



# Help users boost productivity with HP EliteBook 645 G11 Notebook PCs

We compared general and AI performance, battery life, and user experiences on an AMD Ryzen 7 PRO 7735U processor-powered HP EliteBook 645 G11 to those of two Intel Core Ultra 7 processor 165U-based Dell and Lenovo laptops

As productivity-boosting artificial intelligence (AI) technologies change the face of business, the Windows 11 Pro PC and processor model you choose for you and your team are more important than ever. Earlier this year, HP launched the 14-inch EliteBook 645 G11 Notebook PC powered by Zen 3+ AMD® Ryzen™ premium laptop processors. What benefits can this combo deliver that its competitors can't?

In our hands-on tests, the 14-inch HP EliteBook 645 G11 Notebook PC with an 8-core AMD Ryzen 7035 Series PRO mobile processor received higher general and AI performance benchmark scores, provided longer battery life, and delivered better physical experiences than 12-core Intel® vPro® with Intel Core™ Ultra 7 processor-based Dell™ and Lenovo® laptops.



## Boost general productivity

Up to 19.3% higher PassMark PerformanceTest 11 score



## Supercharge machine learning workloads

Up to 154.6% higher Geekbench AI ONNX DirectML iGPU inference score



## Accomplish more unplugged

Up to 10 hr 22 min of battery life\*

This project was commissioned by HP and AMD.

\*MobileMark 30 battery life results in Windows 11 Pro best power efficiency power mode.

## How we tested

When your goal is to boost enterprise knowledge workers' productivity with new Windows 11 Pro PCs, you need to consider a number of factors. We tested the performance, battery life, and user comfort on three enterprise-level options with the following configurations:

### HP EliteBook 645 G11 Notebook PC

- 8-core/16-thread AMD Ryzen 7 PRO 7735U processor
- Integrated 12-core AMD Radeon™ Graphics
- 56-Whr battery

### Dell Latitude™ 5450 laptop

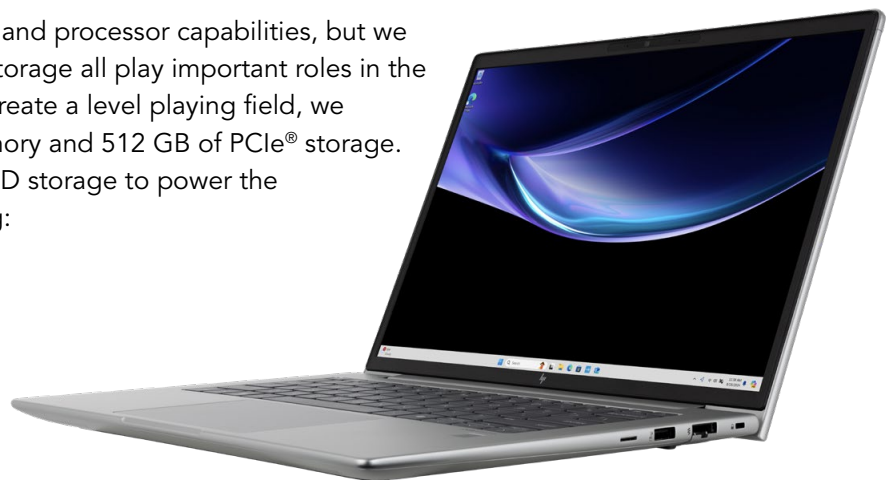
- 12-core/14-thread Intel vPro with Intel Core Ultra 7 processor 165U
- Integrated 4-core Intel Graphics and Intel AI Boost neural processing unit (NPU)
- 54-Whr battery

### Lenovo ThinkPad® L14 Gen 5 laptop

- 12-core/14-thread Intel vPro with Intel Core Ultra 7 processor 165U
- Integrated 4-core Intel Graphics and Intel AI Boost NPU
- 57-Whr battery

We focused our testing on battery life and processor capabilities, but we recognize that CPU, GPU, RAM, and storage all play important roles in the overarching performance picture. To create a level playing field, we equipped each PC with 16 GB of memory and 512 GB of PCIe® storage. This is more than enough RAM and SSD storage to power the benchmarking tools we used in testing:

- 3DMark® Fire Strike
- Cinebench 2024
- Geekbench AI
- LM Studios
- PassMark PerformanceTest 11
- Procyon® AI Computer Vision Benchmark



We also looked at the relationship between battery life and performance by running the MobileMark 30 battery life benchmark twice. First, we tested with the PCs in the Windows 11 Pro “Balanced” power mode. Then, we repeated the test with the PCs in “Best power efficiency” power mode. Finally, because high-end processors can generate a lot of heat and the fans used to cool these components can be loud, we recorded the heat and noise output of each PC while using the resource-intensive Cinebench 2024 workload for an extended period.

Finally, to see how long each laptop would run Microsoft Teams while unplugged and in “Best power efficiency” power mode, we simulated a long-running collaboration scenario among nine participants using the popular video-conferencing app.

The results we report reflect the specific configurations we tested. Any difference in the configurations—as well as screen brightness, network traffic, and software additions—can affect these results. For a deeper dive into our testing parameters and procedures, see the [science behind the report](#).

Note: The graphs in this report use different scales to keep a consistent size. Please be mindful of each graph's data range as you compare.

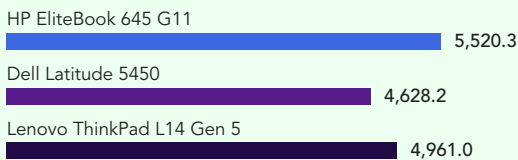
## Boost productivity

Even as we're adopting new and promising AI technologies to improve productivity, models of where we work are continuing to evolve. Your knowledge workers need PCs that will help them succeed in their endeavors now and in the future—whether they're working in the office or on the road. Empower day-to-day work with strong system performance and all-day battery life.

### General performance

We evaluated the PCs' general performance using the PassMark PerformanceTest 11 benchmark. PassMark PerformanceTest 11 combines CPU, 2D and 3D graphics, storage, and memory test performance metrics into an overall PassMark rating.<sup>1</sup> 3DMark Fire Strike scans a system's hardware and estimates the frame rates you can expect when using CPU- and GPU-intensive applications.<sup>2</sup> Cinebench 2024 measures a CPU's multi-core performance by rendering a 3D scene.<sup>3</sup>

#### PassMark PerformanceTest 11.0 ratings (higher is better)



Up to  
19.3% higher  
overall rating

Figure 1: PassMark PerformanceTest 11.0 overall ratings. Higher is better.  
Source: Principled Technologies.

#### 3DMark Fire Strike scores (higher is better)



Figure 2: 3DMark Fire Strike overall scores. Higher is better.  
Source: Principled Technologies.

#### Cinebench 2024 scores (higher is better)

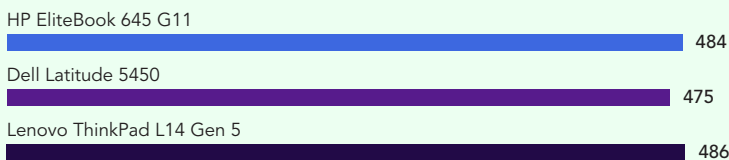


Figure 3: Cinebench 2024 CPU multi-core scores. Higher is better.  
Source: Principled Technologies.



### About the HP EliteBook 645 G11

HP crafted HP EliteBook 605 Series Notebook PCs "for corporate and public sector organizations that need to maximize value and flexibility to equip a range of users in hybrid environments."<sup>4</sup> These PCs come with a wide range of configurable features to meet the different requirements within your workforce.<sup>5</sup> The HP EliteBook 645 G11 delivers the power of next-gen AMD Ryzen 3, 5, or 7 processors, integrated AMD Radeon Graphics, an integrated 1080p FHD or 5MP IR webcam, and a dual-microphone array.<sup>6</sup>

### About the AMD Ryzen 7 PRO 7735U processor

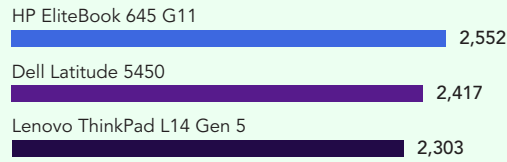
AMD designed this Zen 3+ technology-based AMD Ryzen 7035 Series mobile processor to deliver fast performance and long battery life for hybrid workers.<sup>7</sup> The 8-core/16-thread AMD Ryzen 7 PRO 7735U processor (2.70 – 4.75 GHz) has an integrated 12-core AMD Radeon 680M iGPU for better power efficiency and graphics.<sup>8</sup> According to AMD, adding AMD PRO technologies to the mix "delivers enterprise-grade multi-layered security, simplified deployment and manageability and quality assurance features that business and IT decision makers demand."<sup>9</sup> You can learn more about AMD Ryzen processors with Zen 3+ architecture at: <https://ir.amd.com/news-events/press-releases/detail/1111/amdextends-its-leadership-with-the-introduction-of-its>.

## AI performance

Geekbench AI uses large datasets to simulate real-world use cases and evaluate machine learning, deep learning, and AI-centric workload performance.<sup>10</sup> In our Geekbench testing, we used the Open Neural Network Exchange (ONNX) AI framework as well as the DirectML AI backend for machine learning on Windows. LM Studio uses local large language models (LLMs) to evaluate AI Chat capabilities.<sup>11</sup> In our LM Studios testing, we used the Llama 3 LLM to capture token metrics. Procyon AI Computer Vision Benchmark uses a variety of inference engines to gauge machine learning application performance.<sup>12</sup> In our Procyon testing, we used the Windows ML inference API on the AMD-based system and the Intel OpenVINO inference API on the Intel-based systems. The Windows ML API allowed the use of AMD hardware acceleration features, while the OpenVINO API is optimized for Intel CPU, GPU, and NPU inference.



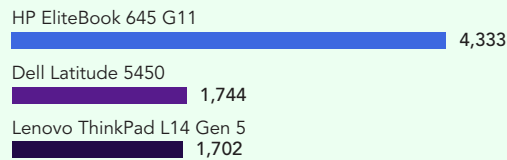
### Geekbench AI ONNX DirectML CPU inference scores (higher is better)



Up to 10.8% higher overall rating

Figure 4: Geekbench AI (ONNX DirectML) CPU inference scores. Higher is better. Source: Principled Technologies.

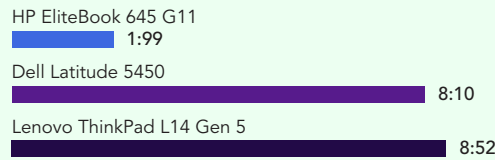
### Geekbench AI ONNX DirectML GPU inference scores (higher is better)



Up to 154.6% higher overall rating

Figure 5: Geekbench AI (ONNX DirectML) iGPU inference scores. Higher is better. Source: Principled Technologies.

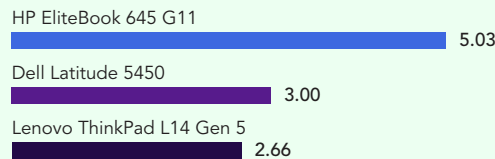
### LM Studio time to first token (s:ms, lower is better)



Up to 76.6% less time to first token

Figure 6: LM Studio Llama 3 time to first token results. Time in seconds. Less time is better. Source: Principled Technologies.

### LM Studio tokens per second (higher is better)



Up to 89.1% more tokens per second

Figure 7: LM Studio Llama 3 tokens per second results. More tokens are better. Source: Principled Technologies.

### Procyon AI Computer Vision Benchmark scores (higher is better)

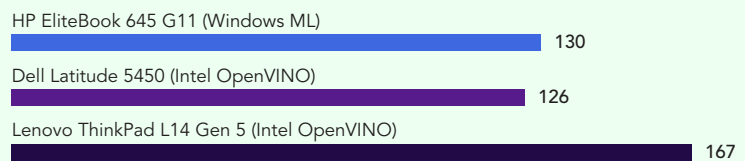


Figure 8: Procyon AI Computer Vision Benchmark GPU float32 scores. Higher Is Better. Source: Principled Technologies.

## Battery life

To see how changing Windows 11 Pro power modes affected performance and battery life, we measured battery life and system responsiveness in both “Balanced” and “Best power efficiency” power plan modes. MobileMark 30 factors in both DC (unplugged) performance and battery life for the MobileMark 30 Index composite score.<sup>13</sup> Higher Index scores denote a better balance between performance and battery life. Lower Index scores indicate that the longer battery life came at the price of performance or vice versa. In these comparisons, while the HP and Dell comparison was a toss-up, the HP EliteBook 645 G11 Notebook PC consistently lasted longer and scored higher than the Lenovo ThinkPad L14 Gen 5.

### MobileMark 30, Balanced mode (higher is better)

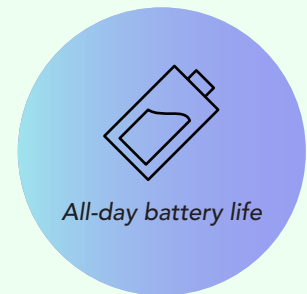
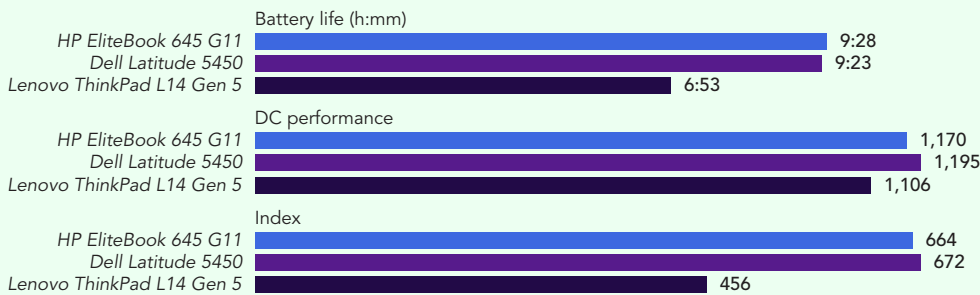


Figure 9: MobileMark 30 benchmark results in “Balanced” power mode. Time in hours and minutes (h:mm). Higher scores and times are better. Source: Principled Technologies.

### MobileMark 30, Best power efficiency mode (higher is better)

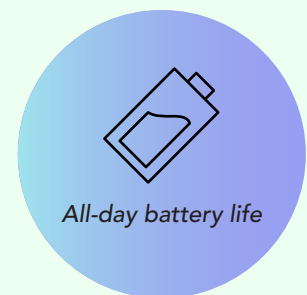
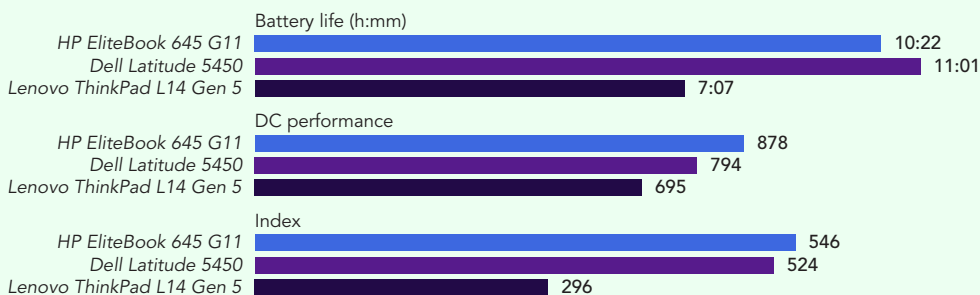


Figure 10: MobileMark 30 benchmark results in “Best power efficiency” power mode. Time in hours and minutes (h:mm). Higher scores and times are better. Source: Principled Technologies.

## Collaboration

For the collaboration assessment, we set up a Microsoft Teams video-conferencing meeting for nine participants and measured how long the devices’ batteries held out.

### Microsoft Teams real-world collaboration (battery life in h:mm, higher is better)



Figure 11: Battery life while conducting a nine-person Microsoft Teams meeting. Time in hours and minutes (h:mm). More time is better. Source: Principled Technologies

## User comfort

Sometimes, opting for high-performing processors can mean users have to deal with more heat or noise coming from the PC. If your team members work with their PCs on their laps or in common areas where excessive noise output can bother others, this can be a real issue. For our hands-on tests, the ambient room temperature was 75.3 degrees Fahrenheit and ambient room noise was 23.5 decibels (dBA). We ran the resource-intensive Cinebench 2024 media-rendering benchmark six times: three times for thermal testing and three times for acoustic testing. Figure 12 shows the median performance scores we captured during the thermal runs. Figures 13 and 14 show the median temps and noise levels.

In this comparison, we found that the AMD Ryzen 7 PRO 7735U processor-powered HP EliteBook 645 G11 Notebook PC received comparable or higher performance scores and was as whisper-quiet as the Intel vPro with Intel Core Ultra 7 processor 165U-powered Dell Latitude 5450 and Lenovo ThinkPad L14 Gen 5 laptops. For reference, 10 dBA is equivalent to normal breathing, 30 dBA is whispering, and 40 dBA is what you'd hear in a quiet office or residential area.<sup>14</sup>

### Cinebench 2024 workload performance scores (higher is better)



Figure 12: Median performance scores while the PCs were plugged in and running the Cinebench 2024 benchmark for 30 minutes. Higher performance scores are better. Source: Principled Technologies.

### Average dBA (lower is better)



Figure 13: Median acoustic results while the PCs were plugged in and running the Cinebench 2024 benchmark for 30 minutes. Lower decibels are better. Source: Principled Technologies.

The big difference was in thermal output, with the Intel vPro with Intel Core Ultra 7 processor 165U-based Dell Latitude 5450 and Lenovo ThinkPad L14 Gen 5 laptops generating almost 30 degrees more heat off the bottom than the AMD Ryzen 7 PRO 7735U processor-powered HP EliteBook 645 G11 Notebook PC.

### External temperatures (lower is better)

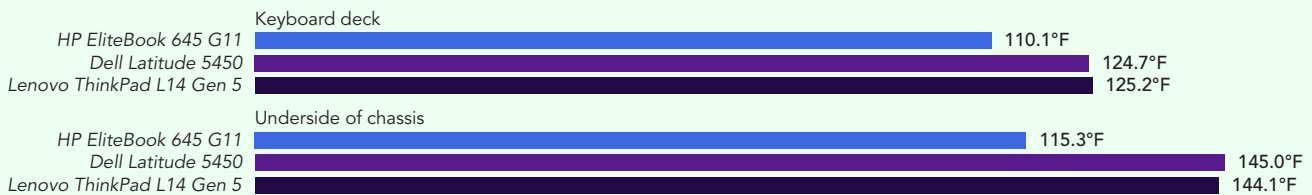


Figure 14: Median thermal results while the PCs were plugged in and running the Cinebench 2024 benchmark for 30 minutes. Lower temperatures are better. Source: Principled Technologies.



## Conclusion

Our hands-on system responsiveness and battery life tests show that investing in 14-inch HP EliteBook 605 Series Notebook PCs powered by next-gen AMD Ryzen 7035 Series processors could help set up your workforce for success. We found that an HP EliteBook 645 G11 Notebook PC with an 8-core AMD Ryzen PRO 7735U processor received higher benchmark scores, provided longer battery life, and ran cooler and quieter under load than 12-core Intel vPro with Intel Core Ultra 7 processor 165U-based Dell Latitude 5450 and Lenovo ThinkPad L14 Gen 5 laptops.

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14. Lexie, "Decibel examples: noise levels of common sounds," accessed August 27, 2024, <https://lexiehearing.com/us/library/decibel-examples-noise-levels-of-common-sounds>.

Read the science behind this report at <https://facts.pt/Tqea8Yt>



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