

# SOUTHWEST RESEARCH INSTITUTE®

6220 CULEBRA ROAD 78238-5166 • P.O. DRAWER 28510 78228-0510 • SAN ANTONIO, TEXAS, USA • (210) 684-5111 • WWW.SWRI.ORG

MECHANICAL ENGINEERING DIVISION

February 24, 2021

## TEST DATA SUMMARY

**SwRI Project No:** 18.18308.06

**Customer Name:** Panasonic System Communications Company  
Two Riverfront Plaza  
Newark, NJ 07102  
Attn: Pala Vachirabanjong

**Equipment Tested:** Panasonic TOUGHBOOK S1

**Test Date(s):** December 18, 2020 through January 27, 2021

**Test Reference:** MIL-STD-810H, "Department of Defense Test Method Standard for Environmental Engineering Considerations and Laboratory Tests," 31 January 2019.  
ASTM D4169-16, "Standard Practice for Performance Testing of Shipping Containers and Systems."

The Panasonic TOUGHBOOK S1 was tested at Southwest Research Institute for compliance to client specified requirements of the referenced standards. The test item was evaluated for performance-affecting physical damage, for its ability to successfully re-boot the operating system following a non-operating test exposure, and to continue to play an audio/video file during operating test environments. Results of the testing performed are summarized in Table 1 below.

This summary is provided for review while the final report is in progress, and is not intended to be a stand-alone document. A full report including detailed configuration information, test procedures and results will be issued as Southwest Research Institute (SwRI) Test Report 18.18308.06.100.FR1, Issue 1.

This summary shall not be reproduced, except in full, without written approval of Southwest Research Institute. The results of this summary apply only to the specific samples tested. If the manufacturer extends the test results to apply to other samples of the same model, or from the same lot or batch, the manufacturer should ensure the additional samples are manufactured using identical electrical and mechanical components and assembly procedures.

*Approved By:*



*Jenny Ferren  
Manager,  
Structural Dynamics & Product Assurance  
Mechanical Engineering Division*



**Table 1: Summary of Test Results - Panasonic TOUGHBOOK S1**

TEST DESCRIPTION	MIL-STD-810H METHOD	GENERAL PARAMETERS	RESULTS
Altitude: Storage / Air Transport	Method 500.6, Procedure I	Non-Operating (50,000 ft.); ≥1hour	Pass
Altitude: Operation / Air Carriage	Method 500.6, Procedure II	Operating (50,000 ft.); ≥1 hour	Pass
High Temperature: Storage	Method 501.7, Procedure I	160°F Non-Operating, Hot Dry/Induced, 7 cycles	Pass
High Temperature: Operation	Method 501.7, Procedure II	122°F Operating Constant temperature, ≥ 3 hours	Pass
High Temperature: Tactical-Standby to Operational	Method 501.7, Procedure III	160°F High Storage Non-Operating to 122°F High Operating (test for operation)	Pass
Low Temperature: Storage	Method 502.7, Procedure I	-22°F, Non-Operating; ≥ 4 hours	Pass
Low Temperature: Operation	Method 502.7, Procedure II,	-4°F, Operating; ≥ 4 hours	Pass
Temperature Shock	Method 503.7, Procedure I-C	From 160°F to -22°F, 3 cycles	Pass
Contamination by Fluids	Method 504.3	See Specification	Pass
Solar Radiation	Method 505.7 Procedure I	Category A1, Cyclic Figure 505.7-1 7 cycles	Pass
Rain: Blowing Rain	Method 506.6, Procedure I	5.8in/hr. rain @ 70 mph wind; 30 min/face, Operating	Pass
Rain: Drip	Method 506.6, Procedure III	15 minute exposure, Operating	Pass
Humidity	Method 507.6, Procedure I	Cycle B3, Induced, Figure 507.6-3 91°F to 160°F; 95%RH; 15 cycles	Pass
Humidity	Method 507.6, Procedure II	Aggravated, Figure 507.6-7 86°F to 140°F, 95%RH, 10 cycles	Pass
Sand and Dust: Blowing Dust	Method 510.7, Procedure I	Operating temperature of 160°F	Pass
Sand and Dust: Blowing Sand	Method 510.7, Procedure II	Operating temperature of 160°F	Pass
Explosive Atmosphere	Method 511.7, Procedure I	Operation in an explosive atmosphere	Pass
Vibration: General Vibration - Non-Operating	Method 514.8, Procedure I	Category 24, General Minimum Integrity, Figure 514.8E-1, 1 hr./axis	Pass
Vibration: General Vibration - Operating	Method 514.8, Procedure I	Category 4, Common Carrier for Unknown Orientation, Figure 514.8C-3, 2 hrs./axis	Pass
		Category 4, Composite Wheeled Vehicle for Unknown Orientation, Figure 514.8C-7, 2 hrs./axis	Pass
Vibration: General Vibration - Operating	Method 514.8, Procedure I	Category 24, Helicopter Minimum Integrity, Figure 514.8E-2, 2 hrs./axis	Pass
Vibration: Loose Cargo	Method 514.8, Procedure II	Category 5, 2.54cm (1 inch) diameter orbital path at 5Hz	Pass
Shock: Functional	Method 516.8, Procedure I	40g, 11ms, Operating: 3/direction/axis	Pass
Shock: Transit-Drop 48-in.	Method 516.8, Procedure IV	26 drops at 48 in. height on to 2-in. plywood, Non-Operating. All drops on the same unit	Pass
Shock: Transit-Drop 60-in.	Method 516.8, Procedure IV	26 drops at 60 in. height on to 2-in. plywood, Non-Operating. The drop heights of 48 in. and 60 in. were performed on the same unit.	Pass
Shock: Bench Handling	Method 516.8, Procedure VI	Four 4" rotational edge drops onto each of two resting faces (front and back)	Pass

TEST DESCRIPTION	MIL-STD-810H METHOD	GENERAL PARAMETERS	RESULTS
Freeze/ Thaw	Method 524.1, Procedure III	Rapid Temperature Change; 14°F to 77°F/95%; 3 cycles of ≥3 hours per dwell	Pass
Random Vibration	ASTM D4169-16	Truck Profile, Medium Level Unpackaged	Pass

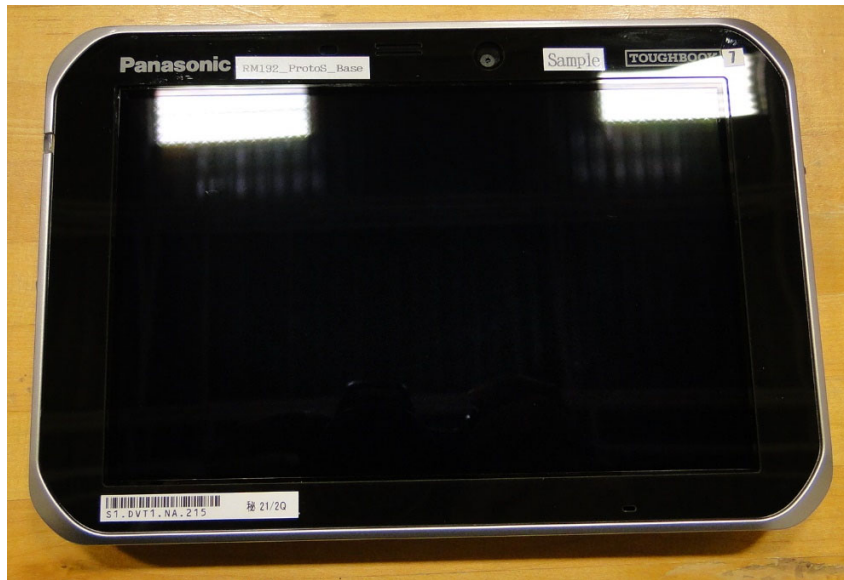


Figure 1: Panasonic TOUGHBOOK S1 Unit Under Test, Front View



Figure 2: Panasonic TOUGHBOOK S1 Unit Under Test, Rear View