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MECHANICAL ENGINEERING DIVISION

June 23, 2022

TEST DATA SUMMARY

SwRI Project No: 18.18328.20

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

Equipment Tested: Panasonic TOUGHBOOK 40

Test Date(s): Testing Completed May 4, 2022

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 40 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 reboot 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 18.18328.20.100.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
Sr. Manager,
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Table 1: Summary of Test Results - Panasonic TOUGHBOOK 40

DESCRIPTION	METHOD	GENERAL PARAMETERS	RESULTS
Altitude: Storage / Air Transport	Method 500.6, Procedure I	Non-Operating (50,000 ft.), ≥ 1 hr.	Pass
Altitude: Operation / Air Carriage	Method 500.6, Procedure II	Operating (50,000 ft.), ≥ 1 hr.	Pass
High Temperature: Storage	Method 501.7, Procedure I	160°F Non-Operating, Category A1, Hot Dry/Induced (Table 501.7-III), 7 days	Pass
High Temperature: Operation	Method 501.7, Procedure II	145°F Operating, Constant Temperature Stable ≥ 2 hrs.	Pass
High Temperature: Tactical - Standby to Operational	Method 501.7, Procedure III	(160°F) High Storage (Non-Operating, Stable ≥ 2 hrs.) to (145°F) High Operating (test for operation)	Pass
Low Temperature: Storage	Method 502.7, Procedure I	-60°F, Non-Operating, Stable ≥ 4 hrs.	Pass
Low Temperature: Operation	Method 502.7, Procedure II	-20°F, Operating on Batteries, Stable + 4 hrs. -25°F, Operating on A/C Power, Stable + 4 hrs.	Pass
Temperature Shock	Method 503.7, Procedure I-C	Multi-cycle Shock from Constant Extreme Temperature From 160°F to -60°F, three cycles, stabilize at extremes	Pass
Contamination by Fluids	Method 504.3, Procedure I	Intermittent Exposure Conditions (8-hr. exposure +16-hr. drying), See Specification for fluids	Pass
Rain: Blowing Rain	Method 506.6, Procedure I	5.8 in/hr. rain, 70 mph wind; 30 min/face, Operating	Pass
Rain: Drip	Method 506.6, Procedure III	15-min. 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
Humidity	Method 507.6, Procedure II	Aggravated; 86°F to 140°F, 95%RH 10 cycles (days)	Pass
Sand and Dust: Dust	Method 510.7, Procedure I	Blowing Dust: Operating Operating temperature at 140°F	Pass
Sand and Dust: Sand	Method 510.7, Procedure II	Blowing Sand: Operating Operating temperature 140°F	Pass
Explosive Atmosphere	Method 511.7, Procedure I	Operation in an Explosive Atmosphere Operating temp. 145°F, max. test altitude 40,000 ft.	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 24, Helicopter Minimum Integrity Figure 514.8E-2, 2 hrs./axis	Pass
Vibration: General Vibration – Operating	Method 514.8, Procedure I	Category 4, Common Carrier, Unknown Orientation Figure 514.8C-3, 2 hrs./axis	Pass
Vibration: General Vibration – Operating	Method 514.8, Procedure I	Category 4, Composite wheeled vehicles, Unknown Orientation, Figure 514.8C-7, 2 hrs./axis	Pass
Shock: Functional	Method 516.8, Procedure I	40g, 11ms, Operating, 3/direction/axis	Pass
Shock: Transportation Shock	Method 516.8, Procedure II	Non-operating, Table 518.8-VII for On & Off-Road Acceleration 5.1 g, 11 ms to 15.2 g, 5 ms	Pass
Solar Radiation	Method 505.7, Procedure I	Category A1, Cyclic, 7 cycles (days) Peak cycle temperature 120°F	Pass
Salt Fog	Method 509.7	5% NaCl, pH 6.5 to 7.2, Two cycles of (24-hr. fog + 24-hr. dry)	Pass

DESCRIPTION	METHOD	GENERAL PARAMETERS	RESULTS
Vibration: Loose Cargo Transportation	Method 514.8, Procedure II	Category 5, Truck/trailer – Loose Cargo 1 in. diam. orbital path at 5Hz, 20 min./orientation.	Pass
Shock: Transit Drop 48-inch (4 ft.)	Method 516.8, Procedure IV	26 drops at 48-inch height on to 2-in. plywood, Operating. All drops on the same unit	Pass
Shock: Transit Drop 60-inch (5 ft.)	Method 516.8, Procedure IV	26 drops at 60-inch height on to 2-in. plywood, Operating. All drops on the same unit as 48-inch test.	Pass
Shock: Transit-Drop 72-inch (6 ft.)	Method 516.8, Procedure IV	26 drops at 72-inch height on to 2-in. plywood, Operating. All drops on the same unit as 48-inch and 60-inch tests.	Pass
Shock Bench Handling	Method 516.8, Procedure VI	Four 4” rotational edge drops onto each of two resting faces (front and back)	Pass
Freeze/Thaw	Method 524.1, Procedure III,	Rapid Temperature Change, Stable + ≥ 1 hr. Test effects include condensation and fog	Pass
Random Vibration	ASTM D4169-16	Truck Profile, Medium Level, 1 hr./axis.	Pass



Figure 1: Panasonic TOUGHBOOK 40 Unit Under Test