



FCC TEST REPORT

REPORT NO.: RF900629R01

MODEL NO.: Wireless Wheel Mouse
Wireless Desktop Wheel Mouse

RECEIVED: June 29, 2001

TESTED: July 6, 2001

APPLICANT: MICROSOFT CORPORATION

ADDRESS: ONE MICROSOFT WAY REDMON,
WA98052-6339, U.S.A

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: 47 14th Lin, Chiapau Tsun, Linko, Taipei,
Taiwan, R.O.C.

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0528



Lab Code: 200102-0



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1 CERTIFICATION

PRODUCT : Wireless Mouse (Transmitter part)
BRAND NAME : Microsoft
MODEL NO : Wireless Wheel Mouse
Wireless Desktop Wheel Mouse
APPLICANT : MICROSOFT CORPORATION
STANDARDS : 47 CFR Part 15, Subpart C,
ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility on July 9, 2001. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

TESTED BY: Gary Chang, **DATE:** July 18, 2001
Gary Chang

CHECKED BY: Demi Chen **DATE:** July 18, 2001
Demi Chen

APPROVED BY: Alan Lane, **DATE:** July 18, 2001
Dr. Alan Lane
Manager



2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
STANDARD PARAGRAPH	TEST TYPE	RESULT	REMARK
15.107	Conducted Emission Test	N/A	Power supply is 3Vdc from batteries.
15.227	Radiated Emission Test	PASS	Minimum passing margin is -10.9dBuV at 35.1MHz

NOTE: The receiver part to communicate with the EUT has been verified to comply with FCC Part 15, Subpart B, Class B (DoC). The test report can be provided upon request.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless Mouse (Transmitter part)
MODEL NO.	Wireless Wheel Mouse Wireless Desktop Wheel Mouse
POWER SUPPLY	3VDC from battery (1.5V x 2)
MODULATION TYPE	FSK
FREQUENCY RANGE	NA
CARRIER FREQUENCY OF EACH CHANNEL	27.045MHZ, 27.145MHz
BANDWIDTH OF EACH CHANNEL	NA
NUMBER OF CHANNEL	2
ANTENNA TYPE	Printed Antenna
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT is the transmitter part of a Wireless Mouse.
2. Wireless Wheel Mouse and Wireless Desktop Wheel Mouse are identical except for their model name and marketing area. Wireless Wheel Mouse was chosen as a representative mode for the test.
3. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



3.2 DESCRIPTION OF TEST MODES

Two channels are provided in this EUT.

Channel	Frequency	Channel	Frequency
1	27.045 MHz		
2	27.145 MHz		

NOTE: Channel 1, the worst case, was chosen for final test.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is the transmitter part of a Wireless Mouse. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC CFR 47 Part 15, Subpart C

ANSI C63.4-1992

All tests have been performed and recorded as per the above standards.

3.4 DESCRIPTION OF SUPPORT UNITS

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Personal Computer	IBM	2187-12W	1S218714ABNA000V	FCC DoC APPROVED
2	21" COLOR MONITOR	HP	D2846	JP92233133	FCC DoC APPROVED
3	PRINTER	HP	2225C+	3123S97230	DSI6XU2225
4	MODEM	ACEEX	1414	980020510	IFAXDM1414
5	PS/2 KEYBOARD	FORWARD	FDA-104GA	FDKB8110111	F4ZDA-104G

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	1.8 m braid shielded wire, terminated with VGA connector via metallic frame, w/o core.
3	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core.
4	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
5	1.5 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.

NOTE: All power cords of the above support units are non shielded (1.8m).



4 TEST PROCEDURE AND RESULT

4.1 CONDUCTED EMISSION MEASUREMENT

NA

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.227 the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)	
	Peak	Average
26.96-27.28	100	80

Field strength limits are at the distance of 3 meters, emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Other Frequencies (MHz)	Field Strength of Fundamental	
	uV/meter	dBuV/meter
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



4.2.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
*HP Spectrum Analyzer	8590L	3544A01176	May 7, 2002
*HP Preamplifier	8447D	2944A08485	Nov. 3, 2001
* HP Preamplifier	8449B	3008A01201	Dec. 13, 2001
* HP Preamplifier	8449B	3008A01292	Aug. 21, 2001
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Jan. 25, 2002
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2001
* CHASE BILOG Antenna	CBL6112A	2221	Aug. 4, 2001
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	July 6, 2002
* EMCO Horn Antenna	3115	9312-4192	April 15, 2002
* EMCO Turn Table	1060	1115	NA
* SHOSHIN Tower	AP-4701	A6Y005	NA
* Software	AS61D3	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Aug. 4, 2001
* TIMES RF cable	LMR-600	CABLE-ST5-01	Aug. 4, 2001
* Antenna (Horn)	BBHA9120-D	D130	July 10, 2001
Open Field Test Site	Site 5	ADT-R05	July 28, 2001
VCCI Site Registration No.	Site 5	R-1039	NA
Site Registration No.	FCC: 90422 Canada IC: IC 3789 VCCI : R-1039		

NOTE:

1. "*" = These equipments are used for the final measurement.
2. The preamplifiers are not used while R&S receiver is doing the measurements.
3. The measurement uncertainty is less than +/- 3.0dB, which is calculated as per the NAMAS document NIS81.
4. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

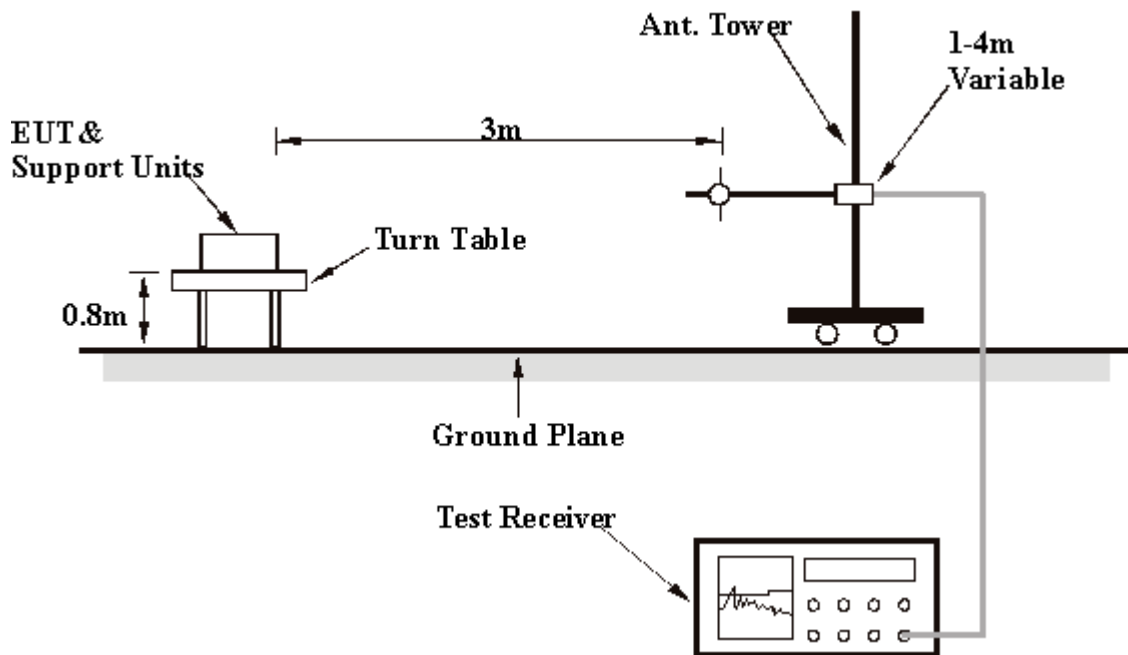
4.2.3 TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for Average detection (AV) at frequency above 1GHz.

4.2.4 TEST SETUP



For the actual test configuration, please refer to the related item in this test report - Photographs of the Test Configuration.

4.2.5 EUT OPERATING CONDITION

The EUT was set to enable EUT under transmission condition continuously at specific channel frequency.



4.2.6 TEST RESULT

EUT	Wireless Mouse (Transmitter Part)	MODEL	Wireless Wheel Mouse
MODE	Channel 1	FREQUENCY RANGE	30-1000 MHz
INPUT POWER	3VDC from battery	DETECTOR FUNCTION & BANDWIDTH	Peak / Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	30 deg. C, 60 % RH, 1050 hPa	TESTED BY: Gary Chang	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	*27.07	50.8 PK	100.00	NA	2.16H	57	68.99	6.80	2.03	27.00	18.17
2	*27.07	40.3 AV	80.00	NA	2.16H	57	31.50	6.80	2.03	0.00	-8.83
3	108.24	30.3 QP	43.50	-13.20	1.26H	85	17.20	10.80	2.31	0.00	-13.12
4	162.40	29.9 QP	43.50	-13.60	1.00H	91	18.20	9.04	2.62	0.00	-11.65
5	216.20	28.4 QP	46.00	-17.60	1.00H	191	16.10	9.43	2.82	0.00	-12.25
6	325.24	31.7 QP	46.00	-14.30	1.34H	261	15.30	13.20	3.24	0.00	-16.44
7	433.10	31.9 QP	46.00	-14.10	1.30H	327	12.80	15.82	3.31	0.00	-19.13
8	460.21	35.1 QP	46.00	-10.90	2.12H	94	15.60	16.24	3.30	0.00	-19.55

NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss
(Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value
5. “ * “ : Fundamental frequency



EUT	Wireless Mouse (Transmitter Part)	MODEL	Wireless Wheel Mouse
MODE	Channel 1	FREQUENCY RANGE	30-1000 MHz
INPUT POWER	3VDC from battery	DETECTOR FUNCTION & BANDWIDTH	Peak / Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	28 deg. C, 60 % RH, 1050 hPa	TESTED BY: Gary Chang	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB/m)
1	*27.07	48.4 PK	100.00	NA	1.00V	183	66.54	6.80	2.03	27.00	18.17
2	*27.07	36.4 AV	80.00	NA	1.00V	183	27.60	6.80	2.03	0.00	-8.83
3	135.24	32.1 QP	43.50	-11.40	1.00V	40	18.70	10.90	2.54	0.00	-13.44
4	189.24	27.9 QP	43.50	-15.60	1.00V	108	16.70	8.51	2.73	0.00	-11.24
5	243.83	29.6 QP	46.00	-16.40	1.00V	80	15.70	11.07	2.87	0.00	-13.93
6	325.12	32.8 QP	46.00	-13.20	2.07V	74	16.40	13.20	3.24	0.00	-16.44
7	405.26	33.2 QP	46.00	-12.80	2.03V	62	14.30	15.43	3.44	0.00	-18.87
8	460.21	33.3 QP	46.00	-12.70	1.85V	122	13.80	16.24	3.30	0.00	-19.55

NOTE:

1. Emission level = Raw value - Correction Factor
2. Correction Factor = Pre-Amp. Factor - Ant. Factor - Cable loss (Pre-Amp. Factor = 0, when a Pre-Amplifier is not used for the test.)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value
5. “ * “ : Fundamental frequency

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST





6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

USA	FCC, NVLAP
Germany	TUV Rheinland
Japan	VCCI
New Zealand	MoC
Norway	NEMKO
R.O.C.	BSMI, DGT, CNLA

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.