

# **FCC TEST REPORT**

for

47 CFR, Part 15, Subpart C

Equipment : Wireless Optical Travel Mouse

Model No. : PT-2002-MY, PT-2002-MZ, PT-2003-MA,  
PT-2003-MC

FCC ID : O3L-PT-02-MV

Filing Type : Certification

Applicant : **Paten Wireless Technology Inc.**  
4F, No. 50, Lane 10, Jihu Road, Neihu, Taipei 114,  
Taiwan, R.O.C.

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***SPORTON International Inc.***

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***SPORTON International Inc.***

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**History of this test report**

Original Report Issue Date: Feb. 28, 2003

☒ No additional attachment.

☐ Additional attachment were issued as following record:

| Attachment No. | Issue Date | Description |
|----------------|------------|-------------|
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# CERTIFICATE OF COMPLIANCE

for

## 47 CFR, Part 15, Subpart C

Equipment : Wireless Optical Travel Mouse

Model No. : PT-2002-MY, PT-2002-MZ, PT-2003-MA,  
PT-2003-MC

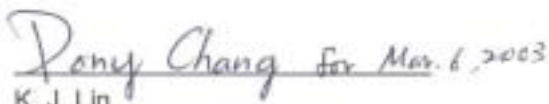
FCC ID : O3L-PT-02-MV

Filing Type : Certification

Applicant : **Paten Wireless Technology Inc.**  
4F, No. 50, Lane 10, Jihu Road, Neihu, Taipei 114,  
Taiwan, R.O.C.

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the energy emitted by this equipment was **passed** both radiated and conducted emission limits. Testing was carried out on Dec. 28, 2002 at **SPORTON International Inc. LAB.**

  
K. J. Lin  
Manager

**SPORTON International Inc.**

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

## **1. General Description of Equipment under Test**

### **1.1. Applicant**

Paten Wireless Technology Inc.

4F, No. 50, Lane 10, Jihu Road, Neihu, Taipei 114, Taiwan, R.O.C.

### **1.2. Manufacturer**

WEI FU MOLD PLASTIC & METAL FACTORY

Da-Ning Industrial Zone, Humen, Dongguan, Guangdong, CHINA

### **1.3. Basic Description of Equipment under Test**

Equipment : Wireless Optical Travel Mouse

Model No. : PT-2002-MY, PT-2002-MZ, PT-2003-MA, PT-2003-MC

(Difference of these models are only the external appearance)

FCC ID : O3L-PT-02-MV

Trade Name : Paten

Power Supply Type : From Battery (3V)

AC Power Cord : N/A

## 1.4. Feature of Equipment under Test

| Mouse                    |                            |                       |
|--------------------------|----------------------------|-----------------------|
| ITEM                     | SPEC                       | REMARK                |
| Channel                  | 1                          |                       |
| User ID:                 | 256 Sets                   |                       |
| Cordless Technology      | Radio Frequency            |                       |
| Modulation               | FSK (Frequency Shift Key)  |                       |
| Transfer Rate            | 10000 bps                  |                       |
| Carry Frequency          | 27.045MHZ                  |                       |
| Input Power              | 3.0VDC (2*AAA)             |                       |
| Rated Output Power Level | 42 mA                      | Maximum(dark surface) |
| RF Power                 | 500 uV/M                   | Minimum               |
| Buttons                  | 2 Buttons, Scroll Button   | 3-Button Type         |
| Encoder Technology       | Opto-Mechanical            |                       |
| Resolution               | 800 DPI                    |                       |
| Frames Speed             | 1500 Frames/sec            | Maximum               |
| Display LED              | 1 LED                      | Green-Normal,         |
| Link Switch              | 1 Rubber Switch            |                       |
| Effective Distance       | 1M                         |                       |
| Battery Life             | 3 Months                   | Non-working           |
| Dimension                | 99.5(L)*63.8(W)*36.5(H) mm |                       |
| Weight                   | 90g                        | Including Batteries   |

## **2. Test Configuration of Equipment under Test**

### **2.1. Test Manner**

- a. The EUT has been associated with peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner which tended to maximize its emission characteristics in a typical application.
- b. The complete test system included HP PC, LOGITECH PS/2 Keyboard, HP Printer, ACEEX Modem, VIEWSONIC Monitor, Paten Wireless Mouse Receiver and EUT for EMI test.
- c. Frequency range investigated: radiation 30 MHz to 1000MHz.

### **2.2. Description of Test System**

#### **Support Unit 1. -- Personal Computer (HP)**

|                   |                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------|
| FCC ID            | : N/A                                                                                                           |
| Model No.         | : VECTRA VL420 DT                                                                                               |
| Power Supply Type | : Switching                                                                                                     |
| Power Cord        | : Non-Shielded                                                                                                  |
| Serial No.        | : SP0040                                                                                                        |
| Remark            | : This support device was tested to comply with FCC standards and authorized under a declaration of conformity. |

#### **Support Unit 2. -- PS/2 Keyboard (LOGITECH)**

|            |                                                                                                                 |
|------------|-----------------------------------------------------------------------------------------------------------------|
| FCC ID     | : N/A                                                                                                           |
| Model No.  | : Y-SJ17                                                                                                        |
| Serial No. | : SP0054                                                                                                        |
| Data Cable | : Shielded, 1.7m                                                                                                |
| Remark     | : This support device was tested to comply with FCC standards and authorized under a declaration of conformity. |

#### **Support Unit 3. -- Printer (HP)**

|                   |                                                    |
|-------------------|----------------------------------------------------|
| FCC ID            | : B94C2642X                                        |
| Model No.         | : DJ 400                                           |
| Power Supply Type | : Linear                                           |
| Power Cord        | : Non-Shielded                                     |
| Serial No.        | : SP0014                                           |
| Data Cable        | : Shielded, 360 degree via metal backshells, 1.35m |

## Support Unit 4. -- Modem (ACEEX)

|                   |                                                    |
|-------------------|----------------------------------------------------|
| FCC ID            | : IFAXDM1414                                       |
| Model No.         | : DM1414                                           |
| Power Supply Type | : Linear                                           |
| Power Cord        | : Non-Shielded                                     |
| Serial No.        | : SP0015                                           |
| Data Cable        | : Shielded, 360 degree via metal backshells, 1.15m |

## Support Unit 5. -- Monitor (VIEWSONIC)

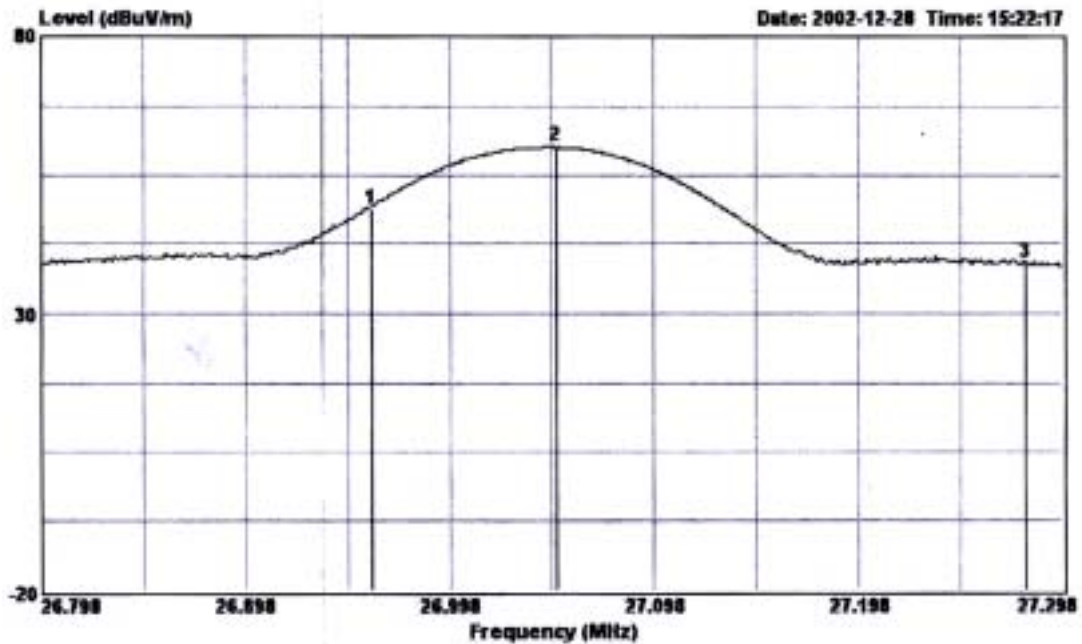
|                   |                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------|
| FCC ID            | : N/A                                                                                                           |
| Model No.         | : VCDTS21553-3P                                                                                                 |
| Power Supply Type | : Switching                                                                                                     |
| Power Cord        | : Non-Shielded                                                                                                  |
| Serial No.        | : SP0013                                                                                                        |
| Data Cable        | : Shielded, 360 degree via metal backshells, 1.7m                                                               |
| Remark            | : This support device was tested to comply with FCC standards and authorized under a declaration of conformity. |

## Support Unit 6. – Wireless Mouse Receiver (Paten)

|           |                                                                                                                 |
|-----------|-----------------------------------------------------------------------------------------------------------------|
| FCC ID    | : N/A                                                                                                           |
| Model No. | : PT-2002-RSUK                                                                                                  |
| Remark    | : This support device was tested to comply with FCC standards and authorized under a declaration of conformity. |

## 2.3. Band edge compliance plot per 15.227(b).

&lt;HORIZONTAL&gt;



&lt;VERTICAL&gt;



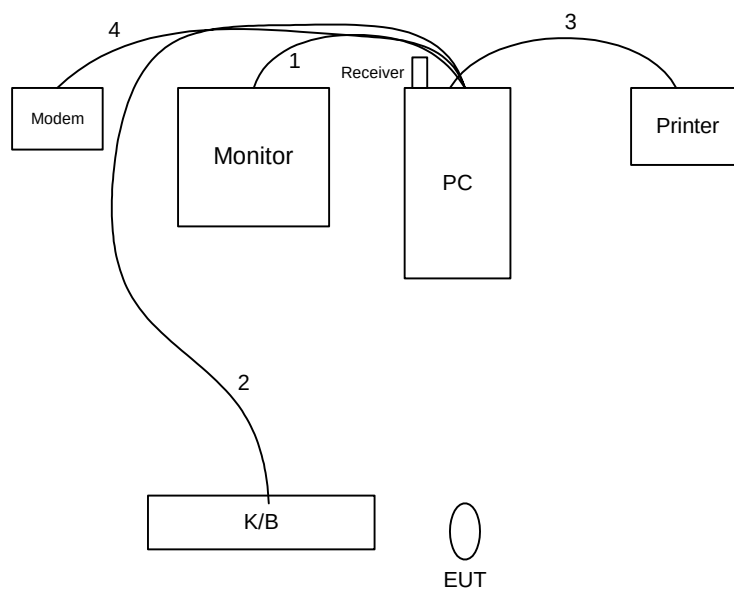
Mark 1: 26.96MHz

Mark 3: 27.28MHz

RBW:120KHz,VBW:300KHz

Conformation of the fundamental frequency

## 2.4. Connection Diagram of Test System



1. The I/O cable is connected from PC to the support unit 2.
2. The I/O cable is connected from PC to the support unit 3.
3. The I/O cable is connected from PC to the support unit 4.
4. The I/O cable is connected from PC to the support unit 5.

### **3. General Information of Test**

#### **3.1. Test Facility**

Test Site Location : No. 52, Hwa Ya 1St Road, Hwa Ya Technology Park,  
Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.  
TEL : 886-3-3273456  
FAX : 886-3-3180055  
Test Site No. : 03CH03-HY

#### **3.2. Test Voltage**

DC 3V

#### **3.3. Standard for Methods of Measurement**

ANSI C63.4-1992

#### **3.4. Frequency Range Investigated**

FCC Part 15, Subpart C

#### **3.5. Frequency Range Investigated**

a. Radiation: from 30 MHz to 1000 MHz

#### **3.6. Test Distance**

The test distance of radiated emission from antenna to EUT is 3 M.

#### **4. Test of Conducted Powerline**

The power supply of the EUT is from Battery.

So Conducted Powerline test is not applicable to this equipment.

## **5. Test of Radiated Emission**

Radiated emissions from 30 MHz to 1 GHz were measured with a bandwidth of 120 kHz according to the methods defines in ANSI C63.4-1992. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in section 5.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

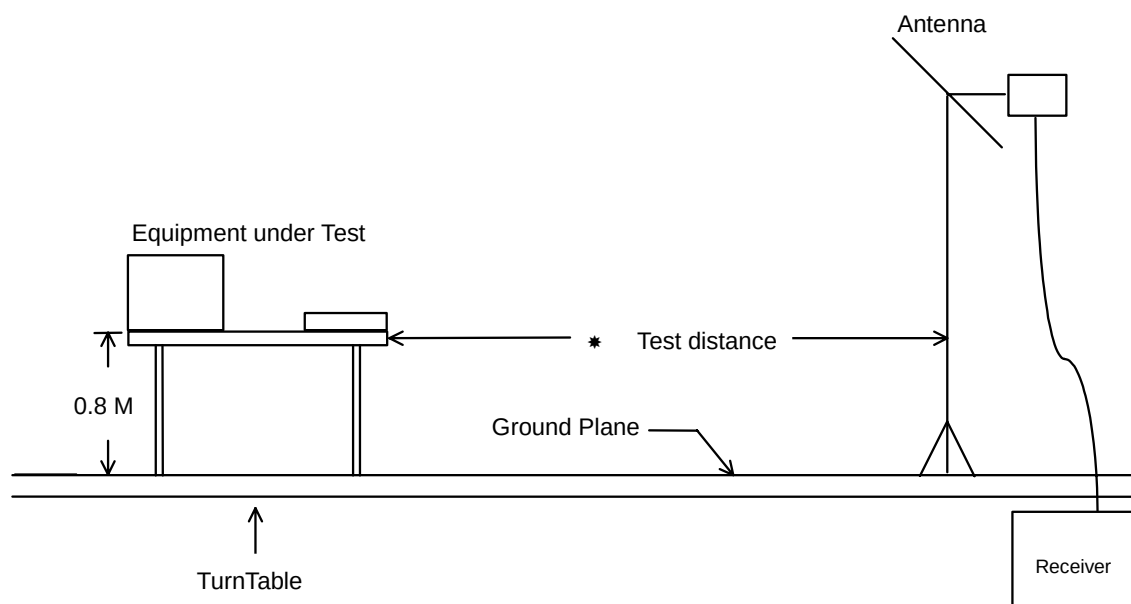
### **5.1. Major Measuring Instruments**

- Amplifier (HP 8447D)
  - RF Gain 30 dB
  - Signal Input 100 KHz to 1.3 GHz
  
- Spectrum Analyzer (R&S FSP)
  - Attenuation 10 dB
  - Start Frequency 30 MHz
  - Stop Frequency 1000 MHz
  - Resolution Bandwidth 120 KHz
  - Signal Input 9 KHz to 7 GHz

**5.2. Test Procedures**

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

### 5.3. Typical Test Setup Layout of Radiated Emission



#### 5.4. Test Result of Radiated Emission

- Test Distance: 3 M
- Temperature: 20.3°C
- Relative Humidity: 58 %
- Test Date: Dec. 28, 2002
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

■ The test was passed at the minimum margin that marked under gray area in the following table, and its antenna height is 1 m, turn table degree is 50°

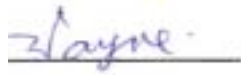
- Spurious Emissions:

| Frequency<br>( MHz ) | Polarity | Antenna<br>Factor<br>( dB/m ) | Cable<br>Loss<br>( dB ) | Reading<br>( dBuV ) | Limits<br>( dBuV/m ) | ( uV/m ) | Emission Level<br>( dBuV/m ) ( uV/m ) |       | Margin<br>( dB ) | Detect<br>Mode |
|----------------------|----------|-------------------------------|-------------------------|---------------------|----------------------|----------|---------------------------------------|-------|------------------|----------------|
| 53.490               | H        | 6.75                          | 1.28                    | 6.99                | 40.00                | 100      | 15.02                                 | 5.64  | -24.98           | Peak           |
| 243.570              | H        | 11.28                         | 2.64                    | 3.98                | 46.00                | 200      | 17.90                                 | 7.85  | -28.10           | Peak           |
| 297.570              | H        | 12.92                         | 2.90                    | 8.70                | 46.00                | 200      | 24.52                                 | 16.83 | -21.48           | Peak           |
| 377.700              | H        | 14.75                         | 3.30                    | 10.74               | 46.00                | 200      | 28.79                                 | 27.51 | -17.21           | Peak           |
| 433.000              | H        | 16.28                         | 3.54                    | 9.66                | 46.00                | 200      | 29.48                                 | 29.79 | -16.52           | Peak           |
| 458.900              | H        | 16.58                         | 3.51                    | 11.45               | 46.00                | 200      | 31.54                                 | 37.76 | -14.46           | Peak           |
| 53.490               | V        | 6.75                          | 1.28                    | 6.38                | 40.00                | 100      | 14.41                                 | 5.25  | -25.59           | Peak           |
| 200.100              | V        | 8.11                          | 2.40                    | 11.83               | 43.50                | 150      | 22.34                                 | 13.09 | -21.16           | Peak           |
| 377.700              | V        | 14.75                         | 3.30                    | 3.78                | 46.00                | 200      | 21.83                                 | 12.35 | -24.17           | Peak           |
| 433.000              | V        | 16.28                         | 3.54                    | 3.81                | 46.00                | 200      | 23.63                                 | 15.19 | -22.37           | Peak           |
| 458.90               | V        | 16.58                         | 3.51                    | 5.74                | 46.00                | 200      | 25.83                                 | 19.57 | -20.17           | Peak           |

- Field strength of fundamental and harmonics:

| Frequency | Antenna  | Cable    | Reading | Limits   |            |          | Emission Level |          | Margin | Detect |
|-----------|----------|----------|---------|----------|------------|----------|----------------|----------|--------|--------|
|           | Polarity | Factor   | Loss    |          |            |          |                |          |        |        |
| ( MHz )   |          | ( dB/m ) | ( dB )  | ( dBuV ) | ( dBuV/m ) | ( uV/m ) | ( dBuV/m )     | ( uV/m ) | ( dB ) | Mode   |
| 27.050    | H        | 15.40    | 0.93    | 29.75    | 80.00      | 10000    | 46.08          | 201.37   | -33.92 | Peak   |
| 27.050    | V        | 15.40    | 0.93    | 29.59    | 80.00      | 10000    | 45.92          | 197.70   | -34.08 | Peak   |

Test Engineer :



Wayne Hsu

## **6. EMI Suppression Component List**

No EMI suppression components.

## 7. Antenna Factor & Cable Loss

| Frequency (MHz) | Antenna Factor (dB) | Cable Loss (dB) |
|-----------------|---------------------|-----------------|
| 30              | 18.10               | 0.90            |
| 35              | 16.00               | 0.90            |
| 40              | 13.19               | 1.09            |
| 45              | 10.57               | 1.10            |
| 50              | 8.00                | 1.21            |
| 55              | 6.30                | 1.30            |
| 60              | 5.30                | 1.30            |
| 65              | 4.95                | 1.40            |
| 70              | 5.19                | 1.40            |
| 75              | 6.05                | 1.49            |
| 80              | 6.86                | 1.50            |
| 85              | 7.94                | 1.60            |
| 90              | 8.60                | 1.60            |
| 95              | 9.70                | 1.60            |
| 100             | 10.26               | 1.69            |
| 110             | 11.19               | 1.70            |
| 120             | 11.60               | 1.81            |
| 130             | 11.42               | 1.90            |
| 140             | 10.92               | 1.99            |
| 150             | 10.20               | 2.00            |
| 160             | 9.20                | 2.11            |
| 170             | 9.00                | 2.20            |
| 180             | 8.60                | 2.29            |
| 190             | 8.70                | 2.30            |
| 200             | 8.10                | 2.40            |
| 220             | 8.86                | 2.51            |
| 240             | 10.70               | 2.60            |
| 260             | 13.10               | 2.71            |
| 280             | 12.50               | 2.80            |
| 300             | 13.00               | 2.90            |
| 320             | 13.51               | 3.00            |
| 340             | 13.90               | 3.10            |
| 360             | 14.43               | 3.30            |
| 380             | 14.79               | 3.30            |
| 400             | 15.80               | 3.40            |
| 450             | 16.37               | 3.59            |
| 500             | 17.40               | 3.80            |
| 550             | 18.57               | 3.90            |
| 600             | 18.50               | 4.20            |
| 650             | 18.93               | 4.40            |
| 700             | 19.03               | 4.40            |
| 750             | 19.84               | 4.71            |
| 800             | 19.82               | 4.90            |
| 850             | 20.30               | 5.00            |
| 900             | 20.32               | 5.11            |
| 950             | 20.82               | 5.60            |
| 1000            | 21.20               | 5.50            |

## 8. List of Measuring Equipments Used

| Instrument               | Manufacturer | Model No.    | Serial No.           | Characteristics | Calibration Date | Remark                   |
|--------------------------|--------------|--------------|----------------------|-----------------|------------------|--------------------------|
| Spectrum analyzer        | R&S          | FSP40        | 100004/040           | 9KHZ~40GHz      | Aug. 07, 2002    | Radiation<br>(03CH03-HY) |
| Amplifier                | HP           | 8447D        | 2944A09072           | 100KHz – 1.3GHz | Oct. 21, 2002    | Radiation<br>(03CH03-HY) |
| Amplifier                | MITEQ        | AFS44        | 879981               | 100MHz~26.5GHz  | Aug. 12, 2002    | Radiation<br>(03CH03-HY) |
| Bilog Antenna            | SCHAFFNER    | CBL6112B     | 2687                 | 30MHz –2GHz     | Dec. 21, 2002    | Radiation<br>(03CH03-HY) |
| Horn Antenna             | COM-POWER    | AH-118       | 10094                | 1GHz – 18GHz    | Apr. 09, 2002    | Radiation<br>(03CH03-HY) |
| Turn Table               | HD           | DS 420       | 420/650/00           | 0 ~ 360 degree  | N/A              | Radiation<br>(03CH03-HY) |
| Antenna Mast             | HD           | MA 240       | 240/560/00           | 1 m - 4 m       | N/A              | Radiation<br>(03CH03-HY) |
| Half-wave dipole antenna | R&S          | HZ12<br>HZ13 | 83924403<br>83924503 | 30MHz - 1GHz    | Sep. 23, 2002    | Radiation<br>(03CH03-HY) |

※ Calibration Interval of instruments listed above is one year.

## 9. Uncertainty of Test Site

### Uncertainty of Radiated Emission Measurement

| Contribution                                                                                                           | Probability Distribution | 3m    |
|------------------------------------------------------------------------------------------------------------------------|--------------------------|-------|
| Antenna factor calibration                                                                                             | normal(k=2)              | ±1    |
| cable loss calibration                                                                                                 | normal(k=2)              | ±0.3  |
| RCV/SPA specification                                                                                                  | rectangular              | ±2    |
| Antenna Directivity                                                                                                    | rectangular              | ±3    |
| Antenna Factor V.S. Height                                                                                             | rectangular              | ±2    |
| Antenna Factor Interpolation for Frequency                                                                             | rectangular              | ±0.25 |
| site imperfection                                                                                                      | rectangular              | ±2    |
| Mismatch<br>Receiver VSWR $\Gamma_1=0.09$<br>Antenna VSWR $\Gamma_2=0.67$<br>Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$ | U-shaped                 | ±0.54 |
| combined standard uncertainty $U_e(y)$                                                                                 | normal                   | ±2.7  |
| Measuring uncertainty for a level of confidence of 95%<br>$U=2U_e(y)$                                                  | normal (k=2)             | ±5.4  |

$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 0.5^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.2$  for 10m test distance

$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 3^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.7$  for 3m test distance

### Uncertainty of Conducted Emission Measurement

| Contribution                                                                                                        | Probability Distribution | 150KHz – 30MHz |
|---------------------------------------------------------------------------------------------------------------------|--------------------------|----------------|
| Cable and I/P attenuator calibration                                                                                | normal(k=2)              | ±0.3           |
| RCV/SPA specification                                                                                               | rectangular              | ±2             |
| LISN coupling specification                                                                                         | rectangular              | ±1.5           |
| Transducer factor frequency interpolation                                                                           | rectangular              | ±0.2           |
| Mismatch<br>Receiver VSWR $\Gamma_1=0.09$<br>LISN VSWR $\Gamma_2=0.33$<br>Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$ | U-shaped                 | 0.2            |
| combined standard uncertainty $U_e(y)$                                                                              | normal                   | ±1.66          |
| Measuring uncertainty for a level of confidence of 95%<br>$U=2U_e(y)$                                               | normal (k=2)             | ±3.32          |

$U = \sqrt{\{(0.3/2)^2 + (2^2 + 1.5^2 + 0.2^2)/3 + (0.2)^2/2\}} = 1.66$