

## IBM Half-High LTO Generation 5 SAS Tape Drive

### IBM System x at-a-glance guide

The fifth-generation IBM® Linear Tape-Open (LTO) Half-High Ultrium Drive delivers twice the capacity (up to 3.0 TB) with significantly greater performance (up to 280 MBps) than the preceding generation, extending the proven reliability and low-cost of ownership LTO lineage to effectively meet the demanding backup, archival, and regulatory compliance requirements of your System x® environment. This enterprise data protection offering is available in a 5.25" half-height internal form factor for integration into IBM System x tower servers and external IBM 1U rackmount enclosures or a half-height external unit for standalone table top or rack shelf applications.

Figure 1 shows the internal IBM Half-high LTO Generation 5 SAS Tape Drive,



Figure 1. IBM Half High LTO Gen 5 Internal SAS Tape Drive

### Did you know

LTO Generation 5 tape drives feature hardware-based data encryption capabilities and support write once, read many (WORM) cartridges to help protect your data. WORM cartridges allow you to store vital data in a non-erasable, non-rewritable format, while AES256 hardware encryption can securely store data to help ensure compliancy with data security, information disclosure, and privacy regulations for data at rest.

This drive is also the first LTO generation to introduce Media Partitioning & IBM Linear Tape File System, which allows LTO Gen 5 media to be divided into segments, improving accessibility by providing the ability to quickly locate data to retrieve or update.

## Part number information

Table 1 lists the ordering part numbers and feature codes.

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
IBM Half-High LTO Generation 5 SAS Tape Drive	49Y9898	5345
IBM External Half-High LTO Gen 5 SAS Tape Drive (with US line cord)	3628L5X	3628-HC1 fc A1XF*
IBM External Half-High LTO Gen 5 SAS Tape Drive (without a line cord)	3628N5X	3628-HC1 fc A1XF
IBM LTO 5 Media 5 Pack	49Y9899	5346
LTO Cleaning Cartridge Option	49Y9893	5347

\* The feature code does not include the US line cord.

The IBM Half-High LTO Generation 5 SAS Tape Drive part number 49Y9898 includes:

- LTO Generation 5 internal SAS tape drive assembly
- Tape mount kit (drive rails)
- Ultrium Cleaning Cartridge
- Documentation CD containing the User's Guide
- Important Notices
- Warranty flyer
- SAS cable for internal tape connectivity

The IBM Half-High LTO Gen 5 External SAS Tape Drive part numbers 3628L5X and 3628N5X include:

- LTO Generation 5 external SAS tape drive
- Ultrium Cleaning Cartridge
- Documentation CD containing the User's Guide
- Important Notices
- Warranty flyer
- External 3m SAS cable (mini-SAS SFF-8088/8088)
- For 3628L5X only: 2.8 m NEMA 5-15P - IEC 320 C13 Line Cord

Figure 2 shows the IBM Half-High LTO Gen 5 External SAS Tape Drive.



Figure 2. IBM Half-High LTO Gen 5 External SAS Tape Drive

## Features

The features of the IBM Half-High LTO Generation 5 SAS Tape Drive are:

- Backward compatibility with LTO 4 (read and write) and LTO 3 (read) media
- Speed matching and channel calibration for improved performance
- Media partitioning for faster access to stored data
- Support for host Application Managed Encryption (AME)
- Support for SAS adapters for improved performance and reliability
- Support for leading operating systems and popular backup software

## Specifications

The specifications for the IBM Half-High LTO Generation 5 SAS tape drive are:

- 6 Gbps SAS interface
- Half-height form factor (for internal tape drive) or standalone tabletop enclosure (for external tape drives)
- Native storage capacity of 1,500 GB (1.5 TB) per cartridge (3,000 GB at 2:1 compression)
- Maximum native data transfer rate of up to 140 MB per second
- Burst data transfer rate of 600 MB per second
- 256 MB read-and-write cache
- Support for encryption on Ultrium 5 tape cartridges
- Single-character display (SCD) operator panel
- Ready and fault status lights
- Maintenance mode functions

The IBM Half-High LTO Gen 5 External SAS Tape Drive has two SAS ports at the rear of the unit. However, the drive supports only one host connection. The other SAS connection is unused. The external tape drive also has an Ethernet port, which is used by service personnel only.

## Key prerequisites

The IBM Half-High LTO Generation 5 SAS Tape Drive prerequisites are:

- SAS controller
- One or more LTO Generation 4 or LTO Generation 5 data cartridges (not supplied with drive option)
- An available half-height drive bay or supported external tape enclosure for internal drive

## Physical specifications

The physical specifications of the internal IBM Half-High LTO Generation 5 SAS Tape Drive are:

- Height: 43 mm (1.7 in.)
- Width: 148 mm (5.8 in.)
- Depth: 210 mm (8.3 in.)
- Weight: 1.6 kg (3.5 lb)

The physical specifications of the external IBM Half-High LTO Generation 5 SAS Tape Drive are:

- Height: 58 mm (2.3 in.)
- Width: 213 mm (8.4 in.)
- Depth: 332 mm (13.1 in.)
- Weight: 4.3 kg (9.4 lb)

## Operating environment

The IBM Half-High LTO Generation 5 SAS Tape Drives (both internal and external) are supported in the following environment:

- Temperature:
  - Operating: 10 to 40 °C (50 to 104 °F)
  - Storage or shipping: -40 to 60 °C (-40 to 140 °F)
- Relative humidity:
  - Operating: 20 to 80% (non-condensing)
  - Storage or shipping: 10 to 90% (non-condensing)
- Maximum altitude:
  - Operating or storage: 3048 m (10000 ft.)
  - Shipping: 12,192 m (40000 ft.)
- Power specifications for external tape drives:
  - AC line current 100 to 240 Vac
  - Line frequency 50 to 60 Hz, auto-ranging
  - Line current at 100 Vac 0.48 A
  - Line current at 240 Vac 0.20 A

## Warranty

The IBM Half-High LTO Generation 5 SAS tape drive has a one-year limited warranty. When installed in a System x server, this tape drive inherits your system's base warranty and any IBM ServicePack upgrade.

The IBM Half High LTO Gen 5 External SAS Tape Drive has a three-year limited warranty.

## Supported servers

The IBM Half-High LTO Generation 5 SAS Tape Drives (both internal and external) are supported with the IBM System x and BladeCenter servers listed in Table 2. Blade servers are only supported with BladeCenter S chassis (8886) and SAS Connectivity Modules (part number 39Y9195). The internal tape drive can be used internally in the server that has an open 5.25" HH bay (commonly used with tower servers) or externally in the tape enclosure connected to the server (commonly used with rack or blade servers).

Table 2. Supported System x servers (part 1)

Adapter	x3100 M3	x3200 M2	x3200 M3	x3250 M2	x3250 M3	x3350	x3400	x3400 M2	x3400 M3	x3455	x3500	x3500 M2	x3500 M3
Internal LTO 5 SAS Tape Drive (installed internally to the server)	N	N	Y	N	N	N	N	Y	Y	N	N	Y	Y
Internal LTO 5 SAS Tape Drive (installed externally in an enclosure)	N	N	Y	N	Y	N	N	Y	Y	N	N	Y	Y
External LTO 5 SAS Tape Drive	N	N	Y	N	Y	N	N	Y	Y	N	N	Y	Y

Table 2. Supported System x servers (part 2)

Adapter	x3550 M2	x3550 M3	x3620 M3	x3630 M3	x3650	x3650 M2	x3650 M3	x3655	x3690 X5	x3755	x3755 M3	x3850 M2	x3950 M2	x3850 X5
Internal LTO 5 SAS Tape Drive (installed internally to the server)	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Internal LTO 5 SAS Tape Drive (installed externally in an enclosure)	Y	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	Y	Y
External LTO 5 SAS Tape Drive	Y	Y	Y	Y	N	Y	Y	N	Y	N	Y	Y	Y	Y

Table 2. Supported servers (part 3)

Expansion card	HS12	HS21	HS21 XM	HS22	HS22V	HX5	LS21	LS22	LS41	LS42	JS12	JS21	JS22	JS23/JS43	PS700/1/2	PS703/4
Internal LTO 5 SAS Tape Drive (installed internally to the server)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Internal LTO 5 SAS Tape Drive (installed in an enclosure)	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	N
External LTO 5 SAS Tape Drive	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	N

## Internal use

The following components are needed:

- A supported SAS host bus adapter installed in the server (Table 3)
- An available 5.25-inch, half-height bay

## External use

If the internal tape drive is to be installed in an external enclosure, the following components are needed. We describe these enclosures and the enclosure adapter kit in the "Supported enclosures and enclosure kit" section.

- A supported SAS host bus adapter installed in the server (Table 3)
- A supported external enclosure:
  - IBM 1U Rackmount Tape Enclosure
  - IBM Half High Tabletop Tape Enclosure
- An IBM SAS Enclosure Adapter Kit (40K2599)

If the external tape drive is to be used, a supported SAS host bus adapter installed in the server is needed. Table 3 lists the host bus adapters that are supported with the IBM Half-High LTO Generation 5 SAS Tape Drive.

Table 3. Supported SAS host bus adapters

Description	Part number	Feature code
IBM System x SAS HBAs		
IBM 3 Gb SAS HBA Controller v2	44E8700	3583
IBM 6 Gb SAS HBA Controller	46M0907	5982
IBM BladeCenter SAS HBAs		
SAS Expansion Card (CFFv) for IBM BladeCenter	39Y9190	2979
SAS Connectivity Card (CIOv) for IBM BladeCenter	43W4068	1593
ServeRAID-MR10ie (CIOv) Controller for IBM BladeCenter	46C7167	5490

For the latest and most accurate compatibility information, visit the ServerProven® website at: <http://ibm.com/servers/eserver/serverproven/compat/us/> or see the *IBM System x Configuration and Options Guide* at <http://www.ibm.com/systems/xbc/cog/>.

## Supported enclosures and enclosure kit

You can use the enclosures and enclosure kit listed in Table 4 with the LTO 5 internal tape drive when it is to be installed externally.

Table 4. External enclosures for use with the internal IBM Half-High LTO Generation 5 SAS Tape Drive

Description	Part number	Feature code
IBM 1U Rack-mount Tape Enclosure	87651UX (AG)*	None
IBM 1U Rack-mount Tape Enclosure	87651NX (AP and EMEA)†	None
IBM Half High Tabletop Tape Enclosure	8767HHX (AG)*	None
IBM Half High Tabletop Tape Enclosure	8767HNX (AP and EMEA)†	None
IBM SAS Enclosure Adapter Kit‡	40K2599	5382

\* These models are for customers in the Americas Group (AG: Canada, U.S., and countries in South America). These models ship with a NEMA 5-15P line cord.

† These models are for customers in the countries known collectively as Asia Pacific (AP) and Europe, Middle East, and Africa (EMEA). These models do not ship with a line cord.

‡ One adapter kit is needed per drive.

Figure 3 shows the IBM Half-High LTO Generation 5 SAS Tape Drive installed in the left-most bay of the IBM 1U Rack-mount Tape Enclosure (87651UX).



Figure 3. The tape drive installed in the 1U rack-mount tape enclosure

The IBM SAS Enclosure Adapter Kit, 40K2599, includes the following items:

- SAS backplane
- 3M external SAS cable (mini-SAS SFF-8088/8088)

## Popular configurations

In this section, we illustrate how you can use the IBM Half-High LTO Generation 5 SAS Tape Drive in configurations.

### Internal installation

Figure 4 shows the IBM Half-High LTO Generation 5 SAS Tape Drive installed internally in a System x tower server.

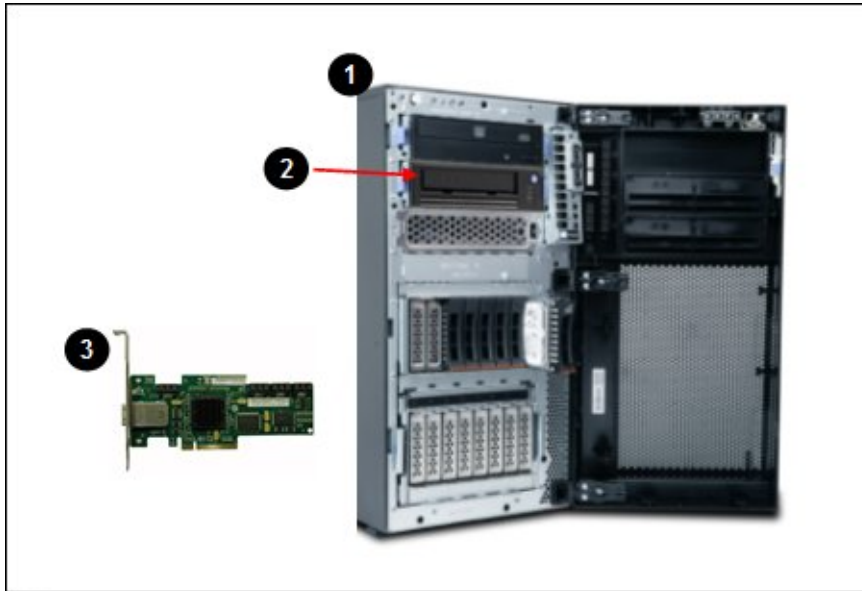


Figure 4. The IBM Half-High LTO Generation 5 SAS Tape Drive installed internally in a System x tower server

Table 5 lists the parts that are used.

Table 5. Components used when installing the IBM Half-High LTO Generation 5 SAS Tape Drive into a tower server

Diagram reference	Part number/machine type	Description	Quantity
1	Varies	Supported IBM System x tower server	1
2	49Y9898	IBM Half-High LTO Generation 5 SAS Tape Drive (includes internal cable)	1
3	46M0907	IBM 6 Gb SAS HBA Controller	1



## Installation in a 1U external enclosure

Figure 5 shows the IBM Half-High LTO Generation 5 SAS Tape Drive installed in an IBM 1U Tape Drive External Enclosure and connected to a System x server.



Figure 5. The tape drive installed in an IBM 1U Tape Drive External Enclosure and connected to a System x server

Table 6 lists the parts that are used.

Table 6. Components used when connecting the IBM Half-High LTO Generation 5 SAS Tape Drive installed in external tape drive enclosure to a supported System x server

Diagram reference	Part number/machine type	Description	Quantity
1	Varies	Supported System x server	1
2	46M0907	IBM 6 Gb SAS Host Bus Adapter	1
3	49Y9898	IBM Half-High LTO Generation 5 SAS Tape Drive	1
4	87651UX	IBM 1U Tape Drive External Enclosure	1
Inside the enclosure	40K2599	IBM SAS Enclosure Adapter Kit (includes the internal cable, 3 m external SAS cable)	1

Figure 6 shows an IBM 1U Tape Drive External Enclosure without the SAS Adapter Kit and after installing the SAS Adapter Kit.



Figure 6. The 1U Tape Drive Enclosure with and without the SAS Enclosure Adapter Kit

### Supported software products

The IBM Half-High LTO Generation 5 SAS Tape Drive supports the following software products:

- CA BrightStor ARCserve Backup
- Legato Networker
- Tivoli® Storage Manager
- Symantec Backup Exec
- Built-in backup functionality of supported operating system (native backup)

### Supported operating systems

The IBM Half-High LTO Generation 5 SAS Tape Drive supports the following operating systems:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x86 Edition
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Web x86 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Microsoft Windows Server 2008, Enterprise x86 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Standard x86 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Windows Small Business Server 2008 Premium Edition
- Windows Small Business Server 2008 Standard Edition
- Microsoft Windows Server 2003, Web Edition
- Microsoft Windows Server 2003/2003 R2, Datacenter Edition
- Microsoft Windows Server 2003/2003 R2, Datacenter x64 Edition
- Microsoft Windows Server 2003/2003 R2, Enterprise Edition
- Microsoft Windows Server 2003/2003 R2, Enterprise x64 Edition
- Microsoft Windows Server 2003/2003 R2, Standard Edition
- Microsoft Windows Server 2003/2003 R2, Standard x64 Edition
- Red Hat Enterprise Linux 6 Server x86, x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server Edition with Xen

- Red Hat Enterprise Linux 5 Server Edition
- Red Hat Enterprise Linux 4 AS for AMD64/EM64T
- Red Hat Enterprise Linux 4 ES for AMD64/EM64T
- Red Hat Enterprise Linux 4 AS for x86
- Red Hat Enterprise Linux 4 ES for x86
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for x86
- SUSE LINUX Enterprise Real Time 11 AMD64/EM64T
- SUSE LINUX Enterprise Server 10 for x86
- SUSE LINUX Enterprise Server 10 with Xen for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 with Xen for x86
- VMware ESX 3.5
- VMware ESX 4.0
- VMware ESXi 3.5
- VMware ESXi 4.0
- AIX 5L for POWER Version 5.3
- SUSE LINUX Enterprise Server 10 for IBM POWER
- SUSE LINUX Enterprise Server 11 for IBM POWER
- Red Hat Enterprise Linux 4 for IBM POWER
- Red Hat Enterprise Linux 5 for IBM POWER

For the latest information about the specific versions and service packs that are supported, see the IBM ServerProven website at:

<http://ibm.com/servers/eserver/serverproven/compat/us/>

When you arrive at the IBM ServerProven website, select the System x or blade server and then select the expansion card to see the supported operating systems.

## Related publications

For more information, see the following resources:

- *IBM HH LTO Generation 5 SAS Tape Drive Installation and User Guide*  
<http://www.ibm.com/support>
- *Installation Guide for IBM 1U Rackmount Tape Enclosure*  
<http://www.ibm.com/support/docview.wss?uid=psg1MIGR-64787>
- *Installation Guide for IBM Half High Tabletop Tape Enclosure*  
<http://www.ibm.com/support/docview.wss?uid=psg1MIGR-64792>
- *IBM System x Configuration and Options Guide*  
<http://www.ibm.com/systems/xbc/cog/>

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