Battery life and performance ratings of the Packard Bell EasyNote TX notebook system

Executive summary

Packard Bell commissioned Principled Technologies (PT) to measure the battery life and performance of the Packard Bell EasyNote TX notebook system. This system has a 2nd generation Intel® Core™ i5-2410M processor (2.30GHz) and ran the Microsoft® Windows® 7 Home Premium 64-bit operating system.

Packard Bell provided the test system. PT set up the system and executed all tests.

We measured system battery life using the BAPCo® MobileMark® 2007 v1.06 Productivity 2007 test. We measured system performance using the following industry-standard benchmarks:

- BAPCo SYSmark® 2007 Preview v1.06
- Futuremark® PCMark® Vantage v1.0.2.0
- Futuremark 3DMark® 11 v1.0.1
- Futuremark 3DMark Vantage v1.1.0

As Figure 1 shows, the Packard Bell EasyNote TX notebook system produced a battery life score of 9 hours 38 minutes.

> **KEY FINDING**
>
> The Packard Bell EasyNote TX notebook system produced a battery life score of 9 hours 38 minutes on the MobileMark 2007 Productivity 2007 test. (See Figure 1.)
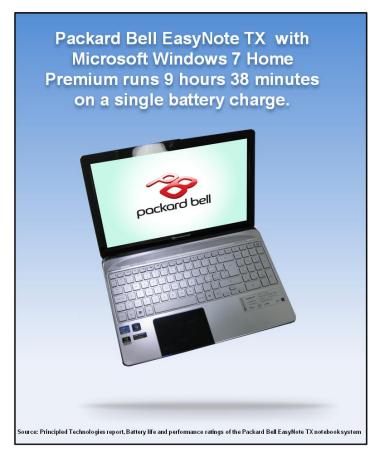

Figure 1: MobileMark 2007 Productivity 2007 battery life score for the Packard Bell EasyNote TX notebook system.

The Workloads section provides details on the benchmarks we used. The Test results section and Appendix A show the test results in more detail. The Test methodology section explains how we ran the tests. Appendix B details the system configuration.

Workloads

BAPCo MobileMark 2007 Productivity 2007

Our goal was to see how long the Packard Bell EasyNote TX notebook battery would last running BAPCo's MobileMark 2007 Productivity 2007 battery life benchmark test.

MobileMark 2007 Productivity 2007 is an industry-standard benchmark that provides a battery life rating and a performance rating based on common office scenarios. In our tests, we focus solely on the battery life rating. MobileMark 2007 Productivity 2007 includes applications and workloads specific to mobile systems. These include office activities like file and document management, data processing, and rich content creation. This module provides a score for battery life of the tested applications.

MobileMark 2007 Productivity 2007 includes the following applications with their corresponding tasks:
- Microsoft Project 2003 (project management)
- Microsoft Excel® 2003 (calculation sheets)
- Microsoft Outlook® 2003 (emails, calendars, scheduler)
- Microsoft PowerPoint® 2003 (slide presentations)
- Microsoft Word® 2003 (formatted text documents)
- WinZip® Computing and WinZip Pro 10.0 (compressed archives)
- Adobe® Photoshop® CS2 (manipulated and compressed images)
- Adobe Illustrator® CS2 (manipulated images)
- Adobe Flash® 8 (vector graphics, animation)

MobileMark 2007 measures system battery life in minutes. MobileMark 2007 records system battery life at the start of the Productivity 2007 benchmark. It repeats the benchmark workload until the system battery life is depleted, or until the system powers down due to low battery life. At the 7 percent battery life setting, MobileMark 2007 records a timestamp once per minute. At the end of the benchmark, it compares the beginning timestamp to the final (last recorded) timestamp. MobileMark 2007 derives its system battery life rating as the number of minutes between the start and end timestamps.

We followed the run rules that BAPCo specifies for MobileMark 2007 here: http://www.bapco.com/support/mobilemark2007/Manual/rules.html.

For more information on this benchmark, see http://www.bapco.com/products/mobilemark2007/.

BAPCo SYSmark 2007 Preview v1.06
BAPCo's SYSmark 2007 Preview v1.06 performance metric tests processor performance in the following four office workload scenarios: e-learning, office productivity, video creation, and 3D modeling. SYSmark 2007 Preview records the time the system takes to complete each individual operation in each scenario. For more information on this benchmark, see http://www.bapco.com/products/sysmark2007preview/.

Futuremark PCMark Vantage v1.0.2.0
Futuremark's PCMark Vantage v1.0.2.0 benchmark suite tests system CPU and GPU performance, RAM speeds, and hard drive read/write speeds. The benchmark runs common tasks such as video playback, audio and video transcoding, data encryption, Windows mail, game testing, and web page rendering. For more information on this benchmark, see http://www.futuremark.com/benchmarks/pcmarkvantage/introduction/.

Futuremark 3DMark 11 v1.0.1
Futuremark's 3DMark 11 v1.0.1. benchmark suite tests system GPU DirectX®11 performance and CPU workload processing performance, primarily to report a system's 3D gaming capability. Tests include HDR rendering, shadow mapping, and pixel shading. For more information on this benchmark, see http://www.3dmark.com/.

FutureMark 3DMark Vantage v1.1.0
FutureMark's 3DMark Vantage v1.1.0 benchmark suite tests system GPU DirectX10 performance, and requires either Microsoft Windows Vista or Windows 7. 3DMark Vantage v1.1.0 includes testing of GPU-powered physics, DirectX10-specific features, and procedural volumetric effects. Like 3DMark06 v1.2.0, 3DMark Vantage v1.1.0 provides an indication of a system's 3D gaming capability. For more information on this benchmark, see http://www.futuremark.com/benchmarks/3dmarkvantage/introduction/.

Test results

Figure 2 presents the median scores for the Packard Bell EasyNote TX notebook system on the benchmark tests we performed. For both MobileMark 2007 Productivity and SYSmark 2007 Preview, we conducted one conditioning run. We then conducted three official runs. For the remaining benchmarks, we conducted three runs. For MobileMark, we used the median of the Battery Life scores to determine the Performance Qualification score. In the event of a tie, we chose the run with the higher Performance Qualification score. For PCMark Vantage, we used the median of the PCMark Suite scores to determine the sub-scores. In the event of a tie, we chose the run with the higher Productivity score. For 3DMark 11 and 3DMark Vantage, we used the median of the 3DMark Scores to determine the sub-scores. In the event of a tie, we chose the run with the higher Combined or CPU score. There were no ties in any of our tests. (Complete test results appear in Appendix A.)

Test	Score
BAPCo MobileMark 2007 v1.06 Productivity (65 nits)	
MobileMark 2007 - Productivity - Performance Qualification score	233
MobileMark 2007 - Productivity - Battery Life score (minutes)	578
BAPCo SYSmark 2007 Preview v1.06	
SYSmark 2007 Preview v1.06 Rating	**179**
SYSmark 2007 Preview v1.06 - E-Learning	158
SYSmark 2007 Preview v1.06 - VideoCreation	194
SYSmark 2007 Preview v1.06 - Productivity	167
SYSmark 2007 Preview v1.06 - 3D	199
Futuremark PCMark Vantage 1.0.2.0	
PCMark Suite	**6,680**
Memories Suite	4,018
TV and Movies Suite	4,044
Gaming Suite	4,720
Music Suite	6,782
Communication Suite	6,104
Productivity Suite	5,678
HDD Test Suite	3,724
3DMark 11 v1.0.1	
3DMark Score	**982**
Graphics Score	879
Physics Score	3,555
Combined Score	815
3DMark Vantage 1.1.0 run in Entry Level mode	
3DMark Score	**13,751**
GPU Score	16,972
CPU Score	8,761
3DMark Vantage 1.1.0 run in Performance Level mode	
3DMark Score	**4,284**
GPU Score	3,661
CPU Score	8,751

Figure 2: Median benchmark scores for the Packard Bell EasyNote TX notebook system we tested.

Test methodology

This section details the methodologies we followed in testing the system.

Measuring battery life with MobileMark 2007

Antivirus software conflicts

MobileMark 2007 is not compatible with any virus-scanning software, so we uninstalled any such software present on the notebook PCs before we installed the benchmark.

Pre-installed software conflicts

MobileMark 2007 installs the following applications, which its test scripts employ:

- Adobe Photoshop 6.0.1
- InterVideo WinDVD® 6.0
- Macromedia® Flash® 5.0
- Microsoft Excel 2002
- Microsoft Outlook 2002
- Microsoft PowerPoint 2002
- Microsoft Word 2002
- Microsoft Visual® C++ 2005 Redistributable
- Netscape® Communicator 6.01
- Network Associates McAfee® VirusScan® 5.13
- WinZip Computing WinZip 8.0

If any of these applications are already on the system under test, they could cause problems with the benchmark due to software conflicts. To avoid any such issues, before we installed the benchmark, we uninstalled all conflicting pre-installed software applications, including different versions of any of the programs MobileMark 2007 uses.

Display brightness and power settings

The brightness of a notebook's display affects its battery life. Therefore, BAPCo requires that, before you test with MobileMark 2007, you do the following step: make sure the brightness of the notebook's monitor is greater than or equal to 60 nits on a completely white screen while the notebook is unplugged and running on battery power. The measurement follows the standards from the Video Electronics Standards Association (www.vesa.org/Standards/summary/2001_6a.htm).

We complied with this standard for all the tests we ran by setting the notebook PC's brightness as close to 60 nits as we could without going below that brightness level. We used the following procedure before we started each test. Note: This procedure assumes we began with the notebook plugged into the power supply.

1. To create a completely blank, white screen, open Microsoft Paint by clicking Start→All Programs→Accessories→Paint.
2. Open the Attributes by pressing Ctrl+E.
3. Enter dimensions that are larger than the current screen resolution. For example, if the screen resolution is 1,280 x 800, type `1600` for Width and `1200` for Height.
4. Click OK.
5. Press Ctrl+F to view the bitmap image and render the screen totally white.
6. Wait 45 minutes to allow the screen to warm.
7. Unplug the notebook from the power supply, and measure the display's brightness using a luminance meter in the center of the screen. (We used the Gossen Mavolux5032C.)
8. If the reading is below or significantly greater than 60 nits, use the notebook's keyboard screen-brightness-adjustment keys to bring the display as close to 60 nits as possible, then retest.
9. Allow the notebook to run on battery power for 10 minutes, re-measure the display, and adjust the brightness up or down as necessary.
10. Verify that the notebook saved the brightness setting by plugging in the system, unplugging it, and taking another reading.
    Note: If the notebook did not save this setting, use its power-management application(s) to set the brightness appropriately, and save that setting. If saving the settings is ineffective, use the keyboard

brightness setting keys to adjust the screen to bring the display as close to 60 nits as possible. Next, note how many times you pressed the button to achieve the desired brightness. After unplugging the system under test, use the keyboard to set the desired brightness by pressing the brightness button as many times as you previously noted to return the screen to the correct brightness level.

BAPCo AutoConfig Tool v2.4.1
This tool supports three levels of configuration:
1. Only makes changes that are REQUIRED in order for the benchmark to run.
2. Additionally, makes changes that are RECOMMENDED for repeatable results.
3. Additionally, makes changes that help ensure best results.

We choose Level 3 in the AutoConfig tool.

The BAPCo AutoConfig tool makes the following configuration changes at each of the three levels:

Level 1—Required
- Creates and activates a new power scheme that it names MobileMark 2007
- Disables hibernate, standby, and display standby
- Sets hard drive timeout and CPU power management
  Note: See the following Power schemes section for details on this scheme
- Disables Screen Saver
- Disables Windows Update
- Disables Desktop Cleanup Wizard
- Disables User Account Control (UAC)
- Disables Sidebar

Level 2—Recommended
- Completes Level 1
- Disables Windows Security Center warning messages
- Disables Windows Firewall
- Disables incoming Remote Desktop connections
- Disables Windows Error Reporting to Microsoft
- Prevents the Welcome Center from running at startup

Level 3—Best scores
- Completes Level 1 and Level 2
- Disables Windows Defender

Power schemes
The BAPCo AutoConfig tool creates a MobileMark 2007 power scheme, which makes the following power option changes:
- a. Additional settings:
  - Require a password on wakeup: No
- b. Hard disk:
  - Turn off hard disk after: 3 minutes
- c. Wireless Adapter Settings:
  - Power Saving Mode: Maximum Power Saving
- d. Sleep:
  - Sleep after: Never
- e. USB settings
  - USB selective suspend setting: Enabled
- f. Power buttons and lid:
  - Lid close action: Do nothing
  - Power button action: Shut down

- Sleep button action: Sleep
- Start menu power button: Shut down
g. PCI Express:
- Link State Power Management: Maximum power savings
h. Processor power management:
- Minimum processor state: 5%
- Maximum processor state: 100%
i. Search and Indexing:
- Power Savings Mode: Power Saver
j. Display:
- Turn off display after: Never
- Adaptive display: Off (Extends the time that Windows waits to turn off the display)
- Display brightness: 100% (We then adjust the brightness percentage to be no less than 60 nits)
k. Multimedia settings:
- When sharing media: Prevent idling to sleep
l. Battery:
- Critical battery action: Shut down (on battery), Do nothing (plugged in)
- Low battery level: 0%
- Critical battery level: 0%
- Low battery notification: Off
- Low battery action: Do nothing

Installing MobileMark 2007 v.1.06 and configuring the system for testing

1. Turn off the wireless network adapter by using the external toggle switch.
2. Insert the MobileMark 2007 Install DVD in the notebook PC's DVD drive.
3. When the Autoplay appears, click Run setup.exe.
4. At the Welcome screen, click Next.
5. Accept the license agreement, and click Next.
6. At the Choose Destination Location screen, accept the default location of C:\ProgramFiles (x86)\BapCo\MobileMark 2007, and click Next.
7. At the Ready to Install the Program screen, click Install.
8. At the InstallShield Wizard Complete screen, click Finish.
9. Download MobileMark 2007 Patch 5 from http://www.bapco.com/support, saving the download to the desktop.
10. Double-click the MobileMark 20007 Patch 5 desktop icon.
11. In the 7-Zip self-extracting archive window, select a location to extract the installation files, and click Extract.
12. Browse to the location of the extracted files, and double-click the MobileMark 2007 folder.
13. Double-click the MobileMark2007_patch folder.
14. Double-click setup.
15. At the Welcome screen, click Next.
16. At the Update Complete window, click Finish.
17. Run the BAPCo Auto-configuration tool, v.2.4.1, or manually set the power options:
    a. Insert the Auto-configuration tool disc in the notebook PC's DVD drive.
    b. Double-click BAPCo_AutoConfig.bat.
    c. Type M to choose MobileMark 2007.
    d. Type 3 to choose the changes that produce the best possible scores.
    e. Type R to restart the system when the application prompts you to do so.
18. Adjust the screen brightness to no less than 60 nits:
    a. Click the Windows start button, and type power options in the Windows Start Search box.
    b. Click Change plan settings.
    c. Click Change advanced power settings.
    d. Expand the Display option, and change the Display brightness on battery and plugged in to the correct percentage that produces no less than 60 nits.

Note: If you are unable to save these settings, please see the Displaying Brightness section above.
19. Disable automatic disk defragmentation:
   a. Click the Windows start button, type `disk defragmenter` in the Windows Start Search box, and press Enter.
   b. Click Configure Schedule.
   c. Uncheck the box next to Run on a schedule, and click OK.
   d. Click Close.
20. Disable System Protection:
   a. Click the Windows start button, and type `System` in the Windows Start Search box. In the search results that appear, click System under the Control Panel heading.
   b. Click System Protection in the left pane.
   c. In the System Properties window under the System Protection tab, click the first Available Drive under the Protection Settings heading, and click Configure.
   d. Click the Turn off system protection radio button, and click OK.
   e. When prompted with Are you sure you want to turn off system protection on this drive?, click Yes.
   f. Repeat steps c through e for any other Available Drives as necessary.
   g. Click OK, and close the System window.
21. Disable Windows Desktop Search indexing:
   a. Click the Windows start button, type `Indexing Options` in the Windows Start Search box, and press Enter.
   b. Click Modify.
   c. Under Change selected locations, uncheck the boxes next to each indexed location, and click OK.
   d. Click Close.
22. Defragment the hard drive(s):
   a. Click the Windows start button, type `disk defragmenter` in the Windows Start Search box, and press Enter.
   b. Highlight the local disk drive under Current status, and click Defragment disk.
   c. When the process is complete, click Close.

Conditioning the battery
1. Plug the AC power adapter into the notebook PC, and completely charge the battery.
2. Install MobileMark 2007 v1.06, following the steps we outlined in the Installing MobileMark 2007 section earlier in this section.
3. Double-click the MobileMark 2007 icon on the desktop.
4. Highlight the Productivity 2007 item in the left panel.
5. Type `System Conditioning` as the name for this test in the Project Name field in the top-right panel, and click Next Step.
6. If MobileMark 2007 lists no problems or warnings, click Next Step. If it does list any problems or warnings, close MobileMark 2007, and correct the problem(s) before proceeding.
7. After the benchmark integrity check, click Next in the Preparing a new test window.
8. When prompted, unplug the AC power adapter. The Productivity 2007 test begins immediately.
9. The test is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.
10. Plug the AC power adapter into the notebook PC, and completely charge the battery.

Measuring battery life with MobileMark 2007 v.1.06
We performed the following steps to run the MobileMark Productivity 2007 benchmark:
1. Double-click the MobileMark 2007 icon on the desktop.
2. Select the Productivity 2007 test by highlighting it in the left panel.
3. Enter a name for this test in the Project Name field in the top right panel, and click Next Step.
4. If MobileMark 2007 lists no problems or warnings, click Next. If it does list any problems or warnings, close MobileMark 2007, and correct the problem(s) before proceeding.
5. After the benchmark integrity check, click Next in the Preparing a new test window.
6. When prompted, unplug the AC power adapter. The test begins immediately.

7. The Productivity 2007 test is complete when the notebook PC has fully depleted its battery and is no longer operational when running on battery power.

We executed the MobileMark Productivity 2007 test three times on the system and took the median battery life run as the representative score for that test.

Getting the MobileMark 2007 results
After each MobileMark Productivity 2007 test completed, we plugged the AC power adapter into the notebook PC and turned on the system. MobileMark 2007 started automatically after the system booted, analyzed the test scores, and opened the Test Results Viewer with the results from the last test.

To submit these results to BAPCo, we saved the test results directory by performing the following steps:
1. Browse to the C:\ Program Files (x86)\BAPCo\MobileMark 2007\results directory.
2. Select My Computer.
3. Select Local Disk (C:).
4. Select the Program Files directory.
5. Select the BAPCo directory.
6. Select the MobileMark2007 directory.
7. Select the results directory. (Note: The name of the directory for the Productivity 2007 results is the name you gave the test in Step 3 of the MobileMark Productivity 2007 process.)

Measuring performance with BAPCo SYSmark 2007 Preview v1.06
Addressing antivirus software conflicts
SYSmark 2007 is not compatible with any virus-scanning software, so we uninstalled any such software that was present on the notebook PC before we installed the benchmark.

Addressing pre-installed software conflicts
SYSmark 2007 installs the following applications, which its test scripts employ:
- Adobe Photoshop 6.0.1
- InterVideo WinDVD 6.0
- Macromedia Flash 5.0
- Microsoft Excel 2002
- Microsoft Outlook 2002
- Microsoft PowerPoint 2002
- Microsoft Word 2002
- Microsoft Visual C++ 2005 Redistributable
- Netscape Communicator 6.01
- Network Associates McAfee VirusScan 5.13
- WinZip Computing WinZip 8.0

If any of these applications are already on the system under test, they cause problems with the benchmark due to software conflicts. To avoid any such issues, we uninstalled all conflicting pre-installed software applications, including different versions of any of the programs SYSmark 2007 uses. We did this before we installed the benchmark.

Setting up the test
1. Reset the system to the base test image.
2. Disable the User Account Control.
   a. Click the Windows start button, and type `Change User Account Settings`.
   b. In the User Account Control Settings window, move the slider down to Never notify.
   c. Click OK.
   d. Click the You must restart your computer to apply these changes pop-up message that appears at the bottom right of the screen, and click Restart Now.
3. Insert the SYSmark 2007 Preview Disc 1 installation disc into the DVD drive.
4. In the Autoplay window that appears, click Run setup.exe.

5. At the Welcome to InstallShield Wizard screen, click Next.
6. At the License Agreement screen, select I accept the terms in the License Agreement, and click Next.
7. At the Choose Destination Location screen, click Next.
8. At the Ready to Install the Program screen, click Install.
9. When the application prompts you to do so, remove SYSmark 2007 Preview Disc 1, and insert SYSmark Preview Disc 2 into the DVD drive. Click OK.
10. When the installation is complete, click Finish.
11. Download SYSmark 2007 Preview Patch 5 from http://www.bapco.com/support, saving the download to the desktop.
12. Double-click the SYSmark2007Preview-Patch5.exe.
13. In the 7-Zip self-extracting archive window, select a location to extract the installation files, and click Extract.
14. Browse to the location of the extracted files, and double-click on the SYSmark2007 file folder.
15. Double-click setup.exe.
16. At the Welcome screen, click Next.
17. At the Update Complete screen, click Finish.
18. Run the BAPCo Auto-configuration tool, v.2.4.1, or manually set the power options:
    a. Insert the Auto-configuration tool in the notebook PC's DVD drive.
    b. Double-click BAPCo_AutoConfig.bat.
    c. Type S and press Enter to choose SYSmark 2007.
    d. Type 3 and press Enter to choose the changes that produce the best possible scores.
    e. Type R and press Enter to reboot the system when the application prompts you to do so.

Running the test
1. Launch SYSmark 2007 Preview by double-clicking the desktop icon.
2. Click Run.
3. Select Official Run, choose 3 Iterations, check the box beside Perform conditioning run, and enter a name for that run.
4. When the benchmark completes and the main SYSmark 2007 Preview menu appears, click Save FDR to create a report.
5. Click OK to close the additional comments window, and select the location to save the report.
6. Select the desktop, and click Save.
7. Record the SYSmark results.

Measuring disk performance with PCMark Vantage 1.0.2.0
Installing and patching PCMark Vantage
1. Download the PCMark_Vantage_v102_installer.exe Windows package from www.futuremark.com/benchmarks/pcmarkvantage/download/.
2. Install PCMark Vantage 1.0.2 with the default options by double-clicking the PCMark_Vantage_v102_installer.exe file.
3. At the Welcome screen, click Next.
4. At the License Agreement window, click I accept the terms of the license agreement, and click Next.
5. At the Setup Type window click Express, and click Next.
6. At the Ready to Install the Program window, click Install.
7. When the PCMark Vantage Read Me page opens in your web browser, review the document, and click Close when you are finished.
8. At the InstallShield Wizard complete screen, click Finish.
9. Launch PCMark Vantage 1.0.2 by clicking on the PCMark Vantage x64 desktop icon. Enter the registration code, click Register, and click OK.
10. Exit PCMark Vantage 1.0.2.
Running PCMark Vantage 1.0.2.0
1. Reboot the system, and wait 2 minutes.
2. Double-click the PCMark Vantage desktop icon to launch the benchmark.
3. Verify all test suites are selected, and that the HDD Suite target is set to C:.
4. Accept the default settings, and click Run Benchmark.

5. When the benchmark run completes, click Submit results.
6. Take a screenshot of the results, and record them as follows:
   - PCMark Suite
   - Memories Suite
   - TV and Movies Suite
   - Gaming Suite
   - Music Suite
   - Communication Suite
   - Productivity Suite
   - HDD Test Suite
7. Perform steps 1 through 6 two more times, and report the median of the three runs.

Measuring graphics performance with 3DMark 11 1.0.1
Installing 3DMark 11
1. Download the 3DMark_11_v101_installer.exe Windows package from http://community.futuremark.com/store/.
2. Install 3DMark 11 1.0.1 with the default options by double-clicking the 3DMark_11_v101.exe file.
3. At the Choose Setup Language screen, choose English and click Next.
4. At the Welcome screen, click Next.
5. At the License Agreement screen, click I accept the terms of the license agreement, and click Next.
6. At the Setup Type screen, click Complete, and click Next.
7. At the Ready to Install the Program screen, click Install.
8. When the 3DMark 11 Read Me page appears in your Web browser, review the document, and click Close when you are finished.
9. At the Setup Complete screen, click Finish to restart the computer.
10. Launch 3DMark 11 1.0.1 by double-clicking on the 3DMark 11 desktop icon. Enter the registration code, and click Register.
11. Exit 3DMark 11 1.0.1.

Running 3DMark11 1.0.1
1. Reboot the system, and wait 2 minutes.
2. Double-click the 3DMark 11 desktop icon to launch the benchmark.
3. In the 3DMark 11 Main section, click the Performance option under Preset and select Benchmark tests only.
4. Click Run 3DMark 11.
5. When the benchmark run completes, take a screenshot of the results, and record them as follows:
   - 3DMark Score
   - Graphics Score
   - Physics Score
   - Combined Score
6. Perform steps 1 through 5 two more times, and report the median of the three runs.

Measuring graphics performance with 3DMark Vantage 1.1.0
Installing and patching 3DMark Vantage
1. Download the 3DMark_Vantage_v110_installer.exe Windows package from http://www.futuremark.com/benchmarks/3dmarkvantage/download/.
2. Install 3DMark Vantage 1.1.0 with the default options by double-clicking the 3DMark_Vantage_v110_installer.exe file.
3. At the Welcome screen, click Next.
4. At the License Agreement screen, click I accept the terms of the license agreement, and click Next.
5. At the Setup Type screen, click Express, and click Next.
6. At the Ready to Install the Program screen, click Install.
7. When the 3DMark Vantage Read Me page appears in your Web browser, review the document, and click Close when you are finished.

8. At the Setup Complete screen, click Finish.
9. Launch 3DMark Vantage 1.1.0 by double-clicking on the 3DMark Vantage desktop icon. Enter the registration code, and click Register.
10. Exit 3DMark Vantage 1.1.0.

Running 3DMark Vantage 1.1.0

For Entry-level results:
1. Reboot the system, and wait 2 minutes.
2. Double-click the 3DMark Vantage desktop icon to launch the benchmark.
3. In the 3DMark Vantage Main section, click the Preset drop-down menu arrow, and select Entry.
4. Click the Options tab, then click the Graphic Tests tab, and ensure that both tests are selected.
5. Click the CPU Tests tab, and ensure that both tests are selected.
6. Click the Feature Tests tab, and deselect all six tests by clicking the check mark by each title.
7. Click Run Benchmark.
8. When the benchmark run completes, take a screenshot of the results, and record them as follows:
   - 3DMark Score
   - GPU Score
   - CPU Score
9. Perform steps 1 through 8 two more times, and report the median of the three runs.

For Performance-level results:
1. Reboot the system, and wait 2 minutes.
2. Double-click the 3DMark Vantage desktop icon to launch the benchmark.
3. In the 3DMark Vantage Main section, click the Preset pull-down menu arrow, and select Performance.
4. Click the Options tab, then click the Graphic Tests tab, and ensure that both tests are selected.
5. Click the CPU Tests tab, and ensure that both tests are selected.
6. Click the Graphic Tests tab, and ensure that both tests are selected.
7. Click the Feature Tests tab, and deselect all six tests by clicking the check mark by each title.
8. Click Run Benchmark.
9. When the benchmark run completes, take a screenshot of the results, and record them as follows:
   - 3DMark Score
   - GPU Score
   - CPU Score
10. Perform steps 1 through 10 two more times, and report the median of the three runs.

Appendix A – Complete test results

Figure 3 presents the complete MobileMark 2007 Productivity 2007 test results for the test system. We conducted one conditioning run followed by three official MobileMark 2007 Productivity 2007 runs.

Test	Score
MobileMark 2007 Productivity 2007	
MobileMark 2007 - Productivity 2007 - Performance Qualification score - Run 1	235
MobileMark 2007 - Productivity 2007 - Performance Qualification score - Run 2	236
MobileMark 2007 - Productivity 2007 - Performance Qualification score - Run 3	233
MobileMark 2007 - Productivity 2007 - Battery Life score (minutes) - Run 1	578
MobileMark 2007 - Productivity 2007 - Battery Life score (minutes) - Run 2	578
MobileMark 2007 - Productivity 2007 - Battery Life score (minutes) - Run 3	578
SYSmark 2007 Preview v1.06	
SYSmark 2007 Preview v1.06 Rating	179
SYSmark 2007 Preview v1.06 - E-Learning	158
SYSmark 2007 Preview v1.06 - VideoCreation	194
SYSmark 2007 Preview v1.06 - Productivity	167
SYSmark 2007 Preview v1.06 - 3D	199
SYSmark 2007 Preview v1.06 - E-Learning Run 1	156
SYSmark 2007 Preview v1.06 - VideoCreation Run 1	187
SYSmark 2007 Preview v1.06 - Productivity Run 1	163
SYSmark 2007 Preview v1.06 - 3D Run 1	197
SYSmark 2007 Preview v1.06 - E-Learning Run 2	158
SYSmark 2007 Preview v1.06 - VideoCreation Run 2	197
SYSmark 2007 Preview v1.06 - Productivity Run 2	166
SYSmark 2007 Preview v1.06 - 3D Run 2	200
SYSmark 2007 Preview v1.06 - E-Learning Run 3	159
SYSmark 2007 Preview v1.06 - VideoCreation Run 3	199
SYSmark 2007 Preview v1.06 - Productivity Run 3	170
SYSmark 2007 Preview v1.06 - 3D Run 3	200
Futuremark PCMark Vantage 1.0.2.0	
PCMark Suite - Run 1	6,727
PCMark Suite - Run 2	6,655
PCMark Suite - Run 3	6,680
Memories Suite - Run 1	3,939
Memories Suite - Run 2	3,925
Memories Suite - Run 3	4,018
TV and Movies Suite - Run 1	4,157
TV and Movies Suite - Run 2	4,140
TV and Movies Suite - Run 3	4,044
Gaming Suite - Run 1	4,436
Gaming Suite - Run 2	4,680
Gaming Suite - Run 3	4,720
Music Suite - Run 1	6,701
Music Suite - Run 2	6,735
Music Suite - Run 3	6,782
Communication Suite - Run 1	6,121
Communication Suite - Run 2	6,048
Communication Suite - Run 3	6,104
Productivity Suite - Run 1	5,619

Test	Score
Productivity Suite - Run 2	5,702
Productivity Suite - Run 3	5,678
HDD Test Suite - Run 1	3,694
HDD Test Suite - Run 2	3,664
HDD Test Suite - Run 3	3,724
3DMark 11 v1.0.1	
3DMark Score - Run 1	984
Graphics Score - Run 1	880
Physics Score - Run 1	3,542
Combined Score - Run 1	827
3DMark Score - Run 2	982
Graphics Score - Run 2	879
Physics Score - Run 2	3,555
Combined Score - Run 2	815
3DMark Score - Run 3	979
Graphics Score - Run 3	878
Physics Score - Run 3	3,382
Combined Score - Run 3	814
3DMark Vantage 1.1.0 Entry Level mode	
3DMark Score - Run 1	13,751
GPU Score - Run 1	16,972
CPU Score - Run 1	8,761
3D Mark Score - Run 2	13,772
GPU Score - Run 2	16,985
CPU Score - Run 2	8,786
3D Mark Score - Run 3	13,749
GPU Score - Run 3	16,995
CPU Score - Run 3	8,740
3DMark Vantage 1.1.0 Performance Level mode	
3DMark Score - Run 1	4,284
GPU Score - Run 1	3,661
CPU Score - Run 1	8,751
3D Mark Score - Run 2	4,285
GPU Score - Run 2	3,657
CPU Score - Run 2	8,832
3D Mark Score - Run 3	4,277
GPU Score - Run 3	3,653
CPU Score - Run 3	8,763

Figure 3: Complete benchmark scores for the Packard Bell EasyNote TX notebook system we tested.

Appendix B – Test system configuration information

Figure 4 provides detailed configuration information about the test system.

System	Packard Bell EasyNote TX
General	
Number of processor packages	1
Number of cores per processor	2
Number of hardware threads per core	2
System power management policy	Balanced
Processor power-saving option	EIST
System dimensions (length x width x height)	Length: 14-7/8" Width: 9-3/4" Height when closed: 7/8" front, 1-1/8" middle, 1-5/16" back Height when open: 5/8" front, 13/16" middle, 10-1/8" back
System weight	5 lbs. 6 oz.
CPU	
Vendor	Intel
Name	Core i5
Model number	2410M
Stepping	D2
Socket type and number of pins	Socket 988B rPGA
Core frequency (GHz)	2.30
Bus frequency	DMI 2.0
L1 cache	32 KB + 32 KB per core
L2 cache	512 KB (256 KB per core)
L3 cache	3 MB (shared)
Platform	
Vendor	Packard Bell
Motherboard model number	SJM50_HR
Motherboard chipset	Intel HM65
BIOS name and version	Packard Bell V1.05 (06/08/2011)
Memory module(s)	
Vendor and model number	1 x Kingston ACR256X64D3S1333C9 & 1 x Elpida EBJ41UF8BCS0-DJ-F
Type	PC3-10600
Speed (MHz)	1,333
Speed running in the system (MHz)	1,333
Timing/Latency (tCL-tRCD-tRP-tRASmin)	9-9-9-24
Memory module Size (MB)	Kingston= 2,048 Elpida= 4,096
Number of memory module(s)	2
Amount of RAM in system (GB)	6
Chip organization (single-sided/double-sided)	Double-sided
Hard disk	
Vendor and model number	Seagate ST9640320AS
Number of disks in system	1
Size (GB)	640
Buffer size (MB)	8
RPM	5,400
Type	SATA 3.0 Gb/s

System	Packard Bell EasyNote TX
Controller	Intel Mobile Express Chipset SATA AHCI Controller
Driver	Intel 10.5.0.1026 (04/26/2011)
Operating system	
Name	Windows 7 Home Premium 64-bit
Build number	7601
Service Pack	1
File system	NTFS
Kernel	ACPI x64-based PC
Language	English
Microsoft DirectX version	11
Graphics 1	
Vendor and model number	Intel HD Graphics 3000
Type	Integrated
Chipset	Intel HD Graphics Family
BIOS version	2111.0
Total available graphics memory (MB)	1,760
Dedicated video memory (MB)	128
System video memory (MB)	0
Shared system memory (MB)	1,632
Resolution	1,366 x 768
Driver	Intel 8.15.10.2342 (03/25/2011)
Graphics 2	
Vendor and model number	NVIDIA$^®$ GeForce$^®$ GT 540M
Type	Discrete
Chipset	GeForce GT 540M
BIOS version	70.08.45.00.42
Total available graphics memory (MB)	4,095
Dedicated video memory (MB)	2,048
System video memory (MB)	0
Shared system memory (MB)	2,047
Resolution	1,366 x 768
Driver	NVIDIA 8.17.12.6721 (02/18/2011)
Sound card/subsystem 1	
Vendor and model number	Conexant High Definition Audio
Driver	Conexant 8.54.8.50 (04/12/2011)
Sound card/subsystem 2	
Vendor and model number	Intel Display Audio
Driver	Intel 6.14.0.3074 (10/15/2010)
Ethernet	
Vendor and model number	Atheros AR8151 PCI-E Gigabit
Driver	Atheros 1.0.0.36 (09/27/2010)
Wireless	
Vendor and model number	Broadcom 802.11n
Driver	Broadcom 5.100.235.19 (02/15/2011)
Optical drive(s)	
Vendor and model number	Matshita UJ8A2AS
Type	DVD-RW

System	Packard Bell EasyNote TX
USB ports	
Number	4
Type	1 x USB 3.0; 3 x USB 2.0
Other	Media card reader
Monitor	
LCD type	HD LED WXGA
Screen size	15.6"
Refresh rate (Hz)	60
Battery	
Type	6-cell Lithium-ion battery (non-removable)

Figure 4: Detailed configuration information for the test system.

About Principled Technologies

We provide industry-leading technology assessment and fact-based marketing services. We bring to every assignment extensive experience with and expertise in all aspects of technology testing and analysis, from researching new technologies, to developing new methodologies, to testing with existing and new tools.

When the assessment is complete, we know how to present the results to a broad range of target audiences. We provide our clients with the materials they need, from market-focused data to use in their own collateral to custom sales aids, such as test reports, performance assessments, and white papers. Every document reflects the results of our trusted independent analysis.

We provide customized services that focus on our clients' individual requirements. Whether the technology involves hardware, software, Web sites, or services, we offer the experience, expertise, and tools to help our clients assess how it will fare against its competition, its performance, its market readiness, and its quality and reliability.

Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 20 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.