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MECHANICAL ENGINEERING DIVISION

October 29, 2021

TEST DATA SUMMARY

SwRI Project No: 18.18308.26

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

Equipment Tested: Panasonic TOUGHBOOK G2

Test Date(s): June 18, 2021 through October 4, 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 G2 was tested at Southwest Research Institute for compliance to client specified requirements of the referenced standards. For each test, the Panasonic TOUGHBOOK G2 tablet was tested attached to a keyboard. Where noted, certain tests were also performed on the standalone tablet without any keyboard attached. 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 18.18308.26.100.FR1, Issue 1.

Approved By:

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

Table 1: Summary of Test Results - Panasonic TOUGHBOOK G2

DESCRIPTION	METHOD	GENERAL PARAMETERS	RESULTS
Altitude: Storage / Air Transport	Method 500.6, Procedure I	Non-Operating (50,000 ft.), ≥1 hour	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, 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. min.	Pass
High Temperature: Tactical - Standby to Operational	Method 501.7, Procedure III	(160°F) High Storage (Non-Operating, Stable + 2 hrs. min.) to (145°F) High Operating (test for operation)	Pass
Low Temperature: Storage	Method 502.7, Procedure I	-60°F, Non-Operating, Stable + 4 hrs. min	Pass
Low Temperature: Operation	Method 502.7, Procedure II,	-20°F, Operating on Batteries, Stable + 4 hrs.	Pass
		-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 200°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 full test report for fluids. Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	Pass
Solar Radiation	Method 505.7, Procedure I	Category A1, Cyclic, 7 cycles (days) Peak cycle temperature 120°F	Pass
Rain: Blowing Rain	Method 506.6, Procedure I	5.8 in/hr. rain, 70 mph wind; 30 min/face, Operating Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	Pass
Rain: Drip	Method 506.6, Procedure III	15-min. exposure, Operating Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	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
Salt Fog	Method 509.7	5% NaCl, pH 6.5 to 7.2, Two cycles of (24-hr. fog + 24-hr. dry) Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	Pass
Sand and Dust: Dust	Method 510.7, Procedure I	Blowing Dust: Operating; Operating temperature at 140°F Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	Pass
Sand and Dust: Sand	Method 510.7, Procedure II	Blowing Sand: Operating; Operating temperature 140°F Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	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 4, Common Carrier, Unknown Orientation Figure514.8C-3, 2 hrs./axis Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	Pass
		Category 4, Composite wheeled vehicles, Unknown Orientation, Figure 514.8C-7, 2 hrs./axis Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	Pass
Vibration: General Vibration - Operating	Method 514.8, Procedure I	Category 24, Helicopter Minimum Integrity Figure 514.8E-2, 2 hrs./axis	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: 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
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. Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	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. Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	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. Testing performed on TOUGHBOOK G2 with keyboard as well as tablet portion only.	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. min. Test effects include condensation and fog	Pass
Random Vibration	ASTM D4169-16	Truck Profile, Medium Level, 1 hr./axis.	Pass

Figure 1: Panasonic TOUGHBOOK G2 Tablet Configuration

Figure 2: Panasonic TOUGHBOOK G2 Laptop Configuration