Overview

HP Solid State Drives (SSDs) for Workstations

Introduction

Solid State Drives (SSDs) are fast becoming a real force with respect to storage in the computer industry. With no moving parts, storage is no longer bound by mechanical barriers to higher performance. HP SSDs for workstations offer overall performance significantly beyond that of SAS 15k rpm HDDs (Hard Disk Drives).

SSDs should be considered for most workstations since the number of processor cores and overall processing power can be limited by the I/O performance of the storage subsystem. For applications where 15k rpm HDDs deliver a performance improvement over standard SATA HDDs, an HP SSD will likely deliver even better performance.

Solid State Drives measure Access Time in microseconds (65 to 85) as opposed to the best HDDs (15k rpm) being measured in milliseconds (~6ms); the SSD is about 70 times faster. In addition, the extremely high average sustained read performance (up to 560MB/s) is considerably higher than the average sustained read performance of 15k rpm HDDs available today (180MB/s to 250MB/s*). The result is a much higher performance potential. Random IOPs (I/O Operations per second) are in a class of their own, up to 20X faster than 15k rpm HDDs. This obviously helps with database operations but it also helps with OS and application performance. Users experience faster boot and data load times, faster application loading and snappier system response. This is especially true where the workflow has a large percentage of random reads and writes.

SSDs help lower the acoustical emissions of the workstation. No moving parts means SSDs inherently have no acoustic emissions, e.g. noise. Furthermore, they consume much less power than Workstation class HDDs so less air is needed for cooling. The result is lower system fan speeds and therefore, lower acoustics.

SSDs tend to be more rugged than hard drives with respect to shock and vibration because SSDs have no moving parts.

* Based on HP and third party tests.

Performance

Performance varies by device, based on the capacity. Higher capacity devices usually have better performance due to the increased number of channels to access the NAND components. Self-Encrypting Drives (SEDs) enable hardware encryption of the data, without a performance penalty. Software encryption does incur a performance penalty in the range of 10-30%.

Enterprise class SSDs offer higher endurance, power loss protection, and other enterprise class features.

See the specific device specifications for performance and endurance data.

Overview

Form Factor

These SSDs are 7mm SFF (Small Form Factor, 2.5") drives, which are then mounted in a removable 3.5" Frame. The SSD can be mounted in specific 2.5" mounting carriers, as listed below.

Intelligent System Maintenance

SSDs emulate HDDs such that the operating system thinks it is talking to a hard drive. However the physical data mapping is quite different. In fact the SSD intelligently manages the physical location of data on the drive in the background via wear leveling algorithms that maximize the life of the SSD. The extremely fast access times of SSDs permit the SSD to move the data around as needed for wear leveling without impacting the performance. The net result is that defragmenting is not needed and defragmenting will not improve the performance. In fact, defragmentation should be turned off.

SSDs use the TRIM function to improve endurance. The TRIM command is focused on maintaining MLC SSD write performance by erasing no longer used (released) logical blocks (aka files deleted from the Windows recycle bin) from the SSD automatically in the background. Most configurations with Win7 and Win8, including single SSD, RAID 0, and RAID 1, will provide support for TRIM. Optional controllers, including the SAS controllers supported on Workstations, do not provide support for TRIM when used in a RAID configuration, but do enable TRIM in non-RAID configurations. For additional information regarding TRIM support, please contact HP technical support. Use HP Performance Advisor software to check the actual usage / wear level of the device.

Models

HP 128GB SATA 6Gb/s SSD	A3D25AA
HP 128GB mSATA 6Gb/s SSD	E5Z78AA
HP 256GB SATA 6Gb/s SSD	A3D26AA
HP 256GB SATA 6Gb/s SED Opal 1 SSD	D8N28AA
HP 256GB SATA 6Gb/s SED Opal 2 SSD	G7U67AA
HP 256GB mSATA 6Gb/s SSD	F3C92AA
HP 512GB SATA 6Gb/s SSD	D8F30AA
HP 512GB SATA SED SSD	N8T26AA
HP 1TB SATA 6Gb/s SSD	F3C96AA
HP 2TB SATA SSD	Y6P08AA
HP Enterprise Class 240GB SATA SSD	T3U07AA
HP Enterprise Class 480GB SATA SSD	T3U08AA

Benefits

- Higher overall performance than 15k HDDs based on random IOPs, sustained reads and sustained writes.
- Lower system level acoustic noise than systems with HDDs, especially 15k rpm HDDs
- More rugged than HDDs with respect to shock and vibration
- Typical wall power savings relative to a 15k drive is ~10W/drive (based on drive idle power and power supply at 85% efficiency. Active drive power deltas are slightly larger.)
- Lower system maintenance because there is no need to defragment the drive

NOTE: Some operating systems may automatically schedule defragmenting sessions. It is best to disable defragmenting when using SSDs.

Compatibility

SSDs are supported on all Z Workstations. Check individual workstation platform Quickspecs for confirmation.

If an HP Solid State Drive is purchased as an After Market Option, the kit will include a mounting bracket for use in the standard 3.5" HDD Bays. If it is for use in an Optical Bay, one of the following mounting brackets will be needed.

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- HP Optical Bay HDD Mounting Bracket-BLK-for WKS, HP Part Number NQ099AA
- HP 2.5in HDD 2-in-1 Optical Bay Bracket, HP Part Number FX615AA or K4T74AA
- HP 4-in-1 SFF HDD Carrier with External access (Option kit only for Z620 and Z820, B8K60AA), fits into ODD bay.

Technical Specifications

SATA SSDs for HP Workstations	**HP 128GB SATA 6Gb/s SSD**	**Capacity**	128GB	
		Protocol	SATA	
		Form Factor	2.5"	
		Controller	AHCI	
		NAND Type	MLC	
		Endurance	100TBW (TB Written)	
		Reliability (MTTF)	1.5M hours	
		Physical Size (Height)	0.28 in; 0.7 cm	
		Physical Size (Width)	2.5 in; 6.36 cm	
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	560 MB/s
			Sequential Write	400 MB/s
			Random Read	90K IOPS
			Random Write	88K IOPS
	HP 128GB mSATA 6Gb/s SSD	**Capacity**	128GB	
		Protocol	SATA	
		Form Factor	mSATA	
		Controller	AHCI	
		NAND Type	MLC	
		Endurance	100TBW (TB Written)	
		Reliability (MTTF)	1.5M hours	
		Physical Size (Height)	2.01 in; 5.1 cm	
		Physical Size (Width)	1.18 in; 3 cm	
		Interface	SATA 6Gb/s	
		Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	**Sequential Read**	560 MB/s
			Sequential Write	400 MB/s
			Random Read	90K IOPS
			Random Write	88K IOPS
	HP 256GB SATA 6Gb/s SSD	**Capacity**	256GB	
		Protocol	SATA	
		Form Factor	2.5"	
		Controller	AHCI	
		NAND Type	MLC	
		Endurance	200TBW (TB Written)	
		Reliability (MTTF)	1.5M hours	
		Physical Size (Height)	0.28 in; 0.7 cm	
		Physical Size (Width)	2.5 in; 6.36 cm	

Technical Specifications

	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	560MB/s (max)
		Sequential Write	510MB/s (max)
		Random Read	100K IOPS (max)
		Random Write	88K IOPS (max)
HP 256GB SATA 6Gb/s SED Opal 1 SSD	**Capacity**	256GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	MLC	
	Endurance	200TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	560MB/s
		Sequential Write	510 MB/s
		Random Read	100K IOPS
		Random Write	88K IOPS
	Self-Encrypting Drive Support	OPAL 1	
HP 256GB SATA 6Gb/s SED Opal 2 SSD	**Capacity**	256GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	MLC	
	Endurance	200TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	560MB/s
		Sequential Write	510 MB/s
		Random Read	100K IOPS
		Random Write	88K IOPS

Technical Specifications

	Self-Encrypting Drive Support	OPAL 2	
HP 256GB mSATA 6Gb/s SSD	**Capacity**	256GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	MLC	
	Endurance	200TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	2.01 in; 5.1 cm	
	Physical Size (Width)	1.18 in; 3 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	560 MB/s
		Sequential Write	510 MB/s
		Random Read	100K IOPS
		Random Write	88K IOPS
HP 512GB SATA 6Gb/s SSD	**Capacity**	512GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	MLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	560 MB/s
		Sequential Write	510 MB/s
		Random Read	100K IOPS
		Random Write	88K IOPS
HP 512GB SATA SED SSD	**Capacity**	512GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	MLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	

Technical Specifications

Physical Size (Height)	0.28 in; 0.7 cm	
Physical Size (Width)	2.5 in; 6.36 cm	
Interface	SATA 6Gb/s	
Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	**Sequential Read**	560 MB/s
	Sequential Write	510 MB/s
	Random Read	100K IOPS
	Random Write	88K IOPS
Self-Encrypting Drive Support	OPAL 1 and 2	

Technical Specifications

HP 1TB SATA 6Gb/s SSD	**Capacity**	1TB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	MLC	
	Endurance	400TBW (TB Written)	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	SATA 6Gb/s	
	Synchronous Transfer Rate (Maximum)	Up to 550MB/s (Sequential Read)	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	560 MB/s
		Sequential Write	510 MB/s
		Random Read	100K IOPS
		Random Write	88K IOPS
HP 2TB SATA SSD 6Gb/s SSD	**Capacity**	2TB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	3D TLC	
	Reliability (MTTF)	1.5M hours	
	Physical Size (Height)	0.28 in; .7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	530 MB/s (max)
		Sequential Write	500 MB/s (max)
		Random Read	92K IOPS (max)
		Random Write	83K IOPS (max)
HP Enterprise Class 240GB SATA SSD	**Capacity**	240GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	MLC	
	Endurance	920TBW (TB Written)	
	Reliability (MTTF)	2.0M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	

Technical Specifications

	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	420 MB/s
		Sequential Write	290 MB/s
		Random Read	63K IOPS
		Random Write	18K IOPS
	Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	
HP Enterprise Class 480GB SATA SSD	**Capacity**	480GB	
	Protocol	SATA	
	Form Factor	2.5"	
	Controller	AHCI	
	NAND Type	MLC	
	Endurance	1850TBW (TB Written)	
	Reliability (MTTF)	2.0M hours	
	Physical Size (Height)	0.28 in; 0.7 cm	
	Physical Size (Width)	2.5 in; 6.36 cm	
	Interface	6Gb/s SATA	
	Synchronous Transfer Rate (Maximum)	Up to 600MB/s	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	420 MB/s
		Sequential Write	380 MB/s
		Random Read	63K IOPS
		Random Write	23K IOPS
	Enterprise Class Features	High Endurance NAND Power Loss Protection End-to-End Data Protection	

Summary of Changes

Date of change:	Version History:		Description of change:
	From v1 to v2		
July 10, 2014	From v16 to v17	**Removed**	Older model offerings
September 16, 2014	From v17 to v18	**Added**	Several specs for all drives
July 1, 2015	From v18 to v19	**Changed**	update SATA SSDs with Micron M600 specs
August 1, 2015	From v19 to v20	**Added**	512GB SED SSD and specs
November 1, 2015	From v20 to v21	**Added**	HP 512GB SATA SED SSD
		Removed	Duplicate instance of 512GB & 1TB
January 1, 2016	From v21 to v22	**Added**	Data specs for new Enterprise Class options, and general clean up
September 1, 2016	From v22 to v23	**Added**	Specs for listed options
		Changes	updates to structure, move performance data to individual devices
October 1, 2016	From v23 to v24	**Added**	Minor updates to specs
November 1, 2016	From v24 to v25	**Added**	2TB SATA SSD specs