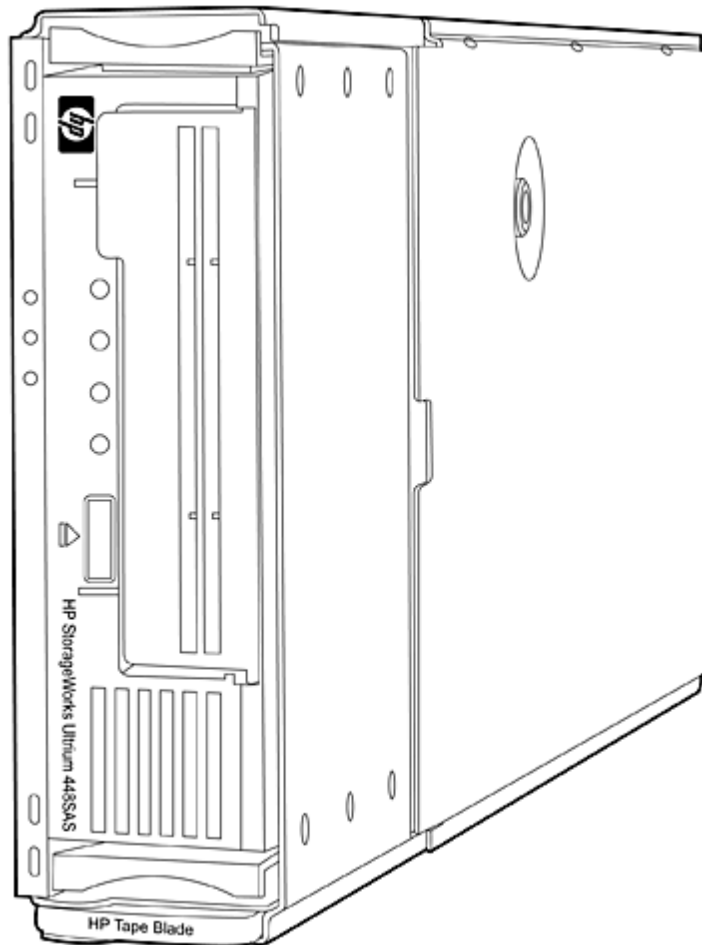


Overview

HP StorageWorks Ultrium 448c Tape Blade

The HP StorageWorks Ultrium 448c Tape Blade is a half-height tape blade providing an integrated data protection solution for BladeSystem c-Class enclosures. This tape blade provides direct backup of the adjacent server blade and network backup capability for all data residing within the enclosure. With second-generation LTO technology, the HP Ultrium 448c Tape Blade delivers a compressed storage capacity of 400GB on a single data cartridge and a compressed transfer rate of 172GB per hour.



Overview

At A Glance

- **Integrated into BladeSystem c-Class enclosures:**
 - Ideal direct attach tape-based data protection solution for those customers not connected into a Storage Area Network (SAN).
 - **Complete data protection and disaster recovery solution:**
 - Ships standard with HP Data Protector Express Single Server Edition data protection software.
 - Supports One Button Disaster Recovery (OBDR) for adjacent backup server. OBDR allows quick recovery of operating system, applications and data from the latest backup set in the event of a hard drive failure.
 - **Versatility:**
 - Direct attach data protection of adjacent server and network backup of data via Ethernet for all other servers within the BladeSystem c-Class enclosure
Protects both half-height and full-height server blades
 - **Form Factor:**
 - Half-height blade
 - **Warranty:**
 - Hewlett-Packard provides a 3-year, next-day, parts exchange, limited warranty for the HP StorageWorks Ultrium 448c Tape Blade, plus 9x5 phone support for the duration of the warranty
-

Models

HP StorageWorks Ultrium 448c Tape Blade

440947-B21

NOTE: 0D1 will appear after this part number on your sales order if factory integration is indicated.

Kit Contents

- HP Ultrium 448c Tape Blade
- HP Ultrium 400GB data cartridge
- StorageWorks CD
- Data Protector Express Single Server Edition CD
- Coupler
- Install poster
- Warranty booklet

Compatibility

Key Features

Features of the HP Ultrium 448c Tape Blade include:

- Integrated Data Protection Solution for BladeSystem c-Class enclosures
- Tape-based data protection solution ideal for customers who are not connected into a Storage Area Network (SAN).
- Deployed as part of a complete server, storage and data protection solution by integrating within the enclosure.
- Half-height blade form factor which optimizes the use of available slots within the enclosure.

Direct Attach Data Protection

Provides direct attach tape-based data protection of the adjacent server blade within the enclosure.

Network Backup Capability

In addition to direct attach data protection of the adjacent server blade, the HP Ultrium 448c Tape Blade also provides network backup capability for other data residing within the blade enclosure. The adjacent server to the tape blade becomes the designated backup server and other server blades within the enclosure can perform network backups via the Ethernet connection within the enclosure. This functionality is enabled by purchasing additional data protection software client licenses for each server blade that needs network backup capability.

Complete data protection and disaster recovery solution

The HP Ultrium 448c Tape Blade ships standard with HP Data Protector Express Single Server Edition data protection software. In addition, the tape blade supports HP's One-Button Disaster Recovery (OBDR) disaster recovery solution. OBDR allows quick restores of your operating system, applications and data from your latest full backup set. OBDR is supported for the server blade adjacent to the tape blade. For more information on HP's One-Button Disaster Recovery, please visit www.hp.com/go/obdr.

Density

The HP Ultrium 448c Tape Blade fits into a half height bay on the BladeSystem c-Class enclosures.

Manageability

- Onboard Administrator module which provides a single point of control for intelligent management of the entire enclosure.
- Insight Display powered by the Onboard Administrator provides local management through an LCD display conveniently sited on the front of the system.
- Library and Tape Tools provides a robust diagnostic tool for the tape blade.

Compatibility and Integration Testing

Extensive compatibility testing with HP BladeSystem c-Class server blades for the highest level of integration available in the industry. Please visit <http://www.hp.com/go/connect> for a complete list of qualified tape blade solutions.

Compatibility

BladeSystem c-Class compatibility Installs into half-height bay of a BladeSystem c-Class enclosure. Compatible with the following BladeSystem c-Class server blades:

HP ProLiant BL c-Class (HP BladeSystem)

- ProLiant BL460c Server Blade
- ProLiant BL465c Server Blade
- ProLiant BL480c Server Blade
- ProLiant BL685c Server Blade

NOTE: For the most up-to-date BladeSystem c-Class compatibility, please visit <http://www.hp.com/go/connect>.

Operating Systems

- Microsoft Windows Server 2003
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

NOTE: For the most up-to-date list of compatible operating systems, please visit <http://www.hp.com/go/connect>.

NOTE: For more Linux OS support & certification information, please visit our the ProLiant & BladeSystem Server Linux matrix: <http://h18004.www1.hp.com/products/servers/linux/hpLinuxcert.html>

Software Suite

HP Data Protector Express Single Server Edition

- Simple data protection that installs from box to backup in minutes
- Fast and robust disaster recovery using One-Button Disaster Recovery (OBDR)

Systems Insight Manager

- Powerful server and server options/storage manager tool
- Monitors over 1,200 system wide parameters
- Configuration/Diagnostic Utilities

HP Library and Tape Tools

- Robust diagnostic tool for HP tape products
- Free download plus quick installation
- Intuitive user interface requires no training
- Web-based smart firmware downloads, updates and notifications

Service and Support, HP Care Pack, and Warranty Information

HP Care Pack Information

HP Care Pack Services offer upgraded service levels to extend and expand your standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your hardware and software investments. They let you choose the support levels that meet your business requirements, from basic to mission-critical. They help you contain total cost of ownership.

HP Care Pack warranty extensions can be purchased along with HP products to cost-effectively upgrade or extend your warranty. For many products, post-warranty HP Care Pack services are available when your original warranty has expired.

Why purchase an HP Care Pack service?

Your standard warranty protects against product defects. HP Care Pack Services help you guard against unplanned downtime, which can reduce your productivity and profitability. These convenient service packages:

- Protect your investment in HP products
- Provide consistent, predictable levels of support across your entire department or business
- Ease budget planning with fixed-cost support that includes parts and labor
- Give you direct access to proven technical and problem-solving expertise
- Offer a choice of response-time and repair-time commitments
- Deliver prompt, measurable results
- Are available whenever and wherever you do business

HP Care Pack availability may vary by country and product.

Supporting your Adaptive Enterprise journey

HP Services helps you make the Adaptive Enterprise real for your organization. The breadth, depth, and quality of HP hardware and software support services can help you improve the performance of your IT support processes and resolve the complex software and hardware problems that tax user productivity. HP Care Pack services help you increase IT environment stability, efficiency, and agility from the desktop to the data center, and improve the productivity of your employees.

Warranty and Services Included with the Product

Hewlett-Packard provides a 3-year, next-day, parts exchange, limited warranty for the HP StorageWorks Ultrium 448c Tape Blade, plus 9x5 phone support for the duration of the warranty.

For more information about HP's Global Limited Warranty and Technical Support, visit: ftp://ftp.compaq.com/pub/products/storageworks/warranty/EN_321708-008.pdf

Service and Support, HP Care Pack, and Warranty Information

Recommended Services

In order to maximize ROI and product uptime, and minimize the cost of ownership, Hewlett Packard recommends:

3 years 24 x 7 Hardware Support

- Guards against downtime, which reduces productivity and profitability
- Eases budget planning with fixed-cost support that includes parts and labor
- Direct access to proven technical and problem-solving expertise

3 years 24 x 7 Software Support

- Improve the productivity of system managers and operators
- Improve system performance and reduce downtime due to software defects
- Expedite problem resolution through expert-level technical resources
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP and selected third-party software at a predictable cost
- Take advantage of subscription savings on software updates
- Keep your license compliancy up-to-date

Available HP Care Pack Services

Extend your product warranty with a wide choice of cost-saving support packages.

HP Care Pack services are sold by HP and HP authorized enterprise and commercial resellers. Services for customers purchasing via direct and enterprise resellers are quoted using HP order configuration tools. Additional information about HP Care Pack service features and benefits is available at <http://www.hp.com/hps/carepack/services/>.

Key for HP Care Pack service availability in the table below:

E = Service available for customers purchasing direct and via enterprise resellers

C = Service available for customers purchasing via commercial resellers

N/A = Service not applicable

HP Care Pack Services Deployment and Per Event Services	Service Available
HP Installation	E/C
HP Installation & Startup	N/A
HP Implementation	N/A

NOTE: For more information about deployment and per event services for HP storage products, visit:

<http://www.hp.com/hps/storage/>.

Service and Support, HP Care Pack, and Warranty Information

HP Care Pack Services Availability Services	1 yr	3 yr	4 yr	5 yr
HP Next Day Hardware Support	E	E	E	E
HP 4 Hr, 9x5 HW Support	N/A	N/A	N/A	N/A
HP 4 Hr, 13x5 Hardware Support	E	E	E	E
HP 4 Hr, 24x7 Hardware Support	E	E	E	E
HP 6 HR Call-to-Repair HW Support	E	E	E	E
HP Software Support	E	E	E	E
HP Software Support 24x7	E	E	E	E
HP Support Plus	E	E	E	E
HP Support Plus 24	E	E	E	E
HP Proactive Essentials 9x5, 10 SW Incidents	N/A	N/A	N/A	N/A
HP Proactive Essentials 9x5, 25 SW Incidents	N/A	N/A	N/A	N/A
HP Proactive Essentials 9x5 Unlimited	N/A	N/A	N/A	N/A
HP Proactive Essentials 24x7, 25 SW Incidents	N/A	N/A	N/A	N/A
HP Proactive Essentials 24x7, 50 SW Incidents	N/A	N/A	N/A	N/A
HP Proactive Essentials 24x7 Unlimited	N/A	N/A	N/A	N/A
HP Proactive 24 Service	E	E	E	E
HP Critical Service	E	E	E	E

NOTE: Both the HP Proactive 24 Service and the HP Critical Service only relate to "reactive elements", "proactive elements", are available on time & materials basis (SW is supported separately per package).

NOTE: To find HP Care Pack Services available via HP authorized commercial resellers, visit: http://h30125.www3.hp.com/csn/salesmktg/elfpack/elf_nonlkup_ctrylang.asp?code=ELNL

HP Care Pack Service Product Numbers

Enterprise & Commercial Purchased Care Packs Commercial Purchased Care Packs

Product Description

Product Number

Installation for Storage (per event)	U2090E
Next Business Day Onsite, HW Support, 3 year	H3157E
4-Hour, 13x5 Onsite, HW Support, 3 year	H4617E
4-Hour, 24x7 Onsite, HW Support, 3 year	H4622E
6-Hour, 24x7, Call-To-Repair, HW Support, 3 year	U6359E
4-Hour, 13x5 Onsite, HW Support, 4 year	U9342E
4-Hour, 24x7 Onsite, HW Support, 4 year	U9343E
4-Hour, 13x5 Onsite, HW Support, 5 year	U9344E
4-Hour, 24x7 Onsite, HW Support, 5 year	U9345E
Post Warranty Service, Next Business Day Onsite, HW Support, 1 year	UA454PE
Post Warranty Service, 4-Hour, 13x5 Onsite, HW Support, 1 year	UA455PE
Post Warranty Service, 4-Hour, 24x7 Onsite, HW Support, 1 year	UA456PE
Post Warranty Service, 6-Hour, 24x7, Call-To-Repair, HW Support, 1 year	UA457PE

Service and Support, HP Care Pack, and Warranty Information

Enterprise Purchased Care Packs	Product Description	Drive Band	Install Band	Product Number
	Tape Installation HW Installation Only	N/A	596	HA113A1
	HP 1y Next Day HW Support	450	N/A	HA101A1
	HP 3y Next Day HW Support	450	N/A	HA101A3
	HP 4y Next Day HW Support	450	N/A	HA101A4
	HP 5y Next Day HW Support	450	N/A	HA101A5
	HP 1y 4h 13x5 HW Support	450	N/A	HA103A1
	HP 3y 4h 13x5 HW Support	450	N/A	HA103A3
	HP 4y 4h 13x5 HW Support	450	N/A	HA103A4
	HP 5y 4h 13x5 HW Support	450	N/A	HA103A5
	HP 1y 4h 24x7 HW Support	450	N/A	HA104A1
	HP 3y 4h 24x7 HW Support	450	N/A	HA104A3
	HP 4y 4h 24x7 HW Support	450	N/A	HA104A4
	HP 5y 4h 24x7 HW Support	450	N/A	HA104A5
	HP 1y 6h CTR HW Support	450	N/A	HA105A1
	HP 3y 6h CTR HW Support	450	N/A	HA105A3
	HP 4y 6h CTR HW Support	450	N/A	HA105A4
	HP 5y 6h CTR HW Support	450	N/A	HA105A5
	HP 1y Support Plus SVC	450	N/A	HA109A1
	HP 3y Support Plus SVC	450	N/A	HA109A3
	HP 4y Support Plus SVC	450	N/A	HA109A4
	HP 5y Support Plus SVC	450	N/A	HA109A5
	HP 1y Support Plus 24 SVC	450	N/A	HA110A1
	HP 3y Support Plus 24 SVC	450	N/A	HA110A3
	HP 4y Support Plus 24 SVC	450	N/A	HA110A4
	HP 5y Support Plus 24 SVC	450	N/A	HA110A5
	HP 1y Proactive 24 Service	450	N/A	HA111A1
	HP 3y Proactive 24 Service	450	N/A	HA111A3
	HP 4y Proactive 24 Service	450	N/A	HA111A4
	HP 5y Proactive 24 Service	450	N/A	HA111A5
	HP 1y Critical Service	450	N/A	HA112A1
	HP 3y Critical Service	450	N/A	HA112A3
	HP 4y Critical Service	450	N/A	HA112A4
	HP 5y Critical Service	450	N/A	HA112A5

Service and Support, HP Care Pack, and Warranty Information

eSupport

HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal

The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.

Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Collaboration with other business and IT professionals
- Download of patches and drivers
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support portal, visit <http://www.hp.com/support>.

HP Education Services For more information about HP Education Services for Storage and SAN, visit <http://education.hp.com/curr-storsan.html>

Additional Services Information

- For more information about Deployment, Per Event, Consulting and Education services for HP Storage, visit: <http://www.hp.com/hps/storage/>
- For more information about HP Care Pack services for storage products, visit: http://www.hp.com/hps/carepack/storage/cp_networked.html
- For more information about HP storage software, services and updates, visit: <http://h18006.www1.hp.com/storage/software.html>
- If you have specific questions, contact your local HP representative. Contact information for a representative in your area can be found at "Contact HP" <http://www.hp.com/>

Related Options

NOTE: Some of the options listed below may be discontinued.

Media	HP Ultrium 400GB Data Cartridge	C7972A
	HP Ultrium Universal Cleaning Cartridge	C7978A
Mezzanine Pass-Thru Card	HP PCI Express Mezzanine Pass-Thru Card for BladeSystem c-Class NOTE: Required when installing an HP Ultrium 448c Tape Blade adjacent to a full-height server blade.	431643-B21
HP Data Protector Express	HP Data Protector Express Backup Server upgrade from Data Protector Express Single Server Edition media and LTU NOTE: Required upgrade when configuring the tape blade to operate in a network backup environment. Recommended SKU for upgrading from HP Data Protector Express Single Server Edition to HP Data Protector Express.	BB117ET
	HP Data Protector Express Backup Server media and LTU NOTE: Required when configuring the tape blade to operate in a network backup environment. If upgrading from HP Data Protector Express Single Server edition, please use BB117ET.	BB117AA
	HP Data Protector Express Network Server Backup Agent LTU NOTE: Required for each server blade backing up over the network to the tape blade.	BB119AA
	HP Data Protector Express Network Server Backup Agent LTU (3 pack) NOTE: Multi-license pack ideal for backing up server blades to the tape blade. A backup server agent is required for each server blade backing up over the network to the tape blade.	BB122AA
	HP Data Protector Express Agent for Microsoft Exchange online backup LTU	BB123AA
	HP Data Protector Express Agent for Microsoft SQL Server online backup LTU NOTE: Please visit http://www.hp.com/go/dataprotectorexpress for more information about HP Data Protector Express.	BB124AA

Storage

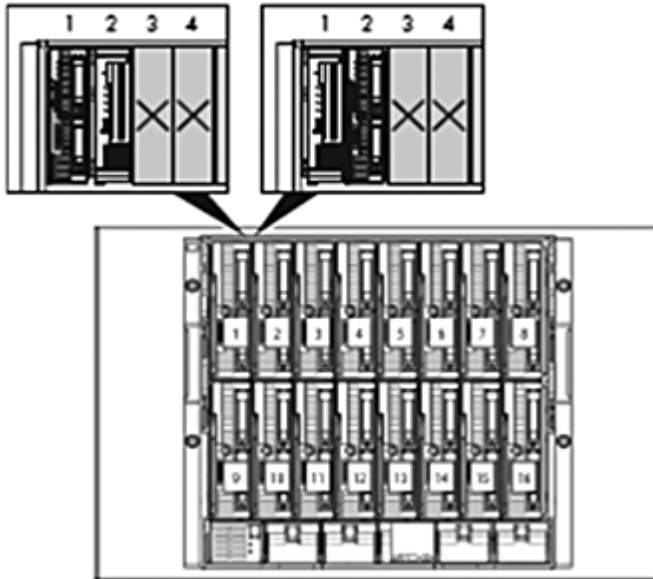


Figure 1 Installing a tape blade adjacent to a half-height server blade.

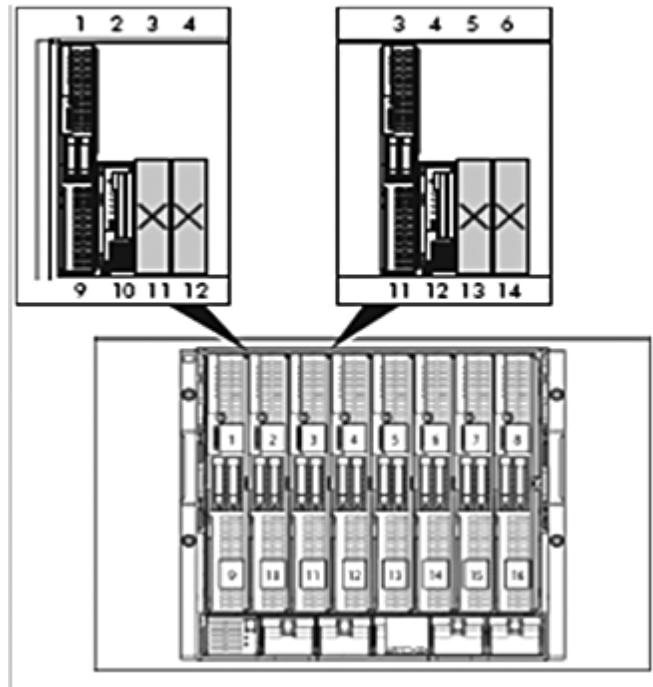


Figure 2 Installing a tape blade adjacent to a full-height server blade.

HP StorageWorks Ultrium 448c Tape Blade

Description	Quantity Supported	Position Supported	Comments
HP Ultrium 448c Tape Blade NOTE: Connected adjacent to a half-height server blade (Figure 1)	Up to 8 per HP BladeSystem c-Class c7000 Enclosure	Odd or Even slots next to partner server blade	<ul style="list-style-type: none"> A tape blade supports one partner server blade, and one partner server blade supports one tape blade. Identify the partner server blade to be installed with the HP Ultrium 448c Tape Blade. The two blades always occupy a pair of slots, as follows: 1 & 2, 3 & 4, 5 & 6, 7 & 8, 9 & 10, 11 & 12, 13 & 14, 15 & 16. If the partner server blade is installed in an odd-numbered bay, the HP Ultrium 448c Tape Blade is installed in the adjacent even-numbered bay to the right. If the partner server blade is installed in an even-numbered bay, the HP Ultrium 448c Tape Blade is installed in the adjacent odd-numbered bay to the left.

Storage

HP Ultrium 448c Tape Blade
NOTE: Connected adjacent to a full-height server blade (Figure 2)

Up to 4 per HP BladeSystem c-Class c7000 Enclosure
Slots 10, 12, 14, or 16 (lower bays only)

- A tape blade supports one partner server blade, and one partner server blade supports one tape blade.
- When partnering a tape blade with a full height server blade, an HP PCI Express Mezzanine Pass-Thru Card for BladeSystem c-Class (431643-B21) is required. This card is installed in mezzanine 3 connector in the server blade.
- Identify the partner server blade to be installed with the HP Ultrium 448c Tape Blade. The two blades always occupy a pair of slots, as follows: 9 & 10, 11 & 12, 13 & 14, 15 & 16.
- The partner server blade is installed in an odd-numbered bay. The HP Ultrium 448c Tape Blade is installed in the adjacent even-numbered bay to the right.
- The tape blade is always located on the lower row of the enclosure in an even-numbered bay (slots 10, 12, 14 or 16)

Technical Specifications

Dimensions (HxWxD)	2.19 x 7.154 x 20.058 in (5.56 x 18.17 x 50.95 cm)
Weight (loaded)	11 lb (4.99 kg)
Capacity	Native 200 GB Compressed 400 GB (assumes 2:1 data compression) Buffer Size 64 MB
Performance	Sustained transfer rate, 24 MB/s native Sustained transfer rate, 48 MB/s compressed (assumes 2:1 data compression) Burst transfer rate 300 MB/s (with 3Gb/sec SAS) Data rate matching range 0-24 MB/s (native) Data access time 64 s typical for a 200 GB tape (native) (from BOT) Average load time 17 s Average unload time 16 s Rewind time from EOT 121 s (200 GB tape) Rewind tape speed 5.0 m/s
Reliability	MTBF 250,000 hours at 100% duty cycle Uncorrected Error Rate 1x10 ¹⁷
Media Compatibility	LTO Ultrium 1 (Read and Write) LTO Ultrium 2 (Read and Write)
Tape Format	Recording method 8-channel linear serpentine Recording format LTO Ultrium 2 LTO Ultrium 1 (for 100 GB tape) Data compression LTO DC dual mode compression (an enhanced version of ALDC) Error detection/correction Reed-Solomon Read channel technology Partial Response Maximum Likelihood (PRML) Data encoding method RLL 0,13/11
Interface	Interface type 3Gb/sec SAS
Power Specifications	Power requirements +5V@2.5A (typical) +5V@2.5A (max) +12V@0.7A (typical) +12V@2.1A (max) Power consumption 13 Watts idle 20 Watts typical 33 Watts max

Technical Specifications

Environmental Specifications	Temperature range	Operating	50° F to 95° F (10° C to 40° C) at a minimum of 6CFM airflow
		Storage	-40° F to 151° F (-40° C to 66° C)
	Non-condensing humidity range	Operating	20 to 80% RH (non-condensing)
		Storage	10 to 95% RH (non-condensing)

NOTE: To maintain proper cooling and airflow, a blank or blade must occupy all bays during operation.

Standards Compliance	CSA Certification to C22.2, No.60950 (cCSAus)
	EN60950 (IEC 60950)
	CE Declaration of Conformity
	FCC 47 CFR Parts 15
	VCCI
	C-TICK
	RRL
BSMI	

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The information contained herein is subject to change without notice.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

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