FCC ID PER PART 15.227
EMI MEASUREMENT AND TEST REPORT

For

Dynapoint (Dong Guan) Electronics Co. Ltd

Hua Guo Shan Industry Park, Jie Kou. Chang An. Dong Guan
Guan Dong, China

FCC ID: P4XH5001

September 3, 2002

This Report Concerns:	Equipment Type:
☒ Original Report	Cordless Mouse, ITE

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Report No.:	R0208132
Test Date:	August 15, 2002
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Dynapoint (Dong Guan) Electronics Co. Ltd.* 's product, model *H5001* or the "EUT" as referred to in this report is a wireless mouse. The transmitter part measures approximately 4.1" L x 2.2" W x 1.5" H and the receiver part measures approximately 4.8" L x 3.0"W x 1.5"H.

The EUT was fed by host PC Bestec Electronics Corp. power supply, M/N: ATX100-5, S/N: 0011A064353.

1.2 Objective

This Type approval report is prepared on behalf of *Dynapoint (Dong Guan) Electronics Co. Ltd.* in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules, Part 15, sec 15.35, sec 15.209 and sec 15.227 for radiated margin.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2000, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2000.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2610A02165	12/6/01
HP	Spectrum Analyzer	8593B	2919A00242	12/20/01
HP	Amplifier	8349B	2644A02662	12/20/01
HP	Quasi-Peak Adapter	85650A	917059	12/6/01
HP	Amplifier	8447E	1937A01046	12/6/01
A.H. System	Horn Antenna	SAS0200/571	261	12/27/01
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/01
Com-Power	Biconical Antenna	AB-100	14012	11/2/01
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/01
Com-Power	LISN	LI-200	12208	12/20/01
Com-Power	LISN	LI-200	12005	12/20/01
BACL	Data Entry Software	DES1	0001	12/20/01

* **Statement of Traceability**: Bay Area Compliance Laboratory Corp. certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

1.7 Host System Configuration

Manufacturer	Description	Model	Serial Number	FCC ID
H-P	Motherboard	CUW-AM	A04-02961	DOC
H-P	VGA Card	Built-in	None	None
SONY	3.5” Floppy Drive	MPF920-F	20588872	DOC
Western Digital	Hard Drive	Caviar 33200	None	DOC
Bestec Electronics Corp.	Power Supply	ATX100-5	0011A064353	DOC
SAMSUNG	CD-ROM	SC-140	0000226P	DOC
H-P	Chassis	N/A	None	None

1.8 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Citizen	Printer	LSP-10	5047999-82	DLK66TLSP-10
Microsoft	Keyboard	Elite	E06401COMB	DOC
EVEREX	Modem	EV-945	None	E3E5UVEV-945
KDS	Monitor	VS-4D	1281150371	EVOKD-1455
Gateway	PC System	X05-59722	0021509077	DOC

1.9 External I/O Cables List and Details

Description	Length (M)	From	To
Shielded Serial Cable	1.5	Serial Port/Host	Modem
Shielded KB Cable	1.5	PS/2 KB Port/Host	Keyboard
Shielded Printer Cable	2.0	Parallel Port/Host	Printer
Shielded Video Cable	1.8	VGA Port/Host	Monitor
Shielded Mouse Cable	1.5	PS/2 Mouse Port/Host	Mouse Receiver/EUT

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing in a typical fashion (as normally used in a typical application).

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software, EMCTEST-H Program, contained on the hard drive, is auto starting on power-up. Once loaded, the program sequentially exercises each system component.

The sequence used is as follows:

1) Lines of Hs are printed on the monitor
2) The printer outputs Hs
3) The modem receives Hs.

The complete cycle takes approximately 5 - 10 seconds and the process is continuously repeated.

2.3 Special Accessories

As shown in section 2.5, all interface cables used for compliance testing are shielded as normally supplied by INMAC, Monster Cable, Y.C. Cables and Qubbain Data Max. The peripherals featured shielded metal connectors.

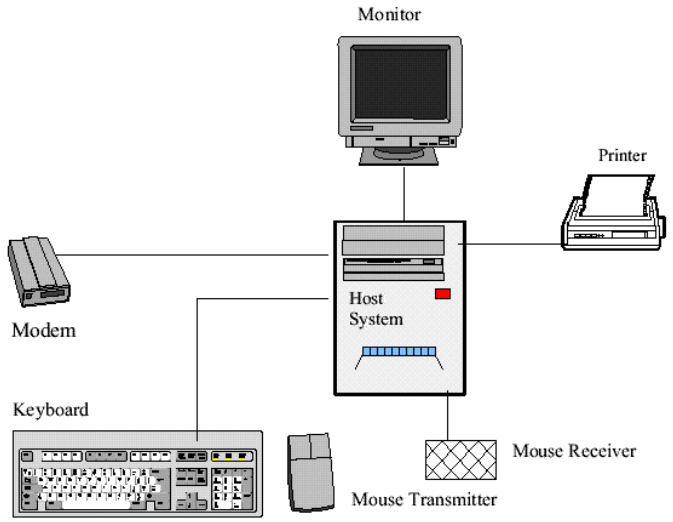
2.4 Schematics and Block Diagram

Please refer to Appendix D.

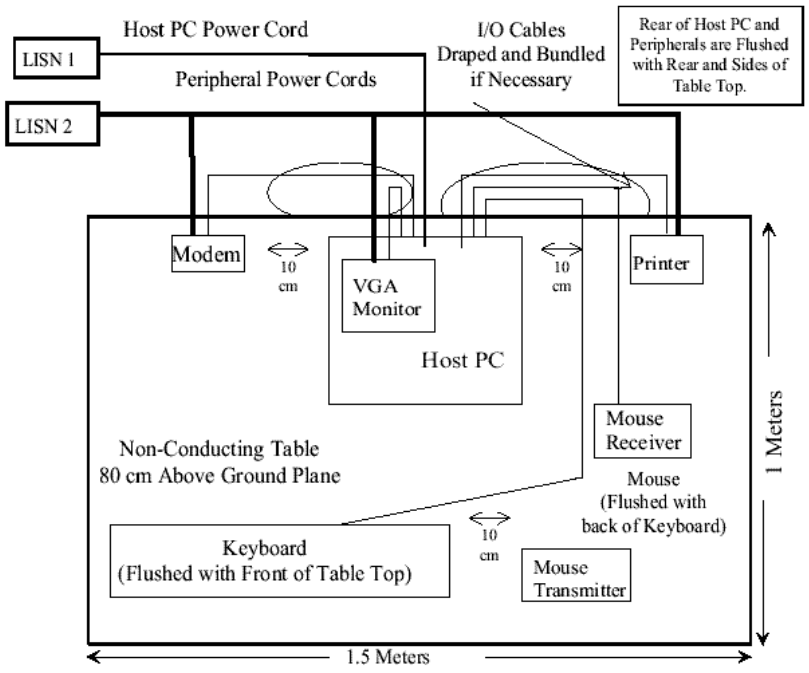
2.5 Equipment Modifications

No modifications were necessary for the EUT to comply with the applicable limits and standards.

2.6 Test Setup Configuration



2.7 Test Setup Block Diagram



3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.207	Conducted Emission	Compliant
§ 15.227 § 15.209 § 15.35	Radiated Emission	Compliant

4 - CONDUCTED EMISSIONS

4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ±2.4 dB.

4.2 EUT Setup

The measurement was performed at the **O**pen **A**rea **T**est **S**ite, using the same setup per ANSI C63.4 - 2000 measurement procedure. The specification used was the CISPR 22 Class B limits.

The external I/O cables were draped along the test table and flushed if necessary.

The spacing between the peripherals was 10 cm.

The host PC was connected to a 120Vac/60Hz power source.

4.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations:

Start Frequency	150 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth	10 kHz
Video Bandwidth	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

4.4 Test Procedure

During the conducted emission test, the power cord of host PC was connected to the auxiliary outlet of the first LISN. Other support equipment power cords were connected to the second LISN. Maximizing procedure was also performed on the highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dBμV of specification limits). Quasi-peak readings are distinguished with a "**Qp**".

4.5 Summary of Test Results

According to the data in section 4.6, the EUT complied with the CISPR 22 Conducted margin for a Class B device, and these test results is deemed as satisfactory evidence of compliance with ICES-003 of the Canadian Interference-Causing Equipment Regulations, with the *worst* margin reading of:

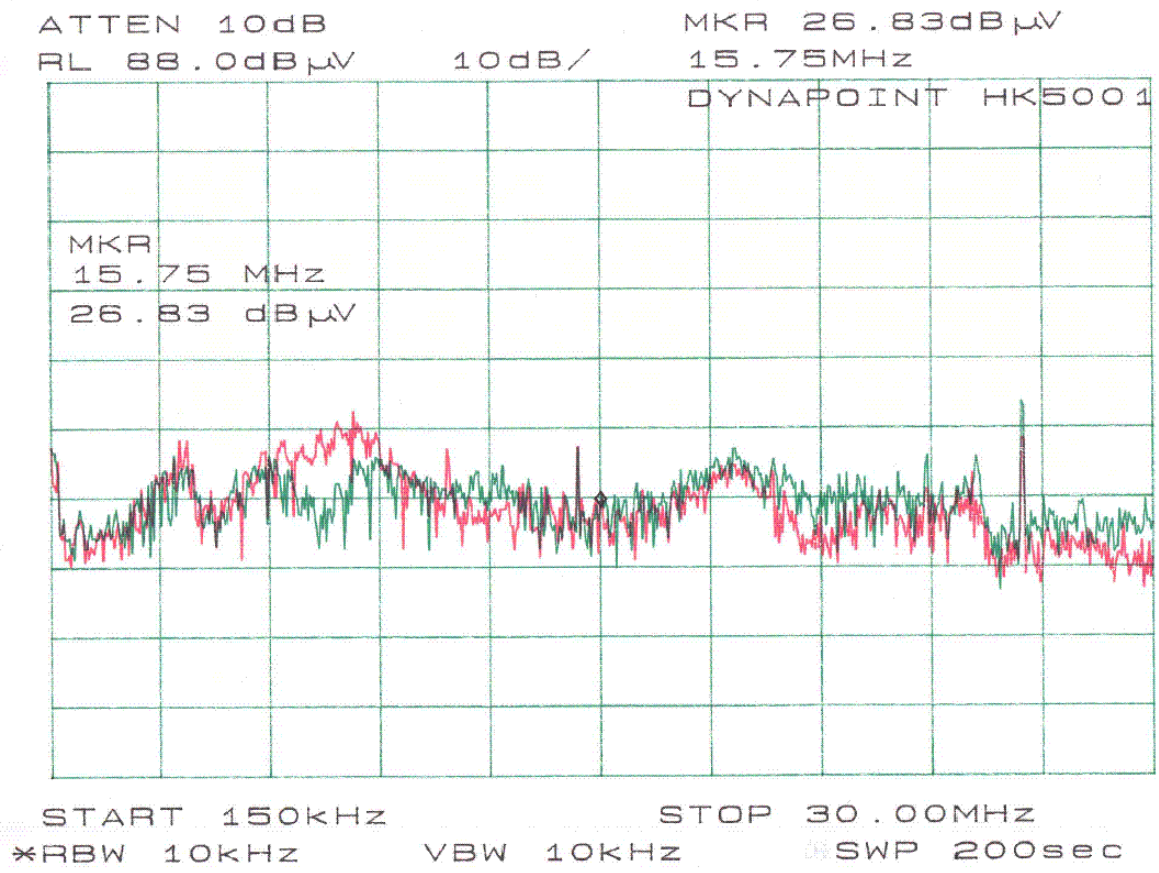
-18.2 dBμV at 26.52 MHz in the Neutral mode

4.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				CISPR 22 CLASS B	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dBμV	QP/Ave/Peak	Line/Neutral	dBμV	dB
26.52	41.8	QP	Neutral	60	-18.2
8.41	40.6	QP	Line	60	-19.4
26.47	36.4	QP	Line	60	-23.6
14.48	35.2	QP	Neutral	60	-24.8
0.21	37.5	QP	Line	63.21	-25.7
0.16	35.2	QP	Neutral	65.46	-30.3

4.7 Plot of Conducted Emissions Test Data

Plot of Conducted Emissions Test Data is presented hereinafter as reference.



5 - RADIATED EMISSIONS TEST

5.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is $\pm$4.0 dB.

5.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4-2000. The specification used was the FCC Class B limits.

The spacing between the peripherals was 10 cm.

External I/O cables are draped over edge of test table or bundled when necessary.

The host PC was connected to a 120Vac/60Hz power source.

5.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33, the EUT was tested to 1000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Start Frequency	30 MHz
Stop Frequency	1000 MHz
Sweep Speed	Auto
IF Bandwidth	100 KHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 kHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

5.4 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -4 dBµV of specification limitation), and are distinguished with a "**QP**" in the data table.

The EUT was operating at normal to represent worst case during final qualification test. Therefore, this configuration was used for final test data recorded in the table(s) listed under section 4.7 of this report.

5.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Limit

5.6 Summary of Test Results

According to the final data in section 5.6, the EUT complied with the FCC 15.227, FCC 15.209 and FCC 15.35 standards, and had the worst margin of:

-10.3 dBμV at 54.09 MHz in the Horizontal polarization, 30-1000MHz, 3 meters

-12.3 dBμV at 53.60 MHz in the Horizontal polarization, Unintentional Emission, 30-1000MHz, 3 meters

5.7 Radiated Emissions Test Result Data

Indicated		Table	Antenna		Correction Factor			Corrected Amplitude	FCC Subpart C	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Transmitter										
54.09	43.2	330	1.0	H	10.5	1.0	25.0	29.7	40	-10.3
81.15	41.3	310	1.0	H	9.6	1.4	25.0	27.3	40	-12.7
54.09	39.7	15	1.0	V	10.5	1.0	25.0	26.2	40	-13.8
81.15	38.6	0	1.2	V	9.6	1.4	25.0	24.6	40	-15.4
27.045 *	71.6	0	1.0	V	15.8	0.3	25.0	62.7	80.0	-17.3
27.045 *	68.4	45	1.0	H	15.8	0.3	25.0	59.5	80.0	-20.5
53.18	29.1	15	1.0	H	10.5	1.0	25.0	15.6	40	-24.4
Receiver										
53.60	41.2	270	1.2	H	10.5	1.0	25.0	27.7	40	-12.3
58.50	40.7	330	1.5	H	10.0	0.6	25.0	26.3	40	-13.7
74.10	39.5	0	1.2	H	9.6	1.6	25.0	25.7	40	-14.3
83.70	38.6	30	1.5	V	9.6	1.4	25.0	24.6	40	-15.4
74.10	36.7	0	1.2	V	9.6	1.6	25.0	22.9	40	-17.1

* Fundamental Frequency