



IBM System Storage TS1060 Tape Drive offers an Ultrium 6 Tape Drive for the TS3500 Tape Library

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At a glance

The IBM® System Storage® TS1060 is an IBM LTO™ Ultrium™ 6 Tape Drive that combines IBM tape reliability and performance at open systems prices. The new Ultrium 6 Tape Drive:

- Increases maximum data transfer rate, providing to up to 160 MB/sec native as compared to LTO Ultrium 5 at 140 MB/sec native
- Supports LTO Generation 6 media specification tape cartridge compressed capacity of up to 6.25 TB with 2:5 to 1 compression
- Includes an 8 Gbps Fibre Channel dual-ported interface attachment
- Supports media partitioning and self-describing tape with Linear Tape File System™ (LTFS) Library Edition and LTFS Storage Manager software
- Supports encryption capabilities
- Adheres to LTO Generation 6 media specification
- Mounts in TS3500 Tape Library Model L53 or D53, and in 3584 Tape Library Models L52, L32, D52, or D32

TS3500 Tape Library functions and features include:

- Support for TS1060 Ultrium 6 tape drive in TS3500 Tape Library Model L53 or D53, and in 3584 Tape Library Models L52, L32, D52, or D32

Overview

IBM System Storage TS1060 (machine type 3588, model F6A) is designed to be installed in an **IBM System Storage TS3500 Tape Library** (machine type 3584) to offer high capacity and performance for the midrange open systems environment. This model incorporates the new Linear Tape-Open™ (LTO) IBM Ultrium 6 Tape Drive with enhanced maximum tape drive throughput over the IBM LTO generation 5 Tape Drive (Ultrium 5). It has a native data transfer of up to 160 MB/sec. The TS1060 Tape Drive supports the LTO Generation 6 media specification of an over double compressed capacity of up to 6.25 TB with 2.5 to 1 compression (up to 2.5 TB native capacity) compared to previous LTO 5 compressed capacity of up to 3.0 TB with 2:1 compression (up to 1.5 TB native capacity) per tape cartridge. IBM Ultrium 6 Tape Drives can read and write LTO Ultrium 5 Data Cartridges and read LTO Ultrium 4 Data Cartridges. The TS1060 has an 8 Gbps Fibre Channel dual-ported interface for connection to a wide spectrum of open system servers.

The IBM System Storage TS1060 LTO Ultrium 6 Tape Drive supports data encryption with Ultrium 6 or Ultrium 5 media.

IBM Ultrium 6 enhancements that help improve performance and reliability include:

- Native data transfer rate up to 160 MB/sec
- LTO Generation 6 media specification tape cartridge compressed capacity of up to 6.25 TB (up to 2.5 TB native)
- 8 Gbps Fibre Channel dual-ported drive attachment
- A larger 1 GB internal buffer
- Support for media partitioning and self describing tape with LTFS Library Edition and LTFS Storage Manager software
- LTO Ultrium 6 encryption support

The TS1060 can be installed in new or installed TS3500 Tape Library Models L53 and D53, and in 3584 Tape Library Models L52, L32, D52, and D32.

Key prerequisites

Appropriate levels of host and drive software are required to attach the TS1060 to a wide range of environments including selected IBM Power Systems™, IBM System i®, IBM System p®, IBM System x®, IBM System z® (zLinux), other servers running HP-UX, Linux™, Sun Solaris, and Microsoft™ Windows™ operating system environments that support Fibre Channel interfaces. Refer to the [Technical information](#) section for details.

LTO-6 tape drive support and other selected TS3500 features require Advanced Library Management (ALMS).

Note: In order to support code level 9500 or higher, all node cards in the library must be xx3-equivalent node cards. For xx2 models, this requires an xx3 model conversion or the Enhanced Node Card feature (#1700 or #1701).

Planned availability date

November 9, 2012

Description

IBM TS1060 is an IBM LTO Ultrium 6 Tape Drive designed for the heavy demands of backup and archive tape storage. The TS1060 is designed to mount in a TS3500 Tape Library and has an 8 Gbps Fibre Channel dual-ported interface for attachment to a wide range of environments, including selected IBM Power Systems, IBM System i, IBM System p, IBM System x, IBM System z (zLinux), other servers running HP-UX, Linux, Sun Solaris, and Microsoft Windows operating system environments.

The TS1060 incorporates sixth-generation IBM LTO Ultrium technology.

It offers the following significant improvements over prior generations:

- **Increased performance:** Maximum tape drive throughput native data rate performance is up to 160 MB/sec. Data tracks are written 16 at a time. IBM LTO6 Tape Drives can read and write LTO Ultrium 5 Data Cartridges at Ultrium 5 capacities and rates, and read LTO Ultrium 4 Data Cartridges at Ultrium 4 capacities and rates.

Note: Although the Ultrium 6 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 LTO Generation 6 media specification tape cartridge physical capacity is up to 6.25 TB compressed physical capacity, more than double that of the Ultrium 4 and 5 Data Cartridge. This is achieved by increasing the linear density, track density, and the media length. The IBM Ultrium 6 tape itself is an advanced Barium Ferrite tape developed to help provide durability and increased capacity.
- **Encryption:** The IBM System Storage TS1060 LTO Ultrium 6 Tape Drive supports data encryption on the base drive with Ultrium 6 or Ultrium 5 media. System Managed and Library Managed Encryption and associated IBM Tivoli® Key Lifecycle Manager access are all available as a chargeable licensed key (feature 1604, Transparent LTO Encryption) under the TS3500 Tape Library L-frames. IBM Tivoli Key Lifecycle Manager v1 (TKLM) is required with this feature.
- **Attachment options:** The TS1060 Tape Drive comes with 8 Gbps Fibre Channel dual-ported attachment models for connection to a wide spectrum of open system servers. They are supported on a wide range of environments including selected IBM Power Systems , IBM System i , IBM System p , IBM System x , IBM System z (zLinux), other servers running HP-UX, Linux , Sun Solaris, and Microsoft Windows operating system environments.
- **WORM media support:** LTO Generation 6 media specification compressed up to 6.25 TB IBM 3589 Ultrium 6 WORM Tape Cartridges are designed for archiving and data retention applications, as well as those applications requiring an audit trail. These cartridges work with the IBM LTO Ultrium 6 Tape Drive to help prevent the alteration or deletion of user data. IBM LTO 6 WORM Tape Cartridges can be ordered as unique 3589 models with the following features:
 - Prelabeling with the ability to specify a starting volume serial and color coding
 - Packaging in individual jewel cases or in bulk
 - Cartridge memory, built into every cartridge, enhances functionality and media reliability by storing access history and media performance information for use by the tape drive every time the cartridge is accessed
 - Half-inch particle tape with an up to 6.25 TB WORM compressed capacity in a single cartridge
- **Larger internal data buffer:** There is a 1 GB internal data buffer in the Ultrium 6 Tape Drive, compared to 512 MB for Ultrium 5.
- **Digital speed matching:** The Ultrium 6 Tape Drive is designed to perform dynamic speed matching (at one of fourteen speeds: 160.0, 150.8, 141.5, 132.3, 123.1, 113.8, 104.6, 95.4, 86.2, 76.9, 67.7, 58.5, 49.2 or 40.0 MB/s) to adjust the drive's native data rate as closely as possible to the net host data rate (after data compressibility has been factored out). This helps reduce the number of backhitch repositions and improve throughput performance. Speed matching on Ultrium 6 ranges from 40 to 160 MB/sec versus 40 to 140 MB/sec on Ultrium 5.
- **Giant Magneto Resistive (GMR) head design:** Use of flat lap head technology in GMR heads from our Enterprise Tape Drives for Ultrium 6 helps minimize contact, edge damage, debris accumulation, and wear on the tape as it moves over the read/write heads.
- **Dual-stage 16-channel head skew actuator:** The actuator is designed to provide precision head alignment to help support higher track density and improved data integrity. Track following skew actuator supports flangeless tape guide rollers and dynamic skew to enable the head to follow skew tape motion and improve linear actuation.
- **Power management:** The Ultrium 6 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. Improvements specifically in idle mode are improved over Ultrium 5.
- **IBM LTFS partitioning support:** The principal function of the media partitioning is to allow for faster data access by splitting the cartridge into two media partitions. LTFS media partitioning is supported in the TS1060 Tape Drive, and LTFS library Edition and LTFS Storage Manager are supported in the TS3500 Tape Library. WORM media cannot be partitioned.

The IBM LTFS software leverages LTO6 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 IBM LTFS software are those who require a standard tape cartridge format at a low cost and will use standalone IBM LTO6 tape drives. IBM LTFS 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 website

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

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 website

<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 " System Storage ".
- 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 drivers and software".
- This will 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 website

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

Proven IBM LTO Ultrium features enhanced in the IBM LTO Ultrium 6 Tape Drive include:

- **Independent tape loader and 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.
- **Graceful dynamic braking:** In the event of power failure, reel motors are designed to maintain tension and gradually decelerate instead of stopping abruptly, helping reduce tape breakage, stretching, or loose tape wraps during a sudden power outage.
- **Servo and track layout technology:** There are 2,176 data tracks in Ultrium 6 versus 1,280 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:** The patented Surface Control Guiding Mechanism from IBM is designed to guide the tape along the tape path in the Ultrium 6, 5, and 4 Tape Drives. 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:** Using some of the most robust components available, such as all metal clutch, steel

ball bearings in loader, robust leader block design, and single circuit card, helps to enhance reliability and prolong the life of drives.

- **Adaptive read equalization:** This feature is designed to automatically compensate for dynamic changes in readback signal response.
- **Dynamic amplitude asymmetry compensation:** Optimizes 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 helps improve performance if a subsequent append overwrites somewhere after the first filemark. A write of multiple filemarks typically indicates a point where an append operation might occur after the first of these filemarks, and this change helps prevent having to rewrite datasets containing customer data and the first filemark, if such an append occurs.
- **LTO Data Compression (LTO-DC):** The Ultrium 6 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. Scheme-Swapping compression, patented by IBM, 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. The compression ratio for LTO Ultrium 6 is 2.5 to 1.
- **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 Generation 6 LTO-CM is 16320 bytes, double the capacity of Generation 5 and 4 LTO-CM 8160 bytes. Communication between the drive and the LTO-CM is via a low-level RF field transmitted by the drive to the cartridge.
- **Statistical Analysis and Reporting System (SARS):** The Ultrium 6 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 most 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.
- **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, to deliver a more reliable drive. The sixth-generation drive electronics are designed to provide error correction of soft errors in the memory arrays in data and control paths.

With support for LTO Ultrium-format tape data cartridges, the TS1060 with the TS3500 Tape Library can be a cost-effective solution for backup, save-and-restore, and archiving functions.

Ultrium 6 Data Cartridge

The LTO Generation 6 media specification tape cartridge physical compressed capacity of the LTO 6 Data Cartridge has more than doubled the capacity of the IBM Ultrium 5 Data Cartridge with a capacity of up to 6.25 TB with 2.5 to 1 compression. IBM LTO Ultrium 6 Tape Drives can read and write Ultrium 5 data cartridges, and read Ultrium 4 data cartridges. IBM LTO 6 cartridges can be resident in the same TS3500 Tape Library with the Ultrium 5 and Ultrium 4 data cartridges. IBM LTO 6 data cartridges can be ordered using IBM machine type 3589, IBM LTO Ultrium Tape Cartridges.

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 TS1060 Tape Drive supports IBM LTFS partitioning which enables data to be written individually on media without affecting data on another partition.

TS3500 features and functions

- **TS1060 Ultrium 6 Tape Drive Support:** TS1060 Ultrium 6 tape drive is supported in TS3500 Tape Library Model L53 or D53, and in 3584 Tape Library Models L52, L32, D52, or D32. Appropriate levels of host and drive software are required to attach the TS1060 to a wide range of environments, including selected IBM Power Systems , IBM System i , IBM System p , IBM System x , IBM System z (zLinux), other servers running HP-UX, Linux , Sun Solaris, and Microsoft Windows operating system environments that support Fibre Channel interfaces.

Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Product positioning

As you compare competitive tape solutions, consider:

- Capacity and performance requirements
- Data integrity and encryption, reliability, and availability
- Data partitioning, formatting, and management like LTFS
- Storage usage and application requirements
- Affordability
- Loyalty to legacy or existing tape formats

The TS1060 and its software applications are designed to address these requirements and deliver a functionally rich tape storage solution incorporating LTO Ultrium 6 Tape Drive technology.

The TS1060 is an excellent choice if you use tape drives that require larger capacity or higher performance tape backup. The TS1060 Tape Drive can be the answer to growing storage requirements and shrinking backup and archive windows.

The TS3500 Tape Library and IBM software applications excel in addressing these requirements and deliver a functionally rich tape storage solution incorporating LTO Ultrium and 3592 tape technology. You also gain flexibility of automated tape library management and unattended save, restore, and archive operations.

The TS3500 Tape Library models are a smart choice for tape automation for IBM Power® , IBM System i , IBM System p , IBM System x , IBM System z products, or Linux , and other popular open systems.

The TS3500 utilizes the patented Multi-Path Architecture, designed to allow homogeneous or heterogeneous open systems applications to share the library robotics, with ALMS for storage slot pooling and flexible drive assignment. Additional TS3500 features include Capacity on Demand entry library frames, LTO and 3592 drive technology choices and integration, dual active accessors, and 16-frame expansion.

The TS3500 Tape Library Base Frame Model L53 offers 64 to 287 slots for LTO Ultrium tape cartridge media and up to twelve IBM LTO Ultrium Fibre Channel Tape Drives. It is designed to provide excellent price and performance in the open systems environments.

The TS3500 Tape Library Base Frame Model L23 offers 58 to 260 slots for 3592 tape cartridge media and up to twelve IBM TS1130, TS1140, or 3592 Tape Drives. The TS1130, TS1140, or 3592 Tape Drives are designed to provide high capacity, performance, and reliability in open systems environments with tape drive flexibility to accommodate capacity and fast access where these requirements are needed.

Up to fifteen 3584 or TS3500 Tape Library Expansion Frame Models D22, D23, D32, D52, D53, S24, or S54 can be added to either the Model L22, L23, L32, L52, or L53. The Model D23 or D22 provides up to 400 cartridge slots for 3592 media, and can contain up to twelve TS1130 or 3592 Tape Drives. The Models D32, D52, or D53 provide up to 440 slots for Ultrium media, and can contain up to twelve Ultrium Tape Drives. The Model S24 provides up to 1000 cartridge slots for 3592 media, and does not support tape drives. The Model S54 provides up to 1320 cartridge slots for LTO media, and does not support tape drives. When a Model HA1 is attached, the last Models D22, D23, D52, D53, S24, or S54 in the TS3500 Tape Library functions as a Service Bay B for the second accessor.

The TS3500 is part of a family of IBM System Storage LTO Ultrium tape products and can be the answer to growing storage requirements and shrinking backup windows.

If you have existing digital linear tape experience or require high-performance, automated tape backup, the TS3500 Tape Library constitutes an excellent tape storage solution. The IBM LTO Ultrium Tape Drives in the TS3500 Tape Library provide an excellent functional alternative to DLT/SDLT, 1/4 in, 4 mm, 8 mm, IBM Magstar® MP 3570, or older LTO generation tape drives.

Depending on capacity requirements, a wide spectrum of tape libraries are available from the IBM Ultrium Tape family of products, based on your storage usage and requirements. Lower capacity tape automation products to choose from include the IBM System Storage TS3310, TS3200, or TS3100 Tape Libraries.

For high duty-cycle and start/stop intensive tape applications, with mission-critical data protection and high-capacity requirements, consider the IBM System Storage TS1130, TS1140, or 3592 Tape Drive with the IBM System Storage TS3500 Tape Library.

Statement of general direction

Product preview

IBM intends to introduce and integrate the IBM System Storage Ultrium 6 Tape Drive technology in selected existing, additional, or alternative IBM System Storage Tape products.

IBM intends to also introduce tape cartridge media meeting the LTO Generation 6 media specification.

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Reference information

For more information, refer to the following announcements:

- IBM System Storage TS1060 Tape Drive Model F6A, Hardware Announcement [ZG12-0272](#), dated October 03, 2012
- The IBM System Storage LTFS Storage Manager V1R1 for TS3500, Software Announcement [ZP12-0253](#), dated June 04, 2012
- The IBM System Storage Tape System Library Manager (TSLM) V1R1, Software Announcement [ZP12-0236](#), dated June 04, 2012
- The IBM System Storage LTFS Library Edition V2R1 for TS3500, Software Announcement [ZP11-0215](#), dated May 09, 2011
- IBM System Storage TS3500 Tape Library Connector Shuttle Complex and TS1140 Tape Drive support, Hardware Announcement [ZG11-0138](#), dated May 09, 2011
- The IBM System Storage TS1140 Tape Drive Model E07, Hardware Announcement [ZG11-0139](#), dated May 09, 2011
- IBM System Storage TS1050 Tape Drive Model F5A, Hardware Announcement [ZG10-0101](#), dated April 12, 2010
- IBM System Storage TS1040 Tape Drive Model F4A, Hardware Announcement [ZG07-0294](#), dated April 24, 2007
- IBM System Storage TS3500 Tape Libraries Supporting LT04 and 4X I/O, Hardware Announcement [ZG07-0293](#), dated April 24, 2007
- The IBM System Storage TS3500 Tape Library, Hardware Announcement [ZG06-0394](#), dated May 09, 2006
- The 3584 Model HA1, Hardware Announcement [ZG05-0166](#), dated February 15, 2005

For IBM statement on compliance with European Union Directive on Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (2002/95/EC) (RoHS), visit

<http://www.ibm.com/ibm/environment/products/rohs.shtml>

Product number

Description	Machine type	Model	Feature number
TS1060 Ultrium 6 Tape Drive	3588	F6A	
3588 F6A Drive Plant Install	3588	F6A	9697
3588 F6A Drive Field Install	3588	F6A	9698

Description	Machine type	Model	Feature number
3588 F6A Drive Plant Install	3584	L53, D53	9697

Description	Machine type	Model	Feature number
3588 F6A Drive Field Install	3584	L32, D32, L52, D52, L53, D53	9698

Publications

Information on the TS1060 Tape Drive Model F6A is contained in the following TS3500 Tape Library publications. Additional copies are available. To order, contact your IBM representative.

Title	Order number
IBM System Storage TS3500 Tape Library with ALMS Introduction and Planning Guide	GA32-0593
IBM System Storage TS3500 Tape Library with ALMS Operator Guide	GA32-0594
IBM System Storage TS3500 Tape Library SCSI Reference	GA32-0561
IBM Tape Device Driver Installation and User's Guide (English)	GC27-2130

Note: All new IBM tape device drivers will be posted to the web through the Fix Central download portal. 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 website

<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 " System Storage ".
- 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 drivers and software".
- This will 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 website

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

The 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.

Product publications will be available in English language on the day of announcement. Key product publications will be submitted to National Language Support for translation. When completed, translations will be available through country ordering systems and the Publications Center Portal. They will also be available from the following website

<http://www-03.ibm.com/storage/tape/ts3500/index.html>

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: 186 mm (7.3 in)
- Depth: 455 mm (17.9 in)
- Height: 89 mm (3.5 in)
- Weight: 5.07 kg (11.2 lb)

Operating environment

- Temperature: 16° to 32° C (60° to 90° F) in operation (media in use)
- Relative humidity: 20% to 80% non-condensing (limited by media)
- Wet bulb: 26° C (78.8° F) maximum
- Electrical power:
 - 9 watts, idle, no tape loaded
 - 32 watts - max continuous (not peak), reading and writing
- Heat output: 109 Btu/Hour - maximum continuous
- Capacity of exhaust: 0.80 Cubic meter/minute (28 CFM) per drive, maximum
- Noise level: 4.8 Bels idle; 6.4 Bels operating

Hardware requirements

The TS1060 is designed for installation in the TS3500 Tape Library Model L53, D53, L52, D52, L32, or D32. Up to 12 TS1060s can be installed in one of these frames (for a total of up to 192 Ultrium Tape Drives in a 16-frame library). The TS1060s can be installed and intermixed within the same frame with other Ultrium 1, 2, 3, 4, 5, or 6 Tape Drives.

TS1060 Model F6A has an 8 Gbps Fibre Channel interface that may attach in either Fabric topology or Arbitrated Loop topology. An LTO Fibre Drive Mounting Kit feature (#1504 or #1514) is required on a TS3500 Tape Library frame to install a TS1060. The TS1060 must be ordered separately, and is designed for customer setup in the TS3500 Tape Library. When ordered with a new TS3500 (coming from the plant), one of the following feature numbers should be specified:

- #9697 (3588 F6A Plant Install) should be specified on the TS1060, and the TS3500 Tape Library frame into which it will be installed, if it is going to be shipped with the TS3500 Tape Library frame.
- #9698 (3588 F6A Field Install) should be specified on the TS1060 if it is going to be shipped for installation into an already installed TS3500 Tape Library frame.

The TS1060 Tape Drive Model F6A is designed for customer setup. However, if the customer desires assistance with the installation, the following feature can be ordered on the TS3500 frame (one feature for each drive that is needed):

- #1678 - 3588 Drive Field Install Assist

Customer-owned TS1060, TS1050, or TS1040 Tape Drives, or 3588 tape drives removed from a TS3500 library frame can be installed in another TS3500 frame. A LTO Fibre Drive Mounting Kit feature (#1514) is required for installing a TS1060 or 3588 Tape Drive in a drive slot in a TS3500 Tape Library Model L53 or D53 frame. A LTO Fibre Drive Mounting Kit feature (#1504) is required for installing a TS1060 or 3588 Tape Drive in a drive slot in a 3584 Model L32, D32, L52, or D52 frame.

Labeled or bulk quantities of LTO Ultrium cartridges can be ordered using machine type 3589 or purchased through distributors. Refer to the [Supplies](#) section for additional information.

Note: The TS3500 requires that cartridges have appropriate bar code labels.

A TS1060 in the TS3500 Tape Library can be attached to a wide range of environments, including selected IBM Power Systems , IBM System i , IBM System p , IBM System x , IBM System z (zLinux), other servers running HP-UX, Linux , Sun Solaris, and Microsoft Windows operating system environments that support Fibre Channel interfaces.

A current list of supported open system configurations for the TS1060 Tape Drive Model F6A is available from the following website

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

Select the model, then "Interoperability Matrix", and view the "Supported Servers and Operating Systems" for the product.

Cables: Cables are required to attach tape drives in the TS3500 Tape Library to each server connection (up to the number of tape drive attachments installed). One or more of the following Fibre Channel cables should be specified on the TS3500 frame.

Fibre Channel cables: A Fibre Channel cable is required to attach a TS1060 in the TS3500 Tape Library via the standard Fibre Channel patch panel in the TS3500 Tape Library Model L23 or L53 to host Fibre Channel adapters, the IBM 2109 SAN Fibre Switch, or other Fibre Channel components. The cable can be customer supplied, or ordered with the TS3500 Tape Library in the lengths shown. The attaching Fibre Channel cable must be a 50.0/125 micrometer short wavelength fiber-optic cable for distances up to 500 meters. These tape drives come with LC Duplex connectors. One 2.0 meter LC-LC Fibre Channel drive-to-patch panel cable is included with each Fibre Mounting Kit (#1504 or #1514). If additional cables are required, for example, to attach the second interface on a 3588 Model F6A or F5A Tape Drive, they can be ordered with the following feature number 1461 - Additional LC/LC Patch Panel Cable.

Features available for Fibre Channel cables, and their respective lengths, are available on the TS3500 frame, with the following feature numbers:

- #6005 - 5 m LC-LC Fibre Channel Cable
- #6013 - 13 m LC-LC Fibre Channel Cable
- #6025 - 25 m LC-LC Fibre Channel Cable
- #6061 - 61 m LC-LC Fibre Channel Cable

An interposer is available to connect a tape drive or server LC Duplex adapter to a SC Duplex cable by ordering the Interposer SC-LC Fibre feature (#5096).

Refer to the **Special Features** section of the TS3500 or 3584 Tape Library Sales Manual for detailed descriptions of these features.

Host Bus Adapter (HBA) Support

For a current list of HBAs that support the TS1060 or TS3500, 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 TS3500 or 3584, TS1060, TS1050, TS1140, or TS1130, refer to the following website

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

Note: All new IBM tape device drivers will be posted to the web through the Fix Central download portal. 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 website

<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 " System Storage ".
- 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 drivers and software".
- This will 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 website

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

Tivoli Storage Manager and other compatible software offerings provide storage and tape management software for the TS3500 or 3584. Supporting software and applications must be obtained separately from IBM , IBM Business Partners, or ISVs. A list of compatible software is available from your IBM representative or visit

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

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

IBM continues to work together with ISVs to support the TS3500 Tape Library. Individual application vendors should be contacted for specific information and

availability dates. Consult with ISV providers for their support of mixed drive types and media types in the same logical library.

TS1060 Tape Drive and Encryption

Support for the TS1060 Tape Drive in the TS3500 Tape Library is provided in i5/ OS® , AIX® , HP-UX, Linux , Sun Solaris, and Microsoft Windows 2003 operating system environments. The installation of a TS1060 Model F6A Tape Drive with encryption may require code updates for Power Systems , System p , System i , System x , and System z and supported open systems device drivers or storage management software. Per the *Solutions Assurance Product Review (SAPR) Guide*, the account team or Business Partner should confirm that the customer checks the appropriate PSP buckets for System z environments or the equivalent support levels required for their particular software environment prior to the installation of the TS1060 Tape Drive.

Note: All new IBM tape device drivers will be posted to the web through the Fix Central download portal. 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 website

<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 " System Storage " .
- 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 drivers and software".
- This will 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 website

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

For a current list of host software versions and release levels that support the TS1060 and TS3500, or TS1060, TS1050, TS1140, TS1130, refer to the following website

<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 TS1060 or TS3500 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 TS1060 Ultrium Tape Drive or TS3500 family of products. Individual application vendors should be contacted for specific information and availability dates.

Compatibility

The TS1060 Tape Drives can read and write LTO Ultrium 6 or 5 Data Cartridges, and can read LTO Ultrium 4 Data Cartridges. The LTO Generation 6 media specification up to 6.25 TB compressed data cartridges can only be used on the new IBM LTO Ultrium 6 Tape Drives.

The TS1060 Tape Drive and LTO Ultrium 6 cartridges can be resident in the same TS3500 Tape Library with IBM LTO Ultrium 5 Tape Drives and cartridges, IBM LTO Ultrium 4 Tape Drives and cartridges, or with TS1130, TS1140 or 3592 Tape Drives and cartridges.

Limitations

- Although 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.
- Fibre Channel cable lengths are limited to 500 meters (1,650 ft).
- Although multiple systems may be attached to a tape drive, the systems cannot use the drive simultaneously.

For LTO Ultrium 6 and 5, IBM Tivoli Key Lifecycle Manager V1.0 or V2.0 is required for enabling System Managed and Library Managed Encryption.

Planning information

Customer responsibilities

Physical planning is a customer responsibility. Detailed planning information is in the *IBM System Storage TS3500 Tape Library Introduction and Planning Guide* (GA32-0559). Current levels of the open systems device drivers should be obtained to ensure the TS1060 Tape Drive Model F6A is supported.

Customers are responsible for obtaining the appropriate adapters, cables, and interposers (if required) for system attachment. Customers are also responsible for ordering media.

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 website 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

Cables are required to attach the TS1060 Tape Drive Model F6A in the TS3500 Tape Library to each server connection (up to the number of tape drive attachments installed). Refer to **Cables** in the [Hardware requirements](#) section for a list of cables for the TS1060 Tape Drive.

Installability

Installation time for the TS1060 Tape Drive Model F6A is approximately 0.5 to 0.7 hours.

Packaging

Product	Shipment group	Number of boxes
3588 Model F6A	3588 Tape Drive Model F6A	1

Supplies

For users and remarketers (IBM tape supplies):

IBM TS1060 Tape Drive Model F6A media supplies can be ordered directly through AAS as Machine Type 3589.

IBM TS1060 Tape Drive Model F6A supplies can be also purchased through Priority Fulfillment Services and its distribution channel in North America, Latin America, and Asia Pacific. These TS1060 Tape Drive Model F6A supplies can be purchased through Forex Telegistics BV and its distribution channel in Europe, the Middle East, and Africa.

For information about Priority Fulfillment Services Europe distribution channels, call +31-433-502-756.

Other country-specific numbers can be found at

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

Security, auditability, and control

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

Global Technology Services

Contact your IBM representative for the list of selected services available in your country, either as standard or customized offerings, for the efficient installation, implementation, and/or integration of this product.

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.

Warranty period

One year

An IBM part or feature installed during the initial installation of an IBM machine is subject to a full warranty effective on the date of installation of the machine. An IBM part or feature that replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. An IBM part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty effective on its date of installation. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature are the same as those for the machine in which it is installed.

Extended Warranty Service

This product is provided with one year of standard warranty. For your convenience, IBM has provided additional years of extended warranty services to make this offering. Please consult with your advisors about the appropriate financial treatment for this offering.

Warranty service

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via 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 IBMs normal service area. Contact your local IBM representative or your reseller for country and location-specific information.

On-site Service

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:

- 24 hours per day, 7 days a week, 6 hour average, same day response.

Non-IBM parts service

Warranty service

IBM is now shipping machines with selected non-IBM parts that contain an IBM field replaceable unit (FRU) part number label. These parts are to be serviced during the IBM machine warranty period. IBM is covering the service on these selected non-IBM parts as an accommodation to their customers, and normal warranty service procedures for the IBM machine apply.

Warranty service upgrades

During the warranty period, warranty service upgrades provide an enhanced level of On-site Service for an additional charge. Service levels are response-time objectives and are not guaranteed. See the Warranty services section for additional details.

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.

Maintenance service options

On-site Service

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. The following on-site response-time objectives are available as warranty service upgrades for your machine. Available offerings are:

- local time in order to qualify for same business day response.
- 24 hours per day, 7 days a week, 6 hour average, same day response.

Maintenance services

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via 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 maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBMs normal service area. Contact your local IBM representative or your reseller for country and location-specific information. The following service selections are available as maintenance options for your machine type.

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 levels are:

- 9 hours per day, Monday through Friday, excluding public or national holidays, next business day response. Calls must be received by 15:00 local time in order to qualify for next business day response.

- 9 hours per day, Monday through Friday, excluding public or national holidays, same business day response. Calls must be received by 12:00 local time in order to qualify for same business day response.
 - 18 hours per day, Monday through Saturday, excluding public or national holidays, same business day response. Calls must be received by 18:00 local time in order to qualify for same business day response.
 - 24 hours per day, 7 days a week, 6 hour average, same day response.
 - ESA and SSU customers: 2 hour coverage extension at no additional charge, 9 hours per day, Monday through Friday, excluding holidays, next business day response. Calls must be received by 15:00 local time in order to qualify for next business day response.
- or
- ESA and SSU customers: 2 hour coverage extension at no additional charge, 9 hours per day, Monday through Friday, excluding holidays, same business day response. Calls must be received by 12:00 local time in order to qualify for same business day response.

Machine Exchange Service

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.

Non-IBM parts service

Under certain conditions, IBM provides services for selected non-IBM parts at no additional charge for machines that are covered under warranty service upgrades or maintenance services.

This service includes hardware problem determination (PD) on the non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, memory) installed within IBM machines and provides the labor to replace the failing parts at no additional charge.

If IBM has a Technical Service Agreement with the manufacturer of the failing part, or if the failing part is an accommodations part (a part with an IBM FRU label), IBM may also source and replace the failing part at no additional charge. For all other non-IBM parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or a maintenance service.

Warranty service upgrades

Usage plan machine

No

IBM hourly service rate classification

Two

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Maintenance service offerings

This machine is eligible under terms and conditions of IBM ServiceElite, the IBM Enterprise Service Agreement (ESA), or the IBM Maintenance Agreement. Consult your IBM representative for details.

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 internal code and licensed machine code

This product does not contain Licensed Internal Code or Licensed Machine Code.

Pricing

For all local charges, contact your IBM representative.

Announcement countries

All European, Middle Eastern, and African countries.

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Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.

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For the most current information regarding IBM products, consult your IBM representative or reseller, or visit the IBM worldwide contacts page

Corrections

(Corrected on November 9, 2012)

The Overview and Description sections have been updated to correct the LTO6 internal buffer.