FCC TEST REPORT

REPORT NO.: RF920529R02
MODEL NO.: 1014
RECEIVED: May. 28, 2003
TESTED: May. 30, 2003

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, Chia Pau Tsuen, Linkou Hsiang, Taipei, Taiwan, R.O.C.

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ILAC MRA

Lab Code: 200102-0

Table of Contents

1 CERTIFICATION

PRODUCT :	Wireless Keyboard
BRAND NAME :	Microsoft®
MODEL NO :	1014
APPLICANT :	MICROSOFT CORPORATION
STANDARDS :	47 CFR Part 15, Subpart C(15.227), RSS-210 ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility on May. 30, 2003. 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: Wendy Liao , **DATE:** June 24, 2003

Wendy Liao

APPROVED BY: for , **DATE:** June 24, 2003

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, RSS-210			
STANDARD PARAGRAPH	**TEST TYPE**	**RESULT**	**REMARK**
15.207	Conducted Emission Test	N/A	3VDC from batteries
15.227	Radiated Emission Test	PASS	Meet the requirement of limit Minimum passing margin is –22.0dBuV/m at 163.66MHz

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 Keyboard
MODEL NO.	1014
POWER SUPPLY	3VDC from battery
MODULATION TYPE	FSK
CARRIER FREQUENCY OF EACH CHANNEL	27.195
BANDWIDTH OF EACH CHANNEL	NA
NUMBER OF CHANNEL	1
ANTENNA TYPE	Wire Antenna
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1.The EUT is the transmitter part of Wireless Keyboard.

2.Three samples were provided to this test:

	Transmitter	**Receiver**	**Mouse**
Serial No	S/N. EVT 55 S/N. EVT 59 S/N. EVT 13	S/N. EVT 46 S/N. EVT 13 S/N. EVT 59	372

3.Three identical transmitters and three identical receivers were provided to test at Micorsoft's request.

4.For more detailed feature description of the EUT, please refer to user's manual.

3.2 DESCRIPTION OF TEST MODES

One channel was provided to this EUT.

Channel	Frequency
1	27.195 MHz

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is the transmitter part of a Wireless Keyboard. 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), RSS-210

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	HP	DTPC 27	SG21103587	FCC DoC Approve
2	COLOR MONITOR	ADI	CM100	026058T102006 11 A	DoC
3	PRINTER	EPSON	LQ-300+	DCGY017096	FCC DoC Approved
4	MODEM	ACEEX	1414	980020569	IFAXDM1414
5	Receiver	Microsoft	1015	NA	Doc

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	1.9 m braid shielded wire, terminated with USB 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)	
26.96-27.28	Peak	Average
	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)
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.

4.2.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
* HP Spectrum Analyzer	8590L	3544A01176	June.10, 2004
Spectrum Analyzer	8593E	3926A04191	Mar. 24, 2004
* HP Preamplifier	8447D	2944A08485	May. 01, 2004
HP Preamplifier	8449B	3008A01201	Dec. 01, 2003
HP Preamplifier	8449B	3008A01292	Aug. 07, 2003
*Spectrum Analyzer	8593E	3926A04191	Mar. 24, 2004
*Test Receiver	ESI7	838496/016	Feb. 23, 2004
SCHAFFNER Tunable Dipole Antenna	VHBA 9123	459	Nov. 22, 2003
SCHWARZBECK Tunable Dipole Antenna	UHA 9105	977	
*ANTENNA (Large Biconical)	VHBA9123	449	Dec. 22, 2003
* CHASE BILOG Antenna	CBL6112A	2221	Aug. 02, 2003
SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	Jul. 03, 2003
EMCO Horn Antenna	3115	9312-4192	Mar. 23. 2004
* EMCO Turn Table	1060	1115	NA
* SHOSHIN Tower	AP-4701	A6Y005	NA
* Software	ADT_Radiated _V5.09	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Jul. 11, 2003
* TIMES RF cable	LMR-600	CABLE-ST5-01	Jul. 11, 2003

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. 5.
5. The VCCI Site Registration No. is R-1039.

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.

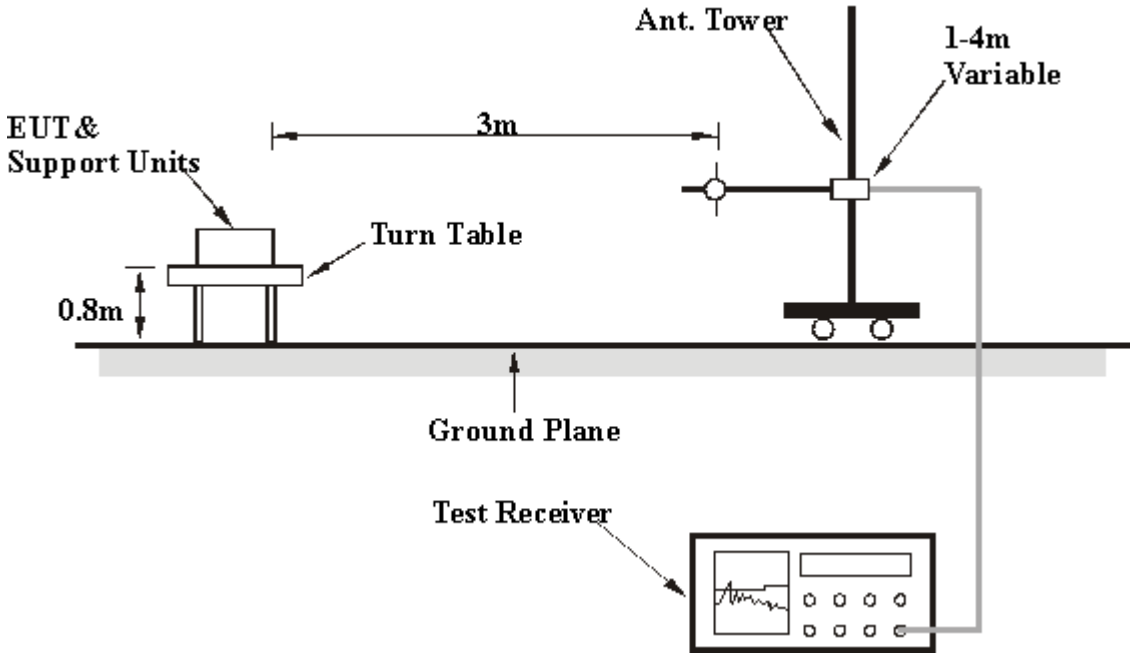
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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

Set the EUT under transmission condition continuously at specific channel frequency.

4.2.6 TEST RESULT

EUT	Wireless Keyboard	**MODEL NO.**	1014
FREQUENCY RANGE	Below 1000 MHz	**DETECTOR FUNCTION**	Peak/Average/Quasi-Peak
SERIAL NO.	S/N. EVT 55	**INPUT POWER**	3VDC
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 991 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)	Correction Factor (dB/m)
1	*27.18	50.6 PK	100.00	-49.40	2.49 H	226	44.00	6.60
2	*27.19	39.1 AV	80.00	-40.90	2.49 H	226	32.50	6.60
3	108.78	13.1 QP	43.50	-30.40	1.00 H	46	0.40	12.70
4	135.98	11.2 QP	43.50	-32.40	1.00 H	65	-1.30	12.40
5	163.17	8.70 QP	43.50	-34.80	1.00 H	99	-2.10	10.80
6	190.37	12.9 QP	43.50	-30.60	1.00 H	122	2.20	10.80
7	217.56	10.8 QP	46.00	-35.20	1.00 H	144	-1.80	12.60
8	244.76	12.9 QP	46.00	-33.10	1.00 H	183	-2.20	15.10

REMARKS:
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	Wireless Keyboard	**MODEL NO.**	1014
FREQUENCY RANGE	Below 1000 MHz	**DETECTOR FUNCTION**	Peak/Average/Quasi-Peak
SERIAL NO.	S/N. EVT 55	**INPUT POWER**	3VDC
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 991 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)	Correction Factor (dB/m)
1	*27.19	31.2 AV	80.00	-48.80	1.00 V	58	24.60	6.60
2	*27.20	45.5 PK	100.00	-54.50	1.00 V	58	38.90	6.60
3	108.78	21.0 QP	43.50	-22.50	1.00 V	239	8.30	12.70
4	136.44	19.9 QP	43.50	-23.60	1.00 V	223	7.60	12.40
5	162.81	18.4 QP	43.50	-25.10	1.00 V	201	7.60	10.80
6	190.74	18.2 QP	43.50	-25.30	1.00 V	176	7.40	10.80
7	217.26	18.6 QP	46.00	-27.40	1.00 V	141	6.00	12.60
8	244.74	19.4 QP	46.00	-26.60	1.00 V	109	4.30	15.10

REMARKS:
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	Wireless Keyboard	**MODEL NO.**	1014
FREQUENCY RANGE	Below 1000 MHz	**DETECTOR FUNCTION**	Peak/Average/Quasi-Peak
SERIAL NO.	S/N. EVT 59	**INPUT POWER**	3VDC
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 991 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)	Correction Factor (dB/m)
1	*27.19	49.5 PK	100.00	-50.50	2.01 H	206	42.90	6.60
2	*27.19	41.6 AV	80.00	-38.40	2.00 H	206	35.00	6.60
3	108.78	14.7 QP	43.50	-28.80	1.00 H	212	2.00	12.70
4	135.98	17.0 QP	43.50	-26.50	1.00 H	212	4.60	12.40
5	162.78	17.1 QP	43.50	-26.40	1.00 H	212	6.30	10.80
6	190.85	19.4 QP	43.50	-24.10	1.00 H	212	8.60	10.80
7	217.09	19.7 QP	46.00	-26.30	1.00 H	212	7.20	12.50
8	245.19	18.4 QP	46.00	-27.60	1.00 H	212	3.20	15.10

REMARKS:
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	Wireless Keyboard	**MODEL NO.**	1014
FREQUENCY RANGE	Below 1000 MHz	**DETECTOR FUNCTION**	Peak/Average/Quasi-Peak
SERIAL NO.	S/N. EVT 59	**INPUT POWER**	3VDC
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 991 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)	Correction Factor (dB/m)
1	*27.19	41.4 PK	100.00	-58.60	1.54 V	42	34.80	6.60
2	*27.19	31.6 AV	80.00	-48.40	1.54 V	42	25.00	6.60
3	108.80	19.7 QP	43.50	-23.80	1.00 V	189	7.00	12.70
4	136.00	20.7 QP	43.50	-22.80	1.00 V	167	8.30	12.40
5	163.61	19.6 QP	43.50	-23.90	1.00 V	136	8.80	10.80
6	190.76	19.5 QP	43.50	-24.00	1.00 V	108	8.70	10.80
7	217.22	18.8 QP	46.00	-27.20	1.00 V	86	6.30	12.60
8	244.98	19.0 QP	46.00	-27.00	1.00 V	65	3.90	15.10

REMARKS:
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	Wireless Keyboard	**MODEL NO.**	1014
FREQUENCY RANGE	Below 1000 MHz	**DETECTOR FUNCTION**	Peak/Average/Quasi-Peak
SERIAL NO.	S/N. EVT 13	**INPUT POWER**	3VDC
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 991 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)	Correction Factor (dB/m)
1	*27.19	49.8 PK	100.00	-50.20	1.89 H	33	43.20	6.60
2	*27.19	38.8 AV	80.00	-41.20	1.88 H	33	32.20	6.60
3	109.11	17.9 QP	43.50	-25.60	1.14 H	186	5.20	12.70
4	135.74	21.0 QP	43.50	-22.50	1.00 H	151	8.60	12.40
5	190.82	21.2 QP	43.50	-22.30	1.00 H	92	10.40	10.80
6	299.60	19.4 QP	46.00	-26.60	1.00 H	57	2.60	16.80
7	353.99	19.4 QP	46.00	-26.60	1.00 H	84	1.60	17.80
8	435.57	20.8 QP	46.00	-25.20	1.00 H	109	1.20	19.60

REMARKS:
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	Wireless Keyboard	**MODEL NO.**	1014
FREQUENCY RANGE	Below 1000 MHz	**DETECTOR FUNCTION**	Peak/Average/Quasi-Peak
SERIAL NO.	S/N. EVT 13	**INPUT POWER**	3VDC
ENVIRONMENTAL CONDITIONS	25deg. C, 60%RH, 991 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)	Correction Factor (dB/m)
1	*27.19	43.0 PK	100.00	-57.00	1.00 V	124	36.40	6.60
2	*27.19	33.6 AV	80.00	-46.40	1.00 V	33	27.00	6.60
3	108.78	20.7 QP	43.50	-22.80	1.00 V	172	8.00	12.70
4	135.97	16.3 QP	43.50	-27.20	1.00 V	154	3.90	12.40
5	163.66	21.5 QP	43.50	-22.00	1.00 V	103	10.70	10.80
6	190.86	15.6 QP	43.50	-27.90	1.00 V	78	4.80	10.80
7	217.27	20.5 QP	46.00	-25.50	1.00 V	49	7.90	12.60
8	245.07	17.5 QP	46.00	-28.50	1.00 V	39	2.40	15.10

REMARKS:
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

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.