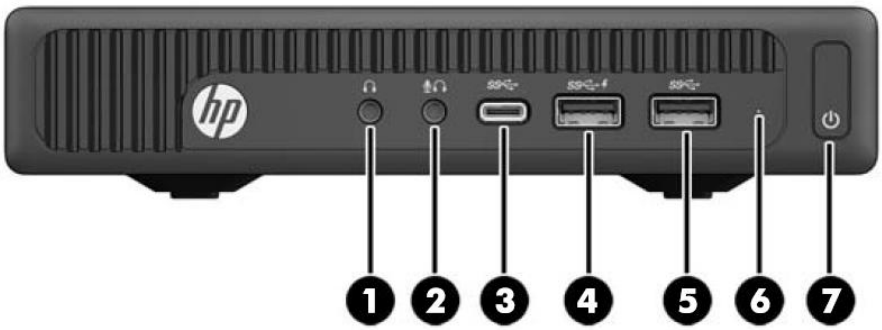
Overview

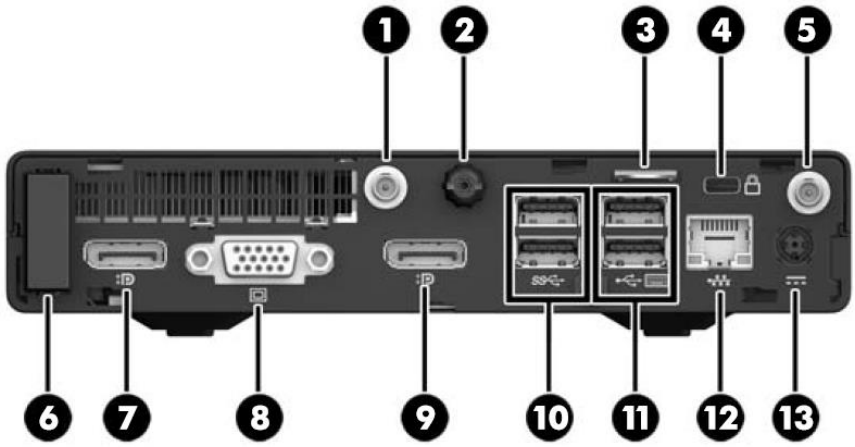
HP MP9 G2 Retail System



FRONT/PORTS

1. Headphone Connector
2. Microphone or Headphone Connector (software selectable, default mode is microphone)
3. USB 3.0 Type-C™
4. USB 3.0 (charging)
5. USB 3.0
6. HDD indicator
7. Dual-State Power Button

Overview



REAR/PORTS

1. External antenna connector (antenna optional)
2. Thumbscrew
3. Padlock loop
4. HP Keyed Cable Lock
5. External antenna connector (antenna optional)
6. Antenna cover
7. DisplayPort monitor connector
8. VGA monitor connector
9. DisplayPort (default, shown) or optional HDMI or serial
10. (2) USB 3.0 ports (blue)
11. (2) USB 3.0 ports (blue) allows for wake from S4/S5 with keyboard/mouse when connected and enabled in BIOS
12. RJ-45 network connector
13. Power connector

AT A GLANCE

Overview

- Windows 10 IoT Enterprise for Retail (64-bit), Windows 10 Pro (64-bit), Windows Embedded 8.1 Industry Pro Retail (64-bit), Windows 8.1 Pro (64-bit), Windows Embedded Standard 7 (64-bit), Windows 7 Pro (32 & 64-bit), Windows Embedded POS Ready 7 (32 & 64-bit), FreeDOS
- UEFI BIOS developed and engineered by HP for better security, manageability and software image stability
- Intel® Q170 chipset
- Intel® 6th generation Core™ processors
- Intel® vPro™ Technology available with select processors
- Integrated Intel® HD Graphics
- Integrated Intel® i219LM Gigabit Network Connection
- Optional wireless connectivity: M.2 Wireless LAN with Bluetooth®
- High performance integrated stereo speakers
- DTS Studio Sound™
- Up to 32 GB of DDR4 SDRAM, dual channel memory support, two SODIMM slots
- Support for up to two (2) storage drives, one (1) 2.5" drive bay, one (1) M.2 slot for SSDs (SATA, PCIe, or NVMe)
- Up to 2TB SATA Hard Drive, and up to 256GB M.2 Solid State Drive
- Six (6) USB 3.0 ports, one (1) USB Type C™, one (1) DisplayPort, one (1) VGA port plus optional port: Serial, HDMI or DisplayPort
- ENERGY STAR® certified models available. EPEAT® registered where applicable. EPEAT registration varies by country. See http://www.epeat.net for registration status by country.
- CC, CECP & SEPA Certified
- Low halogen
- Arsenic free
- Protected by HP Services, including warranties up to 3/3/3 (terms and conditions vary by country; certain restrictions and exclusions apply)
- Long purchase lifecycle and image stability

Standard Features and Configurable Components

OPERATING SYSTEM

Preinstalled When Purchased

Windows® 10 IoT Enterprise for Retail (64-bit)
Windows 10 Pro (64-bit)
Windows Embedded 8.1 Industry Pro Retail (64-bit)
Windows 8.1 Pro (64-bit)
Windows Embedded Standard 7 (64-bit)
Windows 7 Pro (32 & 64-bit) (available through downgrade rights from Windows 10 Pro)**
Windows Embedded POS Ready 7 (32 & 64-bit)
Windows 10 IoT to Industry 8.1 Migration rights
Windows 10 IoT to POSReady 7 Migration rights
FreeDOS 2.0

* Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See http://www.microsoft.com.

** This system is preinstalled with Windows 7 Professional software and also comes with a license and media for Windows 8 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

PROCESSORS

Intel® 6th Generation Core™ i7 Processors

Intel® Core™ i7-6700T
Up to 3.6 GHz Max. Turbo Frequency (2.8GHz base frequency), 8MB cache, 4 cores, 8 threads
Intel® HD Graphics 530
Supports DDR4 memory up to 2133 MT/s data rate
Supports Intel® vPro™ Technologies and Intel's® Stable Image Platform Program (SIPP)

Intel® 6th Generation Core™ i5 Processors

Intel® Core™ i5-6500T
Up to 3.1 GHz Max. Turbo Frequency (2.5 GHz base frequency), 6 MB cache, 4 cores, 4 threads
Intel® HD Graphics 530
Supports DDR4 memory up to 2133 MT/s data rate
Supports Intel® vPro™ Technologies and Intel's® Stable Image Platform Program (SIPP)

Standard Features and Configurable Components

Intel® 6th Generation Core™ i3 Processors

Intel® Core™ i3-6100T
3.2 GHz base frequency
3 MB cache, 2 cores, 4 threads
Intel® HD Graphics 530
Supports DDR4 memory up to 2133 MT/s data rate

Intel® 6th Generation Pentium® Processors (*Planned to be available January 2016)

Intel® Pentium® G4400T Processor
Up to 2.9 GHz Base Frequency
3 MB cache, 2 cores, 2 threads
Intel® HD Graphics 510
Supports DDR4 memory up to 2133 MT/s data rate

Intel® 6th Generation Celeron® Processors

Intel® Celeron® G3900T Processor
Up to 2.6 GHz Base Frequency
2 MB cache, 2 cores, 2 threads
Intel® HD Graphics 510
Supports DDR4 memory up to 2133 MT/s data rate

NOTE: Multi-Core 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 is not a measurement of higher performance.

CHIPSET

Intel® Q170 Chipset

Standard Features and Configurable Components

GRAPHICS

Integrated

Intel® HD 530* Graphics (integrated on processor)

Graphics controller	Intel® Processor Graphics
DisplayPort	Multi-Stream support (supports up to 2 external displays)
Supported Graphics APIs	DX11.1, OpenGL 4.0, OpenCL 1.2, full 1080p Blu-Ray Disc (H264) playback in hardware

*Integrated graphics will depend on processor. HD content required to view HD images

ADAPTERS AND CABLES

HP DisplayPort Cable

HP DisplayPort to DisplayPort Cable

HP DisplayPort Cable 2nd

HP DisplayPort to DVI-D Adapter

HP DisplayPort to DVI-D Adapter 2nd

HP DisplayPort to HDMI 4K Adapter

HP DisplayPort to HDMI 4K Adapter 2nd

HP DisplayPort to VGA Adapter

HP DisplayPort to VGA Adapter 2nd

HP USB-C to USB 3.0

HP USB to Serial Port Adapter

HP USB to Serial Port Adapter 2nd

HP DVI Cable

HP HDMI to VGA Cable

STORAGE

2.5 inch 5.4k RPM Hard Disk Drives

2TB SATA HDD

2.5 inch 7.2k RPM Hard Disk Drives

1TB SATA
500GB SATA
500GB SATA SED Opal 2

2.5 inch Solid State Drives (SSD)

256GB SATA 3D SSD
128GB SATA 3D SSD

2.5 inch Solid State Hybrid Drives (SSHD)

500GB SATA 6G 2.5 8G SSHD
1TB SATA 6G 2.5 8G SSHD

PCIe Cards

HP 256GB Turbo Drive G2 SSD- M.2 PCIe Card
HP 128GB Turbo Drive G2 SSD- M.2 PCIe Card

NOTE: For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and up to 36 GB (for Windows 8.1 and 10) of system disk is reserved for system recovery software.

MEMORY

Type

Non-ECC, DDR4 SDRAM, with transfer rates up to 2133 MT/s

Maximum

32 GB

# of Slots

2 SODIMM
204-pin supporting dual-channel memory
Maximized dual-channel performance requires SODIMMs of the same size and speed in both memory slots.
Both slots are customer accessible / upgradeable:

- 2,048 MB (2048 MB x 1)
- 4,096 MB (4096 MB x 1)
- 8,192 MB (4096 MB x 2)
- 8,192 MB (8192 MB x 1)

- 16,384 MB (8192 MB x 2)
- 32,768 (16,384 MB x 2) – Maximum

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Memory modules support data transfer rates up to 2133 MT/s; actual data rate is determined by the system's configured processor. See processor specifications for supported memory data rate.

NETWORKING/COMMUNICATIONS

Ethernet (RJ-45)

Integrated Intel® I219LM Gigabit Network Connection LOM (standard)

NOTE: The term "10/100/1000" or "Gigabit" Ethernet indicates compliance with IEEE standard 802.3ab for Gigabit Ethernet and does not connote actual operating speed of 1 Gb/s. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

Wireless LAN (optional)*

Intel® 3165 802.11ac M.2 Bluetooth® NIC
Intel® 8260 802.11ac M.2 Bluetooth® NIC
Broadcom BCM943228Z 802.11n wireless M.2 with Bluetooth® NIC

HP Desktop Mini Antenna/Wiring Wireless LAN Kit

*Wireless cards are optional or add-on features and requires separately purchased wireless access point and internet service. Availability of public wireless access points limited.

AUDIO/MULTIMEDIA

HD audio with Realtek ALC 221 codec (all ports are stereo)

DTS Studio Sound™ audio management technology

Microphone and headphone front ports (3.5mm)

Multi-streaming capable

Internal speaker (standard)

Standard Features and Configurable Components

KEYBOARDS AND POINTING DEVICES

Keyboard

HP PS/2 Keyboard

HP USB Business Slim Keyboard

HP USB Keyboard

Mice

HP PS/2 Mouse

HP USB Mouse

HP USB Hardened Mouse

POWER

External, 65 W 89% efficient

External, 90 W 89% efficient

WEIGHTS & DIMENSIONS

Dimensions (W x D x H)

175 x 34 x 177 mm

6.9 x 1.3 x 7.0 in

Weight*

1.3 kg/2.9 lbs

Max. Weight Supported (desktop orientation)

77.0 lb

35.0 kg

Stand Dimensions

77x 4.6 x 6.3 in

19.5 x 117 x 160 mm

Stand Weight:

47g/0 .1 lbs.

Standard Features and Configurable Components

System Volume

62.79 cu in (cubic inches)

1.05 L

Packaging Dimensions (H x W x D)

7.8 x 11.4 x 19.7 in

198 x 290 x 500 mm

Shipping Weight

4.1 kg/ 9.0 lb.

*Configured with 1 hard drive. Exact weight depends on configuration

PORTS

6 - USB 3.0, 2 front, 4 rear

1 – USB 3.0 Type-C™ port

1 - VGA

2 – DisplayPort 1.2

1 – RJ-45

1 – Headphone/microphone combo

1 –Serial (RS-232) optional - replaces 1 DisplayPort 1.2

1 – HDMI, optional - replaces 1 DisplayPort 1.2

SLOTS

1 – m.2 PCIe x4-2230 (for wLAN)

1 - m.2 PCIe x4-2280 (for storage)

BAYS

1 – 2.5” Internal storage drive

HP BIOS

HP BIOSphere

Key features of the HP BIOS include:

- Deployment and manageability - HP BIOS provides several technologies that help integrate the HP EliteOne 800 Retail System into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages.
- Select models feature either Intel® Standard Manageability or Intel® Core™ vPro™ Processor Technology.
- Stability - HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- UEFI specification 2.1
- Absolute Persistence agent – For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management - The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Business Desktop computer in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery - HP BIOS provides numerous ways to upgrade HP retail systems, including BIOS updates from within DOS (DOSFlash), BIOS updates from within Windows (HPQFlash), HP Client Manager, and fail-safe recovery (Emergency Boot Block Recovery). In addition, the HP Business Desktop BIOS Utilities tool enables replicated BIOS setup throughout the Enterprise; it is available from within the BIOS F10 setup and from the support website.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

Additional HP BIOS Features

- Power-On password - Helps prevent an unauthorized user from powering on the system.
- Administrator password - Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.
- Advanced Configuration and Power Interface (ACPI) - Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage. HP Elite models use ACPI to provide power conservation features.
- S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W is S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.

SECURITY

Trusted Platform Module,SLB9670TT1.2FW4.40 (TPM) 1.2 (Common Criteria EAL4+ certified), Field upgradeable to 2.0
SATA port disablement (via BIOS)

Standard Features and Configurable Components

Drive lock
Intel® Identity Protection Technology (IPT)[1]
Serial, parallel, USB enable/disable (via BIOS)
Optional USB Port Disable at factory (user configurable via BIOS)
Removable media write/boot control
Power-On password (via BIOS)
Setup password (via BIOS)
Support for chassis padlocks and cable lock devices

1. Intel® IPT security requires separate Symantec VIP software service subscription and must be activated and configured. Requires a website that uses Symantec VIP Authentication Service. Requires Microsoft® Windows and a system with vPro or any Ultrabook. Intel® and HP assume no liability for lost or stolen data and/or systems or any other damages resulting therefrom.

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

Included	**Windows 7**	**Windows 8.1**	**Windows 10**
BIOS	HP BIOSphere[1] with Sure Start HP DriveLock HP BIOS Protection[2] BIOS Update via Network Master Boot Record Security Power On Authentication Pre-Boot Security Secure Erase[3]	HP BIOSphere[1] with Sure Start HP DriveLock HP BIOS Protection[2] BIOS Update via Network Master Boot Record Security Power On Authentication Pre-Boot Security Secure Erase[3] Hybrid Boot Measured Boot Secure Boot	HP BIOSphere[1] with Sure Start HP DriveLock HP BIOS Protection[2] BIOS Update via Network Master Boot Record Security Power On Authentication Pre-Boot Security Secure Erase[3] Hybrid Boot Measured Boot Secure Boot
	Absolute Persistence Module[4]	Absolute Persistence Module[4]	Absolute Persistence Module[4]
Multimedia	CyberLink Power DVD, BD CyberLink Power2Go (Secure Burn)	CyberLink Power DVD, BD CyberLink Power2Go (Secure Burn)	CyberLink Power DVD, BD CyberLink Power2Go (Secure Burn)

	Windows 7	**Windows 8.1**	**Windows 10**
Communication	Intel® Wireless Display (WiDi) Software for Windows[5] Native Miracast Support[6]	Intel® Wireless Display (WiDi) Software for Windows[5] Native Miracast Support[6]	Intel® Wireless Display (WiDi) Software for Windows[5] Native Miracast Support[6]
HP Value Add	HP ePrint Driver7 HP Recovery Manager HP Support Assistant HP Recovery Disk Creator	HP ePrint Driver7 HP Recovery Manager HP Support Assistant HP Recovery Disk Creator	HP ePrint Driver7 HP Recovery Manager HP Support Assistant Windows 10 Welcome App HP Recovery Disk Creator
3rd Party	Foxit PhantomPDF Express for HP	Foxit PhantomPDF Express for HP	Foxit PhantomPDF Express for HP
Microsoft Products	Buy Office Bing Search Skype	Buy Office Bing Search Skype	Buy Office Bing Search Skype
Manageability	HP Drive Packs[8] HP SoftPaq Download Manager (SDM) HP System Software Manager (SSM) [8] HP Client Catalog [8] HP CIK for Microsoft SCCM [8] LANDESK Management [9]	HP Drive Packs[8] HP SoftPaq Download Manager (SDM) HP System Software Manager (SSM) [8] HP Client Catalog [8] HP CIK for Microsoft SCCM [8] LANDESK Management [9]	HP Drive Packs[8] HP SoftPaq Download Manager (SDM) HP System Software Manager (SSM) [8] HP Client Catalog [8] HP CIK for Microsoft SCCM [8] LANDESK Management [9]

Software

	HP BIOS Config Utility (BCU) [8]	HP BIOS Config Utility (BCU) [8]	HP BIOS Config Utility (BCU) [8]

For more information on HP Client Management Solutions refer to: http://www.hp.com/go/clientmanagement.

	Windows 7	Windows 8.1	Windows 10
Security	HP Drive Encryption[10] HP Disk Sanitizer External Edition HP Security Manager Microsoft Security Essentials[11]	HP Drive Encryption[10] HP Disk Sanitizer External Edition HP Security Manager Microsoft Defender	HP Drive Encryption[10] HP Disk Sanitizer External Edition HP Security Manager Microsoft Defender
Standard	Smart Card Reader Security lock slot Preboot Authentication	Smart Card Reader Security lock slot Preboot Authentication	Smart Card Reader Security lock slot Preboot Authentication

NOTE: The Absolute Persistence agent is shipped turned off, and must be activated by customers when they purchase a subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S.

For more information on HP Client Security Software Suite, refer to http://www.hp.com/go/clientsecurity.

Footnotes:
1 Available only on business PCs with HP BIOS.
2 May require a manual recovery step if all copies of BIOS are compromised or deleted
3 For the methods outlined in the National Institute of Standards and Technology Special Publication 800-88.
4 Absolute agent is shipped turned off, and will be activated when customers activate a purchased subscription. Subscriptions can be purchased for terms ranging multiple years. Service is limited, check with Absolute for availability outside the U.S. The Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. For full details visit: http://www.absolute.com/company/legal/agreements/ computrace-agreement. Data Delete is an optional service provided by Absolute Software. If utilized, the Recovery Guarantee is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either obtain a PIN or purchase one or more RSA SecurID tokens from Absolute Software.
5 Integrated Intel® Wi-Di Display is available on select configurations only and requires a separate projector, TV or monitor with an integrated or external Wi-Di receiver. For more information on Intel® Wi-Di Display visit www.intel.com/go/wirelessdisplay
6 Miracast is a wireless technology your PC can use to project your screen to TVs, projectors, and streaming media players that also support Miracast. You can use Miracast to share what you're doing on your PC and present a slide show. For more information: http://windows.microsoft.com/en-us/windows-8/project-wireless-screen-miracast
7 Requires an Internet connection to HP web-enabled printer and HP ePrint account registration (for a list of eligible printers, supported documents and image types and other HP ePrint details, see www.hp.com/go/eprintcenter). Requires optional broadband module. Broadband use requires separately purchased service contract. Check with service provider for coverage and availability in your area. Separately purchased data plans or usage fees may apply. Print times and connection speeds may vary.
8 Not preinstalled, however available on manageability website.
10 Requires Windows. Data is protected prior to Drive Encryption login. Turning the PC off or into hibernate logs out of Drive Encryption and prevents data access.
11 Opt in and internet connection required for updates.

Technical specifications - Environmental

ENVIRONMENTAL

ENERGY STAR® certified models available

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

Low Halogen (chassis, all internal components and modules)*

TAA compliant models available.

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

For accessibility information on HP products, please visit: http://www.hp.com/accessibility.

SERVICE AND SUPPORT

On-site Warranty [1]: Three-year (3-3-3) limited warranty delivers three years of on-site, next business day [2] service for parts and labor and includes free support [3] 24 x 7. Three-year onsite and labor are not available in all countries. Service offers terms up to 5 years by choosing an optional HP Care Pack. To choose the right level of service for your HP product, visit HP Care Pack Central: http://www.hp.com/go/cpc

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.
NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.
NOTE 3: Technical support applies only to HP-configured Compaq and third-party HP qualified hardware and software. 24 x 7 support may not be available in some countries.

Options & Accessories (availability may vary by region)

MEMORY	Part Number
HP 4GB DDR3-2133 SODIMM	P1N53AA
HP 8GB DDR3-2133 SODIMM	P1N54AA
HP 16GB DDR3-2133 SODIMM	P1N55AA

DATA STORAGE DRIVES AND ACCESSORIES	Part Number
HP 500GB SATA 6G 2.5 8G SSHD	E1C62AA
HP 128-GB SATA 3.0Gb/s Solid State Drive	QV063AA
HP 500-GB SATA 3.0Gb/s Solid State Hybrid Drive	E1C62AA
HP 128-GB SED Opal 2 Solid State Drive	G2K24AA
Intel® Pro 2500 180GB SATA SED Opal2 Solid State Drive	P3X90AA
HP 256GB SATA 3D Non-SED Solid State Drive	N1M49AA
HP 256 GB Value SSD Drive	W0U55AA

MULTIMEDIA DEVICES	Part Number
HP Business Headset	QK550AA
HP USB Business Speakers	D9J19AA

INPUT DEVICES	Part Number
HP USB Business Slim Keyboard	N3R87AA
HP USB Keyboard	QY776AA
HP USB Grey Keyboard	B6B64AA
HP USB Smart Card (CCID) Keyboard	BV813AA
HP USB Grey Smart Card (CCID) Keyboard	J7H70AA
HP USB and PS/2 Washable Keyboard and Mouse Kit	BU207AA
HP USB Grey Mouse	K7W54AA
HP USB Mouse	QY777AA
HP USB 1000dpi Laser Mouse	QY778AA
HP Wireless Business Slim Keyboard and Mouse*	N3R88AA
HP Wireless Keyboard and Mouse*	QY449AA
HP USB Antimicrobial Keyboard and Mouse (China Only)	K7X25AA
*Keyboard contains 25% post-consumer recycled plastic material	

SECURITY	Part Number
HP Solenoid Lock and Hood Sensor (DM/SFF)	E0X97AA
HP Keyed Cable Lock 10mm	T1A62AA
HP Dual Head Keyed Cable Lock	T1A64AA

Options & Accessories (availability may vary by region)

GRAPHICS – VIDEO ADAPTERS AND CABLES	Part Number
HP USB Graphics Adapter	NL571AA
HP Dual Output USB Graphics Adapter	C5U89AA
HP DisplayPort Cable Kit	VN567AA
HP DisplayPort To DVI-D Adapter	FH973AA
HP DisplayPort to VGA Adapter	AS615AA
HP DisplayPort to HDMI 4K Adapter	K2K92AA

STANDS AND ACCESSORIES	Part Number
HP Type-C to USB3 Adapter	N2Z63AA
HP USB to Serial Adapter	J7B60AA
HP Desktop Mini Security/Dual VESA Sleeve	G1K22AA
HP Desktop Mini LockBox	P1N78AA
HP Desktop Mini Port Cover Kit	P3R65AA
HP Desktop Mini Rack Mount Tray Kit	G1K21AA
HP Desktop Mini 500GB HDD/ I/O Expansion Module	K9Q82AA
HP Desktop Mini DVD Super Multi-Writer ODD Expansion Module	K9Q83AA
HP Desktop Mini I/O Expansion Module	K9Q84AA
HP Desktop Mini 90w Power Supply Kit	L4R65AA
Integrated Work Center Desktop Mini	G1V61AA
HP Desktop Mini Vertical Chassis Stand	G1K23AA

CORE™ vPRO™ PROCESSORS

INTEL® 6th GENERATION CORE™ vPRO™ PROCESSORS

All HP Elite Business PC models featuring this technology include processors that are part of the Intel® 2013 Stable Image Platform Program (SIPP) designed to ensure the stability promise inherent in the value proposition of the HP Elite MP9 G2 Business PC for stability, security and enterprise manageability **Intel® Advanced Management Technology (AMT) v9.0** – An advanced set of remote management features and functionality which provides network administrators the latest tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 9.0 includes the following advanced management functions:

- Power Management (on, off, reset)
- Hardware Inventory (includes BIOS and firmware revisions
- Hardware Alerting
- Agent Presence
- System Defense Filters
- SOL/IDER
- Cisco NAC/SDN Support
- ME Wake-on-LAN
- DASH 1.1 compliance
- IPv6 Support
- Fast Call for Help - a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection
- Remote Scheduled Maintenance - pre-schedule when the PC connects to the IT or service provider console for maintenance. Remote PCs can get required patches, be inventoried, etc by connecting to their IT console or Service Provider when it's convenient.
- Remote Alerts - automatically alert IT or service provider if issues arise
- Access Monitor - Provides oversight into Intel® AMT actions to support security requirements
- PC Alarm Clock
- Microsoft NAP Support
- Host Base set-up and configuration
- Management Engine (ME) firmware roll back
- Wireless AMT functionality on Desktop (WoDT)
- Enhanced KVM resolution

GRAPHICS

Intel® HD 530 Graphics

VGA Controller	Integrated
DisplayPort	Multimode capable; supports HDCP, Display Port Audio (2 streams), HBR2 link rates and Multi-Stream Technology for a maximum of 3 displays (including the integrated panel)
Bus Type	N/A
RAMDAC	N/A
Memory	Intel graphics do not have dedicated memory but utilizes some of the computer's system memory The amount of memory used for graphics depending on the amount of system memory installed, BIOS settings, operating system, and system load. 32 MB is pre-allocated for graphics use at system boot time. Additional memory can be allocated at boot time by the BIOS for PAVP (Protected Audio Video Playback) support for playback of protected video content. Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (DVMT), to provide an optimal balance between graphics and system memory use.
Maximum Graphics Memory	Microsoft Windows 7: Up to 1.7GB Windows 8.1: Up to 1.8GB **NOTE:** the actual amount of maximum graphics memory can be less than the amounts listed above depending upon your computer's configuration.
Maximum Color Depth	32 bits/pixel

Graphics/Video API Support	6th Generation Core processors:
	• The Processor Graphics contains a refresh of the seventh generation graphics core enabling substantial gains in performance and lower power consumption. Up to 16 EU support.
	• Next Generation Intel Clear Video Technology HD Support is a collection of video playback and enhancement features that improve the end user's viewing experience
	  ○ Encode/transcode HD content
	  ○ Playback of high definition content including Blu-ray Disc
	  ○ Superior image quality with sharper, more colorful images
	• DirectX Video Acceleration (DXVA) support for accelerating video processing
	  ○ Full AVC/VC1/MPEG2 HW Decode
	• Advanced Scheduler 2.0, 1.0
	• Windows 7, Windows 8, Linux® OS Support
	• DirectX 11.1
	• OpenGL 4.3
	• Open CL 1.2

Supported Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Refresh Rates
800x600	60 Hz
1024x768	60 Hz
1152x864	60 Hz
1280x600	60 Hz
1280x720	60 Hz
1280x800	60 Hz
1280x960	60 Hz
1280x1024	60 Hz
1360x768	60 Hz
1366x768	60 Hz
1400x1050	60 Hz
1440x900	60 Hz
1600x900	60 Hz
1600x1200*	60 Hz
1680x1050	60 Hz
1920x1080	60 Hz
1920x1200*	60 Hz
1920x1440*	60 Hz
2560x1440*	60 Hz
2560x1600*	60 Hz
3840x2160*	60 Hz

* Only supported on displays connected to the external DisplayPort connector.

2.5 inch 5.4k RPM Hard Disk Drives

HP 2 TB* 5.4K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

Formatted Capacity	2 TB	
Rotational Speed	5,400 rpm	
Interface	SATA 6Gb/s NCQ	
Cache, Multisegmented (MB)	TBD	
Bandwidth Performance	Sustained data transfer rate OD	100 MB/s max
	I/O data-transfer rate	600 MB/s max
Height	6.80 mm ± 0.20	
Width	69.85 mm ± 0.25	
Depth	100.35 mm ± 0.25/0.20	
Weight	1.38 lb/626 g	
Operating Temperature	32° to 140° F (0° to 60° C)	

* For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and 36 GB (for Windows 8.1/10) of system disk is reserved for the system recovery software.

2.5 inch 7.2k RPM Hard Disk Drives

HP 1 TB* 7.2K rpm SATA 6.0Gb/s 2.5" Hard Disk Drive

Formatted Capacity	1 TB	
Rotational Speed	7,200 rpm	
Interface	SATA 6Gb/s NCQ	
Cache, Multisegmented (MB)	64 MB	
Seek Time (average)	Read	<8.5 ms
	Write	<9.5 ms
Height	1.028 in/26.11 mm	
Width	4.0 in/101.6 mm	
Depth	5.787 in/146.99 mm	
Weight	1.38 lb/626 g	
Operating Temperature	32° to 140° F (0° to 60° C)	

* For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and 36 GB (for Windows 8.1/10) of system disk is reserved for the system recovery software.

HP 500-GB 7.2K SATA 6.0Gb/s 2.5” Hard Disk Drive

Capacity	500,107,862,016 bytes

Technical Specifications – Storage

Rotational Speed	7,200 rpm	
Interface	Serial ATA 2.0 (6.0 Gb/s)	
Buffer Size	16 MB	
Logical Blocks	976,773,168	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	12 ms
	Full-Stroke:	25 ms
Height (nominal)	0.374 in/9.5 mm	
Width (nominal)	Media diameter: 2.5 in/63.5 mm	
	Physical size: 2.75 in/70 mm	
Operating Temperature	41° to 131° F (5° to 55° C)	

HP 500-GB 7200 RPM SATA 2.5" Self-Encrypting (SED) Hard Disk Drive

Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Drive Type	Self-Encrypting Drive (SED) with SATA interface	
Interface	SATA 6 Gb/s	
Segmented Buffer with write cache	32768 KB - A portion of buffer capacity used for firmware	
Number of Sectors	976,773,168	
Seek Time (typical reads)	**Single Track:**	1.0 ms
	Average:	13 ms
	Full-Stroke:	25 ms
Media Diameter	2.5 in/63.5 mm	
Height	0.267 in/6.8 mm, ±0.2mm	
Width	2.75 in/69.85 mm, ±0.25mm	
Length	3.945 in/100.2 mm, ±0.25mm	
Weight	3.35 oz/95 g (max)	
Operating Temperature	32° to 140° F (0° to 60° C)	

2.5 inch Solid State Drives (SSD)

256 GB SATA 2.5" 3D Solid State Drive* (Pending specifications)

Formatted Capacity	256 GB
Architecture	
Interface	
Form Factor	
Height	
Width	
Length	
Weight (typical)	
Data Transfer Rate (128k Sequential)	Sequential Read Sequential Write
Power Watts	Power consumption (avg):
Environmental (all conditions, non-condensing)	Operating Temperature: Relative Humidity: Shock (0.5 mSec half-sine):

***NOTE:** For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and 36 GB (for Windows 8.1/10) of system disk is reserved for the system recovery software.

128GB SATA 2.5" 3D Solid State Drive

Unformatted Capacity	128 GB 250,069,680 (User Addressable Sectors)	
Architecture	Self-Encrypting (SED) Solid State Drive with NAND Flash and SATA interface. Fully complies with ATA/ATAPI-7 Standard (Partially Complies with ATA/ATAPI-8) Power Saving Modes: DIPM (Partial / Slumber mode) Support NCQ : Up to 32 depth Synchronous Signal Recovery	
Interface	Serial ATA (6.0 Gb/s)	
Form Factor	2.5 inch	
Height	6.80 mm ± 0.20	
Width	69.85 mm ± 0.25	
Length	100.20 mm ± 0.25	
Weight	Up to 54 g	
Bandwidth Performance	**Sustained Sequential Read:**	Up to 530 MB/s
	Sustained Sequential Write:	Up to 140 MB/s

Technical Specifications – Storage

Power	**Power consumption:**	Active: Typical 250mW; Idle: Typical 50mW
Mean Time Between Failure (MTBF)	1,500,000 hours	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/0.5 ms

PCIe Cards

HP 256 GB Turbo Drive SSD-M.2 PCIe Card*

Formatted Capacity	256 GB		
Architecture	Solid State Drive M.2 PCIe Gen 2 x4 AHCI; NCQ Command Set		
Interface	M.2 PCIe Gen 2 x4		
Form Factor	M.2 2280		
Height	7 mm ± 0.20		
Width	.8 mm ± 0.08		
Length	50 mm ± 0.15		
Weight (typical)	Up to 10 g		
Data Transfer Rate (128k Sequential)	Sequential Read	Up to 2150 MB/s	
	Sequential Write	Up to 1200 MB/s	
Power Watts	Power consumption (avg):	Power-Up: N/A Read: 4 W Write: 5.1 W Standby: 700 mW Idle: 70 mW	
Environmental (all conditions, non-condensing)	Operating Temperature:		32° to 158° F (0° to 70° C)
	Relative Humidity:		5% to 95%
	Shock (Linear 2 m/Sec half-sine):		1000 G peak (operating)

***NOTE:** For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and 36 GB (for Windows 8.1/10) of system disk is reserved for the system recovery software.

HP 128 GB Turbo Drive SSD-M.2 PCIe Card*

Unformatted Capacity	128 GB*	
Interface	M.2 PCIe x4 Gen 2	
Architecture	Solid State Drive M.2 PCIe Gen 2 x4 AHCI; NCQ Command Set	
Form Factor	M.2 2280	
Dimensions (Width x Length x Thickness)	.899 x 3.149 x .146 in (22 x 80 x 3.73 mm)	
Weight	0.017 lb (8 g) Max	
Bandwidth Performance - Performance measured using IOMeter 2008 on Windows 8 64bit. Actual performance may vary depending on use conditions and environment.	Sustained Sequential Read (128KB):	Up to 920 MB/ss
	Sustained Sequential Write (128KB):	Up to 430 MB/s
	Random Read (4KB):	up to 8500 IOPs
	Random Write (4KB):	up to 32000 IOPs
Power	Allowable voltage	3.3V ± 5%
	Total power consumption:	5.8 W (Active) ; 80 mW; (Idle)
MTBF	1.5 M hours	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G
Regulations	Safety TUV UL CB c-UL-us	TUV
		UL CB
		c-UL-us
	EMC/EMI	TUV
		CE (EU)
		BSMI (Taiwan)
		KCC (South Korea)
		VCCI (Japan)
		C-Tick (Austrailia)
		FCC (USA)

*** NOTE:** For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and 36 GB (for Windows 8.1/10) of system disk is reserved for the system recovery software.

SYSTEM MEMORY SUPPORT

The **HP MP9 G2 Retail System** supports up to two (2) industry-standard DDR4-SDRAM SO-DIMMs.

The **HP MP9 G2 Retail System** supports the 6th generation Intel® Core™ processor family. Based on a new PC micro-architecture, the processor is designed for a two-chip platform consisting of a processor and Platform Controller Hub (PCH). Unlike previous generations, the 6th generation Intel® Core™ processor includes an Integrated Memory Controller (IMC). The IMC supports DDR4 protocols with two independent, 64-bit wide channels each accessing one or two DIMMs.

- Two channels of non-ECC DDR4 un-buffered dual in-line memory modules (UDIMM) or DDR4 un-buffered small outline dual in-line memory modules (SO-DIMM) with a maximum of two DIMMs per channel
- Single-channel and dual-channel memory organization modes
- Data burst length of eight for all memory organization modes
- Memory data transfer rates of up to 2133 MT/s; actual supported data transfer rate determined by the configured processor.
- 64-bit wide channels
- DDR4/DDR4L system memory I/O voltage of 1.2V
- Theoretical maximum memory bandwidth of:
    - 34 GB/s in dual-channel mode assuming 2133 MT/s

CAUTION: You must shut down the computer and disconnect the power cord before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged in to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

NETWORKING AND COMMUNICATIONS

Intel® I217LM GbE Network Connection (integrated)

Connector	RJ-45
System Interface	Integrated on PCA
Controller	Intel I217LM GbE platform LAN connect networking controller
Memory	24 KB FIFO packet buffer memory
Data rates supported	10/100/1000 Mbps
IEEE Compliance	802.1P 802.1Q 802.2 802.3 802.3ab 802.3az 802.3u
Bus architecture	PCI Express and SMBus
Data transfer mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
Power requirement	Requires 3.3V and 0.9V or just 3.3V with integrated regulators Power consumption 0.733 Watts
Boot ROM support	Yes
Network transfer mode	Full-duplex Half-duplex (not supported for the 1000BASE-T transceiver)
Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
Environmental	Operating Temperature: 0° to 85° C Operating Humidity: 60% RH
Management	WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, Advanced cable diagnostic, WFM 2.0
Alerting	ASF 2.0 support; AMT 9.0 support

Intel® 3165 1x1 Dual Band 802.11ac WLAN/ Bluetooth® Combo*

Wireless LAN Standards	IEEE 802.11 ac/a/b/g/n	
Interoperability	Wi-Fi certification	
	WLAN + Bluetooth® Combo M.2 Card device shall meet all of the requirements to support Bluetooth® 4.1 and backwards compatible with 2.1 with EDR	
Frequency Band	802.11b/g/n	2.402-2.482 GHz
	802.11a/n/ac	4.9 – 4.95 GHz (Japan) 5.15 – 5.25 GHz 5.25 – 5.35 GHz 5.47 – 5.725 GHz 5.825 – 5.850 GHz (Note: Indonesia does not support this band)
Antenna Interface	With antennas installed in the system, the antenna peak gain is less than +3dBi in the 2.4GHz band and less than +4dBi in the 5GHz band to allow the device to meet regulatory limits.	
Data Rates	• 02.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: card will support rates for NSS=1 and NSS=2 for RX and TX for 20 and 40 MHz channels. Short and long guard interval shall be supported. • 802.11ac: card will support rates for NSS=1 and NSS=2 for RX and TX for 80 MHz channels. 433Mbps for 1x.	
Security	• I IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through V5 • WAPI Note: Check latest software/driver release for updates on supported security features.	
Roaming	802.11r Fast Roaming	
Output Power (Transmitting)	• 802.11b: +16dBm minimum • 802.11g: +14dBm minimum • 802.11a: +14dBm minimum • 802.11n HT20 (2.4GHz) : +14dBm minimum • 802.11n HT40 (2.4GHz) : +12dBm minimum • 802.11n HT20 (5GHz) : +14dBm minimum • 802.11n HT40 (5GHz) : +12dBm minimum • 802.11ac 80MHz (5GHz) : +12dBm minimum Notes: 1. RF Tx power have to meet minimum criteria and with +1.5dBm tolerance but -1.5dBm. 2. RF Parameter will be verified by R&S CMW500 via link mode.	
Power Consumption	Transmit: 2.0 Watts Receive: 1.6 Watts Idle mode (PSP): 180 mW (WLAN associated) Idle mode: 50 mW (WLAN unassociated)	

Technical Specifications – Networking and Communications

	Connect Standby 10mW (WLAN+BT)	
	Radio off: 5 mW	
Bluetooth® Power Consumption	Peak operating: 330 mW	
	Receive: 230 mW	
	USB selective suspend: 17 mW	
Power Management	The product conforms to the ACPI and PCI Express M.2 bus methods to manage power of the WLAN components. Supports all 802.11 compliant power-save modes. These include the basic Power Save Polling (PSP) in 802.11 and Automatic Power Save Delivery (APSD) defined in 802.11e.	
Receiver Sensitivity for FER <10%	802.11b, 1Mbps: -94dBm maximum 802.11b, 11Mbps: -86dBm maximum 802.11a/g, 6Mbps: -88dBm maximum 802.11a/g, 54Mbps : -74dBm maximum 802.11n, MCS07 : -69dBm maximum 802.11n, MCS15 : -66dBm maximum 802.11ac, 1SS, MCS-0 : -86dBm maximum 802.11ac, 1SS, MCS-9 : -61dBm maximum 802.11ac, 2SS, MCS-0 : -83dBm maximum 802.11ac, 2SS, MCS-9 : -58dBm maximum Note: 1. Rx sensitivity have to meet maximum criteria and with -1.5dBm tolerance but +1.5dBm. 2. Note: RF Parameter will be verified by R&S CMW500 via link mode.	
Form Factors	PCI Express M.2 form factor	
Operating Voltage	The card will be powered by a 3.3V, ± 9% supply from the host system.	
Temperature	**Operating:**	14° to 158° F (-10° to 70° C)
	Non-operating:	-40° to 176° F (-40° to 80° C)
Humidity	**Operating:**	10% to 90% (non-condensing)
	Non-operating:	5% to 95% (non-condensing)
Altitude	**Operating:**	0 to 10,000 ft (3,048 m)
	Non-operating:	0 to 50,000 ft (15,240 m)

* Wireless access point and Internet service required and not included. Availability of public wireless access points limited.

Intel® 8260 2x2 Dual Band 802.11ac WLAN/ Bluetooth® Combo*

Wireless LAN Standards

IEEE 802.11 ac/a/b/g/n

Interoperability

Wi-Fi certification

WLAN + Bluetooth® Combo M.2 Card device shall meet all of the requirements to support Bluetooth® 4.1 and backwards compatible with 2.1 with EDR

Frequency Band

802.11b/g/n	2.402-2.482 GHz
802.11a/n/ac	4.9 – 4.95 GHz (Japan) 5.15 – 5.25 GHz 5.25 – 5.35 GHz 5.47 – 5.725 GHz 5.825 – 5.850 GHz (Note: Indonesia does not support this band)

Antenna Interface

With antennas installed in the system, the antenna peak gain is less than +3dBi in the 2.4GHz band and less than +4dBi in the 5GHz band to allow the device to meet regulatory limits.

Data Rates

- 802.11b: 1, 2, 5.5, 11 Mbps
- 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
- 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
- 802.11n: card will support rates for NSS=1 and NSS=2 for RX and TX for 20 and 40 MHz channels. Short and long guard interval shall be supported.
- 802.11ac: card will support rates for NSS=1 and NSS=2 for RX and TX for 80 MHz channels. 433Mbps for 1x1 and 867Mbps for 2x2.

Security

- IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only
- AES-CCMP: 128 bit in hardware
- 802.1x authentication
- WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES.
- WPA2 certification
- IEEE 802.11i
- Cisco Certified Extensions, all versions through V5
- WAPI

Note: Check latest software/driver release for updates on supported security features.

Roaming

802.11r Fast Roaming

Output Power (Transmitting)

- 802.11b: +16dBm minimum
- 802.11g: +14dBm minimum
- 802.11a: +14dBm minimum
- 802.11n HT20 (2.4GHz) : +14dBm minimum
- 802.11n HT40 (2.4GHz) : +12dBm minimum
- 802.11n HT20 (5GHz) : +14dBm minimum
- 802.11n HT40 (5GHz) : +12dBm minimum
- 802.11ac 80MHz (5GHz) : +12dBm minimum

Notes:

1. RF Tx power have to meet minimum criteria and with +1.5dBm tolerance but -1.5dBm.
2. RF Parameter will be verified by R&S CMW500 via link mode. .

Power Consumption

Transmit: 2.0 Watts

Receive: 1.6 Watts

Idle mode (PSP): 180 mW (WLAN associated)

Technical Specifications – Networking and Communications

	Idle mode: 50 mW (WLAN unassociated) Connect Standby 10mW (WLAN+BT) Radio off: 5 mW	
Bluetooth® Power Consumption	Peak operating: 330 mW Receive: 230 mW USB selective suspend: 17 mW	
Power Management	The product conforms to the ACPI and PCI Express M.2 bus methods to manage power of the WLAN components. Supports all 802.11 compliant power-save modes. These include the basic Power Save Polling (PSP) in 802.11 and Automatic Power Save Delivery (APSD) defined in 802.11e.	
Receiver Sensitivity for FER <10%	802.11b, 1Mbps: -94dBm maximum 802.11b, 11Mbps: -86dBm maximum 802.11a/g, 6Mbps: -88dBm maximum 802.11a/g, 54Mbps : -74dBm maximum 802.11n, MCS07 : -69dBm maximum 802.11n, MCS15 : -66dBm maximum 802.11ac, 1SS, MCS-0 : -86dBm maximum 802.11ac, 1SS, MCS-9 : -61dBm maximum 802.11ac, 2SS, MCS-0 : -83dBm maximum 802.11ac, 2SS, MCS-9 : -58dBm maximum Note: 1. Rx sensitivity have to meet maximum criteria and with -1.5dBm tolerance but +1.5dBm. 2. Note: RF Parameter will be verified by R&S CMW500 via link mode.	
Form Factors	PCI Express M.2 form factor	
Operating Voltage	The card will be powered by a 3.3V, ± 9% supply from the host system.	
Temperature	**Operating:** **Non-operating:**	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	**Operating:** **Non-operating:**	10% to 90% (non-condensing) 5% to 95% (non-condensing)
Altitude	**Operating:** **Non-operating:**	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)

* Wireless access point and Internet service required and not included. Availability of public wireless access points limited.

Broadcom BCM943228Z 802.11n 2x2 DualBand Combo PCIe x1 Card*

Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n
Interoperability	Wi-Fi certified
Frequency Band	802.11b/g/n • 2.402 – 2.482 GHz Note: The FCC has declared as of January 1, 2015 products that utilize passive scanning on channel 12/13 and are capable of transmitting must fully comply with requirements of 15.247 or otherwise disable those channels. 802.11a/n • 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 Note: Indonesia no support this band)
Antenna Structure	2 transmit; 2 receive (2x2)
Data Rates	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)
Modulation	Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM
Security[1]	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.
Network Architecture	Ad-hoc (Peer to Peer)
Models	Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between band Access Points
Output Power[2]	• 802.11b : +16dBm minimum • 802.11g : +14dBm minimum • 802.11a : +14dBm minimum • 802.11n HT20(2.4GHz) : +13dBm minimum • 802.11n HT40(2.4GHz) : +13dBm minimum • 802.11n HT20(5GHz) : +12dBm minimum • 802.11n HT40(5GHz) : +12dBm minimum
Power Consumption	Transmit: 2.0 W (max) Receive: 1.6 W (max)

Technical Specifications – Networking and Communications

	Idle mode (PSP): 180 mW (WLAN Associated) Idle mode: 60 mW (WLAN unassociated) Radio disabled: 30 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[4]	802.11b, 1Mbps : -94dBm maximum 802.11b, 11Mbps : -86dBm maximum 802.11g, 6Mbps : -88dBm maximum 802.11g, 54Mbps : -74dBm maximum 802.11a, 6Mbps : -86dBm maximum 802.11a, 54Mbps : -72dBm maximum 802.11n, MCS07 : -69dBm maximum 802.11n, MCS15 : -66dBm maximum
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO and Bluetooth® communications
Form Factor	PCI-Express M.2 MiniCard
Dimensions	Type 2230 : 2.3 x 22.0 x 30.0 mm Or Type 1630 : 2.3 x 16.0 x 30.0 mm
Weight	Type 2230 : 2.8g Or Type 1630 : 2g
Operating Voltage	3.3v +/- 9%
Temperature	Operating 14° to 158° F (-10° to 70° C) Non-operating -40° to 176° F (-40° to 80° C)
Humidity	Operating 10% to 90% (non-condensing) Non-operating 5% to 95% (non-condensing)
Altitude	Operating 0 to 10,000 ft (3,048 m) Non-operating 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber - Radio OFF; LED White - Radio ON

1. Check latest software/driver release for updates on supported security features.
2. Maximum output power may vary by country according to local regulations.
3. In Power Save Polling mode and on battery power.
4. Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).
5. WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.

HP Integrated Module with Bluetooth® 4.0+EDR Wireless Technology

Bluetooth® Specification	4.0+EDR Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	79 (1 MHz) available channels
Data Rates and Throughput	3 Mbps data rate; throughput up to 2.17 Mbps Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric or 1306.9 kbps symmetric

Technical Specifications – Networking and Communications

Transmit Power

The Bluetooth component shall operate as a Class II Bluetooth® device with a maximum transmit power of +4 dBm for BR and EDR.

Receiver Sensitivity

Modulation	0.01% BER	0.001% BER
GFSK	-80 dBm	-70 dBm
π/4-DQPSK	-80 dBm	-70 dBm
8DPSK	-80 dBm	-70 dBm

Power Consumption

Peak (Tx) 330 mW
Peak (Rx) 230 mW
Selective Suspend 17 mW

Range

Up to 33 ft (10 m)

Electrical Interface

USB 2.0 compliant

Bluetooth® Software Supported

Microsoft Windows Bluetooth® Software

Link Topology

Point to Point, Multipoint Pico Nets up to 7 slaves

Electrical Interface

Full support of Bluetooth® Security Provisions

Bluetooth® Software Supported

Microsoft Windows ACPI, and USB Bus Support

Security

Self-configurable to optimize power conservation in all operating modes, including Standby, Hold, Park, and Sniff

Power Management

All necessary regulatory approvals for supported countries, including:

Power Management

FCC (47 CFR) Part 15C, Section 15.247 & 15.249

Certifications

ETS 300 328, ETS 300 826

Bluetooth® Profiles Supported

Low Voltage Directive IEC950

UL, CSA, and CE Mark

Certifications

Serial Port Profile (SPP)[1]
Service Discovery Application Profile (SDAP)
Dial-Up Networking (DUN)[1,2]
Generic Object Exchange Profile (GOEP)[1,2]
Object Push Profile (OPP)[1,2]
File Transfer Profile (FTP)
Synchronization Profile (SYNC)
Hard Copy Cable Replacement (HCRP)[1,2]
Personal Area Networking Profile (PAN)[1,2]
Human Interface Device Profile (HID)[1,2]
FAX Profile (FAX)
Basic Imaging Profile (BIP)[2]
Headset Profile (HSP)
Hands Free Profile (HFP)
Advanced Audio Distribution Profile (A2DP)

Bluetooth® Profiles Supported

*Wireless access point and internet access required. The specifications for the 802.11ac WLAN are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the notebook to communicate with other 802.11ac WLAN devices.

HP WLAN 802.11 a/b/g/n 2x2 Dual Band PCIe x1 WLAN/Bluetooth® Card

Wireless LAN Standards	IEEE 802.11a/b/g/n	
Interoperability	Wi-Fi certification BQE certification of the Bluetooth component CCXv1, v2, v3, v4, v5 CCX certified (Cisco Client Extensions) NOTE: WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.	
Frequency Band	802.11b/g/n	2.402-2.482 GHz
	802.11a/n	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
Antenna Structure	2 transmit; 2 receive (2x2) Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications.	
Data Rates	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: card will support rates for NSS=1 and NSS=2 for RX and TX for 20 and 40 MHz channels. Short and long guard interval shall be supported.	
Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through V5 • WAPI **NOTE:** Check latest software/driver release for updates on supported security features.	
Roaming	IEEE 802.11 compliant roaming between band Access Points	
Output Power	• +13.5 dBm minimum • Maximum output power must be able to achieve modular regulatory certification peak gain of +3dBi at 2.4GHz and +5dBi at 5GHz Note: Maximum output power may vary by country according to local regulations.	
Power Consumption	Transmit: 2.0 Watts Receive: 1.6 Watts Idle mode: 250 mW (WLAN associated)	

Technical Specifications – Networking and Communications

Idle mode: 100 mW (WLAN unassociated)

Radio off: 75 mW (WLAN unassociated)

Bluetooth® Power Consumption Peak operating: 330 mW

Receive: 230 mW

USB selective suspend: 17 mW

Power Management ACPI and PCI Express bus compliant power management
802.11 compliant power saving mode
Supports USB selective suspend and resume of the Bluetooth component through the USB control signals.

Receiver Sensitivity

802.11b

Sensitivity (dBm)	Rate (Mbps)	Modulation and Coding Rate
-95	1	BPSK
-93	2	QPSK
-91	5.5	CCK
-88	11	CCK

802.11a/g

Sensitivity (dBm)	Rate (Mbps)	Modulation and Coding Rate
-90	6	BPSK - ½
-89	9	BPSK – ¾
-87	12	QPSK – ½
-85	18	QPSK – ¾
-82	24	16 QAM – ½
-79	36	16 QAM – ¾
-76	48	64 QAM – 2/3
-74	54	64 QAM – ¾

802.11n

Sensitivity (dBm)	Rate (Mbps)	Modulation and Coding Rate
-69	150	64 QAM – 5/6
-66	300	64 QAM – 5/6

Form Factors PCI-Express Half-MiniCard

Weight 0.1133 oz (3.212 g)

Dimensions 1.04 x 1.17 x 0.042 in (26.65 x 29.85 x 1.067 mm)

Operating Voltage 3.3V +/- 9%

Temperature
Operating: 14° to 158° F (-10° to 70° C)
Non-operating: -40° to 176° F (-40° to 80° C)

Humidity
Operating: 10% to 90% (non-condensing)
Non-operating: 5% to 95% (non-condensing)

Altitude
Operating: 0 to 10,000 ft (3,048 m)
Non-operating: 0 to 50,000 ft (15,240 m)

Technical Specifications - Audio

AUDIO

High Definition Audio

Type	Integrated
HD Stereo Codec	Realtek 2-channel ALC221 codec
Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance) Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver) Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load) Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal. All ports are 3.5mm
Internal Speaker Amplifier	1.5W amplifier for the internal speaker only. External speakers must be powered externally. Rear Line-in audio port is re-taskable as either Line-in or Microphone-In.
Multi-streaming Capable	Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz - 192 kHz
Wavetable Syntheses	Yes – Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out	Stereo (Left & Right channels)
Internal Speaker	Yes
External Speaker Jack	Yes

High Definition Audio

Type	Integrated
HD Stereo Codec	Conexant 2-channel CX5001 codec
Audio I/O Ports	Side Headphone/Line-out

Technical Specifications - Audio

	Side Headphone/Microphone/Line-In (function is configurable by audio driver; re-task able to provide Headphone, Microphone, or Line-In) Rear Line-Out All ports are 3.5mm
Internal Speaker Amplifier	2W amplifier for the internal speaker only. External speakers must be powered externally.
Multi-streaming Capable	Multi-streaming can be enabled in the DTS control panel
Sampling	44.1 kHz - 192 kHz
Wavetable Syntheses	Yes – Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out	Stereo (Left & Right channels)
Internal Speaker	Yes
External Speaker Jack	Yes

POWER

Unit Environment and Operating Conditions

General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: –22° to 140° F(–30° to 60° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: (16,404 ft.) 5000m Non-operating: 50,000 ft (15240 m)

*Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

POWER SUPPLY

Standard Efficiency	65W active PFC 89% average efficiency at 115V
80 PLUS Gold	N/A
80 PLUS Platinum	N/A
Operating Voltage Range	90 - 264 VAC
Rated Voltage Range	100 - 240 VAC
Rated Line Frequency	50/60 Hz
Operating Line Frequency	47 – 63 Hz
Rated Input Current	N/A
Rated Input Current with Energy Efficient* Power Supply	
DC Output	+19.5V
Current Leakage (NFPA 99: 2102)	Less than 500 microamps of leakage current at 120 Vac with the ground wire disconnected, as required for Non-patient Electrical Appliances and Equipment used in a patient care facility or that contact patients in normal use. Per section 10.3.5.1. Less than 100 microamps of leakage current at 120 Vac with the ground wire intact with normal polarity, as required for Non-patient Electrical Appliances and Equipment used in a patient care facility or that contact patients in normal use. Per section 10.3.5.1.
Power Supply Fan	N/A
Power cord length	N/A
External Power Adapter	
Dimensions	45 x 30 x 108 mm
Total Cord Length	6 ft

Summary of Changes

Date of change:	Version History:		Description of change:
October 26, 2015	From v1 to v2	Added	Detailed back port callouts
		Changed	5th generation Intel Core processors changed to 6th generation, DDR3 instances to DDR4
November 12, 2015	From v2 to v3	Removed	Intel Celeron G3900T 2.6G 2M 2133 2C CPU
November 30, 2015	From v3 to v4	Changed	Intel® Pentium® G4400TE to Intel® Pentium® G4400T, 5th gen Intel processors changed to 6th generation in Technical Specifications, Memory
December 16, 2015	From v4 to v5	Changed	Operative Systems, Security and
		Added	Intel 6th Generation Celeron Processor
January 12, 2015	From v5 to v6	Removed	Windows Embedded 7 (64-bit)
May 18, 2016	From v6 to v7	Added	CTO/AMO options: 2nd USB to Serial Port Adapter, HP Keyed Cable Lock, 500 GB SATA 6G 2.5 8G SSHD, 1TB SATA 6G 2.5 8G SSHD, 256 GB Values SSD Drive, HP Dual Head Keyed Cable Lock, HP Desktop Mini Antenna/Wiring WLAN Kit
June 10, 2016	From v7 to v8	Removed	RAID 1 support from At a Glance section.
January 2, 2016	From v8 to v9	Removed	“Disabled” from Intel® 8260 WLAN card
July 31, 2017	From v9 to v10	Removed	HP Touchpoint Manager from the Software section
September 22, 2017	From v10 to v11	Changed	HP Desktop Mini Security/Dual VESA Sleeve part numberG2K22AA to G1K22AA