Overview

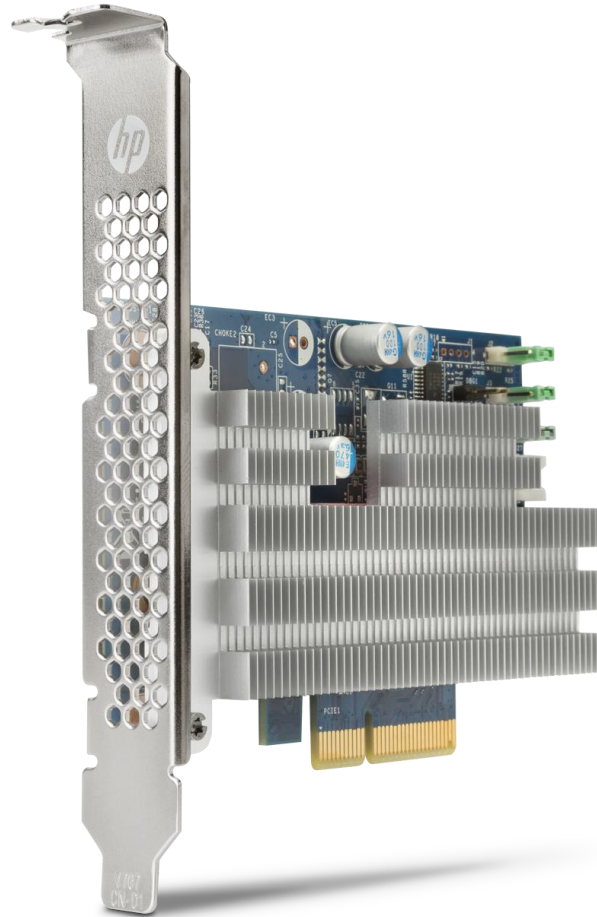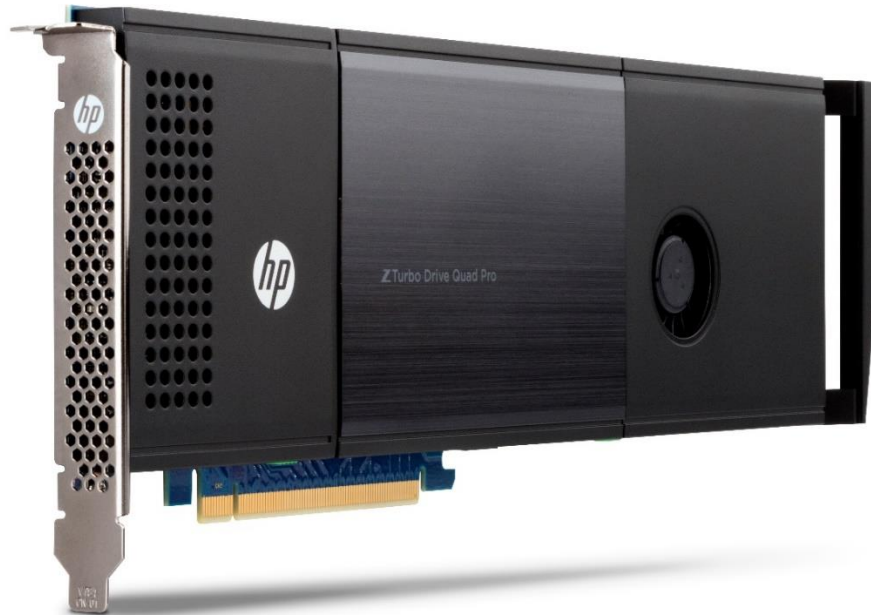### PCIe Solid State Drives for HP Workstations

Overview

Introduction

Storage technology with NAND media is outgrowing the bandwidth limitations of the SATA bus. New high performance Storage solutions will connect directly to the PCIe bus for revolutionary performance improvements. These components will be available in a variety of form factors and performance levels, designed specifically for certain market segments, and ultimately the costs will continue to decline as the technology evolves.

Performance

HP Z Turbo Drive G2

The new HP Z Turbo Drive G2 features the next generation PCIe NVMe SSD. This M.2 form factor device uses PCIe Gen3 x4 which enables performance levels greater than 3GB/s, which is roughly 6x greater than SATA SSDs. The Random Read performance is significantly improved also, due to the NVMe controller technology used on the device. This performance is available at a price that is comparable to commercial SATA SSDs.

The HP Z Turbo Drive G2 will be supported on desktop platforms of HP Z Workstations including Z240, Z440, Z640 and Z840. It will support storage configurations as a Boot device and as a Data device. It also can be configured with other storage components including SATA and SAS drives and controllers. Not all configurations are available from the factory.

The HP Z Turbo Drive G2 is supported on the current desktop workstation platforms, including Z2 Mini, Z240, Z440, Z640, and Z840. It is supported as a boot device and a data device(s). It is also supported by our current offering of Operating Systems, including Linux, and may require a separate driver, depending on OS. It does require a BIOS update for any system shipped prior to the Z Turbo Drive G2 launch, minimum BIOS is 1.53. It can be configured with additional hard drives, both SATA and SAS, and with multiple Z Turbo drives per system. All supported configurations are not available as factory options in all regions.

The HP Z Turbo Drive G2 comes with a custom thermal solution to keep the device within full performance operating temperatures. This solutions consists of a heat sink and thermal pads to make a solid thermal connection between the heatsink and the M.2 SSD. Without adequate cooling, PCIe NVMe SSDs will throttle down their performance significantly, until the device cools off, to get back in the acceptable operating temperature range.

NVMe devices require a driver for proper detection and operation. Microsoft Windows 8 and higher have an inbox NVMe driver. For Windows 7, HP recommends the Microsoft hotfix which provides an NVMe driver (listed below). In addition, the Samsung NVMe driver, version 1.4.7.6, can be used with specific Samsung M.2 devices. (available at www.hp.com). Also note that the new NVMe driver will not support the original HP Z Turbo Drive, which requires an AHCI driver.

KB2990941 (https://support.microsoft.com/en-us/kb/2990941)
KB3087873 (https://support.microsoft.com/en-us/kb/3087873)

Operating System Support

Microsoft Windows 7 64-bit, Microsoft Windows 8.1 64-bit, Microsoft Windows 10 64-bit, RHEL 6,7; SUSE 11,12; Ubuntu 14.04.
Note: Not supported for 32-bit Microsoft Windows Operating Systems.

Support for OPAL hardware encryption: No
Support for Secure Erase: Yes
Supported in HP Performance Advisor: yes (includes wear gauge)

Approved PCIe slots :
Recommended slot order for Z840
        1. Slot 1
        2. Slot 6
        3. Slot 3 (Requires 2nd CPU)
        4. Slot 4 (Requires 2nd CPU)

Z640 - Slot 4, Slot 5, Slot 3 (in order of preference)
Z440 - Slot 4, Slot 5, Slot 3 (in order of preference)
Z240 - Native Motherboard slot first, then available PCIe Gen3 slot (either #1 or #4)

For RAID support, there are some specific differences and thus restrictions as compared to SATA/SAS HDDs or SSDs. Software RAID is used, as there is not a good solution today for hardware based RAID.

- Windows RAID with Boot Configuration: Limited support for RAID 1*, No support for RAID 0, 5, 10
- Windows RAID with Data Configuration: Support for RAID 0, 1; No support for RAID 5, 10

Overview

- Linux RAID with Boot Configuration: Functional for RAID 0, 1*; No support for RAID 5, 10
- Linux RAID with Data Configuration: Functional for RAID 0, 1, 5, 10**

*RAID 1 can be set up, yet will not provide complete, redundant protection as the boot partition is not replicated on both drives. An OS boot partition cannot be protected by software RAID 1.

** Limited testing has been done with Linux to confirm RAID support and performance characteristics

Z1 G3 Platform Note

There are two, adjacent Z Turbo Drive native slots. The Thermal Solution for Z1 G3 is a one-piece heatsink which accommodates both M.2 modules, thus only 1 Thermal Solution kit is required when using one or two M.2 modules. When ordering M.2 modules with the original configuration from the factory, the Thermal Solution will be included.

Overview

Models

HP Z240/440/640/840 Workstation

HP Z Turbo Drive G2 256GB SSD	M1F73AA
HP Z Turbo Drive G2 512GB SSD	M1F74AA
HP Z Turbo Drive G2 1TB SSD	T9H98AA
HP Z Turbo Drive Quad Pro 2x256GB PCIe SSD	N2M98AA
HP Z Turbo Drive Quad Pro 2x512GB PCIe SSD	N2M99AA
HP Z Turbo Drive Quad Pro 2x1TB PCIe SSD	T9H99AA

HP Z240 Workstation

HP Z Turbo Drive G2 256GB PCIe SSD (Z240 MB)	T6U42AA
HP Z Turbo Drive G2 512GB PCIe SSD (Z240 MB)	T6U43AA
HP Z Turbo Drive G2 1TB PCIe SSD (Z240 MB)	W6C19AA

HP Z2 Mini

HP Z Turbo Drive G2 256GB TLC (Z2 Mini)	Y7B60AA
HP Z Turbo Drive G2 256GB MLC (Z2 Mini)	Y7B58AA
HP Z Turbo Drive G2 512GB MLC (Z2 Mini)	Y7B58AA

HP Z4 G4/Z6 G4

HP Z Turbo Drive 256GB MLC Z4/Z6 G4 SSD Kit	1PD56AA
HP Z Turbo Drive 512GB MLC Z4/Z6 G4 SSD Kit	1PD57AA
HP Z Turbo Drive 1TB MLC Z4/Z6 G4 SSD Kit	1PD58AA
HP Z Turbo Drive 256GB TLC Z4/Z6 G4 SSD Kit	1PD59AA
HP Z Turbo Drive 512GB TLC Z4/Z6 G4 SSD Kit	1PD60AA
HP Z Turbo Drive 1TB TLC Z4/Z6 G4 SSD Kit	1PD61AA

HP Z8 G4

HP Z Turbo Drive 256GB MLC Z8 G4 SSD Kit	1PD44AA
HP Z Turbo Drive 512GB MLC Z8 G4 SSD Kit	1PD45AA
HP Z Turbo Drive 1TB MLC Z8 G4 SSD Kit	1PD46AA
HP Z Turbo Drive 256GB MLC Z8 G4 SSD Module	1PD50AA
HP Z Turbo Drive 512GB MLC Z8 G4 SSD Module	1PD51AA
HP Z Turbo Drive 1TB MLC Z8 G4 SSD Module	1PD52AA
HP Z Turbo Drive 256GB TLC Z8 G4 SSD Kit	1PD47AA
HP Z Turbo Drive 512GB TLC Z8 G4 SSD Kit	1PD48AA
HP Z Turbo Drive 1TB TLC Z8 G4 SSD Kit	1PD49AA
HP Z Turbo Drive 256GB TLC Z8G4 SSD Module	1PD53AA
HP Z Turbo Drive 512GB TLC Z8G4 SSD Module	1PD54AA
HP Z Turbo Drive 1TB TLC Z8G4 SSD Module	1PD55AA

HP Z Turbo Drive G2

HP Z Turbo Drive Quad Pro 256GB SSD module	N2N00AA
HP Z Turbo Drive Quad Pro 512GB SSD module	N2N01AA
HP Z Turbo Drive Quad Pro 1TB SSD module	T9J00AA

HP Z1 G3/Z2 G3/Z3 G3

HP Z Turbo Drive G2 256GB PCIe SSD (Z1 G3)	W5A06AA
HP Z Turbo Drive G2 512GB PCIe SSD (Z1 G3)	W5A07AA
HP Z Turbo Drive G2 1TB PCIe SSD (Z1 G3)	T0K72AA
HP Z Turbo Drive Thermal Solution (Z1 G3)	W0T85AA

Overview

HP Z Turbo Drive G2 256GB TLC SSD	Y1T46AA
HP Z Turbo Drive G2 512GB TLC SSD	Y1T49AA
HP Z Turbo Drive G2 1TB TLC SSD	Y1T52AA
HP Z Turbo Drive G2 256GB TLC PCIe SSD (Z2 MB)	Y1T47AA
HP Z Turbo Drive G2 512GB TLC PCIe SSD (Z2 MB)	Y1T50AA
HP Z Turbo Drive G2 1TB TLC PCIe SSD (Z2 MB)	Y1T53AA
HP Z Turbo Drive G2 256GB TLC PCIe SSD (Z1 G3)	Y1T48AA
HP Z Turbo Drive G2 512GB TLC PCIe SSD (Z1 G3)	Y1T51AA
HP Z Turbo Drive G2 1TB TLC PCIe SSD (Z1 G3)	Y1T54AA
HP Z Turbo Drive G2 256GB SED SSD	Y1T55AA
HP Z Turbo Drive G2 512GB SED SSD	Y1T58AA
HP Z Turbo Drive G2 512GB SED (Z2 MB)	Y1T59AA
HP Z Turbo Drive G2 256GB SED (Z2 MB)	Y1T56AA
HP Z Turbo Drive G2 256GB SED (Z1 G3)	Y1T57AA
HP Z Turbo Drive G2 512GB SED (Z1 G3)	Y1T60AA

NOTE 1: Not available today as After Market Option

Technical Specifications

PCIe SSDs for HP Workstations	HP Z Turbo Drive G2 256GB SSD			
		Capacity	256GB	
		Protocol	PCIe	
		Form Factor	M.2 in Half-height, half-length card	
		Controller	NVMe	
		NAND Type	3D MLC	
		Endurance	150TBW (TB Written)	
		Reliability (MTBF)	1.5M hours	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	Sequential Read	3100 MB/s
			Sequential Write	1400 MB/s
			Random Read	330K IOPS
			Random Write	280K IOPS

	HP Z Turbo Drive G2 512GB SSD			
		Capacity	512GB	
		Protocol	PCIe	
		Form Factor	M.2 in Half-height, half-length card	
		Controller	NVMe	
		NAND Type	3D MLC	
		Endurance	300TBW (TB Written)	
		Reliability (MTBF)	1.5M hours	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	Sequential Read	3200 MB/s
			Sequential Write	1700 MB/s
			Random Read	330K IOPS
			Random Write	300K IOPS

	HP Z Turbo Drive G2 1TB SSD			
		Capacity	1TB	
		Protocol	PCIe	
		Form Factor	M.2 in Half-height, half-length card	
		Controller	NVMe	
		NAND Type	3D MLC	
		Endurance	600TBW (TB Written)	
		Reliability (MTTF)	1.5M hours	
		Interface	PCI Express 3.0 x4 electrical x4 physical	
		Operating Temperature	32° to 158° F (0° to 70° C)	
		Performance	Sequential Read	3200 MB/s
			Sequential Write	1700 MB/s
			Random Read	330K IOPS
			Random Write	300K IOPS

QuickSpecs

Technical Specifications

HP Z Turbo Drive Quad Pro 2x256GB PCIe SSD

Capacity	512GB (2x256GB)
Protocol	PCIe
Form Factor	M.2 in Half-height, half-length card
Controller	NVMe
NAND Type	3D MLC
Endurance	150TBW (TB Written)
Reliability (MTBF)	1.5M hours
Interface	PCI Express 3.0 x4 electrical x4 physical
Operating Temperature	32° to 158° F (0° to 70° C)

Performance		
	Sequential Read	3100 MB/s
	Sequential Write	1400 MB/s
	Random Read	330K IOPS
	Random Write	280K IOPS

HP Z Turbo Drive Quad Pro 2x512GB PCIe SSD

Capacity	1TB (2x512GB)
Protocol	PCIe
Form Factor	PCIe Card, Full Height PCIe Slot
Controller	NVMe
NAND Type	3D MLC
Endurance	300TBW (TB Written)
Reliability (MTBF)	1.5M hours
Interface	PCIe Gen3 x4 architecture
Operating Temperature	32° to 158° F (0° to 70° C)

Performance		
	Sequential Read	3200 MB/s
	Sequential Write	1800 MB/s
	Random Read	430K IOPS
	Random Write	320K IOPS

HP Z Turbo Drive Quad Pro 2x1TB PCIe SSD

Capacity	2TB (2x1TB)
Protocol	PCIe
Form Factor	PCIe Card, Full Height PCIe Slot
Controller	NVMe
NAND Type	3D MLC
Endurance	300TBW (TB Written)
Reliability (MTBF)	1.5M hours
Interface	PCI Express 3.0 x4 electrical x4 physical
Operating Temperature	32° to 158° F (0° to 70° C)

Performance		
	Sequential Read	3200 MB/s
	Sequential Write	1800 MB/s
	Random Read	430K IOPS
	Random Write	320K IOPS

HP Z Turbo Drive Quad Pro 256GB SSD module

Capacity	256GB (one M.2 PCIe NVMe module)
Interface	PCI Express 3.0 x4 electrical x4 physical

QuickSpecs

PCIe Solid State Drives for HP Workstations

Technical Specifications

	Operating Temperature	32° to 158° F (0° to 70° C)	
HP Z Turbo Drive Quad Pro 512GB SSD module	**Capacity**	512GB (one M.2 PCIe NVMe module)	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
HP Z Turbo Drive Quad Pro 1TB SSD module	**Capacity**	1TB (one M.2 PCIe NVMe module)	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
HP Z Turbo Drive G2 256GB PCIe SSD (Z240 MB)	**Capacity**	256GB	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard (MB)	
	Controller	NVMe	
	NAND Type	3D MLC	
	Endurance	150TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3100 MB/s
		Sequential Write	1400 MB/s
		Random Read	330K IOPS
		Random Write	280K IOPS
HP Z Turbo Drive G2 512GB PCIe SSD (Z240 MB)	**Capacity**	512GB (one M.2 PCIe NVMe module)	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard	
	Controller	NVMe	
	NAND Type	3D MLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3200 MB/s
		Sequential Write	1800 MB/s
		Random Read	430K IOPS
		Random Write	320K IOPS
HP Z Turbo Drive G2 1TB PCIe SSD (Z240 MB)	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard	

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Technical Specifications

	Controller	NVMe	
	NAND Type	3D MLC	
	Endurance	600TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3200 MB/s
		Sequential Write	1800 MB/s
		Random Read	430K IOPS
		Random Write	320K IOPS
HP Z Turbo Drive G2 256GB PCIe SSD (Z1 G3)	**Capacity**	256GB	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard (MB)	
	Controller	NVMe	
	NAND Type	3D MLC	
	Endurance	150TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3100 MB/s
		Sequential Write	1400 MB/s
		Random Read	330K IOPS
		Random Write	280K IOPS
HP Z Turbo Drive G2 512GB PCIe SSD (Z1 G3)	**Capacity**	512GB (one M.2 PCIe NVMe module)	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard	
	Controller	NVMe	
	NAND Type	3D MLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	**Sequential Read**	3200 MB/s
		Sequential Write	1800 MB/s
		Random Read	430K IOPS
		Random Write	320K IOPS
HP Z Turbo Drive G2 1TB PCIe SSD (Z1 G3)	**Capacity**	1TB	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard	
	Controller	NVMe	

QuickSpecs

Technical Specifications

	NAND Type	3D MLC	
	Endurance	600TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	3200 MB/s
		Sequential Write	1800 MB/s
		Random Read	430K IOPS
		Random Write	320K IOPS
HP Z Turbo Drive Thermal Solution (Z1 G3)	**Capacity**	Heatsink accommodates up to 2 PCIe SSD modules	
HP Z Turbo Drive G2 256GB TLC SSD	**Capacity**	256GB	
	Protocol	PCIe	
	Form Factor	M.2 in Half-height, half-length card	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	75TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2800 MB/s
		Sequential Write	320 MB/s (1100 MB/s max/Turbo)
		Random Read	250K IOPS
		Random Write	180K IOPS
HP Z Turbo Drive G2 512GB TLC SSD	**Capacity**	512GB	
	Protocol	PCIe	
	Form Factor	M.2 in Half-height, half-length card	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	150TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2800 MB/s
		Sequential Write	660 MB/s (1600 MB/s max/Turbo)
		Random Read	260K IOPS
		Random Write	260K IOPS
	Capacity	1TB	

QuickSpecs

Technical Specifications

HP Z Turbo Drive G2 1TB TLC SSD		
Protocol	PCIe	
Form Factor	M.2 in Half-height, half-length card	
Controller	NVMe	
NAND Type	3D TLC	
Endurance	300TBW (TB Written)	
Reliability (MTBF)	1.5M hours	
Interface	PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	**Sequential Read**	3000 MB/s
	Sequential Write	1150 MB/s (1700 MB/s max/Turbo)
	Random Read	360K IOPS
	Random Write	330K IOPS

HP Z Turbo Drv G2 256GB TLC PCIe SSD (Z2 MB)		
Capacity	256GB	
Protocol	PCIe	
Form Factor	M.2 in native slot on motherboard	
Controller	NVMe	
NAND Type	3D TLC	
Endurance	75TBW (TB Written)	
Reliability (MTBF)	1.5M hours	
Interface	PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	**Sequential Read**	2800 MB/s
	Sequential Write	320 MB/s (1100 MB/s max/Turbo)
	Random Read	250K IOPS
	Random Write	180K IOPS

HP Z Turbo Drv G2 512GB TLC PCIe SSD (Z2 MB)		
Capacity	512GB	
Protocol	PCIe	
Form Factor	M.2 in native slot on motherboard	
Controller	NVMe	
NAND Type	3D TLC	
Endurance	150TBW (TB Written)	
Reliability (MTBF)	1.5M hours	
Interface	PCI Express 3.0 x4 electrical x4 physical	
Operating Temperature	32° to 158° F (0° to 70° C)	
Performance	**Sequential Read**	2800 MB/s
	Sequential Write	660 MB/s (1600 MB/s max/Turbo)
	Random Read	260K IOPS
	Random Write	260K IOPS

Technical Specifications

HP Z Turbo Drv G2 1TB TLC PCIe SSD (Z2 MB)	Capacity	1TB	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	3000 MB/s
		Sequential Write	1150 MB/s (1700 MB/s max/Turbo)
		Random Read	360K IOPS
		Random Write	330K IOPS
HP Z Turbo Drive G2 256GB TLC PCIe SSD (Z1 G3)	Capacity	256GB	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	75TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2800 MB/s
		Sequential Write	320 MB/s (1100 MB/s max/Turbo)
		Random Read	250K IOPS
		Random Write	180K IOPS
HP Z Turbo Drive G2 512GB TLC PCIe SSD (Z1 G3)	Capacity	512GB	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard	
	Controller	NVMe	
	NAND Type	3D TLC	
	Endurance	150TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	2800 MB/s
		Sequential Write	660 MB/s (1600 MB/s max/Turbo)
		Random Read	260K IOPS
		Random Write	260K IOPS

Technical Specifications

HP Z Turbo Drive G2 1TB TLC PCIe SSD (Z1 G3)			
Capacity	1TB		
Protocol	PCIe		
Form Factor	M.2 in native slot on motherboard		
Controller	NVMe		
NAND Type	3D TLC		
Endurance	300TBW (TB Written)		
Reliability (MTBF)	1.5M hours		
Interface	PCI Express 3.0 x4 electrical x4 physical		
Operating Temperature	32° to 158° F (0° to 70° C)		
Performance	Sequential Read	3000 MB/s	
	Sequential Write	1150 MB/s (1700 MB/s max/Turbo)	
	Random Read	360K IOPS	
	Random Write	330K IOPS	

HP Z Turbo Drive G2 256GB SED SSD			
Capacity	256GB		
Protocol	PCIe		
Form Factor	M.2 in Half-height, half-length card		
Controller	NVMe		
NAND Type	3D MLC		
Endurance	150TBW (TB Written)		
Reliability (MTBF)	1.5M hours		
Interface	PCI Express 3.0 x4 electrical x4 physical		
Operating Temperature	32° to 158° F (0° to 70° C)		
Performance	Sequential Read	3100 MB/s	
	Sequential Write	1400 MB/s	
	Random Read	330K IOPS	
	Random Write	280K IOPS	
Self-Encrypting Drive Support	OPAL 2		

HP Z Turbo Drive G2 512GB SED SSD			
Capacity	512GB		
Protocol	PCIe		
Form Factor	M.2 in Half-height, half-length card		
Controller	NVMe		
NAND Type	3D MLC		
Endurance	300TBW (TB Written)		
Reliability (MTBF)	1.5M hours		
Interface	PCI Express 3.0 x4 electrical x4 physical		
Operating Temperature	32° to 158° F (0° to 70° C)		
Performance	Sequential Read	3200 MB/s	
	Sequential Write	1700 MB/s	
	Random Read	330K IOPS	
	Random Write	300K IOPS	

QuickSpecs

Technical Specifications

	Self-Encrypting Drive Support	OPAL 2	
HP Z Turbo Drive G2 512GB SED (Z2 MB)	**Capacity**	512GB	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard	
	Controller	NVMe	
	NAND Type	3D MLC	
	Endurance	300TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Performance	Sequential Read	3200 MB/s
		Sequential Write	1700 MB/s
		Random Read	330K IOPS
		Random Write	300K IOPS
	Self-Encrypting Drive Support	OPAL 2	
HP Z Turbo Drive G2 256GB SED (Z2 MB)	**Capacity**	256GB	
	Protocol	PCIe	
	Form Factor	M.2 in native slot on motherboard	
	Controller	NVMe	
	NAND Type	3D MLC	
	Endurance	150TBW (TB Written)	
	Reliability (MTBF)	1.5M hours	
	Interface	PCI Express 3.0 x4 electrical x4 physical	
	Operating Temperature	32° to 158° F (0° to 70° C)	
	Performance	Sequential Read	3100 MB/s
		Sequential Write	1400 MB/s
		Random Read	330K IOPS
		Random Write	280K IOPS
	Self-Encrypting Drive Support	OPAL 2	

Technical Specifications

HP Z Turbo Drive G2 256GB SED (Z1 G3)			
Capacity	256GB		
Protocol	PCIe		
Form Factor	M.2 in native slot on motherboard		
Controller	NVMe		
NAND Type	3D MLC		
Endurance	150TBW (TB Written)		
Reliability (MTBF)	1.5M hours		
Interface	PCI Express 3.0 x4 electrical x4 physical		
Operating Temperature	32° to 158° F (0° to 70° C)		
Performance	**Sequential Read**	3100 MB/s	
	Sequential Write	1400 MB/s	
	Random Read	330K IOPS	
	Random Write	280K IOPS	
Self-Encrypting Drive Support	OPAL 2		

HP Z Turbo Drive G2 512GB SED (Z1 G3)			
Capacity	512GB		
Protocol	PCIe		
Form Factor	M.2 in native slot on motherboard		
Controller	NVMe		
NAND Type	3D MLC		
Endurance	300TBW (TB Written)		
Reliability (MTBF)	1.5M hours		
Interface	PCI Express 3.0 x4 electrical x4 physical		
Operating Temperature	32° to 158° F (0° to 70° C)		
Performance	**Sequential Read**	3200 MB/s	
	Sequential Write	1700 MB/s	
	Random Read	330K IOPS	
	Random Write	300K IOPS	
Self-Encrypting Drive Support	OPAL 2		

QuickSpecs

Summary of Changes

Date of change:	Version History:		Description of change:
	From v1 to v2		
June 11, 2014	From v3 to v4	Removed	Removed the Z Turbo Drives.
September 2. 2014	From v4 to v5	Added	Add slot recommendations for Z840, Z640, Z440, details for Boot, note for support of Secure erase, and Linux support
December 1, 2014	From v5 to v6	Changed	HP Z Turbo Drive compatibility
February 1, 2015	From v6 to v7	Added	Support for Z440, 640 and 840 Workstations
		Removed	third party tools support for Secure Erase
April 1, 2015	From v7 to v8	Added	Z Turbo Drives G2 256 and 512GB
		Removed	Fusion ioFX
June 1, 2015	From v8 to v9	Added	RAID Compatibility
		Changed	Messaging and Compatibility
February 1, 2016	From v9 to v10	Added	HP Z240 Workstations compatibility
		Changed	Z Turbo Drives and Z Turbo Drive Quad Pro Specs
March 1, 2016	From v10 to v11	Changed	Z Turbo G2 NVMe devices comments and driver links
April 1, 2015	From v11 to v12	Added	HP Z Turbo Drive G2 1TB for all current platforms, 256,512GB and 1TB; Support Z240 and Z1 G3, HP Z Turbo Drive Thermal Solution (Z1 G3)
June 7, 2016	From v12 to v13	Added	Z1 G3 Platform Note
		Changed	HP Z Turbo Drive 256GB & 512GB SSD combined performance specs
September 1, 2016	From v13 to v14	Added	new models for SED versions and Turbo Drives Quad Pro, 256GB TLC drive, as well as Z240 specs
		Changed	edits to MTTF info
October 1, 2016	From v14 to v15	Added	Minor specs to TLC drive, as well as Z1 G3, and Z2 drives
		Changed	updates for TLC and SED parts
November 1, 2016	From v15 to v16	Added	HP Z Turbo Drive Quad Pro 2x1TB PCIe SSD
January 1, 2017	From v16 to v17	Added	HP Z Turbo Drive G2 256GB TLC, HP Z Turbo Drive G2 512GB TLC, HP Z Turbo Drive G2 1TB TLC
June 1, 2017	From v17 to v18	Changed	Performance section, Updated all G2 products
		Removed	HP Z Turbo Drive 256GB SSD & HP Z Turbo Drive 512GB SSD also removed references to Z Turbo Drive G1
October 16, 2017	From v18 to v19	Added	HP Z Turbo Drive G2 models to page 4 and pictures to page 2
		Changed	Model list rearranged