Mobile PC Performance: Built-To-Order Systems

Executive summary

Intel Corporation (Intel) commissioned Principled Technologies (PT) to run a set of performance tests on two pairs of built-to-order Acer laptops:

- Acer TravelMate 4402WLMi (with an AMD Turion 64 ML-30 processor; $1,099 at time of purchase), which we compared to an
- Acer TravelMate 4062WLMi (with an Intel Pentium M 740 processor; $974 at time of purchase)
- Acer TravelMate 4404WLMi (with an AMD Turion 64 ML-34 processor; $1,199 at time of purchase, but $1,149 on 03/03/06), which we compared to an
- Acer TravelMate 4202WLMi (with an Intel Core Duo T2300 processor; $1,274 at time of purchase, but $1,099 on 03/03/06)

The goal in choosing the systems was to find units as close in price and configuration as possible.

The goal of the testing was to gauge the performance and energy consumption that laptop buyers would experience on systems they purchased online from such well-known sites as www.newegg.com using five custom performance tests. Intel identified the test systems, tests, test procedures, and test settings. PT purchased and set up the systems, and PT executed all tests. We ran performance tests using the following applications:

> **Key findings**
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> - The Intel Pentium M 740 processor-based system ran from 7 to 23 percent faster than the AMD Turion 64 ML-30 processor-based system on all performance tests.
> - The Intel Pentium M 740 processor-based system consumed from 66 to 86 percent less power than the AMD Turion 64 ML-30 processor- based system during all performance tests.
> - The Intel Core Duo T2300 processor-based system ran from 36 to 100 percent faster than the AMD Turion 64 ML-34 processor-based system on all performance tests.
> - The Intel Core Duo T2300 processor-based system consumed from 133 to 219 percent less power than the AMD Turion 64 ML-34 processor-based system during all performance tests.

Performance test applications	
• Adobe Photoshop Elements 4.0 with Adobe Premiere Elements 2.0	• InterVideo iVideoToGo for PSP
• Apple iTunes 6.0.3	• Microsoft Windows Movie Maker 2.1
	• Pinnacle Studio 10

Tables 1 and 2 summarize the performance results and power measurements of each test. Each result is the median of three runs on each system. (In the event of a tie we chose the run with the higher power consumption. If the power consumption score was also tied, we then chose the first run we executed with those scores.) For these performance and power measurement tests, lower scores are better because they represent the time or the power the system required to complete each workload.

We used the Intel Power Acquisition Recording Kit (iPARK) in the power measurement tests. The iPARK device is an external unit that connects to a host computer through a USB cable. It also has a DC power cable that powers the system under test. We used the iPARK device to monitor the average DC power consumption of each system while under load. We then multiplied iPARK's average DC power score by the time the workload took to complete to calculate the Workload Energy Consumption (WEC) in Watt-seconds. We divided the WEC Watt-seconds score by 3600 (the number of seconds in an hour) to calculate the WEC Watt-hours we reported below.

Because screen brightness can affect the amount of power a system consumes, for each pair of comparison systems we set the brightness to be as close as we could make it to the brightness of the dimmer of the two systems. Consequently, each Intel-based system was actually slightly brighter than its AMD-based comparison system. The nits measurements in parentheses below each system name in Table 1 and Table 2 give the tested brightness for each system.

In the rightmost column of each result set, we compare the median results of the systems. We calculate this comparison by dividing the AMD-based system's score by the Intel-based system's score. Consequently, comparative results above 1.00 indicate tests on which the Intel-based system performed better or was more power-efficient, and those below 1.00 indicate tests on which the AMD-based system performed better or was more power-efficient. See Appendix C for the detailed results of each test run.

PERFORMANCE RESULTS (seconds)				POWER CONSUMPTION RESULTS (watt hours)		
Acer TM4402WLMi AMD Turion 64 ML-30 1.6 GHz (135 nits)	Acer TM4062WLMi Intel Pentium M 740 1.73 GHz (142 nits)	Comparative Rating	TESTS	Acer TM4402WLMi AMD Turion 64 ML-30 1.6 GHz (135 nits)	Acer TM4062WLMi Intel Pentium M 740 1.73 GHz (142 nits)	Comparative Rating
502	433	**1.16**	Adobe Photoshop Elements 4.0 with Adobe Premiere Elements 2.0	8.03	4.61	**1.74**
260	224	**1.16**	Apple iTunes 6.0.3	4.23	2.40	**1.76**
64	52	**1.23**	InterVideo iVideoToGo for PSP	1.01	0.55	**1.84**
203	165	**1.23**	Microsoft Windows Movie Maker 2.1	3.34	1.81	**1.85**
287	269	**1.07**	Pinnacle Studio 10	4.70	2.84	**1.65**

Table 1: Results of performance and power measurement tests on the AMD-based Acer TravelMate 4402WLMi and the Intel-based Acer TravelMate 4062WLMi. Lower scores are better on both execution time and Workload Energy Consumption.

PERFORMANCE RESULTS (seconds)				POWER CONSUMPTION RESULTS (watt hours)		
Acer TM 4404WLMi AMD Turion 64 ML-34 1.8 GHz (165 nits)	Acer TM4202WLMi Intel Core Duo T2300 1.66 GHz (174 nits)	Comparative Rating	TESTS	Acer TM 4404WLMi AMD Turion 64 ML-34 1.8 GHz (165 nits)	Acer TM4202WLMi Intel Core Duo T2300 1.66 GHz (174 nits)	Comparative Rating
444	249	**1.78**	Adobe Photoshop Elements 4.0 with Adobe Premiere Elements 2.0	7.67	2.66	**2.88**
248	131	**1.89**	Apple iTunes 6.0.3	4.10	1.40	**2.93**
57	42	**1.36**	InterVideo iVideoToGo for PSP	0.96	0.41	**2.34**
182	91	**2.00**	Microsoft Windows Movie Maker 2.1	3.19	1.00	**3.19**
261	172	**1.52**	Pinnacle Studio 10	4.44	1.71	**2.60**

Table 2: Results of performance and power measurement tests on the AMD-based Acer TravelMate 4404WLMi and the Intel-based Acer TravelMate 4202WLMi. Lower scores are better on both execution time and Workload Energy Consumption.

The full report is available at http://www.principledtechnologies.com/clients/reports/Intel/MobilePCPerf1.pdf.