
HP 97548T/P and 97544T/P Series 5.25-inch SCSI-2 Disk Drives

Product Brief

**795 or 397 Megabytes
SCSI-2 Interface
150,000 Hours MTBF
5 Year Warranty**



World-Class Performance, Reliability and Value

The HP 97544T/P and 97548T/P Series of disk drives combines world-class performance with outstanding reliability. These drives ship with what Hewlett-Packard believes is the first SCSI-2 embedded controller on any 5.25-inch disk drive. These 397- and 795-megabyte (unformatted) disk drives offer the perfect solution for today's workstations, minicomputers, network file servers and high-end microcomputers.

Industry Leading Embedded SCSI-2 Interface

Low controller overhead, high transfer rate and fast data access highlight both the single-ended HP 97544T and 97548T and the differential HP 97544P and 97548P disk drives. Data bursts from controller buffer to host at up to 5 megabytes per second in synchronous mode. A two-track cache, supporting 1:1 interleaving, provides look ahead capability. This optimizes access time and bus utilization. Spindle synchronization allows for easy integration into high performance arrays. The SCSI-2 command set is supported on the controller board along with a two-track cache. This SCSI-2 controller is hardware and software compatible with SCSI-1 hosts.

A Start-Stop command provides power sequencing. Read out-of-order and write out-of-order enable the drive to read or write on arrival and reduce the effect of drive latency. A powerful implementation of Reed-Solomon error correction code (ECC) provides real-time error correction to obtain a recoverable error rate of less than 10 errors

in 10^{13} bits transferred. The full application will allow an unrecoverable error rate of less than 10 errors in 10^{15} bits transferred, setting a new industry standard for data integrity with real performance advantages.

The controller and all drive electronics are packaged onto a single printed circuit assembly contained within the form factor. All ANSI, SCSI and Common Command Set standards are adhered to.

150,000 Hours Mean-Time-Between Failure

The HP 9754X family of disk drives consistently demonstrates an MTBF of greater than 150,000 hours. Reliability of this caliber is a result of knowledge acquired through eight generations of disk design, including VLSI and servo designs that significantly reduce electronic part count. A "design-for-reliability" approach to disk drive development and manufacturing means potential failures have virtually been eliminated. Data integrity and performance are guaranteed over the widest temperature range in the industry. That's quality and reliability exceptional to other 5.25-inch disk drives. HP's reputation demands it.

Five-Year Warranty and Long-Term Support

HP backs up the quality and reliability of the HP 97544T/P and 97548T/P drives with a five-year warranty, insuring low overall cost of ownership and long-lasting value. HP's standard is to provide parts support for a minimum of five years after date of last manufacture. Data loss, downtime and costly repairs have all been minimized. An experienced team of system integration engineers is

available to provide personal assistance with unique integration issues, or to answer questions at any time during the relationship.

Features

- 795 or 397 megabytes (unformatted)
- SCSI-2 interface
- 150,000 hours MTBF
- Five-year warranty
- <1 ms controller overhead
- 20 megabits-per-second data transfer rate
- 7.5 ms latency
- 16.5 ms average seek
- Operating temperature range of 0° to 50° C (32° to 122° F)
- Burst transfer rate from buffer = 5.0 Mbytes/second**

Technical Information

Performance

Channel transfer rate:
Asynchronous:
1.5 Mbytes/second
Synchronous:
5.0 Mbytes/second**

Seek time (includes settling):
Track-to-track: 3.5 ms
Average: 16.5 ms
Maximum: 32 ms

Average latency: 7.5 ms

Characteristics

Rotational speed: 4,002 RPM
Recording density:
Bits per inch: 30,552
Tracks per inch: 1,667



	HP97544T/P	HP97548T/P
Capacity (Mbytes)		
Unformatted	397	795
Formatted	331	663
Per Track (bytes)		
Unformatted	34,143	34,143
Formatted	28,672	28,672
Per Sector (bytes)		
Unformatted	599+	599+
Formatted	512*	512*
Disks	4	8
Heads	8	16
Sectors	56*	56*
Cylinders	1,447*	1,447*

Reliability

MTBF: 150,000 hours
Service life: greater than 5 years
Recoverable error rate:
 less than 10 errors in 10^{13}
 bits transferred
Unrecoverable error rate:
 less than 10 errors in 10^{15}
 bits transferred
Seek error rate:
 less than 10 errors in 10^7 seeks

Power Requirements

	Single-ended	Differential
+5 Vdc		
Typical:	1.5A	1.8A
+12 Vdc		
Typical (seeking):	34W	35W
Average (seeking):	2.2A	2.2A
Maximum (starting):	4.7A	4.7A

Environmental Conditions

Shock:
Operating: 5G, 11 ms maximum
 (without loss of data)
Nonoperating: 30G, 11 ms maximum

Vibration:
Operating: 0.5 G peak
 (5 to 500 Hz)
Nonoperating: 0.5 G peak
 (5 to 500 Hz)

Ambient temperature:
Operating: 0° to 50° C
 (32° to 122° F)
Nonoperating: -40° to 65° C
 (-40° to 149° F)

Relative humidity:
Operating: 8 to 80%
 (noncondensing)
Maximum wetbulb: 28° C (82° F)
Nonoperating: 5 to 80%
 (noncondensing)
Maximum wetbulb: 28° C (82° F)

Altitude:
Operating: -305 to 3,048 m
 (-1,000 to 10,000 ft)
Nonoperating: -305 to 15,240 m
 (-1,000 to 50,000 ft)

Acoustic noise (worst case):
 <50 dB(A) sound pressure
 (at 1 meter)

Physical Specifications

Height: 83 mm (3.25 in.)
Width: 146 mm (5.75 in.)
Depth: 204 mm (8.0 in.)
Weight:
Shipping: 4.5 kg (10 lbs)
Unit: 3.2 kg (7 lbs)

* Sectors and tracks reserved for spares have been removed.
 + 58 bytes, containing embedded servo information at each intersection gap, are excluded for comparison purposes. The total number of bytes per sector is 657.
 ** Dependent upon host hardware implementation.

SCSI Interface

Controller overhead:
 <1 ms typical

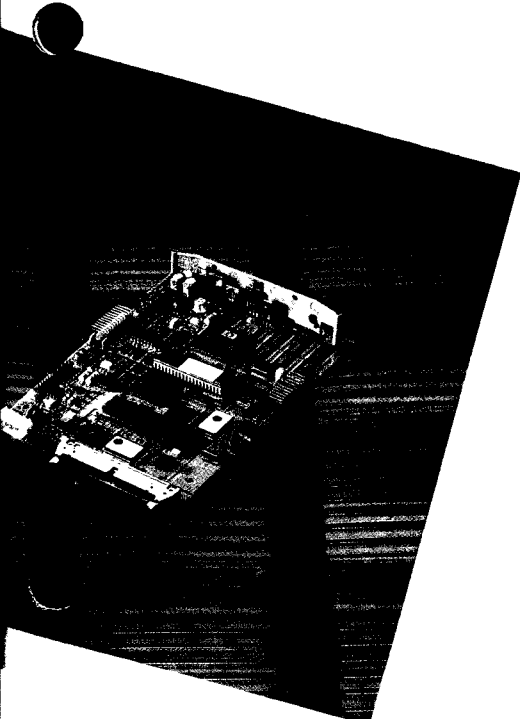
Dual-ported buffer: 2 tracks

Sector interleave: 1:1

Variable logical block size:
 512, 1024, 2048 and 4096
 (user variations available upon request)

Advanced Controller Features

SCSI-2 command interface:
Reed-Solomon Error Correction Code (ECC)
Full parity
Look-ahead read
Read/write on arrival
Track caching
Glitch free power on and power down operation



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SCSI-2 Commands Supported

Log sense/log select
 Mode pages (1, 2, 3, 3F, 4, 8, 9)
 Mode select (10)
 Mode sense (10)
 Read data buffer
 Read long
 Write data buffer
 Write long

SCSI-1 Messages Supported

Abort
 Bus device reset
 Command complete
 Disconnect
 Identify
 Initiator detected error
 Message parity error
 Message reject
 No operation
 Restore pointers
 Save data pointers
 Synchronous data transfer request

SCSI-1 Commands Supported

Format unit
 Inquiry
 Mode pages (1, 2)
 Mode select (6)
 Mode sense (6)
 Read (6) and (10)
 Read capacity
 Reassign block
 Release
 Reserve
 Request sense
 Rezero unit
 Seek (6) and (10)
 Send diagnostics
 Start/stop unit
 Test unit ready
 Verify
 Write and verify
 Write (6) and (10)

Note: Customer unique requirements accommodated.

Hewlett-Packard has been an international manufacturer of high reliability, high performance disk drive for 20 years. Products include models with 3.5-inch, 5.25-inch, 8-inch and 14-inch media sizes. Other 5.25-inch products available to OEMs and System Integrators include:

- HP 97556T/P, 97558T/P and 97560T/P Series
 - 796 megabytes, 1.26 and 1.6 gigabytes (unformatted)
 - SCSI-2 interface
 - Single-ended or differential
- HP 97556E, 97558E, and 97560E Series
 - 796 megabytes, 1.26 and 1.60 gigabytes (unformatted)
 - ESDI interface
- HP 97549T/P Series
 - 1.18 gigabytes (unformatted)
 - SCSI-2 interface
 - Single-ended or differential
- HP 97544T/P and 97548T/P Series
 - 397-795 megabytes (unformatted)
 - SCSI-2 interface
 - Single-ended or differential
- HP 97544S/D and 97548S/D Series
 - 397-795 megabytes (unformatted)
 - SCSI interface
 - Single-ended or differential
- HP 97544E and 97548E Series
 - 397-795 megabytes (unformatted)
 - ESDI interface
- HP 97530S/D/T Series
 - 136, 204 or 408 megabytes (unformatted)
 - SCSI interface
 - Single-ended or differential
- HP 97530E Series
 - 129, 194 or 389 megabytes (unformatted)
 - ESDI interface

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