



ELECTROMAGNETIC COMPATIBILITY TEST REPORT

Company (1) Logitech Far East Ltd.
(2) HEWLETT PACKARD

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

Sample Name Mouse

Model M-U48a

Data Applies To M-UJ48a


Date Received DEC. 15, 1999

Date Tested DEC. 16, 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 |  | Dec. 22, 1999 |
| Approving Manager | Laurence Chang |  | Jan. 14, 2000 |

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 separately 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.



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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 M-U48a

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 D2825
SERIAL NUMBER MY75206542
MANUFACTURER HP CORP.
F.C.C. ID JVP7154E
POWER CORD Unshielded , Detachable , 1.8m
SIGNAL CABLE Shielded , Undetachable , 1.8m

3 KEYBOARD

PRODUCT NUMBER SK-2501K
SERIAL NUMBER MR80700477
MANUFACTURER HP CORP.
F.C.C. ID GYUR38SK
SIGNAL CABLE Shielded , Undetachable , 1.8m
POWER SOURCE 5VDC (from PC)

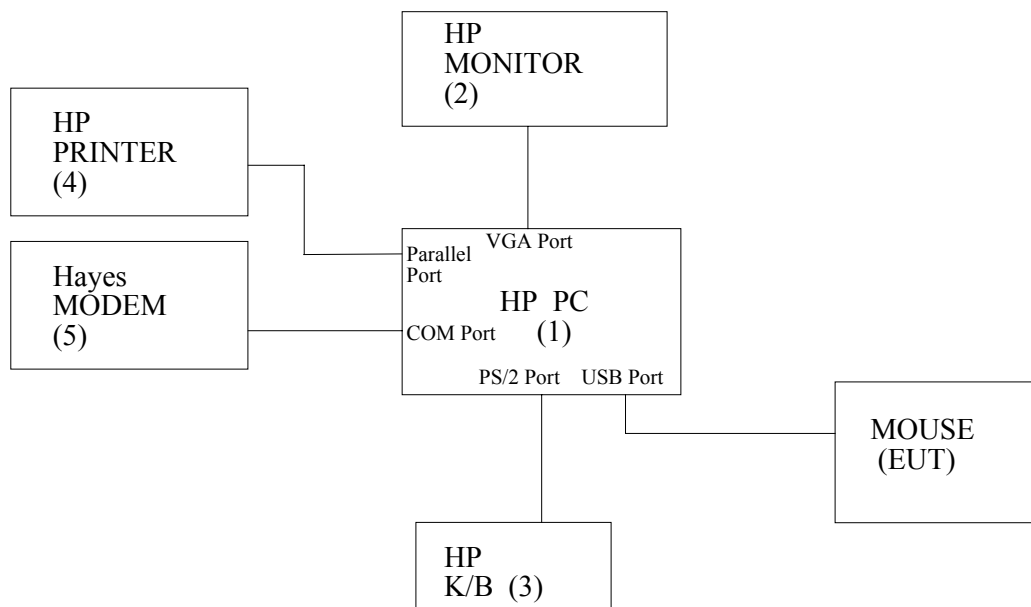
4 PRINTER

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

5 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 1.3



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/PRV TUV certificate NO. :I9664582-9610 Lloyd's certificate NO. :LA003 BSMI certificate NO. :SL2-IN-E-0002 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. |



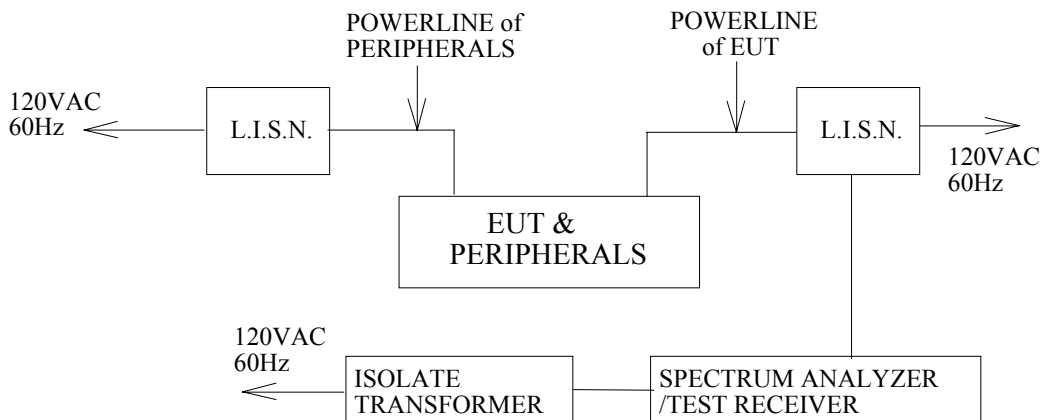
2. CONDUCTED EMISSION TEST

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 | CALIBRATION 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 | 1 Year | FINAL |
| | | | For Characteristic impedance | | |
| | | | JUN. 11, 1999 | | |
| | | | For Insertion loss | | |
| 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 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 25 Humidity 55% RH

| FREQUENCY (MHz) | READING(dB V) | | | | LIMITS | |
|--------------------|-----------------|------|-----------------------|------|--------|-------|
| | ONE END & GRD'D | | THE OTHER END & GRD'D | | (dB V) | |
| | Q.P. | Ave. | Q.P. | Ave. | Q.P. | Ave. |
| 0.150 | | | | | 66.00 | 56.00 |
| 0.167 | 49.00 | | 48.00 | | 65.12 | 55.12 |
| 0.252 | 42.00 | | 40.60 | | 61.69 | 51.69 |
| 0.501 | 35.70 | | 31.70 | | 56.00 | 46.00 |
| 0.801 | 35.10 | | 31.40 | | 56.00 | 46.00 |
| 3.002 | 31.40 | | 27.10 | | 56.00 | 46.00 |
| 7.489 | 37.40 | | 32.30 | | 60.00 | 50.00 |
| 12.143 | | | 32.60 | | 60.00 | 50.00 |
| 14.221 | | | 37.20 | | 60.00 | 50.00 |
| 16.777 | 39.30 | | 39.80 | | 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



2.7 PHOTOS OF CONDUCTION TEST



Comp. Logitech Far East Ltd.

Model M-U48a



3. RADIATED EMISSION TEST

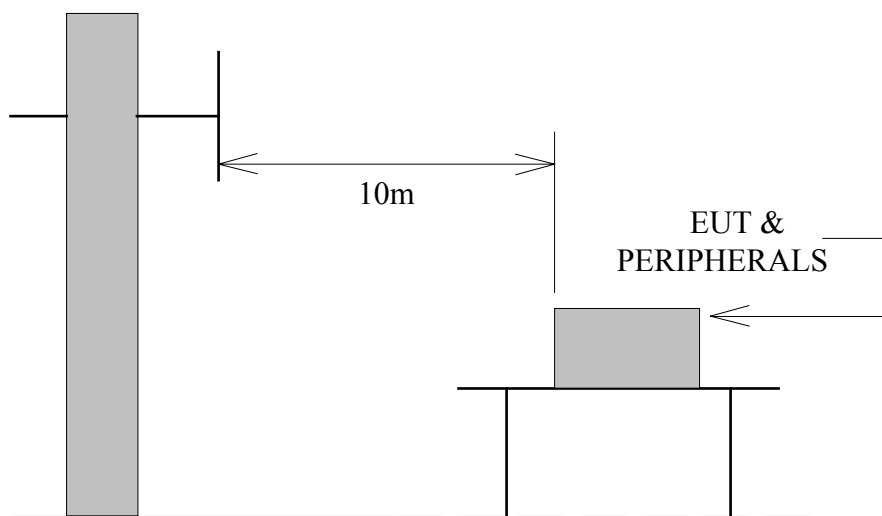
3.1 TEST EQUIPMENTS

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

| MANUFACTURER OR TYPE | MODEL NO | SERIAL NO | DATE OF CALIBRATION | CALIBRATION PERIOD | REMARK |
|----------------------|----------|--------------------------|---------------------|--------------------|--------|
| CHASE BI-LOG ANTENNA | CBL6112B | 2562 | MAY.01, 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 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 ± 2.72 dB.



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 20

Humidity 86 RH

| FREQ- UENCY (MHz) | ANTENNA FACTOR (dB/m) | CABLE LOSS (dB) | METER READING AT10m(dB μ V) | | LIMITS (dB μ V/m) | EMISSION LEVEL AT10m(dB μ V/m) | |
|-----------------------------|---------------------------------|---------------------------|------------------------------------|----------------|------------------------------|---------------------------------------|----------------|
| | | | HORIZON- TAL | VERTICAL | | HORIZON- TAL | VERTICAL |
| | | | 30.00 | 18.02 | | 1.06 | i ⁻ |
| 71.86 | 6.90 | 1.63 | i ⁻ | 9.34 | 30.00 | i ⁻ | 17.87 |
| 171.93 | 9.72 | 2.45 | 8.50 | 5.28 | 30.00 | 20.67 | 17.45 |
| 180.98 | 9.37 | 2.51 | 12.70 | 10.32 | 30.00 | 24.58 | 22.20 |
| 191.98 | 9.50 | 2.58 | 4.16 | 6.27 | 30.00 | 16.24 | 18.35 |
| 199.98 | 9.60 | 2.63 | 8.50 | 12.84 | 30.00 | 20.73 | 25.07 |
| 201.35 | 9.68 | 2.64 | 3.32 | 5.00 | 30.00 | 15.64 | 17.32 |
| 207.96 | 10.06 | 2.68 | i ⁻ | 6.40 | 30.00 | i ⁻ | 19.14 |
| 216.00 | 10.53 | 2.74 | 4.16 | 6.68 | 30.00 | 17.43 | 19.95 |
| 217.19 | 10.60 | 2.75 | 7.38 | 6.12 | 30.00 | 20.73 | 19.47 |
| 233.31 | 11.54 | 2.86 | 5.84 | 6.26 | 37.00 | 20.24 | 20.66 |
| 329.83 | 14.08 | 3.48 | 4.44 | 5.56 | 37.00 | 22.00 | 23.12 |
| 330.67 | 14.10 | 3.48 | 5.56 | i ⁻ | 37.00 | 23.14 | i ⁻ |
| 466.65 | 16.90 | 4.23 | 5.70 | i ⁻ | 37.00 | 26.83 | i ⁻ |
| 559.97 | 18.10 | 4.70 | 4.16 | i ⁻ | 37.00 | 26.96 | i ⁻ |
| 599.99 | 18.54 | 4.90 | 6.12 | i ⁻ | 37.00 | 29.56 | i ⁻ |
| 733.32 | 19.11 | 5.57 | 4.02 | i ⁻ | 37.00 | 28.70 | i ⁻ |
| 750.00 | 19.25 | 5.65 | 2.34 | i ⁻ | 37.00 | 27.24 | i ⁻ |
| 866.66 | 20.14 | 6.23 | 5.28 | i ⁻ | 37.00 | 31.65 | i ⁻ |
| 899.99 | 20.39 | 6.40 | 2.62 | 2.06 | 37.00 | 29.41 | 28.85 |
| 1000.00 | 21.18 | 6.80 | i ⁻ | i ⁻ | 37.00 | i ⁻ | i ⁻ |

REMARKS 1. Undetectable

2. Emission level (dB μ V/m) = Antenna Factor (dB/m) + Cable loss (dB)
+ Meter Reading (dB μ V).



3.7 PHOTOS OF OPEN SITE

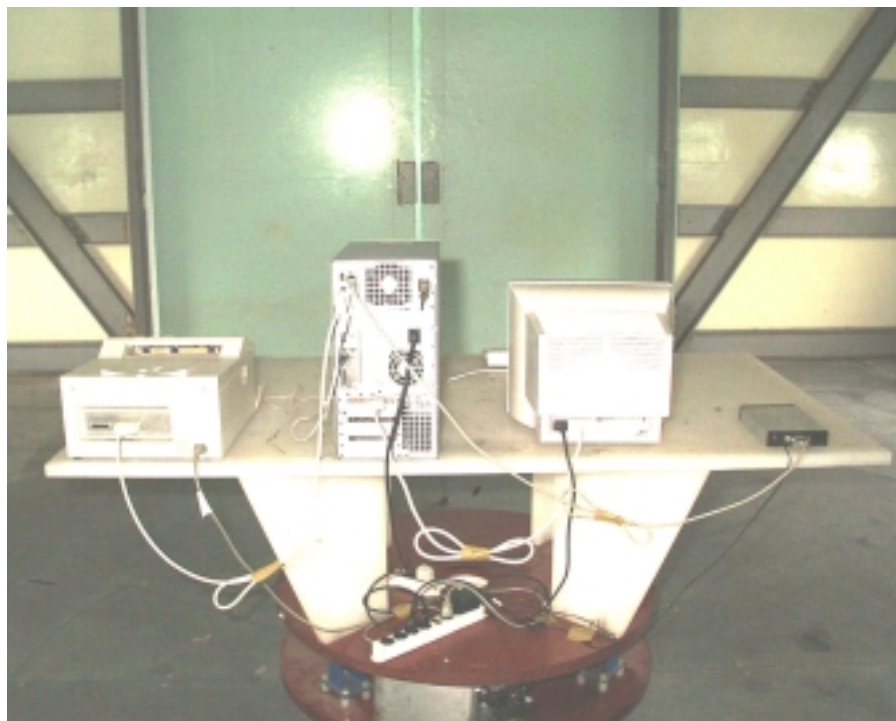


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