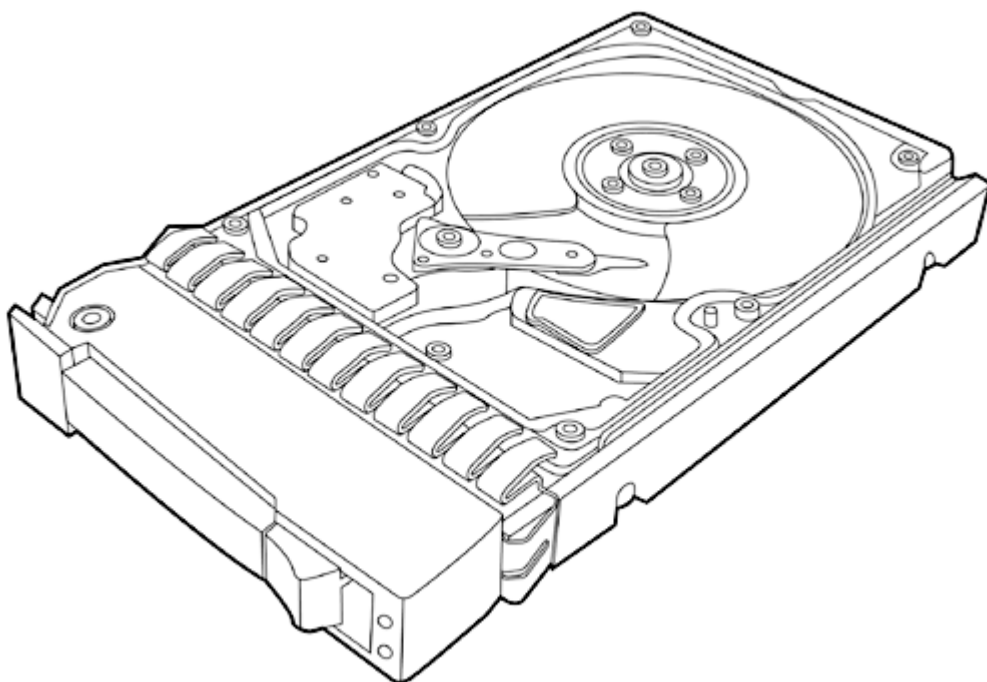


Overview

Serial Attached SCSI (SAS) provides a superior storage solution. With some storage requirements escalating and others becoming more complex, factors such as flexibility, performance, increased reliability, greater density, security, scalability and accessibility are more critical than ever. Today's organizations consist of different kinds of environments. Enterprise data centers must be online 24X7, fulfill requests from numerous users simultaneously, and allow for constant growth and expansion while in operation. Other customer environments require high capacity storage and high data availability for low I/O environments. HP's portfolio of SAS drives meets all these demands.



What's New

SAS Enterprise drives provide maximum reliability and performance for high I/O applications, near 100% workload environments.

New models include a new capacity in SFF 15K drives and the first 6Gb/s SAS drives in the HP SAS drive portfolio:

- HP 146GB 6G SAS 10K SFF ENT HDD
- HP 300GB 6G SAS 10K SFF ENT HDD
- HP 146GB 3G SAS 15K SFF ENT HDD

Overview

Models

SAS Hot Plug SFF Enterprise (ENT) Drives

HP 300GB 6G SAS 10K SFF DP ENT HDD	507127-B21
HP 300GB 3G SAS 10K SFF DP ENT HDD	492620-B21
HP 146GB 6G SAS 10K SFF DP ENT HDD	507125-B21
HP 146GB 3G SAS 15K SFF DP ENT HDD	504062-B21
HP 146GB 3G SAS 10K SFF DP ENT HDD	418367-B21
HP 146GB 3G SAS 10K SFF SP HDD	431958-B21
HP 72GB 3G SAS 15K SFF DP ENT HDD	418371-B21
HP 72GB 3G SAS 15K SFF SP HDD	431935-B21
HP 72GB 3G SAS 10K SFF DP ENT HDD	384842-B21
HP 72GB 3G SAS 10K SFF SP HDD	375861-B21
HP 36GB 3G SAS 15K SFF DP ENT HDD	418369-B21
HP 36GB 3G SAS 15K SFF SP HDD	431933-B21

SAS Hot Plug 3.5" Enterprise (ENT) Drives

HP 450GB 3G SAS 15K 3.5" DP ENT HDD	454232-B21
HP 400GB 3G SAS 10K 3.5" DP ENT HDD	459508-B21
HP 300GB 3G SAS 15K 3.5" SP HDD	431944-B21
HP 300GB 3G SAS 15K 3.5" DP ENT HDD	416127-B21
HP 146GB 3G SAS 15K 3.5" SP HDD	375872-B21
HP 146GB 3G SAS 15K 3.5" DP ENT HDD	384854-B21
HP 72GB 3G SAS 15K 3.5" SP HDD	375870-B21
HP 72GB 3G SAS 15K 3.5" DP ENT HDD	384852-B21

SAS Non-Hot Plug 3.5" Enterprise (ENT) Drives

HP 450GB 3G SAS 15K NHP 3.5" DP ENT HDD	454234-B21
HP 400GB 3G SAS 10K NHP 3.5" DP ENT HDD	508232-B21
HP 300GB 3G SAS 15K NHP 3.5" DP ENT HDD	417950-B21
HP 300GB 3G SAS 15K NHP 3.5" SP HDD	431950-B21
HP 146GB 3G SAS 15K NHP 3.5" DP ENT HDD	417855-B21
HP 146GB 3G SAS 15K NHP 3.5" SP HDD	432093-B21
HP 72GB 3G SAS 15K NHP 3.5" SP HDD	432095-B21

SAS Hot Plug 3.5" Midline (MDL) Drives

HP 1TB 3G SAS 7.2K 3.5" DP MDL HDD	461137-B21
HP 750GB 3G SAS 7.2K 3.5" DP MDL HDD	461135-B21

Standard Features

NOTE: For a brief, printer friendly data sheet that describes this product and informs you of the essential capabilities and specifications, please visit: <http://h71028.www7.hp.com/ERC/downloads/4AA0-0612ENW.pdf>

What is SAS?

Serial Attached SCSI (SAS) is the evolution of the SCSI interface. SAS Enterprise drives satisfy the enterprise data center requirement of scalability, performance, reliability and manageability, while providing an enterprise storage infrastructure for both enterprise SAS drives and SATA disk drives. SAS Midline drives provide the lowest dollars per gigabyte and economical reliability and performance. The SAS interface is compatible with SATA devices. This compatibility provides users with unprecedented choices for server and storage subsystem deployment

Drive Quality and Performance

Today's distributed enterprise is seeing larger, more complex applications, an increase of mission-critical data moving to the server, increasing demand for transaction processing and critical server consolidation. In this environment, storage has become a critical component of the information system, significantly defining both the systems reliability and performance. This is why HP drives undergo an intense qualification process that eliminates firmware and O/S incompatibilities. All drive firmware is specific to our drives and is designed to maximize both functionality and compatibility. All drives are proven to perform in the HP systems for which they were designed.

While selecting the drives in our Enterprise portfolio, only those drives whose performance is suitable for an enterprise environment are selected through the HP qualification process and are labeled "best-in-class." All our Enterprise drives are proven to be reliable and tuned for optimum performance in the HP equipment for which they were designed. The drives in our Midline portfolio undergo a similar qualification process to ensure that you get the economical reliability and performance you need for your low workload (less than 40% I/O) environments.

Performance

Only those drives whose performance is suitable for an enterprise environment are selected through the HP qualification process and are labeled "best-in-class." All our drives are proven to be reliable and tuned for optimum performance in the HP equipment for which they were designed.

Pre-Failure Alert

When used in conjunction with a SMART Array Controller and Systems Insight Manager, the SMART capable firmware in HP hard drives enables extensive fault prediction capabilities. If potential problems develop in one of the drives, the Smart Array Controller, Systems Insight Manager and/or SMART hard disk drive lets you know in advance so you can have the drive replaced, before it fails, under warranty.

NOTE: All drives are protected by a Pre-Failure Alert when used with a HP Smart Array controller and Systems Insight Manager, allowing hard drives to be replaced before failure under warranty. In addition, all drives are covered by a one or three-year limited on-site warranty period for the system in which they are installed. The drive warranty is automatically uplifted when used in a server or MSA for which a Care Pack is purchased. Please see the Support Services section below for additional services.

Integration

Many issues customers have with third party drives are "simple" integration issues. When buying from another supplier, there is no guarantee that a drive has been correctly set for proper operation with ProLiant servers and storage systems. These incompatibilities can create problems in configuration, can rob your system of performance, or at their worst, can cause you to lose data. HP hard drives are specifically designed and tested for flawless operation in your HP equipment. The integration of hard drives in HP systems means that cables, SCSI ID settings, termination, hot plug drive trays and firmware are right for your ProLiant server or storage system.

Standard Features

Support Matrix

Please see the following URL for the latest list of supported servers and enclosures:

<http://h18004.www1.hp.com/products/servers/proliantstorage/drives-enclosures/docs/index.html>

Service and Support, HP Care Pack, and Warranty Information

Support Services

Care Pack services provide a range of life cycle support options that let you choose the service levels that meet your business requirements, from basic to mission-critical.

A full range of HP Care Pack hardware and software services are available including:

- Installation and start up
- Education courses
- Extended onsite hardware coverage hours from same business day 13 ours, 5 day to 24 hours, 7 days call window with options including 4-hour response or 6-hour Call-To-Repair.
- Comprehensive range of software technical support for Microsoft, Linux, ProLiant Essentials, and VMWare-based IT solutions helping to deliver high level of application availability. Response times ranging from 30 minutes for critical problems to 2 hours.
- System Management, Performance Services and Mission Critical Support Solution

NOTE: For more information on HP Care Pack services, contact any of our worldwide sales offices or resellers or visit our worldwide Web site on the internet at: <http://www.hp.com/hps/carepack>

NOTE: For more complete information on HP Services offerings, customers and resellers, please visit us at: <http://www.hp.com/hps>

NOTE: Additional information regarding worldwide limited warranty and technical support is available at: <http://h18004.www1.hp.com/products/servers/platforms/warranty/index.html>

Technical Specifications

SAS Hot Plug SFF Enterprise (ENT) Drives

Application Information SAS Enterprise drives are intended for servers and storage solutions with mission critical and high work load intensive applications where 24/7 duty cycles are a requirement, such as database applications and high transaction level applications.

NOTE: SAS Enterprise hard drives have a 3 year limited warranty regardless of the warranty period for the system in which they are installed.

HP 300GB 6G SAS 10K SFF DP ENT HDD 507127-B21	300GB 10K	Capacity	300,000,000,000
		Height	0.591 in (15.00 mm)
		Width	2.750 in (69.85 mm)
		Interface	SAS
		Transfer Rate	6 Gb/sec
		Synchronous (Maximum)	
		Seek Time	Single Track 0.20 ms
		(typical reads, including settling)	Average 4.0 ms
			Full-Stroke 7.45 ms
		Rotational Speed	10,000 rpm
		Physical Configuration	Bytes/Sector 512
			Logical Blocks 585,937,500
		Operating Temperature	50° to 95° F (10° to 35° C)

HP 300GB 3G SAS 10K SFF DP ENT HDD 492620-B21	300GB 10K	Capacity	300,000,000,000
		Height	0.591 in (15.00 mm)
		Width	2.750 in (69.85 mm)
		Interface	SAS
		Transfer Rate	3 Gb/sec
		Synchronous (Maximum)	
		Seek Time	Single Track 0.20 ms
		(typical reads, including settling)	Average 4.0 ms
			Full-Stroke 7.45 ms
		Rotational Speed	10,000 rpm
		Physical Configuration	Bytes/Sector 512
			Logical Blocks 585,937,500
		Operating Temperature	50° to 95° F (10° to 35° C)

QuickSpecs

HP SAS Enterprise and SAS Midline Hard Drives

Technical Specifications

HP 146GB 6G SAS 10K
SFF DP ENT HDD
507125-B21

146GB 10K

Capacity	146,815,737,856	
Height	0.591 in (15.00 mm)	
Width	2.750 in (69.85 mm)	
Interface	SAS	
Transfer Rate	6 Gb/sec	
Synchronous (Maximum)		
Seek Time (typical reads, including settling)	Single Track	0.20 ms
	Average	4.0 ms
	Full-Stroke	7.48 ms
	Rotational Speed	10,000 rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	286,749,488
Operating Temperature	50° to 95° F (10° to 35° C)	

HP 146GB 3G SAS 10K
SFF DP ENT HDD
418367-B21

146GB 10K

Capacity	146,815,737,856	
Height	0.591 in (15.00 mm)	
Width	2.750 in (69.85 mm)	
Interface	SAS	
Transfer Rate	3 Gb/sec	
Synchronous (Maximum)		
Seek Time (typical reads, including settling)	Single Track	0.60 ms
	Average	4.1 ms
	Full-Stroke	8.0 ms
	Rotational Speed	10,000 rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	286,749,488
Operating Temperature	50° to 95° F (10° to 35° C)	

HP 146GB 3G SAS 10K
SFF SP HDD
431958-B21

QuickSpecs

HP SAS Enterprise and SAS Midline Hard Drives

Technical Specifications

HP 146GB 3G SAS
15K SFF DP ENT HDD
504062-B21

146GB 15K

Capacity	146,815,737,856	
Height	0.591 in (15.00 mm)	
Width	2.750 in (69.85 mm)	
Interface	SAS	
Transfer Rate	3 Gb/sec	
Synchronous (Maximum)		
Seek Time (typical reads, including settling)	Single Track	0.14 ms
	Average	2.58 ms
	Full-Stroke	4.85 ms
	Rotational Speed	15,000 rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	286,749,488
Operating Temperature	50° to 95° F (10° to 35° C)	

HP 72GB 3G SAS 15K
SFF DP ENT HDD
418371-B21

72GB 15K

Capacity	73,407,865,856	
Height	0.591 in (15.00 mm)	
Width	2.750 in (69.85 mm)	
Interface	SAS	
Transfer Rate Synchronous (Maximum)	3 Gb/sec	
Seek Time (typical reads, including settling)	Single Track	0.20 ms
	Average	3.0 ms
	Full-Stroke	7.0 ms
	Rotational Speed	15,000 rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	143,374,738
Operating Temperature	50° to 95° F (10° to 35° C)	

Technical Specifications

HP 72GB 3G SAS 10K SFF DP ENT HDD 384842-B21	72GB 10K	Capacity	73,407,865,856	
		Height	0.591 in (15.00 mm)	
HP 72GB 3G SAS 10K SFF SP HDD 375861-B21		Width	2.750 in (69.85 mm)	
		Interface	SAS	
		Transfer Rate	3 Gb/sec	
		Synchronous (Maximum)		
		Seek Time	Single Track	0.20 ms
		(typical reads, including settling)	Average	4.0 ms
			Full-Stroke	8.1 ms
			Rotational Speed	10,000 rpm
		Physical Configuration	Bytes/Sector	512
			Logical Blocks	143,374,738
		Operating Temperature	50° to 95° F (10° to 35° C)	

HP 36GB 3G SAS 15K SFF DP ENT HDD 418369-B21	36GB 15K	Capacity	36,420,075,520	
		Height	0.591 in (15.00 mm)	
HP 36GB 3G SAS 15K SFF SP HDD 431933-B21		Width	2.750 in (69.85 mm)	
		Interface	SAS	
		Transfer Rate	3 Gb/sec	
		Synchronous (Maximum)		
		Seek Time	Single Track	0.20 ms
		(typical reads, including settling)	Average	3.0 ms
			Full-Stroke	7.0 ms
			Rotational Speed	15,000 rpm
		Physical Configuration	Bytes/Sector	512
			Logical Blocks	71,132,960
		Operating Temperature	50° to 95° F (10° to 35° C)	

SAS Hot Plug 3.5" Enterprise (ENT) Drives

Application Information	<p>SAS Enterprise drives are intended for servers and storage solutions with mission critical and high work load intensive applications where 24/7 duty cycles are a requirement, such as database applications and high transaction level applications.</p> <p>NOTE: SAS Enterprise hard drives have a 3 year limited warranty regardless of the warranty period for the system in which they are installed.</p>
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QuickSpecs

HP SAS Enterprise and SAS Midline Hard Drives

Technical Specifications

HP 450GB 3G SAS 15K
3.5" DP ENT HDD
454232-B21

450GB 15K

Capacity	450,098,159,616	
Height	1.0 in (25.4mm)	
Width	4.0 in (101.6mm)	
Interface	SAS	
Transfer Rate Synchronous (Maximum)	3GB/sec	
Seek Time (typical reads, including settling)	Single Track	0.44ms
	Average	3.6ms
	Full-Stroke	6.6ms
	Rotational Speed	15,000rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	879,097,968
Operating Temperature	50° to 95° F (10° to 35° C)	

HP 400GB 3G SAS 10K
3.5" DP ENT HDD
459508-B21

400GB 10K

Capacity	400,000,000,000	
Height	1.0 in (25.4mm)	
Width	4.0 in (101.6mm)	
Interface	SAS	
Transfer Rate Synchronous (Maximum)	3GB/sec	
Seek Time (typical reads, including settling)	Single Track	0.35ms
	Average	3.9ms
	Full-Stroke	6.8ms
	Rotational Speed	10,000rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	781,250,000
Operating Temperature	50° to 95° F (10° to 35° C)	

HP 300GB 3G SAS 15K
3.5" SP HDD
431944-B21

300GB 15K

HP 300GB 3G SAS 15K
3.5" DP ENT HDD
416127-B21

Capacity	300,000,000,000	
Height	1.0 in (25.4mm)	
Width	4.0 in (101.6mm)	
Interface	SAS	
Transfer Rate Synchronous (Maximum)	3 Gb/sec	
Seek Time (typical reads, including settling)	Single Track	0.57 ms
	Average	3.6 ms
	Full-Stroke	11.0 ms
	Rotational Speed	15,000 rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	585,937,500
Operating Temperature	50° to 95° F (10° to 35° C)	

Technical Specifications

HP 146GB 3G SAS 15K 3.5" SP HDD 375872-B21	146GB 15K	Capacity	146,815,737,856
		Height	1.0 in (25.4mm)
HP 146GB 3G SAS 15K 3.5" DP ENT HDD 384854-B21		Width	4.0 in (101.6mm)
		Interface	SAS
		Transfer Rate Synchronous (Maximum)	3 Gb/sec
		Seek Time (typical reads, including settling)	Single Track 0.57 ms
			Average 3.5 ms
			Full-Stroke 9.0 ms
		Physical Configuration	Rotational Speed 15,000 rpm
			Bytes/Sector 512
			Logical Blocks 286,749,488
		Operating Temperature	50° to 95° F (10° to 35° C)

HP 72GB 3G SAS 15K 3.5" SP HDD 375870-B21	72GB 15K	Capacity	73,407,856,856
		Height	1.0 in (25.4mm)
HP 72GB 3G SAS 15K 3.5" DP ENT HDD 384852-B21		Width	4.0 in (101.6mm)
		Interface	SAS
		Transfer Rate Synchronous (Maximum)	3 Gb/sec
		Seek Time (typical reads, including settling)	Single Track 0.57 ms
			Average 3.5 ms
			Full-Stroke 9.0 ms
		Physical Configuration	Rotational Speed 15,000 rpm
			Bytes/Sector 512
			Logical Blocks 143,374,738
		Operating Temperature	50° to 95° F (10° to 35° C)

SAS Non-Hot Plug 3.5" Enterprise (ENT) Drives

Application Information SAS Enterprise drives are intended for servers and storage solutions with mission critical and high work load intensive applications where 24/7 duty cycles are a requirement, such as database applications and high transaction level applications.

NOTE: SAS Enterprise hard drives have a 3 year limited warranty regardless of the warranty period for the system in which they are installed.

QuickSpecs

HP SAS Enterprise and SAS Midline Hard Drives

Technical Specifications

HP 450GB 3G SAS 15K
NHP 3.5" DP ENT HDD
454234-B21

450GB 15K

Capacity	450,098,159,616	
Height	1.0 in (25.4mm)	
Width	4.0 in (101.6mm)	
Interface	SAS	
Transfer Rate Synchronous (Maximum)	3GB/sec	
Seek Time (typical reads, including settling)	Single Track	0.44ms
	Average	3.6ms
	Full-Stroke	6.6ms
	Rotational Speed	15,000rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	879,097,968
Operating Temperature	50° to 95° F (10° to 35° C)	

HP 400GB 3G SAS 10K
NHP 3.5" DP ENT HDD
508232-B21

400GB 10K

Capacity	400,000,000,000	
Height	1.0 in (25.4mm)	
Width	4.0 in (101.6mm)	
Interface	SAS	
Transfer Rate Synchronous (Maximum)	3GB/sec	
Seek Time (typical reads, including settling)	Single Track	0.35ms
	Average	3.9ms
	Full-Stroke	6.8ms
	Rotational Speed	10,000rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	781,250,000
Operating Temperature	50° to 95° F (10° to 35° C)	

HP 300GB 3G SAS 15K
NHP 3.5" DP ENT HDD
417950-B21

300GB 15K

Capacity	300,000,000,000	
Height	1.0 in (25.4mm)	
Width	4.0 in (101.6mm)	
Interface	SAS	
Transfer Rate Synchronous (Maximum)	3Gb/sec	
Seek Time (typical reads, including settling)	Single Track	0.44ms
	Average	3.6ms
	Full-Stroke	8.0ms
	Rotational Speed	15,000rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	585,937,500
Operating Temperature	50° to 95° F (10° to 35° C)	

HP 300GB 3G SAS 15K
NHP 3.5" SP HDD
431950-B21

Technical Specifications

HP 146GB 3G SAS 15K NHP 3.5" DP ENT HDD 417855-B21	146GB 15K	Capacity	146,815,737,856
		Height	1.0 in (25.4mm)
HP 146GB 3G SAS 15K NHP 3.5" SP HDD 432093-B21		Width	4.0 in (101.6mm)
		Interface	SAS
		Transfer Rate Synchronous	3Gb/sec
		(Maximum)	
		Seek Time	Single Track
		(typical reads, including settling)	Average
			Full-Stroke
			Rotational Speed
		Physical Configuration	Bytes/Sector
			Logical Blocks
		Operating Temperature	50° to 95° F (10° to 35° C)

HP 72GB 3G SAS 15K NHP 3.5" SP HDD 432095-B21	72GB 15K	Capacity	73,407,865,856
		Height	1.0 in (25.4mm)
		Width	4.0 in (101.6mm)
		Interface	SAS
		Transfer Rate Synchronous	3Gb/sec
		(Maximum)	
		Seek Time	Single Track
		(typical reads, including settling)	Average
			Full-Stroke
			Rotational Speed
		Physical Configuration	Bytes/Sector
			Logical Blocks
		Operating Temperature	50° to 95° F (10° to 35° C)

SAS Hot Plug 3.5" Midline (MDL) Drives

Application Information SAS Midline drives are intended for servers and storage solutions where high capacities are required. These drives have moderately-priced reliability and performance for non mission critical, low workload applications, such as disk backup, archival, and reference applications.

NOTE: SAS Midline hard drives have a 1 year limited warranty regardless of the warranty period for the system in which they are installed.

QuickSpecs

HP SAS Enterprise and SAS Midline Hard Drives

Technical Specifications

HP 1TB 3G SAS 7.2K 3.5"
DP MDL HDD
461137-B21

1TB 7.2K

Capacity	1,000,204,886,016	
Height	1.0 in (25.4mm)	
Width	4.0 in (101.6mm)	
Interface	SAS	
Transfer Rate Synchronous (Maximum)	3Gb/sec	
Seek Time (typical reads, including settling)	Single Track	0.4 ms
	Average	7.4 ms
	Full-Stroke	14.3 ms
	Rotational Speed	7,200 rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	1,953,525,168
Operating Temperature	50° to 95° F (10° to 35° C)	

HP 750GB 3G SAS 7.2K
3.5" DP MDL HDD
461135-B21

750GB 7.2K

Capacity	750,156,374,016	
Height	1.0 in (25.4mm)	
Width	4.0 in (101.6mm)	
Interface	SAS	
Transfer Rate Synchronous (Maximum)	3Gb/sec	
Seek Time (typical reads, including settling)	Single Track	0.4 ms
	Average	7.4 ms
	Full-Stroke	14.3 ms
	Rotational Speed	7,200 rpm
Physical Configuration	Bytes/Sector	512
	Logical Blocks	1,465,149,168
Operating Temperature	50° to 95° F (10° to 35° C)	

Environment-friendly
Products and Approach

End-of-life Management
and Recycling

Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to <http://www.hp.com/go/green>. To recycle your product, please go to: <http://www.hp.com/go/green> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <http://www.hp.com/go/green>. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

Technical Specifications

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For hard drives, 1GB = 1 billion bytes. Actual formatted capacity is less.