

IBM System Storage TS2250 Tape Drive Express Model H5S incorporates IBM LTO Ultrium 5 tape drive technology

Table of contents

1 Overview	7 Product number
2 Key prerequisites	8 Publications
3 Planned availability date	10 Technical information
3 Description	15 Terms and conditions
6 Product positioning	19 Prices

At a glance



The IBM® System Storage™ TS2250 Tape Drive Express® Model H5S delivers IBM tape reliability and performance at open systems prices. Features of the new Ultrium 5 model include:

- Maximum data transfer rate of up to 140 MB/sec native compared to 120 MB/sec native for LTO Ultrium 4
- Ultrium 5 cartridge capacity, providing up to 1.5 TB native physical capacity per cartridge (3.0 TB with 2:1 compression) compared to Ultrium 4 800 GB data cartridges
- 6 Gbps SAS attachment for Model H5S included
- LTO specifications met
- Encryption support designed to work with Application Managed Encryption
- 19-inch rack mount shelf option, which can accommodate two TS2250 Tape Drives side by side in the rack
- Dual SAS ports per drive to improve availability
- IBM Long Term File System partitioning support
- Half-high drive form factor

Overview

The new **IBM System Storage TS2250 Tape Drive Express Model H5S**, (SEO 3580S5E) external stand-alone or rack mountable unit, is designed to offer high capacity and performance for the midrange systems environment. The TS2250

incorporates the Linear Tape-Open (LTO) **IBM System Storage Ultrium 5 Half-High Tape Drive**, which is designed to provide maximum tape drive throughput native data rate performance of up to 140 MB/sec compared to the IBM TS2240 LTO half-high Tape Drive (Ultrium 4) at up to 120 MB/sec native data transfer rate. In addition, with the use of the new **IBM LTO Ultrium 5 1.5 TB Data Cartridge**, the IBM TS2250 Ultrium 5 Tape Drive provides nearly double the tape cartridge capacity with up to 1.5 TB native physical capacity (3.0 TB with 2:1 compression) compared to previous Ultrium 4 800 GB (1.6 TB with 2:1 compression) Tape Cartridges. IBM Ultrium 5 Tape Drives can read and write LTO Ultrium 4 data cartridges, and can read LTO Ultrium 3 data cartridges. The Ultrium 5 Tape Drive is encryption-capable and designed to support Application Managed Encryption.

The TS2250 Model H5S Tape Drive uses a 6 Gbps dual port SAS (Serial Attached SCSI) interface for connection to a wide spectrum of system servers. The new TS2250 attaches to the IBM System p5®, IBM Power® System Model p6, and IBM Power System Model p7, and to IBM System x® and PC servers. The TS2250 also supports Microsoft® Windows®, HP-UX, Sun Solaris, and UNIX®.

The following IBM TS2250 H5S Half-high LTO Ultrium 5 Tape Drive enhancements are designed to help improve performance, capacity, and reliability:

- Native data transfer rate of up to 140 MB/sec
- Ultrium 5 data and WORM tape cartridge native physical capacity of up to 1.5 TB
- 6 Gbps SAS attachment support
- A 256 MB internal buffer
- Application Managed Encryption support for Half-high LTO Generation 5 SAS tape drive
- 8 KB cartridge memory with Ultrium 5 media
- Half-high form factor
- Two SAS ports per drive to improve availability and attachability
- IBM Long Term File System partitioning support
- Better integrated electronics using IBM-engineered copper technology

This release of the IBM Long Term File System software application leverages LTO5 tape partitioning. It is designed to enable a self-describing tape file format and to deliver an easy tape storage and distribution solution without the use of additional database applications. Customers of the IBM Long Term File System software are those who require a standard tape cartridge format at low-cost and will use standalone IBM LTO5 tape drives. IBM Long Term File System is the perfect solution for those in the Media and Entertainment industry and other fields that need massive data storage on tape for long retention periods, such as banking, scientific research, and government sectors. For further information and list of supported operating systems, refer to the following Web site

<http://www.ibm.com/tape/ltfs>

A new enclosure design allows two TS2250 storage units to be mounted side by side in a 19-inch IBM server Rack Mount Shelf Kit requiring just two EIA units (2U) of rack space.

The TS2250 Tape Drive provides an excellent migration path from digital linear tape (DLT or SDLT), 1/4 in (QIC), 4 mm (DAT), or 8 mm tape drives.

Key prerequisites

Appropriate levels of host software are required to attach the IBM System Storage TS2250 Tape Drive to selected IBM System p5, IBM Power Systems™ p6, IBM Power Systems p7, IBM System x, HP-UX, SUN, UNIX, and PC servers.

Refer to the [Technical information](#) section for details.

Planned availability date

April 16, 2010

Description

The IBM System Storage TS2250 Tape Drive, an external stand-alone or rack-mountable unit, contains a Linear Tape-Open (LTO) Ultrium 5 tape drive designed for the heavy demands of backup tape storage. The TS2250 is supported for SAS (Serial-attached SCSI) attachment to IBM Power System p6 and p7, IBM System x, HP-UX, Sun Solaris, UNIX, and PC servers.

The TS2250 Tape Drive Express Model H5S incorporates fifth-generation IBM LTO Ultrium technology and offers the following improvements over the Ultrium 4 Tape Drive:

- **Increased performance:** Maximum tape drive throughput native data rate performance is up to 140 MB/sec. Data tracks are written 16 at a time. IBM Ultrium 5 Tape Drives can read and write LTO Ultrium 4 and 5 Data Cartridges, and can read LTO Ultrium 3 Data Cartridges.

Note: Although the Ultrium 5 Tape Drive provides the capability for excellent tape performance, other components of the system may limit the actual performance achieved. Also, although the compression technology used in the tape drive can typically double the amount of data that can be stored on the media, the actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.

- **Increased tape cartridge capacity:** The tape cartridge physical capacity is nearly double the Ultrium 4 Data Cartridge, up to 1.5 TB native physical capacity (3.0 TB with 2:1 compression), with the use of the new IBM LTO Ultrium 1.5 TB Data Cartridge. This is achieved by increasing the linear density and the media length. The tape itself is an advanced metal particle tape developed to help provide durability and capacity.
- **Compatible with Ultrium 4 cartridges:** The Ultrium 5 Tape Drive can read and write Ultrium 4 and 5 cartridges.
- **Supports encryption on Ultrium 5 SAS tape drives:** The IBM System Storage TS2250 LTO Ultrium 4 Tape Drive will support data encryption on the base drive with Ultrium 5 media meeting LTO consortium specifications and Application Managed Encryption.
- **Attachment options:** The TS2250 Tape Drive comes with a 6 Gbps SAS interface for connection to a wide spectrum of open system servers. The TS2250 is supported on IBM Power System p6 and p7, IBM System x, Sun Solaris, HP-UX, Microsoft Windows 2003, Linux®, and other open systems.
- **Giant Magneto Resistive (GMR) head design:** LTO 5 introduces the Giant Magneto Resistive (GMR) head with beveled contouring for reducing stiction/friction, especially with smoother LTO5 media types. This head design is well proven in Enterprise Tape products and helps minimize contact, debris accumulation, and wear on the tape as it moves over the read/write heads.
- **Digital speed matching:** The Ultrium 5 Tape Drive is designed to perform dynamic speed matching at one of fourteen speeds which reduces the number of backhitch repositions and improves throughput performance by more closely matching the speed of the data to or from the host. Speed matching on Ultrium 5 ranges from fourteen speeds, 40 to 140 MB/sec, versus seven speeds, 30 to 120 MB/sec on Ultrium 4.
- **WORM media support:** The IBM 3589 Ultrium 5 1.5 TB WORM Tape Cartridges are designed for applications such as archiving and data retention as well as those applications requiring an audit trail. These cartridges work with the IBM LTO Ultrium 5 Tape Drive to help prevent the alteration or deletion of user data.
- **Large internal data buffer:** There is a 256 MB internal data buffer in the Ultrium 5 Half-high Tape Drive.

- **IBM Long Term File System partitioning support:** The principal function of the media partitioning is to allow for faster data access by splitting the cartridge into two media partitions. WORM media cannot be partitioned.

This release of the IBM Long Term File System software application leverages LTO5 tape partitioning. It is designed to enable a self-describing tape file format and to deliver an easy tape storage and distribution solution without the use of additional database applications. Customers of the IBM Long Term File System software are those who require a standard tape cartridge format at low-cost and will use standalone IBM LTO5 tape drives. IBM Long Term File System is the perfect solution for those in the Media and Entertainment industry and other fields that need massive data storage on tape for long retention periods, such as banking, scientific research, and government sectors. For further information and list of supported operating systems, refer to the following Web site

<http://www.ibm.com/tape/lvfs>

Note: All new IBM tape device drivers will only be posted to the web through the Fix Central download portal and not through the ftpsite. **The device driver FTP site will be sunset June 2010.**

IBM maintains the latest levels of System Storage tape drive and library device drivers and documentation on the Internet. Utilize the Fix Central download portal by accessing the following Web site

<http://www.ibm.com/support/fixcentral>

There are a few pull down menus to navigate to the correct download as follows:

- In the first pull down menu labeled "Product Group", select "Storage Systems".
- In the next pull down menu that appears which is labeled "Product Family", select "Tape Systems".
- With the next pull down menu, "Product Type", select "Tape Device Drivers and Software".
- This will in turn bring up the "Product" menu, which provides selections for "Platform drivers, Tools, or Software".
- Under "Platform drivers", in order to download your driver, select the correct operating system.
- Two more pull down menus will appear with information. Click "Continue".
- The next screen can be used to narrow the search, however just click "Continue" to view what is available.

The IBM Tape Device Drivers Installation and User's Guide can be found at the following Web site

<http://www-01.ibm.com/support/docview.wss?rs=577&uid=ssg1S7002972>

Proven IBM LTO Ultrium features enhanced in the IBM LTO Ultrium 5 Tape Drive include:

- **Highly integrated electronics using IBM engineered copper technology:** This technology is designed to reduce the total number of components in the drive, help lower chip temperatures, and reduce power requirements, providing a more reliable drive. The fifth-generation drive electronics are designed to provide error correction of soft errors and in memory arrays.
- **Dual-stage 16-channel head actuator:** The actuator is designed to provide precision head alignment to help support higher track density and improved data integrity.
- **Independent tape loader, threader motors, and positive pin retention:** These are designed to help improve the reliability of loading and unloading a cartridge, and to retain the pin even if tension is dropped. An independent loader motor, coupled with the positive pin retention, is designed to cause the tape to thread with a higher level of reliability.
- **Servo and track layout technology:** There are 1280 data tracks in Ultrium 5. The high-bandwidth servo system features a low mass servo to help more

effectively track servo bands and improve data throughput with damaged media in less-than-optimal shock and vibration environments.

- **Surface Control Guiding Mechanism:** IBM's patented Surface Control Guiding Mechanism is designed to guide the tape along the tape path in the Ultrium 5 Tape Drive. This method uses the surface of the tape, rather than the edges, to control tape motion. This helps reduce tape damage (especially to the edges of the tape) and tape debris, which comes from the damaged edges and can accumulate in the head area.
- **Robust drive components optimized for automation environments:** To help enhance reliability and prolong the life of the drives, some of the most robust components available are used, such as an all metal clutch, steel ball bearings in loader, robust leader block design, and a single circuit card.
- **Power management:** The Ultrium 5 Tape Drive power management function is designed to control the drive electronics to be either completely turned off or in a low-power mode when the circuit functions are not needed for drive operation. LTO5 will have the most dramatic power savings implementation of any IBM LTO generation. This power savings is designed to bring the wattage used by the drive down to a target of 5 watts at time of availability. This savings is realized in an unloaded state with no commands being issued to the drive over ethernet or host interface.
- **Adaptive read equalization:** Designed to automatically compensate for dynamic changes in readback signal response.
- **Dynamic amplitude asymmetry compensation:** Designed to dynamically optimize readback signals for linear readback response from MR read head transducers.
- **Separate writing of multiple filemarks:** Separate writing of multiple filemarks is designed to cause any write command of two or more filemarks to cause a separate data set to be written containing all filemarks after the first. This feature has two advantages. First, it helps improve performance if a subsequent append overwrites somewhere after the first filemark, and second, write of multiple filemarks typically indicates a point where an append operation might occur after the first of these filemarks. This change helps prevent having to rewrite data set containing customer data and the first filemark, if such an append occurs.
- **LTO Data Compression (LTO-DC):** The Ultrium 5 and 4 uses LTO-DC, which is an implementation of a Lempel-Ziv class 1 (LZ-1) data compression algorithm. LTO-DC is an extension of Adaptive Lossless Data Compression (ALDC) and an improvement over previous IBM lossless compression algorithms. IBM's patented "Scheme-Swapping" compression is designed to look ahead at incoming data, and determine the most efficient storage method (either ALDC or pass-thru mode) to help provide optimal data compression and increase data throughput.
- **LTO Cartridge Memory (LTO-CM):** Contained within the LTO Ultrium data cartridge is the LTO-CM, which is a passive, contactless silicon storage device that is physically a part of the cartridge. The LTO-CM is designed to hold information about that specific cartridge, the media in the cartridge, and the data on the media. The storage capacity of the LTO-CM is 8 KB. Communication between the drive and the LTO-CM is via a low-level radio frequency (RF) field transmitted by the drive to the cartridge.
- **Statistical Analysis and Reporting System (SARS):** The Ultrium 5 Tape Drive uses SARS to help isolate failures between media and hardware. SARS uses the cartridge performance history saved in the CM module and the drive performance history kept in the drive flash EEPROM to help determine the likely cause of failure. SARS is designed to cause the drive to request a cleaner tape, to mark the media as degraded, and to indicate that the hardware has degraded.

Ultrium 5 1.5 TB Data Cartridge

The tape cartridge physical capacity of the IBM Ultrium 1.5 TB Data Cartridge is nearly double that of the IBM Ultrium 4 800 GB Data Cartridge (3.0 TB with 2:1 compression). IBM LTO Ultrium 5 Tape Drives can read and write Ultrium 4 data cartridges, and read Ultrium 3 data cartridges. LTO Ultrium 1.5 TB data cartridges can be ordered using machine type 3589, LTO Ultrium tape cartridges or feature number 8505 at the time of purchase.

These cartridges have been designed to provide several enhancements over previous tape technologies. They are designed to work with tape drives that have increased tape speeds and high-density data recording. The case is specially designed for use in automated libraries and is designed for repeated, unattended handling. The tape itself is an advanced metal particle tape developed for durability and capacity.

New on TS2250 is the IBM Long Term File System partitioning support which enables data to be written individually on your media without affecting data on another partition.

With support for IBM LTO Ultrium-format tape data cartridges, the TS2250 Tape Drive provides an excellent migration path from digital linear tape (DLT or SDLT), 1/4 in (QIC), 4 mm (DAT), or 8 mm Tape Drives. It can be a cost-effective solution for backup, save-and-restore, and archiving functions as the entry point for the family of IBM Ultrium tape products.

Product preview

IBM intends to introduce and integrate the IBM System Storage Ultrium 5 Tape Drive technology in selected existing, additional, or alternative IBM System Storage Tape products.

Previews provide insight into IBM's plans and direction. Such plans and directions are subject to change. Specific availability dates, ordering information, and terms and conditions will be provided when the product is announced.

Product positioning

As you compare competitive tape solutions, consider:

- Capacity and performance requirements
- Data integrity, reliability, and availability
- Storage usage and application requirements
- Affordability
- Loyalty to legacy or existing tape formats
- Work environment, where space is limited

The IBM System Storage TS2250 Tape Drive and software applications are designed to address these requirements and constitute a functionally rich tape storage solution incorporating LTO Ultrium 5 tape drive technology.

The TS2250 Tape Drive Express Model H5S is an excellent choice if you use tape drives that require larger-capacity or higher-performance tape backup. The TS2250, an entry offering to the family of IBM Ultrium Tape products, is the answer to growing storage requirements and shrinking backup windows.

The TS2250 Tape Drive is an excellent tape storage solution if you use digital linear tape drives or require high-performance tape backup. In addition to reading and writing on IBM LTO Ultrium 4 or 5-format tape cartridges, the TS2250 Tape Drive provides an excellent functional alternative to DLT/SDLT, 1/4 in, 4 mm, 8 mm, or IBM Magstar® MP 3570 Tape Drives.

For capacity requirements greater than 1.5 TB (native) and for incorporating LTO Ultrium technology, the IBM System Storage TS2900 Tape Autoloader, IBM System Storage TS3100 or TS3200 Tape Library, or the IBM System Storage TS3310 and TS3500 Tape Libraries should be considered.

For mission-critical data protection needs, optimized for enterprise multi-mode and host attachment, or high-cycle and start/stop intensive tape applications, consider

the IBM System Storage TS1120 Tape Drive with the IBM System Storage TS3400 or TS3500 Tape Library.

Product number

Description	Machine		Feature
	type	Model	
TS2250 Tape Drive Express Model H5S with HHLT05 SAS Tape Drive, with enclosure and power supply	3580	H5S	
SEO Options Routing			0789
SEO Translation Admin Code - Options			0791
TAA Compliant Plant			0807
SEO SCSI Routing Code			0993
Admin SEO Translation Code			0996
China Offload Routing			1770
Capacity Sched Svc			1772
Custom SLA Sched			1796
Consolidate Shipment			8031
TAA Compliant Order			8067
Options for Model H5S			
2.0M SAS/Mini-SAS 1x Cable			5402
2.0M Mini-SAS/Mini-SAS 1x Cable			5502
Rack Mount Shelf Kit w/PDU Line Cord			7003
Ultrium Cleaning Cartridge			8002
Ultrium 4 Data Cartridge (5-Pack)			8405
Ultrium 5 Data Cartridge (5-Pack)			8505
Attached to HP-UX System			9210
Attached to Sun Solaris System			9211
Attached to windows System			9212
Attached to Linux System			9215
Attached to i5/OS® or OS/400® Systems			9400
Attached to IBM AIX® System			9600
Power Cord Options			
2.8M Power Cord 125V US/Canada			9800
2.8M Power Cord 250V France/Germany			9820
2.8M Power Cord 250V Denmark			9821
2.8M Power Cord 250V UK			9825
2.8M Power Cord 250V Israel			9827
2.8M Power Cord 250V Switzerland			9828
2.8M Power Cord 250V S. Africa			9829
2.8M Power Cord 250V Italy			9830
2.8M Power Cord 250V Australia			9831
2.8M Power Cord 250V US/Canada			9833
2.8M Power Cord 250V Uruguay/Argentina			9834
2.8M Power Cord 125V Taiwan			9835
2.8M Power Cord 250V China (PRC)			9840
2.8M Power Cord 250V Taiwan			9841
2.8M Power Cord 125V Japan			9842
2.8M Power Cord 250V Japan			9843
2.8M Power Cord 250V Korea			9844
2.8M Power Cord 250V India			9845
2.8M Power Cord 250V Brazil			9847

Note: The power cord options are used in the country listed and other countries. Refer to the *IBM System Storage TS2250 Tape Drive Model H5S Setup, Operator, and Service Guide* (GC27-2275) for specific country availability or contact your IBM representative.

Single Entity Offerings (SEOs)

Description	Machine type	Model	SEO number
TS2250 Tape Drive Express Model H5S with HHLT05 SAS Tape Drive, with enclosure and power supply	3580	H5S	3580S5E
Options for Model H5S			
2.0M SAS/Mini-SAS 1x Cable			95P4711
2.0M Mini-SAS/Mini-SAS 1x Cable			95P4713
Rack Mount Shelf Kit w/PDU Line Cord			96P1565
Ultrium Cleaning Cartridge			23R7008
Ultrium 4 Data Cartridge (5-pack)			95P4278
Ultrium 5 Data Cartridge (5-pack)			46C2084
Power cord options			
2.8M Power Cord 125V US/CAN			23R7141
2.8M Power Cord 250V US/CAN			23R7145
2.8M Power Cord 250V France/Germany			23R7146
2.8M Power Cord 250V Denmark			23R7147
2.8M Power Cord 250V UK			23R7148
2.8M Power Cord 250V Israel			23R7149
2.8M Power Cord 250V Switzerland			23R7150
2.8M Power Cord 250V S. Africa			23R7151
2.8M Power Cord 250V Italy			23R7152
2.8M Power Cord 250V Australia			23R7153
2.8M Power Cord 250V Uruguay/Argentina			23R7154
2.8M Power Cord 250V China (PRC)			23R7155
2.8M Power Cord 125V Taiwan			23R7158
2.8M Power Cord 250V Taiwan			23R6981
2.8M Power Cord 125V Japan			23R6982
2.8M Power Cord 250V Japan			23R6983
2.8M Power Cord 250V Korea			23R6984
2.8M Power Cord 250V India			23R6985
2.8M Power Cord 250V Brazil			23R6987

Note: The power cord options are used in the country listed and other countries. Refer to the *IBM System Storage TS2250 Tape Drive Model H5S Setup, Operator, and Service Guide* (GC27-2275) for specific country availability or contact your IBM representative.

Publications

The following publication is shipped with the product. Additional copies are available.

Title	Order number
IBM System Storage TS2250 Tape Drive Model H5S Setup, Operator, and Service Guide	GC27-2275

The following publications are available. To order, contact your IBM representative.

Title	Order number
IBM System Storage TS2250 Tape Drive Model H5S Setup, Operator, and Service Guide	GC27-2275
IBM System Storage TS2250 Tape Drive Model H5S Quick Reference (English)	GC27-2276
IBM Tape Device Driver	GC27-2130

Installation and User's Guide
(English)

IBM Tape Device Driver
Programming Reference (English)

GC32-0566

These publications are also available at

<http://www-05.ibm.com/e-business/linkweb/publications/servlet/pbi.wss>

Click on country, then enter publication number.

The device driver publications are also available at

<ftp://ftp.software.ibm.com/storage/devdrv/Doc/>

Note: All new IBM tape device drivers will only be posted to the web through the Fix Central download portal and not through the ftpsite. **The device driver FTP site will be sunset June 2010.**

IBM maintains the latest levels of System Storage tape drive and library device drivers and documentation on the Internet. Utilize the Fix Central download portal by accessing the following Web site

<http://www.ibm.com/support/fixcentral>

There are a few pull down menus to navigate to the correct download as follows:

- In the first pull down menu labeled "Product Group", select "Storage Systems".
- In the next pull down menu that appears which is labeled "Product Family", select "Tape Systems".
- With the next pull down menu, "Product Type", select "Tape Device Drivers and Software".
- This will in turn bring up the "Product" menu, which provides selections for "Platform drivers, Tools, or Software".
- Under "Platform drivers", in order to download your driver, select the correct operating system.
- Two more pull down menus will appear with information. Click "Continue".
- The next screen can be used to narrow the search, however just click "Continue" to view what is available.

The IBM Tape Device Drivers Installation and User's Guide can be found at the following Web site

<http://www-01.ibm.com/support/docview.wss?rs=577&uid=ssg1S7002972>

The IBM Systems Information Center provides you with a single information center where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find information and personalize your access. The IBM Systems Information Center is at

<http://publib14.boulder.ibm.com/infocenter/systems>

IBM Publications Center Portal

<http://www.ibm.com/shop/publications/order>

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided, as well as payment options via credit card. A large number of publications are available online in various file formats, which can currently be downloaded free of charge.

The following translated publications will be included on CD-ROMs, with the product. They will also be available from the following Web site

Click on country, then enter publication number.

Title	Language
IBM System Storage TS2250 Tape Drive Model H5S Setup, Operator, and Service Guide	English
	Brazilian Portuguese
	Czech
	German
	Japanese
	Portuguese
	Spanish
	Chinese - Simplified
	Chinese - Traditional
IBM System Storage TS2250 Tape Drive Model H5S Quick Reference	English (GC27-2276)
	Brazilian Portuguese
	Czech
	German
	Japanese
	Chinese - Simplified
	Chinese - Traditional

Services

Global Technology Services

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an On Demand Business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

<http://www.ibm.com/services/>

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

<http://www.ibm.com/services/continuity>

For details on education offerings related to specific products, visit

<http://www.ibm.com/services/learning/index.html>

Select your country, and then select the product as the category.

Technical information

Specified operating environment

Physical specifications

- Width: 213 mm (8.4 in.)
- Depth: 332 mm (13.1 in.)
- Height: 58 mm (2.3 in.)
- Weight: 4.3 kg (9.40 lbs.)

To assure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

Operating environment

- Temperature: 10 to 38° C (50 to 100° F)
- Relative humidity: 20 to 80%
- Wet bulb (caloric value): 26° C (78.8° F)
- Electrical power: 0.21 kVA 1.0 amps at 100 V ac, 0.5 amps at 240 V ac

Hardware requirements

The TS2250 Tape Drive comes with raven black covers. The TS2250 Model H5S uses a SAS (serial-attached SCSI) interface. The TS2250 Tape Drive can be attached to the IBM System p5, IBM p6 and p7 Power Systems, System x, and HP-UX, Sun Solaris, and non-IBM servers that support those interface specifications. A current list of supported open system configurations is available from the following Web site

<http://www-1.ibm.com/storage/tape/lto>

Select the model, then "Product Details," "LTO Compatibility," to view "Independent Software Vendor Matrix (ISV)" for the product.

A power cord option number, if applicable, should also be specified.

Cables: For the TS2250 Model H5S, a SAS cable is required to attach a TS2250 Tape Drive to host a SAS adapter.

- SAS/Mini-SAS cables provide attachment from HBA with SFF-8470 to the drive with SFF-8088
- Mini-SAS/Mini-SAS cables provide attachment from HBA SFF-8088 to the drive with SFF-8088.

At least one SAS cable should be specified on the initial plant order.

The following cable options are available for SAS attachment:

- Feature number 5402 (SEO 95P4711) - 2.0M SAS/Mini-SAS Cable (from HBA with SFF-8470 to drive with SFF-8088)
- Feature number 5502 (SEO 95P4713) - 2.0M Mini-SAS/Mini-SAS Cable (from HBA with SFF-8088 to drive with SFF-8088)

Refer to the **Special Features** section of the TS2250 (3580) Tape Drive Sales Manual for detailed descriptions of these features.

Support for the following host bus adapters (HBAS)

For a current list of HBAs that support the TS2250, visit

<http://www-03.ibm.com/systems/support/storage/config/ssic/index.jsp>

Software requirements

For a current list of host software versions and release levels that support the TS2250, refer to the following Web site

<http://www-03.ibm.com/systems/support/storage/config/ssic/index.jsp>

Select the model, then "Product Details," and view "Interoperability matrix," for supported servers and operating systems for the product.

Tivoli® Storage Manager, BRMS, and other compatible software offerings provide storage and tape management software for the 3580 or TS2250 family of products. Supporting software and applications must be obtained separately from IBM, IBM

Business Partners, or independent software vendors (ISVs). A list of compatible software is available from your IBM representative or at

<http://www-1.ibm.com/storage/tape/lto>

Select the model, then "Product Details," then "LTO Compatibility," and view "Independent Software Vendor (ISV) matrix for LTO" for the product.

IBM continues to work together with the ISVs to support the IBM LTO Ultrium Tape Drives or TS2250 family of products. Individual application vendors should be contacted for specific information and availability dates.

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<http://www-01.ibm.com/support/docview.wss?rs=577&uid=ssg1S7002972>

Compatibility

The IBM LTO Ultrium 5 Tape Drive can read and write IBM LTO Ultrium 4 and 5 data cartridges and read IBM LTO Ultrium 3 data cartridges. The new LTO Ultrium 1.5 TB data cartridges can only be used on the new IBM LTO Ultrium 5 Tape Drives.

Limitations

SAS cable lengths are limited to 5.5 m (18 ft).

Installing more than one TS2250 tape drive on a SAS bus may impact tape drive or system performance. Intermixing of other SAS devices on the same bus as the TS2250 may also impact performance of those devices.

Although multiple systems may be attached to a tape drive, the systems cannot use the drive simultaneously.

While the compression technology can increase the amount of data stored on the media, the actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.

Planning information

Customer responsibilities

Physical planning is a customer responsibility. Detailed planning information is in the *IBM System Storage TS2250 Tape Drive Model H5S Setup, Operator, and Service Guide* (GC27-2103). The TS2250 Tape Drive is designated as a customer setup unit (CSU). It is the customers' responsibility to install the unit. Customers are responsible for obtaining the appropriate SAS adapters, cables, and interposers (if required) for system attachment. Customers are also responsible for ordering media. For optimum performance, the customer must obtain the latest level of firmware prior to installing the unit. Customers can download the latest level of firmware from the LTO Web site

<http://www.ibm.com/storage/lto>

You are responsible for downloading or obtaining from IBM, and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM machine) and other software updates in a timely manner from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides. You may request IBM to install Machine Code changes; however, you may be charged for that service.

Cable orders

For the TS2250 Model H5S, a SAS cable is required to attach a TS2250 Tape Drive to a host SAS adapter. SAS/Mini-SAS cables provide attachment from HBA with SFF-8470 to the drive with SFF-8088. Mini-SAS/Mini-SAS cables provide attachment from HBA SFF-8088 to the drive with SFF-8088. At least one SAS cable should be specified on the initial plant order.

The following cable options are available for SAS attachment:

- Feature number 5402 (SEO 95P4711) - 2.0M SAS/Mini-SAS Cable (from HBA with SFF-8470 to drive with SFF-8088)
- Feature number 5502 (SEO 95P4713) - 2.0M Mini-SAS/Mini-SAS Cable (from HBA with SFF-8088 to drive with SFF-8088)

Refer to the **Specify or Special Features** section of the 3580 Sales Manual for a detailed description of the cables available.

Installability

Installation time for the TS2250 Tape Drive is approximately 0.5 to 0.7 hours.

Packaging

Product	Shipment group	Number of boxes
3580	TS2250 with Tape Drive (3580 Model H5S) Power cord option One cleaning cartridge Documentation CD that includes: <ul style="list-style-type: none">- IBM System Storage TS2250 Model H5S Tape Drive Setup, Operator, and Service Guide- IBM System Storage TS2250 Statement of Limited warranty- IBM Translated Safety Notices Documentation kit that includes: <ul style="list-style-type: none">- License Agreement- IBM System Storage TS2250 Statement of Limited warranty- IBM System Storage TS2250 Model H5S Quick Reference- CD pointer document- Device Driver pointer document- Compliance document	1

Supplies

For end users: The IBM LTO Ultrium 5 1.5 TB Data Cartridges (feature 8505 or SEO 46C2084) and the IBM LTO Cleaning Cartridge (feature 8002 or SEO 23R7008) for use in the TS2250 Model H5S Tape Drive can be purchased through the dealers around the world using the feature or SEO numbers with the initial order. IBM-branded media, including 1.5 TB LTO 5 tape cartridges, and media supplies can or will also be available directly through AAS. Refer to the 3589 Sales Manual for further information.

For information about IBM media, visit our Web site at

<http://www.storage.ibm.com/media>

For remarketers:

Remarketers can purchase IBM-branded media and media supplies, call 1-888-IBM-MEDIA.

For additional information, go to the following Web site

<http://www.storage.ibm.com/media>

For end users and remarketers:

IBM-branded media and media supplies can be ordered directly through AAS using machine type 3589.

IBM-branded media and media supplies can be also purchased through Priority Fulfillment Services and its distribution channel in North America, Latin America, and Asia Pacific.

For information about Priority Fulfillment Services distribution channels, visit the Web site below or call 1-972-881-0733.

<http://www.ibm.com/storage/media>

Security, auditability, and control

This product uses the security and auditability features of the host hardware, host software, and application software.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a Web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent™ is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM

on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, visit

<http://www.ibm.com/support/electronic>

Terms and conditions

Volume orders: Contact your IBM representative.

On-site Service

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM.

Warranty period

- Three years, IBM Ultrium 5 1.5 TB media is warranted separately

Optional IBM features initially installed in an IBM machine carry the same warranty period as the machine. If installed after the initial machine installation, they carry the balance of the machine warranty or the optional feature warranty, whichever is greater.

The following have been designated as consumables or supply items and are, therefore, not covered by this warranty:

- Media

Warranty service

If required, IBM provides repair or exchange service, depending on the type of warranty service specified below for the machine. IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines On-site Service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts. Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information.

The type of service is Customer Replaceable Unit (for example, keyboard, mouse, speaker, memory, or hard disk drive).

Customer Replaceable Unit (CRU) Service

IBM provides a replacement CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM at any time on your request. A CRU is designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU. Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If IBM installs a Tier 1 CRU at your

request, you will be charged for the installation. You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service specified below, On-site Service.

Based upon availability, a CRU will be shipped for next business day (NBD) delivery. IBM specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU, and you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts have been designated as Tier 1 CRUs:

- The complete IBM TS2250 Tape Drive with enclosure
- External 2.0 m SAS Cables

On-site Service

At IBM's discretion, you will receive specified CRU service, or IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

Service level is:

- 9 hours per day, Monday through Friday, excluding holidays, next business day response. Calls must be received by 5 p.m. local time in order to qualify for next business day response.

International Warranty Service

International Warranty Service (IWS) is not available.

Licensing

Programs included with this product are licensed under the terms and conditions of the License Agreements that are shipped with the system.

Customer Replaceable Unit (CRU) Service

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM.

Warranty period

- Three years, IBM Ultrium 5 1.5 TB media is warranted separately

Optional IBM features initially installed in an IBM machine carry the same warranty period as the machine. If installed after the initial machine installation, they carry the balance of the machine warranty or the optional feature warranty, whichever is greater.

Warranty service

If required, IBM provides repair or exchange service, depending on the type of warranty service specified below for the machine. IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call, machine technology, and availability of parts. Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information.

Customer Replaceable Unit (CRU) Service

IBM provides a replacement CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive) to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM at any time on your request. Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If IBM installs a Tier 1 CRU, at your request, you will be charged for the installation.

Based upon availability, a CRU will be shipped for next business day (NBD) delivery. IBM specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU, and you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts have been designated as Tier 1 CRUs:

- The complete IBM TS2250 Tape Drive with enclosure
- External 2.0 m SAS Cables

International Warranty Service

International Warranty Service (IWS) is not available.

Licensing

Programs included with this product are licensed under the terms and conditions of the License Agreements that are shipped with the system.

CRU and Machine Exchange Service

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM.

Warranty period

- Three years, IBM Ultrium 5 1.5 TB media is warranted separately

Optional IBM features initially installed in an IBM machine carry the same warranty period as the machine. If installed after the initial machine installation, they carry the balance of the machine warranty or the optional feature warranty, whichever is greater.

The following have been designated as consumables or supply items and are, therefore, not covered by this warranty:

- Media

Warranty service

If required, IBM provides exchange service for the machine. IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call, machine technology, and availability of parts. Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information.

CRU and Machine Exchange service

At IBM's discretion you will receive specified CRU service, or IBM will initiate shipment of a replacement machine to your location. You are responsible for its installation and verification of operation. You must pack the failed machine into the shipping container that contained the replacement machine and return the failed machine to IBM. Transportation charges, both ways, are paid by IBM. You may be charged for the replacement machine if IBM does not receive the failed machine within 15 days of your receipt of the replacement.

International Warranty Service

International Warranty Service (IWS) is not available.

Licensing

Programs included with this product are licensed under the terms and conditions of the License Agreements that are shipped with the system.

IBM hourly service rate classification

Two

Field-installable features

No

Model conversions

No

Machine installation

Customer setup. Customers are responsible for installation according to the instructions IBM provides with the machine.

Graduated program license charges apply

No

Licensed machine code

IBM Machine Code is licensed for use by a customer on the IBM machine for which it was provided by IBM under the terms and conditions of the IBM License Agreement for Machine Code, to enable the machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement at

http://www.ibm.com/servers/eserver/support/machine_warranties/machine_code.html

This license machine code pertains to a machine using LMC model:

3580-H5S

IBM may release changes to the Machine Code. IBM plans to make the Machine Code changes available for download from the IBM System Storage technical support Web site

http://www-304.ibm.com/jct01004c/systems/support/machine_warranties/index.html

You may also obtain updated code by contacting your IBM representative.

If the machine does not function as warranted and your problem can be resolved through your application of downloadable Machine Code, you are responsible for downloading and installing these designated Machine Code changes as IBM specifies. If you would prefer, you may request IBM to install downloadable Machine Code changes; however, you may be charged for that service.

Educational allowance

None

Prices

Country prices must be obtained from your local pricing function.

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