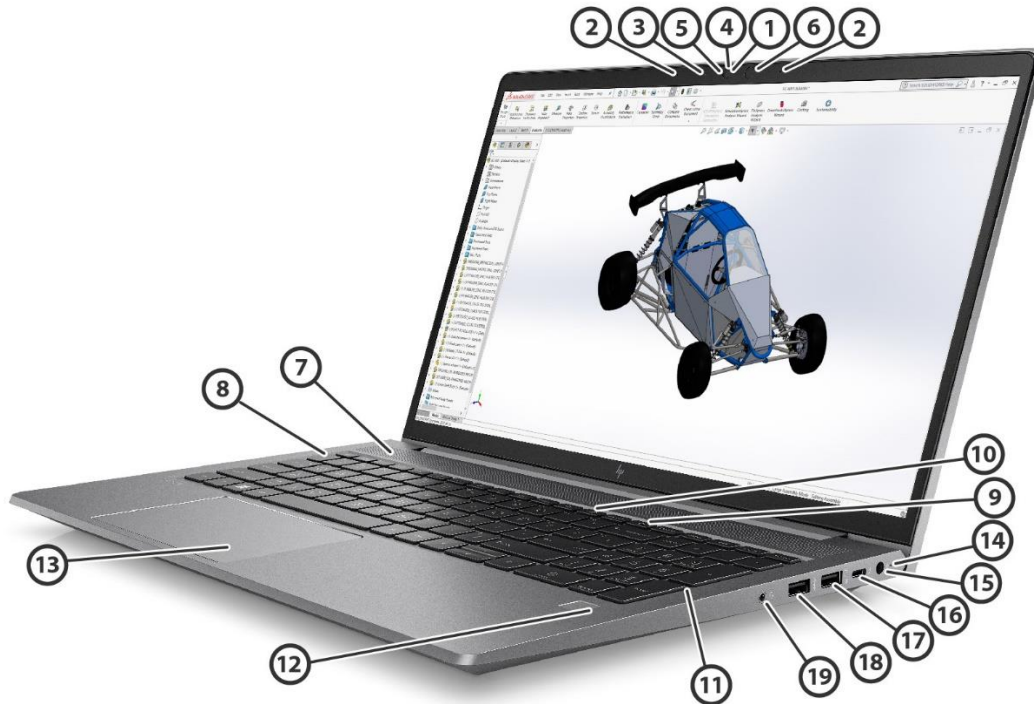


Overview

HP ZBook Power 15.6" G9 Mobile Workstation PC



Right

- | | |
|--|--|
| 1. Ambient Light Sensor | 11. Numeric Keypad |
| 2. Internal Microphones (optional) | 12. Fingerprint Sensor (optional) |
| 3. Camera LEDs (optional) | 13. Touchpad |
| 4. Camera LEDs (optional) | 14. Indicator LEDs: Power light, Wireless light, Storage usage light |
| 5. IR Camera (optional) | 15. Power connector |
| 6. Camera Cover | 16. USB Type-C® with Thunderbolt™ 4 |
| 7. Speakers | 17. USB 3.1 Gen 1 |
| 8. Function Keys (changes with configured options) | 18. USB 3.1 Gen 1 |
| 9. Power button | 19. Audio Combo Jack |
| 10. HP Programmable Key | |

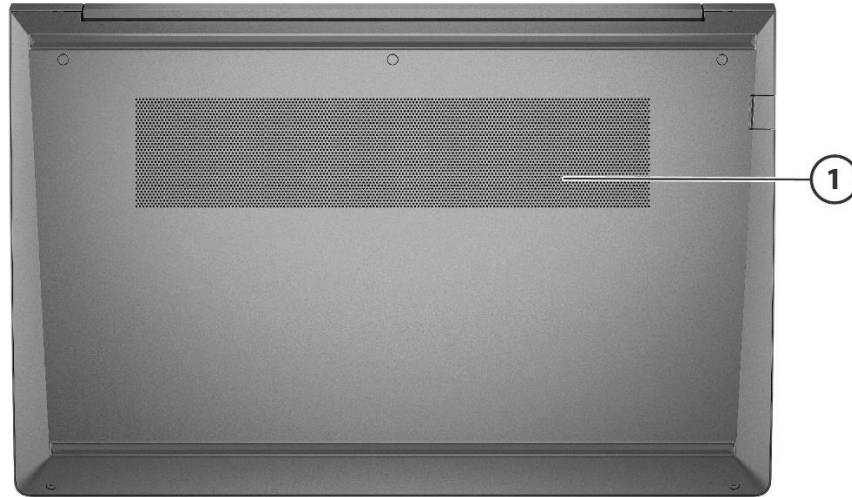
Overview



Left

- | | |
|--------------------------------|----------------------|
| 1. Nano Security lock slot | 4. HDMI port |
| 2. RJ-45 | 5. Smart Card Reader |
| 3. USB 3.1 Gen 1 Charging Port | |
-

Overview



Bottom

1. Fan Venting

Overview

At A Glance

- Work without compromising on performance or security with Windows 10 Pro and HP's collaboration and connectivity technology.
- NVIDIA Professional GPUs provide the interactive visual workspace you need to do great work wherever, whenever. With twice the CUDA cores as previous generations, NVIDIA Professional GPUs deliver the performance professionals need to work from anywhere.
- Take multitasking to the next level with 12th gen Intel® Core™ i9 processors built to handle multithreaded apps like Adobe Premiere Pro®, and with fast clock speeds to boost your speed on single threaded apps like Autodesk 3ds Max.
- Strenuously tested to meet ISV certification and deliver superb performance and support with leading software providers, including Autodesk and Adobe®.
- Have confidence with HP's and defend against firmware and malware attacks with HP Sure Start and Sure Sense.
- Built with the environment in mind, this ZBook includes recycled ocean-bound plastics, plastic-free packaging, and ultraefficient power consumption.
- Designed for ultimate durability, this ZBook undergoes brutal MIL-STD 810H tests to help ensure this PC keeps rolling through your workday.
- Plug in to greater connectivity at your desktop with the HP Thunderbolt™ Dock for lightning fast Thunderbolt™ 4 transfers and the flexibility to run up to 1 external 4K and 1 external 5K.
- Work without limits in any location with up to 8TB of local PCIe storage.

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

Features

OPERATING SYSTEM

Preinstalled OS	Windows 11 Pro - HP recommends Windows 11 Pro for business ²
	Windows 11 Home - HP recommends Windows 11 Pro ²
	Windows 11 Home Single Language - HP recommends Windows 11 Pro ²
	Windows 10 Pro (available through downgrade rights from Windows 11 Pro) ^{1,2,3}
	FreeDOS

¹ Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).

² 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 is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.windows.com>.

³This system is preinstalled with Windows 10 Pro software and also comes with a license for Windows 11 Pro software and provision for recovery 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: Your product does not support Windows 8 or Windows 7. 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>. A full list of HP products and the Windows 10 versions tested is available on the HP support website. <https://support.hp.com/us-en/document/c05195282>

PROCESSOR

12th Generation Intel® Core™ i9-12900H with Intel® Iris® Xe Graphics (1.8 GHz E-core base frequency, 2.5 GHz P-core base frequency, up to 3.8 GHz E-core Max Turbo Frequency, up to 5.0 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 Threads), supports Intel® vPro® Technology ^{1,2,3,4,5}

12th Generation Intel® Core™ i9-12900HK with Intel® Iris® Xe Graphics (1.8 GHz E-core base frequency, 2.5 GHz P-core base frequency, up to 3.8 GHz E-core Max Turbo Frequency, up to 5.0 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 Threads) ^{1,2,3,4}

12th Generation Intel® Core™ i7-12800H with Intel® Iris® Xe Graphics (1.8 GHz E-core base frequency, 2.4 GHz P-core base frequency, up to 3.7 GHz E-core Max Turbo Frequency, up to 4.8 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 Threads), supports Intel® vPro® Technology ^{1,2,3,4,5}

12th Generation Intel® Core™ i7-12700H with Intel® Iris® Xe Graphics (1.7 GHz E-core base frequency, 2.3 GHz P-core base frequency, up to 3.5 GHz E-core Max Turbo Frequency, up to 4.7 GHz P-core Max Turbo frequency, 24MB L3 cache, 6 P-cores and 8 E-cores, 20 Threads), supports Intel® vPro® Technology ^{1,2,3,4,5}

12th Generation Intel® Core™ i5-12600H with Intel® Iris® Xe Graphics (2.0 GHz E-core base frequency, 2.7 GHz P-core base frequency, up to 3.3 GHz E-core Max Turbo Frequency, up to 4.5 GHz P-core Max Turbo frequency, 18MB L3 cache, 4 P-cores and 8 E-cores, 16 Threads), supports Intel® vPro® Technology ^{1,2,3,4,5}

12th Generation Intel® Core™ i5-12500H with Intel® Iris® Xe Graphics (1.8 GHz E-core base frequency, 2.5 GHz P-core base frequency, up to 3.3 GHz E-core Max Turbo Frequency, up to 4.4 GHz P-core Max Turbo frequency, 18MB L3 cache, 4 P-cores and 8 E-cores, 16 Threads) ^{1,2,3,4}

¹ 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.

² Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.

Features

³ Intel® Turbo Boost performance varies depending on hardware, software and overall system configuration. See www.intel.com/technology/turboboost for more information.

⁴ 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>.

⁵ Intel vPro® requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or Wi-Fi 6E WLAN and TPM 2.0. Some functionality requires additional 3rd party software in order to run. Features of vPro® Essentials and Enterprise vary. See <http://intel.com/vpro>

Features

CHIPSET

Chipset is integrated with processor

INTEL® CORE™ I5 WITH VPRO/CORE I7 WITH VPRO TECHNOLOGY CAPABLE

Intel® Core™ i5 with vPro®, Core™ i7 with vPro®, Core™ i9 with vPro® technology is a selectable feature that is available on units configured with select processors, a qualified Intel® WLAN module and a preinstalled Windows® operating system. It provides advances in remote manageability, security, energy efficient performance, and wireless connectivity. Intel® Active Management Technology (iAMT) offers built-in manageability and proactive security for networked mobile workstations, even when they are powered off* or when the operating system is inoperable. It can help identify threats before they reach the network, isolate infected systems, and update regardless of their power state.^{1,2}

¹ Requires a Windows operating system, network hardware and software, connection with a power source, and a direct (non-VPN) corporate network connection which is either cable or wireless LAN.

² Intel vPro® requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or Wi-Fi 6E WLAN and TPM 2.0. Some functionality requires additional 3rd party software in order to run. Features of vPro® Essentials and Enterprise vary. See <http://intel.com/vpro>, see data sheet

GRAPHICS

Integrated

Intel® Iris® Xe Graphics ^{1, 3, 4, 5, 6}

Discrete

NVIDIA Graphic options:

NVIDIA RTX™ A2000 Laptop GPU (8 GB GDDR6 dedicated) ^{1,2,3,4,5}

NVIDIA RTX™ A1000 Laptop GPU (4 GB GDDR6 dedicated) ^{1,2,3,4,5}

NVIDIA T600 Laptop GPU (4 GB GDDR6 dedicated) ^{1,2,3,4,5}

Supports

Support HD decode, DX12, HDMI 2.0b, HDCP 2.3

¹ UHD content required to view UHD images.

² Both UMA & Discrete configurations support 4 independent displays when on the HP Thunderbolt Dock G2 (120W) (sold separately) - Max. resolution = 2.5K @60Hz (DP1) & 2.5K @60Hz (DP2) & FHD (VGA) OR 4K @60Hz (one DP Port) & 4K @60Hz (Type-C output port using a Type C-to-DP adapter).

³ Support HD decode, DX12, HDMI 2.0b, HDCP 2.3 via DP up to 4K @ 60Hz and via HDMI up to 4096x2304 @ 60Hz

⁴ HDMI cable Sold Separately

⁵ Shared video memory (UMA) uses part of the total system memory for video performance. System memory dedicated to video performance is not available for other use by other programs.

⁶ Intel® Iris® Xe Graphics capabilities require system to be configured with Intel® Core™ i5 or i7 processors and dual channel memory. Intel® Iris® Xe Graphics with Intel® Core™ i5 or i7 processors and single channel memory will only function as UHD graphics.

DISPLAY

Non-touch

Features

- 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent NWBZ
- 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NWBZ
- 15.6 inch UHD (3840x2160) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NB2Y

Touch

- 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent Touch on Panel NWBZ

DisplayPort™ 1.2

HDMI 2.0 Support resolution up to 4K @60 Hz

Displays support

Supports dual display through the dock

¹HD content required to view HD images.

²Sold separately or as an optional feature.

³Resolutions are dependent upon monitor capability, and resolution and color depth settings.

⁴HP Sure View Reflect integrated privacy screen is an optional feature that must be configured at purchase and is designed to function in landscape orientation.

⁵Actual brightness will be lower with touchscreen or Sure View.

Features

DOCKING

Docking station model #1	HP Thunderbolt Dock G2
Total number of supported displays (incl.the notebook display)	4
Max.resolutions supported	Dual 4K @30Hz or dual 4K UHD @ 60Hz is supported Single 8K@ 30Hz (multiple tiles) for Thunderbolt hosts Non-TBT hosts DP 1.4 in high res mode(1) 8K video single cable@30Hz
Dock Connectors	2xDP, 1xVGA, 1xTB, 1xUSB-C alt-mode
Technical limitations	Thunderbolt Hosts: Maximum of (4) displays with maximum resolution of 5K@ 30Hz running Thunderbolt host. Max resolution possible is dual 8K displays @ 60Hz running Thunderbolt host or running a non-Thunderbolt host in High Resolution mode @30Hz Non-Thunderbolt hosts: The highest resolution for dual displays running a non-Thunderbolt host in multi-function mode is (1) 5K dual cable (using both DP ports) +(1) 4K on USB-C DP port Non-Thunderbolt hosts support (3) displays with a max resolution of: (2) 5K single cable + (1) 4K UHD @ 60 Hz in high resolution mode. In multi-function mode the maximum resolution for (3) displays is (2) 5K single cable @ 30Hz + (1) 4K UHD @ 30Hz.
Docking station model #2	HP USB-C Dock G5
Total number of supported displays (incl.the notebook display)	3
Max.resolutions supported	Dual 5K@ 30Hz + (1) 4K UHD (multi-function mode)
Dock Connectors	1xHDMI, 2xDP
Technical limitations	Highest resolution with dual displays is two 8K@ 60Hz host in High Resolution mode. Three maximum displays supported are two 5K@ 30 Hz on DP ports plus one 4K UHD@ 30 Hz on HDMI in multi-function mode The highest resolution for a non-Thunderbolt host in Multi-function mode is a single 5K dual cable (using both DP ports) + (1) 4K on HDMI port .
Docking station model #3	HP USB-C/A Universal Dock G2
Total number of supported displays (incl.the notebook display)	3
Max.resolutions supported	Triple 4K UHD@ 60Hz
Dock Connectors	1xHDMI, 2xDP
Technical limitations	The best resolution for dual or triple displays is 4K UHD@ 60Hz. For use with the USB-A adapter that comes in the box the maximum number of displays supported is (2) 4k x 60 Hz on the Type-A Gen 1 connection from the host

Features

STORAGE AND DRIVES*

PCIe® NVMe™ M.2 2280 Storage

4 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC
2 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC
1 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC
512 GB PCIe® Gen4x4 NVMe™ SED TLC OPAL2
512 GB PCIe® Gen4x4 NVMe™ M.2 SSD TLC
256 GB PCIe® Gen4x4 NVMe™ M.2 SSD TLC
256 GB PCIe® Gen4x4 NVMe™ SED TLC OPAL2

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

DRIVE CONTROLLERS

M.2 Storage Bay (PCIe NVMe)

RAID:

PCIe® Gen4 x4 lanes NVMe™ Solid State Drive

Not supported

MEMORY

Maximum Memory

64GB DDR5-4800

Memory

64GB DDR5-4800 (2x32GB)
32GB DDR5-4800 (2x16GB)
32GB DDR5-4800 (1x32GB)
16GB DDR5-4800 (2x8GB)
16GB DDR5-4800 (1x16GB)
8GB DDR5-4800 (1x8GB)

Memory Slots

2 SODIMM

DDR5 SODIMMS, system runs at 4800

Supports Dual Channel Memory

¹64GB memory configurations is only available on configurations without discrete graphics.

²Soldered down memory is a requirement on configurations that have discrete graphics.

³ Due to the non-industry standard nature of some third-party memory modules, we recommend HP branded memory to ensure compatibility. If you mix memory speeds, the system will perform at the lower memory speed.

Features

NETWORKING/COMMUNICATIONS

WLAN¹

Intel® AX211 Wi-Fi 6E+BT5.2 M.2 1216 160MHz CNVi World-Wide WLAN vPro

Intel® AX211 Wi-Fi 6E +BT5.2 M.2 1216 160MHz CNVi World-Wide WLAN non-vPro

¹ Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported.

Near Field Communication (NFC) module

No Near Field Communication (NFC) module

NFC Mirage WNC XRAV-1

Miracast

Native Miracast Support

NOTE: Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming.

AUDIO/MULTIMEDIA

Audio

Audio by Bang & Olufsen

2 Integrated stereo speakers

Discrete Amplifiers

Integrated dual array microphone

Speaker Power

2W/4ohm Per speaker

Camera^{1,2}

720p HD camera with IR

720p HD camera

Sensors

ALS (ambient light sensor)

Magnetometer

Hall Sensor

Gyro

Accelerometer

HP Tamper Lock³

¹ HD content required to view HD images.

² Windows Hello face authentication utilizes a camera specially configured for near infrared (IR) imaging to authenticate and unlock Windows devices as well as unlock your Microsoft Passport.

³ HP Tamper Lock must be enabled by the customer or your administrator.

Features

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard*

HP Premium Keyboard, spill resistant, Backlit keyboard and DuraKeys

HP Premium Keyboard, spill resistant, Non-Backlit keyboard and DuraKeys

HP Premium Keyboard, spill resistant, Backlit keyboard and DuraKeys Privacy

Pointing Devices

Clickpad with multi-touch gesture support, taps enabled as default

Microsoft Precision Touchpad Default Gestures Support

Function Keys

ESC: system information

F1 - Display Switching

F2 - Blank or Privacy

F3 - Brightness Down

F4 - Brightness Up

F5 - Audio Mute

F6 - Volume Down

F7 - Volume Up

F8 - Mic Mute

F9 - Blank or Backlit Toggle

F10 - Insert

F11 - Airplane Mode

F12 - HP Command Center

home

end

Power Button (with LED)

delete

Hidden Keys

Fn+R - Break

Fn+S - Sys Rq

Fn+C - Scroll Lock

**Backlit keyboard is an optional feature.*

SOFTWARE AND SECURITY

Software

HP Quick Touch

HP Quick Drop²¹

HP Easy Clean

HP PC Hardware Diagnostics Windows

HSA Fusion for Commercial

HSA Telemetry for Commercial

Touchpoint Customizer for Commercial

myHP

Tile App^{22,25}

HP Smart Support²⁴

HP Connection Optimizer¹⁰

HP Mac Address Manager

HP Hotkey Support

HP Support Assistant¹

HP Notifications

HP Privacy Settings

HP Power Manager

Features

Buy Microsoft Office (Sold separately)

Manageability Features

HP Connect for Microsoft Endpoint Manager²⁶

HP Image Assistant Gen5 (download)

HP Manageability Integration Kit (download)¹²

HP Client Management Script Library (download)

HP Patch Assistant (download)²⁷

HP Driver Packs (download)

HP Cloud Recovery²⁸

HP Client Catalog (download)

Security Management

HP Wolf Security of Business²⁹ includes:

HP Sure Click³⁰

HP Sure Sense¹⁹

HP Sure Run Gen5³¹

HP Sure Recover Gen5¹⁴

HP Sure Start Gen7¹⁶

HP Tamper Lock

HP Sure Admin²³

HP Client Security Manager Gen7¹⁸

BIOS

HP BIOSphere Gen6⁶

HP Secure Erase¹⁷

Absolute Persistence Module⁷

HP DriveLock & Automatic DriveLock

BIOS Update via Network

HP Wake on WLAN

HP Fingerprint Sensor³²

Secured-Core PC Enable²⁰

TPM 2.0 Embedded Security Chip (Common Criteria EAL4+ Certified) (FIPS 140-2 Level 2 Certified)

For more information on HP Client Security Software Suite, refer to <http://www.hp.com/go/clientsecurity>.

¹ HP Support Assistant - Requires Windows and Internet Access.

⁶ HP BIOSphere Gen6 is available on select HP Pro, Elite and ZBook PCs. See product specifications for details. Features may vary depending on the platform and configurations.

⁷ Absolute agent is shipped turned off, and will be activated when customers activate a purchased subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. The Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. For full details visit:

<http://www.absolute.com/company/legal/agreements/computrace-agreement>. Data Delete is an optional service provided by Absolute Software. If utilized, the Recovery Guarantee is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software.

¹⁰ HP Connection Optimizer requires Windows 10 and beyond version.

¹² HP Manageability Integration Kit can be downloaded from <http://www.hp.com/go/clientmanagement>.

¹⁴ HP Sure Recover Gen5 with Embedded Reimaging is an optional feature which requires Windows 10 and higher must be configured at purchase. You must back up important files, data, photos, videos, etc. before use to avoid loss of data. Network based recovery using Wi-Fi is only available on PCs with Intel Wi-Fi Module

¹⁵ HP Sure Recover with Embedded Reimaging Gen3 is an optional feature which must be configured at purchase with a base unit that has the On System Recovery (OSR) module. See product specifications for availability. You must back up important files, data, photos, videos, etc. before use to avoid loss of data. HP Sure Recover with Embedded Reimaging (Gen1) does not support platforms with Intel® Optane™.

¹⁶ HP Sure Start Gen7 is available on select HP PCs and requires Windows 10 and higher

¹⁷ HP Secure Erase for the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane™.

Features

- ¹⁸ HP Client Security Manager Gen7 requires Windows and is available on select HP Pro, Elite and ZBook PCs. See product specifications for details.
- ¹⁹ HP Sure Sense is available on select HP PCs with Windows 10 Pro, Windows 10 Enterprise, Windows 11 Pro, or Windows 11 Enterprise OS.
- ²⁰ Secured-core PC requires an Intel® vPro® or AMD Ryzen™ Pro processor. Requires 8 GB or more system memory. Secured-core PC functionality can be enabled from the factory.
- ²¹ Requires Internet access and Windows 10 PC preinstalled with HP QuickDrop app and either an Android device (phone or tablet) running Android 7 or higher with the Android HP QuickDrop app, and /or an iOS device (phone or tablet) running iOS 12 or higher with the iOS HP QuickDrop app.
- ²² Some features require optional subscription to Tile Premium. Tile application for Windows 10 available for download from the Windows Store. Mobile phone app available for download from App Store and Google Play. Requires iOS 11 and greater or Android 6.0 and greater see <https://support.thetileapp.com/hc/en-us/articles/200424778> for more information. HP Tile will function as long as the PC has battery power.
- ²³ HP Sure Admin requires Windows 10, HP BIOS, HP Manageability Integration Kit from <http://www.hp.com/go/clientmanagement> and HP Sure Admin Local Access Authenticator smartphone app from the Android or Apple store.
- ²⁴ HP Smart Support is available to commercial customers through your HP Service Representative and HP Factory Configuration Services; or it can be downloaded at: <http://www.hp.com/smart-support>. HP Smart Support automatically collects the telemetry necessary upon initial boot of the product to deliver device-level configuration data and health insights.
- ²⁵ Some Tile features require optional subscription to Tile Premium. Tile application for Windows 10 available for download from the Windows Store. Mobile phone app available for download from App Store and Google Play. Requires iOS 11 and greater or Android 6.0 and greater see <https://support.thetileapp.com/hc/en-us/articles/200424778> for more information. Tile will function as long as the PC has battery power.
- ²⁶ HP Connect for Microsoft Endpoint Manager is available from the Azure Market Place for HP Pro, Elite, Z and Point-of-Sale PCs managed with Microsoft Endpoint Manager. Subscription to Microsoft Endpoint Manager required and sold separately. Network connection required.
- ²⁷ HP Patch Assistant available on select HP PCs with the HP Manageability Kit that are managed through Microsoft System Center Configuration Manager. HP Manageability Integration Kit can be downloaded from <http://www8.hp.com/us/en/ads/clientmanagement/overview.html>.
- ²⁸ HP Cloud Recovery is available for Z by HP, HP Elite and Pro desktops and laptops PCs with Intel® or AMD processors and requires an open, wired network connection. Note: You must back up important files, data, photos, videos, etc. before use to avoid loss of data. Detail please refer to: <https://support.hp.com/us-en/document/c05115630>.
- ²⁹ HP Wolf Security for Business requires Windows 10 or higher, includes various HP security features and is available on HP Pro, Elite, RPOS and Workstation products. See product details for included security features and OS requirement.
- ³⁰ HP Sure Click requires Windows 10 Pro or higher or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.
- ³¹ HP Sure Run Gen5 is available on select HP PCs and requires Windows 10 and higher.
- ³² HP Fingerprint Reader is an optional feature that requires Windows 10 IoT and must be configured at purchase.

Features

POWER

Power Supply

120 W Slim Smart external AC power adapter³

150 W Slim Smart external AC power adapter⁴

Battery

HP Long Life 6-cell, 83 Wh Polymer

Power Cord

3-wire plug - 1m

2-wire plug - 1m

Battery life

Up to 16 hrs

¹ Battery life will vary depending on the product model, configuration, loaded applications, features, use, wireless functionality and power management settings. The maximum capacity of the battery will naturally decrease with time and usage. See MobileMark18 battery benchmark <https://bapco.com/products/mobilemark-2018/> for additional details.

² Supports HP Fast Charge Technology

³ Only available with UMA graphics

⁴ Only available with discrete graphic options

⁵ Actual battery Watt-hours (Wh) will vary from design capacity. Battery capacity will naturally decrease with shelf life, time, usage, environment, temperature, system configuration, loaded apps, features, power management settings and other factors.

ENVIRONMENTAL

ENERGY STAR® certified

EPEAT® 2019 registered where applicable. EPEAT® registration varies by country. See www.epeat.net for registration status by country.

EPEAT® 2019 Gold¹

TCO 8.0 Certified

RCTA DO-160G

SEPA

GS Mark

Eyesafe Certification - Worldwide

Sustainable Impact Specifications

Recycled Aluminum and Magnesium, 75% PCR w/30% ITE plastics

¹ Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit www.epeat.net for more information.

Features

WEIGHTS & DIMENSIONS

Dimensions (w x d x h)

35.94 x 23.39 x 2.28 cm

14.15 x 9.21 x 0.9 in

Weights*

Starting at 1.9kg (4.16 lb)

Weight varies by configuration and components.

A deck: Anodized Aluminum

B deck: PC-ABS with Talc

C deck: Anodized Aluminum

D deck: Anodized Aluminum

Metal Alloy Hinges

*Weight will vary by configuration. Does not include power adapter.

PORTS/SLOTS

Left side

1 RJ-45

1 SuperSpeed USB Type-A 5Gbps signaling rate (charging) [USB 3.1 Gen 1 Type A charging]

1 HDMI1,2

1 smart card reader

1 Nano Security Lock Slot

Right side

1 power connector

1 Audio Combo Jack

1 USB Type-C® (Thunderbolt™ 4, pass through support DisplayPort™ 1.4, USB 3.1 Gen 2, with BC 1.2)

2 SuperSpeed USB Type-A 5Gbps signaling rate [USB 3.1 Gen 1 Type A]

*SuperSpeed USB 20Gbps is not available with Thunderbolt™ 4.

*HDMI cable sold separately.

SERVICE AND SUPPORT

1-year warranty and 90 day software limited warranty options depending on country. Batteries have a default one year limited warranty except for HP Long Life batteries which will follow the one or three year warranty of the platform. Refer to <http://www.hp.com/support/batterywarranty/> for additional battery information. On-site service and extended coverage is also available. HP Care Pack Services are optional extended service contracts that go beyond the standard limited warranties. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: <http://www.hp.com/go/cpc>.

¹Sold separately or as an optional feature. 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. 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. Consult your local HP Customer Support Center for details.

Features

SYSTEM UNIT

Stand-Alone Power Requirements (AC Power)	Nominal Operating Voltage	AC 20V
	Average Operating Power(idle)	WIN10 System in idle mode UMA 2.3W DIS 2.6W
	Integrated graphics	Yes
	Discrete Graphics	N/A
Temperature	Max Operating Power	UMA<65W
	Operating	32° to 95° F (0° to 35° C)
	Non-operating	41° to 95° F (5° to 35° C) (writing optical)
Relative Humidity	Operating	10% to 90%, non-condensing
	Non-operating	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature
Shock	Operating	40 G, 2 ms, half-sine
	Non-operating	200 G, 2 ms, half-sine
Random Vibration	Operating	0.75 grms
	Non-operating	1.50 grms
Maximum Altitude (unpressurized)	Operating	-50 to 10,000 ft (-15.24 to 3,048 m)
	Non-operating	-50 to 40,000 ft (-15.24 to 12,192 m)
Temperature Derating with Altitude	Operating	1.8°F / 1000 ft (1°C / 304.8 m)
Planned Industry Standard Certifications	Regulatory Model Number	HSN-I45C-3
	UL	Yes
	CSA	Yes
	FCC Compliance	Yes
	ENERGY STAR®	Certified ¹
	EPEAT®	EPEAT 2.0 Gold ²
	ICES	Yes
	Australia / NZ A-Tick Compliance	Yes
	CCC	Yes
	Japan VCCI Compliance	Yes
	KCC	Yes
	BSMI	Yes
	CE Marking Compliance	Yes
	MIL STD 810H	Yes, 19 tests
	BNCI or BELUS	Yes
	CIT	Yes
	EAC	Yes
	Saudi Arabian Compliance (ICCP)	Yes
	SABS	Yes

¹Configurations of the HP ZBook Power 15.6" G9 Mobile Workstation PC that are ENERGY STAR® qualified are identified as HP ZBook Power 15.6" G9 Mobile Workstation PC ENERGY STAR on HP websites and on <http://www.energystar.gov>.

Features

² Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit www.epeat.net for more information.

Technical Specifications – Displays

DISPLAYS

Panel LCD 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent NWBZ

Outline Dimensions (W x H)	350.96 x 205.54 mm (max)
Active Area	344.16 x 193.59 mm (typ.)
Weight	370 g (max)
Diagonal Size	15.6 inch
Thickness	3.0 mm/ 5.0 mm (w/PCB) (max)
Interface	eDP 1.2 (2 lane)
Surface Treatment	Anti-Glare
Touch enabled	No
Contrast Ratio	600:1 (typ.)
Refresh Rate	60 Hz
Brightness	250 nits
Pixel Resolution	Pitch 1920 x 1080 (FHD)
	Format RGB Stripe
Backlight	LED
Color Gamut Coverage	NTSC 45%
Color Depth	6 bits (Hi FRC supportive w/ condition to enable)
Viewing Angle	UWVA 85/85/85/85

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

Panel LCD 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA 45percent cg 250nits eDP 1.2 w/o PSR bent Touch on Panel NWBZ

Outline Dimensions (W x H)	350.96 x 205.74 mm (max)
Active Area	344.16 x 193.59 mm (typ.)
Weight	380 g (max)
Diagonal Size	15.6 inch
Thickness	3.2mm/ 5.2mm (PCB) (max)
Interface	eDP 1.2 (2 lane)
Surface Treatment	Anti-Glare On-cell
Touch enabled	Yes
Contrast Ratio	600:1 (typ.)
Refresh Rate	60 Hz
Brightness	250 nits
Pixel Resolution	Pitch 1920 x 1080 (FHD)
	Format RGB Stripe
Backlight	LED
Color Gamut Coverage	NTSC 45%
Color Depth	6 bits
Viewing Angle	UWVA 85/85/85/85

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

Technical Specifications – Displays

Panel LCD 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NWBZ	Outline Dimensions (W x H)	349.46 x 204.79 mm (max)
	Active Area	344.16 x 193.59 mm (typ.)
	Weight	325 g (max)
	Diagonal Size	15.6 inch
	Thickness	2.6mm / 4.6mm (PCB) (max)
	Interface	eDP 1.4 (2 lane)
	Surface Treatment	Anti-Glare
	Touch enabled	No
	Contrast Ratio	1200:1 (typ.)
	Refresh Rate	60 Hz
	Brightness	400 nits
	Pixel Resolution	Pitch 1920 x 1080 (FHD)
		Format RGB Stripe
	Backlight	LED
	Color Gamut Coverage	sRGB 100% (NTSC 72%)
	Color Depth	8 bit
	Viewing Angle	UWVA 85/85/85/85

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

Panel LCD 15.6 inch UHD (3840x2160) Anti-Glare WLED UWVA sRGB 100percent cg 400nits eDP 1.4+PSR2 bent LP NB2Y	Outline Dimensions (W x H)	349.52 x 205.42 mm (max)
	Active Area	344.22 x 193.62 mm (typ.)
	Weight	320 g (max)
	Diagonal Size	15.6 inch
	Thickness	2.6mm / 4.6mm (PCB) (max)
	Interface	eDP 1.4 (4 lane)
	Surface Treatment	Anti-Glare
	Touch Enabled	No
	Contrast Ratio	1200:1 (typ.)
	Refresh Rate	60 Hz
	Brightness	400 nits
	Pixel Resolution	Pitch 3840 x 2160 (UHD)
		Format RGB Stripe
	Backlight	LED
	Color Gamut Coverage	sRGB 100% only for UHD LP
	Color Depth	8 bits
	Viewing Angle	UWVA 85/85/85/85

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

Technical Specifications – Storage

STORAGE AND DRIVES

SSD 256GB 2280 PCIe-4x4 NVMe Three Layer Cell	Form Factor	M.2 2280	
	Capacity	256GB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		4000 MB/s ±20%	2000 MB/s ±20%
	Logical Blocks	500,118,192	
SSD 512GB 2280 PCIe-4x4 NVMe Three Layer Cell	Form Factor	M.2 2280	
	Capacity	512GB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		6400 MB/s ±20%	3500 MB/s ±20%
	Logical Blocks	1,000,215,215	
SSD 1TB 2280 PCIe-4x4 NVMe Three Layer Cell	Form Factor	M.2 2280	
	Capacity	1TB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		6400 MB/s ±20%	5000 MB/s ±20%
	Logical Blocks	2,000,409,264	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	Pyrite 2.0; TRIM; L1.2	

Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.

Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.

Technical Specifications – Storage

Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.			
SSD 2TB 2280 PCIe-4x4 NVMe Three Layer Cell	Form Factor	M.2 2280	
	Capacity	2TB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		6400 MB/s ±20%	5000 MB/s ±20%
	Logical Blocks	4,000,797,360	
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]		
Features	Pyrite 2.0; TRIM; L1.2		
Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.			
256GB PCIe-4x4 2280 NVME Self Encrypted OPAL2 Three Layer Cell Solid State Drive	Form Factor	M.2 2280	
	Capacity	256GB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		4000 MB/s ±20%	2000 MB/s ±20%
	Logical Blocks	500,118,192	
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]		
Features	TCG Opal 2.0; TRIM; L1.2		
Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.			
512GB PCIe-4x4 2280 NVME Self Encrypted OPAL2 Three Layer Cell Solid State Drive	Form Factor	M.2 2280	
	Capacity	512GB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	0.02 lb (10 g)	
	Interface	PCIe NVMe Gen4X4	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		6400 MB/s ±20%	3500 MB/s ±20%
	Logical Blocks	1,000,215,215	
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]		
Features	TCG Opal 2.0; TRIM; L1.2		

Technical Specifications – Storage

4TB PCIe-4x4 2280 NVMe Three Layer Cell double-sided M.2 Solid State Drive	Form Factor	M.2 2280	
	Capacity	4TB	
	NAND Type	TLC	
	Height	0.09 in (2.3 mm)	
	Width	0.87 in (22 mm)	
	Weight	15g	
	Interface	PCIe NVMe Gen4X4	
	Performance	Maximum Sequential Read	Maximum Sequential Write
		Up to 6000 MB/s	Up to 6000 MB/s
	Logical Blocks	8,001,594,720	
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]	
	Features	Pyrite 2.0; TRIM; L1.2	

Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.

Note: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35 GB (for Windows 10) is reserved for system recovery software.

Technical Specifications – Networking

NETWORKING/COMMUNICATION

Intel AX211 Wi-Fi 6E +BT Wireless LAN Standards
5.2 M.2 160MHz CNVi
WLAN vPro

	- IEEE 802.11a - IEEE 802.11b - IEEE 802.11g - IEEE 802.11n - IEEE 802.11ac - IEEE 802.11ax - IEEE 802.11d - IEEE 802.11e - IEEE 802.11h - IEEE 802.11i - IEEE 802.11k - IEEE 802.11r - IEEE 802.11v
Interoperability	Wi-Fi certified
Frequency Band	802.11b/g/n/ax • 2.402 – 2.482 GHz 802.11a/n/ac/ax • 4.9 – 4.95 GHz (Japan) • 5.15 – 5.25 GHz • 5.25 – 5.35 GHz • 5.47 – 5.725 GHz • 5.825 – 5.850 GHz • 5.955 – 6.415 GHz • 6.435 – 6.515 GHz • 6.535 – 6.875 GHz • 6.895 – 7.115 GHz
Data Rates	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: max 300Mbps • 802.11ac : 1733Mbps • 802.11ax : max 2.4Gbps
Modulation	Direct Sequence Spread Spectrum
	OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
Security¹	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • WPA3 certification • IEEE 802.11i • WAPI
Network Architecture Models	Ad-hoc (Peer to Peer)
	Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points

Technical Specifications – Networking

Output Power²

- 802.11b : +17dBm minimum
- 802.11g : +16dBm minimum
- 802.11a : +17dBm minimum
- 802.11n HT20(2.4GHz) : +14dBm minimum
- 802.11n HT40(2.4GHz) : +13dBm minimum
- 802.11n HT20(5GHz) : +14dBm minimum
- 802.11n HT40(5GHz) : +13dBm minimum
- 802.11ac VHT80(5GHz) : +10dBm minimum
- 802.11ac VHT160(5GHz) : +10dBm minimum
- 802.11ax HE40(2.4GHz) : +12dBm minimum
- 802.11ax HE80(5GHz) : +10dBm minimum
- 802.11ax HE160(5GHz) : +10dBm minimum

Power Consumption

- Transmit mode 2.0 W
- Receive mode 1.6 W
- Idle mode (PSP) 180 mW (WLAN Associated)
- Idle mode 50 mW (WLAN unassociated)
- Connected Standby 10mW
- Radio disabled 8 mW

Power Management

ACPI and PCI Express compliant power management
802.11 compliant power saving mode

Receiver Sensitivity³

- 802.11b, 1Mbps : -93.5dBm maximum
- 802.11b, 11Mbps : -84dBm maximum
- 802.11a/g, 6Mbps : -86dBm maximum
- 802.11a/g, 54Mbps : -72dBm maximum
- 802.11n, MCS07 : -67dBm maximum
- 802.11n, MCS15 : -64dBm maximum
- 802.11ac, MCS0(VHT80) : -84dBm maximum
- 802.11ac, MCS9(VHT80) : -59dBm maximum
- 802.11ac, MCS9(VHT160) : -58.5dBm maximum
- 802.11ax, MCS11(HE40): -57dBm maximum
- 802.11ax, MCS11(HE80): -54dBm maximum
- 802.11ax, MCS11(HE160): -53.5dBm maximum

Antenna Type

High efficiency antenna with spatial diversity, mounted in the display enclosure

Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications

Form Factor

PCI-Express M.2 MiniCard

Dimensions

1. Type 1216: 1.67 x 12.0 x 16.0 mm

Weight

2. Type 1216: 1.3g

Operating Voltage

3.3v +/- 9%

Temperature

Operating 14° to 158° F (-10° to 70° C)
Non-operating -40° to 176° F (-40° to 80° C)

Humidity

Operating 10% to 90% (non-condensing)
Non-operating 5% to 95% (non-condensing)

Altitude

Operating Non-operating 0 to 10,000 ft (3,048 m)
0 to 50,000 ft (15,240 m)

LED Activity

LED Amber – Radio Off; LED Off – Radio ON

HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2 Wireless Technology

Frequency Band

2402 to 2480 MHz

Technical Specifications – Networking

Number of Available Channels	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
Bluetooth Software Supported	Microsoft Windows Bluetooth Software
Link Topology	
Power Management	Microsoft Windows ACPI, and USB Bus Support
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Power Management	ETS 300 328, ETS 300 826
Certifications	Low Voltage Directive IEC950 UL, CSA, and CE Mark
Bluetooth Profiles Supported	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 –Link Layer Privacy LE Privacy 1.2 –Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) BT5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range

*Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, and Windows 11 to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported.

Wireless LAN Standards	IEEE 802.11a IEEE 802.11b
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Technical Specifications – Networking

Intel AX211 Wi-Fi 6E +BT
5.2 M.2 160MHz CNVi
WLAN non-vPro

	- IEEE 802.11g - IEEE 802.11n - IEEE 802.11ac - IEEE 802.11ax - IEEE 802.11d - IEEE 802.11e - IEEE 802.11h - IEEE 802.11i - IEEE 802.11k - IEEE 802.11r - IEEE 802.11v
Interoperability	Wi-Fi certified
Frequency Band	802.11b/g/n/ax • 2.402 – 2.482 GHz 802.11a/n/ac/ax • 4.9 – 4.95 GHz (Japan) • 5.15 – 5.25 GHz • 5.25 – 5.35 GHz • 5.47 – 5.725 GHz • 5.825 – 5.850 GHz • 5.955 – 6.415 GHz • 6.435 – 6.515 GHz • 6.535 – 6.875 GHz • 6.895 – 7.115 GHz
Data Rates	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: max 300Mbps • 802.11ac : 1733Mbps • 802.11ax : max 2.4Gbps
Modulation	Direct Sequence Spread Spectrum
	OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
Security¹	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • WPA3 certification • IEEE 802.11i • WAPI
Network Architecture Models	Ad-hoc (Peer to Peer)
	Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power²	• 802.11b : +17dBm minimum • 802.11g : +16dBm minimum • 802.11a : +17dBm minimum • 802.11n HT20(2.4GHz) : +14dBm minimum • 802.11n HT40(2.4GHz) : +13dBm minimum • 802.11n HT20(5GHz) : +14dBm minimum • 802.11n HT40(5GHz) : +13dBm minimum

Technical Specifications – Networking

	• 802.11ac VHT80(5GHz) : +10dBm minimum • 802.11ac VHT160(5GHz) : +10dBm minimum • 802.11ax HE40(2.4GHz) : +12dBm minimum • 802.11ax HE80(5GHz) : +10dBm minimum • 802.11ax HE160(5GHz) : +10dBm minimum
Power Consumption	• Transmit mode 2.0 W • Receive mode 1.6 W • Idle mode (PSP) 180 mW (WLAN Associated) • Idle mode 50 mW (WLAN unassociated) • Connected Standby 10mW • Radio disabled 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity³	• 802.11b, 1Mbps : -93.5dBm maximum • 802.11b, 11Mbps : -84dBm maximum • 802.11a/g, 6Mbps : -86dBm maximum • 802.11a/g, 54Mbps : -72dBm maximum • 802.11n, MCS07 : -67dBm maximum • 802.11n, MCS15 : -64dBm maximum • 802.11ac, MCS0(VHT80) : -84dBm maximum • 802.11ac, MCS9(VHT80) : -59dBm maximum • 802.11ac, MCS9(VHT160) : -58.5dBm maximum • 802.11ax, MCS11(HE40): -57dBm maximum • 802.11ax, MCS11(HE80): -54dBm maximum • 802.11ax, MCS11(HE160): -53.5dBm maximum
Antenna Type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	1. Type 1216: 1.67 x 12.0 x 16.0 mm
Weight	2. Type 1216: 1.3g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (-10° to 70° C) Non-operating -40° to 176° F (-40° to 80° C)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating Non- 0 to 10,000 ft (3,048 m) operating 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF; LED White – Radio ON
HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2 Wireless Technology	
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps BLE : 1 Mbps data rate; throughput up to 0.2 Mbps Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels

Technical Specifications – Networking

Transmit Power	Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5) The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
Bluetooth Software Supported	Microsoft Windows Bluetooth Software
Link Topology	
Power Management	Microsoft Windows ACPI, and USB Bus Support
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Power Management	ETS 300 328, ETS 300 826
Certifications	Low Voltage Directive IEC950 UL, CSA, and CE Mark
Bluetooth Profiles Supported	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 –Link Layer Privacy LE Privacy 1.2 –Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) BT5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range
Security & Manageability	Intel® vPro™ support with appropriate Intel® chipset components
*Wi-Fi 6E requires a Wi-Fi 6E router, sold separately, and Windows 11 to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 6E is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 6E is supported.	

Near Field Communications Controller (optional)

Dimensions (L x W x H)	Module 25 mm by 10 mm by 2.0 mm
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Technical Specifications – Networking

Chipset	NPC300		
System interface	I2C		
NFC RF standards	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 ISO/IEC 18092 ECMA-340 NFCIP-1 Target and Initiator ECMA-320 NFCIP-2		
NFC Forum Support	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2		
Reader (PCD-VCD) Mode	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz cards		
Card Emulation (PICC-VICC) Mode	ISO/IEC 14443 A ISO/IEC 14443 B and B' MIFARE FeliCa		
Frequency	13.56 MHz		
NFC Modes Supported	Reader/Writer, Peer-to-Peer		
Raw RF Data Rates	106, 212, 424, 848 kbps		
Operating temperature	0°C to 70°C		
Storage temperature	-20°C to 125°C		
Humidity	10-90% operating 5-95% non-operating		
Supply Operating voltage	4.35 to 5.25 Volts		
I/O Voltage	1.8V or 3.3V		
Power Consumption	Booster enable, VCC_BOOST = 5V) Mode Power Consumption, Typical	VBAT= 3.3V, Polling Detected Test Tag Type 1 Detected Test Tag Type 2 Detected Test Tag Type 3 Detected Test Tag Type 4	7.3 mA Total 283.8 mA Net Module 236.8 mA Total 288.8 mA Net Module 241.8 mA Total 287.7 mA Net Module 240.7 mA Total 282.3 mA Net Module 235.3 mA
Antenna	Antenna connector, 0.5mm pitch, 7 connector FPC. Antenna matching is external to module.		

AUDIO

HD Stereo Codec	Realtek ALC3315
Audio I/O Ports	Headset: CTIA only and Headphone-out

Technical Specifications – Networking

Internal Speaker Amplifier	Cirrus Logic High-Efficiency Boosted Class D Amplifier
Multi-streaming Capable	Playback multi-streaming can be enabled in the audio control panel to allow independent audio. Following MSFT Behaviour
Sampling	DAC: 44.1k/48kHz ADC: 48kHz
Wavetable Syntheses	
Analog Audio	Support 3.5mm Headset: CTIA only and Headphone-out
# of Channels on Line-Out	
Internal Speaker	Yes

FINGERPRINT READER

Sensor vendor	Synaptics FS7604
Sensor type	Capacitive
DPI resolution	363DPI
Scan area	7.4x6mm sensor area
False Rejection Rate	<1%
False Acceptance Rate	1:50K FAR
Mobile Voltage Operation	Mobile Voltage Operation: 3.0V to 3.6V
Operating Temperature	Operating Temperature: 0~60°C
Current Consumption Image	Current Consumption Image: 100mA Max
Low Latency Wait For Finger	Low Latency Wait For Finger: 260 uA
Capture Rate	Capture Rate: <30msec per image
ESD Resistance	ESD Resistance: IEC 61000-4-2 4B (+/-15KV)
Detection Matrix	Detection Matrix: 363 dpi / 7.4x6mm sensor area

POWER

AC Adapter 65 Watt nPFC Slim USB type C Straight 1.8m	Dimensions	138x66x22mm
	Weight	unit: 325g +/- 10g
	Input	Input Efficiency 88% at 115 Vac and 89% at 230Vac
		Input frequency range 47 ~ 63 Hz
		Input AC current 2.7 A at 90 Vac and Maximum Load
	Output	Output power 150W
		DC output 19.5V
		Hold-up time 5ms at 115 Vac input
		Output current limit <16.0A
	Connector	C6
		DC Plug 4.5mm Barrel Type

Technical Specifications – Networking

Environmental Design	Operating temperature	32° to 95° F (0° to 35° C)
	Non-operating (storage) temperature	-4° to 185° F (-20° to 85° C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	Humidity	5% to 95%
	Storage Humidity	5% to 95%
EMI and Safety Certifications	Eg:	
	*CE Mark - full compliance with LVD and EMC directives	
	* Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1, Class1, SELV;	
	Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE.	
	* MTBF - over 200,000 hours at 25°C ambient condition.	

Technical Specifications – Power

AC Adapter 120 Watt Smart PFC Slim Barrel 4.5mm Right Angle - Delphin	Dimensions	138x68.5x25.4mm
	Weight	unit: 350g +/- 10g
	Input	Input Efficiency 88% at 115 Vac and 89% at 230Vac
		Input frequency range 47 ~ 63 Hz
	Output	Input AC current 1.7 A at 90 Vac and Maximum Load
		Output power 120W
		DC output 19.5V
		Hold-up time 5ms at 115 Vac input
		Output current limit <18.0A
	Connector	C6
	Environmental Design	Operating temperature 32° to 95° F (0° to 35° C)
		Non-operating (storage) temperature -4° to 185° F (-20° to 85° C)
		Altitude 0 to 16,400 ft (0 to 5000m)
		Humidity 5% to 95%
		Storage Humidity 5% to 95%
	EMI and Safety Certifications	Eg: *CE Mark - full compliance with LVD and EMC directives * Worldwide safety standards - IEC60950-1 and/or IEC62368-1, EN60950-1 and/or EN62368-1, UL60950-1 and/or UL62368-1, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, NOM-001 NYCE. * MTBF - over 200,000 hours at 25°C ambient condition.
Battery 6 Cell WHr 83 Long Life -PL Fast Charge	Dimensions (H x W x L)	8.7 x 316.1 x70.2mm (0.342 x 12.44 x 2.763 inch)
	Weight	0.31kg (0.683lb)
	Cells/Type	6cell Lithium-Ion Polymer cell / 685257
	Energy	Voltage 11.58V
		Amp-hour capacity 7.170Ah
		Watt-hour capacity 83Wh
	Temperature	Operating (Charging) 32° to 113° F (0° to 45° C)
		Operating (Discharging) 14° to 122° F (-10° to 60° C)
	Fuel Gauge LED	NA
	Warranty	Refer to http://www.hp.com/support/batterywarranty/ for battery warranty information.
	Optional Travel Battery Available	N/A
	*Batteries have a default one year limited warranty except for Long Life batteries which will have same 1-year or 3-year limited warranty as the platform.	

Technical Specifications – Environmental

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:

- IT ECO declaration
- US ENERGY STAR®
- US Federal Energy Management Program (FEMP)
- EPEAT[®] Gold registered in the United States. See <http://www.epeat.net> for registration status in your country.
- TCO Certified
- IEC 60601-1-2:2014 EN60601-1-2: 2015
- China Energy Conservation Program (CECP)
- China State Environmental Protection Administration (SEPA)
- Taiwan Green Mark
- Korea Eco-label
- Japan PC Green label*

Sustainable Impact Specifications

- Ocean-bound plastic in Speaker Box¹
- 35% post-consumer recycled plastic²
- External Power Supply 90% Efficiency
- Low halogen³
- Outside Box and corrugated cushions are 100% sustainably sourced and recyclable⁴
- Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable⁵
- Bulk packaging available

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".

Energy Consumption (in accordance with US ENERGY STAR® test method)

	115VAC, 60Hz	230VAC, 50Hz	100VAC, 50Hz
Normal Operation (Short idle)	TBD	TBD	TBD
Normal Operation (Long idle)	TBD	TBD	TBD
Sleep	TBD	TBD	TBD
Off	TBD	TBD	TBD

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)	TBD	TBD	TBD
Normal Operation (Long idle)	TBD	TBD	TBD
Sleep	TBD	TBD	TBD
Off	TBD	TBD	TBD

Technical Specifications – Environmental

***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

TBD

TBD

Fixed Disk – Random writes

TBD

TBD

Optical Drive – Sequential reads

TBD

TBD

Longevity and Upgrading

This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the

Spare parts are available throughout the warranty period and or for up to “5” years after the end of production.

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product is 96.2% recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	TBD
Internal:	PAPER/Paperboard	TBD
	PAPER/Molded Pulp	TBD
	PLASTIC/Polypropylene - PP	TBD
	PLASTIC/Polyethylene low density - LDPE	TBD

The plastic packaging material contains at least 100% recycled content.

The corrugated paper packaging materials contains at least 35.6% 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.

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.

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.

To obtain a copy of the HP RoHS Compliance Statement, see [HP RoHS position statement](#).

Technical Specifications – Environmental

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):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Bis(2-Ethylhexyl) phthalate (DEHP)
- Benzyl butyl phthalate (BBP)
- Dibutyl phthalate (DBP)
- Diisobutyl phthalate (DIBP)
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBEBs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging Usage

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- 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.

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>.

Technical Specifications – Environmental

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.

HP Inc. Corporate Environmental Information

For more information about HP's commitment to the environment:

Global Citizenship Report

<http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html>

Eco-label certifications

<http://www8.hp.com/us/en/hp-information/environment/ecolabels.html>

ISO 14001 certificates:

<http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842>

and

<http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf>

Footnotes

¹Percentage of ocean-bound plastic contained in each component varies by product

²Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard.

³External power supplies, WWAN modules, power cords, cables and peripherals excluded.

⁴100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers.

⁵Fiber cushions made from 100% recycled wood fiber and organic materials.

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Date of change:	Version History:		Description of change:
March 29, 2022	From v1 to v2	Changed	DRIVE CONTROLLERS and Power sections
March 31, 2022	From v2 to v3	Changed	PROCESSOR section