

Overview

HP ZBook 8 G1a 14 Mobile Workstation



1	ACS & ALS Sensor
2	Microphone (2)
3	IR Camera (optional)
4	Webcam
5	Camera Shutter
6	IR LED (optional)
7	Webcam LED
8	Nano SIM card slot (Optional)

Left

9	LED Indicator
10	USB Type-C® 10Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)
11	USB Type-A 5Gbps signaling rate (Powered)
12	RJ45 Ethernet port (standard)
13	Security lock slot (Integrated)
14	Fingerprint reader / Power button
15	Touchpad

Overview



Right

1	HDMI 2.1	4	Power Indicator LED
2	Thunderbolt™ 4 with USB Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 2.1)	5	Headphone/mic combo jack
3	Thunderbolt™ 4 with USB Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 2.1)	6	Smart Card Reader (Optional)

Features

PRODUCT NAME

HP ZBook 8 G1ah 14 Mobile Workstation/ HP ZBook 8 G1ak 14 Mobile Workstation/ HP ZBook 8 G1as 14 Mobile Workstation

OPERATING SYSTEM

Preinstalled OS

FreeDOS

Windows 11 Home - HP recommends Windows 11 Pro for business ¹

Windows 11 Home Single Language - HP recommends Windows 11 Pro for business ¹

Windows 11 Pro (Windows 11 Enterprise available with a Volume Licensing Agreement) ¹

Windows 11 Pro ¹

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>.

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>

Features

PROCESSOR

Name ^{1,2,4,5,7}	Cores	Threads	Smart Cache	Max Boost Frequency	Base Frequency	Pro	NPU	NPU TOPs
AMD Ryzen 5 PRO 230	6 cores	12	16 MB	4.90 GHz	3.5	Yes	Y	16
AMD Ryzen AI 5 PRO 340	6 cores	12	16 MB	4.80 GHz	2.0	Yes	Y	50
AMD Ryzen AI 7 PRO 350	8 cores	16	16 MB	5.00 GHz	2.0	Yes	Y	50
AMD Ryzen AI 9 HX PRO 375	12 cores	24	24 MB	5.10 GHz	2.0	Yes	Y	55

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 Intel Turbo Boost performance varies depending on hardware, software and overall system configuration. See <http://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 Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.
⁷ Features and software that require a NPU may require software purchase, subscription or enablement by a software or platform provider, and third party software may have specific configuration or compatibility requirements. Performance varies by use, configuration, and other factors.

CHIPSET

Chipset is integrated with processor

GRAPHICS

Integrated

AMD Radeon™ Graphics with Pro Graphics driver
AMD Radeon™ 840M Graphics with Pro Graphics driver (1)
AMD Radeon™ 860M Graphics with Pro Graphics driver (2)
AMD Radeon™ 890M Graphics with Pro Graphics driver (3)

Support

Support HDMI 2.1

¹Only available with the Ryzen™ AI 5 PRO

²Only available with the Ryzen™ AI 7 PRO

³Only available with the Ryzen™ AI 9 HX PRO



Features

DISPLAY

Non-Touch

35.6 cm (14") diagonal, WUXGA (1920 x 1200), LCD, UWVA, Anti-Glare, Low Blue Light, 800 nits, sRGB 100%, HP Sure View 5 [6]
35.6 cm (14") diagonal, WQXGA (2560 x 1600), Bent, LCD, 120Hz, UWVA, anti-glare, WLED, 500 nits, DCI-P3 100%, HP DreamColor
35.6 cm (14") diagonal, 2.5K (2560 x 1600), LCD, 120Hz (VRR), UWVA, Anti-Glare, WLED + Low Blue Light, 400 nits, Adobe 100% + DCI-P3 100%
35.6 cm (14") diagonal, WUXGA (1920 x 1200), LCD, UWVA, Anti-Glare, WLED + Low Blue Light, 400 nits, Low Power, sRGB 100%
35.6 cm (14") diagonal, WUXGA (1920 x 1200), LCD, UWVA, Anti-Glare, WLED, 300 nits, Low Power, sRGB 62.5%

Touch

35.6 cm (14") diagonal, WUXGA (1920 x 1200), LCD, Touch, UWVA, Anti-Glare, Low Blue Light, 800 nits, sRGB 100%, HP Sure View 5 [6]
35.6 cm (14") diagonal, WUXGA (1920 x 1200), LCD, Touch, UWVA, Anti-Glare, 300 nits, Low Power, sRGB 62.5%

DisplayPort™ 1.4

HDMI 2.0 Support resolution up to 4K @60 Hz

Displays support

Supports dual display through the dock

Display Size

14.0"

35.6 cm

Docking (Sold Separately)

Docking station model #1

HP Thunderbolt 4 Ultra 180W G6 Dock

Total number of supported displays (incl.the

4

notebook)

display)

Max.resolutions supported

(4) 4K @60Hz*
(2) 4K @ 120Hz*
(3) QHD @ 120Hz*
(1) QHD @ 360Hz*

Dock Connectors

1x HDMI 2.1, 2x DisplayPort 1.4, 1x Thunderbolt 4, 1x USB-C 3.2 Gen 2 DisplayPort

HP Quick Connect Support

Yes

Extended Power Range Support

No

Technical limitations

Requires DisplayPort 1.4 support with Display Stream Compression (DSC).
Bluetooth required for HP Quick Connect. HP Quick Connect available on select HP notebooks.

Features

Thunderbolt Hosts

Maximum resolution and display support is dependent on the maximum capability of the notebook.

Maximum of (4) displays with maximum resolution of 5K@ 30Hz running Thunderbolt host.

Maximum 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 maximum 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 Thunderbolt™ 120W G4 Dock

Total number of supported displays (incl.the notebook)

4

display)

Max.resolutions supported

Quad 4K @60Hz

Dual 8K single cable@30 for Thunderbolt hosts or USB-C hosts DisplayPort 1.4 with Display Stream Compression in High-Resolution Mode

2x HDMI 2.0, 2x DisplayPort 1.4, 1x Thunderbolt 4, 1x USB-C 3.2 Gen 2 DisplayPort

Maximum resolution and display support is dependent on the maximum capability of the notebook.

Dock Connectors

Technical limitations

Thunderbolt Hosts:

Maximum of (4) displays with maximum resolution of 5K@ 30Hz running Thunderbolt host.

Maximum 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 maximum 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.

Features

STORAGE AND DRIVES

Primary M.2 Storage

2 TB PCIe® Gen4x4 NVMe™ SSD Three Layer Cell [6]

1 TB PCIe® Gen4x4 NVMe™ SSD Three Layer Cell [6]

1 TB PCIe® NVMe™ SSD Value [6]

512 GB PCIe® Gen4x4 NVMe™ SSD Three Layer Cell [6]

512 GB PCIe® Gen4x4 NVMe™ Self Encrypted OPAL2 SSD Three Layer Cell [6]

512 GB PCIe® NVMe™ SSD Value [6]

256 GB PCIe® NVMe™ Self Encrypted OPAL2 SSD Value [6]

256 GB PCIe® NVMe™ SSD Value [6]

MEMORY

Maximum Memory

64GB DDR5-5600 MT/s (2 x 32 GB) Memory

64GB DDR5-5600 MT/s (2 x 32 GB) Memory

32GB DDR5-5600 MT/s (1 x 32 GB) Memory

32GB DDR5-5600 MT/s (2 x 16 GB) Memory

16GB DDR5-5600 MT/s (1 x 16 GB) Memory

16GB DDR5-5600 MT/s (2 x 8 GB) Memory

24GB DDR5-5600 MT/s (2x12GB) Memory

Memory Slots

2 SODIMM

System runs at up to 5600 MT/s

Supports Dual Channel Memory(optional).

The memory is accessible/upgradeable by IT or self-maintainers only

Features

NETWORKING /COMMUNICATIONS

WLAN

Mediatek RZ616 Wi-Fi 6E Bluetooth® 5.3 AIM-T WLAN

Mediatek MT7925 Wi-Fi 7 Bluetooth® 5.4 AIM-T WW WLAN

Qualcomm® Fast Connect 7800 Wi-Fi 7 Bluetooth® 5.4 AIM-T WW WLAN

WWAN

HP 5G Sub-6 CAT19

HP 4G CAT19

LPWAN

Qualcomm 9205 LTE-M (CAT-M1 fSVC) [12]

NFC

NFC Mirage WNC XRAV-1

Miracast

Native Miracast Support

Ethernet

Realtek RTL8111EPP 1GbE Ethernet Controller

AUDIO/MULTIMEDIA

Audio by Poly Studio

2 Integrated stereo speakers

Discrete Amplifiers

2 Integrated dual array microphone

Speaker Power

1W / 8 ohm per speaker

Camera

5MP + Infrared camera

5MP camera

Sensors

Ambient Light Sensor

Color Sensor with Ambient Light Sensing



Features

Fingerprint Sensor (optional)

Hall Effect Sensor

HP Sure Platform

HP Tamper Lock [14]

Thermal Sensor

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard

HP Premium NB Keyboard, spill-resistant, backlit, Durakey keyboard.

HP Premium NB Keyboard, spill-resistant, Privacy, backlit, Durakey, keyboard.

Pointing Device

Clickpad

Microsoft Precision Touchpad Default Gestures Support

Multi-touch gesture support

Function Keys

ESC - System information

F1 - Display Switching

F2 - Blank or Privacy

F3 - Brightness Down

F4 - Brightness Up

F5 - Blank or Keyboard Backlight

F6 - Audio Mute

F7 - Volume Down

F8 - Volume Up

F9 - Mic Mute

F10 - Play and Pause

F11 - Programmable Key

F12 - HOME

Power Button (with LED)

Insert

Delete

End

Page up

Page down

Microsoft Copilot [15]

Hidden Keys

Fn+R - Break, Fn+S - Sys Rq, Fn+C - Scroll Lock



Features

SOFTWARE AND SECURITY

Application Software

Buy Microsoft Office (Sold Separately)

HP Connection Optimizer

Edge Customization

HP Hotkey Support

HP Mac Address Manager

HP Notifications

HP PC Hardware Diagnostics UEFI

HP PC Hardware Diagnostics Windows

HP Privacy Settings

HP Services Scan [15]

HP Smart Support [16]

HP Support Assistant [17]

myHP

HSA Fusion for Commercial

HSA Telemetry for Commercial

Poly Lens [18]

Poly Camera Pro

Ubuntu Data Science Stack

Manageability Features

HP Client Catalog ([download](#)) [19]

HP Client Management Script Library ([download](#)) [20]

HP Cloud Recovery [21]

HP Connect for Microsoft Endpoint Manager

HP Driver Packs ([download](#)) [22]

HP Image Assistant ([download](#)) [23]

HP Manageability Integration Kit ([download](#)) [24]

HP Power Manager with Battery Health Manager ([download](#)) [25]

Security Management

Secured-Core PC Enable [26]

Windows Hello Enhanced Sign-In Security (ESS)

HP Wolf Security for Business which includes: [27]

HP Tamper Lock

HP Sure Admin [28]

HP Sure Click [29]

HP Sure Recover [30]

HP Sure Run [31]

HP Sure Sense [32]



Features

HP Sure Start [33]

BIOS

Absolute Persistence Module [34]

Audio Permanent Disable

HP BIOS Recovery

HP Fingerprint Sensor [35]

BIOS Update via Network

HP BIOSphere Gen6 [36]

HP DriveLock & Automatic DriveLock

HP Secure Erase [37]

HP Wake on WLAN

Security- TPM

Model: Nuvoton NPCT760HACYX

Firmware Version: 7.2.4.0

TCG TPM 2.0

FIPS 140-2 Compliant: Yes

Smartcard Reader

Alcorlink AK9563E66-GAF-GR (QFN)

FIPS 140-2 Compliant : Yes

15. HP Services Scan is preinstalled and/or provided thru Windows Update and checks for service entitlement on each hardware device and downloads the applicable software agent automatically. To disable this feature, please follow the instructions at <http://www.hpdaas.com/requirements>. The HP Insights agent is a telemetry and analytics platform that provides critical data around devices and applications and is not sold as a standalone service. HP follows stringent GDPR privacy regulations and is ISO27001, ISO27701, ISO27017 and SOC2 Type2 certified for Information Security. Internet access with connection to the HP Insights agent is required. For full system requirements, please visit <http://www.hpdaas.com/requirements>. Not available in China.

16. HP Smart Support requires the HP Insights agent to be installed. For more information about how to enable or to download HP Smart Support, please visit <http://www.hp.com/smart-support>. HP Services Scan is preinstalled and/or provided thru Windows Update and will check entitlement on each hardware device to determine if an HP Insights agent-enabled service has been purchased, and will download applicable software automatically. HP Insights agent is a telemetry and analytics platform that provides critical data around devices and applications and is not sold as a standalone service. HP follows stringent GDPR privacy regulations and is ISO27001, ISO27701, ISO27017 and SOC2 Type2 certified for Information Security. Internet access is required. For full system requirements or to disable this feature, please visit <https://www.hpdaas.com/requirements>.

17. HP Support Assistant is available on Windows. For more information, please visit <https://support.hp.com/us-en/help/hp-support-assistant>.

18. Poly Lens Desktop requires a Windows OS.

19. HP Client Catalog not preinstalled, however available for download at (<https://www.hp.com/us-en/solutions/client-management-solutions.html>)

20. HP Client Management Script Library (<https://www.hp.com/us-en/solutions/client-management-solutions.html#tab=manageability-tools>).

21. 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

Features

open, 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/computer>.

22. HP Driver Packs not preinstalled, however available for download at <http://www.hp.com/go/clientmanagement>.

23. HP Image Assistant not preinstalled, however available for download at (<https://ftp.ext.hp.com/pub/caps-softpaq/cmit/HPIA.html>),

24. HP Manageability Integration Kit not preinstalled, however available for downloaded from <https://www.hp.com/us-en/solutions/client-management-solutions.html#tab=manageability-tools>.

25. HP Power Manager with Battery Health can be downloaded by entering your system information here: https://support.hp.com/in-en/document/ish_4449597-3519507-16.

26. Secured-Core PC Enable requires an Intel® vPro®, AMD Ryzen™ Pro processor or Qualcomm® processor with SD850 or higher and requires 8 GB or more system memory. Secured-core PC is enabled from the factory.

27. HP Wolf Security for Business requires Windows 10 or 11 Pro 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.

28. HP Sure Admin requires HP G8 or newer platforms, Windows 10 or higher, HP BIOS, HP Manageability Kit or KMS Service from <http://www.hp.com/go/clientmanagement> and HP Sure Admin Local Access Authenticator smartphone app from the Android or Apple store.

29. HP Sure Click requires Windows 10 and higher. See https://bit.ly/2PrLT6A_SureClick for complete details.

30. HP Sure Recover is available on select HP PCs and requires Windows 10 or 11 and an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data. HP Sure Recover Gen6 with Embedded Reimaging is an optional feature on select HP PCs which requires Windows 10 or 11 must be configured at purchase. You must back up important files, data, photos, videos, etc. before use to avoid loss of data.

31. HP Sure Run is available on select HP PCs and requires Windows 10 and higher.

32. HP Sure Sense requires Windows 10 and higher. See product specifications for availability. On units with WWAN shipping to China, HP Sure Sense is only available via Softpaq download.

33. HP Sure Start is available on select HP PCs and requires Windows 10 and higher.

34. Absolute Persistence firmware module is shipped turned off and can only be activated with the purchase a license subscription and full activation of the software agent. License subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. Certain conditions apply. For full details visit:

<https://www.absolute.com/about/legal/agreements/absolute/>.

35. HP Fingerprint Reader is an optional feature that requires Windows 10 or 11 and must be configured at purchase.

36. HP BIOSphere Gen6 features may vary depending on the platform and configuration.

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

POWER

HP 140W Slim USB Type-C® AC power adapter

HP 100W Slim USB Type-C® AC power adapter

Battery

HP Long Life 3 cell, 62Whr Polymer



Features

Power Cord

3-wired plug- 1.0m

Battery life

TBD

WEIGHT & DIMENSIONS

Weight

Product Weight- 62Whr

Starting at 1.44 kg (3.18 lb) with 62.00 Whr battery

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

315.60 mm (W) x 222.00 mm (D) x 11.75 mm (front) / 15.50 mm (rear) (12.43 in (W) x 8.74 in (D) x 0.46 in (front) / 0.61 in (rear))

Maximum height 18.95 mm (0.75)

Front height measurement is near the front edge where the chassis bottom cover taper begins. Back height measurement is near the back edge where the chassis bottom cover taper ends.

PORTS/SLOTS

Left Side

2 x Thunderbolt™ 4 with USB Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 2.1) [40]

1 x HDMI 2.1

1 x headphone/mic combo jack

1 x Smart Card Reader (Optional)

Right Side

1 x USB Type-C® 10Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)

1 x USB Type-A 5Gbps signaling rate (Powered)

1 x RJ45 Ethernet port (Optional)

1 x Nano SIM card slot (Optional)

1 x Security lock slot (Integrated)

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



Features

<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>.

Features

Certification and Compliance

CSA/UL 62368-1
ENERGY STAR®
FCC/ICES/CISPR/VCCI
CE MARKING
GS Mark
China CCC/SRRC
Taiwan BSMI/NCC
Korea KCC/KC/KES
Ukraine NSoC/TEC
EAEU Compliance
Saudi Arabian Compliance
TCO
EPEAT® Gold ¹
Low Blue Light

¹EPEAT® registered where applicable. EPEAT® registration varies by country. See www.epeat.net for registration status by country.

Technical Specifications – System Unit

SYSTEM UNIT

Stand-Alone Power Requirements (AC Power)

Nominal Operating Voltage 20.0V

Temperature

Operating 0° to 35° C (32° to 95° F)

System performance may be reduced above 32°C (89.6°F)

Non-operating -20° to 60° C (-4° to 140° F)

System performance may be reduced above 32°C (89.6°F)

Relative Humidity

Operating 10% to 90 % (non-condensing)

Non-operating 5% to 95 %, 38.7° C (101.6° F) maximum wet bulb temperature

Shock

Operating 40 G, 2 ms, half-sine

Non-operating 240 G, 2 ms, half-sine

Random Vibration

Operating 1.043 grms

Non-operating 3.500 grms

Altitude (unpressurized)

Operating 3048 m (10000 ft)

Non-operating 12192 m (40000 ft)

Planned Industry Standard Certifications

Regulatory Model Number HSN-I62C-4

Technical Specifications – Displays

DISPLAYS

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

Availability may vary by country

14.0 in 2.5K (2560 x 1600)

Anti-Glare UWVA WLED+LBL

AD-100 400 eDP 1.4+PSR2

120Hz (VRR) bent LCD Panel

Outline Dimensions (W x H x D)	306.890 x 197.900 (max)
Active Area	301.594 x 188.496 (typ)
Weight	200 (max)
Diagonal Size	14
Thickness	2.0 / 3.8 (max)
Interface	eDP1.4
Surface Treatment	Anti-Glare
Touch Enabled	No
Contrast Ratio	2000:1 (typ)
Refresh Rate	120 (typ)
Brightness	400 (typ)
Pixel Resolution - Format	2560 x 1600 (2.5K)
Backlight	WLED
Pixel Resolution	RGB
Color Gamut Coverage	Adobe RGB 100% + DCI-P3 100%
Color Depth	8
Viewing Angle	UWVA 89/89/89/89
Low Blue Light	Yes
Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.3 (max)/ 2.7 (max)

14.0 in WUXGA (1920 x 1200)

Anti-Glare UWVA LED sRGB

62.5 8bit 300 eDP 1.2 w/o PSR

Low-Power 60Hz bent LCD

Panel

Outline Dimensions (W x H x D)	307.590 x 199.150 (max)
Active Area	301.59 X 188.50(typ)
Weight	300 (max)
Diagonal Size	14
Thickness	3.0/4.8 (max)
Interface	eDP1.2
Surface Treatment	Anti-Glare
Touch Enabled	No



Technical Specifications – Displays

Contrast Ratio	1000 : 1 (typ)
Refresh Rate	60 (typ)
Brightness	300 (typ)
Pixel Resolution - Format	1920 x 1200 (WUXGA)
Backlight	WLED
Pixel Resolution	RGB
Color Gamut Coverage	sRGB 62.5%
Color Depth	8
Viewing Angle	UWVA 89/89/89/89
Low Blue Light	No
Power Consumption (W, EBL@ 150nits max/ 200nits max)	1.70 (max)/2.10(max)

14.0 in WUXGA (1920 x 1200)

Anti-Glare UWVA LED sRGB

62.5 8bit 300 TOP eDP 1.2 w/o

PSR Low-Power 60Hz bent LCD

Panel

Outline Dimensions (W x H x D)	307.59 x 199.15 (max)
Active Area	301.590 x 188.500 (typ)
Weight	300 (max)
Diagonal Size	14
Thickness	3.0/4.8 (max)
Interface	eDP 1.2
Surface Treatment	Anti-Glare
Touch Enabled	Yes
Contrast Ratio	1000:1(typ)
Refresh Rate	60 (typ)
Brightness	300 (typ)
Pixel Resolution - Format	1920 x 1200 (WUXGA)
Backlight	WLED
Pixel Resolution	RGB
Color Gamut Coverage	sRGB 62.5%
Color Depth	8
Viewing Angle	UWVA 89/89/89/89
Low Blue Light	No
Power Consumption (W, EBL@ 150nits max/ 200nits max)	1.75 (max) / 2.15 (max)

14.0 in WUXGA (1920 x 1200)

Anti-Glare UWVA Low Blue

Light sRGB 100 800 eDP



Technical Specifications – Displays

1.4+PSR+IOL Sure View 5 bent

LCD Panel

Outline Dimensions (W x H x D)	306.890 x 197.900 (max)
Active Area	301.590 X 188.500 (typ)
Weight	260 (max)
Diagonal Size	14
Thickness	2.2/ 3.9 (max)
Interface	eDP 1.4
Surface Treatment	Anti-Glare
Touch Enabled	No
Contrast Ratio	1500 : 1 (typ)
Refresh Rate	60 (typ)
Brightness	800 (typ)
Pixel Resolution - Format	1920 x 1200 (WUXGA)
Backlight	WLED
Pixel Resolution	RGB
Color Gamut Coverage	sRGB 100%
Color Depth	8
Viewing Angle	UWVA 89/89/89/89
Low Blue Light	Yes
Power Consumption (W, EBL@ 150nits max/ 200nits max)	1.48 (max)/1.8(max)

14.0 in WUXGA (1920 x 1200)

Anti-Glare UWVA Low Blue

Light sRGB 100 800 TOP eDP

1.4+PSR+IOL Sure View 5 bent

LCD Panel

Outline Dimensions (W x H x D)	306.890 x 197.900 (max)
Active Area	301.590 X 188.500 (typ)
Weight	260 (max)
Diagonal Size	14
Thickness	2.4 / 4.2 (max)
Interface	eDP 1.4
Surface Treatment	Anti-Glare
Touch Enabled	Yes
Contrast Ratio	1500 : 1 (typ)
Refresh Rate	60 (typ)
Brightness	800 (typ)
Pixel Resolution - Format	1920 x 1200 (WUXGA)
Backlight	WLED
Pixel Resolution	RGB
Color Gamut Coverage	sRGB 100%



Technical Specifications – Displays

Color Depth	8
Viewing Angle	UWVA 89/89/89/89
Low Blue Light	Yes
Power Consumption (W, EBL@ 150nits max/ 200nits max)	1.60 (max)/ 1.97 (max)

14.0 in WUXGA (1920 x 1200)

Anti-Glare UWVA WLED+LBL

sRGB NB2X 400 eDP 1.4+PSR2

Low-Power 100 bent LCD Panel

Outline Dimensions (W x H x D)	307.590 x 199.550 (max)
Active Area	301.590 x 188.500 (typ)
Weight	210 (max)
Diagonal Size	14
Thickness	2.0 / 3.8 (max)
Interface	eDP 1.4
Surface Treatment	Anti-Glare
Touch Enabled	No
Contrast Ratio	1000:1(typ)
Refresh Rate	60 (typ)
Brightness	400 (typ)
Pixel Resolution - Format	1920 x 1200 (WUXGA)
Backlight	WLED
Pixel Resolution	RGB
Color Gamut Coverage	sRGB 100%
Color Depth	8
Viewing Angle	UWVA 89/89/89/89
Low Blue Light	Yes
Power Consumption (W, EBL@ 150nits max/ 200nits max)	1.29 (max) / 1.66 (max)

14.0 in WQXGA DRM (2560 x

1600) Anti-Glare UWVA LED

DCI-P3 NB2X 500 eDP 1.4+PSR2

100 120Hz bent LCD Panel

Outline Dimensions (W x H x D)	307.594 x 199.546 (max)
Active Area	301.594 x 188.496 (typ)
Weight	230 (max)
Diagonal Size	14
Thickness	2.0 / 3.8 (max)
Interface	eDP 1.4
Surface Treatment	Anti-Glare



Technical Specifications – Displays

Touch Enabled	No
Contrast Ratio	1200:1(typ)
Refresh Rate	120 (typ)
Brightness	500 (typ)
Pixel Resolution - Format	2560 x1600 (WQXGA)
Backlight	WLED
Pixel Resolution	RGB
Color Gamut Coverage	DCI-P3 100%
Color Depth	8
Viewing Angle	UWVA 89/89/89/89
Low Blue Light	No
Power Consumption (W, EBL@ 150nits max/ 200nits max)	2.88 (max) / 3.44 (max)

Technical Specifications – Storage

STORAGE

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
Maximum Sequential Read	6400 MB/s ±20%
Maximum Sequential Write	5000 MB/s ±20%
Logical Blocks	4000797360
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	Pyrite 2.0; TRIM; L1.2
Not all features are available in all versions.	

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
Maximum Sequential Read	6400 MB/s ±20%
Maximum Sequential Write	5000 MB/s ±20%
Logical Blocks	2000409264
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	Pyrite 2.0; TRIM; L1.2
Not all features are available in all versions.	

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)



Technical Specifications – Storage

Interface	PCIe NVMe Gen4X4
Maximum Sequential Read	6400 MB/s ±20%
Maximum Sequential Write	3500 MB/s ±20%
Logical Blocks	1000215215
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	Pyrite 2.0; TRIM; L1.2 Not all features are available in all versions.

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
Maximum Sequential Read	6400 MB/s ±20%
Maximum Sequential Write	3500 MB/s ±20%
Logical Blocks	1000215215
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	TCG Opal 2.0; TRIM; L1.2 Not all features are available in all versions.

SSD 1TB 2280 PCIe NVMe Value

Form Factor	M.2 2280
Capacity	1TB
NAND Type	Value
Height	0.09 in (2.3 mm)
Width	0.87 in (22 mm)
Weight	0.02 lb (10 g)
Interface	PCIe NVMe Gen4X4
Maximum Sequential Read	2200 MB/s ±20%
Maximum Sequential Write	1600 MB/s ±20%
Logical Blocks	2000409264
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	Pyrite 2.0; TRIM; L1.2 Not all features are available in all versions.

SSD 512GB 2280 PCIe NVMe Value



Technical Specifications – Storage

Form Factor	M.2 2280
Capacity	512 GB
NAND Type	Value
Height	0.09 in (2.3 mm)
Width	0.87 in (22 mm)
Weight	0.02 lb (10 g)
Interface	PCIe NVMe Gen4X4
Maximum Sequential Read	2200 MB/s ±20%
Maximum Sequential Write	1600 MB/s ±20%
Logical Blocks	1000215215
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	Pyrite 2.0; TRIM; L1.2 Not all features are available in all versions.

SSD 256GB 2280 PCIe NVMe

Value

Form Factor	M.2 2280
Capacity	256 GB
NAND Type	Value
Height	0.09 in (2.3 mm)
Width	0.87 in (22 mm)
Weight	0.02 lb (10 g)
Interface	PCIe NVMe Gen4X4
Maximum Sequential Read	3100 MB/s ±20%
Maximum Sequential Write	1200 MB/s ±20%
Logical Blocks	500118192
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	Pyrite 2.0; TRIM; L1.2 Not all features are available in all versions.

Technical Specifications – Networking

NETWORKING / COMMUNICATION

Mediatek RZ616 Wi-Fi 6E	Wireless LAN Standards	IEEE 802.11a IEEE 802.11ac IEEE 802.11ax IEEE 802.11b IEEE 802.11d IEEE 802.11e IEEE 802.11g IEEE 802.11h IEEE 802.11i IEEE 802.11j IEEE 802.11k IEEE 802.11mc IEEE 802.11n IEEE 802.11r IEEE 802.11v IEEE 802.11w
Bluetooth® 5.3 AIM-T WLAN [1]	Interoperability	Wi-Fi certified
	Frequency Band	802.11b/g/n/ax 2.402 – 2.482 GHz 802.11a/n/ac/ax 5.15 – 5.25 GHz 5.25 – 5.35 GHz 5.47 – 5.725 GHz 5.825 – 5.850 GHz 5.925 – 7.125 GHz
	Data Rates	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11ac: MCS0~MCS9, (20MHz, 40MHz, 80MHz, 160MHz) 802.11ax: MCS0~MCS11, (20MHz, 40MHz, 80MHz, 160MHz) 802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS0~MCS15, (20MHz, 40MHz)
	Modulation	1024QAM, 16-QAM, 256-QAM, 64-QAM, BPSK, CCK, Direct Sequence Spread Spectrum, OFDM, QPSK
	Security	802.1x authentication AES-CCMP: 128 bit in hardware IEEE 802.11i IEEE and WiFi certified 64 / 128 bit WEP encryption for a/b/g mode only WAPI WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. WPA2 certification WPA3 (personal) certification

Technical Specifications – Networking

Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power	2.4GHz (MIMO, typical): <ul style="list-style-type: none">802.11b : +18dBm802.11g : +16.5dBm802.11n/ac/ax (HT20/VHT20/HE20) : +16dBm802.11n/ac/ax (HT40/VHT40/HE40) : +12.5dBm
Power Consumption	5GHz (MIMO, typical): <ul style="list-style-type: none">802.11a : +13dBm802.11n/ac/ax (HT20/VHT20/HE20) : +13.5dBm802.11n/ac/ax (HT40/VHT40/HE40) : +12.5dBm802.11ac/ax (VHT80/HE80) : +11.5dBm802.11ax HE160 : +11.5dBm 6GHz LPI mode (MIMO, typical): <ul style="list-style-type: none">802.11a : 0dBm802.11ax HE20 : +1dBm802.11ax HE40 : +4dBm802.11ax HE80 : +7dBm802.11ax HE160 : +7.5dBm Transmit mode : 2.5 W Receive mode : 2.0 W Idle mode (PSP) : 180 mW (WLAN Associated) Idle mode: 50 mW (WLAN unassociated) Connected Standby/Modern Standby : 10 mW Radio disabled : 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[2]	2.4GHz (SISO): <ul style="list-style-type: none">802.11b, 11Mbps : -82dBm maximum802.11g, 54Mbps : -71dBm maximum802.11n, MCS7 : -64dBm maximum802.11ac, MCS9 : -52dBm maximum802.11ax, MCS11(HT40): -49dBm maximum 5GHz (SISO): <ul style="list-style-type: none">802.11a, 54Mbps : -71dBm maximum802.11n, MCS07 : -64dBm maximum802.11ac, MCS9 : -52dBm maximum802.11ax, MCS11(HE80/HE160): -46dBm maximum 6GHz (SISO): <ul style="list-style-type: none">802.11a, 54Mbps : -71dBm maximum802.11n, MCS7 : -64dBm maximum802.11ac, MCS9 : -52dBm maximum

Technical Specifications – Networking

Antenna type	•802.11ax, MCS11(HE160): -46dBm maximum High efficiency antenna with spatial diversity Two embedded tri-band 2.4/5/6 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	30.00 x 22.00 x 2.30 mm (1.18 x 0.87 x 0.09 inch)
Weight	1. Type 2230: 2.8 g
Operating Voltage	3.3 v +/- 9 %
Subtitle	Integrated Bluetooth® specifications
Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2/5.3 Compliant
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 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 1.5 Bluetooth device with a maximum transmit power of + 14 dBm and 10 dBm for BR and EDR, respectively.
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/E, Section 15.247, 15.249, 15.407; ETSI 300 328, ETSI 301 893, ETSI 303 687
Bluetooth Profiles Supported	2Mbps LE Advanced Audio Distribution Profile (A2DP) Basic Imaging Profile (BIP) Bluetooth 4.1 -ESR 5/6/7 Compliance Bluetooth 4.2 ESR08 Compliance Bluetooth 5.2 Bluetooth 5.3 wireless card Channel Selection Algo Encryption key size control enhancements ESR9/10 Compliance FAX Profile (FAX) Hands Free Profile (HFP)

Technical Specifications – Networking

Headset Profile (HSP)
LE Advertisement Extensions
LE Data Packet Length Extension
LE Dual Mode
LE L2CAP Connection Oriented Channels
LE Link Layer
LE Link Layer Ping
LE Long Range
LE Low Duty Cycle Directed Advertising
LE Privacy 1.2 –Extended Scanner Filter Policies
LE Privacy 1.2 –Link Layer Privacy
LE Secure Connection- Basic/Full
Limited High Duty Cycle Non-Connectable Advertising
Periodic Advertisement interval
Train Nudging & Interlaced Scan
Windows Bluetooth profiles support

[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.

Wi-Fi 6E is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately.

[2] Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

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.

Wi-Fi 6E is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately.

2. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

Mediatek MT7925 Wi-Fi 7

Bluetooth® 5.4 AIM-T WW

WLAN [1]

Wireless LAN Standards

IEEE 802.11a

IEEE 802.11ac

IEEE 802.11ax

IEEE 802.11b

IEEE 802.11be

IEEE 802.11d

IEEE 802.11e

IEEE 802.11g

IEEE 802.11h



Technical Specifications – Networking

Interoperability	IEEE 802.11i
Frequency Band	IEEE 802.11k IEEE 802.11n IEEE 802.11r IEEE 802.11v Wi-Fi certified 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	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11ac: MCS0~MCS9, (20MHz, 40MHz, 80MHz, 160MHz) 802.11ax: MCS0~MCS11, (20MHz, 40MHz, 80MHz, 160MHz) 802.11b: 1, 2, 5.5, 11 Mbps 802.11be: MCS0~13, (20MHz, 40MHz, 80MHz, 160MHz) 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS0~MCS15, (20MHz, 40MHz)
Modulation	1024QAM, 16-QAM, 256-QAM, 4096-QAM, 64-QAM, BPSK, CCK, Direct Sequence Spread Spectrum, OFDM, QPSK
Security	802.1x authentication AES-CCMP: 128 bit in hardware IEEE 802.11i IEEE and WiFi certified 64 / 128 bit WEP encryption for a/b/g mode only WAPI WPA, WPA2: 802.1x, WPA-PSK, WPA2-PSK, TKIP, and AES. WPA2 certification WPA3 (personal) certification
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power	<ul style="list-style-type: none">802.11b, 1Mbps : +17dBm minimum802.11g, 6Mbps : +16dBm minimum802.11a, 6Mbps : +17dBm minimum802.11n, MCS7(HT20) : +14dBm minimum802.11n, MCS7(HT40) : +13.5dBm minimum

Technical Specifications – Networking

	<ul style="list-style-type: none">802.11ac MCS9(VHT20) : 13.5dBm minimum802.11ac MCS9(VHT40) : +13.5dBm minimum802.11ac MCS9(VHT80) : +12.5dBm minimum802.11ac MCS9(VHT160) : +10.5dBm minimum802.11ax MCS11(HE20)(6GHz) : +11.5dBm minimum802.11ax MCS11(HE40)(6GHz) : +7.5dBm minimum802.11ax MCS11(HE80)(6GHz) : +7.5dBm minimum802.11ax MCS11(HE160)(6GHz) : +7.5dBm minimum802.11be MCS13(EHT20)(6GHz) : +11.5dBm802.11be MCS13(EHT40)(6GHz) : +7.5dBm802.11be MCS13(EHT80)(6GHz) : +7.5dBm802.11be MCS13(EHT160)(6GHz) : +6.5dBm
Power Consumption	Transmit mode : 2.7 W Receive mode : 1.8 W Idle mode (PSP) : 180 mW (WLAN Associated) Idle mode: 50 mW (WLAN unassociated) Connected Standby/Modern Standby : 10 mW Radio disabled : 8 mW
Power Management	ACPI and PCI Express compliant power management; 802.11 compliant power saving mode
Receiver Sensitivity[2]	<ul style="list-style-type: none">802.11b, 1Mbps : -93.5dBm maximum802.11b, 11Mbps : -85dBm maximum802.11a/g, 6Mbps : -90.5dBm maximum802.11a/g, 54Mbps : -72.5dBm maximum802.11n, MCS0(HT20) : -90dBm maximum802.11n, MCS7(HT20) : -71.5dBm maximum802.11n, MCS0(HT40) : -88.5dBm maximum802.11n, MCS7(HT40) : -68.5dBm maximum802.11ac, MCS9(VHT20) : -88.5dBm maximum802.11ac, MCS9(VHT40) : -65.5dBm maximum802.11ac, MCS9(VHT80) : -60.5dBm maximum802.11ac, MCS9(VHT160) : -58.5dBm maximum802.11ax, MCS11(HE20)(6GHz) : -59.5dBm maximum802.11ax, MCS11(HE40)(6GHz) : -56.5dBm maximum802.11ax, MCS11(HE80)(6GHz) : -53.5dBm maximum802.11ax, MCS11(HE160)(6GHz) : -51.5dBm maximum802.11be, MCS13(EHT20)(6GHz) : -55.5dBm maximum802.11be, MCS13(EHT40)(6GHz) : -53.5dBm maximum802.11be, MCS13(EHT80)(6GHz) : -51.5dBm maximum802.11be, MCS13(EHT160)(6GHz) : -48.5dBm 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

Technical Specifications – Networking

Form Factor	communications
Dimensions	PCI-Express M.2 MiniCard
Weight	30.00 x 22.00 x 2.30 mm (1.18 x 0.87 x 0.09 inch)
Operating Voltage	1. Type 2230: 2.8 g
Subtitle	3.3 v +/- 9 %
Bluetooth Specification	Integrated Bluetooth® specifications
Frequency Band	4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Compliant
Number of Available Channels	2402 to 2480 MHz
Data Rates and Throughput	Legacy : 0~79 (1 MHz/CH) BLE : 0~39 (2 MHz/CH)
	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 I Bluetooth device with a maximum transmit power of +15.5 dBm for BR and +13dBm for 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/E, Section 15.247, 15.249, 15.407; ETSI 300 328, ETSI 301 893, ETSI 303 687
Bluetooth Profiles Supported	2Mbps LE Advanced Audio Distribution Profile (A2DP) Basic Imaging Profile (BIP) Channel Selection Algo Encryption key size control enhancements ESR9/10 Compliance FAX Profile (FAX) Hands Free Profile (HFP) Headset Profile (HSP) LE Advertisement Extensions LE Data Packet Length Extension LE Dual Mode LE L2CAP Connection Oriented Channels LE Link Layer LE Link Layer Ping LE Long Range

Technical Specifications – Networking

LE Low Duty Cycle Directed Advertising
LE Privacy 1.2 –Extended Scanner Filter Policies
LE Privacy 1.2 –Link Layer Privacy
LE Secure Connection- Basic/Full
Limited High Duty Cycle Non-Connectable Advertising
Train Nudging & Interlaced Scan

[1] Wi-Fi 7 requires a Wi-Fi 7 router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 7 is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 7 is supported. Wi-Fi 7 is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels.

[2] Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

1. Wi-Fi 7 requires a Wi-Fi 7 router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 7 is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 7 is supported. Wi-Fi 7 is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels.

2. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

Qualcomm® Fast Connect 7800	Wireless LAN Standards
Wi-Fi 7	IEEE 802.11a
Bluetooth® 5.4 AIM-T	IEEE 802.11ac
WW WLAN [1]	IEEE 802.11ax
	IEEE 802.11b
	IEEE 802.11be
	IEEE 802.11d
	IEEE 802.11e
	IEEE 802.11g
	IEEE 802.11h
	IEEE 802.11i
	IEEE 802.11k
	IEEE 802.11n
	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



Technical Specifications – Networking

	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	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11ac : MCS0 ~ MCS9, (20MHz, 40MHz, 80MHz, 160MHz) 802.11ax : MCS0 ~ MCS11, (20MHz, 40MHz, 80MHz, 160MHz) 802.11b: 1, 2, 5.5, 11 Mbps 802.11be : MCS0~13, (20MHz, 40MHz, ,80MHz, 160MHz, 320MHz) 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, 40MHz)
Modulation	1024QAM, 16-QAM, 256-QAM, 4096QAM, 64-QAM, BPSK, CCK, Direct Sequence Spread Spectrum, OFDM, QPSK
Security	802.1x authentication AES-CCMP: 128 bit in hardware IEEE 802.11i IEEE and WiFi certified 64 / 128 bit WEP encryption for a/b/g mode only WAPI WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. WPA2 certification WPA3 (personal) certification
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power	<ul style="list-style-type: none">802.11b, 1Mbps : +17dBm minimum802.11g, 6Mbps : +16dBm minimum802.11a, 6Mbps : +17dBm minimum802.11n, MCS7(HT20) : +14dBm minimum802.11n, MCS7(HT40) : +13.5dBm minimum802.11ac MCS9(VHT20) : 13.5dBm minimum802.11ac MCS9(VHT40) : +13.5dBm minimum802.11ac MCS9(VHT80) : +12.5dBm minimum802.11ac MCS9(VHT160) : +10.5dBm minimum802.11ax MCS11(HE20)(6GHz) : +11.5dBm minimum802.11ax MCS11(HE40)(6GHz) : +7.5dBm minimum802.11ax MCS11(HE80)(6GHz) : +7.5dBm minimum802.11ax MCS11(HE160)(6GHz) : +7.5dBm minimum802.11be MCS13(EHT20)(6GHz) : 11.5dBm

Technical Specifications – Networking

Power Consumption	<ul style="list-style-type: none">802.11be MCS13(EHT40)(6GHz) : 7.5dBm802.11be MCS13(EHT80)(6GHz) : 7.5dBm802.11be MCS13(EHT160)(6GHz) : 6.5dBm802.11be MCS13(EHT320)(6GHz) : 4.5dBm <p>Transmit mode : 3.1 W Receive mode : 1.8 W Idle mode (PSP) : 180 mW (WLAN Associated) Idle mode: 50 mW (WLAN unassociated) Connected Standby/Modern Standby : 10 mW Radio disabled : 8 mW</p>
Power Management	ACPI and PCI Express compliant power management; 802.11 compliant power saving mode
Receiver Sensitivity[2]	<ul style="list-style-type: none">802.11b, 1Mbps : -93.5dBm maximum802.11b, 11Mbps : -85dBm maximum802.11a/g, 6Mbps : -90.5dBm maximum802.11a/g, 54Mbps : -72.5dBm maximum802.11n, MCS0(HT20) : -90dBm maximum802.11n, MCS7(HT20) : -71.5dBm maximum802.11n, MCS0(HT40) : -88.5dBm maximum802.11n, MCS7(HT40) : -68.5dBm maximum802.11ac, MCS9(VHT20) : -88.5dBm maximum802.11ac, MCS9(VHT40) : -65.5dBm maximum802.11ac, MCS9(VHT80) : -60.5dBm maximum802.11ac, MCS9(VHT160) : -58.5dBm maximum802.11ax, MCS11(HE20)(6GHz) : -59.5dBm maximum802.11ax, MCS11(HE40)(6GHz) : -56.5dBm maximum802.11ax, MCS11(HE80)(6GHz) : -53.5dBm maximum802.11ax, MCS11(HE160)(6GHz) : -51.5dBm maximum802.11be, MCS13(EHT20)(6GHz) : -55.5dBm maximum802.11be, MCS13(EHT40)(6GHz) : -53.5dBm maximum802.11be, MCS13(EHT80)(6GHz) : -51.5dBm maximum802.11be, MCS13(EHT160)(6GHz) : -48.5dBm maximum802.11be, MCS13(EHT320)(6GHz) : -45.5dBm maximum
Antenna type	High efficiency antenna with spatial diversity Two embedded tri-band 2.4/5/6 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	30.00 x 22.00 x 2.35 mm (1.18 x 0.87 x 0.09 inch)
Weight	1. Type 2230: 3.1 g
Operating Voltage	3.3 v +/- 9 %
Subtitle	Integrated Bluetooth® specifications
Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Compliant
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 I Bluetooth device with a maximum transmit power of +15.5 dBm for BR and +13dBm for EDR.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
Bluetooth Software Supported Link Topology	Microsoft Windows Bluetooth Software
Power Management Certifications	Microsoft Windows ACPI, and USB Bus Support FCC (47 CFR) Part 15C/E, Section 15.247, 15.249, 15.407; ETSI 300 328, ETSI 301 893, ETSI 303 687
Bluetooth Profiles Supported	2Mbps LE Advanced Audio Distribution Profile (A2DP) Basic Imaging Profile (BIP) Bluetooth 4.1 -ESR 5/6/7 Compliance Bluetooth 4.2 ESR08 Compliance Bluetooth 5.2 Bluetooth 5.3 wireless card Channel Selection Algo Encryption key size control enhancements ESR9/10 Compliance FAX Profile (FAX) Hands Free Profile (HFP) Headset Profile (HSP) LE Advertisement Extensions LE Data Packet Length Extension LE Dual Mode LE L2CAP Connection Oriented Channels LE Link Layer LE Link Layer Ping LE Long Range LE Low Duty Cycle Directed Advertising LE Privacy 1.2 –Extended Scanner Filter Policies LE Privacy 1.2 –Link Layer Privacy LE Secure Connection- Basic/Full

Technical Specifications – Networking

Limited High Duty Cycle Non-Connectable Advertising
Periodic Advertisement interval
Train Nudging & Interlaced Scan
Windows Bluetooth profiles support

[1] Wi-Fi 7 requires a Wi-Fi 7 router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 7 is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 7 is supported. Wi-Fi 7 is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels.

[2] Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

1. Wi-Fi 7 requires a Wi-Fi 7 router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 7 is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 7 is supported. Wi-Fi 7 is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels.

2. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

HP 5G Sub-6 CAT19

Technology/Operating bands

WCDMA/HSPA+ operating bands:

Band 1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL)
Band 2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL)
Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL)
Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL)
Band 8: 880 to 915 MHz (UL), 925 to 960 MHz (DL)

LTE FDD/TDD operating bands:

Band 1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL)
Band 2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL)
Band 3: 1710 to 1785 MHz (UL), 1805 to 1880 MHz (DL)
Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL)
Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL)
Band 7: 2500 to 2570 MHz (UL), 2620 to 2690 MHz (DL)
Band 8: 880 to 915 MHz (UL), 925 to 960 MHz (DL)
Band 12: 699 to 716 MHz (UL), 729 to 746 MHz (DL)
Band 13: 777 to 787 MHz (UL), 746 to 756 MHz (DL)
Band 14: 788 to 798 MHz (UL), 758 to 768 MHz (DL)
Band 17: 704 to 716 MHz (UL), 734 to 746 MHz (DL)
Band 18: 815 to 830 MHz (UL), 860 to 875 MHz (DL)
Band 19: 830 to 845 MHz (UL), 875 to 890 MHz (DL)



Technical Specifications – Networking

	Band 20: 832 to 862 MHz (UL), 791 to 821 MHz (DL) Band 25: 1850 to 1915 MHz (UL), 1930 to 1995 MHz (DL) Band 26: 814 to 849 MHz (UL), 859 to 894 MHz (DL) Band 28: 703 to 748 MHz (UL), 758 to 803 MHz (DL) Band 29: 717 to 728 MHz (DL) Band 30: 2305 to 2315 MHz (UL) 2350 to 2360 MHz (DL) Band 34: 2010 to 2025 MHz (UL/DL) Band 38: 2570 to 2620 MHz (UL/DL) Band 39: 1880 to 1920 MHz (UL/DL) Band 40: 2300 to 2400 MHz (UL/DL) Band 41: 2496 to 2690 MHz (UL/DL) Band 42: 3400 to 3600 MHz (UL/DL) Band 43: 3400 to 3800 MHz (UL/DL) Band 46: 5150 to 5925 MHz (DL) Band 48: 3550 to 3700 MHz (UL/DL) Band 66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL) Band 71: 663 to 698 MHz (UL), 617 to 652 MHz (DL)
Wireless protocol standards	5GNR Air Interface 3GPP Rel15 5G NR sub-6 LTE Rel15 3GPP Release 8 UMTS Specification
GPS	Standalone/A-GPS (MS-A, MS-B)
GPS bands	GPS L1 (1575.42MHz), GLONASS L1 (1602MHz), Beidou B1 (1561.098MHz), Galileo E1 (1575.42MHz), QZSS (1575.42MHz)
Maximum data rates	SA 5G/NR sub-6 Peak: 4.67 Gbps(Download), 1.25 Gbps(Upload)
Maximum output power	HSPA+: 23.5 dBm LTE (all bands except B41): 23.0 dBm (Not support HPUE) NR (all band except n41, n77, n78, n79): 23.0 dBm (Not support HPUE) NR n41, n77, n78, n79 HPUE: 26.0 dBm (Support HPUE)
Maximum power consumption	5G Sub 6: 3,500 mA LTE: 2,500 mA (peak); mA (average)
Form Factor	M.2; 3052-S3 Key B
Weight	8.6 g (0.303 oz)
Dimensions	30.00 x 52.00 x 2.30 mm (1.18 x 2.05 x 0.09 inch)
(Length x Width x Thickness)	
embedded eSIM	Yes

1. 5G module is optional and must be configured at the factory. Module designed for 5G NR NSA (non-standalone) networks as carriers deploy Evolved-Universal Terrestrial Radio Access New Radio Dual Connectivity (ENDC) with both 100Mhz of 5G NR and LTE channel bandwidth, using 256QAM 4x4 as defined by 3GPP. Module requires activation and separately purchased service contract. Check with service provider for coverage and availability in your area. Data connection, upload and download speeds will vary due to network, location, environment, network conditions, and other factors. Backwards compatible to 4G LTE and 3G HSPA technologies. 5G module

Technical Specifications – Networking

planned to be available in select platforms and select countries, where carrier supported.

HP 4G CAT19

Technology/Operating bands

WCDMA/HSPA+ operating bands:

Band 1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL)

Band 2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL)

Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL)

Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL)

Band 8: 880 to 915 MHz (UL), 925 to 960 MHz (DL)

LTE FDD/TDD operating bands:

Band 1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL)

Band 2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL)

Band 3: 1710 to 1785 MHz (UL), 1805 to 1880 MHz (DL)

Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL)

Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL)

Band 7: 2500 to 2570 MHz (UL), 2620 to 2690 MHz (DL)

Band 8: 880 to 915 MHz (UL), 925 to 960 MHz (DL)

Band 12: 699 to 716 MHz (UL), 729 to 746 MHz (DL)

Band 13: 777 to 787 MHz (UL), 746 to 756 MHz (DL)

Band 14: 788 to 798 MHz (UL), 758 to 768 MHz (DL)

Band 17: 704 to 716 MHz (UL), 734 to 746 MHz (DL)

Band 18: 815 to 830 MHz (UL), 860 to 875 MHz (DL)

Band 19: 830 to 845 MHz (UL), 875 to 890 MHz (DL)

Band 20: 832 to 862 MHz (UL), 791 to 821 MHz (DL)

Band 25: 1850 to 1915 MHz (UL), 1930 to 1995 MHz (DL)

Band 26: 814 to 849 MHz (UL), 859 to 894 MHz (DL)

Band 28: 703 to 748 MHz (UL), 758 to 803 MHz (DL)

Band 29: 717 to 728 MHz (DL)

Band 30: 2305 to 2315 MHz (UL) 2350 to 2360 MHz (DL)

Band 34: 2010 to 2025 MHz (UL/DL)

Band 38: 2570 to 2620 MHz (UL/DL)

Band 39: 1880 to 1920 MHz (UL/DL)

Band 40: 2300 to 2400 MHz (UL/DL)

Band 41: 2496 to 2690 MHz (UL/DL)

Band 42: 3400 to 3600 MHz (UL/DL)

Band 43: 3400 to 3800 MHz (UL/DL)

Band 46: 5150 to 5925 MHz (DL)

Band 48: 3550 to 3700 MHz (UL/DL)

Band 66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL)

Band 71: 663 to 698 MHz (UL), 617 to 652 MHz (DL)

Wireless protocol standards

LTE Rel15

3GPP Release 8 UMTS Specification

GPS

Standalone/A-GPS (MS-A, MS-B)

GPS bands

GPS L1 (1575.42MHz), GLONASS L1 (1602MHz), Beidou B1



Technical Specifications – Networking

Maximum data rates	(1561.098MHz), Galileo E1 (1575.42MHz), QZSS (1575.42MHz)
Maximum output power	UE Category DL 19 (1.6 Gbps Download), UE Category UL 18 (211 Mbps Upload)
Maximum power consumption	LTE (all bands except B41): 23.0 dBm (Not support HPUE)
Form Factor	LTE: 2,500 mA (peak)
Weight	M.2; 3052-S3 Key B
Dimensions	8.4 g (0.296 oz)
(Length x Width x Thickness)	30.00 x 52.00 x 2.30 mm (1.18 x 2.05 x 0.09 inch)
embedded eSIM	Yes

1. Mobile Broadband is an optional feature. Connection requires wireless data service contract, network support, and is not available in all areas. Contact service provider to determine the coverage area and availability. Connection speeds will vary due to location, environment, network conditions, and other factors. 4G LTE not available on all products or in all countries.

Value

NFC Mirage WNC XRAV-1

Dimensions (L x W x H)	17.00 x 10.00 x 2.00 mm (0.67 x 0.39 x 0.08 inch)
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	Type 1, Type 2, Type 3 / Type 4, NFCIP-1 / NFCIP-2
Reader (PCD-VCD) Mode(1)	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz
Card Emulation (PICC-VICC) Mode(1)	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 kbps, 212 kbps, 424 kbps, 848 kbps
Operating temperature	Operating: 0 °C to 70 °C (32 °F to 158 °F) Storage: -20 °C to 125 °C (-4 °F to 257 °F)



Technical Specifications – Networking

Storage temperature	Operating: 10% - 90% (non-condensing) Non-Operating: 5% - 95% (non-condensing)
Humidity	Operating: 10% - 90% (non-condensing) Non-Operating: 5% - 95% (non-condensing)
Supply Operating voltage	4.35 to 5.25 Volts
I/O Voltage	1.8V or 3.3V
Power Consumption (Booster enable, VBAT= 3.3V, VCC_BOOST = 5V)	Booster enable, VBAT= 3.3V, VCC_BOOST = 5V
Mode	Power Consumption, Typical
Polling	7.3 mA
Detected Test Tag Type 1	Total 283.8 mA Net Module 236.8 mA
Detected Test Tag Type 2	Total 288.8 mA Net Module 241.8 mA
Detected Test Tag Type 3	Total 287.7 mA Net Module 240.7 mA
Detected Test Tag Type 4	Total 282.3 mA Net Module 235.3 mA
Antenna	Antenna connector, 0.5mm pitch, 7 connector FPC. Antenna matching is external to module.

Realtek RTL8111EPP 1GbE Ethernet Controller

Connector	RJ-45
System Interface	PCI (Intel proprietary) + SMBus/ USB
Data rates supported	10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14), 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30), 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 802.3 clauses 40),
IEEE Compliance	IEEE 802.1p QoS (Quality of Service) Support, IEEE 802.1q VLAN support, IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable), IEEE 802.3az EEE (Energy Efficient Ethernet), TCP/IP/UDP Checksum Offload (configurable); Protocol Offload (ARP & NS); Large send offload and Giant send offload; Jumbo Frame 9K; Receiving Side Scaling;
Performance	Cable Disconnection: 25mW 100Mbps Full Run: 450mW 1000bp Full Run: 1000mW
Power consumption	WoL Enable(S3/S4/S5): 50mW WoL Disable(S3/S4/S5): 25mW
Power Management	ACPI compliant – multiple power modes; Situation-sensitive features reduce power consumption; Advanced link down power saving for reducing link down power consumption;

Technical Specifications – Networking

Qualcomm 9205 LTE-M (CAT-M1 fSVC) [1]	Management Interface	Auto MDI/MDIX Crossover cable detection
	IT Manageability	Wake-on-LAN from modern standby or sleep state (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only); PXE 2.1 Remote Boot; Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30));
	Security & Manageability	Support DASH 1.1 compliant/Software KVM ASF 2.0
	Technology/Operating bands	<p>FDD LTE: 1700/2100 (Band 4), 1700/2100 (Band 66), 1800 (Band 3), 1900 (Band 2), 1900 (Band 25), 2100 (Band 1), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 14 upper), 700 (Band 28), 700 (band 85), 800 (Band 20), 800 (Band 27), 850 (Band 18 lower), 850 (Band 19 upper), 850 (Band 26), 850 (Band 5), 900 (Band 8) MHz</p>
	Wireless protocol standards	<p>GSM/GPRS/EGPRS: 1800, 1900, 850, 900 MHz</p> <p>3GPP TS 21.111 V10.0.0: USIM and IC card requirements</p> <p>3GPP TS 27.005 V10.0.1: Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)</p> <p>3GPP TS 27.007 V10.0.8: AT command set for User Equipment (UE)</p> <p>3GPP TS 31.102 V10.11.0: Characteristics of the Universal Subscriber Identity Module (USIM) application</p> <p>3GPP TS 31.11 V10.16.0: Universal Subscriber Identity Module (USIM) Application Toolkit (USAT)</p> <p>3GPP TS 36.124 V10.3.0: Electro Magnetic Compatibility (EMC) requirements for mobile terminals and ancillary equipment</p> <p>3GPP TS 36.521-1 V14.3.0: User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing</p> <p>3GPP TS 51.010-1 V10.5.0: Mobile Station (MS) conformance specification; Part 1: Conformance specification</p> <p>3GPP TS 51.011 V4.15.0: Specification of the Subscriber Identity Module -Mobile Equipment (SIM-ME) interface</p> <p>Standalone GPS/Beidou/GLONASS/A-GPS (XTRA)</p>
	GPS	1575.42 MHz \pm 1.023 MHz, GLONASS 1596-1607MHz, Beidou 1561.098 MHz
	GPS bands	
	Maximum data rates	<p>LTE FDD: 375.00 Kbps(Download), 1119.00 Kbps(Upload)</p> <p>GPRS: 107.00 Kbps(Download), 85.60 Kbps(Upload)</p> <p>EGPRS: 296.00 Kbps(Download), 236.80 Kbps(Upload)</p>
	Maximum output power	LTE (all bands except B41): 21.5 dBm
	Maximum power consumption	GSM: 34.0 dBm
	Form Factor	LTE: 151 mA(peak), 16 mA(average)
		M.2

Technical Specifications – Networking

Weight	4.0 g (0.141 oz)
Dimensions (Length x Width x Thickness)	22.00 x 42.00 x 2.30 mm (0.87 x 1.65 x 0.09 inch)
embedded eSIM	Support

1. LPWAN (also called Mobile Narrowband) support HP Protect & Trace with Wolf Connect service through the subscription term, but do not support mobile broadband use.

Technical Specifications – Power

POWER

Power supply availability may vary by country.

HP 100W Slim USB-C Straight AC Power Adapter Mario II	Dimensions	5.354 x 2.362 x 0.866 in (13.6x6.0x2.2cm)
	Weight	340g ± 10g (Not including power cord. Power cord varies by country.)
	Input	100-240Vac
	Input Efficiency	81.50% min at 115 Vac/ 230 Vac @5.00V 86.70% min at 115 Vac/ 230 Vac @9.00V 88.00% min at 115 Vac/ 230 Vac @12.00V 89.00% min at 115 Vac/ 230 Vac @15.00V 89.00% min at 115 Vac/ 230 Vac @20.00V
	Input frequency range	47-63Hz
	Input AC current	Max. 1.6 A at 90 Vac
	Output	5V/15W 9V/27W 12V/60W 15V/75W 20V/100W
	DC output	5V/9V/12V/15V/20V
	Hold-up time	100% load 5ms at 115 Vac input/80% load 10ms at 115 Vac input
	Output current limit	5V/9V/12V/15V<125% max current, 20V<135% max current
	Connector	C6
	Connector	
	Environmental Design	
	Operating temperature	0° to 35° C (32° to 95° F)
	Non-operating (storage) temperature	-20° to 85° C (-4° to 185° F)
	Altitude	0 to 5,000 m (0 to 16,400 ft)
	Humidity	20% to 95%
	Storage Humidity	10% to 95%
	EMI and Safety Certifications	CE Mark - full compliance with LVD and EMC directives Worldwide safety standards - IEC60950-1, IEC 62368-1:2014 and IEC62368-1 : 2018, EN62368-1:2020+A11, UL 62368-1 Agency approvals - C-UL-US, TUV/GS, TUV/PSE, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, CU(EAC), KCC(Safety+EMC), NOM-001 NYCE, NRCan, NRCS, ISC, SEC, PSB, Argentina S-mark, Australia RCM, BIS, BSMI, UAE, UKCA DoC, Ukraine(CoC+DoC+RoHS+ECO)
HP 140W Slim USB-C Straight AC Power Adapter Daisy II	Dimensions	5.433 x 2.578 x 1.122 in (13.8x6.55x2.85cm)



Technical Specifications – Power

Weight	415g(+/-10g) (Not including power cord. Power cord varies by country.)
Input	100-240Vac
Input Efficiency	81.50% min at 115 Vac/ 230 Vac @5.00V 86.70% min at 115 Vac/ 230 Vac @9.00V 88.00% min at 115 Vac/ 230 Vac @12.00V 89.00% min at 115 Vac/ 230 Vac @15.00V 89.00% min at 115 Vac/ 230 Vac @20.00V 89.00% min at 115 Vac/ 230 Vac @28.00V
Input frequency range	47-63Hz
Input AC current	Max. 2.5 A at 90 Vac
Output	5V/15W 9V/27W 12V/60W 15V/75W 20V/100W 28V/140W
DC output	5V/9V/12V/15V/20V/28V
Hold-up time	100% load 5ms at 115 Vac input/80% load 10ms at 115 Vac input
Output current limit	5V/9V/12V/15V/20V<125% max current, 28V<135% max current
Connector	C6
Connector	
Environmental Design	
Operating temperature	0° to 35° C (32° to 95° F)
Non-operating (storage) temperature	-20° to 85° C (-4° to 185° F)
Altitude	0 to 5,000 m (0 to 16,400 ft)
Humidity	20% to 95%
Storage Humidity	10% to 95%
EMI and Safety Certifications	CE Mark - full compliance with LVD and EMC directives Worldwide safety standards - IEC60950-1, IEC 62368-1:2014 and IEC62368-1 : 2018, EN62368-1:2020+A11, UL 62368-1 Agency approvals - C-UL-US, TUV/GS, TUV/PSE, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC, CU(EAC), KCC(Safety+EMC), NOM-001 NYCE, NRcan, NRCS, ISC, SEC, PSB, Argentina S-mark, Australia RCM, BIS, BSMI, UAE, UKCA DoC, Ukraine(CoC+DoC+RoHS+ECO)

MC 62Whr Long Life Polymer Fast charge 3 cell Battery

Dimensions (H x W x L)	L 255.8 mm* W 67.8mm* T 7.4mm
Weight	Max 236.0g
Cells/Type	3cell Lithium-Ion Polymer cell
Energy	



Technical Specifications – Power

Voltage	11.58V
Amp-hour capacity	5355mAh / 5086mAh
Watt-hour capacity	62Whr
Temperature	
Operating (Charging)	0° C ~ 40° C
Operating (Discharging)	-10° C ~ 40° C
Fuel Gauge LED	
Warranty	
Optional Travel Battery	No
Available	

Technical Specifications – Audio

AUDIO

HD Stereo Codec

Realtek ALC3315

Audio I/O Ports

3.5mm Headset: CTIA only;Headphone-out

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 streams to be sent to/from the front jacks or integrated speaker., Following MSFT Behavior

Sampling

DAC: Supports resolutions from 16-bit to 24-bit;48.0 kHz to 48.0 kHz

ADC: Supports resolutions from 16-bit to 24-bit;44.1 kHz to 48.0 kHz

Internal Speaker

Yes

Technical Specifications – Fingerprint Reader

FINGERPRINT READER

Sensor vendor	SYNAPTICS
Sensor type	Capacitive
DPI resolution	363 DPI
Scan area	104 x 86 pixels
False Rejection Rate	< 3%
False Acceptance Rate	< 0.001%
Mobile Voltage Operation	2.7 V ~ 3.6 V
Operating Temperature	5°C ~ 60°C (41°F ~ 140°F)
Current Consumption Image	100 mA max
Low Latency Wait For Finger	260 uA
Capture Rate	50 frames/sec
ESD Resistance	IEC 61000-4-2 4B (+15KV)
Detection Matrix	363 dpi / 7.4 x 6.0 mm sensor area

Fingerprint Reader

Sensor vendor	ELAN
Sensor type	Capacitive
DPI resolution	363 DPI
Scan area	56 x 56 pixels
False Rejection Rate	< 3%
False Acceptance Rate	< 0.001%
Mobile Voltage Operation	2.8 V ~ 3.6 V
Operating Temperature	-20°C ~ 80°C (-4°F ~ 176°F)
Current Consumption Image	100 mA max
Low Latency Wait For Finger	300 uA
Capture Rate	50 frames/sec
ESD Resistance	IEC 61000-4-2 4B (+15KV)
Detection Matrix	363 dpi / 4.0 x 4.0 mm sensor area

Technical Specifications – Environmental

ENVIRONMENTAL DATA - HP ZBook 8 G1ah 14 inch Mobile Workstation PC

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.peat.net> for registration status in your country.
- TCO Certified
- China Energy Conservation Program (CECP)
- China State Environmental Protection Administration (SEPA)
- Taiwan Green Mark
- Korea Eco-label
- Japan PC Green label*
- [Product Carbon Footprint](#)
- At least 30% post-consumer recycled plastic²
- At least 80% recycled metal³
- Low Halogen⁴
- 100% of HP paper-based packaging is from recycled or certified sustainable sources⁵
- Bulk packaging available

Sustainable Impact Specifications

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)	4.77 W	4.84 W	4.62W
Normal Operation (Long idle)	N/A	N/A	N/A
Sleep	0.98 W	0.97 W	1.02W
Off	0.41 W	0.42 W	0.42 W

NOTE:

Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.

Heat Dissipation*

115VAC, 60Hz **230VAC, 50Hz** **100VAC, 50Hz**

Normal Operation (Short idle)	16 BTU/hr	17 BTU/hr	16 BTU/hr
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Technical Specifications – Environmental

Normal Operation (Long idle)	N/A	N/A	N/A
Sleep	3.4 BTU/hr	3 BTU/hr	3.5 BTU/hr
Off	1.4 BTU/hr	1 BTU/hr	1.4 BTU/hr

***NOTE:** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

	Sound Power (L_{WAd} , bels)	Sound Pressure (L_{pAm} , decibels)
Typically Configured – Idle	2.6	14.6
Fixed Disk – Random writes	4.7	39.1
Optical Drive – Sequential reads	4.8	36.2

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 92.8% recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	161g
	PAPER/Molded Pulp	22 g
	PAPER/Paper	101 g

The plastic packaging material contains at least 0.0% recycled content.

The corrugated paper packaging materials contains at least 64.1% 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.



Technical Specifications – Environmental

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](#).

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

<https://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c05998906>):

- 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 (PBBEs)
- 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)

Technical Specifications – Environmental

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.
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- 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:

<https://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c05403198> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

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HP Inc. Corporate Environmental Information

- Sustainable Impact Report
 - <https://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c06040843>
- Eco-label certifications
 - https://www.hp.com/us-en/sustainable-impact/document-reports.html#filters_documents_reports-=document_type-type_energy_star,type_epeat,type_tcolISO
- ISO 14001 certificates
 - <https://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c04777932>

Footnotes

1. Recycled plastic is expressed as a percentage of the total weight plastic. Post-consumer recycled is based on the definition set in the EPEAT standard for computers, IEEE 1680.1-2018 standard.
2. Recycled metal is expressed as a percentage of the total weight of the metal according to ISO 14021 definitions for metal parts over 25 grams.
3. External power supplies, WWAN modules, power cords, cables and peripherals excluded. Service parts obtained after purchase may not be Low Halogen.
4. HP paper and fiber-based packaging for PCs, displays, home and office print, and supplies is reported by suppliers as recycled or certified, with a minimum of 97% by volume verified by HP. Packaging is the box that comes with the product and all paper-based materials inside the box. Packaging for personal systems accessories and spare parts is not included. Plastic cushions are made from >90% recycled plastic.

Technical Specifications – Environmental

ENVIRONMENTAL DATA - HP ZBook 8 G1ak 14 inch Mobile Workstation PC

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.peat.net> for registration status in your country.
- TCO Certified
- China Energy Conservation Program (CECP)
- China State Environmental Protection Administration (SEPA)
- Taiwan Green Mark
- Korea Eco-label
- Japan PC Green label*
- [Product Carbon Footprint](#)
- At least 30% post-consumer recycled plastic²
- At least 80% recycled metal³
- Low Halogen⁴
- 100% of HP paper-based packaging is from recycled or certified sustainable sources⁵
- Bulk packaging available

Sustainable Impact Specifications

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)	4.77 W	4.84 W	4.62W
Normal Operation (Long idle)	N/A	N/A	N/A
Sleep	0.98 W	0.97 W	1.02W
Off	0.41 W	0.42 W	0.42 W

NOTE:

Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.

Heat Dissipation*

115VAC, 60Hz

230VAC, 50Hz

100VAC, 50Hz

Normal Operation (Short idle)	16 BTU/hr	17 BTU/hr	16 BTU/hr
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Technical Specifications – Environmental

Normal Operation (Long idle)	N/A	N/A	N/A
Sleep	3.4 BTU/hr	3 BTU/hr	3.5 BTU/hr
Off	1.4 BTU/hr	1 BTU/hr	1.4 BTU/hr

***NOTE:** Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

Typically Configured – Idle	2.6	14.6
Fixed Disk – Random writes	4.7	39.1
Optical Drive – Sequential reads	4.8	36.2

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 92.8% recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	161g
	PAPER/Molded Pulp	22 g
	PAPER/Paper	101 g

The plastic packaging material contains at least 0.0% recycled content.

The corrugated paper packaging materials contains at least 64.1% 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.



Technical Specifications – Environmental

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](#).

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

<https://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c05998906>):

- 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)
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- Polychlorinated Biphenyl (PCB)
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Technical Specifications – Environmental

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HP Inc. Corporate Environmental Information

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

- Sustainable Impact Report
 - <https://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c06040843>
- Eco-label certifications
 - https://www.hp.com/us-en/sustainable-impact/document-reports.html#filters_documents_reports-=document_type-type_energy_star,type_epeat,type_tcolISO
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Sustainable Impact Specifications

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Technical Specifications – Environmental

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Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)

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Typically Configured – Idle	2.6	14.6
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- Eco-label certifications
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Options and Accessories (sold separately and availability may vary by country)

OPTIONS

Category	Description	Part Number
Audio/Video	TBD	TBD
Cases	TBD	TBD
Docking	HP Thunderbolt 4 Ultra 180W G6 Dock	9X481UT
Hub	TBD	TBD
Adapter	TBD	TBD
Keyboard/Combo	TBD	TBD
Mouse	TBD	TBD
Power	TBD	TBD
Commodity	TBD	TBD

Date of change	Version History		Description of change
May 16, 2025	From v1 to v2	Changed	Format page 1 and PROCESSOR section
June 5, 2025	From v2 to v3	Changed	PROCESSOR section
June 9, 2025	From v3 to v4	Added	ENVIRONMENTAL DATA section
July 21, 2025	From v4 to v5	Changed	Docking (Sold Separately) section
November 20, 2025	From v5 to v6	Changed	SOFTWARE AND SECURITY section

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