HP SureStore Disks C2244, C2245, C2246, and C2247 - Technical Specifications

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HP SureStore Disks C2244, C2245, C2246, and C2247 disk drive capacities

These numbers are for comparison only. Capacities are calculated using a 512 byte sector. When other sector sizes are used, formatted capacity will change. Unformatted capacities are given in parentheses ( ).

	Zone 0 (Outer)	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7 (Inner)
Data tracks per surface:	533	192	136	144	138	318	268	252
Data sectors per track:	96	92	88	84	80	72	64	56
Data bytes per track:	49,152	47,104	45,056	43,008	40,960	36,864	32,768	28,672
	(58,899)	(56,338)	(53,968)	(51,440)	(49,034)	(44,079)	(39,351)	(34,391)

Data sectors per cylinder:								
C2244	672	644	616	588	560	504	448	392
C2245	864	828	792	756	720	648	576	504
C2246	1,056	1,012	968	924	880	792	704	616
C2247	1,248	1,196	1,144	1,092	1,040	936	832	728

Data bytes per cylinder:								
C2244	344,064	329,728	315,392	301,056	286,720	258,048	229,376	200,704
	(412,293)	(394,366)	(377,776)	(360,080)	(343,238)	(308,553)	(275,457)	(240,737)
C2245	442,368	423,936	405,504	387,072	368,640	331,776	294,912	258,048
	(530,091)	(507,042)	(485,712)	(462,960)	(441,306)	(396,711)	(354,159)	(309,519)
C2246	540,672	518,144	495,616	473,088	450,560	405,504	360,488	315,392
	(647,889)	(619,718)	(593,648)	(565,840)	(539,374)	(484,869)	(432,861)	(378,301)
C2247	638,976	612,352	585,728	559,104	532,480	479,232	425,984	372,736
	(765,687)	(732,394)	(701,584)	(668,720)	(637,442)	(573,027)	(511,563)	(447,083)

	C2244	C2245	C2246	C2247
Data surfaces per drive:	7	9	11	13
Data bytes				

bytes per sector:	512 (610)	512 (610)	512 (610)	512 (610)
Data sectors per surface:	158,096	158,096	158,096	158,096
Data bytes per surface:	80,945,152	80,945,152	80,945,152	80,945,152
Data cylinders per drive*:	1,981	1,981	1,981	1,981
Data sectors per drive:	1,106,288	1,422,480	1,738,672	2,054,864
Data bytes per drive:	566,419,456	728,309,760	890,200,064	1,052,090,368
	(678,438,799)	(872,345,769)	(1,066,252,739)	(1,260,159,709)

NOTE: * There are 2051 total cylinders per drive, allocated as follows: 1981 data cylinders, 69 spare cylinders, and 1 cylinder reserved for logs and maintenance information. Partial cylinders have been rounded to the next whole cylinder.

Operating specifications () Top of Page

HP C2244/45/46/47 Operating specifications

NOTE: The C2244/45/46/47 disk drives must be operated within the Disk Drive Environmental Requirements specified in Table 1-4 in order for them to function properly.

Interface

Industry Standard SCSI-2

Controller

Overhead time	Less than 500 microseconds
Buffer size	256 kbytes
Buffer type	dual-ported
Sector size	180 - 744 data field bytes
Interleave	1:1

Seek times (includes settling time)

Track to Track Seek	2.5 milliseconds
Head Switch Time	Less than 1 millisecond
Average Random Seek	
Reads	10.2 milliseconds
Writes	11.2 milliseconds
Maximum Seek	22 milliseconds

NOTE: Seek time is defined as the time from when the actuator begins to move until the head has settled over the target. track.. It does not include any controller overhead time or any initiator overhead time. The values above are derived from a representative sample of disk drives measured under normal temperature and voltage conditions.

Track to track seek time is the mean value of all seek times measured when performing all possible single track seeks.

Average random seek time is the time to do all possible seeks divided by the number of seeks possible.

Maximum seek time is the time it takes to seek 2051

Maximum seek time is the time it takes to seek 2051 physical cylinders.

Head Switch time is the time required to switch from one head to the next head in sequential order (head 0 to head 1, head 1 to head 2, etc.).

Spin-up Time

From Power-On to ready for access

- Typical: 14 seconds

From Power-On to SCSI bus selection

- Typical: 3 seconds
- Maximum: 5 seconds

Disk rotating speed

- 5400 rpm +/-0.5%

Rotational latency (average time)

- 6 milliseconds, +/-0.5%

Internal data transfer rates (controller/disk)

Burst Rates (for single sector transfers)	Sustained Rates (for continuous transfers; excludes controller overhead)
Inner Zone to Outer Zone	Inner Zone to Outer Zone
3.1 to 5.3 MB (24.8 to 42.4 Mbits) per second	2.1 to 3.7 MB (17.1 to 29.5 Mbits) per second

External data transfer rate (host/controller)

Narrow Single-Ended/Differential	Wide Differential
Asynchronous: 2.5 MB per second	Asynchronous: 5.0 MB per second
Synchronous: up to 10.0 MB per second	Synchronous: up to 20 0 MB per second

Recoverable data error rate

Less than ten (10) errors in 10 to the thirteenth power bits transferred when the disk drive is operated within the specified environmental limits.

NOTE: A recoverable data error occurs when a read or write operation successfully completes with the execution of a recovery algorithm. The recovery action is reported to the host with a Sense key of 1. (Refer to the Request Sense command in Appendix A.) Mode pages must be in the factory default states.

Unrecoverable data error rate

Less than ten (10) errors in 10 to the fifteenth power bits transferred when the disk drive is operated within the specified environmental limits.

NOTE: An un-recoverable data error occurs when a read or write operation does not successfully complete with the execution of a recovery algorithm. The unsuccessful operation is reported to the host with a Sense Key of 3. (Refer to the Request Sense command in Appendix A.) Mode pages must be in the factory default states.

Seek error Rate

Less than ten (10) seek errors in 10 to the seventh power seeks when the drive is operated within the specified environmental limits.

NOTE: A seek error occurs when the drive does not successfully locate the desired cylinder and head

Recording density

- Bit Density: 1968 bits per mm (49,987 bits

- Bit Density: 1968 bits per mm (49,987 bits per inch)
- Track Density: 91 tracks per mm (2304 tracks per inch)

Coding system

1,7 Run Length (RLL) Code

Electromagnetic emissions

Current Electromagnetic Compatibility (EMC) regulations do not specify or require testing at the component (standalone) level since EMC is highly dependent upon the characteristics of the system in which the product is installed.
Although regulatory testing is not required, these products have been characterized as individual components using Hewlett-Packard standardized tests.

Acoustical noise

Typical values measured as average sound pressure at one meter per ISO 7779; converted to average sound power (in bels) per ISO 7779.

Idling

- A-Weighted Sound Pressure: 35 db(A)
- Sound Power: 4.6 bels

Seeking

- A-Weighted Sound Pressure: 37 db(A)
- Sound Power: 4.8 bels

Safety

This product will be evaluated as a component (incomplete in nature) to the following specifications. A complete test and evaluation program should be performed on the end use application

IEC: 950, 2nd Edition, Amendment 1
UL: 1950, 2nd Edition
CSA: C22.2 No . 950-M 89
EN: 60950, 1988
TUV: EN 60950, 1988; DIN VDE 0805/05.90
DEMKO: EMKO-TUE (74-SEC) 203/91

Physical characteristics

Unit Weight: 1.0 kg (2.2 lbs.)
Shipping Weight (Single-Unit Package): 1.6 kg (3.5 lbs.)
Shipping Weight (Ten-Unit Package): 11.5 kg (25 lbs.)
Length: 46.1 mm (5.75 inches)
Width: 101.6 mm (4.00 inches)
Height: 41.3 mm (1.63 inches)

Environmental requirements () Top of Page

The environmental requirements for proper operation of the HP C2244/45/46/47.

HP C2244/45/46/47 environmental requirements

Input power

- Voltages: +5 V, + 12 V
- Regulation: +/-5 degrees K
- (+/-10 degrees percent] tolerance allowed for +12V during start-up.)

Ripple and noise

- +5 V: less than 100 mVp-p
- +12 V: less than 200 mVp-p

Ambient air temperature

- Operating: 5°C to 50°C (41°F to 122°F)
- Non-operating: -40°C to 65°C (-40°F to 149°F)
- (Maximum rate of change shall not exceed 20°C (36°F) per hour.)

Airflow requirements

- Narrow, Single-Ended Drives: 3 to 5 cfm
- Narrow, Differential Drives: 3 to 5 cfm
- Wide, Differential Drives: 3 to 5 cfm

Relative humidity

- Operating: 8% to 80% with wet bulb limit of 28°C
- Non-operating (storage and shipping): 5% to 90% with wet bulb limit of 28°C
- (Excludes all conditions which can cause condensation in or on the disk drive.)

Altitude

- Operating: -305 m (-1,000 feet) to 3,048 m (10,000 feet) above sea level.
- Non-operating: -305 m (- 1,000 feet) to 15,240 m (50,000 feet) above sea level

The disk drive will meet all performance specifications on any of the major mounting axes.

Tilt

The disk drive will meet all performance specifications on any of the major mounting axes.

Shock

Operating

Applied Acceleration (half sine): 3.0 g (peak), 11 milliseconds. The drive meets recoverable and unrecoverable data error rate specifications with no recoverable or unrecoverable hardware faults. Mode pages must be in factory default state.
Applied Acceleration (half sine): 10.0 g (peak), 11 milliseconds. The drive meets unrecoverable data error rate specifications with no unrecoverable hardware faults. Mode pages must be in factory default state.

Non-operating

Applied Acceleration (half sine): 50 g (peak), 11 milliseconds. The drive meets recoverable and unrecoverable data error rate specifications with no recoverable or unrecoverable hardware faults and no damage to the mechanism. Mode pages must be in factory default state.

NOTE: A recoverable hardware fault occurs when the drive detects a hardware error, such as a seek or track following error, and successfully completes the operation with the execution of a recovery algorithm. The recovery action is reported to the host with a Sense Key of 1. Mode pages must be in the factory default states.

An un-recoverable hardware fault occurs when the drive detects a hardware error, such as a seek or track following error, and does not successfully complete the operation with the execution of a recovery algorithm. The unsuccessful operation is reported to the host with a Sense Key of 4. Mode pages must be in the factory default states.

Swept sine vibration

Operating

Applied Acceleration: 0.25 g (peak), 5 to 500 Hz. The drive meets recoverable and unrecoverable data error rate specifications with no recoverable or unrecoverable hardware faults. Mode pages must be in factory default state.
Applied Acceleration: 0.5 g (peak), 5 to 500 Hz. The drive meets unrecoverable data error rate specifications with no unrecoverable hardware faults. Mode pages must be in factory default state.

state.

Non-operating

Applied Acceleration: 2.0 g (peak), 5 to 500 Hz.
The drive meets recoverable and unrecoverable
data error rate specifications with no recoverable
or unrecoverable hardware faults and no damage
to the mechanism. Mode pages must be in factory
default state.

Electromagnetic compatibility (EMC)

Current EMC regulations do not specify or require
testing at the component (standalone) level since
EMC is highly dependent upon the characteristics
of the system in which the product is installed.
Although regulatory testing is not required, these
products have been characterized as individual
components using Hewlett-Packard standardized
tests. These tests are summarized below.

Electromagnetic susceptibility

Radiated

- less than 3V/m from 14 kHz to 1 GHz

Conducted

- +5 V: less than 200 mVp-p from 100 kHz to
  250 MHz
- +12 V: less than 400 mVp-p from 100 kHz
  to 250 MHz

Magnetic

- Less than 4 gauss, 47.5 to 198 Hz

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