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HP ZBook 15 Mobile Workstation Product Specifications

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HP ZBook 15 Mobile Workstation

Product features



Feature	Description
Chipset	Mobile Intel QM87
Processors	<ul style="list-style-type: none"> ● 4th Generation Intel Core i7-4900MQ (2.8 GHz, 1600MHz, 8MB L3 cache, 4 cores, 47 W) Up to 3.80 GHz with Intel Turbo Boost Technology ● 4th Generation Intel Core i7-4800MQ (2.7 GHz, 1600MHz, 6MB L3 cache, 4 cores, 47 W) Up to 3.70 GHz with Intel Turbo Boost Technology ● 4th Generation Intel Core i7-4700MQ (2.4 GHz, 1600MHz, 6MB L3 cache, 4 cores, 47 W) (no vPro support)* Up to 3.40 GHz with Intel Turbo Boost Technology ● 4th Generation Intel Core i7-4600M (2.90 GHz, 1600 MHz, 4MB L3 Cache, 2 cores, 37 W) Up to 3.60 GHz with Intel Turbo Boost Technology ● 4th Generation Intel Core i5-4330M (2.80 GHz, 1600 MHz, 3MB L3 Cache, 2 cores, 37 W) Up to 3.50 GHz with Intel Turbo Boost Technology ● Intel Dual-Core i5-4300M (2.60 GHz, 1600 MHz, 3MB L3 Cache, 4 threads, 37 W) Up to 3.30 GHz with Intel Turbo Boost Technology
Graphics ¹	<p>Microsoft DirectX 11.1 (Shader Model 5.0) and OpenGL 4.2 capable</p> <ul style="list-style-type: none"> ● NVIDIA Quadro K610M with 1GB dedicated GDDR5 video memory ● NVIDIA Quadro K1100M with 2GB dedicated GDDR5 video memory ● NVIDIA Quadro K2100M with 2GB dedicated GDDR5 video memory ● NVIDIA Optimus Technology supported
Display	<ul style="list-style-type: none"> ● Internal 15.6-inch diagonal LED-backlit FHD SVA eDP anti-glare (1920 x 1080) 15.6-inch diagonal LED-backlit FHD UWVA eDP anti-glare + Panel Self Refresh (PSR) (1920 x 1080) 15.6-inch diagonal RGB LED-backlit FHD DreamColor UWVA eDP anti-glare (1920 x 1080) ● External Up to 32-bit per pixel color depth ● Thunderbolt Supported as part of the daisy chain connected with Intel approved thunderbolt cables. Click here for more information . Thunderbolt features: <ul style="list-style-type: none"> ● Legacy : DP 1.1a, DVI-A/D, HDMI and VGA displays attached to the end of the thunderbolt daisy chain via Intel certified dongles ● DP 1.2 re-drive: DisplayPort monitors capable of supporting DP 1.2 may be directly attached to the Thunderbolt port to achieve HBR2 and MST functionality.

Feature	Description
	<ul style="list-style-type: none"> • DP display with miniDP connector may be attached directly to TB (Thunderbolt) port. • DP display with standard DP connector and other legacy displays (HDMI, DVI, VGA) may be attached to TB with the use of a dongle. • DP1.2 MST feature ("daisy-chain" feature) is supported through TB port. • DisplayPort w/MST (Multi-stream Transport) Supports resolutions up to QFHD 3840 x 2160, 24/30-bit color depth at 60 Hz, and WUXGA (1920 x 1200) monitors, 24/30-bit color depth at 120 Hz. DisplayPort feature: Multi-stream Transport (MST): Multi-stream Transport is a DP 1.2 feature that allows daisy chaining of DP 1.2 monitors (requires built in support of DP 1.2 MST in monitor), or the use of DP 1.2 hubs with MST to achieve 4 active displays without a docking station. • VGA Port supports resolutions up to 2048 x 1536 at 75 Hz, and lower resolutions at up to 100 Hz • DVI-D (single link) Video signal available through DVI port in optional HP Docking Station (sold separately), as well as through DisplayPort to DVI-D; DisplayPort to DVI-D (dual link); and DisplayPort to HDMI adapters. Supports resolutions up to 1600 x 1200 at both full and reduced blanking, and 1920 x 1200 at reduced blanking
Storage and drives	<ul style="list-style-type: none"> • mSATA storage bay 128GB mini-card Solid State Drive • Primary storage bay Hard drives <ul style="list-style-type: none"> • 320/500/750GB 7200 rpm SMART SATA II • 1TB 5400 rpm SMART SATA II • 500GB 7200 rpm SMART SATA II Self Encrypting Drive • 500GB 5400 rpm SMART SATA II Self Encrypting Drive FIPS 140-2 compliant Solid State Drive • 128/180/512GB SATA 6 Gb/s • 256GB SATA 6 Gb/s Self Encrypting Drive
Optical drives	<ul style="list-style-type: none"> • Fixed 9.5 mm SATA optical drive <ul style="list-style-type: none"> • Blu-ray R/RE DVD+/-RW SuperMulti DL Drive • Blu-ray ROM DVD+/-RW SuperMulti DL Drive • DVD+/-RW SuperMulti DL Drive • DVD-ROM Drive • Second hard drive <ul style="list-style-type: none"> • 750GB 7200 rpm SMART SATA II Hard Drive • 256GB SATA 6 Gb/s Self Encrypting Drive

Feature	Description
	<ul style="list-style-type: none"> • 512GB SATA 6 Gb/s Solid State Drive • RAID 0 and 1 supported
Memory	<ul style="list-style-type: none"> • Standard <ul style="list-style-type: none"> • DDR3L 1.35 V SDRAM (1600 MHz) • Two SODIMM slots (Dual-core processor) or four SODIMM slots (Quad-core processor) supporting dual-channel memory • 2GB, 4GB, and 8GB SODIMMs • Maximum <ul style="list-style-type: none"> • Upgradeable to 16384MB with optional 8192MB SODIMMs in both slots (Dual-core processor) • Upgradeable to 32768MB with optional 8192MB SODIMMs in all 4 slots (Quad-core processor) • Dual-channel Maximized dual-channel performance requires SODIMMs of the same size and speed in both memory slots.
Networking/Communications	<ul style="list-style-type: none"> • Wireless • Mobile Broadband options <ul style="list-style-type: none"> • HP hs3110 HSPA+ Mobile Broadband Module • HP lt4111 LTE/EV-DO/HSPA+ Gobi4G Module • HP lt4112 LTE/HSPA+Gobi4G Module (EMEA,APJ) • All 802.11 integrated wireless LAN options <ul style="list-style-type: none"> • Intel Dual Band Wireless-AC 7260 802.11 ac (2x2) + Bluetooth 4.0 LE Combo • Intel Centrino Advanced-N 6235 802.11 a/b/g/n (2x2) + Bluetooth 4.0 LE Combo • Intel Centrino Advanced-N 6205 802.11 a/b/g/n (2x2) • Communications Integrated Intel I217-LM Gigabit Network Connection (vPro configurations)
Audio/Multimedia	<ul style="list-style-type: none"> • Audio <ul style="list-style-type: none"> • DTS Studio Sound HD audio (Windows OS only) • Integrated stereo speakers • Integrated microphone (dual-microphone array when equipped with optional webcam) • Button for volume mute; function keys for volume up and down • Combo mic-in / stereo headphone-out jack • Webcam Optional 720p HD webcam <ul style="list-style-type: none"> • HD format (widescreen) • Supports videoconferencing and still image capture

Feature	Description
	<ul style="list-style-type: none"> • High quality fixed focus lens • Video capture at various resolutions up to 1280x720 resolution (720p) and up to 30fps • M-JPEG compression supports higher frame rates for video capture and videoconferencing • Improved low light sensitivity • Improved dynamic range
<p>NOTE: NVIDIA Quadro mobile professional graphics support up to four independent displays when using an HP Advanced Docking station (sold separately) without hybrid graphics enabled, and up to 5 with Hybrid graphics enabled.</p>	

System specifications

Specification	Description
Stand-alone power requirements (AC power)	<p>Nominal operating voltage: 19.5 V</p> <p>Average operating power:</p> <ul style="list-style-type: none"> • Windows 7 (32-bit): 16.28 W • Windows 7 (64-bit): 16.8 W <p>Max operating power: Less than 150 W or less than 200 W</p>
Temperature	<p>Operating</p> <ul style="list-style-type: none"> • 0° to 35°C (32° to 95°F) (not writing optical) • 5° to 35°C (41° to 95°F) (writing optical) <p>Non-operating</p> <ul style="list-style-type: none"> • -20° to 60° C (-4° to 140° F)
Relative humidity	<p>Operating: 10% to 90%, non-condensing</p> <p>Non-operating: 5% to 95%, 101.6° F (38.7° C) maximum wet bulb temperature</p>

Specification	Description
Shock	<p>Operating: 40 G, 2 ms, half-sine</p> <p>Non-operating: 200 G, 2 ms, half-sine</p>
Random Vibration	<p>Operating: 0.75 grms</p> <p>Non-operating: 1.50 grms</p>
Altitude (unpressurized)	<p>Operating:</p> <p>-15.24 to 3,048 m (-50 to 10,000 ft)</p> <p>Non-operating:</p> <p>-15.24 to 12,192 m (-50 to 40,000 ft)</p>
Planned industry standard certifications	<ul style="list-style-type: none"> • UL: Yes • CSA: Yes • FCC Compliance: Yes • EPEAT: Less than 150 W or less than 200 W • ICES: Yes • Australia/NZ A-Tick Compliance: Yes • CCC: Yes • Japan VCCI Compliance: Yes • KC: Yes • BSMI: Yes • CE Marking Compliance: Yes

Display specifications

15.6-inch diagonal LEDbacklit FHD UWVA eDP anti-glare + Panel Self Refresh (PSR) (1920 x 1080)

Specification	Description
Active area (W x H)	34.4 x 19.4 cm (13.54 x 7.59 in)

Specification	Description
Dimensions (W x H)	39.6 cm (15.6 in)
Weight	420 g (max)
Surface treatment	Anti-glare
Contrast ratio	600:1 (min)
Refresh rate	60 Hz
Brightness	300 nit (typical)
Pixel resolution	<ul style="list-style-type: none"> • Format: 1920 x 1080 (FHD) • Configuration: RGB Stripe
Backlight	LED
PPI	142
Viewing angle	UWVA 85/85/85/85

15.6-inch LED FHD UWVA (1920 x 1080) anti-glare DreamColor

Specification	Description
Active area (W x H)	34.4 x 19.4 cm (13.54 x 7.59 in)
Dimensions (W x H)	39.6 cm (15.6 in)
Surface treatment	Anti-glare
Contrast ratio	800:1 (min)
Refresh rate	48 Hz, 50 Hz and 60 Hz
Brightness	210 nits (typical)
Pixel resolution	<ul style="list-style-type: none">• Pitch: 0.179 mm x 0.179 mm• Format: 1920 x 1080 (FHD)• Configuration: RGB Stripe
Backlight	RGB LED
PPI	142
Viewing angle	±89° Horizontal, ±89° Vertical (typical)
Technology type	30-bit In-Plane Switching (IPS)

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Specification	Description
Color depth	10-bits/color
Display colors	Over 1 billion colors (native mode)
Color gamut coverage	<p>NTSC:</p> <ul style="list-style-type: none"> • CIE1931 (x,y): 109% • CIE 1976 (u',v'): 129% <p>AdobeRGB</p> <ul style="list-style-type: none"> • CIE1931 (x,y): 114% • CIE 1976 (u',v'): 127% <p>sRGB</p> <ul style="list-style-type: none"> • CIE1931 (x,y): 154% • CIE 1976 (u',v'): 148%

15.6-inch diagonal LEDbacklit FHD SVA eDP antiglare (1920 x 1080)

Specification	Description
Active area (W x H)	34.4 x 19.4 cm (13.54 x 7.59 in)
Dimensions (W x H)	39.6 cm (15.6 in)
Weight	380 g (max)
Surface treatment	Anti-glare
Contrast ratio	400:1 (min)

Specification	Description
Refresh rate	60 Hz
Brightness	300 nit (typical)
Pixel resolution	<ul style="list-style-type: none">• Format: 1920 x 1080 (FHD)• Configuration: RGB Stripe
Backlight	LED
PPI	142
Viewing angle	UWVA 85/85/85/85

HDD specifications

1TB 5400 rpm SATA Hard Drive

Specification	Description
Drive weight	115g (0.25 lb)
Capacity	1TB
Height	9.5 mm (0.37 in)



Specification	Description
Width	70 mm (2.75 in)
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
Transfer rate	Synchronous (maximum) 300MB/s (Drive Capability)
Seek time (typical reads, including settling)	<ul style="list-style-type: none"> • Single Track: 4 ms • Average: 14 ms • Maximum: 24 ms
Cache	16MB
Rotational speed	5400 rpm
Logical blocks	1,953,525,168
Operating temperature	0° to 60° C (32° to 140° F) [case temp]
Features	ATA security

500GB 7200 rpm SATA Hard Drive

Specification	Description
Drive weight	115g (0.25 lb)

Specification	Description
Capacity	500GB
Height	9.5 mm (0.37 in)
Width	70 mm (2.75 in)
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
Transfer rate	Synchronous (maximum) 300MB/s (Drive Capability)
Seek time (typical reads, including settling)	<ul style="list-style-type: none"> • Single Track: 1.5 ms • Average: 11 ms • Maximum: 22 ms
Cache	16GB
Rotational speed	7200 rpm
Logical blocks	976,773,168
Operating temperature	0° to 60° C (32° to 140° F) [case temp]
Features	ATA security

500GB 5400 rpm SATA FIPS Hard Drive



Specification	Description
Drive weight	115g (0.25 lb)
Capacity	500GB
Height	7 mm (0.28 in)
Width	70 mm (2.75 in)
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
Transfer rate	Synchronous (maximum) 300MB/s (Drive Capability)
Seek time (typical reads, including settling)	<ul style="list-style-type: none">• Single Track: 1.5 ms• Average: 11 ms• Maximum: 22 ms
Cache	16MB
Rotational speed	5400 rpm
Logical blocks	976,773,168
Operating temperature	0° to 60° C (32° to 140° F) [case temp]

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Specification	Description
Features	ATA security

500GB 7200 rpm SMART SATA II Self Encrypting Drive

Specification	Description
Drive weight	115g (0.25 lb)
Capacity	500GB
Height	9.5 mm (0.37 in)
Width	63.5 mm (2.50 in)
Interface	ATA-8, SATA 2.6, 3.0 Gb/s
Transfer rate	Synchronous (maximum) 300MB/s (Drive Capability)
Seek time (typical reads, including settling)	<ul style="list-style-type: none"> • Single Track: 1 ms • Average: 12 ms • Maximum: 20 ms
Cache	16MB

Specification	Description
Rotational speed	7200 rpm
Logical blocks	976,773,168
Operating temperature	0° to 60° C (32° to 140° F) [case temp]
Features	ATA security

320GB 7200 rpm SATA Hard Drive

Specification	Description
Drive weight	115g (0.25 lb)
Capacity	320GB
Height	9.5 mm (0.37 in)
Width	70 mm (2.75 in)
Interface	ATA-8, SATA 2.6, 3.0 Gb/s, NCQ
Transfer rate	Synchronous (maximum) 300MB/s (Drive Capability)

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Specification	Description
Seek time (typical reads, including settling)	<ul style="list-style-type: none"> • Single Track: 1.5 ms • Average: 11 ms • Maximum: 22 ms
Cache	16MB
Rotational speed	7200 rpm
Logical blocks	625,142,448
Operating temperature	0° to 60° C (32° to 140° F) [case temp]
Features	ATA security

SATA 6 Gb/s 512 GB, 2.5- inch Solid State Drive

Specification	Description
Drive weight	73g
Capacity	512GB
Height	7 mm (0.276 in)

Specification	Description
Width	70 mm (2.76 in)
Interface	SATA Gen 3 (6 Gb/s)
Performance	<ul style="list-style-type: none"> • Maximum Sequential Read: 460 MB/s • Maximum Sequential Write: 260 MB/s
Logical blocks	1,000,215,216
Operating temperature	0° to 70° C (32° to 158° F) [case temp]
Features	ATA security; ATA-8; SATA 3.0 DIPM; TRIM

SATA 6 Gb/s 128 GB, 2.5- inch Solid State Drive

Specification	Description
Drive weight	73g
Capacity	128GB
Height	7 mm (0.276 in)
Width	70 mm (2.76 in)

Specification	Description
Interface	SATA 3 (6 Gb/s)
Performance	<ul style="list-style-type: none"> • Maximum Sequential Read: 415 MB/s • Maximum Sequential Write: 175 MB/s
Logical blocks	250,069,680
Operating temperature	0° to 70° C (32° to 158° F) [case temp]
Features	ATA security; ATA-8; SATA 3.0 DIPM; TRIM

Optical drive specifications

DVD-ROM Drive

Specification	Description
Access times	<p>Random:</p> <p>Less than 140 ms CD (typical)</p> <p>Less than 160 ms DVD (typical)</p>
Max data transfer rate	<ul style="list-style-type: none"> • 24X CD-ROM • 8X-DVD
Transfer Mode	UDMA Mode 5

Specification	Description
Interface	Gen 1 SATA
Supported Media (read)	CD-DA, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM
Supported Media (write)	None
Max Media Capacity (read)	8.5GB
Transport	Tray Loading

DVD+/-RW SuperMulti DL Drive

Specification	Description
Access times	<p>Random:</p> <p>Less than 140 ms CD (typical)</p> <p>Less than 160 ms DVD (typical)</p>
Max data transfer rate	<ul style="list-style-type: none"> • 24X CD-ROM • 8X-DVD • 24X CD-R • 24X CD-RW • 8X DVD+R • 8X DVD+RW

Specification	Description
	<ul style="list-style-type: none"> • 8X DVD-R • 6X DVD-RW • 6X - DVD+R Dual Layer • 6X - DVD-R Dual Layer • 5X DVD-RAM
Transfer Mode	UDMA Mode 5
Interface	Gen 1 SATA
Supported Media (read)	CD-DA, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW, DVD-RAM
Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+RW, DVD-R, DVD-RW, DVD-RAM, DVD+R DL, DVD-R DL
Max Media Capacity (read)	8.5GB
Max Media Capacity (write)	8.5 GB
Transport	Tray Loading

Blu-ray ROM DVD+/-RW SuperMulti DL Drive



Specification	Description
Access times	<p>Random:</p> <p>Less than 190 ms CD-ROM (typical)</p> <p>Less than 180ms DVD-ROM (typical)</p> <p>Less than 230 ms BD-ROM (typical)</p>
Max data transfer rate	<ul style="list-style-type: none"> • 24X CD-ROM • 8X-DVD • 24X CD-R • 16X CD-RW • 8X DVD+R • 8X DVD+RW • 8X DVD-R • 6X DVD-RW • 4X - DVD+R Dual Layer • 4X - DVD-R Dual Layer • 5X DVD-RAM • 6X BD-ROM
Transfer Mode	UDMA Mode 5
Interface	Gen 1 SATA
Supported Media (read)	CD-DA, , CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW. DVD-RAM, BD-ROM, BD-R, BD-RE
Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+R DL, DVD+RW, DVD-R, DVD-R DL, DVD-RW, DVDRAM



Specification	Description
Max Media Capacity (read)	50.0 GB
Max Media Capacity (write)	8.5 GB
Transport	Tray Loading

Blu-ray R/RE DVD+/-RW SuperMulti DL Drive

Specification	Description
Access times	<p>Random:</p> <p>Less than 165 ms CD-ROM (typical)</p> <p>Less than 185 ms DVD-ROM (typical)</p> <p>Less than 205 ms BD-ROM (typical)</p>
Max data transfer rate	<ul style="list-style-type: none"> • 24X CD-ROM • 8X-DVD • 24X CD-R • 16X CD-RW • 8X DVD+R • 8X DVD+RW • 8X DVD-R • 6X DVD+R Dual Layer • 6X DVD-R Dual Layer • 5X DVD-RAM • 6X BD-ROM • 6X BD-R • 2X BD-RE

Specification	Description
Transfer Mode	UDMA Mode 5
Interface	Gen 1 SATA
Supported Media (read)	CD-DA, , CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW, DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R, DVD-RW, DVD+R, DVD+RW. DVD-RAM, BD-ROM, BD-R, BD-RE
Supported Media (write)	CD-R, CD-RW, DVD+R, DVD+R DL, DVD+RW, DVD-R, DVD-R DL, DVD-RW, DVDRAM, BD-R, BD-RE
Max Media Capacity (read)	50.0 GB
Max Media Capacity (write)	50.0 GB
Transport	Tray Loading

Networking/Communications

Intel® I217-LM Gigabit Network Connection

Specification	Description
Ethernet Features	<ul style="list-style-type: none"> • 10 Mbit/s operation (10BASE-T; IEEE 802.3; 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) • IEEE 802.3u Auto-Negotiation (Automatic Speed Selection)

Specification	Description
	<ul style="list-style-type: none"> • Full Duplex Operation at all Speeds, Half Duplex operation at 10 and 100 Mbit/s • IEEE 802.1p QoS (Quality of Service) Support • IEEE 802.1q VLAN support • IEEE 802.3x Flow Control (IEEE 802.3 clauses 31-32; configurable) • IEEE 802.3az EEE(Energy Efficient Ethernet) • IEEE 802.1as/1588 conformance • Jumbo Frame 9K • Auto MDI/MDIX Crossover cable detection
Power Management	<ul style="list-style-type: none"> • ACPI compliant - multiple power mode • Energy Detect Low Power Mode(Green Ethernet)
Performance Features	<ul style="list-style-type: none"> • TCP/IP/UDP Checksum Offload (configurable) • Protocol Offload(ARP & NS) • Large send offload and Giant send offload • Receiving Side Scaling • MACSec Offload (802.3ae) • Intel vPro • iSCSI Boot
Manageability	<ul style="list-style-type: none"> • 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
Interface	PCI Express 1.1 x1 to fully support ASPM L0s/L1 and CLKREQ.
NIC Device Driver Name	Intel Ethernet Network Connection I217-LM

Specification	Description
Technology/Operating Bands	<ul style="list-style-type: none"> • 1Modes: WCDMA/HSDPA/HSUPA/HSPA+/AWS/GSM/EDGE/GPRS • Penta-band WCDMA/HSDPA/HSUPA/HSPA+/AWS: 850/900/1900/2100/AWS MHz • GSM/GPRS/EDGE: 850/900/1800/1900 MHz
Wireless Protocol Standards	<ul style="list-style-type: none"> • GSM/GPRS/EDGE: Class B, Multi-slot class 33, coding schemes CS1 - CS4 and MSC1 - MSC9. • UMTS/WCDMA: Release 99 and Release 7 Advanced Receiver Type 3i
Wireless Parametric Standards	Complies with 3GPP specifications
Maximum Data Rates	<ul style="list-style-type: none"> • GPRS/EDGE: Multi-slot Class 33, Class B • WCDMA PS: UL (384 kbps) / DL (384 kbps) • UL/DL HSPA: UL (5.76 Mbps)/ DL (7.2 Mbps) • UL/DL HSPA+: UL (5.76 Mbps)/ DL (21Mbps)
GPS	GPS Standalone, A-GPS: L1 (Internet- and Network assisted)
GPS Bands	1575.42 MHz (\pm 1.023 MHz)
Maximum Output Power	<ul style="list-style-type: none"> • WCDMA/HSPA/HSPA+ 2100/1900/900/850/AWS MHz: +24dBm (Power Class 3) • GPRS 1900/1800 MHz: +30dBm (Power Class 1) • GPRS 900/850 MHz: +33dBm (Power Class 4) • EDGE 1900/1800 MHz: +26dBm (Power Class E2) • EDGE 900/850 MHz: +27dBm (Power Class E2)
Maximum Power Consumption	2500mA (peak); 600mA (average)2700mA (peak)

Specification	Description
Power Consumption, Sleep Mode	3.6 mA
Power Management	USB selective suspend, Connected Standby Integrated notebook wireless button
Antenna Type	Dual high efficiency 5 band antennae with spatial diversity, mounted in the display enclosure
Form Factor	M.2 Socket 2, USB 2.0 interface high speed
Weight	Less than 6g

HP lt4111 LTE/EVDO/ HSPA+ Mobile Broadband Module*

Specification	Description
Technology/Operating Bands	<ul style="list-style-type: none"> • LTE FDD all bands with diversity: 1900 MHz (Band II) , 1700/2100MHz (Band IV (AWS), 850 MHz (Band V), 700MHz (Band XIII), 700MHZ (Band XVII), 1900MHz G Block (Band XXV) • WCDMA/HSDPA/HSUPA/HSPA+: all bands with diversity: 2100 MHz (Band I), 1900 MHz (Band II) , AWS 1700/2100MHz (Band IV), 850 MHz (Band V), 800 MHz (Band VIII) • GSM/GPRS/EDGE: 1900 MHz, 1800 MHz , 850 MHz , 900 MHz • CDMA: Cellular 800MHz (BC0), PCS 1900MHz (BC1)
Wireless Protocol Standards	<ul style="list-style-type: none"> • 3GPP Release 8 LTE Specification • WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification EVDO Release 0 and Release A
Wireless Parametric Standards	Complies with 3GPP specifications Release 8 for LTE

Specification	Description
Maximum Data Rates	<ul style="list-style-type: none"> • LTE (Category 3): 100 Mbps (Download), 50Mbps (Upload) • DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) • HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload) • EDGE: 236.8 kbps (Download), 236.8 kbps (Upload) • GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)
GPS	Standalone GPS, A-GPS, GPS XTRA
GPS Bands	LTE: +23 dBm (+/- 1 dBm)
Maximum Output Power	<ul style="list-style-type: none"> • WCDMA: +23 dBm (+/- 1 dBm) • LTE: +23 dBm (+/- 1 dBm) • GSM850/900, GMSK: +32dBm (+/- 1dBm) • GSM850/900, 8PSK: +27dBm (+/- 1dBm) • DCS1800 / PCS 1900, GMSK: +29dBm (+/- 1dBm) • DCS1800 / PCS 1900, 8PSK: +26dBm (+/- 1dBm) • CDMA: +24dBm (+/- 1dBm)
Maximum Power Consumption	<ul style="list-style-type: none"> • LTE: 1,200 mA (peak); less than 900 mA (average) • WCDMA: 1,100 mA (peak); less than 800 mA (average) • EGPRS: 2,500 mA (peak); less than 700 mA (average)
Power Consumption, Sleep Mode	2 mA
Power Management	USB selective suspend, Integrated notebook wireless button
Antenna Type	Dual high efficiency multi-band antennae with spatial diversity



Specification	Description
Form Factor	M.2, 3042-S3 Key B
Weight	Less than 6g
Dimensions (Length x Width x Thickness)	42 mm × 30 mm × 2.3 mm
Voltage, Operating	3.135 V to 4.4 V (3.3 V +1.1V/-0.165V)
Temperature, operating (from TIA/EIA/IS-98-D)	-13° to 140° F (-25° to 60° C)
Temperature, nonoperating, 96 hours (from MIL-STD 202 Method 108)	-40° to 185° F (-40° to 85° C)
Humidity, non-operating	95% relative humidity for 48 hours @ 185° F (85° C) (non-condensing)
LED activity	LED Off - Radio Off; Solid LED On - Radio On

HP It4112 LTE/HSPA+ Gobi 4G Module

Specification	Description
Technology/Operating Bands	<ul style="list-style-type: none"> • LTE FDD all bands with diversity: 2100 MHz (Band I), 1900 MHz (Band II), 1800 MHz (Band III), 850 MHz (Band V), 2600 MHz (Band VII), 900 MHz (Band VIII), 700 MHz (Band XX, DD800) • WCDMA/HSDPA/HSUPA/HSPA+ all bands with diversity: 2100 MHz (Band I), 1900 MHz (Band II), 800 MHz (Band V), 900 MHz (Band VIII)

Specification	Description
	<ul style="list-style-type: none"> • GSM/GPRS/EDGE: 1900 MHz (Band II), 1800 MHz (Band III), 850 MHz (Band V), 900 MHz (Band VIII)
Wireless Protocol Standards	<ul style="list-style-type: none"> • 3GPP Release 8 LTE Specification • WCDMA R99, 3GPP Release 5, 6 and 7 UMTS Specification
Wireless Parametric Standards	Complies with 3GPP specifications Release 8 for LTE
Maximum Data Rates	<ul style="list-style-type: none"> • LTE (Category 3): 100 Mbps (Download), 50Mbps (Upload) • DC-HSPA+: 42 Mbps (Download), 5.76 Mbps (Upload) • HSPA+: 21.6 Mbps (Download), 5.76 Mbps (Upload) • EDGE: 236.8 kbps (Download), 236.8 kbps (Upload) • GPRS: 85.6 kbps(Download), 85.6 kbps (Upload)
GPS	Standalone
GPS Bands	1575.42 MHz (\pm 1.023 MHz), GLONASS 1596-1607MHz
Maximum Output Power	<ul style="list-style-type: none"> • LTE: +23 dBm (+/- 2 dBm) • WCDMA: +23.5 dBm (+/- 1 dBm) • GPRS Band II, III: +29.5 dBm (+/- 1 dBm) • GPRS Band V, VIII: +32.5 dBm (+/- 1 dBm) • EGPRS Band II, III: +26.5 dBm (+/-1.5 dBm) • EGPRS Band V, VIII: +27.5 dBm (+/-1.5 dBm)
Maximum Power Consumption	<ul style="list-style-type: none"> • LTE: 1,200 mA (peak); less than 900 mA (average) • WCDMA: 1,100 mA (peak); less than 800 mA (average) • EGPRS: 2,800 mA (peak); less than 700 mA (average)

Specification	Description
Power Consumption, Sleep Mode	3 mA
Power Management	USB selective suspend, Integrated notebook wireless button
Antenna Type	Dual high efficiency multi-band antennae with spatial diversity
Form Factor	M.2, USB 2.0 interface
Weight	6g
Dimensions (Length x Width x Thickness)	42 mm × 30 mm × 2.3 mm
Voltage, Operating	3.135 V to 4.4 V (3.3 V +1.1V/-0.165V)
Temperature, operating (from TIA/EIA/IS-98-D)	-10° to 55° C (14° to 131° F)
Temperature, nonoperating, 96 hours (from MIL-STD 202 Method 108)	-40° to 85° C (-40° to 185° F)
Humidity, non-operating	95% relative humidity for 48 hours @ 185° F (85° C) (non-condensing)
LED activity	LED Off - Radio Off; Solid LED On - Radio On

Intel Dual Band Wireless- AC 7260 802.11 ac (2x2) WiFi + BT 4.0 combo Adapter

Specification	Description
Wireless LAN Standards	<ul style="list-style-type: none"> • IEEE 802.11a • IEEE 802.11g • IEEE 802.11n • IEEE 802.11ac
Interoperability	Wi-Fi certified
Frequency Band	<p>802.11b/g/n</p> <ul style="list-style-type: none"> • 2.402 - 2.482 GHz <p>802.11a/n</p> <ul style="list-style-type: none"> • 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 • 2.402 - 2.482 GHz
Data Rates	<ul style="list-style-type: none"> • 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)
Modulation	<p>Direct Sequence Spread Spectrum</p> <p>BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM</p>
Security	<ul style="list-style-type: none"> • IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware

Specification	Description
	<ul style="list-style-type: none"> • 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
Network Architecture Models	<ul style="list-style-type: none"> • Ad-hoc (Peer to Peer) • Infrastructure (Access Point Required)
Roaming	IEEE 802.11 compliant roaming between access points
Output Power	<ul style="list-style-type: none"> • 2.4G: +13.5dBm minimum • 5G: +12dBm minimum • Maximum output power must be able to achieve modular regulatory certification with notebooks that have antennas >20cm from the user and peak gain of +3dBi at 2.4GHz and +4dBi at 5GHz
Power Consumption	ACPI and PCI Express compliant power management 802.11 compliant power saving mode
Receiver Sensitivity	<ul style="list-style-type: none"> • 802.11a/g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps) • 802.11b:-95 dBm (1 Mbps), -93 dBm (2 Mbps), -91 dBm (5.5 Mbps), -88 dBm (11 Mbps) • 802.11n:-69 dBm (72.2 Mbps), -66 dBm (300 Mbps)
Antenna type	<ul style="list-style-type: none"> • Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications • High efficiency antenna with spatial diversity, mounted in the display enclosure



Audio/Multimedia - DTS sound

Specification	Description
Hardware	
Implementation	IDT 92HD91
Function key volume	Volume up, volume down, and mute
Full duplex	Yes
Microphone in	Stereo
Headphone/line out	Stereo
Integrated microphone	Yes, dual digital microphone array when equipped with optional webcam
Audio output quality	
Frequency response	20 Hz - 20 kHz
Signal to noise ratio	Less than 85 dB
Total harmonic distortion	0.01%

Specification	Description
Noise floor	- 110 dB
Play/Record sampling rate(s)	8 kHz - 48 kHz
D ac	16, 20 or 24-bit
ADC	16 or 20-bit
Internal stereo speakers	
Power rating	2 W
Impedance	4 ohms

Power

HP 65W EM Smart AC Adapter	
Specification	Description
Dimensions	12.65 x 5.0 x 3.0 cm (4.98 x 1.97 x 1.18 in)

Weight	290 g (0.62 lb)
Input	<p>190 to 265 V ac</p> <p>Input Efficiency: 87% min at 115 V ac</p> <p>Input frequency range: 47 to 63 Hz</p> <p>Input ac current: 1.7 A at 90 V ac</p>
Output	<p>Output power: 65W</p> <p>DC output: 19.5V</p> <p>Hold-up time: 5 msec at 115 V ac input</p> <p>Output current limit: less than 11 A, Over voltage protection- 29V max automatic shutdown</p>
Connector	3 pin/grounded, mates with interchangeable cords
Environmental design	<p>Operating temperature: 0° to 35° C (32° to 95° F)</p> <p>Non-operating (storage) temperature: -20° to 85° C (-4° to 121° F)</p> <p>Altitude: 0 to 5,000 m (0 to 16,405 ft)</p> <p>Humidity: 0% to 95%</p> <p>Storage Humidity: 0% to 95%</p>
EMI and safety certifications	CE Mark - full compliance with LVD and EMC directives; Worldwide safety standards - IEC60950, EN60950, UL60950, Class1, SELV; Agency approvals - C-UL-US, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCC, NOM-1 NYCE; Reliability - failure rate of less than 0.1% annually within the first three years of operation.
HP 200W Slim Smart AC Adapter	

Dimensions	172 x 96 x 25.4 mm (6.77 x 3.80 x 1.0 in)
Weight (max)	748 g (1.65 lb)
Input	<p>100 to 240 VAC</p> <ul style="list-style-type: none"> • 100 to 240 VAC • Input Efficiency 87% min at 115 VAC • Input frequency range 47 to 63 Hz • Input AC current 2.9 A at 90 VAC, 1.45 A at 180 VAC
Output	<ul style="list-style-type: none"> • Output power 200W • DC output 19.5V • Hold-up time 5 msec at 115 VAC input • Less than 16A, Over voltage protection- 29V max automatic shutdown
Connector	3 pin/grounded, mates with interchangeable cords
Environmental Design	
Operating temperature	0° to 40° C (32° to 104° F)
Non-operating (storage)	-20° to 65° C (-4° to 149° F)
Altitude	0 to 3,048 m (0 to 10,000 ft)



Humidity	20% to 80%
Storage Humidity	10% to 90%
EMI and Safety Certifications	CE Mark- full compliance with LVD and EMC directives; Worldwide safety standards- IEC950, EN60950, UL1950, Class 1, SELV; Agency approvals- C-ULUS, NORDICS, DENAN, EN55022 Class B, FCC Class B, CISPR22 Class B, CCIB, NOM-1 NYCE; MTBF- over 200,000 hours at 25°C ambient condition.
HP 150W Slim Smart AC adapter	
Specification	Description
Dimensions	6.59 x 3.23 x 1.0 in (167.5 x 82 x 25.4 mm)
Weight	565 g (1.25 lb)
Input	<p>100 to 240 VAC</p> <p>Input Efficiency 87% min at 115 VAC</p> <p>Input frequency range 47 to 63 Hz</p> <p>Input AC current Less than 2.7 A at 90 VAC</p>
Output	<p>Output power 150W</p> <p>DC output 19.50V +5.0%/-5.0%</p> <p>Hold-up time 5 msec at 115 VAC input</p>



	Output current limit Less than 15A, Over voltage protection- 29V max automatic shutdown
Connector	3 pin/grounded, mates with interchangeable cords
Environmental Design	<p>Operating temperature 5° to 35° C (41° to 95° F)</p> <p>Non-operating (storage) temperature-20° to 85° C (-4° to 185° F)</p> <p>Altitude Humidity</p> <ul style="list-style-type: none"> • 0 to 10,000 ft (0 to 3,048 m) • 10% to 95% • 10% to 95%
EMI and Safety Certifications	Worldwide safety and EMC approvals including CE, UL, CSA or cUL, GS, Australian Electric Permit, C-tick, NOM, CCC, KC, GOST, SABS, S mark, BSMI, ISC, PSE, PSB and SII.
HP 8-cell Lithium-Ion Battery (83 WHr)	
Dimensions	2 x 5.3 x 27cm (0.8 x 2.1 x 10.6 in)
Weight (max)	0.442 kg (0.99lb)
Cells/Type	Lithium-Ion
Energy	<ul style="list-style-type: none"> • Voltage: 14.8V • Amp-hour capacity: 5.6Ah • Watt-hour capacity: 83Wh
Temperature	Operating (Charging: 0° to 45° C (32° to 113° F)



	Operating (Discharging) F(-10° to 50° C (14° to 122°) Non-operating: -20° to 50° C -4° to 122° F
Battery Re-Charge Time	System in OFF or Standby: 2.5 hours System ON : 3 to 5 hours
Fuel Gauge LED	No
Warranty	1 year
Compatible with optional Travel Battery	Yes

HP Long Life 8-cell Lithium-Ion Battery (75 WHr)

Specification	Description
Dimensions (H x W x L)	2 x 5.3 x 27cm (0.8 x 2.1 x 10.6 in)
Weight (max)	0.442 kg (0.99lb)
Cells/Type	8-cell; Lithium-Ion
Energy	<ul style="list-style-type: none"> • Voltage: 14.8V • Amp-hour capacity: 5.1Ah • Watt-hour capacity: 75Wh

Specification	Description
Temperature	<p>Operating (Charging): 0° to 45° C (32° to 113° F)</p> <p>Operating (Discharging) 10° to 60° C (14° to 140° F)</p> <p>Non-operating: -20° to 60° C (-4° to 140° F)</p>
Battery Re-Charge Time	<p>System in OFF or Standby Mode: 2.5 hours</p> <p>System ON: 3 to 5 hours</p>
Fuel Gauge LED	No
Warranty	3 year
Compatible with optional Travel Battery	Yes

Physical specifications

Feature	Description
Weights and dimensions	<p>Weight</p> <ul style="list-style-type: none"> Starting at 2.82 kg (6.20 lb) with mini-card SSD and weight saver (no optical drive). Starting at 2.93 kg (6.45 lb) with hard drive and DVD-R/W drive. <p>Dimensions (w x d x h)</p> <ul style="list-style-type: none"> 0.19 x 1.06 x 1.18 in 3.1 x 26.8 x 30.0 mm
Ports/Slots	<p>Ports</p> <ul style="list-style-type: none"> VGA – One

Feature	Description
	<ul style="list-style-type: none"> ● DisplayPort v1.2– One ● Stereo microphone in / headphone-out combo jack – One ● Power Connector – One ● Secondary Battery Connector – One ● Docking Connector – One ● RJ-45 (Ethernet) – One ● USB 3.0 – Two ● USB 3.0 Charging Port – One ● USB 2.0 – One ● Security lock slot – One
Digital media slots	<ul style="list-style-type: none"> ● ExpressCard/54 slot – One (Supports ExpressCard/54) ● SD UHS-II Flash Media slot – One
<p>NOTE: Height varies depending upon where on the notebook the measurement is made. Weight varies by configuration and components. Weight includes 8-cell battery, hard drive, 1 GB memory, and no optical drive. Weight varies by configuration and components.</p>	

Software/OS

Feature	Description
Operating system	<ul style="list-style-type: none"> ● Windows 8 Pro 64 ● Windows 8 64 ● Windows 7 Professional 32 (available through downgrade rights from Windows 8 Pro) ● Windows 7 Professional 64 ● SuSE Linux Enterprise (SLED 11) SP2 64bit ● FreeDOS
Preinstalled software with Windows operating system	<p>Preinstalled</p> <ul style="list-style-type: none"> ● HP Recovery Manager

Feature	Description
	<ul style="list-style-type: none"> • HP Performance Advisor • HP Remote Graphics Software (pre-load) • HP Support Assistant • HP Client Security • HP Hotkey Support • HP Wireless Hotspot (Windows 8 only) • HP Connection Manager (Windows 7 only) • HP GPS and Location (Select Models) (Windows 7 only) • Adobe Flash Player (Windows 7 only) • Buy Office • Microsoft Office 2013 Trial Version • Microsoft Security Essentials • Cyberlink Power DVD • Cyberlink Power2Go • PDF Complete Corporate Edition • Skype <p>Additional software available from the web</p> <ul style="list-style-type: none"> • HP SoftPaq Download Manager • HP Software System Manager • HP Peak Power Manager <p>HP Remote Graphics Software</p> <p>HP Performance Advisor</p> <p>HP Recovery Manager</p>
Security	<p>Standard</p> <ul style="list-style-type: none"> • HP Client Security (Windows 7 & 8) (standard modules include) <ul style="list-style-type: none"> • Credential Manager • Computrace • Device Access Manager with Just In Time Authentication • Drive Encryption • Validity Fingerprint Driver • File Sanitizer (Windows 8 only) • Trust Circles • HP Fingerprint Sensor (optional) • Integrated Smart Card Reader • Enhanced Pre-Boot Security (Multiuser / Multifactor) • One-Step Logon



Feature	Description
	<ul style="list-style-type: none"> • Security lock slot • Support for Intel AT

Security

Specification	Description
HP Fingerprint Sensor (optional)	
Mobile voltage operation	3.0V -3.6V single supply
Operating temperature	-10° - 75°C (14° - 167°F)
Current consumption image	36mA
Low latency wait for finger	950 uA
Capture rate	3000 lines/sec
ESD Resistance	IEC 6100-4-2 4B (+/-15KV)
Detection matrix	200*1 (plus another secondary line); 508 dpi, sensor area 12*3 mm

Warranty information

Terms of warranty apply to the individual model purchased. To see if your HP product is still in warranty, go to the [HP Product Warranty Check page](#).



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