



HP SSD S700 Pro M.2

Product Specification

Capacity: 128GB, 256GB, 512GB

Components: 3D NAND/ DRAM Cache

Read and Write IOPS

(Iometer* Queue Depth 32)

—128 GB

Random 4 KB reads: Up to 40K IOPS

Random 4 KB writes: Up to 80 K IOPS

— 256 GB

Random 4 KB reads: Up to 80K IOPS

Random 4 KB writes: Up to 90 K IOPS

—512GB

Random 4 KB reads: Up to 85 K IOPS

Random 4 KB writes: Up to 90 K IOPS

Bandwidth Performance

— 128 GB

Sustained sequential read: Up to 564 MB/s

Sustained sequential write: Up to 436 MB/s

— 256 GB

Sustained sequential read: Up to 563 MB/s

Sustained sequential write: Up to 509 MB/s

— 512GB

Sustained sequential read: Up to 563 MB/s

Sustained sequential write: Up to 504 MB/s

SATA 1.5 Gb/s ,3 Gb/s and 6 Gb/s interface

— ATA/ATAPI-7

— SSD-enhanced S.M.A.R.T. ATA feature

— Native Command Queuing (NCQ)

command set

— Data set management command

Trim attribute

Form Factor: Full-sized M.2 2280 SSD

— Dimensions: 80 mm x 22 mm

— Thickness: <=3.8 mm

— Weight: ≤5.4 grams

Power Management

— 3.3 V M.2 SSD power supply

—M.2 SSD interface power management

Power (Mobile Mark* 2007 Workload)

— Idle: 440 mW (TYP)

— max: 2.51W (TYP)

Temperature

— Operating: 0°C to 70°C

— Non-Operating: -40°C to 85°C

Shock (operating and non-operating)

— 100 G/6 msec

Vibration(operating and non-operating)

—3.1G RMS (2-500 Hz)



HP SSD S700 Pro M.2

Latency

— 128 GB

Read: 0.048ms (TYP)

Write: 0.054ms (TYP)

—256 GB

Read: 0.043ms (TYP)

Write: 0.044ms (TYP)

—512B

Read: 0.033ms (TYP)

Write: 0.035ms (TYP)

Reliability

— Uncorrectable Bit Error Rate (UBER):

1 sector in 10^{16} bits read

— Mean Time Between Failures (MTBF):

2,000,000 hours

Certifications and Declarations

— UL*

— CE*

— FCC*

— RoHS*

Order Information

Country/Region	PN	Capacity
APJ	2LU74AA#UUF	128GB
	2LU75AA#UUF	256GB
	2LU76AA#UUF	512GB
NA	2LU74AA#ABC	128GB
	2LU75AA#ABC	256GB
	2LU76AA#ABC	512GB
EURO	2LU74AA#ABB	128GB
	2LU75AA#ABB	256GB
	2LU76AA#ABB	512GB



Contents

1.0	Overview	4
2.0	Architecture	5
3.0	Product Specifications	6
3.1	Capacity	6
3.2	Performance	6
3.3	Electrical	8
3.4	Environmental Conditions	9
3.5	Reliability	10
4.0	Mechanical Information	11
5.0	Pin and Signal Descriptions	13
5.1	Pin Locations	14
5.2	Signal Descriptions.....	15
6.0	Supported Command Sets.....	15
6.1	ATA General Feature Command Set.....	15
6.2	Power Management Command Set.....	16
6.3	Security Mode Feature Set.....	16
6.4	SMART Command Set	17
6.5	Data Set Management Command Set	17
6.6	Host Protected Area Command Set	18
6.7	48-Bit Address Command Set	18
6.8	Device Configuration Overlay Command Set	19
6.9	General Purpose Log Command Set	19
6.10	Native Command Queuing	19
6.11	Software Settings Preservation.....	19
6.12	Device Initiated Power Management (DIPM).....	19
7.0	Certifications and Declarations	20



1.0 Overview

HP SSD S700 Pro M.2 Series delivers compact storage and optimized performance for traditional and innovative small-form-factor and embedded platforms in 3 capacity sizes: 128GB 、 256GB and 512GB.

By combining advanced NAND Flash controller with SATA 6Gb/s interface and 3D NAND Flash, S700 Pro M.2 delivers sequential read speed up to 560MB/s and sequential write speed up to 500MB/s, which makes it a ideal solution for computing device, such as, notebook, thin-and-light systems, mini- and sub-notebooks, all in-one computers, and embedded platforms.

As compared to standard mobile HDDs, HP SSD S700 Pro M.2 Series offers these key features:

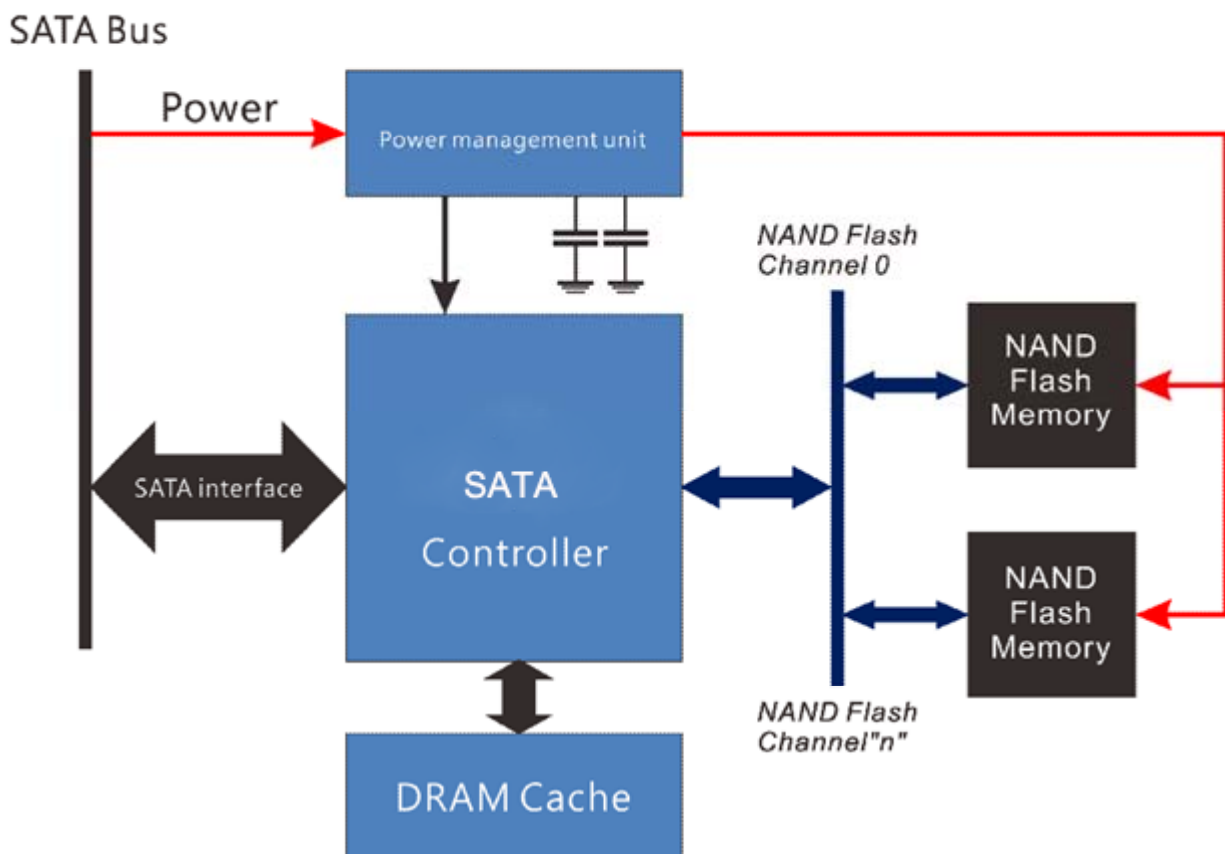
- High performance
- Low power
- Increased system responsiveness
- High reliability
- Small form-factor
- Minimum weight
- Enhanced ruggedness



2.0 Architecture

HP SSD S700 Pro M.2 Series utilizes a cost-effective, high-performance HP SATA-to-NAND controller to manage a full SATA 6 Gb/s bandwidth with the host while managing multiple NAND flash memory devices on 4 channels.

Figure 1. Block Diagram





3.0 Product Specifications

This section provides details on HP SSD S700 Pro M.2 Series product specifications.

3.1 Capacity

Table 1. User Addressable Sectors

Unformatted Capacity	128GB	256GB	512GB
Total User Addressable Sectors	250,069,680	500,118,192	1,000,215,216

Notes: LBA count shown represents total user storage capacity and will remain the same throughout the life of the drive.

The total usable capacity of the SSD may be less than the total physical capacity because a small portion of the capacity issued for NAND flash management and maintenance purposes.

1 GB = 1,000,000,000 bytes; 1 sector = 512 bytes.

3.2 Performance

Table 2. Read/Write IOPS, Bandwidth, Latency

Performance	128GB	256GB	512GB
Random Read/Write IOPS (Input/Output Operations per Second)(1)			
4K Read	Up to 40,000	Up to 80,000	Up to 85,000
4K Write	Up to 80,000	Up to 90,000	Up to 90,000
Maximum Sustained Read and Write Bandwidth(2)			
Sequential Read	Up to 564 MB/s	Up to 563 MB/s	Up to 563 MB/s
Sequential Write	Up to 436 MB/s	Up to 509 MB/s	Up to 504 MB/s
Latency(3)			
Read Write	Read: 0.048 ms Write: 0.054 ms	Read: 0.043 ms Write: 0.044 ms	Read: 0.033 ms Write: 0.035 ms



Notes:

(1). Performance measured using Iometer with queue depth set to 32; Measurements are performed on 8 GB of LBA range. Write Cache enabled.

(2). Performance measured using Iometer with queue depth equal to 32.

Sequential performance measurements assume 1 MB/sec = 1,048,576 bytes/sec.

(3). Device measured using Iometer; Read/Write latency measured on sequential 4 K transfers with queue depth set to 1.

Write Cache Enabled.

Power On To Ready time measured from power rail rising edge to the first DRDY issued from the drive.



3.3 Electrical

Table 3. Operating Voltage and Power Consumption

Electrical Characteristics	128GB	256GB	512GB
Operating Voltage for 3.3V (+/- 5%)			
Min		3.14V	
Max		3.47V	
Power Consumption (Typical)			
Active1	1.73W	2.25 W	2.23 W
Idle	0.44 W	0.44 W	0.44 W

Notes:

1. Active power measured during execution of MobileMark* 2007 with DIPM (Device Initiated Power Management) enabled.
2. Idle power defined as SSD at idle with DIPM enabled.



3.4 Environmental Conditions

Table 4. Temperature, Shock, Vibration

Temperature	Range
Ambient Temperature	
Operating	0 to 70 °C
Non-operating	-40 to 85 °C
Temperature Gradient(1)	
Operating	20 (Typical) °C/hr
Non-operating	30 (Typical) °C/hr
Humidity	
Operating	5 - 95 %
Non-operating	5 - 95 %
Shock, Vibration, Acoustics	Range
Shock(2)	
Operating	100 G/6 msec
Non-operating	100 G/6 msec
Vibration(3)	
Operating	3.1 GRMS (2-500 Hz)
Non-operating	3.1 GRMS (2-500 Hz)

Notes:

(1). Temperature gradient measured without condensation.

(2). Shock specifications assume the SSD is mounted securely with the input vibration applied to the drive-mounting screws. Stimulus may be applied in the X, Y or Z axis. Shock specification is measured using root mean square (RMS) value.

(3). Vibration specifications assume the SSD is mounted securely with the input vibration applied to the drive-mounting screws.

Stimulus may be applied in the X, Y or Z axis. The measured specification is in root mean squared form. Vibration specification is measured using RMS value.



3.5 Reliability

Table 5. Reliability Specifications

Parameter	Value
<p>Uncorrectable Bit Error Rate (UBER)</p> <p>Unrecoverable read bit error rate will not exceed one sector in the specified number of bits read. In the extremely unlikely event of a no recoverable read error, the SSD will report it as a read failure to the host; the sector in error is considered corrupt and is not returned to the host.</p>	1 sector in 10^{16} bits read, max
<p>Mean Time Between Failure (MTBF)</p> <p>Mean time between failures (MTBFs) for the SSD can be predicted based on the component reliability data using the methods referenced in the Telcordia SR-332 reliability prediction procedures for electronic equipment.</p>	2,000,000 hours
<p>Power On/Off Cycles</p> <p>Power On/Off Cycles is defined as power being removed from HP SSD S700 Pro M.2, and then restored. Most host systems remove power from the SSD when entering suspend and hibernate as well as on a system shutdown.</p>	10,000 cycles
<p>Minimum Useful Life</p> <p>HP SSD S700 Pro M.2 will have a minimum of three years of useful life under typical client workloads with up to 80% of the full capacity of host writes per day.</p>	3 years



4.0 Mechanical Information

Figure 2 shows the physical dimension of HP SSD S700 Pro M.2 Series.

All dimensions are in millimeters.

Figure 2. HP SSD S700 Pro M.2 Dimensions

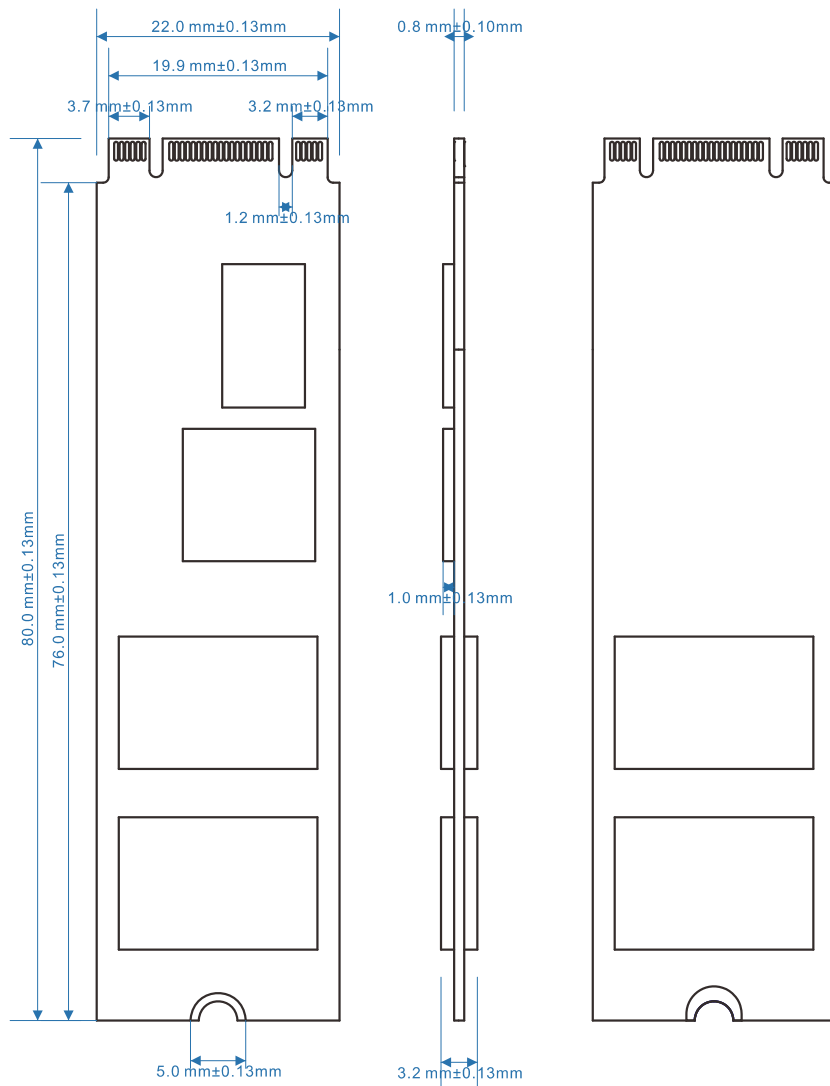
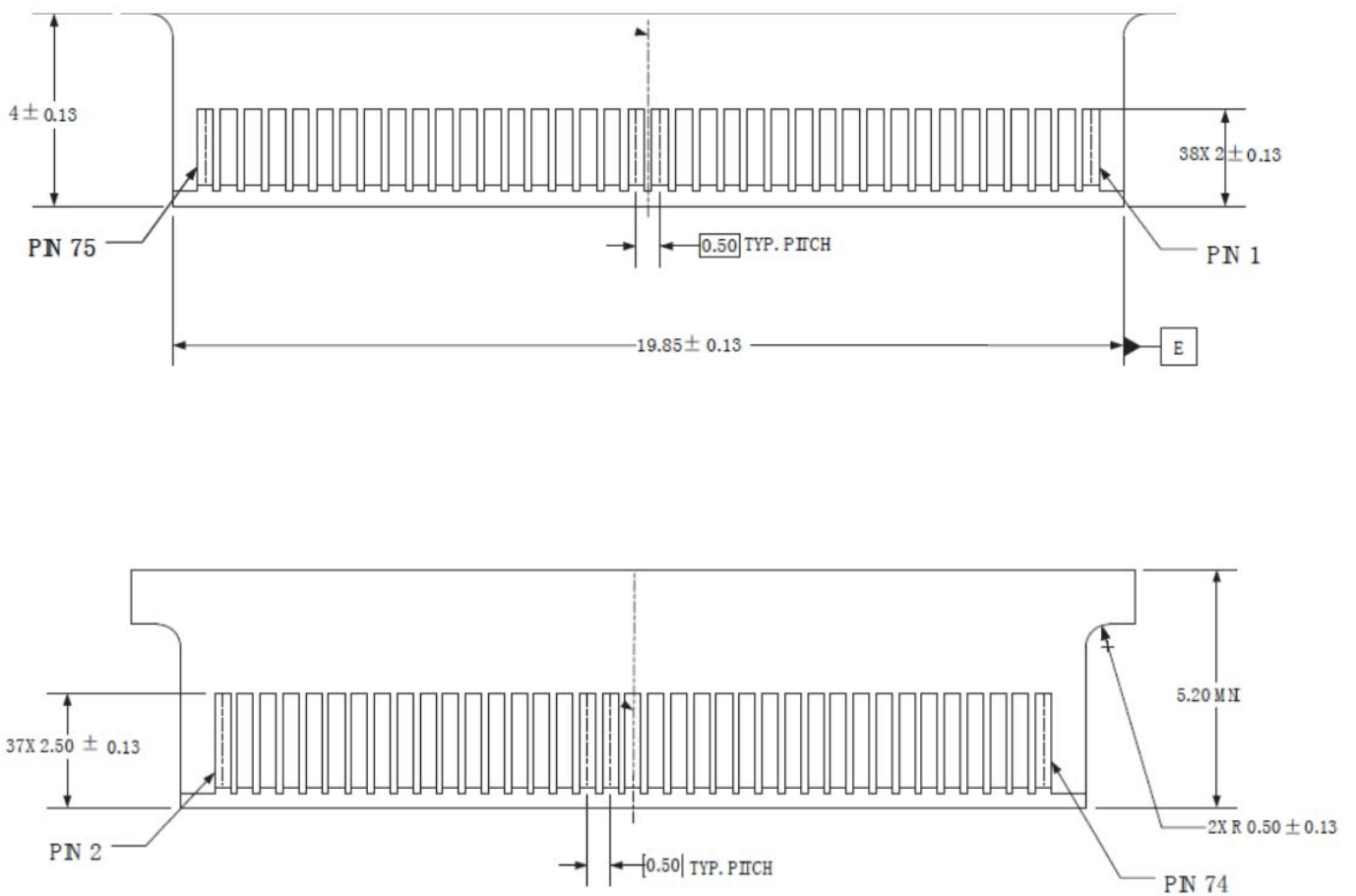




Figure 3. HP SSD S700 Pro M.2 Interface Description





5.0 Pin and Signal Descriptions

5.1 Pin Locations

Pin#	Assignment	Description	Pin#	Assignment	Description
1	CONFIG_3	Defines module type	21	CONFIG_0	Defines module type
2	+3.3V	3.3V source	22	NA	NA
3	GND	Return Current Path	23	NA	NA
4	+3.3V	3.3V source	24	NA	NA
5	NA	NA	25	NA	NA
6	NA	NA	26	NA	NA
7	NA	NA	27	GND	Return Current Path
8	NA	NA	28	NA	NA
9	NA	NA	29	NA	NA
10	NA	NA	30	NA	NA
11	NA	NA	31	NA	NA
12	(removed for key)	Mechanical Notch B	32	NA	NA
13	(removed for key)	Mechanical Notch B	33	GND	Return Current Path
14	(removed for key)	Mechanical Notch B	34	NA	NA
15	(removed for key)	Mechanical Notch B	35	NA	NA
16	(removed for key)	Mechanical Notch B	36	NA	NA
17	(removed for key)	Mechanical Notch B	37	NA	NA
18	(removed for key)	Mechanical Notch B	38	DEVSLP	Device Sleep, Input
19	(removed for key)	Mechanical Notch B	39	GND	Return Current Path
20	NA	NA	40	NA	NA

Table 6.Connector Pin Signal Definitions



5.2 Signal Descriptions

Pin#	Assignment	Description	Pin#	Assignment	Description
41	SATA-B+/PERn0	Host receiver differential signal pair	61	NOTCH	Mechanical Notch M
42	NA	NA	62	NOTCH	Mechanical Notch M
43	SATA-B-/PERp0	Host receiver differential signal pair	63	NOTCH	Mechanical Notch M
44	NA	NA	64	NOTCH	Mechanical Notch M
45	GND	Return Current Path	65	NOTCH	Mechanical Notch M
46	NA	NA	66	NOTCH	Mechanical Notch M
47	SATA-A-/PETn0	Host transmitter differential signal pair	67	NA	NA
48	NA	NA	68	NA	NA
49	SATA-A+/PETp0	Host transmitter differential signal pair	69	CONFIG_1	Defines module type
50	NA	NA	70	+3.3V	3.3V source
51	GND	Return Current Path	71	GND	Return Current Path
52	NA	NA	72	+3.3V	3.3V source
53	NA	NA	73	GND	Return Current Path
54	NA	NA	74	+3.3V	3.3V source
55	NA	NA	75	CONFIG_2	Defines module type
56	NA	NA			
57	GND	Return Current Path			
58	NA	NA			
59	NOTCH	Mechanical Notch M			
60	NOTCH	Mechanical Notch M			



6.0 Supported Command Sets

HP SSD S700 Pro M.2 Series supports ATA (Advanced Technology Attachment) commands described in this section.

6.1 ATA General Feature Command Set

HP SSD S700 Pro M.2 Series supports the ATA General Feature command set (non-PACKET), which consists of:

- EXECUTE DEVICE DIAGNOSTIC
- FLUSH CACHE
- IDENTIFY DEVICE
- READ DMA
- READ SECTOR(S)
- READ VERIFY SECTOR(S)
- SEEK
- SET FEATURES
- WRITE DMA
- WRITE SECTOR(S)
- READ MULTIPLE
- SET MULTIPLE MODE
- WRITE MULTIPLE

HP SSD S700 Pro M.2 Series also supports the following optional commands:

- READ BUFFER
- WRITE BUFFER
- NOP
- DOWNLOAD MICROCODE



6.2 Power Management Command Set

HP SSD S700 Pro M.2 Series supports the Power Management command set, which consists of:

- CHECK POWER MODE
- IDLE
- IDLE IMMEDIATE
- SLEEP
- STANDBY
- STANDBY IMMEDIATE

6.3 Security Mode Feature Set

HP SSD S700 Pro M.2 Series supports the Security Mode command set, which consists of:

- SECURITY SET PASSWORD
- SECURITY UNLOCK
- SECURITY ERASE PREPARE
- SECURITY ERASE UNIT
- SECURITY FREEZE LOCK
- SECURITY DISABLE PASSWORD



6.4 smart Command Set

HP SSD S700 Pro M.2 Series supports the SMART command set, which consists of:

- SMART ENABLE OPERATIONS
- SMART DISABLE OPERATIONS
- SMART ENABLE/DISABLE AUTOSAVE
- SMART RETURN STATUS

HP SSD S700 Pro M.2 Series also supports the following optional commands:

- SMART EXECUTE OFF-LINE IMMEDIATE
- SMART READ DATA
- SMART READ LOG
- SMART WRITE LOG

6.5 Data Set Management Command Set

HP SSD S700 Pro M.2 Series supports the Data Set Management command set Trim attribute, which consists of:

- DATA SET MANAGEMENT EXT



6.6 Host Protected Area Command Set

HP SSD S700 Pro M.2 Series supports the Host Protected Area command set:

- READ NATIVE MAX ADDRESS
- SET MAX ADDRESS
- READ NATIVE MAX ADDRESS EXT
- SET MAX ADDRESS EXT

HP SSD S700 Pro M.2 Series also supports the following optional commands:

- SET MAX SET PASSWORD
- SET MAX LOCK
- SET MAX FREEZE LOCK
- SET MAX UNLOCK

6.7 48-Bit Address Command Set

HP SSD S700 Pro M.2 Series supports the 48-bit Address command set, which consists of:

- FLUSH CACHE EXT
- READ DMA EXT
- READ NATIVE MAX ADDRESS EXT
- READ SECTOR(S) EXT
- READ VERIFY SECTOR(S) EXT
- SET MAX ADDRESS EXT
- WRITE DMA EXT
- WRITE MULTIPLE EXT
- WRITE SECTOR(S) EXT
- WRITE UNCORRECTABLE EXT



6.8 Device Configuration Overlay Command Set

HP SSD S700 Pro M.2 Series supports the Device Configuration Overlay command set, which consists of:

- DEVICE CONFIGURATION FREEZE LOCK
- DEVICE CONFIGURATION IDENTITY
- DEVICE CONFIGURATION RESTORE
- DEVICE CONFIGURATION SET

6.9 General Purpose Log Command Set

The S700 Pro M.2 Series supports the General Purpose Log command set, which consists of:

- READ LOG EXT
- WRITE LOG EXT

6.10 Native Command Queuing

HP SSD S700 Pro M.2 Series supports the Native Command Queuing (NCQ) command as

- READ FPDMA QUEUED
- WRITE FPDMA QUEUED

Note: *With a maximum queue depth equal to 32.*

6.11 Software Settings Preservation

HP SSD S700 Pro M.2 Series supports the SET FEATURES parameter to enable/disable the preservation of software settings.

6.12 Device Initiated Power Management (DIPM)

HP SSD S700 Pro M.2 Series supports the SET FEATURES parameter to enable Device Initiated Power Management.



7.0 Certifications and Declarations

Table 7 describes the Device Certifications supported by HP SSD S700 Pro M.2.

Table 7. Device Certifications and Declarations

Certification	Description
CE Compliant	Indicates conformity with the essential health and safety requirements set out in European Directives Low Voltage Directive and EMC Directive.
UL Certified	Underwriters Laboratories, Inc. Component Recognition UL60950-1.
RoHS Compliant	Restriction of Hazardous Substance Directive

8.0 Revision History

Date	Revision	Description
June 2017	V1.0	Initial release