



Seagate® Nytro® XP6302 Flash Accelerator Cards User Guide

Nytro XP6302-8B4096(ST3500KN0012)
Nytro XP6302-8B2048(ST1750KN0012)
Nytro XP6302-8B1536(ST1300KN0012)

100765563
Rev. E
December 2017

Revision History

Revision	Date	Description of Changes
Rev. E	December 2017	Updated the following Sections: <ul style="list-style-type: none">■ Section 3.3.1, Regulatory Model Number■ Section 3.3.2, Agency and Safety Certifications■ Section 3.3.3, Environmental protection
Rev. D	April 2017	Updated Section 2.3.2, Linux Driver Installation for in-box drivers and updated version in Section 2.3.4, VMware ESXi6.0, ESXi 5.5 .
Rev. C	July 2016	Updated Section 3.3.3.2, China Requirements—China RoHS 2 .
Rev. B	April 2015	Second release. Added new product information to the cover page and to Section 1.1, Overview , Section 3.1.3, Power Consumption for the Nytro XP6302 Card , and Section 3.1.4, Thermal Considerations .
Rev. A	December 2014	Initial release.

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Publication number: 100765563, Rev. E, December 2017

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When referring to drive capacity, one gigabyte, or GB, equals one billion bytes and one terabyte, or TB, equals one trillion bytes. Your computer's operating system may use a different standard of measurement and report a lower capacity. In addition, some of the listed capacity is used for formatting and other functions, and thus will not be available for data storage. Actual quantities will vary based on various factors, including file size, file format, features and application software. Actual data rates may vary depending on operating environment and other factors. The export or re-export of hardware or software containing encryption may be regulated by the U.S. Department of Commerce, Bureau of Industry and Security (for more information, visit www.bis.doc.gov), and controlled for import and use outside of the U.S. Seagate reserves the right to change, without notice, product offerings or specifications.

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

Chapter 1: Introduction

1.1 Overview

This manual describes the functional, mechanical, and interface specifications for the Seagate® Nytro® XP6302 Series Flash Accelerator Cards. The Nytro XP6302 card is a block storage device. The card presents itself to the operating system through a Fusion-MPT™ interface as a single drive that requires minimal user configuration. You can use this card for either nonpersistent (for example, cache) or persistent (for example, database files) data.

The Nytro XP6302 card has a PCI Express® (PCIe®) interface that complies with the PCI Express Specification 3.0. The functionality of the Nytro XP6302 card comes from a SAS2308 I/O controller with Seagate Nytro firmware that runs on the internal processor.

The following table shows the characteristics of the Nytro XP6302 card models:

Table 1 Seagate Nytro XP6302 Card Characteristics Summary

Device Name	Model Name	Part Number	Connector	Capacity	Flash Controller	NAND Type	Card Style	Controller
Nytro XP6302	XP6302-8B4096	ST3500KN0012	X8 PCIe 3.0	4 TB	SF2582	Consumer Multi-Level Cell (cMLC)	Half Height, Half Length (HHHL)	SAS2308
Nytro XP6302	XP6302-8B2048	ST1750KN0012	X8 PCIe 3.0	2 TB	SF2582	Enterprise Multi-Level Cell (eMLC)	HHHL	SAS2308
Nytro XP6302	XP6302-8B1536	ST1300KN0012	X8 PCIe 3.0	1.5 TB	SF2582	eMLC	HHHL	SAS2308

1.2 Features

This section lists the features of the Nytro XP6302 cards.

- Proven enterprise firmware stack
- Flash ROM for storing the BIOS and firmware
- Best-in-class read and write performance
- Average latency of less than 200 μs
- Low host burden – No static CPU and memory overhead
- Support for Windows®, Linux®, VMware®, and FreeBSD® operating systems
- Bootable
- PCIe 3.0 x8
- Half height and half length
- PCIe standard low-profile bracket attached to card (full-height bracket ships in the box)
- LEDs for drive life and drive status
- RAISE™ – High reliability with block-level, page-level, and die-level failure protection

1.3 Related Documents

Refer to the following documents for more information on the Nytro XP6302 card and related tools.

- *Seagate® Nytro® WarpDrive® and Nytro XP6000 Application Acceleration Card Management Utility User Guide*
- *Seagate® Nytro® XP6302 Application Acceleration Card Quick Installation Guide*

Chapter 2: Installation

2.1 Quick Installation Instructions

You can use the quick installation instructions to install your Nytro XP6302 card, or you can see the next section if you need more detailed installation instructions.

To quickly install your Nytro XP6302 card, follow these instructions.

1. Unpack the Nytro XP6302 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 that supports at least 40 W of power.
5. Secure the bracket to the system's chassis.
6. Replace the cover and the power cord, then turn on the server.

The Nytro XP6302 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 Steps

1. **Unpack the Nytro XP6302 card and inspect it for damage.** Unpack the card in a static-free environment and follow good antistatic grounding procedures. Remove the Nytro XP6302 card from the antistatic bag, and carefully inspect it for damage. If you notice any damage, contact Seagate, or your reseller support representative.

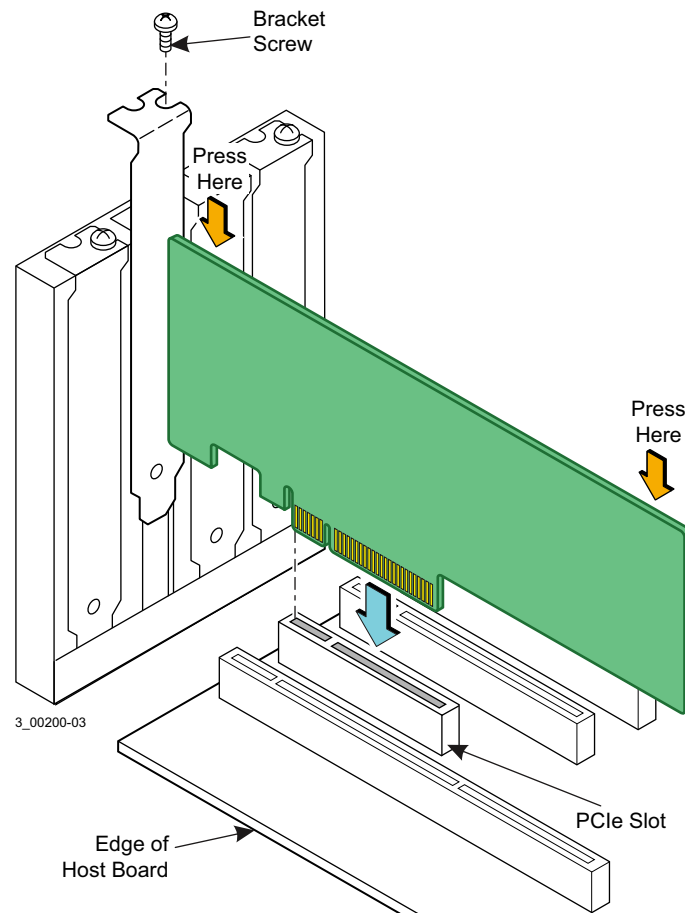
NOTE Back up your data before changing your system configuration.

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 Nytro XP6302 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 Nytro XP6302 card in an available PCIe slot that provides at least 40 W of power.** Locate an empty PCIe slot. Make sure the PCIe slot provides at least 40 W of power. Without sufficient power the Nytro XP6302 card may be damaged or run at less than optimal performance. 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 Nytro XP6302



NOTE The shape, size, and locations of components on your Nytro XP6302 card might vary from this illustration.

CAUTION For highest performance, make sure that the PCIe slot is PCIe 3.0 and make sure that it has an active width of dedicated eight lanes.

CAUTION The location must meet the 300 LFM (linear feet/minute) minimum airflow requirement.

5. **Secure the bracket to the system's chassis.** Install the bracket screw, if applicable, or engage the system retention mechanism to secure the card to the system's chassis.

6. **Replace the cover, reconnect the power cords, and power up the system.** Replace the server's cover, reconnect the power cords, and reconnect any network cables. Turn on the power.

CAUTION For all server types, do not ship the Nytro XP6302 card installed or mounted inside a server. Ship the card separately and install the card into the server at its final destination. This prevents potential damage during shipment. If the card is shipped installed in a server and is damaged during shipment, the applicable warranty is void.

The Nytro XP6302 card hardware installation is complete.

2.3 Software Installation Instructions

2.3.1 Windows Driver Installation

The Seagate drivers for Windows Server® 2012 and Windows Server 2008 are available online.

Download the latest Windows drivers from the Seagate website:

1. Go to this website:
<https://www.seagate.com/support/solid-state-flash-storage/accelerator-cards/nytro-warpdrive-accelerator-card/downloads/>
2. Click the driver you need.
3. Open the Windows Driver Configuration Utility file and follow the instructions to install the driver.

2.3.2 Linux Driver Installation

NOTE New Operating Systems use in-box drivers and are not available in the Seagate Support site.

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.

Download the latest Linux® drivers from the Seagate website.

1. Go to this website:
<https://www.seagate.com/support/solid-state-flash-storage/accelerator-cards/nytro-warpdrive-accelerator-card/downloads/>
2. Click the driver you need.
3. Download the driver files and install the RPM files.

2.3.3 FreeBSD Driver Installation

Download the latest FreeBSD® drivers from the Seagate website.

1. Go to this website:
<https://www.seagate.com/support/solid-state-flash-storage/accelerator-cards/nytro-warpdrive-accelerator-card/downloads/>
2. Click the driver you need.

3. Download the driver files and install the drivers.

2.3.4 VMware ESXi6.0, ESXi 5.5

Download the latest VMware® drivers from the Seagate website.

1. Go to this website:
<https://www.seagate.com/support/solid-state-flash-storage/accelerator-cards/nytro-warpdrive-accelerator-card/downloads/>
2. Click the driver you need.
3. Download the driver files and install the drivers.

You have now completed the driver installation for the Nytro XP6302 card.

2.4 BIOS Boot Support Settings

The Nytro 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.

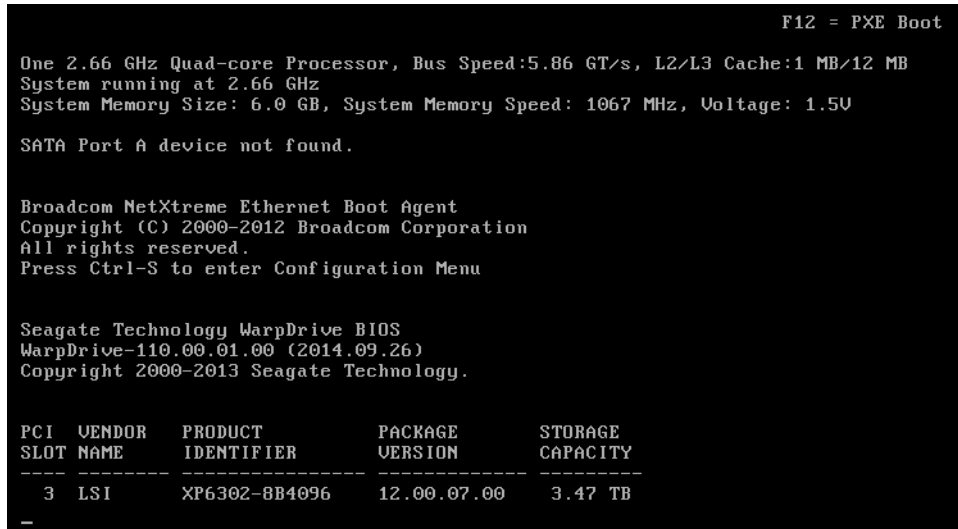
Selecting Disabled prevents the user from booting the card, but in all other respects the card will work the same.

2.4.1 Changing the BIOS Settings

To change the BIOS settings, follow these instructions:

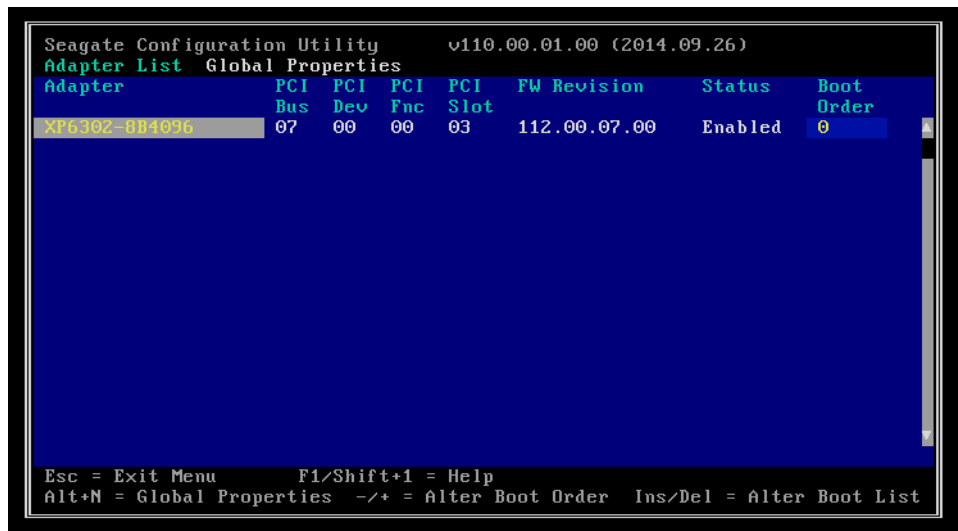
1. During system POST, the Seagate banner displays. Press Ctrl-C to log on to the BIOS screen.

Figure 2 The Seagate BIOS Banner



- In the main BIOS screen, select the Adapter. Press **Enter** to go to **Adapter Properties**.

Figure 3 The Main BIOS Screen



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

Figure 4 The Adapter Properties Screen

```

Seagate Configuration Utility      v110.00.01.00 (2014.09.26)
Adapter Properties -- WarpDrive

Adapter                XP6302-8B4096
PCI Slot               03
PCI Address(Bus/Dev)  07:00
Firmware Revision     112.00.07.00
Package Version       12.00.07.00
SAS Address           500605B0:12345678
NVDATA Version        0D.43.00.02
Status                Enabled
Boot Order            0
Status LED            Green
Life LED              Green
Boot Support          Enabled BIOS & OS

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

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

2.5 Managing the Nytro XP6302 Card

You can use the following tools to manage your Nytro XP6302 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 Nytro XP6302 card. Refer to the *Seagate® Nytro™ WarpDrive® and Nytro XP6000 Application Acceleration Card Management Utility User Guide*.

NytroCLI This command line interface tool permits you to view information, view the status, and flash upgrade the firmware for the Nytro XP6302 card. Refer to the *Seagate® Nytro® Command Line Interface User Guide*.

Chapter 3: Characteristics

This chapter presents characteristics for each Nytro XP6302 card.

3.1 Nytro XP6302 Card Characteristics

The Nytro XP6302 card uses a low-profile, half-height, and half-length PCIe board.

The Nytro XP6302 card uses a SAS2308 controller with drive firmware that runs on its internal processor. The Nytro XP6302 card can be used for either persistent or nonpersistent data and offers high-performance with low latency and a low CPU burden.

The following figure shows the Nytro XP6302 card.

Figure 5 Nytro XP6302 Card

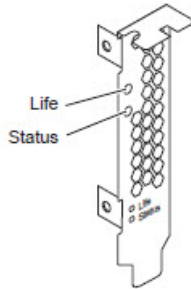


3.1.1 LEDs

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

3.1.2 Troubleshooting the Nytro XP6302 Card

The LEDs provide key status information to diagnose any problem with the Nytro XP6302 card. You can also contact Technical Support. The following figure shows the LED layout.

Figure 6 Nytro XP6302 Card LED Diagram

The following table shows LED Descriptions:

Table 2 Status Indicators on a Running System

Name	Color	LED Description
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 10% 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 Nytro XP6302 card.
Status	Green	On, steady – Normal.
		On, blinking – Lets the user locate a specific Nytro XP6302 card in a rack of servers.
	Yellow	On, steady – Warning. One of the following conditions applies: <ul style="list-style-type: none"> ■ Temperature warning. If this condition persists, you might damage your Nytro XP6302 card. Increase cooling for the card or shut down your system to prevent damage. ■ Other component issues: Run the list and health commands in the management utility to determine which component has an issue.
	Red	On, blinking – Firmware fault code: <ul style="list-style-type: none"> ■ Run the management utility to determine which component has an issue. ■ If no information appears, reboot the system and retry. ■ If no information appears, contact Seagate Technology Support Services.
On, steady – One of the following conditions applies: <ul style="list-style-type: none"> ■ At least one SSD has exceeded its temperature. ■ Failed RAID volume (DD mode). ■ No RAID volume is configured (DD mode). ■ Backup power store failed. ■ Other component issues: Run the list and health commands in the management utility to determine which component has an issue. If no information appears, reboot the system and retry the utility.		

If you experience a problem with your Nytro XP6302 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 Nytro XP6302 card. To view this information, use the management utility List command.
- Report the part number 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 for the Nytro XP6302 Card

The Nytro XP6302 card receives power from the PCIe 12-V power rail.

Use the following data for power consumption.

Table 3 Power Consumption

Model Name	Card Capacity	Idle	Typical Power I/O	Maximum Power I/O
XP6302-8B4096	4 TB	22.7 W	37.2 W	38.9 W
XP6302-8B2048	2 TB	21.1 W	36.2 W	37.2 W
XP6302-8B1536	1.5 TB	21.1 W	36.2 W	37.2 W

NOTE For the 2 TB and the 1.5 TB cards, 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, 70% write, 30% read, QD=32/SSD.

NOTE For the 4 TB card, 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 16-KB, sequential 100% write, QD=32/SSD.

3.1.4 Thermal Considerations

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

- Temperature range: 5 °C to 45 °C
- Relative humidity range: 5% to 90% non-condensing
- Maximum wet bulb temperature: 28 °C
- Minimum airflow: 300 LFM
- Relative humidity range: 20% to 80% non-condensing
- Operating altitude: 3000 m
- De-rate: 2 °C per 1000 m above 1000 m

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

- Temperature range: -25 °C to 70 °C
- Relative humidity range: 5% to 95% non-condensing

3.1.4.1 Maximum Sensor Temperature

System design and cooling capacity variations can affect the actual airflow delivered to the Nytro XP6302 cards. System-level fan speeds might require adjustment to make sure that the Nytro XP6302 sensor temperature does not exceed the maximums. The maximum sensor temperature for the Nytro XP6302 cards is 76 °C.

3.2 Safety, Standards, and Compliance

3.3 Standards

This drive is recognized in accordance with UL 60950-1, CSA 60950-1 and IEC/EN60950-1 as tested by UL.

3.3.1 Regulatory Model Number

The following regulatory Model Numbers represent all features and configurations in this series:

- Regulatory Model Numbers: 25632 and ST25632

3.3.2 Agency and Safety Certifications

Each Solid State Drive ("drives") has a product label that includes certifications that are applicable to that specific drive. The following information provides an overview of requirements that may be applicable to the drive.

3.3.2.1 European Union (EU) CE Marking Requirements

Drives that display the CE mark comply with the European Union (EU) requirements specified in the Electromagnetic Compatibility Directive (2014/30/EU) put into force on 20 April 2016. Testing is performed to the levels specified by the product standards for Information Technology Equipment (ITE). Emission levels are defined by EN 55032:2012, Class B and the immunity levels are defined by EN 55024:2010.

The drives also meet the requirements of The Low Voltage Directive (LVD) 2014/35/EU.

Seagate drives are tested in representative end-user systems. Although CE-marked Seagate drives comply with all relevant regulatory requirements and standards for the drives, Seagate cannot guarantee that all system-level products into which the drives are installed comply with all regulatory requirements and standards applicable to the system-level products. The drive is designed for operation inside a properly designed system (e.g., enclosure designed for the drive), with properly shielded I/O cable (if necessary) and terminators on all unused I/O ports. Computer manufacturers and system integrators should confirm EMC compliance and provide CE marking for the system-level products.

For compliance with the RoHS "Recast" Directive 2011/65/EU (RoHS 2), [Section 3.3.3.1.1, Restriction of Hazardous Substances in Electrical and Electronic Equipment](#).

3.3.2.2 Australian RCM Compliance Mark

If these models have the RCM marking, they comply with the Australia/New Zealand Standard AS/NZ CISPR32 and meet the Electromagnetic Compatibility (EMC) Framework requirements of the Australian Communication and Media Authority (ACMA).

3.3.2.3 Canada ICES-003

If this model has the ICES-003:2016 marking it complies with requirements of ICES tested per ANSI C63.4-2014.

3.3.2.4 South Korean KC Certification Mark

The South Korean KC Certification Mark means the drives comply with paragraph 1 of Article 11 of the Electromagnetic Compatibility control Regulation and meet the Electromagnetic Compatibility (EMC) Framework requirements of the Radio Research Agency (RRA) Communications Commission, Republic of Korea. These drives have been tested and comply with the Electromagnetic Interference/Electromagnetic Susceptibility (EMI/EMS) for Class B products. Drives are tested in a representative, end-user system by a Korean-recognized lab.

기종별	사용자안내문
B급 기기 (가정용 방송통신기자재)	이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

3.3.2.5 Morocco Commodity Mark

Seagate drives are tested for compliance and complies with the European Union (EU) Electromagnetic Compatibility (EMC) Directive 2014/30/EU and the Low Voltage Directive (LVD) 2014/35/EU. Accordingly, the drives also meets the requirements of Morocco's Order of the Minister of Industry, Trade, Investment and Digital Economy No. 2574-14 of 29 Ramadan 1436 (16 July 2015) on electromagnetic compatibility of equipment.

For drives with the Morocco Mark, Seagate has added the Moroccan Commodity Mark to the drives provided to the OEM for the sale of Customer Kits produced by our OEM customers that are intended to be incorporated into the OEM's finished system-level product by an end user. The Customer Kits are considered 'devices' under Morocco's Order of the Minister of Industry, Trade, Investment and Digital Economy No. 2574-14 of 29 Ramadan 1436 (16 July 2015) on electromagnetic compatibility of equipment.

3.3.2.6 Taiwanese BSMI

Drives with the Taiwanese certification mark comply with Chinese National Standard, CNS13438.

For compliance with the Taiwan Bureau of Standards, Metrology and Inspection's (BSMI) requirements, [Section 3.3.3.3, Taiwan Requirements—Taiwan RoHS](#).

3.3.2.7 FCC verification

These drives are intended to be contained solely within a personal computer or similar enclosure (not attached as an external device). As such, each drive is considered to be a subassembly even when it is individually marketed to the customer. As a subassembly, no Federal Communications Commission verification or certification of the device is required.

Seagate has tested this device in enclosures as described above to ensure that the total assembly (enclosure, disk drive, motherboard, power supply, etc.) does comply with the limits for a Class B computing device, pursuant to Subpart J, Part 15 of the FCC rules. Operation with noncertified assemblies is likely to result in interference to radio and television reception.

Radio and television interference. This equipment generates and uses radio frequency energy and if not installed and used in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception.

This equipment is designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television, which can be determined by turning the equipment on and off, users are encouraged to try one or more of the following corrective measures:

- Reorient the receiving antenna.
- Move the device to one side or the other of the radio or TV.
- Move the device farther away from the radio or TV.

- Plug the computer into a different outlet so that the receiver and computer are on different branch outlets.

If necessary, users should consult a dealer or an experienced radio/television technician for additional suggestions. Users may find helpful the following booklet prepared by the Federal Communications Commission: *How to Identify and Resolve Radio-Television Interference Problems*. This booklet is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Refer to publication number 004-000-00345-4.

3.3.2.8 Japan VCCI

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス B 情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
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.

3.3.3 Environmental protection

Seagate designs its products to meet environmental protection requirements worldwide, including regulations restricting certain chemical substances.

3.3.3.1 European Union Restriction of Hazardous Substance Law

3.3.3.1.1 Restriction of Hazardous Substances in Electrical and Electronic Equipment

Seagate drives are designed to be compliant with the European Union RoHS "Recast" Directive 2011/65/EU (RoHS 2) as amended by Directive (EU) 2015/863. The RoHS2 restricts the use of certain hazardous substances such as Lead, Cadmium, Mercury, Hexavalent Chromium, Polybrominated Biphenyls (PBB) and Polybrominated Diphenyl Ether (PBDE), BisBis(2-Ethylhexyl) phthalate (DEHP), Benzyl butyl phthalate (BBP), Dibutyl phthalate (DBP), and Diisobutyl phthalate (DIBP) in electrical and electronic equipment (EEE).

3.3.3.1.2 Substances of Very High Concern (SVHC)

The European Union REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) Regulation (EC) 1907/2006 regulates chemicals shipped into and used in Europe. A number of parts and materials in Seagate products are procured from external suppliers. We rely on the representations of our suppliers regarding the presence of REACH substances in these articles and materials. Our supplier contracts require compliance with our chemical substance restrictions, and our suppliers document their compliance with our requirements by providing full-disclosure material content declarations that disclose inclusion of any REACH-regulated substance in such articles or materials. Product-specific REACH declarations are available upon request through your Seagate Sales Representative.

3.3.3.2 China Requirements—China RoHS 2



China RoHS 2 refers to the Ministry of Industry and Information Technology Order No. 32, effective July 1, 2016, titled Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products. To comply with China RoHS 2, Seagate determines this product's Environmental Protection Use Period (EPUP) to be 20 years in accordance with the *Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products*, SJT 11364-2014.

Table 4 China - Hazardous Substances

部件名称 Part Name	有害物质 Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr ⁺⁶)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板组装 PCBA	X	O	O	O	O	O

本表格依据 SJ/T 11364 的规定编制。

This table is prepared in accordance with the provisions of SJ/T 11364-2014

O: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

O: Indicates that the hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T26572.

X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

X: Indicates that the hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T26572.

3.3.3.3 Taiwan Requirements—Taiwan RoHS

Taiwan RoHS refers to the Taiwan Bureau of Standards, Metrology and Inspection's (BSMI) requirements in standard CNS 15663, Guidance to reduction of the restricted chemical substances in electrical and electronic equipment. Seagate products must comply with the "Marking of presence" requirements in Section 5 of CNS 15663, effective January 1, 2018. This product is Taiwan RoHS compliant.

The following table meets the Section 5 "Marking of presence" requirements.

Table 5 Taiwan - Restricted Substances

設備名稱：硬盤設備 /SSD，型號：僅適用於內部使用 Equipment Name: Hard Disk Device/SSD, Type Designation: Internal Use Only						
單元 Unit	限用物質及其化學符號 Restricted Substance and its chemical symbol					
	鉛 (Pb)	汞 (Hg)	鎘 (Cd)	六價鉻 (Cr ⁺⁶)	多溴聯苯 (PBB)	多溴二苯醚 (PBDE)
印刷電路板組裝 PCBA	—	0	0	0	0	0
備考 1. "0" 係指該項限用物質之百分比含量未超出百分比含量基準值。 Note 1. "0" indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence. 備考 2. "—" 係指該項限用物質為排除項目。 Note 2. "—" indicates that the restricted substance corresponds to the exemption.						



Seagate Technology LLC

AMERICAS Seagate Technology LLC 10200 South De Anza Boulevard, Cupertino, California 95014, United States, 408-658-1000

ASIA/PACIFIC Seagate Singapore International Headquarters Pte. Ltd. 7000 Ang Mo Kio Avenue 5, Singapore 569877, 65-6485-3888

EUROPE, MIDDLE EAST AND AFRICA Seagate Technology SAS 16-18 rue du Dôme, 92100 Boulogne-Billancourt, France, 33 1-4186 10 00

*Publication Number: 100765563, Rev. E
December 2017*