Overview

HP Pro SFF 290 G9 Desktop PC

Front

1. Slim-height Bay - supporting an optical disk drive (optional)
2. Power Button
3. Microphone/Headphone Combo Jack
4. (4) SuperSpeed USB 5Gbps signaling rate Ports[1]

Not Shown

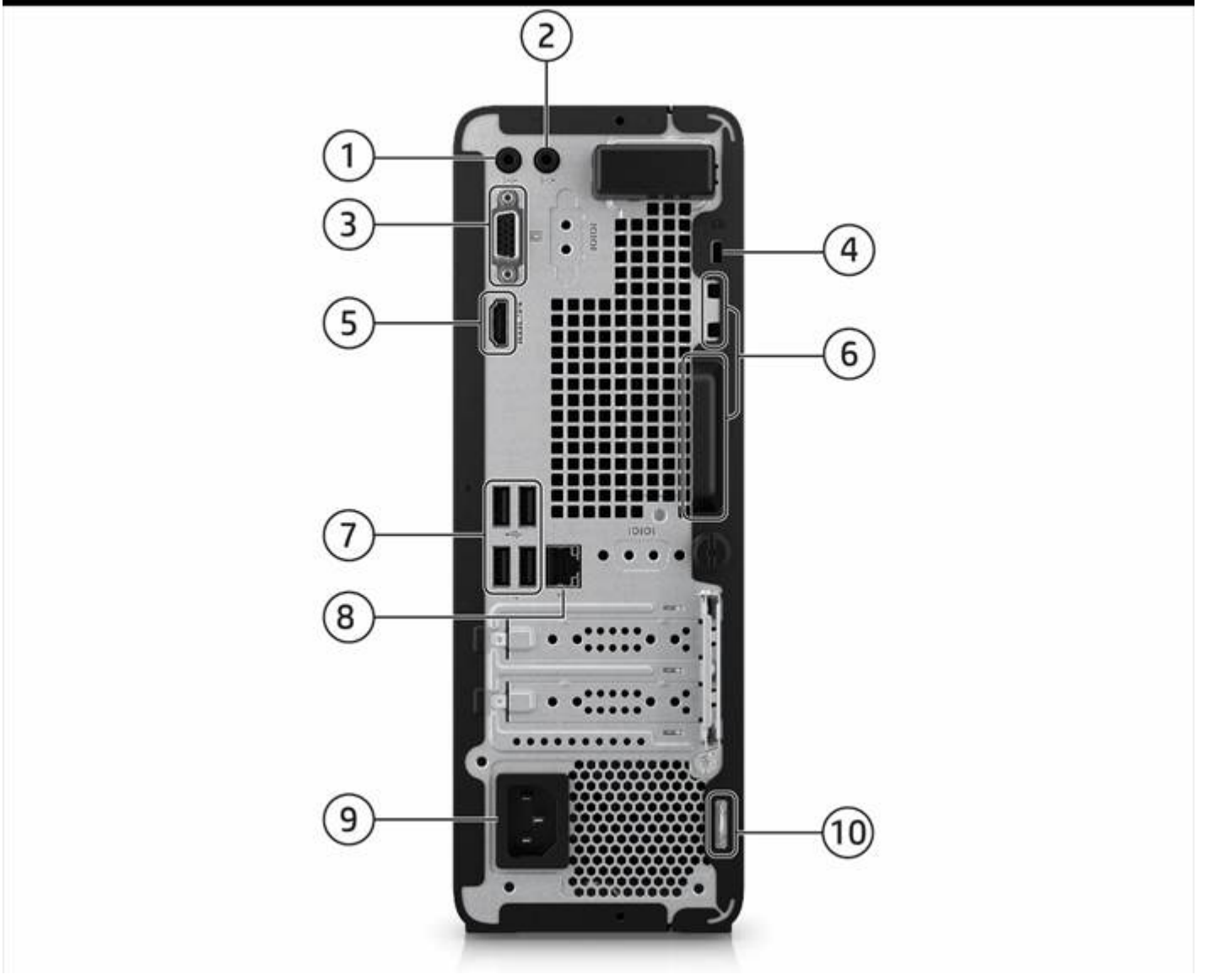
Slots
(1) PCI Express4.0 x16
(1) PCI Express3.0 x1
(1) M.2 for WLAN
(1) M.2 2242/2280 storage

Bays
(1) 3.5"
(1) 9.5mm internal optical drive bay

1. SuperSpeed USB 5Gbps = USB3.2 Gen1
***NOTE:** Start from 10/22/2021 280 G5 Small Form Factor Business PC transit from B460 to H570.

Overview

HP Pro SFF 290 G9 Desktop PC



Back

1. Audio Line out
2. Audio Line in
3. VGA Port[1]
4. Standard lock slot
5. HDMI Port[1]
6. Integrated accessories cable lock
7. (4) USB 2.0 ports
8. RJ-45 Network Connector
9. Power Cord Connector
10. Padlock Loop

Not Shown

Parallel Port (Optional via PCIex1 slot)
4 Serial Port (Optional via PCIe slot)
Intrusion Sensor (Optional)

1. Port will be covered up when configured with processor which is without internal graphics.

Standard Features and Configurable Modules

AT A GLANCE

- Windows 11 Pro 64, Win 11 Home 64, Win 11 Pro 64 Downgrade (Win 10 Pro 64) or FreeDOS.
- Intel® Intel® H670 chipset supporting Intel® 12th processors featuring Intel® UHD Graphics.
- Supports an optional discrete graphics card.
- Integrated 10/100/1000 Ethernet Controller or ac 2x2 +Bluetooth 5 M.2 2230 PCI-e+USB WW or 802.11ac (1x1) Wi-Fi® and Bluetooth® 4.2 Combo.
- Up to 64GB DDR4-2933 Unbuffered Memory (UDIMM).
- Independent monitor support via VGA and HDMI interfaces.
- TPM 2.0 support (firmware).
- Supports both Hard Disk Drives and SATA TLC / PCIe® NVMe™ M.2 SSD orPCIe® NVMe™ TLC M.2 SSD.
- 8 USB Ports (including 4 SuperSpeed USB 5Gbps ports).
- 180W 85%/ 90% HE power supply and 240W 92% HE power supply[1].
- Security cable lock supported (sold separately).
- Intrusion sensor supported (optional).
- Optional Care Services available; terms and conditions vary by country; certain restrictions and exclusions apply[2].

1. 85% available in select regions only.
2. HP Care Services sold separately. Service levels and response times for HP Care Services may vary depending on your geographic location. Service starts on date of hardware purchase. Restrictions and limitations apply. For details, visit www.hp.com/go/cpc. HP services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

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

OPERATING SYSTEMS

Preinstalled	Windows 11 Pro[1] Windows 11 Home - HP recommends Windows 11 Pro for business[1] Windows 10 Pro (available through downgrade rights from Windows 11 Pro)[1,2] Windows 10 Home[2] FreeDOS[3]

1. Device comes with Windows 10 and a free Windows 11 upgrade or may be preloaded with Windows 11. Upgrade timing may vary by device. Features and app availability may vary by region. Certain features require specific hardware (see Windows 11 Specifications).
2. 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 interneet and Microsoft account required. ISP fees apply and additional requirements may apply over time for updates. See http://www.windows.com.
3. TPM feature will be supported on machine pre-configured with FreeDOS, but will default set as disabled in BIOS setup menu. In some cases, machines pre-configured with Windows OS might ship with TPM turned off.

NOTE: Your product does not support Windows 8 or Windows 7. In accordance with Microsoft's support policy, HP does not support the Windows® 8 or Windows 7 operating system on products configured with Intel® and AMD® 7th generation and forward processors or provide any Windows® 8 or Windows 7 drivers on http://www.support.hp.com. A full list of HP products and the Windows 10 versions tested is available on the HP support website. https://support.hp.com/us-en/document/c05195282.

PROCESSORS*

Standard Features and Configurable Modules

Intel® Celeron® Processors[1,2,3]

CPU Intel Celeron G6900 Dual Core 3.4GHz 3200MHz 46W (3.4GHz, 4MB cache, 2 cores)

Intel® Pentium®[1,2]

CPU Intel Pentium Gold G7400 Dual Core 3.7GHz 3200MHz 46W (3.7GHz, 6MB cache, 2 cores)

Intel 10th Processors
Intel® Core™ i3[1,2,3]

CPU Intel Core i3-12100 4C 3.3GHz 3200MHz 60W (3.3GHz, turbo up to 4.3GHz, 12MB cache, 4 cores)

Intel® Core™ i5[1,2,3]

CPU Intel Core i5-12400 6C 2.5GHz 3200MHz 65W (2.5GHz, turbo up to 4.4GHz, 18MB cache, 6 cores)

CPU Intel Core i5-12500 6C 3.0GHz 3200MHz 65W (3.0GHz, turbo up to 4.6GHz, 18MB cache, 6 cores)

Intel® Core™ i7[1,2,3]

CPU Intel Core i7-12700 12C 2.1GHz 3200MHz 65W (2.1GHz, Up to 4.8GHz with Intel® Turbo Boost[4], 25MB cache, 12 cores)

1. Your product does not support Windows 8 or Windows 7, In accordance with Microsoft's support policy, HP does not support the Windows® 8 or Windows 7 operating system on products configured with Intel 8th generation and forward processors or provide any Windows® 8 or Windows 7 drivers on http://www.support.hp.com
2. 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.
3. 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.
4. Intel® Turbo Boost technology requires a PC with a processor with Intel Turbo Boost capability. Intel Turbo Boost performance varies depending on hardware, software and overall system. See http://www.intel.com/technology/turboboost for more information.

***NOTE:** Not all processors are available; it varies by version.

CHIPSET

Intel® H670 Chipset

GRAPHICS

Integrated[1,2]

Intel® UHD
Graphics 770 (integrated on 12th Core i7-i5 processors)
Intel® UHD
Graphics 730 (integrated on 12th Core i5-i3 processors)
Graphics 710 (integrated on Pentium and Celeron)

Discrete Graphics

NVIDIA® Quadro® T400 (4 GB GDDR6 dedicated)

1. HD content required to view HD images.
2. Integrated Intel software is available on select models only and requires separately purchased projector, tv or computer monitor with an integrated or external receiver. External receivers connect to the projector, tv or computer monitor via a standard VGA, HDMI cable, also sold separately.

MEMORY

Standard Features and Configurable Modules

Both slots are customer accessible / upgradeable, Supports Dual Channel Memory

Form Factor	Type	Maximum	# of Slots
Small Form Factor	DDR4 2933	64 GB capacity	2 DIMM[1]

4GB DDR4-2933 UDIMM NECC (1x4GB)
8GB DDR4-2933 UDIMM NECC (1x8GB)
8GB DDR4-2933 UDIMM NECC (2x4GB)
16GB DDR4-2933 UDIMM NECC (1x16GB)
16GB DDR4-2933 UDIMM NECC (2x8GB)
32GB DDR4-2933 UDIMM NECC (1x32GB)
32GB DDR4-2933 UDIMM NECC (2x16GB)
64GB DDR4-2933 UDIMM NECC (2x32GB)

1. Memory modules support data transfer rates up to 2933 MT/s; actual data rate is determined by the system's configured processor. See processor specifications for supported memory data rate.
NOTE: DDR3-2933 UDIMM is only available for 10th Gen i7 processor.

STORAGE AND DRIVES

SATA3 - 3.5" or 2.5"? 6Gb/s HDDs*

2TB 7200 RPM SATA Hard Disk Drive

1TB 7200 RPM SATA Hard Disk Drive

500GB 7200 RPM SATA Hard Disk Drive

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

M.2 Solid State Drives

256GB* M.2 NVMe
512GB* M.2 NVMe
1TB* M.2 NVMe
128GB* M.2 2280 PCIe NVMe Three Layer Cell SSD
256GB* M.2 2280 PCIe NVMe Three Layer Cell SSD
512GB* M.2 2280 PCIe NVMe Three Layer Cell SSD
1TB* M.2 2280 PCIe NVMe Three Layer Cell SSD

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

OPTICAL DISC DRIVES

DVD-ROM 9.5mm[2]

DVD-Writer 9.5mm[2]

2. Optical drives are optional or add on features. HD-DVD disks cannot be played on this drive. No support for DVD-RAM. Actual speeds may vary. Don't copy copyright-protected materials.

NETWORKING/COMMUNICATIONS

Standard Features and Configurable Modules

Networking

Integrated 10/100/1000M GbE LAN

Wi-Fi® and Bluetooth®[1]

Realtek RTL8822CE-CG 802.11a/b/g/n/ac (2x2) with Bluetooth® M.2 PCIe®
Realtek RTL8821CE-CG 802.11a/b/g/n/ac (1x1) with Bluetooth® M.2 PCIe®

1. 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. Wi-Fi 5 (802.11 ac) is backwards compatible with prior 802.11 specs.

AUDIO/MULTIMEDIA

Realtek ALC3867-CG
Integrated Hi-Definition Audio
Combo Jack, Headphone/ Microphone
Line-in/ Line-out (3.5mm)

KEYBOARDS/POINTING DEVICES/BUTTONS AND FUNCTIONS KEYS

Keyboard

HP USB 320K Keyboard
HP 125 Wired Keyboard
HP 125 Antimicrobial Wired Keyboard

Mouse

HP Wired Desktop 320M mouse
HP 125 Wired Mouse
HP 128 Laser Wired Mouse
HP 125 Antimicrobial Wired Mouse (China only)

PORTS

Front

Slim-height Bay - supporting an optical disk drive (optional)
(4) SuperSpeed USB 5Gbps signaling rate
Microphone/Headphone Combo Jack
Power Button

Not Shown

(1) PCI Express4.0 x16
(1) PCI Express3.0 x1
(1) M.2 for WLAN
(1) M.2 2242/2280 storage

Rear

Audio Line out
Audio Line in
HDMI Port
Standard lock slot
VGA Port

Standard Features and Configurable Modules

(4) USB 2.0 port
RJ-45 Network Connector
Power Cord Connector
Padlock loop
Integrated Accessories Cable Lock

Not Shown

(1) Parallel Port (Optional via PCIex1 slot)
(1) 4x Serial port (Optional via PCIex1 slot)[1]
(1) PS/2 Port (Optional)
(1) Intrusion Sensor (Optional)

1. Available for selected regions

BAYS

(2) 3.5" internal storage
(1) 9.5mm internal optical drive bay

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

Security and Protection

McAfee* LiveSafe™ [1]

Productivity

Buy Office (sold separately)
Dropbox[2]
Xerox® DocuShare® (30 day free trial offer)[3]

ODD Playback

sMedio True DVD for HP

Movies

Netflix[4]

App Stores and Content Purchasing

Amazon[4]

HP Utilities and Support

HP Documentation
HP JumpStarts
HP Audio Switch[5]
HP Support Assistant[6]

BTB

HP Setup Integrated OOBE

Standard Features and Configurable Modules

Hardware Enabling Drivers or software utility

HP System Event Utility

***NOTE**: Available for LA region only.
1. Free 1-year subscription of McAfee LiveSafe service included. Internet access required and not included. Subscription required after expiration
2. New Dropbox users are eligible to get 25 GB of Dropbox space free for 12 months from date of registration. For complete details and terms of use, including cancellation policies, visit the Dropbox website at https://www.dropbox.com/help/space/hp-promotion. Internet service required and not included.
3. Simply sign up and start using Xerox® DocuShare® Go. No credit card. No obligation. Data will become unavailable unless a subscription is entered before the end of the 30 day free trial period. See visit http://www.xerox.com/docusharego for details.
4. Internet access required and not included.
5. Easily switch between speaker and microphone sources with intuitive controls and a consistent app experience
6. For more information visit hp.com/go/hpsupportassistant [Link will vary outside of the U.S.] HP Support Assistant is available for Android and Windows based PCs.

POWER

Power Supply

180W

EPA85 Full range 115V/230V

EPA90 Full range 115V/230V

240W

EPA92 Full range

WEIGHT AND DIMENSIONS

(configured with 1 HDD and 1 ODD)

Chassis (W x D x H)	3.74 x 11.93 x 10.63 in (95 x 303 x 270 mm) (w/bezel)
System Weight	8.82 lbs / 4 kg*

***NOTE**: Weight varies by configuration and component

UNIT ENVIRONMENTAL AND OPERATING CONDITIONS

General Unit Operating Guidelines

Environmental and Industry

- 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:**	5° to 35° C[1]
	Non-operating:	-30° to 60°[1]
Relative Humidity	**Operating:**	5% to 90% (non-condensing at ambient)
	Non-operating:	5% to 90% (non-condensing at ambient)

Standard Features and Configurable Modules

Maximum Altitude (unpressurized)	**Operating:**	5,000 m
	Non-operating:	50,000 ft (15240 m)

1. 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.

Eco-Label Certifications & declarations	This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks: • IT ECO declaration • US ENERGY STAR® • US Federal Energy Management Program (FEMP) • EPEAT® Gold registered in the United States. See http://www.epeat.net for registration status in your country. • TCO Certified • China Energy Conservation Program (CECP) • China State Environmental Protection Administration (SEPA) • Taiwan Green Mark • Korea Eco-label • Japan PC Green label • Commission Regulation (EC) No 617/2013 (ErP Lot 3)		
System Configuration	The configuration used for the Energy Consumption and Declared Noise Emissions data for the Desktop model is based on a "Typically Configured Desktop"?.		
Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	12.46W	12.51W	12.40W
Normal Operation (Long idle)	10.16W	10.22W	10.02W
Sleep	1.76W	1.75W	1.76W
Off	0.38W	0.41W	0.41W
	NOTE: Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family. HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system. Search keyword generator on HP's 3rd party option store for solar generator accessories at http://www.hp.com/go/options.		
Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 50Hz**
Normal Operation (Short idle)	42.49 BTU/hr	42.66 BTU/hr	42.28 BTU/hr
Normal Operation (Long idle)	34.65 BTU/hr	34.85 BTU/hr	34.17 BTU/hr
Sleep	6.00 BTU/hr	5.97 BTU/hr	6.00 BTU/hr
Off	1.30 BTU/hr	1.40 BTU/hr	1.40 BTU/hr
	NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.		
Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)	
Typically Configured - Idle	3.2	19.7	
Fixed Disk - Random writes	3.3	20.7	

Standard Features and Configurable Modules

Optical Drive - Sequential reads	4.5	38.2
Longevity and Upgrading	This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the product may include: Spare parts are available throughout the warranty period and or for up to "3"? years after the end of production.	
Batteries	This battery(s) in this product comply with EU Directive 2006/66/EC Batteries used in the product do not contain: Mercury greater the1ppm by weight Cadmium greater than 20ppm by weight Battery size: CR2032 (coin cell) Battery type: Lithium	
Additional Information	• This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC. • This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC. • This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986). • This product is in compliance with the IEEE 1680.1 (EPEAT) standard at the <Silver> level, see http://www.epeat.net • Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043. • This product contains 28.2% post-consumer recycled plastic (by wt.) • This product is 91.7% recycle-able when properly disposed of at end of life.	

Packaging Materials	**External:**	PAPER/Paperboard	540 g
	Internal:	PAPER/Molded Pulp	350 g
		PLASTIC/Polyethylene low density - LDPE	30 g

Material Usage	This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf): • Asbestos • Certain Azo Colorants • Certain Brominated Flame Retardants - may not be used as flame retardants in plastics • Cadmium • Chlorinated Hydrocarbons • Chlorinated Paraffins • Formaldehyde • Halogenated Diphenyl Methanes • Lead carbonates and sulfates • Lead and Lead compounds • Mercuric Oxide Batteries • Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user. • Ozone Depleting Substances • Polybrominated Biphenyls (PBBs) • Polybrominated Biphenyl Ethers (PBBEs) • Polybrominated Biphenyl Oxides (PBBOs) • Polychlorinated Biphenyl (PCB) • Polychlorinated Terphenyls (PCT) • Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.

Standard Features and Configurable Modules

	• Radioactive Substances • Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)
Packaging Usage	HP follows these guidelines to decrease the environmental impact of product packaging: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
End-of-life Management and Recycling	HP Inc. offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment. Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www8.hp.com/us/en/hp-information/environment/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf

SERVICE AND SUPPORT

On-site Warranty[1]: Available three-year (3-3-3) or one-year (1-1-1) limited warranty (varies by country) delivers on-site, next business day[2] service for parts and labor and complimentary limited technical support[3]. Three-year onsite and labor are not available in all countries. Service offers terms up to 5 years by choosing an optional HP Care Service[4]. To choose the right level of service for your HP product, visit HP Care Pack Central: http://www.hp.com/go/cpc.

1. Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.
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.
3. Technical support applies only to HP-configured and third-party HP qualified hardware and software.
4. HP Care Packs are sold separately. Service levels and response times for HP Care Packs may vary depending on your geographic location. Service starts on date of hardware purchase. Restrictions and limitations apply. For details, visit http://www.hp.com/go/cpc. HP services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

Technical Specifications - Graphics

GRAPHICS

Intel® UHD Graphics (integrated)	
Graphics Controller	Integrated
DisplayPort™	Multimode capable; supports HDCP, Display Port Audio (2 streams), HBR2 link rates and Multi-Stream Technology for a maximum of 4 displays connected to any output controlled by Intel® Graphics
HDMI	Supports HDMI 2.0a features Supports HDCP 2.2 Supports audio over HDMI
VGA	VGA output
Memory	The actual amount of maximum graphics memory can be >4GB. System 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 Color Depth	up to 10 bits/color
Graphics/Video API Support	HEVC 10b Enc/Dec HW VP9 10b Dec HW HDR Rec. 2020 DX12
Supported Display Resolutions and Refresh Rates	Max. Resolution (VGA) 2048 x 1536 @60Hz Max. Resolution (HDMI) 7680 x 4320 @60Hz
Note: The actual amount of maximum graphics memory can be less than the amounts listed above depending upon your computer's configuration. **Note:** other resolutions may be available but are not recommended as they may not have been tested and qualified by HP Only supported on displays connected to the external DisplayPort™ connector.	

NVIDIA® Quadro T400 Graphics Card

Engine Clock	2100 MHz
Memory Clock	5001 MHz
Memory Size (width)	4GB (64-bit)
Memory Type	256M x 16 GDDR6
Max. Resolution (DP)	7680x4320@60Hz
Multi Display Support	4 displays
HDCP Compliance	Yes
Rear I/O connectors (bracket)	mDPx3
Cooling (active/passive)	Active fan-sink (Active cooling with dynamic speed)
Total power consumption (W)	30W
PCB form-factor with bracket	LP PCB with LP bracket

Technical Specifications – Storage

STORAGE

HP 2TB* 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive*	
Capacity	2TB
Rotational Speed	7,200 rpm
Interface	SATA 6Gb/s NCQ
Buffer Size	64 MB
Logical Blocks	3,907,029,168
Seek Time	Read: <8.5 ms
	Write: <9.5 ms
Height	1.028 in/26.11 mm
Width	4.0 in/101.6 mm
Operating Temperature	32° to 140° F (0° to 60° C)

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

1TB 7.2K rpm SATA 6.0Gb/s 3.5"? Hard Disk Drive	
Capacity	1TB
Rotational Speed	7,200 rpm
Interface	Serial ATA 3.0 (6.0 Gb/s)
Buffer Size	32 MB
Logical Blocks	1,953,525,168
Seek Time	Read: <8.5 ms
	Write: <9.5 ms
	Full-Stroke: 21 ms
Height	1 in/2.54 cm
Width	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm
Operating Temperature	41° to 131° F (5° to 55° C)

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

Technical Specifications – Storage

500GB 7.2K rpm SATA 6.0Gb/s 3.5"? Hard Disk Drive	
Capacity	500GB
Rotational Speed	7,200 rpm
Drive Type	Serial ATA 3.0 (6.0 Gb/s)
Interface	32 MB
Buffer Size	976,773,168
Seek Time	Single Track: 2.0 ms Average: 11 ms Full-Stroke: 21 ms
Height	1 in/2.54 cm
Width	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm
Operating Temperature	41° to 131° F (5° to 55° C)

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

128GB M.2 2280 PCIe NVMe Three Layer Cell SSD	
Drive Weight	< 10g
Capacity	128GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3x4
Maximum Sequential Read	Up to 2800MB/s
Maximum Sequential Write	Up to 600MB/s
Logical Blocks	250,069,680
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

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

Technical Specifications – Storage

256GB M.2 2280 PCIe NVMe Three Layer Cell SSD

Drive Weight	< 10g
Capacity	256GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3x4
Maximum Sequential Read	Up to 2700MB/s
Maximum Sequential Write	Up to 1000MB/s
Logical Blocks	500,118,192
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

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

512GB M.2 2280 PCIe NVMe Three Layer Cell SSD

Drive Weight	< 10g
Capacity	512GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3x4
Maximum Sequential Read	Up to 2900MB/s
Maximum Sequential Write	Up to 1100MB/s
Logical Blocks	1,000,215,216
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

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

Technical Specifications – Storage

256GB M.2 2280 PCIe NVMe SSD

Drive Weight	< 10g
Capacity	256GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 1600MB/s
Maximum Sequential Write	Up to 780MB/s
Logical Blocks	500,118,192
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

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

512GB M.2 2280 PCIe NVMe SSD

Drive Weight	< 10g
Capacity	512GB
Height	2.38mm
Length	80mm
Width	22mm
Interface	PCIE Gen3
Maximum Sequential Read	Up to 1600MB/s
Maximum Sequential Write	Up to 860MB/s
Logical Blocks	1,000,215,216
Operating Temperature	0° to 70°C (32° to 158°F) [ambient temp]
Features	APST; ASPM L1.2; NVME spec 1.2

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

500GB 7200RPM 2.5in SATA HDD

Capacity	500GB
Rotational Speed	7,200 rpm
Interface	SATA 6 Gb/s
Buffer Size	32 MB
Logical Blocks	976,773,168
Seek Time	12 ms (Average)
Height	0.267 in/6.8 mm (nominal)
Width (nominal)	2.75 in/70 mm (nominal)
Operating Temperature	41° to 131° F (5° to 55° C)

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

Technical Specifications – Storage

1TB 7200RPM 2.5in SATA HDD

Capacity	1TB
Rotational Speed	7,200 rpm
Interface	SATA 6 Gb/s
Buffer Size	32 MB
Logical Blocks	1,953,525,168
Seek Time	12 ms (Average)
Height	0.374 in/9.5 mm (nominal)
Width (nominal)	2.75 in/70 mm (nominal)
Operating Temperature	41° to 131° F (5° to 55° C)

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

Technical Specifications – Optical Disc Drives

OPTICAL DISC DRIVES

HP 9.5mm Desktop G2 Slim DVD Writer Drive	
Height	9.5 mm height
Orientation	Either horizontal or vertical
Interface type	SATA/ATAPI
Disc recording capacity	Up to 8.5 GB DL or 4.7 GB standard
Dimensions (W x H x D)	5.04 x 0.37 x 5.0 in (128 x 9.5 x 127 mm) without bezel
Weight (max)	0.31 lb (140 g)
Read Speeds	DVD-R DL - Up to 6X DVD+R - Up to 8X DVD+RW - Up to 8X DVD+R DL - Up to 6X DVD-R - Up to 8X DVD-RW - Up to 6X CD-R - Up to 24X CD-RW - Up to 10X DVD-RW, DVD+RW - Up to 8X DVD-R DL, DVD+R DL - Up to 8X DVD+R, DVD-R - Up to 8X DVD-ROM DL, DVD-ROM - Up to 8X CD-ROM, CD-R - Up to 24X CD-RW - Up to 24X
Access time (typical reads, including settling)	Random DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical) Full Stroke DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical) Stop Time 6 seconds (typical)
Power	Source Slimline SATA DC power receptacle DC Power Requirement 5 VDC ± 5%-100 mV ripple p-p DC Current 5 VDC (< 1000 mA typical, 1600 mA maximum)
Environmental conditions (operating - non-condensing)	Temperature 41° to 122° F (5° to 50° C) Relative Humidity 10% to 80% Maximum Wet Bulb Temperature 84° F (29° C)

HP 9.5mm Desktop G2 Slim DVD-ROM Drive	
Height	9.5 mm height
Orientation	Either horizontal or vertical
Interface type	SATA/ATAPI
Disc recording capacity	Up to 8.5 GB DL or 4.7 GB standard
Dimensions (W x H x D)	5.04 x 0.37 x 5.0 in (128 x 9.5 x 127 mm) without bezel
Weight (max)	0.31 lb (140 g)
Read Speeds	DVD-R DL - Up to 6X DVD+R - Up to 8X DVD+RW - Up to 8X DVD+R DL - Up to 6X DVD-R - Up to 8X DVD-RW - Up to 6X CD-R - Up to 24X CD-RW - Up to 10X DVD-RW, DVD+RW - Up to 8X DVD-R DL, DVD+R DL - Up to 8X DVD+R, DVD-R - Up to 8X

Technical Specifications – Optical Disc Drives

	DVD-ROM DL, DVD-ROM - Up to 8X CD-ROM, CD-R - Up to 24X CD-RW - Up to 24X
Access time (typical reads, including settling)	Random DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical) Full Stroke DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical) Stop Time 6 seconds (typical)
Power	Source Slimline SATA DC power receptacle DC Power Requirement 5 VDC ± 5%-100 mV ripple p-p DC Current 5 VDC (< 1000 mA typical, 1600 mA maximum)
Environmental conditions (operating - non-condensing)	Temperature 41° to 122° F (5° to 50° C) Relative Humidity 10% to 80% Maximum Wet Bulb Temperature 84° F (29° C)

Technical Specifications – Audio

HIGH DEFINITION AUDIO

Type	Integrated
HD Audio Codec	Realtek ALC3867-CG
Audio I/O Ports	Front side Combo jack for supporting CTIA, Rear side Line-in/ Line-out/ Mic-in jacks
Wavetable Syntheses	Yes
Analog Audio	Yes
Internal Speaker	NA
DAC Sampling Rates	16 to 24-bit; 44.1K/ 48 K/96K / 192K Hz
ADC Sampling Rates	16 bit, 44.1K/ 48K/ 96K/ 192K Hz

Technical Specifications - Power

POWER SUPPLY

P/S 180W SFF ENTS20L EAP85

Operating Voltage Range	180 - 264 VAC
Rated Voltage Range	200-240V AC
Rated Line Frequency	50/60 HZ
Operating Line Frequency	47 - 63 Hz
Rated Input Current	180W: <1.3A
Rated Input Current with Energy Efficient* Power Supply	82/85/82% efficient at 20/50/100% load (230V)
DC Output	+12.1V
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	50 x 20 mm (linear type)

P/S 180W SFF ENTS20L EAP90

Operating Voltage Range	90 - 264 VAC
Rated Voltage Range	100-240V AC
Rated Line Frequency	50/60 HZ
Operating Line Frequency	47 - 63 Hz
Rated Input Current	180W: <2.3A
Rated Input Current with Energy Efficient* Power Supply	87/90/87% efficient at 20/50/100% load (115Vac) 88/92/88% efficient at 20/50/100% load (230V)
DC Output	+12.1V
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	50 x 20 mm (linear type)

P/S 240W SFF ENTS20L EAP92

Technical Specifications - Power

Operating Voltage Range	90 - 264 VAC
Rated Voltage Range	100-240V AC
Rated Line Frequency	50/60 HZ
Operating Line Frequency	47 - 63 Hz
Rated Input Current	240W Platinum ? 2.9A
Rated Input Current with Energy Efficient* Power Supply	90/92/89% efficient at 20/50/100% load (115V) 91/93/90% efficient at 20/50/100% load (230V)
DC Output	+12V
Current Leakage (NFPA 99: 2102)	Less than 500 microamps of leakage current at 264 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 264 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	50mm variable speed

Technical Specifications – Weights and Dimensions

WEIGHTS AND DIMENSIONS

Chassis (W x D x H)	3.74 x 11.93 x 10.63 in (95 x 303 x 270 mm) (w/ bezel)
System Volume	463.16cu in 7.6L
System Weight*	8.82 lbs / 4 kg
Packaged (H x W x D)	13.46 x 7.72 x 19.65 in 342 x 196 x 499 mm
Shipping Weight*	13.2 lb / 6 kg
Shipping Weight (Molded Pulp)*	13.86 lb / 6.3 kg
Palletization Profile	12-units per layer 6 layer max 72 per pallet Footprint (HxWxD) 85.91 x 39.37 x 47.24 in (2182 x 1000 x 1200 mm)

***NOTE**: Weight varies by configuration and component

Technical Specifications – Networking

NETWORKING

10/100/1000 Integrated NIC

Ethernet Features	10 Mbit/s operation (10BASE-T; IEEE 802.3i; IEEE 802.3 clauses 13-14) 100 Mbit/s operation (100BASE-TX; IEEE 802.3u; IEEE 802.3 clauses 21-30) 1000 Mbit/s operation (1000BASE-T; IEEE 802.3ab; IEEE 8023 clauses 40) Auto-Negotiation (Automatic Speed Selection) Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s
Power Management	ACPI compliant - multiple power modes Situation-sensitive features reduce power consumption Advanced link down power saving for reducing link down power consumption
Performance Features	TCP/IP/UDP Checksum Offload (configurable) Protocol Offload (ARP & NS) Large send offload and Giant send offload Receiving Side Scaling Jumbo Frame 9K
Manageability	Wake-on-LAN from standby and hibernation (Magic Packet and Microsoft Wake-Up Frame); Wake-on-LAN from off (Magic Packet only) PXE 2.1 Remote Boot Statistics Gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30)) Comprehensive diagnostic and configuration software suite Virtual Cable Doctor for Ethernet cable status

Realtek RTL8821CE-CG 802.11a/b/g/n/ac (1x1) with Bluetooth® M.2 PCIe®

Wireless LAN Standards1	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac 1. Wireless access point and Internet service required and not included. Availability of public wireless access points limited.	
Interoperability	Wi-Fi® certified modules	
Frequency Bands	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
Data Rates	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) • 802.11ac: MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz, and 80MHz)	

Technical Specifications – Networking

Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
Security[2]	• IEEE and 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 2 Check latest software/driver release for updates on supported security features.
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power[3]	• 802.11b: +14dBm minimum • 802.11g: +12dBm minimum • 802.11a: +12dBm minimum • 802.11n HT20(2.4GHz): +12dBm minimum • 802.11n HT40(2.4GHz): +12dBm minimum • 802.11n HT20(5GHz): +10dBm minimum • 802.11n HT40(5GHz): +10dBm minimum • 802.11ac VHT80(5GHz): +10dBm minimum 3. Maximum output power may vary by country according to local regulations.
Power Consumption	• Transmit mode2.0 W • Receive mode1.6 W • Idle mode (PSP)180 mW(WLAN Associated) • Idle mode50 mW(WLAN unassociated) • Connected Standby 10mW • Radio disabled8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[4]	802.11b, 1Mbps: -93.5dBm maximum 802.11b, 11Mbps: -84dBm maximum 802.11a/g, 6Mbps: -86dBm maximum 802.11a/g, 54Mbps: -72dBm maximum 802.11n, MCS07: -67dBm maximum 802.11n, MCS15: -64dBm maximum 802.11ac, MCS0: -84dBm maximum 802.11ac, MCS9: -59dBm maximum 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).
Antenna type	High efficiency antenna. One embedded dual band 2.4/5 GHz antenna is provided to the card to support WLAN communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard

Technical Specifications – Networking

Dimensions	Type 2230: 2.3 x 22.0 x 30.0 mm	
Weight	Type 2230: 2.8g	
Operating Voltage	3.3v +/- 9%	
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)
LED Activity	LED Amber - Radio OFF; LED White - Radio ON	

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

Bluetooth Specification	4.0/4.1/4.2 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps BLE: 1 Mbps data rate; throughput up to 0.2 Mbps Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.
Receiver Sensitivity Legacy	
Power Consumption	Peak (Tx) 330 mW Peak (Rx) 230 mW Selective Suspend 17 mW
Range	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
Electrical Interface	USB 2.0 compliant
Bluetooth Software Supported **Link Topology**	Microsoft Windows Bluetooth Software
Power Management **Certifications**	Microsoft Windows ACPI, and USB Bus Support
Certifications **Bluetooth Profiles Supported**	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan

Technical Specifications – Networking

	BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 -Link Layer Privacy LE Privacy 1.2 -Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)

Realtek RTL8822CE 802.11ac 2x2 Wi-Fi + BT51

Wireless LAN Standards	IEEE 802.11a IEEE 802.11b IEEE 802.11g IEEE 802.11n IEEE 802.11ac IEEE 802.11d IEEE 802.11e IEEE 802.11h IEEE 802.11i IEEE 802.11k IEEE 802.11r IEEE 802.11v 1. Wireless access point and internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 5 (802.11 ac) is backwards compatible with prior 802.11 specs.
Interoperability	Wi-Fi certified
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
Data Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz) 802.11ac: MCS0 ~ MCS9, (1SS, and 2SS) (20MHz, 40MHz & 80MHz)
Modulation	Direct Sequence Spread Spectrum BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM
Security[2]	IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only AES-CCMP: 128 bit in hardware 802.1x authentication WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. WPA2 certification IEEE 802.11i WAPI 2 Check latest software/driver release for updates on supported security features.

Technical Specifications – Networking

Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power[3]	802.11b: +18.5dBm minimum 802.11g: +17.5dBm minimum 802.11a: +18.5dBm minimum 802.11n HT20(2.4GHz): +15.5dBm minimum 802.11n HT40(2.4GHz): +14.5dBm minimum 802.11n HT20(5GHz): +15.5dBm minimum 802.11n HT40(5GHz): +14.5dBm minimum 802.11ac VHT80(5GHz): +11.5dBm minimum 802.11ac VHT160(5GHz): +11.5dBm minimum 3. Maximum output power may vary by country according to local regulations.
Power Consumption	Transmit mode:2.0 W Receive mode:1.6 W Idle mode (PSP) 180 mW (WLAN Associated) Idle mode:50 mW (WLAN unassociated) Connected Standby/Modern Standby: 10mW Radio disabled: 8 mW
Power Management	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity[4]	802.11b, 1Mbps: -93.5dBm maximum 802.11b, 11Mbps: -84dBm maximum 802.11a/g, 6Mbps: -86dBm maximum 802.11a/g, 54Mbps: -72dBm maximum 802.11n, MCS07: -67dBm maximum 802.11n, MCS15: -64dBm maximum 802.11ac, MCS0: -84dBm maximum 802.11ac, MCS9: -59dBm maximum 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).
Antenna type	High efficiency antenna with spatial diversity, mounted in the display enclosure Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications
Form Factor	PCI-Express M.2 MiniCard with CNVi Interface
Dimensions	1. Type 2230: 2.3 x 22.0 x 30.0 mm 2. Type 1216: 1.67 x 12.0 x 16.0 mm
Weight	1. Type 2230: 2.8g 2. Type 126: 1.3g
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 – Networking

LED Activity	LED Amber - Radio OFF; LED OFF - Radio ON
HP Integrated Module with Bluetooth 4.0/4.1/4.2/5.0 Wireless Technology	
Bluetooth Specification	4.0/4.1/4.2/5.0 Compliant
Frequency Band	2402 to 2480 MHz
Number of Available Channels	Legacy: 0~79 (1 MHz/CH) BLE: 0~39 (2 MHz/CH)
Data Rates and Throughput	Legacy: 3 Mbps data rate; throughput up to 2.17 Mbps BLE: 1 Mbps data rate; throughput up to 0.2 Mbps Legacy: Synchronous Connection Oriented links up to 3, 64 kbps, voice channels Legacy: Asynchronous Connection Less links 2178.1 kbps/177.1 kbps asymmetric (3-DH5) or 864 kbps symmetric (3-EV5)
Transmit Power	The Bluetooth component shall operate as a Class II Bluetooth device with a maximum transmit power of + 4 dBm for BR and EDR.
Power Consumption	Peak (Tx): 330 mW Peak (Rx): 230 mW Selective Suspend: 17 mW
Bluetooth Software Supported **Link Topology**	Microsoft Windows Bluetooth Software
Power Management	Microsoft Windows ACPI, and USB Bus Support
Certifications	FCC (47 CFR) Part 15C, Section 15.247 & 15.249
Power Management **Certifications**	ETS 300 328, ETS 300 826 Low Voltage Directive IEC60950-1/IEC62368-1 UL, CSA, and CE Mark
Bluetooth Profiles Supported	BT4.1-ESR 5/6/7 Compliance LE Link Layer Ping LE Dual Mode LE Link Layer LE Low Duty Cycle Directed Advertising LE L2CAP Connection Oriented Channels Train Nudging & Interlaced Scan BT4.2 ESR08 Compliance LE Secure Connection- Basic/Full LE Privacy 1.2 -Link Layer Privacy LE Privacy 1.2 -Extended Scanner Filter Policies LE Data Packet Length Extension FAX Profile (FAX) Basic Imaging Profile (BIP)2 Headset Profile (HSP) Hands Free Profile (HFP) Advanced Audio Distribution Profile (A2DP)

After-Market Options (availability may vary by region)

AFTER MARKET OPTIONS

Type	***Description***	***Part #***
Memory	HP 4GB DDR4-3200 DIMM	13L78AA
	HP 8GB DDR4-3200 DIMM	13L76AA
	HP 16GB DDR4-3200 DIMM	13L74AA
	HP 32GB DDR4-3200 DIMM	13L72AA
Storage	HP PCIe NVME TLC 256GB SSD M.2 Drive	1CA51AA
	HP PCIe NVME TLC 512GB SSD M.2 Drive	X8U75AA
	HP PCIe Gen 4 NVME TLC M.2 512GB SSD	406L8AA
	HP PCIe Gen 4 NVME TLC M.2 1TB SSD	406L7AA
	HP 500GB 7200PRM SATA 6.0Gb/s 3.5"? Hard Drive	QK554AA
	HP 1TB 7200rpm SATA 6Gb/s 3.5"? Hard Drive	QK555AA
	HP PCIe Gen 4 NVME TLC M.2 1TB SSD	406L7AA
Graphics	NVIDIA T400 4GB GDDR6 3mDP	5Z7E0AA
Security	HP Business PC Security Lock V3 Kit	3XJ17AA
	HP Keyed Cable Lock 10mm kit	T1A62AA
Adapters	HP PCIe x1 Parallel Port Card	T6F94AA
	HP HDMI Standard Cable Kit	J7B60AA
	HP USB to Serial Port Adapter	N1M40AA
Networking	Intel Ethernet I225-T1 GbE NIC Card	406L9AA
Input	HP Wired Desktop 320K Keyboard	9SR37AA
	HP 125 Wired Mouse	265A9AA
	HP 225 Wired Mouse and Keyboard Combo	286J4AA
	HP 225 Antimicrobial Wired Mouse and Keyboard Combo	286K3AA
	HP Wired Desktop 320K Keyboard	9SR37AA
	HP Wired Desktop 320M Mouse	9VA80AA
	HP 125 Wired Keyboard	266C9AA
	HP 125 Wired Mouse	265A9AA

Change Log

Date of change:	Version History:		Description of change:
June 2, 2022	From v1 to v2	Update	T400 graphic card and Graphics table values updated
June 8, 2022	From v2 to v3	Removal	Card reader removed
June 9, 2022	From v3 to v4	Update	Environmental table certifications updated
October 5, 2022	From v4 to v5	Correction	Correction from 2933 UDIMM NECC (1x4GB) to 2933