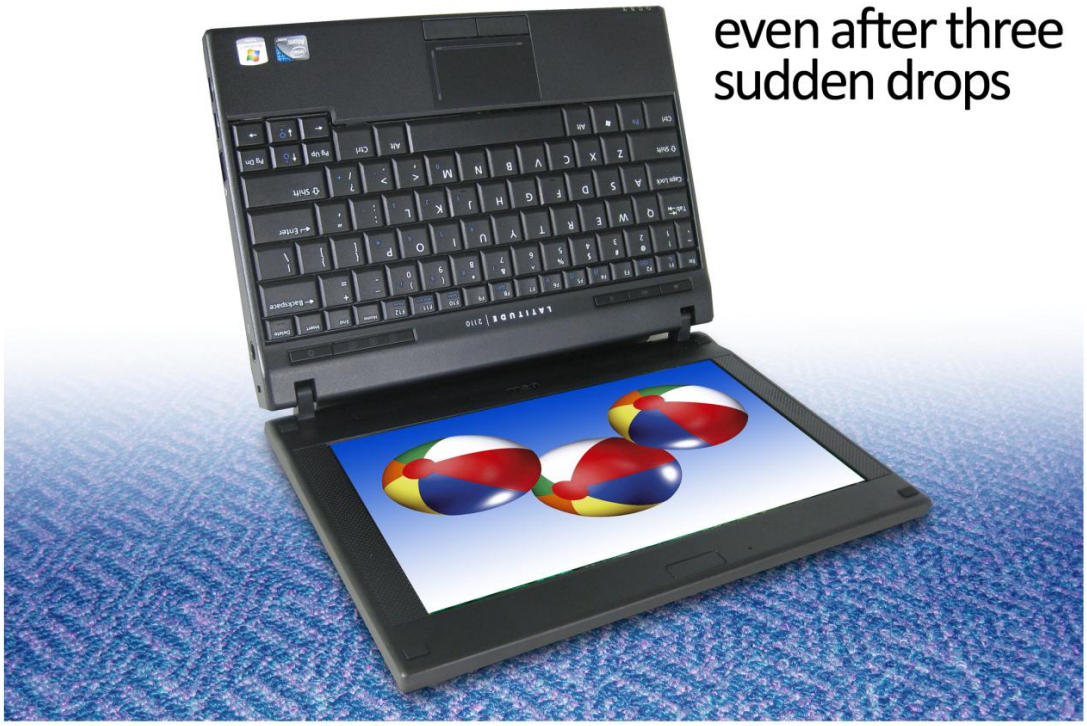
DELL VS. COMPETITORS: NETBOOK DURABILITY

Dell™ Latitude™ 2110 bounced back even after three sudden drops



and kept on working

OUR FINDINGS

In today's educational environment, institutions are eager to get the most for their computing dollar, which means buying systems that last. In Principled Technologies' tests in our labs, the Dell Latitude 2110 was more durable than five other netbooks: Asus® Eee PC™ 1001P-MU17-WT, Asus Eee PC 1201T-MU10-BK, HP Mini 2102, Lenovo® IdeaPad™ S10-3, and Lenovo IdeaPad S10-3t. The Dell Latitude 2110's ability to withstand accidental drops makes it an excellent choice for an educational institution, where netbooks need to last.

OUR PROCESS

To gauge the durability of each netbook system, we dropped it from a height of 29 inches a maximum of three times. After each drop, we assessed external physical damage and ran tests to determine how well the hard drive had protected its data.

JULY 2010
A PRINCIPLED TECHNOLOGIES TEST REPORT
Commissioned by Dell Inc.

PROJECT OVERVIEW

We tested the durability of the following six netbook systems:

- Asus Eee PC 1001P-MU17-WT
- Asus Eee PC 1201T-MU10-BK
- Dell Latitude 2110
- HP Mini 2102
- Lenovo IdeaPad S10-3
- Lenovo IdeaPad S10-3t

To test the drop resistance of each netbook, we performed up to three 29-inch flat drops onto commercial-grade carpet while the netbook was open and running MAXON CINEBENCH R10. After each drop, we measured how well each system had protected its data using HD Tune Pro 4.01 and HDDScan 3.2, tests that assess hard drive damage. After a system failed to boot, we conducted no further testing on that system.

WHAT WE FOUND

Prior to the first drop, we performed a baseline run of HD Tune Pro 4.01 and HDDScan 3.2. All six systems achieved an HD Tune Pro damaged blocks percentage of 0.0% and an HDDScan 3.2 bad blocks score of 0, indicating that their hard drives were all in perfect condition.

Figure 1 shows the results after we dropped each of the six systems one time. The only discernable damage the Dell Latitude 2110 suffered was a slight separation between palm rest and base, which we were able to snap right back into place. Two additional systems—the Asus Eee PC 1201T-MU10-BK and the Lenovo IdeaPad S10-3t—survived the first drop well enough to continue testing. Three other systems—the Asus Eee PC 1001P-MU17-WT, the HP Mini 2102, and the Lenovo IdeaPad S10-3—failed to boot after the first drop, so we removed them from testing.

After first drop	Asus Eee PC 1001P-MU17-WT	Asus Eee PC 1201T-MU10-BK	Dell Latitude 2110	HP Mini 2102	Lenovo IdeaPad S10-3	Lenovo IdeaPad S10-3t
HD Tune Pro damaged blocks percentage	N/A	0.0%	0.0%	12.0%	1.4%	1.1%
HDDScan 3.2 bad blocks	N/A	0	0	1,287	N/A	724

After first drop	Asus Eee PC 1001P-MU17-WT	Asus Eee PC 1201T-MU10-BK	Dell Latitude 2110	HP Mini 2102	Lenovo IdeaPad S10-3	Lenovo IdeaPad S10-3t
Notes	• System was too damaged to initiate scan. System could not boot into the OS, and did not recognize the hard drive. • Separation at the bottom center of the display assembly.	• No damage.	• Slight separation between palm rest and base; snapped right back into place.	• System failed to boot into the OS and did not recognize the presence of the hard drive. BIOS returned error: "Hard Drive Does Not Exist." • Points of separation on the display at the bottom center.	• After we scanned the system for several hours, the system went to a blue screen and would not boot into the OS. System repair failed. • When we tried to pull the results for HDD Scan 3.2, the system froze and would not boot back into the CD. • Assembly separation at the bottom center of the display.	• Upon contact with the floor, the system rebooted.

Figure 1: Results for the netbook systems following the first drop.

Figure 2 shows the results for the three surviving systems after we dropped each a second time. Once again, the only discernable damage the Dell Latitude 2110 suffered was a slight separation between palm rest and base, which we were able to snap right back into place. The Lenovo IdeaPad S10-3t sustained some hard drive damage but did reboot, so remained in the test. The Asus Eee PC 1201T-MU10-BK behaved very erratically after the second drop, so we removed it from testing.

After second drop	Asus Eee PC 1201T-MU10-BK	Dell Latitude 2110	Lenovo IdeaPad S10-3t
HD Tune Pro damaged blocks percentage	N/A	0.0%	2.0%
HDDScan 3.2 bad blocks	N/A	0	860
Notes	• After the second drop, the system would boot to the OS at first, but would only display some of the icons, with no text. They would not respond when clicked. Also, the wait cursor appeared when the mouse hovered on the task bar. • Booting took a long time and sometimes the system would lock up; after some attempts, it would not boot at all. • After the second drop, the BIOS could no longer recognize the hard drive, and we were unable to gather the scan results.	• Slight separation between palm rest and base; snapped right back into place.	• Upon contact with the floor, the system rebooted. • LCD damage: the left half of the screen was dimmer than the right half.

Figure 2: Results for the netbook systems following the second drop. Note: Only three systems survived the first drop.

Figure 3 shows the results for the two surviving systems after we dropped each a third time. At this point, the Dell Latitude 2110 suffered only slight hard drive damage—more than 99 percent of blocks were still good—and the same minor, easy-to-fix slight separation between palm rest and base. The Lenovo IdeaPad S10-3t suffered substantially greater hard drive damage, as well as damage to the LCD screen.

After third drop	Dell Latitude 2110	Lenovo IdeaPad S10-3t
HD Tune Pro damaged blocks percentage	0.7%	6.4%
HDDScan 3.2 bad blocks	456	6,209
Notes	• Slight separation between palm rest and base; snapped right back into place.	• LCD damage: the left half remained dimmer, and the screen displayed color bars when we handled the swivel monitor.

Figure 3: Results for the netbook systems following the third drop. Note: Only two systems survived the second drop.

HOW WE TESTED

Preparing Windows 7 for testing

1. Set the test resolution:
   a. Right-click the desktop.
   b. Select Screen Resolution.
   c. Set the resolution to the maximum supported resolution.
   d. Click OK.
2. Turn off Windows Automatic Updates:
   a. Click the Windows Start button.
   b. Right-click Computer, and select Properties.
   c. Click Windows Update in the left column.
   d. Click Change settings.
   e. Select Never check for updates, check Receive recommended updates the same way you receive important updates, and Allow standard users to install updates on this computer.
   f. Click OK.
3. Turn off the screensaver and power-management options on each system by doing the following:
   a. Right-click the desktop.
   b. Select Personalize.
   c. Click Screensaver.
   d. Select None from the drop down menu, and click Apply.
   e. Click Change power settings.
   f. Under Balanced, click change plan settings.

g. Select Never from the drop-down menus next to Dim the display, Turn off the display, and Put the computer to sleep.
h. Click Save changes.
i. Close any open windows.

4. Leave all services in their default state.
5. Ensure that each system is set to the default power scheme, which is the 'Balanced' power scheme for Windows 7. If the system is not, set it to that scheme.
6. Do not minimize the taskbar.
7. Turn off System Restore. Doing so prevents system restores from occurring during testing and affecting results.
   a. Click Start, and right-click on Computer.
   b. Select Properties.
   c. Click System protection under Tasks in the left panel.
   d. Select drive C:, and click Configure.
   e. Under Restore Settings, select Turn off system protection.
   f. Click Apply, click OK, and close both windows.
8. Disable Security notifications:
   a. Click the Windows Start button.
   b. Click Control Panel.
   c. Click System and Security.
   d. Click Change Action Center settings.
   e. Uncheck all monitoring alert messages, and click OK.
9. Change User Account Control settings:
   a. Click the Windows Start button.
   b. Click Control Panel.
   c. Click System and Security.
   d. Click Change User Account Control settings.
   e. Move the slider bar to Never notify, and click OK.
   f. In the User Account Control dialog box, click Yes.
10. Run the Windows Experience Index on the system.
11. Leave Aero Glass at the setting Windows 7 decides is appropriate.
12. Ensure Search indexing is enabled (default).
13. Leave the brightness at the default level.
14. Check the state of the following hardware items and disable each one if it is not already off:
    - Wireless (use the physical switch if one is available)
    - Bluetooth
    - IR
15. Disconnect any external devices.
16. Do not plug in the network adapter.

17. Add headphones, and set the volume to the midpoint.
18. Capture a sector disk image with Symantec's Ghost product.

Setting up CINEBENCH R10

1. Download CINEBENCH R10 from http://www.techpowerup.com/downloads/697/CINEBENCH_v10.html.
2. Install CINEBENCH:
   a. Right-click the CINEBENCH ZIP file, and choose Extract All.
   b. In the Select a Destination and Extract Files window, click Browse, click Desktop, and click OK.
   c. Click Extract.

Running CINEBENCH R10

1. Launch CINEBENCH R10 by double-clicking the CINEBENCH R10.exe file in the CINEBENCH R10 folder.
2. Enter the MHz frequency of the processor in the MHz (real freq.) field.
3. Click Start all tests.

Measuring physical data protection—the drop test

This test measures the damage that the impact from a drop of 29 inches inflicted upon an open netbook running MAXON CINEBENCH R10. We used a Lansmont PDT56ED Precision Drop Tester, and dropped each netbook onto commercial carpet. We opened the netbook so that the screen and keyboard formed a 120-degree angle, and then placed the netbook flat on the platen. Orienting the netbook in this way resulted in a flat drop. (Figure 4 shows our test setup.)

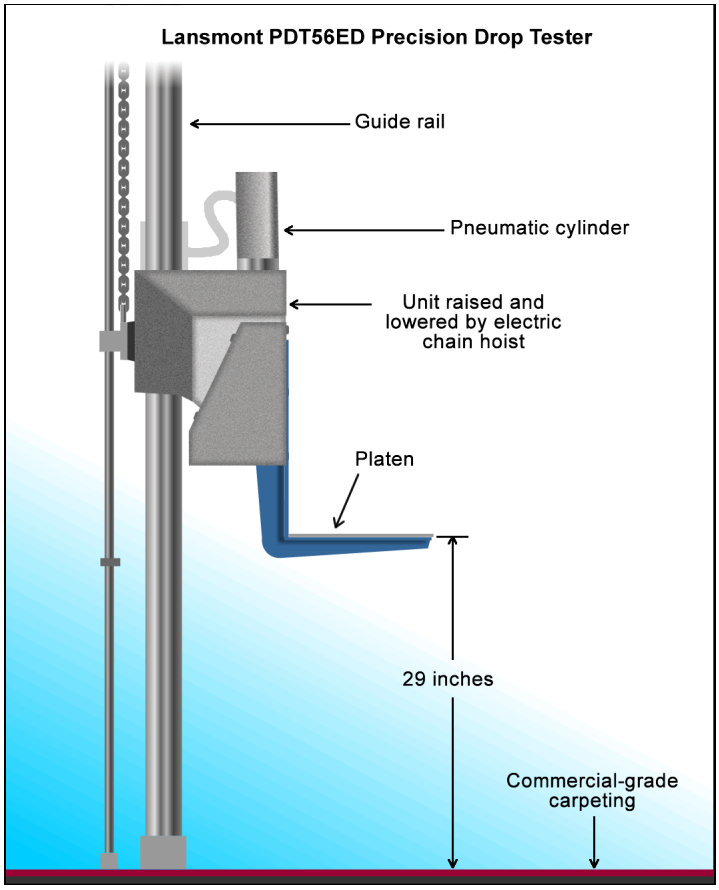


Figure 4: Our physical data protection test setup.

To allow us to scan the netbooks identically, we booted both to BartPE boot CDs and installed the hard disk scanning software to the Microsoft® Windows® XP virtual machine's RAMDISK. Running the scanning software from RAM, we scanned the hard disk with HD Tune Pro 4.01 and HDDScan for Windows 3.2, and recorded the number of bad sectors and blocks before and after the drop test. We also recorded any other physical defects, such as cracks or breaks in the display, as well as separated hinges or displaced screws, which

the impact of the drop caused. Refer to Appendix B for the drop test checklist. We took still photographs of the netbooks before and after each drop. We dropped each netbook once, using this process:

1. Reset the netbook to the base image using Symantec's Ghost product.
2. Install MAXON CINEBENCH R10 onto the test netbook, as we outline above.
3. Run EFD Software's HD Tune Pro 4.01 and HDDScan 3.2 to get baseline data on the state of the hard disk. Boot the system using a WinPE boot disc.
    a. Install HD Tune Pro 4.01:
        i. Insert a USB flash drive containing the HD Tune Pro installation executable, and click once on My Computer.
        ii. Navigate to the USB drive, and double-click the hdtunepro_401_trial.exe installation file to install the application.
        iii. At the welcome screen, click Next.
        iv. Click the I accept the agreement radio button, and click Next.
        v. In the Select Destination Location window, click Browse.
        vi. Click the RAMDisk drive once to select it, and click OK.
        vii. Click Next in the next two windows.
        viii. Leave check box empty for Create a desktop icon, and click Next.
        ix. Click Install.
        x. Leave the check box checked for Launch HD Tune Pro, and click Finish.
    b. Run the HD Tune Pro 4.01 Error Scan:
        i. Select the Error Scan tab.
        ii. Click Start in the right hand pane.
        Note: The Error Scan is complete when the Start button changes from grey to black.
    c. Save the Error Scan Results:
        i. Click the Copy screenshot to clipboard button on the upper right hand menu bar.
        ii. Click the Save screenshot button on the menu bar.
        iii. Save the screenshot by system name and test name.
    d. Click the Copy information to clipboard button on the upper right hand menu bar (it is the first button on the left):
        i. Open a new text file by clicking Start→Run, typing `notepad`, and clicking OK.
        ii. In the Notepad window, click Edit→Paste.
        iii. Click File→Save As, enter an appropriate filename using a .txt extension, and choose the location to save the file (we saved ours to a USB flash drive). Click Save.
    e. Save the relevant log files:
        i. Click the Health tab.
        ii. Click Log in the bottom right hand corner.
        iii. In the Attribute pane, click (01) Raw Read Error Rate, and click Export.
        iv. Enter an appropriate filename using a .txt extension, choose a location to save the file, and click Open.
        v. Repeat steps 3c and 3d for (05) Reallocated Sector Count and (07) Seek Error Rate.
    f. Close the HD Tune Pro 4.01 Hard Disk Utility.
    g. Scan the netbook's hard drive with HDDScan for Windows version 3.2:
        i. Copy the HDDScan folder to the WinPE RAMDisk.

ii. Open the HDDScan folder, and double-click the HDDScan.exe executable file to run the application.
iii. Click Tasks→Surface Tests to open the Test Selection window.
iv. Select Verify from the list of tests, and click Add Test.
v. At the conclusion of the run, double-click the VR-Verify test id in the Test Manager window to open up the results.
vi. Select the Report tab, and copy and paste the test results into Notepad.
vii. Save the results as a text file.

4. Set the height of the platen on the Lansmont Precision Drop Tester to 29 inches above the surface of the 28 oz. commercial carpeting.
5. Place the fully charged netbook on the platen of the drop tester, with the netbook's base flat on the platen and the screen facing forward, open at a 120-degree angle.
6. Launch CINEBENCH.
7. Unplug the netbook, and drop the netbook onto the commercial carpeting.
8. Wait until the netbook is completely still.
9. If the battery or any other components come off the system, inspect them for damage, and reinstall them if possible.
10. Complete the checklist in Appendix B, including the latest version available of Dell Diagnostics, if applicable.
11. Take digital pictures of the netbook from all angles after completing the checklist.
12. Stop CINEBENCH.
13. Reconnect the netbook's AC Adapter.
14. Run HD Tune Pro 4.01 and HDD Scan 3.2 using the process in Step 3, and record the results as the netbook's post-test disk status.

APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figures 5 and 6 provide detailed configuration information for the six netbook systems we tested.

System	ASUS Eee PC 1001P	ASUS Eee PC 1201T	Dell Latitude 2110	HP Mini 2102
				
General				
Number of processor packages	1	1	1	1
Number of cores per processor	1	1	1	1
Number of hardware threads per core	2	1	2	2
System power management policy	Balanced	Balanced	Dell	HP Optimized
Processor power-saving option	Enhanced Intel® SpeedStep® Technology	N/A	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology
System dimensions (length x width x height)	10-1/4” x 7” x 1-3/8”	11-1/2” x 8-1/4” x 1-1/4”	10-3/8” x 7-1/2” x 2-1/4”	10-1/2” x 7” x 1-1/8”
System weight	2 lbs. 14 oz.	3 lbs. 2.5 oz.	3 lbs 3 oz.	2 lbs. 7 oz.
CPU				
Vendor	Intel	AMD	Intel	Intel
Name	Atom	Athlon Neo	Atom	Atom
Model number	N450	MV-40	N470	N450
Stepping	A0	DH-G2	B0	A0
Socket type and number of pins	FCBGA559	ASB1	Socket 437 FCBGA8	Micro-FCBGA559
Core frequency (GHz)	1.66	1.60	1.83	1.66
Front-side bus frequency (MHz)	667	1,600	667	667
L1 cache	32 KB + 24 KB	64 KB +64 KB	24 KB + 32 KB (per core)	32 KB +24 KB
L2 cache (KB)	512	512	512	512
Platform				
Vendor	ASUSTek Computer	ASUSTek Computer	Dell	HP

System	ASUS Eee PC 1001P	ASUS Eee PC 1201T	Dell Latitude 2110	HP Mini 2102
Motherboard model number	1005P	1210T	OM57NM	3660
Motherboard chipset	Intel NM10	AMD 780G	Intel Atom Host Bridge	Intel NM10
BIOS name and version	American Megatrends v0706 (01/04/2010)	American Megatrends v0317 (02/02/2010)	Dell v.A00 (03/09/2010)	HP F.12 (04/23/2010)
Memory module				
Vendor and model number	ASint Technology B2YJUS73FN1	Transcend Information TS256MSQ64V6U	Hynix HYMP112S64CP6-S6	Hyundai HYMP112S64CP6-S6
Type	PC2-6400	PC2-5300	PC2-6400	PC2-6400
Speed (MHz)	800	667	800	800
Speed running in the system (MHz)	667	667	667	667
Timing/Latency (tCL-tRCD-tRP-tRASmin)	5-5-5-15	5-5-5-15	5-5-5-15	5-5-5-15
Size (MB)	1,024	2,048	1,024	1,024
Number of memory module(s)	1	1	1	1
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 ST9160301AS	Hitachi HTS545025B9A300 ATA Device	Western Digital WD1600BEVT-75A23T0 ATA	Toshiba MK1656GSY
Number of disks in system	1	1	1	1
Size (GB)	160	250	160	160
Buffer size (MB)	8	8	8	16
RPM	5,400	5,400	5,400	7,200
Type	SATA 3.0 Gb/s	SATA 3.0 Gb/s	SATA	SATA 3.0 Gb/s
Controller	Intel NM10 Express Chipset	Standard AHCI 1.0 Serial ATA Controller	Standard AHCI 1.0 Serial ATA Controller	Intel NM10 Express Chipset

System	ASUS Eee PC 1001P	ASUS Eee PC 1201T	Dell Latitude 2110	HP Mini 2102
Driver	Intel 8.9.0.1023 (06/04/2009)	Microsoft 6.1.7600.16385 (06/21/2006)	Microsoft 6.1.7600.20575	Intel 8.9.0.1023 (06/04/2009)
Operating system				
Name	Windows 7 Starter	Windows 7 Starter	Windows 7 Starter	Window 7 Starter
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	ACPIx-86-based PC	ACPI x86-Based PC
Language	English	English	English	English
Microsoft DirectX version	11	11	11	11
Graphics				
Vendor and model number	Intel Graphics Media Accelerator 3150	ATI Radeon HD 3200 Graphics	Intel Graphics Media Accelerator 3150	Intel Graphics Media Accelerator 3150
Type	Integrated	Integrated	Integrated	Integrated
Chipset	Intel Graphics Media Accelerator 3150	ATI Radeon HD 3200 Graphics	Intel Graphics Media Accelerator 3150	Intel Graphics Media Accelerator 3150
BIOS version	1790.0	010.094.001.038	1933.2	1818.0
Total available graphics memory (MB)	251	895	250	250
Dedicated video memory (MB)	0	256	0	0
System video memory (MB)	64	0	64	64
Shared system memory (MB)	187	639	186	186
Resolution	1,024 x 600 x 32 bit	1,366 x 768 x 32 bit	1,024 x 600 x 32-bit	1,024 x 600 x 32 bit
Driver	Intel 8.14.10.1929 (09/23/2009)	ATI Technologies 8.56.1.15 (04/24/2009)	Intel 8.14.10.2023 (12/14/2009)	Intel 8.14.10.1929 (09/23/2009)
Sound card/subsystem				
Vendor and model number	Realtek High Definition Audio	High Definition Audio Device	Realtek High Definition Audio	IDT High Definition Audio CODEC
Driver	Realtek 6.0.1.1548 (09/29/2009)	Microsoft 6.1.7600.16385 (07/13/2009)	Realtek 6.0.1.6098 (04/27/2010)	IDT 6.10.6246.0 (10/12/2009)

System	ASUS Eee PC 1001P	ASUS Eee PC 1201T	Dell Latitude 2110	HP Mini 2102
Ethernet				
Vendor and model number	Atheros AR8132 PCI-E Fast Ethernet Controller (NDIS 6.20)	Atherose AR8132 PCI-E Fast Ethernet Controller (NIDS 6.20)	Broadcom NetXtreme Gigabit	Realtek PCIe FE Family Controller
Driver	Atheros 1.0.0.10 (07/27/2010)	Microsoft 1.0.0.4 (04/01/2009)	Broadcom 12.4.1.2 (02/25/2010)	Realtek 7.7.1002.2009 (10/02/2009)
Wireless				
Vendor and model number	Atheros AR2427 Wireless Network Adapter	Realtek RTL8191 Wireless LAN 802 11n PCI-NIC	DW1501 Wireless-N WLAN Half-Mini Card	Broadcom 802.11b/g WLAN
Driver	Atheros 8.0.0.238 (10/05/2009)	Realtek 2015.2.430.2010 (04/30/2010)	Broadcom 5.60.48.35 (01/21/2010)	Broadcom 5.60.18.41 (10/23/2009)
USB ports				
Number	3	3	3	3
Type	2.0	2.0	2.0	2.0
Other	3-in-1 Media Card Reader	3-in-1 Media Card Reader	3-in-1 Media Card Reader	5-in-1 Media Card Reader
IEEE 1394 ports				
Number	0	0	0	0
Monitor				
LCD type	LED-Backlight Display	LED-Backlight Display	WSVGA AntiGlare LED Display	WSVGA LED Anti-glare Widescreen Display
Screen size (inches)	10.1	12.1	10.1”	10.1
Refresh rate (Hz)	60	60	60	60
Battery				
Type	ASUS AL32-1005 Li-ion	ASUS A32-UL20 Li-ion	Dell G038N Lithium-Ion	HP AN03 Li-ion
Size (length x width x height)	8” x 2” x 1”	8-1/8” x 2” x 1”	8” x 1-1/2” x 1-1/2”	8” x 1-3/4” x 7/8”
Rated capacity	4,400mAh / 10.8V (48Wh)	4,400mAh / 10.8V (47Wh)	5,000 mAh / 11.1 V (56 Wh)	2,500mAh / 10.8V (28Wh)
Weight (oz.)	11.1	10.9	12	5.9

Figure 5. Configuration information for the Asus, Dell, and HP netbooks.

System	Lenovo IdeaPad S10-3	Lenovo IdeaPad S10-3t
		
General		
Number of processor packages	1	1
Number of cores per processor	1	1
Number of hardware threads per core	2	2
System power management policy	Balanced	Energy Star
Processor power-saving option	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology
System dimensions (length x width x height)	10-1/2” x 6-5/8” x1-1/2”	11” x 6-7/8” x 1-1/8”
System weight	2 lbs. 9 oz.	2 lbs. 13.5 oz.
CPU		
Vendor	Intel	Intel
Name	Atom	Atom
Model number	N450	N450
Stepping	A0	A0
Socket type and number of pins	Micro-FCBGA559	Micro-FCBGA559
Core frequency (GHz)	1.66	1.66
Front-side bus frequency (MHz)	667	667
L1 cache	32 KB +24 KB	32 KB + 24 KB
L2 cache (KB)	512	512
Platform		
Vendor	Lenovo	Lenovo
Motherboard model number	Mariana3A	Caucasus2
Motherboard chipset	NM10	Intel NM10
BIOS name and version	LENOVO 2ACN21WW (02/03/2010)	Lenovo v24CN18WW (12/11/2009)
Memory module(s)		
Vendor and model number	Ramaxel Technology RMN1150HC48D7F-667	Ramaxel Technology RMN1150HC48D7F-667
Type	PC2-5300	PC2-5300
Speed (MHz)	667	667
Speed running in the system (MHz)	667	667
Timing/Latency (tCL-tRCD-tRP-tRASmin)	5-5-5-15	5-5-5-15
Size (MB)	1,024	512

System	Lenovo IdeaPad S10-3	Lenovo IdeaPad S10-3t
Number of memory module(s)	1	1
Chip organization (Single-sided, Double-sided)	Double-sided	Double-sided
Channel (Single/Dual)	Single	Single
Hard disk		
Vendor and model number	Fujitsu MJA2160BH G2	Hitachi HTS545016B9A300
Number of disks in system	1	1
Size (GB)	160	160
Buffer size (MB)	8	8
RPM	5,400	5,400
Type	SATA 3.0 Gb/s	SATA 3.0 Gb/s
Controller	Intel NM10 Express Chipset	Intel NM10 Express Chipset
Driver	Microsoft 6.1.7600.16385 (06/21/2006)	Intel 8.9.0.1023 (06/04/2009)
Operating system		
Name	Window 7 Starter	Windows 7 Starter
Build number	7600	7600
Service pack	N/A	N/A
File system	NTFS	NTFS
Kernel	ACPI x86-based PC	ACPI x86-based PC
Language	English	English
Microsoft DirectX version	11	11
Graphics		
Vendor and model number	Intel Graphics Media Accelerator 3150	Intel Graphics Media Accelerator 3150
Type	Integrated	Integrated
Chipset	Intel Graphics Media Accelerator 3150	Intel Graphics Media Accelerator 3150
BIOS version	1851.0	1933.0
Total available graphics memory (MB)	250	250
Dedicated video memory (MB)	0	0
System video memory (MB)	64	64
Shared system memory (MB)	186	186
Resolution	1,024 x 600 x 32 bit	1,024 x 600 x 32 bit
Driver	Intel 8.14.10.1929 (09/23/2009)	Intel 8.14.10.1929 (09/23/2009)
Sound card/subsystem		
Vendor and model number	Realtek High Definition Audio	Conexant Pebble High Definition Smart Audio
Driver	Realtek 6.0.1.5989 (11/25/2009)	Conexant 4.98.13.62 (11/02/2009)

System	Lenovo IdeaPad S10-3	Lenovo IdeaPad S10-3t
Ethernet		
Vendor and model number	Realtek PCIe FE Family Controller	Broadcom NetLink Gigabit Ethernet
Driver	Realtek 7.6.820.2009 (08/20/2009)	Broadcom 12.4.3 (10/16/2009)
Wireless		
Vendor and model number	Atheros AR9285 Wireless Network Adapter	Atheros AR9285 Wireless Network Adapter
Driver	Atheros Communications Inc. 8.0.0.279 (01/17/2010)	Atheros Communications 8.0.0.238 (10/05/2009)
USB ports		
Number	3	2
Type	2.0	2.0
Other	5-in-1 Memory Card Reader	6-in-1 Media Card Reader
IEEE 1394 ports		
Number	0	0
Monitor		
LCD type	LED-Backlit	LED Backlight Display
Screen size (inches)	10.1	10.1
Refresh rate (Hz)	60	60
Battery		
Type	Lenovo L09S6Y14	Lenovo L09S4T09
Size (length x width x height)	8” x 2-1/8” X 1-1/16”	9-5/8” x 2” x 5/8”
Rated capacity	4,400mAh / 10.8V (48Wh)	3,740mAh / 7.4V (29Wh)
Weight (oz.)	10.5	6.9

Figure 6: Configuration information for the Lenovo netbooks.

APPENDIX B. DROP TEST CHECKLIST

TEST: _____ **UNIT S/N**: _____
DELL Diagnostics revision number: _____
Pre-drop disk scan results: _____
Post-drop disk scan results: _____

HDD
☐ Verify that HDD is functional

RMS devices
☐ Verify that all internal removable media storage (RMS) devices (FDD, CD-ROM, etc.) are functional

LCD
☐ Abrasion or buffing on the LCD from the keyboard
☐ Loss of pixels at any color layer
☐ Appearance of lines, bars, brightness change, etc.
☐ Broken or deformed parts
☐ Loose or partially unseated connectors

Keyboard
☐ Broken, deformed, or unseated keys
☐ Loss of functionality of any key, Touch Pad, TouchPad buttons, PointStick, PointStick buttons

External connectors
☐ Broken, deformed, or unseated connectors
☐ Loss of functionality of any connector

Latch
☐ Verify that all latches (display, battery, memory door, etc.) are fully functional

Battery
☐ Verify that the battery is fully functional

Cracks or breakage
☐ Cracks, breakage, deformation, or separation at any point on the display assembly and the base assembly

Paint degradation
☐ Scratches or chipping on painted parts

Floatlines/seams
☐ Separation between LCD back and bezel at any point around display, and between palm rest and base

Hinge caps

□ Separation or misfit of hinge caps

Doors

□ Verify that all doors (HDD door, memory door, FDD door, etc.) are fully functional

Screws

□ Verify that screws are set at their original screw setting

Rubber feet

□ Movement or dislodging of any rubber (stationary) foot on netbook

ABOUT PRINCIPLED TECHNOLOGIES

Principled Technologies, Inc.
1007 Slater Road, Suite 300
Durham, NC, 27703
www.principledtechnologies.com

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.