Recording Media Division
Fujifilm Computer Products

FUJIFILM

Data Storage Tape Product Training and Technology Seminar
March 28, 2008

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www.fujifilmusa.com/tapestorage

Fujifilm Computer Products
Tape Technology Seminar

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1. **Midrange – Entry Level**

   - DDS / DAT 72   Pages   3 - 8

2. **Why New High-End Tapes?**

   - Data Growth & Regulations   Page   9

3. **Midrange Systems – High End**

   - DLTtape & Super DLTtape   Pages 10 - 34

   - LTO Ultrium   Pages 35 - 52

   - Value Added Services   Pages 53 - 61

4. **Enterprise Systems**

                                                               Pages 62 - 67
   - 3590 - 3592   Pages 68 - 85

5. **High-End Tape Overview**

   - All High-End Offerings   Pages 86 - 94

6. **Other Products, Services, Accessories & Programs**

   Supplement
   Pages 1 - 38

4mm DDS/DAT-72 Data Cartridges

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~ 50%[1] of all Tape Drives Sold in 2004 were 4mm DDS/DAT Drives.

> DDS 3 – 12 GB at 1.5 MB/s (Native)

> DDS 4 – 20 GB at 3 MB/s (Native)

> DAT 72 – 36 GB at 3.5 MB/s (Native)

New Packaging – 2006

(1) Source: SCCG 4/05 (LTO, SDLT, DLT, 4mm, 8mm, ¼-inch)

The 2006 Tape Drive Market report from IDC shows that in Q3 2006 LTO Ultrium has for the first time overtaken DDS/DAT as the volume leader.

LTO Ultrium was the highest volume tape technology during this period shipping 132.9k drive units and DDS/DAT shipping 131.2k drive units.

Despite this, DDS/DAT saw a 2.7% increase in drive shipments between Q2'06 & Q3'06 and continues to hold significant market-share with 38.5% of all tape drive units shipped.

Native (without compression) capacity and transfer rates shown.
Data transfer rate is drive dependent; top rate for current drives shown.

4mm DDS (DAT)

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Digital Data Storage (DDS) 4mm Data Cartridge Drives and Media

DDS Drives First Generation
(Introduced 1989)
- 60 meter MP Media
- 1.3 GB Native Capacity
- 183 KB/sec. Data Rate

DDS-2 Drives (Introduced 1993)
- 120 meter MP Media
- 4 GB Native Capacity
- 360 - 750 KB/sec. Data Rate

DDS-4 Drives (Introduced 1999)
- 150 meter MP+++ (ATOMM) Media
- 20 GB Native Capacity
- 2.4 - 3 MB/sec. Data Rate

DDS Drives Second Generation
(Introduced 1991)
- 90 meter MP Media
- 2 GB Native Capacity
- 183 - 233 KB/sec. Data Rate

DDS-3 Drives (Introduced 1996)
- 125 meter MP++ (ATOMM) Media
- 12 GB Native Capacity
- 0.7 - 1.5 MB/sec. Data Rate

5th Generation/ **DAT-72** (Arrived 2003)
- 170 meter MP+++ (ATOMM) Media
- 36 GB Native Capacity
- 3.0 - 3.5 MB/sec. Data Rate

Nominal Values Shown. **Native capacity & transfer rates shown.** Data transfer rate is drive dependent; range of current drives shown.

All DDS & DAT-72 Tape Drives use FUJIFILM DDS Drive Cleaning Cassette Part Number 26049006.

4mm DDS (DAT)

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DDS 1st Generation (DDS-1) through DDS 5th Generation (DAT-72)

TAPE MEDIA	Fujifilm P/N	DDS Drives	DDS-2 Drives	DDS-3 Drives	DDS-4 Drives	DAT 72 Drives
DG-60M	~~26047060~~	**1.3 GB**	1.3 GB	1.3 GB	Note	NC
DG-90M	26047190	**2 GB**	2 GB	2 GB	Note	NC
DG-120M	26047120	NC	**4 GB**	4 GB	4 GB	NC
DG3-125M	26047300	NC	NC	**12 GB**	12 GB	12 GB
DG4-150M	26047350	NC	NC	NC	**20 GB**	20 GB
DG5-170M	26046172	NC	NC	NC	NC	**36 GB**

Native Capacities Shown   NC = Not Compatible   Note: DDS-1 tape compatibility on DDS-4 drives varies by drive manufacturer.

**All DDS & DAT-72 Tape Drives use FUJIFILM DDS Drive Cleaning Cassette Part Number 26049006.**

One Gigabyte equals one billion bytes (1 GB = 1,000,000,000 bytes).
One Megabyte equals one million bytes (1 MB = 1,000,000 bytes).

DAT-160 * [NEW 2007]

New DAT-160 Drive [NEW 2007]

- **Uses New 8mm Wide DAT-160 Media***

- **80 GB Native Capacity**
  - **160 GB assuming 2:1 compression**

- **6.9 MB/sec Native Transfer Rate**
  - **13.8 MB/sec assuming 2:1 compression**

- **Backwards read and write compatible with DAT-72 and DDS-4 media.**

• * Fujifilm brand DAT-160 Data Cartridge media for the DAT-160 tape drive is not currently available.

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# DDS/DAT Roadmap

Source: www.DATMGM.com

	DDS1	DDS2	DDS3	DDS4	DAT 72	DAT 160	DAT 7th Gen	DAT 8th Gen
Read/Write Compatibility								
Media Type	90m Tape	120m Tape	125m Tape	150m Tape	170m Tape	150m Wide Tape	Longer Wide Tape	Longer Wide Tape
Native Capacity	2 GB	4 GB	12 GB	20 GB	36 GB	80 GB	~150 GB	~300 GB
Native Transfer Rate	183KB/s	≤720KB/s	≤1.5MB/s	1- 3 MB/s	≥3 MB/s	≥5 MB/s	≥8 MB/s	≥16 MB/s
	1990	1993	1996	1999	2003	2007	Approx +2 years per generation	

Arrows show backward read/write compatibility of the drive.

4mm DDS/DAT – Questions?

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New Packaging – 2006

Questions About
DDS – DAT-72 ?
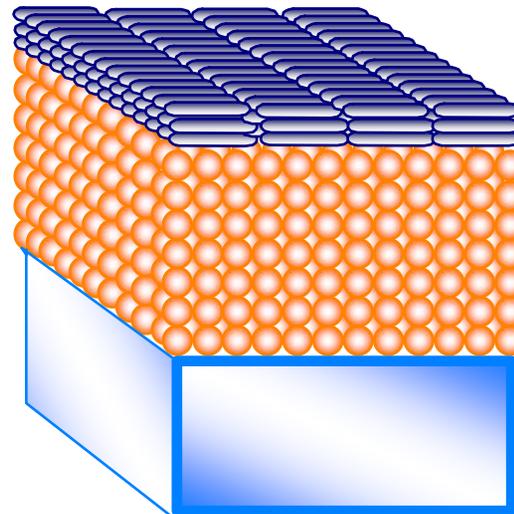
FUJIFILM'S

Advanced super
Thin-layer and high-
Output
Metal
Media

Tape's Future

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Why New High-End Tapes?

Data Growth & Storage Intensive Regulations

• **Sarbanes-Oxley** • **The Patriot Act** • **HIPAA** • **SEC 17a-4**
• **Check 21** • **Gramm-Leach-Bliley Act** • **Mandated Storage**

CENTRALIZATION & UTILIZATION:

- **Network Attached Storage (NAS)**
- **Storage Area Networking (SAN)**
- **Disk-to-Disk Backup & Mirror**
- **Application Service Providers**
- **Storage Service Providers**

- **Near Online Tape**
- **Virtual Tape Systems (VTS)**
- **Fast Access Primary Storage**
- **Live, Serverless LAN-free Backup**
- **Disk-to-Disk-to-Tape Advantages**

Midrange to High-end Tape Open Systems Marketplace

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High-End ½" Linear Tape Technologies

1) **Fujifilm DLTtape**

2) **Fujifilm *Super* DLTtape**

3) **Fujifilm LTO Ultrium**

4) **Value Added Services**

One Gigabyte equals one billion bytes (1 GB = 1,000,000,000 bytes).
One Megabyte equals one million bytes (1 MB = 1,000,000 bytes).

Fujifilm DLTtape ⫸

Digital Linear Tape
DLTtape

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DLT 4000 – 20 GB at 1.5 MB/s (Native)

DLT 7000 – 35 GB at 5 MB/s (Native)

DLT 8000 – 40 GB at 6 MB/s (Native)

DLT 1
DLT VS80 } 40 GB at 3 MB/s (Native)＊

New Packaging 2006

＊ The DLT1 and DLT VS80 Drives write DLTtape IV in a non-DLT 8000 format.

Note: Native capacity & transfer rates shown; double these values for assumed 2:1 compression.

One Gigabyte equals one billion bytes (1 GB = 1,000,000,000 bytes).
One Megabyte equals one million bytes (1 MB = 1,000,000 bytes).

DLTtape

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MEDIA	DRIVES	CAPACITY (Native-Compressed)	PERFORMANCE (Native-Compressed)
DLTtape III – TK85	DLT 260 [1] - Tz85	2.6 GB	0.8 MB/s
	DLT 600 [1] - Tz86	6 GB	0.8 MB/s
	DLT 2000 [1] - Tz87	10 GB – 20 GB	1.25 MB/s – 2.5 MB/s
DLTtape IIIXT –	DLT 2000XT [1] -	15 GB – 30 GB	1.25 MB/s – 2.5 MB/s
DLTtape IV – TK88	DLT 4000 [1] - Tz88	20 GB – 40 GB	1.5 MB/s – 3 MB/s
	DLT 7000 [1] - Tz89	35 GB – 70 GB	5 MB/s – 10 MB/s
	DLT 8000 [1]	40 GB – 80 GB	6 MB/s – 12 MB/s
	DLT 1 [1]	40 GB – 80 GB	3 MB/s – 6 MB/s
	DLT VS80 [1]		

DLTtape	Fujifilm P/N	MEDIA DESCRIPTION
III	26112085	1200' Metal Particle Media (MP)
IIIXT	26112092	1828' Metal Particle Media (MP)
IV	26112088	1828' ATOMM (Advanced super Thin-layer and high-Output Metal Media)

Note 1: These drives retired by the manufacturer.

Fujifilm DLTtape

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DLTtape IV TK88
P/N 26112088

DLT CleaningTape
For DLT-8000 and earlier drives
P/N 26112090

DLTtape III-XT
P/N 26112092
Fujifilm Brand Discontinued

DLT1 &
VS80
Cleaning
Tape

DLT1 & VS80
CleaningTape
Fujifilm Brand Not
currently available.

DLT Plastic Case
P/N 26112090

DLTtape III TK85
P/N 26112085
Fujifilm Brand Discontinued

DLTtape IV
Bar Code Special
P/N 26112089

Note: Old packaging shown above – a new silver color packaging insert was introduced in 2006.

Generations of Success
– DLTtape Drives

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Native Capacity (GB) vs Year chart:

- TK50 (1985)
- TK70 (1987)
- DLT260 (1989)
- DLT600 (1991)
- DLT2000 (~1992)
- DLT2000XT (~1994)
- DLT4000 (~1993)
- DLT7000 (~1995)
- DLT8000 (1999)
- DLT1 * (2001)
- *Super*DLTtape (2001, ~100)
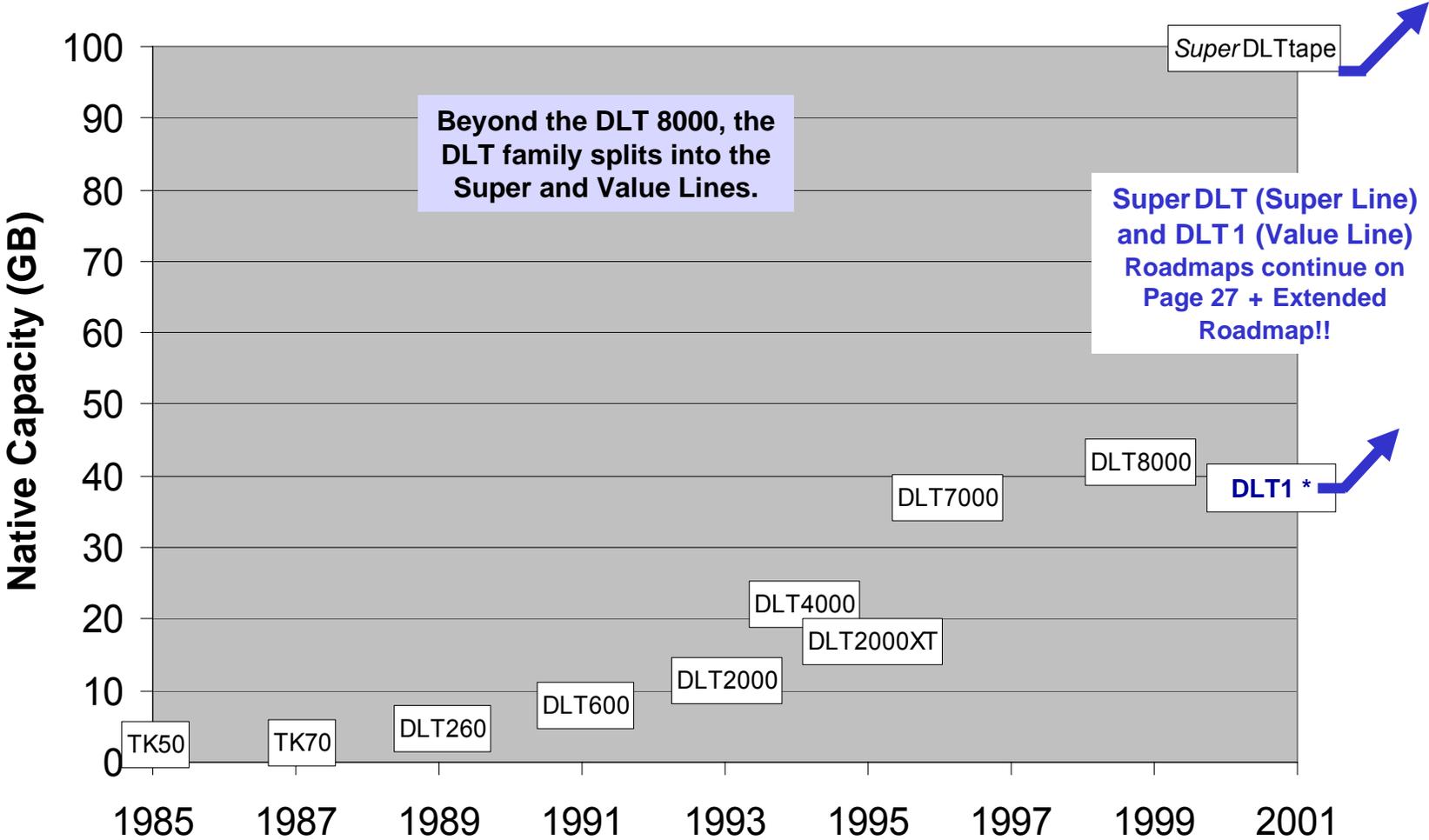
Beyond the DLT 8000, the DLT family splits into the Super and Value Lines.

Super DLT (Super Line) and DLT 1 (Value Line) Roadmaps continue on Page 27 + Extended Roadmap!!

Y-axis: Native Capacity (GB): 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100

X-axis: Year: 1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001

•The DLT-8000 drive is the end of the DLT Family's Roadmap – Future DLT Generations split into two Families: the DLT Super and DLT Value Drives.

•DLT 1 (& ValueSmart 80) are Benchmark* DLT 1 format drives. *Acquired by Quantum 11/02.

Fujifilm Super DLTtape ▮▮➡

Super DLT Technology:
Super DLTtape

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- **Quantum** *Super* DLT Drives and Fujifilm Tape

- Product roadmap from 110 GB to $\geq$ 6 TB
  - ➤ 220 GB to $\geq$ 12 TB with 2:1 compression

- Enabled by four New Technologies

  - *Advanced Metal Powder Media (AMP)*

  - Optical Servo Guides
  - MR Read Heads
  - PRML Channel

FUJiFILM
DLTtape® S4
DATA CARTRIDGE
800 GB NATIVE
1600 GB COMPRESSED

Advanced Metal Powder Media

- **Advanced technology supports multiple generations of Super DLTtape products.**

- **Reliable, proven multi-coated Metal Particle media.**

- **The anti-static backside coating has indelible guide tracks used for optical servo positioning of the drive's read/write head. [1]**

Recording Layer - High coercivity magnetic layer

Non-magnetic Under layer

Enhanced Base Film layer

ANTI-STATIC Back Coat layer with Optical Servo Guides [1]
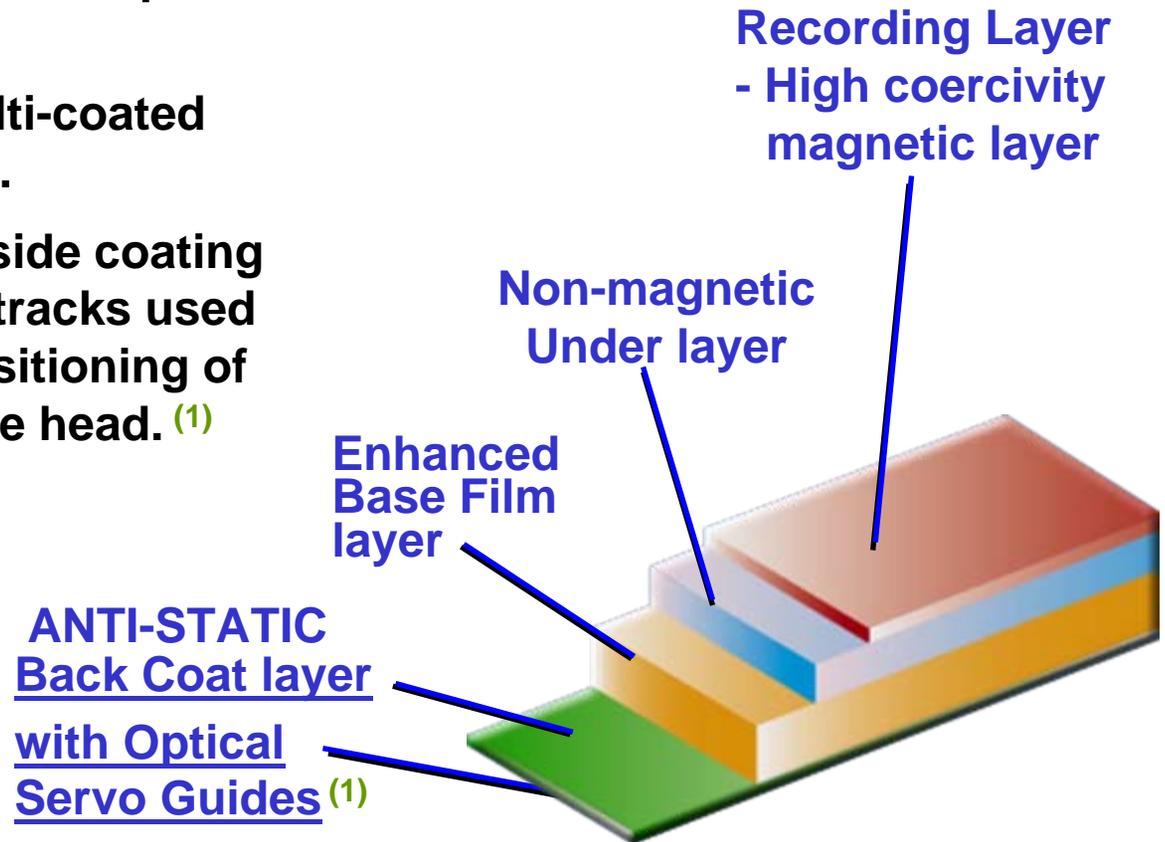
[1] The Optical Servo Positioning feature was introduced beginning with the SDLT-220 drive. Super DLTtape I, II, & DLTtape S4 have factory applied servo guide tracks on the back, non-recording side of the tape media.
Note: DLTtape IV and earlier DLTtape media did not employ servo-positioning and do not have servo tracks.

19   3/06

Super DLTtape *Combines the best of Magnetics & Optics* (Laser Guided Magnetic Recording)

Advanced Multi-Channel MR Cluster Read-Write Head

Optical Guidance

Pivoting Optical Servo

Magnetic Data Tracks*

Laser/Optics

Four Servo Bands of 17 Servo Tracks in each optical band
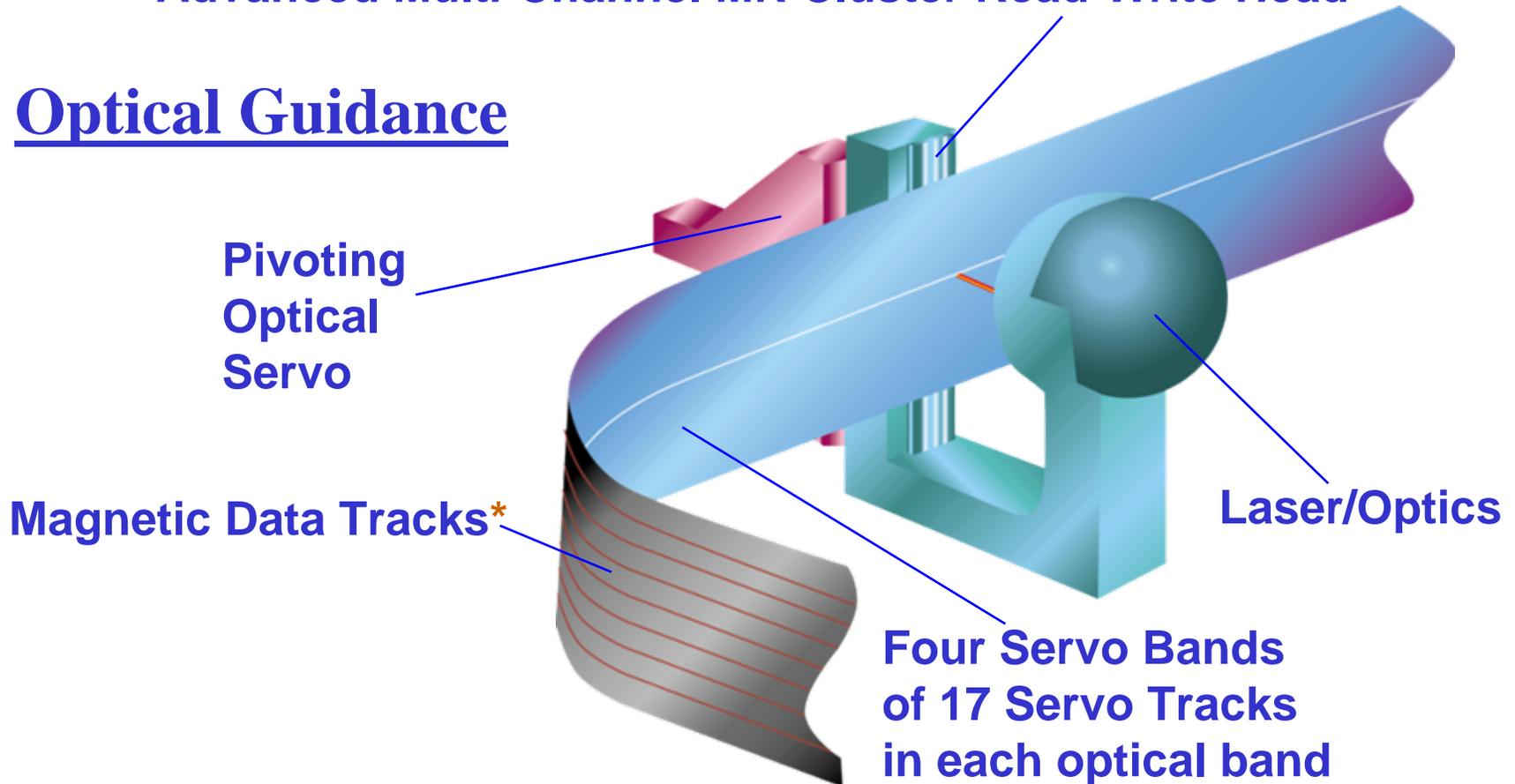
* SDLT-220 & SDLT-320 Drives: 8-Channel Read-Write Head, 448 Data Tracks (56 Track Groups).
* SDLT-600 Drives: 16-Channel Read-Write Head, 640 Data Tracks (40 Track Groups).
* DLT-S4 Drives: 16-Channel Read-Write Head, 1280 Data Tracks (80 Track Groups).

Fujifilm *Super* DLTtape I

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Two Drives for 1st Generation *Super* DLTtape I:

- The first ***Super*-DLTtape** (SDLT-I) is used on two (2) different capacity/performance ***drives*** to meet different end user needs:

    SDLT-220 -- 110 GB Capacity at 11 MB/sec Transfer Rate

    SDLT-320 -- 160 GB Capacity at 16 MB/sec Transfer Rate

- Both drives feature Backward Read Compatibility (BRC) for DLTtape IV, recorded by the DLT-4000, DLT-7000, DLT-8000, DLT-1, & DLT-VS80 drives.

* Native Capacity and Transfer Rates (without compression)   **The SDLT-220 first shipped 1Q 2001, the SDLT-320 on 2Q 2002.

***Added DLT-1 and DLT-VS80 Backward Read Compatibility (BRC) Feature 2Q 2002.

Fujifilm *Super* DLTtape II

Super DLT 600 Drive

- **300 GB Native Capacity, 36 MB/sec Native Transfer Rate**
- **Backward Read-only Compatible only with the SDLT-220 and SDLT-320 formats written to Super DLTtape I media & with DLTtape VS1* media written by DLT-VS160 drives.**

Tape Media	Drive Format Capacity	SDLT 220 Drive (448 Track, 8-channel)	SDLT 320 Drive (448 Track, 8-channel)	SDLT 600 Drive (640 Track, 16-channel)
Super DLTtape I **558 m**	110/220 GB	**R/W 11 MB/s**	R/W	Read
	160/320 GB	NC	**R/W 16 MB/s**	Read
Super DLTtape II **630 m**	300/600 GB	NC	NC	**R/W 36 MB/s**

•Native Transfer Rate shown - Megabytes per Second (MB/s). Capacity Native/Compressed - Gigabytes (GB).
*Fujifilm brand DLTtape VS1 media for the DLT-VS160 [and DLT-V4] drive is not currently available.

Super DLTtape II
SDLT-600 Drive

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SDLT-II WORM Feature for the SDLT-600 Drive

DLTice: SDLT-600 drive firmware, DLTice, has the option of formatting *standard* SDLT-II tapes as WORM (Write Once, Read Many) tapes using the DLTsage utility or supporting ISV backup & archive programs [on an SDLT-600 drive only].

Data written to WORM-formatted tapes cannot be altered or over-written, providing a cost effective solution to regulatory requirements to retain data (records and documents) for a certain number of years in an unalterable format.

Super DLTtape II & Quantum's Professional Video Drive – SDLT 600A

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Super DLT 600A Drive - Professional Video Drive

- **The SDLT 600A drive offers the benefits of file-based data tape storage and the accessibility of video tape. The SDLT 600A's feature set makes the drive MXF-aware enabling videotape-like access to video subclips by timecode.**

- **The SDLT 600A is designed to use a standard Super DLTtape II media cartridge. With a native storage capacity of 300 GB, Super DLTtape II media provides native transfer rates of up to 288 Mb/second to ensure faster-than-real-time, on-demand availability of video content.**

- **300 GB Native Capacity, 36 MB/sec Native Transfer Rate. Compression is not applicable for the SDLT-600A drive.**

Note: Transfer rates for data are typically shown using the prefix B (Byte);
for video the prefix b (bit) is commonly used. Eight bits (b) = one Byte (B).

DLTtape S4

NEW
2/20/06

New DLT-S4 Drive

NEW
2/20/06

- **Uses New DLTtape S4 Media**

- **800 GB Native Capacity**
  - **1.6 TB assuming 2:1 compression**

- **60 MB/sec Native Transfer Rate**
  - **120 MB/sec assuming 2:1 compression**

- **Backwards Read-only Compatible with the SDLT-320 and SDLT-600 Drives.**

- **DLTSage WORM Functionality Feature and new DLTSage Tape Security Feature**

Fujifilm DLTtape
Product Codes

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Product	Standard	Labeled
DLTtape IV	26112088	26112089
DLT CleaningTape III	26112090	26112097
Super DLTtape I	26300001	26300071
Super DLTtape II	26300201	26300213
DLTtape S4	26360000	26320024
Super DLT CleaningTape	26300010	26300074

Not all configurations are shown. For other configurations, contact your sales representative
or call Fujifilm's Recording Media Division – Customer Service Department at 800-488-3854.

• Beyond the DLT-8000 Drive: DLT-S & DLT-V Roadmaps*

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New DLT generations are offered in two families: one optimized for high performance, a second optimized for value.

Generation - - Availability	SDLT Performance Drive Family & Performance **DLT-S** Roadmap			DLT Value Drive Family & Value **DLT-V** Roadmap		
	Drive Model	**Native Capacity**	**Native Data Rate**	**Drive Model**	**Native Capacity**	**Native Data Rate**
Gen 1 -Now	**SDLT-220**	110 GB	11 MB/s	**DLT-1**	40 GB	3 MB/s
Gen 2 -Now	**SDLT-320**	160 GB	16 MB/s	**DLT-VS80**	40 GB	3 MB/s
Gen 3 -Now	**SDLT-600**	300 GB	36 MB/s	**DLT-VS160**	80 GB	8 MB/s
Gen 4 -Now	**DLT-S4**	800 GB	60 MB/s	**DLT-V4**	160 GB	10 MB/s
Gen 5*	**DLT-S5**	≥ 1500 GB (1.5 TB)	≥ 100 MB/s	**DLT-V5**	≥ 250 GB	≥ 17.5 MB/s
Gen 6*	**DLT-S6**	≥ 3000 GB (3 TB)	≥ 200 MB/s	**DLT-V6**	≥ 500 GB	≥ 25 MB/s
Gen 7*	**DLT-S7**	≥ 6000 GB (6 TB)	≥ 400 MB/s	**DLT-V7**	≥ 1000 GB (1 TB)	≥ 30 MB/s

The specifications shown above are native capacity and native data transfer rate (native = without compression).

Beyond the 1st three generations of the Performance line, the SDLT-220, SDLT-320 and SDLT-600 drives, future generations will be known as DLT-S4, DLT-S5, etcetera. The SDLT-220 and SDLT-320 drives can read DLTtape IV written by the DLT-8000, DLT-7000, DLT-4000, DLT-1 and DLT-VS80 drives.

The first two generations of the Value line were the DLT-1 and DLT-VS80 (a half-height version of the DLT-1). Both write to DLTtape IV and offer the same capacity as the earlier DLT-8000 drive (40 GB native); DLT-1 and DLT-VS80 drives write to tape in a different format than the DLT-8000. The DLT-1 and DLT-VS80 drives are backward read compatible with DLTtape IV written by the DLT-4000 drives only. Beyond the earlier existing three generations of the Value line, future generations will be known as DLT-V4, DLT-V5, etcetera. The DLT-V4 introduced on 10/03/05 uses the same DLTtape VS1 cartridge as the DLT-VS160 drive and features backward read compatibility with DLTtape VS1 cartridges written by the DLT-VS160 drives and DLTtape IV cartridges written by DLT-VS80 and DLT-1 drives.

Professional Video Drives

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• **Future-looking roadmap statements are subject to change or withdrawal and represent potential objectives only.**
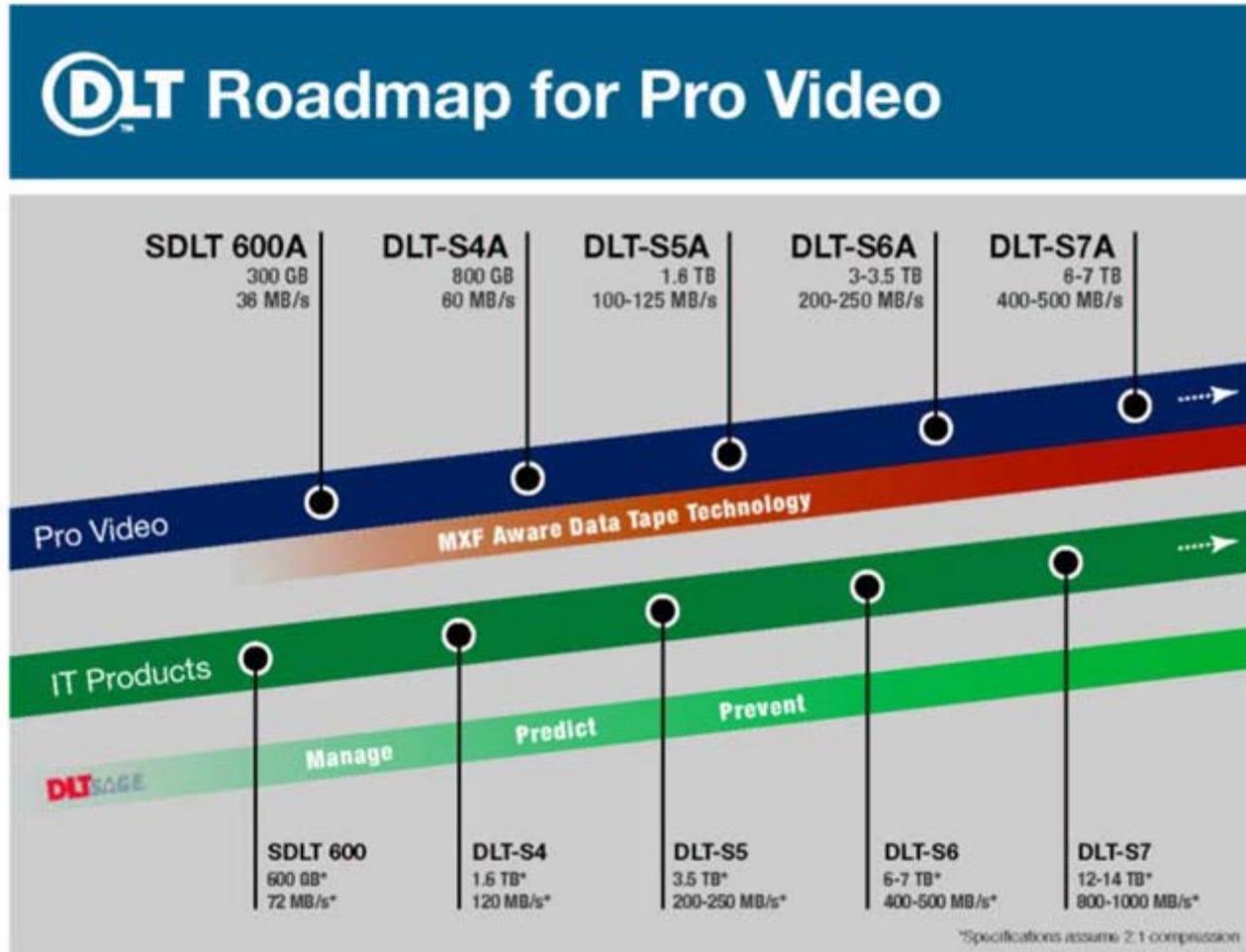
DLT/SDLT

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TAPE MEDIA	TAPE DRIVES	CAPACITY NATIVE - COMPRESSED	PERFORMANCE NATIVE - COMPRESSED
DLTtape S4	**DLT S4**	**800 GB – 1600 GB**	**60 MB/s – 120 MB/s**
Super DLTtape II	**SDLT 600A**	**300 GB – N/A**	**36 MB/s – N/A**
	SDLT 600	**300 GB – 600 GB**	**36 MB/s – 72 MB/s**
Super DLTtape I	**SDLT 320**	**160 GB – 320 GB**	**16 MB/s – 32 MB/s**
	SDLT 220 [1]	**110 GB – 220 GB**	**11 MB/s – 22 MB/s**
DLTtape VS1	DLT V4	160 GB – 320 GB	10 MB/s – 20 MB/s
	DLT VS160	80 GB – 160 GB	8 MB/s – 16 MB/s
DLTtape IV - TK88	**DLT VS80** [1]	**40 GB – 80 GB**	**3 MB/s – 6 MB/s**
	DLT 1 [1]	**40 GB – 80 GB**	**3 MB/s – 6 MB/s**
	DLT 8000 [1]	**40 GB – 80 GB**	**6 MB/s – 12 MB/s**
	DLT 7000 [1] - Tz89	**35 GB – 70 GB**	**5 MB/s – 10 MB/s**
	DLT 4000 [1] - Tz88	**20 GB – 40 GB**	**1.50 MB/s – 3.0 MB/s**
DLTtape IIIXT -	DLT 2000 XT [2] -	15 GB – 30 GB	1.25 MB/s – 2.5 MB/s
DLTtape III - TK85	DLT 2000 [2] - Tz87	10 GB – 20 GB	1.25 MB/s – 2.5 MB/s
	DLT 600 [2] - Tz86	6 GB – N/A	0.8 MB/s – N/A
	DLT 260 [2] - Tz85	2.6 GB – N/A	0.8 MB/s – N/A

Blue shade indicates Fujifilm brand data tape media is currently available for these drives.
(1) Drives retired by the manufacturer. (2) Drives retired and no longer supported by the manufacturer.

DLT / SDLT

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DATA TAPE MEDIA	TAPE DRIVES		Drive Cleaning Cartridge	Clean Uses
DLTtape S4	**DLT S4**		**Fujifilm P/N 26300010**	**20**
Super DLTtape II P/N 26300201	**SDLT 600A**			
	SDLT 600			
Super DLTtape I P/N 26300001	**SDLT 320**			
	SDLT 220 [1]			
DLTtape VS1	DLT V4		Not Available from Fujifilm	20
	DLT VS160			
DLTtape IV - TK88 P/N 26112088	**DLT VS80** [1]		Not Available from Fujifilm	20
	DLT 1 [1]			
	DLT 8000 [1]		**Fujifilm P/N 26112090**	**20**
	DLT 7000 [1]	**- Tz89**		
	DLT 4000 [1]	**- Tz88**		
DLTtape IIIXT -	DLT 2000 XT [2]	-		
DLTtape III - TK85	DLT 2000 [2]	- Tz87		
	DLT 600 [2]	- Tz86		
	DLT 260 [2]	- Tz85		

Blue shade indicates Fujifilm brand Data and/or Cleaning media currently available for these drives.
(1) Drives retired by the manufacturer. (2) Drives retired and no longer supported by the manufacturer.

DLT / SDLT

DRIVES	HEAD CHNL	DATA TRKS	SERVO TRKS	FTPI bits / inch /	R/W IPS	MEDIA	MEDIA LENGTH	CAPACITY NATIVE – COMPRESSED	Data Rate NATIVE – COMPRESSED
DLT-S4	16	1280	Yes [1]	256 K	150	DLTtape S4	2100'	800 – 1600 GB	60 – 120 MB/s
SDLT-600A	16	640	Yes [1]	233 K	108	SDLTtape II	1957'	300 GB - N/A	36 MB/s - N/A
SDLT-600	16	640	Yes [1]	233 K	108	SDLTtape II	1957'	300 – 600 GB	36 – 72 MB/s
SDLT-320	8	448	Yes [1]	193 K	122	SDLTtape I	1833'	160 – 320 GB	16 – 32 MB/s
SDLT-220	8	448	Yes [1]	133 K	116	SDLTtape I	1833'	110 – 220 GB	11 – 22 MB/s
DLT V4	4	352	No	219 K	118	DLTtape VS1	1847'	160 – 320 GB	10 – 20 MB/s
DLT VS160	4	240	No	175 K	122	DLTtape VS1	1847'	80 – 160 GB	8 – 16 MB/s
DLT VS80	2	168	No	123 K	130	DLTtape IV	1828'	40 – 80 GB	3 – 6 MB/s
DLT 1	2	168	No	123 K	130	DLTtape IV	1828'	40 – 80 GB	3 – 6 MB/s
DLT-8000	4	208	No	98 K	168	DLTtape IV	1828'	40 – 80 GB	6 – 12 MB/s
DLT-7000	4	208	No	86 K	160	DLTtape IV	1828'	35 – 70 GB	5 – 10 MB/s
DLT-4000	2	128	No	81.6 K	110	DLTtape IV	1828'	20 – 40 GB	1.5 – 3.0 MB/s
DLT-2000 XT	2	128	No	62.5 K	110	DLTtape III XT	1828'	15 – 30 GB	1.25 - 2.5 MB/s
DLT-2000	2	128	No	62.5 K	110	DLTtape III	1200'	10 – 20 GB	1.25 - 2.5 MB/s
DLT-600	2	112	No	42.5 K	100	DLTtape III	1200'	6 GB - N/A	0.8 MB/s - N/A
DLT-260	2	48	No	42.5 K	100	DLTtape III	1200'	2.6 GB - N/A	0.8 MB/s - N/A

(1) Optical Servo Tracking employed; this allows SDLT/DLT-S tapes to be degaussed and reused.
Other Tape technology with Magnetic Servo Tracks (e.g. LTO) cannot be reused if degaussed.

SDLT Questions?

Security Seal

Fujifilm DLTtape Product Review

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Data Cartridge	Tape Drive	Native Capacity	Native Data Rate
DLTtape IV	DLT 4000	20 GB	1.5 MB/sec
	DLT 7000	35 GB	5 MB/sec
	DLT 8000	40 GB	6 MB/sec
	DLT 1	40 GB	3 MB/sec
	DLT VS80	40 GB	3 MB/sec
Super DLTtape I	SDLT 220	110 GB	11 MB/sec
	SDLT 320	160 GB	16 MB/sec
Super DLTtape II	SDLT 600	300 GB	36 MB/sec
DLTtape S4	DLT-S4	800 GB	60 MB/sec

* Data Capacity and Data Transfer Rate are drive dependent.

One Gigabyte equals one billion bytes (1 GB = 1,000,000,000 bytes).
One Megabyte equals one million bytes (1 MB = 1,000,000 bytes).

Think Fujifilm Media, for Today's & Tomorrow's Most Popular Drives!

Questions About
DLT or SDLT?

FUJIFILM
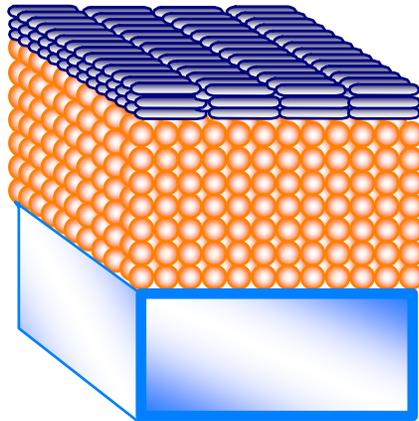
Advanced super
Thin-layer and high-
Output
Metal
Media

Fujifilm LTO Ultrium ⫸

LTO Technology

FUJIFILM

LTO (Linear Tape-Open)

LTO Ultrium high-capacity Tape Drive Format developed by LTO Drive Technology Provider Companies (TPC) – IBM, HP and Quantum.

- **LTO Ultrium Data Cartridge**
  – Single-reel; High-capacity Tape

- **Six-generation Roadmap**
  – From 100 GB to 3.2 TB
    ➢ 200 GB to 6.4 TB with compression

*Quantum acquired Certance (Seagate's former Removable Storage Solutions Division) 12/2004.

• Linear Tape-Open, LTO, the LTO logo, Ultrium, and the Ultrium logo are trademarks of HP, IBM and Quantum in the US and other countries. 36   12/04

LTO Ultrium Format

FUJiFILM

(1) LTO Ultrium 1 Drives & **100/200 GB** Ultrium 1 media - September 2000.

(2) LTO Ultrium 2 Drives & **200/400 GB** Ultrium 2 media - December 2002.

(3) LTO Ultrium 3 Drives & **400/800 GB** Ultrium 3 media - October 2004.

(4) LTO Ultrium 4 Drives & **800/1600 GB** Ultrium 4 media - April 2007.

New Packaging - 2006

LTO Ultrium Cartridge Memory

FUJIFILM

LTO Data Cartridge Memory (LTO-CM)

LTO-CM (cartridge memory) – An embedded <u>E</u>lectronically <u>E</u>rasable <u>P</u>rogrammable <u>R</u>ead <u>O</u>nly <u>M</u>emory (EEPROM) module that stores cartridge ID, usage history and metadata in a non-volatile memory chip with a non-contact passive Radio Frequency (RF) interface.

Cartridge Memory: a contactless storage device mounted in the cartridge shell, which is used to hold information about the specific tape cartridge, the tape media in the cartridge and the data on the tape.

LTO-CM

FUJIFILM

Cartridge Memory: Stores usage history & other information on a Non-contact Passive RF Interface Memory Chip

(shown 2X)

LTO Cartridge Memory (LTO CM)
Radio Frequency Transponder
Serial EEPROM - 13.56 MHz
Non-volatile Memory

- 8K Byte Memory for Generation 4
- 4K Byte Memory for Gen 1 – 3
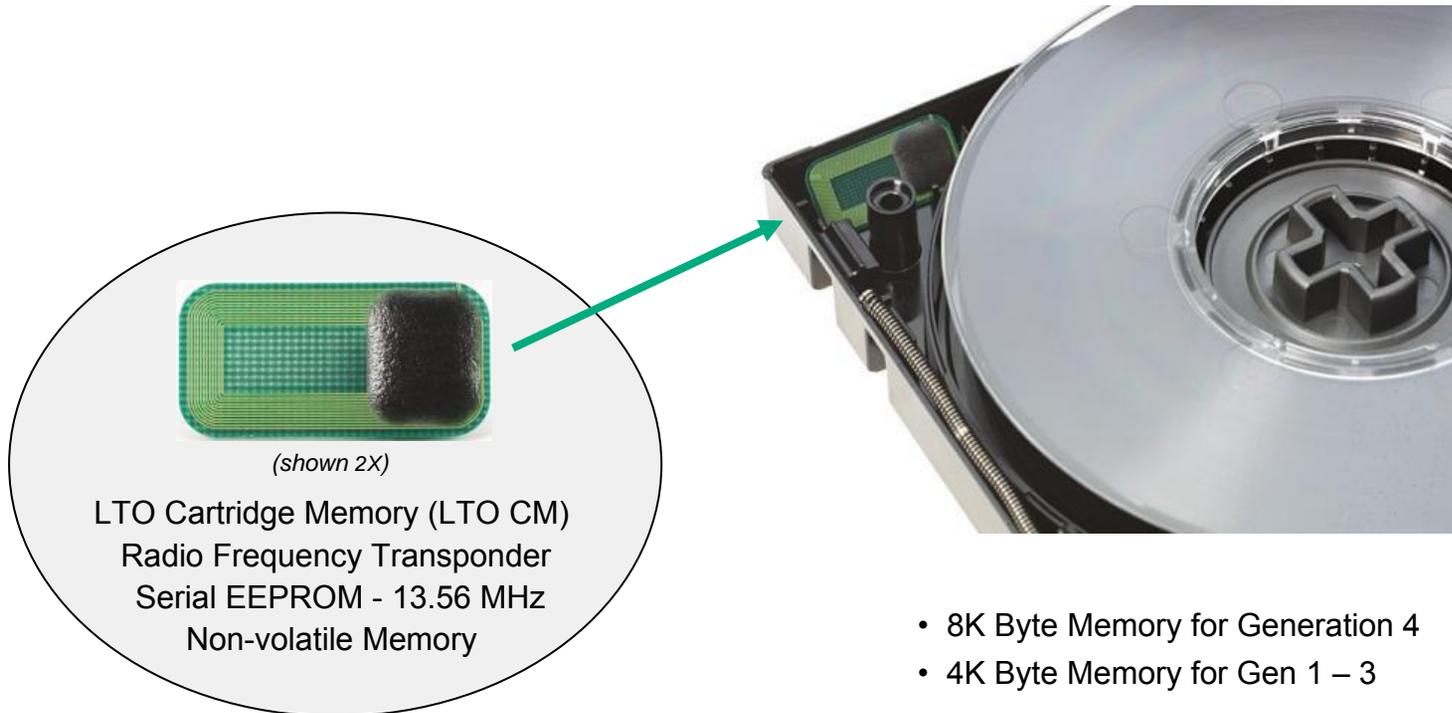
LTO Ultrium Servo-Tracking

Ultrium Data Cartridges

Pre-written <u>Magnetic</u> Servo Tracks –

Magnetic servo tracks for positioning the drive's read/write head are factory written.

Do not degauss (bulk erase) LTO Ultrium data cartridges that you intend to reuse! Degaussing makes the tape unusable!

LTO Ulrtrium Multi-Channel Linear Serpentine Recording Format

Ultrium 1: 8-element Read/Write Head writes 12 sets of 8 tracks in each of 4 data bands = 384 tracks; **Ultrium 2:** 8-element, 512 tracks; **Ultrium 3:** 16-element, 704 tracks.   **Ultrium 4:** 16-element, 896 tracks [see below].
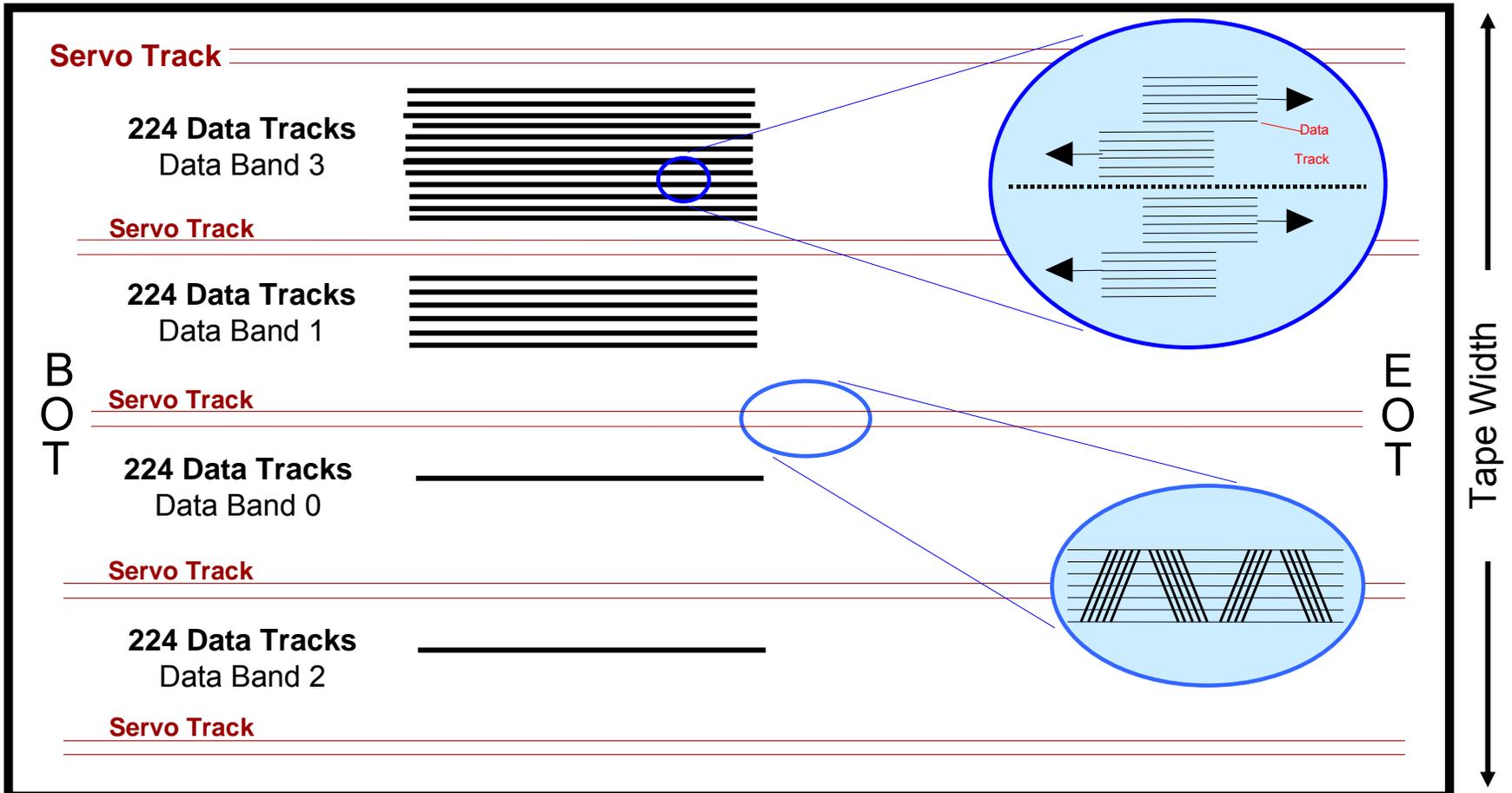
Diagram not to scale.   Five factory recorded servo bands occupy < 8% of recording surface area.
Servo Tracks are scalable and do not change for LTO 1, 2, 3, and 4 (unique code for each and for WORM media).

LTO Ultrium Tape Drives
Full-height & Half-height Models

FUJiFILM

Example Full-height Model

Example Half-height Model

3.5"

1.75"

Nominal height dimension, including bezel.

Nominal height dimension, including bezel shown in Rack Units, one rack unit is 44.45 mm (1.75 in) high; actual height dimension of the examples shown is very-slightly less than indicated, dimensions can vary by manufacturer and model.

LTO Ultrium Tape Media & Drives

FUJIFILM

LTO Ultrium Tape Media	Drive Model	Data Capacity Native / Compressed	Data Transfer Rate Native / Compressed	Speed Matching Minimum Data Rate Native / Compressed
LTO Ultrium 4 & Ultrium 4 WORM	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
	Tandberg LTO-4 [HH] [1]		80 / 160 MB/sec	40 / 80 MB/sec
LTO Ultrium 3 & Ultrium 3 WORM	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	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 [2]	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

• HH indicates Half-height form factor drive models; all others are full height drives.
• How the Speed Matching Feature functions is different among manufacturers and their different drive models.

LTO Ultrium Tape Media	Drive Model	Data Capacity Native / Compressed	Data Transfer Rate Native / Compressed	Speed Matching Minimum Data Rate Native / Compressed
LTO Ultrium 1	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] [3]		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

- 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.
- Certance (former Seagate Removable Storage Solutions Division) LTO drives now shown as Quantum drives. Quantum LTO Ultrium Drives: former Seagate RSS Division / Certance was acquired by Quantum 12 / 2004.
- (1) The Tandberg Storage LTO-4 HH Drive is not currently shipping (1Q-2008), availability expected 2Q-2008.
- (2) Enhanced speed (26 MB/sec Native) Quantum LTO-2 half-height drive; firmware revision upgrade 2005.
- (3) 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 ≥ 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.

• How the Speed Matching Feature functions is different among manufacturers and their different drive models.

LTO Ultrium Drives

FUJIFILM

Tape Media Capacity, Length	LTO-1 Tape Drive	LTO-2 Tape Drive	LTO-3 Tape Drive	LTO-4 Tape Drive
LTO Ultrium 1 100/200 GB, 609m	**Full Read/Write Compatibility**	**Full Read/Write Compatibility**	**Read-Only**	NOT COMPATIBLE
LTO Ultrium 2 200/400 GB, 609m	NOT COMPATIBLE	**Full Read/Write Compatibility**	**Full Read/Write Compatibility**	**Read-Only**
LTO Ultrium 3 400/800 GB, 680m	NOT COMPATIBLE	NOT COMPATIBLE	**Full Read/Write Compatibility**	**Full Read/Write Compatibility**
LTO Ultrium 4 800/1600 GB, 820m	NOT COMPATIBLE	NOT COMPATIBLE	NOT COMPATIBLE	**Full Read/Write Compatibility**

- Ultrium 4 drives are backward read & write compatible with Ultrium 3 Data Cartridges. When using an Ultrium 3 Data Cartridge, the Ultrium 4 Drive will write or read 400 GB (800 GB assuming 2:1 compression), same as an Ultrium 3 Drive.

- When using the Ultrium 4 data cartridge, the Ultrium 4 drive will read & write 800 GB (1600 GB assuming 2:1 compressed) at up to 120 MB/second native (240 MB/second assuming 2:1 compression).

WORM Format LTO Ultrium
3 & 4 Cartridges

FUJiFILM

LTO WORM (Write Once / Read Many) Cartridges

LTO 3 was the first generation in the LTO Roadmap to support the WORM functionality. Once data is written to WORM tape, it cannot be altered.

For LTO Generations 3 and 4, special cartridges with WORM functionality allow secure backup and storage of critical data in a non-erasable, non-rewritable format.

The LTO specification includes the ability for WORM & non-WORM media to function in WORM enabled LTO drives and provides a very cost effective means to store critical information in a non-erasable, non-rewritable format.

The different generations of Fujifilm LTO Ultrium data cartridges can be identified by their unique shell color:
<u>Black</u> Ultrium 1, <u>Purple</u> Ultrium 2, <u>Slate-Blue</u> Ultrium 3 and two-tone <u>Slate-Blue / Platinum</u> Ultrium 3 WORM,
<u>Green</u> (grayish green) Ultrium 4 and two-tone <u>Green / Platinum</u> Ultrium 4 WORM.

LTO Ultrium 4

FUJIFILM

Capacity:

800 Gigabytes (GB)

w/ 2:1 compression:

1600 Gigabytes [1.6 TB]

Speed:

120 Megabytes (MB) per second

w/ 2:1 compression

240 Megabytes per second

LTO-4 drives are backwards read and write compatible with generation 3 format media and backwards read compatible with generation 2 media.

LTO Ultrium 4
Drive-based Encryption

FUJIFILM

The LTO-4 standard provides for encryption capability built into LTO-4 drives. The new specification includes hardware-based AES 256 bit encryption capabilities to provide data security.

The encryption feature provides users the option to encrypt the data on their LTO-4 tapes, helping protect information if the tape cartridges are lost or stolen. The new encryption feature uses standard LTO-4 rewritable and WORM media [no special media needed].

This new feature is part of the LTO standard for LTO-4 and future LTO generations.   Although encryption capability is defined in the Generation 4 specification, encryption is an optional feature that LTO Drive makers can include or not include, based on their individual product lines.

LTO Ultrium
Linear Tape-Open Roadmap

FUJIFILM

Six-Generation Roadmap

Built-in* Encryption Feature LTO-4 & Future Generations!

	Generation 1	Generation 2	Generation 3	Generation 4	Generation 5	Generation 6
				Encryption	Encryption	Encryption
			WORM	WORM	WORM	WORM
Compressed Capacity	200 GB	400 GB	800 GB	1.6 TB	3.2 TB	6.4 TB
Compressed Transfer Rate	up to 40 MB/s	up to 80 MB/s	up to 160 MB/s	up to 240 MB/s	up to 360 MB/s	up to 540 MB/s

Source: The LTO Program

Note: Linear Tape-Open, LTO, the LTO logo, Ultrium, and the Ultrium logo are trademarks of HP, IBM and Quantum in the US and other countries.

* Hardware encryption and decryption ASIC resides in the tape drive. Although encryption capability is defined in the Ultrium specification, encryption is an optional feature that LTO Drive makers can include or not include, based on their individual product lines.

*Capacity and Data Transfer Rate shown with data compression and assuming 2:1 data compression.
-Subject to change - Forward-looking information based on LTO roadmap published 12-14-2004.
-Both WORM and Rewritable media are supported by Generation 3 and future generations.
-Encryption added to the roadmap for Generation 4 and future generations 4-20-2006.

50   6/07

Product Comparison
DLTtape & LTO Ultrium

Data Cartridge	Tape Drive	Native Capacity	Native Data Rate
Super DLTtape I {	SDLT 220	110 GB	11 MB/sec
	SDLT 320	160 GB	16 MB/sec
Super DLTtape II	SDLT 600	300 GB	36 MB/sec
DLTtape S4	DLT-S4	800 GB	60 MB/sec
LTO Ultrium 1	Ultrium 1	100 GB	7.5 -16 MB/sec*
LTO Ultrium 2	Ultrium 2	200 GB	24 - 35 MB/sec*
LTO Ultrium 3	Ultrium 3	400 GB	60 - 80 MB/sec*
LTO Ultrium 4	Ultrium 4	800 GB	80 - 120 MB/sec*

Data Transfer Rate is drive dependent. * Transfer Rate varies among the different LTO drive manufacturers and drive models. The range of current rates for different LTO Ultrium drive models is shown. *For example,* the IBM LTO-3 Half-height model drive transfers data at 60 MB/second native and IBM's LTO-3 Full-height model drive has a transfer rate of 80 MB/second native. The allowable range (LTO specification) for design of LTO-3 drives is between 40 and 80 MB/second native.

One Gigabyte equals one billion bytes (1 GB = 1,000,000,000 bytes). One Megabyte equals one million bytes (1 MB = 1,000,000 bytes).

Q & A

FUJIFILM

Questions?
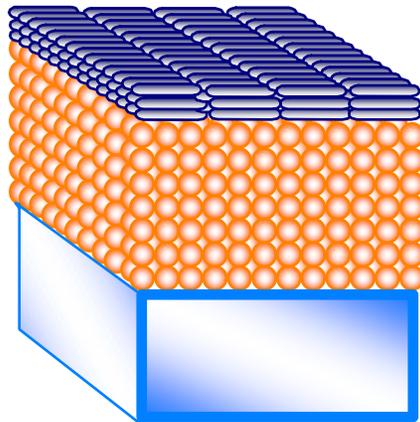
Advanced super
Thin-layer and high-
Output
Metal
Media

nanocubic

Fujifilm Value Added Services

Barcode Labeling

FUJIFILM

- **EDP Tri-Optic In-house Label Printer (Fujifilm Exclusive!)**

- Quick order process time since labels are printed in-house

- Clean room environment

- Technical support

- Drop-ship direct to end-user

- Now Available:
  Custom Logo Barcode Labeling

Barcode Labeling

EDP/Tri-Optic Label Benefits

- #1 barcode label printing system with an 80% market share

- Over 750 million EDP/Tri-Optic labels in use worldwide

- Guaranteed 100% readability by tape libraries and compatible with 15 different media types

- Highest quality materials ensure longevity – long archival life

Tri-Optic®

Barcode Labeling EDP/Tri-Optic Benefits

FUJIFILM

- Tri-Optic® labels are manufactured, not just printed. Fujifilm's Tri-Optic labels are manufactured at our Bedford, MA factory under license from Tri-Optic.

- A special design laminate overlay protects the label from environmental factors, but even more important the overlay helps to optimally scatter light, which is beneficial to most readers.

- Label of choice for major library OEMs – Highest quality materials ensure longevity.

Barcode Labeling

Custom Barcode Labels

- EDP Tri-Optic labels
- Same benefits as our Custom Pad Print!
- Available now!

Custom print area

Custom Pad Printing

FUJIFILM

Customize DLT, SDLT & LTO Tape Cartridges: end-user company name, logo, etc.

- **Increase Security**

- **Data Management**

- **Quick Recognition**

- **Data Protection**

- **Brand Identity**

Bulk Library Packs

FUJiFILM

DLT, SDLT and LTO Cartridges are also available in bulk library packs.

Fujifilm exclusive: Thermo-formed Plastic 20-packs for safe shipment.

Bulk Library Packs are <u>without</u> Individual Protective Cases (P-cases) or U-cards for Easy Loading into Library Magazines.

Library Packs can also be ordered <u>with</u> Protective Cases shipped on-the-side.

Fujifilm DLTtape & LTO Product Codes

FUJIFILM

Product	Standard in Protective Case	Labeled in Protective Case	Library Pk Standard w/o P-case	Library Pk Labeled w/o P-cases	Library Pk Standard plus cases*	Library Pk Labeled plus cases*
DLTtape IV	26112088	26112089	26112096	26112076	26114523	26119521
DLT CleaningTape III	26112090	26112097	–	–	–	–
Super DLTtape I	26300001	26300071	26300007	26300077	26347215	26356320
Super DLTtape I I	26300201	26300213	26300203	26300204	26300206	26300207
DLTtape S4	26360000	26320024	call	call	call	call
SDLT CleaningTape	26300010	26300074	–	–	–	–
LTO Ultrium 1	26200010	26200070	26200012	26200072	26236584	26245321
LTO Ultrium 2	26220001	26220071	26220011	26220012	26221213	26220013
LTO Ultrium 3	26230010	26230013	26230012	26230159	26235463	26200129
LTO Ultrium 3 WORM	26230014	26230002				
LTO Ultrium 4	26247007	26247024	26247008	26247025	call	call
LTO Ultrium 4 WORM	26247009	26247026				
LTO UCC Cleaning Tape	26200014	26200074	–	–	–	–

Not all configurations are shown. For other configurations, contact your sales representative or call Fujifilm's Recording Media Division – Customer Service Department at 800-488-3854.   * Cases shipped separately, on-the-side. Library Pack enables quick & easy unpacking and introduction into your Tape Library, while the Individual Protective Cases (P-cases) are on hand for use later when storing outside the Library, transporting and archiving cartridges.

It's What's Inside that Counts. Think Fujifilm Media, for Today's & Tomorrow's Most Popular Drives!

Questions About
DLT, SDLT or LTO?
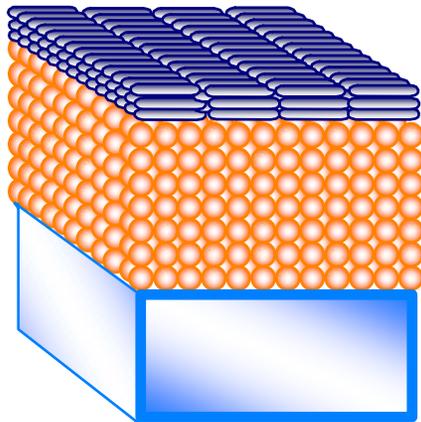
Advanced super
Thin-layer and high-
Output
Metal
Media

nanocubic

Fujifilm Enterprise 359X Tape ⟫▶

Enterprise Tape Systems

FUJIFILM

Enterprise Tape Family 3590 and Enterprise Tape Family 3592:

- ## Enterprise Tape System 3590

  - 3590 Model B Tape Drive
  - 3590 Model E Tape Drive
  - 3590 Model H Tape Drive

- ## Enterprise Tape System 3592

  - 3592 Model J1A Tape Drive
  - 3592 Model E05 (TS1120) Tape Drive

One Gigabyte equals one billion bytes (1 GB = 1,000,000,000 bytes).
One Megabyte equals one million bytes (1 MB = 1,000,000 bytes).

63 10/05

Enterprise Tape Systems
Fujifilm 3590 Tape Media

FUJIFILM

3590 High Performance & Extended High Performance Media

Magstar Drives and Fujifilm 3590 & 3590E ½"-inch Data Cartridges:

Drives	**3590 Media** 320 m - <u>Capacity</u>	**3590 E Media** 631 m - <u>Capacity</u>
3590 B (128 track, 16-channel)	**10**/30* GB 9 MB/sec	**20**/60* GB 9 MB/sec
3590 E (256 track, 16-channel)	**20**/60* GB 14 MB/sec	**40**/120* GB 14 MB/sec
3590 H (384 track, 16-channel)	**30**/90* GB 14 MB/sec	**60**/180* GB 14 MB/sec

*3:1 compressed; depending on data content, is typical for attachment to IBM zSeries Mainframe systems.

Enterprise Tape Systems
Fujifilm 3590 Tape Media

FUJiFILM

| TAPE MEDIA TYPE | DRIVE FORMAT RECORDED BY USER | CAPACITY (NATIVE) | Cartridge Tape Media Compatibility after User Data-Format is Recorded | | |
			3590 B Model 128-track Drive	3590 E Model 256-track Drive	3590 H Model 384-track Drive
3590 J-type	3590 B 128-Track Format	10 GB	Read & Write	Read or Reformat	Read or Reformat
	3590 E 256-Track Format	20 GB	Reformat	Read & Write	Read or Reformat
	3590 H 384-Track Format	30 GB	Reformat	Reformat	Read & Write
3590E K-type	3590 B 128-Track Format	20 GB	Read & Write	Read or Reformat	Read or Reformat
	3590 E 256-Track Format	40 GB	Reformat	Read & Write	Read or Reformat
	3590 H 384-Track Format	60 GB	Reformat	Reformat	Read & Write

65   9/03

Enterprise Tape Systems
Fujifilm 3590 Tape Media

Mainframe tape is not something new for Fujifilm, just something new for Fujifilm in the U.S.A. Fujifilm has sold mainframe tape since 1965 when we introduced 10½" reel-to-reel Computer Tape followed in 1987 by 3480 Cartridge System Tape and later 3490E, 3590 and 3590E. March 2004 wasn't our first sale of 3590 and 3590E, just our first sale in the U.S.A.

Fujifilm Product Codes:

Fujifilm 3590 & 3590E Tape	STANDARD	LABELED	LABELED & INITIALIZED
3590 "J" Cartridge 1050'	26400010	26400011	26400012
3590E "K" Cartridge 2070'	26400510	26400511	26400512
3590 CL (Drive Cleaning)	26400090	26400091	------------

Note: 3590 & 3590E Data Tapes have Factory Written Magnetic Servo Tracks, **Do Not Degauss**.

Enterprise Tape Systems
Fujifilm 3590 Tape Media

Questions about 3590 & 3590E?

3590 "J" Cartridge 1050 '

3590E "K" Cartridge 2070 '

New Tape Technology

Enterprise - IBM 3592

IBM Enterprise Tape Drive 3592 J1A…

- High capacity, high performance, fast access
- Supports IBM & select open system platforms
- Native data transfer rate of up to 40MB/sec
-60 & 300 GB rewritable & WORM cartridges
-Introduced September 2003

NEW
October 2005

IBM Enterprise Tape Drive TS1120 – 3592 E05…

- High capacity, high performance, fast access
- Supports IBM and selected open system platforms
- Provides native data transfer rate of up to 104MB/sec
- Supports 100 GB & 500 GB rewritable & WORM 3592
  cartridges (same cartridges used by 3592-J1A drives).

IBM 3592 J70 Controller…

- Enables attachment of TotalStorage Enterprise tape drives to IBM zSeries Mainframes

IBM Enterprise Tape System
TS1120 (3592 Model E05)

FUJIFILM

September 8, 2006: **Drive based Data Encryption Capabilities are now standard on all newly ordered IBM System Storage™ TS1120 Tape Drives.**

A chargeable upgrade is available for currently installed drives.

Encrypting data at tape speed helps avoid the need for host-based encryption of data and the concurrent drain on host performance or the use of specialized encryption appliances.

This new capability supports high volume data encryption for tape data, helping protect information if tape cartridges are lost or stolen.

All 3592 media, including WORM media, can be encrypted.

This is a feature that many have been anxiously awaiting; for more information, go to http://www-03.ibm.com/servers/storage/enewscast/data_encryption/

Enterprise Tape Systems
Fujifilm 3592 Data Cartridge

FUJIFILM

IBM Enterprise Tape Drive 3592

- 3592 Model J1A
- 3592 Model E05 (Total Storage Model TS1120)

- **Fujifilm 3592 "JA" Data Cartridge**
  - 300 GB native Data Capacity – 3592 J1A Drive
  - 500 GB native Data Capacity – 3592 E05 Drive

  - 40 MB/sec native Data Transfer Rate – 3592 J1A Drive
  - 104 MB/sec native Data Transfer Rate – 3592 E05 Drive

- **Enabled by Fujifilm nanocubic™ Media**
  - From 500 GB today to future TB capacities

- **New Format** - September 2003

Enterprise Tape Systems
Fujifilm 3592 Data Cartridge

FUJIFILM

Enterprise Tape Drive 3592 and Enterprise Tape Cartridge 3592:

Drive	3592 Media 609 m "JA" (1998 feet)	3592 Media 609 m "JA" Alternate Format (1)	3592 Media 246 m "JJ" (807 feet)
3592 J1A (512 track, 8-channel)	300/900* GB 40 MB/sec	60/180* GB 40 MB/sec	60/180* GB 40 MB/sec
3592 E05 **TS1120** (896 track, 16-channel)	500/1500* GB 104 MB/sec	100/300* GB 104 MB/sec	100/300* GB 104 MB/sec

The 609 meter Enterprise Tape Cartridge 3592, can be formatted for either high-capacity or fast-access uses. The drives handle both types of uses and can reformat cartridges as required. [1] The TS1120 (3592-E05) tape drive is able to read and write 3592 cartridges in the same format as the previous 3592-J1A tape drive and can reformat tapes used in the lower capacity format to its higher-capacity format and can also reformat one used at its high capacity format to the lower capacity format of the 3592-J1A drive. However, cartridges having a 3592-E05 higher-capacity format cannot be read by the 3592-J1A tape drive, but can be reformatted by the J1A.

(1) See slides 72, 73 and 74 (1).

*3:1 compressed, depending on data content, for IBM zSeries attachment; typical expectation for all Open System attachment is 2:1 compression.

Capacity Scaling[1] for the 1998' 3592 JA Cartridge
(For 3592 J1A Drive)*
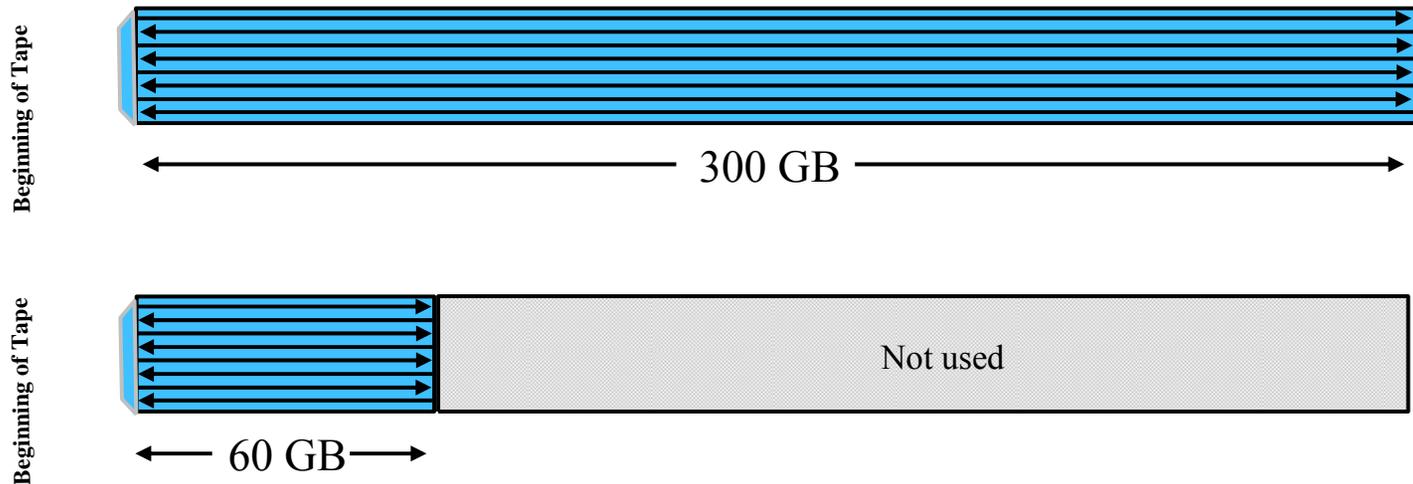
- Capacity Scaling enables cartridge to be initialized to two capacities
  - Allows standardization on a single media type
    - Initializing at 300 GB provides full cartridge storage capacity
    - Initializing at 60 GB improves average time to first byte
  - Tapes can be scaled / de-scaled as requirements change

- **When used on the new TS1120 E05 drive: Capacity is 500 GB for the full capacity Format and 100 GB for the scaled Format.**

Note 1: Capacity scaling is not supported for the Economy 246 m (JJ) Tapes or WORM tapes.

Capacity-scaling and Segmentation [1]

Two data segments allows future Segmented Tape Processing (support for IBM zOS – ISV support is required for open systems).

For example, a 3592 JA cartridge on a 3592 drive with two data segments would have one 60 GB segment having very fast access, and another segment of up to 200 GB for additional capacity:

Beginning of Tape

Default Tape Read/Write processing

300 GB

Beginning of Tape

Segmented Tape Processing*

~60 GB   ~200 GB
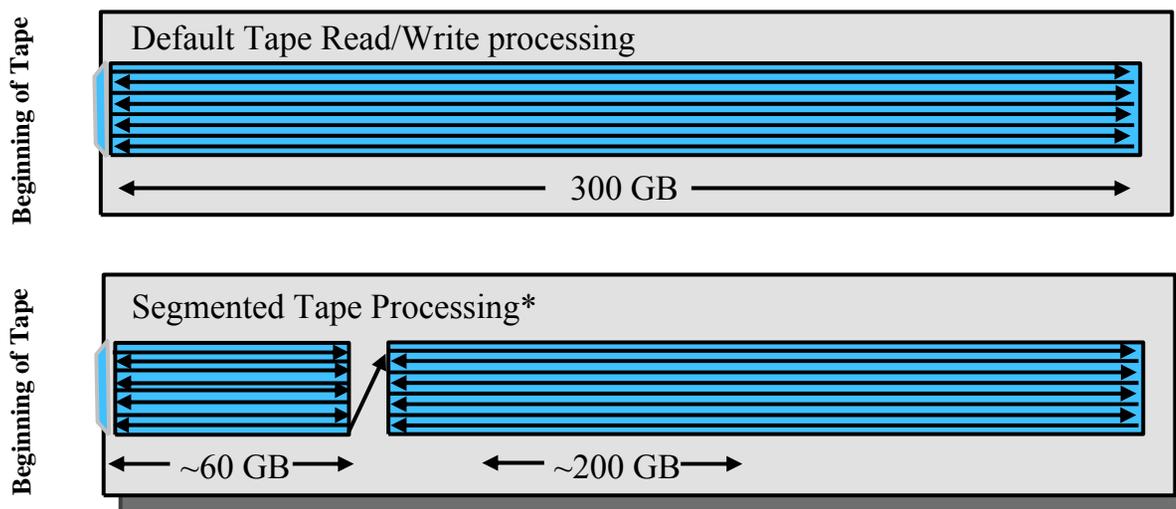
A 3592 cartridge tape can be formatted (initialized) for full capacity use or formatted with capacity scaling & segmentation, and later changed (re-formatted) for other use.

Note 1: Capacity scaling/segmenting is not supported for the Economy 246 m (JJ) Tapes or WORM tapes.

Enterprise Tape Systems

FUJiFILM

(1) In zOS / OS/390 environments, 3592 JA cartridges can be scaled down to a lower capacity (60 GB capacity for 3592 J1A drive format / 100 GB for TS1120 drive format) for fast data access. Capacity scaling reduces the average locate time (from load point) of a random record to less than 30% of normal locate time. ISV support required for open systems.

3592 and TS1120 drives feature many connectivity options. Users can simplify operations by consolidating on a single tape cartridge technology, 3592, for all popular operating platforms.

3592 features: IBM introduced Write Once Read Many (WORM) technology for the 3592 and TS1120 tape drives, so that once written, special WORM* data cartridges cannot be overwritten.

Additionally IBM introduced support for an Economy 60 GB 3592 cartridge, which provides an alternate price/performance point.

*Fujifilm 3592 WORM Cartridges, P/N 26400330 (300GB WORM) and P/N 26400340 (60 GB WORM).

Enterprise Tape Systems
Fujifilm 3592 Data Cartridge

FUJiFILM

Drive: Enterprise Tape Drive 3592 and TS1120 (3592 Model E05)

Recording: Linear Serpentine, 512 tracks (3592-J1A drive), 896 tracks (3592-E05 drive)

Media: nanocubic™ half-inch x 609m media and short length 246m media

Servo: precision servo track formatting (at factory [1])

Capacity: up to 500 GB native (1.5 TB 3:1 compressed*)

Data Rate: up to 104 MB/second native data transfer rate

Memory: Cartridge Memory built into every 3592 cartridge, which stores cartridge identification and performance history information.

Form: Form factor similar to 3590 cartridges, which allows 3592 tape cartridges to work in IBM 3494 and StorageTek 9310 and other enterprise libraries, alongside 3590 and 3490E cartridges.

Compatible: The 3592 drive was the first of a new class of enterprise tape systems. 3592 and TS1120 drives are only compatible with 3592 Enterprise Tape Cartridges (*not backward compatible with 3590 or any other cartridge*).

(1) Factory written servo tracks, **do not degauss**.   *3:1 compressed; depending on data content, is typical for attachment to IBM zSeries systems.

Fujifilm 3592 Data Cartridges

FUJIFILM

3592 "JA" Cartridge 1998'
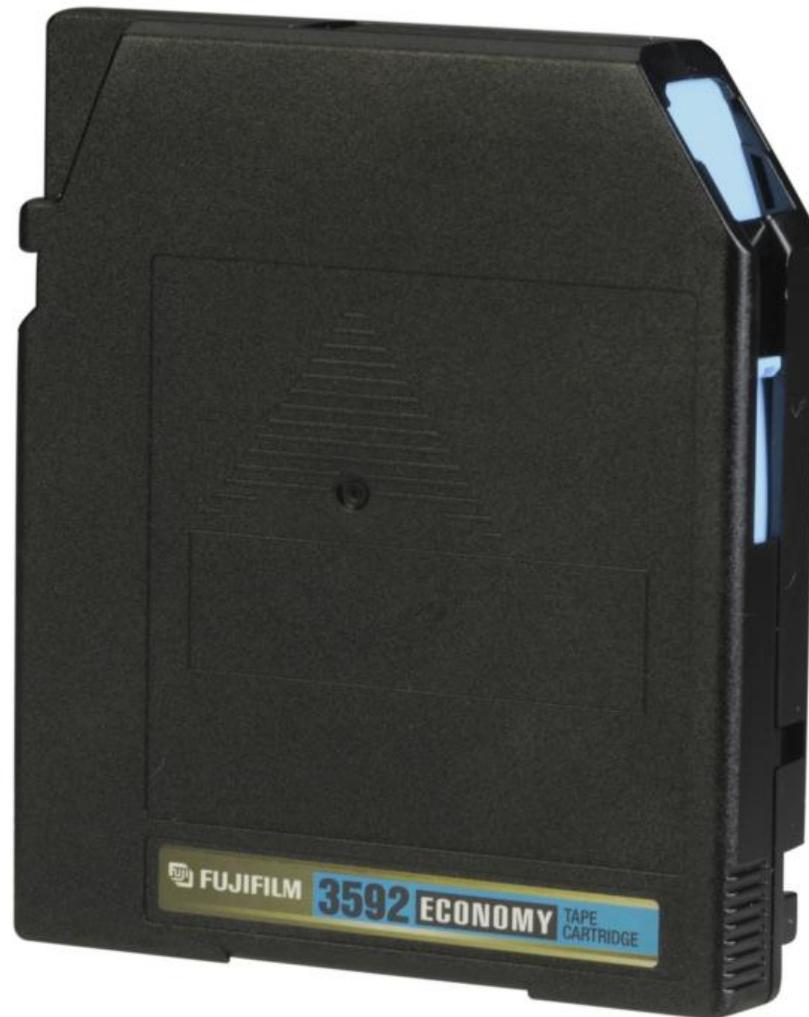
3592 "JJ" Cartridge 807'

Fujifilm 3592 <u>WORM</u> Cartridges

FUJiFILM

3592 WORM "JW" Cartridge 1998'

3592 WORM "JR" Cartridge 807'

Fujifilm 3592 L & I
Available Formats

FUJiFILM

- Initialize with the 1st Gen drive model 3592-J1A <u>or</u> 2nd Gen model TS1120 (3592-EO5)

- "JA" – 300 GB $<or>$ 500 GB

- "JJ" –   60 GB $<or>$ 100 GB

- "JW"– 300 GB $<or>$ 500 GB

- "JR" –   60 GB $<or>$ 100 GB

- Pre-initialization with other format choices, scaled and segmented formats, not currently offered by Fujifilm.

- See the current Fujifilm L & I Order Form for more information on 3592 formats and Fujifilm factory initialization options.

Enterprise Tape Systems
Fujifilm 3590 & 3592 Tape

FUJiFILM

Tape Family 3590 and Enterprise Tape Family 3592:

Fujifilm Enterprise Products & Product Codes	STANDARD	LABELED	LABELED & INITIALIZED
3590 "J" Cartridge 1050'	26400010	26400011	26400012
3590E "K" Cartridge 2070'	26400510	26400511	26400512
3590 CL (Drive Cleaning)	26400090	26400091	-----------
3592 DATA "JA" 1998'	26400310	26400311	26400312
3592 Economy DATA "JJ" 807'	26400320	26400321	26400322
3592 WORM "JW" 1998'	26400330	26400331	26400332
3592 WORM Economy "JR" 807'	26400340	26400341	26400342
3592 CL "CLN + JA" (50 Drive Cleans)	26400390	26400391	-----------

Note: JA, JJ, JW and JR are the Media Identifier, 7th and 8th characters following the six character Volume ID of 3592 Bar Code Labels. Typical 3592 cartridge bar code label format: nnnnnnJx. Typical label format for 3592 cleaning cartridges is CLNnnnJA. Exceptions: e.g., 3592 cartridges inside a StorageTek 9310 Powderhorn Tape Library require a different bar code label schema.

For more information go to: www.fujifilmusa.com/tapestorage

3592 Enterprise Tape Drive Road Map

Native Capacity

Native Transfer Rate

1 Terabyte

100 MB/s

Native capacities and transfer rates shown.

- **Cartridge reuse between generations** *
- **Backward R/W between generations** *

3rd Generation 3592 Drive [1]
~ 1000 GB (1TB)*
~ 150 MB/s*

2nd Generation Drive – October 2005
TS1120/3592 E05 Enterprise Tape Drive
500 GB
104 MB/s } Using Gen 1 Media
700 GB
104 MB/s } Using Gen 2 Media [1]

1st Generation Drive – September 2003
3592 J1A Enterprise Tape Drive and
3592 JA Data Cartridge Tape
300 GB
40 MB/s

Technology Demo
1 TB – April 2002

*Subject to change - Forward-looking information is based on technology announcements & published roadmaps.

[1] 3592 Extended Capacity 700 GB Data Cartridge introduced December 2006. IBM's current intent is to support 1 TB using this cartridge on the 3rd generation drive.

- IBM 1Terabyte Technology demonstrated April 2002, using Fujifilm nanocubic™ tape media.
- IBM 3592-J1A Tape Drive and 300 GB Data Cartridges began shipping September 2003.
- IBM 3592-E05 Tape Drive increases capacity of JA cartridge to 500 GB October 2005.

3592 Extended Capacity Tape Media

FUJIFILM

IBM announced 3592-JB Data Cartridges and 3592-JX WORM Cartridges, which began shipping from IBM in December 2006. Below are the basic facts about 3592 Extended Capacity media:

- The new 3592 JB/JX cartridges are compatible [1] on the current TS1120 (3592 model E05) Tape Drive, providing a native capacity of 700 GB at 104 MB/second native transfer rate.

- At typical compression ratios, the 3592 JB/JX cartridges can provide usable capacity of 1.4 TB (assumes 2:1 compression) in an open system environment and 2.1 TB (assumes 3:1 compression) in an IBM System z™ environment.

- Tape length for the new JB and JX cartridges is 2706 Ft nominal (825m), versus 2001 Ft nominal (610m) for JA and JW cartridges.

It is expected that 3592 JB/JX cartridges will also be compatible with a future Gen 3 drive and reusable at an even higher capacity and data transfer rate [2]. Media re-use on subsequent generation drives at a higher capacity is a valuable benefit of the 3592-technology roadmap [3].

(1) The installed base of TS1120 (3592 model E05) tape drives will require a microcode firmware update for support of the 3592 Extended Data and 3592 Extended WORM Tape Cartridges. The new firmware needed to enable the existing TS1120 drives to use the new cartridges will be made available from IBM prior to general availability of the new cartridges.

(2) Forward-looking statements and plans are subject to change; this information is the current stated intention only and subject to change. Product Road Map statements represent current intent, are subject to change or withdrawal and represent goals and objectives only.

(3) IBM Statement... Media Reuse: The IBM TotalStorage Enterprise Tape System 3592 protects future media investments by supporting full forward read and write compatibility into the next generation of 3592 drives. Additionally, the next generation of TotalStorage Enterprise 3592 drives will also provide a reformatting function, to allow current media to be reused and achieve higher capacities.

 - Next generation drives allowing media reuse at a higher capacity & transfer rate is a valuable feature of the 3592 technology plan.

> Fujifilm's first generation tape media already demonstrates this; its native capacity can be boosted from 300 GB to 500 GB and its transfer rate raised from 40 MB/s to 104 MB/s on a second-generation drive.

 - The 3592 drives are supported for Mainframe (IBM System z™ - z/OS®) attachment, as well as select open system (e.g. Windows, Unix, Linux, Solaris, Netware) attachment.

• Fujifilm Brand 3592 Extended Capacity JB & JX Data Cartridges are not currently available, currently IBM brand only.   81   1/07

Tape Overview – IBM zOS‑OS/390, zSeries, z9, S/390 Mainframe Environments:

Tape Media/ Width & Length	Drive Model	Capacity Native	Data Rate Native	Comments
Enterprise 3592	**Linear**			**Drive Maker – IBM**
3592 [JA], [JW*] ½" 1998'	IBM 3592 – J1A	300 GB	40 MB/s	* WORM cartridges: 609m "JW " and 246m "JR" WORM.
	IBM 3592 – E05	500 GB	104 MB/s	
3592 [JJ], [JR*] ½" 807'	IBM 3592 – J1A	60 GB	40 MB/s	– 3592-J1A Drive: 512 Track
	IBM 3592 – E05	100 GB	104 MB/s	– TS1120 / 3592-E05 Drive: 896 Track
3592 [JB], [JX] ½" 2706'	IBM 3592 – E05	700 GB	104 MB/s	Extended 825m cartridges. JX: WORM IBM brand available December 2006.
Magstar 3590	**Linear**			**Drive Maker – IBM**
3590 [J] ½" 1050'	IBM 3590 – B	10 GB	9 MB/s	Model B: 128-Track
	IBM 3590 – E	20 GB	14 MB/s	Model E: 256-Track
	IBM 3590 – H	30 GB		Model H: 384-Track
3590-E [K] ½" 2070'	IBM 3590 – B *	20 GB	9 MB/s	* 3590-B model drives existing prior to 3/2000 can be field-upgraded to use 3590-E tapes.
	IBM 3590 – E	40 GB	14 MB/s	
	IBM 3590 – H	60 GB		
T10000	**Linear**			**Drive Maker – StorageTek**
T10000 Standard ½" 3008'	STK T10000-A	500 GB	120 MB/s	- Standard length 500 GB cartridge (917m). - Short (Sport) length and VolSafe® WORM media are available.
T10000 Sport ½" (short length)		120 GB		
T 9840	**Linear**			**Drive Maker – StorageTek**
9840 ½" 886' Two-Axis Cartridge	STK T9840-A	20 GB	10 MB/s	*VolSafe® WORM: 9840 A/B drives and C/D drives). T9840 A/B/C: 288 Tracks, T9840-D: 576 Tracks. • Two-Axis, Mid-point load data cartridges
	STK T9840-B		19 MB/s	
	STK T9840-C	40 GB	30 MB/s	
	STK T9840-D	75 GB		

Tape Overview – IBM zOS - OS/390, z Series, z9, S/390 Mainframe Environments:

Tape Media / Width & Length	Drive Model	Capacity Native	Data Rate Native	Comments
T 9940 Linear				**Drive Maker – StorageTek**
9940 ½" 2320'	STK T9940-A	60 GB	10 MB/s	•Single-Axis data cartridge • 9940A: 288-Track, 9940B: 576-Track
	STK T9940-B *	200 GB	30 MB/s	* T9940B drives support VolSafe® 9940B media
Redwood SD-3 Helical				**Drive Maker – StorageTek**
SD-3 ½" 298'		10 GB		
SD-3 ½" 668'	STK Redwood SD-3	25 GB	11 MB/s	This product line has been discontinued.
SD-3 ½" 1286'		50 GB		
3480/3490E Linear				**Drive Maker – IBM, STK, Fujitsu, etc.**
3480 ½" 550'	18-Track - 3480	200 MB	3 MB/s	*1.6GB 9490EE 2200' (STK 9490 drives)
3490E ½" 1100'	36-Track - 3490E *	800 MB		& 1GB 3490E XL 1368' cartridges also.
9-Track Reel-To-Reel (10½" reel) Linear				**Drive Maker – IBM, STK, Fujitsu, etc.**
6250 Bpi ½" 2400'	IBM 3420 Model 8	169 MB	1.25 MB/s	No data compression feature; other models had slower transfer rate; all drives discontinued; drive maintenance support discontinued by all makers.
6250 Bpi ½" 3600'		254 MB		
The IBM 3420 Model 8 and plug compatible drives from other manufacturers were the last in the line of Mainframe Reel-To-Reel Computer Tape drives. 3420 Magnetic Tape Units circa 1970 – 1987: IBM retired the 3420 Model 8, along with earlier Models 3, 4, 5, 6 and 7 IBM reel-reel tape drives, in 1987.				

Connectivity for IBM zOS - OS/390 and Open Systems

As shown, the 3592, 3590, 3590E, T10000, T9940 & T9840 Drives can be attached to IBM mainframes supported by IBM zOS, OS/390 operating systems. These drives, which are supported by the IBM zOS, OS/390 operating systems, are also attachable in an Open System environment using their SCSI or Fibre Channel attachment. Native capacity and transfer rate specifications shown; a 3:1 increase for mainframe data and 2:1 increase for open-system data are typically assumed for compressed values.

Note: 3592, 3590, 3590E, T10000, T9940 & T9840 Data Tapes have Factory Written Magnetic Servo Tracks: **Do Not Degauss!**

Fujifilm 3590 / 3592 Media Review?   **FUJIFILM**

TAPE MEDIA	TAPE DRIVES	CAPACITY NATIVE – COMPRESSED*	PERFORMANCE NATIVE – COMPRESSED*
3592 DATA "JA" (1998')	TS1120 / 3592-E05	500 GB – 1.5 TB	104 MB/s – 210 MB/s
	3592 - J1A	300 GB – 900 GB	40 MB/s – 120 MB/s
3592 WORM "JW" (1998')	TS1120 / 3592-E05	500 GB – 1.5 TB	104 MB/s – 210 MB/s
	3592 - J1A	300 GB – 900 GB	40 MB/s – 120 MB/s
3592 ECONOMY DATA "JJ" (807')	TS1120 / 3592-E05	100 GB – 300 GB	104 MB/s – 210 MB/s
	3592 - J1A	60 GB – 180 GB	40 MB/s – 120 MB/s
3592 ECONOMY WORM "JR" (807')	TS1120 / 3592-E05	100 GB – 300 GB	104 MB/s – 210 MB/s
	3592 - J1A	60 GB – 180 GB	40 MB/s – 120 MB/s
3590 E "K" (2070')	3590 H	60 GB – 180 GB	14 MB/s – 42 MB/s
	3590 E	40 GB – 120 GB	14 MB/s – 42 MB/s
	3590 B	20 GB – 60 GB	9 MB/s – 27 MB/s
3590 "J" (1050')	3590 H	30 GB – 90 GB	14 MB/s – 42 MB/s
	3590 E	20 GB – 60 GB	14 MB/s – 42 MB/s
	3590 B	10 GB – 30 GB	9 MB/s – 27 MB/s

*Assumes 3:1 compression, which is typical for mainframe environments. In a mainframe environment, where data typically compresses at 3:1, the TS1120 tape drive can transfer data up to 210 MB/s and the 3592-J1A tape drive can transfer data up to 120 MB/s. Typical data compression achieved in open system environments is 2:1 compression. Compressed capacity & data transfer rate in open system environments can be assumed at double (2:1) the native value. For example, the TS1120 tape drive supports a native data transfer rate of up to to 104 MB/s in an open systems environment and can transfer data at up to 208 MB/s when the data compresses at 2:1 and up to a maximum of 260 MB/s when greater compression is achieved. For maximum transfer rate the host system must transfer data to/from the drive as fast or faster than the drive's transfer rate.

Questions About
Enterprise Tape
3590? – 3592?
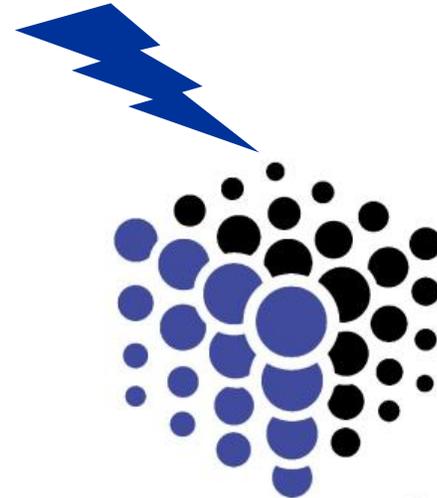
nanocubic

It's What's Inside that Counts. Think Fujifilm nanocubic™
Media, for Today's & Tomorrow's Most Powerful Drives!

More & More Choices in this Fast-Growing Marketplace
Today's Users Have a Choice of Many Different Tape Technologies

High-End Tape Overview

• Many High-Capacity Data Storage Tape Choices

• Sorting the Data Storage Tape Choices:

• Which Data Tape Technology

Fits Your Requirements?

* Mike's Criteria to Make The Charts That Follow on the Next Three Pages:

High Capacity *and* a Sustained Native Transfer Rate of 2 MB/s or Faster.

NOTE: Only the highest capacity/transfer-rate Media and Drive offering in each product family is shown. -- Other media/drive models within the same family often meet the above criteria too, but are not listed.

For charts showing all media/drive models for each tape technology, go to www.fujifilmusa.com/tapestorage => Resource Center => Technical Center.

Tape	Media	Drive	Native Capacity	Native Data Rate	Drive Maker
LTO Ultrium 4 ½" Linear	Nano^3 MP	LTO Ultrium 4	800 GB	120 MB/s	IBM, HP Quantum*
DLTtape S4 ½" Linear	AMP	DLT-S4	800 GB	60 MB/s	Quantum
3592 Extended (JB) ½" Linear	Nano^3 MP	TS1120 (3592-E05)	700 GB	104 MB/s	IBM
DD-2QD L 19mm Helical	MP+	DST-314	660 GB	20 MB/s	Ampex
T10000 ½" Linear	Nano^3 MP	STK-T10000	500 GB	120 MB/s	StorageTek
SAIT-1 ½" Helical	AME	S-AIT	500 GB	30 MB/s	Sony
AIT-5 8mm Helical	AME++	AIT-5	400 GB	24 MB/s	Sony
*Super*DLTtape II ½" Linear	AMP	SDLT-600 / SDLT-600A	300 GB	36 MB/s	Quantum
T9940 ½" Linear	MP	STK-9940B	200 GB	30 MB/s	StorageTek
DTF-2 L ½" Helical	MP+	GY-8240	200 GB	24 MB/s	Sony
VXA – V23 8mm Helical	AME	VXA-320	160 GB	12 MB/s	Exabyte

*Seagate's Tape Drive Division, Removable Storage Solutions (RSS), changed to Certance and bought by Quantum 12/2004.

Tape	Media	Drive	Native Capacity	Native Data Rate	Drive Maker
VS 1 DLTtape ½" Linear	MP++	DLT V4	160 GB	10 MB/s	Quantum
DAT 160 [DDS-6] 8mm Helical	MP+++	DAT-160	80 GB	8.9 MB/s	Quantum*, HP
STK-9840 ½" Linear	MP	STK 9840-D	75 GB	30 MB/s	StorageTek
SLR140 ¼" Linear	MP	SLR140	70 GB	6 MB/s	Tandberg
Magstar 3590-E ½" Linear	MP	3590-H	60 GB	14 MB/s	IBM
M-2 (Mammoth-2) 8mm Helical	AME	Mammoth (8900)	60 GB	12 MB/s	Exabyte
ADR2-120GB 8mm Linear	Co-∂Fe_2O_3	ADR2.120	60 GB	4 MB/s	OnStream
SD-3 – 1286' ½" Helical	AMP	Redwood STK SD-3	50 GB	11 MB/s	StorageTek
DLTtape IV ½" Linear	MP++	DLT-8000	40 GB	6 MB/s	Quantum
DLTtape IV * ½" Linear	MP++	DLT1* VS80*	40 GB	3 MB/s	Quantum

*Benchmark Drives write DLTtape IV in a non-DLT format. Benchmark was acquired by Quantum Corporation 11/02.

*Seagate's Tape Drive Division, RSS, changed to Certance and acquired by Quantum 12/2004.

<u>Current</u> High-Capacity Tape Technologies (page 3 of 3)

Tape	Media	Drive	Native Capacity	Native Data Rate	Drive Maker
DAT 72 [DDS-5] 4mm Helical	MP+++	DAT-72	36 GB	3.5 MB/s	Quantum*, HP
Travan-7 8mm Linear	MP	Travan 40	20 GB	2 MB/s	Quantum**
NCTP ½" Linear	AMP	NCTP	18 GB	10 MB/s	Plasmon LMS (Philips LMS)
Magstar-MP CXL 8mm Linear	AMP	IBM 3570-C	7 GB	7 MB/s	IBM

Note: Lines discontinued by the drive manufacturer are grayed-out in charts

*Seagate's Tape Drive Division, RSS, changed to
Certance and acquired by Quantum 12/2004.

One Gigabyte equals one billion bytes (1 GB = 1,000,000,000 bytes).
One Megabyte equals one million bytes (1 MB = 1,000,000 bytes).

Which Midrange Tape – Backup NAS, SAN & Other High-End Centralized Storage?

FUJIFILM

AIT-3 AIT-4 AIT-5	M2 VXA-2 VXA-320	SLR-100 SLR-140	DLT VS160 DLT V4	LTO- Ultrium1 Ultrium2 Ultrium3 Ultrium4	SDLT -320 -600 DLT-S4
Sony	Exabyte	Tandberg	Quantum	HP IBM Quantum Tandberg	Quantum
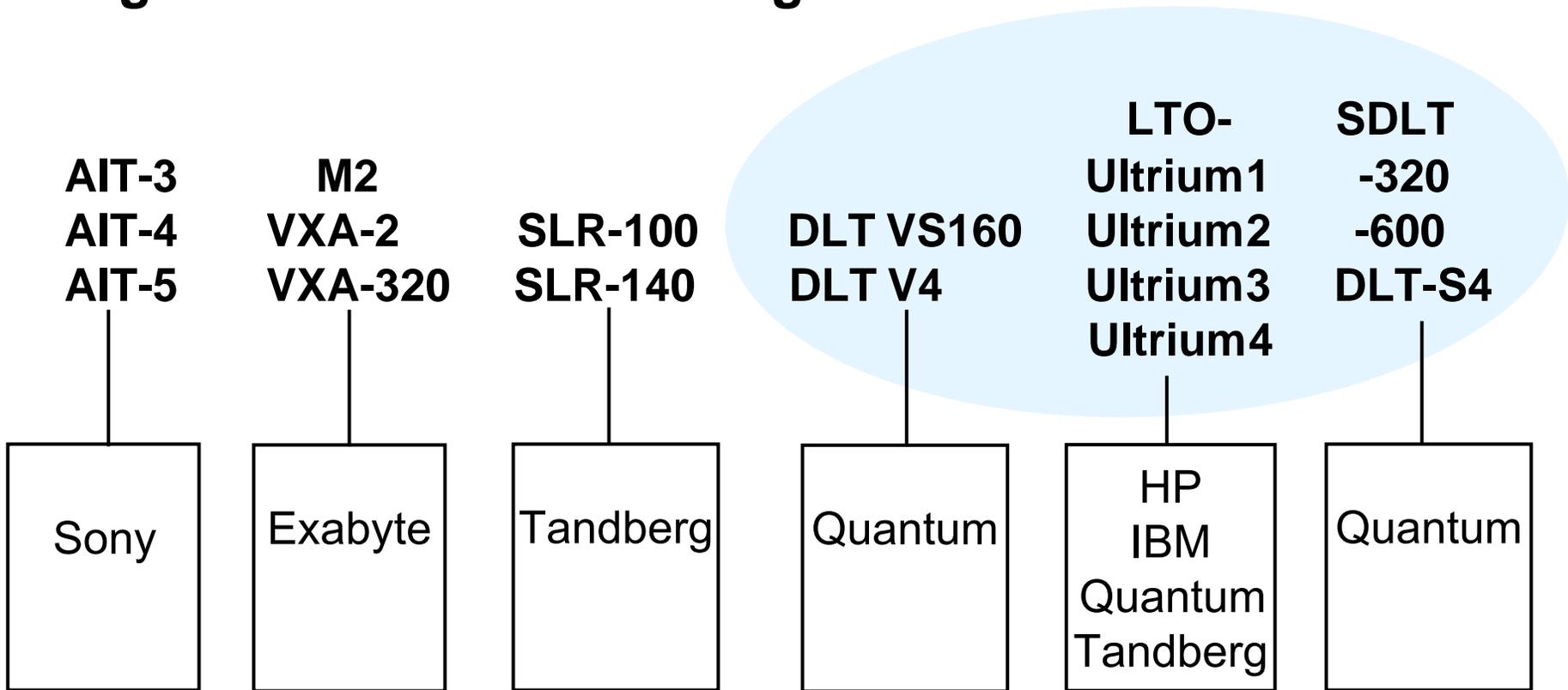
- Mike's Criteria: Less Than $7,500 Drive Cost, Transfer Rate 5 MB/s or faster and shipping.

- Sorting the Choices – Which of these Tape Technologies is right for your business?

Entry level, Mid-range, High-end, Open Systems, Proprietary Systems?

Divisions between computing platforms & customary peripheral attachments can be described in various ways; one way is to group them into four classes:

⇒ **Distributed Client/Server Systems (Open Systems)**

> **DDS/DAT**
> **DLT [Half-height Value Drives]**
> **LTO Ultrium [Half-height Drives]**

     **Midrange
Entry Level**

⇒ **High-end Enterprise Systems (Open Systems)**

> **DLT**
> **Super DLT**
> **LTO Ultrium**
> **Enterprise 3592**

⇒ **High-end Enterprise – iSeries, OS/400 IBM Systems**

> **LTO Ultrium**
> **Enterprise 3592**

     Midrange

⇒ **Mainframe (zSeries, zOS based – IBM Systems)**

> **Magstar 3590**
> **Enterprise 3592**
> **STK T10000**

     Mainframe

Think Fujifilm Media, for Today's & Tomorrow's Most Popular Drives!

Thank You!

Advanced super
Thin-layer and high-
Output
Metal
Media

Fujifilm's Coating Technology Creates Breakthrough Products

Fujifilm began coating motion picture and photographic film in the mid 1930's using die coating technology. Simultaneous multi-coating technology was developed in 1960 . Also in 1960, Fujifilm produced its first magnetic tape products. In 1965, Fujifilm began manufacturing computer tape. Fujifilm's floppy disks (8-inch) were introduced in 1977. Fujifilm began manufacturing dual-coated magnetic media in 1989 and Advanced super Thin-layer and high-Output Metal Media (ATOMM) dual-coated media in 1992. For ATOMM, Fujifilm's special die coating head simultaneously applies two separate and unique layers, one magnetic and one non-magnetic. It's a dual coating system Fujifilm invented that has allowed us to continually develop the industry's "next generation" storage products and develop nanocubic™ Technology for data storage products with even greater capacities.

FUJIFILM

Recording Media Division

Fujifilm U.S.A.

- **Value-Added Services**

- **Accessory Products**

- **Data Center Services**

- **End-User Loyalty Program**

- **A Brand New Look**

Fujifilm U.S.A.

Recording Media Division
Value-Added Services

U.S. Manufacturing Facility

Bedford, MA

- DLTtape & LTO Manufacturing

  Plastic molding, assembling, tape loading, printing & packaging, security seal and value-added services

- Dedicated Data Tape Warehouse

- Barcode Labeling

- Enterprise Tape Initialization

- Custom Labeling & Packaging

Our U.S. location allows Fujifilm to better serve customers with Value-Added Services.

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Fujifilm Value-Added Services

Custom Barcode Labeling & Initialization

→ EDP Colorflex In-house Label Printer

→ Cleanroom Environment Enterprise
   Tape Initialization

→ Full Label Tracking System

→ Quick Order Process Time

→ Technical Support

→ Drop-ship Specialists

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Fujifilm Value-Added Services

Library Packs

Unique thermo-formed pack exclusively designed by Fujifilm for automated tape storage environments.

• Packaged without plastic case or printed u-card

• Designed for easy tape library upload

• Recyclable plastic shell

• Tested to insure safe transportation of DLT, SDLT and LTO tape cartridges

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Fujifilm Value-Added Services

Custom Pad Printing

Customize Fujifilm tape cartridges DLT, SDLT and LTO 1 & 2 cartridges with end-user company name, logo, etc.

- **Brand Identity**

- **Data Protection**

- **Increased Security**

- **Quick Recognition**

Here's 4 Good Reasons...
to customize your tapes with your logo!

1. More Security 2. Your Brand ID 3. Data Protection 4. Quick Recognition

Fujifilm now offers customized pad printing on DLTtape IV and LTO Ultrium I tapes. Maximize your company visibility while adding extra security to all your important company documents. Best of all, it's easy...contact your nearest Fujifilm tape dealer for details.

Fujifilm U.S.A.
Accessory Products

FUJIFILM

Data Tape Courier – 1 Pack

- One time use media shipper
- Mid-Range/Enterprise
- Certified and Approved by Fujifilm
- Meets Best Practices
- Tamper evident security seal
- U.S. Patent Pending

Data Tape Courier

- Protective clamshells only

- Meets Best Practices

- U.S. Patent Pending

- Master carton holds 50 nested pieces

- Availability: Now!

FUJIFILM

Data Tape Courier – 5, 10 Pack

- One time use media shipper

- Mid-Range/Enterprise

- Certified and Approved by Fujifilm

- Master carton holds 10 flat cartons with clamshells

- Availability: Now!

  - Five Pack

  - Ten Pack

Data Tape Courier

SKU Numbers:

• 1 pack shipper: 26089541

• 50 pack clamshells: 26089550

• 5 pack shipper: 26054321

• 10 pack shipper: 26023978

FUJIFILM

Single Pack Cut Top Box

- Customer driven solution

- Unique packaging that saves time and money for Dealers when picking small orders

- True value-add that provides product protection during shipment.

- Available Now!

Data Tape Courier

- Reusable Vault/Shipping Container
- Tray system fits all Mid-Range tapes
- Reliable compression clips, lockable
- Meets Best Practices
- Certified and Approved by Fujifilm
- Availability: Now!

FUJIFILM

Data Tape Courier – Pro Case OverPack

DATA TAPE
COURIER

- Data Tape Courier Pro Overpack

- Recommended way to ship the Pro cases

- Includes special shock absorbing end caps

Data Tape Courier – Pro Double

- Fits 32 – 36 Tapes
- Uses the same inserts

FUJIFILM

Data Tape Courier – Pro LTO Bare

- Pro LTO Bare

- 14 LTO tapes without their plastic protective cases

- Made of super shock absorbent "Croc" material

Tape Tracker

TAPE TRACKER LOSS PREVENTION SYSTEM
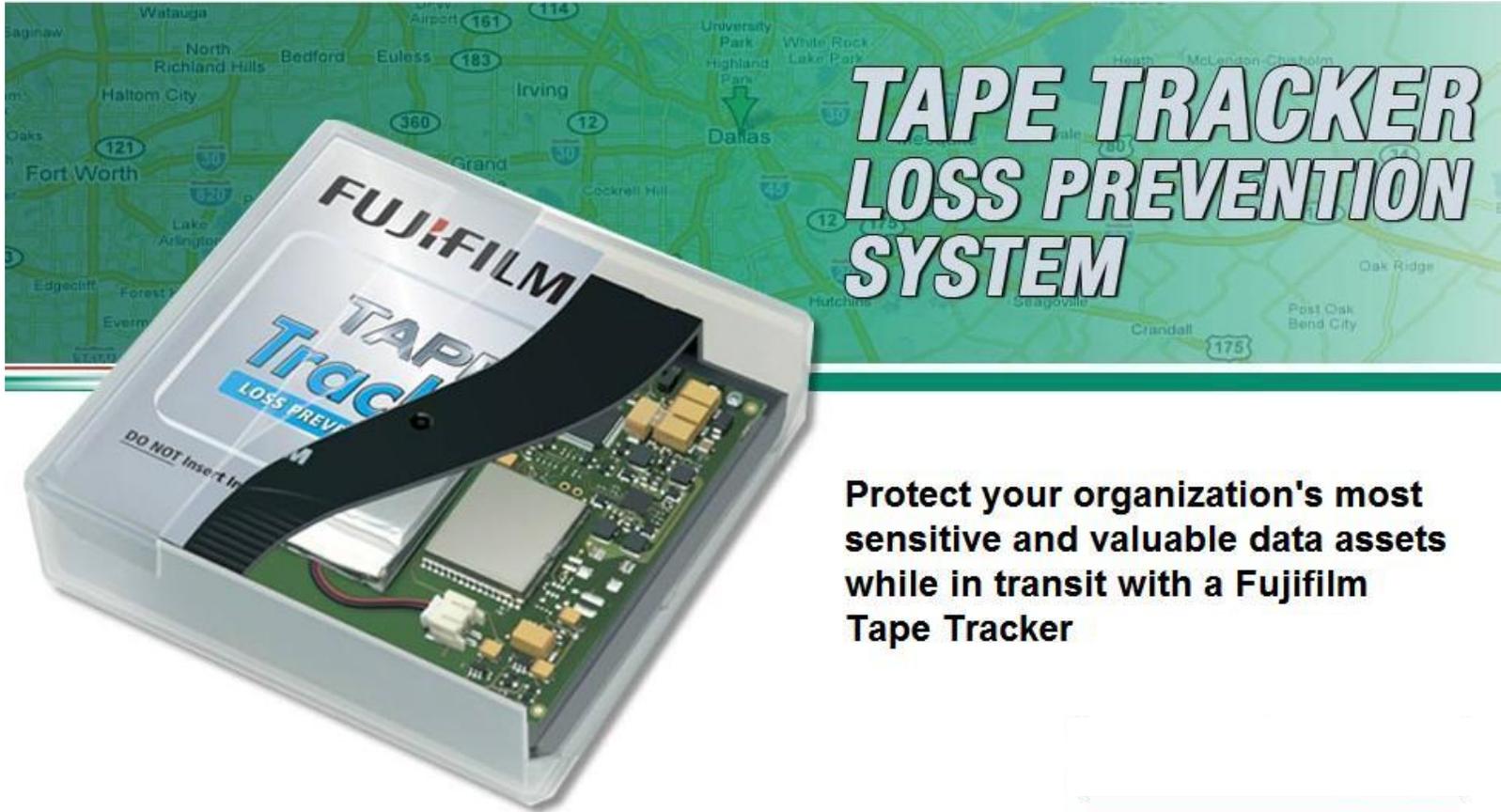
Protect your organization's most sensitive and valuable data assets while in transit with a Fujifilm Tape Tracker

Data Tape Carousel

- This carousel is exclusive to Fujifilm, manufactured by Russ Bassett

- The unit rotates 360 degrees

- Each carousel unit is compact and equipped with 4 full-swivel casters beneath the base of the unit, allowing for easy relocation

- Tapes are stored vertically, supporting **Best Practices** for data tape storage

The base is equipped with 4 full swivel, heavy-duty 5" casters, which are recessed beneath the base to give the unit a "floating" look.

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Data Tape Carousel

- High capacity DLT and LTO tape storage rack

- Dimensions- 76"H x 28"W x 28" D
  - Shipping weight empty: 286 lbs.
  - Max. loaded weight: 645 lbs.

- Cartridge Capacity:
  - 672 DLT per unit (168 DLT per side)
  - 768 LTO per unit (192 LTO per side)
  - 720 DLT and LTO combined per unit (two sides DLT + two sides LTO).

- Available: Now!

Media Destruction

- Integrated Media Destroyer and Degausser in one COMBO unit
- Custom media spacers to safely destroy Mid-Range and Enterprise tapes (this is a Fujifilm exclusive)
- Meets Best Practices
- MSRP: $23,000

Media Degausser

+

Media Destroyer

Media Destruction (Cont.)

- Can destroy both Hard Disk Drives (HDD) and tapes (Fujifilm Exclusive)

- Similar in size to a large tower computer

- Weight 178 lbs

- 2.5 minute degauss and destruction time per tape or hard drive

Before   After

- Demo video at www.youtube.com\FujifilmRMD

Fujifilm
Data Center Services

www.fujifilmusa.com/datacenterservices

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Fujifilm Data Center Services

With the sheer volume of mission critical data growing at an exponential rate, managing an enterprise data center is becoming an increasingly challenging task. In order to help IT organizations maximize their technology investment, Fujifilm's Data Center Services provides a variety of service solutions each designed to make data storage easier and more efficient.

- ➡ **Data Recovery**
- ➡ **Litigation Support**
- ➡ **Environmental Services**
- ➡ **Data Conversion**
- ➡ **Data Migration**

Smart Solutions
Effective Results

- ➡ **www.fujifilmusa.com/datacenterservices**

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Data Recovery

Fujifilm's can help you recover lost data from virtually any type of magnetic tape media including: **DLT, SDLT, LTO, 3480, 3590/3590E, 3592, Mammoth, DDS, QIC, 3570 Magstar and 7 & 9 track open reel tapes**. Fujifilm can retrieve data from media damage caused by such things as:

→ **Malfunctioning hardware**

→ **Environmental hazards such as fire, water or smoke damage**

→ **Overwriting critical data**

→ **Deterioration due to aging**

→ **Improper storage or handling**
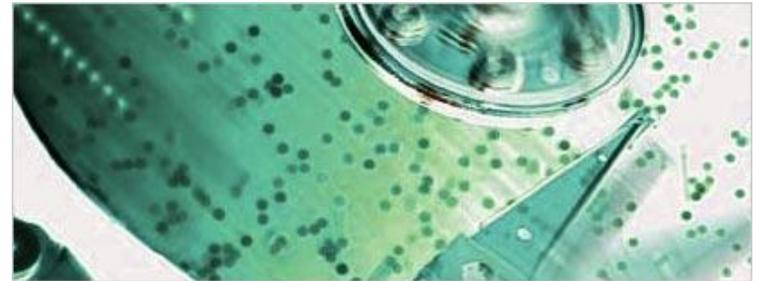
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Litigation Support

Fujifilm's Litigation Support Services offer a comprehensive array of electronic evidence and legal consulting solutions geared toward enabling companies to move from a reactive to a proactive data management position for litigation and investigation response.

- **Litigation Response Planning**

- **Evidence Collection and Preservation**

- **Forensic and Investigative Services**

- **Electronic Data Extraction**

- **Litigation Production Services**

- **Expert Witness Consulting**

- **Evidence Retention Services**

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Environmental Services

Maintaining optimal environmental conditions and stability is essential in running an efficient IT facility. There is a direct correlation between the condition of a facility's physical infrastructure and the reliability and availability of the data processing function. Fujifilm's extensive selection of Environmental Services include:

- **Assessment & Inspection**

- **Design Services**

- **Monitoring and Support**

- **Training and Certification**

- **Construction Services**

- **Remediation Services**

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Data Conversion/Data Migration

Fujifilm's Conversion, Migration and Duplicating Services are structured to offer you an extensive array of cost effective solutions for legacy data conversion.

•**Data Conversion**
Move your data from one operating system onto another. For example, a mainframe system to a mini or PC-based system.

• **Data Migration**
Move your information from one media onto a new or different media when you no longer support or have access to a particular type of tape transport device. This would also include media that may be acquired through trades, purchases, acquisitions or mergers.

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Fujifilm Loyalty Programs

MEGAPOINTS   **www.fujifilmmegapoints.com**

End-User Loyalty Program

End Users earn points for purchasing Fujifilm Recording Media products. Points are redeemable for large selection of brand name merchandise, including Fujifilm cameras and Russ Bassett storage racks.

MegaPoints Award Categories

Data Center IT and Much More

FUJIFILM

Recording Media Division

A Brand New Look

October 2006

FUJIFILM

Recording Media Division

FUJIFILM has sported its current familiar corporate brand logo for 26 years since it was introduced in 1980, and over that time it has built on its core technologies to diversify and expand its business domain. Now, FUJIFILM is embarking on a new beginning, making clear its commitment to continued sustainable growth coupled with further business expansion and diversity. The revamped corporate brand logo will serve as a symbol of FUJIFILM's determination to enhance its corporate brand.

FUJIFILM

A Brand New Look

Recording Media Division

Fuji Photo Film U.S.A., Inc. ➡ **FUJIFILM U.S.A., Inc.**

As of October 1, 2006, Tokyo-based Fuji Photo Film Co., Ltd. made several name changes, including the newly named operating company: Fujifilm Corporation.

The name changes have been made to better reflect the company's expansion into business areas beyond photography, while retaining the assets of "Fujifilm," which is an established corporate brand with a global reputation for reliability and high quality products and services.

FUJIFILM U.S.A., Inc.

Think Fujifilm Media, for Today's & Tomorrow's Most Popular Drives!

Thank You!

FUJiFILM
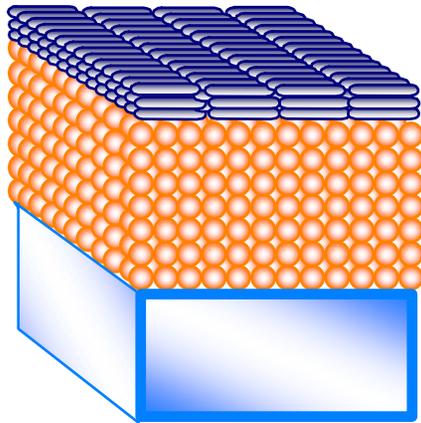
Advanced super
Thin-layer and high-
Output
Metal
Media

FUJiFILM

nanocubic

Fujifilm's Coating Technology Creates Breakthrough Products

Fujifilm began coating motion picture and photographic film in the mid 1930's using die coating technology. Simultaneous multi-coating technology was developed in 1960 . Also in 1960, Fujifilm produced its first magnetic tape products. In 1965, Fujifilm began manufacturing computer tape. Fujifilm's floppy disks (8-inch) were introduced in 1977. Fujifilm began manufacturing dual-coated magnetic media in 1989 and Advanced super Thin-layer and high-Output Metal Media (ATOMM) dual-coated media in 1992. For ATOMM, Fujifilm's special die coating head simultaneously applies two separate and unique layers, one magnetic and one non-magnetic. It's a dual coating system Fujifilm invented that has allowed us to continually develop the industry's "next generation" storage products and develop nanocubic™ Technology for data storage products with even greater capacities.