



Stronger core-to-core benchmark performance



Handled extreme temperatures with better performance



Strong enough to handle tough drops



Easier to read outdoors

Brave the elements with a rugged tablet

In hands-on evaluations, the Dell Latitude 7212 Rugged Extreme tablet proved more durable and better-performing than an Apple iPad Pro with an OtterBox case

If you work outdoors and your job requires a computer, taking a consumer tablet out into the field is just asking for trouble. With a less durable device, harsh weather or an accidental drop could ruin your workday and turn your shiny new device into a thousand-dollar dud. To get field work done without worrying about fragile technology, you need a tablet that can withstand your daily environment.

At Principled Technologies, we tested two solutions that claim durability: the Dell Latitude™ 7212 Rugged Extreme Tablet and a 2017 Apple® iPad Pro® with a second-generation OtterBox® Defender Series® case. The Dell Latitude 7212 outperformed the iPad Pro in benchmarking workloads at room temperature as well as hot and cold temperature extremes. Even without a separate case, it survived a series of more than two-dozen four-foot (1.2-meter) drops from various angles. In addition, eight of ten users we queried found the Latitude display to be more readable in outdoor daylight than that of the iPad Pro.

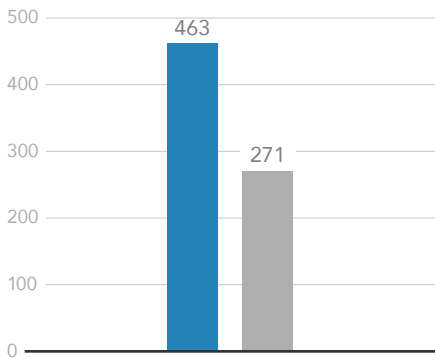
When daily work takes you from an office to the great outdoors, the Dell Latitude 7212 could keep you productive without having to worry about the device's safety.

Baseline benchmark scores

We measured device performance at room temperature (74 °F, 23.3 °C) using three benchmarks: WebXPRT 2015, JetStream v.1.1, and Geekbench. Here, we present scores for each device while plugged into a power outlet. On single-core tests, the Dell Latitude 7212 had markedly better scores across the board. While the Apple device scored higher on the GeekBench multi-core assessment, this is a matter of consequence, as the Apple iPad Pro has more cores available to its processor.

WebXPRT 2015 overall score

■ Dell Latitude 7212 ■ Apple iPad Pro



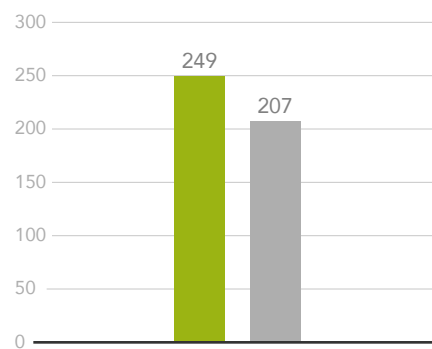
70%
better score

WebXPRT 2015 uses scenarios created to mirror the tasks you do every day to compare the performance of almost any Web-enabled device. WebXPRT is available to the public, compatible with mobile devices, and runs right from your browser.

To learn more about WebXPRT 2015, visit www.webxprt.com

JetStream overall score

■ Dell Latitude 7212 ■ Apple iPad Pro



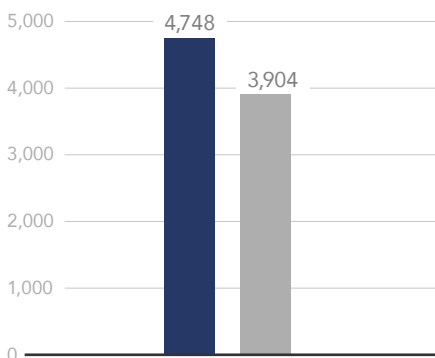
20%
better score

JetStream uses advanced workloads and programming techniques. According to Webkit, JetStream scores are "a good indicator of the performance users would see in advanced web applications like [video] games."¹

To learn more about JetStream, visit www.browserbench.org/JetStream/

Geekbench CPU Single-Core score

■ Dell Latitude 7212 ■ Apple iPad Pro



21%
better score

Geekbench is a cross-platform benchmark that can differentiate between single- and multi-core performance.

Geekbench 4 bases its scores on the performance of an Intel® Core™ i7-6600U processor running at 2.6 GHz, which earns a score of 4,000.

To learn more about Geekbench 4, visit www.geekbench.com

Benchmark scores: Thermal testing

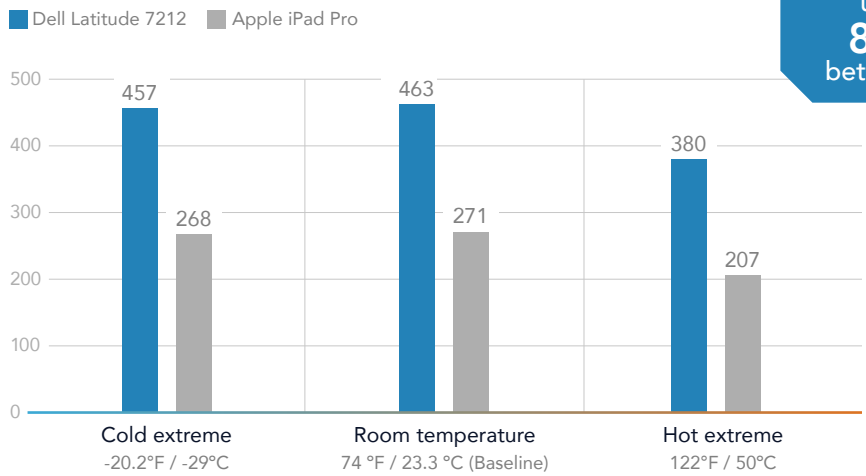
We put each tablet in a thermal chamber set to 122°F / 50°C for our hot test, and -20.2°F / -29°C for our cold test. After the tablets reached the target temperature, we let them rest in the chamber at that temperature for half an hour. We then removed the tablets from the chamber, ran the performance benchmarks again, and recorded the scores.

Here, we report the scores for each device while plugged into an outlet. Even in extremely hot and cold environments, the Dell Latitude continued to outperform the Apple device.



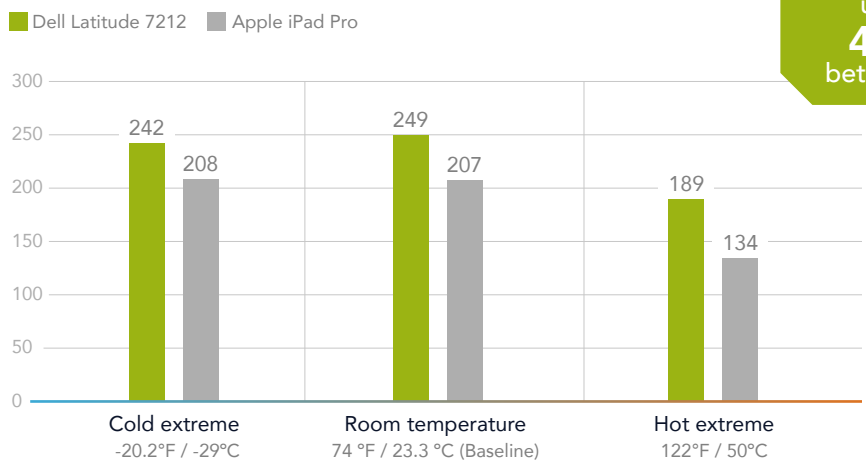
Our thermal chamber

WebXPRT 2015 overall scores at three temperatures



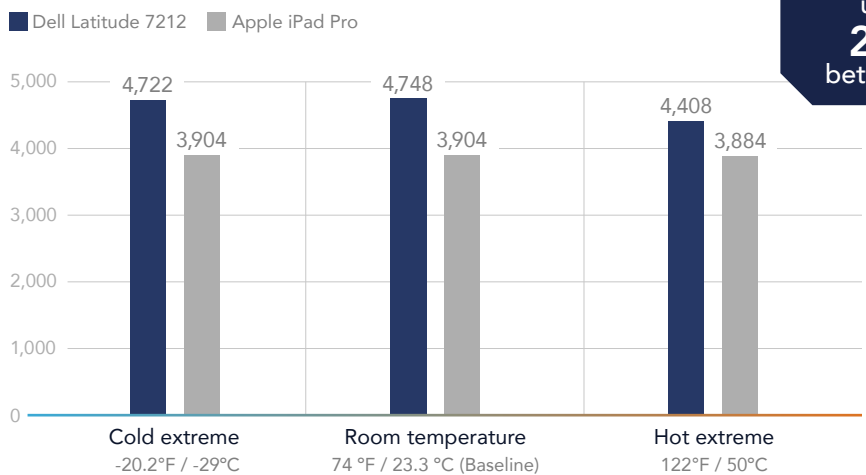
up to
83%
better score

JetStream overall scores at three temperatures



up to
41%
better score

Geekbench CPU Single-Core scores at three temperatures



up to
21%
better score

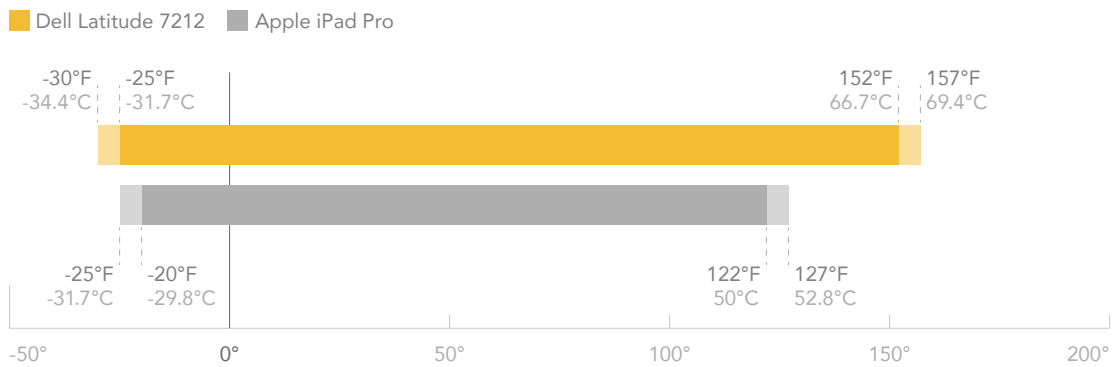
Operational temperature range

We also tested each device to determine the total range at which the devices could function. As we raised or lowered the thermal chamber temperature, we checked the functionality of each device every five degrees Fahrenheit. At hot temperatures, the Apple iPad Pro failed to boot at the 127°F / 52.7°C checkpoint, meaning its true failure point is somewhere between 122 and 127°F (50 and 52.8°C).

At the cold temperature extreme, the Apple iPad Pro failed to boot at -25°F / -31.7°C, meaning failure occurred somewhere between -20 and -25 °F (-28.9 and -31.7°C). The Dell Latitude 7212 had a wider range, successfully booting up between -25 and 152 °F (-31.7 and 66.7°C).

Operational temperature range

Faded endpoints represent failure range



Heat advisory: Your car gets hotter than you'd think

Leaving your tablet in a hot car for even 15 minutes can raise your device's temperature to levels that reduced performance significantly for the Apple iPad Pro. On a hot summer day, the temperature inside a car can quickly climb to between 124°F to 153°F (51.1 and 67.2°C) according to King et al. of the American Academy of Pediatrics (as cited by McLaren et al. of the same organization).² Our operational temperature range data shows that an iPad Pro could refuse to boot at these hot temperatures.

Drop-test results

We set up a drop table in our facilities to test the durability of each tablet. We dropped the devices onto two-inch plywood over concrete flooring. Both devices survived 26 drops from 4 feet (1.2 meters) at various angles with no functional damage. (We ran WebXPRT after each drop to ensure the devices still functioned.)

The OtterBox suffered some minor cosmetic damage on several of the drops, but neither device showed damage to the underlying hardware.



Screen readability

We assembled 10 people on a bright, sunny day, and asked them to use each device to read an excerpt from Bram Stoker's *Dracula*. Out of the 10 jurors, 8 thought the Dell Latitude 7212 screen made for an easier read. One juror thought both devices were equally readable. Read the full comments in [Appendix C](#), page 14.

Conclusion

Our test results demonstrate that, though both devices held up in four-foot drop tests, the Dell Latitude 7212 exhibited stronger single-core performance than the Apple iPad Pro. In extreme heat and cold environments, the Dell device maintained its competitive edge and showed a larger operating temperature range. By a wide margin, a jury of 10 consumers also found the Dell Latitude 7212 display to be more readable than the Apple iPad Pro in sunny outdoor conditions. Based on our results, the Dell Latitude 7212 device could prove a more reliable solution for outdoor usage.

-
- 1 Pizlo, Filip. "Introducing the JetStream Benchmark Suite", accessed February 21, 2018. <https://webkit.org/blog/3418/introducing-the-jetstream-benchmark-suite/>
 - 2 McLaren, Null, and Quinn. "Heat Stress From Enclosed Vehicles: Moderate Ambient Temperatures Cause Significant Temperature Rise in Enclosed Vehicles" Accessed February 21, 2018. <http://pediatrics.aappublications.org/content/pediatrics/116/1/e109.full.pdf>

On November 21, 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 February 15, 2018.

Appendix A: System configuration information

System	Dell Latitude 7212	Apple iPad Pro
Processor		
Vendor	Intel	Apple
Model number	Core i7-7600U	A10X + M10 coprocessor
Core frequency	2.80 GHz	2.34 GHz
Number of cores	2	6
Memory		
Amount	16GB	4GB
Type	LPDDR3	LPDDR4
Graphics		
Vendor	Intel	Imagination Technologies
Model number	HD Graphics 620	PowerVR Series 7XT GT7600 Plus
Storage		
Amount	512GB	512GB
Type	M.2 2280 SSD	NAND Flash
Connectivity/expansion		
Wireless internet	802.11ac (802.11a/b/g/n compatible)	802.11ac (802.11a/b/g/n compatible) with MIMO
Bluetooth	4.2	4.2
Cellular	DW5811e Snapdragon™ X7 LTE	Embedded Apple SIM
USB	1 x USB-A 3.0 1 x USB-C 3.1	N/A
Video	USB-C 3.1	Lightning + adapter
Battery		
Type	2 x 2-cell Lithium Ion	Lithium-polymer
Rated capacity	68 Whr (2 x 34 Whr)	41 Whr
Display		
Size	11.6"	12.9"
Type	Outdoor View Gloved Multi-Touch AG/AR/AS/Polarizer with Gorilla Glass	LED-backlit Multi-Touch
Resolution	1920 x 1080	2732 x 2048

System		Dell Latitude 7212		Apple iPad Pro		
Operating system						
Vendor	Microsoft®		Apple			
Name	Windows® 10 Pro 64 Bit		iOS			
Build number or version	Version 1703		11.2 (15C114)			
BIOS						
BIOS name and version	Dell 0.0.25		N/A			
Dimensions			With OtterBox case		Without OtterBox case	
	Imperial	Metric	Imperial	Metric	Imperial	Metric
Height	12.3 in	31.2 cm	12.5 in	31.7 cm	12.0 in	30.48cm
Width	8.0 in	20.3 cm	9.1 in	22.0 cm	8.6 in	21.84 cm
Depth	0.9 in	2.29 cm	1.1 in	2.8 cm	0.2 in	0.5 cm
Weight	3.15 lbs	1.43 kg	3.41 lbs	1.55 kg	1.53 lbs	0.69 kg

Appendix B: How we tested

Benchmark tests

Geekbench 4

Setting up the test

1. On the Latitude 7212 tablet, install Geekbench 4:
 - a. Download Geekbench 4 from <http://www.primatelabs.com/geekbench/download/>.
 - b. To begin the installation, click Install.
 - c. Setup is complete.
2. On the iPad Pro, install Geekbench 4:
 - a. Download Geekbench 4 from the App Store.
 - b. Setup is complete.

Running the test

1. Make sure the power cable is plugged into the tablet.
2. To Launch Geekbench 4, click the Geekbench 4 icon.
3. Run the CPU benchmark by clicking Run CPU Benchmark.
4. When the test completes, record the results.
5. Repeat steps 1 through 4 twice more.
6. Report the median of the three runs.

WebXPRT 15

Running the test

1. Make sure the power cable is plugged into the tablet.
2. Open the device's default web browser, and navigate to <http://www.principledtechnologies.com/benchmarkxpert/webxpert/>.
3. Click Run WebXPRT 2015.
4. At the Ready to test your browser screen, click Continue.
5. To begin the test, click the play icon.
6. When the test completes, record the results.
7. Repeat steps 1 through 6 twice more.
8. Report the median of the three runs.

JetStream 1.1

Running the test

1. Make sure the power cable is plugged into the tablet.
2. Open the device's default web browser, and navigate to <http://www.browserbench.org/JetStream/>.
3. Click Start Test.
4. When the test completes, record the results.
5. Repeat steps 1 through 4 twice more.
6. Report the median of the three runs.

Low temperature benchmark tests

This test measures tablet performance at an extremely cold temperature. We cooled the tablets to -20 degrees Fahrenheit (-28.9 degrees Celsius).

Running the test

1. Ensure the device is powered on to its Home screen.
2. With the Climate Control Chamber at roughly 75 degrees Fahrenheit (23.9 degrees Celsius), place the device in the Climate Control Chamber, and plug in its power cable.
3. Close the Chamber, and cool the device to -20 degrees Fahrenheit (-28.9 degrees Celsius).
4. Once the Chamber reaches -20 degrees Fahrenheit, cool the device for an additional 30 minutes.
5. After 30 minutes, open the Chamber, and start the CPU benchmark in Geekbench 4.
6. Close the Chamber.
7. When the CPU benchmark is complete, open the Chamber, record the score, and restart the tablet.
8. After the tablet has restarted, close the Chamber, and cool the tablet for five minutes.
9. After the five-minute cooling period, open the Chamber, start WebXPRT 15.
10. Close the Chamber.
11. When the WebXPRT 15 run is complete, open the Chamber, record the score, and restart the tablet.
12. After the tablet has restarted, close the Chamber, and cool the tablet for five minutes.
13. After the five-minute cooling period, open the Chamber, and start JetStream v1.1.
14. Close the Chamber.
15. When the JetStream run is complete, open the Chamber, take out the tablet, and record the score.
16. Allow the tablet to return to a neutral temperature by leaving it out at room temperature for an hour.
17. Repeat steps 1 through 16 twice more, and take the median score of the three runs.

High temperature benchmark tests

This test measures the performance of the tablet while running several different benchmark tests at an extremely hot temperature. In our testing, we heated the tablets to 122 degrees Fahrenheit (50 degrees Celsius).

Running the test

1. Power on the device so that it displays its Home screen.
2. With the Climate Control Chamber at roughly 75 degrees Fahrenheit (23.9 degrees Celsius), place the device inside, and plug in the power cable.
3. Close the Chamber, and heat the device to 122 degrees Fahrenheit (50 degrees Celsius).
4. Once the Chamber reaches 122 degrees Fahrenheit, continue to heat the device for an additional 30 minutes.
5. After 30 minutes, open the Chamber, and start the CPU benchmark in Geekbench 4.
6. Close the Chamber.
7. When the CPU benchmark is complete, open the Chamber, record the score, and restart the tablet.
8. After the tablet has restarted, close the Chamber, and heat the tablet for five minutes.
9. After the five-minute heating period, open the Chamber, start WebXPRT 15.
10. Close the Chamber.
11. When the WebXPRT 15 run is complete, open the Chamber, record the score, and restart the tablet.
12. After the tablet has restarted, close the Chamber, and heat the tablet for five minutes.
13. After the five-minute heating period, open the Chamber, and start JetStream v1.1.
14. Close the Chamber.
15. When the JetStream run is complete, open the Chamber, take out the tablet, and record the score.
16. Allow the tablet to return to a neutral temperature by leaving it out at room temperature for an hour.
17. Repeat steps 1 through 16 twice more, and take the median score of the three runs.

Low-temperature threshold test

This test determines the low-temperature threshold at which each tablet fails to run. We placed each device in a climate-controlled chamber and cooled them to -20 degrees Fahrenheit. After reaching the target temperature, we left each tablet in the chamber for one hour and checked to see if it would still run. We repeated this process, lowering the temperature by five degrees each hour until the tablet ceased functioning.

Running the test

1. Power the device on to its Home screen.
2. With the Climate Control Chamber roughly 75 degrees Fahrenheit (23.9 degrees Celsius), place the device inside.
3. Cool the device to -20 degrees Fahrenheit (-28.9 degrees Celsius). Once the Chamber reaches -20 degrees Fahrenheit, continue to cool the device for an additional hour.
4. After one hour, open the Climate Control Chamber and inspect the device to see if it is still powered on and functional.
5. Remove the device from the Climate Control Chamber and let sit for an hour to warm up to room temperature.
6. If the tablet is powered on and functioning after one hour, repeat steps 1 through 5, lowering the temperature by 5 degrees Fahrenheit.
7. When you observe that the tablet is powered off or not functional after one hour, record the Chamber's temperature as the low-temperature threshold, and repeat steps 1 through 5 twice more.

High-temperature threshold test

This test determines the high-temperature threshold at which each tablet fails to run. We placed each device in a climate-controlled chamber and heated them to 122 degrees Fahrenheit. After reaching the target temperature, we left each tablet in the chamber for one hour and checked to see if it would still run. We repeated this process, raising the temperature by five degrees each hour until the tablet ceased functioning.

Running the test

1. Power the device on to its Home screen.
2. With the Climate Control Chamber roughly 75 degrees Fahrenheit (23.9 degrees Celsius), place the device inside.
3. Heat the device to 122 degrees Fahrenheit (50 degrees Celsius). Once the Chamber reaches 122 degrees Fahrenheit, continue to cool the device for an additional hour.
4. After one hour, open the Climate Control Chamber and inspect the device to see if it is still powered on and functional.
5. Remove the device from the Climate Control Chamber, and let sit for an hour to cool down to room temperature.
6. If the tablet is powered on and functioning after one hour, repeat steps 1 through 5, raising the Chamber's temperature by 5 degrees Fahrenheit on each repeat.
7. When you observe that the tablet is powered off or not functional after one hour, record the Chamber's temperature as the high-temperature threshold, and repeat steps 1 through 5 twice more.

Drop test

We ran through a series of 26 drops at various angles, from a height of 48 inches.

1. After each drop, inspect the device to see if there is any damage to the tablet.
2. After visually inspecting the device, run WebXPRT 15 to determine whether the tablet is still operational.

Appendix C: Detailed test results

WebXPRT 2015

Performance (median)	Dell Latitude 7212			Apple iPad Pro		
	Baseline 74°F / 23.3°C	Hot 122°F / 50°C	Cold -20.2°F / -29°C	Baseline 74°F / 23.3°C	Hot 122°F / 50°C	Cold -20.2°F / -29°C
Overall Score (higher is better)	463	380	457	271	207	268
Photo Enhancement (lower is better)	334	416	324	841	888	787
Organize Album (lower is better)	1,824	2,431	1,865	5,507	6,578	5,413
Stock Option Pricing (lower is better)	230	274	231	186	282	196
Local Notes (lower is better)	125	137	126	108	167	114
Sales Graphs (lower is better)	483	561	500	960	1019	954
Explore DNA Sequencing (lower is better)	1,470	1,899	1,540	3,616	5,745	3,678

JetSteam v1.1

Performance (median)	Dell Latitude 7212			Apple iPad Pro		
	Baseline 74°F / 23.3°C	Hot 122°F / 50°C	Cold -20.2°F / -29°C	Baseline 74°F / 23.3°C	Hot 122°F / 50°C	Cold -20.2°F / -29°C
Overall Score (higher is better)	249.52	189.84	242.06	207.70	134.14	208.61
Latency Score (higher is better)	199.99	153.41	190.25	155.31	99.49	154.67
Throughput Score (higher is better)	295.40	221.58	291.75	260.23	168.49	262.55

Geekbench 4

Performance (median)	Dell Latitude 7212			Apple iPad Pro		
	Baseline 74°F / 23.3°C	Hot 122°F / 50°C	Cold -20.2°F / -29°C	Baseline 74°F / 23.3°C	Hot 122°F / 50°C	Cold -20.2°F / -29°C
CPU Benchmark Single-Core (higher is better)	4,748	4,408	4,722	3,904	3,884	3,902
CPU Benchmark Multi-Core (higher is better)	9,260	7,657	8,939	9,351	9,286	9,358

With the tablets running on battery, the variance in benchmark results was too large to make a performance comparison. The Latitude 7212 continued to run on battery at -20.2°F, but the iPad shut down when we tried to run the benchmarks at that temperature.

Drop test

Drop #	Point of contact	Damage observed	
		Dell Latitude 7212	Apple iPad Pro with Otterbox case
1	Bottom	No damage	No damage
2	Top	No damage	No damage
3	Front	No damage	No damage
4	Left side	No damage	No damage
5	Back	No damage	No damage
6	Right side	No damage	No damage
7	Front-left edge	No damage	No damage
8	Back-left edge	No damage	No damage
9	Back-right edge	No damage	No damage
10	Front-right edge	No damage	No damage
11	Bottom-front edge	No damage	No damage
12	Bottom-left edge	No damage	The bottom left corner of the shield stand is bent along with the bottom left corner of the hard shell case underneath the slip cover.
13	Bottom-back edge	No damage	No damage
14	Bottom-right edge	No damage	The bottom right corner of the shield stand is bent along with the bottom right corner of the hard shell case underneath the slip cover.
15	Top-front edge	No damage	No damage
16	Top-left edge	No damage	The top left corner of the shield stand is bent along with the top left corner of the hard shell case underneath the slip cover.
17	Top-back edge	No damage	No damage
18	Top-right edge	No damage	The top right corner of the shield stand is bent along with the top right corner of the hard shell case underneath the slip cover.
19	Left corner (bottom-front)	No damage	Corners are bent enough that the shield stand won't stay attached to the back. It still attaches to the front, although not very securely.
20	Left corner (bottom-back)	No damage	The hard shell case under the slip cover is very bent and slightly cracked in the bottom left corner.
21	Right corner (bottom-back)	No damage	No damage
22	Right corner (bottom-front)	No damage	The hard shell case under the slip cover is very bent and cracked in the bottom right corner.
23	Left corner (top-front)	No damage	No damage
24	Left Corner (top-back)	No damage	No damage
25	Right corner (top-back)	No damage	No damage
26	Right corner (top-front)	No damage	No damage

Screen readability comments

Tester	Notes
1	Both were adequate
2	"It was very easy to read on the Dell tablet. The screen did not seem to reflect sunlight as much as the apple tablet."
3	"[The Apple iPad Pro] was a little harder to read, though still legible. I felt like there was a glare on the screen that made it a little more challenging to read right after I opened my eyes."
4	"[The Dell Latitude 7212] was easier to read. [the Apple iPad Pro] had a stronger glare , which made it harder to read."
5	"The matte screen [of the Dell Latitude 7212] was much easier to read than the glossy [screen of the Apple iPad Pro]. I would be inclined to increase the brightness personally, but I could read the content at default with no problem."
6	"[The Apple iPad Pro] was easier to read outside than the Dell. The edges of the characters were clearer against the background."
7	"Sometimes I had to tilt [the Apple iPad Pro] while I was reading because my own reflection was in the way. [The Dell Latitude 7212] was a little more like paper/not as reflective."
8	"[The Dell Latitude 7212] was crisp, felt more like reading a Kindle or paper than a computer."
9	"The text on [the Dell Latitude 7212] was crisp and clear with no noticeable glare."
10	"The text on [the Dell Latitude 7212] was smaller than the Apple but easier to read."

Thermal testing results

	Dell Latitude 7212		Apple iPad Pro	
	Fahrenheit	Celsius	Fahrenheit	Celsius
High temperature threshold	152 to 157°	66.7° to 69.4°	122 to 127°	50° to 52.8°
Low temperature threshold	-30° to -25°	-34.4° to -31.7°	-25° to -20°	-31.7° to -29.8°

This project was commissioned by Dell Technologies.



Facts matter.®

Principled Technologies is a registered trademark of Principled Technologies, Inc.
All other product names are the trademarks of their respective owners.

DISCLAIMER OF WARRANTIES; LIMITATION OF LIABILITY:

Principled Technologies, Inc. has made reasonable efforts to ensure the accuracy and validity of its testing, however, Principled Technologies, Inc. specifically disclaims any warranty, expressed or implied, relating to the test results and analysis, their accuracy, completeness or quality, including any implied warranty of fitness for any particular purpose. All persons or entities relying on the results of any testing do so at their own risk, and agree that Principled Technologies, Inc., its employees and its subcontractors shall have no liability whatsoever from any claim of loss or damage on account of any alleged error or defect in any testing procedure or result.

In no event shall Principled Technologies, Inc. be liable for indirect, special, incidental, or consequential damages in connection with its testing, even if advised of the possibility of such damages. In no event shall Principled Technologies, Inc.'s liability, including for direct damages, exceed the amounts paid in connection with Principled Technologies, Inc.'s testing. Customer's sole and exclusive remedies are as set forth herein.