

FCC TEST REPORT

REPORT NO.: RF930310A04

MODEL NO.: TX: 1025, RX:1026

RECEIVED: Mar. 10, 2004

TESTED: Mar. 11~16, 2004

APPLICANT: MICROSOFT CORPORATION

ADDRESS: ONE MICROSOFT WAY REDMOND, WA
98052-6399, U.S.A.

ISSUED BY: Advance Data Technology Corporation

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

This test report consists of 16 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by CNLA or any government agencies. The test results in the report only apply to the tested sample.



0528
ILAC MRA

Table of Contents

1	CERTIFICATION.....	3
2	SUMMARY OF TEST RESULTS	4
3	GENERAL INFORMATION	5
3.1	GENERAL DESCRIPTION OF EUT	5
3.2	DESCRIPTION OF TEST MODES	6
3.3	GENERAL DESCRIPTION OF APPLIED STANDARDS.....	6
3.4	DESCRIPTION OF SUPPORT UNITS	7
4	TEST PROCEDURE AND RESULT.....	8
4.1	RADIATED EMISSION MEASUREMENT.....	8
4.1.1	LIMITS OF RADIATED EMISSION MEASUREMENT	8
4.1.2	TEST INSTRUMENTS.....	9
4.1.3	TEST PROCEDURES	10
4.1.4	DEVIATION FROM TEST STANDARD.....	10
4.1.5	TEST SETUP.....	11
4.1.6	EUT OPERATING CONDITIONS	11
4.1.7	TEST RESULTS	12
5	PHOTOGRAPHS OF THE TEST CONFIGURATION	14
6	INFORMATION ON THE TESTING LABORATORIES.....	16

1 CERTIFICATION

PRODUCT : Microsoft® Standard Wireless Optical Mouse /
Microsoft® Wireless Optical Mouse Receiver 3.0
BRAND NAME : Microsoft®
MODEL NO : TX: 1025, RX:1026
APPLICANT : MICROSOFT CORPORATION
TEST ITEM : ENGINEERING SAMPLE
STANDARDS : FCC Part 15, Subpart C(15.227) ; Subpart B, Class B.
ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility on Mar. 11~16, 2004. 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.

PREPARED BY: Annie Chang , **DATE:** April 8, 2004
(Annie Chang)

APPROVED BY: Mike Su. , **DATE:** April 8, 2004
(Mike Su, 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
15.207	Conducted Emission Test	N/A	Power supply is 3VDC from batteries
15.227	Radiated Emission Test	PASS	Minimum passing margin is -31.03 dB at 27.14MHz

APPLIED STANDARD: FCC Part 15, Subpart B		
TEST TYPE	RESULT	REMARK
Conducted Emission Test	N/A	Power supply is 3VDC from batteries
Radiated Emission Test	PASS	Meet the requirement of limit Minimum passing margin is -11.00 dB at 293.14MHz

NOTE: The information of measurement uncertainty is available upon the customer's request.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Microsoft® Standard Wireless Optical Mouse / Microsoft® Wireless Optical Mouse Receiver 3.0
MODEL NO.	TX: 1025, RX:1026
POWER SUPPLY	TX: DC 3V, from AA battery x2 RX: DC 5V from PC
MODULATION TYPE	FSK
CARRIER FREQUENCY OF EACH CHANNEL	27.145MHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Loop antenna
DATA CABLE	RX: Shielded USB cable (1.8m) with one core
I/O PORTS	USB port
ASSOCIATED DEVICES	NA

NOTE: 1. The EUT is a Microsoft® Standard Wireless Optical Mouse / Microsoft® Wireless Optical Mouse Receiver 3.0 with the following model names:

Model Name	Description
1025	TX (mouse)
1026	RX (receiver, with USB interface)

2. This report recorded the package which includes test results of mouse for standard FCC 47 CFR Part 15, Subpart C (15.227) and receiver for standard FCC Part 15, Subpart B.
3. For more detailed features description of the EUT, please refer to the manufacturer's specifications or the User's Manual.

3.2 DESCRIPTION OF TEST MODES

One channel was provided to this EUT.

Channel	Frequency
1	27.145MHz

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is the transmitter part of a Microsoft® Standard Wireless Optical Mouse / Microsoft® Wireless Optical Mouse Receiver 3.0. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 15, Subpart C (15.227); Subpart B, Class B.

ANSI C63.4-1992

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

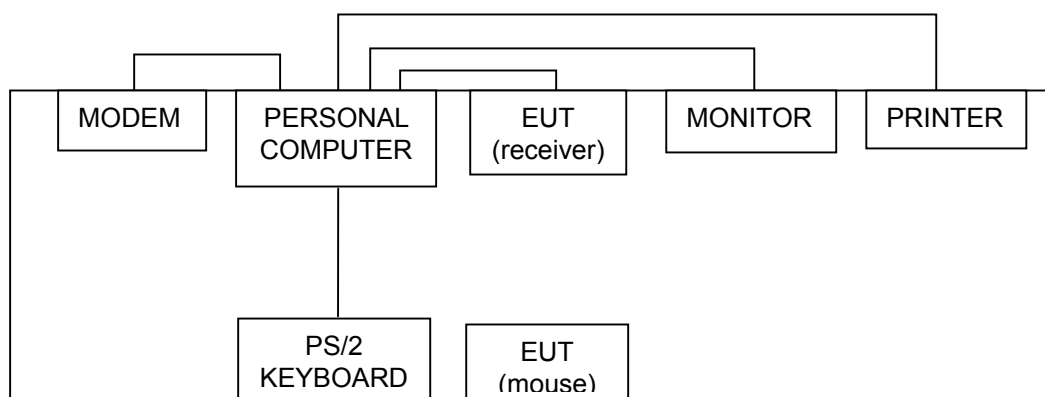
3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	PERSONAL COMPUTER	LEO	Persica 8620G	1A36I98A000219	FCC DoC Approved
2	MONITOR	HP	D2842A	KR93473113	BEJCB910
3	PRINTER	EPSON	LQ-300+	DCGY017076	FCC DoC Approved
4	MODEM	ACEEX	1414	0206026755	IFAXDM1414
5	PS/2 KEYBOARD	BTC	5200T	F24800221	E5XKB5122WTH0110

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A
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	1.6 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 RADIATED EMISSION MEASUREMENT

4.1.1 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

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	$2400/F(\text{kHz})$	300
0.490-1.705	$24000/F(\text{kHz})$	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8594E	3911A07465	July 7, 2004
HP Preamplifier	8447D	2944A10386	Aug. 12, 2004
* HP Preamplifier	8449B	3008A01924	Oct. 12, 2004
* HP Preamplifier	8449B	3008A01638	Oct. 17, 2004
SCHWARZBECK Tunable Dipole Antenna	VHA 9103	NA	Nov. 15, 2004
SCHWARZBECK Tunable Dipole Antenna	UHA 9105	977	
SCHAFFNER TEST RECEIVER	SCR 3501	409	Dec. 22, 2004
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Feb. 12, 2005
* SCHAFFNER BILOG Antenna	CBL6111C	2727	July 15, 2004
* EMCO Horn Antenna	3115	6714	Nov 26, 2004
* EMCO Horn Antenna	3115	9312-4192	Feb. 28 2005
* ADT. Turn Table	TT100	0201	NA
* ADT. Tower	AT100	0201	NA
* Software	ADT_Radiated_V 5.14	NA	NA
* ANRITSU RF Switches	MP59B	6100237246	Oct. 17, 2004
* TIMES RF cable	LMR-600	CABLE-ST10-01	Oct. 17, 2004

- NOTE:** 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. "*" = These equipment are used for the final measurement.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in ADT Open Site No. 10.
5. The VCCI Site Registration No. is R-1625.

4.1.3 TEST PROCEDURES

- 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.

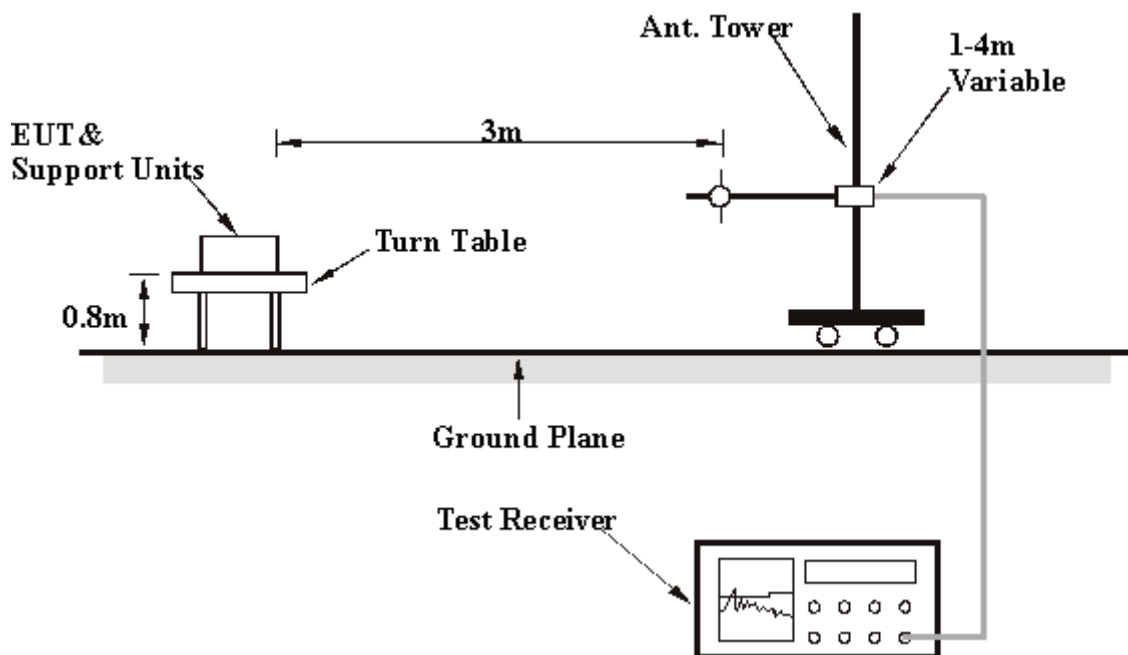
NOTE:

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 10 Hz for Average detection (AV) at frequency above 1GHz.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

- Connected the receiver part of EUT with a computer system on the testing table.
- Set the transmitter and receiver at the same channel.
- Set the receiver part of EUT under receiving condition continuously at specific channel frequency.
- The computer system sent "H" messages to Color Monitor and Monitor displayed "H" patterns on its screen.
- The computer system sent "H" messages to modem.
- The computer system sent "H" messages to printer, and the printer printed it out.

4.1.7 TEST RESULTS

EUT	Microsoft® Wireless Optical Mouse Receiver 3.0	MODEL	RX:1026
MODE	Channel 1	INPUT POWER	5VDC
FREQUENCY RANGE	Below 1000 MHz	DETECTOR FUNCTION	Peak / Quasi-Peak / Average
ENVIRONMENTAL CONDITIONS	23 deg. C, 70 % RH, 1050 hPa	TESTED BY: Martin Lee	

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)	Correction Factor (dB/m)
1	54.24	23.64 QP	40.00	-16.36	1.00 H	120	16.63	7.01
2	81.24	27.22 QP	40.00	-12.78	2.36 H	256	19.24	7.98
3	84.85	24.50 QP	40.00	-15.50	2.11 H	313	16.09	8.41
4	144.15	17.48 QP	43.50	-26.02	1.66 H	93	5.33	12.15
5	162.00	21.22 QP	43.50	-22.28	1.95 H	169	10.53	10.69
6	188.10	18.73 QP	43.50	-24.77	1.43 H	119	8.49	10.24
7	203.12	24.22 QP	43.50	-19.28	2.03 H	62	13.53	10.69
8	240.72	26.94 QP	46.00	-19.06	1.29 H	159	13.66	13.28
9	272.30	25.94 QP	46.00	-20.06	1.67 H	180	10.67	15.27
10	293.14	35.00 QP	46.00	-11.00	1.08 H	122	18.96	16.04
11	480.12	30.74 QP	46.00	-15.26	1.45 H	299	9.45	21.29

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)	Correction Factor (dB/m)
1	48.01	24.14 QP	40.00	-15.86	1.31 V	282	15.00	9.14
2	54.00	23.31 QP	40.00	-16.69	1.29 V	337	16.25	7.06
3	81.20	27.29 QP	40.00	-12.71	1.76 V	29	19.32	7.97
4	84.86	27.30 QP	40.00	-12.70	1.69 V	275	18.89	8.41
5	108.58	24.00 QP	43.50	-19.50	1.06 V	20	12.66	11.34
6	180.93	19.18 QP	43.50	-24.32	1.76 V	267	9.08	10.10
7	240.69	22.59 QP	46.00	-23.41	1.05 V	330	9.31	13.28
8	293.12	24.99 QP	46.00	-21.01	1.46 V	183	8.95	16.04

NOTE:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value
5. “*”= Fundamental frequency.

EUT	Microsoft® Standard Wireless Optical Mouse	MODEL	TX:1025
MODE	Channel 1	INPUT POWER	3VDC
FREQUENCY RANGE	Below 1000 MHz	DETECTOR FUNCTION	Peak / Quasi-Peak / Average
ENVIRONMENTAL CONDITIONS	23 deg. C, 70 % RH, 1005 hPa	TESTED BY: Martin Lee	

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)	Correction Factor (dB/m)
1	*27.15	48.92 PK	100.00	-31.08	2.48 H	158	41.27	7.65

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)	Correction Factor (dB/m)
1	*27.14	48.97 PK	100.00	-31.03	2.98 V	134	41.32	7.65

NOTE:

1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
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 (RX:1026)



(TX:1025)



6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom 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, UL
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB , GOST-ASIA(MOU)
Russia	CERTIS(MOU)

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:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26052943

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab:

Tel: 886-3-3183232

Fax: 886-3-3185050

Linko RF & Telecom Lab.

Tel: 886-3-3270910

Fax: 886-3-3270892

Email: service@mail.adt.com.tw

Web Site: www.adt.com.tw

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