

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : Wireless Handfree
Model No. : UHF-FM05
FCC ID : QDFUHF-05
Filing Type : Certification
Applicant : **Monoeric International Co., Ltd.**
Suite B, 9FI, No. 192, Sec. 3, Chung Yang Rd.,
Sanchung City, Taiwan, 241 R. O. C.

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SPORTON International Inc.

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Table of Contents

History of this test report.....	ii
CERTIFICATE OF COMPLIANCE.....	1
1. General Description of Equipment under Test.....	2
1.1. Applicant.....	2
1.2. Manufacturer.....	2
1.3. Basic Description of Equipment under Test.....	2
1.4. Feature of Equipment under Test.....	2
2. Test Configuration of Equipment under Test.....	3
2.1. Test Manner.....	3
2.2. Description of Test System.....	3
2.3. Connection Diagram of Test System.....	4
2.4 A plot shows the EUT meet the requirement of 15.239(a).....	5
3. Test Software.....	6
4. General Information of Test.....	7
4.1. Test Facility.....	7
4.2. Test Voltage.....	7
4.3. Standard for Methods of Measurement.....	7
4.4. Test in Compliance with.....	7
4.5. Frequency Range Investigated.....	7
4.6. Test Distance.....	7
5. Test of Conducted Powerline.....	8
6. Test of Radiated Emission.....	9
6.1. Major Measuring Instruments.....	9
6.2. Test Procedures.....	10
6.3. Typical Test Setup Layout of Radiated Emission.....	11
6.4. Test Result of Radiated Emission.....	12
7. EMI Suppression Component List.....	18
8. Antenna Factor & Cable Loss.....	19
9. EMI Suppression Component List.....	20
10. List of Measuring Equipments Used.....	21
11. Uncertainty of Test Site.....	22

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

Equipment : Wireless Handfree
Model No. : UHF-FM05
FCC ID : QDFUHF-05
Filing Type : Certification
Applicant : **Monoeric International Co., Ltd.**
Suite B, 9FI, No. 192, Sec. 3, Chung Yang Rd.,
Sanchung City, Taiwan, 241 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 Mar. 14, 2003 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

Monoeric International Co., Ltd.
Suite B, 9FI, No. 192, Sec. 3, Chung Yang Rd.,
Sanchung City, Taiwan, 241 R. O. C.

1.2. Manufacturer

Same as 1.1

1.3. Basic Description of Equipment under Test

Equipment : Wireless Handfree
Model No. : UHF-FM05
FCC ID : QDFUHF-05
Trade Name : Monoeric
Power Supply Type : From Battery (12V)
AC Power Cord : N/A

1.4. Feature of Equipment under Test

- Frequency: FM88.7
- Talking time (continuous) to 10 hours
- Standby time to 30 days
- Available distance for transmission around 3 meters

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. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 1000MHz.
- c. The radiated emissions testing was made by rotating three orthogonal axes.
- d. The EUT employs a switch that will automatically deactivate the transmitter within no more than 5 seconds of being released.
- e. The EUT has no periodic transmission at regular predetermined interval.

2.2. Description of Test System

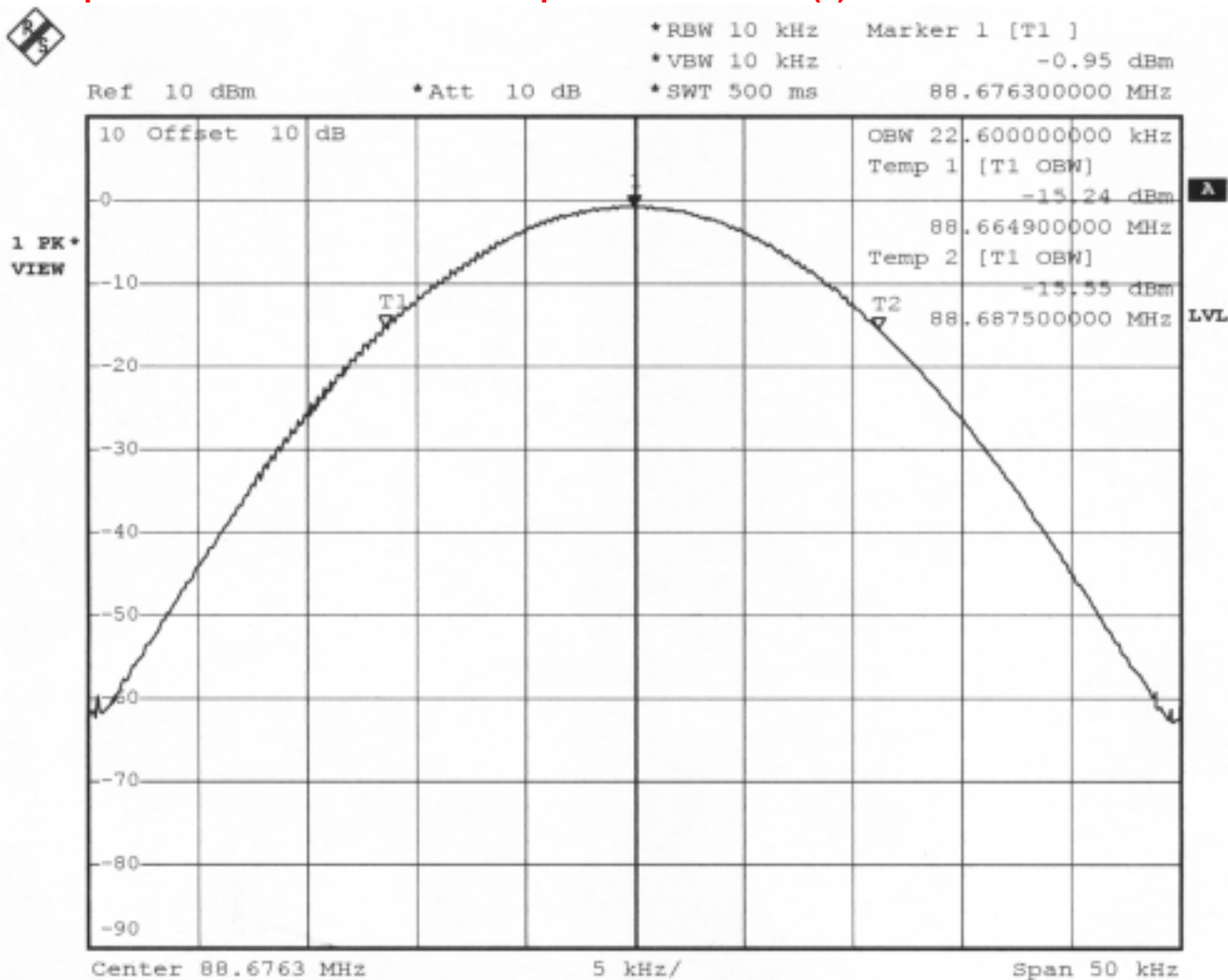
The EUT was tested alone. No support devices is needed for testing.

2.3. Connection Diagram of Test System



EUT

2.4 A plot shows the EUT meet the requirement of 15.239(a)



Date: 17.JUN.2003 20:28:31

Test Result:

Occupied Bandwidth: 22.6KHz

Limit: 200KHz

3. Test Software

No test software was used during testing.

4. General Information of Test

4.1. 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. : 03CH02-HY

4.2. Test Voltage

DC 12V

4.3. Standard for Methods of Measurement

ANSI C63.4-1992

4.4. Test in Compliance with

FCC Part 15, Subpart C 15.239

4.5. Frequency Range Investigated

- a. Conduction: from 150 KHz to 30 MHz
- b. Radiation: from 30 MHz to 1000 MHz

4.6. Test Distance

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

5. Test of Conducted Powerline

The power supply of the EUT is from Battery.

So Conducted Powerline test is not applicable to this equipment.

6. Test of Radiated Emission

Radiated emissions from 30 MHz to 1000 MHz were measured with a bandwidth of 120 kHz for 30MHz to 1 GHz 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 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

6.1. Major Measuring Instruments

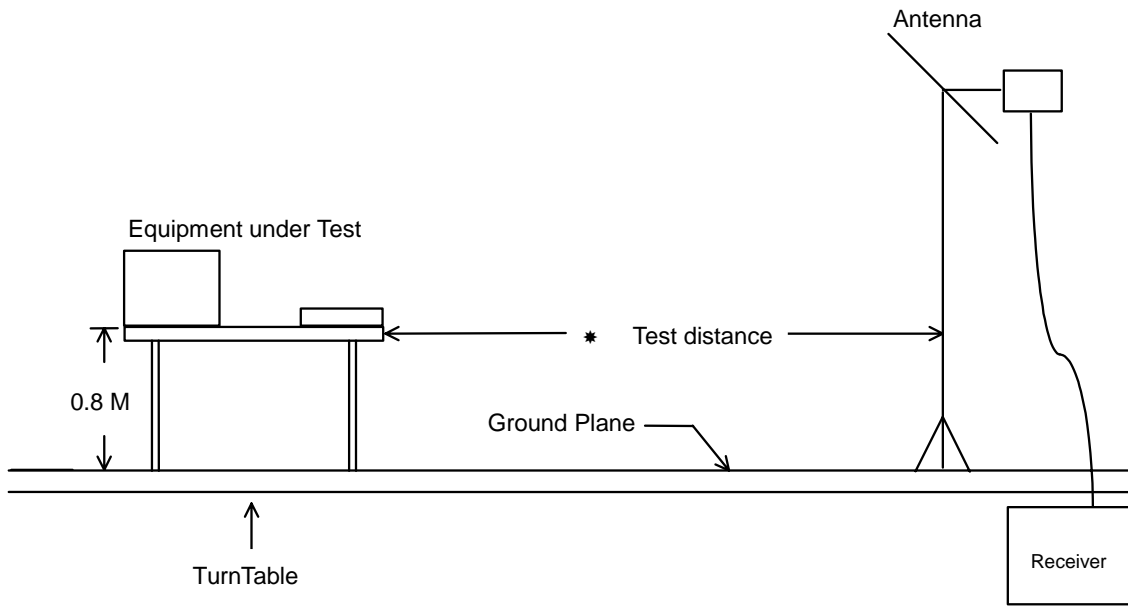
- Amplifier (ADVANTEST BB525C)
 - RF Gain 30 dB
 - Signal Input 9 KHz to 3 GHz

- Spectrum Analyzer (R&S FSP7)
 - Attenuation 10 dB
 - Start Frequency 30 MHz
 - Stop Frequency 1000 MHz
 - Resolution Bandwidth 120 KHz
 - Signal Input 9 KHz to 7 GHz

6.2. 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.

6.3. Typical Test Setup Layout of Radiated Emission



6.4. Test Result of Radiated Emission

6.4.1. Orthogonal axes: **X**

- Frequency range: 30 ~ 1000 MHz
- Test Distance: 3 M
- Temperature: 26
- Relative Humidity: 59
- Test Date: Mar. 14, 2003
- 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 150 °

- Spurious Emissions

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission Level (dBuV/m)	(uV/m)	Margin (dB)	Detect Mode
70.770	H	5.75	2.31	28.76	40.00	100.00	36.82	69.34	-3.18	Peak
106.140	H	11.30	2.52	21.88	43.50	149.62	35.70	60.95	-7.80	Peak
123.690	H	10.95	2.58	14.90	43.50	149.62	28.43	26.39	-15.07	Peak
53.220	V	7.06	1.89	16.07	40.00	100.00	25.02	17.82	-14.98	Peak
70.770	V	5.75	2.31	28.27	40.00	100.00	36.33	65.54	-3.67	Peak
106.140	V	11.30	2.52	15.30	43.50	149.62	29.12	28.58	-14.38	Peak

Field strength of fundamental and harmonics

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission Level (dBuV/m)	(uV/m)	Margin (dB)	Detect Mode
88.680	H	10.11	2.11	34.20	67.96	2500.00	44.68	171.396	-23.28	Peak
88.680	H	10.11	2.11	34.20	47.96	250.00	29.82	30.974	-18.14	A.V.
88.680	V	10.11	2.11	32.46	67.96	2500.00	46.42	209.411	-21.54	Peak
88.680	V	10.11	2.11	32.46	47.96	250.00	40.86	110.408	-7.10	A.V.
177.360	H/V						-			Peak
266.040	H/V						-			Peak
354.720	H/V						-			Peak
443.400	H/V						-			Peak
532.080	H/V						-			Peak
620.760	H/V						-			Peak
709.440	H/V						-			Peak
798.120	H/V						-			Peak
886.800	H/V						-			Peak

Remark “ - ”: Except for the above listed emission, the emission of the EUT is too low to be measured. “

Test Engineer: Jay
Jay Zhong

6.4.2. Orthogonal axes: Y

- Frequency range: 30 ~ 1000 MHz
- Test Distance: 3 M
- Temperature: 26
- Relative Humidity: 59
- Test Date: Mar. 14, 2003
- 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 1.8 m, turn table degree is 256°

- Spurious Emissions

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission Level (dBuV/m)	(uV/m)	Margin (dB)	Detect Mode
70.770	H	5.75	2.31	28.89	40.00	100.00	36.95	70.39	-3.05	Peak
106.140	H	11.30	2.52	16.93	43.50	149.62	30.75	34.47	-12.75	Peak
53.220	V	7.06	1.89	22.53	40.00	100.00	31.48	37.50	-8.52	Peak
70.500	V	5.67	2.31	27.86	40.00	100.00	35.84	61.94	-4.16	Peak
106.140	V	11.30	2.52	21.23	43.50	149.62	35.05	56.56	-8.45	Peak
123.690	V	10.95	2.58	15.06	43.50	149.62	28.59	26.88	-14.91	Peak

Field strength of fundamental and harmonics

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission Level (dBuV/m)	(uV/m)	Margin (dB)	Detect Mode
88.680	H	10.11	2.11	33.02	67.96	2500.00	45.24	182.810	-22.72	Peak
88.680	H	10.11	2.11	33.02	47.96	250.00	30.83	34.794	-17.13	A.V.
88.680	V	10.11	2.11	33.92	67.96	2500.00	46.14	202.768	-21.82	Peak
88.680	V	10.11	2.11	33.92	47.96	250.00	40.33	103.872	-7.63	A.V.
177.360	H/V						-			Peak
266.040	H/V						-			Peak
354.720	H/V						-			Peak
443.400	H/V						-			Peak
532.080	H/V						-			Peak
620.760	H/V						-			Peak
709.440	H/V						-			Peak
798.120	H/V						-			Peak
886.800	H/V						-			Peak

Remark “ - ”: Except for the above listed emission, the emission of the EUT is too low to be measured. “

Test Engineer: Jay
Jay Zhong

6.4.3. Orthogonal axes: Z

- Frequency range: 30 ~ 1000 MHz
- Test Distance: 3 M
- Temperature: 26
- Relative Humidity: 59
- Test Date: Mar. 14, 2003
- 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 127 °

- Spurious Emissions

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission Level (dBuV/m)	(uV/m)	Margin (dB)	Detect Mode
53.220	H	7.06	1.89	15.97	40.00	100.00	24.92	17.62	-15.08	Peak
70.770	H	5.75	2.31	28.33	40.00	100.00	36.39	65.99	-3.61	Peak
53.220	V	7.06	1.89	22.99	40.00	100.00	31.94	39.54	-8.06	Peak
70.770	V	5.75	2.31	27.76	40.00	100.00	35.82	61.80	-4.18	Peak
106.140	V	11.30	2.52	21.77	43.50	149.62	35.59	60.19	-7.91	Peak
123.690	V	10.95	2.58	15.03	43.50	149.62	28.56	26.79	-14.94	Peak

Field strength of fundamental and harmonics

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	Emission Level (uV/m)	Margin (dB)	Detect Mode
88.680	H	10.11	2.11	31.27	67.96	2500.00	43.49 149.45	-24.47 Peak
88.680	H	10.11	2.11	31.27	47.96	250.00	28.20 25.704	-19.76 A.V.
88.680	V	10.11	2.11	39.50	67.96	2500.00	51.72 385.478	-16.24 Peak
88.680	V	10.11	2.11	39.50	47.96	250.00	46.56 212.814	-1.4 A.V.
177.360	H/V						-	Peak
266.040	H/V						-	Peak
354.720	H/V						-	Peak
443.400	H/V						-	Peak
532.080	H/V						-	Peak
620.760	H/V						-	Peak
709.440	H/V						-	Peak
798.120	H/V						-	Peak
886.800	H/V						-	Peak

Remark “ - ”: Except for the above listed emission, the emission of the EUT is too low to be measured. “

Test Engineer: Jay
Jay Zhong

7. EMI Suppression Component List

No EMI suppression components.

8. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	15.35	1.39
35	13.83	1.74
40	12.41	1.64
45	11.69	1.85
50	7.77	1.73
55	6.68	1.98
60	5.58	1.84
65	5.51	2.25
70	5.43	2.31
75	6.65	2.31
80	8.11	1.96
85	9.23	2.17
90	10.34	2.09
95	10.85	2.30
100	11.36	2.71
110	11.27	2.33
120	11.17	2.31
130	11.17	2.34
140	11.72	2.71
150	10.52	2.52
160	9.39	2.70
170	8.93	2.88
180	9.20	2.26
190	8.98	2.90
200	8.76	2.87
220	10.01	3.03
240	11.20	3.18
260	12.19	2.96
280	12.89	3.30
300	13.56	3.20
320	13.94	3.48
340	14.32	3.60
360	14.69	3.71
380	15.07	4.14
400	15.43	3.94
450	16.08	4.17
500	16.73	4.27
550	17.70	4.41
600	18.69	5.18
650	18.99	5.04
700	19.30	5.06
750	19.84	5.06
800	20.39	5.25
850	20.60	5.40
900	20.82	5.18
950	20.98	6.11
1000	21.15	6.33

9. EMI Suppression Component List

No EMI suppression components.

10. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz~1GHz 3m	Jun. 15, 2002	Radiation (03CH02-HY)
Spectrum Analyzer	R&S	FSP7	838858/039	9KHz – 7GHz	Jan. 20, 2003	Radiation (03CH02-HY)
Receiver	SCHAFFNER	SCR 3501	416	9 KHz –1GHz	Feb. 19, 2003	Radiation (03CH02-HY)
Amplifier	ADVANTEST	BB525C	CH300001	9KHz – 3GHz	Nov. 18, 2002	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2681	30MHz –2GHz	Dec. 21, 2002	Radiation (03CH02-HY)
Turn Table	HD	DS 420	420/649/00	0 ~ 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	HD	MA 240	240/559/00	1 m - 4 m	N/A	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB020	30MHz~1GHz	Jan. 02, 2003	Radiation (03CH02-HY)

Calibration Interval of instruments listed above is one year.

11. 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 Receiver VSWR $\Gamma_1=0.09$ Antenna VSWR $\Gamma_2=0.67$ 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% $U=2U_e(y)$	normal (k=2)	±5.4

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

$U = \{ \{(1/2)^2 + (0.3/2)^2 + (2^2 + 3^2 + 2^2 + 0.25^2 + 2^2) / 3 + (0.54)^2 / 2 \} = 2.7$ 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 Receiver VSWR $\Gamma_1=0.09$ LISN VSWR $\Gamma_2=0.33$ 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% $U=2U_e(y)$	normal (k=2)	±3.32

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