

Overview

HP Z1 G3 All-in-One Workstation



- | | |
|--------------------------------------|---|
| 1. Power Button | 4. (2) USB 3.0 ports (lower charging, upper standard) |
| 2. System Activity LED | 5. (1) SD 4.0 Media Card Reader |
| 3. (2) Thunderbolt™ 3/USB 3.1* ports | 6. (1) Headset port (Headphone/Microphone) |

*Thunderbolt™ cable and Thunderbolt™ device (sold separately) must be compatible with Windows. To determine whether your device is Thunderbolt™ Certified for Windows, see <https://thunderbolttechnology.net/products>.

Overview



Form Factor Operating Systems

All in One

Preinstalled:

- Windows 10 Pro 64-bit
- Windows 10 Pro 64-bit Downgrade to Windows 7 Professional 64-bit
- Linux® Ready (TOK20AV)
- Red Hat® Enterprise Linux® Desktop/Workstation (Paper license with 1 year support; no preinstalled OS)

NOTES: The user must still obtain the Red Hat® software bits from Red Hat®.

Supported:

- Windows 10 64-bit
- Windows 10 Pro 64 Downgrade Win 7 64
- Windows 10 Home 64 High-End
- Red Hat® Enterprise Linux® Desktop/Workstation 6, 7

NOTE: For detailed OS/hardware support information for Linux®, see:
http://www.hp.com/support/Linux_hardware_matrix.

Supported Components

Available Processors

Name	Cores	Clock Speed (GHz)	Intel® Turbo Boost Technology ¹	Cache (MB)	Memory Speed (MT/s)	Hyper-Threading	Featuring Intel® vPro™ Technology	Intel® HD Graphics	TDP (W)
Intel® Xeon® E3-1270v5 3.6 8M GT0 4C CPU	4	3.6	4.0	8	2133	Y	Y	N/A	80W
Intel® Xeon® E3-1245v5 3.5 8M GT2 4C CPU	4	3.5	3.9	8	2133	Y	Y	Intel® HD Graphics P530	80W
Intel® Xeon® E3-1225v5 3.3 8M GT2 4C CPU	4	3.3	3.7	8	2133	Y	Y	Intel® HD Graphics P530	80W
Intel® Core™ i7-6700 3.4 8M 4C CPU	4	3.4	4.0	8	2133	Y	Y	Intel® HD Graphics 530	65W
Intel® Core™ i5-6500 3.2 6M 4C CPU	4	3.2	3.6	6	2133	N	Y	Intel® HD Graphics 530	65W
Intel® Core™ i3-6100 3.7 3M 2C CPU	2	3.7	N/A	3	2133	Y	N	Intel® HD Graphics 530	65W

¹The specifications shown in this column represent the maximum frequency (GHz) of one processor core when accelerated with Intel® Turbo Boost Technology. Turbo boost stepping occurs in 100MHz increments. Processors that do not have turbo functionality are denoted as N/A.

Available Processor Disclaimers

Intel® Xeon E3 and Intel® Core™ i3 processors can support either ECC or non-ECC memory.

Multi-core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering is not a measurement of higher performance.

Integrated Display

See below for detailed information

Panel

- Type: IPS (in-plane switching) LED Backlit LCD
- Viewable Image Area: 60 cm, (23.6 in.) widescreen; diagonally measured
- Screen Opening (W x H): 52.1 x 32.1 cm, (20.5 x 11.5 in.)
- Optimal Resolution: 3840 x 2160 @ 60 Hz; 8.3MP
- Aspect Ratio*: 16:9 Widescreen
- Viewing Angle (typical): Up to 178° horizontal / 178° vertical
- Maximum Brightness (typical)*: 300 nits cd/m²
- Minimum Brightness (typical)*: 50 nits cd/m²
- Contrast Ratio (typical)*: 1000:1
- Dynamic Contrast Ratio (typical)*: N/A
- Response Time (typical)*: 14 ms (gray to gray)
- Pixel Pitch: 0.04525 mm x 0.13575 mm
- Backlight LED Life Time: 30,000 hours minimum
- Color Gamut Coverage of sRGB: 100% (CIE 1931)

Supported Components

- Color Support: Up to 16.7 Million colors

*All performance specifications represent the typical specifications provided by HP's component manufacturers; actual performance may vary either higher or lower.

Signal Interface/Performance

- Horizontal Frequency: 131.4 kHz
- Vertical Frequency: 60 H
- Native Resolution: 3840 x 2160 @ 60 Hz; 8.3MP
- Preset VESA Graphic Modes (non-interlaced): 3840 x 2160 @ 60 Hz
- Pixel Clock Speed(typical): 519.8 MHz
- User Programmable Modes: None
- Default Color Temperature: 6500 K
- Anti-glare: less than 25% haze

Notes: non-touch version

Anti-glare: less than 25% haze

Convertibility

The Z1 can either be placed on the desktop in the traditional display method or mounted on a wall with the industry standard VESA mount. The VESA mount on the Z1 uses a 100x100 VESA mount pattern. Mounting hardware sold separately.

Expansion Slots (see system board section for more details)

- (1) MXM 3.1 (dedicated for graphics)
- (2) M.2 Socket type 3. Support for Module Types 2242, 2260, and 2280-M H4.2
- (1) M.2 Socket type 1. Support for Module Type 3030-E H4.2 for WLAN*

* WLAN is only available as a Configure to Order item at the time of purchase.

Expansion Bays (see storage section for more details)

- 2 internal 2.5" bays

Side I/O

(1) USB 3.0, (1) USB 3.0 Charging Data Port, (2) Thunderbolt™ 3/USB 3.1 ports (USB Type-C™ connectors), (1) SD 4.0 Media Card Reader, (1) Headset [(1) Headphone, (1) Microphone]

Internal I/O

(1) **USB 2.0 Type A, 2 internal on 9-pin header.**

Rear I/O

(1) DisplayPort v1.1, (4) USB 3.0, (1) RJ-45 LAN, (1) Re-taskable Audio Port (Line-in, Line-out, MIC).

Chassis Dimensions (H x W x D)

21.5in x 23.5in x 8.3in (includes stand)
54.61cm x 59.69cm x 21.08

Weight

Exact weights depend upon configuration;
Max system weight WITH stand: 10.51kg (23.2lb);
Stand weight 3.12kg (6.9lb)

Temperature

Operating: 40° to 95°F (5° to 35°C)
Non-operating: -40° to 140°F (-40° to 60°C)

Humidity

Operating: 8% to 85%
Non-operating: 8% to 90%

Maximum Altitude (non-pressurized)

Operating: 3,000 m (10,000 ft)
Non-operating: 9,100 m (30,000 ft).

Power Supply

330 watts wide-ranging, active Power Factor Correction, 90% Efficient

Chipset

Intel® C236 chipset

Memory

4 SO-DIMM slots, supporting up to 64GB ECC or 64GB non-ECC Unbuffered DDR4 2133 MT/s Components.
Actual Memory speed is determined by the processor.

Supported Components

Memory Disclaimers The CPU determines the speed at which the memory is clocked. If a 2133MT/s capable CPU is used in the system, the maximum speed the memory will run at is 2133MT/s regardless of the specified speed of the memory.

Workstation ISV Certifications See the latest list of certifications at:
<http://www.hp.com/united-states/campaigns/workstations/partnerships.html>

Processors

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
6th generation Intel® Core™ i3 processor family				
Intel® Core™ i3-6100 3.7 2133 2C CPU	Y	N		Note 1
6th generation Intel® Core™ processor family				
Intel® Core™ i5-6500 3.2 2133 4C CPU	Y	N		Note 1, 3
Intel® Core™ i7-6700 3.4 2133 4C CPU	Y	N		Note 1, 3
Intel® Xeon® processor E3-1200 v5 family				
Intel® Xeon® E3-1270 v5 3.6 2133 4C CPU	Y	N		Note 1, 2
Intel® Xeon® E3-1245 v5 3.5 2133 4C CPU	Y	N		Note 2
Intel® Xeon® E3-1225 v5 3.3 2133 4C CPU	Y	N		Note 2

NOTE 1: Not supported with Intel® HD P530 graphics.

NOTE 2: Not supported with Intel® HD 530 graphics.

NOTE 3: Not supported with ECC memory.

Monitors / Displays

- HP DreamColor Z24x Display
- HP DreamColor Z27x Studio Display
- HP DreamColor Z32x UHD Display
- HP Z Display Z24i 24-inch IPS LED Backlit Monitor
- HP Z Display Z30i 30-inch IPS LED Backlit Monitor
- HP Z22n Narrow Bezel IPS Display
- HP Z23n Narrow Bezel IPS Display
- HP Z24n Narrow Bezel IPS Display
- HP Z24nf Narrow Bezel IPS Display
- HP Z24nq Narrow Bezel IPS Display
- HP Z24s IPS UHD 4K Display

Supported Components

HP Z25n Narrow Bezel IPS Display

HP Z27n Narrow Bezel IPS Display

HP Z27q 27-inch IPS 5K Display

HP Z27s IPS UHD 4K Display

HP Z34c Curved Display

HP Zvr Virtual Reality Display

NOTES:

All HP Z Displays and HP DreamColor Displays are supported. For more information see www.hp.com/go/zdisplays.

Supported by all Operating Systems available from HP
Screen Size Diagonally Measured

Storage / Hard Drives

SATA Hard Drives

SATA Hard Drives for HP Workstations

1TB SATA 7200 rpm 6Gb/s 2.5" HDD

500GB SATA 7200 rpm 6Gb/s 2.5" HDD

Factory
Configured

Option
Kit

Option Kit Part
Number

Support
Notes

Y

Y

T0K74AA

Y

Y

T0K73AA

SATA SSDs

HP Solid State Drive for Workstations

HP 1TB SATA 6Gb/s SSD

HP 512GB SATA 6Gb/s SSD

HP 256GB SATA 6Gb/s SSD

HP 256GB SATA 6Gb/s SED Opal SSD

Y

Y

F3C96AA

Y

Y

D8F30AA

Y

Y

A3D26AA

Y

Y

G7U67AA

Note 1

Note 1:

The 256GB Self-Encrypting Drive (SED) version has similar performance to the standard 256GB SSD. This device supports both Opal 2.0 and Opal 1.0 functionality.

For storage drives, GB = 1 billion bytes. Actual formatted capacity is less. Up to 35GB of system disk is reserved for system recovery software.

PCIe SSDs

HP PCIe SSD Drives for Workstations

HP Z Turbo Drive G2 256GB PCIe SSD (Z1 G3)

HP Z Turbo Drive G2 512GB PCIe SSD (Z1 G3)

HP Z Turbo Drive G2 1TB PCIe SSD (Z1 G3)

HP Z Turbo Drive G2 1TB TLC SSD

HP Z Turbo Drive Thermal Solution (Z1 G3)

Y

Y

W5A06AA

Y

Y

W5A07AA

Y

Y

T0K72AA

Y

Y

Y1T52AA

Y

Y

W0T85AA

Note 1

Note 1: Z1 G3 Platform: There are two, adjacent Z Turbo Drive native slots. The Thermal Solution for Z1 G3

Supported Components

(W0T85AA) 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.

Not all configurations will be available at launch.

For storage drives, GB = 1 billion bytes. Actual formatted capacity is less. Up to 35GB of system disk is reserved for system recovery software.

Supported Components

Hard Drive Controllers	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Factory integrated RAID on motherboard for SATA drives				
RAID 0 Configuration - Striped Array	Y	N		Note 1
RAID 1 Configuration - Mirrored Array	Y	N		Note 1

NOTE 1: Supported with all Windows® Operating Systems. All drives must be identical in interface, size, and speed. 2 HDDs required. Not supported with 1st hard drive SATA-SED drive.

Graphics

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes	Supported Multi Mixed
Integrated Intel® HD Graphics (Z1G3)					
Intel® HD Graphics P530	Y	N	NA	See note 1	1
Intel® HD Graphics 530	Y	N	NA	See note 2	1

NOTE 1: Supported on Intel® Xeon® E3-12xx v5 processors only

NOTE 2: Supported on Intel® Core™ i3/i5-6xxx processors only

Entry 3D

NVIDIA® Quadro® M1000M 2GB Graphics	Y	Y	T8W13AA		1
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Mid-range 3D

NVIDIA® Quadro® M2000M 4GB Graphics	Y	N	NA		1
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High End 3D

NOTE 1:

If a discrete graphics card is installed, Intel® integrated graphics is disabled.

Memory

CTO	Option Kit Part Number	Support Notes
DDR4-2133 nECC Unbuffered DIMMs CTO		
HP 32GB (2x16GB) DDR4-2133 nECC RAM		
HP 16GB (2x8GB) DDR4-2133 nECC RAM		
HP 8GB (2x4GB) DDR4-2133 nECC RAM		
HP 8GB (1x8GB) DDR4-2133 nECC RAM		
HP 4GB (1x4GB) DDR4-2133 nECC RAM		

Supported Components

DDR4-2133 ECC Unbuffered DIMMs - CTO

HP 64GB (4x16GB) DDR4-2133 ECC RAM
 HP 32GB (4x8GB) DDR4-2133 ECC RAM
 HP 32GB (2x16GB) DDR4-2133 ECC RAM
 HP 16GB (2x8GB) DDR4-2133 ECC RAM
 HP 8GB (1x8GB) DDR4-2133 ECC RAM

AM0

DDR4-2133 non-ECC Unbuffered DIMMs - AM0

HP 16GB (1x16GB) DDR4-2133 non-ECC RAM	TOH91AA
HP 8GB (1x8GB) DDR4-2133 non-ECC RAM	TOH90AA
HP 4GB (1x4GB) DDR4-2133 non-ECC RAM	TOH89AA

DDR4-2133 ECC Unbuffered DIMMs - AM0

HP 8GB (1x8GB) DDR4-2133 ECC RAM	TOH92AA
HP 16GB (1x16GB) DDR4-2133 ECC RAM	TOH93AA

Section Description/Notes

The CPU determines the speed at which the memory is clocked.

Multimedia and Audio Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP HD 2MP 1080p Webcam and Digital Mic Array	Y	N		
Integrated Conexant CX7501 Audio Codec with DTS Studio Sound	Y	N		

Optical and Removable Storage

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP External Ultra-Slim DVD-RW Drive	Y	Y	F2B56AA	

Actual speeds may vary. Does not permit copying of commercially available DVD movies or other copyright protected materials. Intended for creation and storage of your original material and other lawful uses. Double Layer discs can store more data than single layer discs. However, double-layer discs burned with this drive may not be compatible with many existing single-layer DVD drives and players. With Blu-ray, certain disc, digital connection, compatibility and/or performance issues may arise, and do not constitute defects in the product. Flawless playback on all systems is not guaranteed. In order for some Blu-ray titles to play, they may require a DVI or HDMI digital connection and your display may require HDCP support. HD-DVD movies cannot be played on this workstation.

Supported Components

Networking and Communications

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
Integrated Intel I219LM PCIe GbE Controller (Intel vPro with Intel AMT 11.0)	Y	N		
Optional Intel® 8260 Wireless LAN (802.11ac) and Bluetooth® 4.2 Module	Y	N	Notes 1, 2	

Note 1: When selected for factory installation, the module is installed into the M.2 type 1 slot.
Note 2: Intel vPro is not available on the Intel 8260 Wireless LAN module

Racking and Physical Security

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Chassis Intrusion Sensor	Y	N		
Remove Computrace BIOS Module*	Y	N		

The Computrace agent is shipped turned off, and must be activated by customers when they purchase a subscription. Subscriptions can be purchased for terms ranging from one to multiple years. Service is limited, check with Absolute for availability outside the U.S.

Input Devices

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP USB Business Slim Keyboard	Y	Y	N3R87AA	
HP USB Laser Scroll Mouse	Y	Y	QY778AA	
Z1 HP No Keyboard	Y	N		
Z1 No Included Mouse	Y	N		
HP Wireless Business Slim KBD and Mouse*	Y	Y	N3R88AA	Note 1
HP USB Hardened Mouse	Y	Y	P1N77AA	

NOTE 1: Only allowed with the No Mouse (T0J62AV) AV selected.

Other Hardware

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Power Cord Kit	Y	N		
HP ENERGY STAR® Certified Configuration	Y	N		

Software

	Factory Configured	Option Kit	Option Kit Part Number	Support Notes
HP Performance Advisor	Y	N		See note 1
HP Remote Graphics Software (RGS) 6.0	Y	N		See note 2
Buy Office	N	N		
Foxit PDF Solution	Y	N		

NOTE 1: Available as a free download here: <http://www.hp.com/go/performanceadvisor>

NOTE 2: Supports Windows® 7 Professional, Windows® 8.1 Professional, Windows® 10 Professional, RHEL v6.6, 7 (Red Hat® Enterprise Linux®)

Operating Systems

	Support Notes
HP Linux® Installer Kit	See note 4

Supported Components

Red Hat® Enterprise Linux® (RHEL) Workstation - Paper License (1yr)	See note 3
Windows 10 Pro 64	
Windows 10 Pro downgrade to Windows® 7 Professional 64	See note 1
Windows 10 Home 64	

NOTE 1: See <http://www.microsoft.com/Windows/Windows-7/> for support details.

NOTE 2: For detailed OS/hardware support information for Linux®, see: http://www.hp.com/support/Linux_hardware_matrix.

NOTE 3: This second OS must be ordered with the HP Linux® Installer Kit as the first OS.

Note 4: What was formally known as the HP Installer Kit for Linux® (HPIKL) is no longer offered. However, the capability provided by the HPIKL is still available by selecting/ordering two separate items:

- Linux®-ready (TOK20AV)
 - Provides the Free DOS OS load
- Linux® Drivers from the HP Support web site

The user must still obtain the Red Hat software bits from Red Hat®.

System Technical Specifications

System Board

System Board Form Factor	Custom Motherboard
Processor Socket	Single LGA 1151
CPU Bus Speed	DMI Gen3
Chipset	Intel® PCH C236
Super I/O Controller	Nuvoton NPCD315H
Memory Expansion Slots	4 DDR4 SO-DIMM memory slots
Memory Type Supported	DDR4, UDIMM (Unbuffered), ECC & non-ECC
Memory Modes	Non-interleaved for single channel. Interleaved when both channels are populated.
Memory Speed Supported	Up to 2300MT/s DDR4
Maximum Memory	64GB ECC or 64GB non-ECC
Memory Configuration (Supported)	4GB, 8GB, and 16GB non-ECC/ 4GB and 8GB ECC unbuffered SO-DIMMs are supported. ECC and non-ECC memory SO-DIMMs cannot be mixed on the same system.

NOTES: Maximum memory capacities assume 64-bit operating systems, such as Windows 7 Professional 64-Bit or Red Hat® Linux® 64-bit. 32-bit Windows Operating Systems support up to 4 GB. 4GB, 8GB and 16GB non-ECC/4GB and 8GB ECC unbuffered SO-DIMMs are supported. ECC and non-ECC memory SO-DIMMs cannot be mixed on the same system.

PCI Express Connectors	1 MXM 3.1 slot (PCIe Gen3 x16 dedicated for graphics) 2 M.2 Socket 3 up to Type 2280-M H4.2 1 M.2 Socket 1 up to Type 3030-E H4.2 for WLAN
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Supported Drive Interfaces	SATA	Integrated Serial ATA interfaces: 2 x 6Gb/s SATA 3.0
	Integrated RAID	NOTE: the Z1 supports a maximum of two SATA SFF/SSD drives only. RAID 0 and 1 supported. (Factory integrated RAID is Microsoft Windows® only).
	Integrated Graphics	NOTE: Requires identical hard drives (speeds, capacity, interface) Intel® HD Graphics P530 (on select processors) Unified Memory Architecture (UMA)- A region of system memory is reserved and dedicated to the graphics display. DirectX 11.1 compliant and OpenGL 4.0. Integrated Graphics can support up to 3 displays: embedded display plus two external displays via either Rear IO or TBT.
	Network Controller	Integrated Ethernet PHY Connection I219LM. Management capabilities: WOL, PXE 2.1 and AMT 11.0
USB Connector(s)	Front	Side (not Front): 1 USB 3.0, 1 USB 3.0 Charging Data Port
	Rear	4 USB 3.0
	Internal	1 USB 2.0 Type A, 2 USB 2.0 across one 9-pin header (9-pin header is not available when the touch display option is selected)
HD Integrated Audio		Intel® HD / Conexant CX7501 codec
Flash ROM		Yes
CPU Fan Header		Yes

System Technical Specifications

Front Control Panel/Speaker Header	Yes
CMOS Battery Holder - Lithium	Yes
Integrated Trusted Platform Module	Integrated TPM 2.0 TPM module disabled where restricted by law.
Power Supply Headers	Yes
Power Switch, Power LED & Hard Drive LED Header	Yes
Clear Password Jumper	Yes
Keyboard/Mouse	USB

Power Supply

Power Supply	330W 90% Efficient, Custom PSU (Wide Ranging, Active PFC)		
Operating Voltage Range	90-264 VAC		
Rated Voltage Range	100-240 VAC		Rated Voltage Range
Rated Line Frequency	50-60 Hz		Rated Line Frequency
Operating Line Frequency Range	47-63 Hz		Operating Line Frequency Range
Rated Input Current	5A @ 100-240 VAC		Rated Input Current
Heat Dissipation (Configuration and software dependent)	Typical: 444 btu/hr (112 kg-cal/hr) Maximum: 1150 btu/hr (314 kg-cal/hr)		
Power Supply Fan	None		
ENERGY STAR® Qualified (Configuration dependent)	Yes		
80 PLUS® Compliant	Yes, > 90% Efficiency at 50% Load 115VAC 60Hz		

Z1 G3 330W power supply efficiency report available at this link:

http://www.plugloadsolutions.com/psu_reports/HP%20INC_PA-3331-1_330W_ECOS%204479_Report.pdf

FEMP Standby Power Compliant @115V	Yes
ErP LOT6 Compliant @ 230V (<0.5 W in S5 - Power Off)	Yes
CECP Compliant @ 220V (<4W in S3 - Suspend to RAM)	NA
Power Consumption in sleep mode (as defined by ENERGY STAR®) - Suspend to RAM (S3) (Instantly Available PC)	<4W
Built-in Self Test LED	Yes

System Technical Specifications

Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V) Yes

System Configurations

Example Configuration #1 Processor Info 1x Intel® Core™ i3-6100
 Memory Info 8GB DDR4-2133 nECC (2x4GB) SODIMM RAM
 Graphics Info Intel® HD Graphics 530
 Disks/Optical/Floppy 1 x 500GB 7200RPM SATA HDD
 Power Supply 330W 90% Custom PSU
 Other

Energy Consumption (Watts)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows® Idle (S0)	11 W		11 W		11 W	
Windows® Busy Typ (S0)	79 W		78 W		78 W	
Windows® Busy Max (S0)	95 W		95 W		95 W	
Sleep (S3)	1.64 W	1.48 W	1.45 W	1.64 W	1.48 W	1.45 W
Off (S5)	1.09 W	0.98 W	1.03 W	1.09 W	0.98 W	1.03 W
Zero Power Mode (EuP)	0.400 W		0.440 W		0.372 W	

Heat Dissipation** (Btu/hr)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows® Idle (S0)	37.5 Btu/hr		37.5 Btu/hr		37.5 Btu/hr	
Windows® Busy Typ (S0)	270 Btu/hr		266 Btu/hr		266 Btu/hr	
Windows® Busy Max (S0)	324 Btu/hr		324 Btu/hr		324 Btu/hr	
Sleep (S3)	5.6 Btu/hr	5.1 Btu/hr	5.0 Btu/hr	5.6 Btu/hr	5.1 Btu/hr	5.0 Btu/hr
Off (S5)	3.7 Btu/hr	3.3 Btu/hr	3.5 Btu/hr	3.7 Btu/hr	3.3 Btu/hr	3.5 Btu/hr
Zero Power Mode (EuP)	1.4 Btu/hr		1.5 Btu/hr		1.3 Btu/hr	

Example Configuration #2 Processor Info 1x Intel® Xeon® E3-1225v5
 Memory Info 16GB DDR4-2133 ECC (2x8GB) SODIMM RAM
 Graphics Info 1x NVIDIA® M1000M Graphics
 Storage HP Z Turbo Drive G2 512GB PCIe 1st SSD
 512GB SATA 1st SSD
 Power Supply 330W 90% Custom PSU

Energy Consumption (Watts)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows® Idle (S0)	18 W		18 W		18 W	
Windows® Busy Typ (S0)	146 W		147 W		148 W	
Windows® Busy Max (S0)	170 W		168 W		170 W	
Sleep (S3)	1.93 W	1.83 W	1.75 W	1.93 W	1.83 W	1.75 W
Off (S5)	1.08 W	0.97 W	1.04 W	1.08 W	0.97 W	1.04 W
Zero Power Mode (EuP)	0.402 W		0.445 W		0.361 W	

Heat Dissipation** (Btu/hr)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows® Idle (S0)	61 Btu/hr		61 Btu/hr		61 Btu/hr	
Windows® Busy Typ (S0)	498 Btu/hr		502 Btu/hr		505 Btu/hr	
Windows® Busy Max (S0)	580 Btu/hr		573 Btu/hr		580 Btu/hr	
Sleep (S3)	6.6 Btu/hr	6.2 Btu/hr	6.0 Btu/hr	6.6 Btu/hr	6.2 Btu/hr	6.0 Btu/hr
Off (S5)	3.7 Btu/hr	3.3 Btu/hr	3.5 Btu/hr	3.7 Btu/hr	3.3 Btu/hr	3.5 Btu/hr
Zero Power Mode (EuP)	1.37 Btu/hr		1.52 Btu/hr		1.23 Btu/hr	

System Technical Specifications

Example Configuration #3
 Processor Info
 Memory Info
 Graphics Info
 Storage
 Power Supply
 Other

1xIntel® Xeon® E5-1270v3
 32GB DDR4-2133 ECC (4x8GB) SODIMM RAM
 1xNVIDIA® M2000M
 2 x HP Z Turbo Drive G2 512GB PCIe SSD
 512GB SATA 1st SSD
 330W 90% Custom PSU -

Energy Consumption (Watts)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows® Idle (S0)	20 W		20 W		20 W	
Windows® Busy Typ (S0)	122 W		123 W		125 W	
Windows® Busy Max (S0)	184 W		182 W		185 W	
Sleep (S3)	2.43 W	2.30 W	2.18 W	2.43 W	2.30 W	2.18 W
Off (S5)	1.09 W	0.98 W	1.05 W	1.09 W	0.98 W	1.05 W
Zero Power Mode (EuP)	0.395 W		0.449 W		0.370 W	

Heat Dissipation (Btu/hr)**

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows® Idle (S0)	68 Btu/hr		68 Btu/hr		68 Btu/hr	
Windows® Busy Typ (S0)	416 Btu/hr		420 Btu/hr		427 Btu/hr	
938 Btu/hr	628 Btu/hr		621 Btu/hr		631 Btu/hr	
Sleep (S3)	8.3 Btu/hr	7.8 Btu/hr	7.4 Btu/hr	8.3 Btu/hr	7.8 Btu/hr	7.4 Btu/hr
Off (S5)	3.7 Btu/hr	3.3 Btu/hr	3.6 Btu/hr	3.7 Btu/hr	3.3 Btu/hr	3.6 Btu/hr
Zero Power Mode (EuP)	1.35 Btu/hr		1.53 Btu/hr		1.26 Btu/hr	

Example Configuration #4
 Processor Info
 Memory Info
 Graphics Info
 Storage
 Other
 Power Supply

1 x Intel® Xeon® E3-1225v5
 64 GB DDR4-2133 ECC (4x16GB) SODIMM RAM
 1xNVIDIA® M2000M
 2 x HP Z Turbo Drive G2 512GB PCIe SSD
 2 x 1TB 7200 RPM SATA HDD
 Webcam and WLAN installed
 330W 90% Custom PSU

Energy Consumption (Watts)

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled	LAN Enabled	LAN Disabled
Windows® Idle (S0)	22 W		22 W		22 W	
Windows® Busy Typ(S0)	153 W		152 W		156 W	
Windows® Busy Max (S0)	187 W		185 W		188 W	
Sleep (S3)	3.11 W	3.06W	2.99 W	3.11 W	3.06W	2.99 W
Off (S5)	1.11 W	1.00 W	1.06 W	1.11 W	1.00 W	1.06 W
Zero Power Mode (ErP)	0.402 W		0.437 W		0.379 W	

Heat Dissipation (Btu/hr)**

	115 VAC		230 VAC		100 VAC	
	LAN Enabled	LAN Disabled	LAN Enabled	LAN Enabled	LAN Disabled	LAN Enabled
Windows® Idle (S0)	75 Btu/hr		75 Btu/hr		75 Btu/hr	
Windows® Busy Typ(S0)	522 Btu/hr		519 Btu/hr		532 Btu/hr	
Windows® Busy Max (S0)	638 Btu/hr		631 Btu/hr		641 Btu/hr	
Sleep (S3)	11 Btu/hr	7.8 Btu/hr	7.4 Btu/hr	11 Btu/hr	7.8 Btu/hr	7.4 Btu/hr
Off (S5)	3.8 Btu/hr	3.4 Btu/hr	3.6 Btu/hr	3.8 Btu/hr	3.4 Btu/hr	3.6 Btu/hr
Zero Power Mode (ErP)	1.37 Btu/hr		1.49 Btu/hr		1.29 Btu/hr	

Declared Noise Emissions (Entry-level and High-end configurations)

System Configuration (Entry level)
Processor Info
Memory Info
Graphics Info

System Technical Specifications

Disks/Optical

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWAd, bels)	Desktop Sound Pressure (LpAm, decibels)
	Idle	TBD	TBD
	Hard drive Operating (random reads)	TBD	TBD
	DVD-ROM Operating (sequential reads)	TBD	TBD

System Configuration (Entry level)

Processor Info
Memory Info
Graphics Info
Disks/Optical

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWAd, bels)	Desktop Sound Pressure (LpAm, decibels)
	Idle	TBD	TBD
	Hard drive Operating (random reads)	TBD	TBD
	DVD-ROM Operating (sequential reads)	TBD	TBD

System Configuration (High-end)	Processor Info	
	Memory Info	
	Graphics Info	
	Disks/Optical	

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)		Sound Power (LWAd, bels)	Desktop Sound Pressure (LpAm, decibels)
	Idle	TBD	TBD
	Hard drive Operating (random reads)	TBD	TBD
	DVD-ROM Operating (sequential reads)	TBD	TBD

Environmental Requirements

Temperature	Operating: 40° to 95° F (5° to 35° C) Non-operating: -40° to 140° F (-40° to 60° C)
Humidity	Operating: 8% to 85% RH, non-condensing Non-operating: 8% to 90% RH, non-condensing
Maximum Altitude	Operating: 10,000 feet (3,000 m) Non-operating: 30,000 feet (9,100 m)
Dynamic (new)	Shock Operating: ½-sine: 40g, 2-3ms (~62 cm/sec) Non-operating: ½-sine: 160 cm/s, 2-3ms (~105g) square: 422 cm/s, 20g
	Vibration Operating random: 0.5g (rms), 5-300 Hz, up to 0.0025 g ² /Hz Non-operating random: 2.0g (rms), 5-500 Hz, up to 0.0150 g ² /Hz
	Values represent individual shock events and do not indicate repetitive shock events. Values do not indicate continuous vibration.
Cooling	Above 5,000 ft (1524 m) altitude, maximum operating temperature is derated by 1.8° F (1° C) per 1,000 ft (305 m) elevation increase.

System Technical Specifications

Physical Security and Serviceability

Access Panel	Tool-free
Hard Drives	Tool-less
Expansion Cards	MXM graphics assembly screws in with two M3 screws and requires a #2 Phillips screwdriver. M.2 accessory cards screw-in with the included screw stand offs and require a Torx T8 screwdriver.
Processor Socket	Tool-free, except for the processor heatsink.
Green User Touch Points	(Blue User Touch Points) Placed on tool-free chassis mechanism touch points
Color-coordinated Cables and Connectors	When appropriate
Memory	Tool-less
System Board	Screw-In with 8 × 6-32 screws and requires a Torx T15 or flat headed screwdriver
Over-Temp Warning on Screen	Yes
Restore CD/DVD Set	Restores the computer to its original factory shipping operating system. Orderable with the workstation, or available from Support.
Dual Function Side Power Switch	Power on/off Causes a fail-safe power off when held for 4 seconds
Cable Lock Support	Yes, Cable Lock (optional): Locks rear cover and secures chassis from theft 3mm x 7mm slot at rear of system
Solenoid Lock and Hood Sensor	No Solenoid Lock Hood Sensor - The Sensor Kit detects when the access panel has been opened.
Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control	Enables or disables USB, audio, and network ports
Power-On Password Setup Password	Yes, prevents an unauthorized person from booting up the workstation Yes, prevents an unauthorized person from changing the workstation configuration
NIC LEDs (integrated) (Green & Amber)	Yes
CPUs and Heatsinks	A T-15 Torx or flat blade screwdriver is needed to remove the CPU heatsink before the CPU can be removed. CPU removal is tool-less
Power Supply Diagnostic LED	Yes
Side Power Button	ACPI multi-function
Side Power LED	white (normal), red (fault)
Side Hard Drive Activity LED	white
Internal Stereo Speakers	Two 2W speakers
System/Emergency ROM Flash Recovery	Recovers corrupted system BIOS.
Cooling Solutions	Air cooled forced convection
Power Supply Fans	Two 40 mm x 40 mm x 20 mm 4-wire PWM (not serviceable separately from the power supply)
System Blower	2 × 80 mm blowers require a Torx T15 screwdriver to remove.
HP PC Hardware Diagnostics UEFI	HP Vision Diagnostics utility must be booted from USB or CD, and enables you to perform testing and to view critical computer hardware and software configuration information from various sources.
Access Panel Key Lock	No
ACPI-Ready Hardware	Advanced Configuration and Power Management Interface (ACPI). <ul style="list-style-type: none"> Allows the system to wake from a low power mode.

System Technical Specifications

- Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system

Trusted Platform Module Chip	Yes
Integrated Chassis Handles	No
Power Supply	Tool-less
M.2 Card Card Retention	M.2 accessory cards screw-in with the included screw stand offs and require a Torx T8 screwdriver. WLAN/BT card screws-in with shoulder screw and requires a P1 phillips screwdriver.
Flash ROM	Present
Diagnostic Power Switch LED on board	No
Clear Password Jumper	Present
Clear CMOS Button	Present
CMOS Battery Holder	Present
DIMM Connectors	Tool-free

BIOS

BIOS 32-bit Services	Standard BIOS 32-bit Service Directory Proposal v0.4
ATAPI	ATAPI Removable Media Device BIOS Specification Version 1.0.
BBS	BIOS Boot Specification v1.01.
WMI Support	WMI is Microsoft's implementation of Web-Based Enterprise Management (WBEM) for Windows®. WMI is fully compliant with the Distributed Management Task Force (DMTF) Common Information Model (CIM) and WBEM specifications.
BIOS Boot Spec 1.01+	Provides more control over how and from what devices the workstation will boot.
BIOS Power On	Users can define a specific date and time for the system to power on.
ROM Based Computer Setup Utility (F10)	Review and customize system configuration settings controlled by the BIOS.
System/Emergency ROM Flash Recovery with Video	Recovers system BIOS in corrupted Flash ROM.
Replicated Setup	Saves BIOS settings to USB flash device in human readable file. BIOS Configuration Utility (BCU) can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup).
SMBIOS	System Management BIOS 2.7.1, for system management information.
Boot Control	Disables the ability to boot from removable media on supported devices.
Memory Change Alert	Alerts management console if memory is removed or changed.
Thermal Alert	Monitors the temperature state within the chassis. Three modes: <ul style="list-style-type: none"> • NORMAL - normal temperature ranges. • ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown. • SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.

Remote ROM Flash	Provides secure, fail-safe ROM image management from a central network console.
ACPI (Advanced Configuration and Power Management Interface)	Allows the system to enter and resume from low power modes (sleep states). Enables an operating system to control system power consumption based on the dynamic workload. Makes it possible to place individual cards and peripherals in a low-power or powered-off state without

System Technical Specifications

	affecting other elements of the system.
	Supports ACPI 4.0 for full compatibility with 64-bit operating systems.
Ownership Tag	A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.
Remote Wakeup/ Remote Shutdown	System administrators can power on, restart, and power off a client computer from a remote location.
Instantly Available PC (Suspend to RAM - ACPI sleep state S3)	Allows for very low power consumption with quick resume time.
Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)	Allows a new or existing system to boot over the network and download software, including the operating system.
ROM revision levels	Reports the system BIOS revision level in Computer Configuration Utility (F10 Setup). Version is available through an industry standard interface (SMBIOS) so that management SW applications can use and report this information.
System board revision level	Allows management SW to read revision level of the system board. Revision level is digitally encoded into the HW and cannot be modified.
Start-up Diagnostics (Power-on Self-Test)	Assesses system health at boot time with selectable levels of testing.
Auto Setup when new hardware installed	System automatically detects addition of new hardware.
Keyboard-less Operation	The system can be booted without a keyboard.
Localized ROM Setup	Common BIOS image supports System Configuration Utility (F10 Setup) menus in 14 languages with local keyboard mappings.
Asset Tag	Enables the user or IT administrator to set a unique tag string in non-volatile memory.
Per-slot Control	Allows I/O slot parameters (option ROM, enable/disable, bus latency) to be configured individually.
Adaptive Cooling	Control parameters are set according to detected hardware configuration for optimal acoustics.
Pre-boot Diagnostics	(Pre-video) critical errors are reported via beeps and blinks on the power LED.
Digitally and Cryptographically Signed BIOS	Helps to prevent the installation of unauthorized versions of a BIOS (a rogue BIOS) from a virus, malware, or other code that could lead to compromised system security, data access, physical service, or even system board replacement.
Master Boot Record Protection	A feature in the HP BIOS that prevents changes and/or infections to the Master Boot Record. Useful in protecting from viruses
Boot Block Emergency Recovery Mode (BIOS Recovery)	The HP BIOS offers a write-protected boot block ROM that provides recovery from a failed flashing of the computer BIOS. This special recovery mode prevents the system from becoming unusable or "bricked" when a BIOS update is interrupted.
Industry Standard Specification Support	
Industry Standard UEFI Specification Revision	Revision Supported by the BIOS 2.4
ACPI	Advanced Configuration and Power Management Interface, Version 4.0
ASF	Alert Standard Format Specification, Version 2.0
ATA (IDE)	AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b
CD Boot	"El Torito" Bootable CD-ROM Format Specification Version 1.0
EDD	- Enhanced Disk Drive Specification Version 1.1 - BIOS Enhanced Disk Drive Specification Version 3.0
PCI Express	- PCI Express Mini Card Electromechanical Specification Revision 1.2 - PCI Express Base Specification, Revision 2.0 - PCI Express Base Specification, Revision 3.0 - MXM Graphics Module Mobile PCI Express Module Electromechanical Specification Version 3.0, Revision 3.1

System Technical Specifications

PMM	POST Memory Manager Specification, Version 1.01
SATA	- Serial ATA Specification, Revision 1.0a - Serial ATA II: Extensions to Serial ATA 1.0, Revision 2.6 - Serial ATA II Cables and Connectors Volume 2 Gold - SATA-IO SATA Revision 3.0 Specification
SPD	PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B
TPM	Trusted Computing Group TPM Specification Version 1.2
USB	- Universal Serial Bus Revision 1.1 Specification - Universal Serial Bus Revision 2.0 Specification - Universal Serial Bus Revision 3.0 Specification - Universal Serial Bus Revision 3.1 Specification

Social and Environmental Responsibility

Eco-Label Certifications & Declarations This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- ENERGY STAR® (energy-saving features available on selected configurations-Windows® only)
- US Federal Energy Management Program (FEMP)
- IT ECO declaration

Batteries The battery in this product complies with EU Directive 2006/66/EC
Battery size: CR2032 (coin cell)
Battery type: Lithium Metal

The battery in this product does not contain:

- Mercury greater than 5ppm by weight
- Cadmium greater than 10ppm by weight
- Lead greater than 40ppm by weight

Restricted Material Usage This product meets the material restrictions specified in HP's General Specification for the Environment. <http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf>

HP is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis.

Low Halogen Statement This product is low halogen except for power cords, cables and peripherals. Service parts obtained after purchase may not be Low Halogen.

End-of-Life Management and Recycling HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <http://www.hp.com/recycle> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. This product is greater than 90% recyclable by weight when properly disposed of at end of life.

HP Corporate Environmental Information For more information about HP's commitment to the environment:
Global Citizenship Report <http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications
<http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html>

ISO 14001 certificates:
<http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html>

Additional Information

- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.

System Technical Specifications

- Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product is >90% recycle-able when properly disposed of at end of life.

EPEAT® Gold - ENERGY STAR® qualified configurations of this product are in compliance with the IEEE 1680 (EPEAT) standard at the Gold level where applicable. EPEAT registration varies by country. See <http://ww2.epeat.net/CompanyDetail.aspx?CompanyID=24> for registration status in your country. HP Workstation product packaging meets the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html

Packaging

- Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment
- Does not contain ozone-depleting substances (ODS)
- Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed
- Maximizes the use of post-consumer recycled content materials in packaging materials
- All packaging material is recyclable
- All packaging material is designed for ease of disassembly
- Reduced size and weight of packages to improve transportation fuel efficiency
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards formatting

Packaging Materials

Internal

Cushions and plastic bags made of low density polyethylene (LDPE).

External

Outer carton, accessories carton, and insert made of corrugated paper board.

Manageability

Industry Standard Specifications

This product meets the following industry standard specifications for manageability functionality:

- DASH 1.1 required functionalities via integrated Intel® LAN

Intel® Active Management Technology (AMT)

Intel® Active Management Technology (Intel® AMT) 11.0

An advanced set of remote management features and functionality which provides network administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 11.0 includes the following advanced management functions:

- Power Management (on, off, standby, reset)
- Hardware/Software Inventory (includes BIOS and firmware revisions)
- Hardware Alerting
- Agent Presence
- System Defense Filters
- Serial Over LAN (SOL)
- ME Wake-on-LAN
- DASH 1.0 compliance
- IPv6 Support
- Fast Call for Help - a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection
- Remote Scheduled Maintenance - pre-schedule when the PC connects to the IT or service provider console for maintenance. Remote PCs can get required patches, be inventoried, etc. by connecting to their IT console or Service Provider when it's convenient

System Technical Specifications

- Remote Alerts - automatically alert IT or service provider if issues arise
- Access Monitor - Provides oversight into Intel® AMT actions to support security requirements
- PC Alarm Clock
- Protected Audio Video Path (PAVP)
- Microsoft NAP Support
- Host Base set-up and configuration
- Management Engine (ME) firmware roll back
- Enhanced KVM resolution (Up to 4K)

Intel® vPro™ Technology The HP Z1 G3 features Intel® vPro™ technologies when purchased with a vPro™ technology capable CPU: Intel® Xeon® E3 5th Generation processor family or 6th Generation Intel® Core™ i5/i7 processors with Intel® VT-d/VT-x and Intel® TXT technology.

Remote Manageability Software Solutions The HP Z1 G3 Workstation is supported on the following remote manageability software consoles (sold separately):

- LANDesk Management Suite (PSG recommended solution)
- Microsoft System Center Configuration Manager

For questions or support for manageability needs, please visit <http://www.hp.com/go/easydeploy>

System Software Manager

For questions or support for SSM, please visit: <http://www.hp.com/go/ssm>

Service, Support, and Warranty

Three years parts, labor, onsite limited warranty depending on country and includes free support 24 x 7. The warranty terms vary by region and are not available in all countries. Optional Care Packs are available to extend your protection beyond the standard limited warranty. To choose the right level of extended service for your HP product, visit HP Care Pack Central: <http://www.hp.com/go/cpc>

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply.

NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

NOTE 3: Technical support applies only to HP-configured, HP and HP-qualified, third-party hardware and software. 24x7 support service may not be available in some countries.

HP Care Packs are optional extended service contracts that go beyond the standard limited warranties. Service starts from date of hardware purchase. To choose the right level of extended service for your HP product, visit HP Care Pack Central: <http://www.hp.com/go/cpc>.

Product Change Notification

- Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile.
- PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition.
- Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support.

Technical Specifications - Processors

Processors	Intel® Core™ i3-6100 3.7 2133 2C CPU
	Intel® Core™ i7-6700 3.4 2133 4C CPU
	Intel® Core™ i5-6500 3.2 2133 4C CPU
	Intel® Xeon® E3-1270 v5 3.6 2133 4C CPU
	Intel® Xeon® E3-1245 v5 3.5 2133 4C CPU
	Intel® Xeon® E3-1225 v5 3.3 2133 4C CPU

Technical Specifications - Hard Drives

SATA Hard Drives for HP Workstations	500GB SATA 7200 rpm 6Gb/s 2.5" HDD	Capacity	500,107 MB
		Height	
		Width	Media Diameter
			Physical Size
		Interface	
		Synchronous Transfer Rate (Maximum)	
		Buffer	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track Average Full Stroke
		Rotational Speed	
		Logical Blocks	
	Operating Temperature		
	1TB SATA 7200 rpm 6Gb/s 2.5" HDD	Capacity	1,000,204MB
		Height	
		Width	Media Diameter
			Physical Size
		Interface	
		Synchronous Transfer Rate (Maximum)	
		Buffer	
		Seek Time (typical reads, includes controller overhead, including settling)	Single Track Average Full Stroke
		Rotational Speed	
		Logical Blocks	
		Operating Temperature	41° to 131° F (5° to 55° C)
		Rotational Speed	7,200 rpm
		Operating Temperature	41° to 131° F (5° to 55° C)

Technical Specifications - Hard Drives

SATA SSDs for HP Workstations

HP 256GB SATA 6Gb/s SSD

Capacity	256,060 MB
Height	0.28 in; 0.7 cm
Interface	SATA 6Gb/s
Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)
Operating Temperature	32° to 158° F (0° to 70° C)

HP 256GB SATA 6Gb/s SED Opal SSD

Capacity	256,060 MB
Height	0.28 in; 0.7 cm
Width	Physical Size 2.5 in; 6.36 cm
Interface	6Gb/s SATA
Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)
Operating Temperature	32° to 158° F (0° to 70° C)

HP 512GB SATA 6Gb/s SSD

Capacity	512GB
Height	0.28 in; 0.7 cm
Width	Physical Size 2.5 in; 6.36 cm
Interface	SATA 6Gb/s
Synchronous Transfer Rate (Maximum)	Up to 500MB/s (Sequential Read)
Operating Temperature	32° to 158° F (0° to 70° C)

HP 1TB SATA 6Gb/s SSD

Capacity	1,024,209 MB
Height	0.28 in; 0.7 cm
Width	Physical Size 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)

Technical Specifications - Hard Drives

PCIe SSDs for HP Workstations

HP Z Turbo Drive G2 256GB PCIe SSD (Z1 G3)

Capacity	256GB								
Protocol	PCIe								
Form Factor	M.2 in native slot on motherboard								
Controller	NVMe								
NAND Type	MLC								
Endurance	146TB								
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	<table> <tr> <td>Sequential Read</td> <td>2150 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>1260 MB/s</td> </tr> <tr> <td>Random Read</td> <td>300K IOPS</td> </tr> <tr> <td>Random Write</td> <td>100K IOPS</td> </tr> </table>	Sequential Read	2150 MB/s	Sequential Write	1260 MB/s	Random Read	300K IOPS	Random Write	100K IOPS
Sequential Read	2150 MB/s								
Sequential Write	1260 MB/s								
Random Read	300K IOPS								
Random Write	100K IOPS								

HP Z Turbo Drive G2 512GB PCIe SSD (Z1 G3)

Capacity	512GB								
Protocol	PCIe								
Form Factor	M.2 in native slot on motherboard								
Controller	NVMe								
NAND Type	MLC								
Endurance	292TB								
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	<table> <tr> <td>Sequential Read</td> <td>2150 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>1550 MB/s</td> </tr> <tr> <td>Random Read</td> <td>300K IOPS</td> </tr> <tr> <td>Random Write</td> <td>100K IOPS</td> </tr> </table>	Sequential Read	2150 MB/s	Sequential Write	1550 MB/s	Random Read	300K IOPS	Random Write	100K IOPS
Sequential Read	2150 MB/s								
Sequential Write	1550 MB/s								
Random Read	300K IOPS								
Random Write	100K 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								
NAND Type	MLC								
Endurance	600TB								
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	<table> <tr> <td>Sequential Read</td> <td>2500 MB/s</td> </tr> <tr> <td>Sequential Write</td> <td>1550 MB/s</td> </tr> <tr> <td>Random Read</td> <td>210K IOPS</td> </tr> <tr> <td>Random Write</td> <td>130K IOPS</td> </tr> </table>	Sequential Read	2500 MB/s	Sequential Write	1550 MB/s	Random Read	210K IOPS	Random Write	130K IOPS
Sequential Read	2500 MB/s								
Sequential Write	1550 MB/s								
Random Read	210K IOPS								
Random Write	130K IOPS								

Capacity	256GB
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Technical Specifications - Hard Drives

HP Z Turbo Drive G2 256GB TLC SSD	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
HP Z Turbo Drive G2 1TB TLC SSD	Capacity	1TB	
	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 Drive Thermal Solution (Z1 G3)	Capacity	Heatsink accommodates up to 2 PCIe SSD modules	

Technical Specifications – Graphics

Integrated Intel® HD Graphics (Z1 G3)	Form Factor	Integrated in select Intel® Xeon® E3, Intel® Core™ i7, Core™ i5, Core™ i3, and Pentium® processors.
		Check specific platform specifications for selections.
	Graphics Controller	Intel® HD Graphics
	Memory	Unified Memory Architecture (UMA) frame buffer. Graphics memory is shared with system memory. Size selectable between 32 MB to 1024 MB via BIOS setting. Default size is 128 MB. Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (Intel® DVM), to provide an optimal balance between graphics and system memory use.
	Connectors	Check system platform specifications where Intel® HD Graphics are available.
	Maximum Resolution	Display Port: 3840x2160 DVI: 1920x1200 VGA: 2048x1536
		Note: For DVI and VGA outputs, separate adapters may be required.
	Shading Architecture	Shader Model 5.1
	Supported Graphics APIs	OpenGL 4.4 DirectX 12
	Available Graphics Drivers	Windows® 7 64-bit Windows® 10 64-bit

NVIDIA® Quadro® M1000M 2GB Graphics	Form Factor	MXM v3.1 Type A (82mm x 70mm)
	Graphics Controller	N16P-Q1, 993MHz core clock 512 CUDA cores
	Bus Type	PCI Express Gen 3 x16 (part of MXM v3.1 connector)
	Memory	2GB GDDR5 128bit wide interface 2500MHz, 80 GB/s
	Connectors	One MXM v3.1 connector (285-pin)
	Maximum Resolution	2 x 4096x2160 @ 60Hz digital displays + 1 x 3840x2160 @ 60Hz internal digital display In Z1 G3 application: - Internal Display: 3840x2160 - External Display via DP 1.2 connector: 4096x2160 - External Display via Thunderbolt™ 3 connector: 4096x2160
	RAMDAC	Not Applicable
	Image Quality Features	Each color component can be processed at up to 32-bit floating point precision and displayed at up to 12-bit precision. Advanced FXAA and TXAA antialiasing. 16K Texture and Render Processing. MPEG-2 HD and WMV HD video playback (1920x1080p). H.264 hardware decode acceleration. Nvidia Scalable Geometry Engine.
	Shading Architecture	Shader Model 5.0 support
	Supported Graphics APIs	Full IEEE 764-2008 32-bit DirectX 12

Technical Specifications – Graphics

Available Graphics Drivers	OpenGL 4.5 Compute API support for NVIDIA® CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python and Fortran Windows® 7 64-bit Windows® 10 64-bit SUSE Linux® Enterprise Desktop 11 64-bit Red Hat® Enterprise Linux® 6 Workstation 64-bit
Notes	See http://www.hp.com/go/support for HP supported NVIDIA graphics drivers

NVIDIA® Quadro® M2000M 4GB Graphics	Form Factor	MXM v3.1 Type A (82mm x 70mm)
	Graphics Controller	N16P-Q3, 1084MHz core clock 640 CUDA cores
	Bus Type	PCI Express Gen 3 x16 (part of MXM v3.1 connector)
	Memory	4GB GDDR5 128 bit wide interface 2500MHz, 80 GB/s
	Connectors	One MXM v3.1 connector (285-pin)
	Maximum Resolution	2 x 4096x2160 @ 60Hz digital displays + 1 x 3840x2160 @ 60Hz internal digital display In Z1 G3 application: - Internal Display: 3840x2160 - External Display via DP 1.2 connector: 4096x2160 - External Display via Thunderbolt™ 3 connector: 4096x2160
	RAMDAC	Not Applicable
	Image Quality Features	Each color component can be processed at up to 32-bit floating point precision and displayed at up to 12-bit precision. Advanced FXAA and TXAA antialiasing. 16K Texture and Render Processing. MPEG-2 HD and WMV HD video playback (1920x1080p). H.264 hardware decode acceleration. Nvidia Scalable Geometry Engine. AES-128 CTR/CBC/ECB decryption modes supported. NVIDIA® 3D Vision Pro
	Shading Architecture	Shader Model 5.0 support
	Supported Graphics APIs	Full IEEE 764-2008 32-bit DirectX 12 OpenGL 4.5 Compute API support for NVIDIA® CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python and Fortran
	Available Graphics Drivers	Windows® 7 64-bit Windows® 10 64-bit SUSE Linux® Enterprise Desktop 11 64-bit Red Hat® Enterprise Linux® 6 Workstation 64-bit
	Notes	See http://www.hp.com/go/support for HP supported NVIDIA® graphics drivers

Technical Specifications – Optical and removable storage

HP External Ultra-Slim DVD-RW Drive	Description	External 9.5mm high, tray-load	
	Mounting Orientation	Either horizontal or vertical	
	Interface Type	USB 2.0	
	Dimensions (WxHxD)	144 x 14 x 137.5mm	
	Supported Media Types	DVD-RAM DVD+R DVD+RW DVD+R DL DVD-R DL DVD-R DVD-RW CD-R CD-RW	
	Disc Capacity	DVD-ROM	8.5 GB DL or 4.7 GB standard
	Access Times	Full Stroke DVD	160ms (typical for Random Stroke)
		Full Stroke CD	140ms (typical for Random Stroke)
	Maximum Data Transfer Rates	CD ROM Read	CD-ROM, CD-R Up to 24X CD-RW Up to 24X
		DVD ROM Read	DVD-RAM Up to 8X
			DVD+RW Up to 8X
			DVD-RW Up to 8X
	DVD+R DL Up to 8X		
	Power	Source	USB 2.0 DC power
		DC Power Requirements	5 VDC ± 5%-100 mV ripple p-p
		DC Current	5 VDC -< 800 mA typical, <1600 mA maximum
		Operating Environmental (all conditions non-condensing)	Temperature
	Relative Humidity		15% to 80%
	Maximum Wet Bulb Temperature		84° F (29° C)
	Operating Systems Supported	Windows 10 32-bit and 64-bit, Windows®8 32-bit and 64-bit, Windows® 7 Professional 32-bit and 64-bit, Windows Vista Business 64*, Windows Vista Business 32*, Windows Vista Home Basic 32*, Windows 2000, Windows XP Professional or Windows XP Home 32*. Red Hat® Enterprise Linux® (RHEL) WS4**, 5, 6 Desktop/Workstation, Removed reference to "Novell" because of acquisition and changed product reference to "SUSE Linux® Enterprise Desktop 10 & 11",	
		No driver is required for this device. Native support is provided by the operating system.	
	Kit Contents	HP External Ultra-Slim DVD-RW Drive DVD Writer drive, USB 2.0 type A to mini-B cable.	
	Approvals	© Copyright 2016 HP Development Company, L.P.	

Technical Specifications – Optical and removable storage

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Technical Specifications - Networking and Communications

Integrated Intel® I219LM PCIe GbE Controller (Intel® vPro with Intel® AMT 11.0)	Connector	RJ-45
	Controller	Intel® I219LM GbE platform LAN connect networking controller
	Memory	3 KB Tx and 3KB Rx FIFO packet buffer memory
	Data Rates Supported	10/100/1000 Mbps
	Compliance	802.1as/1588, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i, 802.3u, 802.3z
	Bus Architecture	PCI Express and SMBus
	Data Transfer Mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
	Power Requirement	Requires 3.3V (integrated regulators for core Vdc)
	Boot ROM Support	Yes
	Network Transfer Mode	Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)
	Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
	Management Capabilities	vPro, WOL, auto MDI crossover, PXE, iSCSI Boot, Multi-port teaming, RSS, ACPI, Advanced cable diagnostic, loopback modes, AMT 9.0 support, Circuit Breaker, VLAN, Multicast Listener Discovery (MLD)

Optional Intel® 8260 Wireless LAN (802.11ac) and Bluetooth® 4.2 Module	Connector	M.2 (Supports 2230 form factor; E Key) Motherboard Interface
	Controller	Intel® Dual Band Wireless-AC 8260
	Compliance	Wireless LAN: IEEE 802.11abgn, 802.11ac, 802.11d, 802.11e, 802.11i, 802.11h, 802.11w, CCX 4.x/CCX Lite, WMM, WPA, WPA2, APS, WPS 2.0, Protected Management Frames Bluetooth®: Dual Mode Bluetooth® 2.1, 2.1+EDR, 3.0, 4.0, BLE, and 4.2
	Bus Architecture	PCI Express Gen3 x1 and USB 2.0
	Power Requirement	Requires 3.3V ; 1.65W TDP
	Management Capabilities	Wake on WLAN (in all sleep states, excluding Max Power Savings mode), WFA Management Frame Protection (802.11w), vPro/WiAMT Not Currently Supported, F10 BIOS Menu option to disable/enable WLAN and Bluetooth® radios, supports seamless roaming between 802.11 wireless access points
	Throughput	Max PHY throughput 887 Mbps (802.11ac) for WLAN

Summary of Changes

Date of change:	Version History:		Description of change:
June 16, 2016	From v1 to v2	Added	Hardened Mouse, M.2 Thermal Solution to PCIe storage area in Supported Components, footnote that WLAN is available as CTO only.
		Changed	Power Supply tables, update turbo freq for core i7, I217LM for I219LM in Networking and communications.
August 5, 2016	From v2 to v3	Changed	USB 3 chargin and standard order in callouts page 1
		Added	HP Z Turbo Drive G2 256, 512, and 1TB TLC SSDs
		Changed	Internal I/O note in Overview

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