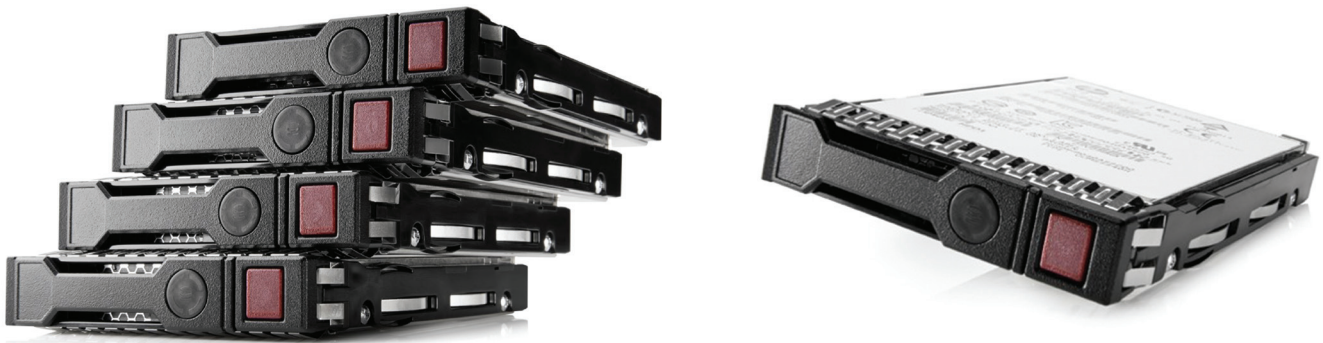# HP Enterprise Solid State Drives

Excellent solid state storage performance for HP ProLiant servers

It is estimated that 2.5 exabytes (a billion gigabytes) of data are created every day. To tap the potential of Big Data, applications must read and write more data, faster than ever. HP Enterprise Solid State Drives (SSDs) help you access data faster by providing exceptional performance, extended endurance, and consistently low latency—all while using less power.

Peak performance for random data applications

HP Enterprise SSDs are suited to enterprise environments with highly random data under a variety of write-workload applications. The SSDs provide significantly better random read and write I/O operations per second (IOPS) compared to 15K SAS HDDs. While sequential read and write throughput is also improved over 15K SAS HDDs, the greatest benefit is recognized in random data applications. As a result, these high-performance, low-latency, and low-power SSDs provide significant system benefits for applications that previously over-provisioned HDD capacity to achieve better performance.

Enterprise features for data center applications

HP Enterprise Solid State Drives have the key features you need in your data center—full data path error detection, surprise power loss protection, and SmartSSD Wear Gauge support. We enable the SmartSSD Wear Gauge through the HP Gen8 Smart Carrier. With the new SmartSSD Wear Gauge utility, HP Enterprise SSDs monitor the amount of data written and report when the device may be nearing its maximum supported lifetime.

Targeted at extreme operating environments or local storage, these drives provide higher I/O throughput, excellent latency, reduced power consumption, enhanced reliability, and faster reads and writes when compared to traditional rotating media. They remove the latency found in conventional rotating hard disk drives (HDDs) caused by seek time for each read operation, so they deliver high random read performance. Most of these SSDs are available as small form factor (SFF), large form factor (LFF), quick release carriers, or non-hot plug (NHP) for general use across the HP ProLiant Server portfolio. The drives are fully qualified and fit seamlessly into the existing HP server infrastructure.

With no moving parts, more reliability, and greater power savings than traditional rotating media drives, SSDs are finding new applications in the Big Data era.

Compatible with your server environment

HP SSDs are fully tested and qualified to enable compatibility with HP ProLiant and HP BladeSystem solutions. The HP Qualified Option designation places HP SSDs among the best of the best compared to products available on the open market. It is important to note that SSDs on the open market—even those with similar model numbers—may not have the same level of performance, endurance, and quality as HP Qualified Options. For example, the NAND or even the controller in non-qualified products may be different from an HP Qualified Option. HP firmware optimizes our qualified SSD performance, wear leveling, and over-provisioning.

You get an outstanding product when you buy from HP—and a three-year warranty.

The right SSD for every application

HP Enterprise SSDs are available in four categories based on their endurance: performance, mainstream, light, and value. The categories indicate the number of drive writes per day (DWPD) that you can expect from the drive. (DWPD is the maximum number of 4K host writes to the entire drive capacity of the SSD per day over a five-year period.)

HP Qualified Options – HP Enterprise Solid State Drives

Table 1. HP Enterprise SSD categories

	Performance	Mainstream	Light	Value
Interface	12/6 Gb SAS	12/6 Gb SAS or 6 Gb SATA	12/6 Gb SAS or 6 Gb SATA	12/6 Gb SAS or 6 Gb SATA
Endurance	High endurance	Mainstream endurance	Light endurance	Value endurance
	~25 DWPD	~10 DWPD	1–3 DWPD	< 1 DWPD
Typical workload	High read/write applications	Mixed read/write applications	Mixed read/write applications	High read/ low write applications

HP Enterprise Performance Solid State Drives
HP Enterprise Performance 12G SAS SSDs provide high performance and endurance. They are best suited for mission-critical enterprise environments with workloads high in both reads and writes. SAS SSDs transfer data at full duplex allowing greater I/O bandwidth to alleviate bottlenecks. Additionally SAS uses SCSI commands for error recovery and error reporting, which have more functionality than the ATA command set used by serial ATA (SATA).

HP Enterprise Mainstream Solid State Drives
HP Enterprise Mainstream 12G SAS and 6G SATA SSDs are best suited for high I/O applications with workloads balanced between reads and writes. The SAS and SATA SSDs provide the workload-optimized performance required for demanding I/O-intensive applications. When paired with HP ProLiant servers, these SSDs help you meet the challenges of Big Data. They achieve twice the performance and endurance of previous HP SAS and SATA SSDs. The SATA SSDs come with a six gigabit per second (Gb/s) SATA hot-plug interface and are available in 800, 400, 200, and 100 gigabyte (GB) capacities. The SAS SSDs come with a 12 gigabit per second (Gb/s) SAS hot-plug interface and are available in 800, 400, and 200 gigabyte (GB) capacities.

HP Enterprise Value Solid State Drives
HP Enterprise Value 12G SAS and 6G SATA SSDs deliver enterprise features for a low price in HP ProLiant Gen8 server systems. This entry-level pricing is fueling rapid SSD adoption for read-intensive workloads because the cost per IOPS compares very favorably to 72 GB and 146 GB 15K HDDs. Available capacities for the HP Enterprise Value12G SAS SSDs are 800 GB and 1.6 TB. The 6G SATA SSDs are available in 240 GB, 480 GB, and 800 GB capacities. HP Enterprise Boot SSDs come in capacities of 80 GB and 120 GB and include an Endurance Manager feature to dynamically throttle writes, which maintains endurance for boot/swap applications.

Key features and benefits

Higher performance and better latency
HP SSDs enable rapid reads and writes of transactional data. On an HDD, random reads require constant repositioning of the read/write head to seek the exact location of data on the platter before the data transfer can begin. However, SSDs have no moving parts or rotating platters that can cause latency problems, and that results in faster access to data. Therefore, with faster seek times, the drives achieve high IOPS, producing quicker data access and better latency.

The drives also pack the operating performance of several rotating HDDs into the same space as a single HDD, so you can get more performance out of your existing data center.

Lower power consumption
Steadily increasing storage requirements pose power and performance challenges to data centers. Solid state devices have a significantly better performance-to-power rating than traditional rotating HDDs. The lack of a motor greatly reduces an SSD's power consumption, so the drives draw less energy—less than two watts idle and less than nine watts maximum—for SSDs.

Environmental ruggedness
The inherent environmental ruggedness of SSDs makes them well suited for extreme environments where traditional drives cannot operate. The drives can tolerate significantly higher operating shock and vibration levels compared to traditional rotating HDDs. In fact, they virtually eliminate rotational vibration problems.

High reliability
Reliability is important for any storage medium, and it is essential when considering a storage device that can be used in servers. HP Enterprise SSDs pass a rigorous HP ProLiant qualification of 2.4 million test hours.

Investment protection
HP Enterprise SSDs are a drop-in replacement for existing HDDs. They fit into existing HDD hot-plug bays and require no modification to operating system or infrastructure tools. The drives are recognized as standard SAS or SATA devices with no special changes in firmware or hardware. Although you cannot mix SSDs and HDDs in the same logical array, you can mix them within the system to provide a more effective use of both technologies.

Technical specifications

HP SSDs come in a range of performance, endurance, and interface options.

Table 2. HP Enterprise Performance SSDs

Model	Sequential reads (MB/s)	Sequential writes (MB/s)	Random reads (IOPS)	Random writes (IOPS)	Maximum power watts	Endurance (drive-writes/day)*
HP 12G SAS High Endurance Hot Plug SFF (2.5-inch) Enterprise Performance Solid State Drives (Gen8 servers and beyond only)						
800GB 741159-B21	1,000	560	87,000	73,000	9	25
400GB 741155-B21	960	585	86,000	73,000	9	25
200GB 741151-B21	960	520	84,000	66,000	9	25
HP 12G SAS High Endurance Hot Plug SFF (2.5-inch) Enterprise Performance Solid State Drives (not supported by Gen8)						
800GB 741157-B21	1,000	560	87,000	73,000	9	25
400GB 741153-B21	960	585	86,000	73,000	9	25
200GB 741148-B21	960	520	84,000	66,000	9	25

Table 3. HP Enterprise Mainstream SSDs

Model	Sequential reads (MB/s)	Sequential writes (MB/s)	Random reads (IOPS)	Random writes (IOPS)	Maximum power watts	Endurance (drive-writes/day)*
HP 12G SAS Mainstream Endurance Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives (Gen8 servers and beyond only)						
800GB 741146-B21	1,000	570	87,000	58,000	9	10
400GB 741142-B21	1,000	625	86,000	58,000	9	10
200GB 741138-B21	1,000	450	84,000	42,000	9	10
HP 12G SAS Mainstream Endurance Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives (not supported by Gen8)						
800GB 741144-B21	1,000	570	87,000	58,000	9	10
400GB 741140-B21	1,000	625	86,000	58,000	9	10
200GB 741136-B21	1,000	450	84,000	42,000	9	10
HP 6G SATA ME Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives (Gen8 servers only)						
800GB 691868-B21	480	450	61,000	35,000	9	10
400GB 691866-B21	480	450	63,000	35,000	9	10
200GB 691864-B21	480	350	63,000	32,000	9	10
100GB 691862-B21	480	185	63,000	19,200	9	10
HP 6G SATA ME Hot Plug LFF (3.5-inch) Enterprise Mainstream Solid State Drives (Gen8 servers only)						
800GB 691860-B21	480	450	61,000	35,000	9	10
400GB 691856-B21	480	450	63,000	35,000	9	10
200GB 691854-B21	480	350	63,000	32,000	9	10
100GB 691852-B21	480	185	63,000	19,200	9	10

HP Enterprise Mainstream SSDs (continued)

Model	Sequential reads (MB/s)	Sequential writes (MB/s)	Random reads (IOPS)	Random writes (IOPS)	Maximum power watts	Endurance (drive-writes/day)*
HP 6G SATA ME Quick Release (2.5-inch) Enterprise Mainstream Solid State Drives (Gen8, G7, and G6 servers)						
800GB 730057-B21	480	450	61,000	35,000	9	10
400GB 730055-B21	480	450	63,000	35,000	9	10
200GB 730053-B21	480	350	63,000	32,000	9	10
100GB 730051-B21	480	185	63,000	19,200	9	10
HP 6G SATA ME Hot Plug SFF (2.5-inch) Enterprise Mainstream Solid State Drives (not supported by Gen8)						
800GB 730065-B21	480	450	61,000	35,000	9	10
400GB 730063-B21	480	450	63,000	35,000	9	10
200GB 730061-B21	480	350	63,000	32,000	9	10
100GB 730059-B21	480	185	63,000	19,200	9	10

Table 4. HP Enterprise Value SSDs

Model	Sequential reads (MB/s)	Sequential writes (MB/s)	Random reads (IOPS)	Random writes (IOPS)	Maximum power watts	Endurance (drive-writes/day)*
HP 12G SAS Value Endurance Hot Plug LFF (3.5-inch) Enterprise Value Solid State Drives (Gen8 servers and beyond only)						
1.6TB 762272-B21	1,000	385	96,000	25,000	9	1
800GB 762270-B21	1,000	390	91,000	28,000	9	1
HP 12G SAS Value Endurance Hot Plug SFF (2.5-inch) Enterprise Value Solid State Drives (Gen8 servers and beyond only)						
1.6TB 762263-B21	1,000	385	96,000	25,000	9	10
800GB 762261-B21	1,000	390	91,000	28,000	9	10
HP 6G SATA Value Endurance Hot Plug SFF (2.5-inch) Enterprise Value Solid State Drives (Gen8 servers only)						
800GB 717973-B21	480	445	64,000	12,000	9	0.3
480GB 717971-B21	480	400	64,000	10,000	9	0.3
240GB 717969-B21	475	250	64,000	8000	9	0.3
HP 6G SATA Value Endurance Hot Plug LFF (3.5-inch) Enterprise Value Solid State Drives (Gen8 servers only)						
800GB 718189-B21	480	445	64,000	12,000	9	0.3
480GB 718183-B21	480	400	64,000	10,000	9	0.3
240GB 718177-B21	475	250	64,000	8000	9	0.3
HP 6G SATA VE Quick Release (2.5-inch) Enterprise Value Solid State Drives (supported Gen8, 7, 6)						
800GB 718192-B21	480	445	64,000	12,000	9	0.3
480GB 718186-B21	480	400	64,000	10,000	9	0.3
240GB 718180-B21	475	250	64,000	8000	9	0.3

HP Enterprise Value SSDs (continued)

Model	Sequential reads (MB/s)	Sequential writes (MB/s)	Random reads (IOPS)	Random writes (IOPS)	Maximum power watts	Endurance (drive-writes/day)*
HP 6G SATA VE Hot Plug SFF (2.5-inch) Enterprise Value Solid State Drives (not supported by Gen8)						
800GB 728743-B21	480	445	64,000	12,000	9	0.3
480GB 728739-B21	480	400	64,000	10,000	9	0.3
240GB 728735-B21	475	250	64,000	8000	9	0.3
HP 6G SATA VE Hot Plug LFF (3.5-inch) Enterprise Value Solid State Drives (not supported by Gen8)						
800GB 728745-B21	480	445	64,000	12,000	9	0.3
480GB 728741-B21	480	400	64,000	10,000	9	0.3
240GB 728737-B21	475	250	64,000	8000	9	0.3
HP 6G SATA Value Endurance Hot Plug SFF (2.5-inch) Solid State Drives (Gen8 servers only)						
120GB 717965-B21	410	n/a	64,000	n/a	9	n/a
80GB 734360-B21	335	n/a	59,000	n/a	9	n/a
HP 6G SATA Value Endurance Hot Plug LFF (3.5-inch) Solid State Drives (Gen8 servers only)						
120GB 718171-B21	410	n/a	64,000	n/a	9	n/a
80GB 734362-B21	335	n/a	59,000	n/a	9	n/a
HP 6G SATA VE Quick Release (2.5-inch) Solid State Drives (supported Gen8, 7, 6)						
120GB 718174-B21	410	n/a	64,000	n/a	9	n/a
80GB 734364-B21	335	n/a	59,000	n/a	9	n/a

Table 5. HP Enterprise Boot SSDs

Model	Sequential reads (MB/s)	Sequential writes (MB/s)	Random reads (IOPS)	Random writes (IOPS)	Maximum power watts	Endurance (drive-writes/day)*
HP 6G SATA VE Hot Plug SFF (2.5-inch) Enterprise Boot Solid State Drives (not supported by Gen8)						
120GB 728726-B21	410	n/a	64,000	n/a	9	n/a
80GB 734366-B21	335	n/a	59,000	n/a	9	n/a
HP 6G SATA VE Hot Plug LFF (3.5-inch) Enterprise Boot Solid State Drives (not supported by Gen8)						
120GB 728732-B21	410	n/a	64,000	n/a	9	n/a
80GB 734368-B21	335	n/a	59,000	n/a	9	n/a

*Represents number of full rewrites of drive "surface" per day for five years using 100 percent random 4 KiB writes.

Specifications common to all HP SSDs

Table 6. Common specifications

Data compression	No
Throttling to guarantee a minimum lifetime	No
Interface	SATA, SAS
Write cache—default	Yes, enabled
User settable	No
Volatile/nonvolatile	Nonvolatile
Operating temperature	0° to 60°C
MTBF	2,000,000 hours
Logical block size	512 bytes
Warranty	3-year warranty, warranty does not cover wear out
Command queuing	Yes
Trim (SATA trim)	Yes
SmartSSD Wear Gauge support	Yes, full ACU/ADU support required. Smart Array Firmware version 5.0 or greater is required
Universal hot-plug carrier	Yes

Enable your success with HP support services

Simplify implementation and support of your server solution.
To streamline installation and enhance ongoing support, HP recommends the following service offerings:

• HP Installation and Startup Service—HP Services offers complete installation and implementation support—including global rollout capabilities—to get your HP server-based solution up and running rapidly, with reduced business disruption. You can choose from all server options and storage for inclusion in the server: Microsoft, Linux, Solaris, and VMware operating software, plus HP Insight Control software management solutions.

• Hardware support—You can cover all the options installed in your server with a single convenient service package. HP Care Pack Services for HP ProLiant servers and storage systems provide support for all HP-branded hardware options qualified for inclusion in your server at the time of purchase or afterward. Any additional HP-qualified options installed within the server are covered at the same service level and for the same period as the server.

Learn more at
hp.com/go/solidstate