



Explore new devices for creative professionals from Microsoft

Comparing Microsoft Surface Studio and Microsoft Surface Book with Performance Base to others in their classes

As a creative professional, your everyday device must be powerful enough to handle heavy applications. If you choose an all-in-one, you also want it to be slim, to save space, with a wide color gamut and color accuracy for your graphics work. It's even better if that all-in-one can provide touch and pen capabilities so you don't have to use a separate device for sketching.

Using a combination of hands-on work and rigorous research, we examined two of the newest offerings from Microsoft®: Surface Book with Performance Base and Surface Studio. We found that based on publicly available data and our own testing, Surface Book with Performance Base has the highest FutureMark® 3DMark® 11 score in its class. (To learn how we defined class, see page 2.) When we examined the Surface Studio and its competitors using research and hands-on colorimeter tests, we found that it is edge to edge the thinnest desktop available; the first standalone desktop with touch and active, pressure-sensitive pen; and able to provide 99.9 percent sRGB gamut coverage and 98.9 percent DCI-P3 gamut coverage with the best color accuracy of any desktop monitor available.

This report reviews our findings and explores the capabilities and features of Surface Book with Performance Base and Surface Studio as compared to others in their classes.

Surface Book with Performance Base



Highest 3DMark score in its class

Surface Studio



First integrated desktop PC with touch and pen



High gamut coverage and color accuracy



Edge to edge thinnest desktop monitor available

Surface Book with Performance Base

To measure the performance of Surface Book with Performance Base, we ran the FutureMark 3DMark 11 benchmark on the device. We then performed extensive research to find publicly available 3DMark scores for other devices in its class. (See Defining class to learn more about devices we included in our research.)

We found that the Surface Book with Performance Base had the highest 3DMark 11 score in its class. FutureMark 3DMark 11 runs four computational and graphical tests to measure a system's graphics and virtual physics performance. After running all four tests, 3DMark provides a single score for the device. A higher 3DMark score can mean a more powerful device that offers stronger computational and graphics performance for heavy applications. Learn more at <http://futuremark.com/benchmarks/3dmark11>.

Defining class

For the purposes of our research, we defined the Surface Book with Performance Base class of laptops to include laptops that weighed less than four pounds; had a display size of between 13 and 14 inches; had a battery life of six hours or more; and included both a discrete graphics processing unit (GPU) and a 5th, 6th, or 7th generation Intel® Core™ processor.



Why pen support is important

Touch capabilities are useful for many tasks, but they may lack the precision required for visual artists and graphic designers who need to create specific, accurate drawings every day. For this reason, a designer might split her work between a tablet with pen and a



separate all-in-one with or without touch. Now, with the Surface Studio, that designer can do all of her work—from sketching to emailing—on a single device.

Surface Studio

Access more artistic possibilities with touch and pen options

We researched a wide range of publicly available standalone desktop computers, or all-in-ones, to learn more about their touch and pen features. Several available all-in-one devices offer touch capabilities, but we could find none that also support the use of a pen. The Surface Studio was the first standalone desktop computer we found that supported both touch and an active, pressure-sensitive pen.

Touch capabilities are useful for many applications, but pen support takes touch one big step further. It allows graphic designers and other artists to sketch and doodle right on the surface of the all-in-one, potentially mitigating the need to pull out a pad of paper or a separate device for drawing.

Do your work in living color

To investigate the color capabilities of the Surface Studio, we researched the color gamut and accuracy of currently available desktop monitors. We then measured the color gamut and color accuracy of the Surface Studio in both DCI-P3 and sRGB modes using a colorimeter. Because the Surface Studio allows the user to switch between DCI-P3 and sRGB display modes, we tested the DCI-P3 color gamut in DCI-P3 mode and the sRGB gamut in sRGB mode.

In our colorimeter tests, the Surface Studio provided 98.9 percent DCI-P3 gamut coverage and 99.9 percent sRGB gamut coverage. When discussing color gamut coverage, most manufacturers round up to integers, making those numbers 99 and 100 percent, respectively.

We also used the colorimeter to measure the color accuracy of the Surface Studio. For a variety of individual color swatches, including white, the colorimeter measures the difference between the way the screen displays the color to the ideal (or assumed) color. It then averages those differences to create an average delta, called average ΔE . It also reports the largest difference in a metric called maximum ΔE .

According to our research of publicly-available data and our colorimeter tests, the Surface Studio offers the best color accuracy of any desktop on the market with an average ΔE of .49 and maximum ΔE of 1.38 in the DCI-P3 color space and an average ΔE of .45 and maximum ΔE of 1.18 in the sRGB color space.

Higher color accuracy and wider gamut coverage is a great boon to any creative professional working with graphics, from a designer to a videographer. With a more accurate understanding of the colors he or she is working with and a wider range of colors available, the possibilities are tremendous.



Covering the color gamut

A device's color gamut entails the range of colors that are available for representation. The standard color gamut for computer displays is sRGB, a common color gamut used for most print and online graphics. Graphic designers will find this color gamut most useful for everyday work. DCI-P3, a standard color gamut for the professional film industry, offers a different but broader range of colors. The Surface Studio offers the ability to toggle between sRGB and DCI-P3 color gamuts for maximum range of use.

Because no single color gamut includes every possible color identifiable to the eye, it is possible for a device like the Surface Studio to cover 99.9 percent of the sRGB color gamut and 98.9 percent of the DCI-P3 gamut while also potentially covering extra colors that are not included in either gamut.





An ultra-thin display for your creative work

According to the publicly available specifications we found in our research, the Surface Studio is edge to edge the thinnest desktop display available on the market. At just 12.5mm, its screen is movable, so you can rotate it down to draw on it like a tablet, or you can keep it upright to use it like a traditional monitor.

Of course, how one reports a monitor's thickness depends a great deal on how you measure it. Many monitors are thicker at one point than another—for example, they may be thicker near the middle, but taper to become very thin at the edges. When considering thickness measurements, we recorded the thickness at the monitor's thickest point. We call this edge to edge thickness because we measure the thickest point from one edge of the device to the other.

Conclusion

We performed extensive research on publicly available data for devices in the same classes as the Surface Book with Performance Base and Surface Studio. We found that according to that publicly available data, the Surface Book with Performance Base has the highest 3DMark 11 score in its class. We also found that compared to the public information we found for desktop monitors and all-in-one devices, the Surface Studio was edge to edge the thinnest desktop display available; the first standalone desktop computer with touch and active, pressure-sensitive pen; and a system that can provide 98.9 percent DCI-P3 gamut coverage and 99.9 percent sRGB gamut coverage with the best color accuracy of any all-in-one device.



On October 14, 2016, we finalized the hardware and software configurations we tested. Updates for current and recently released hardware and software appear often, so unavoidably these configurations may not represent the latest versions available when this report appears. For older systems, we chose configurations representative of typical purchases of those systems. We concluded hands-on testing on October 25, 2016.

Appendix A – System configuration information

System	Surface Book with Performance Base	Surface Studio
General		
Number of processor packages	1	1
Number of cores per processor	2	4
Number of hardware threads per core	2	2
Total number of processor threads in system	4	8
System power management policy	Balanced	Balanced
Processor power-saving option	EIST	EIST
System dimensions (length x width x height)	12.30 x 9.14 x 0.51 - 0.90	N/A
System weight	3.34 lbs.	N/A
CPU		
Vendor	Intel	Intel
Name	Core i7	Core i7
Model number	6600U	6820HQ
Stepping	D0/K0/K1	R0
Socket type	1168 BGA	1440 FCBGA
Core frequency (GHz)	2.60 - 3.40	2.70 – 3.60
L2 cache	2 x 256 KB	4 x 256 KB
L3 cache	4 MB	8 MB
Platform		
Vendor	Microsoft	Microsoft
Motherboard chipset	Skylake-U	Skylake-H
BIOS name and version	Microsoft 90.1327.770 (09/15/2016)	Microsoft 117.1296.768 (08/16/2016)
Memory module(s)		
Type	PC3-14900	PC4 17000
Speed (MHz)	1,867	2,133
Speed running in the system (MHz)	1,867	2,133
Timing/Latency (tCL-tRCD-tRP-tRASmin)	14-17-17-40	15-15-15-36
Size (GB)	4	16
Number of memory module(s)	2	2
Total amount of system RAM (GB)	8	32

System	Surface Book with Performance Base	Surface Studio
Hard disk		
Vendor and model number	Toshiba THNSN5256GPU7	Seagate ST2000LM003
Number of disks in system	1	1
Size	256 GB	2 TB
Buffer size (MB)	N/A	32
RPM	N/A	5,400
Type	NVMe SSD	SATA 6Gb/s
Controller	Standard NVM Express Controller	Intel Chipset SATA RAID Controller
Driver	Microsoft 10.0.14393.0 (06/21/2006)	Intel 14.10.3.1041 (07/29/2016)
Operating system		
Name	Windows® 10 Pro	Windows 10 Pro
Build number	14393	14393
File system	NTFS	NTFS
Kernel	X64-based PC	X64-based PC
Language	English	English
Microsoft DirectX version	12	12
Graphics #1		
Vendor and model number	Intel HD Graphics 520	NVIDIA® GeForce® GTX 980M
Chipset	Intel HD Graphics	NVIDIA GeForce GTX 980M
BIOS version	Intel Video BIOS	84.4.10.0.7
Total available graphics memory (MB)	4,187	20,462
Dedicated video memory (MB)	128	4,096
System video memory (MB)	0	0
Shared system memory (MB)	4,059	16,366
Resolution	3,000 x 2,000	4,500 x 3,000
Driver	Intel 20.19.15.4463 (07/06/2016)	NVIDIA 21.21.13.6910 (08/01/2016)
Graphics #2		
Vendor and model number	NVIDIA GeForce GTX 965M	N/A
Chipset	NVIDIA GeForce GTX 965M	N/A
BIOS version	84.06.72.00.01	N/A
Total available graphics memory (MB)	6,107	N/A
Dedicated video memory (MB)	2,048	N/A
System video memory (MB)	0	N/A
Shared system memory (MB)	4,059	N/A
Resolution	3,000 x 2,000	N/A
Driver	NVIDIA 21.21.13.6936 (09/13/2016)	N/A

System	Surface Book with Performance Base	Surface Studio
Sound card/subsystem		
Vendor and model number	Realtek High Definition Audio (SST)	Realtek High Definition Audio (SST)
Driver	Realtek 6.0.1.7734 (01/29/2016)	Realtek 6.0.1.7937 (09/13/2016)
Ethernet		
Vendor and model number	Marvell AVASTAR Wireless-AC	Intel Ethernet I219-LM
Driver	Marvell 15.68.9046.79 (06/28/2016)	Intel 12.15.23.1 (05/10/2016)
Wireless		
Vendor and model number	N/A	Marvell AVASTAR Wireless-AC
Type	N/A	Marvell 15.68.9048.83 (08/24/2016)
Monitor		
Screen size	13.5"	27"
Battery		
Type	Integrated Lithium-ion	N/A

Appendix B – How we tested

Surface Studio

Running the colorimeter test

1. In the Windows Advanced display settings, click the Color Settings drop-down menu, and select DCI-P3 or sRGB as appropriate for the test.
2. Run DisplayCAL3.
3. Click the Settings drop-down, and select Office & Web (D65, Gamma 2.2)
4. Verify that the Display and Instrument are set to the correct hardware for the test.
5. Set Wide Gamut LCD (RGB LED) for the Mode.
6. Set Correction to LCD White LED IPS.
7. Click Calibrate & Profile.
8. Place the colorimeter on the screen so that the center is centered on the Measurement area. Adjust the window size if necessary to adjust for a safe margin.
9. Click Start measurement.
10. Allow the test to run. It will take several hours.
11. When the measurements are complete, check the box to Show profile information.
12. Save screenshots comparing the results against DCI-P3 and sRGB and any other relevant data from the test run.

Surface Book with Performance Base

Setting up the system

1. Reset image.
 - a. In Windows Search, type `Reset`
 - b. Select Reset this PC.
 - c. Click Get started.
 - d. Select the option to Remove Everything.
 - e. Select Just remove my files.
 - f. Click Reset.
2. Turn off automatic Windows updates.
 - a. In Windows Search, type `Services`
 - b. Double-click the Windows Update Service.
 - c. Select Disable from the drop-down menu, and click Apply.
3. Turn off UAC notifications.
 - a. In Windows Search, type `User Account Control`, and select Change User Account Control settings.
 - b. Move the slider bar to Never notify.
4. Turn off screen saver.
 - a. In Windows Search, type `screen saver`, and select Change screen saver.
 - b. From the screen saver drop-down menu, select None.
5. Set Turn off the display to Never.
 - a. In Windows Search, type `power options`, and press Enter.
 - b. Next to the active power plan being used, click Change plan settings.
 - c. From the Turn off the display drop-down menus (located under On battery and Plugged in), select Never.
6. Set Put the computer to sleep to Never.
 - a. In Windows Search, type `power options`, and press Enter.
 - b. Next to the active power plan being used, click Change plan settings.
 - c. From the Put the computer to sleep drop-down menus (located under On battery and Plugged in), select Never.
7. Turn off Security and Maintenance alerts.
 - a. In Windows search, type `Security and Maintenance` and press Enter.
 - b. Click Change Security and Maintenance settings.
 - c. Uncheck every box, and click Ok.

8. Disable Windows Defender.
 - a. In Windows search, type `gpedit.msc` and press Enter.
 - b. Go to Local Computer Policy/Computer Configuration/Administrative Templates/Windows Components/Windows Defender.
 - c. Double-click the Turn off Windows Defender policy, and select Enable.
9. Verify system time.
 - a. If the system has access to a timer server, make sure the clock is synchronized with the server time.
10. Populate the WinSAT data store.
 - a. On an elevated command prompt, run `winsat prepop`.

Resetting the system before each benchmark run

1. Reboot the system.
2. Bring up the Disk Performance Monitor.
 - a. Right-click the taskbar, and select Task Manager/Performance tab/Disk tab.
3. Run Idle Tasks.
 - a. Press the Windows key.
 - b. In Windows Search, type `cmd`
 - c. Right-click `cmd.exe`, and select Run as administrator.
 - d. In the elevated command prompt, type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
 - e. Watch the disk and CPU performance monitor, and do not interact with the system until the disk and CPU activity is 0-1%.
 - f. After the disk and CPU activity is 0-1%, wait 5 minutes before running the test.

Running 3DMark 11

Setting up the test

1. Purchase 3DMark 11 from <http://community.futuremark.com/store/>.
2. Download and install 3DMark 11 using default options.
3. Launch 3DMark 11, enter the registration code, and click Register.
4. Exit 3DMark 11.

Running the test

1. Power on the system.
2. Bring up the Disk Performance Monitor.
 - a. Right-click the taskbar, and select Task Manager/Performance tab/Disk tab.
3. Run Idle Tasks.
 - a. Press the Windows key.
 - b. In Windows Search, type `cmd`
 - c. Right-click `cmd.exe`, and select Run as administrator.
 - d. In the elevated command prompt, type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
 - e. Watch the disk and CPU performance monitor, and do not interact with the system until the disk and CPU activity is 0-1%.
4. After the disk and CPU activity is 0-1%, wait 5 minutes before running the test.
5. Launch 3DMark 11.
6. In the 3DMark 11 Basic tab, click the Performance (1280x720) option and select Benchmark tests only.
7. Click Run 3DMark 11.
8. When the benchmark run completes, record the results.
9. Shut down the system.
10. Repeat steps 1 through 9 two more times, and report the median of the three runs.

Appendix C – Complete results

Surface Book with Performance Base class devices: Specifications

Device	Discrete graphics	Weight (<4 lbs.)	Intel 5th, 6th, or 7th gen Core Processor	Screen size	3DMark 11 performance
Surface Book with Performance Base	NVIDIA GeForce 965M	3.60	i7-6600U	13.3"	P5896 (Centered) P5937 (Stretched)
ASUS ZenBook UX303UB	NVIDIA GeForce 940M	3.20	i7-6500U	13.3"	P2488
Lenovo® ThinkPad® P40 Yoga™	NVIDIA Quadro® M500M	3.96	i7-6600U	14.1"	P1802
Lenovo Ideapad® 510s 14"	AMD Radeon R7 M460	3.70	i7-6500U	14.0"	NA
Dell™ Latitude™ 14 3000 Series	NVIDIA GeForce GT920M	4.00	i7-6500U	14.0"	NA
Lenovo ThinkPad T460p	NVIDIA GeForce 940MX	4.00	i7-6820HQ	14.0"	P2805 (i7-6700HQ)
Gigabyte P34F v5	NVIDIA GeForce GTX 950M	3.74	i7-6700HQ	14.0"	P4600 (Stretched)
MSI® GS40 6QD Phantom	NVIDIA GeForce GTX 960M	3.96	i7-6700HQ	14.0"	P5750
MSI GS32 6QE Shadow	NVIDIA GeForce GTX 950M	2.64	i7-6500U	13.3"	P5000
Apple® MacBook Pro®	Integrated	3.48	i5-5257U	13.3"	P1828

Surface Studio class devices: Research findings

For color accuracy findings, each of the three measurements we report has a nominal and recommended range for ΔE . Any number within the nominal range is acceptable; any number within the recommended range is ideal. ΔE values less than one are generally considered to be imperceptible to the human eye.

For measured vs. assumed target whitepoint ΔE , the nominal range is ≤ 2 and the recommended range is ≤ 1 .

For average ΔE , the nominal range is ≤ 1.5 and the recommended range is ≤ 1 .

For maximum ΔE , the nominal range is < 4 and the recommended range is ≤ 3 .

Please note that ΔE values between color spaces (DCI-P3 and sRGB) are not comparable.

Class A: Devices with touch/pen and screen resolution >1080p

Device	Microsoft Surface Studio (DCI-P3)	Microsoft Surface Studio (sRGB)	Wacom® Cintiq® 27QHD touch
Screen size	28.25"	28.25"	27"
Resolution	4,500 x 3,000	4,500 x 3,000	2,560x1,440
Touch	Yes	Yes	Yes
Stylus/pen (non-capacitive)	Yes	Yes	Yes
Thickness	0.36" / 12.5mm"	0.36" / 12.5mm	2.1" / 53.3mm
Switching between DCI-P3 and sRGB support	Yes	Yes	Yes, but -P3 not specified
DCI-P3 gamut coverage	98.7%	98.9%	N/A
sRGB gamut coverage	99.9%	99.9%	100%
Measured whitepoint vs 6500K (in K)	6583	6470	N/A
Measured vs. assumed target whitepoint ΔE^*00	0.88	0.15	N/A
ΔE Tested Color space (sRGB/DCI-P3)	DCI-P3	sRGB	Unspecified whether AdobeRGB/sRGB
Average ΔE^*00	0.49	0.45	0.88
Maximum ΔE^*00	1.38	1.18	2.43

Class B: Devices with touch and screen resolution >1080p

Device	Acer T272HUL	HP EliteDisplay E272q	Lenovo IdeaCentre® AIO 910 (UHD)
Screen size	27"	27"	27"
Resolution	2,560 x 1,440	2,560 x 1,440	3,840 x 2,160
Touch	Yes	Yes	Yes
Stylus/pen (non-capacitive)	No	No	No
Thickness	1.5" / 38.1mm	1.74" / 48.0mm	10" / 254mm
Switching between DCI-P3 and sRGB support	No	No	No
DCI-P3 gamut coverage	N/A	N/A	N/A
sRGB gamut coverage	N/A	N/A	100%
Measured whitepoint vs 6500K (in K)	N/A	N/A	N/A
Measured vs. assumed target whitepoint ΔE^*00	N/A	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	N/A	N/A	N/A
Average ΔE^*00	N/A	N/A	N/A
Maximum ΔE^*00	N/A	N/A	N/A

Class C: Devices with professional color and screen resolution >1080p

Device	Acer H277HU	Asus PB278Q	Apple 21.5-inch iMac®	Apple 27-inch iMac	Apple Thunderbolt display
Screen size	27"	27"	21.5"	27"	27"
Resolution	2,560 x 1,440	2,560 x 1,440	4,096 x 2,304	5,120 x 2,880	2,560 x 1,440
Touch	No	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No	No
Thickness	1.4" / 35.56 mm	2.7" / 69.6mm	2.6" with VESA mount / 66mm	3.1" with VESA mount / 78.7mm	2.25" with VESA mount / 55.2mm
Switching between DCI-P3 and sRGB support	No	No	Yes	Yes	No
DCI-P3 gamut coverage	N/A	N/A	99%	99%	N/A
sRGB gamut coverage	N/A	100%	97.7%	100%	N/A
Measured whitepoint vs 6500K (in K)	N/A	6513	N/A	6474	6300
Measured vs. assumed target whitepoint ΔE^*00	N/A	N/A	N/A	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	N/A	N/A	N/A	N/A	AdobeRGB
Average ΔE^*00	N/A	N/A	N/A	0.72*	1.63*
Maximum ΔE^*00	N/A	N/A	N/A	N/A	N/A

Device	BenQ BL2420PT	BenQ BL2420U	BenQ BL2711U	BenQ BL3200PT
Screen size	23.8"	23.6"	27"	32"
Resolution	2560 x 1440	3840 x 2160	3840 x 2160	2560 x 1440
Touch	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No
Thickness	2.8" (w/wall mount) / 71.5mm	2.8" (w/wall mount) / 71.5mm	2.7" (w/wall mount) / 69.75mm	2.7" / 69.75mm
Switching between DCI-P3 and sRGB support	No	No	No	No
DCI-P3 gamut coverage	N/A	N/A	N/A	N/A
sRGB gamut coverage	100%	100%	100%	100%
Measured whitepoint vs 6500K (in K)	N/A	N/A	N/A	N/A
Measured vs. assumed target whitepoint ΔE^*00	N/A	0.80	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	N/A	sRGB	N/A	sRGB
Average ΔE^*00	N/A	1.20	N/A	2.02
Maximum ΔE^*00	N/A	2.10	N/A	N/A

Device	BenQ BL3201PH	BenQ GW2765HT	BenQ PD2700Q	BenQ PV3200PT
Screen size	32"	27"	27"	32"
Resolution	3840 x 2160	2560 x 1440	1560 x 1440	3840 x 2160
Touch	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No
Thickness	2.6" (w/out base) / 65.6mm	2.2" / 56mm	2.2" (w/wall mount) / 56.5mm	2.6" (w/out base) / 65.6mm
Switching between DCI-P3 and sRGB support	No	No	No	No
DCI-P3 gamut coverage	N/A	N/A	N/A	N/A
sRGB gamut coverage	100%	100%	100%	100%
Measured whitepoint vs 6500K (in K)	N/A	5983 OOB/ 6512 calibrated	N/A	N/A
Measured vs. assumed target whitepoint ΔE^*00	N/A	1.50	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	sRGB	sRGB	N/A	N/A
Average ΔE^*00	1.53	1.9 OOB/ 0.2 calibrated	N/A	1.48
Maximum ΔE^*00	N/A	2.8 OOB/ 0.8 calibrated	N/A	N/A

Device	BenQ SW2700PT	Dell UP2715K	Dell UP3216Q	Dell UP3017
Screen size	27"	27"	32"	30"
Resolution	2560 x 1440	5,120 x 2,880	3,840 x 2,160	2,560 x 1,600
Touch	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No
Thickness	8.3" (w/wall mount and No base) / 211.4mm	1.9" / 47.9mm	2.0" / 51.5mm	2.28" / 58.0mm
Switching between DCI-P3 and sRGB support	No	No	No	Yes
DCI-P3 gamut coverage	N/A	N/A	87.0%	99.0%
sRGB gamut coverage	97.06% (volume)	100.0%	100.0%	99.0%
Measured whitepoint vs 6500K (in K)	N/A	6530	N/A	N/A
Measured vs. assumed target whitepoint ΔE^*00	N/A	N/A	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	sRGB	sRGB	sRGB	sRGB/DCI-P3
Average ΔE^*00	0.58	0.87	N/A	0.71 / 2.66
Maximum ΔE^*00	N/A	3.02	N/A	N/A

Device	Dell U3417W	Dell U2515H	Dell U2717DA	Dell UP2516D	Dell UP2716D
Screen size	34"	25"	27"	25"	27"
Resolution	3,440 x 1,440	2,560 x 1,440	2,560 x 1,440	2,560 x 1,440	2,560 x 1,440
Touch	No	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No	No
Thickness	2.30" / 58.4mm	1.83" / 46.4mm	1.90" / 48.3mm	2.03" / 51.6mm	2.02" / 51.4mm
Switching between DCI-P3 and sRGB support	No	No	No	Yes	Yes
DCI-P3 gamut coverage	N/A	N/A	N/A	97%	98%
sRGB gamut coverage	99%	99%	99%	100%	100%
Measured whitepoint vs 6500K (in K)	N/A	6626 OOB / 6476 calibrated	N/A	N/A	6614
Measured vs. assumed target whitepoint ΔE^*00	N/A	N/A	N/A	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	sRGB	sRGB	sRGB	DCI-P3	DCI-P3
Average ΔE^*00	<3	2.8 OOB / 0.4 calibrated	2.30	<2	<2
Maximum ΔE^*00	N/A	6.3 OOB / 0.9 calibrated	7	N/A	N/A

Device	Eizo CG318-4K	Eizo CG248-4K	Eizo CG277	Eizo CG2730	Eizo CG247X
Screen size	31.1"	23.8"	27"	27"	24.1"
Resolution	4,096 x 2,160	3,840 x 2,160	2,560 x 1,440	2,560 x 1,440	1,920 x 1,200
Touch	No	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No	No
Thickness	2.58" / 65.5mm	2.52" / 64mm	3.62" / 92mm	2.52" / 64mm	2.95" / 75mm
Switching between DCI-P3 and sRGB support	Yes	Yes	Yes	Yes	Yes
DCI-P3 gamut coverage	98%	93%	93%	98%	98%
sRGB gamut coverage	100%	N/A	Eizo: 100% / Alpr: 97.8%	100%	N/A
Measured whitepoint vs 6500K (in K)	N/A	N/A	N/A	N/A	N/A
Measured vs. assumed target whitepoint ΔE^*00	N/A	N/A	N/A	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	sRGB	N/A	sRGB	N/A	N/A
Average ΔE^*00	0.46	N/A	0.70	N/A	N/A
Maximum ΔE^*00	1.27	N/A	1.97	N/A	N/A

Device	Eizo CG2420	HP Spectre 32	HP ENVY 34c	HP ENVY 32	HP DreamColor Z32x
Screen size	24.1"	32"	34"	32"	31.5"
Resolution	1,920 x 1,200	3,840 x 2,160	3,440 x 1,440	2,560 x 1,440	3,840 x 2,160
Touch	No	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No	No
Thickness	2.52" / 64mm	2.3" / 58.4mm	3.7" / 94.0mm	2.29" / 58.2mm	2.8" / 70.1mm
Switching between DCI-P3 and sRGB support	Yes	No	No	No	No
DCI-P3 gamut coverage	98%	N/A	N/A	N/A	N/A
sRGB gamut coverage	N/A	>99%	99%	100%	100%
Measured whitepoint vs 6500K (in K)	N/A	N/A	N/A	N/A	N/A
Measured vs. assumed target whitepoint ΔE^*00	N/A	N/A	N/A	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	DCI-P3	N/A	sRGB	N/A	N/A
Average ΔE^*00	0.58	N/A	1.07	N/A	N/A
Maximum ΔE^*00	1.92	N/A	N/A	N/A	N/A

Device	HP Z30i	HP DreamColor Z27x	HP Z27q	HP Z34c	HP Z27s
Screen size	30"	27"	27"	34"	27"
Resolution	2,560 x 1,600	2,560 x 1,440	5,120 x 2,880	3,440 x 1,440	3,840 x 2,160
Touch	No	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No	No
Thickness	2.61" / 66.3mm	2.58" / 65.5mm	2.44" / 62.0mm	3.7" / 94.0mm	2.4" / 61.0mm
Switching between DCI-P3 and sRGB support	No	Yes	No	No	No
DCI-P3 gamut coverage	N/A	99%	N/A	N/A	N/A
sRGB gamut coverage	100%	100%	100%	98.80%	99%
Measured whitepoint vs 6500K (in K)	N/A	N/A	N/A	N/A	N/A
Measured vs. assumed target whitepoint ΔE^*00	N/A	N/A	N/A	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	N/A	sRGB	sRGB	N/A	N/A
Average ΔE^*00	N/A	1.29	1.57	N/A	N/A
Maximum ΔE^*00	N/A	N/A	N/A	N/A	N/A

Device	LG 34UM88C-P	LG 27UD88-W	LG 29V950-A-AA5SU1	NEC EA294WMI-BK	NEC EA275UHD-BK
Screen size	34"	27"	29"	29"	27"
Resolution	3,440 x 1,440	3,840 x 2,160	2,560 x 1,080	2,560 x 1,080	3,840 x 2,160
Touch	No	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No	No
Thickness	1.9" / 48.3mm	1.7" / 43.2mm	8.4" / 213.4mm	2.7" / 69.1mm	2.6" / 66.5mm
Switching between DCI-P3 and sRGB support	No	No	No	No	No
DCI-P3 gamut coverage	N/A	N/A	N/A	N/A	N/A
sRGB gamut coverage	99%	99%	99%	NEC: 100% / Tom's Hardware: 97.2% (volume)	NEC: 100%
Measured whitepoint vs 6500K (in K)	N/A	N/A	N/A	N/A	N/A
Measured vs. assumed target whitepoint ΔE^*00	N/A	N/A	N/A	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	N/A	N/A	N/A	sRGB	sRGB
Average ΔE^*00	N/A	N/A	N/A	1.70	3.28
Maximum ΔE^*00	N/A	N/A	N/A	N/A	N/A

Device	NEC EA244UHD-BK	NEC PA272W	NEC PA272W (-BK and -BK-SV options)	NEC PA302W	NEC PA322UHD-BK-2
Screen size	23.8"	27"	27"	29.8"	31.5"
Resolution	3,840 x 2,160	2,560 x 1,440	2,560 x 1,440	2,560 x 1,600	3,840 x 2,160
Touch	No	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No	No
Thickness	2.8" / 72mm	3.3" / 85mm	3.3" / 85mm	3.2" / 82mm	3.9" / 100mm
Switching between DCI-P3 and sRGB support	No	Yes, but -P3 not specified	Yes, but -P3 Not specified	No	No
DCI-P3 gamut coverage	N/A	N/A	N/A	N/A	N/A
sRGB gamut coverage	NEC: 100% / Tom's Hardware: 97.8% (volume)	NEC: 100% / Tom's Hardware: 95.7% (volume)	NEC: 100% / Tom's Hardware: 95.7% (volume)	NEC: 100% / Tom's Hardware: 94.9% (volume)	NEC: 99.9% / Tom's Hardware: 95.1% (volume)
Measured whitepoint vs 6500K (in K)	6524	N/A	N/A	6530	N/A
Measured vs. assumed target whitepoint ΔE^*00	N/A	N/A	N/A	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	sRGB	DCI-P3	sRGB	sRGB	sRGB
Average ΔE^*00	0.75	1.24	0.61	0.78	0.82
Maximum ΔE^*00	N/A	N/A	N/A	N/A	N/A

Device	Samsung U32D970Q	Samsung S34E790C	Samsung LS27D85KTSR/ZA	Samsung LU28E590DS/ZA
Screen size	31.5"	34"	27"	28"
Resolution	3,840 x 2,160	3,440 x 1,440	2,560 x 1,440	3,840 x 2,160
Touch	No	No	No	No
Stylus/pen (non-capacitive)	No	No	No	No
Thickness	2.4" / 61.0mm	2.02" / 51.31 mm	2.60" / 66.04mm	2.89" / 73.4mm
Switching between DCI-P3 and sRGB support	sRGB/Adobe RGB	No	No	No
DCI-P3 gamut coverage	N/A	N/A	N/A	N/A
sRGB gamut coverage	99	97.3	100	97
Measured whitepoint vs 6500K (in K)	6777	7032	N/A	N/A
Measured vs. assumed target whitepoint ΔE^*00	N/A	N/A	N/A	N/A
ΔE Tested Color space (sRGB/DCI-P3)	sRGB	sRGB	sRGB	sRGB
Average ΔE^*00	0.89	1.65	N/A	1.50
Maximum ΔE^*00	2.75	N/A	N/A	N/A

Device	Reference URL(s)
Microsoft Surface Studio (DCI-P3)	N/A
Microsoft Surface Studio (sRGB)	N/A
Wacom Cintiq 27QHD touch	http://www.photoreview.com.au/reviews/peripherals/monitors/wacom-cintiq-27qhd-touch
Acer T272HUL	http://www.acer.com/ac/en/US/content/model/UM.HT2AA.002
HP EliteDisplay E272q	http://store.hp.com/us/en/pdp/business-solutions/hp-elitedisplay-e272q-27-inch-qhd-monitor-%28energy-star%29-m1p04a8-aba
Lenovo IdeaCentre AIO 910 (UHD)	http://shop.lenovo.com/us/en/desktops/ideacentre/aio-900/aio-910-27/?sb=:000001C9:00018CF6:
Acer H277HU	http://www.acer.com/ac/en/US/content/model/UM.HH7AA.002
Asus PB278Q	https://www.asus.com/Commercial-Monitors/PB278Q/overview/ http://www.tftcentral.co.uk/reviews/asus_pb278q.htm
Apple 21.5-inch iMac	http://www.apple.com/imac/specs/ http://www.expertreviews.co.uk/pcs/pc-systems/1404067/apple-215-inch-imac-review-late-2015-still-the-all-in-one-standard http://arstechnica.com/apple/2015/10/same-design-new-insides-better-screen-21-5-inch-4k-retina-imac-reviewed/
Apple 27-inch iMac	http://www.apple.com/imac/specs/ Delta E version not specified! http://www.alphr.com/apple/apple-imac-1 http://www.trustedreviews.com/5k-imac-27-2015-review
Apple Thunderbolt Display	https://www.cnet.com/products/apple-thunderbolt-display/review/ Delta E version not specified! http://www.anandtech.com/show/4832/the-apple-thunderbolt-display-review/5
BenQ BL2420PT	http://www.benq.us/product/monitor/bl2420pt/specifications/
BenQ BL2420U	http://www.benq.us/product/monitor/bl2420u/specifications/
BenQ BL2711U	http://www.benq.us/product/monitor/bl2711u/specifications/
BenQ BL3200PT	http://www.benq.us/product/monitor/BL3200PT/specifications/
BenQ BL3201PH	http://www.benq.us/product/monitor/BL3201PH/specifications/
BenQ GW2765HT	http://www.benq.us/product/monitor/GW2765HT/specifications/
BenQ PD2700Q	http://www.benq.us/product/monitor/pd2700q/specifications/
BenQ PV3200PT	http://www.benq.us/product/monitor/pv3200pt/specifications/
BenQ SW2700PT	http://www.tomshardware.com/reviews/dell-up3017-30-inch-monitor,4756-4.html

Device	Reference URL(s)
Dell UP2715K	http://accessories.dell.com/sna/productdetail.aspx?c=us&l=en&s=bsd&cs=04&sku=210-ADJR&ST=up2715k&dcg=ST&cid=253603&lid=5562555&acd=12309152537461010&ven1=sBIZREqsr&ven2=e http://www.tomshardware.com/reviews/dell-up2715k-27-inch-5k-monitor,4500-6.html http://www.hardwareluxx.com/index.php/reviews/hardware/displays/33935-reviewed-dell-ultrasharp-up2715k-5k-monitor.html?start=2
Dell UP3216Q	http://www1.la.dell.com/bs/en/corp/peripherals/dell-up3216q-monitor/pd.aspx?refid=dell-up3216q-monitor&s=corp http://en.community.dell.com/support-forums/peripherals/f/3529/t/19674580
Dell UP3017	http://www.dell.com/ed/business/p/dell-up3017-monitor/pd http://www.tomshardware.com/reviews/dell-up3017-30-inch-monitor,4756-4.html
Dell U3417W	http://accessories.dell.com/sna/productdetail.aspx?c=us&l=en&s=bsd&cs=04&sku=210-AIYZ
Dell U2515H	http://accessories.dell.com/sna/productdetail.aspx?c=us&l=en&s=bsd&cs=04&sku=210-AJIY http://www.tftcentral.co.uk/reviews/dell_u2515h.htm
Dell U2717DA	http://accessories.dell.com/sna/productdetail.aspx?c=us&l=en&s=bsd&cs=04&sku=210-AHHP http://www.tftcentral.co.uk/reviews/dell_u2717d.htm
Dell UP2516D	http://accessories.dell.com/sna/productdetail.aspx?c=us&l=en&s=bsd&cs=04&sku=210-AGJQ
Dell UP2716D	http://accessories.dell.com/sna/productdetail.aspx?c=us&l=en&s=bsd&cs=04&sku=210-AGGP https://pcmonitors.info/reviews/dell-up2716d/
Eizo CG318-4K	http://www.eizo.com/products/coloredge/cg318-4k/ http://www.digitalartsonline.co.uk/reviews/monitors/eizo-coloredge-cg318-4k-monitor-review/ http://www.alphr.com/coloredge-cg318-4k/1000369/eizo-coloredge-cg318-4k-review-to-4k-and-beyond
Eizo CG248-4K	http://www.eizo.com/products/coloredge/cg248-4k/
Eizo CG277	http://www.eizo.com/products/coloredge/cg277/ http://www.alphr.com/eizo/eizo-coloredge-cg277/32585/eizo-coloredge-cg277-review
Eizo CG2730	http://www.eizo.com/products/coloredge/cg2730/
Eizo CG247X	http://www.eizo.com/products/coloredge/cg247x/
Eizo CG2420	http://www.eizo.com/products/coloredge/cg2420/ http://www.colourspace.xyz/eizo-coloredge-cg2420-cs2420-reviews/
HP Spectre 32	http://store.hp.com/us/en/pdp/accessories-88342--1/hp-spectre-32-32-inch-studio-display-k3q96aa-aba https://store.hp.com/wcsstore/hpusstore/pdf/k3q96aa.pdf http://www.tigerdirect.ca/applications/SearchTools/item-details.asp?EdpNo=9806229
HP ENVY 34c	http://store.hp.com/wcsstore/hpusstore/pdf/k1u85aa.pdf http://www.tomshardware.com/reviews/hp-envy-34c-monitor,4335-6.html
HP ENVY 32	http://store.hp.com/wcsstore/hpusstore/pdf/n9c43aa.pdf
HP DreamColor Z32x	http://store.hp.com/us/en/pdp/business-solutions/hp-dreamcolor-z32x-professional-display-m2d46a8-aba http://www.displayspecifications.com/en/comparison/08f95bb8
HP Z30i	http://store.hp.com/us/en/pdp/business-solutions/hp-z-display-z30i-30-inch-ips-led-backlit-monitor-%28energy-star%29-d7p94a8-aba
HP DreamColor Z27x	http://store.hp.com/us/en/pdp/accessories-88342--1/hp-dreamcolor-z27x-professional-display-d7r00a8-aba http://www.tomshardware.com/reviews/hp-z27x-dreamcolor-monitor,3927-6.html https://www.bhphotovideo.com/c/product/1111072-REG/hp_d7r00a8_aba_business_z27x_widescreen_lcd.html

Device	Reference URL(s)
HP Z27q	http://store.hp.com/us/en/pdp/accessories-88342--1/hp-z27q-27-inch-ips-5k-display-%28energy-star%29-j3g14a8-aba http://www.anandtech.com/show/9870/hp-z27q-monitor-review-aiming-for-more-pixels/2
HP Z34c	http://store.hp.com/us/en/pdp/business-solutions/hp-z-display-z34c-34-inch-ultra-wide-curved-display-k1u77a8-aba
HP Z27s	http://store.hp.com/us/en/pdp/accessories-88342--1/hp-z27s-27-inch-ips-uhd-display-%28energy-star%29-j3g07a8-aba http://www.postmagazine.com/Publications/Post-Magazine/2016/January-1-2016/Review-HPs-27-inch-z27s-4K-display.aspx
LG 34UM88C-P	http://www.lg.com/us/monitors/lg-34UM88C-P-ultrawide-monitor
LG 27UD88-W	http://www.lg.com/us/monitors/lg-27UD88-W-4k-uhd-led-monitor
LG 29V950-A.AA5SU1	http://www.lg.com/us/desktops-all-in-one-computers/lg-29V950-A.AA5SU1-all-in-one-computer
NEC EA294WMI-BK	http://www.necdisplay.com/p/desktop-monitors/ea294wmi-bk http://www.tomshardware.com/reviews/nec-ea294wmi-monitor-review,3633-7.html
NEC EA275UHD-BK	http://www.necdisplay.com/p/desktop-monitors/ea275uhd-bk http://www.tomshardware.com/reviews/nec-ea275uhd-27-inch-ultra-hd-monitor,4355-6.html
NEC EA244UHD-BK	http://www.necdisplay.com/p/desktop-monitors/ea244uhd-bk http://www.tomshardware.com/reviews/nec-ea244uhd-4k-uhd-24-inch,3975.html http://www.cgarchitect.com/2014/09/nec-24-4k-ea244uhd-review
NEC PA272W	http://www.necdisplay.com/p/desktop-monitors/pa272w http://www.tomshardware.com/reviews/nec-pa272w-professional-monitor,3814-8.html
NEC PA272W (-BK and -BK-SV options)	http://www.necdisplay.com/p/desktop-monitors/pa272w http://www.tomshardware.com/reviews/nec-pa272w-professional-monitor,3814-8.html
NEC PA302W	http://www.necdisplay.com/p/desktop-monitors/pa302w http://www.tomshardware.com/reviews/nec-pa302w-30-inch-desktop-monitor,4602-6.html http://www.prad.de/new/monitore/test/2014/test-nec-pa302w-bk-teil10.html
NEC PA322UHD-BK-2	http://www.necdisplay.com/p/desktop-monitors/pa322uhd-bk-2 http://www.tomshardware.com/reviews/nec-pa322uhd-ultra-hd-monitor,4128-6.html
Samsung U32D970Q	http://www.samsung.com/us/computing/monitors/uhd/u32d970q-32-970-series-uhd-professional-led-monitor-lu32d97kqsr-za/#specs http://www.digitaltrends.com/monitor-reviews/samsung-u32d970q-review/ http://www.trustedreviews.com/samsung-ud970-review-image-quality-uniformity-input-page-2
Samsung S34E790C	http://www.samsung.com/us/computing/monitors/curved/34-ultra-wide-curved-screen-monitor-ls34e790cns-za/#specs http://www.trustedreviews.com/samsung-s34e790c-review-image-quality-screen-modes-page-2
Samsung LS27D85KTSR/ZA	http://www.samsung.com/us/computing/monitors/wqhd/s27d850t-samsung-wqhd-27-led-monitor-ls27d85ktsr-za/#specs https://news.samsung.com/global/samsung-introduces-superior-picture-quality-and-productivity-with-the-new-sd850-business-monitor
Samsung LU28E590DS/ZA	http://www.samsung.com/us/computing/monitors/uhd/samsung-uhd-28-monitor-with-high-glossy-black-finish-lu28e590ds-za/ http://www.gadgetreview.com/samsung-ue590-4k-gaming-monitor-review http://4k.com/monitor/a-review-of-the-samsung-4k-uhd-qhd-ue590-28-inch-screen-u28e590d-led-lit-monitor/

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