

# ASUS Consumer Laptop **MIL-STD-810H** Testing Report



March 2023 version.



## World's Most Strictly Tested US Military-Grade Laptop Durability

\* Selected products are tested using enhanced military-grade MIL-STD-810H durability standards, with 12 test methods and 26 test procedures, to ensure extraordinary toughness. Based on ASUS internal market research using available information and testing reports from main laptop brand websites on Oct 28, 2022, ASUS consumer laptops use a regime consisting of 26 test procedures, which is the consumer laptop industry's strictest and most extensive test regime for the MIL-STD-810H standard.

**ASUS**

# ASUS MIL-STD-810H Testing

For greater reliability and durability, from 2023 onwards all ASUS consumer laptop models will be tested to the latest and strictest MIL-STD-810H military-grade standards.

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 uses up to 12 test methods with 26 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. Compared to other laptop brands, ASUS consumer laptops have more a extensive testing regime and stricter compliance with the US military standard.

## 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 materiel are not ejected during a crash situation."



### 2. Vibration Test

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



### 3. High Temperature Test

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

## Note

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.

\* Some models tested only 8 test methods and 21 test procedures.



**4. Low Temperature Test**

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



**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."



**6. Altitude Test**

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



**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."



**8. Humidity Test**

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



**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. "



**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."



**11. Mechanical Vibration Test**

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



**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."

\* Some models tested only 8 test methods and 21 test procedures.

## Test Descriptions

ASUS laptops are tested to the most stringent US military-grade standards- , MIL-STD 810H, with up to 12 test methods and 26 procedures.\*

Test	Test Method	Test Reference	MIL-STD-810H Test Parameters
Shock Test	1. Functional Shock	Method 516.8- Procedure I	Operational / Unpackage 3 shocks/axis/direction for a total of 18 shocks 40 Gs peak, 11 ms
	2. 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
	3. 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
	4. 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
	5. Bench Handling	Method 516.8- Procedure VI	Operational / Unpackage Drop Height : 100 mm
Vibration Test	6. Two-wheeled tirailer	Method 514.8- Procedure I (Table 514.8C-IV.)	Non-operational / Unpackage Vibration: 5-500 Hz Duration : 32 min/axis
	7. Wheeled vehicle	Method 514.8- Procedure I (Table 514.8C-VII. )	Non-operational / Unpackage Vibration: 5-500 Hz Duration : 40 min/axis
	8. Common carrier	Method 514.8- Procedure I (Table 514.8C-I. )	Operational / Unpackage Vibration: 5-500 Hz Duration : 60 min/axis
High Temperature Test	9. 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%

\* Some models tested only 8 test methods and 21 test procedures.

Test	Test Method	Test Reference	MIL-STD-810H Test Parameters
High Temperature Test	10. 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%
	11. 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
	12. 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	13. 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
	14. Basic Climatic Operational	Method 502.7- Procedure II	Operational Duration: 3 day exposure (3 X 24 hr. cycles) Temperature: -21~ - 32°C
	15. 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)
	16. 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*	17. Blowing Dust	Method 510.7- Procedure I	Particle density: 10 +/- 7 g/m^3 Air velocity: 300~1750 ft/min Temperature: 60°C
	18. Blowing Sand	Method 510.7- Procedure II	Particle density: 1.2g/m^3 Air velocity: 28m/s Temperature: 60°C
Altitude Test	19. Altitude Storage	Method 500.6- Procedure I	Non-Operational Test Pressure: Equivalent to cabin altitude of 40,000ft Temperature: -20°C Duration: 12 hours
	20. 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

\* Some models have not been tested by this test methods or procedures.

Test	Test Method	Test Reference	MIL-STD-810H Test Parameters
Freeze & Thaw Test	21. Freeze & Thaw Test	Method 524.1- Procedure III	Humidity: 95% RH Temperature: 30°C/-10°C Duration: 1 hour, 3 cycles
Humidity Test	22. Humidity Test	Method 507.6- Procedure II	Non-Operational Humidity: 95% RH Temperature: 30°C/60°C Duration:10 Days
Temperature Shock Test*	23. Temperature Shock*	Method 503.7- Procedure I-C	Non-operational Temperature: -51°~71°C Duration: 1 hour, 3 cycles
Solar Radiation Test*	24. Solar Radiation*	Method 505.7- Procedure I	Non-operational Spectral irradiance: 1120W/m <sup>2</sup> , 49°C Duration: 24hrs, 3 cycles
Mechanical Vibration Test	25. Mechanical Vibration Test	Method 528.1- Procedure1 (Type 1)	Operational Frequency: 4-33 Hz Duration: 2 hours
Explosive Atmosphere*	26. Explosive Atmosphere*	Method 511.7- Procedure I	Operational Altitude: 15,000~33,00ft Explosive air: 95% n-Hexane

\* Some models have not been tested by this test methods or procedures.

# ASUS Consumer Laptops Test Results

## Tested Models

### ASUS Zenbook

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#### ASUS Zenbook Classic

- ASUS Zenbook 14X OLED (UX3404V)
- ASUS Zenbook 14 OLED (UX3402V)
- ASUS Zenbook 14 OLED (UM3402Y AMD Ryzen 7000 Series model)

#### ASUS Zenbook Flip

- ASUS Zenbook 14 Flip OLED (UP3404V)

### ASUS Vivobook

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#### ASUS Vivobook Pro

- ASUS Vivobook Pro 16 OLED (K6602V)\*
- ASUS Vivobook Pro 15 OLED (K6502V)\*

#### ASUS Vivobook S Flip

- ASUS Vivobook S 16 Flip OLED (TP3604V)
- ASUS Vivobook S 16 Flip OLED (TN3604Y)
- ASUS Vivobook S 14 Flip OLED (TP3402V)\*
- ASUS Vivobook S 14 Flip OLED (TN3402Y)\*

#### ASUS Vivobook Classic

- ASUS Vivobook 16 (X1605P)
- ASUS Vivobook 16 (X1605V)
- ASUS Vivobook 14 OLED (X1404Z)

#### ASUS Vivobook Slate

- ASUS Vivobook 13 Slate OLED (T3304G)

\* The model tested only 8 test methods and 21 test procedures.

# Test Result

The following tables summarize the MIL-STD-810H test methods that ASUS laptops passed.

## ASUS Zenbook Classic

12 test methods with 26 test procedures

		Zenbook 14X OLED	Zenbook 14 OLED	Zenbook 14 OLED
Test	Test Method	UX3404V	UX3402V	UM3402Y
516.8 Shock	1. Functional shock	Pass	Pass	Pass
	2. Transportation shock- on road	Pass	Pass	Pass
	3. Fragility	Pass	Pass	Pass
	4. Crash hazard shock	Pass	Pass	Pass
	5. Bench handling	Pass	Pass	Pass
514.8 Vibration	6. Two-wheeled trailer	Pass	Pass	Pass
	7. Wheeled vehicle	Pass	Pass	Pass
	8. Common carrier	Pass	Pass	Pass
501.7 High Temperature	9. Basic hot storage and transit	Pass	Pass	Pass
	10. Basic hot operational	Pass	Pass	Pass
	11. Hot dry storage and transit	Pass	Pass	Pass
	12. Hot dry operational	Pass	Pass	Pass
502.7 Low Temperature	13. Basic climatic storage and transit	Pass	Pass	Pass
	14. Basic climatic operational	Pass	Pass	Pass
	15. Cold climatic storage and transit	Pass	Pass	Pass
	16. Cold climatic operational	Pass	Pass	Pass
510.7 Sand and Dust	17. Blowing dust	Pass	Pass	Pass
	18. Blowing sand	Pass	Pass	Pass
500.6 Altitude Test	19. Altitude storage	Pass	Pass	Pass
	20. Altitude operation	Pass	Pass	Pass
524.1 Freeze / Thaw	21. Freeze & thaw test	Pass	Pass	Pass
507.6 Humidity	22. Humidity test	Pass	Pass	Pass
503.7 Temperature Shock	23. Temperature shock	Pass	Pass	Pass
505.7 Solar Radiation	24. Solar radiation	Pass	Pass	Pass
528.1 Mechanical Vibrations Test	25. Mechanical vibration test	Pass	Pass	Pass
511.7 Explosive Atmosphere	26. Explosive atmosphere	Pass	Pass	Pass

Note: A dash (-) in the Test Results tables indicates that the test was not passed by the laptop 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 Result

The following tables summarize the MIL-STD-810H test methods that ASUS laptops passed.

## ASUS Zenbook Flip

12 test methods with 26 test procedures

Zenbook 14 Flip OLED		
Test	Test Method	UP3404V
516.8 Shock	1. Functional shock	Pass
	2. Transportation shock- on road	Pass
	3. Fragility	Pass
	4. Crash hazard shock	Pass
	5. Bench handling	Pass
514.8 Vibration	6. Two-wheeled trailer	Pass
	7. Wheeled vehicle	Pass
	8. Common carrier	Pass
501.7 High Temperature	9. Basic hot storage and transit	Pass
	10. Basic hot operational	Pass
	11. Hot dry storage and transit	Pass
	12. Hot dry operational	Pass
502.7 Low Temperature	13. Basic climatic storage and transit	Pass
	14. Basic climatic operational	Pass
	15. Cold climatic storage and transit	Pass
	16. Cold climatic operational	Pass
510.7 Sand and Dust	17. Blowing dust	Pass
	18. Blowing sand	-
500.6 Altitude Test	19. Altitude storage	Pass
	20. Altitude operation	Pass
524.1 Freeze / Thaw	21. Freeze & thaw test	Pass
507.6 Humidity	22. Humidity test	Pass
503.7 Temperature Shock	23. Temperature shock	Pass
505.7 Solar Radiation	24. Solar radiation	Pass
528.1 Mechanical Vibrations Test	25. Mechanical vibration test	Pass
511.7 Explosive Atmosphere	26. Explosive atmosphere	Pass

Note: A dash (-) in the Test Results tables indicates that the test was not passed by the laptop model.

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# Test Result

The following tables summarize the MIL-STD-810H test methods that ASUS laptops passed.

## ASUS Vivobook Pro

8 test methods with 21 test procedures

		Vivobook Pro 16 OLED	Vivobook Pro 15 OLED
Test	Test Method	K6602V	K6502V
516.8 Shock	1. Functional shock	Pass	Pass
	2. Transportation shock- on road	Pass	Pass
	3. Fragility	Pass	Pass
	4. Crash hazard shock	Pass	Pass
	5. Bench handling	Pass	Pass
514.8 Vibration	6. Two-wheeled trailer	Pass	Pass
	7. Wheeled vehicle	Pass	Pass
	8. Common carrier	Pass	Pass
501.7 High Temperature	9. Basic hot storage and transit	Pass	Pass
	10. Basic hot operational	Pass	Pass
	11. Hot dry storage and transit	Pass	Pass
	12. Hot dry operational	Pass	Pass
502.7 Low Temperature	13. Basic climatic storage and transit	Pass	Pass
	14. Basic climatic operational	Pass	Pass
	15. Cold climatic storage and transit	Pass	Pass
	16. Cold climatic operational	Pass	Pass
507.6 Humidity	17. Humidity test	Pass	-
500.6 Altitude Test	18. Altitude storage	Pass	Pass
	19. Altitude operation	Pass	Pass
524.1 Freeze / Thaw	20. Freeze and thaw test	Pass	Pass
528.1 Mechanical Vibrations Test	21. Mechanical vibration	Pass	Pass

Note: A dash (-) in the Test Results tables indicates that the test was not passed by the laptop model.

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# Test Result

The following tables summarize the MIL-STD-810H test methods that ASUS laptops passed.

## ASUS Vivobook S Flip

12 test methods with 26 test procedures

		Vivobook S 16 Flip OLED	Vivobook S 16 Flip OLED
Test	Test Method	TP3604V	TN3604Y
516.8 Shock	1. Functional shock	Pass	Pass
	2. Transportation shock- on road	Pass	Pass
	3. Fragility	Pass	Pass
	4. Crash hazard shock	Pass	Pass
	5. Bench handling	Pass	Pass
514.8 Vibration	6. Two-wheeled trailer	Pass	Pass
	7. Wheeled vehicle	Pass	Pass
	8. Common carrier	Pass	Pass
501.7 High Temperature	9. Basic hot storage and transit	Pass	Pass
	10. Basic hot operational	Pass	Pass
	11. Hot dry storage and transit	Pass	Pass
	12. Hot dry operational	Pass	Pass
502.7 Low Temperature	13. Basic climatic storage and transit	Pass	Pass
	14. Basic climatic operational	Pass	Pass
	15. Cold climatic storage and transit	Pass	Pass
	16. Cold climatic operational	Pass	Pass
510.7 Sand and Dust	17. Blowing dust	Pass	Pass
	18. Blowing sand	Pass	Pass
500.6 Altitude Test	19. Altitude storage	Pass	Pass
	20. Altitude operation	Pass	Pass
524.1 Freeze / Thaw	21. Freeze & thaw test	Pass	Pass
507.6 Humidity	22. Humidity test	-	-
503.7 Temperature Shock	23. Temperature shock	Pass	Pass
505.7 Solar Radiation	24. Solar radiation	Pass	Pass
528.1 Mechanical Vibrations Test	25. Mechanical vibration test	Pass	Pass
511.7 Explosive Atmosphere	26. Explosive atmosphere	Pass	Pass

Note: A dash (-) in the Test Results tables indicates that the test was not passed by the laptop model.

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The following tables summarize the MIL-STD-810H test methods that ASUS laptops passed.

## ASUS Vivobook S Flip

8 test methods with 21 test procedures

		Vivobook S 14 Flip OLED	Vivobook S 14 Flip OLED
Test	Test Method	TP3402V	TN3402Y
516.8 Shock	1. Functional shock	Pass	Pass
	2. Transportation shock- on road	Pass	Pass
	3. Fragility	Pass	Pass
	4. Crash hazard shock	Pass	Pass
	5. Bench handling	Pass	Pass
514.8 Vibration	6. Two-wheeled trailer	Pass	Pass
	7. Wheeled vehicle	Pass	Pass
	8. Common carrier	Pass	Pass
501.7 High Temperature	9. Basic hot storage and transit	Pass	Pass
	10. Basic hot operational	Pass	Pass
	11. Hot dry storage and transit	Pass	Pass
	12. Hot dry operational	Pass	Pass
502.7 Low Temperature	13. Basic climatic storage and transit	Pass	Pass
	14. Basic climatic operational	Pass	Pass
	15. Cold climatic storage and transit	Pass	Pass
	16. Cold climatic operational	Pass	Pass
507.6 Humidity	17. Humidity test	Pass	Pass
500.6 Altitude Test	18. Altitude storage	Pass	Pass
	19. Altitude operation	Pass	Pass
524.1 Freeze / Thaw	20. Freeze and thaw test	Pass	Pass
528.1 Mechanical Vibrations Test	21. Mechanical vibration	Pass	Pass

Note: A dash (-) in the Test Results tables indicates that the test was not passed by the laptop model.

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# Test Result

The following tables summarize the MIL-STD-810H test methods that ASUS laptops passed.

## ASUS Vivobook Classic

12 test methods with 26 test procedures

		Vivobook 16	Vivobook 16	Vivobook 14 OLED
Test	Test Method	X1605P	X1605V	X1404Z
516.8 Shock	1. Functional shock	Pass	Pass	Pass
	2. Transportation shock- on road	Pass	Pass	Pass
	3. Fragility	Pass	Pass	Pass
	4. Crash hazard shock	Pass	Pass	Pass
	5. Bench handling	Pass	Pass	Pass
514.8 Vibration	6. Two-wheeled trailer	Pass	Pass	Pass
	7. Wheeled vehicle	Pass	Pass	Pass
	8. Common carrier	Pass	Pass	Pass
501.7 High Temperature	9. Basic hot storage and transit	Pass	Pass	Pass
	10. Basic hot operational	Pass	Pass	Pass
	11. Hot dry storage and transit	Pass	Pass	Pass
	12. Hot dry operational	Pass	Pass	Pass
502.7 Low Temperature	13. Basic climatic storage and transit	Pass	Pass	Pass
	14. Basic climatic operational	Pass	Pass	Pass
	15. Cold climatic storage and transit	Pass	Pass	Pass
	16. Cold climatic operational	Pass	Pass	Pass
510.7 Sand and Dust	17. Blowing dust	Pass	Pass	Pass
	18. Blowing sand	Pass	Pass	Pass
500.6 Altitude Test	19. Altitude storage	Pass	Pass	Pass
	20. Altitude operation	Pass	Pass	Pass
524.1 Freeze / Thaw	21. Freeze & thaw test	Pass	Pass	Pass
507.6 Humidity	22. Humidity test	Pass	Pass	Pass
503.7 Temperature Shock	23. Temperature shock	Pass	Pass	Pass
505.7 Solar Radiation	24. Solar radiation	Pass	Pass	Pass
528.1 Mechanical Vibrations Test	25. Mechanical vibration test	Pass	Pass	Pass
511.7 Explosive Atmosphere	26. Explosive atmosphere	Pass	Pass	Pass

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The following tables summarize the MIL-STD-810H test methods that ASUS laptops passed.

## ASUS Vivobook Slate

12 test methods with 26 test procedures

Vivobook 13 Slate OLED		
Test	Test Method	T3304G
516.8 Shock	1. Functional shock	Pass
	2. Transportation shock- on road	Pass
	3. Fragility	Pass
	4. Crash hazard shock	Pass
	5. Bench handling	Pass
514.8 Vibration	6. Two-wheeled trailer	Pass
	7. Wheeled vehicle	Pass
	8. Common carrier	Pass
501.7 High Temperature	9. Basic hot storage and transit	Pass
	10. Basic hot operational	Pass
	11. Hot dry storage and transit	Pass
	12. Hot dry operational	Pass
502.7 Low Temperature	13. Basic climatic storage and transit	Pass
	14. Basic climatic operational	Pass
	15. Cold climatic storage and transit	Pass
	16. Cold climatic operational	Pass
510.7 Sand and Dust	17. Blowing dust	Pass
	18. Blowing sand	Pass
500.6 Altitude Test	19. Altitude storage	Pass
	20. Altitude operation	Pass
524.1 Freeze / Thaw	21. Freeze & thaw test	Pass
507.6 Humidity	22. Humidity test	Pass
503.7 Temperature Shock	23. Temperature shock	Pass
505.7 Solar Radiation	24. Solar radiation	Pass
528.1 Mechanical Vibrations Test	25. Mechanical vibration test	Pass
511.7 Explosive Atmosphere	26. Explosive atmosphere	Pass

Note: A dash (-) in the Test Results tables indicates that the test was not passed by the laptop model.

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