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FUJITSU

No Corners Cut:
Quality and Reliability in the Development and Production of Fujitsu Professional LifeBook® Notebooks and Stylistic® Tablet PCs

(February, 2007)

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1.0 Highlights

Quality is the primary consideration for Fujitsu—beginning with the design and planning of its professional LifeBook notebooks and Stylistic Tablet PCs, continuing through assembly, and long after production. The company has more than 20 years of experience in the development and manufacturing of mobile computers. Close collaboration between our laboratories and business units—in addition to the constant flow of information and innovation among our worldwide operations—enables Fujitsu to quickly bring to market innovative and highly reliable products incorporating the most advanced technologies.

Numerous quality tests are performed in order to achieve the highest system quality and stability. The main tests performed include two shock tests, mechanical tests, life tests, interference tests, package tests, thermal tests, and system integration tests.

2.0 Reliability

2.1 Technology Leadership

Fujitsu has many years of experience in product development and technology integration, with expertise that covers a wide spectrum of IT issues. The company has approximately 14,000 development engineers at operating locations around the globe, helping to integrate stringent quality standards into Fujitsu products. The company's deep understanding of the significance of emerging technologies allows it to anticipate the business computing requirements of its customers. The company's objective is to leverage its R&D activities to deliver long-term sustainable customer value.

2.2 Expert Knowledge

Since its inception in 1935, Fujitsu has developed a variety of new products incorporating state-of-the-art technologies. Today, Fujitsu is the world's third-largest IT services provider and Japan's market leader. Together with Fujitsu Siemens Computers in Europe, Fujitsu is among the world's top five providers of PCs and servers.

In addition to delivering outstanding time-to-market, life-cycle management, and benchmark performance with mature products for established markets, Fujitsu has expanded its IT technologies into emerging digital end-user markets, designed new and innovative server and storage architectures, and developed application tools to integrate these technologies.

2.3 Outstanding Reliability

Fujitsu LifeBook notebooks and Stylistic Tablet PCs offer the latest technologies—including hard drive protection systems, solid-state drives, spill-resistant keyboards, magnesium-alloy casings, and titanium hinges—with the goal of lowering failure and complaint rates.

The company also takes care when selecting and qualifying its suppliers. Great importance is placed on compliance with international standards and exhaustive function tests are required on system components and on the overall system.

All Fujitsu mobile computers comply with international standards in matters of product safety and electromagnetic compatibility. They are certified through Microsoft for Microsoft Operating Systems and listed in the Microsoft Hardware Compatibility List (HCL). Additional certifications are also obtained when the individual project demands them.

3.0 Technology Improving Reliability

Spill-Resistant Keyboard
The spill-resistant keyboard offers two layers of protection against damage caused by accidental spills. If a liquid is accidentally spilled on the keyboard, a protective membrane and collection tray* help reduce the chances of internal components coming in contact with the liquid. Users have more time to save their data and shut down their system**.

3.1 Shock Sensor Hard Drive Protection System

In the event a user's hard disk drive experiences an excessive vibration or shock, there is a possibility that the read-write head could come in contact with of the rotating platter, resulting in a "head crash." If this happens, data loss may occur. The Fujitsu Shock Sensor utility is a sophisticated hard disk drive protection system designed to minimize the likelihood of such an event.

Inside select Fujitsu mobile PCs there is an accelerometer that constantly senses for any sudden movement, including free falls, excessive vibration, or sudden impacts. Fujitsu Shock Sensor monitors movement from three axes: front-to-back, side-to-side, and up-and-down. The sensitivity of the Shock Sensor can be adjusted by the user to accommodate different working environments.

If a sudden movement is detected, the read-write head is quickly retracted to a safe zone, reducing the possibility of a head crash and the potential loss of data.

3.2 Magnesium-Alloy Casing

Valued for its strength and light weight, Magnesium alloy is commonly used in aviation and high-performance car components. Many Corvettes, BMWs, and Porsches, for example, take advantage of magnesium alloy for their "Mag-alloy" wheels, body panels, and engine blocks.

Following suit, Fujitsu uses magnesium alloy to construct a highly durable yet lightweight casing for many of its mobile PCs. This provides additional protection against bumps, and impacts.

*The collection tray holds approximately 20 cc of liquid.
** In the event of an accidental spill, Fujitsu recommends that users keep the system power off and consult Fujitsu Service & Support or an Authorized Service Provider.

4.0 Quality Control

4.1 Fujitsu Shimane Factory

Fujitsu Shimane Factory, Japan

Established in 1989, the Fujitsu Shimane plant employs more than 1,600 people who produce more than 2 million systems per year in a total area of 1,937,504 square feet. The production is certified in accordance to ISO9001 and ISO14001, evidence of the factory's high quality and environmental standards.

Close collaboration between Fujitsu R&D, Product Management, and Manufacturing reduces the reaction times to technological changes and new market requirements. Fujitsu professional LifeBook notebooks and Stylistic Tablet PCs offer solid quality due to an extremely high degree of automation, experience, and function stability.

4.2 Industrial Excellence

The factory in Shimane ranks among the most advanced in Asia. The production site stands out by virtue of its high level of automation and outstanding flexibility. It is also highly competitive in the global market.

5.0 Putting it to the Test

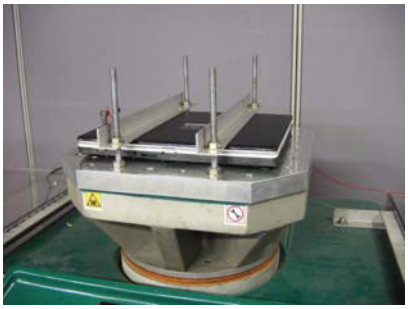
In order to achieve the highest stability and quality while fulfilling the various certifications, LifeBook notebooks and Stylistic Tablet PCs are tested and evaluated in the company's own certified test centers.

System tests include mechanical and climatic stress tests, packaging testing and transport simulation tests. Furthermore, a number of tests related to electrical and mechanical safety and fire resistance are done. Additionally, electromagnetic compatibility, interference immunity, and noise emissions are certified. The test results are the basis for approvals for CE mark, FCC, and GS.

5.1 Testing Procedures

Below are examples of the numerous tests that are performed:

5.1.1 Vibration and Shock Test

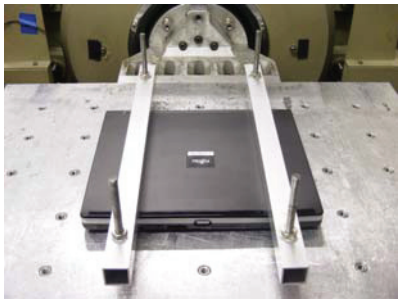


Reliability in data protection for the hard disk drive, and durability of the LCD and optical disc drive is evaluated under accelerated severe conditions. This test contains operating and non-operating vibration tests, shock tests, and operating and non-operating drop tests.

5.1.2 Vibration Test on "The Shaker"

After the vibration testing procedure, the unit and all programs must function normally.

Sophisticated hard disk drive shock-absorption cushions and the Fujitsu Shock Sensor help protect against data loss.



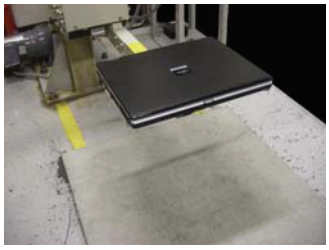
5.1.3 Mechanical Test

Mechanical strength is evaluated under severe conditions. This testing procedure contains pressure tests on display and display cover, torque test, free-fall test, stress test on touch panel, and tensile test on the lock slot.

5.1.4 Life Test

Reliability under normal usage conditions is evaluated in the life test procedure. This testing procedure contains open and close tests on the display lid, keyboard hammering tests, switch durability tests, magnetic resistance test, and tapping tests.

5.1.5 Free-fall Test



After a number of free-fall tests from different heights at various angles, the unit and all programs must function normally. No damage or cracking is allowed in any part of the test sample. There should also be no damage and no ejection of media cards or cables.

5.1.6 Concentrated Pressure Test on Display Cover

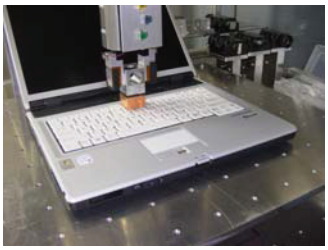
After imposing concentrated pressure on the display cover, no damage or cracking must be found on display or its cover, and no functional failure must be found on the display. Most Fujitsu professional mobile computers are equipped with a robust magnesium alloy cover to provide additional durability yet retain a light weight.

5.1.7 Open-and-Shut Durability Test on Display Cover

After several thousand test cycles, the display must work normally at any angle.

5.1.8 Keyboard Hammering Test

After heavy duty simulation by hammering on the keys, no damage or cracks may be found on mechanical parts, and the operating system and test program must work normally.



5.1.9 Keyboard Abrasion Test

Solid quality with laser print caption process guarantees very low keyboard abrasion factors.

5.1.10 Interference and Acoustic Test

This test series contains electromagnetic compatibility, interference immunity, and noise emission tests.

5.1.11 Package Durability Test

In this test, the reliability of the package is evaluated. This test procedure contains package vibration tests, package free fall tests, package strength test, package pressure tests, and temperature / humidity cycle tests on the package.

5.1.12 Bounce Test

Package vibrations are measured to simulate transport and storing conditions. Fujitsu improved the transport protection with a special shock absorbing package solution.

5.1.13 Package Drop Test

After package free-fall from different heights, no damage or cracks may be found on mechanical parts, and the system must boot normally. Fujitsu tests the packaging in three different ways.

Our accredited test center is equipped to test functionality and conformity to international standards and customer-specific requirements. It is specialized in the following test fields: electromagnetic compatibility, product safety, climatic, mechanical and reliability tests, and noise emissions.

The test center performs tests and measurements, arranges compliance certifications (national and international) and consults and debugs extensively during the development process.

All tests are carried out under realistic operating conditions.

5.1.14 Noise Emission Test

All professional LifeBook notebooks and Stylistic Tablet PCs must pass noise emission tests in the test center. Volume, loudness, sound pressures, and sound power levels are measured in the anechoic noise chamber, along with. TERZ and FFT analyses.

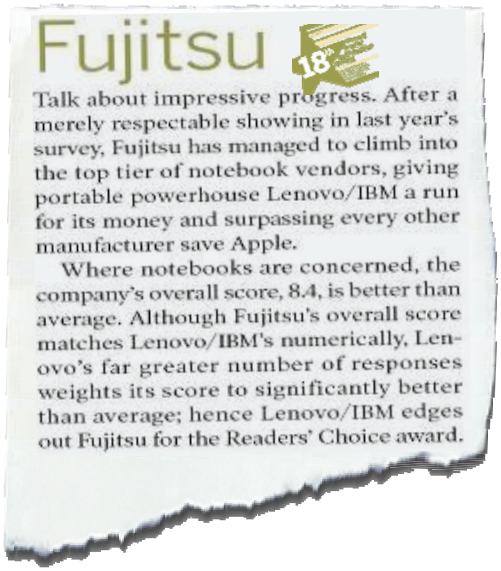
5.1.15 Thermal Tests

All professional LifeBook notebooks and Stylistic Tablet PCs must pass thermal tests in the climate-testing laboratory to ensure reliability under extreme operating conditions. The system must pass a number of benchmark tests under extreme temperature changes. Components as well as housing surface temperatures must not exceed strict temperature limits under these procedures.

5.1.16 System Integration and Compatibility Tests

System integration and system compatibility (e.g. LAN and VGA interfaces), are strictly tested by engineers before mobile computers are released to ensure system reliability in all possible scenarios of network environments.

6.0 Conclusion



Fujitsu

Talk about impressive progress. After a merely respectable showing in last year's survey, Fujitsu has managed to climb into the top tier of notebook vendors, giving portable powerhouse Lenovo/IBM a run for its money and surpassing every other manufacturer save Apple.

Where notebooks are concerned, the company's overall score, 8.4, is better than average. Although Fujitsu's overall score matches Lenovo/IBM's numerically, Lenovo's far greater number of responses weights its score to significantly better than average; hence Lenovo/IBM edges out Fujitsu for the Readers' Choice award.

Fujitsu emphasizes the quality and reliability of its professional LifeBook notebooks and Stylistic Tablet PCs. In a time when many PC vendors are cutting corners, this is rare. As a result, Fujitsu is consistently ranked high in the *PC Magazine* Annual Reader Satisfaction Survey, achieving some of the lowest PC failure rates and need for repair of all the Windows-based PC vendors. According to the survey, the repair rate for Fujitsu professional PCs is more than 40 percent lower than the industry average. Fujitsu customers have come to expect this high level of quality and reliability, and appreciate the reduced overall PC maintenance costs and increased productivity.

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