

# GENERAL DYNAMICS

Itronix

## SUMMARY OF INDEPENDENT LAB TESTING

### GD6000 Laptop Computer

<b>EQUIPMENT TESTED:</b>	General Dynamics Itronix GoBook GD6000
<b>ENVIRONMENTAL TEST DATES:</b>	March 2009
<b>INDEPENDENT TEST COMPANIES AND CONTACTS:</b>	<p>Environmental: INTERTEK TESTING SVC TAIWAN LT 8F, No. 423, Ruiguang Re, Neihu District Taipei, Taiwan 11492 Offline 6878 886-2-6602-2888 <a href="mailto:eugenia.chao@intertek.com">eugenia.chao@intertek.com</a></p> <p>ENVIRONMENTAL ASSOCIATES, Inc. 9604 Variel Avenue Chatsworth, CA 91311 Martin Baxter, Laboratory Supervisor (818) 709-0568 <a href="http://www.eatest.com">www.eatest.com</a></p> <p>EMI: Acme Testing Co. 2002 Valley Highway, Acme WA 98220 ENVIRONMENTAL ASSOCIATES, Inc. 9604 Variel Avenue Chatsworth, CA 91311 Martin Baxter, Laboratory Supervisor (818) 709-0568 <a href="http://www.eatest.com">www.eatest.com</a></p> <p>Safety: CSA International Taiwan - Taipei, Taiwan Mr. Jupiter Huang 5F-3, 26 Wu-Chuan 2nd Rd.(Wu-Ku Industrial Dist.)Hsin Chuang, Taipei Hsien Taiwan Telephone: +886 2 2299 5023 Telefax: +886 2 2299 5022 E-mail: <a href="mailto:csa.taiwan@seed.net.tw">csa.taiwan@seed.net.tw</a></p>

	<p>Hazardous Locations:          CSA International          1707-94 Street North West          Edmonton, Alberta, CANADA, T6N 1E6          Tel: (780) 450-2111          Fax: (780) 461-5322  <a href="http://www.csa-international.org">www.csa-international.org</a>          Department: Hazardous Locations</p> <p>EMI/Immunity:          Sporton International Inc.          6F, No 106, Sec 1          Hsin Tai Wu Rd.,          His Chih, Taipei Hsien, Taiwan R.O.C.          Tel: 886 02 2696 2468,          FAX: 886 02 2696 2255  <a href="http://www.sporton.com.tw">http://www.sporton.com.tw</a></p> <p>MIL-STD 461:          Electromagnetic Interference (EMI) Research          Laboratory          AFRL/RYRA (BLDG 620, RM 1DG106)          2241 Avionics Circle          Wright Patterson AFB, OH 45433-7318          Phone: (937) 904-9024          John C. Zentner, Lab Manager  <a href="mailto:John.Zentner@WPAFB.AF.MIL">John.Zentner@WPAFB.AF.MIL</a></p>
<b>NOTES:</b>	<p>All environmental testing listed in the accompanying tables was performed by the accredited testing companies listed above. Documented MIL-STD-810F and IEC testing guidelines were followed as outlined in the enclosed test summaries.</p>

# 1. SUMMARY TABLES

## 1.1 MIL-STD-810F TESTING

TEST LISTING	TEST METHOD/STANDARD	DESCRIPTION/PARAMETERS	RESULT
Outdoor Viewability LCD	MIL-STD-3009 as tested per MIL-L-85762A (Operating)	Contrast ratio is measured at 30 deg off H-axis, 0 deg V-axis. 2000fL diffused light from sphere, 10,000fC collimated light to simulate high bright lighting conditions...	>3.4:1 contrast ratio
Functional Shock	MIL-STD-810G Method 516.6 Procedure I (Non-operating)	40g, 11ms, EUT operational, 3 shocks/axis/direction 18 total shocks Terminal Peak Sawtooth method	PASS
Crash Shock	Procedure V (Non-Operating )	75G's @ 6ms (Non-Operating ) 3 shocks/axis/direction 18 total shocks Terminal Peak Sawtooth method	PASS
Transit Shock/Drop	MIL-STD 810F Method 516.5 Modified (Non-operating)	30 inch drop to 2" plywood over concrete. 6x. One drop to each face, corner and edge. Unit is non-operational. 6 drops total on a single test item at room temperature. <u>Modified:</u> from 48" to 30"	PASS
Vibration - General Minimum Integrity Exposure	MIL STD 810F, Method 514.5, Procedure I, Category 24, Fig 514.5C-17 (Non-operating)	Fig 17: Power Spectral Density = .04 G <sup>2</sup> /Hz @ 20 to 1000 Hz, descending 6 db/Oct to 2000 Hz. 60 minutes per axis, 3 axes. Unit is not operating.	PASS
Vibration - Helicopter Minimum Integrity Exposure	MIL STD 810F, Method 514.5, Procedure I, Category 24, Fig 514.5C-18 (Non-operating)	Fig 18: Logarithmic sweeps 5 to 500 Hz. Beginning at 0.20 inch (5mm) displacements, 30 minutes per axis, 3 Axes. Unit is not operating. 7.5 min per sweep. 4 ascending and 4 descending sweeps	PASS
Vibration - Ground Vehicles	MIL-STD-810G Method 514.6 Procedure I, Category 20, Custom Profile (operating)	.001g <sup>2</sup> /Hz at 12.5Hz, 0.034 g <sup>2</sup> /Hz at 20-40Hz, 5.7E-06 g <sup>2</sup> /Hz at 200Hz. 60 minutes x 3 axis (Longitudinal, Transverse and Vertical) Unit is operational. Ground Vehicle Profile - simulates 1,000 miles of transportation. Category 20; Custom Profile	PASS
High Temperature Operating	MIL STD 810F, Method 501.4, Procedure II (Operating)	Temperature: 60C (140F) Five 24-hour cycles. Modified; Temperature from 49C (120F) to 60C (140F) Unit is operating, running all burn in tests in a continuous loop.	PASS
High Temperature Storage	MIL STD 810F, Method 501.4, Procedure I Modified + (Non-operating)	Temperature: 75C (167F) Seven 24 hour cycles. <u>Modified:</u> Temperature from 71C (160F) to 75C (167F), Unit is not operating.	PASS
Low Temperature Operating	MIL-STD-810F, Methods-502.4, Procedure II (Operating) Modified +	Constant temperature exposure at low levels. One 24-hour cycle. Functional tests performed and verified. (-30C) Unit is operating, running burn in tests in a continuous loop. <u>Modified:</u> Temperature from -23C to -30C	PASS
Low Temperature Storage	MIL STD 810F, Method 502.4, Procedure I, Modified + (Non-operating)	Temperature: -55C (-67F) One 24-hour cycle. <u>Modified:</u> Temperature from -51C (-60F) to -55C (-67F) Unit is not operating.	PASS
Blowing Dust Exposure	MIL-STD-810F Method 510.4 Procedure I (Dust) (Operating)	With all I/O doors in place. Particle Density: 1-+/- g/mx. Airflow: 1725 FPM (8.7 m/s or 19.5 mph) Temperature cycles from 73F (23C) to 140F (60C). Unit is operating during last 10 min. of 60°C test. Functional test after each 6 hr cycle.	PASS

TEST LISTING	TEST METHOD/STANDARD	DESCRIPTION/PARAMETERS	RESULT
Altitude Low Pressure	MIL-STD-810F Method 500.4 Procedures II (Operating) Modified +	Chamber at 15,000ft, 77F (25C), One hour; unit is operational (the highest equivalent altitude given for cargo pressures of military aircraft). <i>Modified:</i> Altitude from 10,000 feet to 15,000 feet.	PASS
Altitude Low Pressure (Storage)	MIL STD 810F, Method 500.4, Procedure I (Non-operating)	Procedure I: Bring unit to PSIG @ 30,000 FT (9,144 meters): Maximum rate of 2000 feet per minute. Vacuum to be held for one hour, @ Room Temp <i>Modified:</i> 15,000 Ft (4572 meters) to 30,000 FT (9,144 meters)	PASS
Humidity	MIL STD 810F, Method 507.4 (Non-operating)	The temperature cycled between 68F (20C) and 140F (60C) with the relative humidity maintained at 95%. Each cycle is 48 hours and the entire test consisted of 5 cycles. The computers were non-operational during the test. A boot to Windows was performed every 24 hours.	PASS

## 1.2 IEC INGRESS

TEST LISTING	TEST METHOD/STANDARD	DESCRIPTION/PARAMETERS	RESULT
Dust Ingress Protection <sup>4</sup>	IP5x:IEC 529 (EN60529) (IEC60529) (Non-operating)	With all I/O doors in place. Unit is not operating during tests. Functional test at test completion. IP-5x	PASS
Water Resistance <sup>4</sup>	GD-Itronix Special Spill Test	General Dynamics developed - keyboard liquid spill test	PASS

## 1.3 OTHER TEST PROCEDURES

TEST LISTING	TEST METHOD/STANDARD	DESCRIPTION/PARAMETERS	RESULT
Vibration - Truck Transport - Operating	ASTM 4169-99 Truck Assurance Level II Schedule E 11.5.2 (Operating) <i>Modified +</i>	Power Spectral Density ranges 0.00001 to 0.01 g <sup>2</sup> /Hz, frequency range is 1 to 200 Hz. Overall GRMS is 0.52. Perform 90 minutes per axis (with and without external power), 3 axis'. Test unit operating diagnostic software or had drive performing a write/verify test. <i>Modified -:</i> Duration of 180 minutes in shipping axis changed to 90 minutes per axis, 3 axes.	PASS

## 1.4 MIL-STD 461F TESTING

REQUIREMENT	DESCRIPTION	FREQ. RANGE	RESULT
CE101	Damped Sinus. Cables/Pwr Leads	30 Hz - 10 kHz	Pass
CE102	Pwr Leads	10 kHz - 10 MHz	*Passes Meets Category 3
CS101	Pwr Leads	30 Hz - 150 kHz	Pass
CS114	Bulk Cable Inj.	10 kHz - 200 MHz	Pass
CS115	Bulk Cable Inj. Impulse Excit.	-	Pass
CS116	Damped Sinus. Cables/Pwr Leads	10 kHz - 100 MHz	Pass
RE101	Magnetic Field	30 Hz - 100 kHz	Pass
RE102	Electrical Field	10 kHz - 18 GHz	*Passes Meets Category 3
RS101	Magnetic Field	30Hz - 100MHz	Pass
		Frequency Range (MHz)	Level (Volts/meter)
RS103	Electrical Field	2 - 523	200 Pass
		523 - 601	100 Pass
		601 - 2000	200 Pass
		2000 - 4000	30 Pass
		4000 - 18000	60 Pass

\* Category 3: Meets the requirements of AFI 11-202V3, Para.2.5, for operation during all phases of flight on all fixed-wing aircraft.

## 1.5 ADDITIONAL TESTING

TEST LISTING	TEST METHOD	SPECIFICATION	REQUIREMENT LIMITS	TEST LAB	RESULT
ELECTROSTATIC DISCHARGE, VARIOUS CONDUCTED & RADIATED SUSCEPTIBILITY TESTS, VARIOUS IMMUNITY TESTS	EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 EN61000-4-8 EN61000-4-11	EN55024	8Kv/4Kv 3Vrms 3 V / M > 95% - 0.5p, 30% -25[. > 95% - 25 Op		PASS
CONDUCTED AND RADIATED EMISSIONS	FCC Part 15 EN55022 EN61000-3-2 EN61000-3-3	EN55022:2006 Class B ANSI C63.4	Conducted and Radiated Emissions – FCC 47 CFR Part 15, Class B EN55022 Class B		PASS
SAFETY	CSA/UL/IEC MARK	CSA/UL/IEC 60950	Standard Safety Certification		PASS

1. Full details provided in test reports as indicated at the end of the summary report.
2. PASS for operational tests indicates that the unit remained operational during the entirety of the test.
3. PASS for non-operational tests indicates that the unit powered on and booted to Microsoft® Windows® and successfully ran a system functional check following each test.
4. Tests performed with I/O and expansion doors in place.