

Fujifilm Linear Tape-Open (LTO) Ultrium Data Cartridge generations 1–3 employ Fujifilm’s World-renowned ATOMM technology. Fujifilm LTO Ultrium 4 media is the first midrange data storage tape product to employ Fujifilm’s NANOCUBIC technology, which powers earlier generations of Enterprise 3592 and T10000 tape products manufactured by Fujifilm. Fujifilm LTO-5 employs Fujifilm’s enhanced Nanocubic technology and continues support for in-drive encryption & WORM. New to LTO-5 technology is dual partitioning capability for LTO-5 media, providing faster file access and improved data management. Fujifilm LTO-6 uses Fujifilm’s proprietary Barium Ferrite magnetic particle, the first mid-range tape to do so.

LTO Ultrium Data Capacity, Data Transfer Rate and Minimum Transfer Rate

LTO Ultrium Tape Media	Drive Model	Data Capacity Native / Compressed	Data Transfer Rate Native / Compressed	Speed Matching Minimum Data Rate Native / Compressed
LTO Ultrium 6 & Ultrium 6 WORM BaFe 2012	IBM LTO-6	2.5 / 6.25 TB	160 / 400 MB/sec	Digital Speed Matching 40-160 MB/sec (native)
	HP LTO-6		160 / 400 MB/sec	54-160 MB/ sec (native)
	Quantum LTO-6		160 / 400 MB/sec	No Full Height model
	IBM LTO-6 [HH]		160 / 400 MB/sec	Digital Speed Matching 40-160 MB/sec (native)
	HP LTO-6 [HH]		140 / 400 MB/sec	54-160 MB/ sec (native)
	Quantum LTO-6 [HH]		140 / 40 MB/sec	Not specified
LTO Ultrium 5 & Ultrium 5 WORM Nanocubic 2010	IBM LTO-5	1.5 / 3.0 TB	140 / 280 MB/sec	Digital Speed Matching 40-140 MB/sec (native)
	HP LTO-5		140 / 280 MB/sec	47 -140 MB/sec (native)
	Quantum LTO-5		140 / 280 MB/sec	No Full Height model
	IBM LTO-5 [HH]		140 / 280 MB/sec	Digital Speed Matching 40-140 MB/sec (native)
	HP LTO-5 [HH]		140 / 280 MB/sec	47 -140 MB/sec (native)
	Quantum LTO-5 [HH]		140 / 280 MB/sec	Specs not published
LTO Ultrium 4 & Ultrium 4 WORM Nanocubic 2007	IBM LTO-4	800 / 1600 GB	120 / 240 MB/sec	30 / 60 MB/sec
	HP LTO-4		120 / 240 MB/sec	40 / 80 MB/sec
	IBM LTO-4 [HH]		120 / 240 MB/sec	31 / 62 MB/sec
	Quantum LTO-4 [HH]		120 / 240 MB/sec	37 / 74 MB/sec
	HP LTO-4 [HH]		80 / 160 MB/sec	33 / 66 MB/sec

LTO Ultrium 3 & Ultrium 3 WORM ATOMM 2005	IBM LTO-3	400 / 800 GB	80 / 160 MB/sec	40 / 80 MB/sec
	HP LTO-3		80 / 160 MB/sec	27 / 54 MB/sec
	Quantum LTO-3		68 / 136 MB/sec	31 / 62 MB/sec
	Quantum LTO-3 [HH]		68 / 136 MB/sec	20 / 40 MB/sec
	Tandberg LTO-3 [HH]		60 / 120 MB/sec	30 / 60 MB/sec
	IBM LTO-3 [HH]		60 / 120 MB/sec	30 / 60 MB/sec
	HP LTO-3 [HH]		60 / 120 MB/sec	20 / 40 MB/sec
LTO Ultrium 2 ATOMM 2003	IBM LTO-2	200 / 400 GB	35 / 70 MB/sec	17.5 / 35 MB/sec
	Quantum LTO-2		34 / 68 MB/sec	12 / 24 MB/sec
	HP LTO-2		30 / 60 MB/sec	10 / 20 MB/sec
	Quantum LTO-2 [HH]		26 / 52 MB/sec ⁽¹⁾	12 / 24 MB/sec
	HP LTO-2 [HH]		24 / 48 MB/sec	8 / 16 MB/sec
	IBM LTO-2 [HH]		24 / 48 MB/sec	12 / 24 MB/sec
	Tandberg LTO-2 [HH]		24 / 48 MB/sec	12 / 24 MB/sec
LTO Ultrium 1 ATOMM 2000	Tandberg LTO-1 [HH]	100 / 200 GB	16 / 32 MB/sec	N/A
	Quantum LTO-1		16 / 32 MB/sec	8 / 16 MB/sec
	HP LTO-1 [HH] ⁽²⁾		16 / 32 MB/sec	6.7 / 13.4 MB/sec
	HP LTO-1		15 / 30 MB/sec	6 / 12 MB/sec
	IBM LTO-1		15 / 30 MB/sec	N/A
	IBM LTO-1 [HH]		7.5 / 15 MB/sec	6 / 12 MB/sec

Please check with above manufacturers for current drive offerings and specifications.

- Manufacturers' drives shown; these same drives can be found marketed under many other hardware brands. Not all drive models represented above are currently shipping; some models are retired by the manufacturer.
 - Please check with manufacturers for current offerings and specifications.
 - Certance (former Seagate Removable Storage Solutions Division) LTO drives now shown as Quantum drives. Quantum LTO Ultrium Drives: former Seagate RSS Division / Certance acquired by Quantum in 2004.
- (1) Enhanced speed (26 MB/sec Native) Quantum LTO-2 half-height drive; firmware revision upgrade 2005.
- (2) HP LTO-1 HH drive model 232 has a higher data transfer rate versus HP's LTO-1 HH model 215 drive.
- Transfer Rate is drive dependent; where rate varies by drive interface – the faster model is shown. Current transfer rate may be different from shown due to model upgrade or model substitution.
 - Speed Matching: as long as the data supply to the tape drive is \geq the minimum, the tape drive will be able to stream. This can improve media and transport life by reducing repositions.
 - HH indicates Half-Height form factor drives; all other drives are Full-Height models.
 - Compressed values assume 2:1 compression. • Nominal Values Shown.
 - One GB equals 1,000,000,000 bytes. One MB equals 1,000,000 bytes.

Most LTO Ultrium drives offer “speed matching” capability. Speed matching features & function varies among manufacturers and their different drive models. In general, a speed matching feature will slow the drive's read/write transfer rate speed with *various steps* to try to match the speed of a slower host's data transfer, if a host is transferring slower than the drive's data transfer rate. When the data is being transferred between the host and tape drive at a rate \geq the minimum speed shown, the drive will be able to stream.

This improves tape media life and drive transport life by reducing repositions that occur when the host cannot send data to the drive fast enough to keep the drive continuously writing (streaming) when data is being written, or cannot accept data from the drive fast enough when data is being read.

For more information on data transfer rate and a full explanation of “streaming” and its importance, see the Fujifilm Technical Support Flash “Data Transfer Rate – Q & A” under Midrange Tape → LTO → FAQs at: www.fujifilmusa.com/products/tape_data_storage

LTO ULTRIUM MEDIA AND DRIVE COMPATIBILITY

Tape Media Capacity, Length	LTO-1 Tape Drive	LTO-2 Tape Drive	LTO-3 Tape Drive	LTO-4 Tape Drive	LTO-5 Tape Drive	LTO-6 Tape Drive
LTO Ultrium 1 100/200 GB, 609m	Full Read/Write Compatibility	Full Read/Write Compatibility	Read-Only	NOT COMPATIBLE	NOT COMPATIBLE	NOT COMPATIBLE
LTO Ultrium 2 200/400 GB, 609m	NOT COMPATIBLE	Full Read/Write Compatibility	Full Read/Write Compatibility	Read-Only	NOT COMPATIBLE	NOT COMPATIBLE
LTO Ultrium 3 400/800 GB, 680m	NOT COMPATIBLE	NOT COMPATIBLE	Full Read/Write Compatibility	Full Read/Write Compatibility	Read-Only	NOT COMPATIBLE
LTO Ultrium 4 800/1600 GB, 820m	NOT COMPATIBLE	NOT COMPATIBLE	NOT COMPATIBLE	Full Read/Write Compatibility	Full Read/Write Compatibility	Read-Only
LTO Ultrium 5 1.5/3.0TB, 846 m	NOT COMPATIBLE	NOT COMPATIBLE	NOT COMPATIBLE	NOT COMPATIBLE	Full Read/Write Compatibility	Full Read/Write Compatibility
LTO Ultrium 6 2.5/6.25TB, 846 m	NOT COMPATIBLE	NOT COMPATIBLE	NOT COMPATIBLE	NOT COMPATIBLE	NOT COMPATIBLE	Full Read/Write Compatibility

LTO-3, LTO-4, LTO-5 and LTO-6 have WORM capability

LTO-4, LTO-5 and LTO-6 offer in-drive encryption

LTO-5 and LTO-6 technology features media partitioning

Drive compatibility with previous generation of media will be at earlier generation's capacity and transfer rates. (For example; LTO4 media is fully R/W compatible in LTO5 drive with native 800GB capacity at 120MB/sec transfer, and LTO3 media is Read only in LTO-5 drive with max 80MB/sec native transfer)

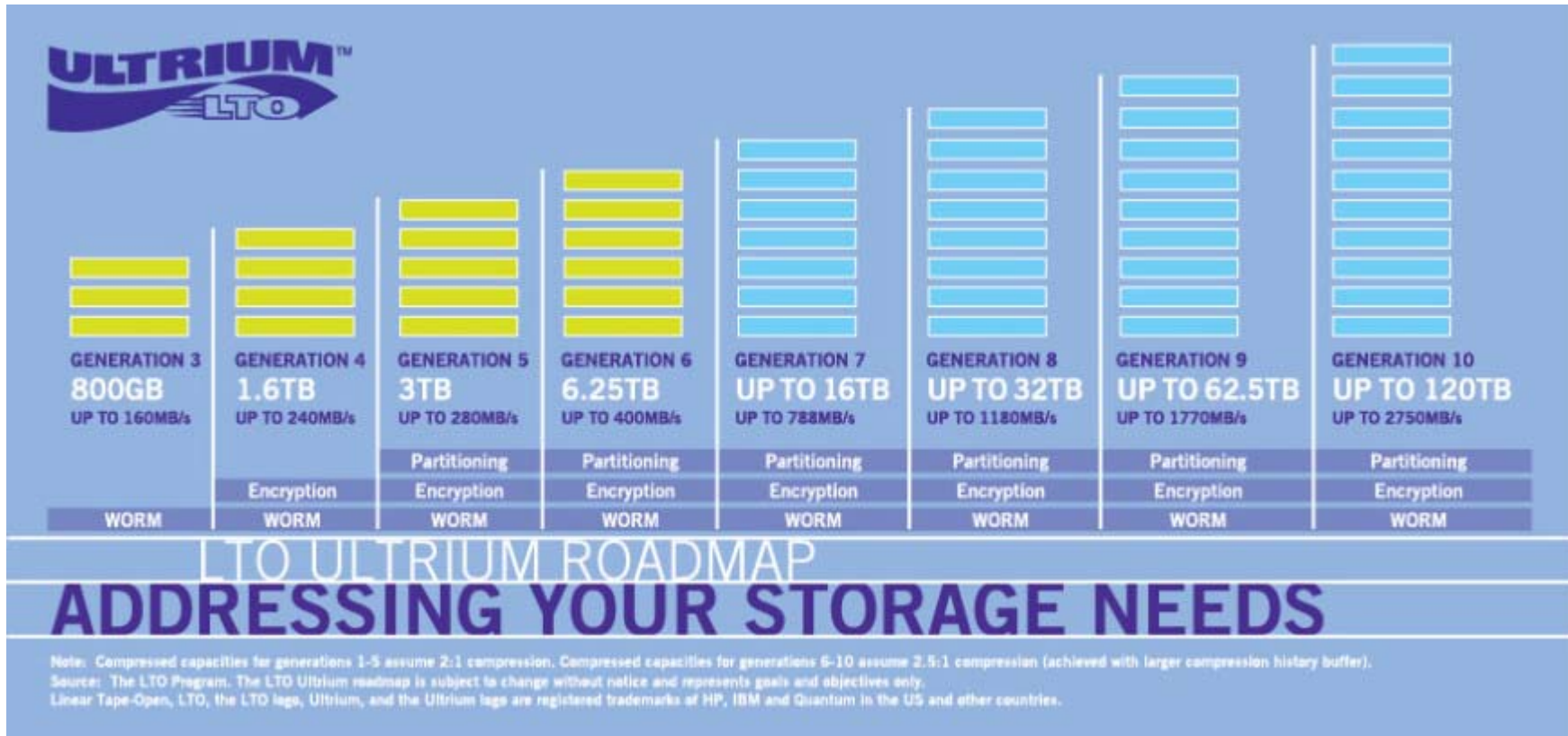
LTO-5 and LTO-6 media Partitioning

The LTO-5 and LTO-6 specification enables a new dual partitioning feature which can help provide faster data access and improved data management: Benefits include improved response time with decreased tape, file management, and archiving costs. (Software enablement required-check with ISV for availability & compatibility)

- Capability for 2 media partitions which can be independently accessed to provide faster data access and improved data management
- Self-describing tape: One partition holds the content, & the other holds the content's index
- Capabilities to manage files directly on tape and allow for easy sharing
- File system access at the operating system level
- Viewing and access of tape files in a fashion like disk or other removable media with directory tree structure
- Addresses the growing needs of users with rich media such as Media & Entertainment, Medical, Digital Surveillance, and others

LTO Roadmap

The LTO roadmap has been extended to 10 generations with higher capacities, faster transfer speeds, and greater compression.



FUJIFILM LTO ULTRIUM PRODUCT CODES

Product ⁽¹⁾	Standard in Cases	Bar Code Labeled ⁽³⁾ in Cases	Library Pk Standard w/o Cases	Library Pk Labeled w/o Cases	Library Pk. Standard + Cases ⁽⁴⁾	Library Pk. Labeled + Cases ⁽⁴⁾
LTO Ultrium 1	600003138	600003212	600003190	600003213	Call	Call
LTO Ultrium 2	600003229	600003258	60003239	600003240	Call	Call
LTO Ultrium 3	15539393	600003267	600004951	600004952	Call	Call
LTO Ultrium 4	15716800	600006393	15716812	600006411	Call	Call
LTO Ultrium 5	16008030	81110000410	16008042	81110000411	Call	Call
LTO Ultrium 6	16310732	81110000850	16008044	81110000853	Call	Call
LTO Ultrium 3 WORM	600004303	600003265	Call	Call	Call	Call
LTO Ultrium 4 WORM	15750246	600006441	Call	Call	Call	Call
LTO Ultrium 5 WORM	16008054	81110000412	Call	Call	Call	Call
LTO Ultrium 6 WORM	16008056	81110000854	Call	Call	Call	Call
LTO UCC ⁽²⁾ Cleaning Tape <i>(compatible w/ all drives-50 uses)</i>	600004292	600003214	–	–	–	–

(1) Fujifilm LTO Data Tapes Ship in Factory Sealed 20-Pack Master Carton Quantities.

(2) Universal Cleaning Cartridge (UCC) for cleaning all generations of LTO Drives: LTO-1, LTO-2, LTO-3, LTO-4, LTO-5 and LTO-6

-Up to 50 cleanings per UCC cartridge-drive dependant –some older generation drive models may achieve fewer cleanings per cartridge.

Consult drive documentation for UCC usage

(3) For assistance finding a correct bar code label for your tape system visit www.Tri-Optic.com or call Fujifilm at 800-488-3854.

(4) Cases shipped separately, on-the-side. Library Packs enable quick & easy unpacking and introduction into your Tape Library, while Individual Protective Cases are on hand for use later when storing tapes outside the Library, transporting and archiving.

For more Data Storage Tape Technical Support Documents and Product Information, go to:
www.fujifilmusa.com/products/tape_data_storage

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