

# FCC TEST REPORT

**REPORT NO.:** RF910517R02

**MODEL NO.:** Microsoft® Wireless MultiMedia  
Keyboard 1.0A

**RECEIVED:** June 12, 2002

**TESTED:** June 14 ~ June 18, 2002

**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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0528  
ILAC MRA



Lab Code: 200102-0

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## 1 CERTIFICATION

**PRODUCT :** Wireless Keyboard  
**BRAND NAME :** Microsoft®  
**MODEL NO :** Microsoft® Wireless MultiMedia Keyboard 1.0A  
**APPLICANT :** MICROSOFT CORPORATION  
**STANDARDS :** 47 CFR Part 15, Subpart C (15.227)  
ANSI C63.4-1992, Canada RSS 210

We, **Advance Data Technology Corporation**, hereby certify that three samples of the designation have been tested in our facility from June 14 to June 18, 2002. 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.

CHECKED BY : Emily Lu , DATE : June 27, 2002  
Emily Lu  
APPROVED BY : Alan Lane , DATE : June 27, 2002  
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                                            |
| 15.207                                      | Conducted Emission Test | N/A    | Power supply is 3VDC from batteries               |
| 15.227                                      | Radiated Emission Test  | PASS   | Minimum passing margin is -16.20dBuV at 216.80MHz |

**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                            |
| <b>MODEL NO.</b>                         | Microsoft® Wireless MultiMedia Keyboard 1.0A |
| <b>POWER SUPPLY</b>                      | 3VDC from battery                            |
| <b>MODULATION TYPE</b>                   | FSK                                          |
| <b>CARRIER FREQUENCY OF EACH CHANNEL</b> | 27.095MHz, 27.195MHz                         |
| <b>BANDWIDTH OF EACH CHANNEL</b>         | NA                                           |
| <b>NUMBER OF CHANNEL</b>                 | 2                                            |
| <b>ANTENNA TYPE</b>                      | wire 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.
2. Three identical samples were tested at Microsoft's request, the serial numbers are DVT1#268(L), DVT1#038(L) and DVT1#051(L).
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

Two channels were provided in this EUT.

| Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|
| 1       | 27.095MHz | 2       | 27.195MHz |

**NOTE:** Test result (A) is for sample serial number DVT1#268(L), test result (B) is for sample DVT1#038(L) and test result (C) is for sample DVT1#051(L).

### 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, Canada RSS 210**

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

### 3.4 DESCRIPTION OF SUPPORT UNITS

NA

## 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<br>(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<br>(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 13, 2003     |
| *HP Preamplifier                   | 8447D                | 2944A08485               | Oct. 30, 2002    |
| HP Preamplifier                    | 8449B                | 3008A01201               | Dec. 06, 2002    |
| HP Preamplifier                    | 8449B                | 3008A01292               | Aug. 21, 2002    |
| * ROHDE & SCHWARZ TEST RECEIVER    | ESMI                 | 839013/007<br>839379/002 | Jan. 27, 2003    |
| SCHWARZBECK Tunable Dipole Antenna | VHA 9103<br>UHA 9105 | E101051<br>E101055       | Nov. 23, 2002    |
| * BICONICAL ANTENNA                | VHBA9123             | 449                      | Dec. 10, 2002    |
| * CHASE BILOG Antenna              | CBL6112A             | 2221                     | Aug. 2, 2002     |
| SCHWARZBECK Horn Antenna           | BBHA9120-D1          | D130                     | July 6, 2002     |
| EMCO Horn Antenna                  | 3115                 | 9312-4192                | April 9, 2003    |
| * EMCO Turn Table                  | 1060                 | 1115                     | NA               |
| * SHOSHIN Tower                    | AP-4701              | A6Y005                   | NA               |
| * Software                         | AS61D4               | NA                       | NA               |
| * ANRITSU RF Switches              | MP59B                | M35046                   | Aug. 2, 2002     |
| * TIMES RF cable                   | LMR-600              | CABLE-ST5-01             | Aug. 2, 2002     |
| Open Field Test Site               | Site 5               | ADT-R05                  | July 28, 2002    |
| VCCI Site Registration No.         | Site 5               | R-1039                   | NA               |

- 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. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

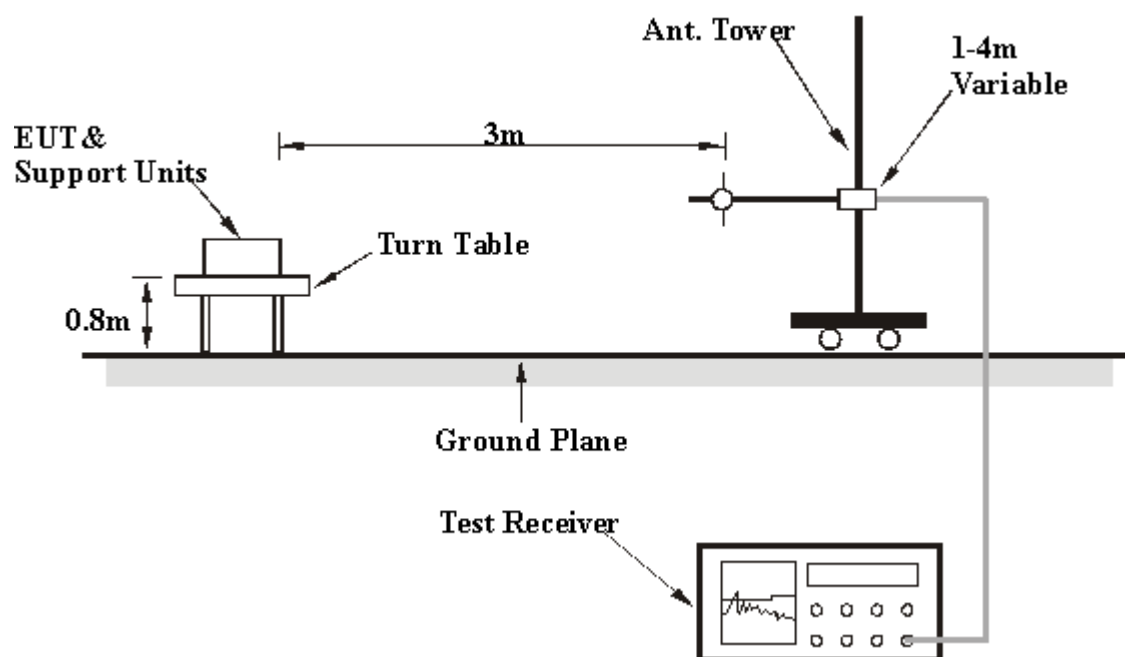
#### 4.2.3 TEST PROCEDURE

- 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 transmitter part of EUT under transmission condition continuously at specific channel frequency.

## 4.2.6 TEST RESULT (A)

|                             |                                 |                      |                                              |
|-----------------------------|---------------------------------|----------------------|----------------------------------------------|
| EUT                         | Wireless Keyboard               | MODEL                | Microsoft® Wireless MultiMedia Keyboard 1.0A |
| FREQUENCY RANGE             | 30-1000 MHz                     | SERIAL NO.           | DVT1#268(L)                                  |
| CHANNEL                     | 1                               | DETECTOR<br>FUNCTION | Peak / Quasi-Peak / Average                  |
| INPUT POWER                 | 3VDC                            |                      |                                              |
| ENVIRONMENTAL<br>CONDITIONS | 30 deg. C, 75 % RH,<br>1050 hPa | TESTED BY: Bunny Yao |                                              |

**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   | *27.10      | 47.2 AV                 | 80.00          | -32.80      | 1.58H              | 11                   | 40.23            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2   | *27.10      | 50.6 PK                 | 100.00         | -49.40      | 1.58H              | 11                   | 43.63            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3   | 54.20       | 16.3 QP                 | 40.00          | -23.70      | 1.39H              | 58                   | 7.50             | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4   | 108.40      | 17.5 QP                 | 43.50          | -26.00      | 1.53H              | 26                   | 5.46             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5   | 162.60      | 13.2 QP                 | 43.50          | -30.30      | 1.29H              | 102                  | 2.29             | 9.53                | 1.38              | 0.00                 | -10.91                 |
| 6   | 189.70      | 12.9 QP                 | 43.50          | -30.60      | 1.33H              | 182                  | 2.57             | 8.95                | 1.39              | 0.00                 | -10.33                 |
| 7   | 216.80      | 26.7 QP                 | 46.00          | -19.30      | 1.50H              | 270                  | 15.22            | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 8   | 243.90      | 19.8 QP                 | 46.00          | -26.20      | 1.46H              | 357                  | 6.56             | 11.56               | 1.69              | 0.00                 | -13.24                 |
| 9   | 271.00      | 18.9 QP                 | 46.00          | -27.10      | 1.31H              | 299                  | 4.66             | 12.47               | 1.77              | 0.00                 | -14.24                 |
| 10  | 298.10      | 18.1 QP                 | 46.00          | -27.90      | 1.36H              | 215                  | 3.04             | 13.18               | 1.88              | 0.00                 | -15.06                 |
| 11  | 325.20      | 18.2 QP                 | 46.00          | -27.80      | 1.12H              | 103                  | 2.47             | 13.72               | 2.00              | 0.00                 | -15.73                 |

**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   | *27.10      | 40.0 AV                 | 80.00          | -40.00      | 1.24V              | 4                    | 33.03            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2   | *27.10      | 43.8 PK                 | 100.00         | -56.20      | 1.24V              | 4                    | 36.83            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3   | 54.20       | 18.9 QP                 | 40.00          | -21.10      | 1.28V              | 309                  | 10.10            | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4   | 108.40      | 13.6 QP                 | 43.50          | -29.90      | 1.34V              | 185                  | 1.56             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5   | 216.80      | 18.0 QP                 | 46.00          | -28.00      | 1.52V              | 72                   | 6.52             | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 6   | 243.90      | 15.3 QP                 | 46.00          | -30.70      | 1.44V              | 64                   | 2.06             | 11.56               | 1.69              | 0.00                 | -13.24                 |
| 7   | 271.00      | 12.3 QP                 | 46.00          | -33.70      | 1.58V              | 296                  | -1.94            | 12.47               | 1.77              | 0.00                 | -14.24                 |

**NOTE:**

1. Emission level = Raw Value – Correction Factor
2. Correction Factor = Pre-Amplifier Factor - Antenna Factor - Cable Factor  
(Pre-Amplifier 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 Keyboard               | MODEL                | Microsoft® Wireless<br>MultiMedia Keyboard 1.0A |
| FREQUENCY RANGE             | 30-1000 MHz                     | SERIAL NO.           | DVT1#268(L)                                     |
| CHANNEL                     | 2                               | DETECTOR<br>FUNCTION | Peak / Quasi-Peak / Average                     |
| INPUT POWER                 | 3VDC                            |                      |                                                 |
| ENVIRONMENTAL<br>CONDITIONS | 30 deg. C, 75 % RH,<br>1050 hPa | TESTED BY: Bunny Yao |                                                 |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |             |                         |                |             |                    |                      |                  |                     |                   |                      |                        |
|----------------------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|---------------------|-------------------|----------------------|------------------------|
| 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                                                              | *27.20      | 47.5 AV                 | 80.00          | -32.50      | 1.69H              | 20                   | 40.53            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2                                                              | *27.20      | 50.8 PK                 | 100.00         | -49.20      | 1.69H              | 20                   | 43.83            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3                                                              | 54.40       | 18.4 QP                 | 40.00          | -21.60      | 1.21H              | 212                  | 9.60             | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4                                                              | 108.80      | 17.6 QP                 | 43.50          | -25.90      | 1.45H              | 278                  | 5.56             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5                                                              | 163.20      | 16.1 QP                 | 43.50          | -27.40      | 1.20H              | 289                  | 5.19             | 9.53                | 1.38              | 0.00                 | -10.91                 |
| 6                                                              | 190.40      | 14.5 QP                 | 43.50          | -29.00      | 1.62H              | 157                  | 4.17             | 8.95                | 1.39              | 0.00                 | -10.33                 |
| 7                                                              | 217.60      | 28.2 QP                 | 46.00          | -17.80      | 1.74H              | 21                   | 16.73            | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 8                                                              | 244.80      | 20.9 QP                 | 46.00          | -25.10      | 1.51H              | 40                   | 7.50             | 11.70               | 1.70              | 0.00                 | -13.40                 |
| 9                                                              | 272.00      | 19.4 QP                 | 46.00          | -26.60      | 1.36H              | 160                  | 5.09             | 12.53               | 1.78              | 0.00                 | -14.31                 |
| 10                                                             | 326.40      | 16.0 QP                 | 46.00          | -30.00      | 1.09H              | 61                   | 0.27             | 13.72               | 2.00              | 0.00                 | -15.73                 |
| 11                                                             | 326.40      | 16.0 QP                 | 46.00          | -30.00      | 1.22H              | 357                  | 0.27             | 13.72               | 2.00              | 0.00                 | -15.73                 |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |             |                         |                |             |                    |                      |                  |                     |                   |                      |                        |
|--------------------------------------------------------------|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|---------------------|-------------------|----------------------|------------------------|
| 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                                                            | *27.20      | 45.0 PK                 | 100.00         | -55.00      | 1.34V              | 11                   | 38.03            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2                                                            | *27.20      | 42.1 AV                 | 80.00          | -37.90      | 1.34V              | 11                   | 35.13            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3                                                            | 54.40       | 18.0 QP                 | 40.00          | -22.00      | 1.22V              | 284                  | 9.20             | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4                                                            | 108.80      | 18.4 QP                 | 43.50          | -25.10      | 1.28V              | 194                  | 6.36             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5                                                            | 217.60      | 18.6 QP                 | 46.00          | -27.40      | 1.46V              | 97                   | 7.12             | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 6                                                            | 244.80      | 13.7 QP                 | 46.00          | -32.30      | 1.37V              | 34                   | 0.30             | 11.70               | 1.70              | 0.00                 | -13.40                 |
| 7                                                            | 272.00      | 15.4 QP                 | 46.00          | -30.60      | 1.46V              | 57                   | 1.09             | 12.53               | 1.78              | 0.00                 | -14.31                 |

**NOTE:**

1. Emission level = Raw Value – Correction Factor
2. Correction Factor = Pre-Amplifier Factor - Antenna Factor - Cable Factor  
(Pre-Amplifier 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.

## 4.2.7 TEST RESULT (B)

|                          |                              |                      |                                              |
|--------------------------|------------------------------|----------------------|----------------------------------------------|
| EUT                      | Wireless Keyboard            | MODEL                | Microsoft® Wireless MultiMedia Keyboard 1.0A |
| FREQUENCY RANGE          | 30-1000 MHz                  | SERIAL NO.           | DVT1#038(L)                                  |
| CHANNEL                  | 1                            | DETECTOR FUNCTION    | Peak / Quasi-Peak / Average                  |
| INPUT POWER              | 3VDC                         |                      |                                              |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 75 % RH, 1050 hPa | TESTED BY: Bunny Yao |                                              |

**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   | *27.10      | 46.5 AV                 | 80.00          | -33.50      | 1.76H              | 243                  | 39.53            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2   | *27.10      | 49.8 PK                 | 100.00         | -50.20      | 1.76H              | 243                  | 42.83            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3   | 54.20       | 16.9 QP                 | 40.00          | -23.10      | 1.69H              | 311                  | 8.10             | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4   | 108.40      | 22.3 QP                 | 43.50          | -21.20      | 1.52H              | 205                  | 10.26            | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5   | 135.50      | 19.7 QP                 | 43.50          | -23.80      | 1.42H              | 133                  | 7.50             | 10.95               | 1.25              | 0.00                 | -12.20                 |
| 6   | 189.70      | 15.3 QP                 | 43.50          | -28.20      | 1.67H              | 51                   | 4.97             | 8.95                | 1.39              | 0.00                 | -10.33                 |
| 7   | 216.80      | 29.8 QP                 | 46.00          | -16.20      | 1.52H              | 54                   | 18.32            | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 8   | 243.90      | 26.0 QP                 | 46.00          | -20.00      | 1.35H              | 123                  | 12.76            | 11.56               | 1.69              | 0.00                 | -13.24                 |
| 9   | 271.00      | 17.6 QP                 | 46.00          | -28.40      | 1.29H              | 226                  | 3.36             | 12.47               | 1.77              | 0.00                 | -14.24                 |
| 10  | 298.10      | 16.2 QP                 | 46.00          | -29.80      | 1.34H              | 303                  | 1.14             | 13.18               | 1.88              | 0.00                 | -15.06                 |
| 11  | 325.50      | 18.6 QP                 | 46.00          | -27.40      | 1.16H              | 336                  | 2.87             | 13.72               | 2.00              | 0.00                 | -15.73                 |

**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   | *27.10      | 38.8 AV                 | 80.00          | -41.20      | 1.10V              | 348                  | 31.83            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2   | *27.10      | 42.6 PK                 | 100.00         | -57.40      | 1.10V              | 348                  | 35.63            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3   | 54.20       | 15.0 QP                 | 40.00          | -25.00      | 1.28V              | 333                  | 6.20             | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4   | 108.40      | 19.3 QP                 | 43.50          | -24.20      | 1.32V              | 349                  | 7.26             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5   | 216.80      | 18.5 QP                 | 46.00          | -27.50      | 1.23V              | 289                  | 7.02             | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 6   | 243.90      | 19.3 QP                 | 46.00          | -26.70      | 1.56V              | 43                   | 6.06             | 11.56               | 1.69              | 0.00                 | -13.24                 |
| 7   | 271.00      | 13.3 QP                 | 46.00          | -32.70      | 1.23V              | 140                  | -0.94            | 12.47               | 1.77              | 0.00                 | -14.24                 |

**NOTE:**

1. Emission level = Raw Value – Correction Factor
2. Correction Factor = Pre-Amplifier Factor - Antenna Factor - Cable Factor  
(Pre-Amplifier 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 Keyboard            | MODEL                | Microsoft® Wireless MultiMedia Keyboard 1.0A |
| FREQUENCY RANGE          | 30-1000 MHz                  | SERIAL NO.           | DVT1#038(L)                                  |
| CHANNEL                  | 2                            | DETECTOR FUNCTION    | Peak / Quasi-Peak / Average                  |
| INPUT POWER              | 3VDC                         |                      |                                              |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 75 % RH, 1050 hPa | TESTED BY: Bunny Yao |                                              |

| 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                                                   | *27.20      | 50.6 PK                 | 100.00         | -49.40      | 1.73H              | 232                  | 43.63            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2                                                   | *27.20      | 47.9 AV                 | 80.00          | -32.10      | 1.73H              | 232                  | 40.93            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3                                                   | 54.40       | 15.6 QP                 | 40.00          | -24.40      | 1.64H              | 70                   | 6.80             | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4                                                   | 108.80      | 20.2 QP                 | 43.50          | -23.30      | 1.60H              | 4                    | 8.16             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5                                                   | 136.00      | 18.9 QP                 | 43.50          | -24.60      | 1.47H              | 33                   | 6.70             | 10.95               | 1.25              | 0.00                 | -12.20                 |
| 6                                                   | 217.60      | 29.0 QP                 | 46.00          | -17.00      | 1.53H              | 151                  | 17.52            | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 7                                                   | 244.80      | 21.6 QP                 | 46.00          | -24.40      | 1.27H              | 228                  | 8.20             | 11.70               | 1.70              | 0.00                 | -13.40                 |
| 8                                                   | 272.00      | 15.8 QP                 | 46.00          | -30.20      | 1.28H              | 315                  | 1.49             | 12.53               | 1.78              | 0.00                 | -14.31                 |
| 9                                                   | 299.20      | 18.4 QP                 | 46.00          | -27.60      | 1.40H              | 329                  | 3.34             | 13.18               | 1.88              | 0.00                 | -15.06                 |
| 10                                                  | 326.40      | 17.7 QP                 | 46.00          | -28.30      | 1.14H              | 257                  | 1.97             | 13.72               | 2.00              | 0.00                 | -15.73                 |

| 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                                                 | *27.20      | 41.2 AV                 | 80.00          | -38.80      | 1.16V              | 359                  | 34.23            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2                                                 | *27.20      | 44.5 PK                 | 100.00         | -55.50      | 1.16V              | 359                  | 37.53            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3                                                 | 54.40       | 15.3 QP                 | 40.00          | -24.70      | 1.35V              | 26                   | 6.50             | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4                                                 | 108.80      | 17.1 QP                 | 43.50          | -26.40      | 1.28V              | 127                  | 5.06             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5                                                 | 217.60      | 18.6 QP                 | 46.00          | -27.40      | 1.41V              | 237                  | 7.12             | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 6                                                 | 272.00      | 14.6 QP                 | 46.00          | -31.40      | 1.03V              | 325                  | 0.29             | 12.53               | 1.78              | 0.00                 | -14.31                 |

**NOTE:**

1. Emission level = Raw Value – Correction Factor
2. Correction Factor = Pre-Amplifier Factor - Antenna Factor - Cable Factor  
(Pre-Amplifier 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.

## 4.2.8 TEST RESULT (C)

|                          |                              |                      |                                              |
|--------------------------|------------------------------|----------------------|----------------------------------------------|
| EUT                      | Wireless Keyboard            | MODEL                | Microsoft® Wireless MultiMedia Keyboard 1.0A |
| FREQUENCY RANGE          | 30-1000 MHz                  | SERIAL NO.           | DVT1#051(L)                                  |
| CHANNEL                  | 1                            | DETECTOR FUNCTION    | Peak / Quasi-Peak / Average                  |
| INPUT POWER              | 3VDC                         |                      |                                              |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 75 % RH, 1050 hPa | TESTED BY: Bunny Yao |                                              |

**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   | *27.10      | 48.3 AV                 | 80.00          | -31.70      | 1.66H              | 113                  | 41.33            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2   | *27.10      | 50.2 PK                 | 100.00         | -49.80      | 1.66H              | 113                  | 43.23            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3   | 54.20       | 20.3 QP                 | 40.00          | -19.70      | 1.46H              | 149                  | 11.50            | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4   | 108.40      | 18.4 QP                 | 43.50          | -25.10      | 1.41H              | 57                   | 6.36             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5   | 135.50      | 18.6 QP                 | 43.50          | -24.90      | 1.61H              | 24                   | 6.40             | 10.95               | 1.25              | 0.00                 | -12.20                 |
| 6   | 216.80      | 28.9 QP                 | 46.00          | -17.10      | 1.83H              | 223                  | 17.42            | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 7   | 243.90      | 26.4 QP                 | 46.00          | -19.60      | 1.51H              | 262                  | 13.16            | 11.56               | 1.69              | 0.00                 | -13.24                 |
| 8   | 271.00      | 21.1 QP                 | 46.00          | -24.90      | 1.76H              | 346                  | 6.86             | 12.47               | 1.77              | 0.00                 | -14.24                 |
| 9   | 298.10      | 19.2 QP                 | 46.00          | -26.80      | 1.55H              | 152                  | 4.14             | 13.18               | 1.88              | 0.00                 | -15.06                 |
| 10  | 325.20      | 18.4 QP                 | 46.00          | -27.60      | 1.64H              | 47                   | 2.67             | 13.72               | 2.00              | 0.00                 | -15.74                 |

**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   | *27.10      | 39.6 AV                 | 80.00          | -40.40      | 1.33V              | 5                    | 32.63            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2   | *27.10      | 43.0 PK                 | 100.00         | -57.00      | 1.33V              | 5                    | 36.03            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3   | 54.20       | 20.5 QP                 | 40.00          | -19.50      | 1.70V              | 177                  | 11.70            | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4   | 81.30       | 13.5 QP                 | 40.00          | -26.50      | 1.63V              | 70                   | 5.05             | 7.33                | 1.12              | 0.00                 | -8.46                  |
| 5   | 108.40      | 14.3 QP                 | 43.50          | -29.20      | 1.29V              | 238                  | 2.26             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 6   | 216.80      | 18.0 QP                 | 46.00          | -28.00      | 1.51V              | 282                  | 6.52             | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 7   | 243.90      | 17.6 QP                 | 46.00          | -28.40      | 1.36V              | 2                    | 4.36             | 11.56               | 1.69              | 0.00                 | -13.24                 |
| 8   | 271.00      | 15.5 QP                 | 46.00          | -30.50      | 1.17V              | 106                  | 1.26             | 12.47               | 1.77              | 0.00                 | -14.24                 |

**NOTE:**

1. Emission level = Raw Value – Correction Factor
2. Correction Factor = Pre-Amplifier Factor - Antenna Factor - Cable Factor  
(Pre-Amplifier 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 Keyboard            | MODEL                | Microsoft® Wireless MultiMedia Keyboard 1.0A |
| FREQUENCY RANGE          | 30-1000 MHz                  | SERIAL NO.           | DVT1#051(L)                                  |
| CHANNEL                  | 2                            | DETECTOR FUNCTION    | Peak / Quasi-Peak / Average                  |
| INPUT POWER              | 3VDC                         |                      |                                              |
| ENVIRONMENTAL CONDITIONS | 30 deg. C, 75 % RH, 1050 hPa | TESTED BY: Bunny Yao |                                              |

| 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                                                   | *27.20      | 48.9 AV                 | 80.00          | -31.10      | 1.76H              | 160                  | 41.93            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2                                                   | *27.20      | 50.9 PK                 | 100.00         | -49.10      | 1.76H              | 160                  | 43.93            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3                                                   | 54.40       | 18.9 QP                 | 40.00          | -21.10      | 1.55H              | 93                   | 10.10            | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4                                                   | 108.80      | 19.9 QP                 | 43.50          | -23.60      | 1.46H              | 187                  | 7.86             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5                                                   | 136.00      | 18.3 QP                 | 43.50          | -25.20      | 1.68H              | 273                  | 6.10             | 10.95               | 1.25              | 0.00                 | -12.20                 |
| 6                                                   | 217.60      | 29.8 QP                 | 46.00          | -16.20      | 1.82H              | 347                  | 18.32            | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 7                                                   | 244.80      | 25.0 QP                 | 46.00          | -21.00      | 1.59H              | 255                  | 11.60            | 11.70               | 1.70              | 0.00                 | -13.40                 |
| 8                                                   | 272.00      | 20.6 QP                 | 46.00          | -25.40      | 1.31H              | 128                  | 6.29             | 12.53               | 1.78              | 0.00                 | -14.31                 |
| 9                                                   | 299.20      | 19.7 QP                 | 46.00          | -26.30      | 1.76H              | 4                    | 4.64             | 13.18               | 1.88              | 0.00                 | -15.06                 |
| 10                                                  | 326.40      | 18.8 QP                 | 46.00          | -27.20      | 1.18H              | 142                  | 3.07             | 13.72               | 2.00              | 0.00                 | -15.73                 |

| 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                                                 | *27.20      | 44.8 PK                 | 100.00         | -55.20      | 1.11V              | 14                   | 37.83            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 2                                                 | *27.20      | 41.7 AV                 | 80.00          | -38.30      | 1.11V              | 14                   | 34.73            | 6.20                | 0.77              | 0.00                 | -6.97                  |
| 3                                                 | 54.40       | 22.0 QP                 | 40.00          | -18.00      | 1.52V              | 194                  | 13.20            | 7.94                | 0.86              | 0.00                 | -8.80                  |
| 4                                                 | 108.80      | 18.3 QP                 | 43.50          | -25.20      | 1.70V              | 324                  | 6.26             | 10.87               | 1.17              | 0.00                 | -12.04                 |
| 5                                                 | 136.00      | 15.8 QP                 | 43.50          | -27.70      | 1.47V              | 318                  | 3.60             | 10.95               | 1.25              | 0.00                 | -12.20                 |
| 6                                                 | 217.60      | 19.7 QP                 | 46.00          | -26.30      | 1.55V              | 223                  | 8.22             | 9.97                | 1.51              | 0.00                 | -11.48                 |
| 7                                                 | 244.80      | 17.7 QP                 | 46.00          | -28.30      | 1.38V              | 129                  | 4.30             | 11.70               | 1.70              | 0.00                 | -13.40                 |
| 8                                                 | 272.00      | 15.2 QP                 | 46.00          | -30.80      | 1.18V              | 58                   | 0.89             | 12.53               | 1.78              | 0.00                 | -14.31                 |

**NOTE:**

1. Emission level = Raw Value – Correction Factor
2. Correction Factor = Pre-Amplifier Factor - Antenna Factor - Cable Factor  
(Pre-Amplifier 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:

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