

### HP ZBook X G1i 16 inch Mobile Workstation PC



- 1 Internal Microphone (2)
- 2 Webcam LED (Optional)
- 3 Webcam
- 4 Camera Shutter
- 5 IR Camera (Optional)
- 6 IR Camera LEDs (Optional)
- 7 Glass Clickpad

#### Left

- 8 Touch Fingerprint Sensor (Select models)
- 9 Power Button Key
- 10 Nano Security Lock Slot (Lock sold separately)
- 11 RJ45 Ethernet port
- 12 SuperSpeed USB Type-A 5Gbps signaling rate
- 13 SIM Card Slot (Optional)



- 1 LED Indicator
- 2 Power connector
- 3 2 Thunderbolt™ 4 with USB4 Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)1
- 4 HDMI 2.1 Port (Cable not included)

**Right**

- 5 SuperSpeed USB Type-A 5Gbps signaling rate
- 6 Audio Combo Jack
- 7 Smartcard Reader (Optional)

### At A Glance

- Premium ultraslim design with precision-crafted all-metal chassis for a premium look and feel
- Intel® Core™ Ultra9 processor; Intel® Core™ Ultra7 processor; Intel® Core™ Ultra5 processor
- Preinstalled with Windows 11 versions or FreeDOS
- 5MP camera (with 88 degree Field of View) with HP Auto Frame allows you to move around without losing viewers' attention during video calls
- DDR5 5600 memory with up to 64GB capacity and PCI Gen4 SSDs provide fast access to your work
- Choice of displays
  - 40.6 cm (16") diagonal, WUXGA (1920 x 1200), IPS, anti-glare, 300 nits, 45% NTSC;
  - 40.6 cm (16") diagonal, WUXGA (1920 x 1200), touch, IPS, anti-glare, 300 nits, 45% NTSC;
  - 40.6 cm (16") diagonal, WUXGA (1920 x 1200), IPS, anti-glare, 400 nits, 100% sRGB;
  - 40.6 cm (16") diagonal, WUXGA (1920 x 1200), IPS, anti-glare, 1000 nits, 100% sRGB, HP Sure View Reflect integrated privacy screen
  - 40.6 cm (16") diagonal, WQXGA(2560x1600), IPS, anti-glare, 400 nits, 100% sRGB, Low Blue light
  - 40.6 cm (16") diagonal, WQUXGA(3840x2400), IPS, anti-glare, 500 nits, 100% sRGB, HP Dreamcolor
- Premium keyboard layout to include easy use of discrete PgUp/Dn, End, and Home keys
- Optional NVIDIA RTX PRO 500/1000/2000 Blackwell pro graphics for improved performance for heavier graphics workloads.
- HP Wolf Security for Business creates a hardware-enforced, always-on, resilient defense.9
- Larger Clickpad surface for easier, more intuitive input
- Connectivity with optional HP KavalanR R15 5G/WWAN available world-wide, and Thunderbolt™ Docking (Dock sold separately)
- Undergoes MIL-STD 810H tests
- Supports fast charging (50% in 30 minutes) with no impact on battery recharge cycles3
- Designed to support all HP docking options

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



### PRODUCT NAME

HP ZBook X G1i 16 inch Mobile Workstation PC

### OPERATING SYSTEM

#### Preinstalled OS

Windows 11 Pro<sup>1</sup>  
Windows 11 Pro Education<sup>1</sup>  
Windows 11 Home - HP recommends Windows 11 Pro for business<sup>1</sup>  
Windows 11 Home Single Language - HP recommends Windows 11 Pro for business<sup>1</sup>  
Windows 11 Pro (Windows 11 Enterprise available with a Volume Licensing Agreement)<sup>1</sup>  
FreeDOS  
Ubuntu Linux 24.04

<sup>1</sup> Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows is automatically updated and enabled. High speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.windows.com>.

**NOTE:** Your product does not support Windows 8 or Windows 7. In accordance with Microsoft's support policy, HP does not support the Windows<sup>®</sup> 8 or Windows 7 operating system on products configured with Intel<sup>®</sup> and AMD<sup>®</sup> 7th generation and forward processors or provide any Windows<sup>®</sup> 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>

### PROCESSOR

Intel<sup>®</sup> Core™ Ultra 5 225H (Up to 4.9 GHz P-core Max Turbo frequency, 18 MB L3 cache, 4 P-cores ,8 E-Cores and 2 LP Cores , 14 threads);<sup>1,2,4,5,6</sup>

Intel<sup>®</sup> Core™ Ultra 5 235H (Up to 5 GHz P-core Max Turbo frequency, 18 MB L3 cache, 4 P-cores ,8 E-Cores and 2 LP Cores , 14 threads), supports Intel<sup>®</sup> vPro<sup>®</sup> Technology;<sup>1,2,3,4,5,6</sup>

Intel<sup>®</sup> Core™ Ultra 7 255H (Up to 5.1 GHz P-core Max Turbo frequency, 24 MB L3 cache, 6 P-cores, 8 E-cores and 2 LP Cores, 16 threads);<sup>1,2,4,5,6</sup>

Intel<sup>®</sup> Core™ Ultra 7 265H (Up to 5.3 GHz P-core Max Turbo frequency, 24 MB L3 cache, 6 P-cores, 8 E-cores and 2 LP Cores, 16 threads), supports Intel<sup>®</sup> vPro<sup>®</sup> Technology;<sup>1,2,3,4,5,6</sup>

Intel<sup>®</sup> Core™ Ultra 9 285H (Up to 5.4 GHz P-core Max Turbo frequency, 24 MB L3 cache, 6 P-cores 8 E-cores and 2 LP Cores, 16 threads), supports Intel<sup>®</sup> vPro<sup>®</sup> Technology;<sup>1,2,3,4,5,6</sup>



<sup>1</sup> 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.

<sup>2</sup> Intel Turbo Boost performance varies depending on hardware, software and overall system configuration. See <http://www.intel.com/technology/turboboost> for more information.

<sup>3</sup> Intel vPro<sup>®</sup> requires Windows 10 Pro 64 bit or higher, a vPro supported processor, vPro enabled chipset, vPro enabled wired LAN and/or Wi-Fi 6E WLAN and TPM 2.0. Some functionality requires additional 3rd party software in order to run. Features of vPro<sup>®</sup> Essentials and Enterprise vary. See <http://intel.com/vpro>

<sup>4</sup> 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>.

<sup>5</sup> Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.

<sup>6</sup> Features and software that require a NPU may require software purchase, subscription or enablement by a software or platform provider, and third-party software may have specific configuration or compatibility requirements. Performance varies by use, configuration, and other factors.

## GRAPHICS

### Integrated

Intel<sup>®</sup> Arc Graphics

### Discrete

NVIDIA RTX PRO 500 Blackwell (6GB)

NVIDIA RTX PRO 1000 Blackwell (8 GB)

NVIDIA RTX PRO 2000 Blackwell (8GB)

### Supports

Support HD decode, DX12, HDMI 2.1



### DISPLAY

#### Non-Touch

40.6 cm (16") diagonal, 2.5K (2560x1600) low blue light, 400n, 120Hz refresh rate 2.5K (2560 x 1600), 120 Hz, UWVA, anti-glare, Low Blue Light, 400 nits, DCI-P3 100%

40.6 cm (16") diagonal, WQUXGA (3840 x 2400), 120 Hz, UWVA, 500 nits, 100% DCI-P3, HP DreamColor

40.6 cm (16") diagonal, WUXGA (1920 x 1200), 60 Hz, UWVA, 300 nits, 62.5% sRGB; 16" diagonal, WUXGA (1920 x 1200), UWVA, Low Blue Light, 800 nits, 100% sRGB, HP Sure View Reflect 5 integrated privacy screen

40.6 cm (16") diagonal, WUXGA (1920 x 1200), 60 Hz, UWVA, Low Blue Light, 400 nits, 100% sRGB

#### Touch

40.6 cm (16") diagonal, WUXGA (1920 x 1200), touch, 60 Hz, UWVA, 300 nits, 62.5% sRGB

#### DisplayPort™ 1.2

HDMI 2.1 Support resolution up to 4K @60 Hz

#### Displays support

Supports dual display through the dock

#### Display Size

16"

40.64 cm (16")

<sup>1</sup>HD content required to view HD images.

<sup>2</sup>Sold separately or as an optional feature.

<sup>3</sup>Resolutions are dependent upon monitor capability, and resolution and color depth settings.

<sup>4</sup>HP Sure View 5 integrated privacy screen is an optional feature that must be configured at purchase and is designed to function in landscape orientation.

<sup>5</sup>Actual brightness will be lower with touchscreen or Sure View.



### Docking (Sold Separately)

|   |  |
|---|--|
| <b>Docking station model #1</b>   | HP Thunderbolt 280W G4 Dock  |
| <b>Total number of supported displays (incl. the notebook) display)</b> | 4  |
| <b>Max.resolutions supported</b>  | Quad 4K @60Hz Dual 8K single cable@30 for TB hosts or USB-C hosts DP 1.4 with DSC in high res mode   |
| <b>Dock Connectors</b>  | 2xDP, 1xVGA, 1xTB, 1xUSB-C alt-mode  |
| <b>Technical limitations</b>  | <p>Thunderbolt Hosts:<br/>Maximum of (4) displays with maximum resolution of 5K@ 30Hz running Thunderbolt host.<br/>Max resolution possible is dual 8K displays @ 60Hz running Thunderbolt host or running a non-Thunderbolt host in High Resolution mode @30Hz</p> <p>Non-Thunderbolt hosts:<br/>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</p> <p>Non-Thunderbolt hosts support (3) displays with a max 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.</p> |

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### STORAGE AND DRIVES

#### Primary M.2 Storage

2 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC  
1 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC  
4 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC  
512 GB PCIe® Gen4x4 NVMe™ M.2 SSD TLC  
512 GB PCIe® Gen4x4 NVMe™ SED TLC OPAL2  
512 GB PCIe® NVMe™ Value M.2 SSD

#### Secondary M.2 Storage

2 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC  
1 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC  
4 TB PCIe® Gen4x4 NVMe™ M.2 SSD TLC  
512 GB PCIe® Gen4x4 NVMe™ M.2 SSD TLC  
512 GB PCIe® Gen4x4 NVMe™ SED TLC OPAL2

<sup>1</sup>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.



### MEMORY

#### Maximum Memory

64GB DDR5-5600

#### Memory

64GB DDR5-5600 (2x32GB)

32GB DDR5-5600 (2x16GB)

32GB DDR5-5600 (1x32GB)

16GB DDR5-5600 (2x8GB)

16GB DDR5-5600 (1x16GB)

#### Memory Slots

2 SODIMM

DDR5 SODIMMS

Supports Dual Channel Memory

<sup>1</sup>All slots are non-accessible / non-upgradeable.

<sup>2</sup>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.

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### NETWORKING /COMMUNICATIONS

#### WLAN

Intel® Wi-Fi 7 BE201 and Bluetooth® 5.4 wireless card, vPro®; Intel® Wi-Fi 7 BE201 and Bluetooth® 5.4 wireless card, non-vPro®  
Intel® Wi-Fi 6E AX211 and Bluetooth® 5.3 wireless card, vPro®; Intel® Wi-Fi 6E AX211 and Bluetooth® 5.3 wireless card, non-vPro®

#### WWAN

HP KavalanR R15 5G Solution;  
LPWAN Qualcomm 9205 LTE-M

#### NFC

No Near Field Communication (NFC) module  
NFC Mirage WNC XRAV-1

#### Miracast

Native Miracast Support

#### Ethernet

Intel® I219-LM GbE, vPro®;  
Intel® I219-V GbE, non-vPro®

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### AUDIO/MULTIMEDIA

#### Audio

Audio by Poly

2 Integrated stereo speakers

Discrete Amplifiers

Integrated dual array microphone

#### Speaker Power

1W/8ohm Per speaker

#### Camera

FHD camera

5 MP+IR camera

#### Sensors

ALS (ambient light sensor)

Adaptive Color Sensor

Hall Sensor

HP Sure Platform

Motion AI LSM6DSL

Thermal Sensor

HP Tamper Lock

<sup>1</sup>HD content required to view HD images.

<sup>2</sup>Sold separately or as an optional feature.

<sup>3</sup>Internet access required.



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### KEYBOARDS/POINTING DEVICES/BUTTONS & FUNCTION KEYS

#### Keyboard

HP Premium Keyboard, spill resistant, Backlit keyboard and DuraKeys

HP Premium Keyboard, spill resistant, Backlit keyboard and DuraKeys Privacy

#### Pointing Device

Clickpad with multi-touch gesture support, taps enabled as default

Microsoft Precision Touchpad Default Gestures Support

#### Function Keys

ESC: system information

F1 - Display Switching

F2 - Blank or Privacy

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 - HP Command Center

home

end

Power Button (with LED)

delete

#### Hidden Keys

Fn+R - Break

Fn+S - Sys Rq

Fn+C - Scroll Lock

Backlit keyboard is an optional feature.



### SOFTWARE AND SECURITY

#### Software

Buy Microsoft Office (Sold Separately)  
CoPilot in Windows with CoPilot Key <sup>1</sup>  
Edge Customization  
HP Connection Optimizer  
HP Hotkey Support  
HP Mac Address Manager  
HP Notifications  
HP PC Hardware Diagnostics UEFI  
HP PC Hardware Diagnostics Windows  
HP Privacy Settings  
HP Services Scan <sup>2</sup>  
HP Smart Support <sup>3</sup>  
HP Support Assistant <sup>4</sup>  
myHP  
HSA Fusion for Commercial  
HSA Telemetry for Commercial  
Poly Camera Pro  
Poly Lens <sup>5</sup>

#### Manageability Features

HP Client Catalog (download) <sup>6</sup>  
HP Client Management Script Library (download) <sup>7</sup>  
HP Cloud Recovery <sup>8</sup>  
HP Connect for Microsoft Endpoint Manager  
HP Driver Packs (download) <sup>9</sup>  
HP Image Assistant (download) <sup>10</sup>  
HP Manageability Integration Kit (download) <sup>11</sup>  
HP Power Manager with Battery Health Manager (download) <sup>12</sup>

#### Security Management

Secured-Core PC Enable  
Windows Hello Enhanced Sign-In Security (ESS)  
HP Wolf Security for Business which includes: <sup>13</sup>  
HP Sure Admin <sup>14</sup>  
HP Sure Click <sup>15</sup>  
HP Sure Recover <sup>16</sup>  
HP Sure Run <sup>17</sup>  
HP Sure Sense <sup>18</sup>  
HP Sure Start <sup>19</sup>  
HP Tamper Lock



### BIOS

Absolute Persistence Module <sup>20</sup>

Audio Perminant Disable

HP BIOS Recovery

HP Fingerprint Sensor <sup>21</sup>

BIOS Update via Network

HP BIOSphere <sup>22</sup>

HP DriveLock & Automatic DriveLock

HP Secure Erase <sup>23</sup>

HP Wake on WLAN

1. Copilot+ in Windows requires Windows 11. Some features require an NPU. Timing of feature delivery and availability varies by market and device. Requires Microsoft account to log in. Where Microsoft in Windows is not available, the Copilot key will lead to the Bing search engine. See [aka.ms/copilotpluspcs](https://aka.ms/copilotpluspcs).
2. HP Services Scan is preinstalled and/or provided thru Windows Update and checks for service entitlement on each hardware device and downloads the applicable software agent automatically. To disable this feature, please follow the instructions at <http://www.hpdaas.com/requirements>. The HP Insights agent is a telemetry and analytics platform that provides critical data around devices and applications and is not sold as a standalone service. HP follows stringent GDPR privacy regulations and is ISO27001, ISO27701, ISO27017 and SOC2 Type2 certified for Information Security. Internet access with connection to the HP Insights agent is required. For full system requirements, please visit <http://www.hpdaas.com/requirements>. Not available in China.
3. HP Smart Support requires the HP Insights agent to be installed. For more information about how to enable or to download HP Smart Support, please visit <http://www.hp.com/smart-support>. HP Services Scan is preinstalled and/or provided thru Windows Update and will check entitlement on each hardware device to determine if an HP Insights agent-enabled service has been purchased, and will download applicable software automatically. HP Insights agent is a telemetry and analytics platform that provides critical data around devices and applications and is not sold as a standalone service. HP follows stringent GDPR privacy regulations and is ISO27001, ISO27701, ISO27017 and SOC2 Type2 certified for Information Security. Internet access is required. For full system requirements or to disable this feature, please visit <https://www.hpdaas.com/requirements>.
4. HP Support Assistant is available on Windows. For more information, please visit [www.support.hp.com/help/hp-support-assistant](http://www.support.hp.com/help/hp-support-assistant).
5. Poly Lens Desktop requires a Windows OS.
6. HP Client Catalog not preinstalled, however available for download at (<https://www.hp.com/us-en/solutions/client-management-solutions.html>)
7. HP Client Management Script Library (<https://www.hp.com/us-en/solutions/client-management-solutions.html#tab=manageability-tools>).
8. HP Cloud Recovery is available for Z by HP, HP Elite and Pro desktops and laptops PCs with Intel® or AMD processors and requires an open, network connection. **NOTE:** You must back up important files, data, photos, videos, etc. before use to avoid loss of data. Detail please refer to: <https://support.hp.com/us-en/computer>.
9. HP Driver Packs not preinstalled, however available for download at <http://www.hp.com/go/clientmanagement>.
10. HP Image Assistant not preinstalled, however available for download at (<https://ftp.ext.hp.com/pub/caps-softpaq/cmit/HPIA.html>),
11. HP Manageability Integration Kit not presintalled, however available for downloaded from <https://www.hp.com/us-en/solutions/client-management-solutions.html#tab=manageability-tools>.
12. HP Power Manager with Battery Health can be downloaded by entering your system information here: [https://support.hp.com/in-en/document/ish\\_4449597-3519507-16](https://support.hp.com/in-en/document/ish_4449597-3519507-16).
13. HP Wolf Security for Business requires Windows 10 or 11 Pro or higher, includes various HP security features and is available on HP Pro, Elite, RPOS and Workstation products. See product details for included security features.



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14. 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.
  15. HP Sure Click requires Windows 10 and higher. See [https://bit.ly/2PrLT6A\\_SureClick](https://bit.ly/2PrLT6A_SureClick) for complete details.
  16. HP Sure Recover is available on select HP PCs and requires Windows 10 or 11 and an open network connection. You must back up important files, data, photos, videos, etc. before using HP Sure Recover to avoid loss of data. HP Sure Recover Gen6 with Embedded Reimaging is an optional feature on select HP PCs which requires Windows 10 or 11 must be configured at purchase. You must back up important files, data, photos, videos, etc. before use to avoid loss of data.
  17. HP Sure Run is available on select HP PCs and requires Windows 10 and higher.
  18. HP Sure Sense requires Windows 10 and higher. See product specifications for availability. On units with WWAN shipping to China, HP Sure Sense is only available via Softpaq download.
  19. HP Sure Start is available on select HP PCs and requires Windows 10 and higher.
  20. Absolute Persistence firmware module is shipped turned off and can only be activated with the purchase a license subscription and full activation of the software agent. License subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. Certain conditions apply. For full details visit: <https://www.absolute.com/about/legal/agreements/absolute/>.
  21. HP Fingerprint Reader is an optional feature that requires Windows 10 or 11 and must be configured at purchase.
  22. HP BIOSphere features may vary depending on the platform and configuration.
  23. HP Secure Erase implements the methods outlined in the National Institute of Standards and Technology Special Publication 800-88r "Clear" sanitation method. HP Secure Erase does not support platforms with Intel® Optane™.
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### POWER

#### Power Supply <sup>16</sup>

HP Smart 150 W External AC power adapter

#### Battery

HP Long Life 6-cell, 83 Wh Li-ion polymer

#### Power Cord

3-wire plug - 1 m

#### Battery life

TBC

<sup>1</sup>Availability may vary by country.

<sup>2</sup>Battery is internal and not replaceable by customer. Serviceable by warranty.

<sup>3</sup>Windows 11 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](http://www.bapco.com) for additional details.

<sup>4</sup>Testing conducted by HP using Google Chrome OS power\_LoadTest. Battery life will vary and the maximum capacity of the battery will naturally decrease with time and usage and battery optimization activation. See <http://www.chromium.org/chromium-os/testing/power-testing> for test details.

<sup>5</sup>Recharges your battery up to 50% within 30 minutes when the system is off or in standby mode. Power adapter with a minimum capacity of 65 watts is required. After charging has reached 50% capacity, charging will return to normal. Charging time may vary +/-10% due to System tolerance.

<sup>6</sup>Recharges up to 90% within 90 minutes when the system is off or in standby mode when used with the power adapter provided with the notebook. After charging has reached 90% capacity, charging speed will return to normal. Charging time may vary +/-10% due to System tolerance.

<sup>7</sup>Actual battery Watt-hours (Wh) will vary from design capacity. Battery capacity will naturally decrease with shelf life, time, usage, environment, temperature, system configuration, loaded apps, features, power management settings and other factors.



### WEIGHT & DIMENSIONS

#### Weight<sup>1</sup>

Product Weight-

Starting at 4.5 lbs

Starting at 2.04 KG

#### Product Dimensions (w x d x h)

14.15 inches (W) x 9.88 inches (D) x (HF) 0.90 inches (HR)

359.40 mm (W) x 251 mm (D) x (HF) 22.9 mm (HR)

<sup>1</sup>Weight will vary by configuration. Does not include power adapter.

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### PORTS/SLOTS

- 2 Thunderbolt™ 4 with USB4 Type-C® 40Gbps signaling rate (USB Power Delivery, DisplayPort™ 1.4)
- 2 Super Speed USB Type-A 5Gbps signaling rate (1 charging)
- 1 HDMI 2.1
- 1 Headphone/microphone combo jack
- 1 Nano Security Lock Slot (Lock sold separately)
- 1 Smartcard reader (Optional)
- 1 nano SIM card slot
- 1 SD card reader

### Expansion Slots

- 1 SD
  - 1 multi-format digital media reader
- Supports SD, SDHC, SDXC

<sup>1</sup>SuperSpeed USB 20Gbps is not available with Thunderbolt™ 4.

<sup>2</sup>HDMI cable sold separately.

<sup>3</sup>SIM slot is not user accessible without WWAN configuration.



### SERVICE AND SUPPORT

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. Refer to <http://www.hp.com/support/batterywarranty/> for additional battery information. On-site service and extended coverage is also available. HP Care Pack<sup>1</sup> 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>.

<sup>1</sup>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.

### Certification and Compliance

ENERGY STAR<sup>®</sup> certified

EPEAT<sup>®</sup> 2019 registered where applicable. EPEAT<sup>®</sup> registration varies by country. See [www.epeat.net](http://www.epeat.net) for registration status by country.

EPEAT<sup>®</sup> 2025 Gold

TCO 10 Certified

RCTA DO-160G

Medical EMC: IEC 60601-1-2:2014 EN60601-1-2: 2015

SEPA

GS Mark

Eyesafe Certification – Worldwide

### Sustainable Impact Specifications

Recycled Aluminum and Magnesium, 75% PCR w/30% ITE plastics

<sup>1</sup>Based on US EPEAT<sup>®</sup> registration according to IEEE 1680.1-2018 EPEAT<sup>®</sup>. Status varies by country. Visit [www.epeat.net](http://www.epeat.net) for more information.

<sup>2</sup>External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

<sup>3</sup>Percentage of ocean-bound plastic contained in each component varies by product.

<sup>4</sup>100% outer box packaging and corrugated cushions made from sustainably sourced certified and recycled fibers.

<sup>5</sup>Plastic cushions are made from >90% recycled plastic.

<sup>6</sup>Recycled plastic content percentage is based on the definition set in the IEEE 1680.1-2018 standard.

<sup>7</sup>ITE Derived Closed Loop Plastic percentage is based on the definition set in the IEEE 1680.1-2018 standard.

<sup>8</sup>Molded pulp cushions made from 100% recycled wood fiber and organic materials.



### SYSTEM UNIT

#### Stand-Alone Power Requirements (AC Power)

|   |   |
|---|---|
| <b>Nominal Operating Voltage</b>                | 19V   |
| <b>Average Operating Power</b>                  |   |
| <b>Integrated graphics</b>                      | Yes   |
| <b>Discrete Graphics</b>                        | Yes   |
| <b>Max Operating Power</b>                      | 150W  |
| <b>Temperature</b>                              |   |
| <b>Operating</b>                                | 32° to 95° F (0° to 35° C)<br>(No sustained direct exposure to sunlight)<br>(System performance may be reduced above 32°C (89.6°F)) |
| <b>Non-operating</b>                            | -4° to 140° F (-20° to 60° C)   |
| <b>Relative Humidity</b>                        |   |
| <b>Operating</b>                                | 10% to 90% (non-condensing)   |
| <b>Non-operating</b>                            | 5% to 95%<br>(38.7° C (101.6° F) maximum wet bulb temperature; non-condensing)  |
| <b>Shock</b>                                    |   |
| <b>Operating</b>                                | 40 G, 2 ms, half-sine   |
| <b>Non-operating</b>                            | 240 G, 2 ms, half-sine  |
| <b>Random Vibration</b>                         |   |
| <b>Operating</b>                                | 1.043 grms  |
| <b>Non-operating</b>                            | 3.5 grms  |
| <b>Altitude (unpressurized)</b>                 |   |
| <b>Operating</b>                                | 10,000 ft (3,048 m)   |
| <b>Non-operating</b>                            | 40,000 ft (12,192 m)  |
| <b>Planned Industry Standard Certifications</b> |   |
| <b>Regulatory Model Number</b>                  | HSN-Q40C  |
| <b>UL</b>                                       | Yes   |
| <b>CSA</b>                                      | Yes   |
| <b>FCC Compliance</b>                           | Yes   |
| <b>ENERGY STAR®</b>                             | Yes   |
| <b>EPEAT</b>                                    | Yes   |
| <b>ICES</b>                                     | Yes   |
| <b>Australia /</b>                              | Yes   |
| <b>NZ A-Tick Compliance</b>                     | Yes   |
| <b>CCC</b>                                      | Yes   |
| <b>Japan VCCI Compliance</b>                    | Yes   |
| <b>KC</b>                                       | Yes   |
| <b>BSMI</b>                                     | Yes   |
| <b>CE Marking Compliance</b>                    | Yes   |
| <b>BNCI or BELUS</b>                            |   |
| <b>CIT</b>                                      |   |
| <b>GOST</b>                                     |   |
| <b>Saudi Arabian Compliance (ICCP)</b>          | Yes   |



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**SABS**  
**UKRSERTCOMPUTER**

Yes

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### DISPLAYS

Actual brightness will be lower with touchscreen or HP Sure View.  
Availability may vary by country

**16.0 in 2.5K (2560 x 1600)**  
**Anti-Glare UWVA WLED+LBL**  
**AD-100 400 eDP 1.4+PSR2**  
**120Hz (VRR) bent LCD Panel**

|   |                              |
|---|------------------------------|
| <b>Outline Dimensions (W x H x D)</b>                       | 349.98 x 224.82 (max)        |
| <b>Active Area</b>  | 344.6784x215.424 (typ)       |
| <b>Weight</b>   | 280 (max)                    |
| <b>Diagonal Size</b>  | 16                           |
| <b>Thickness</b>  | 2.3 / 4.1 (max)              |
| <b>Interface</b>  | eDP1.4                       |
| <b>Surface Treatment</b>                                    | Anti-Glare                   |
| <b>Touch Enabled</b>  | No                           |
| <b>Contrast Ratio</b>                                       | 2000:1 (typ)                 |
| <b>Refresh Rate</b>   | 120 (typ)                    |
| <b>Brightness</b>   | 400 (typ)                    |
| <b>Pixel Resolution - Format</b>                            | 2560 x 1600 (2.5K)           |
| <b>Backlight</b>  | WLED                         |
| <b>Pixel Resolution</b>                                     | RGB                          |
| <b>Color Gamut Coverage</b>                                 | Adobe RGB 100% + DCI-PC 100% |
| <b>Color Depth</b>  | 8                            |
| <b>Viewing Angle</b>  | UWVA 89/89/89/89             |
| <b>Low Blue Light</b>                                       | Yes                          |
| <b>Power Consumption (W, EBL@ 150nits max/ 200nits max)</b> | 2.5 (max)/ 3.0 (max)         |

**16.0 in WUXGGA (1920 x1200)**  
**Anti-Glare UWVA LED sRGB**  
**62.5 8bit 300 eDP 1.2 w.o PSR**  
**60Hz bent LCD Panel**

|                                       |                          |
|---------------------------------------|--------------------------|
| <b>Outline Dimensions (W x H x D)</b> | 350.680 x 226.070 (max)  |
| <b>Active Area</b>                    | 344.6784 x 215.424 (typ) |
| <b>Weight</b>                         | 390 (max)                |
| <b>Diagonal Size</b>                  | 16                       |
| <b>Thickness</b>                      | 3.0 / 4.8 (max)          |
| <b>Interface</b>                      | eDP 1.2                  |
| <b>Surface Treatment</b>              | Anti-Glare               |
| <b>Touch Enabled</b>                  | No                       |
| <b>Contrast Ratio</b>                 | 1000:1(typ)              |
| <b>Refresh Rate</b>                   | 60 (typ)                 |



|   |                       |
|---|-----------------------|
| <b>Brightness</b>   | 300 (typ)             |
| <b>Pixel Resolution - Format</b>                            | 1920 x 1200 (WUXGA)   |
| <b>Backlight</b>  | WLED                  |
| <b>Pixel Resolution</b>                                     | RGB                   |
| <b>Color Gamut Coverage</b>                                 | sRGB 62.5%            |
| <b>Color Depth</b>  | 8                     |
| <b>Viewing Angle</b>  | UWVVA 89/89/89/89     |
| <b>Low Blue Light</b>                                       | No                    |
| <b>Power Consumption (W, EBL@ 150nits max/ 200nits max)</b> | 2.7 (max) / 3.4 (max) |

**16.0 in WUXGA (1920 x 1200)  
Anti-Glare UWVA LED sRGB  
62.5 8bit 300 TOP eDP 1.2 w/o  
PSR 60Hz bent LCD Panel**

|   |                         |
|---|-------------------------|
| <b>Outline Dimensions (W x H x D)</b>                       | 350.680 x 226.070 (max) |
| <b>Active Area</b>  | 344.680 x 215.420 (typ) |
| <b>Weight</b>   | 400 (max)               |
| <b>Diagonal Size</b>  | 16                      |
| <b>Thickness</b>  | 3 / 4.8 (max)           |
| <b>Interface</b>  | eDP1.2                  |
| <b>Surface Treatment</b>                                    | Anti-Glare              |
| <b>Touch Enabled</b>  | Yes                     |
| <b>Contrast Ratio</b>                                       | 1000 : 1 (typ.)         |
| <b>Refresh Rate</b>   | 60 (typ)                |
| <b>Brightness</b>   | 300 (typ)               |
| <b>Pixel Resolution - Format</b>                            | 1920 x 1200 (WUXGA)     |
| <b>Backlight</b>  | WLED                    |
| <b>Pixel Resolution</b>                                     | RGB                     |
| <b>Color Gamut Coverage</b>                                 | sRGB 62.5%              |
| <b>Color Depth</b>  | 8                       |
| <b>Viewing Angle</b>  | UWVA 89/89/89/89        |
| <b>Low Blue Light</b>                                       | Yes                     |
| <b>Power Consumption (W, EBL@ 150nits max/ 200nits max)</b> | 2.43 (max) / 3.03 (max) |

**16.0 in WUXGA (1920 x 1200)  
Anti-Glare UWVA Low Blue  
Light sRGB 100 800 eDP  
1.4+PSR+IOL Sure View 5 bent  
LCD Panel**

|                                       |                        |
|---------------------------------------|------------------------|
| <b>Outline Dimensions (W x H x D)</b> | 349.980 x 224.82 (max) |
|---------------------------------------|------------------------|



|   |                         |
|---|-------------------------|
| <b>Active Area</b>  | 344.680 x 215.420 (typ) |
| <b>Weight</b>   | 310 (max)               |
| <b>Diagonal Size</b>  | 16                      |
| <b>Thickness</b>  | 2.3/4.1 (max)           |
| <b>Interface</b>  | eDP 1.4                 |
| <b>Surface Treatment</b>                                    | Anti-Glare              |
| <b>Touch Enabled</b>  | No                      |
| <b>Contrast Ratio</b>                                       | 1500 : 1 (typ)          |
| <b>Refresh Rate</b>   | 60 (typ)                |
| <b>Brightness</b>   | 800 (typ)               |
| <b>Pixel Resolution - Format</b>                            | 1920 x 1200 (WUXGA)     |
| <b>Backlight</b>  | WLED                    |
| <b>Pixel Resolution</b>                                     | RGB                     |
| <b>Color Gamut Coverage</b>                                 | sRGB 100%               |
| <b>Color Depth</b>  | 8                       |
| <b>Viewing Angle</b>  | UWVA 89/89/89/89        |
| <b>Low Blue Light</b>                                       | Yes                     |
| <b>Power Consumption (W, EBL@ 150nits max/ 200nits max)</b> | 1.93(max)/2.38(max)     |

**16.0 in WUXGA (1920 x 1200)**  
**Anti-Glare UWVA WLED+LBL**  
**sRGB NB2Y 400 eDP 1.4+PSR2**  
**Low-Power 100 bent LCD Panel**

|   |                         |
|---|-------------------------|
| <b>Outline Dimensions (W x H x D)</b>                       | 350.680 x 226.470 (max) |
| <b>Active Area</b>  | 344.678 x 215.424 (typ) |
| <b>Weight</b>   | 330 (max)               |
| <b>Diagonal Size</b>  | 16                      |
| <b>Thickness</b>  | 2.6 / 4.6 (max)         |
| <b>Interface</b>  | eDP1.4                  |
| <b>Surface Treatment</b>                                    | Anti-Glare              |
| <b>Touch Enabled</b>  | No                      |
| <b>Contrast Ratio</b>                                       | 1000:1 (typ)            |
| <b>Refresh Rate</b>   | 60 (typ)                |
| <b>Brightness</b>   | 400 (typ)               |
| <b>Pixel Resolution - Format</b>                            | 1920 x 1200 (WUXGA)     |
| <b>Backlight</b>  | WLED                    |
| <b>Pixel Resolution</b>                                     | RGB                     |
| <b>Color Gamut Coverage</b>                                 | sRGB 100%               |
| <b>Color Depth</b>  | 8                       |
| <b>Viewing Angle</b>  | UWVA 89/89/89/89        |
| <b>Low Blue Light</b>                                       | Yes                     |
| <b>Power Consumption (W, EBL@ 150nits max/ 200nits max)</b> | 1.60 (max)/ 1.95 (max)  |



150nits max/ 200nits max)

16.0 in WQUXGA DRM (3840 x 2400) Anti-Glare UWVA LED DCI-P3 NB2Y 500 eDP1.4 w/o PSR 100 120Hz bent LCD Panel

|   |                         |
|---|-------------------------|
| <b>Outline Dimensions (W x H x D)</b>                       | 349.980 x 225.420 (max) |
| <b>Active Area</b>  | 344.680 x 215.420 (typ) |
| <b>Weight</b>   | 300 (max)               |
| <b>Diagonal Size</b>  | 16                      |
| <b>Thickness</b>  | 2.3 / 4.1 (max)         |
| <b>Interface</b>  | eDP1.4                  |
| <b>Surface Treatment</b>                                    | Anti-Glare              |
| <b>Touch Enabled</b>  | No                      |
| <b>Contrast Ratio</b>                                       | 1200:1 (typ)            |
| <b>Refresh Rate</b>   | 120 (typ)               |
| <b>Brightness</b>   | 500 (typ)               |
| <b>Pixel Resolution - Format</b>                            | 3840 x 2400 (WQUXGA)    |
| <b>Backlight</b>  | WLED                    |
| <b>Pixel Resolution</b>                                     | RGB                     |
| <b>Color Gamut Coverage</b>                                 | DCI-P3 100%             |
| <b>Color Depth</b>  | 8                       |
| <b>Viewing Angle</b>  | UWVA 89/89/89/89        |
| <b>Low Blue Light</b>                                       | No                      |
| <b>Power Consumption (W, EBL@ 150nits max/ 200nits max)</b> | 4.98 (max)/ 5.84 (max)  |



### STORAGE

#### SSD 2TB 2280 PCIe-4x4 NVMe Three Layer Cell

|                                 |  |
|---------------------------------|--|
| <b>Form Factor</b>              | M.2 2280                                 |
| <b>Capacity</b>                 | 2TB                                      |
| <b>NAND Type</b>                | TLC                                      |
| <b>Height</b>                   | 0.09 in (2.3 mm)                         |
| <b>Width</b>                    | 0.87 in (22 mm)                          |
| <b>Weight</b>                   | 0.02 lb (10 g)                           |
| <b>Interface</b>                | PCIe NVMe Gen4X4                         |
| <b>Maximum Sequential Read</b>  | 6400 MB/s $\pm$ 20%                      |
| <b>Maximum Sequential Write</b> | 5000 MB/s $\pm$ 20%                      |
| <b>Logical Blocks</b>           | 4000797360                               |
| <b>Operating Temperature</b>    | 32° to 158°F (0° to 70°C) [ambient temp] |
| <b>Features</b>                 | Pyrite 2.0; TRIM; L1.2                   |

#### SSD 1TB 2280 PCIe-4x4 NVMe Three Layer Cell

|                                 |  |
|---------------------------------|--|
| <b>Form Factor</b>              | M.2 2280                                 |
| <b>Capacity</b>                 | 1TB                                      |
| <b>NAND Type</b>                | TLC                                      |
| <b>Height</b>                   | 0.09 in (2.3 mm)                         |
| <b>Width</b>                    | 0.87 in (22 mm)                          |
| <b>Weight</b>                   | 0.02 lb (10 g)                           |
| <b>Interface</b>                | PCIe NVMe Gen4X4                         |
| <b>Maximum Sequential Read</b>  | 6400 MB/s $\pm$ 20%                      |
| <b>Maximum Sequential Write</b> | 5000 MB/s $\pm$ 20%                      |
| <b>Logical Blocks</b>           | 2000409264                               |
| <b>Operating Temperature</b>    | 32° to 158°F (0° to 70°C) [ambient temp] |
| <b>Features</b>                 | Pyrite 2.0; TRIM; L1.2                   |

#### SSD 512GB 2280 PCIe-4x4 NVMe Three Layer Cell

|                                 |                     |
|---------------------------------|---------------------|
| <b>Form Factor</b>              | M.2 2280            |
| <b>Capacity</b>                 | 512GB               |
| <b>NAND Type</b>                | TLC                 |
| <b>Height</b>                   | 0.09 in (2.3 mm)    |
| <b>Width</b>                    | 0.87 in (22 mm)     |
| <b>Weight</b>                   | 0.02 lb (10 g)      |
| <b>Interface</b>                | PCIe NVMe Gen4X4    |
| <b>Maximum Sequential Read</b>  | 6400 MB/s $\pm$ 20% |
| <b>Maximum Sequential Write</b> | 3500 MB/s $\pm$ 20% |



|                              |  |
|------------------------------|--|
| <b>Logical Blocks</b>        | 1000215215                               |
| <b>Operating Temperature</b> | 32° to 158°F (0° to 70°C) [ambient temp] |
| <b>Features</b>              | Pyrite 2.0; TRIM; L1.2                   |

### SSD 512GB 2280 PCIe NVMe Value

|                                 |  |
|---------------------------------|--|
| <b>Form Factor</b>              | M.2 2280                                 |
| <b>Capacity</b>                 | 512 GB                                   |
| <b>NAND Type</b>                | Value                                    |
| <b>Height</b>                   | 0.09 in (2.3 mm)                         |
| <b>Width</b>                    | 0.87 in (22 mm)                          |
| <b>Weight</b>                   | 0.02 lb (10 g)                           |
| <b>Interface</b>                | PCIe NVMe Gen4X4                         |
| <b>Maximum Sequential Read</b>  | 3500 MB/s ±20%                           |
| <b>Maximum Sequential Write</b> | 1600 MB/s ±20%                           |
| <b>Logical Blocks</b>           | 1000215215                               |
| <b>Operating Temperature</b>    | 32° to 158°F (0° to 70°C) [ambient temp] |
| <b>Features</b>                 | Pyrite 2.0; TRIM; L1.2                   |

### 4TB PCIe-4x4 2280 NVMe Three Layer Cell double-sided M.2 Solid State Drive

|                                 |  |
|---------------------------------|--|
| <b>Form Factor</b>              | M.2 2280                                 |
| <b>Capacity</b>                 | 4TB                                      |
| <b>NAND Type</b>                | TLC                                      |
| <b>Height</b>                   | 0.14 in (3.65 mm)                        |
| <b>Width</b>                    | 0.87 in (22 mm)                          |
| <b>Weight</b>                   | 15g                                      |
| <b>Interface</b>                | PCIe NVMe Gen4X4                         |
| <b>Maximum Sequential Read</b>  | 6400 MB/s ±20%                           |
| <b>Maximum Sequential Write</b> | 5000 MB/s ±20%                           |
| <b>Logical Blocks</b>           | 8001573552                               |
| <b>Operating Temperature</b>    | 32° to 158°F (0° to 70°C) [ambient temp] |
| <b>Features</b>                 | Pyrite 2.0; TRIM; L1.2                   |

### 2TB PCIe-4x4 2280 NVMe Self Encrypted OPAL2 Three Layer Cell Solid State Drive

|                    |          |
|--------------------|----------|
| <b>Form Factor</b> | M.2 2280 |
| <b>Capacity</b>    | 2TB      |
| <b>NAND Type</b>   | TLC      |



|                                 |  |
|---------------------------------|--|
| <b>Height</b>                   | 0.09 in (2.3 mm)                         |
| <b>Width</b>                    | 0.87 in (22 mm)                          |
| <b>Weight</b>                   | 0.02 lb (10 g)                           |
| <b>Interface</b>                | PCIe NVMe Gen4X4                         |
| <b>Maximum Sequential Read</b>  | 6400 MB/s ±20%                           |
| <b>Maximum Sequential Write</b> | 5000 MB/s ±20%                           |
| <b>Logical Blocks</b>           | 4000797360                               |
| <b>Operating Temperature</b>    | 32° to 158°F (0° to 70°C) [ambient temp] |
| <b>Features</b>                 | Pyrite 2.0; TRIM; L1.2                   |

### 1TB PCIe-4x4 2280 NVME Self Encrypted OPAL2 Three Layer Cell Solid State Drive

|                                 |  |
|---------------------------------|--|
| <b>Form Factor</b>              | M.2 2280                                 |
| <b>Capacity</b>                 | 1TB                                      |
| <b>NAND Type</b>                | TLC                                      |
| <b>Height</b>                   | 0.09 in (2.3 mm)                         |
| <b>Width</b>                    | 0.87 in (22 mm)                          |
| <b>Weight</b>                   | 0.02 lb (10 g)                           |
| <b>Interface</b>                | PCIe NVMe Gen4X4                         |
| <b>Maximum Sequential Read</b>  | 6400 MB/s ±20%                           |
| <b>Maximum Sequential Write</b> | 5000 MB/s ±20%                           |
| <b>Logical Blocks</b>           | 2000409264                               |
| <b>Operating Temperature</b>    | 32° to 158°F (0° to 70°C) [ambient temp] |
| <b>Features</b>                 | Pyrite 2.0; TRIM; L1.2                   |

### 512GB PCIe-4x4 2280 NVME Self Encrypted OPAL2 Three Layer Cell Solid State Drive

|                                 |  |
|---------------------------------|--|
| <b>Form Factor</b>              | M.2 2280                                 |
| <b>Capacity</b>                 | 512GB                                    |
| <b>NAND Type</b>                | TLC                                      |
| <b>Height</b>                   | 0.09 in (2.3 mm)                         |
| <b>Width</b>                    | 0.87 in (22 mm)                          |
| <b>Weight</b>                   | 0.02 lb (10 g)                           |
| <b>Interface</b>                | PCIe NVMe Gen4X4                         |
| <b>Maximum Sequential Read</b>  | 6400 MB/s ±20%                           |
| <b>Maximum Sequential Write</b> | 3500 MB/s ±20%                           |
| <b>Logical Blocks</b>           | 1000215215                               |
| <b>Operating Temperature</b>    | 32° to 158°F (0° to 70°C) [ambient temp] |
| <b>Features</b>                 | TCG Opal 2.0; TRIM; L1.2                 |





### NETWORKING / COMMUNICATION

Intel® BE201 Wi-Fi 7

Bluetooth® 5.4 vPro WW WLAN

1

|  |  |
|--|--|
| <b>Wireless LAN Standards</b>              | IEEE 802.11a<br>IEEE 802.11b<br>IEEE 802.11g<br>IEEE 802.11n<br>IEEE 802.11ac<br>IEEE 802.11ax<br>IEEE 802.11be<br>IEEE 802.11d<br>IEEE 802.11e<br>IEEE 802.11h<br>IEEE 802.11i<br>IEEE 802.11k<br>IEEE 802.11r<br>IEEE 802.11v  |
| <b>Interoperability<br/>Frequency Band</b> | Wi-Fi certified<br>802.11b/g/n/ax/be<br>2.402 – 2.482 GHz<br>802.11a/n/ac/ax/be<br>4.9 – 4.95 GHz (Japan)<br>5.15 – 5.25 GHz<br>5.25 – 5.35 GHz<br>5.47 – 5.725 GHz<br>5.825 – 5.850 GHz<br>5.955 – 6.415 GHz<br>6.435 – 6.515 GHz<br>6.535 – 6.875 GHz<br>6.895 – 7.115 GHz |
| <b>Data Rates</b>                          | 802.11b: 1, 2, 5.5, 11 Mbps<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n: max 300Mbps<br>802.11ac : 1733Mbps<br>802.11ax : max 2.4Gbps<br>802.11be : max 5.76Gbps  |
| <b>Modulation</b>                          | Direct Sequence Spread Spectrum<br>OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM, 4096QAM  |



|   |   |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
|---|---|---------------------|-------|--|--------------|-------|--|-----------------|--------|-------------------|-----------|--|-------|--|--|---------------------|-------------------|------|--|----------------|------|--|
| <b>Security<sup>3</sup></b>             | <p>IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only</p> <p>AES-CCMP: 128 bit in hardware</p> <p>802.1x authentication</p> <p>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</p> <p>WPA2 certification</p> <p>WPA3 certification</p> <p>IEEE 802.11i</p> <p>WAPI</p>  |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| <b>Network Architecture Models</b>      | <p>Ad-hoc (Peer to Peer)</p> <p>Infrastructure (Access Point Required)</p>  |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| <b>Roaming</b>                          | <p>IEEE 802.11 compliant roaming between access points</p>  |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| <b>Output Power<sup>2</sup></b>         | <p>802.11b, 1Mbps : +17dBm minimum</p> <p>802.11g, 6Mbps : +16dBm minimum</p> <p>802.11a, 6Mbps : +17dBm minimum</p> <p>802.11n, MCS7(HT20) : +14dBm minimum</p> <p>802.11n, MCS7(HT40) : +13.5dBm minimum</p> <p>802.11ac MCS9(VHT20) : 13.5dBm minimum</p> <p>802.11ac MCS9(VHT40) : +13.5dBm minimum</p> <p>802.11ac MCS9(VHT80) : +12.5dBm minimum</p> <p>802.11ac MCS9(VHT160) : +10.5dBm minimum</p> <p>802.11ax MCS11(HE20)(6GHz) : +11.5dBm minimum</p> <p>802.11ax MCS11(HE40)(6GHz) : +7.5dBm minimum</p> <p>802.11ax MCS11(HE80)(6GHz) : +7.5dBm minimum</p> <p>802.11ax MCS11(HE160)(6GHz) : +7.5dBm minimum</p> <p>802.11be MCS13(EHT20)(6GHz) : 11.5dBm</p> <p>802.11be MCS13(EHT40)(6GHz) : 7.5dBm</p> <p>802.11be MCS13(EHT80)(6GHz) : 7.5dBm</p> <p>802.11be MCS13(EHT160)(6GHz) : 6.5dBm</p> <p>802.11be MCS13(EHT320)(6GHz) : 4.5dBm</p> |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| <b>Power Consumption</b>                | <table border="0"> <tr> <td>Transmit mode</td> <td>3.1 W</td> <td></td> </tr> <tr> <td>Receive mode</td> <td>1.8 W</td> <td></td> </tr> <tr> <td>Idle mode (PSP)</td> <td>180 mW</td> <td>(WLAN Associated)</td> </tr> <tr> <td>Idle mode</td> <td></td> <td>50 mW</td> </tr> <tr> <td></td> <td></td> <td>(WLAN unassociated)</td> </tr> <tr> <td>Connected Standby</td> <td>10mW</td> <td></td> </tr> <tr> <td>Radio disabled</td> <td>8 mW</td> <td></td> </tr> </table>   | Transmit mode       | 3.1 W |  | Receive mode | 1.8 W |  | Idle mode (PSP) | 180 mW | (WLAN Associated) | Idle mode |  | 50 mW |  |  | (WLAN unassociated) | Connected Standby | 10mW |  | Radio disabled | 8 mW |  |
| Transmit mode                           | 3.1 W   |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| Receive mode                            | 1.8 W   |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| Idle mode (PSP)                         | 180 mW  | (WLAN Associated)   |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| Idle mode                               |   | 50 mW               |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
|   |   | (WLAN unassociated) |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| Connected Standby                       | 10mW  |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| Radio disabled                          | 8 mW  |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| <b>Power Management</b>                 | <p>ACPI and PCI Express compliant power management</p>  |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |
| <b>Receiver Sensitivity<sup>3</sup></b> | <p>802.11 compliant power saving mode</p> <p>802.11b, 1Mbps : -93.5dBm maximum</p> <p>802.11b, 11Mbps : -85dBm maximum</p>  |                     |       |  |              |       |  |                 |        |                   |           |  |       |  |  |                     |                   |      |  |                |      |  |



|                                |  |
|--------------------------------|--|
|                                | 802.11a/g, 6Mbps : -90.5dBm maximum  |
|                                | 802.11a/g, 54Mbps : -72.5dBm maximum   |
|                                | 802.11n, MCS0(HT20) : -90dBm maximum   |
|                                | 802.11n, MCS7(HT20) : -71.5dBm maximum   |
|                                | 802.11n, MCS0(HT40) : -88.5dBm maximum   |
|                                | 802.11n, MCS7(HT40) : -68.5dBm maximum   |
|                                | 802.11ac, MCS9(VHT20) : -88.5dBm maximum   |
|                                | 802.11ac, MCS9(VHT40) : -65.5dBm maximum   |
|                                | 802.11ac, MCS9(VHT80) : -60.5dBm maximum   |
|                                | 802.11ac, MCS9(VHT160) : -58.5dBm maximum  |
|                                | 802.11ax, MCS11(HE20)(6GHz) : -59.5dBm maximum   |
|                                | 802.11ax, MCS11(HE40)(6GHz) : -56.5dBm maximum   |
|                                | 802.11ax, MCS11(HE80)(6GHz) : -53.5dBm maximum   |
|                                | 802.11ax, MCS11(HE160)(6GHz) : -51.5dBm maximum  |
|                                | 802.11be, MCS13(EHT20)(6GHz) : -55.5dBm maximum  |
|                                | 802.11be, MCS13(EHT40)(6GHz) : -53.5dBm maximum  |
|                                | 802.11be, MCS13(EHT80)(6GHz) : -51.5dBm maximum  |
|                                | 802.11be, MCS13(EHT160)(6GHz) : -48.5dBm maximum   |
|                                | 802.11be, MCS13(EHT320)(6GHz) : -45.5dBm maximum   |
| <b>Antenna type</b>            | High efficiency antenna with spatial diversity<br>Two embedded tri-band 2.4/5/6 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications |
| <b>Form Factor</b>             | PCI-Express M.2 MiniCard   |
| <b>Dimensions</b>              | 1. Type 2230 : 2.3 x 22.0 x 30.0 mm<br>2. Type 1216 : 1.67 x 12.0 x 16.0 mm  |
| <b>Weight</b>                  | 1. Type 2230 : 2.8g<br>2. Type 1216 : 1.3g   |
| <b>Operating Voltage</b>       | 3.3v +/- 9%  |
| <b>Temperature</b>             | Operating: 14° to 158° F (-10° to 70° C)<br>Non-operating: -40° to 176° F (-40° to 80° C)  |
| <b>Humidity</b>                | Operating: 10% to 90% (non-condensing)<br>Non-operating: 5% to 95% (non-condensing)  |
| <b>Altitude</b>                | Operating: 0 to 10,000 ft (3,048 m)<br>Non-operating: 0 to 50,000 ft (15,240 m)  |
| <b>LED Activity</b>            | LED Amber – Radio OFF; LED OFF – Radio ON  |
| <b>Subtitle</b>                | HP Integrated Module with Bluetooth  |
| <b>Bluetooth Specification</b> | 4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Wireless Technology  |
| <b>Bluetooth Specification</b> | 4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Compliant  |
| <b>Frequency Band</b>          | 2402 to 2480 MHz   |



|   |  |
|---|--|
| <b>Number of Available Channels</b>               | Legacy : 0~79 (1 MHz/CH)<br>BLE : 0~39 (2 MHz/CH)  |
| <b>Data Rates and Throughput</b>                  | Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps<br>BLE : 1 Mbps data rate; throughput up to 0.2 Mbps<br>Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels<br>Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)   |
| <b>Transmit Power</b>                             | The Bluetooth component shall operate as a Class I Bluetooth device with a maximum transmit power of +15.5 dBm for BR and +13dBm for EDR.  |
| <b>Power Consumption</b>                          | Peak (Tx): 330 mW<br>Peak (Rx): 230 mW<br>Selective Suspend: 17 mW   |
| <b>Bluetooth Software Supported Link Topology</b> | 1. Microsoft Windows Bluetooth Software<br>2. Linux/Chrome OS Bluetooth Software.  |
| <b>Power Management</b>                           | ACPI and PCI Express compliant power management<br>802.11 compliant power saving mode  |
| <b>Certifications</b>                             | FCC (47 CFR) Part 15C/E, Section 15.247, 15.249, 15.407  |
| <b>Bluetooth Profiles Supported</b>               | ETSI 300 328, ETSI 301 893, ETSI 303 687<br>BT4.1-ESR 5/6/7 Compliance<br>LE Link Layer Ping<br>LE Dual Mode<br>LE Link Layer<br>LE Low Duty Cycle Directed Advertising<br>LE L2CAP Connection Oriented Channels<br>Train Nudging & Interlaced Scan<br>BT4.2 ESR08 Compliance<br>LE Secure Connection- Basic/Full<br>LE Privacy 1.2 –Link Layer Privacy<br>LE Privacy 1.2 –Extended Scanner Filter Policies<br>LE Data Packet Length Extension<br>FAX Profile (FAX)<br>Basic Imaging Profile (BIP)2<br>Headset Profile (HSP)<br>Hands Free Profile (HFP)<br>Advanced Audio Distribution Profile (A2DP)<br>BT5.2<br>ESR9/10 Compliance<br>LE Advertisement Extensions<br>Channel Selection Algo |



Limited High Duty Cycle Non-Connectable Advertising  
 2Mbps LE  
 LE Long Range  
 BT5.3  
 Host to Controller Encryption Key Control Enhancements  
 Compliance to the latest Errata Section 12.3 of BT 5.3 specification

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

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

**Intel® BE201 Wi-Fi 7**

**Bluetooth® 5.4 non-vPro WW  
 WLAN <sup>1</sup>**

**Wireless LAN Standards**

IEEE 802.11a  
 IEEE 802.11b  
 IEEE 802.11g  
 IEEE 802.11n  
 IEEE 802.11ac  
 IEEE 802.11ax  
 IEEE 802.11be  
 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  
 802.11b/g/n/ax/be  
 2.402 – 2.482 GHz  
 802.11a/n/ac/ax/be  
 4.9 – 4.95 GHz (Japan)  
 5.15 – 5.25 GHz  
 5.25 – 5.35 GHz  
 5.47 – 5.725 GHz  
 5.825 – 5.850 GHz  
 5.955 – 6.415 GHz  
 6.435 – 6.515 GHz  
 6.535 – 6.875 GHz  
 6.895 – 7.115 GHz



|                                    |   |
|------------------------------------|---|
| <b>Data Rates</b>                  | <p>802.11b: 1, 2, 5.5, 11 Mbps</p> <p>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</p> <p>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps</p> <p>802.11n: max 300Mbps</p> <p>802.11ac : 1733Mbps</p> <p>802.11ax : max 2.4Gbps</p> <p>802.11be : max 5.76Gbps</p>  |
| <b>Modulation</b>                  | <p>Direct Sequence Spread Spectrum</p> <p>OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM, 4096QAM</p>  |
| <b>Security<sup>3</sup></b>        | <p>IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only</p> <p>AES-CCMP: 128 bit in hardware</p> <p>802.1x authentication</p> <p>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.</p> <p>WPA2 certification</p> <p>WPA3 certification</p> <p>IEEE 802.11i</p> <p>WAPI</p>  |
| <b>Network Architecture Models</b> | <p>Ad-hoc (Peer to Peer)</p> <p>Infrastructure (Access Point Required)</p>  |
| <b>Roaming</b>                     | <p>IEEE 802.11 compliant roaming between access points</p>  |
| <b>Output Power<sup>2</sup></b>    | <p>802.11b, 1Mbps : +17dBm minimum</p> <p>802.11g, 6Mbps : +16dBm minimum</p> <p>802.11a, 6Mbps : +17dBm minimum</p> <p>802.11n, MCS7(HT20) : +14dBm minimum</p> <p>802.11n, MCS7(HT40) : +13.5dBm minimum</p> <p>802.11ac MCS9(VHT20) : 13.5dBm minimum</p> <p>802.11ac MCS9(VHT40) : +13.5dBm minimum</p> <p>802.11ac MCS9(VHT80) : +12.5dBm minimum</p> <p>802.11ac MCS9(VHT160) : +10.5dBm minimum</p> <p>802.11ax MCS11(HE20)(6GHz) : +11.5dBm minimum</p> <p>802.11ax MCS11(HE40)(6GHz) : +7.5dBm minimum</p> <p>802.11ax MCS11(HE80)(6GHz) : +7.5dBm minimum</p> <p>802.11ax MCS11(HE160)(6GHz) : +7.5dBm minimum</p> <p>802.11be MCS13(EHT20)(6GHz) : 11.5dBm</p> <p>802.11be MCS13(EHT40)(6GHz) : 7.5dBm</p> <p>802.11be MCS13(EHT80)(6GHz) : 7.5dBm</p> <p>802.11be MCS13(EHT160)(6GHz) : 6.5dBm</p> <p>802.11be MCS13(EHT320)(6GHz) : 4.5dBm</p> |



|   |  |
|---|--|
| <b>Power Consumption</b>                | <p>Transmit mode 3.1 W</p> <p>Receive mode 1.8 W</p> <p>Idle mode (PSP) 180 mW (WLAN Associated)</p> <p>Idle mode 50 mW (WLAN unassociated)</p> <p>Connected Standby 10mW</p> <p>Radio disabled 8 mW</p>   |
| <b>Power Management</b>                 | ACPI and PCI Express compliant power management  |
| <b>Receiver Sensitivity<sup>3</sup></b> | <p>802.11 compliant power saving mode</p> <p>802.11b, 1Mbps : -93.5dBm maximum</p> <p>802.11b, 11Mbps : -85dBm maximum</p> <p>802.11a/g, 6Mbps : -90.5dBm maximum</p> <p>802.11a/g, 54Mbps : -72.5dBm maximum</p> <p>802.11n, MCS0(HT20) : -90dBm maximum</p> <p>802.11n, MCS7(HT20) : -71.5dBm maximum</p> <p>802.11n, MCS0(HT40) : -88.5dBm maximum</p> <p>802.11n, MCS7(HT40) : -68.5dBm maximum</p> <p>802.11ac, MCS9(VHT20) : -88.5dBm maximum</p> <p>802.11ac, MCS9(VHT40) : -65.5dBm maximum</p> <p>802.11ac, MCS9(VHT80) : -60.5dBm maximum</p> <p>802.11ac, MCS9(VHT160) : -58.5dBm maximum</p> <p>802.11ax, MCS11(HE20)(6GHz) : -59.5dBm maximum</p> <p>802.11ax, MCS11(HE40)(6GHz) : -56.5dBm maximum</p> <p>802.11ax, MCS11(HE80)(6GHz) : -53.5dBm maximum</p> <p>802.11ax, MCS11(HE160)(6GHz) : -51.5dBm maximum</p> <p>802.11be, MCS13(EHT20)(6GHz) : -55.5dBm maximum</p> <p>802.11be, MCS13(EHT40)(6GHz) : -53.5dBm maximum</p> <p>802.11be, MCS13(EHT80)(6GHz) : -51.5dBm maximum</p> <p>802.11be, MCS13(EHT160)(6GHz) : -48.5dBm maximum</p> <p>802.11be, MCS13(EHT320)(6GHz) : -45.5dBm maximum</p> |
| <b>Antenna type</b>                     | <p>High efficiency antenna with spatial diversity</p> <p>Two embedded tri-band 2.4/5/6 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications</p>  |
| <b>Form Factor</b>                      | PCI-Express M.2 MiniCard   |
| <b>Dimensions</b>                       | <p>1. Type 2230 : 2.3 x 22.0 x 30.0 mm</p> <p>2. Type 1216: 1.67 x 12.0 x 16.0 mm</p>  |
| <b>Weight</b>                           | <p>1. Type 2230 : 2.8g</p> <p>2. Type 1216: 1.3g</p>   |



|   |  |
|---|--|
| <b>Operating Voltage</b>                          | 3.3v +/- 9%  |
| <b>Temperature</b>                                | Operating: 14° to 158° F (–10° to 70° C)<br>Non-operating: –40° to 176° F (–40° to 80° C)  |
| <b>Humidity</b>                                   | Operating: 10% to 90% (non-condensing)<br>Non-operating: 5% to 95% (non-condensing)  |
| <b>Altitude</b>                                   | Operating: 0 to 10,000 ft (3,048 m)<br>Non-operating: 0 to 50,000 ft (15,240 m)  |
| <b>LED Activity</b>                               | LED Amber – Radio OFF; LED OFF – Radio ON  |
| <b>Subtitle</b>                                   | HP Integrated Module with Bluetooth  |
| <b>Bluetooth Specification</b>                    | 4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Wireless Technology  |
| <b>Frequency Band</b>                             | 4.0/4.1/4.2/5.0/5.1/5.2/5.3/5.4 Compliant  |
| <b>Number of Available Channels</b>               | Legacy : 0~79 (1 MHz/CH)<br>BLE : 0~39 (2 MHz/CH)  |
| <b>Data Rates and Throughput</b>                  | Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps<br>BLE : 1 Mbps data rate; throughput up to 0.2 Mbps<br>Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels<br>Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5) |
| <b>Transmit Power</b>                             | The Bluetooth component shall operate as a Class I Bluetooth device with a maximum transmit power of +15.5 dBm for BR and +13dBm for EDR.  |
| <b>Power Consumption</b>                          | Peak (Tx): 330 mW<br>Peak (Rx): 230 mW<br>Selective Suspend: 17 mW   |
| <b>Bluetooth Software Supported Link Topology</b> | 1. Microsoft Windows Bluetooth Software<br>2. Linux/Chrome OS Bluetooth Software.  |
| <b>Power Management</b>                           | ACPI and PCI Express compliant power management<br>802.11 compliant power saving mode  |
| <b>Certifications</b>                             | FCC (47 CFR) Part 15C/E, Section 15.247, 15.249, 15.407  |
| <b>Bluetooth Profiles Supported</b>               | ETSI 300 328, ETSI 301 893, ETSI 303 687<br>BT4.1-ESR 5/6/7 Compliance<br>LE Link Layer Ping<br>LE Dual Mode<br>LE Link Layer<br>LE Low Duty Cycle Directed Advertising<br>LE L2CAP Connection Oriented Channels<br>Train Nudging & Interlaced Scan<br>BT4.2 ESR08 Compliance<br>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)  
 BT5.2  
 ESR9/10 Compliance  
 LE Advertisement Extensions  
 Channel Selection Algo  
 Limited High Duty Cycle Non-Connectable Advertising  
 2Mbps LE  
 LE Long Range  
 BT5.3  
 Host to Controller Encryption Key Control Enhancements  
 Compliance to the latest Errata Section 12.3 of BT 5.3 specification

1. Wi-Fi 7 requires a Wi-Fi 7 router, sold separately, to function in the 6GHz band. Availability of public wireless access points limited. Wi-Fi 7 is backwards compatible with prior 802.11 specs. And available in countries where Wi-Fi 7 is supported. Wi-Fi 7 is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels.
2. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CKK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).

**Intel® AX211 Wi-Fi 6E**  
**Bluetooth® 5.3 vPro WLAN<sup>1</sup>**

|                               |  |
|-------------------------------|--|
| <b>Wireless LAN Standards</b> | IEEE 802.11a<br>IEEE 802.11b<br>IEEE 802.11g<br>IEEE 802.11n<br>IEEE 802.11ac<br>IEEE 802.11ax<br>IEEE 802.11d<br>IEEE 802.11e<br>IEEE 802.11h<br>IEEE 802.11i<br>IEEE 802.11k<br>IEEE 802.11r<br>IEEE 802.11v |
| <b>Interoperability</b>       | Wi-Fi certified  |
| <b>Frequency Band</b>         | 802.11b/g/n/ax<br>2.402 – 2.482 GHz<br>802.11a/n/ac/ax   |



|                                    |   |
|------------------------------------|---|
|                                    | 4.9 – 4.95 GHz (Japan)  |
|                                    | 5.15 – 5.25 GHz   |
|                                    | 5.25 – 5.35 GHz   |
|                                    | 5.47 – 5.725 GHz  |
|                                    | 5.825 – 5.850 GHz   |
|                                    | 5.955 – 6.415 GHz   |
|                                    | 6.435 – 6.515 GHz   |
|                                    | 6.535 – 6.875 GHz   |
|                                    | 6.895 – 7.115 GHz   |
| <b>Data Rates</b>                  | 802.11b: 1, 2, 5.5, 11 Mbps<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n: max 300Mbps<br>802.11ac : 1733Mbps<br>802.11ax : max 2.4Gbps  |
| <b>Modulation</b>                  | Direct Sequence Spread Spectrum<br>OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM<br>, 1024QAM  |
| <b>Security</b>                    | IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only<br>AES-CCMP: 128 bit in hardware<br>802.1x authentication<br>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.<br>WPA2 certification<br>WPA3 certification<br>IEEE 802.11i<br>WAPI   |
| <b>Network Architecture Models</b> | Ad-hoc (Peer to Peer)<br>Infrastructure (Access Point Required)   |
| <b>Roaming</b>                     | IEEE 802.11 compliant roaming between access points   |
| <b>Output Power</b>                | 802.11b : +17dBm minimum<br>802.11g : +16dBm minimum<br>802.11a : +17dBm minimum<br>802.11n HT20(2.4GHz) : +14dBm minimum<br>802.11n HT40(2.4GHz) : +13dBm minimum<br>802.11n HT20(5GHz) : +14dBm minimum<br>802.11n HT40(5GHz) : +13dBm minimum<br>802.11ac VHT80(5GHz) : +10dBm minimum<br>802.11ac VHT160(5GHz) : +10dBm minimum<br>802.11ax HE40(2.4GHz) : +12dBm minimum |





|   |  |
|---|--|
| <b>LED Activity</b>                               | LED Amber – Radio OFF; LED OFF – Radio ON  |
| <b>Subtitle</b>                                   | Integrated Bluetooth® specifications   |
| <b>Bluetooth Specification</b>                    | 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Compliant  |
| <b>Frequency Band</b>                             | 2402 to 2480 MHz   |
| <b>Number of Available Channels</b>               | Legacy : 0~79 (1 MHz/CH)<br>BLE : 0~39 (2 MHz/CH)  |
| <b>Data Rates and Throughput</b>                  | Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps<br>BLE : 1 Mbps data rate; throughput up to 0.2 Mbps<br>Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels<br>Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)   |
| <b>Transmit Power</b>                             | The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.  |
| <b>Power Consumption</b>                          | Peak (Tx): 330 mW<br>Peak (Rx): 230 mW<br>Selective Suspend: 17 mW   |
| <b>Bluetooth Software Supported Link Topology</b> | 1. Microsoft Windows Bluetooth Software<br>2. Linux/Chrome OS Bluetooth Software.  |
| <b>Power Management</b>                           | ACPI and PCI Express compliant power management<br>802.11 compliant power saving mode  |
| <b>Certifications</b>                             | FCC (47 CFR) Part 15C/E, Section 15.247, 15.249, 15.407  |
| <b>Bluetooth Profiles Supported</b>               | ETSI 300 328, ETSI 301 893, ETSI 303 687<br>BT4.1-ESR 5/6/7 Compliance<br>LE Link Layer Ping<br>LE Dual Mode<br>LE Link Layer<br>LE Low Duty Cycle Directed Advertising<br>LE L2CAP Connection Oriented Channels<br>Train Nudging & Interlaced Scan<br>BT4.2 ESR08 Compliance<br>LE Secure Connection- Basic/Full<br>LE Privacy 1.2 –Link Layer Privacy<br>LE Privacy 1.2 –Extended Scanner Filter Policies<br>LE Data Packet Length Extension<br>FAX Profile (FAX)<br>Basic Imaging Profile (BIP)2<br>Headset Profile (HSP)<br>Hands Free Profile (HFP)<br>Advanced Audio Distribution Profile (A2DP) |



- BT5.2
- ESR9/10 Compliance
- LE Advertisement Extensions
- Channel Selection Algo
- Limited High Duty Cycle Non-Connectable Advertising
- 2Mbps LE
- LE Long Range
- BT5.3
- Host to Controller Encryption Key Control Enhancements
- Compliance to the latest Errata Section 12.3 of BT 5.3 specification

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.

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® AX211 Wi-Fi 6E

### Bluetooth® 5.3 WW WLAN <sup>1</sup>

#### 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
- IEEE 802.11r
- IEEE 802.11v

#### Interoperability Frequency Band

- Wi-Fi certified
- 802.11b/g/n/ax
- 2.402 – 2.482 GHz
- 802.11a/n/ac/ax
- 4.9 – 4.95 GHz (Japan)
- 5.15 – 5.25 GHz
- 5.25 – 5.35 GHz
- 5.47 – 5.725 GHz
- 5.825 – 5.850 GHz
- 5.955 – 6.415 GHz
- 6.435 – 6.515 GHz



|                                    |  |
|------------------------------------|--|
| <b>Data Rates</b>                  | 6.535 – 6.875 GHz<br>6.895 – 7.115 GHz<br>802.11b: 1, 2, 5.5, 11 Mbps<br>802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br>802.11n: max 300Mbps<br>802.11ac : 1733Mbps<br>802.11ax : max 2.4Gbps   |
| <b>Modulation</b>                  | Direct Sequence Spread Spectrum<br>OFDM, BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM, 1024QAM   |
| <b>Security</b>                    | IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only<br>AES-CCMP: 128 bit in hardware<br>802.1x authentication<br>WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.<br>WPA2 certification<br>WPA3 certification<br>IEEE 802.11i<br>WAPI  |
| <b>Network Architecture Models</b> | Ad-hoc (Peer to Peer)<br>Infrastructure (Access Point Required)  |
| <b>Roaming</b>                     | IEEE 802.11 compliant roaming between access points  |
| <b>Output Power</b>                | 802.11b : +17dBm minimum<br>802.11g : +16dBm minimum<br>802.11a : +17dBm minimum<br>802.11n HT20(2.4GHz) : +14dBm minimum<br>802.11n HT40(2.4GHz) : +13dBm minimum<br>802.11n HT20(5GHz) : +14dBm minimum<br>802.11n HT40(5GHz) : +13dBm minimum<br>802.11ac VHT80(5GHz) : +10dBm minimum<br>802.11ac VHT160(5GHz) : +10dBm minimum<br>802.11ax HE40(2.4GHz) : +12dBm minimum<br>802.11ax HE80(5GHz) : +10dBm minimum<br>802.11ax HE160(5GHz) : +10dBm minimum |
| <b>Power Consumption</b>           | Transmit mode 2.0 W<br>Receive mode 1.6 W<br>Idle mode (PSP) 180 mW (WLAN Associated)<br>Idle mode 50 mW (WLAN unassociated)   |



|   |  |
|---|--|
|   | Connected Standby 10mW   |
|   | Radio disabled 8 mW  |
| <b>Power Management</b>                 | ACPI and PCI Express compliant power management  |
|   | 802.11 compliant power saving mode   |
| <b>Receiver Sensitivity<sup>4</sup></b> | 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   |
| <b>Antenna type</b>                     | High efficiency antenna with spatial diversity<br>Two embedded tri-band 2.4/5/6 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications |
| <b>Form Factor</b>                      | PCI-Express M.2 MiniCard   |
| <b>Dimensions</b>                       | 1. Type 2230 : 2.3 x 22.0 x 30.0 mm<br>2. Type 1216: 1.67 x 12.0 x 16.0 mm   |
| <b>Weight</b>                           | 1. Type 2230 : 2.8g<br>2. Type 1216: 1.3g  |
| <b>Operating Voltage</b>                | 3.3v +/- 9%  |
| <b>Temperature</b>                      | Operating: 14° to 158° F (-10° to 70° C)<br>Non-operating: -40° to 176° F (-40° to 80° C)  |
| <b>Humidity</b>                         | Operating: 10% to 90% (non-condensing)<br>Non-operating: 5% to 95% (non-condensing)  |
| <b>Altitude</b>                         | Operating: 0 to 10,000 ft (3,048 m)<br>Non-operating: 0 to 50,000 ft (15,240 m)  |
| <b>LED Activity</b>                     | LED Amber – Radio OFF; LED OFF – Radio ON  |
| <b>Subtitle</b>                         | HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0/5.1/5.2/5.3<br>Wireless Technology   |
| <b>Bluetooth Specification</b>          | 4.0/4.1/4.2/5.0/5.1/5.2/5.3 Compliant  |
| <b>Frequency Band</b>                   | 2402 to 2480 MHz   |
| <b>Number of Available Channels</b>     | Legacy : 0~79 (1 MHz/CH)<br>BLE : 0~39 (2 MHz/CH)  |



|   |   |
|---|---|
| <b>Data Rates and Throughput</b>                  | Legacy : 3 Mbps data rate; throughput up to 2.17 Mbps<br>BLE : 1 Mbps data rate; throughput up to 0.2 Mbps<br>Legacy : Synchronous Connection Oriented links up to 3, 64 kbps, voice channels<br>Legacy : Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)  |
| <b>Transmit Power</b>                             | The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 9.5 dBm for BR and EDR.   |
| <b>Power Consumption</b>                          | Peak (Tx): 330 mW<br>Peak (Rx): 230 mW<br>Selective Suspend: 17 mW  |
| <b>Bluetooth Software Supported Link Topology</b> | 1. Microsoft Windows Bluetooth Software<br>2. Linux/Chrome OS Bluetooth Software.   |
| <b>Power Management</b>                           | ACPI and PCI Express compliant power management<br>802.11 compliant power saving mode   |
| <b>Certifications</b>                             | FCC (47 CFR) Part 15C/E, Section 15.247, 15.249, 15.407   |
| <b>Bluetooth Profiles Supported</b>               | ETSI 300 328, ETSI 301 893, ETSI 303 687<br>BT4.1-ESR 5/6/7 Compliance<br>LE Link Layer Ping<br>LE Dual Mode<br>LE Link Layer<br>LE Low Duty Cycle Directed Advertising<br>LE L2CAP Connection Oriented Channels<br>Train Nudging & Interlaced Scan<br>BT4.2 ESR08 Compliance<br>LE Secure Connection- Basic/Full<br>LE Privacy 1.2 –Link Layer Privacy<br>LE Privacy 1.2 –Extended Scanner Filter Policies<br>LE Data Packet Length Extension<br>FAX Profile (FAX)<br>Basic Imaging Profile (BIP)2<br>Headset Profile (HSP)<br>Hands Free Profile (HFP)<br>Advanced Audio Distribution Profile (A2DP)<br>BT5.2<br>ESR9/10 Compliance<br>LE Advertisement Extensions<br>Channel Selection Algo<br>Limited High Duty Cycle Non-Connectable Advertising<br>2Mbps LE |



LE Long Range

BT5.3

Host to Controller Encryption Key Control Enhancements

Compliance to the latest Errata Section 12.3 of BT 5.3 specification

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

### HP 5G Sub-6 Cat 19

#### Technology/Operating bands

WCDMA/HSPA+ operating bands:

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

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

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

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

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

LTE FDD/TDD operating bands:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Band 29: 717 to 728 MHz (DL)

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

Band 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 46: 5150 to 5925 MHz (DL)                        |
|                                    | Band 48: 3550 to 3700 MHz (UL/DL)                     |
|                                    | Band 66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL) |
|                                    | Band 71: 663 to 698 MHz (UL), 617 to 652 MHz (DL)     |
|                                    | 5G NR Sub 6GHz  |
|                                    | n1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL)      |
|                                    | n2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL)      |
|                                    | n3: 1710 to 1785 MHz (UL), 1805 to 1880 MHz (DL)      |
|                                    | n5: 824 to 849 MHz (UL), 869 to 894 MHz (DL)          |
|                                    | n7: 2500 to 2570 MHz (UL), 2620 to 2690 MHz (DL)      |
|                                    | n8: 880 to 915 MHz (UL), 925 to 960 MHz (DL)          |
|                                    | n20: 832 to 862 MHz (UL), 791 to 821 MHz (DL)         |
|                                    | n25: 1850 to 1915 MHz (UL), 1930 to 1995 MHz (DL)     |
|                                    | n28: 703 to 748 MHz (UL), 758 to 803 MHz (DL)         |
|                                    | n30: 2305 to 2315 MHz (UL) 2350 to 2360 MHz (DL)      |
|                                    | n38: 2570 to 2620 MHz (UL/DL)                         |
|                                    | n40: 2300 to 2400 MHz (UL/DL)                         |
|                                    | n41: 2496 to 2690 MHz (UL/DL)                         |
|                                    | n48: 3550 to 3700 MHz (UL/DL)                         |
|                                    | n66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL)     |
|                                    | n71: 663 to 698 MHz (UL), 617 to 652 MHz (DL)         |
|                                    | n77: 3300 to 4200 MHz (UL/DL)                         |
|                                    | n78: 3300 to 3800 MHz (UL/DL)                         |
|                                    | n79: 4400 to 5000 MHz (UL/DL)                         |
| <b>Wireless protocol standards</b> | NR Sub6G rel15  |
|                                    | 200MHz 2 DLCA, 256 QAM                                |
|                                    | 200MHz 2 ULCA, 256 QAM                                |
|                                    | 15KHz/30KHz SCS for FDD/TDD                           |
|                                    | LTE Rel15   |
|                                    | 100MHz 5 DLCA, 256 QAM                                |
|                                    | 40MHz 2 ULCA, 256 QAM                                 |
|                                    | UMTS Rel8   |
| <b>GPS</b>                         | GPS only support L1 C/A                               |
| <b>GPS bands</b>                   | GPS: L1 (1575.42MHz)                                  |
|                                    | GLONASS: L1 (1602MHz)                                 |
|                                    | BeidouB1(1561.098MHz)                                 |
|                                    | Galileo E1 (1575.42)                                  |
|                                    | QZSS(1575.42 MHz)                                     |
| <b>Maximum data rates</b>          | Sub-6 SA Peak   |
|                                    | DL 4.67Gbps/UL 1.25Gbps                               |
|                                    | Sub-6 NSA Peak  |
|                                    | DL 3.74Gbps/UL 835Mbps                                |



|  |  |
|--|--|
| <b>Maximum output power</b>                        | <p>LTE Peak<br/>DL 1.6Gbps (CAT19)/UL 211Mbps (CAT18)<br/>UMTS/HSPA+<br/>DL DC-HSPA+: 42 Mbps (CAT24)/UL 11.5 Mbps (CAT7)<br/>NR :<br/>23 dBm in all band except (n30 = 22dBm &amp; n48=21dBm &amp; n77=25dBm &amp; n41/n77/n78 = 26dBm)<br/>LTE:<br/>23 dBm in all band except (B30 = 22dBm &amp; B48=21dBm &amp; B41=26dBm)<br/>UMTS:<br/>23.5 dBm</p> |
| <b>Maximum power consumption</b>                   | 3500 mA (peak); 1674mA (average)   |
| <b>Form Factor</b>                                 | M.2, 3052-S3 Key B   |
| <b>Weight</b>                                      | 8.7g   |
| <b>Dimensions<br/>(Length x Width x Thickness)</b> | 52 mm x 30 mm x 2.3 mm   |
| <b>embedded eSIM</b>                               | Support  |

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

### Qualcomm 9205

|                                    |  |
|------------------------------------|--|
| <b>Technology/Operating bands</b>  | <p>FDD LTE: 2100 (Band 1), 1900 (Band 2), 1800 (Band 3), 1700/2100 (Band 4), 850 (Band 5), 900 (Band 8), 700 (Band 12 lower), 700 (Band 13 upper), 700 (Band 14 upper), 850 (Band 18 lower), 850 (Band 19 upper), 800 (Band 20), 1900 (Band 25), 850 (Band 26), 800 (Band 27), 700 (Band 28), 1700/2100 (Band 66), 700 (band 85) MHz.<br/>GSM/GPRS/EGPRS: 850, 900, 1800, 1900MHz.</p>   |
| <b>Wireless protocol standards</b> | <ul style="list-style-type: none"> <li>□ 3GPP TS 51.010-1 V10.5.0: Mobile Station (MS) conformance specification; Part 1: Conformance specification</li> <li>□ 3GPP TS 36.521-1 V14.3.0: User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing</li> <li>□ 3GPP TS 21.111 V10.0.0: USIM and IC card requirements</li> <li>□ 3GPP TS 51.011 V4.15.0: Specification of the Subscriber Identity Module -Mobile Equipment (SIM-ME) interface</li> <li>□ 3GPP TS 31.102 V10.11.0: Characteristics of the Universal Subscriber Identity Module (USIM) application</li> </ul> |



|  |  |
|--|--|
| <b>GPS</b>                                     | <ul style="list-style-type: none"> <li>□ 3GPP TS 31.11 V10.16.0: Universal Subscriber Identity Module (USIM) Application Toolkit (USAT)</li> <li>□ 3GPP TS 36.124 V10.3.0: Electro Magnetic Compatibility (EMC) requirements for mobile terminals and ancillary equipment</li> <li>□ 3GPP TS 27.007 V10.0.8: AT command set for User Equipment (UE)</li> <li>□ 3GPP TS 27.005 V10.0.1: Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)</li> </ul> |
| <b>GPS bands</b>                               | 1575.42 MHz ± 1.023 MHz, GLONASS 1596-1607MHz, Beidou 1561.098 MHz   |
| <b>Maximum data rates</b>                      | LTE FDD: 375 Kbps (Download), 1119 Kbps (Upload)<br>GSM:<br>- GPRS: 107 Kbps (Download), 85.6 Kbps (Upload)<br>- EGPRS: 296 Kbps (Download), 236.8 Kbps (Upload)   |
| <b>Maximum output power</b>                    | LTE: 21.5 dBm in all band<br>GSM:34dBm   |
| <b>Maximum power consumption</b>               | LTE: 147 mA(peak), 18 mA(average)  |
| <b>Form Factor</b>                             | M.2,   |
| <b>Weight</b>                                  | 4 g  |
| <b>Dimensions (Length x Width x Thickness)</b> | 22 x 42 x 2.3 mm   |
| <b>embedded eSIM</b>                           | Support  |

### NFC NXP NPC300

|   |   |
|---|---|
| <b>Dimensions (L x W x H)</b>                     | 17 x 10 x 2.0 mm  |
| <b>Chipset</b>                                    | NPC300  |
| <b>System interface</b>                           | I2C   |
| <b>NFC RF standards</b>                           | ISO/IEC 14443 A<br>ISO/IEC 14443 B<br>ISO/IEC 15693<br>ISO/IEC 18092<br>ECMA-340 NFCIP-1 Target and Initiator<br>ECMA-320 NFCIP-2   |
| <b>NFC Forum Support Reader (PCD-VCD) Mode(1)</b> | Tag Type 1, Type 2, Type3 and Type 4, NFCIP-1 and NFCIP-2<br>ISO/IEC 14443 A<br>ISO/IEC 14443 B<br>ISO/IEC 15693<br>MIFARE 1K<br>MIFARE 4K<br>MIFARE DESFire<br>FeliCa<br>Jewel and Topaz cards |



|   |   |
|---|---|
| <b>Card Emulation (PICC-VICC) Mode(1)</b> | ISO/IEC 14443 A<br>ISO/IEC 14443 B and B'<br>MIFARE<br>FeliCa                             |
| <b>Frequency</b>                          | 13.56 MHz   |
| <b>NFC Modes Supported</b>                | Reader/Writer, Peer-to-Peer   |
| <b>Raw RF Data Rates</b>                  | 106, 212, 424, 848 kbps   |
| <b>Operating temperature</b>              | Operating: 0 °C to 70 °C (32 °F to 158 °F)<br>Storage: -20 °C to 125 °C (-4 °F to 257 °F) |
| <b>Storage temperature</b>                | 10-90% operating<br>5-95% non-operating   |
| <b>Humidity</b>                           | 4.35 to 5.25 Volts  |
| <b>Supply Operating voltage</b>           | 1.8V or 3.3V  |
| <b>I/O Voltage</b>                        | (Booster enable, VBAT= 3.3V, VCC_BOOST = 5V)  |
| <b>Power Consumption Mode</b>             | (Booster enable, VBAT= 3.3V, VCC_BOOST = 5V)<br>Power Consumption, Typical                |
| <b>Polling</b>                            | 7.3 mA  |
| <b>Detected Test Tag Type 1</b>           | Total 283.8 mA<br>Net Module 236.8 mA   |
| <b>Detected Test Tag Type 2</b>           | Total 288.8 mA<br>Net Module 241.8 mA   |
| <b>Detected Test Tag Type 3</b>           | Total 287.7 mA<br>Net Module 240.7 mA   |
| <b>Detected Test Tag Type 4</b>           | Total 282.3 mA<br>Net Module 235.3 mA   |
| <b>Antenna</b>                            | Antenna connector, 0.5mm pitch, 7 connector FPC. Antenna matching is external to module.  |

### Intel® I219-LM 1 Gigabit Network Connection LOM (vPro)

|                             |  |
|-----------------------------|--|
| <b>Connector</b>            | RJ-45  |
| <b>System Interface</b>     | PCI(Intel proprietary) + SMBus   |
| <b>Data rates supported</b> | 10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14)<br>100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30)<br>1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40)<br>Auto-Negotiation (Automatic Speed Selection)<br>Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s |



|  |   |
|--|---|
| <b>IEEE Compliance</b>                       | IEEE 802.1p QoS (Quality of Service) Support<br>IEEE 802.1q VLAN support<br>IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable)<br>IEEE 802.3az EEE (Energy Efficient Ethernet)   |
| <b>Performance</b>                           | TCP/IP/UDP Checksum Offload (configurable)<br>Protocol Offload (ARP & NS)<br>Large send offload and Giant send offload<br>Receiving Side Scaling(Hash Mode Only)<br>Jumbo Frame 9K  |
| <b>Power consumption</b>                     | Cable Disconnection: 25mW<br>100Mbps Full Run: 450mW<br>1000bp Full Run: 1000mW<br>WoL Enable(S3/S4/S5): 50mW<br>WoL Disable(S3/S4/S5): 25mW  |
| <b>Power Management</b>                      | ACPI compliant – multiple power modes<br>Situation-sensitive features reduce power consumption<br>Advanced link down power saving for reducing link down power consumption  |
| <b>Management Interface IT Manageability</b> | Auto MDI/MDIX Crossover cable detection<br>Wake-on-LAN from modern standby or sleep state (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only)<br>PXE 2.1 Remote Boot<br>Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30))<br>Comprehensive diagnostic and configuration software suite<br>Virtual Cable Doctor for Ethernet cable status |
| <b>Security &amp; Manageability</b>          | Intel® vPro™ support with appropriate Intel® chipset components   |

### Intel® I219v 1 Gigabit Network Connection LOM (non-vPro)

|                             |   |
|-----------------------------|---|
| <b>Connector</b>            | RJ-45   |
| <b>System Interface</b>     | PCI(Intel proprietary) + SMBus  |
| <b>Data rates supported</b> | 1. 10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14)<br>2. 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30)<br>3. 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 802.3 clauses 40)<br>4. Auto-Negotiation (Automatic Speed Selection)<br>Full Duplex Operation at all Speeds, Half Duplex operation at 10, 100 & 1000 Mbit/s |



|  |  |
|--|--|
| <b>IEEE Compliance</b>                       | <p>IEEE 802.1p QoS (Quality of Service) Support</p> <p>IEEE 802.1q VLAN support</p> <p>IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable)</p> <p>IEEE 802.3az EEE (Energy Efficient Ethernet)</p> <p>IEEE 802.3i 10BASE-T</p> <p>IEEE 802.3u 100BASE-TX</p> <p>IEEE 802.3ab 1000BASE-T</p> <p>IEEE 802.3bz 2.5GBASE-T</p>   |
| <b>Performance</b>                           | <p>TCP/IP/UDP Checksum Offload (configurable)</p> <p>Protocol Offload (ARP &amp; NS)</p> <p>Large send offload and Giant send offload</p> <p>Receiving Side Scaling(Hash Mode only)</p> <p>Jumbo Frame 9K</p>  |
| <b>Power consumption</b>                     | <p>Cable Disconnection: 25mW</p> <p>100Mbps Full Run: 450mW</p> <p>1000bps Full Run: 1000mW</p> <p>WoL Enable(S3/S4/S5): 50mW</p> <p>WoL Disable(S3/S4/S5): 25mW</p>   |
| <b>Power Management</b>                      | <p>ACPI compliant – multiple power modes</p> <p>Situation-sensitive features reduce power consumption</p> <p>Advanced link down power saving for reducing link down power consumption</p>  |
| <b>Management Interface IT Manageability</b> | <p>Auto MDI/MDIX Crossover cable detection</p> <p>Wake-on-LAN from modern standby or sleep state (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only)</p> <p>PXE 2.1 Remote Boot</p> <p>Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30))</p> <p>Comprehensive diagnostic and configuration software suite</p> <p>Virtual Cable Doctor for Ethernet cable status</p> |
| <b>Security &amp; Manageability</b>          | <p>Intel® non-vPro™ support with appropriate Intel® chipset components</p>   |

### POWER

Power supply availability may vary by country.

#### AC Adapter 150 Watt Smart PFC Slim Barrel 4.5mm - Vesta II

|  |  |
|--|--|
| <b>Dimensions</b>                          |  |
| <b>Weight</b>                              | 0.716 lb (325 g) max (Not including power cord. Power cord varies by country.)   |
| <b>Input</b>                               | 100-240Vac   |
| <b>Input Efficiency</b>                    | 88% at 115 Vac and 89% at 230Vac   |
| <b>Input frequency range</b>               | 47-63Hz  |
| <b>Input AC current</b>                    | Max. 2.7 A at 90 Vac   |
| <b>Output</b>                              |  |
| <b>Output power</b>                        | 150W   |
| <b>DC output</b>                           | 19.5V  |
| <b>Hold-up time</b>                        | 100% load 5ms at 115 Vac input   |
| <b>Output current limit</b>                | < 16.0A  |
| <b>AC Inlet Type</b>                       | C6   |
| <b>DC Cable Connector</b>                  | 4.5mm Barrel Type  |
| <b>DC Cable Material</b>                   | PVC  |
| <b>Environmental Design</b>                |  |
| <b>Operating temperature</b>               | 32oF to 95oF (0to 35oC)  |
| <b>Non-operating (storage) temperature</b> | -4o F to 185oF (-20oto 85oC)   |
| <b>Altitude</b>                            | 0 to 16,400 ft (0 to 5000m)  |
| <b>Humidity</b>                            | 20% to 95%   |
| <b>Storage Humidity</b>                    | 10% to 95%   |
| <b>EMI and Safety Certifications</b>       | *CE Mark - full compliance with LVD and EMC directives<br>*Worldwide safety standards - IEC60950-1 and IEC62368-1 : 2018, EN62368-1:2014+A11, UL62368-1<br>*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), NOM-001 and 029 NYCE, NRcan, NRCS, ISC, SEC, PSB, Argentina S-mark, Australia GEMS and RCM, BIS, BSMI, UAE, UKCA DoC |

#### AC Adapter 120 Watt Smart PFC Slim Barrel 4.5mm Right Angle - Delphin

|                   |  |
|-------------------|--|
| <b>Dimensions</b> |  |
| <b>Weight</b>     | 350g(+/-10g) (Not including power cord. Power cord varies by country.) |
| <b>Input</b>      | 100-240Vac   |



|  |  |
|--|--|
| <b>Input Efficiency</b>                    | 88 % at 115 Vac and 89 % at 230Vac   |
| <b>Input frequency range</b>               | 47-63 Hz   |
| <b>Input AC current</b>                    | Max. 1.7 A at 90 Vac   |
| <b>Output</b>                              |  |
| <b>Output power</b>                        | 120W   |
| <b>DC output</b>                           | 19.5V  |
| <b>Hold-up time</b>                        | 100% load 5ms at 115 Vac input/80% load 10ms at 115 Vac input  |
| <b>Output current limit</b>                | < 18.0A  |
| <b>AC Inlet Type</b>                       | C6   |
| <b>DC Cable Connector</b>                  | 4.5mm Barrel Type  |
| <b>DC Cable Material</b>                   | PVC  |
| <b>Environmental Design</b>                |  |
| <b>Operating temperature</b>               | 32oF to 95oF (0oto 35oC)   |
| <b>Non-operating (storage) temperature</b> | -4oF to 185oF (-20oto 85oC)  |
| <b>Altitude</b>                            | 0 to 16,400 ft (0 to 5000m)  |
| <b>Humidity</b>                            | 20% to 95%   |
| <b>Storage Humidity</b>                    | 10% to 95%   |
| <b>EMI and Safety Certifications</b>       | CE Mark - full compliance with LVD and EMC directives<br>Worldwide safety standards - IEC60950-1 and IEC62368-1 : 2018, EN62368-1:2014+A11, UL62368-1<br>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 GEMS and RCM, BIS, BSMI, UAE, UKCA DoC |

### Battery MB 6 Cell WHr 83 Long Life -PL Fast Charge

|  |   |
|--|---|
| <b>Dimensions (H x W x L)</b>            |   |
| <b>Weight</b>                            | 0.305kg +/-0.010kg<br>(0.67lb +/-0.02lb)  |
| <b>Cells/Type</b>                        | 6 cell Lithium-Ion polymer cell/ 685257   |
| <b>Energy</b>                            |   |
| <b>Voltage</b>                           | 11.58V  |
| <b>Amp-hour capacity</b>                 | 7.17Ah  |
| <b>Watt-hour capacity</b>                | 83Wh  |
| <b>Temperature</b>                       |   |
| <b>Operating (Charging)</b>              | 32° to 113° F (0° to 45° C) (Charge Initial Temperature)<br>32° to 122° F (0° to 50° C) (Continuous Charging) |
| <b>Operating (Discharging)</b>           | 14° to 140° F (-10° to 60° C)   |
| <b>Optional Travel Battery Available</b> | No  |





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### AUDIO

**HD Stereo Codec**

Realtek ALC3247

**Audio I/O Ports**

3.5mm Headset: CTIA only, Headphone-out,

**Internal Speaker Amplifier**

None

**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 Microsoft behavior.

**Sampling**

DAC: 16bit/24bit, 48000Hz

ADC: 16bit/24bit, 44100Hz/48000Hz

**Wavetable Syntheses**

**Analog Audio**

3.5mm Headset: CTIA only, Headphone-out,

**# of Channels on Line-Out**

None

**Internal Speaker**

YES

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### FINGERPRINT READER

|                                    |                             |
|------------------------------------|-----------------------------|
| <b>Sensor vendor</b>               | ELAN 80SW                   |
| <b>Sensor type</b>                 | Capacitive                  |
| <b>DPI resolution</b>              | 508 DPI                     |
| <b>Scan area</b>                   | 80x80 pixels                |
| <b>False Rejection Rate</b>        | <3%                         |
| <b>False Acceptance Rate</b>       | < 0.001%                    |
| <b>Mobile Voltage Operation</b>    | 2.7~3.6V                    |
| <b>Operating Temperature</b>       | -20°C - +80°C               |
| <b>Current Consumption Image</b>   | 35mA peak                   |
| <b>Low Latency Wait For Finger</b> | 300uA                       |
| <b>Capture Rate</b>                | Capture Rate: 50 frame/sec  |
| <b>ESD Resistance</b>              | IEC 61000-4-2 4B (+15KV)    |
| <b>Detection Matrix</b>            | 508 dpi / 4x4mm sensor area |
| <b>Footnotes</b>                   |                             |

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### OPTIONS

| Category       | Description   | Part Number |
|----------------|---|-------------|
| Audio/Video    |   |             |
| Cases          | HP Renew Business 17.3 Laptop Bag                   | 3E2U6AA     |
|                | HP Renew Executive 16 Laptop Backpack               | 6B8Y1AA     |
|                | HP Renew Executive 16 Laptop Bag                    | 6B8Y2AA     |
|                | HP Campus XL Marble Stone Backpack                  | 7K0E2AA     |
|                | HP Campus XL Tie Dye Backpack                       | 7K0E3AA     |
|                | HP Convertible Laptop Stand                         | 9C2H2AA     |
|                | HP Everyday 16 Odyssey Gray Laptop Bag              | A08KKAA     |
|                | HP Travel Plus 30 Liter 17 Laptop Backpack          | A2CE0AA     |
|                | HP Travel Plus 22 Liter 16 Laptop Bag               | A2CE1AA     |
| Docking        | HP Thunderbolt 280W G4 Dock w/Combo Cable           | 4J0G4AA     |
|                | HP Thunderbolt 280W G4 Dock w/Combo Cable           | 4J0G4ET     |
|                | HP Thunderbolt 280W TAA G4 Dock w/Combo Cable       | 4J0J9AA     |
|                | HP Thunderbolt 4 Ultra 180W G6 Dock                 | 9X481UT     |
|                | HP Thunderbolt 4 Ultra 180W TAA G6 Dock             | 9X4A1AA     |
|                | HP Thunderbolt 4 Ultra 280W G6 Dock                 | AW5M5UT     |
|                | HP Thunderbolt 4 Ultra 280W TAA G6 Dock             | AW5N3AA     |
| Hub            | HP USB-C to USB-A Hub                               | Z6A00AA     |
|                | HP Portable USB-C Hub                               | B8SU8UT     |
| Adapter        | HP HDMI to VGA Adapter                              | H4F02AA     |
|                | HP USB-C to USB 3.0 Adapter                         | N2Z63AA     |
|                | HP USB-C to VGA Adapter                             | N9K76AA     |
|                | HP USB-C to HDMI 2.0 Adapter                        | 1WC36AA     |
|                | HP USB-C to RJ45 Adapter G2                         | 4Z527AA     |
|                | HP USB 3.0 to Gig RJ45 Adapter G2                   | 4Z7Z7AA     |
|                | HP USB-C to DisplayPort Adapter G2                  | 8Y8Y1AA     |
| Keyboard/Combo | HP 320K Wired Keyboard                              | 9SR37AA     |
|                | HP 975 USB+BT Dual-Mode Wireless Keyboard           | 3Z726AA     |
|                | HP 455 Programmable Wireless Keyboard               | 4R177AA     |
|                | HP 355 Compact Multi-Device Keyboard                | 692S9AA     |
|                | HP 965 BLK Ergonomic Wireless Keyboard              | 7E756AA     |
|                | HP 475 Dual-Mode Wireless Keyboard                  | 7N7B9AA     |
|                | HP 405 Multi-Device Backlit Wired Keyboard          | 7N7C1AA     |
|                | HP 435 Programmable Bluetooth Wireless Keypad       | 7N7C3AA     |
|                | HP 225 Wireless Keyboard                            | 805T1AA     |
|                | HP 485 Comfort Wired Keyboard                       | 8T6M2AA     |
|                | HP 725 Multi-Device Rechargeable Wireless Keyboard  | 9T5B2AA     |
|                | HP 125 G2 USB Wired Keyboard                        | AY2Y7AA     |
|                | HP Wired Desktop 320MK Mouse and Keyboard           | 9SR36AA     |
|                | HP 235 Wireless Mouse and Keyboard Combo            | 1Y4D0AA     |
|                | HP 225 Wired Mouse and Keyboard Combo               | 286J4AA     |
|                | HP 225 Antimicrobial Wired Mouse and Keyboard Combo | 286K3AA     |



|           |   |         |
|-----------|---|---------|
|           | HP 655 Wireless Keyboard and Mouse Combo                      | 4R009AA |
|           | HP 655 Wireless Keyboard and Mouse Combo White                | 860P8AA |
|           | HP 225 Wired Mouse and Keyboard Combo Cashmere White          | 86J24AA |
|           | HP 225 Wired Mouse and Keyboard Combo G2                      | AX2Y7AA |
|           | HP 225 Wired Mouse and Keyboard Combo G2 Cashmere White       | AW5S6AA |
| Mouse     | HP Wired 320M Mouse   | 9VA80AA |
|           | HP Travel USB Mouse   | G1K28AA |
|           | HP Multi-Device 635 Black Wireless Mouse                      | 1D0K2AA |
|           | HP Creator 935 Black Wireless Mouse                           | 1D0K8AA |
|           | HP 235 Slim Wireless Mouse                                    | 4E407AA |
|           | HP 128 LSR Wired Mouse  | 265D9AA |
|           | HP 125 Wired Mouse  | 265A9AA |
|           | HP 435 Multi-Device Wireless Mouse                            | 3B4Q5AA |
|           | HP 155 Wired Mouse  | 5B8B7AA |
|           | HP 715 Rechargeable Multi-Device Bluetooth Mouse              | 6E6F0AA |
|           | HP 925 Ergonomic Vertical Wireless Mouse                      | 6H1A5AA |
|           | HP 285 Silent Wireless Mouse                                  | 6G4E6AA |
|           | HP 425 Programmable Wireless Mouse                            | 7M1D5AA |
|           | HP 105 Black Wired Mouse                                      | 822M9AA |
|           | HP 245 Black Bluetooth Mouse                                  | 81S67AA |
|           | HP 695 Qi-Charging Wireless Mouse                             | 8F1Y4AA |
|           | HP 255 Dual Wireless Mouse                                    | 8R3U1AA |
|           | HP 515 Ultra-Fast Rechargeable Wireless Mouse                 | 9C2F7AA |
|           | HP 705 Rechargeable Wireless Mouse                            | AZ7B1AA |
|           | HP 405 Quiet Black Wireless Mouse                             | AZ7B3AA |
| Power     | HP 230W Smart AC Adapter                                      | AQ9X8AA |
| Commodity | HP USB External DVDRW Drive                                   | F2B56AA |
| Security  | HP Nano Keyed Cable Lock                                      | 1AJ39AA |
|           | HP Nano Master Keyed Cable Lock                               | 1AJ40AA |
|           | HP Sure Key Cable Lock  | 6UW42AA |
|           | HP Nano Combination Cable Lock                                | 63B28AA |
|           | HP Essential Nano Combination Cable Lock                      | 63B31AA |
| Monitor   | HP Series 7 Pro 34 inch WQHD Conferencing Monitor - 734pm     | 8K157AA |
|           | HP Series 7 Pro 27 inch QHD Thunderbolt 4 Monitor - 727pu     | 8J9E6AA |
|           | HP Series 7 Pro 37.5 inch WQHD+ Thunderbolt 4 Monitor - 738pu | 8K167AA |
|           | HP Series 7 Pro 27 inch 4K Thunderbolt 4 Monitor - 727pk      | 8J9G2AA |
|           | HP Series 7 Pro 27 inch 4K Conferencing Monitor - 727pm       | 8K135AA |
|           | HP Series 7 Pro 24 inch WUXGA USB-C Monitor - 724pu           | 8Y2F7AA |
|           | HP Series 7 Pro 31.5 inch 4K Thunderbolt 4 Monitor - 732pk    | 8Y2K9AA |
|           | HP Series 7 Pro 39.7 inch 5K2K Conferencing Monitor - 740pm   | 8Y2R2AA |



### CHANGELOG

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

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