Powerfully immersive. Perfectly sized



Be ready when inspiration strikes. Packed with professional performance in an incredibly sleek PC that comfortably fits in your bag, the ZBook Studio is engineered to get you in the zone and help you stay focused. Now you can build complex assemblies, render in real time or visualize data—from anywhere.

Power to push the limits

Push your workflow further with up to an Intel® Core™ i9 vPro CPU,^{1,9} NVIDIA RTX™ Ada Laptop GPU or GeForce RTX™ GPU,² and 64 GB RAM.²⁰ From 3D design to machine learning this pro grade PC delivers peak performance so you can work uninterrupted.

Immerse in your work

Get complete color accuracy and a 120Hz refresh rate with a 16:10 HP DreamColor display² or choose an OLED display for absolute blacks and extreme whites.² Customize your keyboard lighting and highlight shortcuts with RGB per-key LED backlighting.³

Create and collaborate everywhere

Follow inspiration wherever it strikes with a thin and light laptop that delivers the power to run the software you need on the go. Work and collaborate effectively with a long-lasting battery, AI Noise Suppression⁵ and Wi-Fi 6E.⁶

A work laptop you'll want to game on

Enjoy fast, smooth gameplay with an NVIDIA RTXTM professional or GeForce RTXTM GPU.² Highlight favorite keys and create custom key maps with Z Light Space software⁷ and a RGB keyboard with per-key LED backlighting.⁸







Additional Features

Windows 11

Work without compromising on performance with Windows 118 combined with HP's collaboration and security technology.²⁴

Intel® Core™ Processor

Crank up your multi-tasking and productivity with up to Intel vPro® with 13th Gen Intel® Core™ i9 processor, 1,2,9 designed to handle complex, multithreaded apps.

NVIDIA® Graphics

With up to NVIDIA RTX™ 40000 Ada Laptop GPU or GeForce RTX™ 4080 Laptop GPU, accelerate rendering, graphics, and compute workflows to unlock new levels of productivity.²

Lightning-Fast Storage

Blitz through multiple tasks and ditch external drives with up to 4 TB PCIe Gen4 NVMe storage^{10,11}

Large Memory Configurations

Accelerate your workflow. Power through projects with up to 64 GB RAM¹² for fast rendering, editing, and visual effects performance.

HP DreamColor Display

Have confidence in what you see on screen with an optional HP DreamColor Display with 100% DCI-P3 color gamut and a 120Hz refresh rate you get smooth motion for high-speed videos. 2,21

Z Command Keyboard

Used to working on a Mac? Now you can choose the Z Command Keyboard, which replicates a Mac layout, for a seamless switch. 13

Z Light Space

With Z Light Space software, customize your keyboard lighting with the RGB per-key LED backlighting. For commonly used software apps, like Adobe Photoshop, AutoCAD or SOLIDWORKS, 4 use pre-loaded color-maps or create your own.

Easy Battery Management

Manage and monitor your battery's performance and condition and customize charging options with the easy-to-use HP Power Manager dashboard.²³

HP Vaporforce Thermals

Keep cool under any workload with HP Vaporforce Thermals, ¹⁶ with curved metal blades, that protect your workstation from overheating, so you can cut through your heaviest workloads with peak processing power.

HP 16:10 Aspect Ratio

The 16:10 aspect ratio reduces the need to scroll by showing 11% more vertical content than a 16:9 aspect ratio display. See more of your project without minimizing program menus or toolbars.

HP Context Aware

HP Context Aware provides Al based optimization to maximize performance when you're working at a table, comfort when you're working from your lap, and responsiveness when you're working on the go.¹⁷

Specifications Table

Available Operating Systems	Windows 11 Pro – HP recommends Windows 11 Pro ¹ Windows 11 Home – HP recommends Windows 11 Pro for Business ¹ Windows 11 Pro (preinstalled with Windows 10 Pro Downgrade) ^{1,2} Ubuntu 22.04 LTS FreeDOS 3.0
Processor family ^{2,3,4,5,6,9}	13th Generation Intel® Core™ i9 processor; 13th Generation Intel® Core™ i7 processor; 13th Generation Intel® Core™ i5 processor
Available Processors ^{2,3,4,5,6,9}	Intel® Core™ i9-13900H (1.9 GHz E-core base frequency, 2.6 GHz P-core base frequency, up to 4.1 GHz E-core Max Turbo frequency, up to 5.4 GHz P-core Max Turbo frequency, 24 L3 MB cache, 6 P-cores and 8 E-cores, 20 threads), supports Intel® vPro® Technology Intel® Core™ i7-13800H (1.8 GHz E-core base frequency, 2.5 GHz P-core base frequency, up to 4.0 GHz E-core Max Turbo frequency, up to 5.2 GHz P-core Max Turbo frequency, 24 MB L3 cache, 6 P-cores and 8 E-cores, 20 threads), supports Intel® vPro® Technology Intel® Core™ i7-13700H (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 5.0 GHz P-core Max Turbo frequency, 24 MB L3 cache, 6 P-cores and 8 E-cores, 20 threads) Intel® Core™ i5-13600H (3.6 GHz E-core Max Turbo frequency, up to 4.8 GHz P-core Max Turbo frequency, 18 MB L3 cache, 4 P-cores and 8 E-cores, 16 threads), supports Intel® vPro® Technology
Maximum memory	64 GB DDR5-4800 non-ECC SODIMM; 64 GB DDR5-5600 non-ECC SODIMM ¹¹ Memory is SODIMM. Supports dual channel memory.
Memory slots	2 SODIMM; supports dual channel
Internal storage	512 GB up to 4 TB PCle® Gen4 x4 NVMe™ M.2 SSD ¹⁰ 512 GB up to 1 TB PCle® NVMe™ M.2 SED SSD ¹⁰
Maximum storage capacity	Up to 4 TB
Display size (diagonal)	16"
Display size (diagonal, metric)	40.6 cm (16")
Display	16" diagonal, WQUXGA (3840 x 2400), OLED, touch, BrightView, eDP + PSR, micro-edge, Low Blue Light, 400 nits, 100% DCI-P3; 16" diagonal, WQUXGA (3840 x 2400), 120 Hz, IPS, anti-glare, eDP + PSR, micro-edge, 500 nits, 100% DCI-P3, HP DreamColor; 16" diagonal, WUXGA (1920 x 1200), IPS, anti-glare, eDP + PSR, micro-edge, 400 nits, 100% sRGB ^{15,16,27,29} 40.6 cm (16") diagonal, WQUXGA (3840 x 2400), OLED, touch, BrightView, eDP + PSR, micro-edge, Low Blue Light, 400 nits, 100% DCI-P3; 40.6 cm (16")
	diagonal, WQUXGA (3840 x 2400), 120 Hz, IPS, anti-glare, eDP + PSR, micro-edge, 500 nits, 100% DCI-P3, HP DreamColor; 40.6 cm (16") diagonal, WUXGA (1920 x 1200), IPS, anti-glare, eDP + PSR, micro-edge, 400 nits, 100% sRGB ^{15,16,27,29}
Available Graphics	Integrated: Intel® Iris® X° Graphics ^{18,20,22} Discrete: NVIDIA® GeForce RTX™ 4080 (12 GB GDDR6X dedicated) NVIDIA® GeForce RTX™ 4070 Laptop GPU (8 GB GDDR6 dedicated) NVIDIARTX™ 4000 Ada Generation Laptop GPU (12 GB GDDR6 dedicated) NVIDIA RTX™ 3000 Ada Generation Laptop GPU (8 GB GDDR6 dedicated) NVIDIA RTX™ 2000 Ada Generation Laptop GPU (8 GB GDDR6 dedicated) NVIDIA RTX™ 2000 Ada Generation Laptop GPU (8 GB GDDR6 dedicated) NVIDIA RTX™ A1000 Laptop GPU (6 GB GDDR6 dedicated)
Audio	Audio by Bang & Olufsen, Quad-speaker audio (2 tweeters & 2 Quad woofers), 2 Top Facing Microphone dual array digital microphones, functions keys for volume up and down, combo microphone/headphone jack, HD audio with 200Hz Bass Roll off
Memory card device ⁵⁹	1 microSD 7.1 media card reader
Ports and connectors	Left side: 1 power connector; 1 headphone/microphone combo; 2 Thunderbolt™ 4 with USB4™ Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4, HP Sleep and Charge)¹²; Right side: 1 Super Speed USB Type-A 5Gbps signaling rate (charging); 1 SuperSpeed USB Type-C® 10Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)¹²
Keyboard	HP Premium Quiet Keyboard – spill-resistant, full-size, backlit keyboard with drain and DuraKeys; HP RGB Keyboard - Full-size, per-key RGB backlit keyboard; HP RGB Z Command Keyboard – spill-resistant, full-size, backlit keyboard with drain and DuraKeys ²⁴
Mouse	Clickpad with image sensor, supporting multi-touch gestures and taps

Specifications Table

Communications	WLAN:Intel® Wi-Fi 6E AX211 (2x2) and Bluetooth® 5.3 wireless card, vPro®; Intel® Wi-Fi 6E AX211 (2x2) and Bluetooth® 5.3 wireless card, non-vPro®14;
Camera	720p HD IR camera ^{16,17}
Software ^{25,28,30,31,33,51,52}	Bing search for IE11 HP Hotkey Support HP Noise Cancellation Software HP Performance Advisor HP Support Assistant Native Miracast support HP Connection Optimizer myHP HP Privacy Settings Data Science Stack HP Easy Clean HP PC Hardware Diagnostics Windows 10 Cloud Recovery Client HP Z Light Space HP Camera & Super Resolution Software Microsoft 365 and Office (sold separately and Internet access required for activation) HP Presence
Available software	HP Smart Support ¹⁹
Security management 8,34,35,37,38,39,43,49	Absolute persistence module HP Credential Manager HP Power On Authentication Master Boot Record security Pre-boot authentication Windows Defender HP Manageability Integration Kit HP BIOSphere Gen6 HP Sure Start Gen6 HP Sure Admin HP Image Assistant Nano Security Lock Slot HP Image Assistant Gen4.6 HP Client Security Manager Gen7 Trusted Platform Module TPM 2.0 HP Privacy Key HP Tamper Lock (select models)
Security Software Licenses	HP Wolf Pro Security Edition ⁵⁶
Fingerprint reader	Fingerprint sensor (select models)
Management features	HP Power Manager ¹³
Power	HP Slim Smart 150 W External AC power adapter; HP Slim Smart 200 W External AC power adapter ⁴⁸
Battery type	HP Long Life 6-cell, 86 Wh Li-ion polymer ^{26,47}
Battery recharge time	Supports battery fast charge: approximately 50% in 30 minutes
Dimensions	$14.02 \times 9.54 \times 0.76$ in (non-touch); $14.02 \times 9.54 \times 0.72$ in (touch); $35.6 \times 24.2 \times 1.9$ cm (non-touch); $35.6 \times 24.2 \times 1.8$ cm (touch); $21.73 \times 2.71 \times 13.58$ in $552 \times 69 \times 345$ mm (Package)
Weight	Starting at 3.81 lb; Starting at 1.73 kg; (Weight varies by configuration and components.)
Ecolabels	EPEAT® Gold registered in the U.S. ⁴⁵
Sustainable impact specifications	Low Halogen ⁴⁶

Messaging Footnotes

- 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
- Optional feature that must be configured at purchase
- 3 RGB keyboard is an optional feature that must be configured at purchase. Available in the US, UK, Germany and France
- ⁴ Battery life will yary 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.
- Al Noise Reduction is delivered automatically through Windows update or can be downloaded from https://support.hp.com/us-en/drivers when available. Requires Windows 10 or higher, compatible with internal PC speakers. microphone and analog headsets. The DNN Noise Reduction setting can be configured through the Application HP Audio
- 6 Wi-Fi 6E is an optional feature that must be configured at purchase, 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.
- ⁷ Z Light Space requires Windows 10 or higher.
- RGB keyboard is an optional, configurable feature. Available only in the US, UK, Germany and France only.
 MIL STD testing is not intended to demonstrate fitness for U.S. Department of Defense contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Accidental Damage or damage under these test conditions requires an optional HP Accidental Damage Protection Care Pack. ²⁰ 64GB Memory is an optional, configurable feature.
- ²² Memory is an optional, configurable feature.
- ⁸ 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.
- ⁹ For full Intel® vPro® functionality, Windows 10 Pro 64 bit, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or WLAN card and TPM 2.0 are required. Some functionality requires additional 3rd party software in order to run. See http://intel.com/vpro
- 10 For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35GB (for Windows) is reserved for system recovery software
- Optional, configurable feature
- 12 Up to 64GB memory is an optional, configurable feature.
- ¹³ Z Command Keyboard is an optional, configurable feature. Available only with the RGB keyboard and in the US, UK, Germany and France only.
- 14 Software sold senarately
- ¹⁵ Applies to HP PCs, Workstations and Displays manufactured after January 2019. Based on most Gold and Silver EPEAT® the optional points for EPEAT® Gold according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit www.epeat.net
- and higher GFX.

 17 HP Context Aware requires Windows 10 or higher and an Intel processor.
- ¹⁸ Testing is not intended to demonstrate fitness of U.S. Department of Defense (DoD) contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Accidental damage requires an optional HP Accidental Damage Protection Care Pack.
- vary either higher or lower. 23 HP Power Manager requires Windows 10 and higher and can be downloaded from the Microsoft Store
- ²⁴ HP conferencing features require Windows and the latest myHP app, available over the air or for download via sofpaq on the HP Support website. Planned availability in spring 2023.

Technical Specifications Footnotes

- ¹ Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. 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
- This 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.
- 3 Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode ⁴ Intel® Turbo Boost performance varies depending on hardware, software and overall system configura
- http://www.intel.com/technology/turboboost for more information.

 5 In accordance with Microsoft's support policy, HP does not support the Windows 8 or Windows 7 operating system on products configured with Intel and AMD 7th generation and forward processors or provide any Windows 8 or Windows 7 drivers on http://www.support.hp.com .
- 6 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
- 8 HP Tamper Lock is an optional feature that must be configured at the factory and requires a supervisor password be
- established prior to use.

 9 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

- 10 For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 35GB (for Windows) is reserved for system recovery software
- ¹¹ 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 in the properties of the torining the memory speed in the properties of the system will perform at the lower memory speed.

 Multi-Function USB-C port works with Discrete Graphics and Intel(r) Iris Xe Graphics. Note: For Nvidia Discreate Gfx, it can support HDML2.1 except GPLL of ON20-P1 SKLI(HDMI2.0 support)
- ¹³ Manage and monitor your battery's performance and condition and customize charging options with the easy-to-use HF
- Power Manager dashboard.

 14 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.

 15 UHD content required to view UHD images
- ¹⁶ HD content required to view HD images.
- 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.

 Both UMA and Discrete configurations support 4 independent displays (both Intel and NVIDIA Graphic cards, UMA/DIS mode need to close lid or only 3 displays max are supported externally. Max. resolution = 8K@60Hz (miniDP) 4K@60Hz (Type-C output port using a Type C-to-DP adapter), 4K@60Hz (Type-C output port using a Type C-to-DP adapter), OR 4K 60Hz (DP1) & 2.5K @60Hz (DP2) & FHD (VGA) OR 4K @60Hz (one DP Port) & 4K @60Hz (Type-C output port using a repe C-to-DP adapter).
- 19 HP Smart Support automatically collects the telemetry necessary upon initial boot of the product to deliver device-level configuration data and health insights and is available preinstalled on select products, thru HP Factor Configuration Services; or it can be downloaded. For more information about how to enable HP Smart Support or for download, please visit http://www.hp.com/smart-support .
- ²⁰ 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.
 ²² GPU configurations may be limited to specific GPU/Memory Configurations
- ²⁴ HP RGB Z Command Keyboard only available in the US, UK, France, and Germany. Not available with Privacy Panel.
- Data Science Stack is available on select skus only.
 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
- ²⁸ HP Z Light space is an optional feature, requires Windows 10 or higher and must be configured at hardware purchase.
- Par 2 Light space is an opuorial realurle, requires windows 10 or higher and miss de configured at nariowate purchase.
 Pagesolutions are dependent upon monitor capability, and resolution and color depth settings.
 Available on select HP PCs with Windows 10 and higher and Intel processors.
 Miracast is a wireless technology your PC can use to project your screen to Tvs, projectors, and streaming media players that also support Miracast. You can use Miracast to share what you're doing on your PC and present a slide show. For more information: http://windows.microsoft.com/en-us/windows-8/project-wireless-screen-miracast.
 Chlers NVIDIA dGPU: Support HD decode, DX12, HDMI 21, mDP 14, HDCP 2.3 via DP up to SK@60HZ(W/o DSC) or Wicksoft and the processor of the property of the pro
- 8K@60(With DSC and requires 2 display heads) and via HDMI up to 8K@60Hz(With DSC and requires 2 display heads) 33 HP Connection Optimizer requires Windows 10.
 34 HP BIOSphere Gen6 features may vary depending on the platform and configuration.
- 35 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.
- HP Manageability Integration Kit can be downloaded from http://www.hp.com/go/clientmanagement
- Security lock for security slot is sold separately.

 PHP Client Security Manager Gen7 requires Windows and is available on the select HP Elite and Pro P
- 43 HP Sure Start Gen6 is available on select HP PCs.
- ⁴⁵ Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. EPEAT® status varies by country. Visit www.epeat.net for more information.
- www.epeat.net for more information.

 46 External power supplies, power cords, cables and peripherals are not low halogen. Service parts obtained after purchase may not be low halogen.

 47 HP Fact Charge recharges up to 50% within 30 minutes when the system is off or in standby mode. Power adapter with a
- minimum capacity of 65 watts is required. After charging has reached 50% capacity, charging will return to normal. Charging
- time may vary +/-10% due to System tolerance.

 48 150W Power Adapter is not available with Nvidia RTX™ Graphics
- ⁴⁹ HP Sure Admin requires Windows 10 or higher, 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
- HP Easy Clean requires Windows 10 RS3 and will disable the keyboard, touchscreen, and clickpad only. Ports are not disabled. See user quide for clean.
- ⁵² Select HP Products are enhanced with HP Presence. Features vary by platform. HP conferencing features require Windows and the latest myHP app, available over the air or for download via sofpaq on the HP Support website. Planned availability in spring 2023.
- ⁵⁶ HP Wolf Pro Security Edition (including HP Sure Click Pro and HP Sure Sense Pro) is available preloaded on select SKUs and, depending on the HP product purchased, includes a paid 1-year or 3-year license. The HP Wolf Pro Security Edition software is licensed under the license terms of the HP Wolf Security Software - End-User license Agreement (EULA) that can be found at: https://support.hp.com/us-en/document/ish_3875769-3873014-16 as that EULA is modified by the following: '7. Term. Unless otherwise terminated earlier pursuant to the terms contained in this EULA, the license for the HP Wolf Pro Security Edition (HP Sure Sense Pro and HP Sure Click Pro) is effective upon activation and will continue for either a twelve (12) month or thirty-six (36) month license term ("Initial Term"). At the end of the Initial Term you may either (a) purchase a renewal license for the HP Wolf Pro Security Edition from HP.com, HP Sales or an HP Channel Partner, or (b) continue using the standard versions of HP Sure Click and HP Sure Sense at no additional cost with no future software updates or HP
- Support. 59 MicroSD 7.1 media reader supports SD 4.0 cards at SD 3.0 speeds with any SD 7.0 host. SD 7.0 card availability is

Sign up for updates hp.com/go/getupdated

© Copyright 2023 HP Development Company, L.P. The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein

River, Curtain, Pentium, Iris, XMM, and Inunderboit are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. AMD, Ryzen, Athlon, and Radeon are trademarks of Advanced Micro Devices, Inc. Bluetooth is a trademark owned by its proprietor and used by HP Inc. under license. NVIDIA and GeForce are trademarks and/or registered trademarks of NVIDIA Corporation in the U.S. and other countries. USB Type-C® and USB-C® are registered trademarks of USB Implementers Forum. DisplayPort^{IM} and the DisplayPort^{IM} logo are trademarks owned by the Video Electronics Standards Association (VESA®) in the United States and other countries. McAfee and McAfee LiveSafe are trademarks or registered trademarks of the U.S. Environmental Protection Agency. All other trademarks are the property of their respective owners. Intel, Core, Optane, Celeron, Pentium, Iris, XMM, and Thunderbolt are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. AMD