Nytro™ WarpDrive™ Family

APPLICATION ACCELERATION CARDS
Data Sheet

Capacity Range

- **Capacity options from 800GB to 3.2TB**

Performance and Reliability Features

- **High throughput up to 4GB/s on PCIe 3.0 products**
- **DuraWrite™ advanced wear leveling technology**
- **Ultra-low write amplification**
- **Built-in data compression**
- **Dynamic over-provisioning**
- **Advanced read disturb management**
- **Recycler, advanced garbage collection**
- **Error correction protection up to 55 bits per 512 bytes**
- **Self-heals from block level and page level failures**
- **Battery-less power fail protection**
- **Instant recovery from power failure**
- **High reliability with ASIC-based controller instead of FPGA**

Integration Features

- **PCIe 2.0 for HHHL, PCIe 3.0 support for FHHL**
- **Installs with no user configuration required—just plug and play**
- **Bootable solutions with Unified Extensible Firmware Interface (UEFI) support**
- **Industry hardened drivers**
- **Integrated management with rich feature set**
- **S.M.A.R.T. monitoring and TRIM support**
- **AES-128/245 data encryption**
- **Secure Erase support**
- **Broad OS and server support**
- **Non-destructive single push firmware/driver update**

The family of Seagate® Nytro application acceleration cards is designed to offer high performance with low latency and a low CPU burden. The Nytro cards accelerate applications such as data warehousing, data mining, data analytics, online transaction processing, high performance computing and big data.

Their PCIe host interface standard, enterprise drivers and small form factors make them more flexible and easier to integrate into today's low-profile, high-performance system chassis.

Improve Application Performance

The Nytro cards are designed to improve application performance and maximize return on investrment. Nytro cards can greatly improve end-user-level performance because less power, cooling and server requirements can significantly lower CAPEX and total cost of ownership.

Sophisticated Architecture

The Nytro cards are built on the latest enterprise-level solid state technologies and include sophisticated advanced features to help deliver consistently high levels of performance, endurance, and reliability under some of the most demanding conditions. Seagate DuraWrite™ technology optimizes the number of program cycles to the flash storage, effectively extending the rated write endurance of the flash storage by 8x or more when compared to standard controllers.

Other sophisticated algorithms and dedicated onboard hardware resources handle complex flash management tasks like garbage collection and wear leveling. Leveraging these advanced features, the Nytro cards deliver the performance and endurance needed for accelerating critical business applications.

The Nytro cards contain no moving parts to maintain and require no user configuration at set-up and they include a management infrastructure for extensive monitoring, including health, error rate and failure monitoring.

Nytro™ WarpDrive™ Card	800GB/1.6TB	1.2TB	1.6TB/3.2TB
Form Factor	HHHL	FHHL	
Workload Optimization	Balanced Read-Write Workload	Balanced Read-Write Workload	Balanced Read-Write Workload
Read IOPS (8K)	185,000	230,000	280,000
Write IOPS (8K)	120,000	140,000	200,000
Read Bandwidth (256K)	2.0GB/s	3.0GB/s	4.0GB/s
Write Bandwidth (256K)	1.0GB/s	2.0GB/s	2.5GB/s

Note: Sequential compressible data was used for these tests.

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Key End-User Benefits

- Offload architecture resulting in low host CPU and memory utilization
- Lower space, power, cooling and management costs than traditional HDD solutions
- Requires no user configuration, thereby reducing operational overhead
- Enterprise quality and reliability

Nytro™ WarpDrive™ Acceleration Card Specifications	
Usable Capacity	800GB to 3.2TB
Average Latency	<50 microseconds
End-of-Life Data Retention	>3 months
Interface	x8 PCIe 2.0 and 3.0 (electrical)
Brackets	Full-height spare bracket included with HHHL cards
Environmental Compliance	RoHS, WEEE
Auxiliary Power	Auxiliary power may be required for a FHHL card. Auxiliary power cable will be shipped with the card.
Product Health Monitoring	Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T.) commands, plus additional flash monitoring
Data Encryption	AES-128/256
Warranty	The lesser of 3 years or the end of the flash or NAND life
Regulatory Compliances	Safety: US/Canada UL, Europe CB Agency Certifications: CE mark, C-Tick mark, Canadian Compliance Statement, KCC, HF, Taiwan BSMI, Japan VCCI, FCC Class B, and CISPR Class B
Environmentals	Operational at 0ºC to 45ºC Airflow requirement 300 LFM Humidity: 5% to 90% non-condensing Altitude: Operational max 10,000 feet
Operating System	CentOS: 5.10, 6.0-6.4 Debian: 6.0.5, 6.0.7 Fedora: 17, 18 FreeBSD: 7.2, 7.4, 8.2, 8.3, 9 OEL: 5.4-6.4 RHEL : 5.0-5.10, 6.0-6.4 SLES: 10 SP0-SP4, 11 SP)-SP3 Solaris 10U10, 11 (x86 & SPARC) Ubuntu˚: 10.04, 11.1, 12.04 VMware: ESX4.0U4, 4.1U2, 5.0 U1, 5.1 Windows: XP SP2, Windows7-SP1, 8, Windows Server: 2003 R2 SP2, 2008 R2-SP1, 2012

Nytro™ WarpDrive™ Card Ordering Information				
Model Number	Capacity[1]	NAND Type	Form Factor	NAND PetaByte Writes (typical)
ST800KN0002	800GB	eMLC	HHHL	>29
ST1600KN0002	1.6TB	eMLC	HHHL	>59
ST1200KN0012	1.2TB	eMLC	FHHL	>44
ST1600KN0022	1.6TB	eMLC	FHHL	>59
ST3200KN0002	3.2TB	eMLC	FHHL	>117

1 One gigabyte, or GB, equals one billion bytes and one terabyte, or TB, equals one trillion bytes when referring to product capacity.

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