



16 hours of battery life: Asus ExpertBook P5 Lunar Lake in review

The hidden Legion: Lenovo ThinkBook 16p Gen 5 IRX in review

Business notebooks: The top 10 options

ThinkPad answer to the MacBook Pro 16: ThinkPad P1 G7 in review

HP ZBook Power 16 G3: Bigger screen, bigger

Lenovo ThinkPad Z16 G1 laptop review: Powerful AMD flagship with a hickup

Premium problem case. A high quality, a high performance, and even relatively efficient with current AMD Ryzen CPUs and Radeon graphics - what could possibly go wrong? Quite a lot, actually. But it was really only one problem with the Lenovo ThinkPad Z16 G1, that created difficulties for our test evaluation.

Benjamin Herzig, Benjamin Herzig ([translated by](#) Mark Riege), Published 10/01/2022 ... AMD Business Laptop Zen Ryzen (Zen) Radeon ThinkPad Windows



ThinkPad and AMD - a combination that hasn't been seen very often for a long time. However, in the last few years this has definitely changed, now culminating in the Lenovo ThinkPad Z series, the first high-end series with the Ryzen chips. In the beginning of the year, Lenovo announced two models and sizes. We were already able to test the smaller [Lenovo ThinkPad Z13](#), and now follows the model with the large 16-inch display,

the Lenovo ThinkPad Z16.

While the Z13 clearly places the focus on mobility, the Z16 targets the multimedia sector and is supposed to compete with laptops such as the [Dell XPS 15](#) and [Apple MacBook Pro 16](#), and even with the [Lenovo ThinkPad X1 Extreme](#), the current Lenovo top dog for multimedia customers.

Lenovo ThinkPad Z16 G1 21D5S00T00 (ThinkPad Z16 Series)

Processor: [AMD Ryzen 7 PRO 6850H](#) 8 x 3.2 - 4.7 GHz, 65 W PL2 / Short Burst, 47 W PL1 / Sustained, Rembrandt-H (Zen 3+)

Graphics adapter: [AMD Radeon RX 6500M](#) - 4 GB VRAM, Core: 2433 MHz, RAM: 2000 MHz, 55 W TDP, Navi 24, Adrenalin 21.40.64, Switchable Graphics

Memory: 32 GB [□](#), LPDDR5-6400, on-board, quad-channel

Display: 16.00 inch 16:10, 1920 x 1200 pixel 142 PPI, NE160WUM-N62, IPS LED, glossy: no

Mainboard: AMD Promontory/Bixby FCH

Storage: [Samsung PM9A1 MZVL21T0HCLR](#), 1024 GB [□](#), M.2 2280, NVMe PCIe 4.0, 893 GB free

Weight: 1.887 kg (= 66.56 oz / 4.16 pounds), Power Supply: 541 g (= 19.08 oz / 1.19 pounds)

Price: 2450 Euro

Links: [Lenovo homepage](#)

[Lenovo notebook section](#)

Note: The manufacturer may use components from different suppliers including display panels, drives or memory sticks with similar specifications.

[see all specifications](#)

[+] Add to comparison » **Compare devices 0**

Possible Competitors in Comparison

Rating	Date	Model	Weight	Height	Size	Resolution	Price
87.3 % v7 (old)	10 / 2022	Lenovo ThinkPad Z16 G1 21D5S00T00 R7 PRO 6850H, Radeon RX 6500M	1.9 kg	15.8 mm	16.00"	1920x1200	from EUR 2450
89 % v7 (old)	11 / 2021	Lenovo ThinkPad X1 Extreme G4-20Y5CTO1WW (3050 Ti) i7-11800H, GeForce RTX 3050 Ti Laptop GPU	2 kg	18.2 mm	16.00"	3840x2400	from EUR 0
88.3 % v7 (old)	12 / 2021	Lenovo ThinkPad X1 Extreme G4-20Y50040GE i9-11950H, GeForce RTX 3080 Laptop GPU	1.9 kg	18.2 mm	16.00"	3840x2400	from EUR 4000
89.5 % v7 (old)	05 / 2022	Dell XPS 15 9520 RTX 3050 Ti i7-12700H, GeForce RTX 3050 Ti Laptop GPU	1.9 kg	18 mm	15.60"	3456x2160	Alternative specs USD 1,199.99
89.3 % v7 (old)	06 / 2022	Dell XPS 17 9720 i7-12700H, GeForce RTX 3050 4GB Laptop GPU	2.5 kg	19.5 mm	17.00"	3840x2400	Alternative specs USD 1,681.65
93.2 % v7 (old)	11 / 2021	Apple MacBook Pro 16 2021 M1 Pro M1 Pro, M1 Pro 16-Core GPU	2.2 kg	16.8 mm	16.20"	3456x2234	Alternative specs USD 1,529.16
92.5 % v7 (old)	11 / 2021	Apple MacBook Pro 16 2021 M1 Max M1 Max, M1 Max 32-Core GPU	2.2 kg	16.8 mm	16.20"	3456x2234	Alternative specs USD 2,699.00

search



good (87%)

ThinkPad Z16 G1 21D5S00T00

AMD Ryzen 7 PRO 6850H
AMD Radeon RX 6500M

Multimedia - 09/29/2022 - v7

Test device courtesy of [Campuspoint](#)

Download your [licensed](#) rating image as [PNG](#) [SVG](#)

A compact aluminum case: Lenovo ThinkPad Z16 G1

The largest difference compared to the established

ThinkPad X1 Extreme series is in the design: While the [X1 Extreme](#) uses classic ThinkPad attributes, the looks of the ThinkPad Z16 are a much closer match to the mainstream of the laptop market. With its large touchpad, the rectangular keyboard, and silver display lid, it looks like a hybrid between an XPS or MacBook and a ThinkPad. Of course Lenovo will also place its own accents, such as the camera bulge on the display lid, for example, which is also very practical to use for raising the lid. This can be done easily with one hand, but only up to an opening angle of about 135 degrees. 180 degrees, like with other ThinkPads, are not possible here.



Lenovo ThinkPad Z16 Gen 1

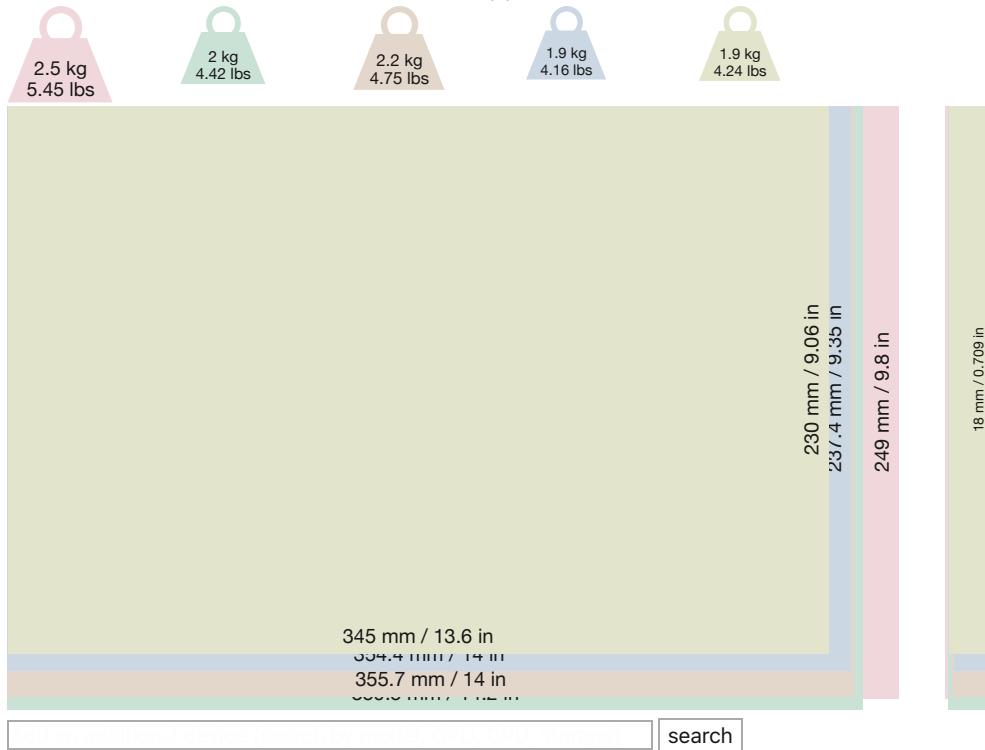
In terms of the choice of materials, Lenovo also takes a different path than with the X1 series. The display lid is made of silver aluminum, the keyboard frame is anodized black, and the bottom is black lacquer. Only the display frame is made of plastic. Another interesting feature is the palm rests, since they are made of matte glass. This creates some haptics for the Z16 that are a level above the X1 Extreme, but this might also be a matter of taste. At least, the Z16 will definitely have less problems with greasy surfaces. The stability of the case is also at a very high level, but naturally, the thin display lid is weaker than the base.



The ThinkPad Z16 is the most compact 16-inch laptop in our comparison. The [Dell XPS 15](#) is smaller, but it "only" offers a 15.6-inch LCD. In terms of the thickness, the Z16 is also ahead, since it is slimmer than all other competitors. In terms of their weight, all the competitors are extremely close to each other.

Size Comparison

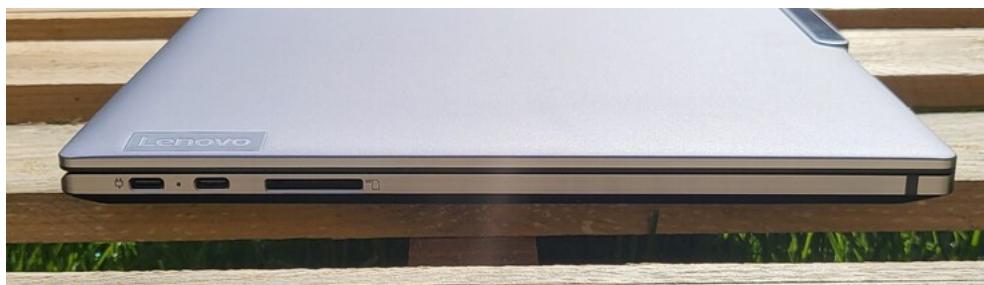
- Dell XPS 17 9720 Lenovo ThinkPad X1 Extreme G4-20Y5CTO1WW (3050 Ti)
- Apple MacBook Pro 16 2021 M1 Pro **Lenovo ThinkPad Z16 G1 21D5S00T00**
- Dell XPS 15 9520 RTX 3050 Ti DIN A4 X


 search

Equipment: Lenovo with a sparse port selection

The connection equipment is identical to that of the Dell XPS 15 9520, which makes it one of the weakest in our test field. In this point, the Z16 clearly lags behind the [ThinkPad X1 Extreme](#), and even the [Apple MacBook Pro 16](#) at least offers HDMI.

In contrast to Intel laptops, there is no Thunderbolt 4 with AMD. On the other hand, the ThinkPad Z16 includes USB 4, which offers the same feature set as Thunderbolt 3. However, compatibility with Thunderbolt accessories isn't guaranteed and has to be determined individually.



Left side: 2x USB 4, SD card



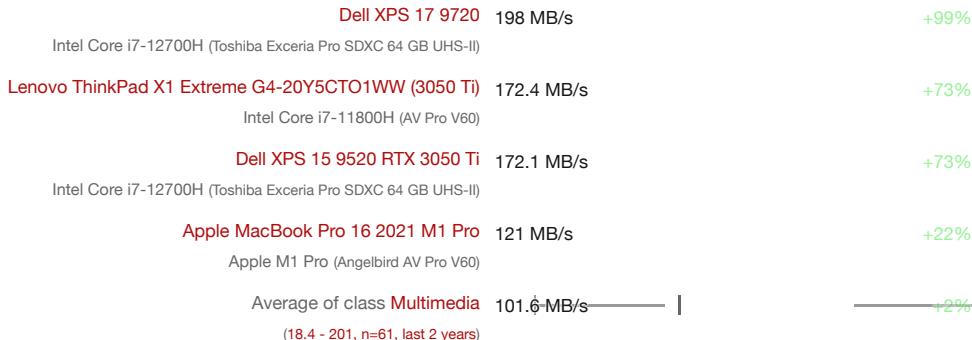
Right side: SIM, 3.5mm audio, USB C 3.2 Gen 1, Kensington Lock

SD Card Reader

The Lenovo ThinkPad Z16 G1 includes a full-size SD card reader, but SD cards cannot be inserted fully. The card reader is extremely fast, particularly when reading data. We tested this with our 128-GB AV Pro microSD reference card.

SD Card Reader

average JPG Copy Test (av. of 3 runs)



Lenovo ThinkPad Z16 G1 21D5S00T00 99.55 MB/s

AMD Ryzen 7 PRO 6850H

maximum AS SSD Seq Read Test (1GB)

Lenovo ThinkPad Z16 G1 21D5S00T00 256.53 MB/s

AMD Ryzen 7 PRO 6850H

Dell XPS 17 9720	195.7 MB/s	-24%
Intel Core i7-12700H (Toshiba Exceria Pro SDXC 64 GB UHS-II)		

Dell XPS 15 9520 RTX 3050 Ti	178.5 MB/s	-30%
Intel Core i7-12700H (Toshiba Exceria Pro SDXC 64 GB UHS-II)		

Lenovo ThinkPad X1 Extreme G4-20Y5CTO1WW (3050 Ti)	175.1 MB/s	-32%
Intel Core i7-11800H (AV Pro V60)		

Average of class Multimedia	141.7 MB/s	-45%
(25.8 - 266, n=60, last 2 years)		

search

Communication

Lenovo labels the built-in Qualcomm WCN685x (2x2) as "Qualcomm NFA-725A." It is a Wi-Fi 6E card. With some slight variations, the ThinkPad Z16 achieves very good results with this Wi-Fi module.

Our test unit also includes a 4G module from Quectel. If you need WWAN, it has to be already included in your order, since you cannot install it later.

Networking

Lenovo ThinkPad Z16 G1 21D5S00T00

Qualcomm WCN685x

iperf3 receive AXE11000 6GHz 1771 (min: 1738) MBit/s ~100%

iperf3 receive AXE11000 1740 (min: 1591) MBit/s ~100%

iperf3 transmit AXE11000 6GHz 1822 (min: 1515) MBit/s ~100%

iperf3 transmit AXE11000 1490 (min: 666) MBit/s ~100%

Lenovo ThinkPad X1 Extreme G4-20Y5CTO1WW (3050 Ti)

Intel Wi-Fi 6E AX210

iperf3 transmit AX12 955 (min: 771) MBit/s ~100%

iperf3 receive AX12 1315 (min: 1034) MBit/s ~100%

Dell XPS 15 9520 RTX 3050 Ti

Intel Wi-Fi 6E AX211

iperf3 receive AXE11000 1289 (min: 1159) MBit/s ~74%

iperf3 transmit AXE11000 833 (min: 660) MBit/s ~56%

Dell XPS 17 9720

Intel Wi-Fi 6E AX211

iperf3 receive AXE11000 1630 (min: 1597) MBit/s ~94%

iperf3 transmit AXE11000 1367 (min: 1038) MBit/s ~92%

Apple MacBook Pro 16 2021 M1 Pro

802.11 a/b/g/n/ac/ax

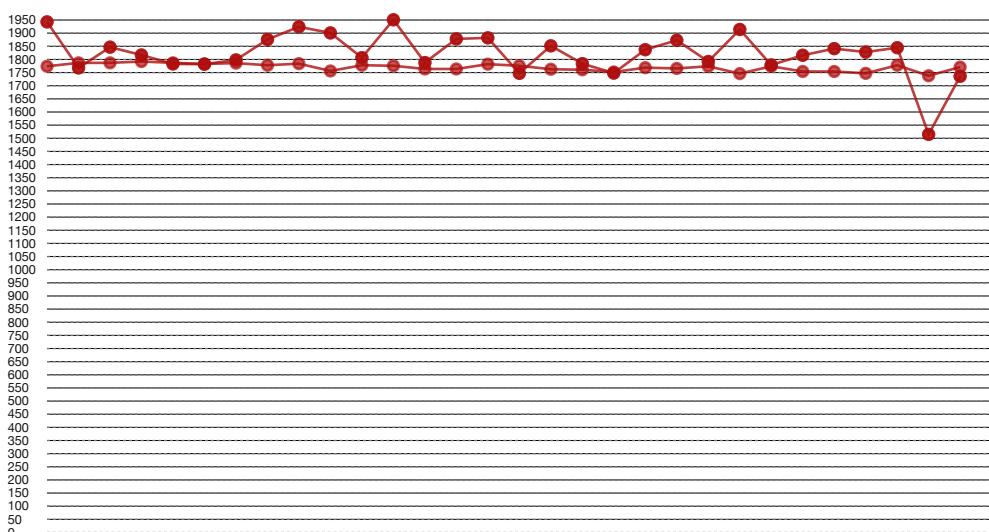
iperf3 transmit AX12 772 (min: 748) MBit/s ~81%

iperf3 receive AX12 760 (min: 404) MBit/s ~58%

iperf3 receive AXE11000 874 (min: 522) MBit/s ~50%

iperf3 transmit AXE11000 766 (min: 698) MBit/s ~51%

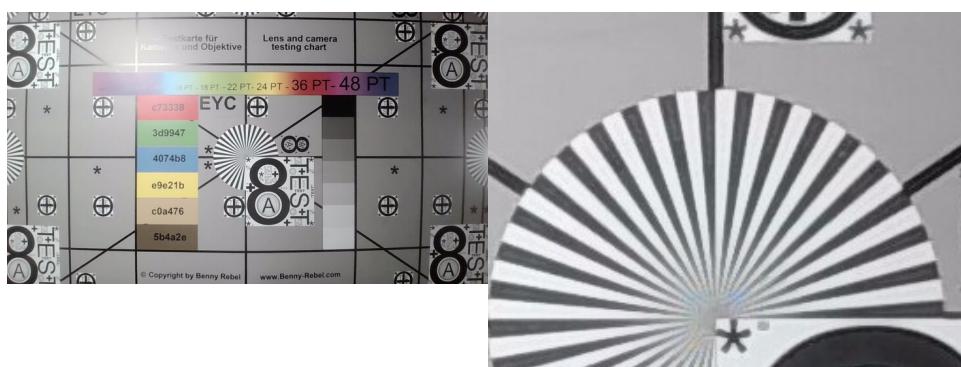
search

[Lenovo ThinkPad Z16 G1 21D5S00T00; iperf3 transmit AXE11000 6GHz; iperf 3.1.3: Ø1822 \(1515-1951\)](#)[Lenovo ThinkPad Z16 G1 21D5S00T00; iperf3 receive AXE11000 6GHz; iperf 3.1.3: Ø1770 \(1738-1792\)](#)

search

Webcam

Lenovo gives a lot of room to the webcam in terms of the design, and the 1080p camera is also relatively good for a laptop. However, there is still a lot of room for improvement, and the selfie shooter in a smartphone is still much better.

ColorChecker *Lenovo ThinkPad Z16 G1 21D5S00T00*: 17.16 ΔE min: 2.01 - max: 32.19 ΔE
 search
*Lenovo ThinkPad Z16 G1 21D5S00T00*
 search

Security

In addition to dTMR, the Lenovo ThinkPad Z16 also includes a fingerprint reader in the keyboard, the infrared camera for Windows Hello, and a Kensington Lock. What is not included is a smartcard reader and a physical webcam shutter, but you can turn off the camera electronically by pressing the F9 key instead.

Accessories

Besides the 135-Watt charger with a USB-C connector, no other accessories are included.

Maintenance

Lenovo makes it very easy to access the insides of the ThinkPad Z16 Gen 1. After removing the five Philips screws, you can directly remove the back cover. Unfortunately, there are not many options for upgrades, and the ThinkPad Z16 is not very modular at all for such a large laptop. The RAM and the Wi-Fi module are soldered in, and there is only a single M.2-2280 slot. The WWAN card occupies an M.2-2242 slot.

Of course, you can clean the fans or replace the battery, but the ThinkPad laptop clearly disappoints us in terms of upgrade options. Both the Dell XPS models and the [ThinkPad X1 Extreme](#) are significantly more modular.





ThinkPad Z16: aluminum bottom



ThinkPad Z16: few upgrade options

Warranty

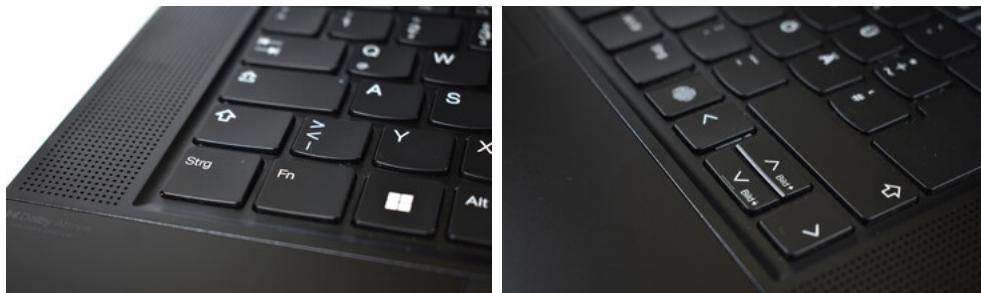
Our test unit is a special model from Campuspoint, offering a very generous warranty package: 36 months of on-site service and "Premier Support." The warranty varies depending on the country, and ThinkPads are often sold with only a year of warranty in the US. However, in all cases the warranty can be expanded up to five years and also upgraded by services such as a replacement of the integrated battery. In addition, the Z16 also includes an international warranty as a ThinkPad, but there is no on-site service outside your country of purchase.

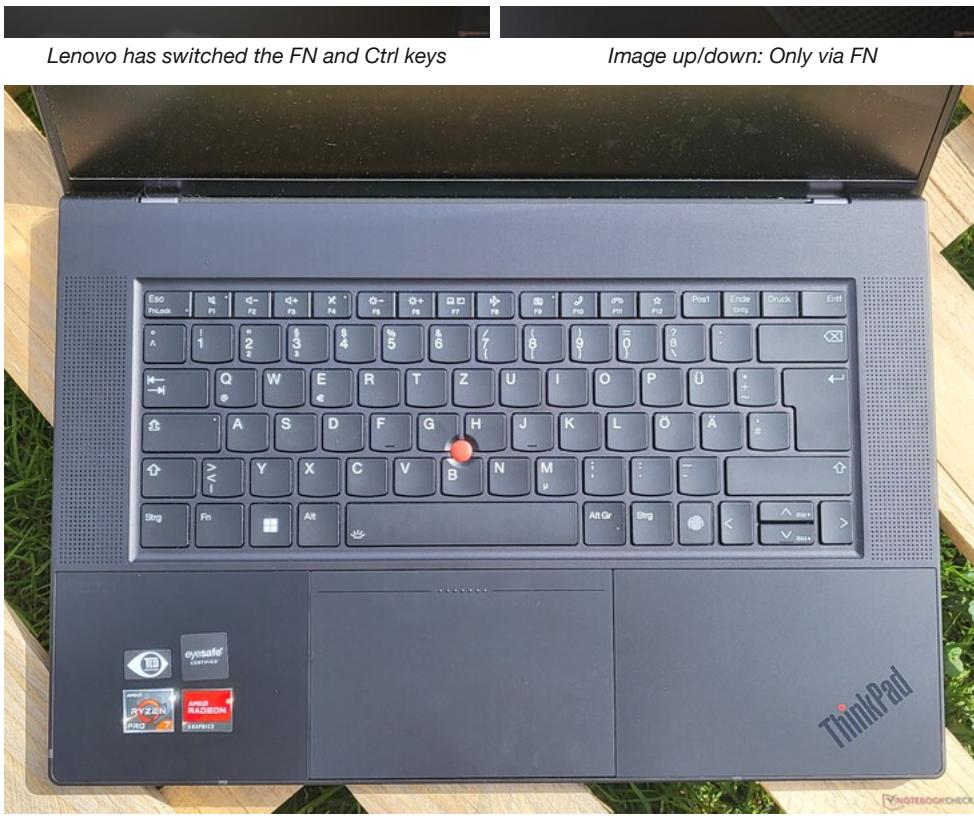
Input Devices: The best touchpad in a Lenovo ThinkPad

Keyboard

The two-level backlit keyboard is also closer to the laptop mainstream, and the outer keys don't have the ThinkPad-typical U-shaped key form anymore. Lenovo also forced the keyboard overall into a rectangular form and removed the recess for the arrow keys that is otherwise customary for ThinkPads. Together with this change, the Image up/down keys were also removed. And finally, Lenovo has also switched the Ctrl and Fn keys, with the Ctrl key now being on the outside.

Offering a key stroke of only 1.35 mm (~0.053 in), the keys are again slimmer than in many other current ThinkPad laptops. For example, the [X1 Extreme](#) offers 1.5 mm (~0.059 in). In addition, the key tops are flatter. This results in the typing experience feeling less luxurious and not very ThinkPad typical. However, compared to the Dell XPS and the MacBook Pro, the keyboard is still better, offering a clear and crisp pressure point and a resistance that is just right. At 28.5 cm (~11.2 in), the keyboard also has the full standard width.





Lenovo ThinkPad Z16: keyboard

TrackPad and TrackPoint

Without further ado: The Z16 has the best and also largest TrackPad (12 x 8 cm) of all the current ThinkPads. The surface is made of matte glass, just like the palm rest. This has an extremely high quality and also ensures ideal sliding characteristics. The haptic motor of the ClickPad, which simulates real clicks, is also very good. The ClickPad can be clicked evenly everywhere, in contrast to the usual mechanic TrackPads that you can only use for clicking in the bottom area. With its high-quality haptics, software implementation, and spacious size, the ThinkPad laptop can be operated extremely comfortably using the touchpad.

Compared to other ThinkPads, what is slightly less comfortable is the TrackPoint without any dedicated keys. On the other hand, the TrackPoint continues to be a great option, if you have to quickly move the mouse cursor while typing. In this haptic solution, the integrated TrackPoint keys are better than we would have previously thought.



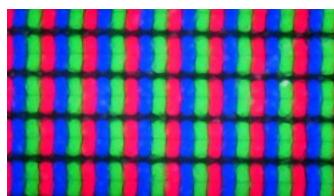
Lenovo ThinkPad Z16: TrackPad

ThinkPad Z16 Gen 1: Matte WUXGA display with a good brightness

Lenovo almost always offers several display options with its ThinkPad laptops, and the Lenovo ThinkPad Z16 Gen 1 is no exception from this rule. Buyers can choose among the following displays that all have the 16:10 format and 16-inch diagonal in common:

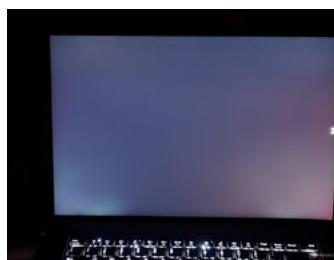
- **IPS WUXGA (1,920 x 1,200), 400 cd/m², matte, 100% sRGB, Low Power**
- IPS WUXGA (1,920 x 1,200), 400 cd/m², semi-glossy, 100% sRGB, Low Power, Touch
- OLED WQUXGA (3,840 x 2,400), 400 cd/m² (SDR), semi-glossy, 100 % DCI-P3, Touch, Dolby Vision

What stands out compared to the [ThinkPad X1 Extreme](#) is that there is no 2.5K option (2,560 x 1,600). Users have to select between a fairly low and a very high resolution. In the case of our test unit, we have the basic option. This more than fulfills the promised 400 cd/m², since the average brightness is 446 cd/m².



Subpixel grid - Lenovo ThinkPad

Z16 Gen 1



A little backlight bleeding (here displayed amplified)

			NE160WUM-N62 tested with X-Rite i1Pro 2
			Maximum: 487 cd/m ² (Nits) Average: 446.3 cd/m ²
			Minimum: 21.14 cd/m ²
			Brightness Distribution: 83 %
			Center on Battery: 487 cd/m ²
			Contrast: 1571:1 (Black: 0.31 cd/m ²)
			ΔE Color 1.8 0.5-29.43 Δ4.92, calibrated: 0.8
			ΔE Greyscale 2.3 0.5-98 Δ5.2
			72.1% AdobeRGB 1998 (Argyll 2.2.0 3D)
			99.7% sRGB (Argyll 2.2.0 3D)
			70% Display P3 (Argyll 2.2.0 3D)
			Gamma: 2.16
<i>Distribution of brightness</i>			Download ICC File (X-Rite i1Pro 2)

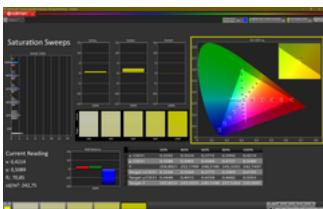
	Lenovo ThinkPad Z16 G1 21D5S00T00	Lenovo ThinkPad X1 Extreme G4- 20Y5CTO1WW (3050 Ti)	Dell XPS 15 9520 RTX 3050 Ti	Dell XPS 17 9720	Apple MacBook Pro 16 2021 M1 Pro
NE160WUM-N62 , IPS LED, 1920x1200, 16"	NE160WUM-N62 , IPS LED, 1920x1200, 16"	LP160UQ1-SPB1, IPS LED, 3840x2400, 16"	Samsung 156XG01, OLED, 3456x2160, 15.6"	Sharp LQ170R1, IPS, 3840x2400, 17"	Liquid Retina XDR, Mini-LED, 3456x2334, 16.2"
Display		18%	20%	25%	21%
Display P3 Coverage	70	84.3 20%	97.8 40%	94.8 35%	99.1 42%
sRGB Coverage	99.7	98.3 -1%	99.9 0%	100 0%	100 0%
AdobeRGB 1998 Coverage	72.1	97.8 36%	86 19%	100 39%	88 22%
Response Times		-59%	94%	-24%	-137%
Response Time Grey 50% / Grey 80% *	40 ?	60 ? -50%	1.9 ? 95%	53.2 ? -33%	42.8 ? -7%
Response Time Black / White *	25 ?	42 ? -68%	1.9 ? 92%	28.4 ? -14%	91.6 ? -266%
PWM Frequency			59.52 ?	17990 ?	14880
Screen		-14%	-55%	-23%	212%
Brightness middle	487	639 31%	381.4 -22%	438 -10%	514 6%
Brightness	446	612 37%	384 -14%	411 -8%	497 11%
Brightness Distribution	83	84 1%	95 14%	86 4%	95 14%
Black Level *	0.31	0.47 -52%		0.27 13%	0.02 94%
Contrast	1571	1360 -13%		1622 3%	25700 1536%
Colorchecker dE 2000 *	1.8	2.2 -22%	4.34 -141%	2.5 -39%	1.4 22%
Colorchecker dE 2000 max. *	3.3	5.3 -61%	9.24 -180%	6.3 -91%	2.8 15%
Colorchecker dE 2000 calibrated *	0.8	1.4 -75%		0.8 -0%	
Greyscale dE 2000 *	2.3	1.7 26%	2 13%	4.2 -83%	2.3 -0%

Gamma	2.16 102%	2.31 95%	2.13 103%	2.22 99%	2.27 97%
CCT	6867 95%	6390 102%	6210 105%	7034 92%	6792 96%
Total Average (Program / Settings)	-18% / -14%	20% / -8%	-7% / -13%	32% / 115%	

* ... smaller is better



Grayscale



Saturation



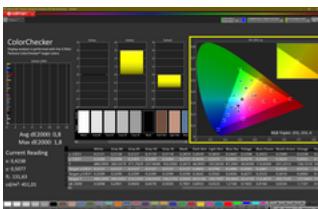
Colorchecker



Grayscale (calibrated)



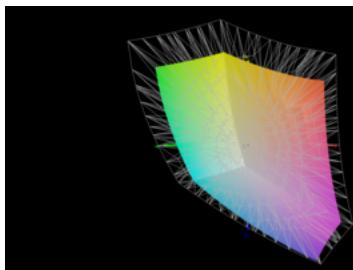
Saturation (calibrated)



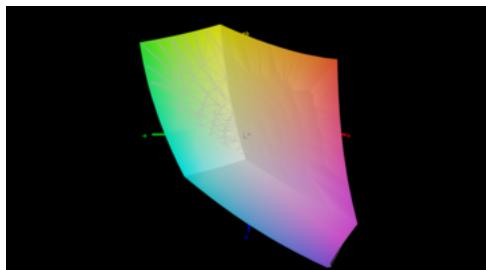
Colorchecker (calibrated)

The display of the Lenovo ThinkPad Z16 G1 is already relatively well-adjusted in the state of delivery, which is shown in its low Delta-E deviations. We measured the display using CalMan and the X-Rite i1 Pro 2 Colorimeter. A calibration with the i1 Profiler was able to drop the Delta-E value even further, leading to a quite accurate color reproduction. As always, the created color profile is available for your free download above.

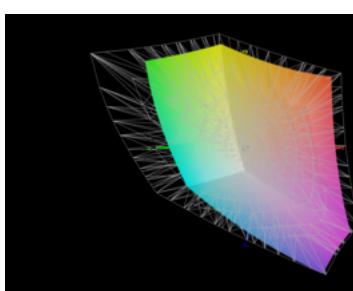
Lenovo's marketing promises 100% sRGB color space coverage, and we measured 99.7%. With this, the LCD display is suited for simple image processing. In order to get an even wider color space coverage, you'd have to select the optional OLED panel.



DCI P3: 70%



sRGB: 99.7%



AdobeRGB: 72.1%



ThinkPad Z16 outdoors

Due to its relatively high brightness and matte display surface, the ThinkPad Z16 laptop can be used outdoors without any problems, as long as you avoid direct sunlight.

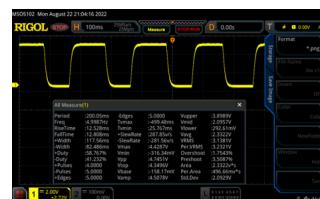
Display Response Times

i Display response times show how fast the screen is able to change from one color to the next. Slow response times can lead to afterimages and can cause moving objects to appear blurry (ghosting). Gamers of fast-paced 3D titles should pay special attention to fast response times.

Response Time Black to White

25 ms ... rise ↗ and fall ↓ combined

↗ 12 ms rise
↓ 13 ms fall



The screen shows relatively slow response rates in our tests and may be too slow for gamers.

In comparison, all tested devices range from 0.1 (minimum) to 240 (maximum) ms. > 55 % of all devices are better.

This means that the measured response time is worse than the average of all tested devices (21 ms).

Response Time 50% Grey to 80% Grey

40 ms ... rise ↗ and fall ↓ combined

↗ 17 ms rise
↓ 23 ms fall



The screen shows slow response rates in our tests and will be unsatisfactory for gamers.

In comparison, all tested devices range from 0.165 (minimum) to 636 (maximum) ms. > 57 % of all devices are better.

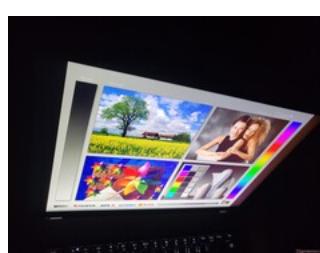
This means that the measured response time is worse than the average of all tested devices (32.9 ms).

Screen Flickering / PWM (Pulse-Width Modulation)

i To dim the screen, some notebooks will simply cycle the backlight on and off in rapid succession - a method called Pulse Width Modulation (PWM). This cycling frequency should ideally be undetectable to the human eye. If said frequency is too low, users with sensitive eyes may experience strain or headaches or even notice the flickering altogether.

Screen flickering / PWM not detected

In comparison: 53 % of all tested devices do not use PWM to dim the display. If PWM was detected, an average of 8750 (minimum: 5 - maximum: 343500) Hz was measured.



Lenovo ThinkPad Z16: As typical for IPS...

...there is nothing to complain...

...about the viewing angle stability

Performance: AMD Ryzen 6000H meets Radeon RX 6500M

The selection of processors for the ThinkPad Z16 Gen 1 includes three choices, with all

CPUs being part of AMD's Ryzen Pro lineup for business customers. The [AMD Ryzen 5 Pro 6650H](#) with six cores serves as the entry level, and you can also get the [Ryzen 7 Pro 6850H](#) and the [Ryzen 9 Pro 6950H](#), both with eight cores. As graphics chip, you can either use the integrated Radeon GPU or optionally get the [AMD Radeon RX 6500M](#). The Lenovo ThinkPad Z16 is the first ThinkPad that you can buy with a combination of AMD CPU and AMD dGPU.

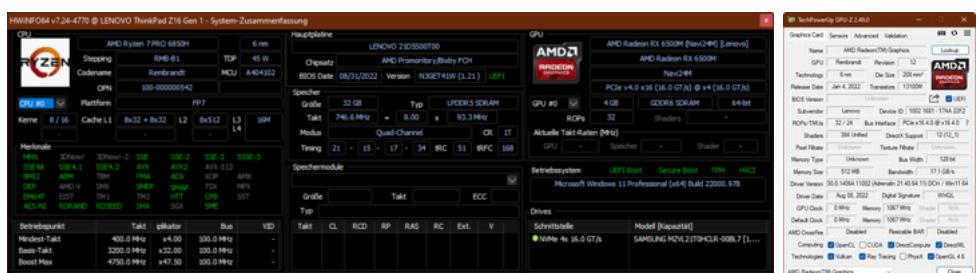
In the ThinkPad Z series, Lenovo uses soldered LPDDR5-6400 memory, with the Z16 offering either 16 or 32 GB of RAM. A single M.2-2280 SSD serves as the storage.



CPU-Z

CPU-Z Mainboard

CPU-Z Memory



HWiNEO

GPU-Z AMD

Test Conditions

Our test was performed under difficult conditions, since the Z16 created some big problems for us. Our first test unit constantly restarted when the Wi-Fi was activated. We then received an exchange device, which solved the problems to a large extent, and the replacement ThinkPad was significantly more stable.

In the Windows "Best Performance" mode, the CPU of the ThinkPad Z16 has a short-term power limit of 65 watts, and in the long term, the processor can consume 47 watts.

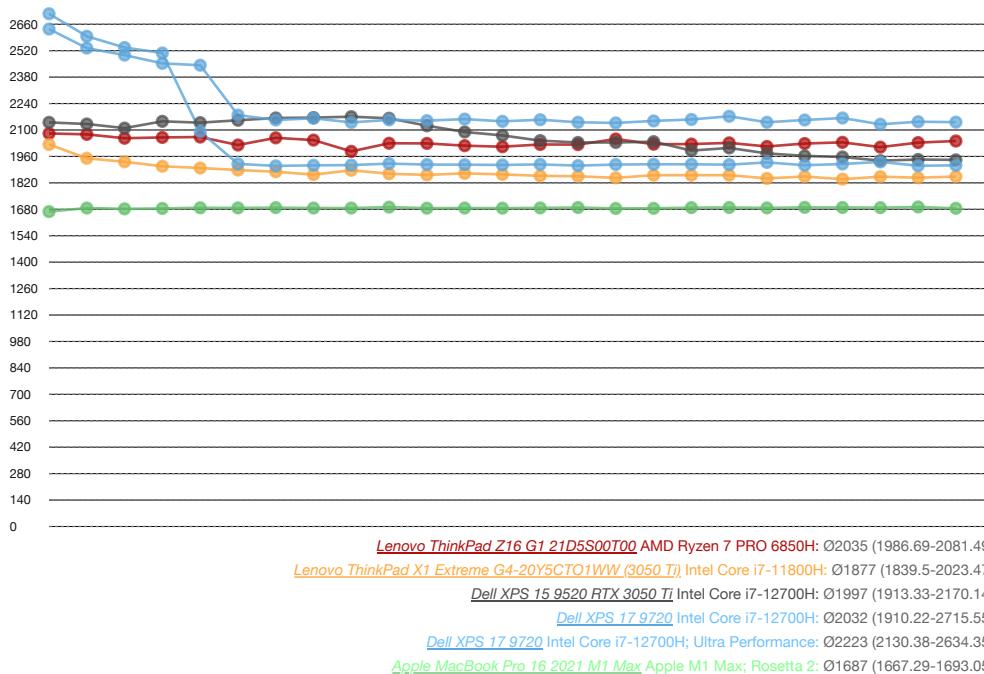
Processor

The AMD Ryzen 7 Pro 6850H is a processor of the 2022 Rembrandt generation that has a typical TDP of 45 watts as a chip of the H series. Its eight cores (16 threads with Hyperthreading) have a basic clock speed of 3.2 GHz and a maximum speed of 4.7 GHz. For some additional comparisons with other processors, we recommend our [CPU comparison list](#).

The Lenovo ThinkPad Z16 Gen 1 is the first ThinkPad with the AMD-H series. In the benchmark tests, it achieves a very good performance, although it remains behind the competitors in several disciplines. The Intel Core-i CPUs of the 12th generation are better in both the single and multicore performance, even though the advantage doesn't last long in the multicore performance. The M1 Pro and Max processors also have advantages, aside from the emulated benchmarks.

Even though the "Ultra Performance" mode isn't available in battery operation, the CPU performance remains almost unchanged in battery operation despite this (11,963 points in the Cinebench R23 Multicore test).

Cinebench R15 Multi Constant Load Test


 search

CPU Performance Rating: Percent

Cinebench R23: Multi Core | Single Core

Cinebench R20: CPU (Multi Core) | CPU (Single Core)

Cinebench R15: CPU Multi 64Bit | CPU Single 64Bit

Blender: v2.79 BMW27 CPU

7-Zip 18.03: 7z b 4 | 7z b 4 -mmt1

Geekbench 5.5: Multi-Core | Single-Core

HWBOT x265 Benchmark v2.2: 4k Preset

LibreOffice : 20 Documents To PDF

R Benchmark 2.5: Overall mean

CPU Performance Rating

Dell XPS 17 9720	80.3 pt	+9%
Intel Core i7-12700H		
Average of class Multimedia	79.4 pt	+8%
Dell XPS 15 9520 RTX 3050 Ti	79 pt	+7%
Intel Core i7-12700H		
Lenovo ThinkPad X1 Extreme G4-20Y50040GE	71.1 pt	-4%
Intel Core i9-11950H		
Apple MacBook Pro 16 2021 M1 Pro	69.7 pt	-6%
Apple M1 Pro		
Lenovo ThinkPad Z16 G1 21D5S00T0Q	69.4 pt	-6%
AMD Ryzen 7 PRO 6850H		
Apple MacBook Pro 16 2021 M1 Max	69.2 pt	-6%
Apple M1 Max		
Lenovo ThinkPad X1 Extreme G4-20Y5CT01WW (3050 Ti)	67.5 pt	-9%
Intel Core i7-11800H		

Average AMD Ryzen 7 PRO 6850H	64.1 pt	-13%
-------------------------------	---------	------

* ... smaller is better

Cinebench R10 Shading 32Bit	13701
Cinebench R10 Rendering Single 32Bit	5791
Cinebench R10 Rendering Multiple CPUs 32Bit	34412
Cinebench R11.5 OpenGL 64Bit	144.15 fps
Cinebench R11.5 CPU Single 64Bit	2.6 Points
Cinebench R11.5 CPU Multi 64Bit	21.32 Points
Cinebench R15 CPU Single 64Bit	244 Points
Cinebench R15 Ref. Match 64Bit	98 %
Cinebench R15 OpenGL 64Bit	181 fps
Cinebench R15 CPU Multi 64Bit	2081 Points
Cinebench R20 CPU (Multi Core)	4887 Points
Cinebench R20 CPU (Single Core)	583 Points
Cinebench R23 Multi Core	12016 Points
Cinebench R23 Single Core	1491 Points

... in comparison

Performance Rating: Percent

AIDA64: [FP32 Ray-Trace](#) | [FPU Julia](#) | [CPU SHA3](#) | [CPU Queen](#) | [FPU SinJulia](#) | [FPU Mandel](#) | [CPU AES](#)
| [CPU ZLib](#) | [FP64 Ray-Trace](#) | [CPU PhotoWorxx](#)

Performance Rating

Average AMD Ryzen 7 PRO 6850H	87 pt	+18%
-------------------------------	-------	------

Lenovo ThinkPad Z16 G1 21D5S00T00	86.3 pt	+17%
AMD Ryzen 7 PRO 6850H, Radeon RX 6500M		

Lenovo ThinkPad X1 Extreme G4-20Y50040GE	83.7 pt	+13%
Intel Core i9-11950H, GeForce RTX 3080 Laptop GPU		

Average of class Multimedia	83.2 pt	+13%
-----------------------------	---------	------

Lenovo ThinkPad X1 Extreme G4-20Y5CTO1WW (3050 Ti)	80.9 pt	+10%
Intel Core i7-11800H, GeForce RTX 3050 Ti Laptop GPU		

Dell XPS 15 9520 RTX 3050 Ti	63 pt	-15%
Intel Core i7-12700H, GeForce RTX 3050 Ti Laptop GPU		

Dell XPS 17 9720	62.4 pt	-15%
Intel Core i7-12700H, GeForce RTX 3050 4GB Laptop GPU		

System Performance

In the PCMark 10, the Lenovo ThinkPad Z16 G1 places in the middle of the field but in the Crossmark, more at the bottom end of the comparison field. In everyday operation, the Lenovo ThinkPad Z16 G1 runs absolutely smoothly and fast.

PCMark 10: [Score](#) | [Essentials](#) | [Productivity](#) | [Digital Content Creation](#)

CrossMark: [Overall](#) | [Productivity](#) | [Creativity](#) | [Responsiveness](#)

PCMark 10 / Score

Dell XPS 15 9520 RTX 3050 Ti	7075 Points	+8%
------------------------------	-------------	-----

GeForce RTX 3050 Ti Laptop GPU, i7-12700H, WDC PC SN810

512GB

Lenovo ThinkPad X1 Extreme G4-20Y50040GE 6919 Points

+6%

GeForce RTX 3080 Laptop GPU, i9-11950H, Kioxia XG7

KXG7AZNV1T02

Dell XPS 17 9720 6879 Points

+5%

GeForce RTX 3050 4GB Laptop GPU, i7-12700H, Micron 3400

MTFDKBA512TFH 512GB

Average of class Multimedia 6816 Points

+4%

(4542 - 8670, n=72, last 2 years)

Lenovo ThinkPad Z16 G1 21D5S00T00 6530 Points

Radeon RX 6500M, R7 PRO 6850H, Samsung PM9A1

MZVL21T0HCLR

Average AMD Ryzen 7 PRO 6850H, AMD Radeon RX 6530 Points

0%

6500M

()

Lenovo ThinkPad X1 Extreme G4-20Y5CTO1WW (3050 Ti) 6524 Points

0%

GeForce RTX 3050 Ti Laptop GPU, i7-11800H, Samsung PM9A1

MZVL21T0HCLR

search
PCMark 10 Score

6530 points

AIDA64: Memory Copy | Memory Read | Memory Write | Memory Latency

AIDA64 / Memory Copy

Average of class Multimedia 69035 MB/s

+42%

(20549 - 104459, n=77, last 2 years)

Dell XPS 17 9720 63610 MB/s

+31%

Intel Core i7-12700H, GeForce RTX 3050 4GB Laptop GPU

Dell XPS 15 9520 RTX 3050 Ti 57944 MB/s

+19%

Intel Core i7-12700H, GeForce RTX 3050 Ti Laptop GPU

Lenovo ThinkPad Z16 G1 21D5S00T00 48504 MB/s

AMD Ryzen 7 PRO 6850H, Radeon RX 6500M

Average AMD Ryzen 7 PRO 6850H 39414 MB/s

-19%

(30324 - 48504, n=2)

Lenovo ThinkPad X1 Extreme G4-20Y5CTO1WW (3050 Ti) 39053 MB/s

-19%

Intel Core i7-11800H, GeForce RTX 3050 Ti Laptop GPU

Lenovo ThinkPad X1 Extreme G4-20Y50040GE 27947 MB/s

-42%

Intel Core i9-11950H, GeForce RTX 3080 Laptop GPU

* ... smaller is better

search
DPC Latencies

Our test unit of the Lenovo ThinkPad Z16 G1 has problems with DPC latencies, which might lead to some drops during audio and video processing. These problems can be remedied with driver or firmware updates and might vary from unit to unit.

There are hardly any drops in the YouTube test, where the CPU and GPU loads also remain extremely low.

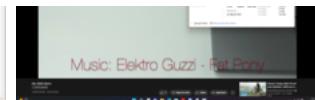




LatencyMon



LatencyMon Drivers



YouTube test

DPC Latencies / LatencyMon - interrupt to process latency (max), Web, Youtube, Prime95

Lenovo ThinkPad X1 Extreme G4-20Y50040GE	1604 µs *	-149%
GeForce RTX 3080 Laptop GPU, i9-11950H, Kioxia XG7 KXG7AZNV1T02		
Dell XPS 17 9720	1011.2 µs *	-57%
GeForce RTX 3050 4GB Laptop GPU, i7-12700H, Micron 3400 MTFDKBA512TFH 512GB		
Lenovo ThinkPad X1 Extreme G4-20Y5CT01WW (3050 Ti)	950 µs *	-48%
GeForce RTX 3050 Ti Laptop GPU, i7-11800H, Samsung PM9A1 MZVL21T0HCLR		
Dell XPS 15 9520 RTX 3050 Ti	912.2 µs *	-42%
GeForce RTX 3050 Ti Laptop GPU, i7-12700H, WDC PC SN810 512GB		
Lenovo ThinkPad Z16 G1 21D5S00T00	643.2 µs *	
Radeon RX 6500M, R7 PRO 6850H, Samsung PM9A1 MZVL21T0HCLR		

* ... smaller is better

 search

Storage Solution

The Samsung PM9A1 SSD in the Lenovo ThinkPad Z16 Gen 1 offers a storage capacity of 1 Terrabyte. It is an M.2-2280 SSD that is connected with the newest NVMe PCIe-4.0 standard. The results in our benchmark test paint a mixed picture: Looking at the absolute speed, this is a very fast SSD, but all the other laptops in our comparison are faster, even if the difference isn't very large. In addition, the performance under constant load also varies.



AS SSD DiskSpd

Samsung PM9A1 MZVL21T0HCLR

Sequential Read: 4572.06MB/s

Sequential Write: 2339.86MB/s

4K Read: 63.1MB/s

4K Write: 138.07MB/s

4K-64 Read: 863.66MB/s

4K-64 Write: 2682.07MB/s

Access Time Read: 0.045ms

Access Time Write: 0.028ms

Copy ISO: 2156.8MB/s

Copy Program: 426.1MB/s

Copy Game: 1157.07MB/s

Score Read: 1384Points

Score Write: 3054Points

Score Total: 5050Points

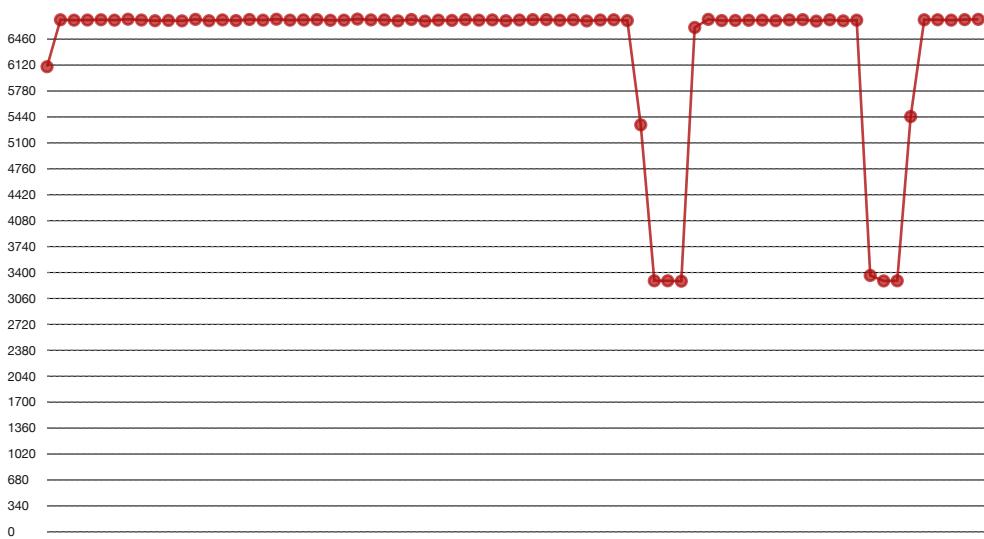
[Drive Performance Rating](#) | [DiskSpd](#) | AS SSD

Drive Performance Rating - Percent

Average Samsung PM9A1 MZVL21T0HCLR	90.2 pt	+22%
Lenovo ThinkPad X1 Extreme G4-20Y5CTO1WW (3050 Ti)	76.7 pt	+4%
Samsung PM9A1 MZVL21T0HCLR		
Dell XPS 15 9520 RTX 3050 Ti	75 pt	+2%
WDC PC SN810 512GB		
Dell XPS 17 9720	73.8 pt	0%
Micron 3400 MTFDKBA512TFH 512GB		
Lenovo ThinkPad Z16 G1 21D5S00T00	70.1 pt	-5%
Samsung PM9A1 MZVL21T0HCLR		
Average of class Multimedia	67.8 pt	-8%

* ... smaller is better

search

Constant Performance Reading: DiskSpd Read Loop, Queue Depth 8

[3DMark Performance Rating](#) | [3DMark 11](#) | [3DMark](#)**3DMark Performance Rating - Percent**

Lenovo ThinkPad X1 Extreme G4-20Y50040GE ^{-1!}	100 pt	+36%
NVIDIA GeForce RTX 3080 Laptop GPU, Intel Core i9-11950H		
Lenovo ThinkPad Z16 G1 21D5S00T00	63.5 pt	-14%
AMD Radeon RX 6500M, AMD Ryzen 7 PRO 6850H		
Average AMD Radeon RX 6500M	63.5 pt	-14%
Average of class Multimedia 60.7 pt		
Dell XPS 17 9720	57.5 pt	-22%
NVIDIA GeForce RTX 3050 4GB Laptop GPU, Intel Core i7-12700H		
Lenovo ThinkPad X1 Extreme G4-20Y5CTO1WW (3050 Ti) ^{-1!}	53.6 pt	-27%
NVIDIA GeForce RTX 3050 Ti Laptop GPU, Intel Core i7-11800H		
Dell XPS 15 9520 RTX 3050 Ti	52.8 pt	-28%
NVIDIA GeForce RTX 3050 Ti Laptop GPU, Intel Core i7-12700H		
Lenovo ThinkPad Z13 21D2CTO1WW	21.7 pt	-71%
AMD Radeon 660M, AMD Ryzen 5 PRO 6650U		

 search

3DMark 06 Standard Score	35958 points
3DMark Vantage P Result	51599 points
3DMark 11 Performance	17548 points
3DMark Ice Storm Standard Score	116884 points
3DMark Cloud Gate Standard Score	92553 points
3DMark Fire Strike Score	12287 points
3DMark Time Spy Score	4795 points

... in comparison

In our test reports, the Blender 3.3 test is relatively new. In the Classroom benchmark in HIP mode, the ThinkPad Z16 with the **Radeon RX 6500M** achieves a similar performance as the **Dell Inspiron 14 Plus 7420** with the **RTX 3050** in CUDA mode. The **RTX 3050 Ti** in the **Dell Inspiron 16 Plus 7620** performs about 30% better in this test. In any case, the render time is significantly reduced compared to the CPU mode.

Blender**v3.3 Classroom HIP/AMD**

Lenovo ThinkPad Z13 21D2CTO1WW	527 Seconds *	-379%
AMD Radeon 660M, AMD Ryzen 5 PRO 6650U		
Average of class Multimedia	461 Seconds *	-319%
(308 - 683, n=5, last 2 years)		
Lenovo ThinkPad Z16 G1 21D5S00T00	110 Seconds *	
AMD Radeon RX 6500M, AMD Ryzen 7 PRO 6850H		

v3.3 Classroom OPTIX/RTX**Dell Inspiron 14 Plus 7420** 58 Seconds *

NVIDIA GeForce RTX 3050 4GB Laptop GPU, Intel Core i7-12700H

Dell Inspiron 16 Plus 7620 49 Seconds *

NVIDIA GeForce RTX 3050 Ti Laptop GPU, Intel Core i7-12700H

Average of class **Multimedia** 41.2 Seconds *

(19 - 99, n=45, last 2 years)

v3.3 Classroom CUDA**Dell Inspiron 14 Plus 7420** 107 Seconds *

NVIDIA GeForce RTX 3050 4GB Laptop GPU, Intel Core i7-12700H

Dell Inspiron 16 Plus 7620 84 Seconds *

NVIDIA GeForce RTX 3050 Ti Laptop GPU, Intel Core i7-12700H

Average of class **Multimedia** 72.3 Seconds *

(32 - 181, n=46, last 2 years)

v3.3 Classroom CPU**Lenovo ThinkPad Z13 21D2CTO1WW** 799 Seconds * -52%

AMD Radeon 660M, AMD Ryzen 5 PRO 6650U

Lenovo ThinkPad Z16 G1 21D5S00T00 525 Seconds *

AMD Radeon RX 6500M, AMD Ryzen 7 PRO 6850H

Dell Inspiron 14 Plus 7420 456 Seconds * +13%

NVIDIA GeForce RTX 3050 4GB Laptop GPU, Intel Core i7-12700H

Dell Inspiron 16 Plus 7620 436 Seconds * +17%

NVIDIA GeForce RTX 3050 Ti Laptop GPU, Intel Core i7-12700H

Average of class **Multimedia** 426 Seconds * | +19%
(189 - 946, n=84, last 2 years)

* ... smaller is better

 search**Gaming Performance**

As in the synthetic benchmarks, the gaming performance is approximately at the level of the **Dell XPS 15 9520** with the RTX 3050 Ti, with the X1 Extreme that has the same Nvidia chip tending to turn out slightly better in the games. Even newer games can be reproduced in high or the highest detail settings, but only at Full-HD resolution. The performance of the AMD Radeon in all likelihood won't be sufficient for 4K gaming.

You should note that the GPU performance suffers from throttling. In our The Witcher 3 loop, the FPS rate drops from an initial 45 to only 35 FPS.

The Witcher 3 | F1 2021 | GTA V | Strange Brigade**The Witcher 3 - 1920x1080 High Graphics & Postprocessing (Nvidia HairWorks Off)****Lenovo ThinkPad X1 Extreme G4-20Y5004GE** 177 fps +208%

Intel Core i9-11950H, NVIDIA GeForce RTX 3080 Laptop GPU

Average of class **Multimedia** 100.9 fps | +76%
(11.2 - 290, n=74, last 2 years)**Dell XPS 17 9720** 99 fps +72%

Intel Core i7-12700H, NVIDIA GeForce RTX 3050 4GB Laptop GPU

Lenovo ThinkPad X1 Extreme G4-20Y5CTO1WW (3050 Ti) 95.2 (79^{min}) fps +66%

Intel Core i7-11800H, NVIDIA GeForce RTX 3050 Ti Laptop GPU

Dell XPS 15 9520 RTX 3050 Ti 62.4 (59^{min}) fps +9%

Intel Core i7-12700H, NVIDIA GeForce RTX 3050 Ti Laptop GPU

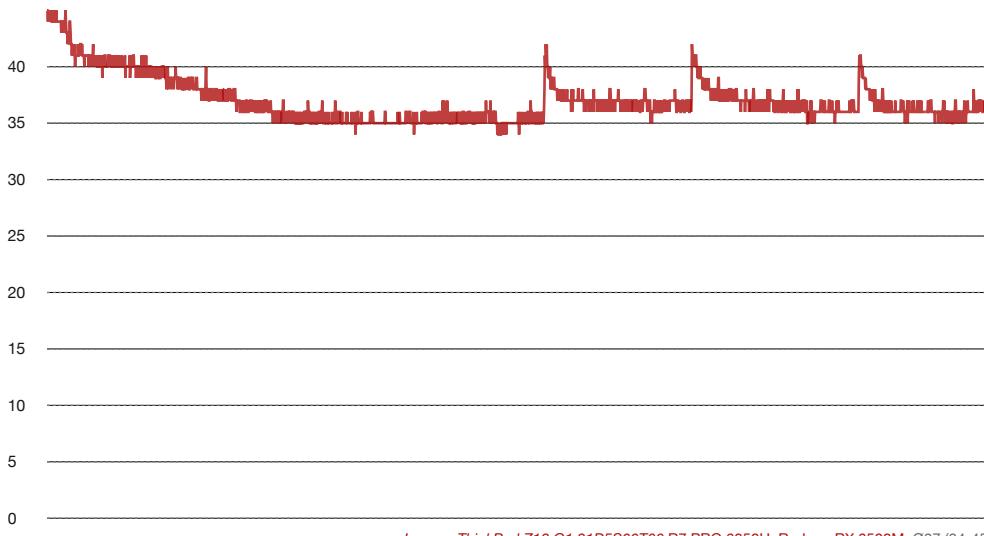
Lenovo ThinkPad Z16 G1 21D5S00T00 57.4 (49^{min}) fps

AMD Ryzen 7 PRO 6850H, AMD Radeon RX 6500M

Average AMD Radeon RX 6500M 57.4 fps | 0% 

 search

The Witcher 3 FPS Chart



[Lenovo ThinkPad Z16 G1 21D5S00T00 R7 PRO 6850H, Radeon RX 6500M: Ø37 \(34-45\)](#)

 search

	low	med.	high	ultra
GTA V (2015)	154.7	144.8	96.6	41.8
The Witcher 3 (2015)	195	136.2	57.4	39.1
Dota 2 Reborn (2015)	121.5	106.1	102.2	94.8
Final Fantasy XV Benchmark (2018)	126.6	65.8	46.9	
X-Plane 11.11 (2018)	47.7	40.7	36.8	
Far Cry 5 (2018)	90	75	71	66
Strange Brigade (2018)	266	119.1	98.8	86.3
Metro Exodus (2019)	137.4	66.7	46.7	37
The Division 2 (2019)	129	82	67	47
Borderlands 3 (2019)	78.2	66.6	47.1	34.5
Hunt Showdown (2020)	124.8	68.9	57.3	
Doom Eternal (2020)	232	101.2	57.5	
Gears Tactics (2020)	257.8	125.2	82.4	56.6
Death Stranding (2020)	130.4	89.3	82.2	78.9
Horizon Zero Dawn (2020)	103	71	59	54
Crysis Remastered (2020)	185.6	88.7	26.3	19.6
Mafia Definitive Edition (2020)	91.4	53	48.7	
Star Wars Squadrons (2020)	267	150.5	131.7	119.6
Watch Dogs Legion (2020)	81.1	70	59.1	24.6
Dirt 5 (2020)	159.4	72.9	56.3	37.4
Assassin's Creed Valhalla (2020)	113	62	45	39
Yakuza Like a Dragon (2020)	80.3	60.6	58.4	54.5
Immortals Fenyx Rising (2020)	89	68	47	41
Hitman 3 (2021)	157.2	102.1	88.7	80.5
Mass Effect Legendary Edition (2021)	82.2			75.6
Days Gone (2021)	116.3	70.6	62.7	44.2
F1 2021 (2021)	245	139	105.1	42.9
New World (2021)	70.3	53	46.2	40.4

	91.7	69.8	62.5	54.5
Far Cry 6 (2021)				
Back 4 Blood (2021)		116	95.3	92.7
Guardians of the Galaxy (2021)	83	48	47	44
Riders Republic (2021)	71	68	58	43
Forza Horizon 5 (2021)	152	101	81	27
Battlefield 2042 (2021)	129.7	71.2	53.3	23.3
Farming Simulator 22 (2021)			96.6	86
Halo Infinite (2021)		62.4	43.6	42.4
God of War (2022)	64.5	54.1	39.6	11.9
Rainbow Six Extraction (2022)	96	69	61	34
Dying Light 2 (2022)	58.4	46.6	37	
GRID Legends (2022)	146.9	105	75.9	59.9
Cyberpunk 2077 1.6 (2022)	66.2	66.5	32.3	29.2
Elex 2 (2022)	53.4	51	44	37.6
Ghostwire Tokyo (2022)	72.7	71	65.5	66.3
Tiny Tina's Wonderlands (2022)	118.1	88.5	45.8	29.8
Vampire Bloodhunt (2022)	142.7	115	106.7	98.1
F1 22 (2022)	116.3	97.2	75.6	13.9
The Quarry (2022)	64.1	48.3	38.9	25.4

Emissions: The fan remains quiet, but the ThinkPad Z16 runs hot

Noise Emissions

Under low load, the fan of the Lenovo ThinkPad Z16 G1 runs very quietly, so that you can hardly notice it. Even the [MacBook Pro 16 mit M1 Pro](#) is minimally louder at this point.

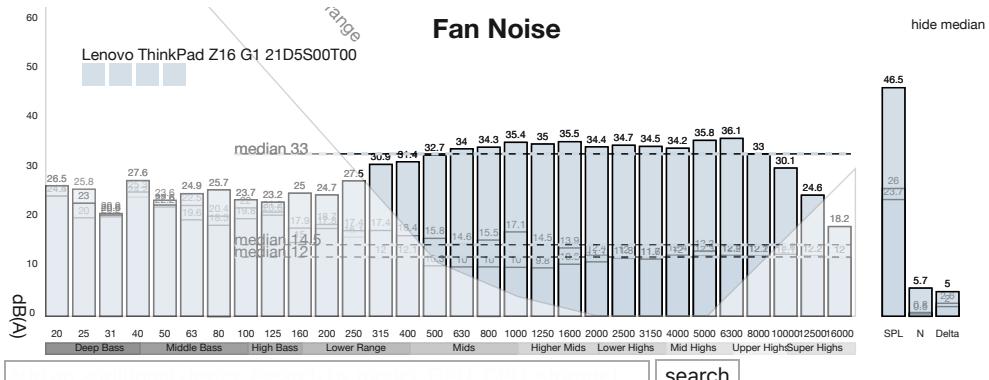
This changes under maximum load, since the MacBook is then quieter, even in the more powerful version with the M1 Max. However, the ThinkPad Z16 is still not a loud laptop, and the maximum noise level of the fans remains significantly below that of the [Lenovo ThinkPad X1 Extreme G4](#).

We do not notice any coil whine in the Z16.

Noise Level



Fan Noise



			Dell XPS 15 9520 RTX				
	Lenovo ThinkPad X1 Extreme G4-	Lenovo ThinkPad X1 Extreme G4-	3050 Ti	Apple MacBook Pro 16	Apple MacBook Pro 16		
Lenovo ThinkPad Z16 G1 21D5S00T00	20Y5CTO1WW (3050 Ti)	20Y50040GE	GeForce RTX GPU, i7- Radeon RX 6500M, R7 PRO 6850H, Samsung PM9A1 MZVL21T0HCLR	RTX Laptop GPU, 3050 Ti 3050 Ti Laptop GPU, i7- 11800H, Samsung PM9A1 XG7 KXG7AZNV1T02	3050 Ti Laptop GPU, 3050 4GB Laptop GPU, i7-12700H, WDC PC SN810 512GB	Dell XPS 17 9720 M1 Pro 16-Core GPU, M1 Pro, Max, SSD AP1024R	M1 Pro M1 Max SSD AP204
Noise	-12%		-15%		3%	-11%	1%
off / environment *	23.7	23.52 1%	24.7 -4%	22.8 4%	24 -1%	24.7 -4%	24.1 -2%
Idle Minimum *	23.7	23.52 1%	24.7 -4%	22.9 3%	24 -1%	24.7 -4%	24.1 -2%
Idle Average *	23.7	23.52 1%	24.7 -4%	22.9 3%	24 -1%	24.7 -4%	24.1 -2%
Idle Maximum *	23.7	23.52 1%	28.1 -19%	22.9 3%	24 -1%	24.7 -4%	24.1 -2%
Load Average *	25.9	42.9 -66%	42.5 -64%	30.9 -19%	43.9 -69%	26.1 -1%	42.1 -66%
Witcher 3 ultra *	46.9	52.5 -12%	46.4 1%	37.8 19%	48.4 -3%		39.1 16%
Load Maximum *	46.9	52.45 -12%	52.1 -11%	44.7 5%	48.4 -3%	37.4 20%	42.1 9%

* ... smaller is better

search

Temperatures

The Lenovo ThinkPad Z16 Gen 1 remains completely cool during idle operation. On the other hand, the ThinkPad Z16 runs fairly hot under load, whether it is during the stress test or the Witcher 3 test. We measure the maximum temperature above the keyboard at 56.8 °C (~134 °F). Even though you can easily avoid touching this area, the rest of the case also heats up significantly. The palm rest reaches a maximum temperature of 36.5 °C (~98 °F), which feels noticeably warm and can lead to sweaty hands.

During the stress test, our replacement test unit also fails to remain stable. Both Prime95 and FurMark running lead to frequent sudden reboots. We are therefore unable to include the hour-long stress test.

Max. Load	46.6 °C	56.8 °C	50.3 °C	46.7 °C	53.3 °C	44.6 °C
Idle	116 F	134 F	123 F	116 F	128 F	112 F
Witcher 3	39.2 °C	53 °C	43 °C	38.1 °C	47.8 °C	37.7 °C
	103 F	127 F	109 F	101 F	118 F	100 F
	35.3 °C	36.6 °C	36.5 °C	33.3 °C	34.5 °C	32.5 °C
	96 F	98 F	98 F	92 F	94 F	91 F

Maximum: 56.8 °C = 134 F
Average: 44.1 °C = 111 FMaximum: 53.3 °C = 128 F
Average: 40.9 °C = 106 F

Power Supply (max.) 39.3 °C = 103 F | Room Temperature 25.8 °C = 78 F |

Fluke 62 Max+

- (-) The average temperature for the upper side under maximal load is 44.1 °C / 111 F, compared to the average of 31.3 °C / 88 F for the devices in the class Multimedia.
- (-) The maximum temperature on the upper side is 56.8 °C / 134 F, compared to the average of 36.9 °C / 98 F, ranging from 21.1 to 71 °C for the class Multimedia.
- (-) The bottom heats up to a maximum of 53.3 °C / 128 F, compared to the average of 39.2 °C / 103 F
- (+) In idle usage, the average temperature for the upper side is 27 °C / 81 F, compared to the device average of 31.3 °C / 88 F.
- (-) Playing The Witcher 3, the average temperature for the upper side is 43.8 °C / 111 F, compared to the device average of 31.3 °C / 88 F.
- (±) The palmrests and touchpad can get very hot to the touch with a maximum of 36.6 °C / 97.9 F.
- (-) The average temperature of the palmrest area of similar devices was 28.8 °C / 83.8 F (-7.8 °C / -14.1 F).

	Lenovo ThinkPad X1 Extreme G4- Z16 G1 21D5S00T00	Lenovo ThinkPad X1 Extreme G4- 20Y5CTO1WW	Dell XPS 15 9520 RTX 3050 Ti	Dell XPS 17 9720	Apple MacBook Pro 16 2021 M1 Pro	Apple MacBook Pro 16 2021 M1 Max
Processor	Intel Core i7-11800H, NVIDIA 7 PRO	Intel Core i9-11950H, NVIDIA	Intel Core i7-12700H, NVIDIA	Intel Core i7-12700H, NVIDIA	Apple M1 Pro, Apple M1	Apple M1 Max, Apple M1
GPU	GeForce RTX 6850H, AMD Radeon RX 6500M	GeForce RTX 3050 Ti Laptop GPU	GeForce RTX 3080 Laptop GPU	GeForce RTX 3050 4GB Laptop GPU	GeForce RTX 3050 4GB Core GPU	GeForce RTX 3050 4GB Core GPU
Heat	4%	3%	-1%	12%	22%	21%
Maximum Upper Side *	56.8	49 14%	51.4 10%	51.4 10%	49.5 13%	41 28% 42.3 26%
Maximum Bottom *	53.3	44.4 17%	55.9 -5%	51 4%	38.4 28%	39 27% 41.7 22%
Idle Upper Side *	28.2	32.1 -14%	27.2 4%	30 -6%	28 1%	24 15% 23.9 15%
Idle Bottom *	29.4	29.8 -1%	28.8 2%	33 -12%	27.8 5%	24 18% 23.9 19%

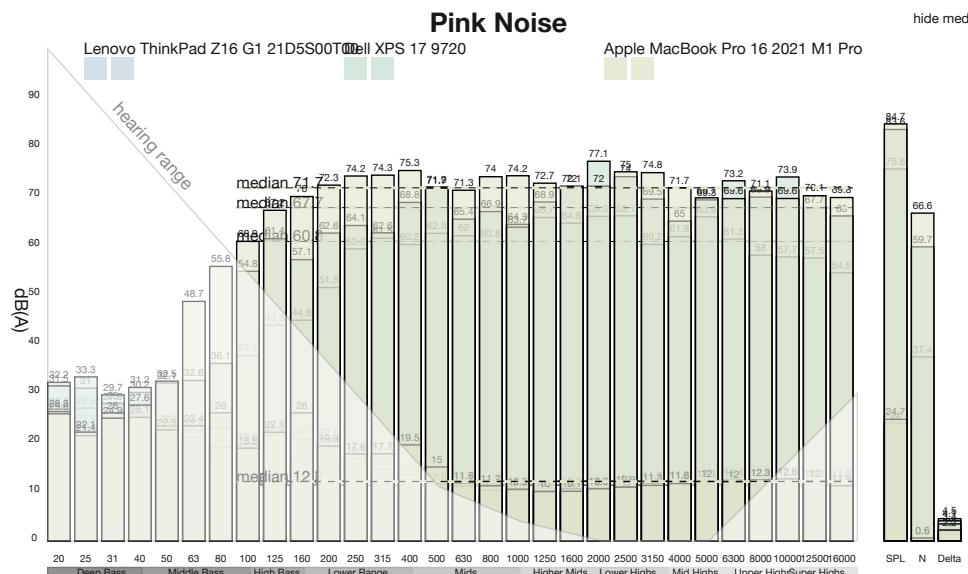
* ... smaller is better

 search

Speaker

On both sides of the keyboard are the stereo speakers of the Lenovo ThinkPad Z16.

They are fairly loud and even have a little bass, but still lose compared to those of the Apple MacBook Pro 16. The MacBook simply offers more bass and volume.



Frequency diagram (checkboxes can be checked and unchecked to compare devices)

Lenovo ThinkPad Z16 G1 21D5S00T00 audio analysis

- (±) | speaker loudness is average but good (75.56 dB)
- Bass 100 - 315 Hz
- (±) | reduced bass - on average 11.3% lower than median
- (±) | linearity of bass is average (13% delta to prev. frequency)
- Mids 400 - 2000 Hz
- (+) | balanced mids - only 2.6% away from median
- (+) | mids are linear (3.2% delta to prev. frequency)
- Highs 2 - 16 kHz
- (+) | balanced highs - only 2.6% away from median
- (+) | highs are linear (5.7% delta to prev. frequency)
- Overall 100 - 16.000 Hz
- (+) | overall sound is linear (12.5% difference to median)
- Compared to same class
- » 19% of all tested devices in this class were better, 4% similar, 77% worse
- » The best had a delta of 5%, average was 18%, worst was 45%
- Compared to all devices tested
- » 9% of all tested devices were better, 2% similar, 89% worse
- » The best had a delta of 4%, average was 25%, worst was 134%

Dell XPS 17 9720 audio analysis

- (+) | speakers can play relatively low
- Bass 100 - 315 Hz
- (±) | reduced bass - on average 7.3
- (±) | linearity of bass is average (11
- Mids 400 - 2000 Hz
- (+) | balanced mids - only 3.4% aw
- (±) | linearity of mids is average (7.6
- Highs 2 - 16 kHz
- (+) | balanced highs - only 3.7% av
- (±) | linearity of highs is average (7.
- Overall 100 - 16.000 Hz
- (+) | overall sound is linear (8.8% d
- Compared to same class
- » 8% of all tested devices in this cla
- » The best had a delta of 5%, averag
- Compared to all devices tested
- » 2% of all tested devices were bett
- » The best had a delta of 4%, averag

 search

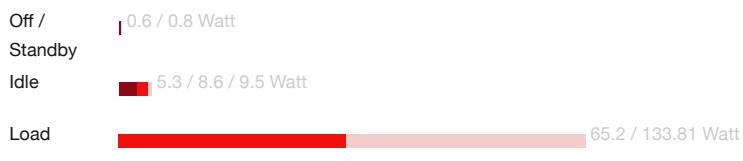
Power Management: ThinkPad with a good battery life despite the small battery

Power Consumption

In this category, the Lenovo ThinkPad Z16 G1 is really the best of its class, and none of its direct competitors runs more efficiently. Only the Apple MacBook Pro 16 with the M1 Pro is slightly more efficient in terms of the minimum idle consumption. However, we should also mention here, that the display of the ThinkPad Z16 Gen 1 has a significantly lower resolution than those of the comparison devices.

The 135-Watt power supply is just large enough for the maximum consumption of about 133 watts.

Power Consumption

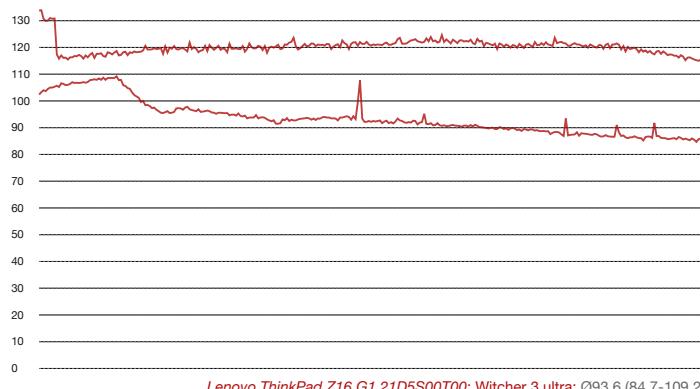


Key: min: ■, med: ■, max: ■ Metrahit Energy

	Lenovo ThinkPad X1 Extreme G4- 20Y5CTO1WW Lenovo ThinkPad Z16 (3050 Ti) G1 21D5S00T00 R7 PRO 6850H, Radeon RX 6500M, Samsung PM9A1 MZVL21T0HCLR, IPS LED, 1920x1200, 16"	Lenovo ThinkPad X1 Extreme G4- 20Y50040GE i7-11800H, GeForce RTX 3050 Ti Laptop GPU, Samsung PM9A1 KZV21T0HCLR, IPS LED, 3840x2400, 16"	Dell XPS 15 9520 RTX 3050 i7-12700H, GeForce RTX 3050 Ti Laptop i9-11950H, GeForce RTX 3080 Laptop GPU, Kioxia XG7 512GB, OLED, IPS, 3840x2400, 15.6"	Dell XPS 17 9720 i7-12700H, GeForce RTX 3050 4GB Laptop PC SN810 512GB, OLED, IPS, 3456x2160, 3840x2400, 17"	Apple MacBook Pro 16 2021 M1 Pro M1 Pro, M1 Pro 16- Core GPU, Apple SSD GPU, Micron 3400 MTFDKBA512TFH 512GB, IPS, 3456x2234, 3840x2400, 16.2"
Power Consumption		-79%	-80%	-13%	-50%
Idle Minimum *	5.3	10.3 -94%	12.3 -132%	5.5 -4%	7.8 -47%
Idle Average *	8.6	22.06 -157%	22.8 -165%	7.2 16%	15.1 -76%
Idle Maximum *	9.5	23 -142%	13.9 -46%	16 -68%	17 -79%
Load Average *	65.2	102.57 -57%	95.4 -46%	91.8 -41%	114 -75%
Witcher 3 ultra *	93.6	106 -13%	154 -65%	74.6 20%	115.2 -23%
Load Maximum *	133.81	147.8 -10%	170.7 -28%	134.7 -1%	90 33%

* ... smaller is better

search

Power Consumption The Witcher 3 / Stress Test

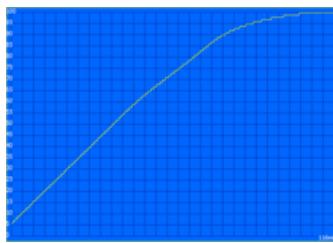
search

Power Consumption With External Monitor

search

Battery Life

In terms of the battery capacity, the Lenovo ThinkPad Z16 G1 presents itself as relatively miserly with only 72 Wh. Yet the battery life of the ThinkPad laptop is still better, at least compared to the Windows competitors. On the other hand, it doesn't even come close to reaching the values of Apple's [MacBook Pro 16](#), but that also has the largest battery in our comparison field.



Recharging time: 116 minutes

At around 10 hours in the Wi-Fi test (at 150 cd/m² brightness), the Z16 doesn't have to hide. At maximum brightness, it still lasts for 8 hours in our automated Wi-Fi test. However, this only goes for the WUXGA version of the Z16, and the optional 4K UHD display should shorten the battery life significantly.

Battery Runtime

WiFi Websurfing (Edge 105)	9h 54min
WiFi Websurfing max. Brightness (Edge 105)	7h 57min
Big Buck Bunny H.264 1080p	11h 55min
Load (maximum brightness)	2h 03min

Lenovo	Lenovo	Lenovo	Dell XPS 15	Apple	Apple	Average of class
ThinkPad	ThinkPad X1	ThinkPad X1	9520 RTX	MacBook Pro 16	2021 M1 Max	
Z16 G1	Extreme G4-21D5S00T00	Extreme G4-20Y5CTO1WW	3050 Ti	Pro 16	2021 M1 Max	
R7 PRO	(3050 Ti)	i9-11950H, GeForce RTX 3050 Ti Laptop GPU, 90 Wh	i7-12700H, GeForce RTX 3050 Ti	M1 Pro, M1 Pro 16-Core GPU, 99.6 Wh	M1 Max, M1 Max 32-Core GPU, 99.6 Wh	
6850H, Radeon RX 6500M, 72 Wh	6850H, GeForce RTX 3050 Ti Laptop GPU, 90 Wh	6850H, GeForce RTX 3080 Laptop GPU, 86 Wh	6850H, GeForce RTX 3080 Laptop GPU, 86 Wh	6850H, GeForce RTX 3080 Laptop GPU, 86 Wh	6850H, GeForce RTX 3080 Laptop GPU, 86 Wh	

Battery Runtime		-39%	-40%	23%	59%	15%	0%
H.264	715	402 -44%	414 -42%		1048 47%	1021 43%	821 ? 15%
WiFi v1.3	594	396 -33%	406 -32%	528 -11%	1016 71%	894 51%	627 ? 6%
Load	123	73 -41%	68 -45%	192 56%		63 -49%	98.6 ? -20%

search

Verdict: The Lenovo ThinkPad Z16 G1 is a great laptop, but...

The Lenovo ThinkPad Z16 Gen 1 really gave us some headaches. On paper, it could be a very good laptop, and in our test, this also turned out to be true. However, we are still unable to give it a "very good" recommendation.

First, we should list all the positive aspects of the ThinkPad laptop: The ThinkPad Z16 G1 offers a very good performance in a relatively compact case. The quality of the case is excellent, and with the combination of a lot of aluminum and the glass palm rest, Lenovo does a lot of things right in this regard. The manufacturer also does a good job with the touchpad, which is significantly better than that of all the other ThinkPads. The keyboard is also



Testing the Lenovo ThinkPad Z16, test unit provided by

Pros

- + very high-quality case
- + excellent trackpad
- + comfortable keyboard

- + LTE is integrated
- + high performance
- + good battery life
- + matte, bright low-power display
- + good-quality webcam and speakers

Cons

- system stability

good, even if it isn't as good as that in other ThinkPads.

The ThinkPad Z16 includes a matte, bright display and offers a good battery life, even though the battery is relatively small.



campuspoint.de

- high temperatures under load
- no HDMI connection
- soldered working memory
- only a single SSD slot
- no 2.5K option, only 60-Hz displays

The first large problem of the Z16 is its connections. The ThinkPad Z16 is a 16-inch laptop and a business device. The fact that such a device offers no USB-A port, and particularly no HDMI either, is hardly acceptable. The temperature management also creates some difficulties, since the ThinkPad Z16 gets fairly hot. You better not touch the area above the keyboard under load. In a relatively large ThinkPad, we find the soldered RAM an unnecessary limitation. A significantly less important but still relevant point of complaint: The Z16 lacks an option for a 2.5K display, and there is also no display with a higher refresh rate.

¶ *It could be a very good laptop if there only weren't the problems with restarting, since otherwise, we see many positive aspects in the Lenovo ThinkPad Z16 Gen 1.*

But all these complains weren't what caused our headaches - that was the already mentioned problem with the restarts, leading us to ask for a new test unit. Fortunately, the problem was significantly less pronounced in our replacement test unit, but unfortunately, the problem still happened.

This leads to a significantly worse evaluation of the ThinkPad Z16 than it would otherwise have to be. This is unfortunate, since otherwise we really don't dislike the ThinkPad, even if its lacking connection equipment is less convincing for its target market than that of the compact ThinkPad Z13. In terms of the ports, the [Lenovo ThinkPad X1 Extreme G4](#) is significantly more flexible. Even the [MacBook Pro 16](#) still offers at least HDMI, but on the other hand, it lacks the WWAN option of the ThinkPad Z16.

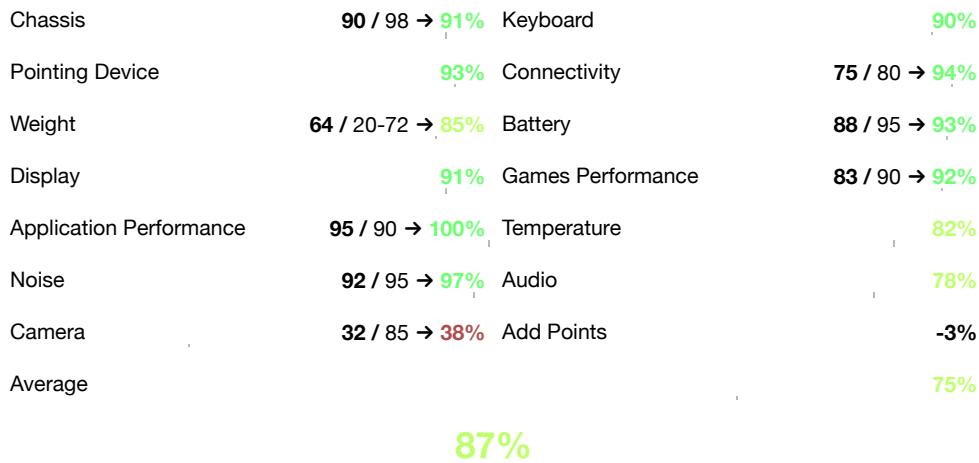
Note: Due to the problem with the system stability, the evaluation of the ThinkPad Z16 turned out 3 percentage points lower.

Price and Availability

The Lenovo ThinkPad Z16 Gen 1 is available [starting from \\$1,975](#) at Lenovo's web shop.

Amazon also lists various configurations of the [ThinkPad Z16 starting from \\$1850](#) (affiliate link).

► [load Youtube video](#)



Multimedia - Weighted Average

17 comments

post your questions, comments or corrections here

[read whole topic in the forum / answer](#)

#17 **NikoB** 1 years 7 months 17 days ago

High temperatures of the power piping of the processor and gpu lead to long-term unreliability of the device. The long-term unreliability of the device leads to the requirement of the buyer for a guarantee of at least 3-4 years from the manufacturer "out of the box". With cheap service for at least another 5 years...

[» read whole comment](#)

#16 **Benjamin Herzig** 1 years 7 months 18 days ago

This article is a complete lie...because it actually shows exactly what you are complaining about, that the Z16 gets hot? I don't know if you even read the article, because if you had, you would have seen that "high temperatures" is listed in the drawback category.

[» read whole comment](#)

#15 **Jason Wang** 1 years 7 months 18 days ago

Simply, this article is a complete lie. I use heavyload to test the performance. Under heavy load, CPU goes to 100 C very easily. the region above the keyboard become extremely hot, and if you contact this region for 5 seconds, your skin will burn.

This is the biggest problem of this laptop. TOO HOT!

[» read whole comment](#)

#14 **Indycat** 1 years 11 months 3 days ago

Except for one BIG issue, the system can crash anytime and will completely remove all the hard disk!!

There are more than one hard disk? How does it remove them? Do they come flying out of the case or how?

[» read whole comment](#)

#13 **Indycat** 1 years 11 months 3 days ago

If AMD is supposed to be the more power efficient one, then why does this get only 10 hours of websurfing, whereas the Intel T16 gets 14 hours? I know the latter has a slightly bigger battery, but the numbers tell that the T16 consumes 6.1 W and Z16 7.3 W during the test.

With the power consumption of the T16 the Z16's battery would last 11 hours 49 minutes.

More articles related to this device

[Lenovo ThinkPad Z16 G1 21D5S00T00 \(ThinkPad Z16 Series\)](#)

- News • [Good-looking Lenovo ThinkPad Z...](#)
- Review • [Radeon RX 6550M performance de...](#)
- News • [Lenovo ThinkPad Z16 laptop wit...](#)
- News • [Lenovo ThinkPad Z16 with AMD R...](#)
- News • [Lenovo ThinkPad Z16 Gen 1 with...](#)
- News • [Lenovo ThinkPad Z16 again show...](#)

Related Articles



[Lenovo ThinkPad T16 G1 AMD laptop review: Efficient and faster than Intel](#) 02/03/2023



[Lenovo Legion 5 Pro Gen 7 laptop review: Ryzen 7 6800H or Ryzen 9 6900HX?](#) 10/29/2022



[Lenovo ThinkPad L14 G3 AMD reviewed: Budget business laptop with long battery life has](#) 10/08/2022



[Lenovo ThinkBook 16p Gen 3 ARH laptop review: The Dell XPS 15 challenger](#) 10/08/2022

[» read whole comment](#)#12 **eli k** 2 years 7 days ago

I own the computer for a few months, and it's performing great for me. Except for one BIG issue, the system can crash anytime and will completely remove all the hard disk!! I can understand that a first generation can have some issues , but this one is a deal breaker for me. Many users had the same problem, and nothing from Lenovo yet.

[» read whole comment](#)#11 **NikoB** 2 years 10 days ago

Nobody bothers you to buy Legion 7 with 6800H, it costs \$1750 right now on newegg. Unfortunately, non-US buyers can only dream of such a price (even though median incomes outside the US are sharply below the US almost everywhere, especially in developing countries). And dream even more about the quality of warranty obligations in their countries vs in the USA. The United States is literally bathed in low prices (and huge discounts, simply unseen in other countries) for electronics and goods, thanks to the control of key technologies on the planet (although almost all production is concentrated in Asia) and dollar seigniorage at the expense of the whole world, as well as control over financial planetary system...

[» read whole comment](#)#10 **NikoB** 2 years 10 days ago

Select all images with
boats

[» read whole comment](#)#9 **Unknow** 2 years 10 days ago

What a rubbish laptop.

Nowadays, even gaming laptop like legion are better then those business laptop.

Need full keyboard like the legion.

Maintain the pointer.

And please, more ports!

This is just a frugling useless netbook!

[» read whole comment](#)#8 **OmegaMalkior** 2 years 1 months 14 days ago

The restarts on the Z16 are due to an old bluetooth driver from Windows 10 installed on the Z16. If you change the bluetooth driver to a more later Windows 11 one it should be fixed. Credit to my friend who discovered this near the end of August with his Z16.

[» read whole comment](#)#7 **fmyhr** 2 years 1 months 15 days ago

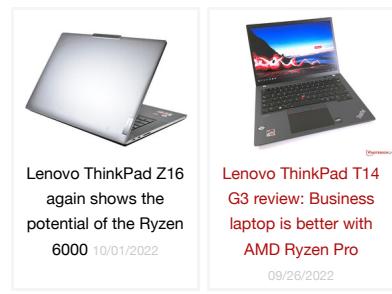
Those half-height Up/Down arrow keys on a laptop this large are even more of an abomination than usual.

I'm sad to read of the stability problems. I hope Lenovo (and/or AMD) can fix those.

Anyone have experience using USB 4?

[» read whole comment](#)#6 **RobertJasiek** 2 years 1 months 15 days ago

LL, Thx for your clarification! (In German, I also praise NBC when they do a GPU seriously with work benchmarks. :))



Lenovo ThinkPad Z16
again shows the
potential of the Ryzen
6000 10/01/2022

Lenovo ThinkPad T14
G3 review: Business
laptop is better with
AMD Ryzen Pro
09/26/2022



Lenovo ThinkPad T16
G1 Intel: Much is new
in the 16 incher with
long battery runtimes
09/25/2022

NikoB, keep up your good job of exhibiting design weaknesses! Mutual education helps us all.

[» read whole comment](#)

#5 **LL** 2 years 1 months 15 days ago

Robert, not related to Blender, that was praise for Notebookcheck include that GPU test, that why i put the doted line separating subjects.

That serious issues are what Notebookcheck call "hickups" : high temperature with a CPU that even is not pushed to the maximum, crashes in the 2 models they tested. That is unacceptable.

[» read whole comment](#)

#4 **NikoB** 2 years 1 months 15 days ago

Well, about the short, funny keyboard from the 14 "model, I won't grovel, we'll immediately move on to the main jamb:

1. Exhaust under load exceeds 55C, which means that if such a jet hits the screen from below, there is a very high probability of failure of the panel electronics, which have a critical temperature of just 55-60C.
2. Again, absolutely disgusting ram tuning, and the latency is simply terrible - 132+ ns! The loss in comparison with Intel laptops, from the same Lenovo, is more than 35% in terms of memory bandwidth, despite the fact that the fastest chips are soldered here, while Intel has them "slower"...

I also have very strong doubts about the reliability of the noise level at an average load - because. further, the author indicates it in the region of 65W+, with such thermal dissipation, 25dB is simply impossible a priori, especially looking at similar speeds in other models and the noise produced at a much lower load. Although the temperature level signals that the engineers obviously deliberately went to overheat the hardware, which clearly does not add long-term reliability to this series under serious loads in the background.

It should also be noted that the screen does not represent anything outstanding, moreover, it is some strange pseudo "IPS", which usually (true IPS) have the same viewing angles vertically and horizontally. But in this case, Lenovo claims 178gr horizontally and only shameful 160gr vertically! This is clearly not IPS, although Lenovo marketers are trying to convince buyers of the opposite. The declared minimum contrast also does not shine from 1000:1. They already have a lot of series where they claim much more. The screen is too slow by response, which means your eyes will get tired when scrolling text and anywhere you need a quick response. The resolution of 1920x1200 is too small for a 16 "screen, very low ppi, the text will look like a little grainy for 50-60cm distance. Again, why bothered to install 4k@120Hz IPS here? But as an option, only a shimmering and glossy OLED 4k. And given its price, it has base must be a minimum of 4k@120Hz IPS.

I just can hardly understand why the buyer should pay almost \$2500 here. There is nothing premium here. The usual 32GB of memory, and even with very slow settings in bios, not the fastest processor, a weak obsolete discrete video card, so-so screen even for work, well, this model is definitely not suitable for games, except perhaps only through an eGPU...

[» read whole comment](#)

#3 **RobertJasiek** 2 years 1 months 15 days ago

Thanks for the Blender GPU tests.

Those are serious issues and unacceptable big black eye for Lenovo.

Do the "issues" refer to the Blender GPU tests? If so, please explain! I have no experience with Blender but only look at the numbers. Can you provide some context for interpretation? So far, there

are too few tests for Blender GPU so I cannot judge from the numbers alone yet.

[» read whole comment](#)

#2 **LL** 2 years 1 months 16 days ago

Thanks for the Blender GPU tests.

Those are serious issues and unacceptable big black eye for Lenovo.

Btw the 6850H CPU have worse performance in Cinebench R23 in this installation than a 5800H in a Legion from last year.

[» read whole comment](#)

#1 **Russel** 2 years 1 months 16 days ago

Thank you for the detailed review.

Much appreciated.

I guess it's better to wait for someone else to make a more stable amd laptop.

[» read whole comment](#)

[read all 17 comments / answer](#)

[Comment on this article](#)



Editor of the original article: **Benjamin Herzig** - Managing Editor - 1220 articles published on Notebookcheck since 2016

I was an ardent reader of Notebookcheck's laptop reviews even back in school. After writing reviews as a hobby, I then joined Notebookcheck in 2016 and have worked on device reviews and news articles ever since then. My personal interest lies more with laptops than smartphones, with business laptops being the most interesting category for me. Technology should make our lives and work easier and good laptops are an essential tool for that to happen. This is why laptop reviews are not just my work but are also my passion.

contact me via: [LinkedIn](#)



Translator: **Mark Riege** - Translator - 534 articles published on Notebookcheck since 2018

Having worked as a programmer for 20 years (medical devices, AI, data management systems), I've been following the computer scene for many years and especially enjoy finding out about new technology advances. Originally from Germany but living in the US, I've been working as a translator more recently, with Notebookcheck allowing me to combine my interest in new devices and translation. Other interests include Buddhism, spending time in Tibetan monasteries, and translating ancient Tibetan texts.

Please share our article, every link counts!



> [Expert Reviews and News on Laptops, Smartphones and Tech Innovations](#) > [Reviews](#) > Lenovo ThinkPad Z16 G1 laptop review: Powerful AMD flagship with a hickup

Benjamin Herzig, 2022-10- 1 (Update: 2024-08-15)

[Contact / Imprint](#) | [Data Privacy Declaration](#)

Languages: [Deutsch](#) | [English](#) | [Español](#) | [Français](#) | [Italiano](#) | [Nederlands](#) | [Polski](#) | [Português](#) | [Русский](#) | [Türkçe](#) | [Svenska](#) | 15.11.2024 06:46

* If you buy something via one of our affiliate links, Notebookcheck may earn a commission. Thank you for your support!

[dark](#) / [light](#) / [del](#)