

Overview

SATA (Serial ATA) Hard Drives for HP Workstations

Introduction

Commercial grade SATA 7200 rpm drives are our standard high bandwidth hard drive storage option. Storage capacities for the 7200 rpm drives range up to a massive 4.0TB. This enables very large capacity storage solutions due to the expandability of the workstation platforms. In addition, the high capacity drives can be combined with SSD storage to enable high performance and large capacity solutions.

Most of the 7200 rpm HDDs are 3.5" drives. The one exception is the new 500GB SATA 7200 rpm SED drive which is 2.5" form factor. This drive ships with the appropriate carrier to enable installation in the 3.5" bays.

SMART technology

Self Monitoring Analysis and Reporting Technology (SMART) hard drive technology allows hard drives to monitor their own health and to raise flags if imminent failures are predicted. If the drive determines that a failure is imminent, the SMART hard drive technology enables intelligent manageability or management software to generate a fault alert. While the legacy versions of SMART hard drives do a good job monitoring the data on the hard drive media, the ever increasing emphasis on reliability and quality has prompted HP to implement SMART IV technology which constantly checks that the data flow from host interface to media and media to host interface is not compromised. This is accomplished by inserting a parity code into every 512 byte block in the data path of the hard drive's Cache RAM. This parity checking performed by HP's SMART IV technology hard drives, allows for more complete error detection coverage encompassing the entire data path between the host and the hard drive. Smart IV is also known as IOEDC: I/O Error Detection Code.

Restrictions on Hazardous Substances (RoHS)

RoHS is a European Union directive that requires OEM manufacturers' compliance. The directive assures that hazardous substances are not contained within electronic equipment. Those substances include lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers. Hewlett-Packard is committed to adhering to this directive.

Native Command Queuing

NCQ, or Native Command Queuing, is a capability of modern SATA drives. NCQ is a SATA protocol extension that allows the hard drive to have several write or read commands outstanding at the same time. In contrast, normal non-queued operation requires each command to be completed before the next command is issued by the host system. Queuing allows the drive to complete the commands in the order that allows for best overall throughput. It also involves an advanced method of transferring data to or from the host, called First Party Direct Memory Access (FPDMA), that allows the hard drive and the host controller to manage the data transfers for multiple outstanding commands, without involving the host processor. NCQ can contribute to better performance but the results are dependent on many factors, including the access patterns of the various applications and operating system functions that are initiating drive accesses. It requires support from the host system BIOS, controller, and driver in order to be useful. However NCQ-capable drives are compatible with host systems that do not include the support; the NCQ and FPDMA features are simply not used on those systems.

Self Encrypting Drive (SED) support

The Trusted Computing feature set which has been developed by the Trusted Computing Group (TCG) is supported. Specifically, the Opal Security Subsystem class (SSC) is supported. This feature allows the HDD to do the following:

- **Deploy Storage Device and Take Ownership:** the HDD is integrated into its target system and ownership transferred by setting or changing the Storage Device's owner credential.
- **Activate or Enroll Storage Device:** LBA ranges are configured and data encryption and access control credentials (re)generated and/or set on the Storage Device. Access control is configured for LBA range unlocking.
- **Lock and Unlock Storage Device:** unlocking of one or more LBA ranges by the host and locking of those ranges under host control via either an explicit lock or implicit lock triggered by a reset event. MBR shadowing provides a mechanism to boot into a secure pre-boot authentication environment to handle device unlocking.

Overview

- Repurpose and End-of-Life: erasure of data within one or more LBA ranges and reset of locking credential(s) for Storage Device repurposing or decommissioning.

[GB = 1 billion bytes. Actual available capacity is less.](#)

Most of our platforms support SED HDD and SED SSD. Check specific platforms for availability.

Performance

SATA Hard Drives use the SATA III interface running at up to 6 Gb/s. Actual sustained transfer rates are lower due to command protocol and SATA bus management overhead.

The new 4.0TB SATA HDD is excellent for high capacity applications. It is classified as a low end Enterprise class drive (also known as Midline), with MTBF rating of 1.4M hours, and max sequential performance of 226MB/s.

Models

500GB SATA 7200 rpm 6Gb/s 3.5" HDD	LQ036AA
1TB SATA 7200 rpm 6Gb/s 3.5" HDD	LQ037AA
2TB SATA 7200 rpm 6Gb/s 3.5" HDD	QB576AA
3TB SATA 7200 rpm 6Gb/s 3.5" HDD	QF298AA
1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	WOR10AA
4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	K4T76AA
500GB SATA 7.2K SED SFF HDD	D8N29AA
1TB SATA 7200 rpm 8GB 3.5" SSHD (hybrid)	M7S54AA
1TB SATA 7.2K SED SFF HDD	TOK74AA
500GB SATA 7200 rpm 6Gb/s 2.5" HDD	TOK73AA
1TB SATA 7200 rpm 6Gb/s 3.5" HDD	TOK74AA

Benefits

SATA Hard drives provide an excellent storage solution. They can enable the lowest cost/GB, which is an important criteria for high capacity storage solutions. The commercial grade components have relatively high reliability, and enterprise grade components can increase the reliability. In addition, due to the maturity of the solution in the industry, the drives are offered for long periods, such that they can be offered in platforms that require long life cycles.

Compatibility

Most SATA Hard Drives are compatible with all of the current HP Z-series Workstations (check the individual workstation QuickSpecs for current hard drive compatibility information).

[Not all hard drive models are available in all regions.](#)

Service and Support

Your Option Limited Warranty is a one (1) year (HP Option Limited Warranty Period) parts replacement warranty on any HP-branded or Compaq-branded options (HP Options). If your HP Option is installed in an HP Hardware Product, HP may provide warranty service either for the HP Option Limited Warranty Period or the remaining Limited Warranty Period of the HP Hardware Product in which the HP Option is being installed, whichever period is the longer but not to exceed three (3) years from the date you purchased the HP Option.

Technical Specifications

Storage / Hard Drives & SSDs	500GB SATA 7200 rpm 6Gb/s 3.5" HDD	Capacity	500GB	
		Protocol	SATA	
		Form Factor	3.5"	
		Rated Power On Hours	3120/year	
		Annualized Failure Rate (based on Rated POH)	<3.0%	
		Rated for 24/7/365 operation	NO	
		Physical Size (Height)	1 in; 2.54 cm	
		Physical Size (Width)	4 in; 10.17 cm	
		Media Diameter	3.5 in; 8.9 cm	
		Interface	Serial ATA (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
		Buffer	32MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2 ms
			Average	11 ms
			Full Stroke	21 ms
		Rotational Speed	7,200 rpm	
		Logical Blocks	976,773,168	
		Operating Temperature	41° to 131° F (5° to 55° C)	
		Performance	Sequential Read	170 MB/s
	Sequential Write		85 MB/s	

	1TB SATA 7200 rpm 6Gb/s 3.5" HDD	Capacity	1TB	
		Protocol	SATA	
		Form Factor	3.5"	
		Rated Power On Hours	3120/year	
		Annualized Failure Rate (based on Rated POH)	<3.0%	
		Rated for 24/7/365 operation	NO	
		Physical Size (Height)	1 in; 2.54 cm	
		Physical Size (Width)	4 in; 10.17 cm	
		Media Diameter	3.5 in; 8.9 cm	
		Interface	Serial ATA (6.0Gb/s), NCQ enabled	
		Synchronous Transfer Rate (Maximum)	Up to 600 MB/s	
		Buffer	64MB	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2 ms
			Average	11 ms
			Full Stroke	21 ms
		Rotational Speed	7,200 rpm	

Technical Specifications

	Logical Blocks	1,953,525,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
	Performance	Sequential Read	170 MB/s
		Sequential Write	85 MB/s
2TB SATA 7200 rpm 6Gb/s 3.5" HDD	Capacity	2TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Rated Power On Hours	3120/year	
	Annualized Failure Rate (based on Rated POH)	<3.0%	
	Rated for 24/7/365 operation	NO	
	Physical Size (Height)	1 in; 2.54 cm	
	Physical Size (Width)	4 in; 10.17 cm	
	Media Diameter	3.5 in; 8.9 cm	
	Interface	Serial ATA (6.0 Gb/s), NCQ Enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	64MB	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	1.0 ms
		Average	11 ms
		Full Stroke	18 ms
	Rotational Speed	7,200 rpm	
	Logical Blocks	3,907,029,168	
	Operating Temperature	41° to 131° F (5° to 55° C)	
	Performance	Sequential Read	170 MB/s
		Sequential Write	85 MB/s
3TB SATA 7200 rpm 6Gb/s 3.5" HDD	Capacity	3.0TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Rated Power On Hours	3120/year	
	Annualized Failure Rate (based on Rated POH)	<3.0%	
	Rated for 24/7/365 operation	NO	
	Physical Size (Height)	1 in; 2.54 cm	
	Physical Size (Width)	4.0 in; 10.17 cm	
	Media Diameter	3.5 in; 8.9 cm	
	Interface	Serial ATA (6.0Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	

Technical Specifications

	Buffer	64MB	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.6 ms
		Average	11 ms
		Full Stroke	Not specified
	Rotational Speed	7,200 rpm	
	Operating Temperature	41° to 131° F (5° to 55° C)	
	Performance	Sequential Read	170 MB/s
		Sequential Write	85 MB/s
1TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)	Capacity	1TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Controller	AHCI	
	Reliability (MTBF)	2.0M hours	
	Rated Power On Hours	8760/yr	
	Annualized Failure Rate (based on Rated POH)	<0.62%	
	Rated for 24/7/365 operation	YES	
	Physical Size (Height)	1 in; 2.54 cm	
	Physical Size (Width)	4 in; 10.17 cm	
	Media Diameter	3.5 in; 8.9 cm	
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Buffer	128MB	
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.32ms
		Average	7.45ms
		Full Stroke	14.2ms
	Rotational Speed	7,200 rpm	
	Operating Temperature	41° to 131° F (5° to 55° C)	
	Performance	Sequential Read	up to 226MB/s
		Sequential Write	up to 226MB/s
	Enterprise Class Features	High Reliability	
4TB SATA 7200 rpm 6Gb/s 3.5" HDD	Capacity	4.0TB	
	Protocol	SATA	
	Form Factor	3.5"	
	Reliability (MTBF)	2.0M hours	
	Rated Power On Hours	8760/year	
	Annualized Failure Rate (based on Rated POH)	<0.62%	
	Rated for 24/7/365 operation	YES	

Technical Specifications

Physical Size (Height)	1 in; 2.54 cm	
Physical Size (Width)	4 in; 10.17 cm	
Media Diameter	3.5 in; 8.9 cm	
Interface	Serial ATA (6Gb/s), NCQ enabled	
Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
Buffer	128MB	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track	0.7ms
	Average	8.5ms
	Full Stroke	15.7ms
Rotational Speed	7,200 rpm	
Operating Temperature	5° to 60° F (-15° to 15.56° C)	
Performance	Sequential Read	226 MB/s
	Sequential Write	100 MB/s

500GB SATA 7.2K SED SFF HDD	Capacity	500GB		
	Protocol	SATA		
	Form Factor	2.5"		
	Rated Power On Hours	3120/year		
	Annualized Failure Rate (based on Rated POH)	<3.0%		
	Rated for 24/7/365 operation	NO		
	Physical Size (Height)	0.275 in; 0.7 cm		
	Physical Size (Width)	2.75 in; 6.99 cm		
	Media Diameter	2.5 in; 6.36 cm		
	Interface	Serial ATA (6Gb/s)		
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s		
	Buffer	32MB		
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	1ms	
		Average	4.2ms	
		Full Stroke	25ms (typical)	
	Rotational Speed	7,200 rpm		
Operating Temperature	32° to 140° F (0° to 60° C)			
Performance	Sequential Read	170 MB/s		
	Sequential Write	85 MB/s		
Self-Encrypting Drive Support	OPAL 1			

Technical Specifications

1TB SATA 7200 rpm 8GB 3.5" SSHD (hybrid)	Capacity	1TB		
	Protocol	SATA		
	Form Factor	3.5"		
	Rated Power On Hours	3120/year		
	Annualized Failure Rate (based on Rated POH)	<3.0%		
	Rated for 24/7/365 operation	NO		
	Physical Size (Height)	1 in; 2.54 cm		
	Physical Size (Width)	4 in; 10.17 cm		
	Media Diameter	3.5 in; 8.9 cm		
	Interface	6Gb/s SATA		
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s		
	Buffer	64MB standard HDD cache buffer		
	Cache	8GB NAND flash		
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	2 ms	
		Average	11 ms	
		Full Stroke	21 ms	
	Rotational Speed	7200 rpm		
	Logical Blocks	1,953,525,168		
	Operating Temperature	32° to 140° F (0° to 60° C)		
	Performance	Sequential Read	170 MB/s	
		Sequential Write	85 MB/s	
1TB SATA 7.2K SED SFF HDD	Capacity	1TB		
	Protocol	SATA		
	Form Factor	2.5"		
	Rated Power On Hours	3120/year		
	Annualized Failure Rate (based on Rated POH)	<3.0%		
	Rated for 24/7/365 operation	NO		
	Physical Size (Height)	0.275 in; 0.7 cm		
	Physical Size (Width)	2.75 in; 6.99 cm		
	Media Diameter	2.5 in; 6.36 cm		
	Interface	Serial ATA (6Gb/s)		
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s		
	Buffer	32MB		
	Seek Time (typical reads, includes controller overhead, including settling)	Single Track	1ms	
		Average	4.2ms	
		Full Stroke	25ms (typical)	
Rotational Speed	7,200 rpm			
Operating Temperature	32° to 140° F (0° to 60° C)			

Technical Specifications

	Performance	Sequential Read	170 MB/s
		Sequential Write	85 MB/s
	Self-Encrypting Drive Support	OPAL 1 and 2	
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500GB SATA 7200 rpm 6Gb/s SFF HDD	Capacity	500GB	
	Protocol	SATA	
	Form Factor	SFF (2.5")	
	Controller	AHCI	
	Rated for 24/7/365 operation	NO	
	Physical Size (Height)	0.28 in; .7 cm	
	Physical Size (Width)	2.75 in; 6.99 cm	
	Media Diameter	2.5 in; 6.36 cm	
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Operating Temperature	32° to 140° F (0° to 60° C)	
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1TB SATA 7200 rpm 6Gb/s SFF HDD	Capacity	1TB	
	Protocol	SATA	
	Form Factor	SFF (2.5")	
	Controller	AHCI	
	Rated for 24/7/365 operation	NO	
	Physical Size (Height)	0.28 in; .7 cm	
	Physical Size (Width)	2.75 in; 6.99 cm	
	Media Diameter	2.5 in; 6.36 cm	
	Interface	Serial ATA (6Gb/s), NCQ enabled	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Operating Temperature	32° to 140° F (0° to 60° C)	

Date of change:	Version History:		Description of change:
	V1 to v2		
July 1, 2014	v21 to v22	Changed	
		Added	IDNumber
		Removed	
January 1, 2015	From v22 to v23	Changed	Cache size for 7200 rpm HDDs
March 1, 2015	From v23 to v24	Added	Introduction messaging, Benefits
		Changed	SMART and Performance notes
		Removed	SATA 10K Introduction, Compatibility and messaging notes
June 1, 2015	From v24 to v25	Added	Details for new 1TB SATA 7200 rpm 8GB 3.5" SSHD (hybrid)
November 1, 2015	From v25 to v26	Added	Enterprise Class to 4TB SATA, 7200rpm
March 31, 2016	From v26 to v27	Changed	Sync transfer rate for the 3TB SATA HDD

Summary of Changes

September 1, 2016	From v27 to v28	Added	1TB SATA SFF SED for Zuri, 2.5" SATA HDDS (500GB & 1TB) and specs for all listed
October 1, 2016	From v28 to v29	Added	1 TB SATA Enterprise Class drive, SFF drive specs

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