

Advanced Intelligent Tape™

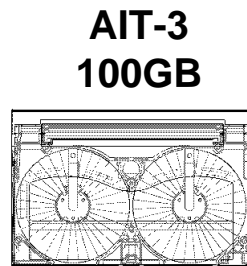
Features and Benefits

Advanced Intelligent Tape™

- **Tape format developed by Sony in 1996**
 - **AIT is intended to address the increased capacity, performance, and reliability requirements of today's demanding network environments**
 - **AIT utilizes a combination of advanced technologies developed by Sony through over 50 years of recording media innovations, with core competencies including:**
 - **Broadcast audio video**
 - **Consumer audio video**
 - **Computer data storage**

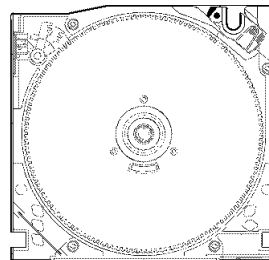
Helical Scan Recording

- **Data tracks written at an angle provide higher density recording**
 - **Allows for higher capacities in less space**
 - **AIT-1, up to 35GB native**
 - **AIT-2, up to 50GB native**
 - **AIT-3, up to 100GB native**



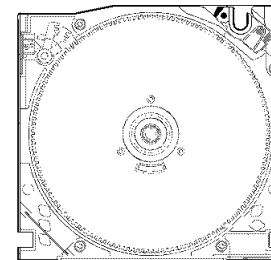
8mm x 230m

**S-DLT
110GB**



½ inch x 600m

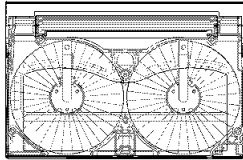
**LTO
100GB**



½ inch x 600m

Helical Scan Recording

AIT-3

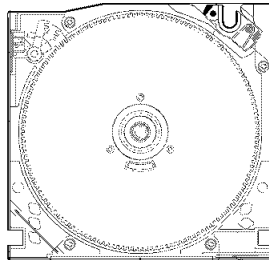


100GB

8mm x 230m



S-DLT

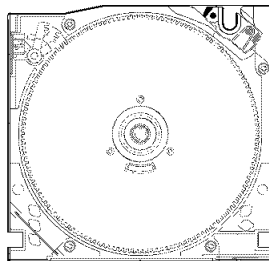


110GB

1/2 inch x 540m



LTO



100GB

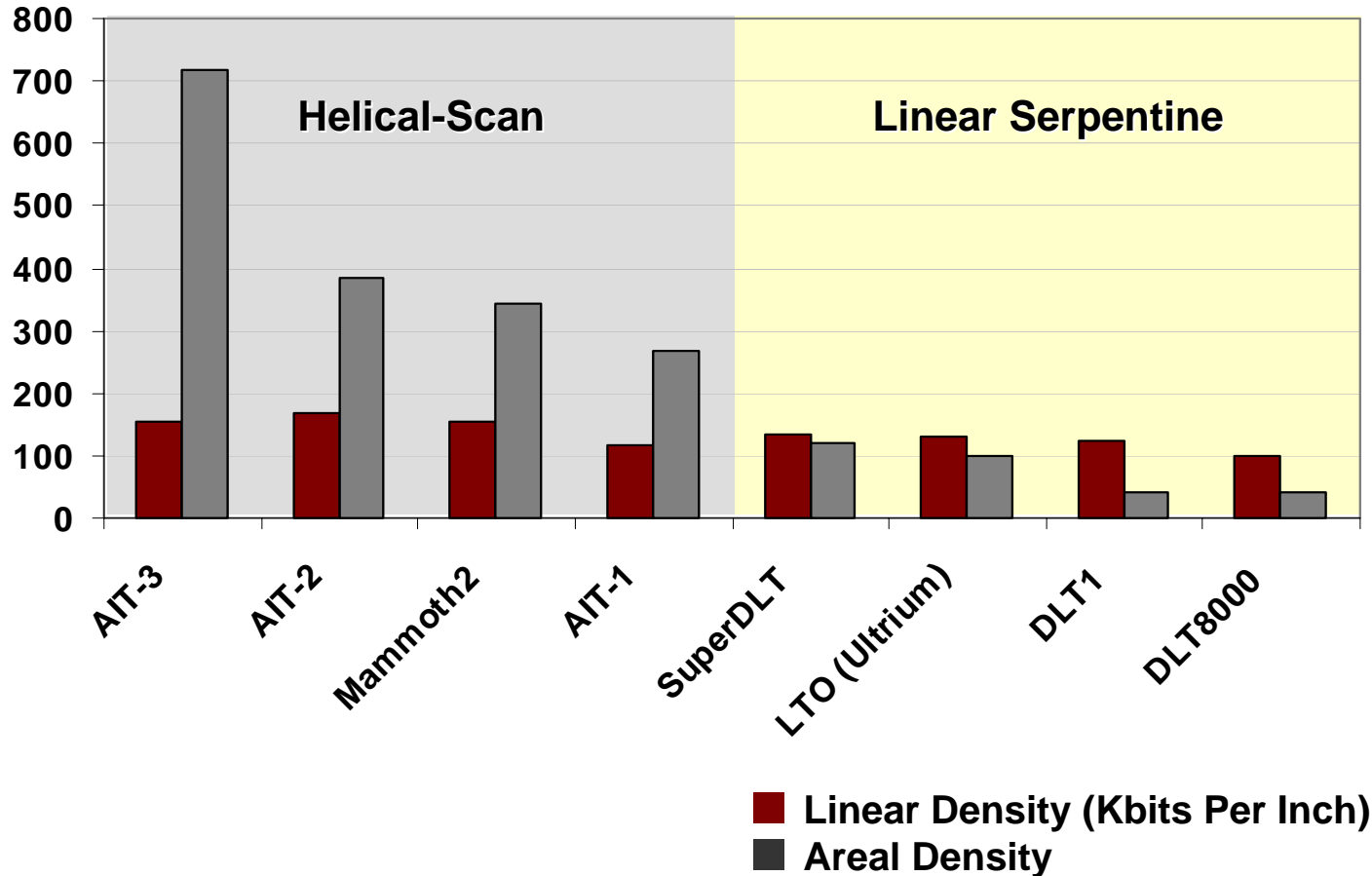
1/2 inch x 600m



Up to 5 times
higher density
than linear...for
higher capacities
within less space

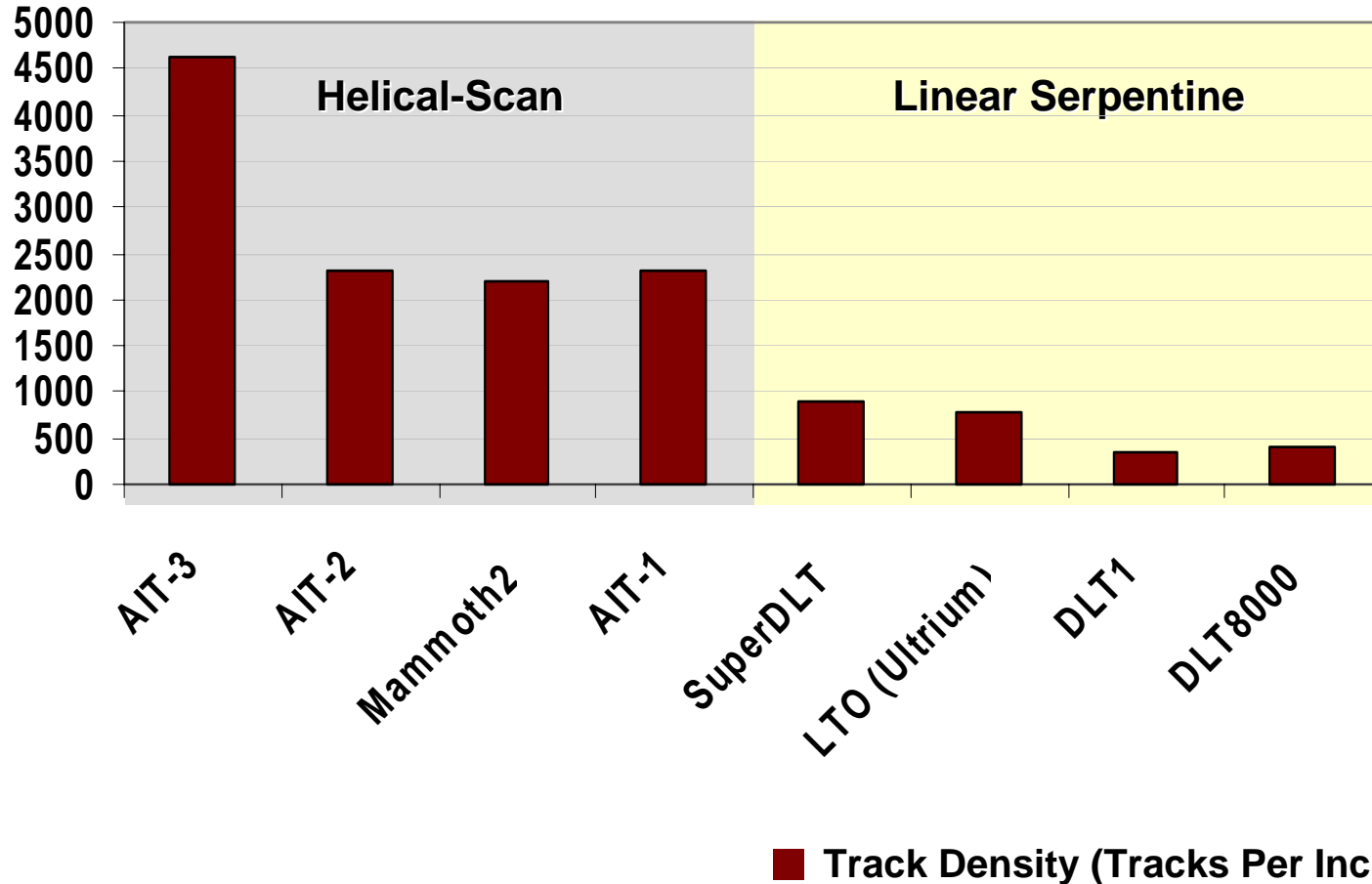
Helical Scan Recording

Helical-Scan vs. Linear Serpentine Density Comparison Chart



Helical Scan Recording

Helical-Scan vs. Linear Serpentine
Density Comparison Chart



Helical Scan Recording

- **Reads and writes tape in one end-to-end pass at a slow, smooth tape speed**
 - **Increases performance and reliability**
 - **Eliminates "shoe-shining" process common with linear serpentine technologies, reducing wear-and-tear on drive and media**
 - **"Re-positioning" time is much faster than linear serpentine technologies**
 - **No data transfer delays common with linear serpentine technologies during the reversal cycle at the end of each of the several hundred passes to write the tape**

Compact Footprint

- **3.5-Inch Half Height Form Factor**
 - **Easy integration into existing environments**
 - **Particularly beneficial in multiple drive environments, such as automation**
 - **Increases maximum capacity potential**
 - **Up to twice as many drives or media cartridges can be installed within the same space**
 - **Reduces the cost per GB**

Automation Advantages

The following chart illustrates the capacity and cost per gigabyte advantages of the small form-factor of AIT within a standard 19" rack-mount tape library enclosure:

	Quantum DLT 8000	Sony AIT-2	IBM LTO (Ultrium)	Sony AIT-3	Quantum SuperDLT
Native Capacity per Cartridge	40GB	50GB	100GB	100GB	110GB
Compressed Capacity per Cartridge	80GB	130GB	200GB	260GB	220GB
Max Number of Drives	2	2	2	2	2
Max Number of Cartridges	10	19	10	19	10
Max Native Capacity per Enclosure	400GB	950GB	1,000GB	1,900GB	1,100GB
Max Compressed Capacity per Enclosure	800GB	2,470GB	2,000GB	4,940GB	2,200GB
Native Price per GB (Drives and Media)	\$11.15	\$4.63	\$10.75	\$4.89	\$7.65
Compressed Price per GB (Drives and Media)	\$5.57	\$1.78	\$5.38	\$1.88	\$3.82

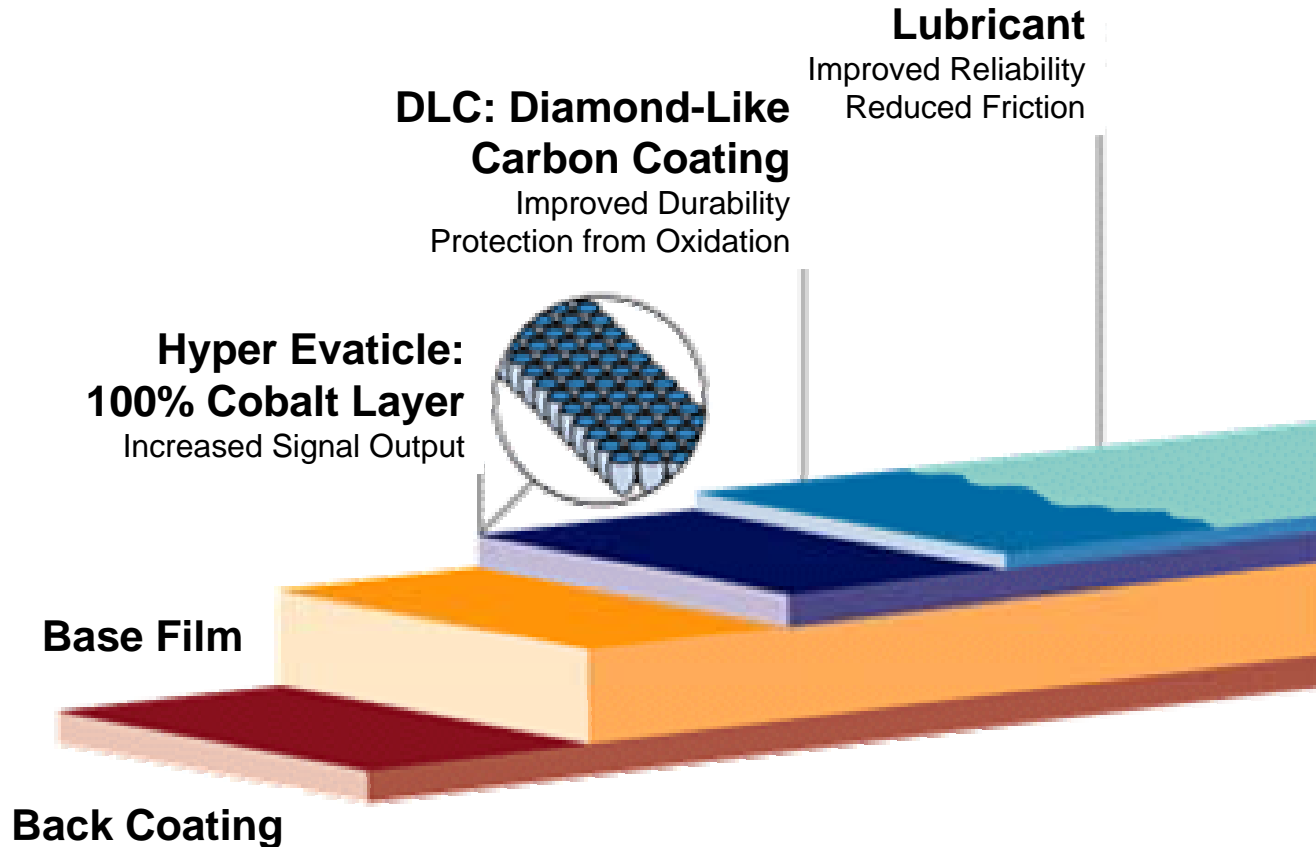
The above information is based on published specifications and street prices of drives and media according to www.CDW.com as of August 20, 2002.



AME Media Technology

- **Advanced Metal Evaporated (AME)**
 - **Pure vacuum-evaporated cobalt**
 - **Does not contain binder adhesives that cause head clogging, reducing need for periodic cleaning**
 - **Diamond-Like-Carbon coating improves abrasion resistance increasing overall durability**
 - **Higher density capability results in higher capacities**

AME Media Technology



Super Head Cleaner™

- **Automatic head cleaner mechanism**
 - **Reduces the need for periodic cleaning**
 - **Reduces the potential for downtime**
 - **Increases data integrity**
 - **Reduces wear-and-tear, improving head life and overall reliability**

Memory-In-Cassette (MIC)

- **64-kbit memory chip embedded in data cartridge**
 - Up to 48-kbits of user free memory
 - Automatic recording and updating of System Log
 - Increases performance
 - Fast search speed (to 720MB sec)
 - Fast access to data (less than 27 sec)
 - Quick load time (less than 10 sec)
 - Reduces wear-and-tear, increasing overall reliability
 - Future application development possibilities

Memory-In-Cassette (MIC)

- **System Log**
 - **Captures significant media and data integrity statistics**
 - **Load counts, access counts, and error correction counts (ECC)**
 - **Media management software can utilize this information and copy and retire media volumes approaching the tape or in a database**
 - **The MIC contents are maintained directly with the media but separated from the tape itself**
 - **The MIC contents are always available—even if the media is reinitialized for a new application**

Memory-In-Cassette (MIC)

- **Drive-Generated High Speed Search Map**
 - **Contains positioning information**
 - Allows AIT drive to provide a high-speed, bi-directional search – 120 ips speed mode previously used only for cartridge rewind
 - Once the drive reaches the tape segment identified by the MIC information, its speed drops to the standard search speed of 60 ips
 - Locates the tape's precise position by reading the identifier blocks directly from the tape

Reduces file
access time to
27 sec – a 50%
improvement!

Memory-In-Cassette (MIC)

- **Multiple Partitioning**
 - Multi-partitioning function enables up to 64 partitions to be freely added and linked on one tape
 - During searches, data can be unloaded from individual partitions, eliminating the need to rewind to the start and reducing average access time
 - This solution is ideal for libraries and for HSM (Hierarchical Storage Management) systems that combine different file storage systems

Memory-In-Cassette (MIC)

- **Multiple Partitioning (continued)**
 - Each partition has the same structure and can be written independently
 - For example, in a 2-partition tape
 - The partition further from BOM (Partition 0) can contain data files, and
 - The partition closer to BOM (Partition 1) could contain a directory of these files, written later
 - With the exception of the Device area on the tape, each partition is identical to a single data space tape in structure
 - Each partition has its own Tape Log area; this is necessary because the patterns of usage may be very different for each partition
 - Similarly, each has its own Vendor Group, because the partitions might be written by different drives

Memory-In-Cassette (MIC)

- **Formatting Partitions**
 - The **SCSI MODE SELECT** command is used to create partitions on a tape
 - The command can perform the following operations:
 - Set up two partitions on a blank tape
 - Convert a single data space tape to a 2-partition tape
 - Convert a 2-partition tape to a single data space tape
 - Change the size of both partitions on a 2-partition tape
 - Re-size the partitions of a 2-partition

Memory-In-Cassette (MIC)

30% - 40% Faster

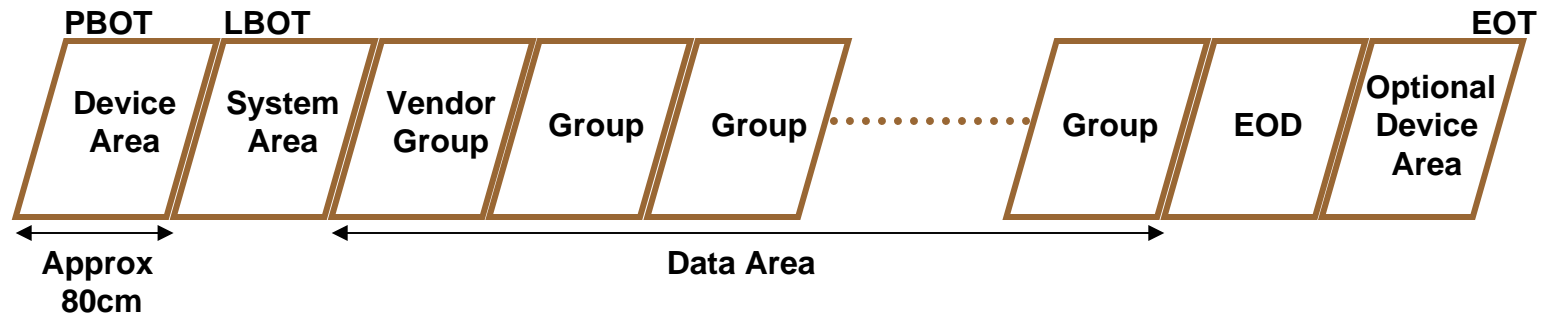
	Avg Search Time (sec)		
	BOT	MOT	EOT
170m with MIC	76.0	49.0	71.0
170m without MIC	76.0	71.0	120.0
230m with MIC	102.0	61.0	115.0
230m without MIC	102.0	91.0	162.0

Up to 45% Faster

	Avg Load Time (sec)	Avg Unload Time (sec)		
		BOT	MOT	EOT
170m with MIC	< 10	17.0	64.5	91.5
170m without MIC	20.0	21.3	69.3	98.1
230m with MIC	< 10	18.7	88.7	120.9
230m without MIC	20.5	21.6	94.0	128.0

Memory-In-Cassette (MIC)

• Tape Layout



PBOT: Physical Beginning of Tape

LBOT: Logical Beginning of Tape

Device Area: Load/Unload Position

System Area: Tape Information (Load and Reread Counts, Rewritten Frame, etc.)

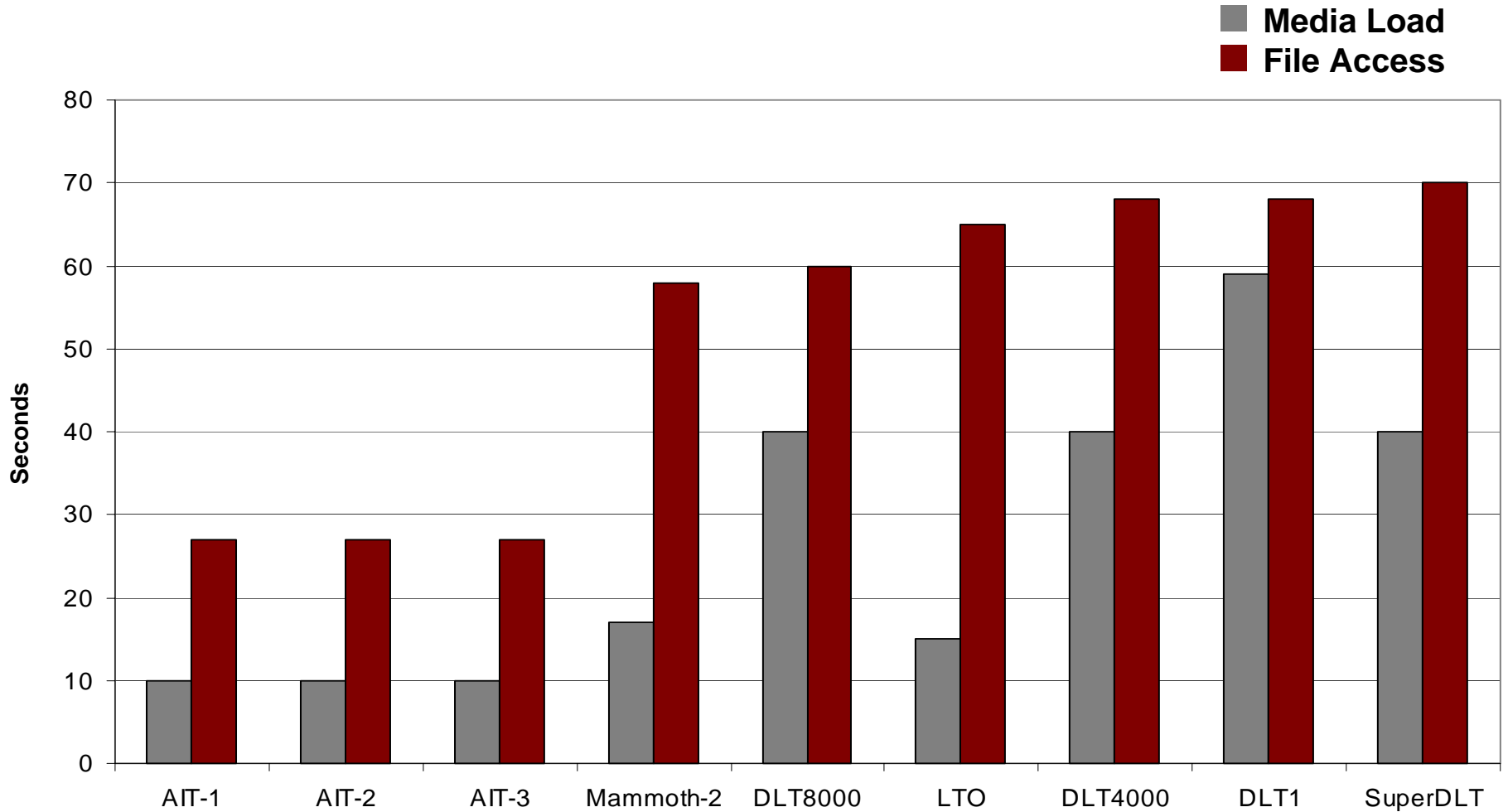
Vendor Group: Device Information (Sony, SDX, etc.)

Group: User Data

EOD: End of Data

EOT: End of Tape

Memory-In-Cassette (MIC)



The above information is based on published specifications.

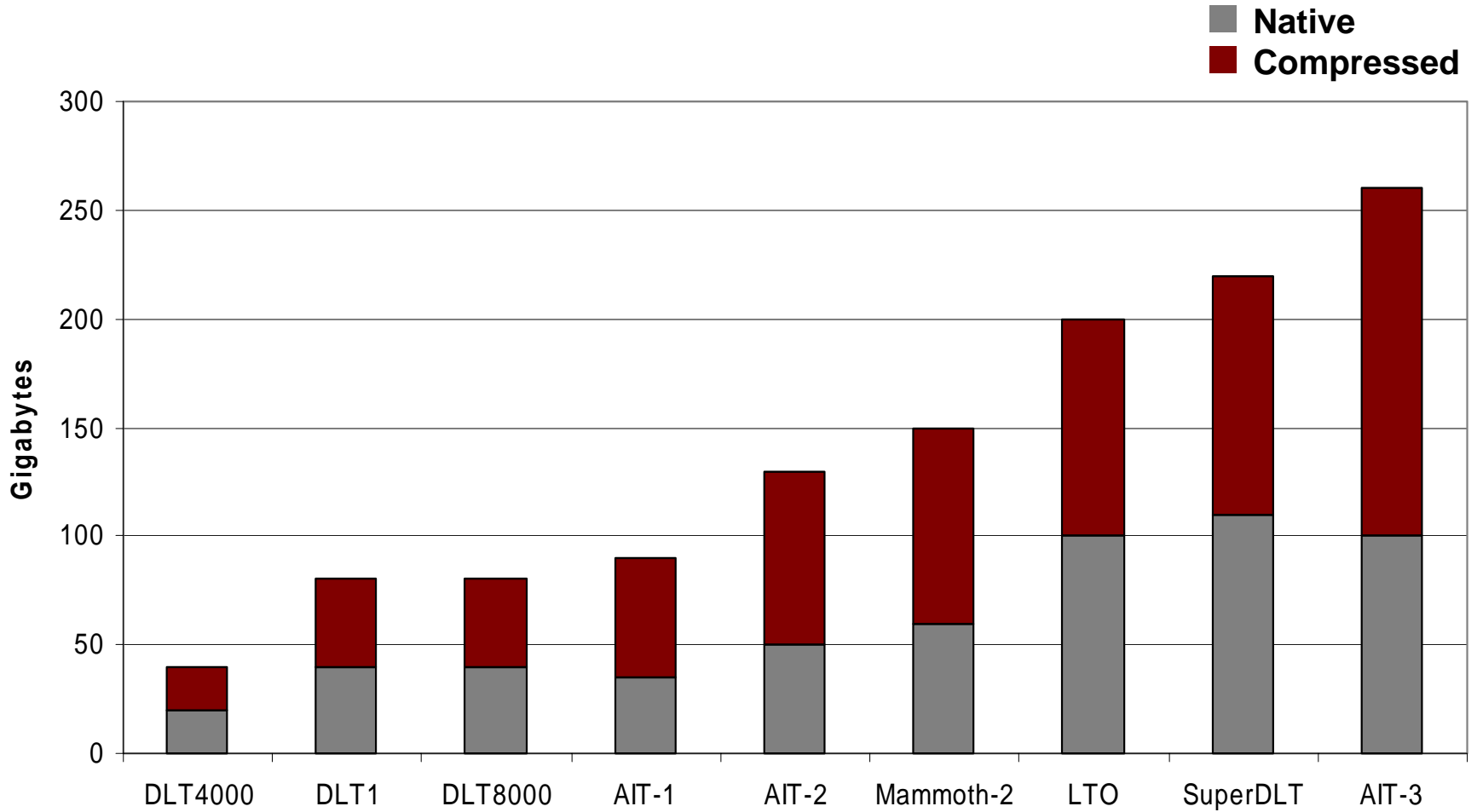
ALDC Technology

- **Adaptive Lossless Data Compression**
 - **Enhanced data compression technology developed by IBM**
 - **Improves data compression efficiency**
 - **Offers average compression of 2.6:1**
 - **Increases maximum compressed capacities and transfer rates**
 - **AIT-1, up to 90GB, up to 10MB/s**
 - **AIT-2, up to 130GB, up to 15.6MB/s**
 - **AIT-3, up to 260GB, up to 31.2MB/s**

ALDC Technology

- **How does it work?**
 - ALDC is an implementation of Lempel-Ziv compression algorithm 1 (LZ1).
 - The ALDC algorithm defines a symbol to be one byte of data, and supports history buffer sizes of 512, 1024, and 2048 bytes.
 - Sequences of bytes that match sequences maintained within the history buffer are represented in the coded data as copy-pointer and match-length code words.
 - Bytes which cannot be included in matches are encoded as literals with a flag bit.

ALDC Technology

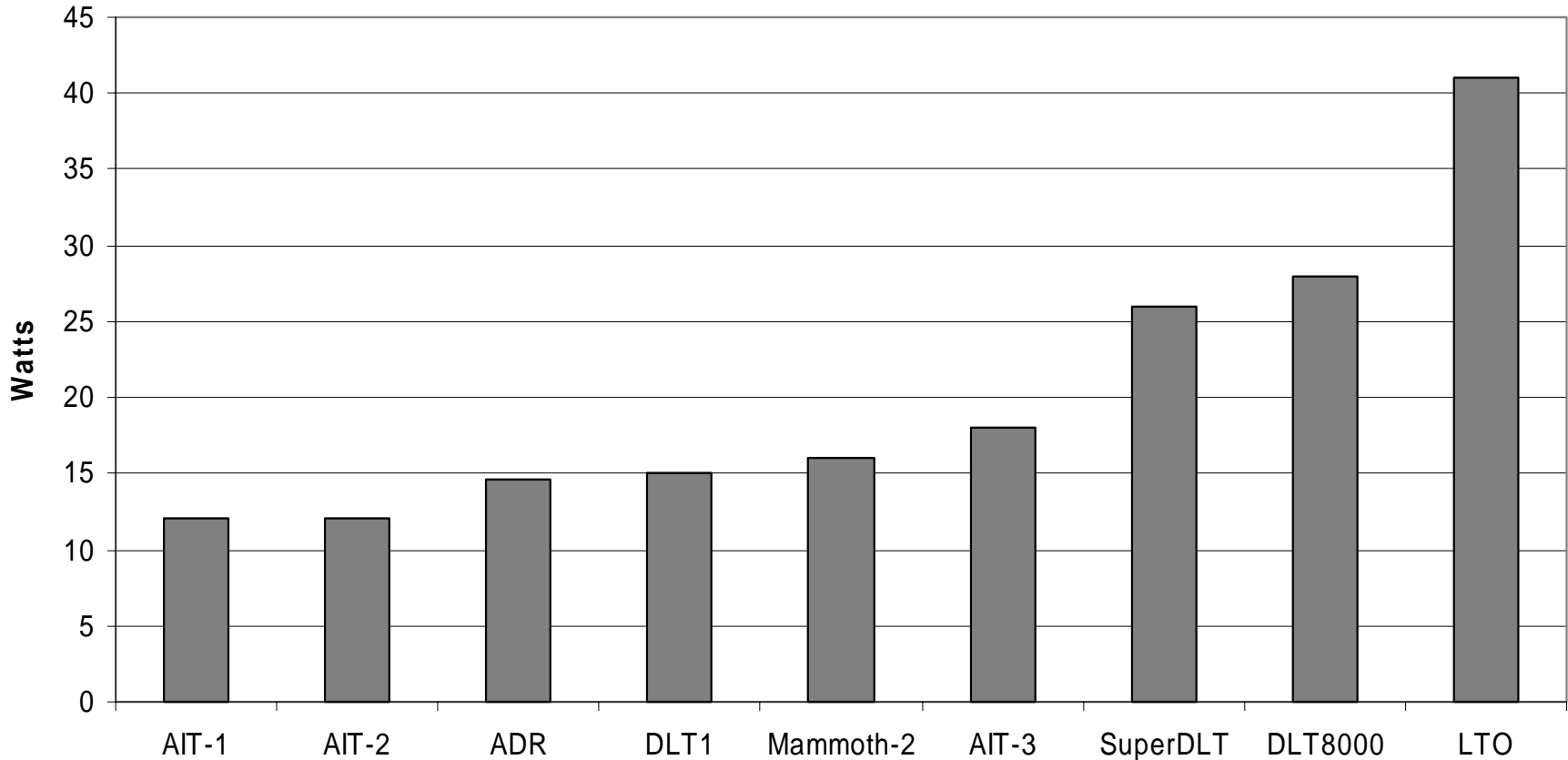


The above information is based on published specifications.

Low Power Requirements

- **AIT drives require less power**
 - **1/2 to 1/3 the power typically required by competing technologies – 12 watts on average**
 - **Emits less heat, improving reliability**
 - **Easily supported in multiple drive solutions, such as automation**

Low Power Requirements



The above information is based on published specifications.

Full Backward Compatibility

- **AIT drives are fully backward compatible – Read and Write !**
 - Offers flexibility and convenience
 - Provides investment protection

	SDX1-25C	SDX1-35C	SDX2-36C	SDX2-50C	SDX3-100C
AIT-1	X (4MB/s)	X (4MB/s)			
AIT-2	X (4MB/s)	X (4MB/s)	X (6MB/s)	X (6MB/s)	
AIT-3	X (8MB/s)	X (8MB/s)	X (12MB/s)	X (12MB/s)	X (12MB/s)

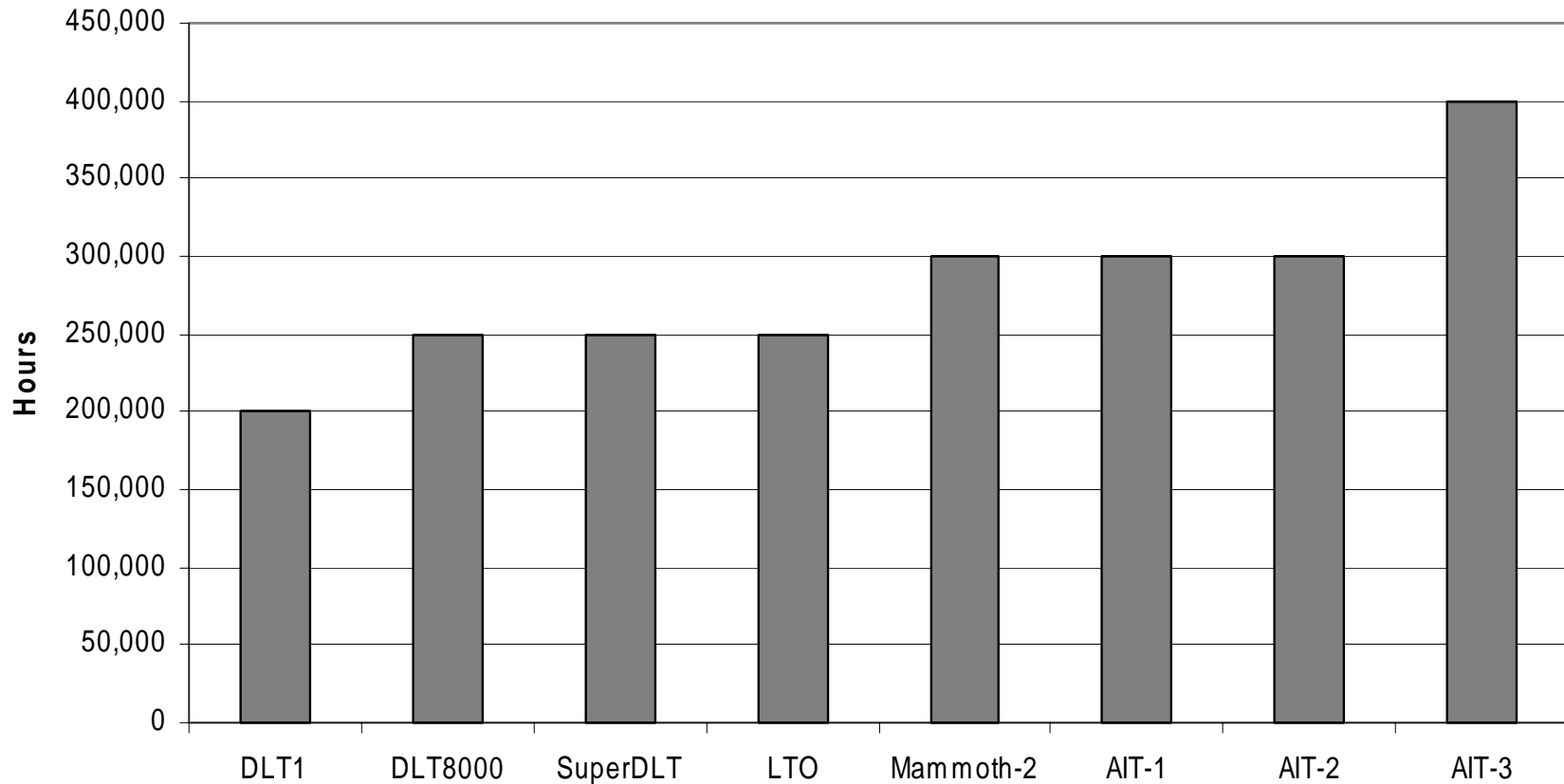
Quality Leads to Reliability

- **OEM-grade manufacturing and advanced features, such as...**
 - Helical Scan Recording
 - Memory-In-Cassette
 - AME Media
 - Super Head Cleaner™
 - Large Geometry Tape Head

...result in industry leading reliability

- MTBF of at least 300,000 POH at 100%
- Head life of 50,000 hours
- Media life of 30,000 uses
- Media archival of 30 years

Quality Leads to Reliability



The above information is based on published specifications.

Thank You

Questions?