

|                                                                                   |                                                                                                                             |                      |                                                                                            |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------|
|  | <b>Spectrum Research &amp; Testing Lab., Inc.</b><br>No. 101-10, Ling 8,<br>Shan-Tong Li, Chung-Li<br>City, Taoyuan, Taiwan | <h1>TEST REPORT</h1> | Reference No.:A02102501<br>Report No.:FCCA02102501<br>Page: 1 of 13<br>Date: Oct. 31, 2002 |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------|

Product Name: Wireless Keyboard  
 Model Number: FDA-18N1  
 Applicant: FORWARD ELECTRONICS CO., LTD.  
 393, CHUNG CHENG RD., SEC. 1, SANHSIA TOWN,  
 TAIPEI COUNTY, TAIWAN, 237, R.O.C.  
 Date of Receipt: Oct. 25, 2002  
 Finished date of Test: Oct. 31, 2002  
 Applicable Standards: 47 CFR Part 15, Subpart C  
 ANSI C63.4:1992

We, **Spectrum Research & Testing Laboratory Inc.**, hereby certify that one sample of the above was tested in our laboratory with positive results according to the above-mentioned standards. The records in the report are an accurate account of the results. Details of the results are given in the subsequent pages of this report.

Tested By : James Lee , Date: Oct. 31, 2002  
 ( James Lee )

Checked By : Spring Wang , Date: Oct. 31, 2002  
 ( Spring Wang )

Approved By : Harris W. Lai , Date: Oct. 31, 2002  
 ( Harris W. Lai, Director )

NVLAQ®

Lab Code: 200099-0



# TEST REPORT

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## 1. DOCUMENT POLICY AND TEST STATEMENT

### 1.1 DOCUMENT POLICY

- The report shall not be reproduced except in full, without the written approval of SRT Lab, Inc.
- The report must not be used by the applicant to claim that the product is endorsed by NVLAP.
- The NVLAP logo applies only to the applicable standards specified in this report.

### 1.2 TEST STATEMENT

- The test results in the report apply only to the unit tested by SRT Lab.
- There was no deviation from the requirements of test standards during the test.
- DC power source, 3V from battery, was used during the test.

|                                                                                                                                                                                                               |                      |                                                                                              |
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## 2. DESCRIPTION OF EUT AND TEST MODE

### 2.1 GENERAL DESCRIPTION OF EUT

|                                 |                            |
|---------------------------------|----------------------------|
| <b>PRODUCT</b>                  | Wireless Keyboard          |
| <b>MODEL NO.</b>                | FDA-18N1                   |
| <b>POWER SUPPLY</b>             | DC 3V from Battery         |
| <b>CABLE</b>                    | N/A                        |
| <b>I/O PORT</b>                 | N/A                        |
| <b>FREQUENCY BAND</b>           | 26.96 ~ 27.28 MHz          |
| <b>CARRIER FREQUENCY</b>        | 27.145 MHz                 |
| <b>NUMBER OF CHANNEL</b>        | 1                          |
| <b>CHANNEL SPACING</b>          | 39 kHz                     |
| <b>RF OUTPUT POWER (EIRP)</b>   | -36.9 dBm                  |
| <b>I.F. &amp; L.O.</b>          | I.F. 0kHz, L.O. 27.145 MHz |
| <b>MODULATION TYPE</b>          | FSK                        |
| <b>BIT RATE OF TRANSMISSION</b> | 2k bps                     |
| <b>ANTENNA TYPE</b>             | Mono pole                  |

**NOTE :** The EUT is the transmitter part of a Mini optical mouse. For more detailed features, please refer to the User's Manual of EUT.

### 2.2 DESCRIPTION OF EUT INTERNAL DEVICE

| DEVICE | BRAND / MAKER | MODEL # | FCC ID/DOC | REMARK |
|--------|---------------|---------|------------|--------|
| N/A    |               |         |            |        |
|        |               |         |            |        |
|        |               |         |            |        |
|        |               |         |            |        |
|        |               |         |            |        |
|        |               |         |            |        |
|        |               |         |            |        |

### 2.3 DESCRIPTION OF TEST MODE

N/A (It is only applicable to more than one test mode.)

|                                                                                                                                                                                                               |                      |                                                                                             |
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## 2.4 DESCRIPTION OF SUPPORT UNIT

The EUT was configured by the requirement of ANSI C63.4. All interface ports were connected to the appropriate support units via specific cables. The support units and cables are listed below.

| NO | DEVICE | BRAND | MODEL # | FCC ID / DOC | CABLE |
|----|--------|-------|---------|--------------|-------|
|    | N/A    |       |         |              |       |
|    |        |       |         |              |       |
|    |        |       |         |              |       |
|    |        |       |         |              |       |
|    |        |       |         |              |       |
|    |        |       |         |              |       |
|    |        |       |         |              |       |
|    |        |       |         |              |       |
|    |        |       |         |              |       |
|    |        |       |         |              |       |

**NOTE :** For the actual test configuration, please refer to the photos of testing.

|                                                                                                                                                                                                               |                      |                                                                                              |
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### 3. DESCRIPTION OF APPLIED STANDARDS

The EUT is a kind of ITE and according to the specifications provided by the applicant, it must comply with the requirements of the following standards:

47 CFR Part 15, Subpart C  
 ANSI C63.4:1992

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

### 4. RADIATED EMISSION TEST

#### 4.1 RADIATED EMISSION LIMIT

All emission from EUT, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below :

FCC Part 15, Subpart C Section 15.227.

| FREQUENCY (MHz) | DISTANCE (m) | FIELD STRENGTH (dB $\mu$ V/m) |         |
|-----------------|--------------|-------------------------------|---------|
|                 |              | PEAK                          | AVERAGE |
| 26.96 - 27.28   | 3            | 100.0                         | 80.0    |

FCC Part 15, Subpart B Section 15.209.

| FREQUENCY (MHz) | DISTANCE (m) | FIELD STRENGTH (dB $\mu$ V/m) |
|-----------------|--------------|-------------------------------|
| 30 - 88         | 3            | 40.0                          |
| 88 - 216        | 3            | 43.5                          |
| 216 - 960       | 3            | 46.0                          |
| ABOVE 960       | 3            | 54.0                          |

- NOTE** :
1. In the emission tables above , the tighter limit applies at the band edges.
  2. Distance refers to the distance between measuring instrument , antenna , and the closest point of any part of the device or system.

|                                                                                                                                                                                                               |                      |                                                                                              |
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## 4.2 TEST EQUIPMENT

The following test equipment was used during the radiated emission test :

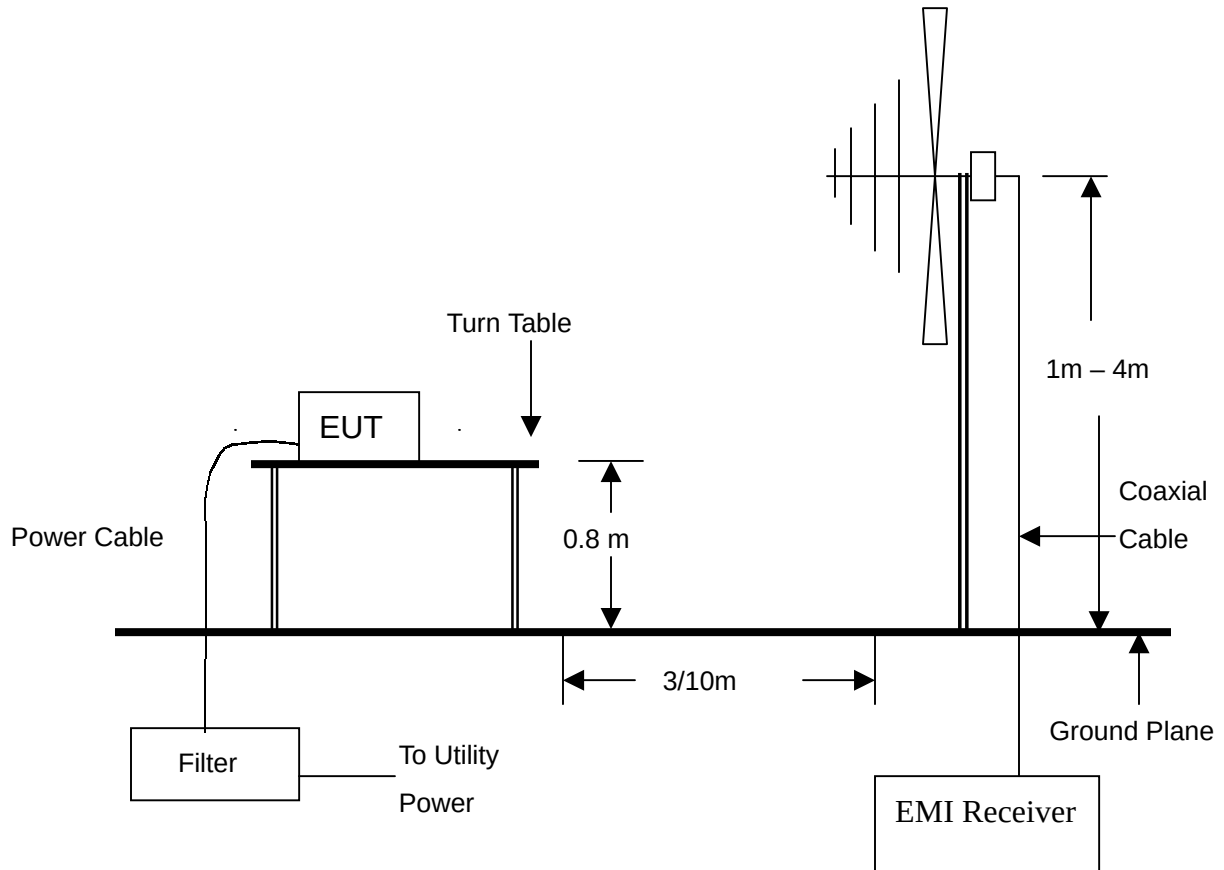
| EQUIPMENT/<br>FACILITIES | SPECIFICATIONS          | MANUFACTURER       | MODEL#/<br>SERIAL#    | DUE DATE OF CAL. &<br>CAL. CENTER |
|--------------------------|-------------------------|--------------------|-----------------------|-----------------------------------|
| EMI TEST<br>RECEIVER     | 9 kHz TO 2750<br>MHz    | ROHDE &<br>SCHWARZ | ESCS30/<br>836858/008 | DEC. 2002<br>R&S                  |
| BI-LOG<br>ANTENNA        | 25 MHz TO<br>2 GHz      | EMCO               | 3142/9701-1124        | JUL. 2003<br>ETC                  |
| OATS                     | 3 - 10 M<br>measurement | SRT                | SRT-1                 | MAY 2003                          |

### NOTE:

1. The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.
2. The Open Area Test Site (SRT-1) is registered by FCC with No. 90957 and VCCI with No. R-1081.
3. The Open Area Test Site (SRT-2) is registered by FCC with No. 98458 and VCCI with No. R-1168.

|                                                                                                                                                                                                               |                      |                                                                                              |
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## 4.3 TEST SET-UP



### NOTE :

1. The EUT system was put on a wooden table with 0.8m heights above a ground plane.
2. For the actual test configuration, please refer to the photos of testing.

|                                                                                                                                                                                                                   |                      |                                                                                              |
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#### 4.4 TEST PROCEDURE

The EUT was tested according to the requirement of ANSI C63.4. The measurements were made at an open area test site with 3 meter measurement distance. The frequency spectrum measured started from 30 MHz. Under 1 GHz, all readings were quasi-peak values with 120 kHz resolution bandwidth of the test receiver. Above 1 GHz, all readings were peak or average values with 1 MHz resolution bandwidth of the test receiver.

#### 4.5 EUT OPERATING CONDITION

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

|                                                                                                                                                                                                               |                      |                                                                                               |
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## 4.6 RADIATED EMISSION TEST RESULT

|                    |                |                    |           |
|--------------------|----------------|--------------------|-----------|
| Temperature:       | 25 °C          | Humidity:          | 65 %RH    |
| Ferquency Range:   | 30 – 1000 MHz  | Measured Distance: | 3m        |
| Receiver Detector: | PK, Q.P. , AV. | Tested by          | James Lee |

Antenna Polarization : Horizontal

| Frequency (MHz) | Cable Loss (dB) | Antenna Factor (dB/m) | Reading Data (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | EL(m) | AZ(°) |
|-----------------|-----------------|-----------------------|---------------------|-------------------------|----------------|-------------|-------|-------|
| 27.1450(F)      | 1.33            | 15.30                 | 27.0(AV.)           | 43.6                    | 80.0           | -36.4       | 3.4   | 0     |
| 27.1450(F)      | 1.33            | 15.30                 | 33.6(PK)            | 50.2                    | 100.0          | -49.8       | 3.4   | 0     |
| 135.7440        | 1.39            | 8.30                  | 13.3(Q.P.)          | 23.0                    | 43.5           | -20.5       | 2.2   | 83.0  |
| 162.8930        | 1.57            | 9.28                  | 23.2(Q.P.)          | 34.1                    | 43.5           | -9.4        | 1.8   | 0     |
| 190.0420        | 1.59            | 10.20                 | 22.1(Q.P.)          | 33.9                    | 43.5           | -9.6        | 1.4   | 147.0 |
| 217.1910        | 1.73            | 11.18                 | 16.8(Q.P.)          | 29.7                    | 46.0           | -16.3       | 1.4   | 342.0 |
| 244.3400        | 1.98            | 12.44                 | 13.7(Q.P.)          | 28.1                    | 46.0           | -17.9       | 1.0   | 351.0 |
| 271.4890        | 1.93            | 13.39                 | 9.7(Q.P.)           | 25.0                    | 46.0           | -21.0       | 1.0   | 357.0 |
| 325.7860        | 2.08            | 15.03                 | 15.9(Q.P.)          | 33.0                    | 46.0           | -13.0       | 1.0   | 341.0 |

Antenna Polarization : Vertical

| Frequency (MHz) | Cable Loss (dB) | Antenna Factor (dB/m) | Reading Data (dBμV) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | EL(m) | AZ(°) |
|-----------------|-----------------|-----------------------|---------------------|-------------------------|----------------|-------------|-------|-------|
| 27.1450(F)      | 1.33            | 15.30                 | 31.5(AV.)           | 48.1                    | 80.0           | -31.9       | 1.0   | 0     |
| 27.1450(F)      | 1.33            | 15.30                 | 39.0(PK)            | 55.6                    | 100.0          | -44.4       | 1.0   | 0     |
| 162.8930        | 1.57            | 9.28                  | 13.4(Q.P.)          | 24.3                    | 43.5           | -19.2       | 2.4   | 339.0 |
| 190.0430        | 1.59            | 10.20                 | 12.8(Q.P.)          | 24.6                    | 43.5           | -18.9       | 2.5   | 261.0 |
| 229.1870        | 1.85            | 11.75                 | 6.6(Q.P.)           | 20.2                    | 46.0           | -25.8       | 3.0   | 184.0 |
| 244.3400        | 1.98            | 12.44                 | 8.0(Q.P.)           | 22.4                    | 46.0           | -23.6       | 1.0   | 43.0  |
| 271.4890        | 1.93            | 13.39                 | 5.9(Q.P.)           | 21.2                    | 46.0           | -24.8       | 1.4   | 97.0  |
| 325.7860        | 2.08            | 15.03                 | 6.6(Q.P.)           | 23.7                    | 46.0           | -22.3       | 1.0   | 100.0 |

- NOTE :**
1. Measurement uncertainty is less than +/- 4dB
  2. "": Measurement does not apply for this frequency.
  3. Emission Level = Reading Value + Ant. Factor + Cable Loss
  4. The field strength of other emission frequencies were very low against the limit.
  5. (F) : Fundamental frequency of transmitter.

|                                                                                                                                                                                                               |                      |                                                                                               |
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## 5 BAND EDGE

### 5.2 BAND EDGE LIMIT

The limit is less than 26dB with respect to the amplitude of fundamental frequency.

### 5.2 TEST EQUIPMENT

The following test equipment was used during the radiated emission test :

| EQUIPMENT/<br>FACILITIES | SPECIFICATIONS | MANUFACTURER       | MODEL#/<br>SERIAL#  | DUE DATE OF CAL. &<br>CAL. CENTER |
|--------------------------|----------------|--------------------|---------------------|-----------------------------------|
| SPECTRUM                 | 9 kHz TO 7GHz  | ROHDE &<br>SCHWARZ | FSP7/<br>839511/010 | MAR. 2003<br>ETC                  |

**NOTE:** 1. The calibration interval of the above test equipment is one year and the calibrations are traceable to NML/ROC and NIST/USA.

### 5.3 TEST SET-UP



### 5.3 TEST PROCEDURE

A specific loop antenna was connected to receiver to detect the EUT's power level. The Receiver displayed the EUT's power level and printed out the plot of measurement.

### 5.5 EUT OPERATING CONDITION

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



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Shan-Tong Li, Chung-Li  
City, Taoyuan, Taiwan

# TEST REPORT

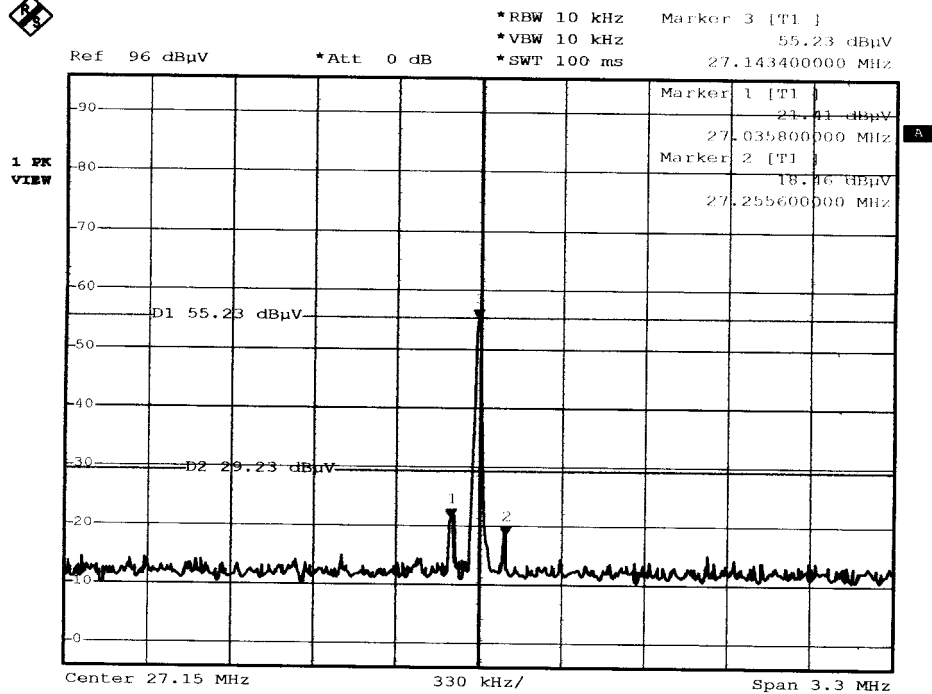
Reference No.: A02102501  
Report No.: FCCA02102501  
Page: 12 of 13  
Date: Oct. 31, 2002

## 5.6 BAND EDGE TEST RESULT

Temperature: 25 °C  
Receiver Detector: Peak  
Test Result: Pass

Humidity: 65 %RH  
Tested by James Lee

| FREQUENCY<br>(MHZ) | RF LEVEL<br>10kHz BW<br>(dBμV) | LIMIT<br>(dBμV) | MARGIN<br>(dB) |
|--------------------|--------------------------------|-----------------|----------------|
| 27.0358            | 21.41                          | 29.23           | -7.82          |
| 27.2256            | 18.46                          | 29.23           | -10.77         |
|                    |                                |                 |                |



Date: 29.OCT.2002 12:33:21

|                                                                                                                                                                                                               |                      |                                                                                               |
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## 6 TERMS OF ABRIVATION

|          |                                              |
|----------|----------------------------------------------|
| AV.      | Average detection                            |
| AZ(°)    | Turn table azimuth                           |
| Correct. | Correction                                   |
| EL(m)    | Antenna height (meter)                       |
| EUT      | Equipment Under Test                         |
| Horiz.   | Horizontal direction                         |
| LISN     | Line Impedance Stabilization Network         |
| NSA      | Normalized Site Attenuation                  |
| PK       | Peak detection                               |
| Q.P.     | Quasi-peak detection                         |
| SRT Lab  | Spectrum Research & Testing Laboratory, Inc. |
| Vert.    | Vertical direction                           |