

ASUS Business & Education Laptop Devices

MIL-STD-810H Testing Report

D700TER, D500TER



November 2024

* Selected products are tested using enhanced military-grade MIL-STD-810H durability standards, with up to 13 test methods and 28 test procedures, to ensure extraordinary toughness. Based on ASUS internal market research using available information and testing reports from main laptop brand websites on August 1, 2024, ASUS commercial laptops use a regime consisting of up to 28 test procedures.

ASUS DURABILITY TESTING

ASUS is committed to delivering reliable devices and services you can trust while creating positive, meaningful change in the environment. With 5,000+ world-class engineers, we build rock-solid products with a commitment to sustainability, from operations to product design. Our products are built to military-grade standards, hold hundreds of world records and have been honored with tens of thousands of awards.

MIL-STD-810H is a US military standard developed by the US Department of Defense that provides durability testing advice for military equipment manufacturers. It includes a wide range of laboratory test procedures that replicate the environmental and physical situations that military equipment is expected to endure.

ASUS includes up to 13 test methods with 28 test procedures* in the full suite, including operation in harsh environmental conditions along with physical vibration and shock tests designed to mimic rough day-to-day handling.

Note

The testing regime includes both MIL-STD 810H standards and ASUS quality tests, and varies depending on device. MIL-STD-810 testing is conducted on selected ASUS products only. Note that the MIL-STD-810 testing helps to ensure the quality of ASUS products but does not indicate a particular fitness for military use. The test is performed under laboratory conditions. Any damage caused by attempts to replicate these test conditions would be considered accidental, and would not be covered by the standard ASUS warranty. Additional coverage is available with ASUS Premium Care.

*The test methods and procedures tested for each series or model can vary and depend on usage scenario

Test Result

ASUS ExpertCenter Tower Series

Up to 6 test methods with 14 test procedures

| Test | Test Method | ExpertCenter Tower | ExpertCenter Tower |
|--------------------------------------|---------------------------------|--------------------|--------------------|
| | | D700TER | D500TER |
| 500.6 Low Pressure (Altitude) | Method 500.6-Procedure I | Pass | Pass |
| | Method 500.6-Procedure II | Pass | Pass |
| 501.7 High Temperature | Method 501.7-Procedure II (A1) | Pass | Pass |
| | Method 501.7-Procedure I (A1) | Pass | Pass |
| | Method 501.7-Procedure II (A2) | Pass | Pass |
| | Method 501.7-Procedure I (A2) | Pass | Pass |
| 502.7 Low Temperature | Method 502.7- Procedure I (C1) | Pass | Pass |
| | Method 502.7- Procedure II (C1) | Pass | Pass |
| | Method 502.7- Procedure I (C2) | Pass | Pass |
| | Method 502.7- Procedure II (C2) | Pass | Pass |
| 503.7 Temperature Shock | Method 503.7- Procedure I-C | Pass | Pass |
| 507.6 Humidity | Method 507.6- Procedure II | Pass | Pass |
| 516.8 Shock | Method 516.8- Procedure I | Pass | Pass |
| | Method 516.8- Procedure II | Pass | Pass |

Note: A dash (-) in the Test Results tables indicates that the test was not tested on the particular model.

The testing regime includes the requirements of both military-grade standards and ASUS quality tests, and varies depending on device. MIL-STD-810 testing is conducted on selected ASUS products only. Note that the MIL-STD-810 testing helps to ensure the quality of ASUS products but does not indicate a particular fitness for military use. The test is performed under laboratory conditions. Any damage caused by attempts to replicate these test conditions would be considered accidental, and would not be covered by the standard ASUS warranty. Additional coverage is available with ASUS Premium Care.



Test Descriptions

ASUS laptops are tested to the most stringent US military-grade standards-, MIL-STD 810H, with up to 14 test methods and 28 procedures.

| Test | Test Method | Test Reference | MIL-STD-810H Test Parameters |
|----------------------------------|------------------------------------|--|---|
| Shock Test | Functional Shock | Method 516.8- Procedure I | Operational / Unpackage 3 shocks/axis/direction for a total of 18 shocks 40 Gs peak, 11 ms |
| | Transportation shock- On road | Method 516.8- Procedure II | Non-operational / Package A total of 3 ~ 42 times shocks 5.1-7.6 Gs peak, 11 ms Terminal Peak Sawtooth |
| | Fragility | Method 516.8- Procedure III | Non-operational / Unpackage 3 shocks/axis/direction for a total of 18 shocks 30~50 Gs peak Trapezoidal pulse |
| | Crash Hazard Shock | Method 516.8- Procedure V | Non-operational / Unpackage 2 shocks/axis/direction for a total of 12 shocks 75 Gs peak, 6 ms Terminal Peak Sawtooth |
| | Bench Handling | Method 516.8- Procedure VI | Operational / Unpackage Drop Height : 100 mm |
| Vibration Test | Two-wheeled tirailer | Method 514.8- Procedure I (Table 514.8C-IV.) | Non-operational / Unpackage Vibration: 5-500 Hz Duration : 32 min/axis |
| | Wheeled vehicle | Method 514.8- Procedure I (Table 514.8C-VII.) | Non-operational / Unpackage Vibration: 5-500 Hz Duration : 40 min/axis |
| | Common carrier | Method 514.8- Procedure I (Table 514.8C-I.) | Operational / Unpackage Vibration: 5-500 Hz Duration : 60 min/axis |
| | Composite wheeled vehicle | Method 514.8- Procedure I (Table 514.8C-VI.) | Category - 4 - Composite wheeled vehicle vibration exposure (Break points for curves of Figure 514.8C-6) NOP/test time 40min/axis |
| | General minimum integrity tests | Method 514.8- Procedure I (Figure 514.8E-1.) | Category 24 - General minimum integrity tests (Figure 514.8E-1) NOP/ test time 60min/axis ; RMS= 7.7g's |
| High Temperature Test | Basic Hot Storage and Transit | Method 501.7-Procedure I | Non-operational Duration: 7 day exposure (7 X 24 hr. cycles) Temperature: 30~63°C Humidity: 5~44% |

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The testing regime includes the requirements of both military-grade standards and ASUS quality tests, and varies depending on device. MIL-STD-810 testing is conducted on selected ASUS products only. Note that the MIL-STD-810 testing helps to ensure the quality of ASUS products but does not indicate a particular fitness for military use. The test is performed under laboratory conditions. Any damage caused by attempts to replicate these test conditions would be considered accidental, and would not be covered by the standard ASUS warranty. Additional coverage is available with ASUS Premium Care.

| Test | Test Method | Test Reference | MIL-STD-810H Test Parameters |
|------------------------------|------------------------------------|----------------------------|--|
| High Temperature Test | Basic Hot Storage and Transit | Method 501.7-Procedure I | Non-operational Duration: 7 day exposure (7 X 24 hr. cycles) Temperature: 30~63°C Humidity: 5~44% |
| | Basic Hot Operational | Method 501.7-Procedure II | Operational Duration: 3 day exposure (3 X 24 hr. cycles) Temperature: 30~43°C cycling temperature exposure Humidity: 14~44% |
| | Hot Dry Storage and Transit | Method 501.7-Procedure I | Non-operational Duration: 7 day exposure (7 X 24 hr. cycles) Temperature: 33~71°C |
| | Hot Dry Operational | Method 501.7-Procedure II | Operational Duration: 3 day exposure (3 X 24 hr. cycles) Temperature: 32~49°C cycling temperature exposure |
| Low Temperature Test | Basic Climatic Storage and Transit | Method 502.7- Procedure I | Non-operational Duration: 7 day exposure (7 X 24 hr. cycles) Temperature: -25~ -33°C |
| | Basic Climatic Operational | Method 502.7- Procedure II | Operational Duration: 3 day exposure (3 X 24 hr. cycles) Temperature: -21~ - 32°C |
| | Cold Climatic Storage and Transit | Method 502.7- Procedure I | Non-Operational Duration: 7 day exposure (7 X 24 hr. cycles) Non-operational -37~ -46°C (-50°F) |
| | Cold Climatic Operational | Method 502.7- Procedure II | Operational Duration: 3 day exposure (3 X 24 hr. cycles) Operational -37~ -46°C (-50°F) |
| Sand and Dust Test | Blowing Dust | Method 510.7- Procedure I | Particle density: 10 +/- 7 g/m ³ Air velocity: 300~1750 ft/min Temperature: 60°C |
| | Blowing Sand | Method 510.7- Procedure II | Particle density: 1.2g/m ³ Air velocity: 28m/s Temperature: 60°C |
| Altitude Test | Altitude Storage | Method 500.6-Procedure I | Non-Operational Test Pressure: Equivalent to cabin altitude of 40,000ft Temperature: -20°C Duration: 12 hours |
| | Altitude Operation | Method 500.6-Procedure II | Operational Test Pressure: Equivalent to cabin altitude of 15,000ft Temperature: 5°C and 40°C Duration: 12 and 12 hours |

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| Test | Test Method | Test Reference | MIL-STD-810H Test Parameters |
|----------------------------------|---------------------------|-----------------------------------|---|
| Freeze & Thaw Test | Freeze & Thaw Test | Method 524.1- Procedure III | Rapid Temperature Change Humidity: 95% RH Temperature: 30°C/-10°C Duration: 1 hour, 3 cycles |
| Humidity Test | Humidity Test | Method 507.6- Procedure II | Non-Operational Humidity: 95% RH Temperature: 30°C/60°C Duration:10 Days |
| Temperature Shock Test | Temperature Shock | Method 503.7- Procedure I-A | Non-Operational -25C to 60C Dwell : 4hour / One-way shock |
| | Temperature Shock | Method 503.7- Procedure I-B | Non-Operational -25C to 60C to -25C Dwell: 6Hour / single cycle shock |
| | Temperature Shock | Method 503.7- Procedure I-C | Non-operational Temperature: -51°~71°C Duration: 1 hour, 3 cycles |
| Solar Radiation Test | Solar Radiation | Method 505.7- Procedure I | Category A1, Paragraph 4.4.2, Figure 505.7C-5 (Cyclic)- three 24-hour cycles of test peak conditions of 1120 W/m2 (355 BTU/ft2/hr) and 49°C (120°F) |
| Mechanical Vibration Test | Mechanical Vibration Test | Method 528.1- Procedure1 (Type 1) | Operational Frequency: 4-33 Hz Duration: 2 hours |
| Explosive Atmosphere | Explosive Atmosphere | Method 511.7- Procedure I | Operational Altitude: 15,000~33,00ft Explosive air: 95% n-Hexane |

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MIL-STD 810H

The new MIL-STD-810H standard is the eighth and most comprehensive version of the standard, concentrating on rigorous requirements for the durability of a product.



1. Shock Test

"To ensure the device can physically and functionally withstand the shocks encountered in handling, transportation, and service environments and verify that parts of the material are not ejected during a crash situation."



4. Low Temperature Test

"To evaluate effects of low temperature conditions on device safety, integrity, and performance during storage, operation, and manipulation."



7. Freeze & Thaw Test

"To determine the ability of device to withstand the effects of moisture phase changes between liquid and solid or moisture induced by transfer from a cold-to-warm or warm-to-cold environment."



10. Solar Radiation

"To determine the heating effects of solar radiation on device, and identify the actinic (photo degradation) effects of exposure to solar radiation."



2. Vibration Test

"To verify the device will function in and withstand the vibration exposures of a life cycle."



5. Sand and Dust

"To evaluate the ability of device to resist the effects of dust (< 150 µm) and to be stored and operated in blowing sand (150 to 850 µm particle size) conditions."



8. Humidity Test

"To determine the resistance of device to the effects of a warm, humid atmosphere."



11. Mechanical Vibration Test

"To determining the ability of device to withstand Navy shipboard equipment environment and excited vibration testing."



3. High Temperature Test

"To evaluate effects of high temperature conditions on device safety, integrity, and performance."



6. Altitude Test

"To determine the device can withstand and/or operate in a low pressure environment and/or withstand rapid pressure changes."



9. Temperature Shock

"To determine the device can withstand sudden changes in the temperature of the surrounding atmosphere without experiencing physical damage or deterioration in performance."



12. Explosive Atmosphere

"To demonstrate the ability of a device to operate in a fuel-air explosive atmosphere without causing ignition, and that an explosion or combustion reaction will be contained."