DELL LATITUDE 2120: NETBOOK SOLVENT-RESISTANCE COMPARISON

INTRODUCTION

As technological advances make educational information easier to access electronically, school systems strive to provide students with the most appropriate and effective tools to use both in the classroom and at home. Netbooks are an ideal choice: they are easy to transport, they build on the familiarity many students have with PCs, and, most importantly, they provide these benefits at a fraction of the cost of a traditional notebook PC.

With so many netbooks on the market, how does an educational institution decide which to buy? Because students will be transporting them and using them in all kinds of settings, sometimes carelessly, durability is essential; the systems must continue to look good throughout their lifespan. In the labs at Principled Technologies, we tested the ability of 17 leading netbook systems to resist various solvents. Of the netbooks we tested, the Dell Latitude 2120 proved the most resistant, with its lid showing no discoloration or damage from any of the solvents.

PROJECT OVERVIEW

Students who use school-provided netbooks do not always handle these systems with appropriate care. A student leaving his or her netbook on the coffee table at home is likely to overlook the risk of spills from common household substances such as cleaning products. To see how resistant they were to such substances, we tested the following netbooks from leading vendors:

- Acer Aspire One 532h*
- Acer Aspire One 533
- Acer Aspire One 721
- Acer Aspire One D255
- Apple® iPad™*
- ASUS Eee PC™ 1015PEM
- ASUS Eee PC 1016P
- ASUS Eee PC 1018P
- ASUS Eee PC 1215N

- Dell Latitude 2120
- Equus® NOBi Convertible*
- HP Mini 100e
- HP Mini 2102*
- HP Mini 5103
- Lenovo® IdeaPad® S10-3*
- Lenovo IdeaPad S10-3t*
- Lenovo ThinkPad® X100e*

To test the solvent resistance of each netbook's exterior, we used a dropper to place one drop of each of six solvents (non-acetone nail polish remover, acetone-based nail polish remover, bleach, hydrogen peroxide, isopropyl alcohol, and Oil of Olay® facial wash) on its lid. We conducted three test rounds for each netbook, allowing the solvents to sit on the lid's surface for increasing amounts of time before wiping them away. The solvents remained on the surface for 10 seconds for the first round, 1 minute for the second round, and 5 minutes for the third round. Three judges assessed each netbook after each test round, assigning a score from 1 (least discolored or stained) to 5 (most discolored or stained). We then averaged these scores for each test run. Finally, at the end of the three test rounds, the judges assigned an overall ranking to each of the 17 systems, from 1 (least discolored, stained, or damaged) to 5 (most discolored, stained, or damaged). We then averaged the scores of the three judges to assign an overall average ranking for the netbooks.

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* Please note that PT tested the systems marked with an asterisk in June 2010. In this report, we compare the systems we tested in February 2011 to these previously published results, which we reproduce here and are available at http://www.principledtechnologies.com/clients/reports/Dell/Latitude2110_scratch_solvent0610.pdf.

WHAT WE FOUND

We tested the solvent resistance of the 17 netbooks by allowing six different solvents to remain on the closed lids for times ranging from 10 seconds to 5 minutes. The Dell Latitude 2120 performed best during the three solvent-resistance test rounds, showing no signs of discoloration or other damage from any of the solvents at any duration. See the How we tested section for the detailed steps we followed for testing.

Figure 1 shows the netbooks, ranked from 1 (least damaged) to 17 (most damaged), with a description of the damage we recorded for each netbook.

Overall ranking	Netbook	Notes
1	Dell Latitude 2120	The system showed no signs of discoloration or damage from any of the solvents at any duration.
2	Equus NOBi Convertible*	System was only discolored by the Oil of Olay facial wash, which left a faint oily stain.
3	Lenovo IdeaPad S10-3*	System was only affected by Oil of Olay, which left a barely noticeable stain on the textured surface.
4	ASUS Eee PC 1015PEM	After 1 minute, the system was discolored by the Oil of Olay facial wash, which left a faint oily stain. The acetone and non-acetone nail polish removers left barely-noticeable rings on the surface after 5 minutes.
5	Apple iPad*	After 5 minutes, the bleach left a faint white stain on the aluminum surface. The Oil of Olay facial wash and acetone-based nail polish remover had a similar effect on the system's aluminum surface.
6	Acer Aspire One 532h*	System affected by the non-acetone and acetone-based nail polish remover. After 5 minutes, the non-acetone nail polish remover left a significantly noticeable stain and a sizable smudge on the system's surface. The acetone-based nail polish remover initially left no stains on the lid, but after the 60-second and 5-minute tests, began to cause a ring stain filled in with discoloration.
7	Lenovo IdeaPad S10-3t*	System affected by the non-acetone and acetone-based nail polish removers. Initially, the non-acetone nail polish remover had no effect on the system's surface, but, after the 5-minute test, it left a distinct ring on the surface as well as some discoloration within the ring. The acetone-based nail polish remover produced a stain that was more noticeable with each consecutive test.
8	HP Mini 2102*	System affected by the non-acetone and acetone-based nail polish removers. Both left a ring and discoloration, which were more pronounced with each run.
9	ASUS Eee PC 1016P	The system was discolored by the Oil of Olay facial wash, which left an oily smudge, at each duration. The acetone-based nail polish remover left a ring after 1 minute, and the non-acetone based remover and isopropyl alcohol left barely-noticeable rings after 5 minutes.

Overall ranking	Netbook	Notes
10	Acer Aspire One 533	The system was affected by both nail polish removers. After 1 minute, the non-acetone remover left a noticeable ring, which became much more noticeable after 5 minutes. The acetone-based remover left a very noticeable ring after 1 minute; the ring did not get worse during the 5-minute test.
11	ASUS Eee PC 1215N	Both nail polish removers discolored the system's lid after 1 minute, and discolored it even further after 5 minutes. After 5 minutes, the isopropyl alcohol left a faint stain, and the Oil of Olay facial wash left a barely-noticeable smudge after 1 minute.
12	Lenovo ThinkPad X100e*	System affected by the non-acetone and acetone-based nail polish removers and Oil of Olay facial wash. The non-acetone immediately left a slight stain after the 10-second test, which became more discolored and noticeable with each consecutive run. The acetone-based nail polish remover left only a light ring, which is only noticeable from certain angles. The Oil of Olay facial wash left a slight oil stain on the lid.
13	Acer Aspire One 721	Both nail polish removers discolored the system's lid after 1 minute, and discolored it even further after 5 minutes. After 1 minute, the isopropyl alcohol left a faint stain, and the Oil of Olay facial wash left a slight smudge after all tests.
14	HP Mini 5103	After 1 minute, the non-acetone nail polish remover left a faint stain, which did not get worse after 5 minutes. The acetone-based nail polish remover left a very noticeable stain after 1 minute, which did not get worse after 5 minutes. After 10 seconds, the bleach left a slight spot, which got worse only after the 5-minute test. After 10 seconds, the Oil of Olay facial wash left a slight smudge, which did not get worse with the subsequent tests.
15	ASUS Eee PC 1018P	After 1 minute, the non-acetone nail polish remover left a barely noticeable ring, which became severe after 5 minutes. The acetone-based remover left a very noticeable ring after 1 minute, and the discoloration worsened significantly after 5 minutes. The bleach and isopropyl alcohol left barely visible rings after 5 minutes, and the Oil of Olay facial wash left a slight smudge after 10 seconds; the smudge did not get worse with the subsequent tests.
16	Acer Aspire One D255	The non-acetone nail polish remover left a slight ring, which got worse after the 5-minute test, while the acetone-based nail polish remover left a significant ring after 1 minute; this became worse after the 5 minute-test. The bleach left a slight circular smudge after 10 seconds, and the Oil of Olay facial wash left a slight smudge after 1 minute.
17	HP Mini 100e	The non-acetone nail polish remover left a barely noticeable ring, which became more severe at longer durations. The acetone-based remover left a slight ring after 10 seconds, and significantly discolored the lid after 5 minutes. The Oil of Olay facial wash left a slight smudge after all tests.

Figure 1: Solvent-resistance test notes for the 17 netbook systems.

Figure 2 shows the key for the solvent-resistance test results in figures 3 through 5.

Key to solvent-resistance test results				
🟢	⚪	🟡	🟠	🔴
No damage	Slight damage	Moderate damage	Above-moderate damage	Heavy damage

Figure 2: Key to solvent-resistance test results.

Figure 3 presents detailed results of the solvent-resistance test when the solvents remained on the netbook lids for 10 seconds.

Overall ranking	Netbook system	Non-acetone nail polish remover	Acetone – based nail polish remover	Bleach	Hydrogen peroxide	Isopropyl alcohol	Oil of Olay facial wash
1	Dell Latitude 2120	🟢	🟢	🟢	🟢	🟢	🟢
2	Equus NOBi Convertible*	🟢	🟢	🟢	🟢	🟢	⚪
3	Lenovo IdeaPad S10-3*	🟢	🟢	🟢	🟢	🟢	⚪
4	ASUS Eee PC 1015PEM	🟢	🟢	🟢	🟢	🟢	🟢
5	Apple iPad*	🟢	🟢	🟢	🟢	🟢	⚪
6	Acer Aspire One 532h*	🟢	🟢	🟢	🟢	🟢	🟢
7	Lenovo IdeaPad S10-3t*	🟢	🟢	🟢	🟢	🟢	🟢
8	HP Mini 2102*	🟢	🟢	🟢	🟢	🟢	🟢
9	ASUS Eee PC 1016P	🟢	🟢	🟢	🟢	🟢	⚪
10	Acer Aspire One 533	🟢	🟢	🟢	🟢	🟢	🟢
11	ASUS Eee PC 1215N	🟢	🟢	🟢	🟢	🟢	🟢
12	Lenovo ThinkPad X100e*	⚪	🟢	🟢	🟢	🟢	⚪
13	Acer Aspire One 721	🟢	🟢	🟢	🟢	🟢	⚪
14	HP Mini 5103	🟢	🟢	⚪	🟢	🟢	⚪
15	ASUS Eee PC 1018P	🟢	🟢	🟢	🟢	🟢	⚪
16	Acer Aspire One D255	⚪	🟢	⚪	🟢	🟢	🟢
17	HP Mini 100e	⚪	⚪	🟢	🟢	🟢	⚪

Figure 3: Solvent-resistance results for the 17 netbook systems. Solvents remained on the lid's surface for a duration of 10 seconds.

Figure 4 presents detailed results of the solvent-resistance test when the solvents remained on the netbook lids for 60 seconds.

Overall ranking	Netbook system	Non-acetone nail polish remover	Acetone – based nail polish remover	Bleach	Hydrogen peroxide	Isopropyl alcohol	Oil of Olay facial wash
1	Dell Latitude 2120	🟢	🟢	🟢	🟢	🟢	🟢
2	Equus NOBi Convertible*	🟢	🟢	🟢	🟢	🟢	◯(olive)
3	Lenovo IdeaPad S10-3*	🟢	🟢	🟢	🟢	🟢	◯(olive)
4	ASUS Eee PC 1015PEM	🟢	🟢	🟢	🟢	🟢	◯(olive)
5	Apple iPad*	🟢	🟢	🟢	🟢	🟢	◯(olive)
6	Acer Aspire One 532h*	🟢	◯(olive)	🟢	🟢	🟢	🟢
7	Lenovo IdeaPad S10-3t*	🟢	◯(olive)	🟢	🟢	🟢	🟢
8	HP Mini 2102*	◯(olive)	◯(olive)	🟢	🟢	🟢	🟢
9	ASUS Eee PC 1016P	🟢	◯(olive)	🟢	🟢	🟢	◯(olive)
10	Acer Aspire One 533	◯(olive)	🟡	🟢	🟢	🟢	🟢
11	ASUS Eee PC 1215N	◯(olive)	🟡	🟢	🟢	🟢	◯(olive)
12	Lenovo ThinkPad X100e*	🟡	◯(olive)	🟢	🟢	🟢	◯(olive)
13	Acer Aspire One 721	◯(olive)	◯(olive)	🟢	🟢	◯(olive)	◯(olive)
14	HP Mini 5103	◯(olive)	🟡	◯(olive)	🟢	🟢	◯(olive)
15	ASUS Eee PC 1018P	◯(olive)	🟡	🟢	🟢	🟢	◯(olive)
16	Acer Aspire One D255	◯(olive)	🟡	◯(olive)	🟢	🟢	◯(olive)
17	HP Mini 100e	🟡	◯(olive)	🟢	🟢	🟢	◯(olive)

Figure 4: Solvent-resistance results for the 17 netbook systems. Solvents remained on the lid's surface for a duration of 60 seconds.

Figure 5 presents detailed results of the solvent-resistance test when the solvents remained on the netbook lids for 5 minutes.

Overall ranking	Netbook system	Non-acetone nail polish remover	Acetone – based nail polish remover	Bleach	Hydrogen peroxide	Isopropyl alcohol	Oil of Olay facial wash
1	Dell Latitude 2120	green	green	green	green	green	green
2	Equus NOBi Convertible*	green	green	green	green	green	light green
3	Lenovo IdeaPad S10-3*	green	green	green	green	green	light green
4	ASUS Eee PC 1015PEM	light green	light green	green	green	green	light green
5	Apple iPad*	green	green	green	green	green	light green
6	Acer Aspire One 532h*	yellow	yellow	green	green	green	green
7	Lenovo IdeaPad S10-3t*	yellow	yellow	green	green	green	green
8	HP Mini 2102*	yellow	yellow	green	green	green	green
9	ASUS Eee PC 1016P	light green	light green	green	green	green	light green
10	Acer Aspire One 533	yellow	yellow	green	green	green	green
11	ASUS Eee PC 1215N	yellow	yellow	green	green	green	light green
12	Lenovo ThinkPad X100e*	orange	light green	green	green	green	light green
13	Acer Aspire One 721	yellow	yellow	green	green	light green	light green
14	HP Mini 5103	light green	yellow	yellow	green	green	light green
15	ASUS Eee PC 1018P	orange	orange	light green	green	green	light green
16	Acer Aspire One D255	yellow	orange	light green	green	green	light green
17	HP Mini 100e	orange	orange	green	green	green	light green

Figure 5: Solvent-resistance results for the 17 netbook systems. Solvents remained on the lid's surface for a duration of 5 minutes.

HOW WE TESTED

Measuring resistance to solvents

Jane Smith has just placed her netbook computer on an end table in order to remove her nail polish. Jane places the nail polish remover on the end table and reaches for her water, not thinking of the proximity of the nail polish remover to the netbook, and accidentally splashes a drop of the liquid onto the lid of her netbook. It takes Jane several seconds to retrieve a paper towel and remove the nail polish remover. How will Jane's netbook handle the spill of such a solvent?

The size and portability of a netbook computer increases its likelihood of encountering typical household solvents such as nail polish remover, bleach, isopropyl alcohol, hydrogen peroxide, and makeup removing facial wash. We designed this test to measure the effects, both cosmetic and functional, that such solvents have on netbook computers when spilled on the closed lid surface. Because it is unlikely that a spill would be wiped away immediately in an accident, we allowed the solvents to sit on the surface for various periods of time, ranging from 10 seconds to 5 minutes, before cleaning them off.

To measure the effects of solvent spills on the surface of a netbook, we performed the following steps:

1. Place the closed netbook on an absorbent pad on the test bench.
2. Using the location map, below, use a glass dropper to place one drop of non-acetone nail polish remover on the surface of the netbook lid.
3. Wait 10 seconds and wipe with an absorbent paper towel.
4. Mark the area to indicate the solvent type.
5. Repeat steps 2 through 4 with the following solvents, using different areas of the netbook lid:
   a. Acetone-based nail polish remover
   b. Bleach
   c. Hydrogen peroxide
   d. Isopropyl alcohol
   e. Oil of Olay facial wash
6. Evaluate each area for discoloration, bubbling, and corrosion. Evaluate each lid on a scale from 1 to 5, with 1 being equal to lightly damaged and 5 being equal to heavily corroded, bubbled, or discolored.
7. Repeat steps 2 through 6 twice more, substituting the following durations in step 3:
   a. 60 seconds
   b. 5 minutes

Figure 6 shows the placement of solvents on the netbook lid.

Figure 6: Position diagram for placement of solvents on netbook lid.

IN CONCLUSION

One of the most important factors an educational institution can consider when selecting netbooks to purchase for students is system durability. Budgets do not allow for poor purchasing decisions that require schools to replace netbooks that appear old and damaged before the end of a typical lifecycle.

In our hands-on tests, the lid of the Dell Latitude 2120 displayed no cosmetic damage when we applied common household solvents, making it an excellent netbook for schools to offer their students.

APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figures 7 through 9 present the system configuration information for the test systems, which we list alphabetically. System configuration information for the systems we tested previously is available at http://www.principledtechnologies.com/clients/reports/Dell/Latitude2110_scratch_solvent0610.pdf.

System	Acer Aspire One 533	Acer Aspire One 721	Acer Aspire One D255
General			
Number of processor packages	1	1	1
Number of cores per processor	1	1	1
Number of hardware threads per core	2	1	2
System power management policy	Balanced	Balanced	Balanced
Processor power-saving option	Enhanced Intel® SpeedStep® Technology	AMD Cool'n'Quiet™ Technology	Enhanced Intel SpeedStep Technology
System dimensions (length x width x height)	10" x 7-1/2" x 1-3/4"	11-1/4" x 8" x 1-1/4 "	10-1/8" x 7-1/4" x 1-1/4"
System weight	2 lbs. 10 oz.	2 lbs. 14 oz.	2 lbs. 8 oz.
CPU			
Vendor	Intel	AMD	Intel
Name	Atom™	Athlon™ II Neo	Atom
Model number	N475	K125	N450
Stepping	B0	DA-C3	B0
Socket type and number of pins	Socket 437 FCBGA8	Socket ASB2	Socket 437 FCBGA8
Core frequency (GHz)	1.83	1.70	1.66
Bus frequency	667 MHz	2,000 MHz	667 MHz
L1 cache	24 KB + 32 KB	64 KB + 64 KB	24 KB + 32 KB
L2 cache	512 KB	1 MB	512 KB
L3 cache	N/A	N/A	N/A
Platform			
Vendor	Acer	Acer	Acer
Motherboard model number	AO533	Aspire One 721	JE02_PT
Motherboard chipset	Intel NM10	AMD 785GX	Intel NM10

System	Acer Aspire One 533	Acer Aspire One 721	Acer Aspire One D255
BIOS name and version	Acer v1.02 (05/07/2010)	Phoenix Technologies V1.15 (09/06/2010)	Acer V3.09(DDR2) (11/03/2010)
Memory module(s)			
Vendor and model number	Samsung M471B2873FHS-CH9	Elpida EBJ21UE8BDS0-DJ-F	Kingston ACR128X64D2S800C6
Type	PC3-10600	PC3-10600	PC2-6400
Speed (MHz)	1,333	1,333	800
Speed running in the system (MHz)	667	800	667
Timing/Latency (tCL-tRCD-tRP-tRASmin)	5-5-5-12	6-6-6-15	5-5-5-15
Size (MB)	1,024	2,048	1,024
Number of memory module(s)	1	1	1
Chip organization (single-sided/double-sided)	Double-sided	Double-sided	Double-sided
Channel (single/dual)	Single	Single	Single
Hard disk			
Vendor and model number	Hitachi HTS545025B9A300	Western Digital WD2500BEVT-22A23T0	Toshiba MK1665GSX
Number of disks in system	1	1	1
Size (GB)	250	250	160
Buffer size (MB)	8	8	8
RPM	5,400	5,400	5,400
Type	SATA 3.0 Gb/s	SATA 3.0 Gb/s	SATA 3.0 Gb/s
Controller	Intel NM10	AMD SB850	Intel NM10
Driver	Intel 8.9.0.1023 (06/04/2009)	Microsoft 6.1.7600.16385 (06/21/2006)	Intel 9.6.4.1002 (06/08/2010)
Operating system			
Name	Windows ® 7 Starter 32-bit	Windows 7 Home Premium 64-bit	Windows 7 Starter 32-bit
Build number	7600	7600	7600
Service Pack	N/A	N/A	N/A
File system	NTFS	NTFS	NTFS
Kernel	ACPI x86-based PC	ACPI x64-based PC	ACPI x86-based PC
Language	English	English	English
Microsoft® DirectX® version	DirectX 11	DirectX 11	DirectX 11

System	Acer Aspire One 533	Acer Aspire One 721	Acer Aspire One D255
Graphics			
Vendor and model number	Intel GMA 3150	ATI Mobility Radeon HD 4225	Intel GMA 3150
Type	Integrated	Discrete	Integrated
Chipset	Intel Graphics Media Accelerator 3150	ATI display adapter	Intel Graphics Media Accelerator 3150
BIOS version	1818.0	BK-ATI-VER010.094.001.045.035 928	2001.0
Total available graphics memory (MB)	250	1,023	250
Dedicated video memory (MB)	0	384	0
System video memory (MB)	64	0	64
Shared system memory (MB)	186	639	186
Resolution	1,024 x 600	1,366 x 768	1,024 x 600
Driver	Intel 8.14.10.2117 (04/19/2010)	ATI 8.692.1.0 (01/22/2010)	Intel 8.14.10.2117 (04/19/2010)
Sound card/subsystem			
Vendor and model number	Realtek High Definition Audio	Realtek High Definition Audio	Realtek High Definition Audio
Driver	Realtek 6.0.1.6066 (03/22/2010)	Realtek 6.0.1.6043 (02/08/2010)	Realtek 6.0.1.6171 (08/03/2010)
Ethernet			
Vendor and model number	Atheros® AR8152 PCI-E Fast Ethernet Controller	Atheros AR8151 PCI-E Gigabit Ethernet Controller	Atheros AR8152 PCI-E Father Ethernet Controller
Driver	Atheros 1.0.0.29 (04/21/2010)	Atheros 1.0.0.26 (02/22/2010)	Atheros 1.0.0.35 (08/24/2010)
Wireless			
Vendor and model number	Broadcom® 802.11n Network Adapter	Broadcom 802.11n Network Adapter	Broadcom 802.11n Network Adapter
Driver	Broadcom 5.60.350.6 (03/22/2010)	Broadcom 5.60.350.6 (03/22/2010)	Broadcom 5.100.249.2 (06/03/2010)
Modem			
Vendor and model number	N/A	N/A	N/A
Driver	N/A	N/A	N/A

System	Acer Aspire One 533	Acer Aspire One 721	Acer Aspire One D255
USB ports			
Number	3	3	3
Type	2.0	2.0	2.0
Other	Multimedia card reader	Multimedia card reader	Media card reader
Monitor			
LCD type	WSVGA	WSVGA	WSVGA
Screen size	10.1"	11.6"	10.1"
Refresh rate (Hz)	60	60	60
Battery			
Type	Acer UM09H51 Lithium-ion	Acer AL10C31 Lithium-ion	Acer AL10B31 Lithium-ion
Size (length x width x height)	8" x 2" x 1-1/4"	8" x 1-3/4" x 3/4"	8" x 2-1/8" x 1"
Rated capacity	4,400mAh / 10.8V (48Wh)	4,400mAh / 11.1V (49Wh)	4,240mAh / 11.1V (47Wh)
Weight	10 oz.	9 oz.	10 oz.

Figure 7: System configuration information for the Acer netbooks.

System	ASUS Eee PC 1015PEM	ASUS Eee PC 1016P	ASUS Eee PC 1018P	ASUS Eee PC 1215N
General				
Number of processor packages	1	1	1	1
Number of cores per processor	2	1	1	2
Number of hardware threads per core	2	2	2	2
System power management policy	Balanced	Balanced	Balanced	Balanced
Processor power-saving option	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology	Enhance Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology
System dimensions (length x width x height)	10-1/4" x 7" x 7/8"	10-1/3" x 7" x 1-1/3"	10-1/4" x 7-1/4" x 1"	11-5/8" x 8" x 1-1/8"
System weight	2 lbs. 13 oz.	2 lbs. 13 oz.	2 lbs. 8 oz.	3 lbs. 6 oz.

System	ASUS Eee PC 1015PEM	ASUS Eee PC 1016P	ASUS Eee PC 1018P	ASUS Eee PC 1215N
CPU				
Vendor	Intel	Intel	Intel	Intel
Name	Atom	Atom	Atom	Atom
Model number	N550	N455	N455	D525
Stepping	B0	B0	B0	B0
Socket type and number of pins	Socket 437 FCBGA8	Socket 437 FCBGA8	Socket 437 FCBGA8	Socket 437 FCBGA8
Core frequency (GHz)	1.50	1.66	1.66	1.83
Bus frequency	667	667 MHz	667 MHz	800 MHz
L1 cache	24 KB + 32 KB (per core)	24 KB + 32 KB	24 KB + 32 KB	24 KB + 32 KB (per core)
L2 cache	1 MB (512 KB per core)	512 KB	512 KB	1 MB (512 KB per core)
L3 cache	N/A	N/A	N/A	N/A
Platform				
Vendor	ASUSTek	ASUSTek	ASUSTeK	ASUSTeK
Motherboard model number	1015PE	1015PE	1018P	1215N
Motherboard chipset	Intel NM10	Intel NM10	Intel NM10	Intel NM10
BIOS name and version	American Megatrends Inc. 0801 (10/06/2010)	American Megatrends Inc. 0801 (10/06/2010)	American Megatrends Inc. 0502 (08/25/2010)	American Megatrends Inc. 0503 (09/07/2010)
Memory module(s)				
Vendor and model number	Hynix HMT112S6TFR8C-H9	Hynix HMT325S6BFR8C-H9	Hynix HMT112S6TFR8C-H9	Hynix HM112S6TFR8C-H9
Type	PC3-10600	PC3-10600	PC3-10600	PC3-10600
Speed (MHz)	1,333	1,333	1,333	1,333
Speed running in the system (MHz)	667	667	667	800
Timing/Latency (tCL-tRCD-tRP-tRASmin)	5-5-5-12	5-5-5-12	5-5-5-12	6-6-6-15
Size (MB)	1,024	2,048	1,024	1,024
Number of memory module(s)	1	1	1	2

System	ASUS Eee PC 1015PEM	ASUS Eee PC 1016P	ASUS Eee PC 1018P	ASUS Eee PC 1215N
Chip organization (single-sided/double-sided)	Double-sided	Double-sided	Double-sided	Double-sided
Channel (single/dual)	Single	Single	Single	Single
Hard disk				
Vendor and model number	Seagate ST9250315AS	Seagate ST9320325AS	Seagate ST9250315AS	Seagate ST9250315AS
Number of disks in system	1	1	1	1
Size (GB)	250	320	250	250
Buffer size (MB)	8	8	8	8
RPM	5,400	5,400	5,400	5,400
Type	SATA 3.0 Gb/s	SATA 3.0 Gb/s	SATA 3.0 Gb/s	SATA 3.0 Gb/s
Controller	Intel NM10	Intel NM10	Intel NM10	Intel NM10
Driver	Intel 8.9.0.1023 (06/04/1023)	Intel 8.9.0. 1023 (06/04/2009)	Intel 8.9.0.1023 (06/04/2009)	Intel 8.9.0.1023 (06/04/2009)
Operating system				
Name	Windows 7 Starter 32-bit	Windows 7 Professional 32-bit	Windows 7 Starter 32-bit	Windows 7 Home Premium 32-bit
Build number	7600	7600	7600	7600
Service Pack	N/A	N/A	NA	N/A
File system	NTFS	NTFS	NTFS	NTFS
Kernel	ACPI x86-based PC	ACPI x86-based PC	ACPI x86-based PC	ACPI x86-based PC
Language	English	English	English	English
Microsoft DirectX version	DirectX 11	DirectX 11	DirectX 11	DirectX 11
Graphics card #1				
Vendor and model number	Intel GMA 3150	Intel GMA 3150	Intel GMA 3150	Intel GMA 3150
Type	Integrated	Integrated	Integrated	Integrated
Chipset	Intel Graphics Media Accelerator 3150	Intel Graphics Media Accelerator 3150	Intel Graphics Media Accelerator 3150	Intel Graphics Media Accelerator 3150
BIOS version	1933.0	1933.0	1933.0	2001.0
Total available graphics memory (MB)	251	256	251	256
Dedicated video memory (MB)	0	0	0	0

System	ASUS Eee PC 1015PEM	ASUS Eee PC 1016P	ASUS Eee PC 1018P	ASUS Eee PC 1215N
System video memory (MB)	64	64	64	64
Shared system memory (MB)	187	192	187	192
Resolution	1,024 x 600	1,024 x 600	1,024 x 600	1,366 x 768
Driver	Intel Corporation 8.14.10.2117 (04/19/2010)	Intel 8.14.10.2117 (04/19/2010)	Microsoft 6.1.7600.16385 (06/21/2006)	Intel 8.14.10.2117 (04/19/2010)
Graphics card #2				
Vendor and model number	N/A	N/A	N/A	NVIDIA® ION automatic switchable graphics
Type	N/A	N/A	N/A	Discrete
Chipset	N/A	N/A	N/A	NVIDIA ION
Resolution	N/A	N/A	N/A	1,366 x 768
Sound card/subsystem				
Vendor and model number	Realtek High Definition Audio	Realtek High Definition Audio	Realtek High Definition Audio	Realtek High Definition Audio
Driver	Realtek 6.0.1.6066 (03/13/2010)	Realtek 6.0.1.6066 (03/13/2010)	Realtek 6.0.1.6077 (03/26/2010)	Realtek 6.0.1.6186 (08/24/2010)
Ethernet				
Vendor and model number	Atheros AR8132 PCI-E Fast Ethernet Controller	Atheros AR8131 PCI-E Gigabit Ethernet Controller	Atheros AR8131 PCI-E Gigabit Ethernet Controller	Atheros AR8152 PCI-E Fast Ethernet Controller
Driver	Atheros 1.0.0.29 (04/21/2010)	Atheros 1.0.0.29 (04/21/2010)	Atheros 1.0.0.23 (12/22/2009)	Atheros 1.0.0.34 (07/29/2010)
Wireless				
Vendor and model number	Broadcom 802.11n Network Adapter	Broadcom 802.11n Network Adapter	Broadcom 802.11n Network Adapter	Atheros AR9285 Wireless Network Adapter
Driver	Broadcom 5.60.350.11 (05/07/2010)	Broadcom 5.60.350.11 (05/07/2010)	Broadcom 5.60.350.11 (05/07/2010)	Atheros 8.0.0.238 (10/05/2009)
Modem				
Vendor and model number	N/A	N/A	N/A	N/A
Driver	N/A	N/A	N/A	N/A
USB ports				
Number	3	3	3	3

System	ASUS Eee PC 1015PEM	ASUS Eee PC 1016P	ASUS Eee PC 1018P	ASUS Eee PC 1215N
Type	2.0	2.0	3.0	2.0
Other	Multimedia card reader	Multimedia card reader	Multimedia card reader	Multimedia card reader
Monitor				
Type	WSVGA	WSVGA	WSVGA	WXGA
Screen size	10.1"	10.1"	10.1"	12.1"
Refresh rate (Hz)	60	60	60	60
Battery				
Type	ASUS A32-1015 Lithium-ion	ASUS A32-1015 Lithium-ion	ASUS C22-1018 Lithium-ion	ASUS A32-1015 Lithium-ion
Size (length x width x height)	8" x 1-7/8" x 3/4"	8" x 1-7/8" x 3/4"	9-3/4" x 2-1/2" x 1/2"	8" x 1-7/8" x 3/4"
Rated capacity	5,600mAh / 11.25V (63Wh)	5,600mAh / 11.25V (63Wh)	6,000mAh / 7.4V (44Wh)	5,200mAh / 10.95V (56Wh)
Weight	11 oz.	11 oz.	10 oz.	11 oz.

Figure 8: System configuration information for the ASUS netbooks.

System	Dell Latitude 2120	HP Mini 100e	HP Mini 5103
General			
Number of processor packages	1	1	1
Number of cores per processor	1	1	1
Number of hardware threads per core	2	2	2
System power management policy	Dell	Balanced	HP Optimized
Processor power-saving option	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology
System dimensions (length x width x height)	10-1/4" x 7-1/4" x 1-1/2"	10-5/8" x 9-3/4" x 1-3/8"	10-1/4" x 7" x 1"
System weight	2 lbs. 14 oz.	3 lbs. 7 oz.	2 lbs. 12 oz.
CPU			
Vendor	Intel	Intel	Intel
Name	Atom	Atom	Atom

System	Dell Latitude 2120	HP Mini 100e	HP Mini 5103
Model number	N455	N455	N455
Stepping	B0	B0	B0
Socket type and number of pins	Socket 437 FCBGA8	Socket 437 FCBGA8	Socket 437 FCBGA8
Core frequency (GHz)	1.66	1.66	1.66
Bus frequency	667 MHz	667 MHz	667 MHz
L1 cache	24 KB + 32 KB	24 KB + 32 KB	24 KB + 32 KB
L2 cache	512 KB	512 KB	512 KB
L3 cache	N/A	N/A	N/A
Platform			
Vendor	Dell	Foxconn	Hewlett-Packard
Motherboard model number	0YY3FH	1586	1608
Motherboard chipset	Intel NM10	Intel NM10	Intel NM10
BIOS name and version	Dell A00 (10/27/2010)	Hewlett-Packard F.02 (07/29/2010)	Hewlett-Packard 68PGP Ver. F.02 (10/20/2010)
Memory module(s)			
Vendor and model number	Micron® 4JSF12864HZ-1G4D1	Samsung M471B2873FHS-CH9	Kingston HP594907-HR1-ELD
Type	PC3-10600	PC3-10600	PC3-10600
Speed (MHz)	1,333	1,333	1,333
Speed running in the system (MHz)	667	667	667
Timing/Latency (tCL-tRCD-tRP-tRASmin)	5-5-5-12	5-5-5-12	5-5-5-12
Size (MB)	1,024	1,024	1,024
Number of memory module(s)	1	1	1
Chip organization (single-sided/double-sided)	Double-sided	Double-sided	Double-sided
Channel (single/dual)	Single	Single	Single
Hard disk			
Vendor and model number	Western Digital WD2500BEVT-75A23T0	Western Digital WD1600BEVT-22A23T0	Toshiba MK2556GSY
Number of disks in system	1	1	1
Size (GB)	250	160	250
Buffer size (MB)	8	8	16
RPM	5,400	5,400	7,200
Type	SATA 3.0 Gb/s	SATA 3.0 Gb/s	SATA 3.0 Gb/s

System	Dell Latitude 2120	HP Mini 100e	HP Mini 5103
Controller	Intel NM10	Intel NM10	Intel NM10
Driver	Intel 8.9.4.1004 (10/13/2009)	Intel 8.9.4.1004 (10/13/2009)	Intel 8.9.8.1005 (04/05/2010)
Operating system			
Name	Windows 7 Home Premium 32-bit	Windows 7 Starter 32-bit	Windows 7 Starter 32-bit
Build number	7600	7600	7600
Service Pack	N/A	N/A	N/A
File system	NTFS	NTFS	NTFS
Kernel	ACPI x86-based PC	ACPI x86-based PC	ACPI x86-based PC
Language	English	English	English
Microsoft DirectX version	DirectX 11	DirectX 11	DirectX 11
Graphics			
Vendor and model number	Intel GMA 3150	Intel GMA 3150	Intel GMA 3150
Type	Integrated	Integrated	Integrated
Chipset	Intel Graphics Media Accelerator 3150	Intel Graphics Media Accelerator 3150	Intel Graphics Media Accelerator 3150
BIOS version	1933.2	2001.0	2001.0
Total available graphics memory (MB)	250	250	246
Dedicated video memory (MB)	0	0	0
System video memory (MB)	64	64	64
Shared system memory (MB)	186	186	182
Resolution	1,024 x 600	1,024 x 600	1,024 x 600
Driver	Intel 8.14.10.2117 (04/19/2010)	Intel 8.14.10.2117 (04/19/2010)	Intel 8.14.10.2117 (04/19/2010)
Sound card/subsystem			
Vendor and model number	Realtek High Definition Audio	Realtek High Definition Audio	IDT High Definition Audio
Driver	Realtek 6.0.1.6201 (09/14/2010)	Realtek 6.0.1.6088 (04/13/2010)	IDT 6.10.6289.0 (06/17/2010)
Ethernet			
Vendor and model number	Broadcom NetXtreme® Gigabit Ethernet	Realtek PCIe FE Family Controller	Marvell Yukon 88E8059 PCI-E Gigabit Ethernet Controller

System	Dell Latitude 2120	HP Mini 100e	HP Mini 5103
Driver	Broadcom 14.2.0.5 (05/21/2010)	Realtek 7.17.304.2010 (03/04/2010)	Marvell 11.25.3.3 (04/26/2010)
Wireless			
Vendor and model number	DW1501 Wireless –N WLAN	Realtek RTL8191SE	Broadcom 4313 802.11b/g/n
Driver	Broadcom 5.60.48.35 (01/21/2010)	Realtek 2011.0.204.2010 (02/04/2010)	Broadcom 5.60.350.11 (05/07/2010)
Modem			
Vendor and model number	N/A	LSI HDA Modem	N/A
Driver	N/A	LSI 2.2.99.0 (12/03/2009)	N/A
USB ports			
Number	3	2	3
Type	2.0	USB 2.0	2.0
Other	Multimedia card reader	Multimedia card reader	Multimedia card reader
Monitor			
LCD type	WSVGA	WSVGA	WSVGA
Screen size	10.1"	10.1"	10.1"
Refresh rate (Hz)	60	60	60
Battery			
Type	Dell F079N Lithium-ion	HP HSTNN-LB1W Lithium-ion	HP HSTNN-DB1R Lithium-ion
Size (length x width x height)	8" x 1-1/2" x 3/4"	10-1/4" x 2-3/4" x 3/4"	8-1/8" x 1-7/8" x 15/16"
Rated capacity	2,500mAh / 11.1V (28Wh)	4,400mAh / 10.8V (47Wh)	5,900mAh / 11.1V (66Wh)
Weight	6 oz.	11 oz.	11 oz.

Figure 9: System configuration information for the Dell Latitude 2120 and HP netbooks.

APPENDIX B - SOLVENT TEST SCORING SHEET

Solvent test

System Name: _____

Non-acetone nail polish remover

10-second score: ____

1-minute score: ____

5-minute score: ____

Average score: ____

Hydrogen peroxide

10-second score: ____

1-minute score: ____

5-minute score: ____

Average score: ____

Acetone-based nail polish remover

10-second score: ____

1-minute score: ____

5-minute score: ____

Average score: ____

Isopropyl alcohol

10-second score: ____

1-minute score: ____

5-minute score: ____

Average score: ____

Bleach

10-second score: ____

1-minute score: ____

5-minute score: ____

Average score: ____

Olay Age Defying Cleanser

10-second score: ____

1-minute score: ____

5-minute score: ____

Average score: ____

ABOUT PRINCIPLED TECHNOLOGIES

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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.

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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.