

Download the latest Windows drivers from the Seagate website. Consult the `ReadMe.txt` file available online with the driver if more detail is needed. To open the readme file, click the plus sign next to the title of the driver.

### 2.3.3 Linux Driver Installation

Download the latest Linux drivers from the Seagate website. Seagate Nytro WarpDrive cards have in-kernel driver support. This means that the Linux driver for supported versions of Linux is included in kernel. This makes installation of Seagate Nytro WarpDrive cards as primary or secondary storage very easy. Boot from the Linux installation media and the driver for the Seagate Nytro WarpDrive card automatically loads. The driver that is included in kernel is not the latest version of the driver. For best performance, upgrade to the latest driver.

Consult the `Linux ReadMe.txt` file available online with the driver. To open the readme file, click the plus sign next to the title of the driver. For Seagate downloads, go to:

<http://www.seagate.com/support/downloads/>

Seagate provides open source drivers in the following ways:

- Precompiled binaries to add to an existing installation using driver update disks or RPMs for selected distributions.
- Fusion-MPT source to add or update any distribution.

### 2.3.4 FreeBSD Driver Installation

Download the latest FreeBSD drivers from the Seagate website. Consult the `FreeBSDReadMe.txt` file available online with the driver. To open the readme file, click the plus sign next to the title of the driver. For Seagate downloads, go to:

<http://www.seagate.com/support/downloads/>

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Seagate provides open source drivers in the following way:

- Precompiled binaries to add to a supported installation using pre-compiled .ko files.

## 2.3.5 VMware Driver Installation

### 2.3.5.1 VMware ESX4.1

Download the latest VMware ESX4.1 driver from the Seagate website at <http://www.seagate.com/support/downloads/>

Installation information is available at [knowledge.seagate.com](http://knowledge.seagate.com)

### 2.3.5.2 VMware ESX5.0/ESX 5.1

Use the following steps to download the latest VMware ESX5.0 or ESX 5.1 driver from the VMware website:

1. Go to this website <http://www.vmware.com/resources/compatibility/search.php?deviceCategory=io>.
2. Search for the device with the vendor ID (VID) 1000 and the device ID (DID) 007E.
3. Click on your Nytro WarpDrive model link from the search result.
4. Copy the information string under Device Driver(s).
5. Go to this website <https://my.vmware.com/web/vmware/downloads> to download the driver.
6. Enter the information string in the search box.
7. Click on the topmost link of the search results.
8. After you download the driver zip file, refer to the *readme.txt* file for all installation instructions.

## 2.4 BIOS Boot Support Settings

The Seagate Nytro WarpDrive BIOS permits you to change the card properties. You can specify that the card is eligible for Seagate software control or that the card is reserved for control by software that does not belong to Seagate. You can select from the following settings in the Boot Support feature of the BIOS:

**Enabled BIOS and OS** permits the BIOS and the operating system driver to control the card.

**Enabled BIOS Only** permits the BIOS to control the card. The operating system driver does not control the card. Some operating system drivers (such as Windows drivers) do not support this option.

**Enabled OS Only** permits the operating system to control the card. The BIOS does not control the card with this setting.

**Disabled** prevents the motherboard from considering the card as a boot device. Therefore you cannot boot from the card. However, you can still see the card when you use the configuration protocol, and in all other respects, the card performs as usual. You can use this option when you have multiple cards in your system and you do not plan to boot from this card.

Changes to these settings display in the Status field on the main Adapter List menu. The new setting takes effect when the BIOS reloads when you reboot the system.

Selecting Disabled prevents the user from booting the WarpDrive, but in all other respects the WarpDrive will work the same.

## 2.4.1 Changing the BIOS Settings

To change the BIOS settings, follow these instructions:

1. At power-on, press Ctrl-C to log on to the BIOS screen.

**NOTE** The model number, date, and firmware number for your Seagate Nytro XP6209 card will vary from the illustrations below.

Figure 2 The BIOS Screen



2. Press **Enter** to go to **Adapter Properties**.

**Figure 3 The Adapter Properties Screen**



3. To toggle between the **Boot Support** settings, use the **-/+ Enter** keys.

**Figure 4 The Disabled Boot Support Setting**



```
Config Utility                               v110.00.00.00 (2013.05.20)
Adapter Properties -- WarpDrive

Adapter                NWD-BLP4-1600
PCI Slot               06
PCI Address(Bus/Dev)   05:00
Firmware Revision     110.00.00.00
Package Version        0.00.00.00
SAS Address            500605B0:12341234
NUDATA Version        0D.43
Status                 Enabled
Boot Order             0
Status LED             Green
Life LED               Green
Boot Support           [Disabled]

Esc = Exit Menu      F1/Shift+1 = Help
Enter = Select Item  -/+Enter = Change Item
```

4. Press **Esc** to exit the BIOS menu.

## 2.5 Managing the Seagate Nytro XP6209 Card

You can use the following tools to manage your Seagate Nytro XP6209 card:

**BIOS** This tool is available only during boot. Use this tool to view information about the card and to configure the boot support options. See [BIOS Boot Support Settings](#).

**DDCLI** This menu-driven, command line interface tool permits you to view information, view the status, and flash upgrade the firmware for the Seagate Nytro XP6209 card. Refer to the *Seagate Nytro™ WarpDrive® and Nytro XP6000 Application Acceleration Card Management Utility User Guide*.

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## Chapter 3: Characteristics

This chapter presents characteristics for the Seagate Nytro XP6209 WarpDrive Application Acceleration Card.

### 3.1 Seagate Nytro XP6209 Card Characteristics

The Seagate Nytro XP6209 card uses a low-profile, half-height, and half-length PCIe board.

The Seagate Nytro XP6209 card uses a SAS2008 controller with the DirectDrive firmware that runs on its internal processor. The controller connects to up to four embedded flash modules. You can use the Seagate Nytro XP6209 card for either persistent or nonpersistent data and the card offers high-performance with consistent low latency with a low host CPU and DRAM burden.

The following figure shows the Seagate Nytro XP6209 card.

**Figure 5 Seagate Nytro XP6209 Card**



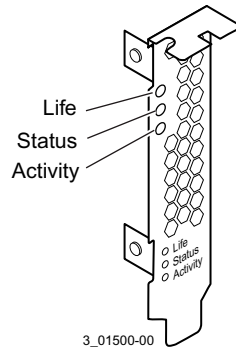
#### 3.1.1 LEDs

Three board-mounted, right-angle LEDs shine through holes in the PCI bracket: one is for data activity, one is for drive life, and one is for drive status. The LEDs are labeled on the bracket.

#### 3.1.2 Troubleshooting the Seagate Nytro XP6209 Card

The LEDs provide status information to diagnose problems with the Seagate Nytro XP6209 card. The following figure shows the LED layout.

**Figure 6 Seagate Nytro XP6209 LED Diagram**



**Table 2 Status Indicators on a Running System**

Name	Color	LED Description
Activity	Green	On, blinking - Indicates data activity on the card. No action required.
Life	Green	On, steady - Card has sufficient life remaining for programming and erasing the Flash memory. No action required.
	Yellow	On, steady - Card has approximately 20% or less of life remaining for programming and erasing the Flash memory. Plan for replacements.
	Red	On, steady - Card has no program or erase cycles left. Data can be read, but writes are at risk. Back up data and copy to a new Seagate Nytro XP6209 card.
Status	Green	On, steady - Normal. On, blinking - Lets the user locate a specific Seagate Nytro XP6209 card in a rack of servers.
	Yellow	On, steady - Warning. One of the following conditions applies: <ul style="list-style-type: none"> <li>Temperature warning. If this condition persists, you might damage your Seagate Nytro XP6209 card. Increase cooling for the card or shut down your system to prevent damage.</li> <li>Other component issues: Run the list and health commands in the <code>ddcli</code> utility to determine which component has an issue.</li> </ul>
	Red	On, blinking - Firmware fault code: <ul style="list-style-type: none"> <li>Run the <code>ddcli</code> utility to determine which component has an issue.</li> <li>If no information appears, reboot the system and retry.</li> <li>If no information appears, call your field application engineer.</li> </ul> On, steady - One of the following conditions applies: <ul style="list-style-type: none"> <li>One or more SSDs failed.</li> <li>Failed RAID volume (DD mode).</li> <li>No RAID volume is configured (DD mode).</li> <li>At least one SSD has exceeded its temperature.</li> <li>Backup power store failed.</li> <li>Other component issues: Run the list and health commands in the <code>ddcli</code> utility to determine which component has an issue.</li> </ul> If no information appears, reboot the system and retry the utility (DD mode).

If you experience a problem with your Seagate Nytro XP6209 card that you cannot resolve, report it to your FAE. Or if you obtained the product from an OEM, report it to the OEM. Keep these tips in mind when reporting a problem:

- Clearly identify and report the revision level of the Seagate Nytro XP6209 card. To view this information, use the `ddc1i` command, Option 1.
- Report the part number (for example, L3-25256-00C) listed on the label, and clearly identify the board revision.
- Describe the steps leading up to the error.
- Report the operating system version and the host driver version.

### 3.1.3 Power Consumption

The Seagate Nytro XP6209 card receives power from the PCIe 12-V and 3.3-V power rails.

Use the following data for power consumption.

**Table 3 Power Consumption**

Model	Idle	Typical Power I/O	Maximum Power I/O
XP6209-4A1024	11.3 W	16.5 W	17.5 W
XP6209-4B2048	11.8 W	18.3 W	19.7 W

**NOTE** For the XP6209-4A1024, typical power I/O was measured at 8-KB, random access, 30% write, 70% read, Queue Depth (QD)=32/SSD. Maximum power I/O was measured at 4-KB, random access, 0% write, 100% read, QD=32/SSD.

**NOTE** XP6209-4B2048 typical power I/O was measured at 8-KB, random access, 30% write, 70% read, QD=32/SSD. Maximum power I/O was measured at 8-KB, sequential access, 100% write, 0% read, QD=32/SSD.

### 3.1.4 Thermal Considerations

The board is designed to operate in an environment defined by the following parameters:

- Temperature range: 0 °C to 50 °C
- Relative humidity range: 5% to 90% noncondensing
- Maximum wet bulb temperature: 28 °C
- Minimum airflow: 250 LFM

The board is designed for the following storage and transit environmental parameters:

- Temperature range: -20 °C to 75 °C
- Relative humidity range: 5% to 95% noncondensing

#### 3.1.4.1 Maximum Sensor Temperature

System design and cooling capacity variations can affect the actual airflow delivered to the Seagate Nytro XP6209 cards. System-level fan speeds might require adjustment to make sure that the Seagate Nytro XP6209 sensor temperature does not exceed the maximums. Here are the maximum sensor temperatures for the Seagate Nytro XP6209 cards:

- XP6209-4A1024: 70°C.
- XP6209-4B2048: 80°C



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## 3.2 Electromagnetic and Environmental Specifications

The Seagate Nytro XP6209 card is designed to minimize electromagnetic emissions, susceptibility to radio frequency energy, and the effects of electrostatic discharge. The card carries the CE mark, C-Tick mark, Canadian Compliance Statement, KCC, HF, Taiwan BSMI, Japan VCCI, and FCC Class B, GOST, and the card is marked with the FCC Self-Certification logo. The card also meets the requirements of CISPR Class B.

## 3.3 Safety Characteristics

All Seagate PCIe boards meet or exceed the requirements of UL flammability rating 94V-0. Each bare board is marked with the supplier's name or trademark, type, and UL flammability rating. Because these boards are installed in a PCIe bus slot, all voltages are below the SELV 42.4-V limit.

## 3.4 Seagate KnowledgeBase

The Seagate KnowledgeBase website provides resources for customers. It includes articles on performance tuning and troubleshooting. For KnowledgeBase website information, go to:

[knowledge.seagate.com](http://knowledge.seagate.com)

## 3.5 Technical Support

For information regarding online support and services, visit:

<http://www.seagate.com/about/contact-us/technical-support/>

Available services include:

- Presales & Technical support
- Global Support Services telephone numbers & business hours
- Authorized Service Centers

For information regarding Warranty Support, visit: <http://www.seagate.com/support/warranty-and-replacements/>

For information regarding data recovery services, visit:

<http://www.seagate.com/services-software/data-recovery-services/>

For Seagate OEM and Distribution partner portal, visit: <http://www.seagate.com/partners/>

For Seagate reseller portal, visit: <http://www.seagate.com/partners/my-spp-dashboard/>



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