The science behind the report:

Enable on-the-go productivity at multiple price points with Dell Latitude 5000 series laptops featuring 12th Gen Intel Core Processors

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 Enable on the go productivity at multiple price points with Dell Latitude 5000 series laptops featuring 12th Gen Intel Core Processors.

We concluded our hands-on testing on August 29, 2022. 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 July 20, 2022 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. We ran each benchmark three times and report the median results here.

	Dell® Latitude® 5530 with an Intel® Core™ i5-1245U processor	Dell Latitude 5530 with an Intel Core i5-1250P processor	Dell Latitude 5531 with an Intel Core i5-12600H processor	Dell Latitude 5420 with an Intel Core i5-1135G7 processor
CrossMark® benchmark ratings				
Overall	1,500	1,588	1,760	1,126
Productivity	1,482	1,582	1,621	1,189
Creativity	1,565	1,586	2,013	1,119
Responsiveness	1,367	1,612	1,505	978
Photo-editing benchmarks overall scores				
Procyon® Photo Editing Benchmark using Adobe® Photoshop® and Lightroom® Classic	6,152	6,404	7,535	N/A
PugetBench for Adobe Lightroom Classic	837.0	923.5	1,087.0	N/A

	Dell® Latitude® 5530 with an Intel® Core™ i5-1245U processor	Dell Latitude 5530 with an Intel Core i5-1250P processor	Dell Latitude 5531 with an Intel Core i5-12600H processor	Dell Latitude 5420 with an Intel Core i5-1135G7 processor
PugetBench for Adobe Photoshop	761	772	1,110	N/A
Video-editing benchmarks overall scores				
Procyon Video Editing benchmark using Adobe Premiere® Pro	1,647	1,798	2,866	N/A
PugetBench for Adobe Premiere Pro	206	228	428	N/A
Digital visual effects benchmark overall scores				
PugetBench for Adobe After Effects®	451	474	739	N/A

System configuration information

Table 2: Detailed information on the systems we tested.

	Dell Latitude 5530	Dell Latitude 5530	Dell Latitude 5531	Dell Latitude 5420
Processor				
Vendor	Intel	Intel	Intel	Intel
Model number	Core i5-1245U	Core i5-1250P	Core i5-12600H	Core i5-1135G7
Core frequency (GHz)	3.3 – 4.4	3.3 – 4	3.3 – 4.5	2.4 – 4.2
Number of cores	10	12	12	4
Memory				
Amount (GB)	16	16	32	8
Type	DDR4	DDR4	DDR4	DDR4
Graphics				
Vendor	Intel	Intel	Intel	Intel
Model number	Iris® Xe Graphics	Iris Xe Graphics	Iris Xe Graphics	Iris Xe Graphics
Storage				
Amount (GB)	512	512	1TB	256
Type	NVMe	NVMe	NVMe	NVMe
Connectivity/expansion				
Wireless internet	Intel Wi-Fi 6E AX211	Intel Wi-Fi 6E AX211	Intel Wi-Fi 6E AX211	Qualcomm QCA61x4A
Bluetooth	5.2	5.2	5.2	5.2
USB	1 x USB 3.2 Gen 1 1 x USB 3.2 Gen 1 with Powershare 2 x Thunderbolt™ 4 with Power Delivery and DisplayPort 2.0 (USB Type-C™)	1 x USB 3.2 Gen 1 1 x USB 3.2 Gen 1 with Powershare 2 x Thunderbolt 4 with Power Delivery and DisplayPort 2.0 (USB Type-C)	1 x USB 3.2 Gen 1 1 x USB 3.2 Gen 1 with Powershare 2 x Thunderbolt 4 with Power Delivery and DisplayPort 2.0 (USB Type-C)	1 x USB 3.2 Gen 1 1 x USB 3.2 Gen 1 with Powershare 2 x Thunderbolt 4 with Power Delivery and DisplayPort (USB Type-C)
Battery				
Type	Integrated Lithium-polymer	Integrated Lithium-polymer	Integrated Lithium-polymer	Integrated lithium-polymer
Rated capacity (Whr)	41	41	64	41
Display				
Size (in.)	15.6	15.6	15.6	14.0
Resolution	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080	1,366 x 768
Touchscreen	No	No	No	No

	Dell Latitude 5530	Dell Latitude 5530	Dell Latitude 5531	Dell Latitude 5420
Operating system				
Vendor	Microsoft	Microsoft	Microsoft	Microsoft
Name	Windows® 11 Pro	Windows 11 Pro	Windows 11 Pro	Windows 11 Pro
Build number or version	21H2 Build 22000.795	21H2 Build 22000.795	21H2 Build 22000.795	22H2 Build 22621.608
BIOS				
BIOS name and version	Dell 1.4.0	Dell 1.4.0	Dell 1.5.0	Dell 1.21.2
Dimensions				
Height (in.)	0.82	0.82	0.89	0.76
Width (in.)	14.09	14.09	14.09	12.65
Depth (in.)	9.19	9.19	9.19	8.35
Weight (lb.)	3.50	3.50	3.94	3.03

How we tested

Setting up the systems

Creating and updating the OEM Windows 11 Pro image

1. Boot the system.
2. To complete installation, follow the on-screen instructions using the default selections when appropriate.
3. In the bottom right-hand corner, click the battery icon, and adjust the Windows Power mode to Best Performance.
4. Set DPI scaling to 100%, and set Screen and Sleep options to Never:

    - Right-click the desktop, and select Display settings.
    - Under the Scale and layout section, for the Change the size of text, apps, and other items option, select 100%.
    - From the left column, select Power & Sleep.
    - For all power options listed under Screen and Sleep, select Never:

5. Disable User Account Control notifications:

    - Select Windows Start, type `UAC`, and press the Enter key.
    - Move the slider control to Never notify, and click OK.

6. Disable Virtualization Based Security:

    - Select Windows Start, type `Group Policy`, and press the Enter key.
    - Select Computer Configuration→Administrative Templates System→Device Guard.
    - Double-click Turn on Virtualization Based Security.
    - Select Disabled, and click Apply and OK.

7. Run Windows Update, and install all updates available.
8. Launch the Windows Store app, and install all Store app updates.
9. 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.
10. Verify the date and time are correct, and synchronize the system clock with the time server.
11. Install Intel CPU Runtime for OpenCL Applications for Windows OS (64bit or 32bit) from https://registrationcenter.intel.com/en/forms/?productid=3207&pass=yes.
12. Disable Automatic Windows Update:

    - Right-click the Windows Start button.
    - Select Computer Management.
    - Select Services and Applications.
    - Select Services.
    - Scroll down, and double-click Windows Update.
    - Click Stop.
    - From the Startup type drop-down menu, select Disabled.

Capturing an image

1. Connect an external HDD to the system.
2. Open Control Panel, and to select All Control Panel Items, click the arrow.
3. Click Backup and Restore.
4. Click Create a system image.
5. Verify that the external HDD is selected as the save drive, and click Next.
6. Verify that all drives are selected to back up, and click Next.
7. Click Start backup.
8. 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. At the Restore system files and settings screen, select Next .
8. Verify that the external HDD is selected, and click Next.
9. Once the recovery has completed, click Finish.

Comparing overall system performance

BAPCo CrossMark Pro

Setting up the benchmark test

1. Download and install CrossMark from the Microsoft Store using the registered Microsoft Store account.
2. Launch CrossMark Pro.
3. At the license agreement screen, click Accept.
4. Click Settings.
5. Click Restore Purchase.
6. At the Success screen, click Ok, and close CrossMark.
7. Follow the instructions found inside the BAPCo CrossMark user guide, and make the following system configuration changes:

- Disable User Account Control (UAC):

  - Click the Windows start icon, and type regedit in the search field, to open the Registry Editor, and press Enter.
  - Go to HKEY_LOCAL_MACHINE→SOFTWARE→Microsoft→Windows→CurrentVersion→Policies→System.
  - Double-click EnableLUA, and type 0 in the value data field. Click OK.
  - Double-click ConsentPromptBehaviorAdmin, type 0 in the value data field, and click OK.

- Set Power Plan Type to "High Performance":

  - Press the Windows key + X, and select Windows Powershell (Admin).
  - Type powercfg.exe -SETACVALUEINDEX SCHEME_CURRENT SUB_NONE 245d8541-3943-4422-b025-13a784f679b7 1 and press Enter.
  - Close Windows PowerShell.

- Disable WinSAT service:

  - Click the Windows start icon, and type task scheduler in the search field, to open the Task Scheduler, and press Enter.
  - Click Task Scheduler Library→Microsoft→Windows→Maintenance, right-click WinSAT, and select Disable.

- Disable Windows Update:

  - Click the Windows start icon, and select Settings→Update & Security→Windows Update.
  - Select Advanced Options, and turn off the following:

    - Receive updates for other Microsoft products when you update Windows
    - Download updates over metered connections
    - Restart this device as soon as possible when a restart is required to install an update
    - Show a notification when your PC requires a restart to finish updating.

- Disable Windows Search, Diagnostic policy service, and SysMain service:

  - Click the Windows start icon, type services in the search field, and press Enter.
  - Right-click Diagnostic policy service, and select Stop.
  - Double-click Diagnostic policy service, from the Startup type dropdown menu select Disabled, and click Apply and Ok.
  - Right-click Windows Search service, and select Stop.
  - Double-click Windows Search service, from the Startup type dropdown menu, select Disabled, and click Apply and Ok.
  - Right-click SysMain service, and select Stop.
  - Double-click SysMain service, from the Startup type dropdown menu select Disabled, and click Apply and Ok.

- Disable Windows Security Center:

    - Click the Windows start icon, type regedit in the search field, and to open the Registry Editor, press Enter.
    - Go to HKEY_LOCAL_MACHINE→SYSTEM→CurrentControlSet→Services→SecurityHealthService.
    - Double-click Start and type 4 in the value data field. Click OK.
    - Go to HKEY_LOCAL_MACHINE→SYSTEM→CurrentControlSet→Services→wscsvc.
    - Double-click Start, and type 4 in the value data field. Click OK.

- Disable Tamper protection:

    - Click the Windows start icon, and select Settings→Update & Security→Windows Security.
    - Under Virus & Threat Protection settings click Manage settings.
    - Turn off Tamper protection.

- Disable Windows Defender:

    - Click the Windows start icon, and type regedit in the search field, and press Enter to open the Registry Editor.
    - Go to HKEY_LOCAL_MACHINE→SOFTWARE→Policies→Microsoft→Windows Defender.
    - Right-click Windows Defender, and select New→Key→DWORD (32-bit) Value.
    - Type DisableAntiSpyware, and press Enter.
    - Double-click the DisableAntiSpyware, and in the value data field type 1. Click Ok.

- Reboot the system for the changes to take effect.

Running the benchmark test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks.` Do not interact with the system until the command completes.
5. After the command completes, wait five minutes before running the test.
6. Launch CrossMark.
7. Click Settings.
8. For Number of Iterations choose 1.
9. Enter a valid email address, and click Back.
10. Click Run Benchmark.
11. Record the result, and shut down the system.
12. Repeat steps 1 through 11 twice more, and record the median result.

Comparing photo-editing performance

PugetBench for Lightroom Classic

Setting up the benchmark test

1. Launch Adobe Lightroom Classic.
2. Click through the Tutorial pop-up tips.
3. Close Adobe Lightroom Classic.
4. Purchase and download the PugetBench for Lightroom license from https://www.pugetsystems.com/labs/articles/PugetBench-for-Adobe-Creative-Cloud-1642/.
5. Click Download Plugin & Assets.
6. Extract the Plug-in file.
7. Open Adobe Lightroom Classic.
8. Click File→Plug-in Manager.
9. Click Add, and navigate to the location of the benchmark folder, and select the pugetsystems.lrplugin folder. Click Done.
10. Click Open Catalog, and select the Benchmark Catalog v11.lrcat.
11. Click Relaunch.
12. Click File→Plug-in Extras→Benchmark Run.
13. Enter the License Key, and click Save/Update Settings.

Running the benchmark test

1. Boot the system.
2. Select Windows Start.
3. Type cmd, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks.` Do not interact with the system until the command completes.
5. After the command completes, wait five minutes before running the test.
6. Open Adobe Lightroom Classic.
7. Click File→Plug-in Extras→Benchmark Run.
8. Click Run Benchmark.
9. Record the overall score when the benchmark finishes.
10. Close Adobe Lightroom Classic, and restart the system under test.
11. Wait 15 minutes before performing the next run.
12. Repeat steps 6 through 11 twice more, and record the median result.

PugetBench for Photoshop

Setting up the benchmark test

1. Launch Adobe Photoshop.
2. Click through the Tutorial pop-up tips.
3. Close Adobe Photoshop.
4. Purchase and download the PugetBench for Photoshop license from https://www.pugetsystems.com/labs/articles/PugetBench-for-Adobe-Creative-Cloud-1642/.
5. Click Get on Adobe Marketplace, and log into your Adobe account.
6. To install the PugetBench Photoshop plug-in, click it. .
7. Open Adobe Photoshop.
8. Click Window→Extensions→PugetBench for Photoshop.
9. Next to License Key, click Change, and enter your license key. Click Save.

Running the benchmark test

1. Boot the system.
2. Select Windows Start.
3. Type cmd, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks.` Do not interact with the system until the command completes.
5. After the command completes, wait five minutes before running the test.
6. Open Adobe Photoshop.
7. Click Window→Extensions→PugetBench for Photoshop.
8. Click Run Benchmark.
9. When the benchmark finishes, record the overall score.
10. Close Adobe Photoshop, and restart the system under test.
11. Wait 15 minutes before performing the next run.
12. Repeat steps 6 through 11 twice more, and record the median result.

Comparing photo- and video-editing performance

UL Procyon Photo and Video Editing Benchmark

Setting up the benchmark test

1. Download, and install Procyon.
2. Open Procyon.
3. Click Photo Editing Benchmark or Video Editing Benchmark.
4. Click Register.
5. Enter the license key for the Photo and Video Editing Benchmark, and click Register.
6. Before running the benchmarks, make sure to install licensed versions of Adobe Photoshop 22.0 or higher, Adobe Lightroom Classic 10.0 or higher, and Adobe Premiere 14.5 or higher.

Running the benchmark test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks.` Do not interact with the system until the command completes.
5. After the command completes, wait five minutes before running the test.
6. Launch Procyon.
7. Click Photo Editing Benchmark or Video Editing Benchmark.
8. Click Run.
9. When the benchmark is complete, record the results.
10. Shut down the system.
11. Repeat steps 1 through 10 twice more, and record the media result.

PugetBench for Premiere Pro

Setting up the benchmark test

1. Purchase a PugetBench for Premiere Pro license from h ttps://www.pugetsystems.com/labs/articles/PugetBench-for-Adobe-Creative-Cloud-1642/.
2. Click Get on Adobe Marketplace, and log into your Adobe account.
3. To install the PugetBench Premiere Pro Plug-in, click it.
4. Open Adobe Premiere Pro.
5. Click Create New Project→Create.
6. Click Window→Extensions→PugetBench for Premiere Pro.
7. Next to License Key, click Change, and enter your license key. Click Save.
8. Click Download Project Files, and download the test assets.
9. Extract the PugetBench for Premiere Pro 0.95.4 test assets found in Downloads.

Comparing digital visual effects performance

Testing with PugetBench for After Effects

Setting up the benchmark test

1. Launch Adobe After Effects.
2. Click through the Tutorial pop-up tips.
3. Close Adobe After Effects.
4. Purchase and download the PugetBench for After Effects license from https://www.pugetsystems.com/labs/articles/PugetBench-for-Adobe-Creative-Cloud-1642/.
5. Click Get on Adobe Marketplace, and log into your Adobe account.
6. To install the PugetBench After Effects plug-in, click it.
7. Open Adobe After Effects.
8. Click Edit→Preferences→Scripting & Expressions.
9. Select Allow Scripts to Write Files and Access Network, and click OK.
10. Click Edit→Preferences→Memory & Performance.
11. The benchmark requires After Effects to have 12 GB of RAM space. Adjust the RAM reserved for other applications to get to 12 GB RAM reserved for After Effects, and click OK.
12. Click Composition→New Composition.
13. Accept the default Composition Settings, and click Ok.
14. Click Composition→Preview, and uncheck Cache Frames When Idle.
15. Click Window→Extensions→PugetBench for After Effects.
16. Next to License Key, click Change, and enter your license key. Click Save.

Running the benchmark test

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press Ctrl+Shift+Enter.
4. Type `Cmd.exe /c start /wait Rundll32.exe advapi32.dll,ProcessIdleTasks.` Do not interact with the system until the command completes.
5. After the command completes, wait five minutes before running the test.
6. Open Adobe After Effects.
7. Click Window➔Extensions➔PugetBench for After Effects.
8. Click Run Benchmark.
9. Record the overall score when the benchmark finishes.
10. Close Adobe After Effects, and restart the system under test.
11. Wait 30 minutes before performing the next run.
12. Repeat steps 6 through 11 twice more, and record the median result.

This project was commissioned by Dell Technologies.

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