



# FCC TEST REPORT

**REPORT NO.:** RF900703R01

**MODEL NO.:** Wireless Desktop Keyboard

**RECEIVED:** July 3, 2001

**TESTED:** July 11, 2001

**APPLICANT:** MICROSOFT CORPORATION

**ADDRESS:** ONE MICROSOFT WAY

REDMON, WA 98052-6399, USA

**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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0528



Lab Code: 200102-0

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## 1 CERTIFICATION

**PRODUCT :** Wireless Keyboard (Transmitter Part)  
**BRAND NAME :** Microsoft  
**MODEL NO :** Wireless Desktop Keyboard  
**APPLICANT :** MICROSOFT CORPORATION  
**STANDARDS :** 47 CFR Part 15, Subpart C(15.227)  
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 11, 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 19, 2001  
Gary Chang

**CHECKED BY:** Anna Kuo **DATE:** July 19, 2001  
Anna Kuo

**APPROVED BY:** Alan Lane, **DATE:** July 19, 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 -7.6dBuV at 54.14MHz

**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

<b>PRODUCT</b>	Wireless Keyboard (Transmitter Part)
<b>MODEL NO.</b>	Wireless Desktop Keyboard
<b>POWER SUPPLY</b>	3VDC from battery
<b>MODULATION TYPE</b>	FSK
<b>FREQUENCY RANGE</b>	NA
<b>CARRIER FREQUENCY OF EACH CHANNEL</b>	27.095MHz, 27.195MHz
<b>BANDWIDTH OF EACH CHANNEL</b>	+/- 7 kHz
<b>NUMBER OF CHANNEL</b>	2
<b>ANTENNA TYPE</b>	Wired antenna
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	NA
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:**

- 1.The EUT is the transmitter part of a Wireless Keyboard (Transmitter Part).
- 2.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

Two channels are provided in this EUT.

Channel	Frequency	Channel	Frequency
1	27.095 MHz		
2	27.195 MHz		

NOTE: Channel 2, the worst case, was chosen for final test.

### 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 CFR 47 Part 15, Subpart C(15.227)**

**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	1S218714ABNA 000V	FCC DoC Approved
2	MONITOR	ADI	SM-5514A	521S030301A	BR8SM-5514AC
3	PRINTER	HP	2225C+	3123S97230	DSI6XU2225
4	MODEM	ACEEX	1414	980020510	IFAXDM1414

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.

**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, 2002
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.The measurement uncertainty is less than +/- 3.0dB, which is calculated as per the 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. "\*" = These equipment are used for the final measurement.



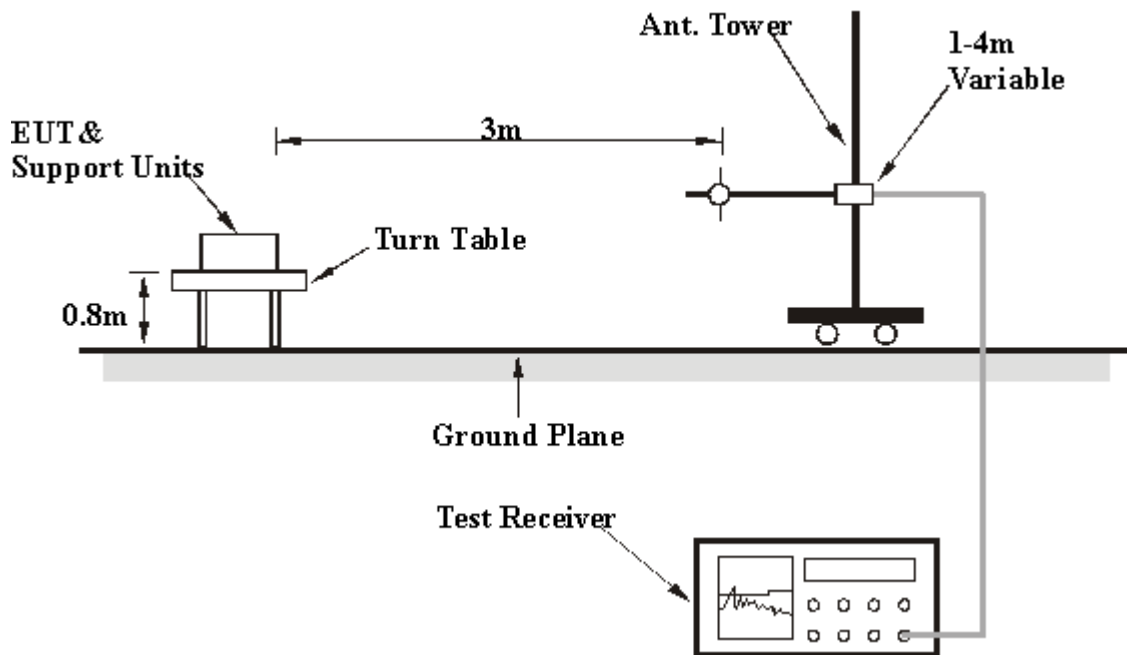
### 4.2.3 TEST PROCEDURE

- 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

- Connected the EUT with a computer system on the testing table.
- The computer system ran a test program to enable EUT under transmission 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 prints them on paper.

#### 4.2.6 TEST RESULT

<b>EUT</b>	Wireless Keyboard (Transmitter Part)	<b>MODEL</b>	Wireless Desktop Keyboard
<b>MODE</b>	Channel 2	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>INPUT POWER</b>	3VDC	<b>DETECTOR FUNCTION</b>	Peak / Quasi-Peak / Average
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 60 % RH, 1050 hPa	<b>TESTED BY:</b> 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	27.19	41.6 Av	80.00	-38.40	1.00H	9	32.80	6.80	2.03	0.00	-8.83
2	27.19	54.4 pk	100.00	-45.60	1.00H	9	72.58	6.80	2.03	27.00	18.17
3	162.45	32.7 QP	43.50	-10.80	1.15H	3	21.00	9.04	2.62	0.00	-11.65
4	189.20	29.4 QP	43.50	-14.10	1.11H	129	18.20	8.51	2.73	0.00	-11.24
5	243.86	32.8 QP	46.00	-13.20	1.00H	219	18.90	11.07	2.87	0.00	-13.93
6	325.00	32.3 QP	46.00	-13.70	2.10H	219	15.90	13.20	3.24	0.00	-16.44
7	405.30	34.0 QP	46.00	-12.00	1.81H	22	15.10	15.43	3.44	0.00	-18.87
8	460.25	34.3 QP	46.00	-11.70	1.91H	71	14.80	16.24	3.30	0.00	-19.55

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) – Correction Factor(dB)
  2. Correction Factor(dB) = Pre-Amplifier Factor (dB) - Antenna Factor (dB) - Cable Factor (dB)
  3. Pre-Amplifier Factor (dB) = 0, when the test receiver is used to read the value and because it did not use the Pre-Amplifier.
  4. The other emission levels were very low against the limit.
  5. Margin value = Emission level – Limit value.

<b>EUT</b>	Wireless Keyboard (Transmitter Part)	<b>MODEL</b>	Wireless desktop keyboard
<b>MODE</b>	Channel 2	<b>FREQUENCY RANGE</b>	30-1000 MHz
<b>INPUT POWER</b>	3VDC	<b>DETECTOR FUNCTION</b>	Peak / Quasi-Peak / Average
<b>ENVIRONMENTAL CONDITIONS</b>	25 deg. C, 60 % RH, 1050 hPa	<b>TESTED BY:</b> 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)	Cable Factor (dB)	Pre-Amp. Factor (dB)	Correction Factor (dB)
1	27.18	37.2 Av	80.00	-42.80	1.00V	334	28.40	6.80	2.03	0.00	-8.83
2	27.18	48.3 pk	100.00	-51.30	1.00V	334	66.50	6.80	2.03	27.00	18.18
3	54.14	32.4 QP	40.00	-7.60	1.48V	7	24.30	6.02	2.08	0.00	-8.11
4	108.45	33.5 QP	43.50	-10.00	1.06V	70	20.40	10.80	2.31	0.00	-13.12
5	189.20	29.6 QP	43.50	-13.90	1.00V	356	18.40	8.51	2.73	0.00	-11.24
6	216.48	29.8 QP	46.00	-16.20	1.00V	113	17.50	9.43	2.82	0.00	-12.25
7	325.47	33.2 QP	46.00	-12.80	2.05V	81	16.80	13.20	3.24	0.00	-16.44
8	432.56	35.0 QP	46.00	-11.00	2.04V	323	15.90	15.82	3.31	0.00	-19.13

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) – Correction Factor(dB)
  2. Correction Factor(dB) = Pre-Amplifier Factor (dB) - Antenna Factor (dB) - Cable Factor (dB)
  3. Pre-Amplifier Factor (dB) = 0, when the test receiver is used to read the value and because it did not use the Pre-Amplifier.
  4. The other emission levels were very low against the limit.
  5. Margin value = Emission level – Limit value.

## 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:

<b>USA</b>	FCC, NVLAP
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>New Zealand</b>	MoC
<b>Norway</b>	NEMKO
<b>R.O.C.</b>	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](http://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.