Industrial Technology Research Institute
Electronics Research & Service Organization
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Taiwan, Republic Of China
TEL : 886-3-5917069 FAX : 886-3-5825720

ELECTROMAGNETIC COMPATIBILITY TEST REPORT

Company : Logitech Far East Ltd.

Address : NO.2,Creation Rd. 4, Science-Based Industrial Park, Hsinchu Taiwan, R.O.C.

Sample Name : Mouse

Model : M-U34

Data Applies To : M-U35

Date Received : AUG. 09, 1999

Date Tested : AUG. 13, 1999

MEASUREMENT PROCEDURE USED :

FCC RULES AND REGULATION PART 15 SUBPART B CLASS B OCTOBER 1998 AND ANSI C63.4 MAY 1992
CISPR 22, CLASS B, 1996

WE HEREBY CERTIFY THAT: The measurements shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable. We assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.

	Name	Signature	Date
Testing Engineer	C.F.Wu/NVLAP	C. F. Wu	Aug. 20, 1999
Approving Manager	Paul Y. Liau/NVLAP	Paul Y. Liau	Aug. 20, 1999

Notes :

1. This report will be invalid if duplicated or photocopied in part.
2. This report refers only to the specimen(s) submitted to test, and is invalid as seperately used.
3. This report is invalid without examination stamp and signature of this institute.
4. The tested specimen(s) will be preserved for thirty days from the date issued.
5. This is a NIST/NVLAP accrediated report but not constituted and endorsed by US government.

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1. GENERAL INFORMATION

1.1 GENERAL STATEMENT

MEASUREMENT DEVIATION : Comply with standard in full

TRACEABILITY : This test result is traceable to national or international std.

1.2 DESCRIPTION OF EUT & POWER

MANUFACTURER : Logitech Far East Ltd.

SAMPLE NAME : Mouse

MODEL NUMBER : (1) M-U34 ; (2) M-U35

SERIAL NUMBER : Not applicable

POWER SUPPLY : DC5V(from PC)

SIGNAL LINE : Connect to PC USB port by 1.8m shielded cable

I/O PORT : USB cable to PC

Engineering Sample ☑ , Product Sample ☐ , Mass Product Sample ☐ .

1.3 DESCRIPTION OF PERIPHERALS

(1) PC

MODEL NUMBER	: KAYAK XU 6/300
SERIAL NUMBER	: SG82100177
MANUFACTURER	: HP CORP.
F.C.C. ID	: B94VECTRAXU6WT
POWER CORD	: Unshielded , Detachable , 1.8m

(2) MONITOR

MODEL NUMBER	: CN73811590
SERIAL NUMBER	: 1024
MANUFACTURER	: HP CORP.
F.C.C. ID	: A3KM064
POWER CORD	: Unshielded , Detachable , 1.8m
SIGNAL CABLE	: Shielded , Undetachable , 1.8m

(3) KEYBOARD

PRODUCT NUMBER	: E03633YLTW-C
SERIAL NUMBER	: C3758-60223
MANUFACTURER	: HP CORP.
F.C.C. ID	: CIGE03633
SIGNAL CABLE	: Shielded , Undetachable , 1.8m
POWER SOURCE	: 5VDC (from PC)

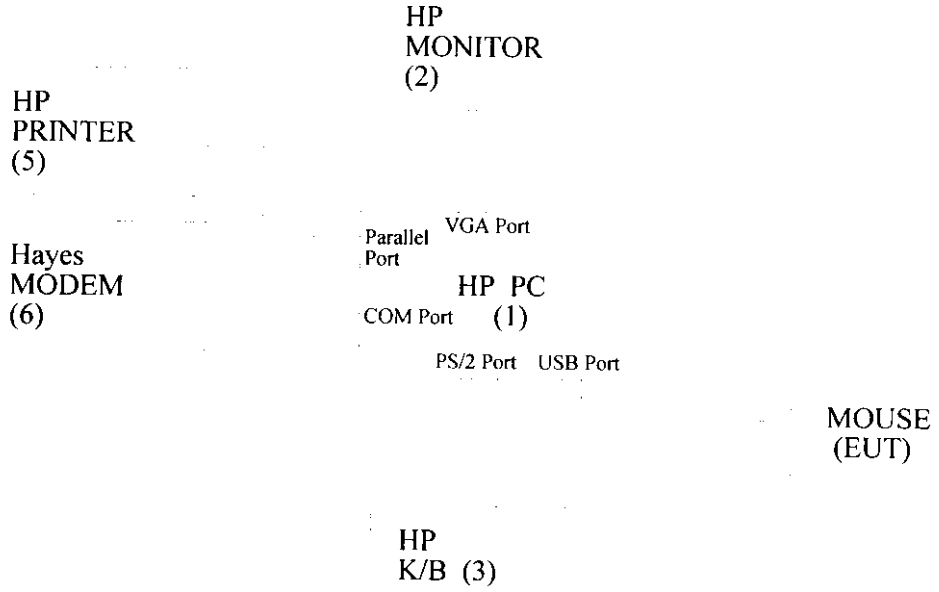
(4) PRINTER

MODEL NUMBER	: HP33481A
SERIAL NUMBER	: 3102JA145C
MANUFACTURER	: HP CORP.
F.C.C. ID	: B9433481A
POWER CORD	: Shielded , Undetachable , 1.8m
SIGNAL CABLE	: Shielded , Detachable , 1.5m

(6) MODEM

MODEL NUMBER	: 5240AM
SERIAL NUMBER	: A0095240K270
MANUFACTURER	: Hayes CORP
F.C.C. ID	: BFJ5201AM
POWER CORD	: Unshielded , Detachable , 1.8m (9VAC from adapter)
SIGNAL CABLE	: Shielded , Detachable , 2m

1.4 EUT & PERIPHERALS SETUP DIAGRAM



The indicated numbers (1)(2)------please refer to item 1.2

1.5 EUT OPERATING CONDITION

1. Setup whole system for test and power them on.
2. Get into window 98 operating system.
3. Run "EMITEST.EXE" program and start testing.
4. Scrolling "H" pattern will be displayed on Monitor, printer will print out "H" character continuous, MODEM will exercise sending and receiving operation PC will check keyboard and mouse function periodically.

1.6 DESCRIPTION OF TEST SITE

SITE DESCRIPTION : FCC certificate NO. :31040/SIT
TUV certificate NO. :I9664582-9610
Lloyd's certificate NO. :LA003
BCIQ certificate NO. :SL2-IN-E-02
NVLAP Lab code : 200118-0
CNLA certificate NO. :CNLA-ZL97018
VCCI certificate NO. :R-706, C-650

NAME OF SITE : Electronics Research & Service Organization
Industrial Technology Research Institute

SITE LOCATION : K500, 195-4 , sec. 4, Chung Hsing Rd.,
Chu-Tung Chen. Hsin-Chu, Taiwan 31015 R.O.C.

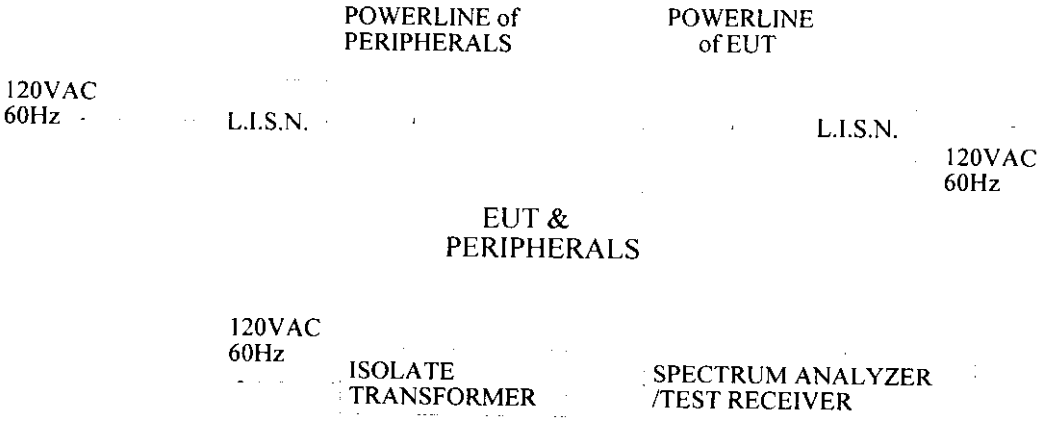
2. CONDUCTED EMISSION TEST

2.1 TEST EQUIPMENTS

The following test equipments are used during the conducted powerline tests :

MANUFACTURER OR TYPE	MODEL No	SERIAL NO.	DATE OF CALIBRATION	CALIBRA -TION PERIOD	REMARK
SPECTRUM ANALYZER & DISPLAY	HP 8568A	2235A02320	MAR. 18, 1999	1 Year	PRETEST
QUASI-PEAK ADAPTER	HP 85650 A	2341A00672	MAR. 18, 1999	1 Year	PRETEST
ISOLATION TRANSFORMER	SOLAR 7032-1	N/A	N/A	N/A	FINAL
L.I.S.N.	EMCO 3850/2	9311-1025 9401-1028	MAR. 25. 1999 For Characteristic impedance JUN. 11, 1999 For Insertion loss	1 Year	FINAL
TEST RECEIVER	R/S ESH3	8720791118	JUL. 29, 1999	1 Year	FINAL
SHIELDED ROOM	KEENE 5983	NO.1	N/A	N/A	FINAL
PULSE LIMIT	R/S EHS3Z2	357.8810.52	JUL. 22, 1999	1 Year	FINAL
N TYPE COAXIAL CABLE	----------	----------	JUL. 05, 1999	1 Year	FINAL
50Ω TERMINATOR	----------	----------	JUL. 14, 1999	1 Year	FINAL

2.2 TEST SETUP



2.3 CONDUCTED POWER LINE EMISSION LIMIT

FREQUENCY (MHz)	MAXIMUM RF LINE VOLTAGE (dB μ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56	56-46
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

2.4 TEST PROCEDURE

The test procedure is performed in a 12ft × 12ft × 8ft(L × W × H) shielded room. the EUT along with its peripherals were placed on a 1.0m(W) × 1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chasis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chasis ground also bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

2.5 UNCERTAINTY OF CONDUCTED EMISSION

The uncertainty of conducted emission is ±1.36dB.

2.6 CONDUCTED RF VOLTAGE MEASUREMENT

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.

Temperature : 28℃ Humidity : 50% RH

FREQUENCY	READING(dB μ V)				LIMITS (dB μ V)	
	ONE END & GRD'D		THE OTHER END & GRD'D			
(MHz)	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.150	*	*	*	*	66.00	56.00
0.164	49.95	*	50.35	*	65.25	55.25
0.505	35.60	*	*	*	56.00	46.00
0.880	35.93	*	36.63	*	56.00	46.00
2.001	*	*	32.67	*	56.00	46.00
2.900	34.29	*	*	*	56.00	46.00
3.840	*	*	34.70	*	56.00	46.00
7.137	*	*	36.83	*	60.00	50.00
7.566	40.43	*	*	*	60.00	50.00
17.109	48.87	*	*	*	60.00	50.00
17.199	*	*	48.97	*	60.00	50.00
21.373	*	*	40.98	*	60.00	50.00
30.000	*	*	*	*	60.00	50.00

REMARKS : 1. * Undetectable or the Q.P.values is lower than the limits of Ave
2. For M-U34

2.6 CONDUCTED RF VOLTAGE MEASUREMENT

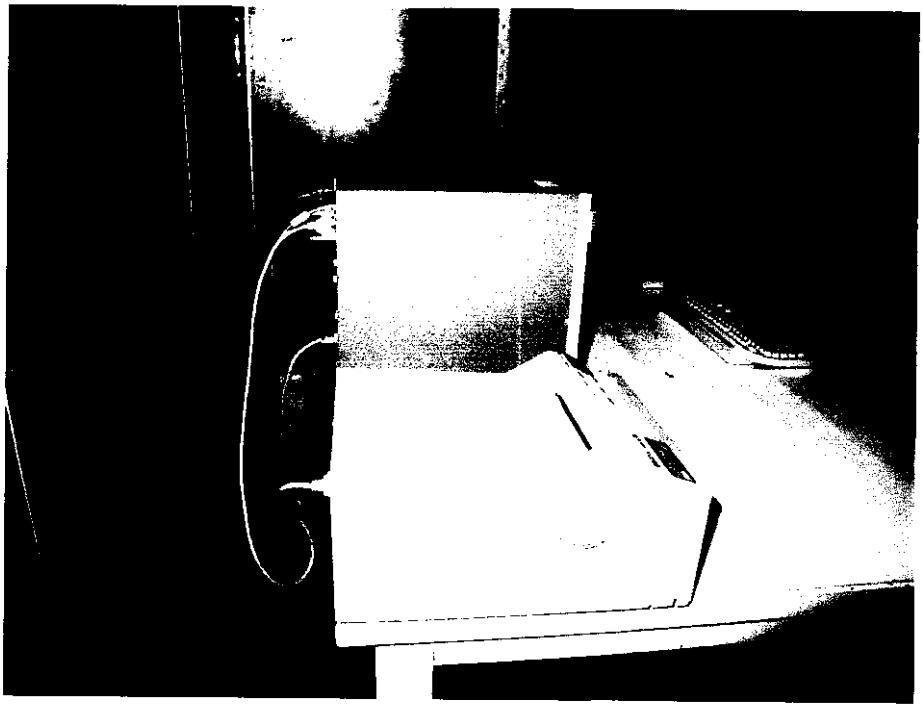
The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.

Temperature : 28℃ Humidity : 50% RH

FREQUENCY	READING(dB μ V)				LIMITS (dB μ V)	
	ONE END & GRD'D		THE OTHER END & GRD'D			
(MHz)	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.150	*	*	*	*	66.00	56.00
0.163	*	*	50.55	*	65.30	55.30
0.164	49.55	*	*	*	65.25	55.25
0.334	*	*	37.78	*	59.35	49.35
0.505	35.50	*	*	*	56.00	46.00
0.876	36.33	*	*	*	56.00	46.00
0.880	*	*	36.83	*	56.00	46.00
2.409	*	*	33.88	*	56.00	46.00
2.946	34.99	*	*	*	56.00	46.00
7.526	*	*	37.23	*	60.00	50.00
7.606	39.03	*	*	*	60.00	50.00
11.683	40.85	*	*	*	60.00	50.00
17.109	47.87	*	*	*	60.00	50.00
17.199	*	*	49.67	*	60.00	50.00
21.373	38.38	*	41.28	*	60.00	50.00
30.000	*	*	*	*	60.00	50.00

REMARKS : 1. * Undetectable or the Q.P.values is lower than the limits of Ave
2. For M-U35

2.7 PHOTOS OF CONDUCTION TEST



Comp. : Logitech Far East Ltd.
Model : M-U34

3. RADIATED EMISSION TEST

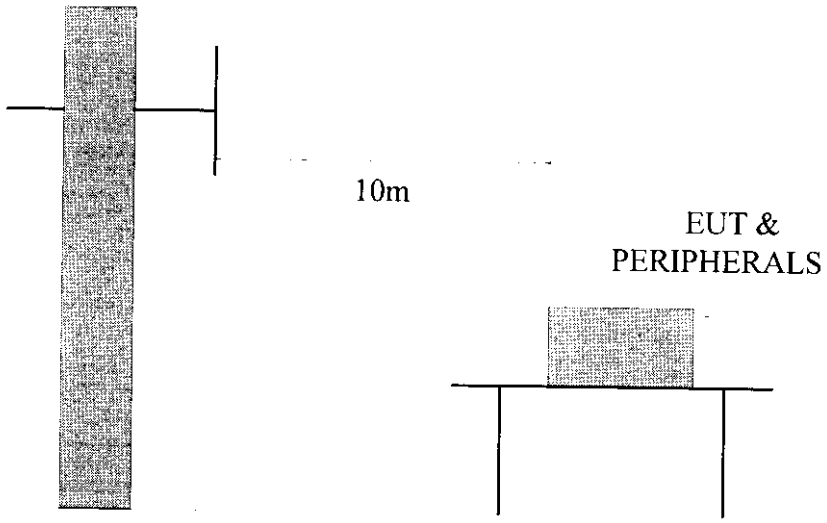
3.1 TEST EQUIPMENTS

The following test equipments are utilized in making the measurements contained in this report.

MANUFACTURER OR TYPE	MODEL NO	SERIAL NO	DATE OF CALIBRATION	CALIBRA -TION PERIOD	REMARK
CHASE BI-LOG ANTENNA	CBL6111A	1546	MAY.23, 1999	1 Year	FINAL
R/S TEST RECEIVER	ESMI	842088/005 841978/008	JUL.29, 1999	1 Year	FINAL
OPEN SITE	----------	No.1	JUN. 29, 1999	1 Year	FINAL
N TYPE COAXIAL CABLE	CHA9525	015	JUL. 06, 1999	1 Year	FINAL

3.2 TEST SETUP

The diagram below shows the test setup which is utilized to make these measurements.



Antenna Elevation Variable

3.3 RADIATION LIMIT

All emanation from a class B computing device or system , including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below :

FREQUENCY (MHz)	DISTANCE (METERS)	FIELD STRENGTHS(dB μ V/m)	
		CLASS A	CLASS B
30－230	10	40	30
230－1000	10	47	37

Note : (1)The tighter limit shall apply at the edge between two frequency bands.
(2)Distance refers to the distance in meters between the measuring instrument antenna and the closest point of any part of the device or system.

3.4 TEST PROCEDURE

The devices under test were placed on a ratable table top 0.8 meter above ground. The table was rotated 360 degrees to determine the position of the highest radiation. EUT is set 10 meters from the interference receiving antenna which is mounted on the top of a variable height mast. The antenna height is varied between one meter and four meters above ground to find the maximum value of the field strength Both horizontal polarization and vertical polarization of the antenna are set to make the measurement. The bandwidth setting on the E.M.I. meter (R/S TEST RECEIVER ESMI) is 120 KHz. The levels are quasi peak value readings. The frequency spectrum from 30MHz to 1000MHz was investigated.

3.5 UNCERTAINTY OF RADIATED EMISSION

The uncertainty of radiated emission is $\pm$2.72dB.

3.6 RADIATED RF NOISE MEASUREMENT

The frequency spectrum from 30 MHz to 1000 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.
All readings are quasi-peak values.

Temperature : 33℃ Humidity : 77% RH

FREQ-UENCY (MHz)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	METER READING AT10m(dBμV) HORIZON-TAL	METER READING AT10m(dBμV) VERTICAL	LIMITS (dBμV/m)	EMISSION LEVEL AT10m(dBμV/m) HORIZON-TAL	EMISSION LEVEL AT10m(dBμV/m) VERTICAL
30.00	19.50	1.06	*	*	30.00	*	*
156.70	11.01	2.35	11.58	8.92	30.00	24.94	22.28
168.70	10.11	2.43	11.16	7.52	30.00	23.70	20.06
180.80	8.94	2.51	6.40	4.16	30.00	17.84	15.60
199.97	9.34	2.63	13.96	11.30	30.00	25.93	23.27
204.82	9.66	2.66	15.92	10.32	30.00	28.24	22.64
216.87	10.46	2.74	9.06	6.26	30.00	22.26	19.46
228.92	11.25	2.83	8.92	4.86	30.00	23.00	18.94
233.30	11.54	2.86	10.18	7.38	37.00	24.58	21.78
239.97	11.99	2.90	11.86	7.80	37.00	26.75	22.69
266.64	12.89	3.08	7.94	10.98	37.00	23.91	26.95
320.00	13.81	3.42	7.10	12.42	37.00	24.33	29.65
330.00	14.03	3.48	8.50	13.26	37.00	26.01	30.77
1000.00	24.86	6.80	*	*	37.00	*	*

REMARKS : 1. * Undetectable

2. Emission level (dBμV/m) =Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).
3. For M-U34
4. The test data marked in gray background means the EUT emission data is located in the margin uncertainty range of emission limits.

3.6 RADIATED RF NOISE MEASUREMENT

The frequency spectrum from 30 MHz to 1000 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.
All readings are quasi-peak values.

Temperature : 33℃ Humidity : 77% RH

FREQ-UENCY (MHz)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	METER READING AT10m(dBμV) HORIZON-TAL	METER READING AT10m(dBμV) VERTICAL	LIMITS (dBμV/m)	EMISSION LEVEL AT10m(dBμV/m) HORIZON-TAL	EMISSION LEVEL AT10m(dBμV/m) VERTICAL
30.00	19.50	1.06	*	*	30.00	*	*
156.70	11.01	2.35	13.82	9.76	30.00	27.18	23.12
168.70	10.11	2.43	13.26	9.90	30.00	25.80	22.44
180.80	8.94	2.51	11.44	6.68	30.00	22.88	18.12
199.97	9.34	2.63	12.00	12.84	30.00	23.97	24.81
204.95	9.67	2.66	15.92	11.02	30.00	28.25	23.35
217.00	10.47	2.75	7.24	7.80	30.00	20.45	21.01
229.06	11.26	2.83	6.54	4.44	30.00	20.63	18.53
233.30	11.54	2.86	9.34	3.32	37.00	23.74	17.72
239.97	11.99	2.90	10.04	10.18	37.00	24.93	25.07
266.64	12.89	3.08	10.74	11.86	37.00	26.71	27.83
320.00	13.81	3.42	5.84	12.42	37.00	23.07	29.65
330.00	14.03	3.48	7.80	10.60	37.00	25.31	28.11
465.66	17.93	4.23	4.58	6.26	37.00	26.74	28.42
1000.00	24.86	6.80	*	*	37.00	*	*

REMARKS : 1. * Undetectable

2. Emission level (dBμV/m) =Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).
3. For M-U35
4. The test data marked in gray background means the EUT emission data is located in the margin uncertainty range of emission limits.