

White Paper

Product Quality Client Computing Devices

Quality from beginning to end is the principle that guides Fujitsu from the design and planning stage up to the assembly of FUJITSU Notebook LIFEBOOK and Tablet STYLISTIC, Thin Client FUTRO, Desktop ESPRIMO and Workstation CELSIUS. Fujitsu evaluates customer requirements, technology trends, market trends and competition products methodically to achieve the highest quality and full customer satisfaction. Our products are the ideal professional solution for the highest customer requirements, featuring the latest technology and delivering high performance and excellent quality.



We at Fujitsu have more than 25 years of expert knowledge in developing and manufacturing computers and mobile devices. The collaboration with Fujitsu Japan provides us with access to best-in-class technologies and combines research and development investments. The development and engineering of our deskbound and mobile products takes place worldwide. Our factory in Augsburg ranks among the most advanced in Europe and stands out due to its extremely short reaction times to market requirements. Numerous quality tests are carried out in our own certified test centers in Augsburg to ensure full quality and stability of our IT products. The main tests include shock tests, mechanical tests, life tests, interference tests, packaging tests, climatic tests and system integration tests.

Reliability

Technology leadership and Expert knowledge

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 in Germany, Japan, in the heart of Silicon Valley and as well at various locations around the globe. This helps us to integrate diverse quality requirements into our products.



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

Equally important, we work very closely with Fujitsu Japan, bringing together global IT knowledge. This collaboration provides us with access to best-in-class technologies and combines current research and development with knowledge in developing and engineering computers.

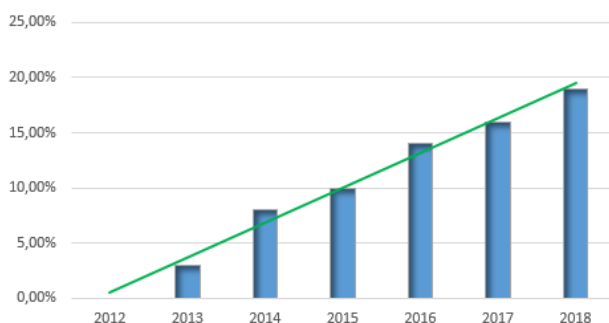
All our deskbound and mobile products are assembled by Fujitsu in our own factory, which gives us control over the whole production process. This enables us to ensure the competence of our products while offering all the support and competitive edge our customers expect.

Outstanding reliability

Our products feature the latest technologies, high levels of component consistency and expandable models to assure system continuity and long product life cycles. Low failure and complaint rates lead to a further reduction of overall IT costs.

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.

Quality Improvement:



This is reflected by our failure rates, which are the lowest on the market. We are constantly striving to ensure better reliability rates and we achieved an additional 19 percent improvement over the past seven years on our already low failure rates.

Robustness

Technology "Engineered in Germany"

The engineering and development of our FUTROs, ESPRIMOs and CELSIUS systems takes place in Augsburg, Germany. Founded in 1987, the plant employs more than 1,500 people in the production of our business client products and Intel-based servers as well as keyboards and mainboards. The production is certified in accordance with ISO9001 and ISO14001.



Short distances

Research and development as well as our product management are mainly located next to the production. For the computer business, the modern factory offers various advantages: The communication channels between research, development and manufacturing are extremely short. Therefore, response times to technological changes and new market requirements are kept to a minimum. Our systems offer solid quality due to an extremely high degree of automation, experience, and the highest functional stability.

Technology "Engineered in Japan – certified in Germany" - World class quality

Fujitsu's Notebooks and Tablets are tested in Japan and certified in Germany, ensuring each Notebook is of the highest quality and reliability. Built in a stringent quality-controlled environment called Qfinity, all Fujitsu computing products are rigorously tested before they are shipped to you. Fujitsu world class quality assurance maintains high user satisfaction by reducing failure incidents while increasing uptime.

Versatile form-factors

At Fujitsu, we design our products with the users in mind. From Desktops, Workstations, ultra-portables, mobile performers and convertible Notebooks to lightweight Tablets, you can find a personal computer that truly meets your usage requirements. Built with the focus on user's convenience, Fujitsu designs its keyboards ergonomically. Key spacing and depth are thoroughly researched and tested to ensure maximum comfort for users. With their sleek designs, Fujitsu products are aesthetically pleasing and stylish without compromising on quality.

Industrial excellence

Fujitsu's award-winning factory is widely recognized as Europe's most modern facility for the manufacturing, development, configuration and staging of PCs, Notebooks and servers, the Fujitsu factory in Augsburg won the 2013 Bavarian Quality Award for its exceptional quality and innovation, quality of research and development, production and service.

The production site stands out by virtue of its high level of automation and outstanding flexibility. It is also highly competitive in terms of the global market.



Mainboard development and manufacturing

Fujitsu develops and manufactures mainboards in Augsburg, Germany in line with stringent quality standards. We guarantee the highest level of quality, best logistics and excellent support combined with innovative product features.

Fujitsu mainboards have proven their outstanding profile continuously in Thin Clients, PCs, Workstations and servers.



Mainboards designed by Fujitsu are well known in many PC test magazines as stable and up-to-date platforms with an elegant design and outstanding features. Additionally, we often find our mainboards in first place, crowned with various awards.

Environmentally conscious products

"Green" is Fujitsu's DNA and its concept provides environmental guidelines for the entire value chain from product development to the use of materials, transport and recycling. We remain deeply committed to our responsibility for the environment in all of our products and processes. Furthermore, most of our products meet stringent requirements for environmental certificates such as Blue Angel, ENERGY STAR® and EPEAT.

Examples of certificates:



These examples underline how we have successfully changed our production processes to protect our environment. Sophisticated lead-free soldering methods, along with nitrogen environment, water-soluble flux, and the reduction of halogens in the printed circuit board (PCB), reduce the emission of environmental pollutants. The chlorine and bromine content in printed circuit boards was, for example, reduced from 12 to less than 0.15 percent. The mainboards from Fujitsu no longer contain PBB and PBDE. In addition, only batteries that are free from mercury and cadmium are used.

Water use has been drastically cut throughout production. For example, there is no need to wash the mainboard after soldering. All production media are cleaned in one cycle. To ease the recycling process, the case and molded plastic parts are labeled. Our production is halogen-free since flame retardants containing bromine and chlorine are no longer used, yet the equipment still complies with existing fire protection guidelines. The mainboard also contains halogen-free flame retardants. Designing the packaging more intelligently reduces the volume and increases the transport capacities, making the transportation itself more efficient and environmentally conscious.

Putting it to the test

To ensure full stability and the highest quality, and to fulfill the various certifications, our products are tested and evaluated in our own company test center. This test center is legally certified. System tests include mechanical and climatic stress tests, packaging testing and transport simulation tests. Furthermore, a number of tests regarding electrical and mechanical safety and fire resistance are carried out. Electromagnetic compatibility, interference immunity, and noise emission are also certified. Selected client computing devices are even certified to fulfill the stringent requirements for use in the healthcare industry. The test results are the basis for regulatory approvals such as CE, FCC, and GS.

Examples of approvals:



Testing procedures

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.

Vibration and shock test

Reliability in protecting data on hard disk drives and optical disc drives is evaluated under accelerated, severe conditions. This test contains operating and non-operating vibration tests and shock tests.

Vibration test on the shaker

After the vibration testing procedure the unit and all programs have to work normally.



Vibration test on vibration test machine

After 30 minutes of vibration testing per axis, at a frequency of 5 to 500 Hz, the test unit and all test programs have to work normally.

Display test

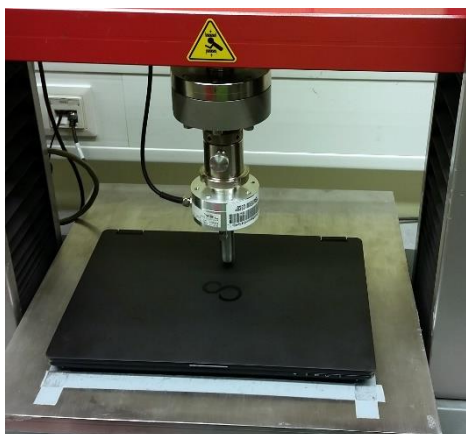
The same approvals and standards apply to displays and all mobile products as well. They undergo thermo vision tests, packaging tests and a safety check. The system integration test with Fujitsu Thin Clients, PCs and Workstations, Notebooks and Tablets is mandatory.

Magnesium lid

Valued for its strength and light weight, magnesium alloys are commonly used in aviation and high-performance car components. Following suit, Fujitsu uses a magnesium alloy to construct a highly durable yet lightweight lid for many of its mobile PCs. A magnesium cover board and bottom plate provide protection against bumps and impacts and ensure that outward pressure is not applied directly to internal parts.



Concentrated pressure test on LIFEBOOK display cover



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

Open-and-shut durability test on display cover

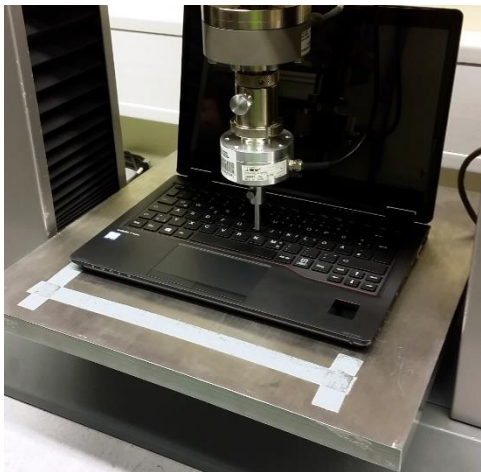
After several thousand test cycles, the display must work normally at any angle.

Hinge test

As new Desktop form factors like All-in-one PCs are available on the market, new functions are introduced. The innovative Fujitsu ESPRIMO X Line features an adjustable display which enables a fully flat working position. The hinges are rigorously tested to ensure excellent functionality over the product's lifecycle.



Keyboard hammering test



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

Keyboard abrasion test

Solid, quality keyboards with laser print lettering guarantee very high keyboard abrasion resistance on all products.



EMI test

This test is about electromagnetic compatibility and interference immunity.



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 emission.

Acoustic emission test

All Thin Clients, PCs, Workstations, Notebooks and Tablets must pass acoustic emission tests in the test center.

Volume, loudness, sound pressure and sound power level are measured in the anechoic noise chamber. One-third-octave-band and FFT analyses are also carried out.

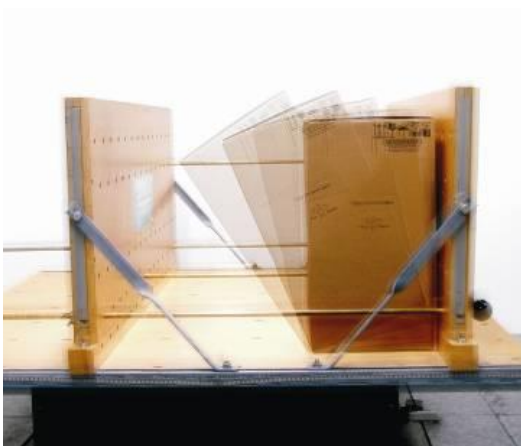
With sophisticated cooling concepts, the Thin Clients, PCs, Workstations and mobile devices are silent and provide the optimum working environment.



Packaging durability test

Reliability of packaging is evaluated to make sure that the system arrives in perfect condition. This includes a packaging vibration test, packaging free fall test, packaging strength test, packaging pressure test and temperature / humidity cycle test on package.

Bounce test

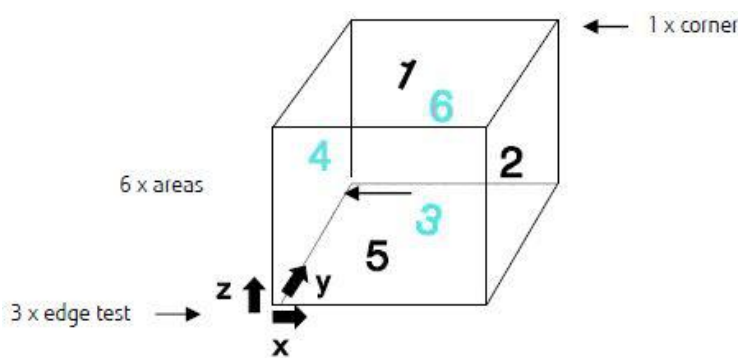


Vibrations on packaging are measured to simulate transport and storage conditions. Fujitsu improved the transport protection with a special shock-absorbing packaging solution.

To minimize the negative impact on the environment and therefore reduce waste, we are constantly optimizing our packaging. The materials used are selected with a focus on environmental sustainability. Packaging is balanced to fulfill the transportation requirements and minimize the use of materials.

Packaging drop test

After packaging freefalls from different heights, no damage or cracks must be found on mechanical parts, and the operating system and test program must work normally.

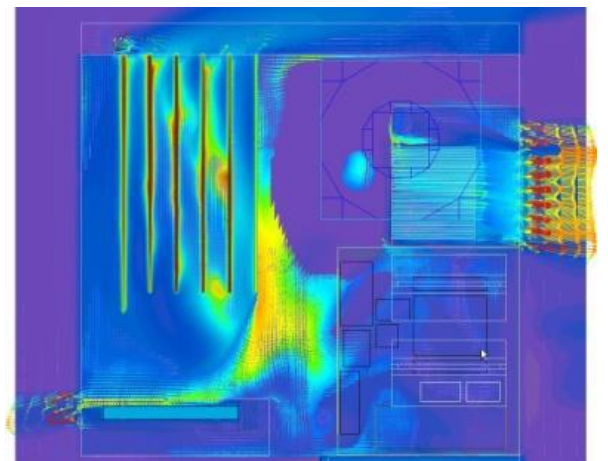


Fujitsu tests the Tablets, Notebooks, Thin Clients, PCs and Workstations packaging in three different ways. Our accredited test center is equipped to test functionality and conformity to international standards and customer-specific requirements

Climatic stress test

All Thin Clients, PCs and Workstations have to pass climatic tests in the climate-testing laboratory to ensure reliability under extreme operating conditions.

The system has to pass different benchmark tests when subjected to extreme temperature changes. Components as well as housing surface temperatures must not exceed strict limits under this procedure.



System integration and compatibility test

System integration and system compatibility, e.g. LAN and display interfaces, are strictly tested by engineers before the systems are released. This guarantees system reliability under all common scenarios in the complex network environments of the modern office.

Quality Management

The “Fujitsu Way”

Be “quality”, we mean more than just products and services meeting our own specifications. It means meeting customers’ requirements and ensuring quality in all dealings with our customers. Quality is, therefore, not just the responsibility of our research, manufacturing and service departments, but is the responsibility of all departments. When we think about quality, our aim is therefore to continuously meet the quality levels expected by our customers in everything we do.



Field Quality Review Process

Monthly Q-reviews are important parts of the Continual Improvement Process.



With modern quality and statistic tooling’s we analyze and review constantly quality related aspects and parameter in production and field.

This kind “Closed-loop quality management” essentially means connecting quality process from production and field directly to the engineering, always with the goal.

This closed quality loop with its internal and external monitoring mechanisms enables us to react quick and effective on KPI (Key Performance Indicator) deviations.

The effectiveness of closed-loop quality systems is evident.

Tasks & Responsibilities

Supplier selection and possible improvements are going hand in hand with supplier Audits and quality checks. Negotiating quality contracts and defining the product related quality criteria are important steps to fulfill our duty. Internal and external Audits keep our quality processes and quality level up to date.

Quality speaks for itself

Several expert quality teams at any engineering and production stages take care for a constant high quality level.



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