

### Overview

#### 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 typically beyond that of SAS 15k rpm HDDs (Hard Disk Drives).

SSDs should be considered for workstations with HDD bound workloads. For applications where 15k rpm HDDs deliver a performance improvement over standard SATA HDDs, an HP SSD will likely deliver even better performance.

The 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 270MB/s) is considerably higher than the average sustained read performance of 15k rpm HDDs available today (150MB/s to 205MB/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 times, faster application loading and snappier system response.

SSDs help lower the acoustical emissions of the workstation. No moving parts means SSDs inherently have no acoustical emissions. 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.

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#### Performance

##### **HP 128GB SATA 6Gb/s SSD:**

**(includes 2.5" and mSATA form factors)**

Up to 500MB/s sustained reads and up to 175MB/s sustained writes.

Power Consumption (typical):

Active: 150mW

Idle: <85mW

Endurance (TBW): 72TB

##### **HP 256GB SATA 6Gb/s SSD:(SED and non-SED version)**

**(includes 2.5" and mSATA form factors)**

Up to 500MB/s sustained reads and up to 260MB/s sustained writes.

Power Consumption (typical):

Active: 160mW

Idle: <85mW

Endurance (TBW): 144TB

The 256GB Self-Encrypting Drive (SED) version has similar performance to the standard 256GB SSD.

##### **HP 512GB SATA 6Gb/s SSD:**

Up to 500MB/s sustained reads and up to 260MB/s sustained writes.

Power Consumption (typical):

Active: 280mW

Idle: <100mW

Endurance (TBW): 288TB

##### **Seagate 600 Pro 120GB SSD:**

Sustained 128KB Sequential Read/Write data transfer rates (MB/s max): 520/300

Peak 4KB Random Read/Write command rates (KIOPs): 80/20

Average LBA access time (us typ)~158 us read / ~125 us write.

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Power Consumption for Peak Operating Mode:

Random Read (typical): 1.74W

Random Write (typical): 2.43W

Sequential Read (typical): 2.48W

Sequential Write (typical): 2.61W

Endurance (TBW): 127TB

Flash Memory Type: NAND MLC

Power Loss Protection

End-to-End Data Protection

#### **Seagate 600 Pro 240GB SSD:**

Sustained 128KB Sequential Read/Write data transfer rates (MB/s max): 520/450

Peak 4KB Random Read/Write command rates (KIOPs): 85/30

Average LBA access time (us typ)~158 us read / ~125 us write.

Power Consumption for Peak Operating Mode:

Random Read (typical): 1.75W

Random Write (typical): 2.06W

Sequential Read (typical): 2.20W

Sequential Write (typical): 2.92W

Endurance (TBW): 290TB

Flash Memory Type: NAND MLC

Power Loss Protection

End-to-End Data Protection

#### **Seagate 600 Pro 480GB SSD:**

Sustained 128KB Sequential Read/Write data transfer rates (MB/s max): 520/450

Peak 4KB Random Read/Write command rates (KIOPs): 85/30

Average LBA access time (us typ)~158 us read / ~125 us write.

Power Consumption for Peak Operating Mode:

Random Read (typical): 1.92W

Random Write (typical): 2.76W

Sequential Read (typical): 2.39W

Sequential Write (typical): 3.12W

Endurance (TBW): 580TB

Flash Memory Type: NAND MLC

Power Loss Protection

End-to-End Data Protection

**Note:** The numbers above represent raw system performance. Actual performance in applications will typically be lower.

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### Form Factor

These SSDs are SFF (Small Form Factor, 2.5") drives, which are mounted in a removable 3.5" Frame. The SSD can be mounted in either a standard 3.5" bay or in a SFF, 2.5" bay by removing the 3.5" frame.

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#### 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.

All of these SSDs benefit from the Microsoft Windows 7 TRIM command. 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. Note that TRIM is not supported with SSDs in a RAID array.

#### 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 SSD	D8N28AA
HP 256GB mSATA 6Gb/s SSD	E5Z79AA
HP 512GB SATA 6Gb/s SSD	D8F30AA
Seagate 600 Pro 120GB SATA SSD	E9Q50AA
Seagate 600 Pro 240GB SATA SSD	E9Q51AA
Seagate 600 Pro 480GB SATA SSD	E9Q52AA

#### Benefits

- Higher overall performance than 15k HDDs based on random IOPs, sustained reads and sustained writes.
- Lower systems level acoustical emissions 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 such as Microsoft Vista automatically schedule defragmenting sessions. Shutting off automatic defragmenting for the SDD will save both time and energy.

#### 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.

- 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
- HP 4-in-1 SFF HDD Carrier with External access (Option kit only for Z620 and Z820, B8K60AA), fits into ODD bay.

#### Service and Support

HP SSD drives have a one-year limited warranty or the remainder of the warranty of the HP Workstation (up to 3 years, whichever is longer). Technical support is available seven days a week, 24 hours a day by phone, as well as in online support forums. Certain restrictions and exclusions apply.

### Technical Specifications

<b>Hard Drives</b>	<b>HP 128GB SATA 6Gb/s SSD</b>	<b>Capacity</b>	128GB		
		<b>Height</b>	0.28 in; 0.7 cm		
		<b>Width</b>		<b>Physical Size</b>	2.5 in; 6.36 cm
		<b>Interface</b>	SATA 6Gb/s		
		<b>Synchronous Transfer Rate (Maximum)</b>	Up to 500MB/s (Sequential Read)		
		<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)		
	<b>HP 128GB mSATA 6Gb/s SSD</b>	<b>Capacity</b>	128GB		
		<b>Interface</b>	SATA 6Gb/s		
	<b>HP 256GB SATA 6Gb/s SSD</b>	<b>Capacity</b>	256GB		
		<b>Height</b>	0.28 in; 0.7 cm		
		<b>Interface</b>	SATA 6Gb/s		
		<b>Synchronous Transfer Rate (Maximum)</b>	Up to 500MB/s (Sequential Read)		
		<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)		
	<b>HP 256GB SATA 6Gb/s SED SSD</b>	<b>Capacity</b>	256GB		
		<b>Height</b>	0.28 in; 0.7 cm		
		<b>Width</b>		<b>Physical Size</b>	2.5 in; 6.36 cm
		<b>Interface</b>	6Gb/s SATA		
		<b>Synchronous Transfer Rate (Maximum)</b>	Up to 500MB/s (Sequential Read)		
		<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)		
	<b>HP 256GB mSATA 6Gb/s SSD</b>	<b>Capacity</b>	256GB		
		<b>Interface</b>	6Gb/s SATA		
	<b>HP 512GB SATA 6Gb/s SSD</b>	<b>Capacity</b>	512GB		
		<b>Height</b>	0.28 in; 0.7 cm		
		<b>Width</b>		<b>Physical Size</b>	2.5 in; 6.36 cm
		<b>Interface</b>	SATA 6Gb/s		
		<b>Synchronous Transfer Rate (Maximum)</b>	Up to 500MB/s (Sequential Read)		
		<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)		

### Technical Specifications

<b>Seagate 600 Pro 120GB Capacity SATA SSD</b>	<b>Capacity</b>	120GB
	<b>Height</b>	0.276 in; 0.7 cm
	<b>Width</b>	<b>Physical Size</b> 2.76 in; 7.01 cm
	<b>Interface</b>	SATA 6Gb/s
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

<b>Seagate 600 Pro 240GB Capacity SATA SSD</b>	<b>Capacity</b>	240GB
	<b>Height</b>	0.28 in; 0.7 cm
	<b>Width</b>	<b>Physical Size</b> 2.76 in; 7.01 cm
	<b>Interface</b>	SATA 6Gb/s
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

<b>Seagate 600 Pro 480GB Capacity SATA SSD</b>	<b>Capacity</b>	480GB
	<b>Height</b>	0.28 in; 0.7 cm
	<b>Width</b>	<b>Physical Size</b> 2.76 in; 7.01 cm
	<b>Interface</b>	SATA 6Gb/s
	<b>Synchronous Transfer Rate (Maximum)</b>	Up to 600MB/s
	<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

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