



# Seagate® Nytro® XF1230 SATA SSD

## Product Manual

### **Standard Models**

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**XF1230-1A0240**

**XF1230-1A0480**

**XF1230-1A0960**

**XF1230-1A1920**

## Revision History

Version and Date	Description of Changes
Rev L, March 2018	Updated throughout the document to comply with Seagate branding requirements.
Rev K, January 2018	Updated <a href="#">Section 7.4, Reference Documents</a>
Rev J, November 2017	Updated the following: <ul style="list-style-type: none"><li>■ <a href="#">Section 7, Safety, Standards, and Compliance</a></li></ul>
Rev H, October 2017	Added new product photo to front cover and updated the following: <ul style="list-style-type: none"><li>■ <a href="#">Section 7, Safety, Standards, and Compliance</a></li></ul>
Rev G, October 2017	Added new product photo to front cover.
Rev F, September 2017	Updated the following: <ul style="list-style-type: none"><li>■ <a href="#">Section 1, Introduction</a> (Endurance)</li><li>■ <a href="#">Section 2.6, Endurance</a></li><li>■ <a href="#">Section 7, Safety, Standards, and Compliance</a></li></ul>
Rev E, October 2016	Updated SMART attributes in <a href="#">Section 6.2, SMART Attributes</a> .
Rev D, August 2016	First public release of the document.

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## Seagate Technology Support Services

For Nytro Support, visit: <http://www.seagate.com/support/by-product/ssd-and-pcie-flash/>

For information regarding online support and services, visit: <http://www.seagate.com/contacts/>

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/recover/>

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

# 1. Introduction

The Seagate® Nytro® XF1230 SSDs provide high reliability and sustained performance for enterprise Server and Storage products. The Nytro XF1230 series offers a SATA interface, fully compatible with SATA 3.1 6.0Gb/s.

**Table 1 Nytro XF1230 SSD Features**

Feature	Description	
<b>Capacity</b>	<ul style="list-style-type: none"> <li>240, 480, 960, 1920 GB</li> </ul>	
<b>Certifications, Eco-Compliance</b>	<ul style="list-style-type: none"> <li>CE, UL, FCC, RCM, BSMI, KCC, Microsoft WHQL, SATA-IO</li> <li>China RoHS2, Taiwan RoHS</li> </ul>	
<b>Dimension</b>	<ul style="list-style-type: none"> <li>(69.85±0.25) x (100±0.25) x (Max. 7) mm</li> </ul>	SSD outer case can support suitable Z-height for various host situations.
<b>Endurance</b>	<ul style="list-style-type: none"> <li>1 Drive Write Per Day (DWPD) for higher lifetime endurance. See <a href="#">Table 10, Endurance, on page 10</a>.</li> </ul>	
<b>Form Factor</b>	<ul style="list-style-type: none"> <li>2.5 Inch Standard SSD</li> </ul>	
<b>Interface Compliance</b>	<ul style="list-style-type: none"> <li>Fully compliant with SATA revision 3.1, compatible with SATA 6.0Gb/s interface rates.</li> <li>Fully compliant with ATA-8/ACS-3 Standard.</li> <li>PIO, DMA, UDMA (up to 6, dependent on host) supported.</li> <li>SATA 6.0Gb/s Native Command Queuing (NCQ): up to 32 commands.</li> <li>SMART command transport (SCT) technology.</li> <li>Data Set Management Command Trim support.</li> </ul>	
<b>Latency</b>	<ul style="list-style-type: none"> <li>Read: 140 µs (Typ.)</li> <li>Write: 60 µs (Typ.)</li> </ul>	Latency measured with a transfer size of 4 KB and queue depth of 1 on a random workload, and based on high density (1920 GB).
<b>NAND</b>	<ul style="list-style-type: none"> <li>16 nm 2D MLC</li> </ul>	
<b>Performance Random (Sustained)</b>	<ul style="list-style-type: none"> <li>4 KB Read: Up to 98K IOPS</li> <li>4 KB Write: Up to 16.8K IOPS</li> <li>8 KB Read: Up to 58K IOPS</li> <li>8 KB Write: Up to 8K IOPS</li> </ul>	<p>Actual performance may vary depending on use conditions and environment.</p> <p>See <a href="#">Section 2.2, Performance, on page 8</a>.</p> <p>Typical I/O performance numbers measured with a queue depth of 32, write cache enabled, 6Gb/s SAS chipset port, and the Intel RST driver.</p>
<b>Performance Sequential (128 KB Sustained)</b>	<ul style="list-style-type: none"> <li>Read: Up to 560MB/s</li> <li>Write: Up to 505MB/s</li> </ul>	<p>Actual performance may vary depending on use conditions and environment.</p> <p>See <a href="#">Section 2.2, Performance, on page 8</a>.</p> <p>Typical I/O performance numbers as measured with a queue depth of 32, write cache enabled, 6Gb/s SAS chipset port, and the Intel RST driver.</p>
<b>Power Consumption</b>	<ul style="list-style-type: none"> <li>Active: Up to 5.7 W</li> <li>Idle: Up to 0.9 W</li> </ul>	<p>See <a href="#">Section 2.3, Power, on page 9</a>.</p> <p>RMS Average.</p> <p><b>NOTE</b> This specification is for the 1920 GB SSD; smaller capacity SSDs have lower active power.</p>
<b>Power Loss Protection</b>		
<b>Power Management</b>	<ul style="list-style-type: none"> <li>5 V SATA Supply</li> <li>OS-aware hot plug/removal</li> </ul>	
<b>Power On Ready</b>	<ul style="list-style-type: none"> <li>Normal shut down: 5 s</li> <li>Unsolicited shut down: 21 s</li> </ul>	Based on High Density (1920 GB).

**Table 1 Nytro XF1230 SSD Features (continued)**

Feature	Description	
<b>Quality of Service</b>	<ul style="list-style-type: none"> <li>■ Read/Write: 0.2 ms/0.9 ms (99.9%)</li> </ul>	Based on Random 4 KB, queue depth=1, and 1920 GB Density.
<b>Reliability</b>	<ul style="list-style-type: none"> <li>■ MTBF: 2 million hours</li> <li>■ Uncorrectable bit error rate: &lt;1 error in <math>10^{17}</math> bits read</li> <li>■ End-to-End data-path protection</li> </ul>	
<b>Shock</b>	<ul style="list-style-type: none"> <li>■ Operating: 1500G, duration 0.5ms</li> <li>■ Non-Operating: 1500G, duration 0.5ms</li> </ul>	
<b>Temperature Range (Operating)</b>	<ul style="list-style-type: none"> <li>■ 0°C to 70°C</li> <li>■ Temperature Sensor (SMART Attribute ID 194)</li> </ul>	
<b>Vibration</b>	<ul style="list-style-type: none"> <li>■ Operating: 20 G<sub>RMS</sub>, 10~20 KHz</li> <li>■ Non-Operating: 20 G<sub>RMS</sub>, 10~20 KHz</li> </ul>	
<b>Voltage</b>	<ul style="list-style-type: none"> <li>■ 5V±5%</li> </ul>	
<b>Warranty</b>	<ul style="list-style-type: none"> <li>■ Five-year limited Warranty with Media Usage, based on the shorter of the term or the endurance usage of the SSD.</li> </ul>	
<b>Weight</b>	<ul style="list-style-type: none"> <li>■ Up to 85g ±5%</li> </ul>	

## 2. Specifications

### 2.1 Models and Capacity

**Table 2 Nytro XF1230 SSD Models**

Device Name	Model Names	Usable Capacity	LBAs
Nytro XF1230	XF1230-1A0240	240 GB	468,862,128
	XF1230-1A0480	480 GB	937,703,088
	XF1230-1A0960	960 GB	1,875,385,008
	XF1230-1A1920	1920 GB	3,750,748,848

### 2.2 Performance

**Table 3 Random Read/Write Input/Output Operations Per Second (IOPS)**

Parameter	240 GB	480 GB	960 GB	1920 GB
Random 4 KB Read (IOPS)	96,700	98,000	98,000	98,000
Random 4 KB Write (IOPS)	8,700	15,800	16,800	16,000
Random 8 KB Read (IOPS)	58,000	58,000	58,000	58,000
Random 8 KB Write (IOPS)	4,000	8,000	8,000	8,000

**Table 4 Sequential Read/Write Throughput**

Parameter	240 GB	480 GB	960 GB	1920 GB
Sequential Read—Sustained (MB/s)	560	560	560	560
Sequential Write—Sustained (MB/s)	306	505	490	445

**NOTE**

Information on performance

- Performance measured with queue depth set to 32.
- 4 KB = 4,096 bytes, 8 KB = 8,192 bytes.
- Drive write cache enabled.
- Measurements performed on Full Logical Block Address (LBA) range, sustained for 2x SSD Capacity.
- Set to 4 KB alignment.
- Performance test precondition: SSD is preconditioned with 2x SSD capacity 128 KB write IOs.
- Measured on system with Intel Xeon E5-2640v3 and C610 chipset with on-board AHCI controller running Microsoft Windows® 2012 R2 DC. System variations may affect measured results.
- MB/s = 1,000,000 bytes/second.



## 2.3 Power

The 2.5" SSD uses 5 V DC power.

**Table 5 Operating Voltage**

	240 GB	480 GB	960 GB	1920 GB
Operating Voltage range	5 V $\pm$ 5%	5 V $\pm$ 5%	5 V $\pm$ 5%	5 V $\pm$ 5%
Inrush Current	0.91 A	1.10 A	1.20 A	1.60 A

### 2.3.1 Power Consumption

**Table 6 Power Consumption**

	240 GB	480 GB	960 GB	1920 GB
Active Read – Average (W)	2.1	2.2	2.2	2.8
Active Write – Average (W)	2.8	4.2	4.2	4.3
Active Read – Burst 500 $\mu$ S Average (W)	2.2	2.4	2.4	3.0
Active Write – Burst 500 $\mu$ S Average (W)	3.2	4.8	5.1	5.7
Idle (W)	0.8	0.8	0.8	0.9

## 2.4 Environmental Conditions

**Table 7 Temperature, Humidity, Shock**

Specification	Nytro XF1230
Temperature	
Operating (case temperature at specific airflow)	0°C to 70°C
Non-Operating	- 40°C to 95°C
Humidity	
Operating and Non-Operating	5 to 95%
Shock	
Operating and Non-Operating	1500 Gs at 0.5 ms

**NOTE**

Operating, as measured by temperature sensor, SMART Attribute ID 194.

- Measured without condensation.
- The Shock specification assumes that the SSD is mounted securely with the input vibration applied to the SSD mounting. Stimulus may be applied in the X, Y or Z- axis.
- Operating Shock: The SSD, as installed for normal operation, operates error-free while subjected to intermittent shock not exceeding specification. Shock may be applied in the X, Y, or Z-axis. Shock must not be repeated more than once every 2 seconds.

- **Non-Operating Shock:** The limits of non-operating shock applies to all conditions of handling and transportation. This includes isolated and integrated SSDs. Shock may be applied in the X, Y, or Z-axis.

**Table 8 Vibration**

Specification	Nytro XF1230
Maximum Vibrations	
Operating	20 G <sub>RMS</sub> (10 to 20 KHz)
Non-Operating	20 G <sub>RMS</sub> (10 to 20 KHz)

**NOTE**

The Vibration specification assumes that the SSD is mounted securely with the input Vibration applied to the SSD mounting screws. Stimulus may be applied in the X, Y, or Z-axis.

- **Operating Vibration:** The SSD, as installed for normal operation, shall operate error free while subjected to specified vibration not exceeding specification. Vibration may be applied in the X, Y, or Z-axis.
- **Non-Operating Vibration:** The limits of non-operating vibration shall apply to all conditions of handling and transportation. This includes both isolated SSDs and integrated SSDs. Vibration may be applied in the X, Y, or Z-axis.

## 2.5 Reliability

**Table 9 Reliability**

Specification	Nytro XF1230
Mean time between failures (MTBF)	2 million hours
Uncorrectable Bit Error Rate	<1 error in 10 <sup>17</sup> bits read

## 2.6 Endurance

**Table 10 Endurance**

Specification	240 GB	480 GB	960 GB	1920 GB
Endurance Rating (DWPD)	1	1	1	1
Terabytes Written (TBW)	375	750	1500	3000

**NOTE**

Information on endurance:

- 1 DWPD is tested based on a 100% random write workload with the assumption that the user does not exceed 90% of the total usable space.
- DWPD is drive write per day.
- Limited Warranty with Media Usage provides coverage for the warranty period or for the endurance usage of the SSD, whichever comes first.

### 3. Mechanical Information

#### 3.1 Dimensions and Weight

**Weight:** 0.187 lbs, 85 g

**Height:** Maximum 7 mm

**Width:** 69.85±0.25

**Length:** 100±0.25

**NOTE** All dimensions are in millimeters.

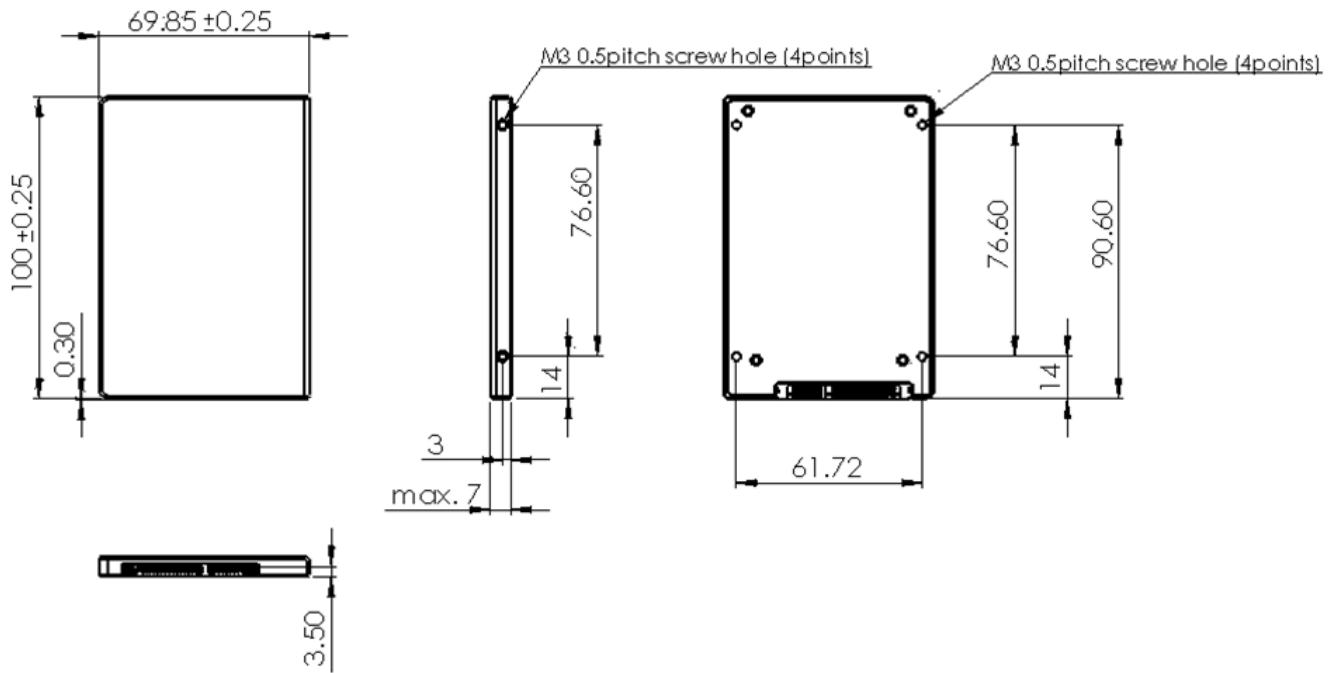


Figure 1 Nytro XF1230 Dimensions

## 4. Pin and Signal Descriptions

### 4.1 Serial ATA Interface Connector

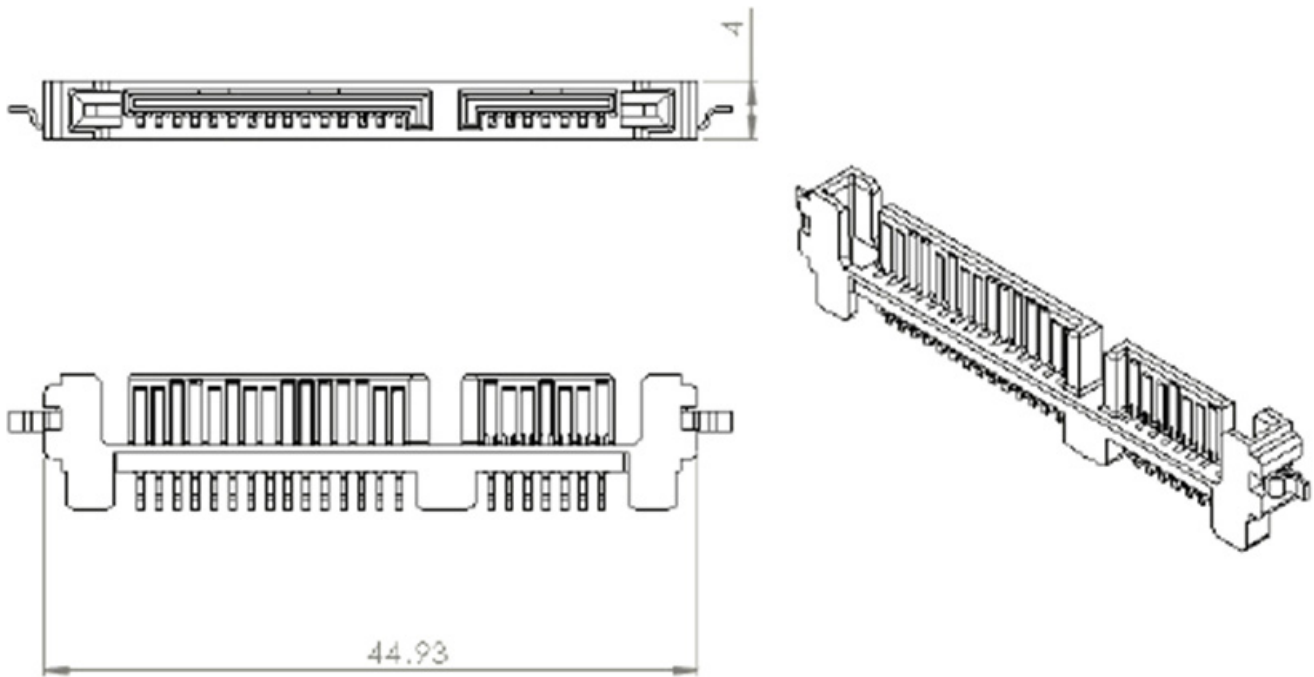
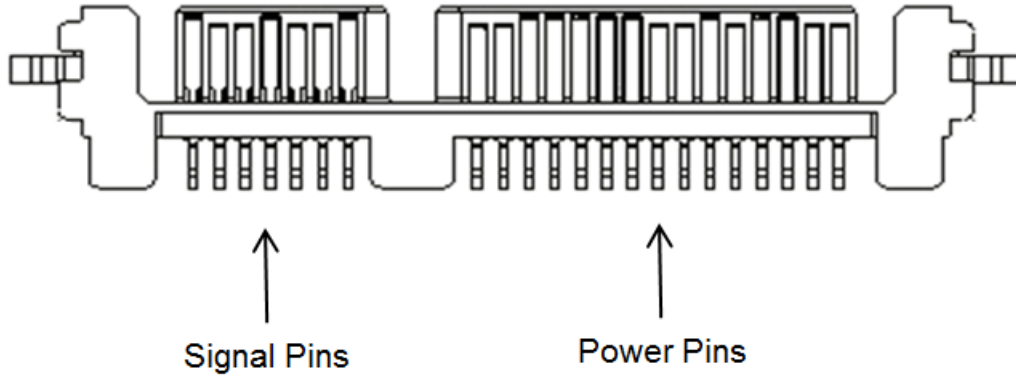


Figure 2 Connector Physical Dimension and Connector Assembly

## 4.2 Pin Locations



**Figure 3** Layout of 2.5-inch Signal and Power Segment Pins

**NOTE** The 2.5-inch connector supports built in latching capability.

## 4.3 Connector Pin Signal Definitions

**Table 11** Serial ATA Connector Pin Signal Definitions—2.5-inch Form Factors

Pin	Name	Definition
S1	Ground	Ground
S2	A+	Differential signal pair A+ and A-
S3	A-	
S4	Ground	Ground
S5	B-	Differential signal pair B+ and B-
S6	B+	
S7	Ground	Ground

**NOTE** Key and spacing separate the signal and power segments.

## 4.4 Power Pin Signal Definitions

**Table 12 Serial ATA Power Pin Signal Definitions—2.5-inch Form Factors**

Pin	Function	Definition
P1	V33	3.3 V Power; not used
P2	V33	3.3 V Power; not used
P3	V33	3.3 V Power; not used
P4	GND	Ground
P5	GND	Ground
P6	GND	Ground
P7	V5	5 V Power
P8	V5	5 V Power
P9	V5	5 V Power
P10	GND	Ground
P11	DAS	Device Activity Signal
P12	GND	Ground
P13	V12	12 V Power; not used
P14	V12	12 V Power; not used
P15	V12	12 V Power; not used

### NOTE

Key and spacing separate the signal and power segments.

- Uses 5 V power only, 3.3 V (P1-P3) and 12 V (P13-P15) power are not used.
- Pins P1, P2, and P3; Pins P13, P14, and P15 are connected together. They are not connected internally to the device, and the host may apply voltage on these pins.
- Ground pins are P4, P5, P6, P10, P12.
- Signal pins and the rest of the 5 V power pins are P8, P9.
- Power pins P7, P8, and P9 are internally connected to one another within the device

## 4.5 SSD Activity LED Indicator (Optional)

The Nytro XF1230 can support DAS Control function from the SSD module to indicate LED activity of host side.

The device includes a physical pin P11 for connecting device activity LEDs.

The signal provided to indicate activity of the device is a low-voltage and low-current driver intended for efficient integration into current and future IC manufacturing processes. The signal is not suitable for directly driving an LED and is first buffered using a circuit external to the device before driving an LED.

For DAS function operation, a Firmware function feature and R das are included as an option.

The DAS function firmware feature generates a Low/High toggle Activity signal input when the SSD is in a busy state and generates a high Activity signal input when the SSD is in idle mode (Low level: GND, High level: 3.3V).

Using DAS function increases current because of the Activity LED operation.

The DAS Firmware feature is disabled and the R das is opened when the DAS function is not in use.

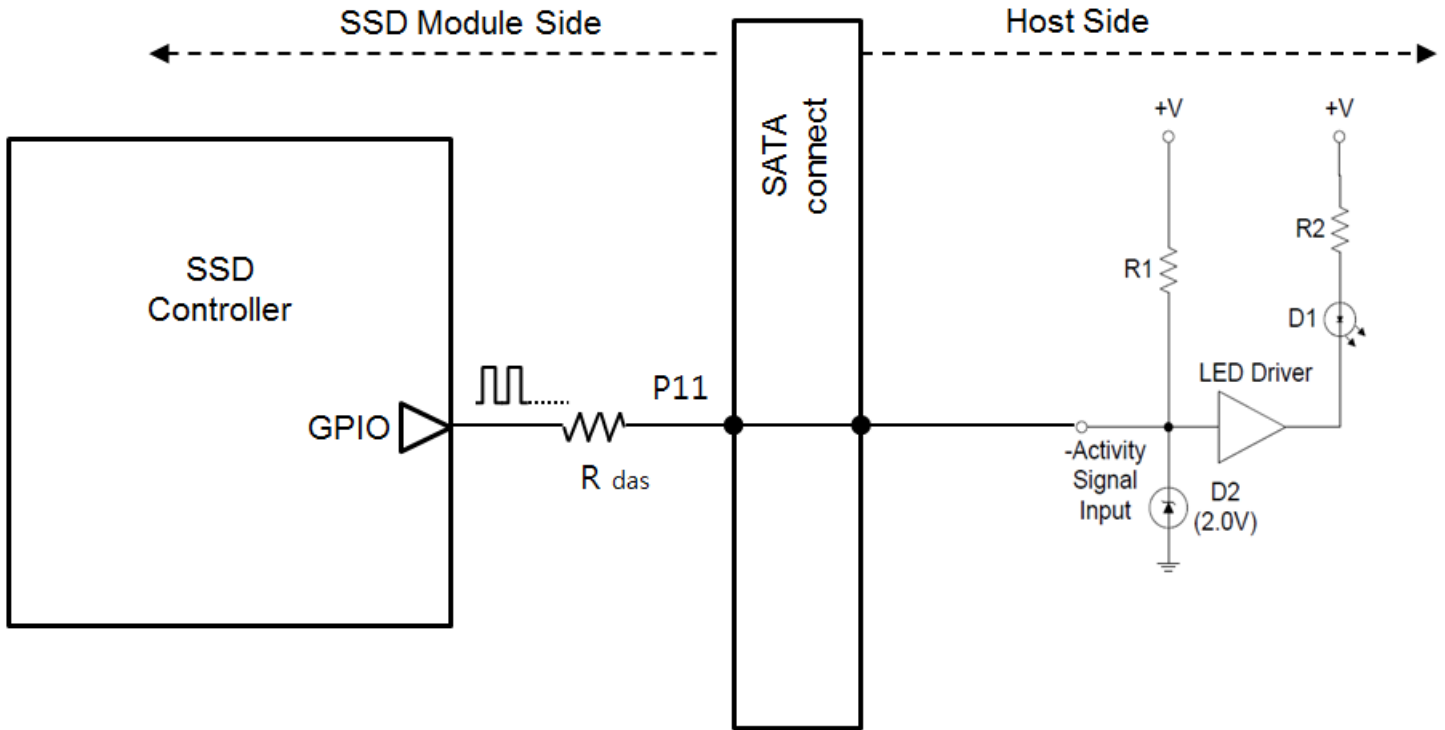


Figure 4 Circuit of SSD Activity LED indication

## 5. Supported ATA Command List

The Nytro XF1230 complies with ATA-8/ACS-3. All mandatory and many optional commands and features are supported.

### 5.1 ATA Feature Set

The following table shows the ATA feature set and commands that the Nytro XF1230 supports.

**Table 13 ATA Feature Set**

Feature	Supported
48-Bit Address feature set	Yes
General feature set	Yes
Native Command Queuing (NCQ) feature set	Yes
Power Management feature set	Yes
Security feature set	Yes
SMART feature set	Yes

### 5.2 ATA Command Description

The following table shows the ATA commands supported.

**Table 14 ATA Command Description**

Command	Code (Hex)	Command	Code (Hex)
CHECK POWER MODE	E5h	SMART DISABLE OPERATION	B0h/D9h
DATA SET MANAGEMENT	06h	SMART ENABLE/DISABLE	B0h/D2h
DOWNLOAD MICROCODE	92h	SMART ENABLE OPERATION	B0h/D8h
EXECUTE DEVICE DIAGNOSTIC	90h	SMART EXECUTE OFFLINE	B0h/D4h
FLUSH CACHE	E7h	SMART READ DATA	B0h/D0h
FLUSH CACHE EXT	EAh	SMART READ LOG	B0h/D5h
IDENTIFY DEVICE	ECh	SMART READ THRESHOLD	B0h/D1h
IDLE	E3h	SMART RETURN STATUS	B0h/DAh
IDLE IMMEDIATE	E1h	SMART SAVE ATB VALUES	B0h/D3h
INITIALIZE DEVICE PARAMETERS	91h	SMART WRITE LOG	B0h/D6h
NOP	00h	STANDBY	E2h
READ BUFFER	E4h	STANDBY IMMEDIATE	E0h
READ DMA	C8h	WRITE BUFFER	E8h
READ DMA EXT	25h	WRITE DMA	CAh
READ DMA W/O RETRIES	C9h	WRITE DMA EXT	35h
READ FPDMA QUEUED	60h	WRITE DMA FUA EXT	3Dh
READ LOG DMA EXT	47h	WRITE DMA WITHOUT RETRIES	CBh
READ LOG EXT	2Fh	WRITE FPDMA QUEUED	61h
READ MULTIPLE	C4h	WRITE LOG DMA EXT	57h
READ MULTIPLE EXT	29h	WRITE LOG EXT	3Fh



**Table 14 ATA Command Description (continued)**

Command	Code (Hex)	Command	Code (Hex)
READ SECTOR(S)	20h	WRITE MULTIPLE	C5h
READ SECTOR(S) EXT	24h	WRITE MULTIPLE EXT	39h
READ SECTOR(S) W/O RETRY	21h	WRITE MULTIPLE FUA EXT	CEh
READ VERIFY SECTOR(S)	40h	WRITE SECTOR(S)	30h
READ VERIFY SECTOR(S) W/O RETRY	41h	WRITE SECTOR(S) EXT	34h
READ VERIFY SECTOR(S) EXT	42h	WRITE SECTORS WITHOUT RETRY	31h
RECALIBRATE	10h	WRITE UNCORRECTABLE EXT	45h
REQUEST SENSE DATA EXT	0Bh		
SECURITY DISABLE PASSWORD	F6h		
SECURITY ERASE PREPARE	F3h		
SECURITY ERASE UNIT	F4h		
SECURITY FREEZE LOCK	F5h		
SECURITY SET PASSWORD	F1h		
SECURITY UNLOCK	F2h		
SEEK	70h		
SET FEATURES	EFh		
SET MULTIPLE MODE	C6h		
SLEEP	E6h		

## 5.3 Security

The user/master password is supported.

When the device receives a normal SECURITY ERASE UNIT command, the device erases all data blocks including unallocated (hidden) blocks.

You can download firmware regardless of the security state.

### 5.3.1 Password Loss

If you lose the user password, you can access the device using the master password. If both passwords are lost, there is no way to access the device.

## 6. SMART Support

The Nytro XF1230 supports the SMART Command Set.

### 6.1 SMART Command Set

The Nytro XF1230 supports the SMART Command Set shown in the following table.

**Table 15 SMART Commands**

Feature Field Values	Command
D0h	SMART READ DATA
D1h	SMART READ ATTRIBUTE THRESHOLDS
D2h	SMART ENABLE/DISABLE ATTRIBUTE AUTOSAVE
D3h	SAVE ATTRIVUTE VALUES
D4h	SMART EXECUTE OFF-LINE IMMEDIATE
00h*	Execute SMART Off-Line routine
01h*	Execute SMART Short Self-test routine (Off-Line)
02h*	Execute SMART Extended Self-test routine (Off-Line)
03h*	Execute SMART Conveyance self-test routine in off-line mode
04h*	Execute SMART Selective self-test routine in off-line mode
7Fh*	Abort Off-Line routine
81h*	Execute SMART Short Self-test routine (Captive)
82h*	Execute SMART Extended Self-test routine (Captive)
83h*	Execute SMART Conveyance self-test routine in captive mode
84h*	Execute SMART Selective self-test routine in captive mode
D5h	SMART READ LOG
D6h	SMART WRITE LOG
D8h	SMART ENABLE OPERATIONS
D9h	SMART DISABLE OPERATIONS
DAh	SMART RETURN STATUS
*Low LBA values	

## 6.2 SMART Attributes

The Nytro XF1230 supports the SMART attributes shown in the following table.

**Table 16 SMART Attributes**

ID	Attribute ID	Description
1	Raw Read Error Rate	Rate of hardware read errors that occurred when reading data from a device
5	Retired Block count	Count of number of blocks that have been reallocated, excluding pending sectors
9	Power on hours	The time accumulated while the power is on and operating
12	Power Cycle Count	Count of number of Power Cycles, excluding power mode commands
174	Unexpected Power Loss Count	Number of Issue on Unexpected Power Loss
175	Program Fail Count (Worst Case Component per die)	Maximum number of Program Error Events per die
176	Erase Fail Count (Worst Case Component per die)	Maximum number of Erase Error Events per die
177	Endurance Limit Met	Indicates the number of NAND wear
178	Used Reserved Block Count (Worst Case Component)	Number of used reserved blocks
179	Used Reserved Block Count (SSD Total)	Number of used reserved blocks in SSD
180	End to End Error Detection / Correction Rate	Number of error detection of the data path between host and NAND in SSD during last power-on
181	Program Fail Count	Number of Error Events on Program (Lifetime)
182	Erase Fail Count	Number of Error Events on Erase (Lifetime)
183	SATA Downshift Count	Number of times that SATA interface speed reduced
184	End to End Error Detection Count	Number of error detection of the data path between host and NAND in SSD of lifetime
187	Reported Uncorrectable Errors	Uncorrectable Error Count
188	Command Timeout Count	Number of total uncompleted commands
189	SSD Health Flags	Indicates PLP health status and Thermal Throttling status
190	SATA Error Counter	Number of encountered SATA error
194	Temperature (Celsius)	Temperature of the SSD
195	ECC On the Fly Rate	Hardware read error rate that occurred when reading data
199	Ultra DMA CRC Error Count	Number of Ultra DMA CRC error count (Lifetime)
201	Read Error Rate	Number of soft read errors (Count of UECC Error)
204	Soft ECC Correction Rate	Count of errors corrected by software ECC[citation needed]
231	SSD Life Left (%)	Indicates the approximate SSD life left, in terms of program/erase cycles or Flash blocks currently available for use.
234	Lifetime NAND programs in GB	Lifetime NAND programs in GB

**Table 16 SMART Attributes (continued)**

ID	Attribute ID	Description
241	Lifetime Writes From The Host in GB	Track the number of user data in GB written by the host
242	Lifetime Reads From The Host in GB	Track the number of user data in GB read by the host
245	SSD Life Left	Indicates the approximate SSD life left, in terms of program/erase cycles or Flash blocks currently available for use.
250	Total Number of NAND Read Retries	Indicates the total number of NAND read retires.

### 6.3 SMART Trip

SMART trip (threshold exceeded condition) indicates impending degradation or fault condition. The host can issue a SMART return status command (B0h/DAh) to communicate the reliability status of the SSD. The threshold-exceeded condition is also checked during SSD self tests.

## 7. Safety, Standards, and Compliance

This section describes applicable safety, certification, and compliance requirements for this device.

### 7.1 Standards

This device is recognized in accordance with UL 60950-1, CSA 60950-1 as tested by UL, IEC/EN60950-1 as tested by TUV SUD.

### 7.2 Agency and Safety Certifications

Each Solid State Drive ("device") has a product label that includes certifications that apply to that specific device. The following information provides an overview of requirements that may apply to the device.

#### 7.2.1 Safety certification

These devices are certified to meet the requirements of UL/cUL 60950-1, EN 60950-1, and may also include, IEC 62368, UL 62368 and EN 62368.

#### 7.2.2 Regulatory Model

The following regulatory model number represents all features and configurations in this series:

- Regulatory Model Number: XF1230-1A1920

#### 7.2.3 European Union (EU) CE Marking Requirements

Devices 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.

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

Seagate devices are tested in representative end-user systems. Although CE-marked Seagate devices comply with all relevant regulatory requirements and standards for the devices, Seagate cannot guarantee that all system-level products into which the devices are installed comply with all regulatory requirements and standards applicable to the system-level products. The device is designed for operation inside a properly designed system (for example, enclosure designed for the device), 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 7.3.1.1, Restriction of Hazardous Substances in Electrical and Electronic Equipment](#).

### 7.2.4 Australian RCM Compliance Mark

If these devices 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).

### 7.2.5 Canada ICES-003

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

### 7.2.6 South Korean KC Certification Mark

The South Korean KC Certification Mark means the devices 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 devices have been tested and comply with the Electromagnetic Interference/Electromagnetic Susceptibility (EMI/EMS) for Class B products. Devices 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.

### 7.2.7 Morocco Commodity Mark

Seagate devices 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 device 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 devices with the Morocco Mark, Seagate has added the Moroccan Commodity Mark to the devices 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.

### 7.2.8 Taiwanese BSMI

Devices 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 7.3.3, Taiwan Requirements — Taiwan RoHS](#).

### 7.2.9 FCC verification

These devices are intended to be contained solely within a personal computer, server, or similar enclosure (not attached as an external device). As such, each device 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 device 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 device 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 device 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.

## 7.2.10 Japan VCCI

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

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。

## 7.3 Environmental protection

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

### 7.3.1 European Union Restriction of Hazardous Substance Law

#### 7.3.1.1 Restriction of Hazardous Substances in Electrical and Electronic Equipment

Seagate devices 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).

### 7.3.1.2 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.

### 7.3.2 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 device'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 17 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 <sup>+6</sup> )	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
机壳 Chassis	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.



### 7.3.3 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 devices must comply with the "Marking of presence" requirements in Section 5 of CNS 15663, effective January 1, 2018. This device is Taiwan RoHS compliant.

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

**Table 18 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 <sup>+6</sup> )	多溴聯苯 (PBB)	多溴二苯醚 (PBDE)
印刷電路板組裝 PCBA	—	0	0	0	0	0
機殼 Chassis	—	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.						

## 7.4 Reference Documents

In case of conflict between this document and any reference document, this document takes precedence.

**Table 19 Reference Documents**

	Name
Apr. 2007	<a href="#">ATA Attachment 8 - ATA/ATAPI Command Set (ATA8-ACS)</a>
Jun. 2016	<a href="#">Solid-State Drive (SSD) Requirements and Endurance Test Method(JESD218B)</a>
Jul. 2011	<a href="#">Serial ATA Revision 3.1 (press release)</a>
Jul. 2011	<a href="#">IDEMA (LBA1-03_standard.doc)</a>
Jul. 2012	<a href="#">SOLID-STATE DRIVE (SSD) Endurance Workload(JESD219A)</a>
Oct. 2013	<a href="#">ATA/ATAPI Command Set -3 (ACS-3) Working Draft</a>
Jan. 2017	<a href="#">ISO/IEC 14776-323:xxxx Information technology -- Small computer system interface (SCSI) -- Part 323: SCSI Block commands -- 3 (SBC-3)</a>



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**Publication Number: 100797573, Rev. L**

**March 2018**