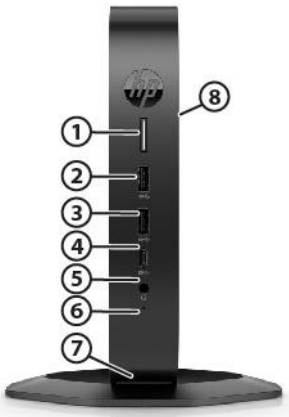
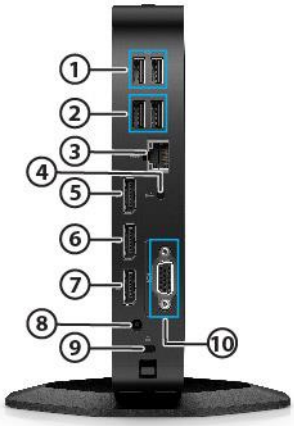
*Overview*

## HP Elite t655 Thin Client




**FRONT**

| | |
|---|---|
| 1 | Power button (with integrated power indicator) |
| 2 | USB-A 3.1 Gen 1 port |
| 3 | USB-A 3.1 Gen 1 port |
| 4 | USB-C® 3.2 Gen 2 port |
| 5 | 3.5mm combo headset/audio jack |
| 6 | Flash memory activity indicator |
| 7 | Stand |
| 8 | 100 x 100mm VESA mounting holes |




**BACK**

| | |
|---|---|
| 1 | (2) USB-A 2.0 port |
| 2 | (2) USB-A 3.2 Gen 1 port |
| 3 | RJ-45 (network)jack- option with or without DASH Manageability support |
| 4 | Audio-out (headphone) |
| 5 | DisplayPort™ 1.2 connector |
| 6 | DisplayPort™ 1.2 connector |
| 7 | DisplayPort™ 1.2 connector |
| 8 | Power connector |
| 9 | Security cable slot |
| 10 | Configurable Option Port supporting one of the following:<br>• Blank; no optional configured port<br>• DP/USB-C® with PD<br>• DisplayPort™ over USB-C® with USB Power Delivery<br>• (2) USB-A 3.2 Gen 1 port<br>• HDMI digital video output<br>• VGA analog video output<br>• External Wi-Fi® antenna connector<br>• Fiber Optic NIC connectors (SC or LC)<br>• Serial port with configurable power<br>• Dual serial ports (includes cable adapter) |

## *Overview*

### AT A GLANCE

- AMD Ryzen R2314 System-on-Chip; 2.1 – 3.5 GHz; 4 cores, 4 threads[3]
- DASH Manageability support - Option to order with DASH or non-DASH
- AMD Memory Guard Secure Run technology that encrypts data in main memory
- DDR4 dual-channel SDRAM system memory; up to 2667 MT/s transfer rate; two SODIMM slots
- (3) DisplayPort™ 1.2 video outputs supporting up to UHD/4K (3840 x 2160 @ 60 Hz) resolutions

  **NOTE:** DisplayPort™ cables and displays sold separately.
- Solid-state flash memory storage; M.2 form factor modules; one slot
- Gigabit Ethernet (GbE) network connection; support for DASH out-of-band remote management
- Optional Allied Telesis M.2 Fiber Optic NICs; Fast Ethernet (100 Mb/s) or Gigabit (1,000 Mb/s)
- Optional Realtek WLAN 8852AE Wi-Fi 6 + Bluetooth® 5.2 WW adapter including antennas integrated internally in the chassis. (Antenna is internally integrated in the chassis with the Wi-fi® SKU)

  **NOTE:** Fiber optic and Wi-Fi® NIC options cannot be supported together[1]

  **NOTE:** Wireless features, performance and support may vary depending on environmental variables such placement, settings and firmware of your access points. Please contact your wireless vendor for support of your wireless environment
- Optional remote external Wi-Fi® antenna system
- Option Port with a selection of available factory options (see detailed listing later in this document)
- Integrated PC speaker for basic audio playback; 3.5 mm combo headset/audio port on front and 3.5 mm audio port on rear that can be configured as line in or line out supporting headphones, external speaker systems, or microphone
- 45W non-PFC external power adapter
- Security features include a TCG certified TPM version 2.0 and a system UEFI (BIOS) designed to address NIST SP 800-147 BIOS protection guidelines and NIST SP800-155 BIOS integrity measurement guidelines. A cable lock slot is provided for use with a cable lock to enable the system's physical security
- Passive thermal design (no cooling fans) and active thermal management technology that monitors the system operating temperatures, throttles SOC operation if appropriate and prevents unit thermal shutdown.
- Rated for a maximum ambient operating temperature of 40 degree C
- ENERGY STAR® certified configurations available and EPEAT® Silver registered in the United States. See http://www.epeat.net for registration status in other countries
- Post-consumer recycled plastics content greater than 50% total unit plastics (by weight)
- Low halogen[2] material content
- All models TAA compliant in North America

**NOTE: See important legal disclosures for all listed specs in their respective features sections.**

*Overview*

## Warranty

HP one-year hardware limited warranty in most regions; HP Care Packs* are extended service contracts that go beyond your standard limited warranties; for more details visit http://www.hp.com/go/cpc

*HP Care Packs are sold separately. Service levels and response times for HP Care Packs may vary depending on your geographic location. Service starts on date of hardware purchase. Restrictions and limitations apply. For details, visit www.hp.com/go/cpc. HP Services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

*Technical Specifications*

## OPERATING SYSTEMS

- HP ThinPro, including HP /Smart Zero Core, HP Cloud Endpoint Manager[2]
- Windows 10 IoT Enterprise LTSC 2021[1]
- IGEL
- No OS

1. 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. ISP fees may apply, and additional requirements may apply over time for updates. See http://www.windows.com.

2. Not all features are available with HP ThinPro, Smart Zero Core and FreeDOS.

## PROCESSOR[3,4,5]

| Model | CPU Frequency Max/Base | Cores/Threads | GPU Type | GPU Frequency |
|---|---|---|---|---|
| AMD Ryzen™ Embedded R2314 with Radeon™ Graphics | 3.5/2.1 GHz | 4/4 | Radeon™ Graphics | 1,200 MHz |

3. 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, branding and/or naming is not a measurement of higher performance.

4. Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.

5. 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 7th generation and forward processors or provide any Windows 8 or Windows 7 drivers on http://www.support.hp.com.

## DISPLAY SUPPORT

**Number of displays supported**

**A maximum of 3 displays are supported.**
Combination:

3 x DisplayPort™ (onboard)

2 x DisplayPort™ (onboard) + 1 x DisplayPort over USB-C (optional)

2 x DisplayPort™ (onboard) + 1 x HDMI (optional)

2 x DisplayPort™ (onboard) + 1 x VGA (optional)

## *Technical Specifications*

**Video Resolution Support Matrix***

| Windows 10 IoT 21H2* *Min of 8GB required | ≤3 x FHD 1920 X 1080 @ 60Hz | 1 x UHD/4K 3840 x 2160 @ 60Hz | 2 x UHD/4K 3840 x 2160 @ 60Hz | 3 x UHD/4K 3840 x 2160 @ 60Hz (2 x 4G RAM or above) |
|---|---|---|---|---|
| Static screen (no video) | ✓ | ✓ | ✓ | ✓ |
| 1080 60fps(or below) video | ✓ | ✓ | ✓ | ✓ |
| 4K 30fps video | ✓ | ✓ | ✓ | ✓ |
| 4K 60fps video | ✓ | ✓ | ✓ | ✓ |

| ThinPro 8 | ≤3 x FHD 1920 X 1080 @ 60Hz | 1 x UHD/4K 3840 x 2160 @ 60Hz | 2 x UHD/4K 3840 x 2160 @ 60Hz | 3 x UHD/4K 3840 x 2160 @ 60Hz (2 x 4G RAM or above) |
|---|---|---|---|---|
| Static screen (no video) | ✓ | ✓ | ✓ | ✓ |

*For best 4K experience dual channel memory is required.

## HP USB-C® DOCK G5 (support requires system to be configured with the Type-C® option Port)

Maximum resolution support for monitors connected to the HP USB-C® Dock G5:
Single Monitor – Max of 2560 x 1440 @60Hz refresh rate
Dual Monitor – Max of two monitors at 1920x1080 @60Hz refresh rate

For an expanded list of supported monitor combinations, refer to the HP Dock Quickspecs document. For the HP Elite t655 Thin Client, refer to the "DP 1.2 MF" column.

## GRAPHICS

| | | |
|---|---|---|
| **Number of displays supported:** | 3 | |
| **Video outputs:** | Standard: | (3) DisplayPort™ 1.2 |
| | Optional: | (1) DisplayPort™ over USB-C® with USB Power Delivery<br>(1) VGA analog output<br>(1) HDMI digital output |
| | **NOTE:** adding an optional output does not increase the number of displays supported. | |
| **Max. screen resolution:** | 3840 x 2160 @ 60 Hz | |

**NOTE:** HP recommends dual channel memory (two SODIMMs) configurations for optimal display resolution performance

## MEMORY

| | |
|---|---|
| **Type:** | DDR4 dual channel SDRAM |
| **Data Transfer Rate:** | Up to 2,667 MT/s |
| **Peak Transfer Rate:** | Up to 19,200 MB/s |
| **Number of Slots** | 2 x SODIMM |
| **Capacities:** | 4*, 8, 16 and 32 GB |

**NOTES:**

- *** 4GB not configurable with Windows 10 IoT Enterprise LTSC 2021**
- The actual transfer rates will be dependent upon the specification of the SODIMM modules used
- The Graphics Processing Unit (GPU) uses part of the total system memory. System memory dedicated to graphics performance is not available for use by other programs
- HP recommends dual channel memory (two SODIMMs) configurations for optimal system performance

*Technical Specifications*

## UEFI

| | |
|---|---|
| **UEFI Specification Revision** | 2.8 |
| **TPM 2.0** | Meets requirements for Common Criteria, an independent third-party certification of trustworthiness<br>Meets requirements for FIPS 140-2, a standard for cryptographic integrity |
| **Security features** | System UEFI designed to address NIST SP 800-147 BIOS protection guidelines and NIST SP800-155 BIOS integrity measurement guidelines |

## STORAGE*

| | |
|---|---|
| **Type:** | NAND flash memory; non-volatile |
| **Number of Sockets:** | (1) M.2 |
| **Capacities:** | 32 GB M.2 eMMC flash module (32GB not configurable with Windows 10 IoT Enterprise LTSC 2021)<br>64 GB M.2 eMMC flash module<br>256 GB M.2 PCIe NVMe flash module<br>512 GB M.2 PCIe NVMe flash module |

*For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and 11) is reserved for system recovery software.

## Input/Output

| | | |
|---|---|---|
| **USB:** | Front access: | (2) USB-A 3.2 Gen 1 port<br>(1) USB-C® 3.2 Gen 2 port |
| | Rear access: | (2) USB-A 2.0 port (optional WOSK (designated for Power-on from Keyboard if equipped))<br>(2) USB-A 3.2 port<br>(2) USB-A 3.2 Gen 1 ports (optional)<br>(1) USB-C® DisplayPort™ (optional) |
| **Video Outputs:** | Standard: | (3) DisplayPort™ 1.2 digital outputs |
| | Optional: | (1) VGA analog output<br>(1) HDMI digital output<br>(1) DisplayPort™ over USB-C® with USB Power Delivery |
| | **NOTE:** adding an optional output does not increase the number of displays supported. | |
| **I/O Interfaces:** | Standard: | (1) RJ45 network connector<br>(1) 3.5 mm combo headset/audio jack (front)<br>(1) 4.5 mm DC audio jack (rear) |
| | Optional: | (1) Dual serial port with configurable power<br>(2) serial ports enabled with an included cable adapter |

**Option Port:** The rear I/O panel includes an Option Port that can be configured with one of the following factory options:

- Blank; no optional configured port
- 2 x USB-A 3.0 Gen 1 ports
- DisplayPort™ over USB-C® with USB Power Delivery
- HDMI digital video output
- VGA analog video output
- External Wi-Fi® antenna connector (requires Wi-Fi® adapter option)
- Fiber Optic NIC connectors; SC or LC connector (requires Fiber Optic NIC option)

- Serial port with configurable power
- Dual serial ports enabled with an included cable adapter

## AUDIO/VIDEO

**Audio Subsystem**

- Internal amplified speaker system for basic audio playback
- 3.5 mm combo headset/headphone/analog microphone audio jack (front access)
- 3.5 mm /4.5mm combo line-out/ line-in socket (rear access)

**Audio CODECs**

- MP3
- AAC Stereo
- HE AAC
- Includes hardware acceleration support

**Video CODECs**

- MPEG-4 part 2 (DivX, Xvid)
- MPEG-4 part 10 (H.264, AVC), Advanced Video Coding (AVC) (H.264 encode & decode )
- MPEG-H part 2, High Efficiency Video Coding (HEVC, available with Windows 10 IoT Only) (H.265 (8-bit / 10-bit) decode and (8-bit) encode
- WMV 7/8/9 VC-1 & ASF Demuxer
- Includes hardware acceleration support

## NETWORKING

**Local Area Networking**

Realtek RTL8111EPH-CG Gigabit Ethernet (GbE) Controller with support for DASH out-of-band remote management and Wake-On-Lan. Realtek RTL8111HSH-CG Gigabit Ethernet (GbE) Controller with support non-DASH and Wake-On-Lan[2]

**Wi-Fi® Networking**

Realtek 8852AE Wi-Fi 6 +BT5.2 WLAN[1]
Realtek 8852BE Wi-Fi 6 +BT5.2 WLAN[1]

1. Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 6 (802.11ax) is backwards compatible with prior 802.11 specs. Wi-Fi 6 is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels.
2. The term “10/100/1000” or “Gigabit” Ethernet indicates compatibility with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/s. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

## FIBER OPTIC NETWORKING

**Adapter Options:**

- Allied Telesis AT-27M2/SC Fiber Fast Ethernet M.2 Adapter
- Allied Telesis AT-29M2/SC or LC Fiber Gigabit M.2 Adapter

**Features:**

- IEEE 802.1p priority encoding/tagging (QoS, CoS)
- IEEE 802.1q VLAN tagging
- IEEE 802.3x flow control
- Buffer/FIFO: 22K transmit and 40K receive
- Loopback mode
- Descriptor-Based Buffer Management

## *Technical Specifications*

- Wake-on-LAN from S3 (Sleep) and S4 (Hibernate) not supported (AT-29M2)
- Link Detection and PHY interface power; the PHY interface, Link detection and Link LED should be enabled by default at power-up

**Performance:**

AT-27M2

- >= 85 Mbit/s receive, <= 30% CPU utilization
- >= 85 Mbit/s transmit, <= 30% CPU utilization
- >= 170 Mbit/s total bi-directional, <= 30% CPU utilization

**NOTE:** The minimum transfer size at 100 Mbit/s is 1 Gbps

AT-29M2

- >= 800 Mbit/s receive, <= 30% CPU utilization
- >= 800 Mbit/s transmit, <= 30% CPU utilization
- >= 1500 Mbit/s total bi-directional, <= 30% CPU utilization

**NOTE:** The minimum transfer size at 1000 Mbit/s is 1500 Gbps

**External Interface:** Complies with IEEE 802.3 100BASE-FX operation (AT-27M2)
Complies with IEEE 802.3 1000BASE-X operation (AT-29M2)

**Power:**

- Uses less than 1800 mW of power at full performance (AT-27M2)
- Uses less than 2100 mW of power at full performance (AT-29M2)
- Supports all PCI Express bus states L0, L0s, L1 and L2

**Non-volatile Storage:** The MAC address is unique for each system; assigned from the board assembly manufacturer's IEEE registered allocation.

The PCI subsystem ID is unique to HP and unique to each design to allow Windows Update to be finely controlled.

## SOFTWARE SUPPORT

| Host Environment | Protocol | HP ThinPro | Microsoft Windows 10 IoT Enterprise 2021 |
|---|---|---|---|
| Remote Desktop Services | Remote FX (RFX), RDP | ✓ | ✓ |
| Citrix® | ICA, HDX | ✓ | ✓ |
| Vmware® Horizon | RDP, PcoIP, Blast Extreme | ✓ | ✓ |

| Protocol Clients | HP ThinPro | Microsoft Windows 10 IoT Enterprise 2021 |
|---|---|---|
| Citrix® Workspace app | ✓ | ✓ |
| Microsoft Remote Desktop Client | | ✓ |
| Free Remote Desktop Client | ✓ | |
| Vmware™ Horizon View™ Client | ✓ | ✓ |
| HP Remote Graphics Software (RGS) | via add-on | ✓ |
| Turbosoft Tterm for Linux® Terminal emulation Software | via add-on | |
| Turbosoft TTWin Terminal emulation software | | via add-on |
| AVD/Win365 | via add-on | via add-on |
| AWS Amazon Workspace | via add-on | via add-on |
| HP Anyware[1] | via add-on | via add-on |

[1]HP Anyware supports Windows®, Linux® and MacOS® host environments and Window, Linux, MacOS, iOS®, Android®, and Chrome OS® end-user devices. For more on the system requirements for installing HP Anyware, refer to the Admin Guides at: https://docs.teradici.com/find/product/cloud-access-software

| Browser Support | HP ThinPro | Microsoft Windows 10 IoT Enterprise 2021 |
|---|---|---|
| Mozilla Firefox | ✓ | |
| Internet Explorer | | ✓ |
| Microsoft Edge | | ✓ |

| Security | HP ThinPro | Microsoft Windows 10 IoT Enterprise 2021 |
|---|---|---|

## *Technical Specifications*

| | | |
|---|---|---|
| Smart Card | ✓ | ✓ |
| Log-on Manager | ✓ | ✓ |
| Read only Operating System | ✓ | ✓ |
| 802.1x | ✓ | ✓ |
| Microsoft Firewall | | ✓ |
| HP Write Manager | | ✓ |
| Microsoft Unified Write Filter | | ✓ |

**NOTE:** the HP Write Manager is the default active write filter. The Microsoft Unified Write Filter is disabled by default but can be enabled by the user if required.

| Management Tools | HP ThinPro | Microsoft Windows 10 IoT Enterprise 2021 |
|---|---|---|
| HP Cloud Endpoint Manager | ✓ | ✓ |
| HP Device Manager | ✓ | ✓ |
| HP ThinUpdate | | ✓ |
| HP Easy Tools | ✓ | |
| HP Smart Zero Client Services | ✓ | |
| Microsoft SCCM/EDM agent | | ✓ |
| HP USB Port Manager | | ✓ |
| HP User State Tool | | Add-on only |

| Additional Windows Components | HP ThinPro | Microsoft Windows 10 IoT Enterprise 2021 |
|---|---|---|
| HP Easy Shell | | ✓ |
| Windows Media Player | | ✓ |
| Microsoft Direct Access | | ✓ |
| Microsoft BranchCache | | ✓ |
| Microsoft AppLocker | | ✓ |
| Microsoft Sideloading | | ✓ |
| CyberLink Media Player | | ✓ |

## *Technical Specifications*

**NOTE:** Other add-on software available (see: http://www.hp.com/support for latest list of available add-ons). Software performance and support may vary depending on customer environment and backend.

| Audio/Video CODECs | HP ThinPro | Microsoft Windows 10 IoT Enterprise 2021 |
|---|---|---|
| MP3 | ✓ | ✓ |
| WMA stereo | ✓ | ✓ |
| AAC stereo & HE AAC | ✓ | |
| Microsoft AC3 encoder | | ✓ |
| MPEG-1 | ✓ | |
| MPEG-4 part 2 (DivX, Xvid, H.263) | ✓ | ✓ |
| MPEG-4 part 10 (H.264, AVC) | ✓ | ✓ |
| h.365/HEVC | ✓ | ✓ |
| WMV 7/8/9/ VC-1 & ASF Demuxer | ✓ | ✓ |

### Recommended TC config for Microsoft Teams media optimization

| | TC CPU | Vmware Teams Optimization | Citrix Teams Optimization |
|---|---|---|---|
| **t655** | 2.10 GHz 4 Core | ✓ | ✓ |

- Not recommended, ✓ recommended

## WEIGHTS & DIMENSIONS

**W x D x H: (vertical orientation)** 35 x 200 x 200 mm

**Volume:** 1.4 liter

**System Weight (unit with stand)** 1174g
Lowest weight. Weight will vary by configuration.

**Shipping Weight (System+Stand+AC+PC)** 2106g

**NOTE:** All measurements are approximate; the addition of optional modules will increase the weight

## EXTERNAL POWER SUPPLY

45W non-PFC Smart external power adapter
Worldwide auto-sensing 100 – 240 VAC; nominal voltage is 120 VAC; 50 – 60 Hz

## *Technical Specifications*

Energy saving automatic power-down; surge tolerant

1.8m output cable

External power adapters are sourced from several suppliers in order to ensure adequate supply and availability is maintained. The actual dimensions of the power brick will vary by supplier.

| HP P/N | Vendor | Dimensions: |
|---|---|---|
| L25296-001 | Lite-On | 94 x 40 x 26.5 mm |
| L25296-002 | Chicony | 95 x 40 x 26.5 mm |
| L25296-003 | Delta | 94 x 39 x 26.5 mm |
| L25296-004 | AcBel | 91.4 x 44 x 26.8 mm |

## COMPLIANCE/CERTIFICATIONS

| | |
|---|---|
| **Accessibility:** | Section 508 Accessibility; VPAT report available. |
| **Environmental Stewardship:** | Worldwide (ENERGY STAR® configurations available, EPEAT 2.0, RoHS2, ERP, TCO Certified, CECP& SEPA, HP GSE, WEEE, Low Halogen, etc.) |
| **Product Safety:** | Worldwide (UL, CB, GS, CCC, BSMI, etc.) |
| **Electromagnetic Compliance (EMC):** | Worldwide (FCC/CISPR/EN/VCCI/ICES/AS/NZS/CNS/KCC) "Class B" EMI regulations |
| **International Medical Safety Standard:** | EN60601-1-2 (Medical Equipment EMC) passed |

## ENVIRONMENTAL

| | | |
|---|---|---|
| **Operating Temperature Range:** | 50° to 104° F<br>10° to 40° C | |
| **Non-operating Temperature Range:** | -22° to 140° F<br>-30° to 65° C | |
| **Humidity:** | Condensing:<br>Non-condensing: | 20% to 80%<br>10% to 90% |

**NOTE:** Specifications are at sea level with altitude derating of 1° C/300m (1.8° F/1000ft) to a maximum of 3 Km (10,000 ft), with no direct, sustained sunlight. Upper limit may be limited by the type and number of options installed.

| | | |
|---|---|---|
| **Environmental Data** | **Eco-Label Certifications & declarations** | This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:<br>• IT ECO declaration<br>• US ENERGY STAR®<br>• US Federal Energy Management Program (FEMP)<br>• EPEAT Gold registered in the United States. See http://www.epeat.net for registration status in your country.<br>• TCO Certified<br>• China Energy Conservation Program (CECP)<br>• China State Environmental Protection Administration (SEPA)<br>• Taiwan Green Mark<br>• Korea Eco-label<br>• Japan PC Green label* |
| | **Sustainable Impact Specifications** | • Ocean-bound plastic in stand<br>• 55% post-consumer recycled plastic<br>• Low halogen<br>• Outside Box and corrugated cushions are 100% sustainably sourced and recyclable<br>• Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable |
| | **System Configuration** | The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a "Typically Configured Notebook". |

## *Technical Specifications*

| | | | | |
|---|---|---|---|---|
| | **Energy Consumption (in accordance with US ENERGY STAR® test method)** | **115VAC, 60Hz** | **230VAC, 50Hz** | **100VAC, 50Hz** |
| | Normal Operation (Sort idle) | 6.44 W | 6.94 W | 6.96 W |
| | Normal Operation (Long idle) | 5.34 W | 5.49 W | 6.12 W |
| | Sleep | 0.85 W | 0.94 W | 0.86 W |
| | Off | 0.8 W | 0.86 W | 0.76 W |
| | | **NOTE:** Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system. | | |
| | **Heat Dissipation*** | **115VAC, 60Hz** | **230VAC, 50Hz** | **100VAC, 50Hz** |
| | Normal Operation (Short idle) | 22.0 BTU/hr | 23.7 BTU/hr | 23.8 BTU/hr |
| | Normal Operation (Long idle) | 18.3 BTU/hr | 18.8 BTU/hr | 20.9 BTU/hr |
| | Sleep | 2.9 BTU/hr | 3.2 BTU/hr | 2.9 BTU/hr |
| | Off | 2.7 BTU/hr | 2.9 BTU/hr | 2.6 BTU/hr |
| | | ***NOTE:** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour. | | |
| | **Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)** | Sound Power ($L_{WAd}$, bels) | Sound Pressure ($L_{pAm}$, decibels) | |
| | Typically Configured – Idle | 2.5 | 13.7 | |
| | Fixed Disk – Random writes | 2.5 | 13.7 | |
| | Optical Drive – Sequential reads | 2.5 | 13.9 | |
| | **Longevity and Upgrading** | This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the<br><br>Spare parts are available throughout the warranty period and or for up to “5” years after the end of production. | | |

## *Technical Specifications*

| | | | | |
|---|---|---|---|---|
| | **Additional Information** | • This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.<br>• This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.<br>• This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).<br>• This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net<br>• Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.<br>• This product is 90.3% recycle-able when properly disposed of at end of life. | | |
| | **Packaging Materials** | **External:** | PAPER/Corrugated | 366 g |
| | | | PAPER/Molded Pulp | 51 g |
| | | | PAPER/Corrugated | 80 g |
| | | | PAPER/Corrugated | 115 g |
| | | **Internal:** | PLASTIC/Polyethylene low density - LDPE | 6 g |
| | | The plastic packaging material contains at least 30.0% recycled content. | | |
| | | The corrugated paper packaging materials contains at least 87.0% recycled content. | | |
| | **RoHS Compliance** | HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam.<br><br>We believe the RoHS directive and similar laws play an important role in promoting industry-wide elimination of substances of concern. We have supported the inclusion of additional substances—including PVC, BFRs, and certain phthalates—in future RoHS legislation that pertains to electrical and electronics products.<br><br>We met our voluntary objective to achieve worldwide compliance with the new EU RoHS requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve.<br><br>To obtain a copy of the HP RoHS Compliance Statement, see HP RoHS position statement. | | |
| | **Material Usage** | This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):<br><br>• Asbestos<br>• Certain Azo Colorants<br>• Certain Brominated Flame Retardants – may not be used as flame retardants in plastics<br>• Cadmium<br>• Chlorinated Hydrocarbons<br>• Chlorinated Paraffins<br>• Bis(2-Ethylhexyl) phthalate (DEHP) | | |

| | | |
|---|---|---|
| | | • Benzyl butyl phthalate (BBP)<br>• Dibutyl phthalate (DBP)<br>• Diisobutyl phthalate (DIBP)<br>• Formaldehyde<br>• Halogenated Diphenyl Methanes<br>• Lead carbonates and sulfates<br>• Lead and Lead compounds<br>• Mercuric Oxide Batteries<br>• Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.<br>• Ozone Depleting Substances<br>• Polybrominated Biphenyls (PBBs)<br>• Polybrominated Biphenyl Ethers (PBBEs)<br>• Polybrominated Biphenyl Oxides (PBBOs)<br>• Polychlorinated Biphenyl (PCB)<br>• Polychlorinated Terphenyls (PCT)<br>• Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.<br>• Radioactive Substances<br>• Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO) |
| | **Packaging Usage** | HP follows these guidelines to decrease the environmental impact of product packaging:<br>• Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.<br>• Eliminate the use of ozone-depleting substances (ODS) in packaging materials.<br>• Design packaging materials for ease of disassembly.<br>• Maximize the use of post-consumer recycled content materials in packaging materials.<br>• Use readily recyclable packaging materials such as paper and corrugated materials.<br>• Reduce size and weight of packages to improve transportation fuel efficiency.<br>• Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards. |
| | **End-of-life Management and Recycling** | HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.<br><br>The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment. |

## *Technical Specifications*

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|---|---|---|
| | **HP, Inc. Corporate Environmental Information** | For more information about HP's commitment to the environment:<br><br>Global Citizenship Report<br>http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html<br>Eco-label certifications<br>http://www8.hp.com/us/en/hp-information/environment/ecolabels.html<br>ISO 14001 certificates:<br>http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842<br>and<br>http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf |
| | **footnotes** | • Percentage of ocean-bound plastic contained in each component varies by product<br>• Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard.<br>• External power supplies, WWAN modules, power cords, cables and peripherals excluded.<br>• 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers.<br>• Fiber cushions made from 100% recycled wood fiber and organic materials.<br>• Plastic cushions are made from >90% recycled plastic. |

| **Acoustic Noise Emission Declaration** | |
|---|---|
| Measurement and declaration standards: | ISO 7779: Acoustics – Measurement of airborne noise emitted by information technology and telecommunications equipment |
| | ISO 9296: Acoustics – Declared noise emission values of computer and business equipment |

| **Declared Noise Emission Values in accordance with ISO 9296** | | | | | | |
|---|---|---|---|---|---|---|
| Product Configuration or Operating Mode # (see section below for description) | Declared Sound Power Level, $L_{Wad}$ Bels | | | Declared Sound Pressure Level, $L_{pAm}$ dBA Tested on ISO Table | | |
| | Idle | Operating | | Idle | Operating | |
| | ECMA-74 C.15.3.2 Idle Mode | ECMA-74 C.9.3.2 Drive Random Seek | ECMA-74 C.15.3.3 g Active Mode | ECMA-74 C.15.3.2 Idle Mode | ECMA-74 C.9.3.2 Drive Random Seek | ECMA-74 C.15.3.3 g Active Mode |
| Vertical | 2.6 | 2.6 | 2.6 | 13.7 | 13.7 | 13.7 |
| Horizontal | 2.6 | 2.6 | 2.6 | N/A | N/A | N/A |

| | |
|---|---|
| The Product meets the acoustic noise limits of these voluntary Eco labels: | TCO Certified<br>Blue Angel<br>Nordic Swan<br>EU Flower |

**NOTE:** Measured under ISO 7779 and ISO 9296 measurement and declaration standards.

## *Summary of Changes*

| Date of change: | Version History: | Type of change | Description of change: |
|---|---|---|---|
| October 7, 2022 | From v1 to v2 | Changed | PROCESSOR and MEMORY sections |
| October 13, 2022 | From v2 to v3 | Changed | PROCESSOR section |
| October 27, 2022 | From v3 to v4 | Changed | WEIGHTS & DIMENSIONS, Recommended TC config for Microsoft Teams media optimization sections |
| February 6, 2023 | From v4 to v5 | Changed | Format page 1, Storage and COMPLIANCE/CERTIFICATIONS sections |
| March 17, 2023 | From v5 to v6 | Changed | SOFTWARE SUPPORT section |
| April 17, 2023 | From v6 to v7 | Changed | UEFI section |
| April 25, 2023 | From v7 to v8 | Changed | Input/Output section |
| May 2, 2023 | From v8 to v9 | Changed | Environmental Data section |
| May 6, 2023 | From v9 to v10 | Changed | NETWORKING section |
| June 12, 2023 | From v10 to v11 | Changed | HP USB-C DOCK G5 section |