

HP ZBook Studio G3 Mobile Workstation



Looks stunning. Works wonders.



Conquer the workday with the perfect combination of brains and beauty. The iconic 15.6" diagonal HP ZBook Studio G3 is HP's thinnest, lightest, and most attractive full performance mobile workstation.

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Chassis and system highlights

The HP ZBook Studio G3 Mobile Workstation provides the ideal blend of full performance and extreme mobility. Take advantage of powerful processing and graphics, innovative design, and the blazing-fast connectivity and storage to perform and collaborate at the speed of creativity.

Innovative sleek design

Make a bold statement with innovative style and performance. Starting at just 4.4 lbs. and 18 mm thin, the HP ZBook Studio G3 is a meticulously-designed performance machine.

Figure 1. HP ZBook Studio G3



Professional performance

Get the performance you need with Windows 10¹⁴, the latest 6th generation Intel® Core™ and Xeon® processors⁵, Intel HD Graphics 530 available as standalone configurable graphics, next level NVIDIA® Quadro® graphics, and the HP Z Turbo Drive G2 for exceptional storage performance.

Workstation reliability

Optimize your HP ZBook Studio G3 for peak performance with HP Performance Advisor³ by automatically configuring your system with the most current settings and drivers. Be confident that your ZBook can withstand the demands of professional computing with workstation ISV application certifications, 115,000 hours of testing through the HP Total Test Process, and rigorous MIL-STD-810G testing standards. Also, take advantage of HP Sure Start to help ensure a proper boot-up thanks to corruption detection, a self-healing BIOS, and recovery that restarts where it left off if the update stalls, fails, or is corrupted.

Designed with the environment in mind

HP is committed to environmental sustainability and energy efficiency. To reduce energy consumption, HP offers ENERGY STAR® certified mobile workstation configurations and meets EPEAT® Gold standards. The HP Workstation design team has taken a proactive approach (beyond industry regulations) to recyclability and selecting materials that help reduce the impact to the environment.

System architecture

The HP ZBook Studio G3 Mobile Workstation unleashes the power of the latest 6th generation Intel® Core™ and Xeon® processors⁵, workstation-caliber NVIDIA® Quadro® graphics, Thunderbolt™ 3 ports and the HP Z Turbo Drive G2 to perform and collaborate at the speed of creativity.

New technologies

New Intel® processor micro-architecture

The HP ZBook Studio G3 supports Intel®’s latest Core™ i7 and Intel® Xeon® processors⁵, featuring a new micro-architecture and a new instruction set including AVX2 (Advanced Vector Extensions 2.0) and FMA (floating-point fused multiply add instructions) that help deliver fast computing performance with low energy consumption. The Mobile Intel® CM236 chipset complements the HP ZBook Studio G3’s core architecture.

Intel® vPRO™ Technology Capable

Intel® Core™ i7 with vPro™ and XEON® with vPro™ technology is a selectable feature that is available on units configured with select processors, a qualified Intel® Centrino® 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.

Operating system

The HP ZBook Studio G3 is compatible with Windows operating system. Windows has been designed to bring you one operating system that can handle all your work’s toughest demands—no matter where you are. The HP ZBook Studio G3 supports the operating systems seen below.

Table 1. Supported operating systems

Preinstalled OS	Supported OS
Windows 10 Pro 64 ¹⁴	Windows 10 Enterprise 64 ¹⁴
Windows 10 Home 64 ¹⁴	Windows 7 Enterprise 64 ¹⁴
Windows 7 Professional 64 ^{10,14} (available through downgrade rights from Windows 10 Pro)	
Windows 7 Professional 64 ¹⁴	
FreeDOS 2.0	

I/O and storage

Internal I/O

The ZBook Studio G3 has two Thunderbolt™ 3 ports. Thunderbolt™ 3 utilizes the industry standard USB Type-C™ port that brings multiple functions together including data, video, and power (15W maximum for bus powered devices).

Thunderbolt 3 offers 40 Gb/s data throughput, DisplayPort 1.2 support, and USB 3.1 Gen2 @10 Gb/s. The Thunderbolt™ 3 ports on the ZBook Studio G3 are capable of driving two 4K monitors or a single 5K resolution monitor (this reduces the maximum bandwidth available for PCIe and USB devices).

The HP ZBook Studio G3 comes configured with three USB 3.0 ports (one charging), headset and microphone connections, an RJ-45 connection, and a media reader slot that supports SD, SDHC, and SDXC.

The system ships with a WLAN/Bluetooth® card. The WLAN controller connects via a PCIe bus and the Bluetooth® controller connects via a USB 2.0 bus. Both controllers can be enabled or disabled in the BIOS F10 menu by enabling/disabling PCIe slot.¹

This mobile workstation is equipped with a dual-microphone array, Bang & Olufsen audio and an optional 720p HD webcam.

Storage

The PCIe NVMe specification provides the needed connectivity to the PCIe bus, enabling higher bandwidth. This results in a significant performance increase today and performance growth for the foreseeable future. Through a direct connection to the PCIe bus, the HP Z Turbo Drive G2 (PCIe M.2 2280 SSD) enables sequential performance that is 4 times faster than SATA SSDs. The HP ZBook Studio G3 supports a maximum of two M.2 NVMe drives.

Graphics

The HP ZBook Studio G3 supports Intel HD Graphics 530 available as standalone configurable graphics, discrete graphics with a special edition NVIDIA® Quadro® M1000M with 4 GB¹³ dedicated GDDR5 video memory. The system also supports hybrid (“NVIDIA Optimus”) graphics with the discrete NVIDIA® GPU and either integrated Intel® HD graphics 530, Intel® HD graphics P530, or Intel® Iris Pro Graphics P580.

Battery

The HP ZBook Studio G3 has an extended battery life for the longest of days. The HP Long Life 4-cell Prismatic Battery (64 WHr) has enough power to keep your workstation running for up to 9.5 hours⁸, depending on the configuration (FHD display etc).

Networking and security

Wireless networking

The HP ZBook Studio G3 supports WLAN (Intel® 802.11 2x2ac) and Bluetooth® (BT 4.1) both vPro and non-vPro.

Table 2. 802.11 Wireless LAN options

Intel® Dual Band Wireless-AC 8260 802.11 AC/a/b/g/n (2x2) WiFi + Bluetooth® 4.0 Combo Adaptor (vPro)

Intel® Dual Band Wireless-AC 8260 802.11 AC/a/b/g/n (2x2) WiFi + Bluetooth® 4.0 Combo Adaptor (non-vPro)

Security

The HP ZBook Studio G3 supports Integrated Smart Card Reader, Full Volume Encryption, a security lock slot, an optional fingerprint reader and Trusted Platform Module (TPM) 2.0 security processor.

Display options

As a mobile workstation customer, we know that viewing your work precisely is critical to your success. You need the right display in order to accurately and efficiently get your work done. Our HP ZBook Studio G3 offers different display options to ensure you will get the best visual experience. This section will help you choose the display that is right for you. Our mobile workstation can also be docked to take advantage of our HP Z Displays.

Display technology background and information

There are many different measures used to understand or express the performance of a mobile workstation-level display. Although display resolution, the most obvious measure, is important for clarity, there are other measures of a display that contribute to your viewing experience such as screen brightness, viewing angle, response rate, and bit-precision.

IPS displays

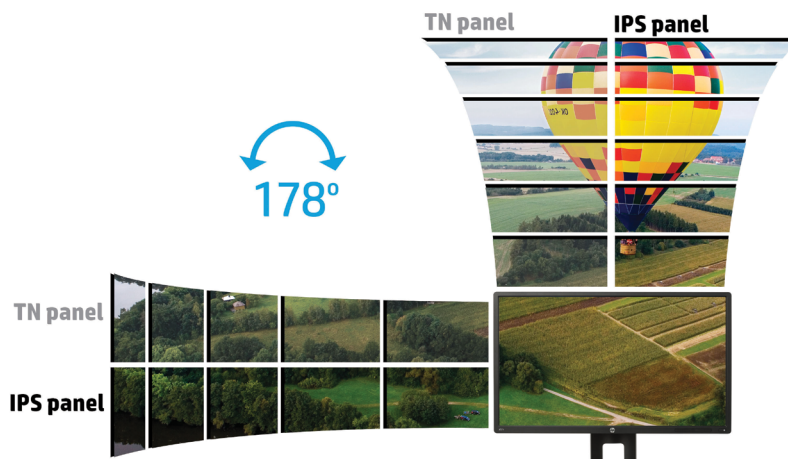
Our displays contain In-Plane Switching (IPS) technology. While Twisted Nematic (TN) displays are common in the industry, IPS displays offer superior viewing angles, color accuracy and newer technology to create an immersive viewing experience.

Viewing angles

The viewing angle of a display represents how far left, right, down or up a display can be observed at with acceptable viewing performance. When looking at a TN screen from an angle, the images on the display often look faded or disappear completely. This is due to the TN displays' shallow viewing angle. Figure 1 below shows the effect different viewing angles have on a TN display. Alternatively, an IPS display has a larger viewing angle of up to 178 degrees that allows the screen to be viewed comfortably from several positions. Wider viewing angles are especially useful when several users are viewing one screen or the screen is not being viewed head-on.

Viewing angles are usually measured in a left/right/down/up format. This means they have an angle measurement for each viewing direction. A standard viewing angle (SVA) is 40/40/15/30. This means you can view it 40 degrees to the left, 40 degrees to the right, 15 degrees down, and 30 degrees up while still having adequate color and detail. The next step up, wide viewing angle (WVA), measures in at 60/60/50/50. The ultra-wide viewing angle (UWVA), which is available on our HP ZBook Studio G3 displays, measures at 85/85/85/85.

Figure 2. The effect different viewing angles have on IPS and TN displays



Brightness

Luminance and brightness, while being different terms and measurements, represent the same thing. While brightness is a relative measure, luminance is an exact measurement of light output from your display. Luminance is measured in candelas per square meter (cd/m²) often referred to as cdm or, in the shorthand, nits. Simply put, a cdm measures the amount of light a screen produces relative to screen size, facilitating an easy comparison between differing screen sizes. Another benefit of measuring screen brightness in nits is how straightforward the scale is to understand: the more cdm, the brighter the screen.

While luminance is an important value to keep in mind, brighter doesn't always mean better. High luminance displays work great in bright environments but may not be suitable for lower light conditions. Be sure to assess your work location before selecting how bright your display will be.

Refresh rates

The refresh rate of a display measures the amount of times the display is updated every second. A higher refresh rate means decreased blurring and ghosting effects when using the display. Ghosting is the effect when an image or video moves on your display and leaves a faint trail. Having a good refresh rate, commonly around 60 Hz (60 images/second), assures video playback and display use is smooth.

Resolution

Screen resolution measures the amount of pixels a screen can display. Usually measured in the format "Width x Height," a display of 1920 x 1080 would contain 1920 pixels horizontally and 1080 pixels vertically for a total resolution of 2,073,600 pixels. A higher screen resolution means more pixels and more detail in the images on your display. Figures 2 and 3 illustrate the difference between a lower resolution display and a higher resolution display. A display with more pixels allows you to view more information on one screen due to increased pixel density. In theory, a display with more pixels should allow you to view more on your screen at once than a display with a lower pixel count.

Figure 3. FHD

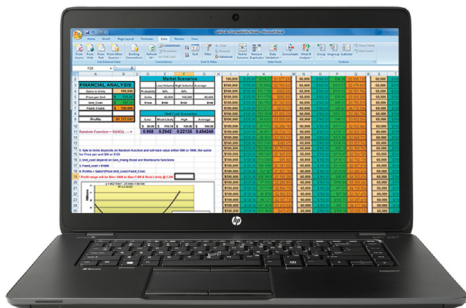
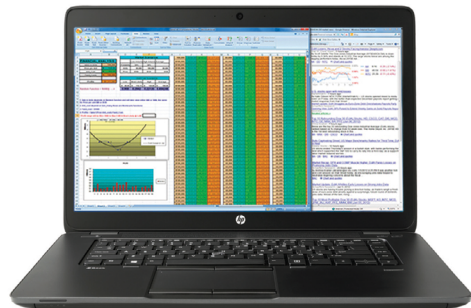


Figure 4. UHD



Similar to resolution, displays can be measured in pixels per inch (PPI). This simple measurement takes both screen size and resolution into account to define the amount of pixels per square inch present in the display. A display with a low PPI measurement has fewer pixels per inch and lower quality image production than a display with a high PPI measurement. Generally, image sensitive work requires a high PPI display.

Resolution types

Displays exist in several resolutions. Table 1, shown below, outlines the resolution differences of displays offered in the market.

Table 3. High definition video standards

Video standard	Full name	Resolution
HD	High Definition	1280 x 720
HD+	High Definition Plus	1600 x 900
FHD	Full High Definition	1920 x 1080
QHD	Quad High Definition	2560 x 1440

QHD+	Quad High Definition Plus	3200 x 1800
UHD/4K⁶	Ultra High Definition	3840 x 2160
Cinema 4K⁶	Cinema High Definition	4096 x 2160
QQHD/5K	Quad Quad High Definition	5760 x 2880

HP display solutions

HP ZBook Studio G3 display options

The HP ZBook Studio G3 is crafted to maximize your productivity. The 15.6-inch diagonal screen size with a 16:9 aspect ratio provides a comfortable workspace and keyboard layout.

Table 4. HP ZBook Studio G3 display options

	Resolution	Refresh rate*	Brightness*	Viewing angle
15.6-inch diagonal FHD	1920 x 1080	60 Hz	300 cd/m2	UWVA
15.6-inch diagonal FHD Touch	1920 x 1080	60 Hz	300 cd/m2	UWVA
15.6-inch diagonal UHD DreamColor	3840 x 2160	60 Hz	300 cd/m2	UWVA

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

HP Z Displays

We offer HP Z Displays for those times you need something bigger. Switching from an HP ZBook display to an HP Z Display is as simple as “click and go” when combined with a docking station. With sizes ranging from 22- to 34-inch diagonal displays you can find the perfect size for your work. Choose from several different resolutions to best meet your display needs and even combine multiple displays side-by-side, enabling you to be as productive as possible.

All HP Z Displays and DreamColor Displays are supported on the HP Zbook G3 family. For more information, see hp.com/go/zdisplays.

When selecting a display, be sure to consider what the display will be used for. If visual details are important, a higher resolution display is a must. However, if you mainly use your computer for word processing and Excel, a lower resolution display is a cost-effective option.

Recap

With different resolutions, response rates, viewing angles, bit precision, and display types, the choice of display can be overwhelming. However, understanding what these measurements mean and why they are important is helpful when choosing a display. Our HP ZBook Studio G3 display options are perfect for any workstation-worthy job and can benefit professionals in any field.

Multiple display support

The HP ZBook Studio G3 Mobile Workstation supports a maximum of three independent displays by utilizing display outputs from the system HDMI, system Thunderbolt ports, and internal LCD panel.

The number of independent displays supported depends on a number of factors, including if a docking station is used and if a DisplayPort Hub or “daisy-chain” capable display is being used.

HP ZBook Studio G3 Hybrid and Discrete Graphics without ZBook Dock:

HP ZBook Studio G3 with hybrid graphics or discrete graphics and without the use of the ZBook dock supports up to a maximum of three independent displays. These three displays are the internal panel plus two external displays connected to two of the three following ports: HDMI 1.4, Thunderbolt™ 3, and Thunderbolt™ 3.

HP ZBook Studio G3 Hybrid Graphics with ZBook Dock:

The ZBook Dock with Thunderbolt™ 3 has a Thunderbolt™ 3 port, VGA port, and two DisplayPort 1.2 ports. When used together with the HP ZBook Studio G3 configuration with hybrid graphics, a maximum of 5 independent displays are supported. These five displays are internal panel plus four external displays connected to the ZBook dock’s Thunderbolt™ 3, VGA, and two DisplayPort ports.

HP ZBook Studio G3 Discrete Graphics with ZBook Dock:

When the ZBook Dock with Thunderbolt™ 3 is used together with the HP ZBook Studio G3 configuration with discrete graphics, a maximum of 4 independent displays are supported. These four displays are any combination of four from the internal panel and external displays connected to the ZBook dock’s Thunderbolt™ 3, VGA, and two DisplayPort ports.

Figure 5. Multiple Displays Configuration for HP ZBook Studio G3 with Hybrid Graphics

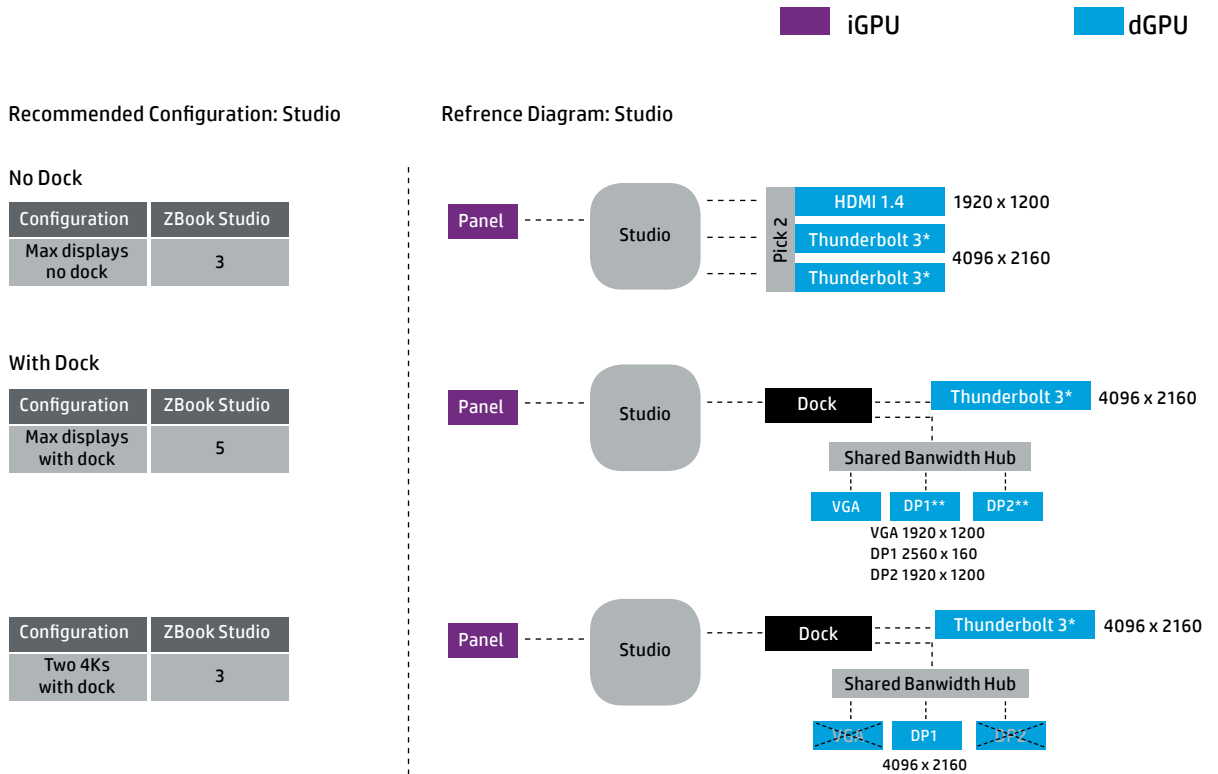


Figure 6. Multiple Displays Configuration for HP ZBook Studio G3 with Discrete Graphics



Recommended Configuration: Studio

No Dock

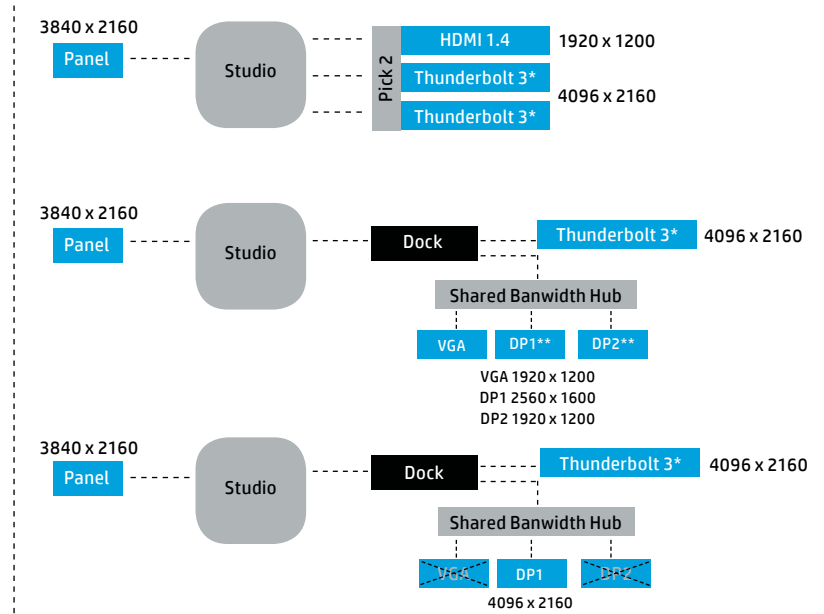
Configuration	ZBook Studio
Max displays no dock	3

With Dock

Configuration	ZBook Studio
Max displays with dock	Pick any 4

Configuration	ZBook Studio
Two 4Ks with dock	3

Reference Diagram: Studio



*DisplayPort connector supports a DisplayPort display, a HDMI display with a DP-to-HDMI dongle, a VGA display with a DP-to-VGA dongle, or a DVI display with a DP-to-DVI dongle

DisplayPort 1.2 “daisy-chain” feature

DisplayPort (DP) v1.2 supports “multi-stream transport,” which allows multiple video streams across a single DisplayPort connection. This is commonly referred to as the DP 1.2 “daisy-chain” feature. With the feature, daisy chaining of DP 1.2 is used to achieve 5 active displays without a docking station on HP ZBook Studio G3 configurations with hybrid graphics enabled. Daisy chaining DP 1.2 is used to achieve 4 active displays without a docking station on HP ZBook Studio G3 configurations with discrete only graphics enabled.

This capability provides flexibility on the type of displays that may be used. For example, three DP displays may be connected with the use of a DP 1.2 Hub9 with both DP monitors connected to the hub, and the hub connected to the DP connector on the HP ZBook Studio G3.

Special note on hybrid graphics during Pre-OS environment

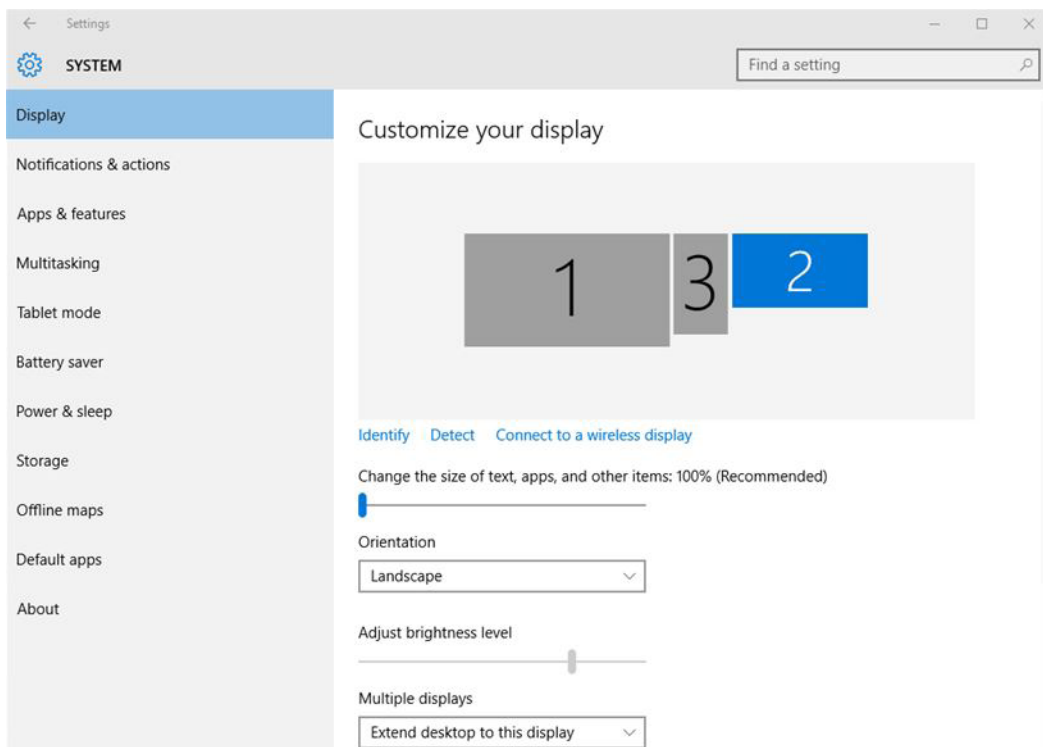
With hybrid graphics, HP is using displays that may be connected to either one or both GPUs. Because the standard industry support for Pre-OS session involves only one GPU, there is a standard industry limitation where only displays connected to the integrated GPU may be used during Pre-OS. As such, display(s) attached to the discrete GPU are not viewable during Pre-OS. For example, if users boot with the panel closed and an external display attached to a DisplayPort connector driven by the discrete GPU, that display cannot show any image during Pre-OS session such as during POST, when in BIOS setup, when running early diagnosis, when using Power-On Password, and so on.

Multiple displays management

On the HP ZBook Studio G3, users may use Windows Display Manager to set up and manage multiple displays.

To launch Windows Display Manager, right-click any empty area of your desktop, and then select **Screen Resolution** on Windows 8/8.1 or Display Settings on Windows 7 or 10. (Figure 7 shows the screen shot for Windows Display Manager).

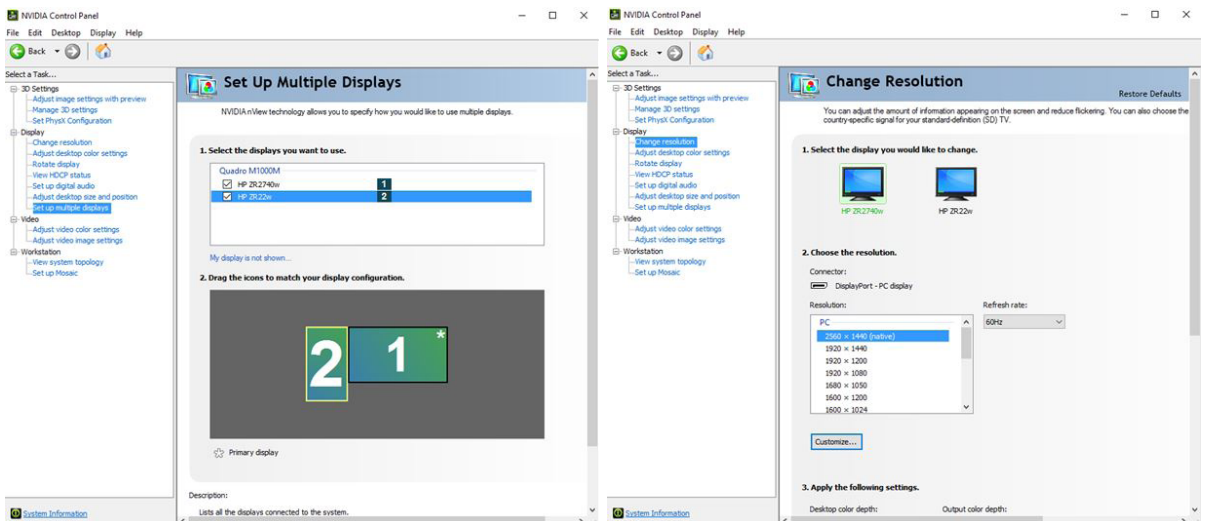
Figure 7. Multiple Displays Configuration for HP ZBook Studio G3 with Discrete Graphics



Tip: A quick way to enable all displays connected (up to the maximum supported) in extended desktop mode is to use Windows presentation key and choose "Extend" mode. 1- Connect displays. 2- Press Windows logo key + P. 3- Select Extend.

Users may also use NVIDIA Control Panel to manage multiple displays on G3 Mobile Workstations with NVIDIA graphics.

Figure 8. Screen shot for NVIDIA Control Panel



SATA to PCIe technology transition for SSDs¹³

This section highlights the transition from SATA protocol to PCIe protocol as it relates to solid-state storage (SSD) devices.

Why the transition from SATA to PCIe?

HP ZBooks are transitioning from the use of SATA SSDs onto the PCI Express (PCIe) SSDs. M.2 is the new and smaller industry standard for factor that enables thinner and lighter HP ZBooks and provides support for various devices, focusing on SSDs that support either the legacy SATA interface or the PCIe interface. This transition fosters performance improvements of SSDs on the HP ZBook Studio G3. The HP Z Turbo Drive G2, built on the industry standard M.2 form factor, is a PCIe based NVMe SSD storage device that takes advantage of this advancement.

Today's SATA HDDs and SATA SSDs have reached a performance ceiling. HDDs are limited by the mechanical nature of the devices, while SATA SSDs are limited by the 6 Gb/s¹³ ceiling of the SATA bus. HP's SATA I/O working group has strategically shifted focus from the SATA bus to the multi-lane capabilities of PCI Express.

In order to support multi-lane PCIe devices, a new specification was needed to enable performance improvements of storage in small devices. The PCI Express M.2 specification was created and provides the needed connectivity to the PCIe bus providing both a significant performance bump today and performance growth for the foreseeable future.

Introduction to M.2 interface and form factor

M.2 is a specification for internally mounted computer expansion cards and associated connectors. Through different keying the M.2 specification supports multiple functions for add-in cards including WLAN (Wi-Fi), 3G/LTE (WWAN), and SSDs. Exposed buses through M.2 are SATA, PCIe 3.0, and USB 3.0 buses. M.2 storage devices replace mSATA with a denser, more flexible physical specification that is most suitable for SSDs, especially when utilized in small devices.

Figure 9. M.2 PCIe SSD



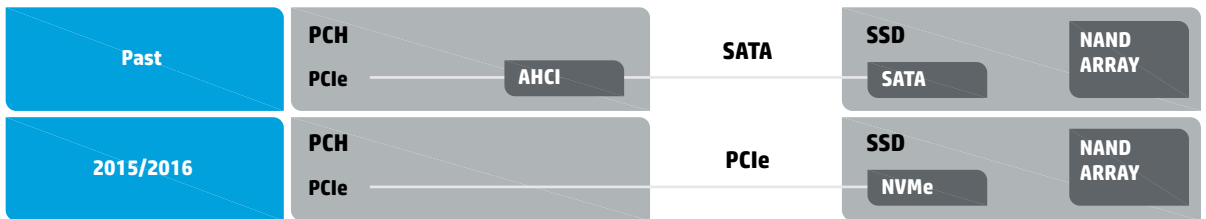
Table 5. Physical dimension specification of M.2 available for ZBook G3

	M.2
Board area (mm)	22 x 80

M.2 PCIe SSD benefits and features

- Maximizes usage of card space
 - Longer modules and double-sided components population allows double the storage capacity within the footprint of mSATA SSD devices
- Four PCI Express lanes and one SATA 3.0 6 Gb/s¹³ port accessed through same connector
 - Compatibility to legacy storage interface (SATA)
 - Same form-factor and interface provides path to the PCIe storage devices of the future
- Reduces bottlenecks by connecting directly to the PCIe bus thus providing an excellent solution for those with large files and big data workflows
 - Bandwidth to the SSDs increases due to lane aggregation
 - Simpler storage hierarchy reduces latency
- NVMe Controller: designed specifically for non-volatile memory storage devices
- Lowers latency that results in significantly better Random Read performance
- Lowers command overhead
- Exploits the parallelism available in modern host HW and SW

Figure 10. AHCI to NVMe Transition



Performance advantage with HP Z Turbo Drive

As previously mentioned, current mSATA SSDs connected via a SATA connection are limited by the 6 Gb/s ceiling of the SATA bus. With the implementation of the M.2 specification and use of PCIe SSD devices, performance levels now exceed 6 Gb/s.

The HP ZBook Studio G3 takes advantage of this opportunity by utilizing the HP Z Turbo Drive G2, a PCIe SSD storage device built on the industry standard M.2 interface connected to the PCIe bus via the M.2 interface. In an HP ZBook Studio G3, the HP Z Turbo Drive G2 connects to four lanes of PCIe G2.

Table 6. HP ZBook and Z Turbo Drive Generations

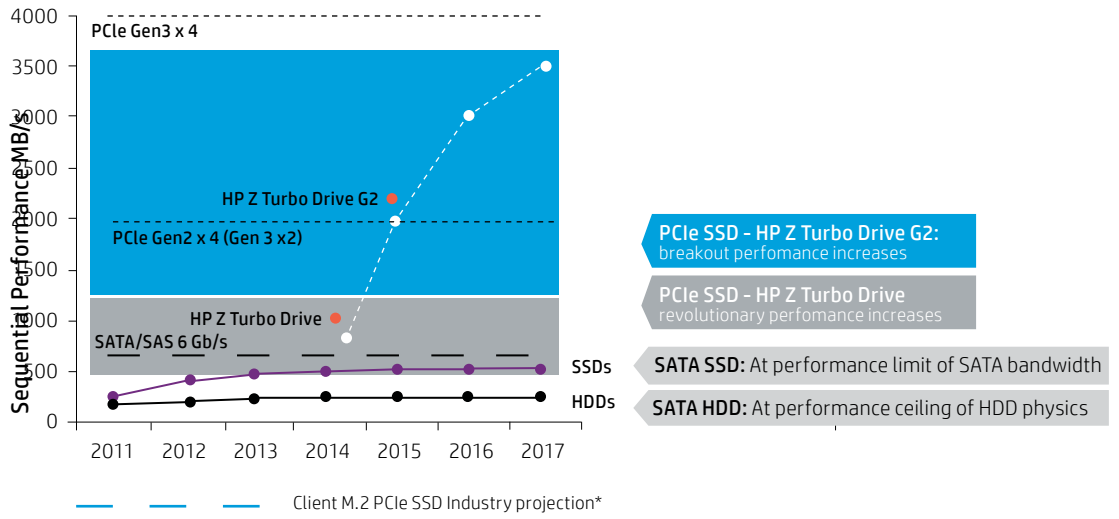
HP ZBook Generations	PCIe Generation	HP Z Turbo Drive Generation
G3	PCIe 3x4 (4 lanes)	G2
G2	PCIe 2x2 (2 lanes)	G1
G1	N/A	N/A

Table 7. HP Z Turbo Drive G2 specifications on HP ZBook Mobile Workstations

	HP Z Turbo Drive G2 256 GB ¹³	HP Z Turbo Drive G2 512 GB ¹³	HP Z Turbo Drive G2 1 TB ¹³
Connection	PCIe 3x4 (4 lanes)	PCIe 3x4 (4 lanes)	PCIe 3x4 (4 lanes)
Sequential read	2150 MB/s	2150 MB/s	2400 MB/s
Sequential write	1260 MB/s	1550 MB/s	1500 MB/s

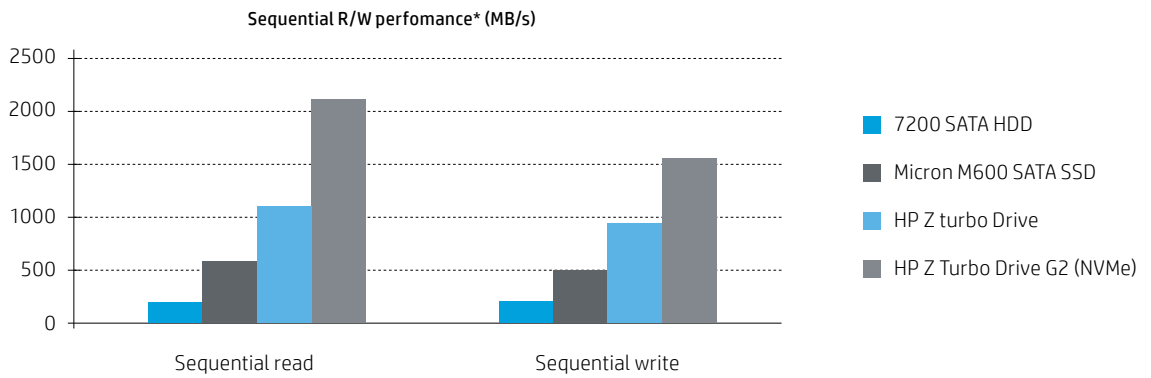
The chart below shows a comparison of storage device performance measured in MB/s. By directly connecting to the PCIe Bus, the HP Z Turbo Drive G2 is able to considerably exceed previous performance capabilities.

Figure 11. Comparison of storage device performance



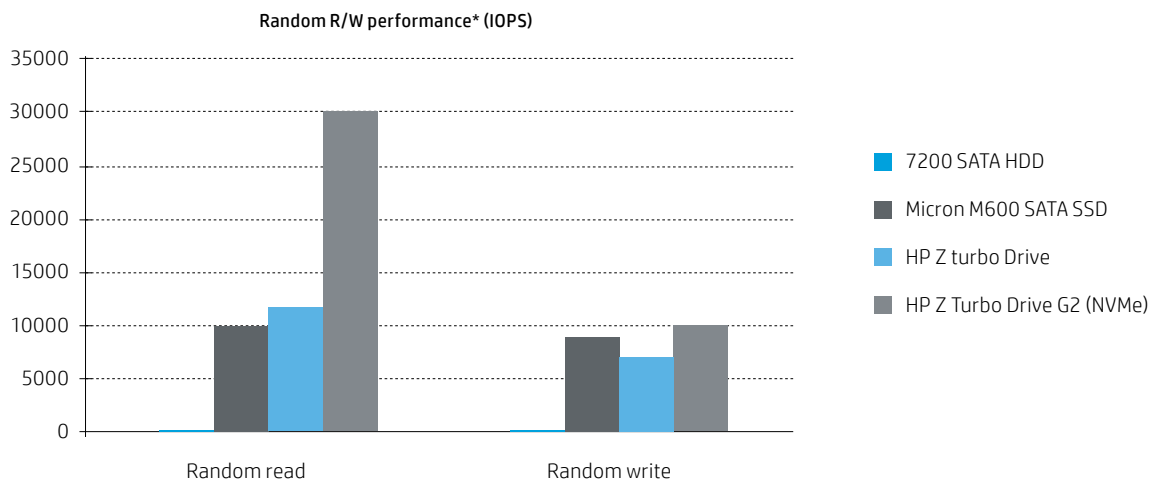
Detailed performance and benchmarking results

Figure 12. Sequential R/W performance (MB/s)



*Performance measured using IOMeter 2006 with queue depth 32

Figure 13. Random R/W performance (IOPS)



*Performance measured using IOMeter 2006 with queue depth 32

Customer advantages

The HP Z Turbo Drive G2 benefits all workstation customer segments by allowing customers to realize performance gains due to improvements in storage performance. While workflows with large data files will see the most noticeable improvement, all users will appreciate the improved transfer rates and quicker performance.

These specific segments are:

- Product Development/AEC
- Media & Entertainment
- Finance
- Oil & Gas
- Geospatial

Summary

The transition from SATA to PCIe protocols for solid-state devices enables customers to utilize the M.2 form factor to benefit from faster data transfer speeds and improved storage performance. The HP Z Turbo Drive G2 offering on the HP ZBook Studio G3 provides a huge performance gain over HDDs, enables large file/big data workflows, and offers impressive price/performance for NAND components. Integrating the HP Z Turbo Drive G2 technology into HP platforms increases the flexibility of the storage subsystems and provides the user options for performance and capacity that stand out in the industry.

Power supply

Save size and weight

The HP ZBook Studio G3 Mobile Workstation takes the reliability and performance advantages of a workstation on the go. With Intel processor technology, NVIDIA graphics cards, and an Ultrabook™ thin chassis, professionals can take their work with them wherever they travel. Our powerful system requires an efficient power supply, which is why the HP ZBook Studio G3 ships standard with the HP 3-pin 150 Watt Smart PFC Slim AC Adapter.

Function of the power supply

External power supplies convert the 120 V or 240 V AC power, depending on the country, from a wall outlet into DC current. The HP ZBook Studio G3 will only pull as much power as required to operate all operating components and open applications. The HP ZBook Studio G3 ships with the power supply option to best meet the demands of a fully loaded machine running an intense workload. Power supply units have an efficiency rating, measured as a percentage of power the machine uses out of total power pulled from the source.

What happens if the power supply is too low in wattage?

The HP ZBook Studio G3 can be configured in the settings to run in full use, balanced, or power saving modes. When the ZBook is connected to a landline, it will attempt to pull all of the current it needs from the wall. If the energy demand exceeds the power supply rating, the management system within the BIOS will automatically draw the additional power needed from the battery. In this case, it is possible to drain the battery while connected to a landline. When ran at maximum capacity, low wattage power supplies may produce noticeable but not harmful heat.

The HP ZBook Studio G3 is compatible with the 150 W and 200 W AC power adapters.

What makes the power adapter smart?

The smart feature displays a pop-up message:

“For full performance, connect a higher capacity AC adapter”

This message informs the user that as power demands increase, the ZBook may not perform at full capacity, which may result in longer battery charging time. In cases of extreme power demands, the system may also throttle back the processor or, with systems that have discrete video subsystems, a video balance mode may occur to further balance the power needs of the system.

Note: System CPU functions always have priority over battery charging, so charging delays will occur first.

Table 8. HP ZBook Studio G3 AC power adapter configure to order options

Adapter	External 150 Watt Smart PFC Slim AC Adapter ¹⁶
Size	153 x 66 x 22 mm
Weight	0.70 lb (320 g)
Total cord length	6 feet (1.8 meters)
Barrel Size	4.5 mm

Switch it up

When workloads change or the user finds that they require a different power supply, all of the power supply sizes are offered as after-market options that customers can purchase at a later time. In the case of a professional using a docking station to connect at work, it is highly recommended to use the higher wattage power supply option. For many of these users, the purpose of a docking station is to connect to a larger and/or multiple displays, often to use more applications that require greater resources. For this reason, it is best to choose the higher wattage power supply. HP recommends the External HP 3-pin 150 Watt Smart PFC Slim AC Adapter for optimal performance on the HP ZBook Studio G3.

MIL-STD-810G testing¹⁵

The HP ZBook Studio G3 Mobile Workstation is designed with reliability in mind, which is why it undergoes a series of tests. This testing¹⁵ consists of a variety of conditions that are intended to evaluate the reliability of the HP ZBook Studio G3 under a specific set of environmental conditions.

HP Total Test Process

The HP ZBook Studio G3 is intended to provide users with a reliable product wherever they go, under many conditions. In the design phase, we start with the HP Total Test Process. This is a multi-tiered product validation process with comprehensive, end-to-end diagnostics and a minimum of 115,000 hours of testing per platform. After this phase, we send our products to a third party to see how well they can match up against the MIL-STD-810G testing¹⁵ process.

MIL-STD-810G testing¹⁵

MIL-STD-810G testing¹⁵ is from the Department of Defense (DoD) Test Method Standard for Environmental Engineering Considerations and Laboratory Tests. This standard, though created specifically for DoD, is widely used for a variety of technological devices, including the HP ZBook Studio G3. It outlines a broad range of tests that can be tailored to measure the reliability of specific pieces of equipment and is intended to help organizations design their equipment for enhanced durability. The MIL-STD-810G is a set of testing standards set by the U.S. military and it is now the most widely used international standard for testing a computer’s durability. It uses a range of test methods to determine the reliability of the equipment. The series of tests performed are approved and used by all departments and agencies of the DoD. This set of standards is used to:

- Define the environmental stresses, durations, and equipment lifecycle
- Develop analysis and test criteria tailored to the equipment and its environmental life cycle
- Evaluate equipment lifecycles when exposed to environmental stresses
- Identify deficiencies and defects in the design, materials, manufacturing processes, packaging techniques, and maintenance methods

How does the HP ZBook Studio G3 measure up?

Below is the ZBook Studio G3 MIL-STD-810G testing report. The ZBook Studio G3 passed all 14 tests listed below and all tests were performed from a 3rd party to ensure accurate testing results and no bias in the reports.

Table 9. MIL-STD-810G tests¹⁵ passed by the HP ZBook Studio G3 in 2015

	MIL-STD-810G reference
Altitude	Method 500.5 Procedure I Method 500.5 Procedure II
Bench Handling	Method 516.6 Procedure IV
Crash Hazard Shock	Method 516.5 Procedure V
Drop	Method 516.6 Procedure IV
Dust	Method 510.5 Procedure I
Explosive Atmosphere	Method 511.5 Procedure I

Freeze/Thaw	Method 524.5 Procedure III
Functional Shock	Method 516.6 Procedure I
High temperature	Method 501.5 Procedure I Method 501.5 Procedure II
Humidity	Method 507.5 Procedure II
Low temperature	Method 502.5 Procedure I Method 502.5 Procedure II
Sand	Method 510.5 Procedure II
Thermal Shock	Method 503.5 Procedure I
Vibration	Method 514.6 Procedure I category 4 Method 514.6 Procedure I category 24

Testing¹⁵ scenarios

A third party performs the various MIL-STD-810G testing¹⁵ at their own facility. This eliminates any bias in the testing and ensures that the durability of our products is accurately measured for customers. The variety of tests that the HP ZBook Studio G3 undergoes are listed below with explanations to the specific testing purpose.

Altitude test¹⁵

The Altitude test was performed in accordance with MIL-STD-810G, Method 500.5, Procedure I (Storage) and II (Operation). The altitude level simulated for both procedures was 15,000 feet (the highest equivalent altitude given within MIL-STD-810G for cargo pressures within military aircraft).

Bench Handling test¹⁵

The bench handling test was performed in accordance to the MIL-STD-810G, Method 516.6 Procedure IV. This test was designed to test whether the unit can withstand levels of shock resulting from bench handling, bench maintenance, and/or packaging.

Crash Hazard test¹⁵

The crash hazard test was performed in accordance to the MIL-STD-810G, Method 516.5 Procedure V. The purpose of this test was to ensure that the ZBook does not eject sub-elements and that its restraining devices will not fail during crash situations.

Drop test¹⁵

The Drop test was performed in accordance with MIL-STD-810G, Method 516.6 Procedure IV. The objective of this test was to determine whether the unit could be safely operated after being dropped from desk height. For this test, 26 drops were performed from 30 in. onto every side, angle and edge onto 2 in. of plywood over steel over concrete. Unit is powered down and checked for operation.

Dust test¹⁵

The Dust Resistance test was performed in accordance with MIL-STD-810G, Method 510.5, Procedure I (Dust). Test parameters were set so that the unit was dusted with Arizona Road Dust for six hours while being operated.

Explosive Atmosphere test¹⁵

The Explosive Atmosphere test was performed in accordance with MIL-STD-810G, Method 511.5, Procedure I. The objective of the test was to determine whether the unit can operate in fuel-air explosive atmospheres without igniting the surrounding atmosphere.

Freeze/Thaw test¹⁵

The Freeze/Thaw test was performed in accordance with MIL-STD-810G, Method 524.54 Procedure III. The objective of this test was to determine whether the unit could be safely operated after being exposed to a temperature drop of -10°C (14°F) for two hours. Unit is removed and checked for operation.

Functional Shock test¹⁵

The Functional Shock test was performed in accordance to the MIL-STD-810G, Method 516.6 Procedure I. The purpose of the functional shock test is to determine if the ZBook can operate after sudden exposure to physical shock. During this test, three shocks are performed across each axis and direction for a total of 18 shocks. Shock testing of products and materials determines to what degree the items can physically and functionally withstand a relatively infrequent, short time, moderately high-level force impulse that would be encountered in handling, transportation, and service environments. This test is done with the same machine as the one used for the Vibration test.

High Temperature test¹⁵

The High Temperature test was performed in accordance with MIL-STD-810G, Method 501.5, Procedure I (Storage) and II (Operation). This test evaluated the units' performance while it was being exposed to high temperature conditions: 60°C (140°F) operational and 71°C (160°F) non-operational.

Humidity test¹⁵

The Humidity test was performed in accordance with MIL-STD-810G, Method 507.5, Procedure II with the aggravated temperature-humidity cycle. Each cycle was one day (24 hours); ten cycles with the temperature being cycled between 30°C (86°F) and 60°C (140°F); and relative humidity was a constant 95%.

Low Temperature test¹⁵

The Low Temperature test was performed in accordance with MIL-STD-810G, Method 502.5, Procedure I (Storage) and II (Operation). This test evaluated the unit's performance while it was being exposed to low temperature conditions: -29°C (-20°F) operational and -51°C (-60°F) non-operational.

Sand test¹⁵

The Sand test was performed in accordance with MIL-STD-810G, Method 510.4 Procedure II. The objective of this test was to determine whether the unit could be safely operated after being exposed to blowing sand of up to 20M/S at a temperature of 60°C (140°F) for 4.5 hours (every 90 minutes, the unit is rotated 90°).

Temperature Shock test¹⁵

The Temperature Shock test was performed in accordance with MIL-STD-810G, Method 503.5 Procedure I. The objective of this test was to determine whether the unit could be safely operated after being exposed to sudden changes in ambient temperature while non-operational. The high temperature was set to be 96°C (205°F) and the low temperature to be -51°C (-60°F); three high-to-low cycles were performed.

Vibration test¹⁵

The Vibration Resistance test was performed in accordance with MIL-STD-810G Test Method 514.6, Procedure I (Non-operational) and Procedure II (Operational). Test parameters were set to simulate the following:

- Operate the unit during a 1000-mile simulation of vibrations created by a truck driving on a U.S. highway
- Operate the unit after it has been subjected to higher levels of vibration while in storage

Terrain, road and surface discontinuities, vehicle speed, loading, structural characteristics, and suspension system are all reflected in this simulation.

Preferred offerings

As a workstation customer, we know that you often need your product delivered quickly. That is why we have created the Preferred Offering program for HP ZBook Mobile Workstations. The Preferred Offering program aims to ensure high availability and short turn-around times on your orders.

The Preferred Offering program uses configurations that represent the mainstream components that make up a large percentage of shipments. Put simply, our most popular systems will be stocked with a buffer to assure the delivery of those systems to you in a timely manner. In fact, 90% of orders using the Preferred Offering program selections are filled in 6 days. And with roughly 40% of our mobile workstation parts on the Preferred Offering list, you have several options to choose from to build a system that fits your needs.

Table 10. The following AVs are part of the Preferred Offering program selection

HP ZBook Studio G3 Preferred Offerings	
Base unit	
M6V79AV	HP IDS DSC i7-6700HQ Studio G3 Base NB PC
M6V80AV	HP IDS DSC i7-6820HQ Studio G3 Base NB PC
M6V81AV	HP IDS DSC E3-1505M Studio G3 Base NB PC
Graphics	
M6V89AV	NVIDIA® Quadro M1000M w/4 GB GDDR5 Graphics
Processor⁵	
Included in base unit	Intel® Core™ i7-6700HQ Quad Core
Included in base unit	Intel® Core™ i7-6820HQ Quad Core
Included in base unit	Intel® Xeon™ E3-1505M Quad Core
Camera- integrated	
M6V97AV	WEBCAM Integrated 720p HD
Display	
M6V92AV	15.6 inch LED FHD UWVA Anti-Glare enabled for Webcam (1920x1080)
M6V94AV	15.6 inch B-LED UHD UWVA Anti-Glare enabled for Webcam (3840x2160)
Memory¹²	
M6W00AV	8 GB (1x8 GB) 2133MHz DDR4
M6W01AV	8 GB (2x4 GB) 2133MHz DDR4
M6W03AV	16 GB (2x8 GB) 2133MHz DDR4
M6W04AV	32 GB (2x16 GB) 2133MHz DDR4
HP Z Turbo Drive G2¹³	
M6W13AV	256 GB Z Turbo Drive G2 PCIe Solid State Drive
M6W14AV	512 GB Z Turbo Drive G2 PCIe Solid State Drive
M6W15AV	256 GB Z Turbo Drive G2 PCIe Solid State Drive 2nd
M6W16AV	512 GB Z Turbo Drive G2 PCIe Solid State Drive 2nd
Solid State Drives¹³	
M6W11AV	256 GB SATA-3 Self Encrypted OPAL2 Solid State Drive
M6W12AV	256 GB SATA-3 Self Encrypted OPAL2 Solid State Drive 2nd

HP ZBook Studio G3 Preferred Offerings

Battery

M6W21AV 4 Cell 64 WHr Long Life

AC adapter

N3T53AV 150 Watt Smart PFC Slim AC Adapter

Fingerprint reader

M6W23AV Fingerprint reader

Wireless LAN

M6W19AV Intel® 8260 ac 2x2 + Bluetooth 4.2 WW

M6W20AV Intel® 8260 ac 2x2 non vPro + Bluetooth 4.2 WW

Resources, contacts, or additional links

HP ZBook Studio G3 Mobile Workstation

hp.com/go/ZBookStudio

Learn more at

hp.com/go/whitepapers

¹ Optional feature.

² Not all configurations qualify as an Ultrabook™.

³ HP Performance Advisor requires Windows and an internet connection.

⁴ EPEAT® registered where applicable. EPEAT registration varies by country. See epeat.net for registration status by country.

⁵ Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel®'s numbering is not a measurement of higher performance.

⁶ 4K content required to view 4K resolution.

⁷ DisplayPort connector support a DisplayPort display, a HDMI display with an DP-to-HDMI dongle, a VGA display with a DP-to-VGA dongle, or a DVI display with a DP-to-DVI dongle.

⁸ Windows 10 MM14 battery life will vary depending on various factors including 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 www.bapco.com for additional details.

⁹ Multiple displays may be connected to DP 1.2 Hub. DP 1.2 Hub is connected to a DisplayPort connector on the HP ZBook or Docking Station.

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

¹¹ Not available when using WWAN.

¹² Maximum memory capacities assume Windows 64-bit operating systems or Linux. With Windows 32-bit operating systems, memory above 3 GB may not all be available due to

¹³ system resource requirements.

¹⁴ 1 GB = 1 billion bytes, TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB of system disk is reserved for system recovery software (for Windows 8).

¹⁵ Not all features are available in all editions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. See microsoft.com.

¹⁶ Testing was not intended to demonstrate fitness for Department of Defense contracts requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Accidental damage or damage under the MIL STD test conditions requires an optional HP Accidental Damage Protection Care Pack.

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