

Overview

HP ProBook 650 G8 Notebook PC



Left

- | | |
|--------------------------------|---|
| 1. Internal Microphones | 6. Smartcard Reader (Optional) |
| 2. Webcam LED (Optional) | 7. USB 3.1 Gen 1 Port |
| 3. HD and IR Camera (Optional) | 8. RJ-45 |
| 4. IR Camera LEDs (Optional) | 9. Nano Security Lock Slot (Lock sold separately) |
| 5. Clickpad | |



Overview



Right

- | | |
|--------------------------|---|
| 1. Power Button Key | 6. HDMI Port (Cable not included) |
| 2. Power Connector | 7. Audio Combo Jack |
| 3. USB 3.1 Gen 2 Type-C® | 8. SIM Card Slot (Optional) |
| 4. USB 3.1 Gen 1 Port | 9. Touch Fingerprint Sensor (select models) |
| 5. USB 3.1 Gen 1 Port | |

Overview

At a Glance

- New mechanical design - Smaller footprint and Light weight
- Powerful quad core 11th Gen Intel® Core™ U-Series
- NVidia® GeForce MX450 graphics solution (Optional)
- HP Sure View Gen3 panel
- Physical HP Privacy Camera (Optional)
- Gigabit class 4G LTE wireless broadband (Optional)
- HP Fast Charge - Charge up to 50% in 30 minutes
- Wi-Fi 6 capability (Optional)
- Multi Factor Authentication - IR camera Hardened fingerprint sensor (Optional)
- Rich IO ports with charging USB
- Responsiveness w/Modern Standby and Wake on Fingerprint Sensor (Optional)
- Backlit keyboard option and new programmable key
- Nice range of display option from HD, FHD, all the way to SureView option
- Passed 19 MIL STD 810H tests¹

1. MIL-STD 810H is not intended to demonstrate fitness of U.S. Department of Defense contract requirements or for military use. Test results are not a guarantee of future performance under these test conditions. Accidental damage requires an optional HP Accidental Damage Protection Care Pack.

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



Technical Specifications

PRODUCT NAME

HP ProBook 650 G8 Notebook PC

OPERATING SYSTEMS

Preinstalled

Windows 10 Pro 64 – HP recommends Windows 10 Pro¹
Windows 10 Pro 64 (National Academic only)²
Windows 10 Home 64¹
Windows 10 Home Single Language 64¹
Windows 10 Pro (Windows 10 Enterprise available with a Volume Licensing Agreement)¹
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. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.windows.com>.

2. Some devices for academic use will automatically be updated to Windows 10 Pro Education with the Windows 10 Anniversary Update. Features vary; see <https://aka.ms/ProEducation> for Windows 10 Pro Education feature information.

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>.

Supported Version

HP tested Windows 10, version 1809 on this platform For testing information on newer versions of Windows10, please see: <https://support.hp.com/document/c05195282>.

PROCESSORS

Intel® Core™ i7-1165G7 processor (Up to 4.7 GHz with Intel® Turbo Boost Technology, 12 MB L3 cache, 4 cores)^{3,4 5,6}
Intel® Core™ i5-1135G7 processor (Up to 4.2 GHz with Intel® Turbo Boost Technology, 8 MB L3 cache, 4 cores)^{3,4 5,6}
Intel® Core™ i3-1115G4 processor with Intel® UHD Graphics (Up to 4.1 GHz with Intel® Turbo Boost Technology, 6 MB L3 cache, 2 cores)^{3,4 5,6}

Processors Family

11th Generation Intel® Core™ i7 processor (i7-1165G7)⁷
11th Generation Intel® Core™ i5 processor (i5-1135G1)⁷
11th Generation Intel® Core™ i3 processor (i3-1115G4)⁷

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. Intel's numbering, branding and/or naming is not a measurement of higher performance.

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

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

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



Technical Specifications

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>.

CHIPSET

Chipset is integrated with processor

GRAPHICS

Integrated

Intel® Iris® Xe Graphics (Core i5 and Core i7)⁴³

Intel® UHD Graphics (Core i3)⁸

Discrete

NVIDIA® GeForce® MX450 (2 GB DDR5 dedicated)

Supports

Support HD decode, DX12, HDMI 1.4b

8. HD content required to view HD images.

43. Intel® Iris® Xe Graphics capabilities require system to be configured with Intel® Core™ i5 or i7 processors and dual channel memory. Intel® Iris® Xe Graphics with Intel® Core™ i5 or 7 processors and single channel memory will only function as UHD graphics.

DISPLAYS

Internal

Non-Touch

39.6 cm (15.6") diagonal HD SVA eDP anti-glare narrow bezel bent, 250 nits, 45% NTSC (1366 x 768)^{8,10}

39.6 cm (15.6") diagonal HD SVA eDP anti-glare narrow bezel bent, 250 nits, 45% NTSC for HD camera (1366 x 768)^{8,10}

39.6 cm (15.6") diagonal FHD UWVA eDP anti-glare narrow bezel bent, 250 nits, 45% NTSC (1920 x 1080)^{8,10}

39.6 cm (15.6") diagonal FHD UWVA eDP anti-glare narrow bezel bent, 250 nits, 45% NTSC for HD camera (1920 x 1080)^{8,10}

39.6 cm (15.6") diagonal FHD UWVA eDP anti-glare narrow bezel bent, 250 nits, 45% NTSC for HD camera and WWAN (1920 x 1080)^{8,10}

39.6 cm (15.6") diagonal FHD UWVA eDP anti-glare narrow bezel bent, 250 nits, 45% NTSC for HD + IR camera and WWAN (1920 x 1080)^{8,10}

39.6 cm (15.6") diagonal FHD UWVA eDP anti-glare Low Power narrow bezel bent, 400 nits, 100% sRGB for HD camera and WWAN (1920 x 1080)^{8,10}

39.6 cm (15.6") diagonal FHD UWVA eDP anti-glare Low Power narrow bezel bent, 400 nits, 100% sRGB for HD + IR camera and WWAN (1920 x 1080)^{8,10}

39.6 cm (15.6") diagonal FHD IPS eDP+PSR anti-glare flat with HP Sure View Gen3 Integrated Privacy Screen, 1000 nits, 72% NTSC for HD+IR camera and WWAN (1920 x 1080)^{8,9,10,11,*}

Touch

39.6 cm (15.6") diagonal FHD SVA eDP narrow bezel bent touch-on-panel screen, 250 nits, 45% NTSC for HD camera (1920 x 1080)^{8,9,10,*}

39.6 cm (15.6") diagonal FHD SVA eDP narrow bezel bent touch-on-panel screen, 250 nits, 45% NTSC for HD + IR camera and WWAN (1920 x 1080)^{8,9,10,*}

HDMI

Supports resolutions up to 4K 30Hz



Technical Specifications

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

* Actual brightness will be lower with HP Sure View or touch screen.

Dockingstation model	Total number of supported displays (incl. the notebook) display)	Max. resolutions supported	Dock Connectors	Technical limitations
HP Thunderbolt Dock G2	3	Dual 4K @ 60Hz	2xDP, 1xVGA, 1xTB, 1xUSB-C alt-mode	System only runs at alt-mode speed
HP Elite USB-C Dock G5	3	Three 1680x1050 @ 60 Hz Dual 2K @ 60Hz Single 4K @ 60Hz (3840 x 1440)	1xHDMI, 2xDP	
HP USB-C Universal Dock G2	3	Dual 4K @ 60Hz Single 5K @ 60Hz	1xHDMI, 2xDP	
HP USB-C Travel Dock	2	Single 2K @ 60Hz	1xHDMI, 1xVGA	Single external display Only HDMI or VGA at the time



Technical Specifications

STORAGE AND DRIVES

Primary M.2 Storage

128 GB PCIe® NVMe™ M.2 TLC Solid State Drive¹²
256 GB PCIe® NVMe™ M.2 Value Solid State Drive¹²
256 GB PCIe® NVMe™ M.2 TLC Solid State Drive¹²
256 GB PCIe® NVMe™ M.2 TLC Solid State Drive (Opal 2)¹²
512 GB PCIe® NVMe™ M.2 TLC Solid State Drive¹²
512 GB PCIe® NVMe™ M.2 Value Solid State Drive¹²
512 GB PCIe® Gen3x4 NVMe™ M.2 SED SSD TLC¹²
512 GB Intel® PCIe® NVMe™ QLC M.2 SSD with 32 GB Intel® Optane™ memory H10^{12,*}
1 TB PCIe® NVMe™ M.2 TLC Solid State Drive¹²

12. For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10) is reserved for system recovery software.

*Intel® Optane™ H10 memory system acceleration does not replace or increase the DRAM in your system. Requires 8th Gen or higher Intel® Core™ processor, BIOS version with Intel® Optane™ supported, Windows 10 64-bit, and an Intel® Rapid Storage Technology (Intel® RST) driver.

MEMORY

Maximum Memory

64 GB DDR4-3200 SDRAM¹³

Memory

64 GB DDR4-3200 SDRAM (2 x 32 GB)¹³
32 GB DDR4-3200 SDRAM (1 x 32 GB)¹³
32 GB DDR4-3200 SDRAM (2 x 16 GB)¹³
16 GB DDR4-3200 SDRAM (1 x 16 GB)¹³
16 GB DDR4-3200 SDRAM (2 x 8 GB)¹³
12 GB DDR4- 3200 SDRAM (4 GB and 8 GB (1 x 8 GB)¹³
8 GB DDR4-3200 SDRAM (1 x 8 GB)¹³
8 GB DDR4-3200 SDRAM (2 x 4 GB)¹³
4 GB DDR4-3200 SDRAM (1 x 4 GB)¹³

Memory Slots

2 SODIMM

Both slots are customer accessible / upgradeable

DDR4 PC4 SODIMMS, (Tiger Lake runs at 3200)

Supports Dual Channel Memory

13. 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.



Technical Specifications

NETWORKING/COMMUNICATIONS

WLAN

Intel® Dual Band Wireless-AC 9560 802.11a/b/g/n/ac (2x2) WLAN and Bluetooth® 5 Combo, non-vPro™¹⁴
Intel® Dual Band Wi-Fi 6 AX201 802.11a/b/g/n/ac (2x2) WLAN and Bluetooth® 5 Combo, non-vPro™¹⁴

WWAN

Intel® XMM™ 7360 LTE-Advanced (Cat9)¹⁵

NFC

NFC Mirage WNC XRAV-1

Ethernet

Intel 10/100/1000 NIC¹⁶

14. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 5 (802.11 ac) is backwards compatible with prior 802.11 specs.

15. WWAN module is optional, must be configured at the factory 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.

16. 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.

AUDIO/MULTIMEDIA

Audio

2 Integrated stereo speakers (70dB)
Integrated microphone (Dual Array)

Camera

720p HD Camera⁸
720p HD Camera+IR Camera^{8,9}

8. HD content required to view HD images.

9. Sold separately or as an optional feature.



Technical Specifications

KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

Keyboard

HP Premium Keyboard, spill resistant with numeric keypad and optional backlit function

Pointing Device

Clickpad with multi-touch gesture support

Function Keys

F1 - Display Switching

F2 - Blank or SureView On/Off

F3 - Brightness Down

F4 - Brightness Up

F5 - Audio Mute

F6 - Volume Down

F7 - Volume Up

F8 - Mic Mute

F9 - Blank or Backlit Toggle

F10 - Insert

F11 - Airplane mode

F12 - Programmable key

Hidden Function Keys

Fn+R - Break

Fn+S - Sys Rq

Fn+C - Scroll Lock

PORTS/SLOTS

Ports

1 USB 3.1 Gen 2 Type-C® (Power delivery, DisplayPort™ 1.4)

2 USB 3.1 Gen 1 (1 Powered port)

1 USB 3.1 Gen 1 (Power delivery)

1 HDMI 1.4b ³⁷

1 Headphone/microphone combo jack

1 AC power

1 Nano SIM (optional)

1 RJ-45

Expansion Slots

1 Smart Card Reader (optional)

[37. HDMI cable sold separately.](#)

SOFTWARE AND SECURITY

Preinstalled Software

HP BIOSphere Gen5 ¹⁷

HP Drive Lock & Automatic Drive Lock

BIOS Update via Network

Master Boot Record Security

Power On Authentication

HP Secure Erase ¹⁹

Absolute Persistence Module ²⁰

HP LAN-Wireless Protection



Technical Specifications

Pre-boot Authentication

Software

HP Connection Optimizer ¹⁸
HP Image Assistant
HP Hotkey Support
myHP
HP Support Assistant ²¹
HP Noise Cancellation Software
HSA Fusion for Commercial
HSA Telemetry for Commercial
Touchpoint Customizer for Commercial
HP Notifications
HP Privacy Settings
HP Wireless Button Driver
HP Power Manager
Buy Office (sold separately)

Manageability Features

HP Driver Packs (download) ²²
HP Manageability Integration Kit Gen3 (download) ²³
HP System Software Manager (SSM) (download)
HP BIOS Config Utility (BCU) (download)
HP Client Catalog (download)
HP Client Management Script Library (download)

Client Security Software

HP Client Security Manager Gen6 ²⁴
Windows Defender ²⁵

Security Management

Pre-boot Authentication
USB enable/disable (via BIOS)
Power-on password (via BIOS)
Setup password (via BIOS)
HP Fingerprint Sensor ²⁶
Support for chassis padlocks and cable lock devices
HP Pro Security Edition^{*,**}
HP Sure Click ²⁷
HP Sure Sense ²⁸
HP Sure Start Gen6 ²⁹
HP Sure Admin ³⁰
HP Sure Recover Gen3 ³¹
HP Sure Run Gen3 ³²
TPM 2.0 Embedded Security Chip shipped with Windows 10 (Common Criteria EAL4+ Certified)(FIPS 140-2 Level 2 Certified) ³³

Security

TPM

Model: Infineon SLB9670
Version: 7.85
Revision: TPM 2.0
FIPS 140-2 Compliant: Yes

Smartcard Reader

Model number: Alcor AU9560
FIPS 201 Compliant: Yes

IPv6 Compliance

Yes



Technical Specifications

Is the BIOS on this notebook ISO/IEC 19678:2015 (formerly NIST 800-147) compliant?:

Yes

UEFI version: 2.7

17. HP BIOSphere Gen5 is available on select HP Pro and Elite PCs. See product specifications for details. Features may vary depending on the platform and configurations.

18. HP Connection Optimizer requires Windows 10.

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

20. 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/>.

21. HP Support Assistant requires Windows and Internet access.

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

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

24. HP Client Security Manager Gen6 requires Windows and is available on the select HP Pro and Elite PCs.

25. Windows Defender Opt in and internet connection required for updates.

26. HP Fingerprint sensor is an optional feature that must be configured at purchase.

27. HP Sure Click requires Windows 10 Pro or Enterprise. See https://bit.ly/2PrLT6A_SureClick for complete details.

28. HP Sure Sense requires Windows 10.

29. HP Sure Start Gen6 is available on select HP PCs.

30. HP Sure Admin requires Windows 10, HP BIOS, HP Manageability Integration Kit from <http://www.hp.com/go/clientmanagement> and HP Sure Admin Local Access Authenticator smartphone app from the Android or Apple store.

31. HP Sure Recover Gen3 is available on select HP PCs and requires an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data.

32. HP Sure Run Gen3 is available on select Windows 10 based HP Pro, Elite and Workstation PCs with select Intel® or AMD processors.

33. Firmware TPM is version 2.0.

*HP Pro Security Edition is available preloaded on select HP PCs and includes HP Sure Click Pro and HP Sure Sense Pro. 3-year license required. The HP Pro Security Edition software is licensed under the license terms of the HP End User License Agreement (EULA) that can be found

at: https://h30670.www3.hp.com/e-commerce/common/disclaimer.do#EN_US as modified by the following:
7. Term. Unless otherwise terminated earlier pursuant to the terms contained in this EULA, the license for the HP Pro Security Edition (HP Sure Sense Pro and HP Sure Click Pro) is effective upon activation and will continue for thirty-six (36) months thereafter ("Initial Term"). At the end of the Initial Term you may either (a) purchase a renewal license for the HP Pro Security Edition from HP.com, HP Sales or an HP Channel Partner, or (b) continue using the standard versions of HP Sure Click and HP Sure Sense at no additional cost with no future software updates or HP Support.

**HP Pro Security Edition is optimized for the SMB environment and ships pre-configured - manageability is optional. The HP Pro Security Edition supports a limited tool set that can be used by the HP Manageability Integration Kit which can be downloaded from <http://www.hp.com/go/clientmanagement>



Technical Specifications

POWER

Power Supply ¹⁶

HP Smart 65 W External AC power adapter ³⁴
HP Smart 65 W EM External AC power adapter ³⁴
HP Smart 65 W USB Type-C® adapter ³⁴
HP Smart 45 W External AC power adapter ³⁴
HP Smart 45 W USB Type-C® adapter ³⁴

Primary Battery

HP Long Life 3-cell, 45 Wh Polymer ³⁵

Power Cord

3-wire plug - 1 m ³⁴
2-wire plug - 1 m ³⁴

Battery life

MM18: Up to 12 hours and 30 minutes

Battery Weight

190 g

34. Availability may vary by country.

35. Battery is internal and not replaceable by customer. Serviceable by warranty.

WEIGHTS & DIMENSIONS

Product Weight ³⁶

Starting at 3.82 lb
Starting at 1.74 kg

Product Dimensions (w x d x h)

14.14 x 9.2 x 0.78 in
35.94 x 23.39 x 1.99 cm

36. Weight will vary by configuration.

PORTS/SLOTS

Ports

1 USB 3.1 Gen 2 Type-C® (Power delivery, DisplayPort™ 1.4)
2 USB 3.1 Gen 1 (1 Powered port)
1 USB 3.1 Gen 1 (Power delivery)
1 HDMI 1.4b ³⁷
1 Headphone/microphone combo jack
1 AC power
1 Nano SIM (optional)
1 RJ-45

Expansion Slots

1 Smart Card Reader (optional)

37. HDMI cable sold separately.



Technical Specifications

SERVICE AND SUPPORT

HP Services offers 1-year and 3-year limited warranties and 90 day software limited warranty options depending on country. Batteries have a default one year limited warranty except for Long Life batteries which will have same 1-year or 3-year limited warranty as the platform. 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>.³⁸

38. 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 <http://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.



Technical Specifications

CERTIFICATION AND COMPLIANCE

Energy Efficiency Compliance	ENERGY STAR® certified
Energy Efficiency Compliance	EPEAT® 2019 Silver ³⁹
Environmental Specifications	Low halogen ⁴⁰
Environmental Specifications	TCO NB 8.0 Certification

39. Based on US EPEAT® registration according to IEEE 1680.1-2018 EPEAT®. Status varies by country. Visit <http://www.epeat.net> for more information.

40. External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

SYSTEM UNIT

Stand-Alone Power Requirements (AC Power)

Nominal Operating Voltage	19 V
Average Operating Power	4.86W
Integrated graphics	Yes
Discrete Graphics	N185-G5 : 25W
Max Operating Power	Discrete < 65W UMA < 45W

Temperature

Operating	32° to 95° F (0° to 35° C)
Non-operating	-4° to 140° F (-20° to 60° C)

Relative Humidity

Operating	10% to 90%, non-condensing
Non-operating	5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature

Shock

Operating	40 G, 2 ms, half-sine
Non-operating	200 G, 2 ms, half-sine

Random Vibration

Operating	0.75 grms
Non-operating	1.50 grms

Altitude (unpressurized)

Operating	-50 to 10,000 ft (-15.24 to 3,048 m)
Non-operating	-50 to 40,000 ft (-15.24 to 12,192 m)

Planned Industry Standard Certifications

UL	Yes
CSA	Yes
FCC Compliance	Yes
ENERGY STAR®	Select models ⁴¹
EPEAT®	EPEAT® 2019 Gold in U.S. ⁴²
ICES	Yes
Australia /	Yes



Technical Specifications

NZ A – Tick Compliance	Yes
CCC	Yes
Japan VCCI Compliance	Yes
KC	Yes
BSMI	Yes
CE Marketing Compliance	Yes
BNCI or BELUS	Yes
CIT	Yes
GOST	Yes
Saudi Arabian Compliance (ICCP)	Yes
SABS	Yes

41. Configurations of the HP ProBook 650 G8 that are ENERGY STAR® certified are identified as HP ProBook 650 G8 ENERGY STAR on HP websites and on <http://www.energystar.gov>.

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

DISPLAYS

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

*Actual brightness will be lower with HP Sure View or touch screen.

Panel LCD 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA 45% NTSC 250 nits eDP 1.2 w/o PSR bent NWBZ	Outline Dimensions (W x H x D)	350.96 x 205.54 mm (max)
	Active Area	344.16 x 193.59 mm (typ.)
	Weight	370 g (max)
	Diagonal Size	15.6 inch
	Thickness	3.0 mm/ 5.0 mm (w/PCB) (max)
	Interface	eDP 1.2 (2 lane)
	Surface Treatment	Anti-Glare
	Touch Enabled	No
	Contrast Ratio	600:1 (typ.)
	Refresh Rate	60 Hz
	Brightness	250 nits
	Pixel Resolution	1920 x 1080 (FHD)
	Format	RGB Stripe
	Backlight	LED
	Color Gamut Coverage	45% of NTSC
	Color Depth	6 bits (Hi FRC supportive w/ condition to enable)
	Viewing Angle	UWVA 85/85/85/85



Technical Specifications

Panel LCD 15.6 inch FHD (1920x1080) Anti-Glare WLED UWVA 45% NTSC 250nits eDP 1.2 w/o PSR bent Touch on Panel NWBZ	Outline Dimensions (W x H x D)	350.96 x 205.74 mm (max)
	Active Area	344.16 x 193.59 mm (typ.)
	Weight	380 g (max)
	Diagonal Size	15.6 inch
	Thickness	3.2mm/ 5.2mm (PCB) (max)
	Interface	eDP 1.2
	Surface Treatment	Anti-Glare On-cell
	Touch Enabled	Yes
	Contrast Ratio	600:1 (typ.)
	Refresh Rate	60 Hz
	Brightness	250 nits*
	Pixel Resolution	1920 x 1080 (FHD)
	Format	RGB Stripe
	Backlight	LED
	Color Gamut Coverage	45% of NTSC
	Color Depth	6 bits
	Viewing Angle	UWVA 85/85/85/85

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



Technical Specifications

**Panel LCD 15.6 inch FHD
(1920x1080) Anti-Glare
WLED UWVA 72 percent cg
1000nits eDP 1.4+PSR2
PrivacyG3 NWBZ bent**

Outline Dimensions (W x H x D)	349.52x 205.39 mm (max)
Active Area	344.16 x 193.59 mm (typ.)
Weight	350 g (max)
Diagonal Size	15.6 inch
Thickness	2.6mm / 4.5mm Max. (PCB side)
Interface	eDP 1.4 + PSR (4 lane)
Surface Treatment	Anti-Glare
Touch Enabled	No
Contrast Ratio	2000:1 (typ.)
Refresh Rate	60 Hz
Brightness	1000 nits*
Pixel Resolution	1920 x 1080 (FHD)
Format	RGB
Backlight	LED
Color Gamut Coverage	sRGB 100%
Color Depth	8 bits
Viewing Angle	UWVA 85/85/85/85

**Panel LCD 15.6-in HD
(1366x768) Anti-Glare
WLED SVA 45% NTSC 250
nits eDP 1.2 w/o PSR NWBZ
bent**

Outline Dimensions (W x H x D)	350.96 x 205.54 (mm) max
Active Area	344.23 x 193.54 mm (typ.)
Weight	370 g max
Diagonal Size	15.6"
Thickness	3.2mm (panel) / 5.0mm (panel+PCB) max.
Interface	eDP 1.2 (1 lane)
Surface Treatment	Anti-Glare
Touch Enabled	No
Contrast Ratio	300:1 (typ)
Refresh Rate	60 Hz
Brightness	250nits
Pixel Resolution	1366 x 768 (HD)
Format	RGB
Backlight	LED
Color Gamut Coverage	45% of NTSC
Color Depth	6 bits
Viewing Angle	SVA 45/45/15/35



Technical Specifications

* For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10) is reserved for system recovery software.

STORAGE AND DRIVES*

SSD 128GB 2280 PCIe-3x2 Three Layer Cell	Form Factor	M.2 2280
	Capacity	128 GB
	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
	Maximum Sequential Read	1400 ~ 2100 MB/s
	Maximum Sequential Write	800 ~ 1200 MB/s
	Logical Blocks	250,069,680
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security; DIPM; TRIM; DEVSLP

SSD 1TB 2280 PCIe-3x4 NVMe Three Layer Cell single-sided	Form Factor	M.2 2280
	Capacity	1 TB
	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 Gen3X4
	Maximum Sequential Read	3100 ~ 3500 MB/s
	Maximum Sequential Write	2770 ~ 3037 MB/s
	Logical Blocks	2,000,409,264
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security; TRIM; L1.2

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 Gen3
	Maximum Sequential Read	2100 ~ 2200 MB/s
	Maximum Sequential Write	900 ~ 1400 MB/s
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (optional); TRIM; L1.2



Technical Specifications

SSD 512GB 2280 PCIe NVMe

Value	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 Gen3
	Maximum Sequential Read	2200 ~ 2300 MB/s
	Maximum Sequential Write	1000 ~ 1600 MB/s
	Logical Blocks	1,000,215,215
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (optional); TRIM; L1.2

SSD 512GB 2280 PCIe-3x2x2 NVMe+SSD 32GB 3D Xpoint

Form Factor	M.2 2280
Capacity	512 GB
NAND Type	QLC+3D XPoint
Height	0.09 in (2.3 mm)
Width	0.87 in (22 mm)
Weight	0.02 lb (10 g)
Interface	PCIe NVMe Gen3X2X2
Maximum Sequential Read	Up to 2400 MB/s
Maximum Sequential Write	Up to 1300 MB/s
Logical Blocks	1,000,215,215
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	ATA Security; TRIM; L1.2

SSD 512GB 2280 M2 PCIe-3x4 SS NVMe TLC

Form Factor	M.2 2280
Capacity	512 GB
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 Gen3X4
Maximum Sequential Read	3100 ~ 3500 MB/s
Maximum Sequential Write	2400 ~ 2956 MB/s
Logical Blocks	1,000,215,215
Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
Features	ATA Security; TRIM; L1.2



Technical Specifications

SSD 256GB 2280 M2 PCIe-3x4 SS NVMe TLC	Form Factor	M.2 2280
	Capacity	256 GB
	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 Gen3X4
	Maximum Sequential Read	2800 ~ 3500 MB/s
	Maximum Sequential Write	1400 ~ 2200 MB/s
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security; TRIM; L1.2
SSD 256GB 2280 PCIe-3x4 NVMe Self Encrypted OPAL2 Three Layer Cell	Form Factor	M.2 2280
	Capacity	256 GB
	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 Gen3X4
	Maximum Sequential Read	2800 ~ 3500 MB/s
	Maximum Sequential Write	1663 ~ 2200 MB/s
	Logical Blocks	500,118,192
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (Option); TCG Opal 2.0; TRIM; L1.2
SSD 512GB 2280 PCIe-3x4 NVMe Self Encrypted OPAL2 Three Layer	Form Factor	M.2 2280
	Capacity	512 GB
	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 Gen3X4
	Maximum Sequential Read	3100 ~ 3500 MB/s
	Maximum Sequential Write	2400 ~ 2956 MB/s
	Logical Blocks	1,000,215,215
	Operating Temperature	32° to 158°F (0° to 70°C) [ambient temp]
	Features	ATA Security (Option); TCG Opal 2.0; TRIM; L1.2



Technical Specifications

NETWORKING/COMMUNICATIONS

Intel Wi-Fi 6 AX201 + BT5 Wireless LAN Standards (802.11ax 2x2, non-vPro, supporting gigabit file transfer speeds)^{*,} Non-vPro**

IEEE 802.11a
IEEE 802.11b
IEEE 802.11g
IEEE 802.11n
IEEE 802.11ac
IEEE 802.11ax
IEEE 802.11d
IEEE 802.11e
IEEE 802.11h
IEEE 802.11i
IEEE 802.11k
IEEE 802.11r
IEEE 802.11v

Interoperability

Features Wi-Fi 6 technology

Frequency Band

- 802.11b/g/n/ax
2.402 – 2.482 GHz
- 802.11a/n/ac/ax
4.9 – 4.95 GHz (Japan)
5.15 – 5.25 GHz
5.25 – 5.35 GHz
5.47 – 5.725 GHz
5.825 – 5.850 GHz

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, (1SS, and 2SS) (20MHz, 40MHz, ,80MHz & 160MHz)
- 802.11ax: MCS0 ~ MCS11, (1SS and 2SS) (20MHz, 40MHz, ,80MHz & 160MHz)

Modulation

Direct Sequence Spread Spectrum
OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM

Security³

- IEEE compliant 64 / 128 bit WEP encryption for a/b/g mode only
- AES-CCMP: 128 bit in hardware
- 802.1x authentication
- WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.
- WPA2 certification
- IEEE 802.11i
- WAPI

Network Architecture Models

Ad-hoc (Peer to Peer)
Infrastructure (Access Point Required)

Roaming

IEEE 802.11 compliant roaming between access points

Output Power²

- 802.11b: +18.5dBm minimum
- 802.11g: +17.5dBm minimum
- 802.11a: +18.5dBm minimum
- 802.11n HT20(2.4GHz): +15.5dBm minimum
- 802.11n HT40(2.4GHz): +14.5dBm minimum
- 802.11n HT20(5GHz): +15.5dBm minimum
- 802.11n HT40(5GHz): +14.5dBm minimum
- 802.11ac VHT80(5GHz): +11.5dBm minimum
- 802.11ac VHT160(5GHz): +11.5dBm minimum
- 802.11ax HT40(2.4GHz): +10dBm minimum
- 802.11ax VHT160(5GHz): +10dBm minimum



Technical Specifications

Power Consumption	• Transmit mode: 2.0 W • Receive mode: 1.6 W • Idle mode (PSP) 180 mW (WLAN Associated) • Idle mode: 50 mW (WLAN unassociated) • Connected Standby/Modern Standby: 10mW • Radio disabled: 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity³	• 802.11b, 1Mbps: -93.5dBm maximum • 802.11b, 11Mbps: -84dBm maximum • 802.11a/g, 6Mbps: -86dBm maximum • 802.11a/g, 54Mbps: -72dBm maximum • 802.11n, MCS07: -67dBm maximum • 802.11n, MCS15: -64dBm maximum • 802.11ac, MCS0: -84dBm maximum • 802.11ac, MCS9: -59dBm maximum • 802.11ax, MCS11(HT40): -59dBm maximum • 802.11ax, MCS11(VHT160): -58.5dBm maximum
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard with CNVi Interface
Dimensions	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
Weight	1. Type 2230: 2.8 g 2. Type 126: 1.3 g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (–10° to 70° C) Non-operating –40° to 176° F (–40° to 80° C)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating 0 to 10,000 ft (3,048 m) Non-operating 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF LED Off – Radio ON

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

Bluetooth Specification	4.0/4.1/4.2/5.0/5.1 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
Signaling Data Rate	Legacy: 3 Mbps signaling data rate¹ 2.17 Mbps BLE: 1 Mbps signaling data rate¹ 0.2 Mbps 1. Actual throughput may vary. Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.



Technical Specifications

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, Section 15.247 & 15.249
Power Management Certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
Bluetooth Profiles Supported	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 –Link Layer Privacy LE Privacy 1.2 –Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)

1. Wireless access point and Internet service is required. Availability of public wireless access point is limited.
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).

*Wi-Fi supporting gigabit speeds is achievable when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 160MHz channels.

** Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. The specifications for Wi-Fi 6 (802.11ax WLAN) are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the notebook to communicate with other 802.11ax WLAN devices. Only available in countries where 802.11ax is supported.



Technical Specifications

Intel Jefferson Peak2 9560 802.11a/b/g/n/ac (2x2) WiFi® and Bluetooth® 5.0 Combo¹ non-vPro	Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v
	Interoperability Frequency Band	Wi-Fi® CERTIFIED modules • 802.11b/g/n 2.402 – 2.482 GHz • 802.11a/n/ac 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
	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, (1SS, and 2SS) (20MHz, 40MHz, , 80MHz & 160MHz)
	Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
	Security³	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • WAPI
	Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
	Roaming	IEEE 802.11 compliant roaming between access points
	Output Power²	• 802.11b: +18.5dBm minimum • 802.11g: +17.5dBm minimum • 802.11a: +18.5dBm minimum • 802.11n HT20(2.4GHz): +15.5dBm minimum • 802.11n HT40(2.4GHz): +14.5dBm minimum • 802.11n HT20(5GHz): +15.5dBm minimum • 802.11n HT40(5GHz): +14.5dBm minimum • 802.11ac VHT80(5GHz): +11.5dBm minimum • 802.11ac VHT160(5GHz): +11.5dBm minimum
	Power Consumption	• Transmit mode: 2.0 W • Receive mode: 1.6 W • Idle mode (PSP) 180 mW (WLAN Associated) • Idle mode: 50 mW (WLAN unassociated) • Connected Standby/Modern Standby: 10mW • Radio disabled: 8 mW



Technical Specifications

Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity⁴	• 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: -84dBm maximum • 802.11ac, MCS9: -59dBm maximum
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard with CNVi Interface
Dimensions	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
Weight	1. Type 2230: 2.8 g 2. Type 126: 1.3 g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (-10° to 70° C) Non-operating -40° to 176° F (-40° to 80° C)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating 0 to 10,000 ft (3,048 m) Non-operating 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber – Radio OFF LED Off – Radio ON

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

Bluetooth Specification	4.0/4.1/4.2/5.0 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
Signaling Data Rate	Legacy: 3 Mbps signaling data rate ¹ throughput up to 2.17 Mbps BLE: 1 Mbps signaling data rate ¹ throughput up to 0.2 Mbps 1. Actual throughput may vary.
Transmit Power	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) 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



Technical Specifications

Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Power Management Certifications	ETS 300 328, ETS 300 826 Low Voltage Directive IEC950 UL, CSA, and CE Mark
Bluetooth Profiles Supported	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 –Link Layer Privacy LE Privacy 1.2 –Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)

1. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 6 is backwards compatible with prior 802.11 specs. The specifications for Wi-Fi 6 (802.11 ax) are draft and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the notebook to communicate with other 802.11ax devices. Only available in countries where 802.11ax is supported. Wi-Fi® supporting gigabit speeds is achievable when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 160 MHz 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).

Intel® XMM™ 7360 LTE-Advanced CAT9	Technology/Operating bands	FDD LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 2600 (Band 7), 900 (Band 8), 1400 (Band 11), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 17 lower), 850 (Band 18 lower), 850 (Band 19 upper), 800 (Band 20), 1400 (Band 21), 850 (Band 26), 700 (Band 28), 700 (Band 29 RX only), 2300 (Band 30), 1700/2100 (Band 66). TDD LTE: 2600 (Band 38), 1900 (Band 39), 2400 (Band 40), 2500 (Band 41). HSPA+: 2100 (Band 1), 1900 (Band 2), 1700/2100 (Band 4), 850 (Band 5), 900 (Band 8) MHz
	Wireless protocol standards	3GPP Release 11 LTE Specification CAT.9, DL 60MHz BW throughput up to 450Mbps; UL 20MHz throughput up to 50Mbps WCDMA R99, 3GPP Release 5, 6, 7 and 8 UMTS Specification
	GPS	Standalone, A-GPS (MS-A, MS-B)
	GPS bands	1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz, Beidou 1561.098 MHz
	Maximum data rates	LTE: 450 Mbps (Download), 50 Mbps (Upload) DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) HSPA+: 21Mbps (Download), 5.76 Mbps (Upload)
	Maximum output power	LTE: 23 dBm HSPA+: 23.5 dBm



Technical Specifications

Maximum power consumption	LTE: 1,200 mA (peak); 900 mA (average) HSPA+: 1,100 mA (peak); 800 mA (average)
Form Factor	M.2, 3042-S3 Key B
Weight	5.8 g
Dimensions (Length x Width x Thickness)	42 x 30 x 2.3 mm

NXP NPC300 Near Field Communication Module	Dimensions (L x W x H)	Module 17 mm by 10 mm by 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) Mode¹	ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Jewel and Topaz cards 1. With application or UICC support
	Card Emulation (PICC-VICC) Mode¹	ISO/IEC 14443 A ISO/IEC 14443 B and B' MIFARE FeliCa 1. With application or UICC support
	Frequency	13.56 MHz
	NFC Modes Supported	Reader/Writer, Peer-to-Peer
	Raw RF Data Rates	106, 212, 424, 848 kbps
	Operating temperature	-25°C to 80°C
	Storage temperature	-25°C to 125°C
	Humidity	10-90% operating 5-95% non-operating
	Supply Operating voltage	2.7 to 5.5 Volts
	I/O Voltage	1.8V or 3.3V

Power Consumption

(Booster enable, VBAT= 3.3V, VCC_BOOST = 5V)

Mode	Power Consumption, Typical Actual Power Consumption is dependent on NFC antenna and matching circuit and on the particular polling sequence and period configured.
Polling	710.93 mW
Detected Test Tag Type 1	152.09 mW

Not all configuration components are available in all regions/countries.
c06725528 — DA16752 — Worldwide — Version 2 — November 4, 2020



Technical Specifications

Detected Test Tag Type 2 341.26 mW**Detected Test Tag Type 3** 383.76 mW**Detected Test Tag Type 4** 312.26 mW**Antenna** Antenna connector, 0.3mm pitch, 7 connector FPC. Antenna matching is external to module.

Intel i219v 10/100/1000 Integrated NIC	Connector	RJ-45
	System Interface	PCI(Intel proprietary) + 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 802.3 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 Disconnection: 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
	Management Interface IT Manageability	Advanced link down power saving for reducing link down power consumption
		Auto MDI/MDIX Crossover cable detection
		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))
	Security & Manageability	Comprehensive diagnostic and configuration software suite
		Virtual Cable Doctor for Ethernet cable status
		Intel® vPro™ support with appropriate Intel® chipset components

RFID Controller Gen 2 (optional)	Dimensions (L x W x H)	Module 50 mm by 23 mm by 2.89 mm
	Chipset	SiM3U156+SiM3U154+AMS3911
	System interface	USB 2.0
	System interface (I/O)	Audio signal output on card read
	NFC RF standards (In reading CSN)	ISO/IEC 14443 A
		ISO/IEC 14443 B ISO/IEC 15693



Technical Specifications

		ISO/IEC 18092 ECMA-340 NFCIP-1
	NFC Forum Support Reader Mode	Tag Type 1, Type 2, Type3 and Type 4 in reading CSN 13.56MHz: ISO/IEC 14443 A ISO/IEC 14443 B ISO/IEC 15693 MIFARE 1K MIFARE 4K MIFARE DESFire FeliCa Topaz cards HID iClass ISO 125kHz: HID Prox UID AWID UID CASI-RUSCO UID EM 410x UID Indana ASP/ASP+ UID
	Frequency	13.56MHz and 125kHz
	NFC Modes Supported	Reader
	Raw RF Data Rates	106, 212 kbps
	Operating temperature	-30°C to 70°C
	Storage temperature	-40°C to 80°C
	Humidity	10-90% operating 5-95% non-operating
	Supply Operating voltage	4.35 to 5.25 Volts
Power Consumption	Mode	Power Consumption, Typical
	Polling	75mA
	Communication	85mA
	Antenna	13.56MHz/125kHz combo antenna. Antenna connector, 0.5mm pitch, 16pin connector FPC.



Technical Specifications

POWER

AC Adapter 45 Watt nPFC Standard USB Type-C® Straight 1.8m	Dimensions (H x W x D)	94.0 x 40.0 x 26.5 mm		
	Weight	192.5g +/-10%		
	Input	Input Efficiency	Average Efficiency of 25%, 50%, 75%, 100% load condition with 115Vac/230Vac Spec: 5V : 81.5% 9V : 86.7% 12V : 87.41% 15V : 87.8%	
		Input frequency range	47 ~ 63 Hz	
		Input AC current	Max. 1.4 A at 90 Vac	
		Output	Output power	5V/15W 9V/27W 12V/36W 15V/45W
		DC output	5V/9V/12V/15V	
		Hold-up time	5 ms at 115 Vac input	
	Connector	USB Type-C®		
	Environmental Design	Operating temperature	32°F to 95°F (0° to 35°C)	
		Non-operating (storage) temperature	-4°F to 185°F (-20° to 85°C)	
		Altitude	0 to 16,400 ft (0 to 5,000 m)	
		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, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. MTBF - over 200,000 hours at 25°C ambient condition.		

AC Adapter 45 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.8m	Dimensions	95 x 45 x 26.8 mm	
	Weight	200 g +/- 10 g	
	Input	Input Efficiency	87.74 % at 115 Vac and 88.4 % at 230Vac
		Input frequency range	47 ~ 63 Hz
		Input AC current	Max. 1.4 A at 90 Vac
	Output	Output power	45 W
		DC output	19.5 V
		Hold-up time	5 ms at 115 Vac input
		Output current limit	<8.0A
	Connector	4.5mm Barrel Type	
Environmental Design	Operating temperature	32°F to 95°F (0°to 35°C)	



Technical Specifications

	EMI and Safety Certifications	Non-operating (storage) temperature	-4°F to 185°F (-20°to 85°C)
		Altitude	0 to 16,400 ft (0 to 5000m)
		Humidity	20% to 95%
		Storage Humidity	10% to 95%
		CE Mark - full compliance with LVD and EMC directives Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. MTBF - over 200,000 hours at 25°C ambient condition.	
AC Adapter 45 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.8m 2prong	Dimensions	95 x 45 x 26.8 mm	
	Weight	200 g +/- 10 g	
	Input	Input Efficiency	87.74 % at 115 Vac and 88.4 % at 230Vac
		Input frequency range	47 ~ 63 Hz
	Output	Input AC current	Max. 1.4 A at 90 VAC
		Output power	45 W
		DC output	19.5 V
		Hold-up time	5 ms at 115 Vac input
		Output current limit	<8.0A
		Connector 4.5mm Barrel Type	
	Environmental Design	Operating temperature	32°F to 95°F (0°to 35°C)
		Non-operating (storage) temperature	-4°F to 185°F (-20°to 85°C)
		Altitude	0 to 16,400 ft (0 to 5000m)
		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, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. MTBF - over 200,000 hours at 25°C ambient condition.	
AC Adapter 65 Watt nPFC Standard USB type C® Straight 1.8m	Dimensions	90.0 x 51 x 28.5mm	
	Weight	250 g +/- 10 g	
	Input	Input Efficiency	81.5% min at 115 Vac/ 230Vac @ 5V/3A
			86.7% min at 115 Vac/ 230Vac @ 9V/3A
			88% min at 115 Vac/ 230Vac @ 12V/5A
			89% min at 115 Vac/ 230Vac @ 15V/4.33A
			89% min at 115 Vac/ 230Vac @ 20V/3.25A
	Output	Input frequency range	47 ~ 63 Hz
		Input AC current	1.6 A at 90 VAC and maximum load
		Output power	65 W



Technical Specifications

	DC output	5V/9V/12V/15V/20V
	Hold-up time	5 ms at 115 Vac input
	Output current limit	8.0A Max.
Connector	USB Type C®	
Environmental Design	Operating temperature	32°F to 95°F (0° to 35°C)
	Non-operating (storage) temperature	-4°F to 185°F (-20° to 85°C)
	Altitude	0 to 16,400 ft (0 to 5000m)
	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, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. MTBF - over 200,000 hours at 25°C ambient condition.	

AC Adapter 65 Watt Smart nPFC EM Barrel 4.5mm New EM	Dimensions (H x W x D)	102 x 55 x 30mm
	Weight	250g +/-10%
	Input	Input Efficiency 88.0 % at 115 Vac and 89.0 % at 230 Vac Input frequency range 47 ~ 63 Hz Input AC current Max. 1.7 A at 90 Vac
	Output	Output power 65W DC output 19.5V Hold-up time 5 ms at 115 Vac input Output current limit <11.0A
	Connector	4.5mm Barrel Type
	Environmental Design	Operating temperature 32°F to 95°F (0° to 35°C)
		Non-operating (storage) temperature -4°F to 185°F (-20° to 85°C)
		Altitude 0 to 16,400 ft (0 to 5,000 m)
		Humidity 20% to 95%
	EMI and Safety Certifications	Storage Humidity 10% to 95%
		CE Mark - full compliance with LVD and EMC directives Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. MTBF - over 200,000 hours at 25°C ambient condition.



Technical Specifications

AC Adapter 65 Watt Smart nPFC Standard Barrel 4.5mm Right Angle 1.8m	Dimensions (H x W x D)	90 x 51 x 28.5mm		
	Weight	230g +/-10%		
	Input	Input Efficiency	88.0 % at 115 Vac and 89.0 % at 230 Vac	
		Input frequency range	47 ~ 63 Hz	
		Input AC current	Max. 1.7 A at 90 Vac	
		Output	Output power	65W
		DC output	19.5V	
		Hold-up time	5 ms at 115 Vac input	
		Output current limit	<11.0A	
	Connector	4.5mm Barrel Type		
	Environmental Design	Operating temperature	32°F to 95°F (0° to 35°C)	
		Non-operating (storage) temperature	-4°F to 185°F (-20° to 85°C)	
		Altitude	0 to 16,400 ft (0 to 5,000 m)	
		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, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE. MTBF - over 200,000 hours at 25°C ambient condition.			
Battery RH 3 Cell WHr 45 Long Life -PL Fast Charge	Dimensions (H x W x L)	6.2 x 68.7 x 249.6mm		
	Weight	190g		
	Cells/Type	3cell Lithium-Ion Polymer cell/ 545974		
	Voltage	11.4 V		
	Amp-hour capacity	3.950Ah		
	Watt-hour capacity	45 Wh		
	Operating (Charging)	32° to 113° F (0° to 45° C)		
	Operating (Discharging)	14° to 122° F (-10° to 60° C)		
	Optional Travel Battery Available	No		
	Warranty	Based on system offering		



Technical Specifications

Country of Origin

China



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

Type	Description	Part Number
Cases	HP Business Backpack (up to 17.3")	2SC67AA
	HP Business Slim Top Load (up to 15.6")	2SC65AA
	HP Prelude Pro Recycle Backpack (Montrose)	1X644AA
	HP Prelude Pro Recycle Top Load (Midtown)	1X645AA
	HP Recycled Top Load	5KN29AA
	HP Recycled Backpack	5KN28AA
Docking	HP USB-C Mini Dock	1PM64AA
	HP Thunderbolt Dock 120W G2	2UK37AA
	HP TB Dock G2 w/ Combo Cable	3TR87AA
	HP TB Dock 120W G2 w/Audio	3YE87AA
	HP TB Dock 120W G2 Cable	3XB94AA
	HP TB Dock G2 Combo Cable	3XB96AA
	HP TB Dock G2 Audio Module	3AQ21AA
	HP USB-C/A Universal Dock G2	5TW13AA
	HP USB-C Dock G5	5TW10AA
Input/Output	HP USB Essential Keyboard and Mouse	H6L29AA
	HP Wired Desktop 320MK Mouse & Keyboard	9SR36AA
	HP Bluetooth Travel Mouse	6SP30AA
	HP Comfort Grip Wireless Mouse	H2L63AA
	HP Wired Desktop 320M Mouse	9VA80AA
	HP USB Travel Mouse	G1K28AA
	HP Elite USB-C Hub	4WX89AA
	HP USB-C Travel Hub G2	7PJ38AA
	HP USB-C to RJ45 Adapter	V7W66AA
	HP USB-C to USB 3.0 Adapter	N2Z63AA
	HP USB-C to HDMI 2.0 Adapter	1WC36AA
Power	HP 45W Smart AC Adapter 4.5mm	H6Y88AA
	45W Smart Power Adapter 2 prong -4.5mm (Japan only)	L6F60AA
	65W Smart Power Adapter (w/ 4.5mm to 7.5mm DC dongle)	H6Y89AA
	HP 65W Slim AC Adapter	H6Y82AA
	HP 65W USB-C Slim Power Adapter	3PN48AA
	HP 45W LC USB-C Power Adapter	1MZ01AA
	HP 65W USB-C LC Power Adapter	TBD
	HP Power Bank	N9F71AA
	HP USB-C Notebook Power Bank	3TB55AA
Storage	HP External USB Optical Drive	F2B56AA



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

Security	HP Sure Key Cable Lock	6UW42AA
	HP Nano Keyed Cable Lock	1AJ39AA



Summary of Changes

Date of change:	Version History:		Description of change:
November 4, 2020	V1 to V2	Updated	Removed - Intel® Iris® X ^e Graphics from processor name and added Iris footnote in graphics section

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