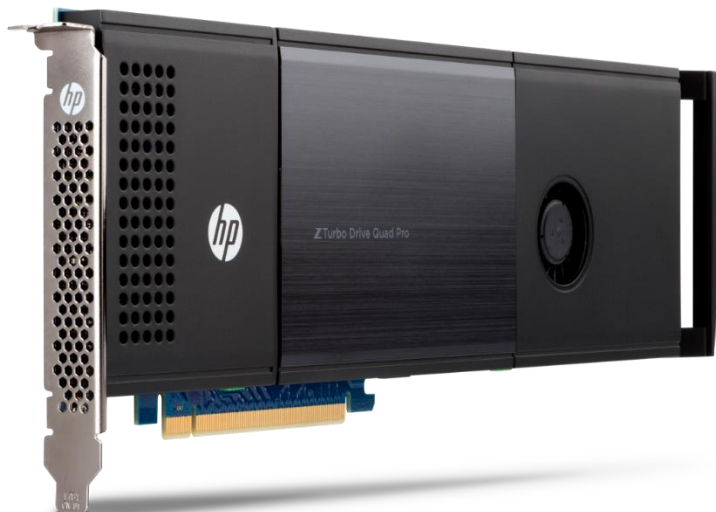


### Overview

## HP Z Turbo Quad Pro and Dual Pro



### Introduction

The demands on Workstations continue to increase, especially in segments like digital media or imaging, where resolutions and file sizes are increasing. SSD technology is improving to enable greater bandwidth at lower costs/GB. The most intense workflows require greater capacity and greater performance than individual M.2 modules can offer. Combining 4 modules into a card that occupies only one PCIe x16 slot is efficient and meets the requirements for performance and capacity.

### Performance

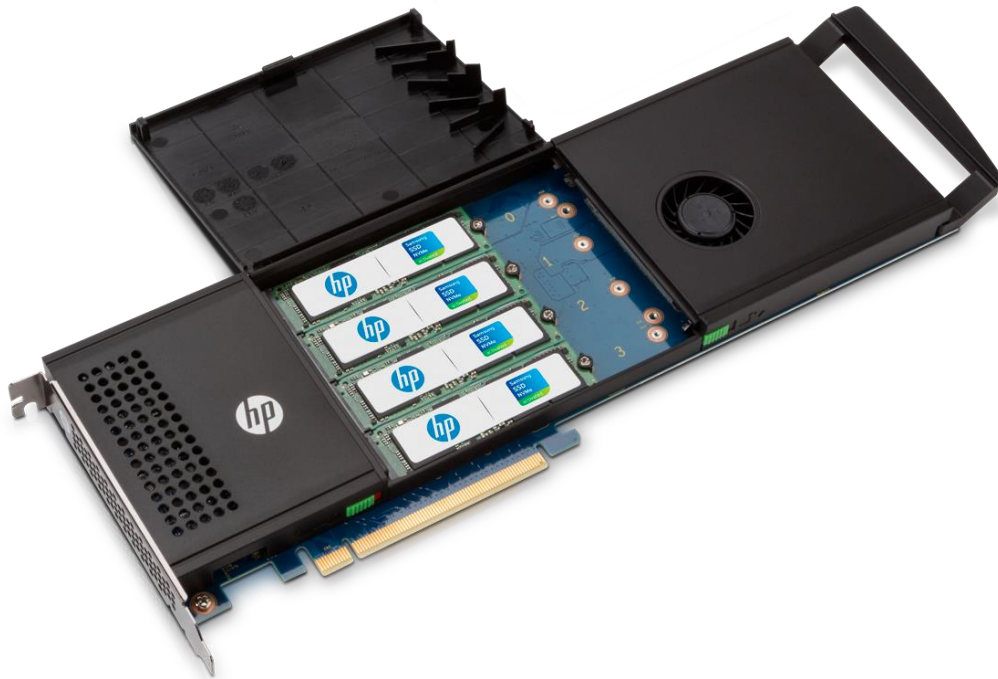
#### HP Z Turbo Drive Quad Pro and Dual Pro solutions

The HP Z Turbo Drive Quad Pro enables up to four M.2 PCIe SSD modules to be connected to one PCIe Gen3 x16 slot. This M.2 form factor device uses PCIe Gen3 x4 which enables sequential performance levels greater than 2GB/s for each module. HP Z Turbo Drive Dual Pro enables up to two M.2 PCIe SSD modules to be connected to one PCIe Gen3 x8 slot.

The devices can be set up with RAID for additional performance and redundancy using software RAID, or by using VROC technology from Intel.

**Note:** There are restrictions to using RAID with boot volumes when using software RAID. RAID volumes created by using VROC technology can be enabled for boot, provided all M.2 devices are connected to the same PCIe root port.

### Overview



### Benefits of Z Turbo Drive Quad Pro

- Supports up to four PCIe M.2 SSD modules (NVMe) in one card, PCIe Gen3 x16 slot required.
- The HP Z Turbo Drive Quad Pro is equipped with Power Loss Protection circuitry that employs a bank of super caps to provide the power to fully finish data storage operations in the event of a power loss condition.
- The active cooling solution ensures that the M.2 SSD modules will not throttle to low performance levels due to over-heating.
- Support for single and double sided PCIe M.2 SSDs, up to 110mm in length.
- One of the M.2 SSD modules on the card can be used as a Boot device, and the other devices can be used as Data storage. Alternatively, all of the M.2 SSD modules can be used as Data devices.
- Additional storage devices, e.g. HDDs, SATA SSDs, can be used in combination with the HP Z Turbo Drive Quad Pro.
- Multiple HP Z Turbo Drive Quad Pro cards can be installed into HP Z Workstations. A card with 3 or 4 M.2 SSD modules requires a PCIe Gen3 x16 slot.

### Models

HP Z Turbo Drive Quad Pro 2x256GB PCIe TLC SSD	4YZ38AA
HP Z Turbo Drive Quad Pro 2x512GB PCIe TLC SSD	4YZ39AA
HP Z Turbo Drive Quad Pro 2x1TB PCIe TLC SSD	4YZ40AA
HP Z Turbo Drive Quad Pro 2x2TB PCIe TLC SSD	3KP42AA
HP Z Turbo Drive Quad Pro 256GB PCIe TLC SSD Module	4YZ35AA
HP Z Turbo Drive Quad Pro 512GB PCIe TLC SSD Module	4YZ36AA

### Overview

HP Z Turbo Drive Quad Pro 1TB PCIe TLC SSD Module

4YZ37AA

HP Z Turbo Drive Quad Pro 2TB PCIe TLC SSD Module

3KP43AA



### Benefits of Z Turbo Drive Dual Pro

- Supports up to four PCIe M.2 SSD modules (NVMe) in one card, PCIe Gen3 x16 slot required.
- The active cooling solution ensures that the M.2 SSD modules will not throttle to low performance levels due to over-heating.
- Support for single and double sided PCIe M.2 SSDs, up to 110mm in length.
- One of the M.2 SSD modules on the card can be used as a Boot device, and the other device can be used as Data storage. Alternatively, both of the M.2 SSD modules can be used as Data devices.
- Additional storage devices, e.g. HDDs, SATA SSDs, can be used in combination with the HP Z Turbo Drive Dual Pro.
- Multiple HP Z Turbo Drive Dual Pro cards can be installed into HP Z Workstations.

### Models

HP Z Turbo Drive Dual Pro 256GB TLC SSD

4YF60AA

HP Z Turbo Drive Dual Pro 512GB TLC SSD

4YF61AA

HP Z Turbo Drive Dual Pro 1TB TLC SSD

4YF62AA

HP Z Turbo Drive Dual Pro 2TB TLC SSD

4YF63AA

HP 1x256GB M.2 2280 PCIe NVMe TLC SSD Dual Pro Kit

8PE74AA

HP 1x512GB M.2 2280 PCIe NVMe TLC SSD Dual Pro Kit

8PE75AA

HP 1x1TB M.2 2280 PCIe NVMe TLC SSD Dual Pro Kit

8PE76AA

### Compatibility

The HP Z Turbo Drive Quad Pro is supported on desktop platforms of HP Z Workstations, including Z4, Z6 and Z8 G4, 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.

### Overview

**NOTE:** Not all models are available in all regions.

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### Recommended Slot Order

For all HP Workstation platforms the tested and approved slots for the HP Z Turbo Drive Quad Pro are as follows (in order of preference):

**Z6 G4:** Slot #4, Slot #6 (requires 2<sup>nd</sup> CPU), Slot #3 (requires 2<sup>nd</sup> CPU)

**Z840:** Slot #6, #4 (requires 2<sup>nd</sup> CPU), and #2\*

**Z6 G4 and Z4 G4:** Slot 5

**Z4 G4 with Core Processors:** i9 – Slot #3, i7 – Not Supported

**Z640 and Z440:** Slot #5 and #2\*

\* Use of Z Turbo Drive Quad Pro in Slot 2 will necessitate moving the primary graphics card to an x8 or x4 PCIe slot, which could lead to reduced graphics performance.

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### Raid Support

For RAID support, there are some specific differences and thus restrictions as compared to SATA/SAS HDDs or SSDs, because software RAID is used.

- 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
- 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\*\*

On Z8 G4, Z6 G4, and Z4 G4, bootable RAID support can be configured via VROC. VROC is an Intel technology that allows NVMe devices to be configured and included in RAID arrays.

There are two versions of VROC available to customers:

- Standard – This version enables RAID 0, RAID 1, and RAID 10. RAID volumes are bootable as long as the configured devices are all on the same PCIe Root Port.
- Premium – This version enables all RAID levels available in the Standard version and adds RAID 5.

\*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.

**Note:** When using more than one HP Z Turbo Drive Quad Pro in a system, please ensure that the card ID switches are set up correctly. See installation guide for complete details.

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### Service and Support

The HP Z Turbo Drive Quad Pro has a one-year Limited Warranty or the remainder of the warranty of the HP supported product in which it is installed. Technical support is available seven days a week, 24 hours a day, by phone, as well as online support forums. Certain restrictions and exclusions apply.

### Overview

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### Technical Specifications - SSD Modules for Z Turbo Quad Pro

#### M.2 PCIe TLC SSD Modules

##### 256GB M.2 PCIe SSD (NVMe)

<b>Capacity:</b>	256GB M.2 PCIe SSD (NVMe)
<b>Interface</b>	PCIe Gen3 x16 architecture NVMe Controller
<b>NAND Type:</b>	3D TLC
<b>Read Bandwidth (128KB):</b>	3500 MB/s
<b>Write Bandwidth (1MB):</b>	2200 MB/s
<b>Random Read IOPS (4KB):</b>	240K
<b>Random Write IOPS (4KB):</b>	480K
<b>Endurance (Total Bytes Written):</b>	200

##### 512GB M.2 PCIe SSD (NVMe)

<b>Capacity:</b>	512GB M.2 PCIe SSD (NVMe)
<b>Interface</b>	PCIe Gen3 x16 architecture NVMe Controller
<b>NAND Type:</b>	3D TLC
<b>Read Bandwidth (128KB):</b>	3500 MB/s
<b>Write Bandwidth (1MB):</b>	2900 MB/s
<b>Random Read IOPS (4KB):</b>	240K
<b>Random Write IOPS (4KB):</b>	460K
<b>Endurance (Total Bytes Written):</b>	300 TBW

##### 1TB M.2 PCIe SSD (NVMe)

<b>Capacity:</b>	1TB M.2 PCIe SSD (NVMe)
<b>Interface</b>	PCIe Gen3 x16 architecture NVMe Controller
<b>NAND Type:</b>	3D TLC
<b>Read Bandwidth (128KB):</b>	3500 MB/s
<b>Write Bandwidth (1MB):</b>	3000 MB/s
<b>Random Read IOPS (4KB):</b>	580K
<b>Random Write IOPS (4KB):</b>	500K
<b>Endurance (Total Bytes Written):</b>	400 TBW

##### 2TB M.2 PCIe SSD (NVMe)

<b>Capacity:</b>	2TB M.2 PCIe SSD (NVMe)
<b>Interface</b>	PCIe Gen3 x16 architecture NVMe Controller
<b>NAND Type:</b>	3D TLC
<b>Read Bandwidth (128KB):</b>	3500 MB/s

### Technical Specifications - SSD Modules for Z Turbo Quad Pro

<b>Write Bandwidth (1MB):</b>	3000 MB/s
<b>Random Read IOPS (4KB):</b>	600K
<b>Random Write IOPS (4KB):</b>	500K
<b>Endurance (Total Bytes Written):</b>	500 TBW

#### HP Z Turbo Drive Quad Pro 2x1TB PCIe SSD

<b>Capacity:</b>	2x1TB M.2 PCIe SSD (NVMe) modules
<b>Interface</b>	PCIe Gen3 x16 architecture NVMe Controller
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

### Technical Specifications - SSD Modules for Z Turbo Quad Pro

#### HP Z Turbo Drive Quad Pro 512GB SSD module

<b>Capacity:</b>	512GB (one M.2 PCIe NVMe module)
<b>Interface</b>	PCI Express 3.0 x4 electrical x4 physical NVMe Controller
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

**Note:** NVMe devices require a driver for proper detection and operation. Windows® 8 and higher have an inbox NVMe driver. For Windows® 7, HP recommends using the Samsung NVMe driver, version 1.4.7.6, which will be available online. It is important to note that Microsoft has also published a hotfix that provides an NVMe driver, yet this driver is not recommended by HP. Also note that the new NVMe driver will not support the original HP Z Turbo Drive, which requires an AHCI driver.

**Support for OPAL hardware encryption:** No

**Support for Secure Erase:** Yes

**Support in HP Performance Advisor:** yes, with the exception that the wear gauge support is not available yet.

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### Technical Specifications - Z Turbo Quad Pro PCIe SSD Card

#### HP Z Turbo Drive Quad Pro 2x256GB PCIe SSD

Capacity:	2x256GB (two M.2 PCIe NVMe modules)
Interface:	PCI Express Gen3 x16
Operating Temperature:	32° to 158° F (0° to 70° C)

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#### HP Z Turbo Drive Quad Pro 2x512GB PCIe SSD

Capacity:	2x512GB (two M.2 PCIe NVMe modules)
Interface:	PCI Express Gen3 x16
Operating Temperature:	32° to 158° F (0° to 70° C)

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#### HP Z Turbo Drive Quad Pro 2x1TB PCIe SSD

Capacity:	2x1TB (two M.2 PCIe NVMe modules)
Interface:	PCI Express Gen3 x16
Operating Temperature:	32° to 158° F (0° to 70° C)

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#### 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
Operating Temperature	32° to 158° F (0° to 70° C)

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#### 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)

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#### HP Z Turbo Drive Quad Pro 1TB SSD module

<b>Capacity:</b>	1TB (one M.2 PCIe NVMe module)
<b>Interface</b>	PCI Express 3.0 x4 electrical x4 physical NVMe Controller
<b>Operating Temperature</b>	32° to 158° F (0° to 70° C)

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#### HP Z Turbo Drive Dual Pro 256GB SSD

<b>Capacity:</b>	256GB (one M.2 PCIe NVMe module)
<b>Interface</b>	PCI Express 3.0 x4 electrical x4 physical

### Technical Specifications - Z Turbo Quad Pro PCIe SSD Card

**Operating Temperature** 32° to 158° F (0° to 70° C)

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#### HP Z Turbo Drive Dual Pro 512GB SSD

**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)

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#### HP Z Turbo Drive Dual Pro 1TB SSD

**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)

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#### HP Z Turbo Drive Dual Pro 2TB SSD

**Capacity:** 2TB (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)

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### Technical Specifications - Z Turbo Quad Pro PCIe SSD Card

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<b>Device Interface Protocol</b>	PCIe Gen3
<b>Devices Supported</b>	HP qualifies and supports certain M.2 PCIe SSD modules to be used with this card.
<b>Bus Type</b>	PCIe card, full height PCIe slots
<b>BIOS</b>	Minimum BIOS required: Z840, Z640, Z440: 1.62
<b>Data Protection Features</b>	Full Power Loss Protection circuitry, including multiple onboard super caps to provide power in the event of a power loss event.
<b>Temperature - Operating</b>	10 to 55C with 20 to 30% relative humidity
<b>Temperature - Storage</b>	-30 to 60C, with 5 to 90% relative humidity
<b>Operating Systems Supported</b>	Genuine Windows 7 Professional 64-bit, Genuine Windows 8.1 64-bit, Genuine Windows 10 64-bit, RHEL 6, SLED 11 SP3, Ubuntu 14.04.
<b>Kit Contents</b>	HP Z Turbo Drive Quad Pro card + M.2 SSD Modules ordered, full height bulkhead bracket, Installation documentation and warranty card.

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### Options & Accessories

**The HP Z Turbo Drive Quad Pro supports up to 4 SSD modules. It is initially sold configured with two modules. HP Z Turbo Drive Dual Pro supports up to 2 SSD modules. It is initially sold configured with one module. Additional modules can be purchased separately:**

HP Z Turbo Drive Quad Pro 256GB TLC SSD module (individual module)	4YZ35AA
HP Z Turbo Drive Quad Pro 512GB TLC SSD module (individual module)	4YZ36AA
HP Z Turbo Drive Quad Pro 1TB TLC SSD module (individual module)	4YZ37AA
HP Z Turbo Drive Quad Pro 2TB TLC SSD module (individual module)	3KP43AA

### Summary of Changes

<b>Date of change:</b>	<b>Version History:</b>		<b>Description of change:</b>
December 1, 2015	From v1 to v2	Changed	Part numbers for HP Z Turbo Drive Quad Pro modules
May 1, 2016	From v2 to v3	Changed	Wording of Benefits section bullet #7
November 1, 2016	From v3 to v4	Added	Quad Pro 2x1TB and 1TB modules
November 15, 2018	From v4 to v5	Added	HP Z Turbo Drive Dual Pro SSD family
December 4, 2018	From v5 to v6	Changed	Title
February 4, 2020	From v6 to v7	Changed	Format

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