Overview

HP Elite mt645 G8 Mobile Thin Client

Left

1.	Internal Microphones (2)	**6.**	Clickpad
2.	Webcam LED (Optional)	**7.**	Smartcard Reader (Optional)
3.	HD TNR and IR Camera (Optional)	**8.**	Audio Combo Jack
4.	IR Camera LED (Optional)	**9.**	2 SuperSpeed USB Type-C® 10Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)
5.	Camera Shutter (Only available with webcam)	**10.**	SuperSpeed USB Type-A 5Gbps signaling rate port (USB 3.2 Gen 1)
		11.	HDMI 2.1 Port (Cable not included)

Overview

Right

1. Power Button Key
2. Nano Security Lock slot
3. RJ45

4. SuperSpeed USB Type-A 5Gbps signaling rate port (USB 3.2 Gen 1)
5. External SIM Card Slot (Optional)
6. Touch Fingerprint Sensor (Select Models)

Overview

AT A GLANCE

- Choice of Windows 10 IoT Enterprise 2021 LTSC, HP ThinPro OS, HP Smart Zero OS, FreeDOS, IGEL OS
- Fast and upgradeable dual channel DDR4 SODIMM memory up to 16 GB
- Choice of AMD Ryzen™ 5 7535U and AMD Ryzen™ 3 PRO 7335U series mobile processors
- Choice of 35.56 cm (14") diagonal HD, Ultra-Wide Viewing Angle FHD, Touch* or Non-Touch screen, and Privacy Panel option.
- Choice of solid state drives up to 256 GB
- Multi-layered security with HP SureStart Gen7, HP Sure View Gen4, Touch Fingerprint reader, and Tamper Lock, HP IR camera (Windows Only), Camera with Privacy Shutter.
- Supports wireless options for connectivity on the go including gigabit-speed Wi-Fi 6e and CAT16 4G/LTE WWAN.
- Supports fast charging (50% in 30 minutes) with no impact on battery recharge cycles
- Supports HP USB-C® Dock G5 and Thunderbolt Dock G4
- Optimize your video calls with an HD camera that adjusts to the lighting in your environment.
- 180˚synchronized hinge allows the mobile thin client to lay completely flat, without lifting the keyboard, and includes everyone with visibility from multiple angles.

* Touch only available with Windows 10 IoT

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

Technical Specifications

PRODUCT NAME

HP Elite mt645 G8 Mobile Thin Client

OPERATING SYSTEM

Preinstalled   Windows 10 IoT[1]
HP ThinPro 8.1[2]
HP Smart Zero Core[2]
IGEL 11[2]
IGEL 12[2v]
FreeDOS

1. Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. ISP fees may apply, and additional requirements may apply over time for updates. See http://www.windows.com.

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

PROCESSORS

Name[3,4,5,6]	Cores	Threads	L3 Cache	Max Boost Frequency	Base Frequency
AMD Ryzen™ 5 7535U	6 cores	12	16 MB	4.55 GHz	2.90 GHz
AMD Ryzen™ 3 7335U	4 cores	8	8 MB	4.30 GHz	3.00 GHz

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

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

5. 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. Potential NPU inferencing performance varies by use, configuration, and other factors.

6. AMD Max Boost frequency performance varies depending on hardware, software and overall system configuration.

Technical Specifications

CHIPSET

NPC300

GRAPHICS

Integrated
AMD Radeon™ Graphics

Supports
UMA: Support HDMI 2.1[7]

7. HD content required to view HD images.

DISPLAY

Non-Touch
35.6 cm (14") diagonal, WUXGA (1920 x 1200), Bent, LCD, UWVA, anti-glare, WLED, 300 nits, NTSC 45%[8,9,10,11]
35.6 cm (14") diagonal, WUXGA (1920 x 1200), Bent, LCD, UWVA, anti-glare, WLED + Low Blue Light, 400 nits, low power, sRGB 100%[8,9,10]
35.6 cm (14") diagonal, WUXGA (1920 x 1200), Bent, LCD, UWVA, anti-glare, WLED + Low Blue Light, 1000 nits, sRGB 100%, HP Sure View reflect integrated privacy screen [8,9,10,11,12]

Touch
35.6 cm (14") diagonal, WUXGA (1920 x 1200), Bent, LCD, touch, UWVA, anti-glare, WLED, 300 nits, NTSC 45% [6,7,8,10][8,9,10,12]

Display Size
14" diagonal
35.6 cm (14") diagonal

8. HD content required to view HD images.
9. Sold separately or as an optional feature.
10. Resolutions are dependent upon monitor capability, and resolution and color depth settings.
11. CODEC H.265/HEVC (High Efficiency Video Coding) is disabled on this platform.
12. HP Sure View integrated privacy screen is an optional feature that must be configured at purchase and is designed to function in landscape orientation.
13. Actual brightness will be lower with touchscreen or HP Sure View.
14. WUXGA/FHD resolution content required to view WUXGA/FHD resolution images

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Technical Specifications

DOCKING (Sold Separately)

Docking station model #1	HP USB-C® Dock G5
Docking station model #2	HP Thunderbolt 120W G4 Dock

Docking station model	Total number of supported displays	Max. resolutions support	Dock Connector	Technical limitations
HP Thunder bolt Dock 120W G4	4	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. 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.
HP USB-C Dock G5	3	Multi-Function Mode: (2) 5k @ 30Hz and (1) 4k UHD @ 30Hz on any port High-Resolution Mode: (2) 5k @ 60Hz on DisplayPort ports and (1) 4k UHD @ 60Hz on HDMI port	1x HDMI 2.0, 2x DisplayPort 1.4	Maximum resolution and display support is dependent on the maximum capability of the notebook. Highest resolution with dual displays is two 8K@ 60Hz host in High Resolution mode. Three maximum displays supported are two 5K@ 30 Hz on DP ports plus one 4K UHD@ 30 Hz on HDMI in Multi-function mode The highest resolution for a non-Thunderbolt host in Multi-function mode is a single 5K dual cable (using both DP ports) + (1) 4K on HDMI port.

STORAGE AND DRIVES

Primary M.2 Storage
256 GB PCIe® Gen4x4 NVMe™ SSD Value[13]

13. For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30GB of disk is reserved for system recovery software.

MEMORY

Technical Specifications

Memory
16GB DDR5-4800 (2 x 8 GB) MT/s RAM[16]
16GB DDR5-4800 (1 x 16 GB) MT/s RAM[16]
8GB DDR5-4800 (1 x 8 GB) MT/s RAM[16]

Memory Slots
2 SODIMM
System runs at 4800 MT/s
Supports Dual Channel Memory[16]

16. 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.

NETWORKING/COMMUNICATIONS

Ethernet
Realtek RTL8111EPP 10/100/1000 Integrated NIC[17]
Realtek RTL8111HSH 10/100/1000 Integrated NIC[17]

WLAN
Realtek 8852CE Wi-Fi 6E Bluetooth® 5.3 Wireless Card WLAN[18]
Mediatek RZ616 Wi-Fi 6E Bluetooth® 5.3 Wireless Card AIM-T WLAN[18]

WWAN*
HP 4G LTE-A Pro Cat16 WWAN eSIM[19,21]

NFC
NFC Mirage WNC XRAV-1

Miracast
Native Miracast Support[20]

17. The term "10/100/1000" or "Gigabit" Ethernet indicates compatibility with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/s. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.
18. 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.
19. Gigabit-class 4G LTE module is optional and must be configured at the factory. Module designed for up to 1 Gbps download speeds as carriers deploy 5 carrier aggregation and 100Mhz channel bandwidth, requires activation and separately purchased service contract. Backwards compatible to HSPA 3G technologies. Check with service provider for coverage and availability in your area. Connection, upload, and download speeds will vary due to network, location, environment, network conditions, and other factors. 4G LTE not available on all products, in all regions.
20. Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming.
21. WWAN module is an optional feature, requires factory configuration and requires separately purchased service contract. Check with service provider for coverage and availability in your area.
Connection speeds will vary due to location, environment, network conditions, and other factors. 4G LTE not available on all products, in all regions.

Technical Specifications

Technical Specifications

AUDIO/MULTIMEDIA

Audio
Audio by Poly Studio
2 Integrated stereo speakers
2 Integrated dual array microphones

Speaker Power
2W/4ohm Per speaker

Camera
5MP+Infrared camera[8,9]
FHD camera[8,9]

8. HD content required to view HD images.
9. Sold separately or as an optional feature.
10. Select product only (Privacy panel SKU).

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard
HP Standard Keyboard, spill-resistant, backlit, Durakey keyboard[21]
HP Standard Keyboard, spill-resistant, Privacy, backlit, Durakey keyboard[21]
HP Standard Keyboard, spill-resistant keyboard.[21]

Pointing Device
Clickpad with multi-touch gesture support
Microsoft Precision Touchpad Default Gestures Support

Function Keys
ESC: System Information
F1 - Display Switching
F2 - Blank or SureView On/Off
F3 - Brightness Down
F4 - Brightness Up
F5 - Blank or Backlit Toggle
F6 - Audio Mute
F7 - Volume Down
F8 - Volume Up
F9 - Mic Mute
F10 - Play and Pause[23]
F11 - HPX key
F12 - Home key
End
Insert
Delete
Power Button (with LED)
Microsoft Copilot[22, 23]
Hidden Function Keys
Fn+R - Break, Fn+S - Sys Rq, Fn+C - Scroll Lock[23]

Technical Specifications

21. Backlit keyboard is an optional feature.

22. Requires Windows 11 and an NPU. Timing of feature delivery and availability varies by market and device. Requires Microsoft account to log in. Where Copilot in Windows is not available, the Copilot key will lead to the Bing search engine. See http://aka.ms/WindowsAIFeatures

NOTE: for Copilot key, we haven't tested because we haven't got unit with build-in copilot key yet. The test result will be update later.

23. F10, Microsoft Copilot and Hidden Function Keys doesn't work on Linux local but may function with Win11 remote desktop when enabled by the virtualization protocol.

Technical Specifications

SOFTWARE AND SECURITY

Software
HP Auto Logon
HP System Information
TTWIN
CyberLink Media Suite
HP Connection Optimizer[32]
Preinstall HEVC CODEC

HP Manageability Features
HP Device Manager
HP Easy Shell[36]
HP ThinUpdate
HP USB Port Manager
HP Write Filter Manager
SUS Agent version 4.4.13.1445
Microsoft System Center Configuration Manager

Security Management
Windows Hello Enhanced Sign-In Security (ESS)
HP TPM Configuration Utility
HP Platform Certificate
HP Platform Certificate On Device Installation
HP Sure Admin [34]
HP Sure Start [33]
HP Tamper Lock[39]

Security TPM
1st Source
Model: NPCT760HABYX
Version: 7.2.3.1
FIPS 140-2 Compliant: Yes

2nd Source
Model: Infineon SLB9672VU2.0
TCG TPM 2.0
Version: 15.23
FIPS 140-2 Compliant: Yes

BIOS
Absolute Persistence Module [37]
HP Fingerprint Sensor [38]
Bluetooth Permanent Disable
BT/WLAN Permanent Disable
China CIIO Customer - China TPM Hide
HP LAN-Wireless Protection
HP Protect and Trace Permanent Disable
Microphone Permanent Disable
Microsoft 3rd Party UEFI CA Enable
NFC Permanent Disable

Technical Specifications

Physical Presence Rollback
Pre-Boot UEFI Wi-Fi support
Signed 3rd Party Binaries
SMBios
TPM Hide
UEFI Support
Webcam Permanent Disable
WOWLan

Smartcard Reader
Model number: AK9563
FIPS 201 Compliant: Yes

32. HP Connection Optimizer requires Windows 10 and beyond version.
33. HP Sure Start is available on select HP PCs and requires Windows 10 and higher
34. 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"35. For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88 "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane™.
36. HP Easy Shell is currently available on Windows Embedded Standard 7E, Windows Embedded Standard 7P, Windows Embedded 8 Standard, Windows Embedded 8.1 Industry Pro, Windows 10 IOT Enterprise 2016 LTSC, and Windows 10 IoT Enterprise 2019.
37. Absolute 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/
38. HP Fingerprint Reader is an optional feature that requires Windows 10 or 11 and must be configured at purchase.
39. HP Tamper Lock must be enabled by the customer or your administrator.

Technical Specifications

POWER

Power Supply
HP Standard 65W USB Type-C® adapter[41]
HP Standard 65W USB Type-C® Halogen Free adapter[41]

Battery
HP Long Life 3 cell 56Whr Polymer [42,43]
HP Long Life 3 cell 48Whr Polymer[42,43]

Battery Recharge Time
Supports battery HP Fast Charge: approximately 50% in 30 minutes[44]

Power Cord
3-wire plug - 1m[41]

Battery Life[45]
Up to 14hours with 56Whr battery (Benchmark: MobileMark25)

41. Availability may vary by country.
42. Battery is internal and not replaceable by customer. Serviceable by warranty.
43. For new batteries, actual battery Watt-hours (Wh) may differ from the design capacity and may have a full charge capacity that differs by up to 10, which is typical for lithium-ion batteries. Battery capacity naturally decreases over time and with use, depending on several factors such as battery health management settings, shelf life, temperature, environment, loaded apps, features, system configuration, and power settings.
44. Recharges your battery up to 50% within 30 minutes when the system is off or in standby mode. Power adapter minimum of 65 watts required for battery capacities 56Whr or less. Power adapter minimum of 100 watts required for battery capacities greater than 56Whr and less than 83Whr. Power adapter minimum of 120 watts required for battery capacities greater than 83Whr and less than 100Whr. After charging has reached 50% capacity, charging will return to normal. Charging time may vary +/-10% due to System tolerance. Upon initial startup, it is necessary to use an minimum 45 W adapter.
45. MM25 battery life will vary depending on various factors including product model, configuration, loaded applications, features, use, wireless functionality, and power management settings. The maximum capacity of the battery will naturally decrease with time and usage. See www.bapco.com for additional details.

Technical Specifications

WEIGHTS & DIMENSIONS

Product Weight

Starting at 1.3980 kg (3.09- lb) with 56 Whr battery 56[46]

Product Dimensions (W x D x H)

318.6 mm (W) x 224.3 mm (D) x 10.9mm (front)/17mm (rear)

(12.54 in x 8.83 in x 0.43 in (front) / 0.67 in (rear))

Maximum height 19.9mm (Plastic); 20.9mm (Metal)

Pallet Dimensions (W x D x H)

12" to 15" boxes (305mm height): 1200mm x 1000mm x 1080mm 57

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

47. Product packaging size varies based on options chosen. Please contact your HP representative for your packaging size details.

PORTS/SLOTS

Left Side

1 HDMI 2.1[48]

1 Super Speed USB Type-A 5Gbps signaling rate Power charging

2 USB4™ Type-C® 40 Gbps signaling rate USB Power Delivery DisplayPort™ 1.4

2 USB4™ Type-C® 40 Gbps signaling rate USB Power Delivery DisplayPort™ 1.4

1 Power Indicator LED1 Power Indicator LED

Headphone/mic combo jack

Smart Card Reader (Optional)

Right side

1 Nano SIM card slot (Optional)

1 Super Speed USB Type-A 5Gbps signaling rate Data only

1 RJ45 Ethernet port

1 Security lock slot (Integrated)

48. HDMI cable sold separately.

49. USB 20Gbps speed is not available with Thunderbolt™ 4.

Technical Specifications

SERVICE AND SUPPORT

1-year warranty software limited warranty options depending on country. Batteries have a default one year limited warranty. Refer to http://www.hp.com/support/batterywarranty/ for additional battery information. On-site service and extended coverage is also available. HP Care Pack Services are optional extended service contracts that go beyond the standard limited warranties. To choose the right level of service for your HP product, use the HP Care Pack Services Lookup Tool at: http://www.hp.com/go/cpc.[49]

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

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 in the U.S.[1]
Low Blue Light
WW RoHS

Sustainable Impact Specifications
Low Halogen[2] aligned with HP GSE

[1]Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. EPEAT® status varies by country. Visit www.epeat.net for more information.
[2]External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

Technical Specifications

SYSTEM UNIT

Nominal Operating Voltage	20.0V
Average Operating Power	W
Max Operating Power	UMA 65W
	Discrete W
Temperature	
Operating	Operating: 0° to 35° C (32° to 95° F)No sustained direct exposure to sunlight, System performance may be reduced above 32°C (89.6°F)
Non-operating	Non-operating: -20° to 60° C (-4° to 140° F)No sustained direct exposure to sunlight, System performance may be reduced above 32°C (89.6°F)
Relative Humidity	
Operating	Operating: 10% to 90 % (non-condensing)
Non-operating	Non-operating: 5% to 95 %, 38.7° C (101.6° F) maximum wet bulb temperature
Shock	
Operating	Operating: 40 G, 2 ms, half-sine
Non-operating	Non-operating: 240 G, 2 ms, half-sine
Random Vibration	
Operating	Operating: 1.043 grms
Non-operating	Non-operating: 3.500 grms
Altitude (unpressurized)	
Operating	Operating: 3048 m (10000 ft)
Non-operating	Non-Operating: 12192 m (40000 ft)
Planned Industry Standard Certifications	
Regulatory Model Number	HSN-Q39C-4
CSA/UL 62368-1	Yes
ENERGY STAR®	Yes
FCC/ICES/CISPR/VCCI	Yes
CE MARKING	Yes
GS Mark	Yes
	Related commodity should comply with ISO 9241 Standards.
China CCC/SRRC/CEL	Yes
Taiwan BSMI/NCC	Yes
Korea KCC/KC/KES	Yes
Ukraine NSoC/TEC	Yes
EAEU Compliance	Yes
Saudi Arabian Compliance	Yes
TCO	Yes
EPEAT® Gold	Yes
Low Blue Light	Yes
WW RoHS	Yes
Regulatory Model Number	HSN-Q39C-4
CSA/UL 62368-1	Yes
ENERGY STAR®	Yes
FCC/ICES/CISPR/VCCI	Yes

Technical Specifications

DISPLAYS

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

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

35.6 cm (14") diagonal, WUXGA (1920 x 1200), Bent, LCD, UWVA, anti-glare, WLED, 300 nits, NTSC 45%	Outline Dimensions (W x H)	307.29x199.25(max)
	Active Area	301.59 X 188.50 (typ)
	Weight	300 (max)
	Diagonal Size	14
	Surface Treatment	Anti-Glare
	Touch Enabled	No
	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	NTSC 45%
	Color Depth	6+2 FRC
	Viewing Angle	UWVA 89/89/89/89
	Low Blue Light	No
	Power Consumption (W, EBL@ 150nits max/ 200nits max))	2.20 (max) / 2.70 (max)

35.6 cm (14") diagonal, WUXGA (1920 x 1200), Bent, LCD, touch, UWVA, anti-glare, WLED, 300 nits, NTSC 45%	Outline Dimensions (W x H)	307.29x199.25(max)
	Active Area	301.59 X 188.50 (typ)
	Weight	305g (max)
	Diagonal Size	14
	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	NTSC 45%
	Color Depth	6+2 FRC
	Viewing Angle	UWVA 89/89/89/89
	Low Blue Light	No
	Power Consumption (W, EBL@ 150nits max/ 200nits max))	2.15 (max)/2.65 (max)

Technical Specifications

35.6 cm (14") diagonal, WUXGA (1920 x 1200), Bent, LCD, UWVA, anti-glare, WLED + Low Blue Light, 400 nits, low power, sRGB 100%

Outline Dimensions (W x H)	307.590 x 199.550 (max)
Active Area	301.590 x 188.500 (typ)
Weight	210 (max)
Diagonal Size	14
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)

35.6 cm (14") diagonal, WUXGA (1920 x 1200), Bent, LCD, UWVA, anti-glare, WLED + Low Blue Light, 1000 nits, sRGB 100%, HP Sure View reflect integrated privacy screen

Outline Dimensions (W x H)	307.600 x 199.550 (max)
Active Area	301.680 x 188.500 (typ)
Weight	238 (max)
Diagonal Size	14
Surface Treatment	Anti-Glare
Touch Enabled	No
Contrast Ratio	1500:1 (typ)
Refresh Rate	60 (typ)
Brightness	1000 (typ)
Pixel Resolution - Format	1920 x1200 (WUXGA)
Backlight	WLED
Pixel Resolution	RGB
Color Gamut Coverage	sRGB 100%
Color Depth	8
Viewing Angle	UWVA 85/85/85/85
Low Blue Light	Yes
Power Consumption (W, EBL@ 150nits max/ 200nits max))	N/A

Technical Specifications

STORAGE AND DRIVES

For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less.

256 GB PCIe® Gen4x4 NVMe™ SSD Value

Form Factor	M.2 2280
Capacity	256 GB
NAND Type	TLC
Interface	PCIe NVMe Gen4X4
Maximum Sequential Read	2000 MB/s ±20%
Maximum Sequential Write	900 MB/s ±20%
Logical Blocks	500,118,192
Features	Pyrite 2.0; TRIM; L1.2

Technical Specifications

NETWORKING/COMMUNICATIONS

Realtek RTL8852CE 802.11ax 2x2 Wi-Fi 6E + Bluetooth® 5.3 Wireless Card (802.11ax 2x2, supporting gigabit data rate)[1]	**Wireless LAN Standards**	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k
	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 • 5.955 – 6.415 GHz • 6.435 – 6.515 GHz • 6.535 – 6.875 GHz • 6.895 – 7.115 GHz
	Data Rates	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) • 802.11ac : MCS0 ~ MCS9, (20MHz, 40MHz, ,80MHz & 160MHz) • 802.11ax : MCS0 ~ MCS11, (20MHz, 40MHz, ,80MHz & 160MHz)
	Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
	Security[3]	• IEEE and WiFi certified 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • WPA3 (personal) certification • IEEE 802.11i • WAPI • EAP
	Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points
	Output Power[2]	• 802.11b : +17dBm minimum • 802.11g : +16dBm minimum • 802.11a : +17dBm minimum • 802.11n HT20(2.4GHz) : +14dBm minimum • 802.11n HT40(2.4GHz) : +13dBm minimum • 802.11n HT20(5GHz) : +14dBm minimum

Technical Specifications

	• 802.11n HT40(5GHz) : +13dBm minimum	
	• 802.11ac VHT80(5GHz) : +10dBm minimum	
	• 802.11ac VHT160(5GHz) : +10dBm minimum	
	• 802.11ax HE40(2.4GHz) : +12dBm minimum	
	• 802.11ax HE80(5GHz) : +10dBm minimum	
	• 802.11ax HE160(5GHz) : +10dBm minimum	
	• 802.11ax HE80(6GHz) : +10dBm minimum	
	• 802.11ax HE160(6GHz) : +10dBm minimum	
Power Consumption	• Transmit mode :2.5 W • Receive mode :2 W • Idle mode (PSP) 180 mW (WLAN Associated) • Idle mode :50 mW (WLAN unassociated) • Connected Standby/Modern Standby: 10mW • Radio disabled: 8 mW	
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity[4]	802.11b, 1Mbps : -93.5dBm maximum 802.11b, 11Mbps : -84dBm maximum 802.11a/g, 6Mbps : -86dBm maximum 802.11a/g, 54Mbps : -72dBm maximum 802.11n, MCS07 : -67dBm maximum 802.11n, MCS15 : -64dBm maximum 802.11ac, MCS0(VHT80) : -84dBm maximum 802.11ac, MCS9(VHT80) : -59dBm maximum 802.11ac, MCS9(VHT160) : -58.5dBm maximum •802.11ax, MCS11(HE40): -57dBm maximum •802.11ax, MCS11(HE80): -54dBm maximum •802.11ax, MCS11(HE160): -53.5dBm maximum	
Antenna type	High efficiency antenna with spatial diversity 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	1. Type 2230 : 2.3 x 22.0 x 30.0 mm	
Weight	1. Type 2230 : 2.8g	
Operating Voltage	3.3v +/- 9%	
Temperature	**Operating** **Non-operating**	Operating: 14° to 158° F (−10° to 70° C) Non-operating: −40° to 176° F (−40° to 80° C)
Humidity	**Operating** **Non-operating**	Operating: 10% to 60% (non-condensing) Non-operating: 5% to 95% (non-condensing)
Altitude	**Operating** **Non-operating**	Operating: 0 to 10,000 ft (3,048 m) Non-operating: 0 to 50,000 ft (15,240 m)
LED Activity	N/A	

HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Wireless Card Technology

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

Technical Specifications

	Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth® component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and 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	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
Power Management Certifications	Bluetooth® 4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan Bluetooth 4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 –Link Layer Privacy LE Privacy 1.2 –Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) Bluetooth® 5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range Windows Bluetooth® profiles support Bluetooth® 5.3 Wireless Card Periodic Advertisement interval Encryption key size control enhancements

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, that supports 80MHz and higher channels.
2. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
3. Check latest software/driver release for updates on supported security features.
4. 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).

Technical Specifications

MediaTek RZ616 Wi-Fi 6E + Bluetooth®5.3 Wireless Card (802.11ax 2x2, AMD AIM-T)[1]		
	Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11ax IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11j IEEE 802.11k IEEE 802.11mc IEEE 802.11r IEEE 802.11v IEEE 802.11w
	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	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) • 802.11ac : MCS0 ~ MCS9, (20MHz, 40MHz, ,80MHz & 160MHz) • 802.11ax : MCS0 ~ MCS11, (20MHz, 40MHz, ,80MHz & 160MHz)
	Modulation	Direct Sequence Spread Spectrum OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM
	Security[3]	• IEEE and WiFi certified 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • WPA3 (personal) certification • IEEE 802.11i • WAPI
	Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points
	Output Power[2]	2.4GHz (MIMO, typical): • 802.11b : +18dBm • 802.11g : +16.5dBm • 802.11n/ac/ax (HT20/VHT20/HE20) : +16dBm • 802.11n/ac/ax (HT40/VHT40/HE40) : +12.5dBm

Technical Specifications

	5GHz (MIMO, typical): • 802.11a : +13dBm • 802.11n/ac/ax (HT20/VHT20/HE20) : +13.5dBm • 802.11n/ac/ax (HT40/VHT40/HE40) : +12.5dBm • 802.11ac/ax (VHT80/HE80) : +11.5dBm • 802.11ax HE160 : +11.5dBm 6GHz LPI mode (MIMO, typical):: • 802.11a : 0dBm • 802.11ax HE20 : +1dBm • 802.11ax HE40 : +4dBm • 802.11ax HE80 : +7dBm • 802.11ax HE160 : +7.5dBm	
Power Consumption	• Transmit mode :2.5 W • Receive mode :2 W • Idle mode (PSP) 180 mW (WLAN Associated) • Idle mode :50 mW (WLAN unassociated) • Connected Standby/Modern Standby: 10mW • Radio disabled: 8 mW	
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity[4]	2.4GHz (SISO): •802.11b, 11Mbps : -82dBm maximum • 802.11g, 54Mbps : -71dBm maximum • 802.11n, MCS7 : -64dBm maximum • 802.11ac, MCS9 : -52dBm maximum •802.11ax, MCS11(HT40): -49dBm maximum 5GHz (SISO): • 802.11a, 54Mbps : -71dBm maximum • 802.11n, MCS07 : -64dBm maximum • 802.11ac, MCS9 : -52dBm maximum •802.11ax, MCS11(HE80/HE160): -46dBm maximum 6GHz (SISO): • 802.11a, 54Mbps : -71dBm maximum • 802.11n, MCS7 : -64dBm maximum • 802.11ac, MCS9 : -52dBm maximum •802.11ax, MCS11(HE160): -46dBm 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	1. Type 2230 : 2.3 x 22.0 x 30.0 mm	
Weight	1. Type 2230 : 2.8g	
Operating Voltage	3.3v +/- 9%	
Temperature	**Operating** **Non-operating**	Operating: 14° to 158° F (−10° to 70° C) Non-operating: −40° to 176° F (−40° to 80° C)
Humidity	**Operating** **Non-operating**	Operating: 10% to 60% (non-condensing) Non-operating: 5% to 95% (non-condensing)
Altitude	**Operating** **Non-operating**	Operating: 0 to 10,000 ft (3,048 m) Non-operating: 0 to 50,000 ft (15,240 m)
LED Activity	N/A	

Technical Specifications

HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Wireless Card Technology

Bluetooth Specification	4.0/4.1/4.2/5.0/5.1/5.2/5.3 Compliant
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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 Link Topology	Microsoft Windows Bluetooth® Software
Power Management	Microsoft Windows ACPI, and USB Bus Support
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.407 ETS 300 328 Low Voltage Directive CE Mark
Power Management Certifications	Bluetooth® 4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan Bluetooth 4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 –Link Layer Privacy LE Privacy 1.2 –Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP) Bluetooth® 5.2 ESR9/10 Compliance LE Advertisement Extensions Channel Selection Algo Limited High Duty Cycle Non-Connectable Advertising 2Mbps LE LE Long Range Windows Bluetooth® profiles support Bluetooth® 5.3 Wireless Card Periodic Advertisement interval Encryption key size control enhancements

Technical Specifications

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, that supports 80MHz and higher channels.
2. The FCC has declared as of September 1, 2014 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels.
3. Check latest software/driver release for updates on supported security features.
4. 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).

NFC NXP NPC300*	**Dimensions (L x W x H)**	17 x 10 x 2.0 mm
	Chipset	NPC300
	System interface	I2C
	NFC RF standards	ISO/IEC 14443 A
		ISO/IEC 14443 B
		ISO/IEC 15693
		ISO/IEC 18092
		ECMA-340 NFCIP-1 Target and Initiator
		ECMA-320 NFCIP-2
	NFC Forum Support	Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2
	Reader (PCD-VCD)	ISO/IEC 14443 A
	Mode(1)	ISO/IEC 14443 B
		ISO/IEC 15693
		MIFARE 1K
		MIFARE 4K
		MIFARE DESFire
		FeliCa
		Jewel and Topaz cards
	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, 212, 424, 848 kbps
	Temperature	Operating: 0 °C to 70 °C (32 °F to 158 °F)
		Storage: -20 °C to 125 °C (-4 °F to 257 °F)
	Humidity	10-90% operating
		5-95% non-operating
	Supply Operating voltage	4.35 to 5.25 Volts
	I/O Voltage	1.8V or 3.3V
	Power Consumption (Booster enable, VBAT= 3.3V, VCC_BOOST = 5V)	
	Mode	Power Consumption, Typical
	Polling	7.3 mA
	Detected Test Tag	Total 283.8 mA
	Type 1	Net Module 236.8 mA

Technical Specifications

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 RTL8111HSH 10/100/1000 Integrated NIC	**Connector**	RJ-45
	System Interface	PCIe + SMBus
	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 8023 clauses 40)
		Auto-Negotiation (Automatic Speed Selection)
		Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s
	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)
	Performance	TCP/IP/UDP Checksum Offload (configurable)
		Protocol Offload (ARP & NS)
		Large send offload and Giant send offload
		Receiving Side Scaling
		Jumbo Frame 9K
	Power consumption	Cable Disconnetion: 25mW
		100Mbps Full Run: 450mW
		1000bp Full Run: 1000mW
		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
	Management Interface	Auto MDI/MDIX Crossover cable detection
	IT Manageability	Wake-on-LAN from standby and hibernation (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))
		Comprehensive diagnostic and configuration software suite
		Virtual Cable Doctor for Ethernet cable status

HP 4G LTE-A Pro Cat16 WWAN eSIM[1],*	**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)

Technical Specifications

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 32: 1452 to 1496 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 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	3GPP LTE Rel15 LTE Specification, 100MHz 5 DLCA, 256 QAM, DL 1.0Gbps (CAT16)/ 40MHz 2 ULCA, 256 QAM, UL 211Mbps (CAT18) WCDMA 3GPP Release 8 UMTS Specification, DL UMTS: 384 kbps/UL 384 kbp, DL DC-HSPA+: 42 Mbps (CAT24)/UL 11.5 Mbps (CAT7) WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
GPS	Standalone, A-GPS (MS-A, MS-B)
GPS bands	GPS: L1 (1575.42MHz) GLONASS: L1 (1602MHz) BeidouB1(1561.098MHz) Galileo E1 (1575.42) QZSS(1575.42 MHz)
Maximum data rates	LTE: ue-CategoryDL 16, (DL : 1 Gbps) ue-CategoryUL 18 , (UL: 211Mbps) DC-HSPA+: 42 Mbps (Download), 11.5 Mbps (Upload)
Maximum output power	HPUE: Not supported LTE: 23 dBm in all band except (B30= 22dBm& B48= 21dBm) UMTS: 23.5 dBm
Maximum power consumption	LTE: 1300 mA (peak); 1100 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
Form Factor	M.2, 3052-S3 Key B

Technical Specifications

Weight	8 g
Dimensions (Length x Width x Thickness)	52 mm × 30 mm × 2.3 mm
eSIM	Support

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.

Technical Specifications

POWER

HP Standard 65W USB Type-C® adapter	Weight		unit: 250g +/- 10g
	Input		100-240Vac
	Input	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 ~ 63 Hz
		Input AC current	Max. 1.6 A at 90 Vac
	Output	Output power	5V/15W 9V/27W 12V/60W 15V/65W 20V/65W
		DC output	5V/9V/12V/15V/20V
		Hold-up time	100% load 5ms at 115 Vac input
		Output current limit	<8.0A
	DC Cable Connector		USB type C
	DC Cable Material		PVC
	Connector		C6
	Environmental Design	Operating temperature	32ºFto 95ºF (0ºto 35ºC)
		Non-operating (storage) temperature	-4ºFto 185ºF (-20ºto 85ºC)
		Altitude	0 to 16,400 ft (0 to 5,000m)
		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 and IEC62368-1 : 2018, EN62368-1:2014+A11, UL 62368-1 Agency approvals - C-UL-US, TUV/GS, TUV/PSE, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC and CECP, CU(EAC), EAEU, KCC(Safety+EMC) and K-MEPS, NOM-001 and 029 NYCE, NRcan, NRCS, ISC, SEC, PSB, Argentina S-mark, Australia RCM, BIS, BSMI, UAE, UKCA DoC
HP Standard 65W USB Type-C® Halogen Free adapter	Weight		unit: 250g +/- 10g
	Input		100-240Vac
	Input	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 ~ 63 Hz
		Input AC current	Max. 1.6 A at 90 Vac
	Output	Output power	5V/15W

Technical Specifications

		9V/27W 12V/60W 15V/65W 20V/65W
	DC output	5V/9V/12V/15V/20V
	Hold-up time	100% load 5ms at 115 Vac input
	Output current limit	<8.0A
DC Cable Connector	USB type C	
DC Cable Material	Halogen Free	
Connector	C6	
Environmental Design	**Operating temperature**	32ºFto 95ºF (0ºto 35ºC)
	Non-operating (storage) temperature	-4ºFto 185ºF (-20ºto 85ºC)
	Altitude	0 to 16,400 ft (0 to 5,000m)
	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 and IEC62368-1 : 2018, EN62368-1:2014+A11, UL 62368-1 Agency approvals - C-UL-US, TUV/GS, TUV/PSE, EN55032 Class B, FCC Class B, CISPR32 Class B, CCC and CECP, CU(EAC), EAEU, KCC(Safety+EMC) and K-MEPS, NOM-001 and 029 NYCE, NRcan, NRCS, ISC, SEC, PSB, Argentina S-mark, Australia RCM, BIS, BSMI, UAE, UKCA DoC

HP Long Life 3 cell 56Whr* Polymer	**Weight**	0.208kg +/- 10g (0.459 lb)
	Cells/Type	3cell Lithium-Ion Polymer cell / 586075
	Energy	
	Voltage	11.58V
	Amp-hour capacity	4.840Ah
	Watt-hour capacity*	56.04Wh
	Temperature	
	Operating (Charging)	32˚ to 113˚ F (0˚ to 45˚ C) (Charge Initial Temperature) 32˚ to 122˚ F (0˚ to 50˚ C) (Continuous Charging)
	Operating (Discharging)	14˚ to 140˚ F (-10˚ to 60˚ C)
	Optional Travel Battery Available	No

*For new batteries, actual battery Watt-hours (Wh) may differ from the design capacity and may have a full charge capacity that differs by up to 10% from the design capacity, which is typical for lithium-ion batteries. Battery capacity decreases over time and with use, depending on several factors such as battery health management settings, shelf life, temperature, environment, loaded apps, features, system configuration, and power settings.

HP Long Life 3 cell 48Whr* Polymer	**Weight**	0.192kg +/- 10g (0.423 lb)
	Cells/Type	3cell Lithium-Ion Polymer cell / NCM 565875
	Energy	

Technical Specifications

Voltage	11.58V
Amp-hour capacity	4.285Ah
Watt-hour capacity*	48.84Wh
Temperature	
Operating (Charging)	32˚ to 113˚ F (0˚ to 45˚ C) (Charge Initial Temperature) 32˚ to 122˚ F (0˚ to 50˚ C) (Continuous Charging)
Operating (Discharging)	14˚ to 140˚ F (-10˚ to 60˚ C)
Optional Travel Battery Available	No

*For new batteries, actual battery Watt-hours (Wh) may differ from the design capacity and may have a full charge capacity that differs by up to 10% from the design capacity, which is typical for lithium-ion batteries. Battery capacity decreases over time and with use, depending on several factors such as battery health management settings, shelf life, temperature, environment, loaded apps, features, system configuration, and power settings.

Technical Specifications

AUDIO

HD Stereo Codec	ALC3247
Audio I/O Ports	3.5mm Headset: CTIA only;Headphone-out
Internal Speaker 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 16-bit;48.0 kHZ to 48.0 kHz
	ADC: Supports resolutions from 16-bit to 16-bit;48.0 kHZ to 48.0 kHz
Wavetable Syntheses	Yes - Uses OS soft wavetable
Analog Audio	N/A
# of Channels on Line-Out	Yes
Internal Speaker	ALC3247

FINGERPRINT READER

1st Source

Sensor vendor	ELAN
Sensor type	Capacitive
DPI resolution	508 DPI
Scan area	80 x 80 pixels
False Rejection Rate	< 3%
False Acceptance Rate	< 0.001%
Mobile Voltage Operation	2.7 V ~ 3.6 V
Operating Temperature	–20°C ~ 80°C (-4°F ~ 176°F)
Current Consumption Image	35 mA max
Low Latency Wait For Finger	300 uA
Capture Rate	50 frames/sec
ESD Resistance	IEC 61000-4-2 4B (+15KV)
Detection Matrix	508 dpi / 4.0 x 4.0 mm sensor area

2nd Source

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	0°C ~ 60°C (32°F ~ 140°F)

Technical Specifications

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

Technical Specifications

ENVIRONMENTAL DATA

Eco-Label Certifications & declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: • IT ECO declaration • US ENERGY STAR® • US Federal Energy Management Program (FEMP) • EPEAT▢ Gold registered in the United States. See http://www.epeat.net for registration status in your country. • TCO Certified • China Energy Conservation Program (CECP) • China State Environmental Protection Administration (SEPA) • Taiwan Green Mark • Korea Eco-label • Japan PC Green label*
Sustainable Impact Specifications	• Product Carbon Footprint • Ocean-bound plastic in Fan and Speaker[1] • 25% post-consumer recycled plastic[2] • 50% recycled metal[7] • Low halogen[6] • Outside Box and corrugated cushions are 100% sustainably sourced and recyclable[4] • Molded Paper Pulp Cushion inside box is 100% sustainably sourced and recyclable.[5] • Bulk packaging available
System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Notebook model is based on a "Typically Configured Notebook".

Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Sort idle)	5.18 W	5.30 W	5.16 W
Normal Operation (Long idle)	N/A	N/A	N/A
Sleep	1.28 W	1.28 W	1.29 W
Off	0.42 W	0.46 W	0.43 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)	17.72 BTU/hr	18.12 BTU/hr	17.64 BTU/hr

Technical Specifications

Normal Operation (Long idle)	N/A	N/A	N/A
Sleep	4.37 BTU/hr	4.37 BTU/hr	4.41 BTU/hr
Off	1.43 BTU/hr	1.60 BTU/hr	1.47 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	14.8	
Fixed Disk – Random writes	3.7	29.1	
Optical Drive – Sequential reads	3.7	29.2	
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 93.4% recycle-able when properly disposed of at end of life.		
Packaging Materials	**External:**	PAPER/Corrugated	281 g
		PAPER/Molded Pulp	140 g
	Internal:	PLASTIC/Polyethylene low density - LDPE	16 g
	The plastic packaging material contains at least 0.0% recycled content.		
	The corrugated paper packaging materials contains at least 54.5% recycled content.		
RoHS Compliance	HP Inc. complies fully with materials regulations. We were among the first companies to extend the restrictions in the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive to our products worldwide through the HP GSE. HP has contributed to the development of related legislation in Europe, as well as China, India, and Vietnam. We believe the RoHS directive and similar laws play an important role in promoting industry-wide elimination of substances of concern. We have supported the inclusion of additional substances— including PVC, BFRs, and certain phthalates—in future RoHS legislation that pertains to electrical and electronics products. We met our voluntary objective to achieve worldwide compliance with the new EU RoHS requirements for virtually all relevant products by July 2013, and we will continue to extend the scope of the commitment to include further restricted substances as regulations continue to evolve. To obtain a copy of the HP RoHS Compliance Statement, see HP RoHS position statement.		

QuickSpecs

Technical Specifications

Material Usage	This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html): • Asbestos • Certain Azo Colorants • Certain Brominated Flame Retardants – may not be used as flame retardants in plastics • Cadmium • Chlorinated Hydrocarbons • Chlorinated Paraffins • Bis(2-Ethylhexyl) phthalate (DEHP) • Benzyl butyl phthalate (BBP) • Dibutyl phthalate (DBP) • Diisobutyl phthalate (DIBP) • Formaldehyde • Halogenated Diphenyl Methanes • Lead carbonates and sulfates • Lead and Lead compounds • Mercuric Oxide Batteries • Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user. • Ozone Depleting Substances • Polybrominated Biphenyls (PBBs) • Polybrominated Biphenyl Ethers (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)
Packaging Usage	HP follows these guidelines to decrease the environmental impact of product packaging: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
End-of-life Management and Recycling	HP offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly

Technical Specifications

	instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

HP, Inc. Corporate Environmental Information	For more information about HP's commitment to the environment:
	
	Global Citizenship Report
	    http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html
	Eco-label certifications
	    http://www8.hp.com/us/en/hp-information/environment/ecolabels.html
	 ISO 14001 certificates:
	    http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=c04755842
	    and
	    http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf

footnotes	1. Percentage of ocean-bound plastic contained in each component varies by product 2. Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard. 3. External power supplies, WWAN modules, power cords, cables and peripherals excluded. 4. 100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers. 5. Fiber cushions made from 100% recycled wood fiber and organic materials. 6. External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen. 7. Disclaimer: 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.

COUNTRY OF ORIGIN

China

Options and Accessories (sold separately and availability may vary by country)

Category	Description	Part Number
AC Adapter	HP 45W USB-C LC Dali AC Power Adapter	1MZ01AA
	HP 65W GaN USB-C Laptop Charger	600Q8AA, 600Q8UT
	HP 65W GaN USB-C LC Laptop Charger	9Y3X5AA, 9Y3X5UT
	HP 65W USB-C Laptop Charger - New AMO	671R3AA, 671R3UT
	HP 65W USB-C LC AC Power Adapter	1P3K6AA, 1P3K6UT
	HP 100W+10W USB-C+USB-A Slim Straight Kenting AC Power Adapter	8B3Y2AA, 8B3Y2UT
Adapters	HP HDMI to VGA Adapter	H4F02AA, H4F02UT
	HP USB 3.0 to Gigabit RJ45 Adapter G2	4Z7Z7AA, 4Z7Z7UT
	HP USB-C to DisplayPort Adapter	N9K78AA, N9K78UT
	HP USB-C to DisplayPort Adapter G2	8Y8Y1AA
	HP USB-C to HDMI 2.0 Adapter	1WC36AA
	HP USB-C to RJ45 Adapter G2	4Z527AA ,4Z527UT
	HP USB-C to USB 3.0 Adapter	N2Z63AA, N2Z63UT
	HP USB-C to VGA Adapter	N9K76AA, N9K76UT
Bags and Cases	HP Campus Blue Backpack	7K0E5AA
	HP Campus Green Backpack	7K0E4AA
	HP Campus XL Marble Stone Backpack	7K0E2AA
	HP Campus XL Tie Dye Backpack	7K0E3AA
	HP Renew Business 14.1 Laptop Bag	3E5F9AA, 3E5F9UT
	HP Renew Business 14.1 Laptop Sleeve	3E2U7AA, 3E2U7UT
	HP Renew Executive 14.1 Laptop Sleeve	6B8Y3AA
Docking Stations	HP Thunderbolt 120W G4 Dock	4J0A2AA, 4J0A2ET
	HP USB-C Dock G5	5TW10AA, 5TW10ET
Hub	HP 4K USB-C Multiport Hub	6G842AA, 6G843UT
	HP Universal USB-C Hub and Laptop Charger Combo	9H0H9AA
	HP Universal USB-C Multiport Hub	50H55AA, 50H55UT
	HP USB-C to USB-A Hub	Z6A00AA, Z6A00UT
	HP USB-C Travel Hub G3	86S97AA, 86T46UT
Keyboard	HP 405 Wired Backlit USB-C Keyboard	7N7C1AA, 7N7C1UT
	HP 455 Wireless Programmable USB Keyboard	4R177AA, 4R177UT
	HP 475 Dual-Mode Keyboard	7N7B9AA, 7N7B9UT
	HP 655 Wireless Keyboard and Mouse Combo	4R009AA
	HP 965 Ergonomic Wireless Keyboard	7E756AA
	HP 975 WL Dual-Mode USB+BT Keyboard	3Z726AA, 3Z726UT
Mouse	HP 125 USB-A Wired Mouse	265A9AA, 265A9UT
	HP 128 USB Laser Wired Mouse	265D9AA, 265D9UT
	HP 320M USB-A Wired Mous	9VA80AA
	HP 425 Programmable Bluetooth Wireless Mouse	7M1D5AA

Options and Accessories (sold separately and availability may vary by country)

	HP 435 Bluetooth 5.0 + Wireless 2.4GHz Multi-Device Wireless Mouse	3B4Q5AA, 3B4Q5UT
	HP 515 Ultra-Fast Rechargeable Wireless Mouse	9C2F7AA
	HP 715 Rechargeable Multi-Device Bluetooth 5.0 + Wireless 2.4GHz Bluetooth Mouse	6E6F0AA
	HP 925 Ergonomic Vertical Bluetooth 5.0 + Wireless 2.4GHz Wireless Mouse	6H1A5AA
	HP Creator USB-A+Bluetooth 935 Wireless Mouse Black	1D0K8AA, 1D0K8UT
	HP USB-A Premium Wireless Mouse	1JR31AA, 1JR31UT
	HP USB-A+Bluetooth Multi-Device 635 Wireless Mouse Black	1D0K2AA, 1D0K2UT
Security Hardware	HP Combination Nano Cable Lock	63B28AA
	HP Essential Combination Nano Cable Lock	63B31AA
	HP Nano Keyed Cable Lock	1AJ39AA, 1AJ39UT
	HP Nano Master Keyed Cable Lock	1AJ40AA
	HP SureKey Standard/Nano/Wedge Cable Lock	6UW42AA, 6UW42UT
Storage - ODD	HP USB DVD-Writer EXT ODD	F2B56AA, F2B56UT

Summary of Changes

Date of change	Version History		Description of change
	From v1 to v2		

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