The science behind the report:

Achieve more with the HP ZBook Ultra G1a

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report ***Achieve more with the HP ZBook Ultra G1a***.

We concluded our hands-on testing on May 6, 2025. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on June 3, 2025 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

To learn more about how we have calculated the wins in this report, go to ***http://facts.pt/calculating-and-highlighting-wins***. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Table 1: Results of our testing.

	HP ZBook Ultra G1a w/ AMD Ryzen™ AI Max+ PRO 395	HP ZBook Ultra G1a w/ AMD Ryzen AI Max PRO 390	Apple MacBook Pro w/ Apple M4 Pro (14-inch)
PassMark PerformanceTest v11.1			
CPU Mark score	54,272	45,850	32,432
Cinebench R23			
CPU multi-core score (higher is better)	29,737	25,023	19,829

	HP ZBook Ultra G1a w/ AMD Ryzen™ AI Max+ PRO 395	HP ZBook Ultra G1a w/ AMD Ryzen AI Max PRO 390	Apple MacBook Pro w/ Apple M4 Pro (14-inch)
3DMark			
Steel Nomad Light Unlimited - overall score (higher is better)	9,826	8,784	6,757
Sub-score - frames per second (FPS)	*72.79*	*65.07*	*50.10*
Solar Bay Unlimited - overall score (higher is better)	46,033	4,1567	287,48
Sub-score - Graphics test/Average frame rate - FPS	*175.03*	*158.05*	*109.30*
Sub-score - Section 1 - FPS	*187.34*	*173.97*	*118.40*
Sub-score - Section 2 - FPS	*180.28*	*163.72*	*111.40*
Sub-score - Section 3 - FPS	*157.76*	*137.93*	*98.20*
Wildlife Extreme Unlimited - overall score (higher is better)	20,945	19,415	16,277
Sub-score - FPS	*125.42*	*116.26*	*97.50*
Procyon AI Computer Vision Benchmark - FP32	Windows ML - GPU, float32	Windows ML - GPU, float32	coreml_all_fp32
Overall Score (higher is better)	569	546	391
MobileNet V3 - Total inferences count	*71,357*	*71,362*	*43,179*
ResNet 50 - Total inferences count	*15,155*	*15,267*	*7,628*
Real-ESRGAN - Total inferences count	*3,990*	*3,904*	*147*
Geekbench AI GPU			
AI framework	ONNX	ONNX	Core ML
AI backend	DirectML-GPU	DirectML-GPU	GPU
Single precision (FP32) score (higher is better)	20,387	18,259	14,756
Half precision (FP16) score (higher is better)	25,661	21,067	16,598
Chaos V-Ray CPU Benchmark v6.00.01			
Overall score (higher is better)	33,718	27,676	23,429

System configuration information

Table 2: Detailed information on the systems we tested.

System	HP ZBook Ultra G1a	HP ZBook Ultra G1a	Apple MacBook Pro 14
Processor			
Vendor	AMD	AMD	Apple
Model number	AMD Ryzen AI Max+ Pro 395	AMD Ryzen AI MAX PRO 390	Apple M4 Pro chip with 12-core CPU, 16-core GPU, 16-core Neural Engine
Core frequency (GHz)	3.0 – 5.1	3.2 – 5.0	4.5
Number of cores	16	12	12 (8 performance cores and 4 efficiency cores)
Number of threads	32	24	12
Cache (MB)	64	64	32 x8 4 x4
Memory			
Amount (GB)	128	64	24
Type	LPDDR5X-8533	LPDDR5X-8533	Unified
Speed	8,000 MT/s	8,000 MT/s	NA
Graphics			
Vendor	AMD	AMD	Apple
Model number	AMD Radeon™ 8060S	AMD Radeon 8050S	M4 Pro 16-core GPU
Driver	AMD v32.0.12045.6001	AMD v32.0.12045.6001	N/A
Storage			
Amount	2 TB	1 TB	512 GB
Type	M.2 2280 NVMe® PCIe® Gen 4 x4	M.2 2280 NVMe PCIe Gen 4 x4	Onboard SSD
Connectivity/expansion			
Wireless internet	MediaTek® Wi-Fi® 7 MT7925	MediaTek Wi-Fi 7 MT7925	Wi-Fi 6E
Bluetooth	5.4	5.4	5.3
USB	1x USB Type-C® 10Gbps 2xThunderbolt™ 4x w/ USB Type-C 40Gbps 1x USB Type-A 10Gbps	1x USB Type-C 10Gbps 2xThunderbolt 4x w/ USB Type-C 40Gbps 1x USB Type-A 10Gbps	3x Thunderbolt 5 with USB-C 40 Gbps
Video	1x HDMI 2.1	1x HDMI 2.1	NA
Battery			
Type	Lithium-polymer	Lithium-polymer	Lithium-polymer
Rated capacity (Wh)	74.5	74.5	72.4
Cells	4	4	NA

System	HP ZBook Ultra G1a	HP ZBook Ultra G1a	Apple MacBook Pro 14
Display			
Size (inches)	14.0	14.0	14.2
Type	2.8K (2,880 x 1,800), OLED, UWVA, touch, 48-120 Hz, BrightView, Low Blue Light, 400 nits, 100% DCI-P3	2.8K (2,880 x 1,800), OLED, UWVA, touch, 48-120 Hz, BrightView, Low Blue Light, 400 nits, 100% DCI-P3	Liquid Retina XDR display, 3,024 x 1,964 native resolu-tion at 254 pixels per inch
Resolution	2,880 x 1,800	2,880 x 1,800	3,024 x 1,964
Touchscreen	Yes	Yes	No
Operating system			
Vendor	Microsoft	Microsoft	Apple
Name	Windows 11 Pro	Windows 11 Pro	macOS Se-quoia
Build number or version	24H2 Build 26100.3915	24H2 Build 26100.3915	15.4.1
BIOS			
BIOS name and version	HP X89 v01.02.01 (03/05/2025)	HP X89 v01.02.01 (03/05/2025)	Darwin 24.4.0
Dimensions			
Height (inches)	0.71	0.71	0.61
Width (inches)	12.29	12.29	12.31
Depth (inches)	8.45	8.45	8.71
Weight (lbs)	3.46	3.46	3.5

How we tested

Setting up the system (Windows)

Setting up and updating the OEM image

1. Boot the system.
2. Follow the on-screen instructions to complete installation, using the default selections when appropriate.
3. Set the Windows (plugged in) Power Mode to Best Performance.
4. Set Screen and Sleep options to Never:
    a. Right-click the desktop, and select Display settings.
    b. Select System from the left column.
    c. Click Power & Battery.
    d. For all power options listed under Screen and Sleep, select Never.
5. Disable User Account Control notifications:
    a. Select Windows Start, type `UAC`, and press Enter.
    b. Move the slider control to Never notify, and click OK.
6. Run Windows Update, and install all available updates.
7. Run the HP/Dell/Lenovo Support Assistant utilities, and install all recommended BIOS and available driver updates.
8. Verify the date and time are correct, and synchronize the system clock with the time server.
9. Pause Automatic Windows Updates:
    a. Click Windows Start.
    b. Type `Windows Update settings`, and press Enter.
    c. From the Pause updates drop-down menu, select Pause for 5 weeks.

Capturing an image

1. Connect an external HDD to the system.
2. Click Windows Menu, and type `Control Panel` in the search bar. Click Control Pane l → System and Security → Backup and Restore (Windows 7) → Create a system image.
3. Verify that the external HDD is selected as the save drive, and click Next.
4. Verify that all drives are selected to back up, and click Next.
5. Click Start backup.
6. When you see the prompt to create a system repair disc, select No, and close the dialogs.

Restoring an image

1. Connect an external HDD to the system.
2. Press and hold the Shift key while restarting the system.
3. Select Troubleshoot.
4. Select Advanced options.
5. Select See more recovery options.
6. Select System image recovery.
7. Select the User account.
8. Enter the system password, and click Continue.
9. At the Restore system files and settings screen, select Next.
10. Verify that the external HDD is selected, and click Next.
11. Once the recovery has completed, click Finish.

Setting up the system (macOS)

Setting up and updating the OEM image

1. Boot the system.
2. Follow the on-screen instructions to complete installation, using the default selections when appropriate.
3. Set Energy Mode to High Power (processor dependent).
    a. Select System Settings.
    b. Select Battery.
    c. Change the drop-down menu next to Only on Power Adapter to High Power.
4. Set Screen and Sleep options to Never:
    a. Select System Settings.
    b. Select Screen Saver.
    c. Select Lock Screen.
    d. Change the following options to Never:
        - Start Screen Saver when inactive.
        - Turn display off on battery when inactive.
        - Turn display off on power adapter when inactive.
        - Require password after screen saver begins or display is turned off.
5. Disable Automatically adjust brightness:
    a. Select System Settings.
    b. Select Display.
    c. Disable Automatically adjust brightness.
6. Run Software Update, and install all available updates.
7. Verify the date and time are correct.
8. Enable Automatic log in:
    a. Select System Settings.
    b. In the search box, type `Users & Groups`.
    c. Click Users & Groups.
    d. Select the drop-down menu next to the Automatically log in as setting, and select the User account.
9. Disable Automatic Mac Updates:
    a. Select System Settings.
    b. Click General.
    c. Click Software Update.
    d. Click the information icon next to Automatic updates.
    e. Disable Download new updates when available.

Capturing an image

1. Connect an external HDD to the system.
2. Click the Apple, and select System Settings.
3. Select General, and select Time Machine.
4. Click Add Backup Disk, and select the drive. Wait for the initial backup to complete.
5. Click Options.
6. Set Backup Frequency to Manually.
7. Click Done.

Restoring an image

1. Shut down the system.
2. Press and hold the power button until Loading startup options appears.
3. Select Options, and click Continue.
4. Select Disk Utility.
5. Select Macintosh HD.
6. Click Erase HD.
7. At the Erase APFS volume group "Macintosh HD" screen, click Erase.
8. At the Erase Mac dialog screen, click Erase Mac.
9. At the Are you sure screen, click Erase Mac and Restart.
10. Select a Wi-Fi network, and click Join.
11. Click Exit to Recovery.
12. Select Reinstall macOS Sequoia, and click Continue.
13. At the macOS Sequoia screen, click Continue.
14. At the license agreement screen, click Agree.
15. Click Agree.
16. Select the Macintosh HD, and click Continue.
17. Select Your Country or Region, and click Continue.
18. At the Accessibility screen, click Not Now.
19. Select a Wi-Fi network, and click Continue.
20. At the Data & Privacy screen, click Continue.
21. At the Migration Assistant screen, choose From a Mac, Time Machine backup or Startup disk, and click Continue.
22. Connect an external HDD to the system.
23. Select the backup image, and click Continue.
24. At the Select a Backup screen, select the correct backup date and time, and click Continue.
25. Ensure all boxes are checked, and click Continue.
26. Enter the Administrator password, and click Ok.
27. After the backup restore completes, click Done.

Running PassMark PerformanceTest (Windows)

Setting up the test

1. Install PassMark PerformanceTest.
2. Download PassMark PerformanceTest from ***https://www.passmark.com/products/performancetest/download.php***.
3. To begin the installation, press Install.
4. To accept the license agreement, select Accept, and press Next.
5. After the installation completes, deselect Launch Performance Test, and press Finish.

Running the test

1. To launch PassMark PerformanceTest, press the PassMark PerformanceTest icon.
2. To start the benchmark, press Run Benchmark.
3. When the test completes, record the results.
4. Complete steps 1 through 3 two more times.
5. Report the median of the three runs.

Running PassMark PerformanceTest (macOS)

Note: The macOS version differs from the Windows version and can run only CPU Mark and Memory Mark benchmarks.

Setting up the test

1. Install PassMark PerformanceTest.
2. Download PassMark PerformanceTest from ***https://www.passmark.com/products/performancetest/download.php***.
3. To begin the installation, press Install.
4. Select Accept to accept the license agreement, and press Next.
5. After the installation is complete, deselect Launch Performance Test, and press Finish.

Running the test

1. To launch PassMark PerformanceTest, press the PassMark PerformanceTest icon.
2. To start the CPU Mark benchmark, press Run next to CPU Mark.
3. When the test completes, record the results.
4. To start the Memory Mark benchmark, press Run next to Memory Mark.
5. When the test completes, record the results.
6. Complete steps 1 through 5 two more times.
7. Report the median of the three runs.

Running Cinebench R23 (Windows and macOS)

Setting up the test

1. Download and install Cinebench R23 from ***https://www.maxon.net/en/downloads***.

Running the test

1. Launch Cinebench.
2. Select File→Advanced benchmark.
3. Set the Minimum Test Duration to Off.
4. Select either CPU (Multi Core) or CPU (Single Core), and click Start.
5. Record the result.
6. Wait 10 minutes before re-running.
7. Complete steps 1 through 6 two more times, and record the median result.

Running 3Dmark (Windows)

Setting up the test

1. Download 3DMark from ***http://www.futuremark.com/benchmarks/3dmark/all***.
2. To install 3DMark with the default options, double-click the 3DMark installer.exe file.
3. To launch 3DMark, double-click the 3DMark desktop icon.
4. Enter the registration code, and click Register.
5. Exit 3DMark.

Running the test

1. To launch the benchmark, double-click the 3DMark desktop icon.
2. At the 3DMark Home screen, click More Tests.
3. Select the desired benchmark to run (e.g., Steel Nomad Light, Solar Bay Unlimited, or Wild Life Extreme Unlimited).
4. Move the slider to turn off the "Include Demo" feature.
5. Click Run.
6. When the run completes, record the results.
7. Perform steps 1 through 6 two more times for each benchmark, and report the median of the three runs.

Running 3Dmark (macOS)

Setting up the test

1. Download and install 3DMark from the Apple App Store.

Running the test

1. To launch the benchmark, double-click the 3DMark desktop icon.
2. At the Benchmarks screen, select the desired benchmark to run (e.g., Steel Nomad Light, Solar Bay Unlimited, or Wild Life Extreme Unlimited).
3. Move the slider to turn on Unlimited mode, so that the benchmark is not handicapped by the refresh rate.
4. Click Start.
5. When the run completes, record the results.
6. Perform steps 1 through 5 two more times for each benchmark, and report the median of the three runs.

Running Procyon AI Computer Vision Benchmark (Windows)

Setting up the test

1. Purchase and download the Procyon AI Computer Vision benchmark from ***https://benchmarks.ul.com/procyon***.
2. Install the Procyon benchmark.
3. Double-click the installer.
4. Click Next.
5. Click to agree to EULA, and click Next.
6. Click Next.
7. Launch Procyon.
8. Select Settings, and input the Procyon AI Computer Vision license key.
9. Close Procyon.

Running the test

1. Launch Procyon.
2. Select the Computer Vision test.
3. For the Float32 and Float16 tests, select the Windows ML tab.
4. Choose the GPU, and select Float32.
5. To begin the test, click Run.
6. When the test completes, record the results, and wait 15 minutes before re-running.
7. Complete three runs.

Running Procyon AI Computer Vision Benchmark (macOS)

Setting up the test

1. Download and install a licensed version of Procyon AI Computer Vision Benchmark from ***https://benchmarks.ul.com/direct-download/Procyon-v2-1-38-ai-computer-vision-benchmark-macos.pkg***.
2. Use default installation options.
3. After installation finishes, launch Terminal.
4. Type `cd /Library/UL/Procyon/AIComputerVision`
5. Type `./UL_Procyon --register <license key>` and press Enter.

Running the test

1. Launch Terminal.
2. Type `cd /Library/UL/Procyon/AIComputerVision`
3. For float32 testing: Type `./UL_Procyon -d "ai_computer_vision_coreml_all_fp32.def" -o "/Users/user/test01.zip" -l 2 --export-simple-csv "/Users/user/test01.csv"` and press Enter.
4. If prompted, click Accept to allow Terminal access to System Events.
5. Wait 15 minutes before rerunning the benchmark, changing `test01` to `test02`.
6. Complete steps 3 through 7 twice, waiting 15 minutes between runs and changing `test01` to `test02` or `test03` depending on run.

Running Geekbench AI (Windows)

Setting up the test

1. Purchase and download a Geekbench AI Pro license from ***https://www.geekbench.com/ai/download/***.
2. Using all the defaults, run the installer, and install the benchmark.

Running the test

1. Launch Geekbench AI.
2. Enter the license key.
3. For GPU testing, select:
   - AI Framework: ONNX
   - AI Backend: DirectML
   - AI Device: graphics card
4. Click Run AI Benchmark.
5. Wait 5 minutes, complete steps 3 through 5, and capture the median of three runs.

Running Geekbench AI benchmark (macOS)

Setting up the test

1. Purchase and download a Geekbench AI Pro license from ***https://www.geekbench.com/ai/***.
2. Using all the defaults, run the installer, and install the benchmark.

Running the test

1. Launch Geekbench AI.
2. Enter the license key.
3. Set AI Framework to Core ML.
4. From the AI Backend drop-down menu, choose GPU.
5. Click Run AI Benchmark.
6. Record the result.
7. Wait 5 minutes before re-running.
8. Complete steps 1 through 7 two more times.

Running V-Ray Chaos benchmark (Windows and macOS)

Setting up the V-Ray Benchmark

1. Download the V-Ray Benchmark from ***https://www.chaos.com/benchmark-download***. We used version 6.00.01.

Running the V-Ray Benchmark

We captured the following metrics for this testing.

- V-Ray – CPU

1. Run V-Ray benchmark
2. Using V-Ray for CPU, run V-Ray for 5 minutes. Record the results.
3. Wait 5 minutes, and complete step 2 twice.

Read the report ▶

This project was commissioned by HP.