EMC

TEST REPORT

REPORT NO. : F89031562
MODEL NO. : M-U61
DATE OF TEST : Mar. 16, 2000

PREPARED FOR: Logitech Far East Ltd.

ADDRESS: No. 2, Creation Rd. 4, Science-Based Ind. Park,
Hsin Chu, Taiwan, R.O.C.

PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION

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Accredited Laboratory

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Chiung Lin Hsiang, Hsin Chu Hsien, Taiwan, R.O.C.

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1. CERTIFICATION

Issue Date: Mar. 21, 2000
Reference No. 89031562

Product	:	Mouse
Trade Name	:	Logitech
Model No.	:	M-U61, M-UJ61, M-U62, M-UJ62
Applicant	:	Logitech Far East Ltd.
Standard	:	FCC Part 15, Subpart B, Class B ANSI C63.4-1992 CISPR 22:1993+A1: 1995+A2: 1996, Class B

We hereby certify that one sample of the designation has been tested in our facility on Mar. 16, 2000. The test record, data evaluation and Equipment Under Test (EUT) configurations represent herein are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

The test results show that the EUT as described in this report is in compliance with the Class B limits of conducted and radiated emission of applicable standards

TESTED BY: Dragon Liu , DATE: Mar. 21, 2000
(Dragon Liu)

CHECKED BY: Rita Yi , DATE: Mar. 21, 2000
(Rita Yi)

APPROVED BY: Fred Chen , DATE: Mar. 21, 2000
(Fred Chen)

ADVANCE DATA TECHNOLOGY CORPORATION

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	Mouse
Model No.	:	M-U61
Power Supply Type	:	DC 5V (From PC)
Power Cord	:	N/A
Data Cable	:	USB Cable, 1.8m

Note: The EUT is a mouse device with USB interface. It has four model names which are identical to each other in all aspects except for their outer appearance:

Model Name	Brand Name	From of function button
M-U61	Logitech	Oval
M-UJ61		
M-U62	Logitech	Rectangular
M-UJ62		

From the above models, model: M-U61 was selected as representative model for the test and its data was recorded in this report.

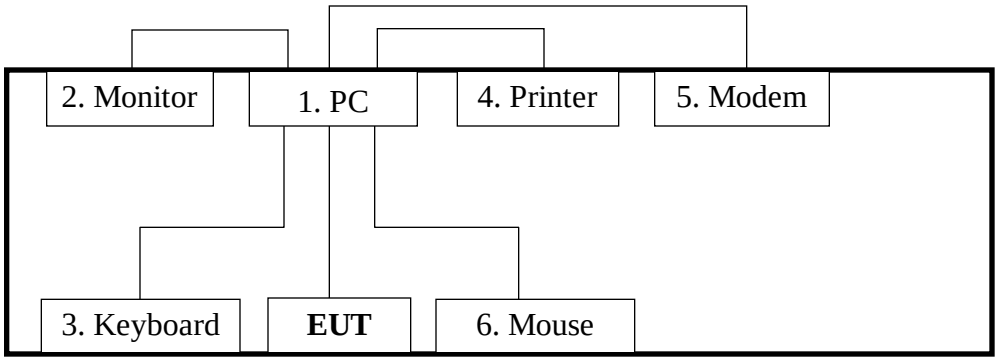
For more detailed features description, please refer to user's manual.

2.2 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as a component installed into a system and tested together with necessary accessories or support units. The following support units or accessories are used to form representative test configuration during the tests.

No.	Product	Brand	Model No.	FCC ID	I/O Cable
1.	PERSONAL COMPUTER	IBM	2187-12W	FCC DoC	Nonshielded Power (1.8m)
2.	COLOR MONITOR	ADI	937G	BR8937G	Shielded Signal (1.2m) Nonshielded Power (1.8m)
3.	KEYBOARD	FORWARD	FDA-104GA	F4ZDA-104G	Shielded Signal (1.4m)
4.	PRINTER	HP	C2642A	B94C2642X	Shielded Signal (1.2m) Nonshielded Power (2.1m)
5.	MODEM	ACEEX	1414	IFAXDM1414	Shielded Signal (1.5m) Nonshielded Power (1.8m)
6.	MOUSE	LOGITECH	M-S35	DZL211029	Shielded Signal (1.8m)

2.3 TEST METHODOLOGY AND CONFIGURATION



Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 1992. Radiated testing was performed at an antenna to EUT distance of 10 m on an open area test site. Please refer to the photos of test configuration in Item 5.

3. TEST INSTRUMENTS

3.1 TEST INSTRUMENTS (EMISSION)

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESCS 30	847124/029	Oct. 6, 2000
ROHDE & SCHWARZ LISN	ESHS-Z5	848773/004	Oct. 8, 2000
KYORITSU LISN	KNW-407	8/1395/12	Aug. 02, 2000
Shielded Room	Con A	ADT-CA	N/A

Note: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per NAMAS document NIS81.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

RADIATED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP Spectrum Analyzer	8590L	3467U00646	Aug. 11, 2000
ADVANTEST Spectrum Analyzer	R3271A	85060311	May. 14, 2000
CHASE RF Pre_Amplifier	CPA9232	1010	Feb. 15, 2001
HP Pre_Amplifier	8449B	3008A01281	June 22, 2000
ROHDE & SCHWARZ Test Receiver	ESVS 10	84923/019	Jan. 12, 2001
CHASE Broadband Antenna	CBL6112B	2467	July 26, 2000
Schwarzbeck Horn_Antenna	BBHA9120-D1	D123	July 21, 2000
ROHDE & SCHWARZ Precision Dipole	HZ-12 (30~300MHz)	846932/0003	June 06, 2000
ROHDE & SCHWARZ Precision Dipole	HZ-13 (300~1000MHz)	846556/0007	June 17, 2000
CHANCE MOST Antenna Tower	AT-100	CM-A007	N/A
CHANCE MOST Turn Table	TC-008	CM-T007	N/A
CORCOM AC Filter	MRI2030	024/019	N/A
Open Field Test Site	Site B	ADT-RB	Oct. 03, 2000

Note: 1. The measurement uncertainty is less than +/- 3dB, which is calculated as per NAMAS document NIS81.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

3.2 LIMITS OF CONDUCTED AND RADIATED EMISSION

LIMIT OF RADIATED EMISSION OF CISPR 22

FREQUENCY (MHz)	Class A (at 10m) * dBuV/m	Class B (at 10m) * dBuV/m
30 - 230	40	30
230 - 1000	47	37

* Detector Function: Quasi-Peak

LIMIT OF RADIATED EMISSION OF FCC PART 15, SUBPART B FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	Peak	Average	Peak	Average
Above 1000	80.0	60.0	74.0	54.0

Note: (1) The lower limit shall apply at the transition frequencies.
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).
(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

LIMIT OF CONDUCTED EMISSION OF CISPR 22

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Note: (1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz
(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4. TEST RESULTS (EMISSION)

4.1 RADIO DISTURBANCE

Frequency Range	:	0.15 - 30 MHz (Conducted Emission)
		30 - 1000 MHz (Radiated Emission)
Input Voltage	:	120Vac, 60Hz
Temperature	:	20 •
Relative Humidity	:	68 •
Atmospheric Pressure	:	981 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -10.3 dB at 0.200 MHz Minimum passing margin of radiated emission: -7.0 dB at 895.4 MHz

4.2 EUT OPERATION CONDITION

1. Turned on the power of all equipment.
2. PC ran a test program to enable all functions of EUT.
3. EUT sent “H” messages to monitor and monitor displays them on screen.
4. EUT sent messages to printer, then printer prints them on paper.
5. EUT sent messages to modem.
6. EUT access HDD and FDD.
7. Repeat steps 3-7.

4.3 TEST DATA OF CONDUCTED EMISSION

EUT: **Mouse** MODEL: **M-U61**

6 dB Bandwidth: 9 kHz PHASE: LINE (**L**)

Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (Uv)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.200	0.1	53.8	-	53.9	-	64.6	54.6	-10.7	-
0.302	0.1	42.8	-	42.9	-	61.6	51.6	-18.7	-
0.501	0.1	42.1	-	42.2	-	56.0	46.0	-13.8	-
0.603	0.1	40.2	-	40.3	-	56.0	46.0	-15.7	-
12.968	0.4	10.2	-	10.6	-	60.0	50.0	-49.4	-
22.218	0.6	11.6	-	12.2	-	60.0	50.0	-47.8	-

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
4. The emission level of other frequencies were very low against the limit.
5. Emission Level = Corr. Factor + Reading Value
6. Margin value = Emission level - Limit value.

4.3 TEST DATA OF CONDUCTED EMISSION

EUT: **Mouse** MODEL: **M-U61**

6 dB Bandwidth: 9 kHz PHASE: NEUTRAL (**N**)

Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.200	0.1	54.2	-	54.3	-	64.6	54.6	-10.3	-
0.302	0.1	47.1	-	47.2	-	61.6	51.6	-14.4	-
0.501	0.1	40.8	-	40.9	-	56.0	46.0	-15.1	-
0.603	0.1	40.1	-	40.2	-	56.0	46.0	-15.8	-
12.968	0.7	26.4	-	27.1	-	60.0	50.0	-32.9	-
22.218	0.9	20.4	-	21.3	-	60.0	50.0	-38.7	-

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
4. The emission level of other frequencies were very low against the limit.
5. Emission Level = Corr. Factor + Reading Value
6. Margin value = Emission level - Limit value.

4.4 TEST DATA OF RADIATED EMISSION

EUT: **Mouse** MODEL: **M-U61**

ANT. POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle
48.9	9.0	6.0	15.0	30.0	-15.0	400	271
52.5	8.0	5.0	13.0	30.0	-17.0	373	41
165.7	11.6	5.2	16.8	30.0	-13.2	384	342
171.9	11.4	5.1	16.2	30.0	-13.5	389	193
209.8	11.5	9.0	20.5	30.0	-9.5	381	282
217.0	11.4	9.5	20.9	30.0	-9.1	346	333
528.9	23.1	2.5	25.6	37.0	-11.4	260	255
701.0	24.5	2.4	26.9	37.0	-10.1	218	5
895.4	27.2	2.8	30.0	37.0	-7.0	120	321

REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading Value (dBuV).
2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

4.4 TEST DATA OF RADIATED EMISSION

EUT: **Mouse** MODEL: **M-U61**

ANT. POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle
45.2	10.9	9.4	20.3	30.0	-9.7	141	252
48.2	9.5	12.7	22.2	30.0	-7.8	118	265
51.2	8.3	5.8	14.1	30.0	-15.9	105	293
166.0	11.6	5.7	17.3	30.0	-12.7	100	339
171.9	11.4	8.5	19.9	30.0	-10.1	100	325
217.0	11.4	7.7	19.1	30.0	-10.9	158	343
697.0	24.5	2.5	27.0	37.0	-10.0	234	299
816.0	26.1	2.7	28.8	37.0	-8.2	329	309
930.0	27.4	1.1	28.5	37.0	-8.5	345	341

REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading Value (dBuV).
2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

5. PHOTOGRAPHS OF THE TEST CONFIGURATION WITH MINIMUM MARGIN

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST

6. APPENDIX - INFORMATION OF THE TESTING LABORATORY

Information of the testing laboratory

We, ADT Corp., are founded in 1988, to provide our best service in EMC and Safety consultation. Our laboratory is accredited by the following approval agencies according to ISO/IEC Guide 25 or EN 45001:

● USA	FCC, UL, NVLAP
● Germany	TUV Rheinland
	TUV Product Service
● Japan	VCCI
● New Zealand	RFS
● Norway	NEMKO, DNV
● U.K.	INCHCAPE
● R.O.C.	BSMI

Enclosed please find some certificates of our laboratory obtained from approval agencies. If you have any comments, please feel free to contact us with the following:

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