Superior performance, reliability, and capacity for advanced enterprise, workstation, subsystem, and server applications

IBM Ultrastar Family of Disk Drives

2nd Quarter 1998

Highlights

High capacity
With capacity up to 18.2 GB and an areal density of 1.2 Gbits per square inch, IBM Ultrastar disk drives provide reliable, high-performance storage for today's data-intensive applications.

Industry-leading performance
The IBM Ultrastar family is designed for the most demanding of corporate and enterprise server applications available today. High performance is achieved by combining fast rotational speeds of up to 10,000 RPM and rapid seek times as fast as 6.3 milliseconds. In addition, IBM controllers incorporate command queuing.

Leading drive technology
The Ultrastar family delivers high sustained data rate performance through the combination of Magnetoresistive Extended (MRX) advanced head technology, an embedded digital servo, efficient No-ID™ sector formatting, and a fifth-generation Partial Response Maximum Likelihood (PRML) data channel with enhanced track ID detection.

Data protection
S.M.A.R.T. (Self-Monitoring Analysis and Reporting Technology)-compliant Predictive Failure Analysis™ (PFA) and Drive Temperature Indicator Processor (DriveTIP™) monitors enable the Ultrastar 9LP, 18XP, and 9ZX to report significant changes or impending failures when pre-programmed thresholds are exceeded.

Warranty
All Ultrastar hard disk drives have a five year warranty.

Wide-ranging applications
The Ultrastar family is specifically designed for servers and high-end workstations running a range of applications—from collaborative workgroup applications to image processing, video editing to data mining, and online transaction processing to online analytical processing.

Ultrastar 9ZX 3.5-inch
9.1 GB 10,000 RPM disk drive

Ultrastar 18XP 3.5-inch
18.2 GB 7,200 RPM disk drive

IBM Ultrastar Family Specifications, 2nd Quarter 1998

			New 3Q 98	
Description (capacity-disks)	**Ultrastar ES 2-2**	**Ultrastar ES 4-3**	**Ultrastar ES 4-3**	**Ultrastar XP 4-5**
Product Family Name	Ultrastar 2ES	Ultrastar 2ES	Ultrastar 9ES	Ultrastar 2XP
Capacity and Interface				
Capacity (512 Bytes)	2.16 GB	4.22 GB	4.5 GB	4.55 GB
Performance				
Data Buffer	512 KB	512 KB	512 KB	512 KB
Rotational Speed (RPM)	5400	5400	7200	7200
Latency (Average ms)	5.56	5.56	4.17	4.17
Media Transfer Rate (Mbits/sec, inner–outer)	62.5–103.4	62.5–103.4	108.6–171.1	81.6–123.4
Interface Transfer Rate (MB/sec)[1]	20/40	20/40	20/40/80	20/40/80
Seek Time (Typical)				
Average (ms)	8.5	8.5	7.5	7.5
Track to Track (ms)	1.1	1.1	0.8	0.5
Full Track (ms)	15	15	15	
Configuration				
Sector Size (Bytes)	512	512	512	512
Recording Zones	8	8	8	
User Cylinders	8210	8210	8420	
Data Heads	3	6	5	9
Disks	2	3	3	5
Areal Density	1158 Mbits/sq in	1158 Mbits/sq in	1.56 Gbits/sq in	829 Mbits/sq in
Recording Density (Max. KBPI)	134.6	134.6	156	134.5
Track Density (TPI)	8600	8600	10,000	6160
Reliability				
Warranty (Years)	5	5	5	5
Error Rates (non-recoverable bits read)	<1 in 1.0E 13	<1 in 1.0E 13	<10 in 10E 14	<10 in 10E 15
Power				
Dissipation (Typical)				
Start-up (Max. Peak) Amps	0.46 (5V), 1.83 (12V)	0.46 (5V), 1.83 (12V)	0.27 (5V), 2.0 (12V)	1.7
Idle (Avg.) Watts	3.42	4.05	5.3	11.2
Power Consumption				
Efficiency Index (Watts/MB)	0.0015	0.0009	0.0012	.0025
Environmental (Operating/Nonoperating)				
Ambient Temperature	5 to 55° C/-40 to 65° C	5 to 55° C/-40 to 65° C	5 to 55° C/0 to 65° C	5 to 55° C/-40 to 65° C
Relative Humidity	8% to 90%/5% to 95%	8% to 90%/5% to 95%	8% to 90%/5% to 95%	5% to 90%/5% to 95%
Shock (half sine wave)	10G (11 ms)/75G (11 ms)	10G (11 ms)/75G (11 ms)	10G (11 ms)/65G (2 ms)	10G/70G
Vibration (random(RMS))	0.67G (5-500 Hz)/ 1.04G (2-200 Hz)	0.67G (5-500 Hz)/ 1.04G (2-200 Hz)	0.67G (5-500 Hz)/ 1.04G (2-200 Hz)	5G/2G
Physical Size				
Height	25.4 mm/1 in	25.4 mm/1 in	25.4 mm/1 in	25.4 mm/1 in
Width	101.6 mm/4 in	101.6 mm/4 in	101.6 mm/4 in	101.6 mm/4 in
Depth	146 mm/5.75 in	146 mm/5.75 in	146 mm/5.75 in	146 mm/5.75 in
Weight (Max)	610 g/21.52 oz	610 g/21.52 oz	630 g/22.22 oz	460 g/16.23 oz
Ordering Information				
Model	DCAS 32160	DCAS 34330	DDRS 34560	DCHS 34550
Part Numbers[2]	09J1034 USCSI 50P/SE 09J1036 USCSI 68P/SE 03L5652 USCSI 68P/SE 09J1038 USCSI 80P/SE	09J1035 USCSI 50P/SE 09J1037 USCSI 68P/SE 03L5653 USCSI 68P/SE 09J1039 USCSI 80P/SE	00K3980 SCSI 50P 00K4000 SCSI 68P 00K4020 SCSI 80P	27H1713 USCSI 50P/SE 27H1772 USCSI 68 P/SE 93G3024 USCSI 68P/DIFF 93G3026 USCSI 80P/SCA 27H1715 USCSI 50P/SE 93G3022 USCSI 68P/SE

[1] Interface transfer rates vary based on the pin configuration. 50 Pin=20 MB/sec; 68 Pin=40 MB/sec; 80 Pin=40 MB/sec

[2] P=Pin, SE=Single-Ended, T=Terminal, Diff=Differential, SCA=Single Connector, DE=IDE, USCSI=UltraSCSI, SSA=Serial Storage Architecture

Ultrastar XP 9-9 Ultrastar 2XP	Ultrastar LP 9-5 Ultrastar 9LP	Ultrastar ES 9-5 Ultrastar 9ES
9.1 GB	9.1 GB	9.1 GB
512 KB	1 MB	512 KB
7200	7200	7200
4.17	4.17	4.17
81.6–123.4	92.2–179.2	108.6–171.1
20/40	40	20/40
7.5	6.5	7.5
0.5	0.7	0.8
	14	15
512	512-732	512
	16	8
	8151	8420
18	10	10
9	5	5
829 Mbits/sq in	1253 Mbits/sq in	1.56 Gbits/sq in
134.5	150	156
6160	8356	10,000
5	5	5
<10 in 10E 15	<10 in 10E 15	<10 in 10E 14
2.7	1.6	0.27 (5V), 2.0 (12V)
15.6	9.2	7.1
.0017	0.0009	0.0008
5 to 55° C/-40 to 65° C	5 to 50° C/-40 to 65° C	5 to 55° C/0 to 65° C
5% to 90%/5% to 95%	5% to 90%/5% to 95%	8% to 90%/5% to 95%
10G/70G	10G (2.11 ms)/140G (2 ms)	10G (11 ms)/65G (2 ms)
5G/2G	10G (2.11 ms)/140G (2 ms)	0.67G (5-500 Hz)/1.04G (2-200 Hz)
41.3 mm/1.63 in	25.4 mm/1 in	25.4 mm/1 in
101.6 mm/4 in	101.85 mm/4.01 in	101.6 mm/4 in
46 mm/5.75 in	147 mm/5.77 in	146 mm/5.75 in
850 g/29.98 oz	570 g/20.11 oz	630 g/22.22 oz
DCHS-391000	DGHS	DDRS-39130
27H1714	59H6588	00K3970
USCSI 50P/SE	USCSI 50P/SE T	SCSI 50P
27H1771	59H6590	00K3990
USCSI 68P/SE	USCSI 68P/SE T	SCSI 68P
93G3025	59H6594	00K4010
USCSI 80P/DIFF	USCSI 80P/SCA	SCSI 80P
93G3047		
USCSI 80P/SCA		
93G2959		
SSA		

IBM Ultrastar Family Specifications, 2nd Quarter 1998

Description (capacity-disks)	Ultrastar ZX 9-6	Ultrastar XP 18-10
Product Family Name	Ultrastar 9ZX	Ultrastar 18XP
Capacity and Interface		
Capacity (512 Bytes)	9.1 GB	18.2 GB
Performance		
Data Buffer	1 MB	1 MB
Rotational Speed (RPM)	10020	7200
Latency (Average ms)	2.99	4.17
Media Transfer Rate (Mbits/sec)	129.3–204.8	92.2–179.2
Interface Transfer Rate (MB/sec)[1]	40/80/160/200	40/80/160/200
Seek Time (Typical)		
Average (ms)	6.3	7.5
Track to Track (ms)	0.7	0.7
Full Track (ms)	17	17
Configuration		
Sector Size (Bytes)	512-732	512-732
Recording Zones	16	16
User Cylinders	7400	8151
Data Heads	12	20
Disks	6	10
Areal Density	1136 Mbits/sq in	1253 Mbits/sq in
Recording Density (Max. KBPI)	151	150
Track Density (TPI)	7258	8356
Reliability		
Warranty (Years)	5	5
Error Rates (non-recoverable bits read)	<10 in 10E 15	<10 in 10E 15
Power		
Dissipation (Typical)		
Start-up (Max. Peak) Amps	3.5	2.7
Idle (Avg.) Watts	16.5	13.1
Power Consumption	0.0019	0.0007
Efficiency Index (Watts/MB)		
Environmental (Operating/Nonoperating)		
Ambient Temperature (° C)	5 to 50° C/-40 to 65	5 to 50° C/-40 to 65
Relative Humidity	5% to 90%/5% to 95%	5% to 90%/5% to 95%
Shock (half sine wave)	10G (2.11 ms)/140G (2 ms)	10G (2.11 ms)/140G (2 ms)
Vibration (random(RMS))	10G (2.11 ms)/140G (2 ms)	10G (2.11 ms)/140G (2 ms)
Physical Size		
Height	42 mm/ 1.65 in	42 mm/1.65 in
Width	101.85 mm/4.01 in	101.85 mm/4.01 in
Depth	147 mm/5.77 in	147 mm/5.77 in
Weight (Max)	870 g/30.69 oz	930 g/32.80 oz
Ordering Information		
Model	DGVS	DGHS
Part Numbers[2]	05J7618	59H6589
	USCSI 68P/SET	USCSI 50P/SET
	05J7625	59H6591
	USCSI 80P/SCA T	USCSI 68P/SET
	05J7627	59H6595
	USCSI 68P/SET	USCSI 80P/SCA T
	05J7623	
	USCSI 68P/SET	

[1] Interface transfer rates vary based on the pin configuration. 50 Pin=20 MB/sec; 68 Pin=40 MB/sec; 80 Pin=40 MB/sec
[2] P=Pin, SE=Single-Ended, T=Terminal, Diff=Differential, SCA=Single Connector, DE=IDE, USCSI=UltraSCSI, SSA=Serial Storage Architecture