BENCHMARK CPU TESTING OF 13-INCH-CLASS LAPTOPS

In our hands-on testing labs at Principled Technologies, we compared the CPU performance of the Dell™ XPS™ 13 laptop to ten other 13-inch-class laptops with 15-watt processors. We tested laptops from Acer®, Apple®, HP®, Huawei, Lenovo®, Microsoft®, and Razer™, using the benchmark Maxon Cinebench 15, which employs real-world workloads to measure CPU performance. We found that, under a heavy Cinebench CPU load, the Dell XPS 13 scored higher than its competitors on sustained multi-core CPU performance.

The devices we tested

We compared the Dell XPS 13 laptop to ten other laptops in the 13-inch class. Each of these laptops had a 15-watt processor:

- Acer Spin® 5
- Apple MacBook Air®
- HP Spectre® Laptop -13t
- HP Spectre® x360 Convertible Laptop - 13t
- Huawei MateBook X Pro
- Lenovo Yoga® 920
- Microsoft Surface® Laptop 2
- Microsoft Surface Book 2
- Microsoft Surface Pro 6
- Razer Blade™ Stealth

Results

The Dell XPS 13 had the highest overall performance of the eleven laptops we tested. The XPS 13 continued to show strong performance, even as competitor scores dropped. In the first run, the Dell XPS 13 had a 2.5-percent lead over its nearest competitor, the Microsoft Surface Book 2. After the first run, performance for the Surface Book 2 dropped sharply. By the final run, the lead widened to 40 percent. Microsoft Surface Laptop 2 was the closest competitor to the Dell XPS 13 on the final run, trailing 7.4 percent behind the Dell device.

Conclusion

In our Cinebench testing of sustained multi-core CPU performance, we found that the Dell XPS 13 maintained high performance. In contrast, all other competitors either achieved initial strong performance that declined over time, or performed at levels that were steady but significantly lower than that of the Dell XPS 13. This makes the Dell XPS 13 the most powerful 13-inch laptop we tested, when measuring for sustained performance under a heavy CPU workload and controlling for processor wattage.

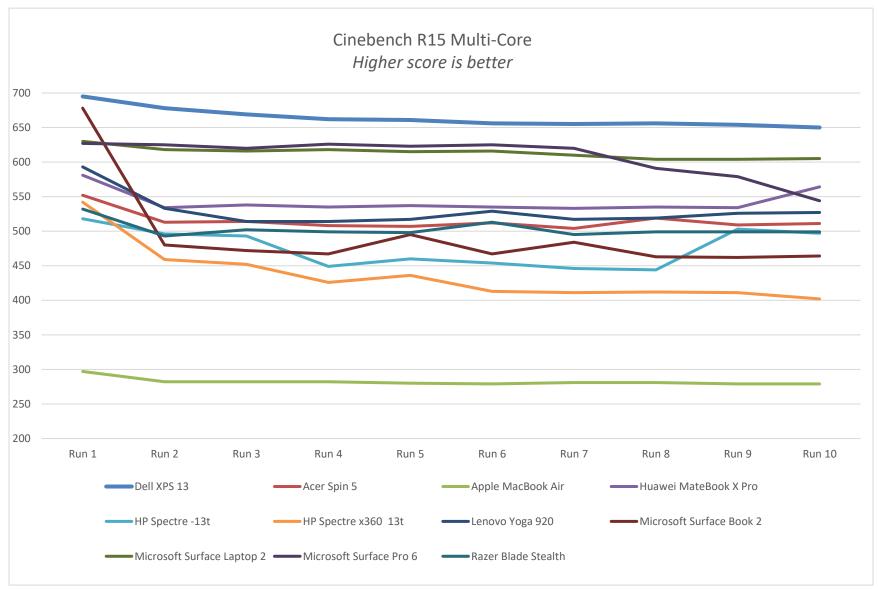We concluded testing on November 15, 2018.

Figure 1: Cinebench CPU (multi-core) results. All data current as of 11/15/2018.

	Dell XPS 13	Acer Spin 5	Apple MacBook Air	Huawei MateBook X Pro	HP Spectre -13t	HP Spectre x360 13t	Lenovo Yoga 920	Microsoft Book 2	Microsoft Surface Laptop 2	Microsoft Surface Pro 6	Razer Blade Stealth
Run 1	695	552	297	581	518	542	593	678	630	627	532
Run 2	678	513	282	534	496	459	533	480	618	625	493
Run 3	669	514	282	538	493	452	514	472	616	620	502
Run 4	662	508	282	535	449	426	514	467	618	626	499
Run 5	661	507	280	537	460	436	517	495	615	623	498
Run 6	656	512	279	535	454	413	529	467	616	625	513
Run 7	655	504	281	533	446	411	517	484	610	620	495
Run 8	656	519	281	535	444	412	519	463	604	591	499
Run 9	654	509	279	534	503	411	526	462	604	579	499
Run 10	650	511	279	564	497	402	527	464	605	544	499
Average	664	515	282	543	476	436	529	493	614	608	503

Figure 2: Cinebench CPU (multi-core) results. All data current as of 11/15/2018.

On June 21, 2018, 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 July 25, 2018.

APPENDIX A: SYSTEM CONFIGURATION INFORMATION

System	Acer Spin 5	Apple MacBook Air	Dell XPS 13
Processor			
Vendor	Intel®	Intel	Intel
Name	Core™ i7	Core i5	Core i7
Model number	8550U	8210Y	8565U
Core frequency (GHz)	1.8 – 4.0	1.6 – 3.6	1.8 – 4.6
Number of cores	4	2	4
Cache	8 MB L3	4 MB L3	8 MB L3
Memory			
Amount (GB)	8	8	16
Type	DDR4	DDR3	DDR3
Speed (MHz)	2,133	2,133	2,133
Graphics			
Vendor	Intel	Intel	Intel
Model number	UHD Graphics 620	UHD Graphics 617	UHD Graphics 620
Storage			
Amount (GB)	512	512	1024
Type	SSD	SSD	SSD
Connectivity/expansion			
Wireless internet	Qualcomm Atheros QCA61x4A	802.11ac	Killer Wireless -n/a/ac 1435
Bluetooth	4.1	4.2	4.2
USB	1 x USB 2.0, 2 x USB 3.0	2 x Thunderbolt 3 (USB-C 3.1)	3 x USB-C
Video	1 x HDMI	2 x Thunderbolt 3	1 x Thunderbolt USB-C
Battery			
Type	Lithium-polymer	Lithium-polymer	Lithium-polymer
Rated capacity (Wh)	47	50.3	N/A

System	Acer Spin 5	Apple MacBook Air	Dell XPS 13
Display			
Size (in.)	13.3	13.3	13.3
Type	IPS LCD	LED-backlit IPS display	InfinityEdge
Resolution	1,920 x 1,080	2,560 x 1,600	3,840 x 2,160
Touchscreen	Yes	No	Yes
Operating system			
Vendor	Microsoft	Apple	Microsoft
Name	Windows 10 Home	macOS® Mojave	Windows 10 Pro
Build number or version	10.0.17763	10.14.1	10.0.17763
BIOS			
BIOS name and version	Insyde 1.10	N/A	Dell Inc. 0.3.9
Dimensions w/ keyboard			
Height (in)	0.63	0.16- 0.61	0.3-0.46
Width (in)	12.69	11.97	11.9
Depth (in)	8.87	8.36	7.8
Weight (lbs.)	3.39	2.75	2.68

System	HP Spectre 13t laptop	HP Spectre x360 13t	Huawei MateBook X Pro	Lenovo Yoga 920
Processor				
Vendor	Intel	Intel	Intel	Intel
Name	Core i7	Core i7	Core i7	Core i7
Model number	8550U	8550U	8550U	8550U
Core frequency	1.8 – 4.0	1.8 – 4.0	1.8 – 4.0	1.8 – 4.0
Number of cores	4	4	4	4
Cache	8 MB L3	8 MB L3	8 MB L3	8 MB L3
Memory				
Amount	16	16	16	16
Type	DDR3	DDR3	DDR3	DDR4
Speed (MHz)	2,133	2,133	2,133	2,133
Graphics				
Vendor	Intel	Intel	Intel / NVIDIA	Intel
Model number	UHD Graphics 620	UHD Graphics 620	UHD Graphics 620 / NVIDIA GeForce MX150	UHD Graphics 620
Storage				
Amount	512 GB	512 GB	512	1 TB
Type	SSD	SSD	SSD	SSD
Connectivity/expansion				
Wireless internet	Intel AC 8265	Intel AC 8265	Intel AC 8275	Qualcomm Atheros QCA61x4A
Bluetooth	4.2	4.2	4.2	4.1
USB	1 x USB 3.1 Type-C	1 x USB 3.1, 2 x USB-C	1 x USB Type-C 1 x USB 3.0	2 x USB-C, 1 x USB 3.0
Video	2 x Thunderbolt 3	2 x Thunderbolt USB-C	1 x Thunderbolt 3	2 x USB-C DisplayPort
Battery				
Type	Lithium-polymer	Lithium-polymer	Lithium-polymer	Lithium-polymer
Rated capacity (Wh)	43.7	60	57.4	70
Display				
Size (in.)	13.3	13.3	13.9	13.9
Type	4K IPS micro-edge WLED-backlit multitouch-	4K IPS micro-edge WLED-backlit touch	LTPS	UHD IPS Multitouch

System	HP Spectre 13t laptop	HP Spectre x360 13t	Huawei MateBook X Pro	Lenovo Yoga 920
	enabled edge-to-edge glass			
Resolution	3,840 x 2,160	3,840 x 2,160	3000 x 2000	3,840 x 2,160
Touchscreen	Yes	Yes	Yes	Yes
Operating system				
Vendor	Microsoft	Microsoft	Microsoft	Microsoft
Name	Windows 10 Home	Windows 10 Home	Windows 10 Home	Windows 10 Home
Build number or version	10.0.17763	10.0.17763	10.0.17763	10.0.17763
BIOS				
BIOS name and version	Insyde F.21	American Megatrends® Inc. F.21	Huawei 1.18	Lenovo 5NCN38WW
Dimensions w/ keyboard				
Height (in)	0.41	0.53	0.57	0.53
Width (in)	12.09	12.06	11.97	12.69
Depth (in)	8.83	8.56	8.54	8.79
Weight (lbs.)	2.42	2.74	2.93	2.97

System	Microsoft Surface Laptop	Microsoft Surface Book 2	Microsoft Surface Pro 6	Razer Blade Stealth
Processor				
Vendor	Intel	Intel	Intel	Intel
Name	Core i7	Core i7	Core i7	Core i7
Model number	8650U	8650U	8650U	8550U
Core frequency	1.9 – 4.2	1.9 – 4.2	1.9 – 4.2	1.8 – 4.0
Number of cores	4	4	4	4
Cache	8 MB L3	8 MB L3	8 MB L3	8 MB L3
Memory				
Amount (GB)	16 GB	16 GB	16 GB	16
Type	DDR3	DDR3	DDR3	DDR3
Speed (MHz)	1866	1866	1866	2,133
Graphics				
Vendor	Intel	Intel / NVIDIA®	Intel	Intel
Model number	UHD Graphics 620	UHD Graphics 620 / GeForce® GTX 1050	UHD Graphics 620	UHD Graphics 620
Storage				
Amount (GB)	512	512	512	512
Type	SSD	SSD	SSD	SSD
Connectivity/expansion				
Wireless internet	Marvell® AVASTAR® Wireless-AC	Marvell® AVASTAR® Wireless-AC	Marvell® AVASTAR® Wireless-AC	Killer Wireless-n/a/ac 1535
Bluetooth	4.0	4.1	4.1	4.1
USB	1 x USB 3.0, 1 x Surface Connect	2 x USB 3.0, 1 x USB Type-C, 1 x UHS-II SDXC card reader, 2 x Surface Connect	1 x USB 3.0, 1 x Surface Connect, 1 x microSDXC card reader	1 x Thunderbolt™ 3, 2 x USB 3.0
Video	1 x Mini DisplayPort	1 x USB-C DisplayPort	1 x Mini DisplayPort	1 x HDMI
Battery				
Type	Lithium-polymer	Lithium-polymer	Lithium-polymer	Lithium-polymer
Rated capacity (Wh)	N/A	N/A	N/A	53.6
Display				
Size (in.)	13.5	13.5	12.3	13.3

System	Microsoft Surface Laptop	Microsoft Surface Book 2	Microsoft Surface Pro 6	Razer Blade Stealth
Type	PixelSense Display	PixelSense Display	PixelSense Display	QHD+
Resolution	2,256 x 1,504	3,000 x 2,000	2,736 x 1,824	3,200 x 1,800
Touchscreen	Yes	Yes	Yes	Yes
Operating system				
Vendor	Microsoft	Microsoft	Microsoft	Microsoft
Name	Windows 10 Home	Windows 10 Pro	Windows 10 Home	Windows 10 Home
Build number or version	10.0.17763	10.0.17763	10.0.17763	10.0.17763
BIOS				
BIOS name and version	Microsoft 137.2307.769	Microsoft 388.1932.769	Microsoft 234.2344.769	Razer 3.02
Dimensions w/ keyboard				
Height (in)	0.57	0.59-0.90	0.33	0.54
Width (in)	12.13	12.32	11.5	12.56
Depth (in)	8.79	9.14	7.9	8.11
Weight (lbs.)	2.83	3.57	1.73	2.98

APPENDIX B: HOW WE TESTED

Performing the Cinebench R15.038 test

Setting up the test

1. From https://www.maxon.net/en/products/cinebench/, download the Cinebench R15.
2. Unzip the Cinebench R15 Windows package to the desktop.
3. To launch Cinebench from inside the unzipped directory, double-click the Cinebench Windows 64-Bit icon.
4. Click Agree to the EULA.
5. Click File → Advanced benchmark.
6. Deselect the check mark beside OpenGL.
7. Exit Cinebench.
8. Shut down the system.

Running the test

1. Bring up an administrative command prompt by typing `CMD` in the Windows Search box.
2. To open App options, right-click the Command Prompt app, and click the Run as administrator button.
3. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks`
4. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.
6. Launch Cinebench.
7. Verify that only the CPU and CPU (Single Core) tests are selected.
8. Select File → Run all selected tests.
9. When the benchmark run completes, record the results and immediately repeat steps 6 and 7 until Cinebench has completed 10 continuous runs.

ABOUT PRINCIPLED TECHNOLOGIES

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Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 20 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.

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