

ASUS Business & Education Laptop Devices

MIL-STD-810H Testing Report

P5405CSA



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.

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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 ExpertBook P5 Series

Up to 11 test methods with 24 test procedures

ExpertBook P5 14"		
Test	Test Method	P5405CSA
500.6 Low Pressure (Altitude)	Method 500.6-Procedure I	Pass
	Method 500.6-Procedure II	Pass
501.7 High Temperature	Method 501.7-Procedure II (A2)	Pass
	Method 501.7-Procedure I (A2)	Pass
502.7 Low Temperature	Method 502.7- Procedure I (C1)	Pass
	Method 502.7- Procedure II (C1)	Pass
503.7 Temperature Shock	Method 503.7- Procedure I-A	Pass
	Method 503.7- Procedure I-B	Pass
	Method 503.7- Procedure I-C	Pass
505.7 Solar Radiation	Method 505.7- Procedure I	Pass
507.6 Humidity	Method 507.6- Procedure II	Pass
510.7 Sand and Dust	Method 510.7- Procedure I	Pass
	Method 510.7- Procedure II	Pass
514.8 Vibration	Method 514.8- Procedure I (Table 514.8C-I.)	Pass
	Method 514.8- Procedure I (Table 514.8C-IV.)	Pass
	Method 514.8- Procedure I (Table 514.8C-VII.)	Pass
	Method 514.8- Procedure I (Figure 514.8E-1.)	Pass
516.8 Shock	Method 516.8- Procedure I	Pass
	Method 516.8- Procedure II	Pass
	Method 516.8- Procedure III	Pass
	Method 516.8- Procedure V	Pass
	Method 516.8- Procedure VI	Pass
524.1 Freeze / Thaw	Method 524.1- Procedure III	Pass
528.1 Mechanical Vibrations of Shipboard Equipment	Method 528.1- Procedure1 (Type 1)	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%

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	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/m ² (355 BTU/ft ² /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

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

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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."