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 nine 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 nine 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
- Microsoft Surface® Book 2
- Razer Blade™ Stealth

Results

The Dell XPS 13 had the highest overall performance of the nine laptops we tested. The XPS 13 exceeded its original performance score, even as competitor scores dropped by as much as 62 percent. In the first run, the Dell XPS 13 had a three-percent lead over it's nearest competitor, the Microsoft Surface Book 2; by the final run, the Dell XPS 13 had a 12-percent lead over the Lenovo Yoga 920.

Conclusion

In our Cinebench testing of sustained multi-core CPU performance, we found that the Dell XPS 13 maintained and even exceeded its initial 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 July 25, 2018.

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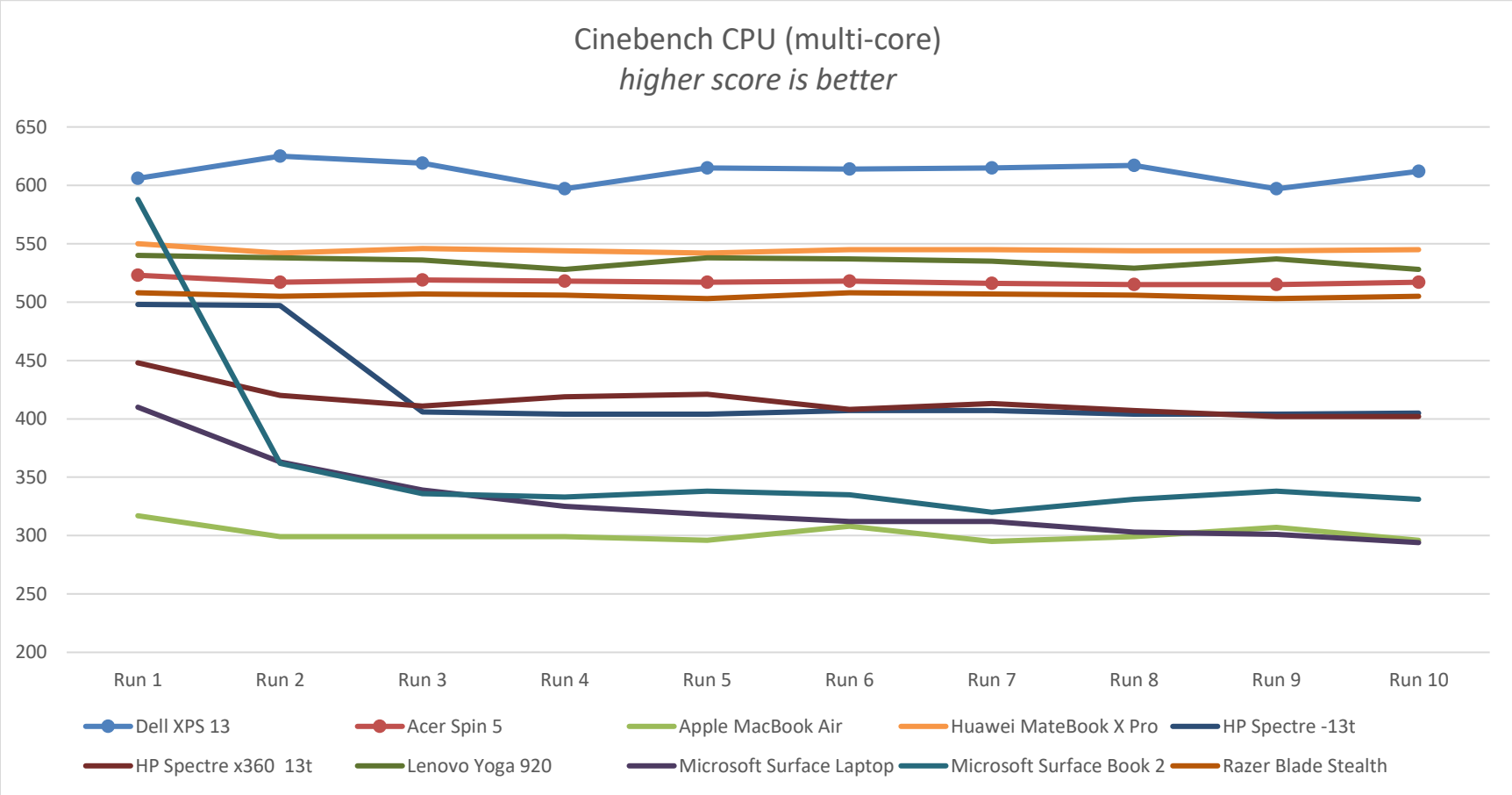

Figure 1: Cinebench CPU (multi-core) results. All data current as of 07/25/2018.

	Dell XPS 13	Acer Spin 5	Apple MacBook Air	Huawei MateBook X Pro	HP Spectre -13t	HP Spectre x360 13t	Lenovo Yoga 920	Microsoft Surface Laptop	Microsoft Surface Book 2	Razer Blade Stealth
Run 1	606	523	317	550	498	448	540	410	588	508
Run 2	625	517	299	542	497	420	538	363	362	505
Run 3	619	519	299	546	406	411	536	339	336	507
Run 4	597	518	299	544	404	419	528	325	333	506
Run 5	615	517	296	542	404	421	538	318	338	503
Run 6	614	518	308	545	407	408	537	312	335	508
Run 7	615	516	295	545	407	413	535	312	320	507
Run 8	617	515	299	544	404	407	529	303	331	506
Run 9	597	515	307	544	404	402	537	301	338	503
Run 10	612	517	296	545	405	402	528	294	331	505
Average	**612**	**518**	**302**	**545**	**424**	**415**	**535**	**328**	**361**	**506**

Figure 2: Cinebench CPU (multi-core) results. All data current as of 07/25/2018.

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 i7	Core i7
Model number	8550U	5650U	8550U
Core frequency (GHz)	1.8 – 4.0	2.2 – 3.2	1.8 – 4.0
Number of cores	4	2	4
TDP (W)	15	15	15
Cache	8 MB L3	4 MB L3	8 MB L3
Memory			
Amount (GB)	8	8	16
Type	DDR4	DDR3	DDR3
Speed (MHz)	2,133	1,600	1,866
Graphics			
Vendor	Intel	Intel	Intel
Model number	UHD Graphics 620	HD Graphics 6000	UHD Graphics 620
Storage			
Amount (GB)	512	512	512
Type	SSD	SSD	SSD
Connectivity/expansion			
Wireless internet	Qualcomm® Atheros® QCA61x4A	802.11ac	Killer™ Wireless -n/a/ac 1435
Bluetooth	4.1	4.0	4.1
USB	1 x USB 2.0, 2 x USB 3.0	2 x USB 3.0, 1 x SDXC card slot	3 x USB-C
Video	1 x HDMI	1 x Thunderbolt 2	1 x Thunderbolt USB-C
Battery			
Type	Lithium-polymer	Lithium-polymer	Lithium-polymer

System	Acer Spin 5	Apple MacBook Air	Dell XPS 13
Rated capacity (Wh)	47	54	52
Display			
Size (in.)	13.3	13.3	13.3
Type	IPS LCD	LED-backlit display	InfinityEdge
Resolution	1920 x 1080	1440 x 900	3840 x 2160
Touchscreen	Yes	No	Yes
Operating system			
Vendor	Microsoft®	Apple	Microsoft
Name	Windows® 10 Home	macOS® Sierra	Windows 10 Home
Build number or version	10.0.17134	10.13.5	10.0.17134
BIOS			
BIOS name and version	Insyde 1.08	N/A	Dell Inc. 1.3.3
Dimensions w/ keyboard			
Height (in)	0.63	0.11 to 0.68	0.33 to 0.46
Width (in)	12.69	12.69	11.86
Depth (in)	8.87	8.93	7.82
Weight (lbs.)	3.39	3.01	2.62

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
TDP (W)	15	15	15	15
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

System	HP Spectre 13t laptop	HP Spectre x360 13t	Huawei MateBook X Pro	Lenovo Yoga 920
Type	4K IPS micro-edge WLED-backlit multitouch-enabled edge-to-edge glass	4K IPS micro-edge WLED-backlit touch	LTPS	UHD IPS Multitouch
Resolution	3840 x 2160	3840 x 2160	3000 x 2000	3840 x 2160
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	10.0.17134	10.0.17134	10.0.17134	10.0.17134
BIOS				
BIOS name and version	Insyde F.06	American Megatrends® Inc. F.15	Huawei 1.09	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	Razer Blade Stealth
Processor			
Vendor	Intel	Intel	Intel
Name	Core i7	Core i7	Core i7
Model number	7660U	8650U	8550U
Core frequency	2.5 – 4.0	1.9 – 4.2	1.8 – 4.0
Number of cores	2	4	4
TDP (W)	15	15	15
Cache	4 MB L3	8 MB L3	8 MB L3
Memory			
Amount (GB)	16	16	16
Type	DDR3	DDR3	DDR3
Speed (MHz)	1,866	1,866	2,133
Graphics			
Vendor	Intel	Intel / NVIDIA®	Intel
Model number	Iris Plus Graphics 640	UHD Graphics 620 / GeForce® GTX 1050	UHD Graphics 620
Storage			
Amount (GB)	512	512	512
Type	SSD	SSD	SSD
Connectivity/expansion			
Wireless internet	Marvell® AVASTAR® Wireless-AC	Marvell AVASTAR Wireless-AC	Killer Wireless-n/a/ac 1535
Bluetooth	4.0	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 Thunderbolt™ 3, 2 x USB 3.0
Video	1 x Mini DisplayPort	1 x USB-C DisplayPort	1 x HDMI
Battery			
Type	Lithium-polymer	Lithium-polymer	Lithium-polymer
Rated capacity (Wh)	N/A	N/A	53.6
Display			
Size (in.)	13.5	13.5	13.3

System	Microsoft Surface Laptop	Microsoft Surface Book 2	Razer Blade Stealth
Type	PixelSense Display	PixelSense Display	QHD+
Resolution	2256 x 1504	3000 x 2000	3200 x 1800
Touchscreen	Yes	Yes	Yes
Operating system			
Vendor	Microsoft	Microsoft	Microsoft
Name	Windows 10 Pro	Windows 10 Pro	Windows 10 Home
Build number or version	10.0.17134	10.0.17134	10.0.17134
BIOS			
BIOS name and version	Microsoft 136.1932.789	Microsoft 388.1932.769	Razer 1.01
Dimensions w/ keyboard			
Height (in)	0.38 - 0.57	0.59-0.90	0.54
Width (in)	12.13	12.32	12.56
Depth (in)	8.79	9.14	8.11
Weight (lbs.)	2.83	3.57	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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We provide industry-leading technology assessment and fact-based marketing services. We bring to every assignment extensive experience with and expertise in all aspects of technology testing and analysis, from researching new technologies, to developing new methodologies, to testing with existing and new tools.

When the assessment is complete, we know how to present the results to a broad range of target audiences. We provide our clients with the materials they need, from market-focused data to use in their own collateral to custom sales aids, such as test reports, performance assessments, and white papers. Every document reflects the results of our trusted independent analysis.

We provide customized services that focus on our clients' individual requirements. Whether the technology involves hardware, software, Web sites, or services, we offer the experience, expertise, and tools to help our clients assess how it will fare against its competition, its performance, its market readiness, and its quality and reliability.

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.