



The science behind the report:

# Use less energy—and get a performance boost

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 [Use less energy—and get a performance boost](#).

We concluded our hands-on testing on October 21, 2024. 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 September 3, 2024 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: Median results of our hands-on testing. Unless we note otherwise, higher numbers are better.

HP Elite SFF 805 G9 Desktop PC with an AMD Ryzen™ 5 PRO 8600G processor and 16GB RAM	Dell™ OptiPlex™ SFF Plus Desktop with Intel® vPro® with an Intel Core™ i5-14500 processor and 16GB RAM	HP Elite SFF 805 G9 Desktop PC with an AMD Ryzen 7 PRO 8700G processor and 32GB RAM	Dell OptiPlex SFF Plus Desktop with Intel vPro with an Intel Core i7-14700 processor and 32GB RAM
PassMark PerformanceTest 11.0 score			
6,567	3,599	7,927	3,842
Procyon Photo Editing Benchmark score			
5,349	5,183	6,752	5,986
Procyon Video Editing Benchmark score			
2,969	2,769	3,886	3,125
3DMark Fire Strike score			
4,965	2,700	7,419	2,832
3DMark Time Spy score			
1,919	893	3,216	933

HP Elite SFF 805 G9 Desktop PC with an AMD Ryzen™ 5 PRO 8600G processor and 16GB RAM	Dell™ OptiPlex™ SFF Plus Desktop with Intel® vPro® with an Intel Core™ i5-14500 processor and 16GB RAM	HP Elite SFF 805 G9 Desktop PC with an AMD Ryzen 7 PRO 8700G processor and 32GB RAM	Dell OptiPlex SFF Plus Desktop with Intel vPro with an Intel Core i7-14700 processor and 32GB RAM
LM Studio time to first token Time in seconds. (Lower is better.)			
1:42	8:62	1:15	8:21
LM Studio tokens per second			
9.32	8.69	10.24	9.62
Geekbench AI ONNX DirectML			
Full Precision score			
3,030	1,546	3,768	1,630
Quantized score			
4,634	1,022	5,476	1,077
Procyon AI Computer Vision Benchmark (Windows ML GPU on AMD. Intel OpenVINO™ GPU on Intel.)			
float32 score			
201	77	196	81
Power (Watts) consumption during a video meeting presentation (Lower is better.)			
18.70	26.30	18.50	23.90

## System configuration information

Table 2: Detailed information on the test systems with 16 GB of RAM.

System configuration information	HP Elite SFF 805 G9	Dell OptiPlex SFF Plus
Processor		
Vendor	AMD	Intel
Model number	Ryzen 5 PRO 8600G	Core i5-14500 vPro
Core frequency (GHz)	4.2 - 5.0	E-cores up to 3.80 P-cores up to 5.10
Number of cores	6	14
Threads	12	20
Memory module(s)		
Amount (GB)	16 (2 x 8)	16 (2 x 8)
Type	DDR5-5600	DDR5-5600
Integrated graphics		
Vendor	AMD	Intel
Model number	Radeon™ 760M	UHD Graphics 770
Storage		
Amount (GB)	512	512
Type	SSD	SSD
Connectivity/expansion		
Wired internet	Realtek PCIe GbE Family Controller	Intel Ethernet Connection I219-LM
Wireless internet	Realtek RTL8852BE Wi-Fi 6 (802.11ax)	N/A
Bluetooth	5.3	N/A
USB	4 x USB-A 2.0 6 x USB-A 3.2 1 x USB-C 3.2	4 x USB-A 2.0 5 x USB-A 3.2 1 x USB-C 3.2
Video	1 x DisplayPort 1.4a 1 x HDMI 2.1	3 x DisplayPort 1.4a
Operating system		
Vendor	Microsoft	Microsoft
Name	Windows 11 Pro	Windows 11 Pro
Version	10.0.22631 Build 22631	10.0.22631 Build 22631
BIOS		
BIOS name and version	HP W06 02.07.00.00	Dell 1.7.0
Dimensions		
Height (in.)	13.30	11.42
Width (in.)	3.94	3.65
Depth (in.)	12.13	11.53
Weight (lbs.)	9.87	9.14

Table 3: Detailed information on the test systems with 32 GB of RAM.

System configuration information	HP Elite SFF 805 G9	Dell™ OptiPlex™ SFF Plus
Processor		
Vendor	AMD	Intel
Model number	Ryzen 7 Pro 8700G	Core i7-14700 vPro
Core frequency (GHz)	4.2 - 5.1	E-cores up to 4.20 P-cores up to 5.30
Number of cores	8	20
Threads	16	28
Memory module(s)		
Amount (GB)	32 (2 x 16)	32 (2 x 16)
Type	DDR5-5600	DDR5-5600
Integrated graphics		
Vendor	AMD	Intel
Model number	Radeon 780M	UHD Graphics 770
Storage		
Amount (GB)	512	512
Type	SSD	SSD
Connectivity/expansion		
Wired internet	Realtek PCIe GbE Family Controller	Intel Ethernet Connection I219-LM
Wireless internet	MediaTek MT7922 Wi-Fi 6E (802.11ax)	N/A
Bluetooth	5.3	N/A
USB	4 x USB-A 2.0 6 x USB-A 3.2 1 x -C 3.2	4 x USB-A 2.0 5 x USB-A 3.2 1 x USB-C 3.2
Video	1 x DisplayPort 1.4a 1 x HDMI 2.1	3 x DisplayPort 1.4a
Operating system		
Vendor	Microsoft	Microsoft
Name	Windows 11 Pro	Windows 11 Pro
Version	10.0.22631 Build 22631	10.0.22631 Build 22631
BIOS		
BIOS name and version	HP W06 02.07.00	Dell 1.7.0
Dimensions		
Height (in.)	13.30	11.42
Width (in.)	3.94	3.65
Depth (in.)	12.13	11.53
Weight (lbs.)	9.88	9.12

# How we tested

## Setting up the systems

When running the test, we used a factory provided image. We reset the system image between tests to prevent software from corrupting the test image.

### Setting up and updating the OEM image

1. Boot the system.
2. To complete installation, follow the on-screen instructions, using the default selections when appropriate.
3. Set the Windows Power Plan to Best Performance.
4. Set Screen and Sleep options to Never:
  - a. Right-click the desktop, and select Display settings.
  - b. From the left column, select System.
  - c. Click Power.
  - 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 updates available.
7. Launch each vendor-proprietary utility app installed on each system, and update any drivers or BIOS files:
  - For Dell, run the Dell Command | Update utility.
  - For Lenovo, run the Lenovo Commercial Vantage application. Run all Critical and Recommended Updates.
  - For HP, check for updates using HP PC Hardware Diagnostics Windows. Then, run the HP Support Assistant Application, using a guest login, and run updates. After running updates, go to application settings and disable automatic software 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 button, and type Control Panel in the search bar. Click Control Panel→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. At Do you want 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.

## Running ProcessIdleTasks

Once every 24-hour period, before testing, we rebooted the system and ran the ProcessIdleTasks command, which forces idle processes to complete. This minimizes the chance of background tasks affecting test runs.

1. Boot the system.
2. Select Windows Start.
3. Type `cmd` and press Ctrl+Shift+Enter.
4. Type `Rundll32.exe advapi32.dll,ProcessIdleTasks`  
Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the tests.

## Measuring general, graphics, and AI performance with benchmarks

### 3DMark testing

#### Setting up the tests

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 tests

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 (i.e., Fire Strike or Time Spy).
4. Move the slider button to turn off the Include Demo feature.
5. Click Run.
6. When the benchmark run completes, record the results.
7. Perform steps 1 through 6 two more times for each workload.
8. Report the median results.

### Geekbench AI testing

#### Setting up the test

1. Download Geekbench AI from <https://www.geekbench.com/ml/>.
2. Run the installer, and install using all defaults.

#### Running the test

1. Launch Geekbench AI.
2. In Geekbench ML, select ONNX and DirectML.
3. For Inference Device select the GPU.
4. Click Run Inference Benchmark.
5. Wait 5 minutes, and repeat steps 1 through 4 two more times.
6. Report the median results.

### LM Studios testing

#### Setting up the test

1. Download LM Studio from <https://lmstudio.ai>.
2. Run the installer, and install using all defaults.
3. Launch LM Studio.
4. Run the installer, and install using all defaults.
5. Launch LM Studio.
6. In the Select a model to load field, download the Llama 3.1 8B model.

## Running the test

1. Launch LM Studio.
2. Select Load a model, and choose the Meta-Llama-3.1-8B-Instruct-Q4\_K\_M model.
3. When the model is fully loaded, type `How can AMD Ryzen Processors in HP small form factor workstations help enterprise customers deliver better user experience, productivity performance and ROI?` into the message field, and click Send.
4. When the test is complete, record the results.
5. Delete the chat window.
6. Eject the model.
7. Open a new chat window, and reload the same model.
8. Wait 5 minutes, open a new chat window, and repeat steps 2 through 7 two more times.
9. Report the median results.

## PassMark Performance Test 11 testing

### 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, click Install.
4. Select Accept to accept the license agreement, and click Next.
5. After the installation is complete, deselect Launch Performance Test, and click Finish.

### Running the test

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

## Procyon AI Computer Vision Benchmark testing

### Setting up the test

1. Purchase and download the Procyon Office Productivity benchmark from <https://benchmarks.ul.com/procyon>.
2. Install the Procyon benchmark.
3. Launch Procyon.
4. Select Settings, and input the Procyon AI Computer Vision license key.
5. Close Procyon.

### Running the test

1. Launch Procyon.
2. Select the Computer Vision test.
3. For the hardware under test, select the appropriate tab.
4. If applicable, select the device and precision.
5. To begin the test, click Run
6. When the test completes, record the results, and wait 15 minutes before re-running.
7. Repeat steps 4 through 6 two more times.
8. Report the median results.

## Procyon photo- and video-editing benchmark testing

Before running the benchmarks, install licensed versions of Adobe® Photoshop® 22.0 or higher, Adobe Lightroom® Classic 10.0 or higher, and Adobe Premiere® 14.5 or higher.

### Setting up the tests

1. Download and install UL Procyon.
2. Open UL Procyon.
3. Click Photo Editing Benchmark.
4. Click Register.
5. Enter the license key for the photo-editing benchmark, and click Register.
6. For the Video Editing Benchmark, repeat steps 3 through 5.
7. Check for updates in the Adobe Creative Cloud® desktop application.
8. Open the Adobe Photoshop, Adobe Lightroom Classic, and Adobe Premiere applications, and disable tips when possible.

### Running the tests

1. Launch UL Procyon.
2. Click Photo Editing Benchmark.
3. Click Run.
4. When the benchmark is complete, record the results.
5. Click Video Editing Benchmark.
6. Click Run.
7. When the benchmark is complete, record the results.
8. Shut down the system.
9. Repeat steps 1 through 8 twice more.
10. Record the median results.

## Measuring power consumption

This test requires the following items:

- Extech Power Analyzer / Data Logger 380803
- 180MB MicrosoftPower Point file
- Microsoft Teams
- Microsoft LifeCam Cinema webcam
- Three client computers
- One data-recording computer (PC)

### Setting up the test

1. Plug the system under test into the Extech Power Analyzer.
2. Plug the Extech Power Analyzer into the wall power socket, and turn it on.
3. To record the data, connect the Extech Power Analyzer's data output to a PC.
4. On the data-recording PC, install the Extech Power Analyzer software.
5. On the system under test, set the power mode to Best Power Efficiency.
6. Install the USB Microsoft LifeCam Cinema.
7. Download and install Microsoft Teams.
8. Add a 180MB PowerPoint file to the desktop.
9. On the three client systems, install Microsoft Teams.

### Running the test

1. Boot the system under test.
2. Open Microsoft Teams, and start a new meeting.
3. Connect the three client computers to the Teams meeting.
4. On the system under test, open the 180MB PowerPoint file.
5. Share the PowerPoint file in Teams.
6. On the data-recording PC, simultaneously start the stopwatch and start recording in the Extech software.
7. After 30 minutes, stop the Extech recording, and record the results.
8. Repeat steps 1 through 7 two more times.
9. Report the median results.

Read the report at <https://facts.pt/V7o6mFV> ▶

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