

# 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 from Acer®, Apple®, HP®, Lenovo®, Microsoft®, and Razer™. We tested the devices using the benchmark Maxon Cinebench 15, which uses 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 when it came to 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:

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

## Results

After 10 consecutive runs of Cinebench's multi-core CPU test, the Dell XPS 13 maintained 96 percent of its original performance even as competitor scores dropped by as much as 30 percent. While the Dell XPS 13 had a 4 percent lead over its nearest competitor (the Microsoft Surface Book 2) in the first run, this lead had widened to 27 percent versus its closest competitor (the Lenovo Yoga 920) by the final run.

## Conclusion

In our Cinebench testing of sustained, multi-core CPU performance, we found that the Dell XPS 13 maintained its initial high performance. In contrast, 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 that we tested, when measuring for sustained performance under a heavy CPU workload.

We concluded testing on December 12, 2017.



Figure 1: Cinebench CPU (multi-core) results. All data current as of 12/12/2017.

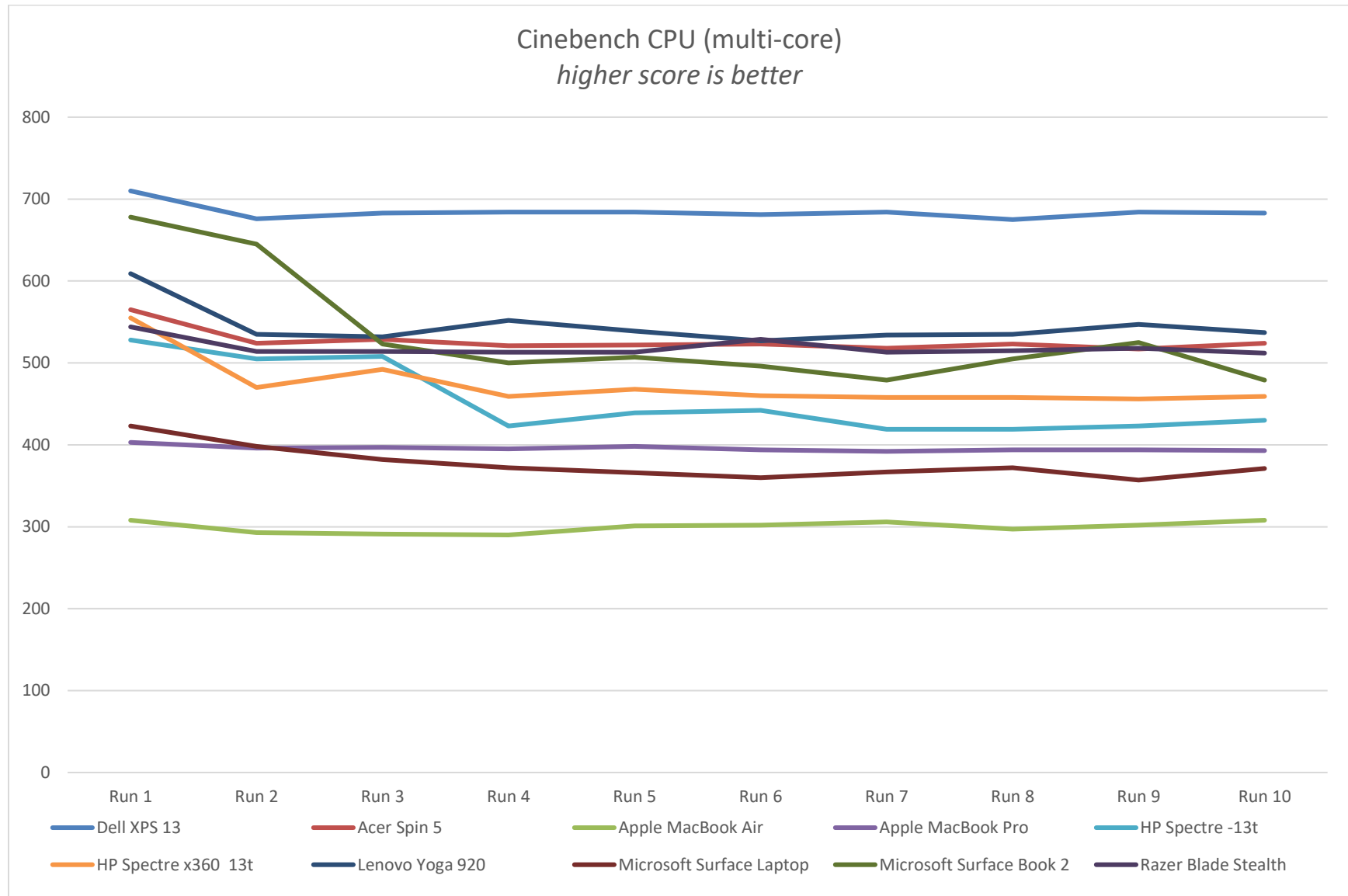


Figure 2: Cinebench CPU (multi-core) results. All data current as of 12/12/2017.

	Dell XPS 13	Acer Spin 5	Apple MacBook Air	Apple MacBook Pro	HP Spectre 13t	HP Spectre x360 13t	Lenovo Yoga 920	Microsoft Surface Laptop	Microsoft Surface Book 2	Razer Blade Stealth
Run 1	710	565	308	403	528	555	609	423	678	544
Run 2	676	524	293	396	505	470	535	398	645	514
Run 3	683	529	291	397	508	492	532	382	523	514
Run 4	684	521	290	395	423	459	552	372	500	513
Run 5	684	522	301	398	439	468	539	366	507	513
Run 6	681	523	302	394	442	460	527	360	496	529
Run 7	684	518	306	392	419	458	534	367	479	513
Run 8	675	523	297	394	419	458	535	372	505	515
Run 9	684	517	302	394	423	456	547	357	525	518
Run 10	683	524	308	393	430	459	537	371	479	512
<b>Average</b>	<b>684</b>	<b>527</b>	<b>300</b>	<b>396</b>	<b>454</b>	<b>474</b>	<b>545</b>	<b>377</b>	<b>534</b>	<b>519</b>

On November 17, 2017, 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 December 12, 2017.

## APPENDIX A: SYSTEM CONFIGURATION INFORMATION

System	Acer Spin 5	Apple MacBook Air	Apple MacBook Pro	Dell XPS 13
<b>Processor</b>				
Vendor	Intel®	Intel	Intel	Intel
Name	Core™ i7	Core i7	Core i7	Core i7
Model number	8550U	5650U	7567U	8550U
Core frequency (GHz)	1.8 – 4.0	2.2 – 3.2	3.5 – 4.0	1.8 – 4.0
Number of cores	4	2	2	4
Cache	8 MB L3	4 MB L3	4 MB L3	8 MB L3
<b>Memory</b>				
Amount (GB)	8	8	16	16
Type	DDR4	DDR3	DDR3	DDR3
Speed (MHz)	2,133	1,600	2,133	1,866
<b>Graphics</b>				
Vendor	Intel	Intel	Intel	Intel
Model number	UHD Graphics 620	HD Graphics 6000	Iris Plus Graphics 650	UHD Graphics 620
<b>Storage</b>				
Amount (GB)	512	512	512	512
Type	SSD	SSD	SSD	SSD
<b>Connectivity/expansion</b>				
Wireless internet	Qualcomm® Atheros® QCA61x4A	802.11ac	802.11ac	Killer™ Wireless -n/a/ac 1435
Bluetooth	4.1	4.0	4.2	4.1
USB	1 x USB 2.0, 2 x USB 3.0	2 x USB 3.0, 1 x SDXC card slot	4 x Thunderbolt™ 3 (USB-C)	3 x USB-C
Video	1 x HDMI	1 x Thunderbolt 2	DisplayPort through Thunderbolt	1 x Thunderbolt USB-C

System	Acer Spin 5	Apple MacBook Air	Apple MacBook Pro	Dell XPS 13
<b>Battery</b>				
Type	Lithium-polymer	Lithium-polymer	Lithium-polymer	Lithium-polymer
Rated capacity (Wh)	47	54	49.2	52
<b>Display</b>				
Size (in.)	13.3	13.3	13.3	13.3
Type	IPS LCD	LED-backlit display	LED-backlit display with IPS technology	InfinityEdge
Resolution	1,920 x 1,080	1,440 x 900	2,560 x 1,600	3,840 x 2,160
Touchscreen	Yes	No	No	Yes
<b>Operating system</b>				
Vendor	Microsoft®	Apple	Apple	Microsoft
Name	Windows® 10 Home	macOS® Sierra	macOS Sierra	Windows 10 Home
Build number or version	10.0.16299	10.13.1	10.13.2	10.0.16299
<b>BIOS</b>				
BIOS name and version	Insyde 1.00	N/A	N/A	Dell Inc. 0.3.13
<b>Dimensions w/ keyboard</b>				
Height (in)	0.63	0.11 to 0.68	0.59	0.33 to 0.46
Width (in)	12.69	12.69	11.97	11.86
Depth (in)	8.87	8.93	8.36	7.82
Weight (lbs.)	3.39	3.01	3.02	2.62

System	HP Spectre 13t laptop	HP Spectre x360 13t	Lenovo Yoga 920
<b>Processor</b>			
Vendor	Intel	Intel	Intel
Name	Core i7	Core i7	Core i7
Model number	8550U	8550U	8550U
Core frequency	1.8 – 4.0	1.8 – 4.0	1.8 – 4.0
Number of cores	4	4	4
Cache	8 MB L3	8 MB L3	8 MB L3
<b>Memory</b>			
Amount	16	16	16
Type	DDR3	DDR3	DDR4
Speed (MHz)	2,133	2,133	2,133
<b>Graphics</b>			
Vendor	Intel	Intel	Intel
Model number	UHD Graphics 620	UHD Graphics 620	UHD Graphics 620
<b>Storage</b>			
Amount	512 GB	512 GB	1 TB
Type	SSD	SSD	SSD
<b>Connectivity/expansion</b>			
Wireless internet	Intel AC 8265	Intel AC 8265	Qualcomm Atheros QCA61x4A
Bluetooth	4.2	4.2	4.1
USB	1 x USB 3.1 Type-C	1 x USB 3.1, 2 x USB-C	2 x USB-C, 1 x USB 3.0
Video	2 x Thunderbolt 3	2 x Thunderbolt USB-C	2 x USB-C DisplayPort
<b>Battery</b>			
Type	Lithium-polymer	Lithium-polymer	Lithium-polymer
Rated capacity (Wh)	43.7	60	70
<b>Display</b>			
Size (in.)	13.3	13.3	13.9
Type	4K IPS micro-edge WLED-backlit multitouch-enabled edge-to-edge glass	4K IPS micro-edge WLED-backlit touch	UHD IPS Multitouch
Resolution	3,840 x 2,160	3,840 x 2,160	3,840 x 2,160
Touchscreen	Yes	Yes	Yes

System	HP Spectre 13t laptop	HP Spectre x360 13t	Lenovo Yoga 920
<b>Operating system</b>			
Vendor	Microsoft	Microsoft	Microsoft
Name	Windows 10 Home	Windows 10 Home	Windows 10 Home
Build number or version	10.0.16299	10.0.16299	10.0.16299
<b>BIOS</b>			
BIOS name and version	Insyde F.06	American Megatrends® Inc. F.10	Lenovo 5NCN28WW
<b>Dimensions w/ keyboard</b>			
Height (in)	0.41	0.53	0.53
Width (in)	12.09	12.06	12.69
Depth (in)	8.83	8.56	8.79
Weight (lbs.)	2.42	2.74	2.97

System	Microsoft Surface Laptop	Microsoft Surface Book 2	Razer Blade Stealth
<b>Processor</b>			
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
Cache	4 MB L3	8 MB L3	8 MB L3
<b>Memory</b>			
Amount (GB)	16	16	16
Type	DDR3	DDR3	DDR3
Speed (MHz)	1,866	1,866	2,133
<b>Graphics</b>			
Vendor	Intel	Intel / NVIDIA®	Intel
Model number	Iris Plus Graphics 640	UHD Graphics 620 / GeForce® GTX 1050	UHD Graphics 620
<b>Storage</b>			
Amount (GB)	512	512	512
Type	SSD	SSD	SSD
<b>Connectivity/expansion</b>			
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
<b>Battery</b>			
Type	Lithium-polymer	Lithium-polymer	Lithium-polymer
Rated capacity (Wh)	N/A	N/A	53.6
<b>Display</b>			
Size (in.)	13.5	13.5	13.3
Type	PixelSense Display	PixelSense Display	QHD+
Resolution	2,256 x 1,504	3,000 x 2,000	3,200 x 1,800



System	Microsoft Surface Laptop	Microsoft Surface Book 2	Razer Blade Stealth
Touchscreen	Yes	Yes	Yes
<b>Operating system</b>			
Vendor	Microsoft	Microsoft	Microsoft
Name	Windows 10 Pro	Windows 10 Pro	Windows 10 Home
Build number or version	10.0.16299	10.0.16299	10.0.16299
<b>BIOS</b>			
BIOS name and version	Microsoft 136.1736.769	Microsoft 387.1879.769	Razer 1.01
<b>Dimensions w/ keyboard</b>			
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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