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MECHANICAL ENGINEERING DIVISION

October 26, 2022

TEST DATA SUMMARY

SwRI Project No: 18.18328.04

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

Equipment Tested: Panasonic TOUGHBOOK 33

Test Date(s): Testing completed December 29, 2021

Test Reference: MIL-STD-810H, "Department of Defense Test Method Standard for Environmental Engineering Considerations and Laboratory Tests," 31 January 2019.

The Panasonic TOUGHBOOK 33 was tested at Southwest Research Institute for compliance to client specified requirements of the referenced standard(s). Original testing of the TOUGHBOOK 33 was performed in 2017 and 2018, in accordance with previous versions of the MIL-STD-810. Gap testing was performed in December 2021 to cover any test conditions not yet compliant with updated MIL-STD-810H requirements. Throughout all testing, 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. Unless otherwise specified, all testing was performed with the TOUGHBOOK 33 tablet attached to a Premium Keyboard as well as the TOUGHBOOK 33 tablet attached to a Lite Keyboard. Where noted, certain tests were also performed on the TOUGHBOOK 33 tablet only (without keyboard attachment).

This summary 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 18.18328.04.100.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
Senior Manager - R&D
Structural Dynamics & Product Assurance
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Table 1: Summary of Test Results - Panasonic TOUGHBOOK 33

TEST DESCRIPTION	MIL-STD-810H METHOD	GENERAL PARAMETERS	RESULTS
Altitude: Storage / Air Transport	Method 500.6, Procedure I	Non-Operating (50,000 ft.)	Pass
Altitude: Operation / Air Carriage	Method 500.6, Procedure II	Operating (50,000 ft.)	Pass
High Temperature: Storage	Method 501.7, Procedure I	160°F Non-Operating, Hot Dry/Induced, 7 cycles (days)	Pass
High Temperature: Operation	Method 501.7, Procedure II	145°F Operating Constant temperature	Pass
High Temperature: Tactical-Standby to Operational	Method 501.7, Procedure III	160°F Storage Non-Operating to 145°F Operating (test for operation)	Pass
Low Temperature: Storage	Method 502.7, Procedure I	-60°F, Non-Operating	Pass
Low Temperature: Operation	Method 502.7, Procedure II,	-20°F, Operating on Batteries	Pass
		-25°F, Operating with AC Adapter	Pass
Temperature Shock	Method 503.7, Procedure I-C	200°F to -60°F, 3 cycles	Pass
Contamination by Fluids	Method 504.3 Procedure I	See full report for list of test fluids; testing performed also as tablet only	Pass
Solar Radiation	Method 505.7 Procedure I	Category A1, Cyclic, 7 cycles (days)	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, Cycle from 91°F to 160°F; 95%RH; 15 cycles (days)	Pass
	Method 507.6, Procedure II	Aggravated; 86°F to 140°F, 95%RH 10 cycles (days)	Pass
Salt Fog	Method 509.7 Procedure I	5% NaCl by mass; testing performed also as tablet only	Pass
Sand and Dust: Blowing Dust	Method 510.7, Procedure I	Operating temperature of 140°F; testing performed also as tablet only	Pass
Sand and Dust: Blowing Sand	Method 510.7, Procedure II	Operating temperature of 140°F; testing performed also as tablet only	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, 1 hr./axis	Pass
Vibration: General Vibration - Operating	Method 514.8, Procedure I	Category 4, Common Carrier, 2 hrs./axis	Pass
		Category 4, Composite Wheeled Vehicle, 2 hrs./axis ¹	Pass
Vibration: Loose Cargo	Method 514.8, Procedure II	Category 5, 2.54cm (1 inch) diameter orbital path at 5 Hz	Pass
Shock: Functional	Method 516.8, Procedure I	40g, 11ms, Operating: 3/direction/axis	Pass

¹ As per client instruction, test parameters for vibration for *Composite Wheeled Vehicles* followed MIL-STD-810G, which had higher g_{RMS} levels than in MIL-STD-810H.

TEST DESCRIPTION	MIL-STD-810H METHOD	GENERAL PARAMETERS	RESULTS
Shock: Transit-Drop 36-in.	Method 516.8, Procedure IV	26 drops at 36 in. height onto 2-in. plywood, Operating. All drops on the same unit. Testing performed on a tablet attached to Lite keyboard.	Pass
Shock: Transit-Drop 48-in.	Method 516.8, Procedure IV	26 drops at 48 in. height onto 2-in. plywood, Operating. All drops on the same unit. Testing performed on a tablet attached to Premium keyboard.	Pass
Shock: Transit-Drop 60-in.	Method 516.8, Procedure IV	26 drops at 60 in. height onto 2-in. plywood, Operating. All drops on the same unit. Testing performed on a tablet attached to Premium keyboard.	Pass
Shock: Bench Handling	Method 516.8, Procedure VI	Four pivot drops onto each of two resting surfaces.	Pass
Freeze/ Thaw	Method 524.1, Procedure III	Rapid Temperature Change; Test effects include condensation and fog.	Pass



Figure 1: Panasonic TOUGHBOOK 33 Units Under Test