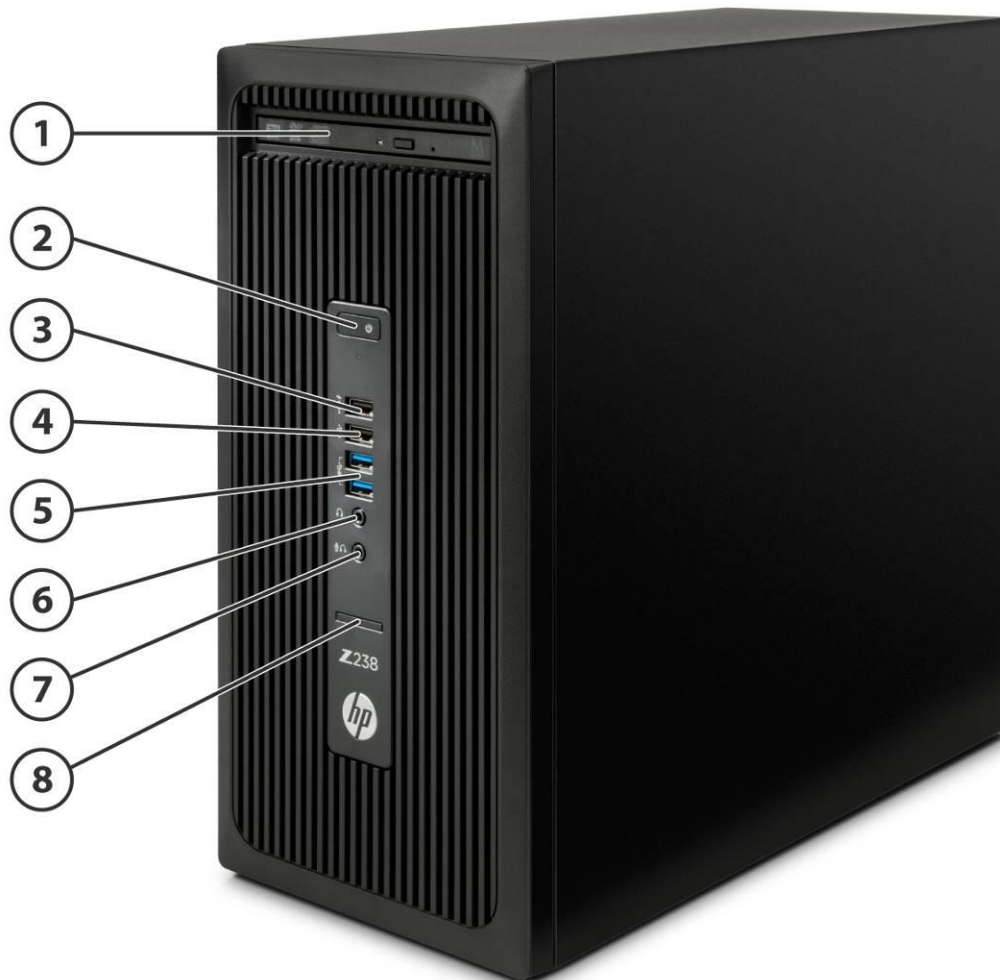


### Overview

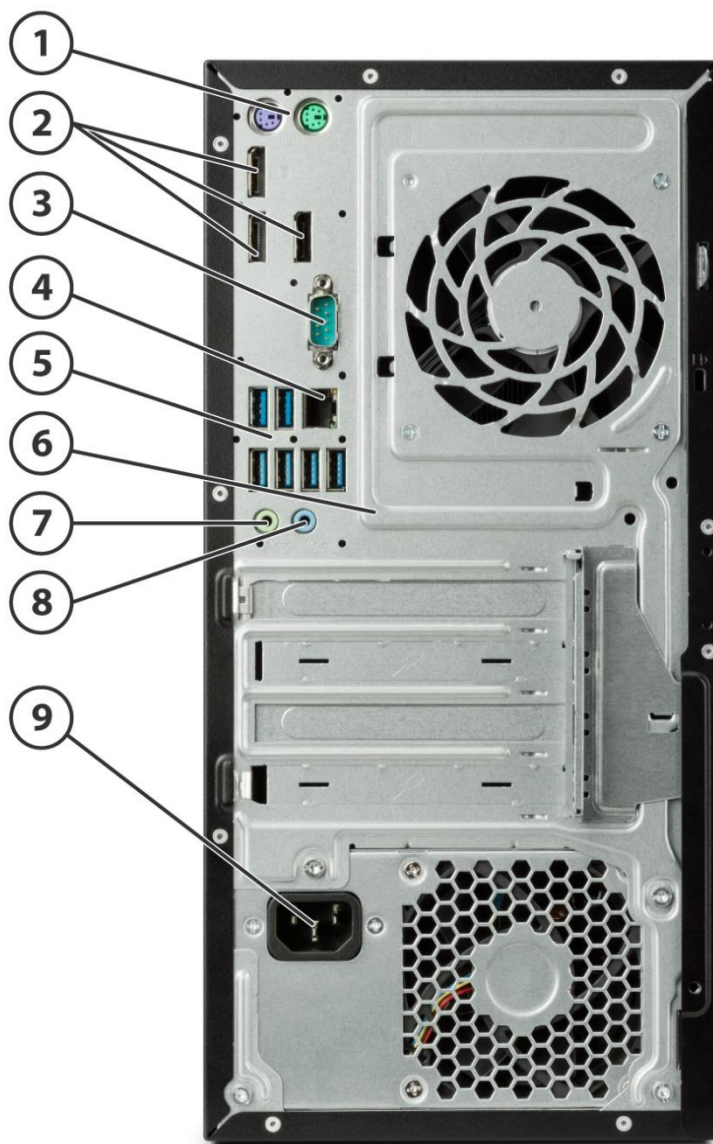
## HP Z238 Microtower Workstation



### Front View

1. Optical Drive (shown with: HP 9.5mm Slim SuperMulti DVD Writer)
2. Power button
3. USB 3.0 (charging)
4. USB 3.0
5. (2) USB 2.0
6. Headphone Jack
7. Headphone/Microphone Combo Jack
8. Optional: SD Media Card Reader

### Overview



### Back View

- |                             |                                   |
|-----------------------------|-----------------------------------|
| 1. (2) PS/2                 | 6. (2) internal 3.5" storage bays |
| 2. (3) DisplayPort (DP 1.2) | 7. 1 Audio Line-out               |
| 3. 1 Serial port (standard) | 8. 1 Audio Line-in                |
| 4. RJ-45 (LoM)              | 9. Power connector                |
| 5. (6) USB 3.0 ports        |                                   |

|                          |   |
|--------------------------|---|
| <b>Form Factor</b>       | Minitower   |
| <b>Operating Systems</b> | Preinstalled: <ul style="list-style-type: none"><li>• Windows 10 Pro 64<sup>1</sup></li></ul> |

### Overview

- Windows 10 Home 64 High End<sup>1</sup>
- Windows 10 Home 64 Chinese Market CPPP<sup>1</sup>
- Windows 7 Professional 64 (available through downgrade rights from Windows 10 Pro 64)<sup>2</sup>
- HP Linux-ready

Supported:

- Windows 10 Enterprise 64
- Windows 7 Enterprise 32/64
- Windows 7 Professional 32
- Red Hat Enterprise Linux Desktop 6, 7
- SUSE Linux Enterprise Desktop 11 SP3, 12

**NOTES:** For detailed OS/hardware support information for Linux, see:

[http://www.hp.com/support/linux\\_hardware\\_matrix](http://www.hp.com/support/linux_hardware_matrix)

<sup>1</sup> Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.microsoft.com>

<sup>2</sup> This system is preinstalled with Windows 7 Professional software and also comes with a license and media for Windows 10 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

**Note:** Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. See <http://www.microsoft.com>.

### Overview

| Processors                       |       |                   |  |            |                     |                 |                         |                                   |         |
|----------------------------------|-------|-------------------|--|------------|---------------------|-----------------|-------------------------|-----------------------------------|---------|
| Name                             | Cores | Clock Speed (GHz) | Intel® Turbo Boost Technology <sup>1</sup> | Cache (MB) | Memory Speed (MT/s) | Hyper-Threading | Integrated Graphics     | Featuring Intel® vPro™ Technology | TDP (W) |
| Intel® Xeon® E3-1240v6 processor | 4     | 3.7               | 4.1  | 8          | 2400                | Y               | N/A                     | Y                                 | 80W     |
| Intel® Xeon® E3-1230v6 processor | 4     | 3.5               | 3.9  | 8          | 2400                | Y               | N/A                     | Y                                 | 80W     |
| Intel® Xeon® E3-1225v6 processor | 4     | 3.3               | 3.7  | 8          | 2400                | N               | Intel® HD Graphics P630 | Y                                 | 80W     |
| Intel® Xeon® E3-1205v6 processor | 4     | 3.0               | N/A  | 8          | 2400                | N               | Intel® HD Graphics P630 | Y                                 | 65W     |
| Intel® Xeon® E3-1240v5 processor | 4     | 3.5               | 3.9  | 8          | 2133                | Y               | N/A                     | Y                                 | 80W     |
| Intel® Xeon® E3-1230v5 processor | 4     | 3.4               | 3.8  | 8          | 2133                | Y               | N/A                     | Y                                 | 80W     |
| Intel® Xeon® E3-1225v5 processor | 4     | 3.3               | 3.7  | 8          | 2133                | N               | Intel® HD Graphics P530 | Y                                 | 80W     |
| Intel® Core™ i7-7700 processor   | 4     | 3.6               | 4.2  | 8          | 2400                | Y               | Intel® HD Graphics 630  | Y                                 | 65W     |
| Intel® Core™ i5-7500 processor   | 4     | 3.4               | 3.8  | 6          | 2400                | N               | Intel® HD Graphics 630  | Y                                 | 65W     |
| Intel® Core™ i3-7100 processor   | 2     | 3.9               | N/A  | 3          | 2400                | N               | Intel® HD Graphics 630  | N                                 | 51W     |
| Intel® Pentium® G4560 processor  | 2     | 3.5               | N/A  | 3          | 2400                | N               | Intel® HD Graphics 630  | N                                 | 54W     |
| Intel® Core™ i7-6700 processor   | 4     | 3.4               | 4.0  | 8          | 2133                | Y               | Intel® HD Graphics 530  | Y                                 | 65W     |
| Intel® Core™ i5-6600 processor   | 4     | 3.3               | 3.9  | 6          | 2133                | N               | Intel® HD Graphics 530  | Y                                 | 65W     |
| Intel® Core™ i3-6100 processor   | 2     | 3.7               | N/A  | 3          | 2133                | N               | Intel® HD Graphics 530  | N                                 | 51W     |
| Intel® Pentium® G4400 processor  | 2     | 3.3               | N/A  | 3          | 2133                | N               | Intel® HD Graphics 510  | N                                 | 54W     |

<sup>1</sup>The specifications shown in this column represent the maximum turbo frequency with one core active. Turbo boost stepping occurs in 100MHz increments. Processors that do not have turbo functionality are denoted as N/A.

**NOTE:**In accordance with Microsoft's support policy, HP does not support the Windows® 8 or Windows® 7 operating system on products configured with Intel and AMD 7<sup>th</sup> generation and forward processors or provide any Windows® 8 or Windows® 7 drivers on <http://www.support.hp.com>

**NOTES:** Integrated Intel® HD graphics is not supported on the Intel® Xeon® Processor E3-1230v5, E3-1240v5 Intel® Xeon E3, Intel® Core i3 processors can support either ECC or non-ECC memory; Intel® Core i5/i7 processors only support non-ECC memory.

Processor numbers differentiate features within each processor family, not across different processor families. See: [http://www.intel.com/products/processor\\_number/](http://www.intel.com/products/processor_number/) for details.

### Overview

Multicore 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.

|  |  |
|--|--|
| <b>Color</b>   | Black  |
| <b>Expansion Slots (see system board section for more details)</b> | <p>1 PCIe Gen3 x16 slot<br/>                     1 PCIe Gen3 x1 slot /x1 connector<br/>                     1 PCIe Gen3 x1 slot /x1 connector<br/>                     1 PCIe Gen3 x4 slot /x16 connector</p> <p>Note: In the PCIe Gen3 x16 slot, if it is not being used for a graphics card, only cards certified as After Market Options for this platform are supported.</p>                           |
| <b>Expansion Bays (see storage section for more details)</b>       | 2 internal 3.5" bays   |
| <b>Front I/O</b>   | 2 USB 3.0, 2 USB 2.0, 1 Headphone, and 1 Microphone;   |
| <b>Internal I/O</b>  | 1 USB 3.0 and 3 USB 2.0 ports available as 2 separate 2x10(3.0 x1, 2.0 x1) and 2x5(2.0 x2) header: supports one HP Internal USB 2.0 Port Kit and one USB 3.0 Media Card Reader.  |
| <b>Rear I/O</b>  | 3 DisplayPort (DP 1.2) outputs from Intel® HD graphics (available on specific processors only); 6 USB 3.0 ports, 1 serial port (standard), 2 PS/2, RJ-45 (LoM), 1 Audio Line-in, and 1 Audio Line-out.   |
| <b>Interfaces Supported</b>  | SD Media Card Reader (optional)  |
| <b>Chassis Dimensions (H x W x D)</b>                              | Standard desktop orientation: 355 x 165 x 356 mm (14.0 x 6.5 x 14.1 in)  |
| <b>Weight</b>  | <p>Exact weights depend upon configuration;</p> <p>Minimum Weight: 6.42 kg (14.12 lb)<br/>                     Typical Weight*: 6.99 kg (15.38 lb)<br/>                     Maximum Weight: 7.9 kg (17.42 lb)</p> <p>Max Supported Weight (desktop orientation): 35 kg (77 lb)</p> <p><b>NOTE:</b> Configured with 2 3.5" hard drives, 1 optical drive, 2 DIMMs and 1 NVIDIA Quadro K620 graphics card</p> |
| <b>Temperature</b>   | <p>Operating: 40° to 95°F (5° to 35°C)<br/>                     Non-operating: -40° to 140°F (-40° to 60°C)</p> <p><b>NOTE:</b> Derate the maximum operating temperature by one degree C (1.8 degrees F) for every 305m (1,000 ft) altitude over 1,524m (5,000 ft).</p>  |
| <b>Humidity</b>  | <p>Operating: 8% to 85%<br/>                     Non-operating: 8% to 90%</p>  |
| <b>Maximum Altitude (non-pressurized)</b>                          | <p>Operating: 3,000 m (10,000 ft)<br/>                     Non-operating: 9,100 m (30,000 ft).</p>   |

### Overview

|                                       |  |
|---------------------------------------|--|
| <b>Power Supply</b>                   | 280W 85% Efficiency wide-ranging, active Power Factor Correction (PFC)<br><br>The Power Supply Efficiency Report for the 280W, 85% efficiency power supply may be found at this link: TBD  |
| <b>Backup Devices</b>                 | For a complete listing of compatible DAT tape drives, LTO tape drives and RDX Removable Disk Backup System offerings, please visit <a href="http://www.hp.com/go/connect">http://www.hp.com/go/connect</a>   |
| <b>Chipset</b>                        | Intel® C236 chipset  |
| <b>Memory</b>                         | 4 DIMM slots, supporting up to 64GB ECC/non-ECC, DDR4 2133 MT/s  |
| <b>Memory disclaimers</b>             | The CPUs determine the speed at which the memory is clocked. If a 2133 MT/s capable CPU is used in the system, the maximum speed the memory will run at is 2133 MT/s regardless of the specified speed of the memory.<br><b>NOTE:</b> Transfer rates up to 2133 MT/s |
| <b>Workstation ISV Certifications</b> | See the latest list of certifications at <a href="http://www.hp.com/united-states/campaigns/workstations/partnerships.html">http://www.hp.com/united-states/campaigns/workstations/partnerships.html</a>   |

### Supported Components

#### Processors

|  | Factory Configured | Option Kit | Support Notes |
|--|--------------------|------------|---------------|
| <b>Intel® Xeon® processor E3-1200 v6 family</b>                |                    |            |               |
| Intel® Xeon E3-1240 v6 3.7 2400 4C TWR CPU                     | Y                  | N          | Note 1,3      |
| Intel® Xeon E3-1230 v6 3.5 2400 4C TWR CPU                     | Y                  | N          | Note 1,3      |
| Intel® Xeon E3-1225 v6 3.3 2400 4C TWR CPU                     | Y                  | N          | Note 1,3      |
| Intel® Xeon E3-1205 v6 3.0 2400 4C TWR CPU                     | Y                  | N          | Note 1,3      |
| <b>Intel® Xeon® processor E3-1200 v5 family</b>                |                    |            |               |
| Intel® Xeon E3-1240 v5 3.5 2133 4C CPU                         | Y                  | N          | Note 3        |
| Intel® Xeon E3-1230 v5 3.4 2133 4C CPU                         | Y                  | N          | Note 3        |
| Intel® Xeon E3-1225 v5 3.3 2133 4C CPU                         | Y                  | N          | Note 2        |
| <b>7th generation Intel® Core™ processor family</b>            |                    |            |               |
| Intel® Core™ i7-7700 processor 3.6 2400 4C TWR CPU             | Y                  | N          | Note 4        |
| Intel® Core™ i5-7500 processor 3.4 2400 4C TWR CPU             | Y                  | N          | Note 4        |
| <b>7th generation Intel® Core™ i3 processor family</b>         |                    |            |               |
| Intel® Core™ i3-7100 processor 3.9 2400 2C TWR CPU             | Y                  | N          | Note 4        |
| <b>6th generation Intel® Core™ processor family</b>            |                    |            |               |
| Intel® Core i7-6700 3.4 2133 4C CPU                            | Y                  | N          | Note 4        |
| Intel® Core i5-6600 3.3 2133 4C CPU                            | Y                  | N          | Note 4        |
| <b>6th generation Intel® Core™ i3/Pentium processor family</b> |                    |            |               |
| Intel® Core i3-6100 3.7 2133 2C CPU                            | Y                  | N          | Note 3        |
| Intel® Pentium G4400 3.3 2133 2C CPU                           | Y                  | N          |               |

**NOTE 1:** Intel® HD Graphics P630 supports workstation-specific graphics drivers for improved compatibility and performance on select professional applications, compared to Intel® HD Graphics 630.

**NOTE 2:** Intel® HD Graphics P530 supports workstation-specific graphics drivers for improved compatibility and performance on select professional applications, compared to Intel® HD Graphics 530.

**NOTE 3:** These processors support either ECC or non-ECC memory

**NOTE 4:** These processors support only non-ECC memory

#### Monitors / Displays

|   | Factory Configured | Option Kit | Option Kit Part Number | Support Notes |
|---|--------------------|------------|------------------------|---------------|
| HP Z Display Z27n 27-inch IPS LED Backlit Monitor   |                    | Y          | K7C09A8#ABA            |               |
| HP Z Display Z25n 25-inch IPS LED Backlit Monitor   |                    | Y          | K7C01A8#ABA            |               |
| HP Z Display Z24n 24-inch IPS LED Backlit Monitor   |                    | Y          | K7B99A8#ABA            |               |
| HP Z Display Z24nq 23.8-inch IPS Backlit Monitor    |                    | Y          | L1K59A8#ABA            |               |
| HP Z Display Z24nf 23.8-inch IPS Backlit Monitor    |                    | Y          | K7C00A8#ABA            |               |
| HP Z Display Z23n 23-inch IPS LED Backlit Monitor   |                    | Y          | M2J79A8#ABA            |               |
| HP Z Display Z22n 21.5-inch IPS LED Backlit Monitor |                    | Y          | M2J71A8#ABA            |               |

### Supported Components

Supported by all Operating Systems available from HP

Screen Size Diagonally Measured

#### Hard Drives\*

##### SATA Hard Drives

|   | Factory Configured | Option Kit | Option Kit Part Number | Support Notes |
|---|--------------------|------------|------------------------|---------------|
| <b>SATA (Serial ATA) Hard Drives for HP Workstations</b>  |                    |            |                        |               |
| 500GB SATA 7200 rpm 6Gb/s 3.5" HDD  | Y                  | Y          | LQ036AA                |               |
| 1TB SATA 7200 rpm 6Gb/s 3.5" HDD  | Y                  | Y          | LQ037AA                |               |
| 2TB SATA 7200 rpm 6Gb/s 3.5" HDD  | Y                  | Y          | QB576AA                |               |
| 3TB SATA 7200 rpm 6Gb/s 3.5" HDD  | Y                  | Y          | QF298AA                |               |
| 4TB SATA 7200 rpm 6Gb/s 3.5" HDD (Enterprise Class)<br>For storage drives, GB = a billion bytes. TB = a trillion bytes. Actual formatted capacity is less. Up to 36GB (for Windows 10) of system disk is reserved for system recovery software. | Y                  | Y          | K4T76AA                |               |

##### SATA Solid State Drives\*

##### HP Solid State Drives (SSDs) for Workstations

HP 256GB SATA 6Gb/s SSD

\*For storage drives, GB = a billion bytes. TB = a trillion bytes. Actual formatted capacity is less. Up to 36GB (for Windows 10) of system disk is reserved for system recovery software.

|   |   |         |  |
|---|---|---------|--|
| Y | Y | A3D26AA |  |
|---|---|---------|--|

##### PCIe SSDs

##### PCIe SSDs for HP Workstations

|                               |   |   |         |
|-------------------------------|---|---|---------|
| HP Z Turbo Drive G2 256GB SSD | Y | Y | M1F73AA |
| HP Z Turbo Drive G2 512GB SSD | Y | Y | M1F74AA |

#### Hard Drive Controllers

##### Integrated SATA Controller (Z230)

Integrated SATA Controller, RAID 0,1 supported: 4x 6 Gb/s ports

|  | Factory Configured | Option Kit | Support Notes |
|--|--------------------|------------|---------------|
| Integrated SATA Controller (Z230)<br>Integrated SATA Controller, RAID 0,1 supported: 4x 6 Gb/s ports | Y                  | Y          |               |
| <b>Factory integrated RAID on motherboard for SATA drives</b>  |                    |            |               |
| RAID 0 Configuration – Striped Array   | Y                  | N          | See Note 1    |
| RAID 1 Configuration – Mirrored Array  | Y                  | N          | See Note 1    |
| <b>Integrated RAID for PCIe SSDs</b>   |                    |            |               |
| RAID 0 Data Configuration  | Y                  | N          | See Note 1    |
| RAID 1 Data Configuration  | Y                  | Y          | See Note 1    |



### Supported Components

SATA hardware RAID is not supported on Linux systems. The Linux kernel, with built-in software RAID, provides excellent functionality and performance. It is a good alternative to hardware-based RAID. All drives must be identical in type and capacity

**NOTE 1:** Windows OS only; Supported only with two drives of identical type and capacity

| Graphics   | Factory Configuration |   | Option Kit Part Number | Support Notes | Supported  |        |
|--|-----------------------|---|------------------------|---------------|------------|--------|
|  | Option Kit            |   |                        |               | # of cards | Mixed? |
| <b>Integrated Intel® HD Graphics Media Accelerators (Z230)</b> |                       |   |                        |               |            |        |
| Intel® HD Graphics P630  | Y                     | N |                        |               | 1          |        |
| Intel® HD Graphics 630   | Y                     | N |                        |               | 1          |        |
| Intel® HD Graphics 610   | Y                     | N |                        |               | 1          |        |
| Intel® HD Graphics P530  | Y                     | N |                        |               | 1          |        |
| Intel® HD Graphics 530   | Y                     | N |                        |               | 1          |        |
| Intel® HD Graphics 510   | Y                     | N |                        |               | 1          |        |
| <b>Professional 2D</b>   |                       |   |                        |               |            |        |
| NVIDIA® NVS™ 310 512MB Graphics*                               | Y                     | Y | A7U59AA                |               | 1          |        |
| * Can be mixed with one NVS 510                                |                       |   |                        |               |            |        |
| NVIDIA® NVS™ 315 1GB Graphics                                  | Y                     | Y | E1U66AA                |               | 1          |        |
| NVIDIA® NVS™ 510 2GB Graphics**                                | Y                     | Y | C2J98AA                |               | 1          |        |
| ** Can be mixed with NVS 310                                   |                       |   |                        |               |            |        |
| <b>Graphics Cable Adapters</b>                                 |                       |   |                        |               |            |        |
| HP DisplayPort To DVI-D Adapter                                | Y                     | Y | FH973AA                |               | 1          |        |
| HP DisplayPort To DVI-D Adapter (2-Pack)                       | Y                     | N |                        |               | 1          |        |
| HP DisplayPort To DVI-D Adapter (4-Pack)                       | Y                     | N |                        |               | 1          |        |
| HP DisplayPort To VGA Adapter                                  | Y                     | Y | AS615AA                |               | 1          |        |
| HP DisplayPort to Dual Link DVI Adapter                        | Y                     | Y | NR078AA                |               | 1          |        |
| <b>Entry 3D</b>  |                       |   |                        |               |            |        |
| AMD FirePro™ W2100 2GB Graphics                                | Y                     | Y | J3G91AA                |               | 1          |        |
| NVIDIA® Quadro® K420 2GB Graphics                              | Y                     | Y | N1T07AA                |               | 1          |        |
| NVIDIA® Quadro® K620 2GB Graphics                              | Y                     | Y | J3G87AA                |               | 1          |        |
| <b>Mid-range 3D</b>  |                       |   |                        |               |            |        |
| NVIDIA® Quadro® K1200 4GB Graphics                             | Y                     | Y | L4D16AA                |               | 1          |        |

### Supported Components

**NOTE 1:** Intermixing integrated Intel® HD graphics and discrete graphics cards in order to drive more than three displays can be enabled using the Computer (F10) Setup Utility. However, HP recommends using only discrete graphics when four or more displays are required to be supported.

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### Supported Components

#### Memory

#### Sub-Section Description/Notes

Intel® Xeon E3, Intel® Core i3 and Intel® Pentium processors can support either ECC or non-ECC memory; Intel® Core i5/i7 processors only support non-ECC memory.

#### CTO

#### Support Notes

#### DDR4-2400 ECC Unbuffered DIMMs - CTO

4GB DDR4-2400 ECC (1x4GB) RAM  
 8GB DDR4-2400 ECC (2x4GB) RAM  
 8GB DDR4-2400 ECC (1x8GB) RAM  
 16GB DDR4-2400 ECC (2x8GB) RAM  
 32GB DDR4-2400 ECC (4x8GB) RAM  
 32GB DDR4-2400 ECC (2x16GB) RAM  
 64GB DDR4-2400 ECC (4x16GB) RAM

#### DDR4-2400 nECC Unbuffered DIMMs - CTO

4GB DDR4-2400 nECC (1x4GB) RAM  
 8GB DDR4-2400 nECC (2x4GB) RAM  
 16GB DDR4-2400 nECC (2x8GB) RAM  
 32GB DDR4-2400 nECC (4x8GB) RAM  
 64GB DDR4-2400 nECC (4x16GB) RAM

#### DDR4-2133 ECC Unbuffered DIMMs - CTO

HP 4GB (1x4GB) DDR4-2133 ECC RAM  
 HP 8GB (2x4GB) DDR4-2133 ECC RAM  
 HP 8GB (1x8GB) DDR4-2133 ECC RAM  
 HP 16GB (2x8GB) DDR4-2133 ECC RAM  
 HP 32GB (4x8GB) DDR4-2133 ECC RAM  
 HP 64GB (4x16GB) DDR4-2133 ECC RAM

#### DDR4-2133 nECC Unbuffered DIMMs CTO

HP 4GB (1x4GB) DDR4-2133 nECC RAM  
 HP 8GB (2x4GB) DDR4-2133 nECC RAM  
 HP 16GB (2x8GB) DDR4-2133 nECC RAM  
 HP 32GB (4x8GB) DDR4-2133 nECC RAM  
 HP 64GB (4x16GB) DDR4-2133 nECC RAM

#### Sub-Section Description/Notes

Two channels of DDR3 memory are supported. To realize full performance at least one DIMM must be inserted into each channel.

#### AMO

#### Option Kit Part Number

#### Support Notes

#### DDR4-2400 ECC Unbuffered DIMMs - AMO

| Option Kit Part Number                        | Support Notes |
|---|---------------|
| HP 4GB (1x4GB) DDR4-2400 ECC Unbuffered RAM   | 1CA77AA       |
| HP 8GB (1x8GB) DDR4-2400 ECC Unbuffered RAM   | 1CA79AA       |
| HP 16GB (1x16GB) DDR4-2400 ECC Unbuffered RAM | 1CA75AA       |

#### DDR4-2400 non-ECC Unbuffered DIMMs - AMO

### Supported Components

|   |         |
|---|---------|
| HP 8GB (1x8GB) DDR4-2400 nECC Unbuffered RAM    | 1CA80AA |
| PROMO 4GB (1x4GB) DDR4-2400 nECC Unbuffered RAM | 1CA78AT |

#### DDR4-2133 ECC Unbuffered DIMMs - AMO

|                                    |         |
|------------------------------------|---------|
| HP 4GB (1x4GB) DDR4-2133 ECC RAM   | NOH86AA |
| HP 8GB (1x8GB) DDR4-2133 ECC RAM   | NOH87AA |
| HP 16GB (1x16GB) DDR4-2133 ECC RAM | NOH88AA |

#### DDR4-2133 non-ECC Unbuffered DIMMs - AMO

|  |         |
|--|---------|
| HP 4GB (1x4GB) DDR4-2133 non-ECC RAM   | TOE50AA |
| HP 8GB (1x8GB) DDR4-2133 non-ECC RAM   | TOE51AA |
| HP 16GB (1x16GB) DDR4-2133 non-ECC RAM | TOE52AA |

**NOTE:** Only unbuffered DDR3 DIMMs are supported.

Two channels of DDR4 memory are supported. To realize full performance at least one DIMM must be inserted into each channel.

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

**NOTE:** Transfer rates up to 2133 MT/s

**NOTE:** Factory-configured CTO (xxxxxAV) and aftermarket AMO (xxxxxAA, xxxxxAT) HP memory part numbers designated as “2133” will be transitioned to using 2400MHz speed memory components. This does not affect HP part number availability nor does it affect system performance or operation. All hardware configurations currently supporting HP memory part numbers designated as “2133” have been tested to work with 2400MHz memory and are fully-supported by HP under standard support terms.

### Multimedia and Audio Devices

|                                    | Factory Configured | Option Kit | Option Kit Part Number | Support Notes |
|------------------------------------|--------------------|------------|------------------------|---------------|
| Integrated Realtek HD ALC221 Audio | Y                  | N          |                        |               |

### Optical and Removable Storage

|                                     | Factory Configured | Option Kit | Option Kit Part Number | Support Notes |
|-------------------------------------|--------------------|------------|------------------------|---------------|
| HP 9.5mm Slim DVD-ROM Drive         | Y                  | Y          | K3R63AA                |               |
| HP 9.5mm Slim SuperMulti DVD Writer | Y                  | Y          | K3R64AA                |               |
| HP 15-in-1 Media Card Reader        | Y                  | Y          |                        |               |

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™1 with Intel® AMT 11.0) | Y                  | Y          |                        |                |
| Intel® Ethernet I210-T1 PCIe NIC  | Y                  | Y          | E0X95AA                | See Notes 3, 4 |

**NOTE 1:** The integrated network connection is required to support Intel® vPro Technology.

**NOTE 2:** If AMT is enabled network teaming with the integrated LAN port is not possible.

**NOTE 3:** "Gigabit" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/sec. For high speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

**NOTE 4:** The Intel® Ethernet I210-T1 PCIe NIC is supported on the following operating systems:

- Microsoft Windows 7 and Windows 8 32-bit and 64-bit versions
- Red Hat Enterprise Linux(RHEL)
- SLED 11.

#### Input Devices

|                                | Factory Configured | Option Kit | Option Kit Part Number | Support Notes |
|--------------------------------|--------------------|------------|------------------------|---------------|
| HP USB 1000dpi Laser Mouse     | Y                  | Y          | QY778AA                |               |
| HP USB Optical 3-Button Mouse  | Y                  | Y          | DY651A                 |               |
| HP USB Optical Mouse           | Y                  | Y          | QY777AA                |               |
| HP PS/2 Mouse                  | Y                  | Y          | QY775AA                |               |
| HP USB Business Slim Keyboard  | Y                  | Y          | N3R87AA                |               |
| HP PS/2 Business Slim Keyboard | Y                  | Y          | N3R86AA                |               |

#### Other Hardware

|                        | Factory Configured | Option Kit | Option Kit Part Number | Support Notes |
|------------------------|--------------------|------------|------------------------|---------------|
| HP Power Cord Kit      | N                  | Y          | DM293A                 |               |
| HP Serial Port Adapter | Y                  | Y          | PA716A                 |               |

#### Software

|                                       | Factory Configured | Option Kit | Support Notes   |
|---------------------------------------|--------------------|------------|-----------------|
| HP Performance Advisor                | Y                  | N          | See Note 1      |
| HP Remote Graphics Software (RGS) 7.1 | Y                  | Y          |                 |
| PDF Complete - Corporate Edition      | Y                  | N          |                 |
| HP PC Hardware Diagnostics UEFI       | Y                  | N          | Windows OS only |
| HP Client Security Software           | Y                  | Y          |                 |

**NOTE 1:** Supports, and preinstalled with, Windows 7 and Windows 8 only. Also available as a free download from <http://www.hp.com/go/performanceadvisor>

**NOTE 2:** Supported Operating Systems:

### Supported Components

- [Windows 7 Professional](#)
- [Windows 10 Pro](#)

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### Operating Systems

Windows® 7 Professional 64-bit

Red Hat Enterprise Linux (RHEL) Workstation -  
Paper License (1yr)

Windows 10 Pro 64

Windows 10 Pro downgrade to Windows 7  
Professional 64

Windows 10 Home 64

### Support Notes

See <http://www.microsoft.com/windows/windows-7/>  
for support details.

See <http://www.redhat.com/rhel/desktop/>

### Environmental

| <b>System Board</b>                     |  |             |  |                             |      |                        |  |                            |   |
|---|--|-------------|--|-----------------------------|------|------------------------|--|----------------------------|---|
| <b>System Board Form Factor</b>         | ATX 24.38 x 24.38 mm (9.6 x 9.6 inches)  |             |  |                             |      |                        |  |                            |   |
| <b>Processor Socket</b>                 | Single LGA 1151  |             |  |                             |      |                        |  |                            |   |
| <b>CPU Bus Speed</b>                    | DMI  |             |  |                             |      |                        |  |                            |   |
| <b>Chipset</b>                          | Intel® PCH C236  |             |  |                             |      |                        |  |                            |   |
| <b>Memory Expansion Slots</b>           | 4 DDR4 memory slots  |             |  |                             |      |                        |  |                            |   |
| <b>Memory Type Supported</b>            | DDR4, UDIMM (Unbuffered), ECC & non-ECC  |             |  |                             |      |                        |  |                            |   |
| <b>Memory Modes</b>                     | Non-Interleaved for single channel. Interleaved when both channels are populated.  |             |  |                             |      |                        |  |                            |   |
| <b>Memory Speed Supported</b>           | 2133MHz DDR4   |             |  |                             |      |                        |  |                            |   |
| <b>Memory Protection</b>                | ECC available on data  |             |  |                             |      |                        |  |                            |   |
| <b>Maximum Memory</b>                   | 64GB   |             |  |                             |      |                        |  |                            |   |
| <b>Memory Configuration (Supported)</b> | 4GB, 8GB and 16GB non-ECC/ 4GB, 8GB and 16GB ECC unbuffered DIMMs are supported. ECC and non-ECC memory DIMMs cannot be mixed on the same system.<br><br><b>NOTES:</b> Maximum memory capacities assume 64-bit operating systems, such as Genuine Windows® 7 Professional 64-Bit or Red Hat Linux 64-bit. 32-bit Windows Operating Systems support up to 4 GB.   |             |  |                             |      |                        |  |                            |   |
| <b>Supported Drive Interfaces</b>       | <table border="1"> <tbody> <tr> <td><b>SATA</b></td> <td>Integrated (4) Serial ATA interfaces (6Gb/s SATA). One port can optionally be used for eSATA. RAID 0 and 1 supported. Factory integrated RAID is Microsoft Windows only.</td> </tr> <tr> <td><b>Serial Attached SCSI</b></td> <td>None</td> </tr> <tr> <td><b>Integrated RAID</b></td> <td>NOTE: Requires identical hard drives (speeds, capacity, interface)</td> </tr> <tr> <td><b>Integrated Graphics</b></td> <td>Intel® HD Graphics 530 (on Core i3/i5/i7-6xxx processors); Intel® HD Graphics P530 (on Intel® Xeon E3-12x5v5 processors).<br/>Based on Unified Memory Architecture (UMA)- A region of system memory is reserved and dedicated to the graphics display.</td> </tr> </tbody> </table> | <b>SATA</b> | Integrated (4) Serial ATA interfaces (6Gb/s SATA). One port can optionally be used for eSATA. RAID 0 and 1 supported. Factory integrated RAID is Microsoft Windows only. | <b>Serial Attached SCSI</b> | None | <b>Integrated RAID</b> | NOTE: Requires identical hard drives (speeds, capacity, interface) | <b>Integrated Graphics</b> | Intel® HD Graphics 530 (on Core i3/i5/i7-6xxx processors); Intel® HD Graphics P530 (on Intel® Xeon E3-12x5v5 processors).<br>Based on Unified Memory Architecture (UMA)- A region of system memory is reserved and dedicated to the graphics display. |
| <b>SATA</b>                             | Integrated (4) Serial ATA interfaces (6Gb/s SATA). One port can optionally be used for eSATA. RAID 0 and 1 supported. Factory integrated RAID is Microsoft Windows only.   |             |  |                             |      |                        |  |                            |   |
| <b>Serial Attached SCSI</b>             | None   |             |  |                             |      |                        |  |                            |   |
| <b>Integrated RAID</b>                  | NOTE: Requires identical hard drives (speeds, capacity, interface)   |             |  |                             |      |                        |  |                            |   |
| <b>Integrated Graphics</b>              | Intel® HD Graphics 530 (on Core i3/i5/i7-6xxx processors); Intel® HD Graphics P530 (on Intel® Xeon E3-12x5v5 processors).<br>Based on Unified Memory Architecture (UMA)- A region of system memory is reserved and dedicated to the graphics display.  |             |  |                             |      |                        |  |                            |   |

### Environmental

|  |  |   |
|--|--|---|
|  |  | Support for Microsoft DirectX 11, OpenGL 4.0 and OpenCL 1.2 on Intel® HD Graphics P530;<br>3 DP 1.2 graphics ports integrated on motherboard; Supports up to three simultaneous displays across DP outputs.<br>Max. resolution supported: 3840x2160 @60Hz |
|  | <b>Network Controller</b>  | Integrated Ethernet PHY Connection I217LM. Management capabilities: WOL, PXE 2.1 and AMT 11.0   |
|  | <b>Serial</b>  | 1 rear port   |
|  | <b>2nd Serial</b>  | Yes- requires optional Serial Port Adapter Kit  |
| <b>IEEE 1394 Connector(s)</b>                              |  |   |
| <b>USB Connector(s)</b>                                    | <b>Front</b>   | 2 USB 3.0, 2 USB 2.0  |
|  | <b>Rear</b>  | 6 USB 3.0   |
|  | <b>Internal</b>  | 1 USB 3.0, 1 USB 2.0  |
| <b>HD Integrated Audio</b>                                 | Yes  |   |
| <b>Flash ROM</b>   | Yes  |   |
| <b>Chassis Fan Header</b>                                  | 1 Rear System Chassis Fan  |   |
| <b>Front Control Panel/Speaker Header</b>                  | Yes  |   |
| <b>CMOS Battery Holder - Lithium</b>                       | Yes  |   |
| <b>Integrated Trusted Platform Module</b>                  | Integrated TPM 1.2.  |   |
| <b>Power Supply Headers</b>                                | Yes  |   |
| <b>Power Switch, Power LED &amp; Hard Drive LED Header</b> | Yes  |   |
| <b>Clear Password Jumper</b>                               | Yes  |   |
| <b>Keyboard/Mouse</b>                                      | USB or PS/2  |   |
|  | 280W, 85% efficiency, wide-ranging, active PFC Power Supply<br>The Z238 85% PSU Efficiency Report can be found at this link: TBD |   |
| <b>Operating Voltage Range</b>                             | 90-264 VAC   |   |



### Environmental

|   |  |
|---|--|
| <b>Rated Voltage Range</b>  | 100–240 VAC  |
| <b>Rated Line Frequency</b>   | 50–60 Hz   |
| <b>Operating Line Frequency Range</b>   | 47–63 Hz   |
| <b>Rated Input Current</b>  | 4A @ 100-240V  |
| <b>Heat Dissipation</b>   | Heat Dissipation   |
| <b>Power Supply Fan</b>   | Power Supply Fan   |
| <b>FEMP Standby Power Compliant</b>   | FEMP Standby Power Compliant   |
| <b>Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)</b> | Surge Tolerant Full Ranging Power Supply (withstands power surges up to 2000V)         |
| <b>ErP Lot 6- Tier 2 Compliance @ 230V (&lt;0.5W in S5- Power Off)</b>                | ErP Lot 6- Tier 2 Compliance @ 230V (<0.5W in S5- Power Off)                           |
| <b>Declared Noise Emissions (Entry-level and High-end configurations)</b>             | Declared Noise Emissions (Entry-level and High-end configurations)                     |
| <b>System Configuration (Entry level)</b>   | System Configuration (Entry level)   |
|   | <b>Memory Info</b>   |
| <b>System Configuration (High-end)</b>  |  |
| <b>Environmental Requirements</b>   |  |
| <b>Temperature</b>  | Operating: 40° to 95° F (5° to 35° C)<br>Non-operating: -40° to 140° F (-40° to 60° C) |
| <b>Humidity</b>   | Operating: 8% to 85% RH, non-condensing<br>Non-operating: 8% to 90% RH, non-condensing |
| <b>Maximum Altitude</b>   | Operating: 10,000 feet (3,000 m)<br>Non-operating: 30,000 feet (9,100 m)               |

### Environmental

|   |   |
|---|---|
| <b>Dynamic(new)</b>                                     | <p>Shock</p> <p>Operating: ½-sine: 40g, 2-3ms</p> <p>Non-operating:</p> <p>    ½-sine: 160 cm/s, 2-3ms (~100g)</p> <p>    square: 422 cm/s, 20g</p> <p>Vibration</p> <p>Operating random: 0.5g (rms), 5-300 Hz</p> <p>Non-operating random: 2.0g (rms), 10-500 Hz</p> <p><b>NOTES:</b> Values represent individual shock events and do not indicate repetitive shock events. Values do not indicate continuous vibration.</p> |
| <b>Cooling</b>  | Above 5,000 ft (1524 m) altitude, maximum operating temperature is de-rated by 1.8° F (1° C) per 1,000 ft (305 m) elevation increase  |
| <b>Physical Security and Serviceability</b>             |   |
| <b>Access Panel</b>                                     | Tool-less<br>Includes system board and memory information   |
| <b>Hard Drives</b>                                      | Tool-less (Internal bays)   |
| <b>Expansion Cards</b>                                  | Tool-less   |
| <b>Processor Socket</b>                                 | Tool-less, except for the processor heatsink.   |
| <b>Access Panel</b>                                     | Tool-less<br>Includes system board and memory information   |
| <b>Hard Drives</b>                                      | Tool-less (Internal bays)   |
| <b>Expansion Cards</b>                                  | Tool-less   |
| <b>Processor Socket</b>                                 | Tool-less, except for the processor heatsink.   |
| <b>Green User Touch Points</b>                          | Yes, on tool-free internal chassis mechanisms   |
| <b>Color-coordinated Cables and Connectors</b>          | Yes   |
| <b>Memory</b>   | Tool-less   |
| <b>System Board</b>                                     | Screw-In  |
| <b>Dual Color Power and HD LED on Front of Computer</b> | Yes   |
| <b>Configuration Record SW</b>                          | Yes   |

### Environmental

|   |   |
|---|---|
| <b>Over-Temp Warning on Screen</b>  | Yes   |
| <b>Restore CD/DVD Set</b>   | Consists of an operating system DVD (OSDVD) and a driver DVD (DRDVD). OSDVD restores the original operating system. DRDVD will provide all drivers for the system. The DRDVD may also contain applications that originally shipped with the system for optional installation. Applications can also be obtained from HP.com. OSDVD and DRDVD are orderable with the system and available from HP Support. |
| <b>Dual Function Front Power Switch</b>                                   | Yes, causes a fail-safe power off when held for 4 seconds   |
| <b>Padlock Support</b>  | Yes (optional): Locks side cover and secures chassis from theft<br>0.22-in diameter padlock loop at rear of system  |
| <b>Cable Lock Support</b>   | Yes, Kensington Cable Lock (optional): Locks side cover and secures chassis from theft<br>3 mm x 7 mm slot at rear of system  |
| <b>Universal Chassis Clamp Lock Support</b>                               | Yes (optional): Locks side cover and locks cables to chassis. Secures chassis from theft and allows multiple units to be chained together when used with optional cable<br>Threaded feature at rear of system   |
| <b>Rear Port Control Cover</b>  | Yes, locks rear IO cables to prevent cable theft  |
| <b>Serial, Parallel, USB, Audio, Network, Enable/Disable Port Control</b> | Yes, enables or disables serial, parallel, USB, audio, and network ports  |
| <b>Removable Media Write/Boot Control</b>                                 | Yes, prevents ability to boot from removable media on supported devices (and can disable writes to media)   |
| <b>Power-On Password</b>  | Yes, prevents an unauthorized person from booting up the workstation  |
| <b>Setup Password</b>   | Yes, prevents an unauthorized person from changing the workstation configuration  |
| <b>NIC LEDs (integrated) (Green &amp; Amber)</b>                          | Yes   |
| <b>CPUs and Heatsinks</b>   | 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  |
| <b>Power Supply Diagnostic LED</b>  | No  |
| <b>Front Power Button</b>   | Yes, ACPI multi-function  |
| <b>Front Power LED</b>  | Yes, blue (normal), red (fault)   |

### Environmental

|   |   |
|---|---|
| <b>Front Hard Drive Activity LED</b>        | Yes, green  |
| <b>Front ODD Activity LED</b>               | Yes   |
| <b>Internal Speaker</b>                     | Yes   |
| <b>System/Emergency ROM Flash Recovery</b>  | Recovers corrupted system BIOS.   |
| <b>Cooling Solutions</b>                    | Air cooled forced convection  |
| <b>Power Supply Fans</b>                    | 80mm x 80mm x 25mm 4-wire PWM (non-serviceable)   |
| <b>CPU Heatsink Fan</b>                     | Mainstream (<=65W): 92mm x 92mm 52.5mm<br>Performance (<=95W): 94mm x 100.2mm x 110mm   |
| <b>Chassis Fan</b>                          | 92mm x 92mm x 25mm 4-wire PWM (non-serviceable).  |
| <b>Memory Heatsink Fan</b>                  | No  |
| <b>HP PC Hardware Diagnostics UEFI</b>      | HP PC Hardware Diagnostics (UEFI) enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support.  |
| <b>Access Panel Key Lock</b>                | No  |
| <b>ACPI-Ready Hardware</b>                  | Advanced Configuration and Power Management Interface (ACPI).<br><ul style="list-style-type: none"> <li>• Allows the system to wake from a low power mode.</li> <li>• 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</li> </ul> |
| <b>Trusted Platform Module Chip</b>         | Yes   |
| <b>Integrated Chassis Handles</b>           | No  |
| <b>Power Supply</b>                         | Requires T15 Torx or flat blade screwdriver   |
| <b>PCI Card Retention</b>                   | Yes, rear (all), middle (none), front (none)  |
| <b>Flash ROM</b>                            | Yes   |
| <b>Diagnostic Power Switch LED on board</b> | Yes   |
| <b>Clear Password Jumper</b>                | Yes   |

### Environmental

|   |  |
|---|--|
| <b>Clear CMOS Button</b>                              | Yes  |
| <b>CMOS Battery Holder</b>                            | Yes  |
| <b>DIMM Connectors</b>                                | Yes  |
| <b>BIOS</b>   |  |
| <b>BIOS 32-bit Services</b>                           | Standard BIOS 32-bit Service Directory Proposal v0.4   |
| <b>PCI 3.0 Support</b>                                | Full BIOS support for PCI Express through industry standard interfaces.  |
| <b>ATAPI</b>  | ATAPI Removable Media Device BIOS Specification Version 1.0.   |
| <b>BBS</b>  | BIOS Boot Specification v1.01.<br>Provides more control over how and from what devices the workstation will boot.  |
| <b>WMI Support</b>                                    | 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.  |
| <b>BIOS Power On</b>                                  | Users can define a specific day-of-week and time for the system to power on.   |
| <b>ROM Based Computer Setup Utility (F10)</b>         | Review and customize system configuration settings controlled by the BIOS.   |
| <b>System/Emergency ROM Flash Recovery with Video</b> | Recovers system BIOS in corrupted Flash ROM.   |
| <b>Replicated Setup</b>                               | Saves BIOS settings to USB flash device in human readable file. Repset.exe utility can then replicate these settings on machines being deployed without entering Computer Configuration Utility (F10 Setup).   |
| <b>SMBIOS</b>   | System Management BIOS 2.7.1, for system management information.   |
| <b>Boot Control</b>                                   | Disables the ability to boot from removable media on supported devices.  |
| <b>Memory Change Alert</b>                            | Alerts management console if memory is removed or changed.   |
| <b>Thermal Alert</b>                                  | Monitors the temperature state within the chassis. Three modes: <ul style="list-style-type: none"> <li>• NORMAL - normal temperature ranges.</li> <li>• ALERTED - excessive temperatures are detected. Raises a flag so action can be taken to avoid shutdown or provide for a smoother system shutdown.</li> <li>• SHUTDOWN - excessive temperatures are encountered. Automatically shuts down the computer without warning before hardware component damage occurs.</li> </ul> |
| <b>Remote ROM Flash</b>                               | Provides secure, fail-safe ROM image management from a central network console.<br>Updates can be performed before starting the OS.<br>Updates can be periodically scheduled.  |
|   |  |

### Environmental

|   |   |
|---|---|
| <b>ACPI (Advanced Configuration and Power Management Interface)</b>           | 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 affecting other elements of the system. Supports ACPI 4.0 for full compatibility with 64-bit operating systems. |
| <b>Ownership Tag</b>  | A user-defined string stored in non-volatile memory that is displayed in the BIOS splash screen.  |
| <b>Remote Wakeup/Remote Shutdown</b>  | System administrators can power on, restart, and power off a client computer from a remote location.  |
| <b>ASF 2.0 Compliant</b>  | No.   |
| <b>Instantly Available PC (Suspend to RAM - ACPI sleep state S3)</b>          | Allows for very low power consumption with quick resume time.   |
| <b>Remote System Installation via F12 (PXE 2.1) (Remote Boot from Server)</b> | Allows a new or existing system to boot over the network and download software, including the operating system.   |
| <b>ROM revision levels</b>  | 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.  |
| <b>System board revision level</b>  | Allows management SW to read revision level of the system board. Revision level is digitally encoded into the HW and cannot be modified.  |
| <b>Start-up Diagnostics (Power-on Self-Test)</b>                              | Assesses system health at boot time with selectable levels of testing.  |
| <b>Auto Setup when new hardware installed</b>                                 | System automatically detects addition of new hardware.  |
| <b>Keyboard-less Operation</b>  | The system can be booted without a keyboard.  |
| <b>Localized ROM Setup</b>  | Common BIOS image supports System Configuration Utility (F10 Setup) menus in 12 languages with local keyboard mappings.   |
| <b>Asset Tag</b>  | The user or IT administrator to set a unique tag string in non-volatile memory.   |
| <b>Per-slot Control</b>   | Allows I/O slot parameters (option ROM enable/disable) to be configured individually.   |
| <b>Adaptive Cooling</b>   | Control parameters are set according to detected hardware configuration for optimal acoustics.  |
| <b>Pre-boot Diagnostics</b>   | (Pre-video) critical errors are reported via beeps and blinks on the power LED.   |

### Environmental

|   |   |
|---|---|
| <b>Intel® Active Management Technology (AMT)</b>          | AMT 11.0; Allows workstation status to be monitored on a remote console   |
| <b>Digitally and Cryptographically Signed BIOS</b>        | 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.     |
| <b>Master Boot Record Protection</b>                      | A feature in the HP BIOS that prevents changes and/or infections to the Master Boot Record. Useful in protecting from viruses.  |
| <b>Boot Block Emergency Recovery Mode (BIOS Recovery)</b> | 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. |
| <b>Industry Standard Specification Support</b>            |   |
| <b>Industry Standard</b>                                  | Revision Supported by the BIOS  |
| <b>UEFI Specification Revision</b>                        | UEFI 2.4.0  |
| <b>ACPI</b>   | Advanced Configuration and Power Management Interface, Version 4.0  |
| <b>ASF</b>  | Alert Standard Format Specification, Version 2.0  |
| <b>ATA (IDE)</b>  | AT Attachment 6 with Packet Interface (ATA/ATAPI-6), Revision 3b  |
| <b>CD Boot</b>  | "El Torito" Bootable CD-ROM Format Specification Version 1.0  |
| <b>EDD</b>  | - Enhanced Disk Drive Specification Version 1.1<br>- BIOS Enhanced Disk Drive Specification Version 3.0   |
| <b>EHCI</b>   | Enhanced Host Controller Interface for Universal Serial Bus, Revision 1.0   |
| <b>PCI</b>  | PCI Local Bus Specification, Revision 2.3<br>PCI Power Management Specification, Revision 1.1<br>PCI Firmware Specification, Revision 3.0   |
| <b>PCI Express</b>  | PCI Express Base Specification, Revision 2.0;<br>PCI Express Base Specification, Revision 3.0.  |
| <b>PMM</b>  | POST Memory Manager Specification, Version 1.01   |
| <b>SATA</b>   | - Serial ATA Specification, Revision 1.0a<br>- Serial ATA II: Extensions to Serial ATA 1.0, Revision 1.0a<br>- Serial ATA II Cables and Connectors Volume 2 Gold<br>- SATA-IO SATA Revision 3.0 Specification                                 |
| <b>SPD</b>  | PC SDRAM Serial Presence Detect (SPD) Specification, Revision 1.2B  |

### Environmental

|            |   |
|------------|---|
|            |   |
| <b>TPM</b> | Trusted Computing Group TPM Specification Version 1.2   |
| <b>USB</b> | Universal Serial Bus Revision 1.1 Specification<br>Universal Serial Bus Revision 2.0 Specification<br>Universal Serial Bus Revision 3.0 Specification |

|                                   |                         |  |
|-----------------------------------|-------------------------|--|
| <b>Environmental Requirements</b> | <b>Temperature</b>      | Operating: 40° to 95° F (5° to 35° C)<br>Non-operating: -40° to 140° F (-40° to 60° C)   |
|                                   | <b>Humidity</b>         | Operating: 8% to 85% RH, non-condensing<br>Non-operating: 8% to 90% RH, non-condensing   |
|                                   | <b>Maximum Altitude</b> | Operating: 3,000 m (10,000 ft)<br>Non-operating: 9,100 m (30,000 ft)   |
|                                   | <b>Dynamic (new)</b>    | Shock<br>Operating: ½-sine: 40g, 2-3ms<br>Non-operating:<br>½-sine: 160 cm/s, 2-3ms (~100g)<br>square: 422 cm/s, 20g<br><br>Vibration<br>Operating random: 0.5g (rms), 5-300 Hz<br>Non-operating random: 2.0g (rms), 10-500 Hz<br><br><b>NOTES:</b> Values represent individual shock events and do not indicate repetitive shock events. Values do not indicate continuous vibration. |
|                                   | <b>Cooling</b>          | Above 1524 m (5,000 ft) altitude, maximum operating temperature is de-rated by 1.8° F (1° C) per 305 m (1000 ft) elevation increase  |



### Environmental

| <b>Social and Environmental Responsibility</b>     |   |
|--|---|
| <b>Eco-Label Certifications &amp; Declarations</b> | <p>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:</p> <ul style="list-style-type: none"> <li>ENERGY STAR® (energy-saving features available on selected configurations-Windows only)</li> <li>US Federal Energy Management Program (FEMP)</li> <li>China Energy Conservation Program</li> <li>IT ECO declaration</li> </ul>   |
| <b>Batteries</b>                                   | <p>The battery in this product complies with EU Directive 2006/66/EC<br/>           Battery size: CR2032 (coin cell)<br/>           Battery type: Lithium Metal</p> <p>The battery in this product does not contain:</p> <ul style="list-style-type: none"> <li>Mercury greater than 5ppm by weight</li> <li>Cadmium greater than 10ppm by weight</li> <li>Lead greater than 40ppm by weight</li> </ul>   |
| <b>Restricted Material Usage</b>                   | <p>This product meets the material restrictions specified in HP's General Specification for the Environment. <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf">http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf</a><br/>           HP Inc. 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.</p>   |
| <b>Low Halogen Statement</b>                       | <p>This product is low halogen except for power cords, cables and peripherals, as well as the following customer-configurable internal components: Creative Recon3D PCIe Audio Card is not Low Halogen. Service parts obtained after purchase may not be Low Halogen.</p>   |
| <b>End-of-Life Management and Recycling</b>        | <p>HP Inc. offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: <a href="http://www.hp.com/recycle">http://www.hp.com/recycle</a> 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.</p>  |
| <b>HP Inc. Corporate Environmental Information</b> | <p>For more information about HP's commitment to the environment:<br/>           Global Citizenship Report <a href="http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html">http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html</a></p> <p>Eco-label certifications<br/> <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html">http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html</a></p> <p>ISO 14001 certificates:<br/> <a href="http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html">http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html</a></p> |
| <b>Additional Information</b>                      | <ul style="list-style-type: none"> <li>This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.</li> <li>Plastic parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.</li> <li>This product is &gt;90% recycle-able when properly disposed of at end of life</li> <li>EPEAT Gold registered in the U.S. EPEAT registration varies by country. See <a href="http://www.epeat.net">http://www.epeat.net</a> for registration status by country.</li> </ul>   |
| <b>Packaging</b>                                   | <p>HP Workstation product packaging meets the HP General Specification for the Environment at <a href="http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html">http://www.hp.com/hpinfo/globalcitizenship/society/gen_specifications.html</a></p> <ul style="list-style-type: none"> <li>Does not contain restricted substances listed in HP Standard 011-1 General Specification for the Environment</li> </ul>  |

### Environmental

|                            |   |
|----------------------------|---|
|                            | <ul style="list-style-type: none"> <li>• Does not contain ozone-depleting substances (ODS)</li> <li>• Does not contain heavy metals (lead, mercury, cadmium or hexavalent chromium) in excess of 100 ppm sum total for all heavy metals listed</li> <li>• Maximizes the use of post-consumer recycled content materials in packaging materials</li> <li>• All packaging material is recyclable</li> <li>• All packaging material is designed for ease of disassembly</li> <li>• Reduced size and weight of packages to improve transportation fuel efficiency</li> <li>• Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards formatting</li> </ul> |
| <b>Packaging Materials</b> |   |
| <b>Internal</b>            | Cushions made from fabricated recycled expanded-polyethylene (EPE) or recycled expanded-polypropylene (EPP). May also be made from recycled molded paper-pulp (MPP).  |
| <b>External</b>            | Carton made from corrugated fiberboard with at least 25% recycled content.  |

### Technical Specifications – Storage / Hard Drives

| <b>Manageability</b>                             |   |
|--|---|
| <b>Intel® Active Management Technology (AMT)</b> | <p>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 8.0 includes the following advanced management functions:</p> <ul style="list-style-type: none"> <li>• Power Management (on, off, reset)</li> <li>• Hardware Inventory (includes BIOS and firmware revisions)</li> <li>• Hardware Alerting</li> <li>• Agent Presence</li> <li>• System Defense Filters</li> <li>• SOL/IDER</li> <li>• Cisco NAC/SDN Support</li> <li>• ME Wake-on-LAN</li> <li>• DASH 1.1 compliance</li> <li>• IPv6 Support</li> <li>• 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</li> <li>• 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</li> <li>• Remote Alerts - automatically alert IT or service provider if issues arise</li> <li>• Access Monitor - Provides oversight into Intel® AMT actions to support security requirements</li> <li>• PC Alarm Clock</li> <li>• Microsoft NAP Support</li> <li>• Host Base set-up and configuration</li> <li>• Management Engine (ME) firmware roll back</li> <li>• Wireless AMT functionality on Desktop (WoDT)</li> <li>• Enhanced KVM resolution</li> </ul> |
| <b>Intel® vPro™ Technology</b>                   | The HP Z230 workstations support Intel® vPro technology when purchased with a vPro technology capable CPU: Intel® Xeon® processor E3-1200v3 family or 4th Generation Intel® Core i5/i7 processors with Intel® VT and Intel® TXT technology  |
| <b>Remote Manageability Software Solutions</b>   | Visit: <a href="http://www.hp.com/go/easydeploy">http://www.hp.com/go/easydeploy</a>  |
| <b>System Software Manager</b>                   | Visit: <a href="http://www.hp.com/go/ssm">http://www.hp.com/go/ssm</a>  |
| <b>Service, Support, and Warranty</b>            | <ul style="list-style-type: none"> <li>• Program to proactively communicate Product Change Notifications (PCNs) and Customer Advisories by email to customers, based on a user-defined profile.</li> <li>• PCNs provide advance notification of hardware and software changes to be implemented in the factory providing time to plan for transition.</li> <li>• Customer Advisories provide concise, effective problem resolution, greatly reducing the need to call technical support</li> </ul> <p>As part of its commitment to hardware, software, and solution innovation, HP is proud to introduce this breakthrough platform configuration stability to HP Workstation customers. HP Stable &amp; Consistent Offerings are built on the foundation of a carefully chosen set of hardware and software designed and tested to work with all HP Z Workstation platforms through their end of life. These components and their corresponding HP Workstation platform compatibility are outlined in this section. HP Stable &amp; Consistent Offerings are available worldwide to all HP Workstation customers—no special programs, no additional cost—no kidding. Simply select your hardware and software components when you customize your HP Workstation and be assured that you'll be able to buy that same configuration throughout the lifecycle of the product.</p>   |

### Technical Specifications – Storage / Hard Drives

|   |   |  |                                   |                       |                |
|---|---|--|-----------------------------------|-----------------------|----------------|
| <b>SATA Hard Drives for HP Workstations</b> | <b>500GB SATA 7200 rpm<br/>6Gb/s 3.5" HDD</b> | <b>Capacity</b>  | 500GB                             |                       |                |
|   |   | <b>Height</b>  | 1 in; 2.54 cm                     |                       |                |
|   |   | <b>Width</b>   |                                   | <b>Media Diameter</b> | 3.5 in; 8.9 cm |
|   |   |  |                                   | <b>Physical Size</b>  | 4 in; 10.17 cm |
|   |   | <b>Interface</b>   | Serial ATA (6.0Gb/s), NCQ enabled |                       |                |
|   |   | <b>Synchronous Transfer Rate (Maximum)</b>   | Up to 600MB/s                     |                       |                |
|   |   | <b>Buffer</b>  | 16MB                              |                       |                |
|   |   | <b>Seek Time (typical reads, includes controller overhead, including settling)</b> | <b>Single Track</b>               | 2 ms                  |                |
|   |   |  | <b>Average</b>                    | 11 ms                 |                |
|   |   |  | <b>Full Stroke</b>                | 21 ms                 |                |
|   |   | <b>Rotational Speed</b>  | 7,200 rpm                         |                       |                |
|   |   | <b>Logical Blocks</b>  | 976,773,168                       |                       |                |
|   |   | <b>Operating Temperature</b>   | 41° to 131° F (5° to 55° C)       |                       |                |

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|  |   |  |                                   |                       |                |
|--|---|--|-----------------------------------|-----------------------|----------------|
|  | <b>1TB SATA 7200 rpm<br/>6Gb/s 3.5" HDD</b> | <b>Capacity</b>  | 1 Terabyte (1000 GB)              |                       |                |
|  |   | <b>Height</b>  | 1 in; 2.54 cm                     |                       |                |
|  |   | <b>Width</b>   |                                   | <b>Media Diameter</b> | 3.5 in; 8.9 cm |
|  |   |  |                                   | <b>Physical Size</b>  | 4 in; 10.17 cm |
|  |   | <b>Interface</b>   | Serial ATA (6.0Gb/s), NCQ enabled |                       |                |
|  |   | <b>Synchronous Transfer Rate (Maximum)</b>   | Up to 600 MB/s                    |                       |                |
|  |   | <b>Buffer</b>  | 32MB                              |                       |                |
|  |   | <b>Seek Time (typical reads, includes controller overhead, including settling)</b> | <b>Single Track</b>               | 2 ms                  |                |
|  |   |  | <b>Average</b>                    | 11 ms                 |                |
|  |   |  | <b>Full Stroke</b>                | 21 ms                 |                |
|  |   | <b>Rotational Speed</b>  | 7,200 rpm                         |                       |                |
|  |   | <b>Logical Blocks</b>  | 1,953,525,168                     |                       |                |
|  |   | <b>Operating Temperature</b>   | 41° to 131° F (5° to 55° C)       |                       |                |

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|  |   |   |                                    |                       |                |
|--|---|---|------------------------------------|-----------------------|----------------|
|  | <b>2.0TB SATA 7200 rpm<br/>6Gb/s 3.5" HDD</b> | <b>Capacity</b>                                       | 2TB                                |                       |                |
|  |   | <b>Height</b>   | 1 in; 2.54 cm                      |                       |                |
|  |   | <b>Width</b>  |                                    | <b>Media Diameter</b> | 3.5 in; 8.9 cm |
|  |   |   |                                    | <b>Physical Size</b>  | 4 in; 10.17 cm |
|  |   | <b>Interface</b>                                      | Serial ATA (6.0 Gb/s), NCQ Enabled |                       |                |
|  |   | <b>Synchronous Transfer Rate (Maximum)</b>            | Up to 600MB/s                      |                       |                |
|  |   | <b>Buffer</b>   | 64MB                               |                       |                |
|  |   | <b>Seek Time (typical reads, includes controller)</b> | <b>Single Track</b>                | 1.0 ms                |                |
|  |   |   | <b>Average</b>                     | 11 ms                 |                |
|  |   |   | <b>Full Stroke</b>                 | 18 ms                 |                |

### Technical Specifications – Storage / Hard Drives

overhead, including settling)

|                              |                             |
|------------------------------|-----------------------------|
| <b>Rotational Speed</b>      | 7,200 rpm                   |
| <b>Logical Blocks</b>        | 3,907,029,168               |
| <b>Operating Temperature</b> | 41° to 131° F (5° to 55° C) |

#### 3.0TB SATA 7200 rpm 6Gb/s 3.5" HDD

|  |                                       |
|--|---------------------------------------|
| <b>Capacity</b>  | 3.0TB                                 |
| <b>Height</b>  | 1 in; 2.54 cm                         |
| <b>Width</b>   | <b>Media Diameter</b> 3.5 in; 8.9 cm  |
|  | <b>Physical Size</b> 4.0 in; 10.17 cm |
| <b>Interface</b>   | Serial ATA (6.0Gb/s), NCQ enabled     |
| <b>Synchronous Transfer Rate (Maximum)</b>   | Up to 6.0 Gb/s                        |
| <b>Buffer</b>  | 64MB                                  |
| <b>Seek Time</b> (typical reads, includes controller overhead, including settling) | <b>Single Track</b> 0.6 ms            |
|  | <b>Average</b> 11 ms                  |
|  | <b>Full Stroke</b> Not specified      |
| <b>Rotational Speed</b>  | 7200 rpm                              |
| <b>Operating Temperature</b>   | 41° to 140° F (5° to 60° C)           |

#### 4TB SATA 7200 rpm 6Gb/s 3.5" HDD

|  |                                      |
|--|--------------------------------------|
| <b>Capacity</b>  | 4TB                                  |
| <b>Height</b>  | 1 in; 2.54 cm                        |
| <b>Width</b>   | <b>Media Diameter</b> 3.5 in; 8.9 cm |
|  | <b>Physical Size</b> 4 in; 10.17 cm  |
| <b>Interface</b>   | Serial ATA (6Gb/s)                   |
| <b>Synchronous Transfer Rate (Maximum)</b>   | Up to 600MB/s                        |
| <b>Buffer</b>  | 32MB                                 |
| <b>Seek Time</b> (typical reads, includes controller overhead, including settling) | <b>Single Track</b> 0.7ms            |
|  | <b>Average</b> 8.5ms                 |
|  | <b>Full Stroke</b> 15.7ms            |
| <b>Rotational Speed</b>  | 7,200 rpm                            |
| <b>Operating Temperature</b>   | 5° to 60° F (-15° to 15.56° C)       |

### Technical Specifications – Storage / Hard Drives

|  |                                   |  |   |
|--|-----------------------------------|--|---|
| <b>HP Solid State Drives (SSDs) for Workstations</b> | <b>HP 256GB SATA 6Gb/s SSD</b>    | <b>Capacity</b>                            | 256GB                                     |
|  |                                   | <b>Height</b>                              | 0.28 in; 0.7 cm                           |
|  |                                   | <b>Interface</b>                           | SATA 6Gb/s                                |
|  |                                   | <b>Synchronous Transfer Rate (Maximum)</b> | Up to 500MB/s (Sequential Read)           |
|  |                                   | <b>Operating Temperature</b>               | 32° to 158° F (0° to 70° C)               |
| <b>PCIe SSDs for HP Workstations</b>                 | <b>HP Z Turbo Drive 256GB SSD</b> | <b>Capacity</b>                            | 256GB                                     |
|  |                                   | <b>Interface</b>                           | PCI Express 2.0 x4 electrical x4 physical |
|  |                                   | <b>Operating Temperature</b>               | 32° to 158° F (0° to 70° C)               |
|  | <b>HP Z Turbo Drive 512GB SSD</b> | <b>Capacity</b>                            | 512GB                                     |
|  |                                   | <b>Interface</b>                           | PCI Express 2.0 x4 electrical x4 physical |
|  |                                   | <b>Operating Temperature</b>               | 32° to 158° F (0° to 70° C)               |

### Technical Specifications - Graphics

|   |                                   |   |
|---|-----------------------------------|---|
| <b>Integrated Intel® HD Graphics (Z240)</b> | <b>Form Factor</b>                | <p>Integrated in select Intel® Xeon E3, Intel® Core i7, and Intel® Core i5 processors.</p> <p>Check specific platform specifications for selections.</p>  |
|   | <b>Graphics Controller</b>        | Intel® HD Graphics  |
|   | <b>Memory</b>                     | <p>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 5.0), to provide an optimal balance between graphics and system memory use.</p> |
|   | <b>Connectors</b>                 | Check system platform specifications where Intel® HD Graphics are available.  |
|   | <b>Maximum Resolution</b>         | <p>Display Port: 2560 x 1600<br/>           DVI: 1920x1200<br/>           VGA: 2048x1536</p> <p>Note: For DVI and VGA outputs, separate adapters may be required.</p>   |
|   | <b>Shading Architecture</b>       | Shader Model 5.0  |
|   | <b>Supported Graphics APIs</b>    | <p>OpenGL 4.0<br/>           DirectX 11.1</p>   |
|   | <b>Available Graphics Drivers</b> | <p>Windows 10<br/>           Windows 7</p>  |
|   | <b>Form Factor</b>                | <p>Integrated in select Intel® Xeon E3, Intel® Core i7, and Intel® Core i5 processors.</p> <p>Check specific platform specifications for selections.</p>  |
|   | <b>Graphics Controller</b>        | Intel® HD Graphics  |
|   | <b>Memory</b>                     | <p>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 5.0), to provide an optimal balance between graphics and system memory use.</p> |
|   | <b>Connectors</b>                 | Check system platform specifications where Intel® HD Graphics are available.  |
|   | <b>Maximum Resolution</b>         | <p>Display Port: 2560 x 1600<br/>           DVI: 1920x1200<br/>           VGA: 2048x1536</p>  |

### Technical Specifications - Graphics

Note: For DVI and VGA outputs, separate adapters may be required.

|                                   |                            |
|-----------------------------------|----------------------------|
| <b>Shading Architecture</b>       | Shader Model 5.0           |
| <b>Supported Graphics APIs</b>    | OpenGL 4.0<br>DirectX 11.1 |
| <b>Available Graphics Drivers</b> | Windows 10<br>Windows 7    |

#### NVIDIA NVS 310 512MB Graphics

|                               |   |
|-------------------------------|---|
| <b>Form Factor</b>            | Low Profile:<br>2.713 inches in height × 6.150 inches in length |
| <b>Graphics Controller</b>    | NVIDIA NVS 310  |
| <b>Bus Type</b>               | PCI Express x16, 2.0 compliant                                  |
| <b>Memory</b>                 | Size: 512MB DDR3<br>Clock: 875Mhz<br>Memory Bandwidth: 14GB/s   |
| <b>Connectors</b>             | 2 x DisplayPort 1.2   |
| <b>Maximum Resolution</b>     | Up to 2560 x 1600 (digital display) per display.                |
| <b>Image Quality Features</b> | See Display Output section.                                     |

The following video formats are supported:

- MPEG2
- MPEG4 Part 2 Advanced Simple Profile
- H.264 SVC codec support
- Support for 3D Blu Ray
- VC1
- DivX version 3.11 and later
- MVC

A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS 310 GPU provides hardware acceleration for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.

|                       |   |
|-----------------------|---|
| <b>Display Output</b> | Up to 2 displays in the following configurations: |
|-----------------------|---|

DisplayPort output:

- Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card
- Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort 1.2 multi stream topology technology.

DVI-D output:



### Technical Specifications - Graphics

- Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors
- Drives two digital display at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors

#### HDMI output:

- NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors

#### VGA display output:

- Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

|                                   |   |
|-----------------------------------|---|
| <b>Shading Architecture</b>       | Shader Model 5.0  |
| <b>Supported Graphics APIs</b>    | DX11, OpenGL 4.1  |
| <b>Available Graphics Drivers</b> | Windows 8.1<br>Windows 8<br>Genuine Windows 7 Professional (64-bit and 32-bit)<br>Microsoft Windows XP Professional (64-bit and 32-bit)<br>Red Hat Enterprise Linux(RHEL)<br>SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit) |

HP qualified drivers may be preloaded or the latest HP qualified drivers are available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

SUSE Linux Enterprise drivers may also be obtained from:

<ftp://download.nvidia.com/novell> or <http://www.nvidia.com>

#### **Power Consumption Note**

19.5 Watts

1. The thermal solution used on this card is an active fan heatsink.
2. Factory configured NVS 310 graphics card have no cable adapters included. Adapters must be ordered separately.
3. Option kit NVS 310 includes 2 DP to DVI-D cable adapters.
4. Configurations of three NVS 310 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

#### **NVIDIA NVS 315 1GB Graphics (for HP Workstations)**

|                            |  |
|----------------------------|--|
| <b>Form Factor</b>         | Low Profile:<br>2.713 inches in height × 5.7 inches in length  |
| <b>Graphics Controller</b> | NVIDIA NVS 315 (using GF119-825 GPU)<br>Number of Cores: 48 CUDA cores<br>Max. Power: 19.3W<br>Cooling Solution: Active fan heatsink |
| <b>Bus Type</b>            | PCI Express x16, 2.0 compliant   |

### Technical Specifications - Graphics

|                                |  |
|--------------------------------|--|
| <b>Memory</b>                  | Size: 1GB DDR3<br>Clock: 875Mhz<br>Memory Bandwidth: 14GB/s  |
| <b>Connectors</b>              | DMS-59 output  |
| <b>Maximum Resolution</b>      | Cables included:<br>- For CTO: DMS-59 to DVI cable<br>- For AMO: DMS-59 to DVI cable and DMS-59 to VGA cable<br>Maximum number of displays supported: 2<br><br>Maximum Resolution Support:<br><br>- DMS-59 to VGA: 2048 x 1536 @ 85Hz<br>- DMS-59 to DVI: 1980 x 1200 @ 60Hz<br>- DMS-59 to DP: 2560 x 1600 @ 60Hz   |
| <b>Image Quality Features</b>  | See Display Output section.<br><br>The following video formats are supported:<br><br>- MPEG2<br>- MPEG4 Part 2 Advanced Simple Profile<br>- H.264 SVC codec support<br>- Support for 3D Blu Ray<br>- VC1<br>- DivX version 3.11 or later<br><br>A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i. The NVS 315 GPU provides hardware acceleration for the computationally intensive parts of video processing, as well as provides improved video playback speeds via faster decode and transcode.   |
| <b>Display Output</b>          | Up to 2 displays in the following configurations:<br><br>DisplayPort output: <ul style="list-style-type: none"><li>• Drives two DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected via the DMS-59 to DP adapter.</li></ul> DVI-D output: <ul style="list-style-type: none"><li>• Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DMS-59 to DVI-D single-link cable adaptor</li></ul> VGA display output: <ul style="list-style-type: none"><li>• Drives two analog display at resolutions up to 2048 × 1536 at 85 Hz using DMS-59 to VGA cable adaptor.</li></ul> |
| <b>Shading Architecture</b>    | Shader Model 5.0   |
| <b>Supported Graphics APIs</b> | DX11, OpenGL 4.3   |

### Technical Specifications - Graphics

#### Available Graphics Drivers

Microsoft Windows 8  
 Microsoft Windows 7 Professional (64-bit and 32-bit)  
 Microsoft Windows XP Professional (64-bit and 32-bit)  
 Red Hat Enterprise Linux(RHEL)  
 SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)

HP qualified drivers may be preloaded or the latest HP qualified drivers are available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

SUSE Linux Enterprise drivers may also be obtained from:

<ftp://download.nvidia.com/novell> or <http://www.nvidia.com>

#### Notes

1. The thermal solution used on this card is an active fan heatsink. Factory configured graphics card includes DMS-59 to DVI cable.
2. Option kit graphics card includes DMS-59 to DVI and DMS-59 to VGA cables (one each).
3. Configurations of three NVS 315 graphics cards in HP Z440 Workstation require the HP Z440 Fan and Front Card Guide Kit, configurable from the factory (CTO PN: G8T99AV) or as an Aftermarket Option (AMO PN: J9P80AA).

#### NVIDIA NVS 510 2GB Graphics

#### Form Factor Graphics Controller

Low Profile, 2.713 inches × 6.3 inches, single slot

NVS 510 GPU  
 Core Clock: 797 Mhz  
 Memory Clock: 891 Mhz  
 CUDA Cores: 192

#### Bus Type

PCI Express x16, Generation 2.0

#### Memory

2GB DDR3

#### Connectors

Four mini-DisplayPort.  
 Four mini-DisplayPort to DisplayPort adapters included.  
 (DisplayPort to DVI-D, DisplayPort to VGA, DisplayPort to HDMI, and DisplayPort to Dual-Link DVI adapters available as separate accessories)

#### Maximum Resolution

Mini-DisplayPort connectors support ultra-high-resolution panels (up to 3840 x 2160 @ 60Hz)

**NOTE:** This card supports up to four displays. For Windows XP, only 2 active displays are supported.

#### Image Quality Features

10-bit internal display processing, including hardware support for 10-bit scan-out

#### Display Output

DisplayPort with Multi-Stream Technology (MST) and High Bit Rate 2 (HBR2) support.

Digital Display Support

#### 1. DisplayPort Output

- Drives four DisplayPort enabled digital display at resolutions up to 3840 × 2160 at 60 Hz with reduced blanking, when connected natively using the 4 DisplayPort connectors on the NVS 510 graphics card.
- DisplayPort Multi-Stream Topology (MST) Technology: Supports various combinations of display resolutions and number of displays when using

### Technical Specifications - Graphics

DisplayPort multi stream topology technology - up to a maximum of 4 monitors at a resolution of 1920 × 1200 at 60 Hz with reduced blanking.

#### 2. DVI-D Output

- Drives four digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors.
- Drives four digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors.

#### 3. HDMI Output

- The NVS 510 graphics board is capable of driving four high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors.

#### Analog Display Support

##### 1. VGA display output

- Drives four analog displays at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors.

#### Supported Graphics APIs

Full Microsoft DirectX 11, Shader Model 5.0 support  
Full OpenGL 4.3 support

#### Available Graphics Drivers

Genuine Windows 7 Professional (64-bit and 32-bit)  
Microsoft Windows XP Professional (64-bit and 32-bit)  
Red Hat Enterprise Linux(RHEL) 6 Desktop/Workstation  
SUSE Linux Enterprise Desktop 11 (64-bit and 32-bit)

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

#### Power Consumption Note

33.4 Watts  
Heatsink cooler design is active.

#### Graphics Cable Adapters Notes

Graphics Cable Adapter option choice is available starting Feb 1 2013 for the following graphics cards:

NVS 310, Quadro 410, Qaudro K5000, FirePro V3900, FirePro W7000

New Graphics Cards introduced after Feb 1 2013 will be eligible for choosing Graphics Cable Adapters, unless otherwise specified.

No cable choice for NVS 300, NVS 510.

Maximum number of cables allowed is 8.

#### AMD FirePro W2100 2GB Graphics Form Factor

Low Profile, half length (full-height bracket included)

#### Graphics Controller

AMD FirePro™ W2100 professional graphics based on Oland GPU.  
GPU: 320 Stream Processors organized into 5 Compute Units  
GPU Frequency: 630Mhz  
Power: 26W  
Cooling: Active

### Technical Specifications - Graphics

|                                   |  |
|-----------------------------------|--|
| <b>Bus Type</b>                   | PCI Express® x8, Generation 3.0  |
| <b>Memory</b>                     | 2GB DDR3 memory<br>Memory Bandwidth: up to 28.8 GB/s<br>Memory Width: 128 bit  |
| <b>Connectors</b>                 | 2x Display Port 1.2 connectors<br><br>Factory Configured: No video cable adapter included<br>After market option kit: No video cable adapter included<br><br>Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.                              |
| <b>Maximum Resolution</b>         | DisplayPort 1.2:<br>- up to 4096x2160 x 24 bpp @ 60Hz<br><br>Dual Link DVI(I) (requires adapter cable):<br>- up to 2560 x 1600 x 32 bpp @ 60Hz<br><br>Single Link-DVI(I)(requires adapter cable):<br>- up to 1920 x 1200 x 32 bpp @ 60Hz<br><br>VGA (requires adapter cable):<br>- up to 1920 x 1200 x 32 bpp @ 60Hz     |
| <b>Image Quality Features</b>     | Advanced support for 8-bit, 10-bit, and 16-bit per RGB color component. High bandwidth scaler for high quality up and downscaling.   |
| <b>Display Output</b>             | 2 x DisplayPort® 1.2a<br>Maximum number of displays: 2   |
| <b>Shading Architecture</b>       | Shader Model 5.0   |
| <b>Supported Graphics APIs</b>    | OpenCL™ 1.2, DirectX® 11.2/12, OpenGL 4.4<br><br>OpenGL 4.4 support with driver release 14.301.xxx<br>OpenCL 1.2 conformance expected with drive release 14.301.xxx  |
| <b>Available Graphics Drivers</b> | Windows 8.1 (64-bit and 32-bit)<br>Windows 7 (64-bit and 32-bit)<br>Linux<br><br>HP qualified drivers may be preloaded or available from the HP support Web site:<br><a href="http://welcome.hp.com/country/us/en/support.html">http://welcome.hp.com/country/us/en/support.html</a>                                     |
| <b>Notes</b>                      | Depending on the card model, native DisplayPort™ connectors and/or certified DisplayPort™ active or passive adapters to convert your monitor's native input to your card's DisplayPort™ or Mini-DisplayPort™ connector(s) may be required. See <a href="http://www.amd.com/firepro">www.amd.com/firepro</a> for details. |

### Technical Specifications - Graphics

|  |                               |   |
|--|-------------------------------|---|
| <b>NVIDIA Quadro K420 2GB Graphics</b> | <b>Form Factor</b>            | Low Profile, single slot<br>Dimensions: 2.713 inches × 6.3 inches<br>Cooling: Active  |
|  | <b>Graphics Controller</b>    | NVIDIA Quadro K420<br>GPU: GK107 with 192 CUDA cores<br>Power: 41W  |
|  | <b>Bus Type</b>               | PCI Express x16, 2.0 compliant  |
|  | <b>Memory</b>                 | Size: 2GB DDR3<br>Clock: 891MHz<br>Memory Bandwidth: 29GB/s<br>Memory Width: 128 bit  |
|  | <b>Connectors</b>             | One dual-link DVI-I connector<br>One DisplayPort connector<br><br>Factory Configured: No video cable adapter included<br>After market option kit: One DP-to-DVI adapter included with card<br><br>Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories.          |
|  | <b>Maximum Resolution</b>     | VGA (via adapter cable):<br>- 2048 × 1536 × 32 bpp at 85 Hz<br><br>Dual-link DVI<br>- 2560 × 1600 × 32 bpp at 60 Hz (reduced blanking)<br><br>Single-link DVI<br>- 1920 × 1200 × 32 bpp at 60 Hz (reduced blanking)<br><br>DisplayPort 1.2<br>- 3840 × 2160 × 30 bpp at 60 Hz   |
|  | <b>Image Quality Features</b> | 12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)<br><br>Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo   |
|  | <b>Display Output</b>         | Maximum number of displays:<br>- 2 direct attached monitors<br>- 4 using DP 1.2a with MST and HBR2 enabled monitors<br><br>Maximum number of DisplayPort displays possible (may require MST and/or HBR2):<br>- 4 1920x1200<br>- 2 2560x1600<br>- 1 3840x2160<br>Maximum number of monitors across all available Quadro K420 outputs is 4. |

### Technical Specifications - Graphics

|                                   |   |
|-----------------------------------|---|
| <b>Shading Architecture</b>       | Shader Model 5.0  |
| <b>Supported Graphics APIs</b>    | DX11, OpenGL 4.4<br>Programming support for CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Python, and Fortran  |
| <b>Available Graphics Drivers</b> | Microsoft Windows 8.1<br>Microsoft Windows 8<br>Microsoft Windows 7<br>Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions  |
| <b>Notes</b>                      | <ol style="list-style-type: none"> <li>1. Factory configured Quadro K420 does not include any video adapters. Adapters must be ordered separately.</li> <li>2. Option kit Quadro K420 includes one DP to DVI-D adapter.</li> <li>3. Full Height Profile bracket installed. Low Profile bracket included in after market kit.</li> </ol> |

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|  |                            |  |
|--|----------------------------|--|
| <b>NVIDIA Quadro K620 2GB Graphics</b> | <b>Form Factor</b>         | Dimensions: 2.713" H x 6.3" L<br>Single Slot, Low Profile<br>Cooling: Active<br>Weight: 133 grams  |
|  | <b>Graphics Controller</b> | NVIDIA Quadro K620<br>GPU: GM107 GPU with 384 CUDA cores<br>Power: 45 Watts  |
|  | <b>Bus Type</b>            | PCI Express 2.0 x16  |
|  | <b>Memory</b>              | Size: 2GB GDDR3<br>Memory Bandwidth: 29 GB/s<br>Memory Width: 128-bit  |
|  | <b>Connectors</b>          | 1 DL-DVI(I)<br>1 DisplayPort<br><br>Factory Configured: No video cable adapter included<br>After market option kit: One DP-to-DVI adapter included with card<br><br>Additional DVI-to-VGA, DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as Factory Configuration or Option Kit accessories. |
|  | <b>Maximum Resolution</b>  | DisplayPort 1.2:<br>- up to 4096x2160 x 30 bpp @ 60Hz<br>- supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)<br><br>Dual Link DVI(I) output:<br>- up to 2560 x 1600 x 32 bpp @ 60Hz<br><br>Single Link-DVI(I) output:<br>- up to 1920 x 1200 x 32 bpp @ 60Hz                                    |

### Technical Specifications - Graphics

VGA (via adapter cable):  
- 2048 × 1536 × 32 bpp at 85 Hz

**Image Quality Features** 12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)

Stereoscopic 3D display support including NVIDIA® 3D Vision™ technology, 3D DLP, Interleaved, and passive stereo

**Display Output** Maximum number of displays:  
- 2 direct attached monitors  
- 4 using DP 1.2a with MST and HBR2 enabled monitors

Maximum number of DisplayPort displays possible (may require MST and/or HBR2):  
- 4 1920x1200  
- 2 2560x1600  
- 1 4096x2160

Maximum number of monitors across all available Quadro K620 outputs is 4.

**Shading Architecture** Shader Model 5.0

**Supported Graphics APIs** OpenGL 4.4  
DirectX 11

API support includes:  
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

**Available Graphics Drivers** Microsoft Windows 8.1  
Microsoft Windows 8  
Microsoft Windows 7  
Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

**Notes**

1. Factory configured Quadro K620 does not include a video cable adapter. Video cable adapters must be ordered separately.
2. Quadro K620 offered as an Option Kit (AMO) includes one DP-to-DVI video cable adapter. Additional cables must be ordered separately.
3. Full Height Profile bracket installed. Low Profile bracket included in aftermarket kit.

**NVIDIA Quadro K1200  
4GB Graphics**

**Form Factor**

Dimensions: 2.71" H x 6.875" L  
Single Slot, Low Profile



### Technical Specifications - Graphics

|                                |   |
|--------------------------------|---|
|                                | Cooling: Active<br>Weight: ~175 grams   |
| <b>Graphics Controller</b>     | NVIDIA Quadro K1200 Graphics Card<br>GPU: GM107 with 512 CUDA cores<br>Power: 46 Watts  |
| <b>Bus Type</b>                | PCI Express 2.0 x16   |
| <b>Memory</b>                  | Size: 4GB GDDR5<br>Memory Bandwidth: 80 GB/s<br>Memory Width: 128-bit   |
| <b>Connectors</b>              | 4 mini-DisplayPort 1.2a<br><br>Factory Configured Option: 4 mini-DP-to-DP adapters included with card<br>Option Kit: 4 mini-DP-to-DP adapters included with card<br><br>Additional DisplayPort-to-VGA or DisplayPort-to-DVI adapters are available as accessories   |
| <b>Maximum Resolution</b>      | DisplayPort:<br>- up to 4096 x 2160 x 30 bpp @ 60Hz<br>- supports High Bit Rate 2 (HBR2) and Multi-Stream Transport (MST)<br><br>DL-DVI(I) output:<br>- up to 2560 x 1600 x 32 bpp @ 60Hz<br><br>Single Link-DVI(I) output:<br>- up to 1920 x 1200 x 32 bpp @ 60Hz<br><br>VGA (via adapter cable):<br>- 2048 x 1536 x 32 bpp at 85 Hz |
| <b>Image Quality Features</b>  | 12-bit internal display pipeline (hardware support for 12-bit scanout on supported panels, applications and connection)   |
| <b>Display Output</b>          | Maximum number of displays<br>- 4 direct attached monitors<br><br>Maximum number of DisplayPort displays possible:<br>- 4 1920x1200<br>- 4 2560x1600<br>- 4 4096x2160<br><br>Maximum number of monitors across all available Quadro K1200 outputs is 4.   |
| <b>Shading Architecture</b>    | Shader Model 5.0  |
| <b>Supported Graphics APIs</b> | OpenGL 4.4<br>DirectX 11.1  |

### Technical Specifications - Graphics

API support includes:  
CUDA C, CUDA C++, DirectCompute 5.0, OpenCL, Java, Python, and Fortran

#### **Available Graphics Drivers**

Microsoft Windows 8.1  
Microsoft Windows 8  
Microsoft Windows 7  
Linux - Full OpenGL implementation, complete with NVIDIA and ARB extensions

HP qualified drivers may be preloaded or available from the HP support Web site:

<http://welcome.hp.com/country/us/en/support.html>

#### **Notes**

1. Quadro K1200 offered as Factory Configured Option includes 4 miniDP to DP video cable adapters. Other video cable adapters must be ordered separately.
  2. Quadro K1200 offered as an Option Kit includes 4 mini-DP to DP adapters. Additional cables must be ordered separately.
  3. A total maximum of 4 active monitors are supported across all display output types. This may be accomplished by using daisy chained DisplayPort 1.2 displays (displays must support MST and HBR2).
-

### Technical Specifications - Optical and Removable Storage

|   |                                     |  |
|---|-------------------------------------|--|
| <b>Description</b>  | 9.5mm height, tray-load             |  |
| <b>Mounting Orientation</b>                                       | Either horizontal or vertical       |  |
| <b>Interface Type</b>   | SATA / ATAPI                        |  |
| <b>Dimensions (WxHxD)</b>   | 128 x 9.5 x 127mm                   |  |
| <b>Disc Capacity</b>  | <b>DVD-ROM</b>                      | Single layer: Up to 4.7 GB<br>Double layer: Up to 8.5 GB   |
| <b>Access Times</b>   | <b>DVD-ROM Single Layer</b>         | < 110 ms (typical)   |
|   | <b>CD-ROM Mode 1</b>                | < 110 ms (typical)   |
|   | <b>Full Stroke DVD</b>              | < 230 ms (typical)   |
|   | <b>Full Stroke CD</b>               | < 220 ms (typical)   |
|   | <b>DVD-ROM</b>                      | Single layer: Up to 4.7 GB<br>Double layer: Up to 8.5 GB   |
| <b>Power</b>  | <b>DVD-ROM Single Layer</b>         | < 110 ms (typical)   |
|   | <b>Source</b>                       | SATA DC power receptacle   |
|   | <b>DC Power Requirements</b>        | 5 VDC ± 5%-100 mV ripple p-p   |
|   | <b>DC Current</b>                   | 5 VDC – <800mA typical, < 1600 mA maximum  |
| <b>Operating Environmental</b><br>(all conditions non-condensing) | <b>Temperature</b>                  | 41° to 122° F (5° to 50° C)  |
|   | <b>Relative Humidity</b>            | 10% to 80%   |
|   | <b>Maximum Wet Bulb Temperature</b> | 84° F (29° C)  |
| <b>Operating Systems Supported</b>                                | <b>Operating Systems Supported</b>  | Windows 8.1, 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*.<br>Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation<br>SUSE Linux Enterprise Desktop 10 & 11 |
|   |                                     | No driver is required for this device. Native support is provided by the operating system.   |
| <b>Kit Contents</b>   | <b>Kit Contents</b>                 | 9.5mm Slim DVD-ROM Drive, 5.25" ODD Bay adapter/carrier, slim SATA data/power cable, installation guide  |

#### HP 9.5mm Slim SuperMulti DVD Writer

|                              |   |
|------------------------------|---|
| <b>Description</b>           | 9.5mm height, tray-load                                     |
| <b>Mounting Orientation</b>  | Either horizontal or vertical                               |
| <b>Interface Type</b>        | SATA/ATAPI  |
| <b>Dimensions (WxHxD)</b>    | 128 x 9.5 x 127mm   |
| <b>Supported Media Types</b> | DVD-RAM<br>DVD+R<br>DVD+RW<br>DVD+R DL<br>DVD-R DL<br>DVD-R |

### Technical Specifications - Optical and Removable Storage

|   |   |   |
|---|---|---|
|   | DVD-RW<br>CD-R<br>CD-RW   |   |
| <b>Disc Capacity</b>  | <b>DVD-ROM</b>  | 8.5 GB DL or 4.7 GB standard  |
|   | <b>Full Stroke DVD</b>  | < 200 ms (seek)   |
|   | <b>Full Stroke CD</b>   | < 200 ms (seek)   |
| <b>Maximum Data Transfer Rates</b>                                | <b>CD ROM Read</b>  | CD-ROM, CD-R Up to 24X<br>CD-RW Up to 24X   |
|   | <b>DVD ROM Read</b>   | DVD-RAM Up to 8X<br>DVD+RW Up to 8X<br>DVD-RW Up to 8X<br>DVD+R DL Up to 8X<br>DVD-R DL Up to 8X<br>DVD-ROM Up to 8X<br>DVD-ROM DL Up to 8X<br>DVD+R Up to 8X<br>DVD-R Up to 8X |
| <b>Power</b>  | <b>Source</b>   | SATA DC power receptacle  |
|   | <b>DC Power Requirements</b>  | 5 VDC ± 5%-100 mV ripple p-p  |
|   | <b>DC Current</b>   | 5 VDC -< 800 mA typical, <1600 mA maximum   |
| <b>Operating Environmental</b><br>(all conditions non-condensing) | <b>Temperature</b>  | 41° to 122° F (5° to 50° C)   |
|   | <b>Relative Humidity</b>  | 10% to 80%  |
|   | <b>Maximum Wet Bulb Temperature</b>   | 84° F (29° C)   |
| <b>Operating Systems Supported</b>                                | 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*.<br>Red Hat Enterprise Linux(RHEL) WS4**, 5, 6 Desktop/Workstation<br>SUSE Linux Enterprise Desktop 10 & 11 |   |
|   | No driver is required for this device. Native support is provided by the operating system.  |   |
| <b>Kit Contents</b>   | HP SATA SuperMulti DVD Writer drive, Cyberlink Power2Go Software, Cyberlink PowerDVD Software, installation guide, and DVD+R media.   |   |

#### HP SD Media Card Reader Description

Supports hardware ECC (Error Correction Code) function  
Supports hardware CRC (Cyclic Redundancy Check) function  
Supports MS 4-bit parallel transfer mode  
Supports MS-PRO 4-bit parallel transfer mode  
Supports MS PRO-HG Duo 4-bit parallel transfer mode  
Supports SD 4-bit parallel transfer mode  
Supports UHS-104 SD 4-bit card (version 3.0)  
Supports CF v6.0 with PIO mode 6 and Ultra DMA 7 mode

#### Interface Type

USB 3.0 High-speed interface  
Note: If there is a USB2 connection, USB2 transfer speeds are supported.

#### Dimensions (WxHxD)

Dedicated slot in front bezel (orderable option)

### Technical Specifications - Optical and Removable Storage

|                                    |  |
|------------------------------------|--|
| <b>Supported Media Types</b>       | <p>Secure Digital Card (SD)<br/>Secure Digital High Capacity (SDHC)<br/>SD Extended Capacity Memory Card (SDXC)<br/>SD Ultra High Speed II (SD UHSII)<br/>These additional media types are supported with a card adapter.<br/>Memory Stick Micro (M2)<br/>miniSD<br/>miniSD High Capacity<br/>Micro SD Memory Card (MicroSD)<br/>Micro SD High Capacity Memory Card (MicroSDHC)</p> <p>Test Parameters/Conditions - Power applied, unit operating on system<br/>±5%</p>  |
| <b>Operating Systems Supported</b> | <p>Windows 8 Pro (64-bit)*<br/>Windows 8.1 (64-bit)*<br/>Windows 8 (64-bit)*<br/>Windows 7 Ultimate (32-bit)**<br/>Windows 7 Ultimate (64-bit)**<br/>Windows 7 Professional (32-bit)**<br/>Windows 7 Professional (64-bit)**<br/>Windows 7 Home Basic**<br/>Windows 7 Home Premium (32-bit)**<br/>Windows 7 Home Premium (64-bit)**<br/>Windows Vista Business 64<br/>Windows Vista Business 32<br/>Windows Vista Home Basic 32<br/>Windows XP Professional<br/>Windows XP Home 32<br/>No driver is required for this device. Native support is provided by the operating system.</p> <p>Not all features are available in all editions of Windows 8. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8 functionality. See <a href="http://www.microsoft.com">http://www.microsoft.com</a>.</p> <p>Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality.<br/>See <a href="http://www.microsoft.com/windows/windows-7/">http://www.microsoft.com/windows/windows-7/</a> for details.</p> |
| <b>Kit Contents</b>                | <p>SD card reader, Install Guide, IO &amp; Security Software and Documentation CD<br/>USB-IF, WHQL, Compliant with USB Mass Storage Class Bulk only Transport Specification Rev. 1.0,<br/>Compliant Intel® Front Panel I/O Connectivity Design Guide V. 1.3, FCC, CE, BSMI, C-Tick, VCCI, MIC, cUL, TUVT</p> <p>0.35 lbs (0.16 kg)</p>   |

### Technical Specifications - Networking and Communications

|  |                                |   |
|--|--------------------------------|---|
| <b>Integrated Intel® I219LM PCIe GbE Controller (Intel® vPro with Intel® AMT 11.0)</b> | <b>Connector</b>               | RJ-45   |
|  | <b>Controller</b>              | Intel® I2179LM GbE platform LAN connect networking controller   |
|  | <b>Memory</b>                  | 3 KB Tx and 3KB Rx FIFO packet buffer memory  |
|  | <b>Data Rates Supported</b>    | 10/100/1000 Mbps  |
|  | <b>Compliance</b>              | 802.1as/1588, 802.1p, 802.1Q, 802.3, 802.3ab, 802.3az, 802.3i, 802.3u, 802.3z   |
|  | <b>Bus Architecture</b>        | PCI Express and SMBus   |
|  | <b>Data Transfer Mode</b>      | PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)   |
|  | <b>Power Requirement</b>       | Requires 3.3V (integrated regulators for core Vdc)  |
|  | <b>Boot ROM Support</b>        | Yes   |
|  | <b>Network Transfer Mode</b>   | Full-duplex; Half-duplex (not supported for the 1000BASE-T transceiver)   |
|  | <b>Network Transfer Rate</b>   | 10BASE-T (half-duplex) 10 Mbps<br>10BASE-T (full-duplex) 20 Mbps<br>100BASE-TX (half-duplex) 100 Mbps<br>100BASE-TX (full-duplex) 200 Mbps<br>1000BASE-T (full-duplex) 2000 Mbps        |
|  | <b>Management Capabilities</b> | vPro, WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, ACPI, Advanced cable diagnostic, loopback modes, AMT 9.0 support, Circuit Breaker, VLAN, Multicast Listener Discovery (MLD) |

### Summary of Changes

| Date of change:    | Version History: |         | Description of change:   |
|--------------------|------------------|---------|--|
| March 1, 2017      | From v1 to v2    | Added   | 7 <sup>th</sup> Gen Intel Processors, CTO & AMO memory, Intel HD Graphics 630, HP Corporate info.  |
| April 1, 2017      | From v2 to v3    | Added   | Intel Xeon processors E3 v6 Family, CTO & AMO memory, Intel HD Graphics 610 & P630.  |
| September 22, 2017 | From v3 to v4    | Added   | Memory footnotes   |
|                    |                  | Changed | Displays section   |
|                    |                  | Removed | iSCSI Boot as Management Capabilities for the Integrated Intel I219LM PCIe GbE Networking Controller and removed the integrated Intel HD Graphics P630 for the E3-1240, 1230 v6 Intel Xeon processors. |
| November 30, 2017  | From v4 to v5    | Added   | Disclaimer added to processors section   |
|                    |                  |         |  |
|                    |                  |         |  |
|                    |                  |         |  |
|                    |                  |         |  |
|                    |                  |         |  |

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