

# Measurement Report

**FCC ID: H8GNB90A**This report concerns (check one) : ☒ Original Grant ☐ Class II Change**Issued Date** : Mar. 1, 2005**Project No.** : 05E0079**Equipment** : Wireless Battery Free Optical Mouse**Model No.** : NB-90; NB-90A**Applicant** : A-FOUR TECH CO., LTD.6F, No.108, Min-Chuan Rd., Hsin-Tien,  
Taipei, Taiwan, R.O.C.**Tested by:**

Neutron Engineering Inc. EMC Laboratory

**Data of Test:**

Feb. 15, 2005 ~ Feb. 25, 2005

**Testing Engineer** :**Technical Manager** :**Authorized Signatory** :

(Andy Chiu)

**NEUTRON ENGINEERING INC.**No. 132-1, Lane 329, Sec. 2, Palain Rd.,  
Shijr City, Taipei, Taiwan  
TEL : (02) 2646-5426 FAX : (02) 2646-6815

## Declaration

**Neutron** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (NML) of R.O.C., or National Institute of Standards and Technology (NIST) of U.S.A.

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## Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

## Assessment Authorities



## Test Standard/Scope/Item Acceptance

FCC Part 15 Subpart B  
IEC/CISPR22  
AS/NZS CISPR 22  
CNS 13438

FCC Part 15 Subpart B  
CISPR 22/EN 55022  
AS/NZS CISPR 22  
VCCI -Technical Requirement  
CNS 13438  
SS IEC/CISPR 22  
IEC/EN 61000-3-2 IEC/EN 61000-4-5  
IEC/EN 61000-3-3 IEC/EN 61000-4-6  
IEC/EN 61000-4-2 IEC/EN 61000-4-8  
IEC/EN 61000-4-3 IEC/EN 61000-4-11  
IEC/EN 61000-4-4

CISPR 22/EN 55022  
IEC/EN 61000-3-2 IEC/EN 61000-4-5  
IEC/EN 61000-3-3 IEC/EN 61000-4-6  
IEC/EN 61000-4-2 IEC/EN 61000-4-8  
IEC/EN 61000-4-3 IEC/EN 61000-4-11  
IEC/EN 61000-4-4

VCCI -Technical Requirement

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**1. General Information****1.1 Applicant**

Name : A-FOUR TECH CO., LTD.

Address : 6F, No.108, Min-Chuan Rd., Hsin-Tien, Taipei, Taiwan, R.O.C.

**1.2 Manufacturer**

Name : N/A

Address : N/A

**1.3 Equipment Under Tested**

Name : Wireless Battery Free Optical Mouse

Trade Name : A4TECH

Model No. : NB-90; NB-90A

**1.4 OEM Brand/Model (if applicable)**

OEM Brand(s)/Model(s) except the basic model in sub-clause 1.3 is (are) the follows:

OEM Brand : N/A

Model No. : N/A

**1.5 Model Difference (Series, Versions, if any)**

Except the basic model no. (model designation of the sample tested in this test report), additional model no. covered is(are) :

Model NB-90A is identical to model NB-90 except the model no. designation.

**1.6 Product Descriptions (Application/Features/Specification)**

The EUT is a Wireless Battery Free Optical Mouse. A major technical descriptions of EUT is described as following:

|                        |                          |
|------------------------|--------------------------|
| A. Operation Frequency | 121 KHz – 128 KHz        |
| B. Modulation Type     | ASK                      |
| C. Antenna Designation | Integra (Induction coil) |
| D. Output Power        | 2.5 mW (Max.)            |
| E. Mode of Operation   | Simplex                  |

Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual .

**1.7 Connecting I/O Port(s)**

Please refer to the User's Manual.

**1.8 Power Supplied**

Power Pad: DC 5 V, 400mA(Max.)/ Supplied from PC USB port

Wireless Battery Free Optical Mouse: DC 5 V, 90mA(Max.)/ Faradism

**1.9 Products Covered (if applicable)**

The sample tested including the following sub-system/module/accessory :

| Sub-system/ Module/ Accessory | Model/Type No. | Int. Inst./ Ext. Cont. |
|-------------------------------|----------------|------------------------|
| N/A                           | N/A            | N/A                    |

**1.10 Description of Test Mode(s)**

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

|        |                     |
|--------|---------------------|
| Mode 1 | Low CH: 121.0KHz    |
| Mode 2 | Middle CH: 124.5KHz |
| Mode 3 | High CH: 128.0KHz   |

The EUT system operated Mode 2, mentioned above was found to be the worst case during the pre-scanning test.

These operation modes were used for final testing and collecting test data included in this report.

**1.11 Summary of Test Results**

Test procedures according to the technical standards: (Antenna to EUT distance is **3 m**)

| FCC Part15, Subpart C |                    |         |                       |        |
|-----------------------|--------------------|---------|-----------------------|--------|
| Section               | Test Item          | Limit   | Frequency Range (MHz) | Result |
| 15.207                | Conducted Emission | Class B | 0.15 - 30             | PASS   |
| 15.209                | Radiated Emission  | Class B | 0.09 -1000            | PASS   |

**NOTE:**

(1)" N/A" denotes test is not applicable in this Test Report

## 2. RFI Emissions Measurement

### 2.1 Test Facility

The test facilities used to collect the test data in this report is C01/OS02 at the location of No.132-1, Lane 329, Sec. 2, Palain Road, Shijr City, Taipei, Taiwan.

### 2.2 Standard Compliance

The test data contained in this report relate only to the item(s) listed below:

Limitation Class B

FCC Part15, Subpart C / RSS-210: 2001/ ANCI C63.4 : 2003

### 2.3 Test Methodology

Both conducted and radiated tests were performed during the max. EMI emission evaluation.

Antenna to EUT distance is 10 m.

Test procedures according to the technical standards:

FCC Part15, Subpart C / ANSI C63.4 : 2003

### 2.4 Deviations from Standard Test Method

N/A

### 2.5 Sample(s) Tested

The representative sample tested in this reports is(are): NB-90

Test results in this test report relate only to the sample(s) tested.

The EUT has been tested according to the following environmental condition:

|                          |                                       |
|--------------------------|---------------------------------------|
| Input Power              | 230Vac/50Hz                           |
| Environmental Conditions | Please refer to the measurement data. |

### 2.6 Measurement Instruments

Valid measurement instruments used in this report refer to **Table-1** enclosed.

## 2.7 Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

A. Conducted Measurement :5.05dB

B. Radiated Measurement :

| Test Site | Method | Measurement Frequency Range | Ant.<br>H / V | U , (dB) | NOTE |
|-----------|--------|-----------------------------|---------------|----------|------|
| OS-01     | ANSI   | 30MHz ~ 200MHz              | H             | 4.59     |      |
|           |        | 30MHz ~ 200MHz              | V             | 4.80     |      |
|           |        | 200MHz ~ 1,000MHz           | H             | 4.47     |      |
|           |        | 200MHz ~ 1,000MHz           | V             | 5.03     |      |

## 2.8 Tested System Set-Up/Configuration Details

The system was configured for testing in a typical fashion (as a user would normally use) or in accordance with the operating configuration specified in the user's manual. A Block Diagram (please refer to the Diagram - 1) and Photos (please refer to the attachment - **A**) showing the set-up/configuration of system tested. In addition, **Table-2** and **Table-3** provide a detail of all equipment items and cables information used in the system tested.

**Table -1 Measurement Instruments List**

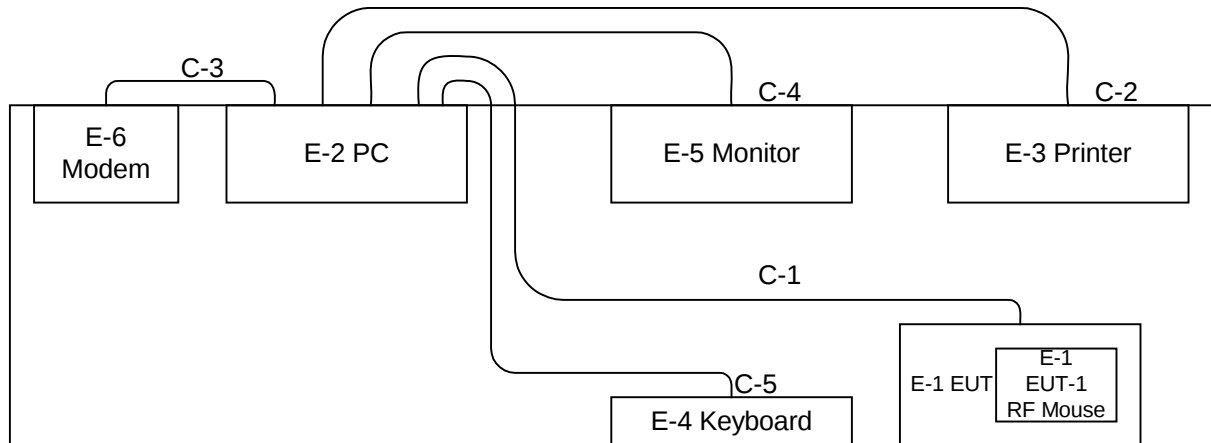
| Item | Instruments            | Mfr/Brand       | Model/Type No. | Serial No.  | Calibrated Date | Next Cali. Date | Note |
|------|------------------------|-----------------|----------------|-------------|-----------------|-----------------|------|
| 1    | LISN                   | EMCO            | 3825/2         | 9605-2539   | 2004-10-01      | 2005-09-30      |      |
| 2    | LISN                   | Rolf Heine      | NNB-2/16Z      | 98083       | 2004-08-03      | 2005-08-02      |      |
| 3    | LISN                   | Rolf Heine      | NNB-2/16Z      | 98053       | 2004-12-14      | 2005-12-13      | ✓    |
| 4    | 4L-V-LISN              | Rolf Heine      | NNB-4/63TL     | 02/10040    | 2004-04-07      | 2005-04-06      | ✓    |
| 5    | LISN                   | EMCO            | 4825/2         | 00028234    | 2004-10-08      | 2005-10-07      |      |
| 6    | Pulse Limiter          | Electro-Metrics | EM-7600        | 112644      | 2004-12-07      | 2005-12-06      | ✓    |
| 7    | 50 $\Omega$ Terminator | N/A             | N/A            | N/A         | 2004-05-08      | 2005-05-07      | ✓    |
| 8    | Test Cable             | N/A             | C01            | N/A         | 2004-12-08      | 2005-12-07      | ✓    |
| 9    | Log-Bicon Antenna      | MESS-ELEKTRONIK | VULB 9160      | 3058        | 2004-10-20      | 2005-10-19      |      |
| 10   | Log-Bicon Antenna      | MESS-ELEKTRONIK | VULB 9160      | 3115        | 2004-04-14      | 2005-04-13      | ✓    |
| 11   | Log-Bicon Antenna      | MESS-ELEKTRONIK | VULB 9161      | 4022        | 2004-07-15      | 2005-07-14      |      |
| 12   | Test Cable             | N/A             | 10M_OS01       | N/A         | 2004-12-08      | 2005-12-07      |      |
| 13   | Test Cable             | N/A             | OS01-1/-2      | N/A         | 2004-12-08      | 2005-12-07      |      |
| 14   | Test Cable             | N/A             | 10M_OS02       | N/A         | 2004-12-08      | 2005-12-07      | ✓    |
| 15   | Test Cable             | N/A             | OS02-1/-2/-3   | N/A         | 2004-12-08      | 2005-12-07      | ✓    |
| 16   | RF Switch              | Anritsu         | MP59B          | M65982      | 2004-12-07      | 2005-12-06      |      |
| 17   | Quasi-Peak Adapter     | HP              | 85650A         | 2521A00844  | 2004-03-16      | 2005-03-15      |      |
| 18   | RF Pre-Selector        | HP              | 85685A         | 2648A00417  | 2004-03-16      | 2005-03-15      |      |
| 19   | Spectrum Analyzer      | HP              | 85680B         | 2634A03025  | 2005-01-07      | 2006-01-06      |      |
| 20   | Spectrum Monitor       | HP              | 85662B         | 2648A13616  | 2005-01-07      | 2006-01-06      |      |
| 21   | Pre-Amplifier          | Anritsu         | MH648A         | M09961      | 2004-11-24      | 2005-11-23      | ✓    |
| 22   | Spectrum Analyzer      | ADVAN TEST      | R3261C         | 81720298    | 2004-09-01      | 2005-08-31      | ✓    |
| 23   | Test Receiver          | R&S             | ESH3           | 860156/018  | 2004-12-31      | 2005-12-30      |      |
| 24   | Test Receiver          | R&S             | ESVP           | 860687/009  | 2004-12-31      | 2005-12-30      |      |
| 25   | Test Receiver          | R&S             | ESMI           | 843977/005  | 2004-12-06      | 2005-12-05      | ✓    |
| 26   | Horn Antenna           | EMCO            | 3115           | 9605-4803   | 2004-05-28      | 2005-05-27      |      |
| 27   | Test Receiver          | R&S             | ESMI           | 843977/005  | 2004-05-18      | 2005-05-17      |      |
| 28   | Absorbing Clamp        | R&S             | MDS-21         | 841077/011  | 2004-09-09      | 2005-09-08      |      |
| 29   | Voltage Probe          | R&S             | ESH2-Z3        | 841.800/023 | 2004-09-07      | 2005-09-06      |      |
| 30   | Signal Generator       | HP              | 8648A          | 3426A01034  | 2004-05-17      | 2006-05-16      |      |
| 31   | Antenna Mast           | Chance Most     | CMTB-1.5       | N/A         | N/A             | N/A             | ✓    |
| 32   | Turn Table             | Chance Most     | CMTB-1.5       | N/A         | N/A             | N/A             | ✓    |
| 33   | Loop Ant               | R&S             | HFH2-Z2        | 830749/020  | 2004-10-01      | 2005-09-30      | ✓    |

Remark :

(1)" ✓" indicates the instrument used in Test Report.

(2)" N/A" denotes No Model No. / Serial No. and No Calibration specified.

**Diagram - 1**  
**Block diagram showing the configuration of system tested**



C-1 USB Cable  
C-2 Centronics Cable  
C-3 RS-232 Cable  
C-4 Video Cable  
C-5 Data Cable

**Table - 2 Equipments Used in Tested System**

| Item | Equipment                           | Mfr/Brand | Model/Type No. | FCC ID   | Series No. | Note |
|------|-------------------------------------|-----------|----------------|----------|------------|------|
| E-1  | Wireless Battery Free Optical Mouse | A4TECH    | NB-90          | H8GNB90A |            | EUT  |
| E-2  | PC                                  | HP        | Pavilion 8801  | DOC      | SG12460765 |      |
| E-3  | Printer                             | SII       | DPU-414        | DOC      | 1045105A   |      |
| E-4  | PS/2 K/B                            | HP        | 5181           | DOC      | N/A        |      |
| E-5  | Monitor                             | HITACHI   | CM753ET        | DOC      | T8L000003  |      |
| E-6  | Modem                               | ACEEX     | DM-1414V       | DOC      | 8041708    |      |
|      |                                     |           |                |          |            |      |
|      |                                     |           |                |          |            |      |
|      |                                     |           |                |          |            |      |
|      |                                     |           |                |          |            |      |
|      |                                     |           |                |          |            |      |
|      |                                     |           |                |          |            |      |

Note:

- (1) Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment.
- (2) Unless otherwise marked as ※ in 『Remark』 column, Neutron consigns the support equipment to the tested system.
- (3) The support equipment was authorized by Declaration of Confirmation.

**Table - 3 Information of Interface Cable**

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|------|
| C-1  | YES           | NO           | 1M     | ※    |
| C-2  | YES           | NO           | 1.8M   |      |
| C-3  | YES           | NO           | 1.5M   |      |
| C-4  | YES           | YES          | 1.8M   |      |
| C-5  | YES           | NO           | 1.8M   |      |
|      |               |              |        |      |
|      |               |              |        |      |
|      |               |              |        |      |
|      |               |              |        |      |
|      |               |              |        |      |
|      |               |              |        |      |

Note:

- (1) Unless otherwise marked as ※ in 『Remark』 column, Neutron consigns the support equipment to the tested system.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

## 2.9 EUT Operating Conditions

- (a) Both conducted and radiated testing were performed during the max. EMI emission evaluation. The EUT was connected to support equipment-personal computer. Peripherals of PC, such as monitor, keyboard, modem and printer were contained in this system in order to comply with the CISPR22 Rules requirement. The PC operated in the default 800 x 600 / 35 KHz VGA Graphic mode. This operating condition was tested and used to collect the included data.
- (b) The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.
- (c) The EUT exercise program used during radiated and/or conducted emission measurement was designed to exercise the various system components in a manner similar to a typical use. The program contained on a PC hard disk and is auto-starting on power-up. Once loaded, the program sequentially exercises each system component in turn. The sequence used is:
  - 1. Read (write) from (to) mass storage device (Disk).
  - 2. Send "H" pattern to video port device (Monitor).
  - 3. Send " H " pattern to parallel port device (Printer).
  - 4. Send " H " pattern to serial port device (Modem).
  - 5. Repeated from 2 to 4 continuously.

### 3. Justification

#### 3.1 Limitations

##### 3.1.1 Power Line Conducted Emission

| Measurement<br>Frequency<br>Range<br>(MHz) | Mains Terminal<br>Class A Limits<br>(dBuV) |         | Mains Terminals<br>Class B Limits<br>(dBuV) |           | Note<br>CISPR<br>FCC<br>Std. |
|--------------------------------------------|--------------------------------------------|---------|---------------------------------------------|-----------|------------------------------|
|                                            | QP Mode                                    | AV Mode | QP Mode                                     | AV Mode   |                              |
|                                            |                                            |         |                                             |           |                              |
| 0.15 - 0.50                                | 79.00                                      | 66.00   | 66 - 56 *                                   | 56 - 46 * | CISPR                        |
| 0.50 - 5.00                                | 73.00                                      | 60.00   | 56.00                                       | 46.00     | CISPR                        |
| 5.00 - 30.0                                | 73.00                                      | 60.00   | 60.00                                       | 50.00     | CISPR                        |
| 0.15 - 0.50                                | 79.00                                      | 66.00   | 66 - 56 *                                   | 56 - 46 * | FCC                          |
| 0.50 - 5.00                                | 73.00                                      | 60.00   | 56.00                                       | 46.00     | FCC                          |
| 5.00 - 30.0                                | 73.00                                      | 60.00   | 60.00                                       | 50.00     | FCC                          |

Notes:

- (1). The tighter limit applies at the band edges.
- (2). The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

##### 3.1.2 Radiated Emission Limits

| Frequency<br>(MHz) | Field Strength<br>Limitation |      | Field Strength Limitation at 3m Measurement Dist |                         |
|--------------------|------------------------------|------|--------------------------------------------------|-------------------------|
|                    | (uV/m)                       | Dist | (uV/m)                                           | (dBuV/m)                |
| 0.009 – 0.490      | 2400 / F(KHz)                | 300m | 10000 * 2400/F(KHz)                              | 20log 2400/F(KHz) + 80  |
| 0.490 – 1.705      | 24000 / F(KHz)               | 30m  | 100 * 24000/F(KHz)                               | 20log 24000/F(KHz) + 40 |
| 1.705 – 30.00      | 30                           | 30m  | 100* 30                                          | 20log 30 + 40           |
| 30.0 – 88.0        | 100                          | 3m   | 100                                              | 20log 100               |
| 88.0 – 216.0       | 150                          | 3m   | 150                                              | 20log 150               |
| 216.0 – 960.0      | 200                          | 3m   | 200                                              | 20log 200               |
| Above 960.0        | 500                          | 3m   | 500                                              | 20log 500               |

Notes:

- (1). The tighter limit shall apply at the boundary between two frequency range.
- (2). Limitation expressed in dBuV/m is calculated by 20log Emission Level (uV/m).
- (3). If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of  $L_{d1} = L_{d2} * (d_2/d_1)^2$ .

Example:

F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as  $L_{d1} = L_1 = 30\text{uV/m} * (10)^2 = 100 * 30 \text{ uV/m}$

### 3.2 Measurement Justification

#### 3.2.1 Conducted Emission

The EUT is placed on a table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-1992. Conducted emissions from the EUT measured in the **frequency range between 0.15 MHz and 30MHz** were made with a **Spectrum Analyzer** using **CISPR Quasi-Peak detector mode**.

The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and these signals are then Quasi Peak detector mode and/or Average detector mode re-measured.

Data of **Table - 4** lists the significant emission frequencies, measured levels, limits and safe margins. All readings are Peak Mode measured unless otherwise stated as QP or AV in column of " Remark ".

If the Peak Mode measured value lower than both QP Mode and AV Mode Limit, EUT shall be deemed to compliance with both QP & AV Limits and then no additional QP Mode or AV Mode measurement performed.

If additional QP or AV Mode measurement needed, and if the QP Mode measured value compliance with the QP Mode Limit and lower than AV Mode Limit, the EUT shall be deemed to meet both QP & AV Limits and then only QP Mode was measured, but AV Mode was not performed °.

#### 3.2.2 Radiated Emission

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.

The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak, Peak or Average detector mode re-measured.

Data of **Table – 5** lists the significant emission frequencies, measured levels, limits and safe margins. All readings are Peak Mode measured unless otherwise stated as QP or AV in column of " Remark ".

If the Peak Mode measured value compliance with and lower than Quasi Peak or Average Mode Limit, the EUT shall be deemed to meet QP/AV Limits and then no additional QP/AV Mode measurement performed.

### 3.2.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as **FS = RA + AF + CL - AG**

Where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor (1)

CL = Cable Attenuation Factor(Cable Loss) (1)

AG = Amplifier Gain (1)

Remark :

- (1) The Correction Factor = AF + CL - AG, as shown in the data tables' Correction Factor column.

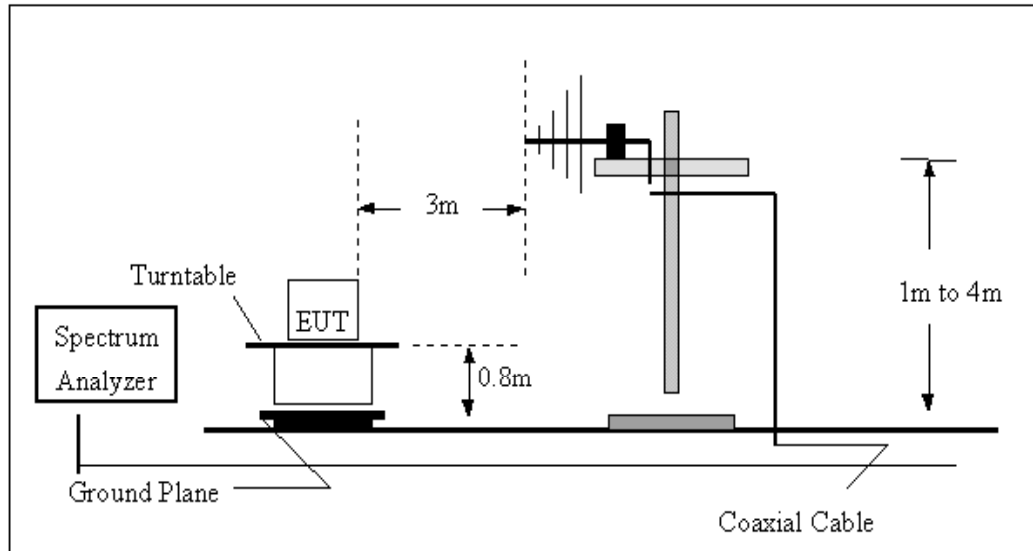
### 3.3 Measurement Data

Table - 4. Conducted Emission Data

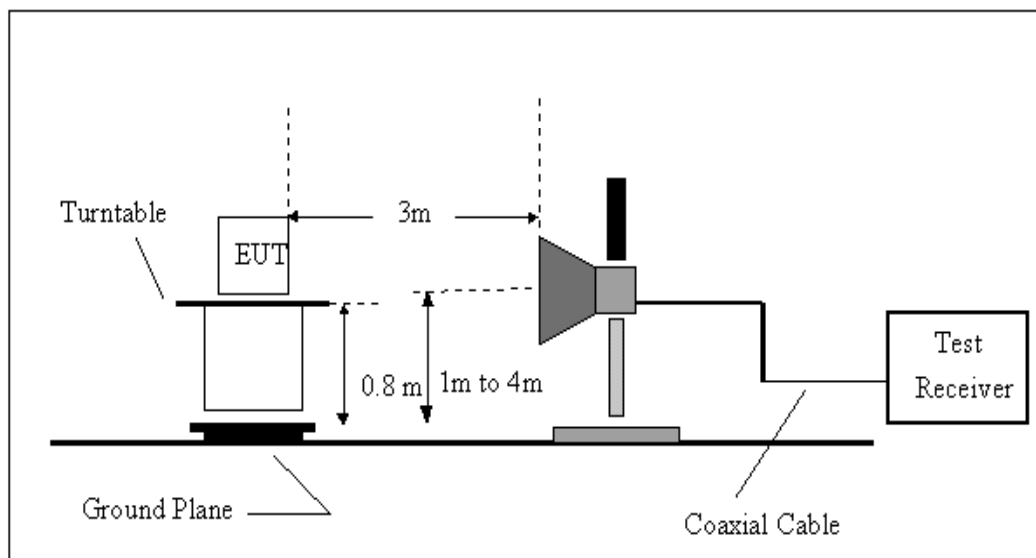
Table - 5. Radiated Emission Data (Bellow 30MHz)

Table - 6. Radiated Emission Data (Between 30 - 1000MHz)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



**Table 4 Conducted Emission Data**

EUT : Wireless Battery Free Optical Mouse Model/Type No. : NB-90

Temperature : 23 °C Relative Humidity : 62 % Pressure : 1031.1 hPa

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

Mode 2

**Minimum passing margin is -12.84dB at 1.29MHz**

| Freq.<br>(MHz) | Terminal<br>L/N | Measured(dBuV) |         | Limits(dBuV) |         | Safe Margins |      |
|----------------|-----------------|----------------|---------|--------------|---------|--------------|------|
|                |                 | QP-Mode        | AV-Mode | QP-Mode      | AV-Mode | (dBuV)       | Note |
| 0.63           | Line            | 41.61          | *       | 56.00        | 46.00   | -14.39       | (QP) |
| 0.89           | Line            | 42.31          | *       | 56.00        | 46.00   | -13.69       | (QP) |
| 1.04           | Line            | 43.00          | *       | 56.00        | 46.00   | -13.00       | (QP) |
| 1.29           | Line            | 43.16          | *       | 56.00        | 46.00   | -12.84       | (QP) |
| 1.78           | Line            | 42.48          | *       | 56.00        | 46.00   | -13.52       | (QP) |
| 2.53           | Line            | 41.19          | *       | 56.00        | 46.00   | -14.81       | (QP) |
| 0.63           | Neutral         | 41.91          | *       | 56.00        | 46.00   | -14.09       | (QP) |
| 1.04           | Neutral         | 43.10          | *       | 56.00        | 46.00   | -12.90       | (QP) |
| 1.41           | Neutral         | 42.74          | *       | 56.00        | 46.00   | -13.26       | (QP) |
| 1.78           | Neutral         | 42.48          | *       | 56.00        | 46.00   | -13.52       | (QP) |
| 2.14           | Neutral         | 41.83          | *       | 56.00        | 46.00   | -14.17       | (QP) |
| 12.25          | Neutral         | 37.07          | *       | 60.00        | 50.00   | -22.93       | (QP) |

## Remark :

- (1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9KHz ; SPA setting in RBW=10KHz,VBW =10KHz, Swp. Time = 0.3 sec./MHz . Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=1MHz,VBW=10Hz, Swp. Time =0.3 sec./MHz .
- (2) All readings are QP Mode value unless otherwise stated AVG in column of 『Note』 . If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform . In this case, a " \* " marked in AVG Mode column of Interference Voltage Measured .
- (3) Measuring frequency range from 150KHz to 30MHz .

**Table 5 Radiated Emission Data (Below 30MHz)**

EUT : Wireless Battery Free Optical Mouse Model/Type No. : NB-90

Temperature : 18 °C Relative Humidity : 59 % Pressure : 1013.1 hPa

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

Mode 2

**Minimum passing margin is -9.75dB at 124.50KHz**

| Freq.<br>(KHz) | Receiver<br>Reading in<br>dBuV/m | Factor<br>(dB) | Field<br>Strength<br>Limit<br>(uV/m) | Required<br>Measurement<br>Distance(m) | Limitation<br>Converted<br>3m dist.<br>(dBuV/m) | Over<br>Limit | Dectector<br>Mode<br>PK/AV |
|----------------|----------------------------------|----------------|--------------------------------------|----------------------------------------|-------------------------------------------------|---------------|----------------------------|
| 124.50         | 75.85                            | 20.10          | 19.28                                | 300.00                                 | 105.70                                          | - 9.75        | Peak                       |
| 249.00         | 38.55                            | 20.10          | 9.64                                 | 300.00                                 | 99.68                                           | - 41.03       | Peak                       |
| 373.50         | 27.60                            | 20.10          | 6.43                                 | 300.00                                 | 96.16                                           | - 48.46       | Peak                       |
| 498.00         | 24.22                            | 20.10          | 48.19                                | 30.00                                  | 73.66                                           | - 29.34       | Peak                       |
| 622.50         | 15.03                            | 20.20          | 38.55                                | 30.00                                  | 71.72                                           | - 36.49       | Peak                       |
| 747.00         | -                                | 20.20          | 32.13                                | 30.00                                  | 70.14                                           | -             | Peak                       |
| 871.50         | 9.87                             | 20.20          | 27.54                                | 30.00                                  | 68.80                                           | - 38.73       | Peak                       |
| 996.00         | 11.14                            | 20.30          | 24.10                                | 30.00                                  | 67.64                                           | - 36.20       | Peak                       |
| 1120.50        | -                                | 20.30          | 21.42                                | 30.00                                  | 66.62                                           | -             | Peak                       |
| 1245.00        | -                                | 20.30          | 19.28                                | 30.00                                  | 65.70                                           | -             | Peak                       |

Remark :

(1) Spectrum Setting:

9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.

150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.

30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.

(2) All receiver readings (the measured field strength levels) are measured from loop antenna directly.

(3) The emission limits shown in the above table are base on measurements employing a quasi-peak detector except for the frequency bands 9-90 KHz, 110-490 KHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

(4) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

**Table 6 Radiated Emission Data (Between 30 – 1000 MHz)**

EUT : Wireless Battery Free Optical Mouse Model/Type No. : NB-90

Temperature : 23 °C Relative Humidity : 61 % Pressure : 1013.1 hPa

Special Notes : (EUT Operation Mode or Test Configuration Mode, if applicable)

Mode 2

**Minimum passing margin is -2.58dB at 38.06MHz**

| Freq.<br>(MHz) | Ant.Pol.<br>H/V | DetectorMode<br>(PK/AV) | Reading<br>(dBuV) | Ant./CL/<br>Amp. CF(dB) | Actual FS<br>(dBuV/m) | Limits 3m<br>(dBuV/m) | Safe Margins<br>(dB) | Note |
|----------------|-----------------|-------------------------|-------------------|-------------------------|-----------------------|-----------------------|----------------------|------|
| 38.06          | V               | Peak                    | 56.74             | - 19.32                 | 37.42                 | 40.00                 | - 2.58               |      |
| 99.45          | V               | Peak                    | 51.04             | - 19.08                 | 31.96                 | 43.50                 | - 11.54              |      |
| 181.01         | V               | Peak                    | 54.11             | - 19.22                 | 34.89                 | 43.50                 | - 8.61               |      |
| 393.10         | V               | Peak                    | 54.12             | - 19.74                 | 34.38                 | 46.00                 | - 11.62              |      |
| 427.40         | V               | Peak                    | 54.13             | - 19.82                 | 34.31                 | 46.00                 | - 11.69              |      |
| 138.90         | V               | Peak                    | 56.39             | - 19.84                 | 36.55                 | 46.00                 | - 9.45               |      |
| 94.11          | H               | Peak                    | 56.62             | - 19.12                 | 37.50                 | 43.50                 | - 6.00               |      |
| 167.45         | H               | Peak                    | 55.97             | - 19.22                 | 36.75                 | 43.50                 | - 6.75               |      |
| 174.79         | H               | Peak                    | 56.55             | - 19.21                 | 37.34                 | 43.50                 | - 6.16               |      |
| 392.00         | H               | Peak                    | 56.97             | - 19.73                 | 37.24                 | 46.00                 | - 8.76               |      |
| 446.90         | H               | Peak                    | 58.04             | - 19.86                 | 38.18                 | 46.00                 | - 7.82               |      |
| 573.70         | H               | Peak                    | 57.63             | - 19.93                 | 37.70                 | 46.00                 | - 8.30               |      |

Remark :

(1) Spectrum Setting:

9 KHz – 150 KHz, RBW= 1 KHz, VBW=1 KHz, Sweep time = 200 ms.

150 K Hz – 30 MHz, RBW= 9 KHz, VBW=9 KHz, Sweep time = 200 ms.

30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.

(2) All readings are Peak unless otherwise stated QP in column of 『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

(3) Measuring frequency range from 30MHz to 1000MHz.

(4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

## **Attachment**

### **Table Contents**

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- A. EUT Test Photos
- B. Product Labeling

## **Attachment - A**

### **EUT Test Photos**

**Attachment - B**

**Product Labeling**

# **ATTACHMENT**

**05E0079**

## **PHOTOGRAPHS OF EUT**