

FCC Radio TEST Report

FCC ID: V4P-MS112OR

Issued Date : Apr. 23, 2008
Project No. : 0801C167
Equipment : 27MHz Wireless Mouse
Model Name. : MS-112OR
Applicant : Shenzhen Fuyeda Industry Development Corp., Ltd.
Address : No.1, Newmen Road, TongSheng Village, Dalang
Street, Bao'an, Shenzhen, China

Tested by:

Neutron Engineering Inc. EMC Laboratory

Date of Test:

Apr. 07, 2008 ~ Apr. 22, 2008

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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.

Table of Contents	Page
1 . CERTIFICATION	5
2 . SUMMARY OF TEST RESULTS	6
2.1 TEST FACILITY	7
2.2 MEASUREMENT UNCERTAINTY	7
3 . GENERAL INFORMATION	8
3.1 GENERAL DESCRIPTION OF EUT	8
3.2 DESCRIPTION OF TEST MODES	9
3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
3.4 DESCRIPTION OF SUPPORT UNITS	11
4 . EMC EMISSION TEST	12
4.1. FIELD STRENGTH OF FUNDAMENTAL EMISSIONS MEASUREMENT	12
4.1.1. LIMIT	12
4.1.2. MEASURING INSTRUMENTS AND SETTING	12
4.1.3. TEST PROCEDURES	13
4.1.4. TEST SETUP LAYOUT	13
4.1.5. TEST DEVIATION	13
4.1.6. EUT OPERATION DURING TEST	13
4.2. 20dBc SPECTRUM BANDWIDTH MEASUREMENT	16
4.2.1.LIMIT	16
4.2.2 MEASURING INSTRUMENTS AND SETTING	16
4.2.3.TEST PROCEDURES	16
4.2.4.TEST SETUP LAYOUT	16
4.2.5.TEST DEVIATION	16
4.2.6. EUT OPERATION DURING TEST	16
4.2.7.TEST RESULT OF 20dB SPECTRUM BANDWIDTH.	17
4.3. RADIATED EMISSIONS MEASUREMENT	18
4.3.1.LIMIT	18
4.3.2.MEASURING INSTRUMENTS AND SETTING	18
4.3.3.TEST PROCEDURES	19
4.3.4.TEST SETUP LAYOUT	20
4.3.5.TEST DEVIATION	20
4.3.6.EUT OPERATION DURING TEST	20
4.3.7.TEST RESULTS (30MHz~1GHz)	21
4.4. BAND EDGE EMISSION MEASUREMENT	23
4.4.1. LIMIT	23
4.4.2. MEASURING INSTRUMENTS AND SETTING	23
4.4.3. TEST PROCEDURES	23

Table of Contents	Page
4.4.4. TEST SETUP LAYOUT	23
4.4.5. TEST DEVIATION	23
4.4.6. EUT OPERATION DURING TEST	23
4.4.7. TEST RESULT OF BAND EDGE AND FUNDAMENTAL EMISSIONS	24
4.5. ANTENNA REQUIREMENTS	25
4.5.1. LIMITS	25
4.5.2. ANTENNA CONNECTOR CONSTRUCTION	25
5 . EUT TEST PHOTO	26

1. CERTIFICATION

Equipment : 27MHz Wireless Mouse
Trade Name : Fuyeda
Model Name. : MS-112OR
Applicant : Shenzhen Fuyeda Industry Development Corp.,Ltd.
Date of Test : Apr. 07, 2008 ~ Apr. 22, 2008
Test Item: ENGINEERING SAMPLE
Standards: FCC Part15, Subpart C(15.227) / ANCI C63.4 : 2003

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-0801C167) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

Applied Standard: 47 CFR FCC Part 15 Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	-	Note(1)
15.227(a)	Field Strength of Fundamental Emissions	PASS	
15.215(c)	20dB Spectrum Bandwidth	PASS	
15.227(b)	Radiated Emissions	PASS	
15.227(b)	Band Edge Emissions	PASS	
15.203	Antenna Requirements	PASS	

NOTE:

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

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.

Neutron's test firm number is 95335

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended 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 :

Test Site	Method	Measurement Frequency Range	U , (dB)	NOTE
C01	ANSI	150 KHz ~ 30MHz	1.94	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U , (dB)	NOTE
OS01	ANSI	30MHz ~ 200MHz	V	3.82	
		30MHz ~ 200MHz	H	3.60	
		200MHz ~ 1,000MHz	V	3.86	
		200MHz ~ 1,000MHz	H	3.94	
OS02	ANSI	30MHz ~ 200MHz	V	2.48	
		30MHz ~ 200MHz	H	2.16	
		200MHz ~ 1,000MHz	V	2.50	
		200MHz ~ 1,000MHz	H	2.66	

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	27MHz Wireless Mouse	
Trade Name	Fuyeda	
Model Name.	MS-112OR	
OEM Brand/Model No.	N/A	
Model Difference	N/A	
Product Description	The EUT is a 27MHz Wireless Mouse	
	Operation Frequency:	27.045 MHz
	Modulation Type:	FSK
	Number Of Channel	1 CH
	Antenna Designation:	Integral antenna
	Max. Field strength	42.56 dBuV/m
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.		
Power Source	DC Voltage from 2*AA size battery	
Power Rating	DC 3Vdc	
Connecting I/O Port(s)	Please refer to the User's Manual	
Products Covered	N/A	
EUT Modification(s)	N/A	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3.2 DESCRIPTION OF TEST MODES

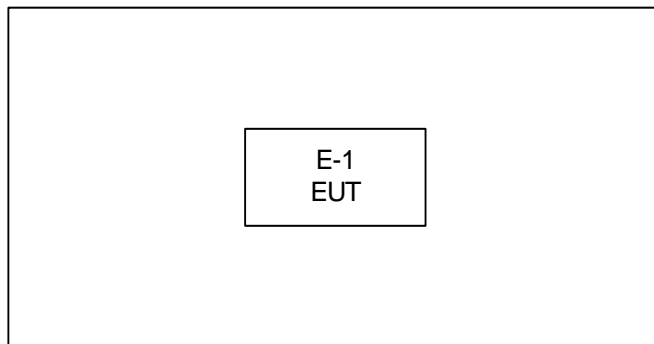
To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration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

Pretest Mode	Description
Mode 1	TX CH 01-27.945MHz

For Conducted Test	
Final Test Mode	Description
	N/A - denotes test is not applicable in this test report

For Radiated Test	
Final Test Mode	Description
Mode 1	TX CH 01-27.945MHz

3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	27MHz Wireless Mouse	Fuyeda	MS-112OR	V4P-MS112OR	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

4. EMC EMISSION TEST

4.1. FIELD STRENGTH OF FUNDAMENTAL EMISSIONS MEASUREMENT

4.1.1. LIMIT

The field strength of emissions within these bands specified at a distance of 3 meters shall comply with the following table.

Frequency Band	Fundamental Emissions Limit (dBuV/m) at 3m
26.96 ~ 27.28 MHz	80 (Average)
26.96 ~ 27.28 MHz	100 (Peak)

4.1.2. MEASURING INSTRUMENTS AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Log-Bicon Antenna	Schwarzbeck	VULB 9160	3058	Nov. 27, 2008
2	Test Cable	N/A	10M_OS02	N/A	Nov. 27, 2008
3	Test Cable	N/A	OS02-1/-2/-3	N/A	Nov. 27, 2008
4	Pre-Amplifier	Anritsu	MH648A	M09961	Nov. 27, 2008
5	EMI Test Receiver	R&S	ESCI	100082	Jan. 30, 2009
6	Antenna Mast	Chance Most	CMTB-1.5	N/A	N/A
7	Turn Table	Chance Most	CMTB-1.5	N/A	N/A
8	Spectrum Analyzer	R&S	FSP_40	100129	Jan. 07, 2009
9	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-325	Oct. 24, 2008
10	Horn Antenna	Schwarzbeck	BBHA9170	9170187	Oct. 25, 2008
11	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Mar. 09, 2009
12	Microflex Cable	United Microwave	57793	1m	Mar. 09, 2009
13	Microflex Cable	United Microwave	A30A30-500 6	10M	Jul. 07, 2008

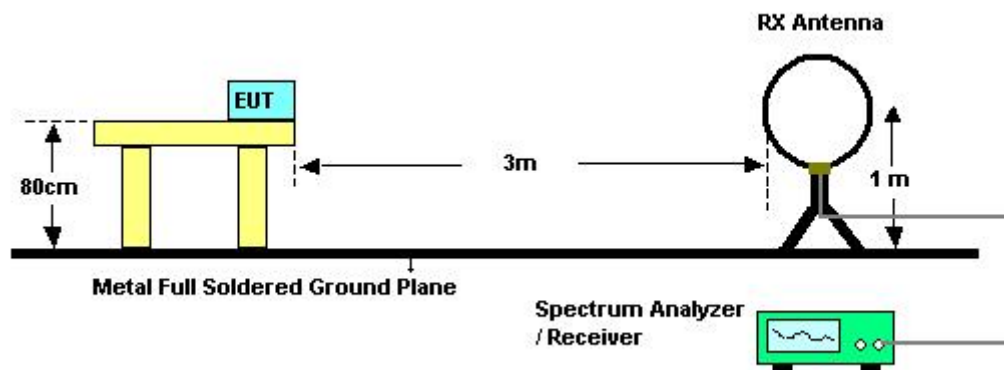
Please refer to section 5 in this report. The following table is the setting of the receiver.

Receiver Parameter	Setting
Attenuation	Auto
Center Frequency	Fundamental Frequency
RB	9 kHz
Detector	Peak / Average

4.1.3. TEST PROCEDURES

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure peak and average reading.
5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

4.1.4. TEST SETUP LAYOUT



4.1.5. TEST DEVIATION

There is no deviation with the original standard.

4.1.6. EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.

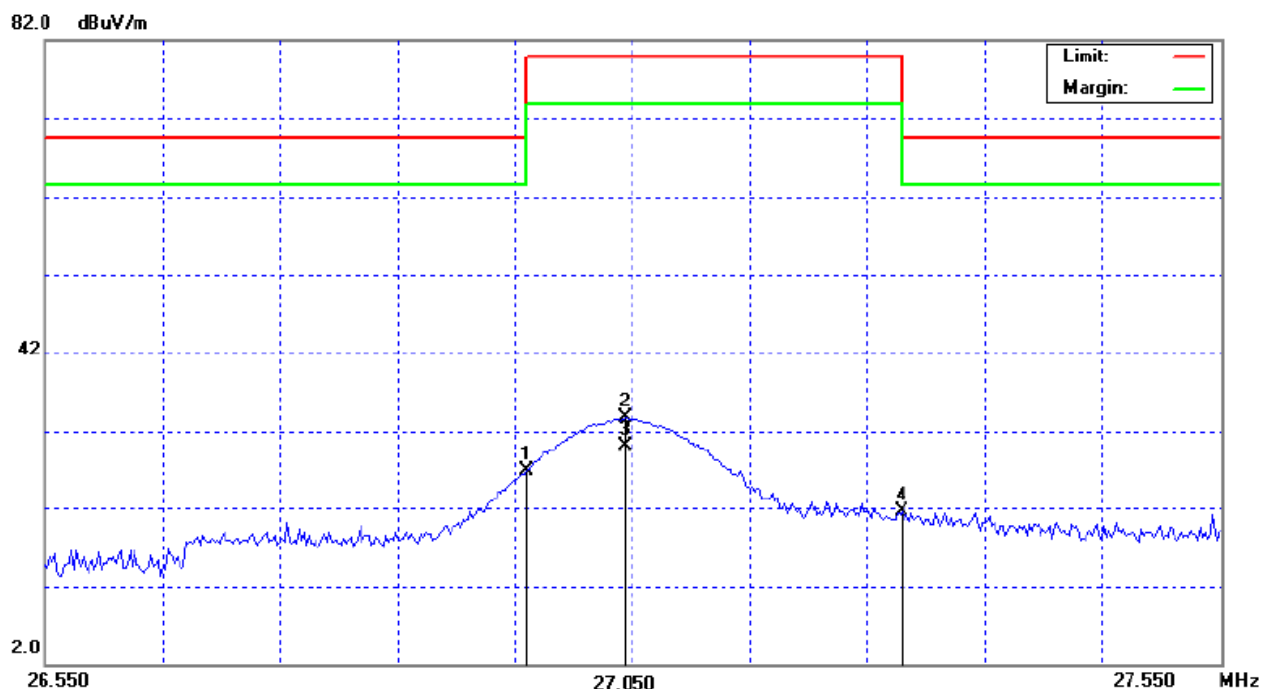
4.1.7. TEST RESULT OF FIELD STRENGTH OF FUNDAMENTAL EMISSIONS

EUT :	27MHz Wireless Mouse	Model Name :	MS-112OR
Temperature :	26 °C	Relative Humidity :	58%
Pressure :	1010hPa	Test Voltage :	DC 3V
Test Mode :	TX CH01-27.045MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
26.96	V	36.70	-9.71	26.99	69.50	- 42.51	E/QP
27.04	V	43.36	-9.75	33.61	100.00	- 46.39	F/PK
27.04	V	39.76	-9.75	30.01	80.00	- 49.99	F/AV
27.28	V	31.39	-9.85	21.54	69.50	- 47.96	E/QP

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz .
- (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 .

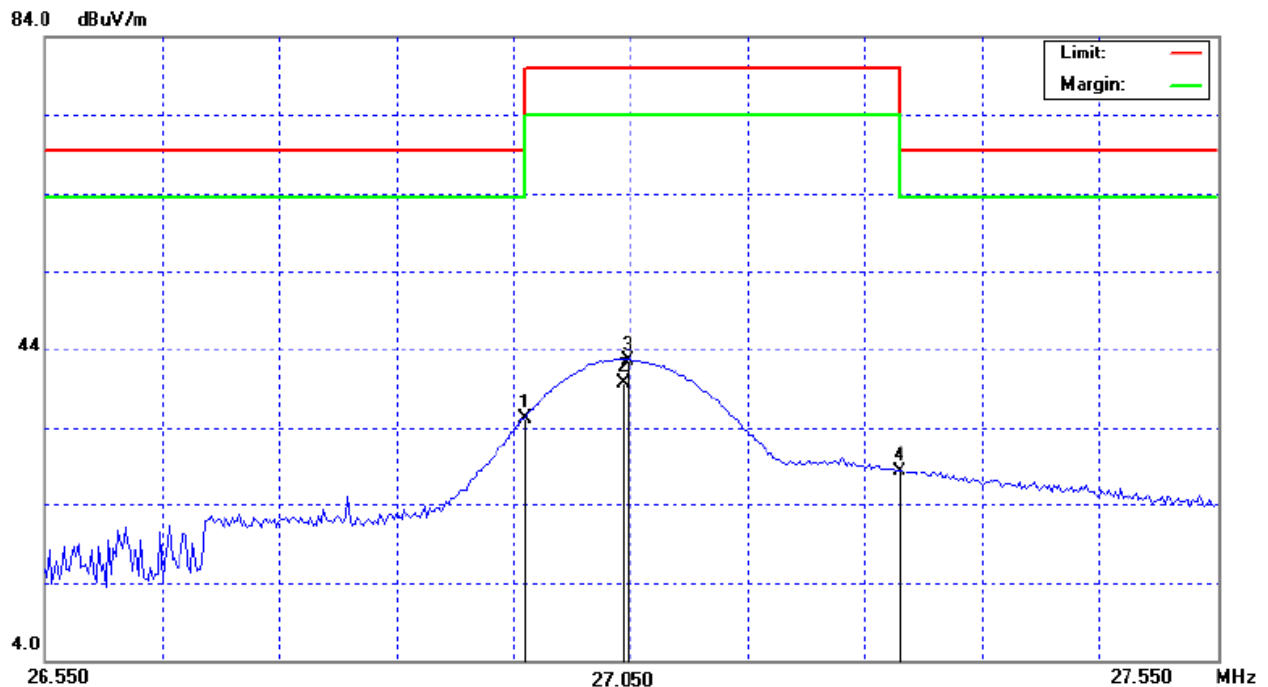


EUT :	27MHz Wireless Mouse	Model Name :	MS-112OR
Temperature :	26 °C	Relative Humidity :	60%
Pressure :	1010 hPa	Test Power :	DC 3V
Test Mode :	TX Mode 27.045MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
26.96	H	44.88	-9.71	35.17	69.50	- 34.33	E/QP
27.04	H	49.45	-9.75	39.70	80.00	- 40.30	F/AV
27.05	H	52.31	-9.75	42.56	100.00	- 57.44	F/PK
27.28	H	38.15	-9.85	28.30	69.50	- 41.20	E/QP

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz .
- (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 .



4.2. 20dBc SPECTRUM BANDWIDTH MEASUREMENT

4.2.1.LIMIT

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (26.96 ~ 27.28 MHz).

4.2.2 MEASURING INSTRUMENTS AND SETTING

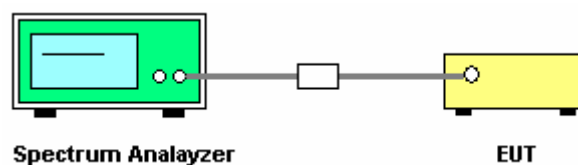
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 20dB Bandwidth
RB	1 kHz
VB	1 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.2.3.TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 1 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.

4.2.4.TEST SETUP LAYOUT



4.2.5.TEST DEVIATION

There is no deviation with the original standard.

4.2.6. EUT OPERATION DURING TEST

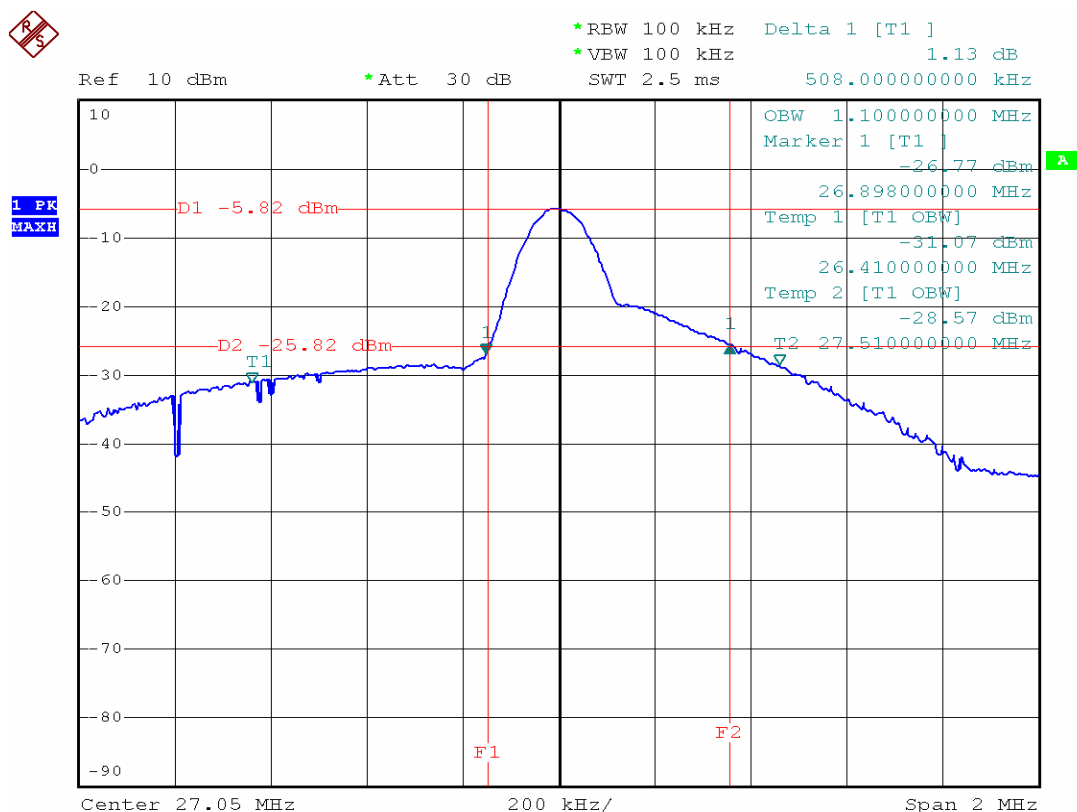
The EUT was programmed to be in continuously transmitting mode.

4.2.7.TEST RESULT OF 20dB SPECTRUM BANDWIDTH.

EUT :	27MHz Wireless Mouse	Model Name :	MS-112OR
Temperature :	26 °C	Relative Humidity :	60%
Pressure :	1010 hPa	Test Power :	DC 3V
Test Mode :	TX CH 01-27.045MHz		

Frequency	20dB BW (kHz)	99% OBW (MHz)	Frequency range (MHz) $f_L > 26.96\text{MHz}$	Frequency range (MHz) $f_H < 27.28\text{MHz}$	Test Result
27.045 MHz	508	1.10			Complies

20 dBc 99% Bandwidth Plot on 27.045 MHz



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4.3. RADIATED EMISSIONS MEASUREMENT

4.3.1.LIMIT

The field strength of any emissions which appear outside of 26.96 ~ 27.28 MHz band shall not exceed the general radiated emissions limits in Section 15.209(a)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.3.2.MEASURING INSTRUMENTS AND SETTING

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Log-Bicon Antenna	Schwarzbeck	VULB 9160	3058	Nov. 27, 2008
2	Test Cable	N/A	10M_OS02	N/A	Nov. 27, 2008
3	Test Cable	N/A	OS02-1/-2/-3	N/A	Nov. 27, 2008
4	Pre-Amplifier	Anritsu	MH648A	M09961	Nov. 27, 2008
5	EMI Test Receiver	R&S	ESCI	100082	Jan. 30, 2009
6	Antenna Mast	Chance Most	CMTB-1.5	N/A	N/A
7	Turn Table	Chance Most	CMTB-1.5	N/A	N/A
8	Spectrum Analyzer	R&S	FSP_40	100129	Jan. 07, 2009
9	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-325	Oct. 24, 2008
10	Horn Antenna	Schwarzbeck	BBHA9170	9170187	Oct. 25, 2008
11	Microwave Pre_amplifier	Agilent	8449B	3008A01714	Mar. 09, 2009
12	Microflex Cable	United Microwave	57793	1m	Mar. 09, 20009
13	Microflex Cable	United Microwave	A30A30-500 6	10M	Jul. 07, 2008

Please refer to section 5 in this report. The following table is the setting of receiver.

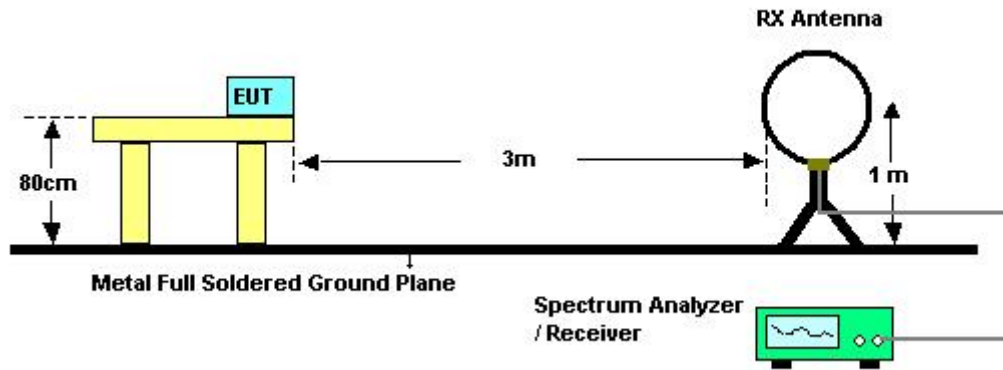
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.3.3.TEST PROCEDURES

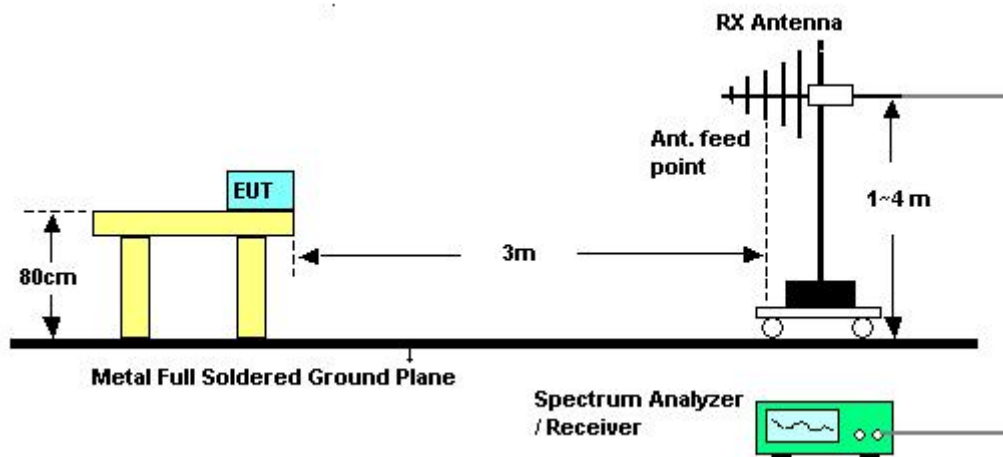
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
7. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.3.4. TEST SETUP LAYOUT

For radiated emissions below 30MHz



For radiated emissions above 30MHz



4.3.5. TEST DEVIATION

There is no deviation with the original standard.

4.3.6. EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.

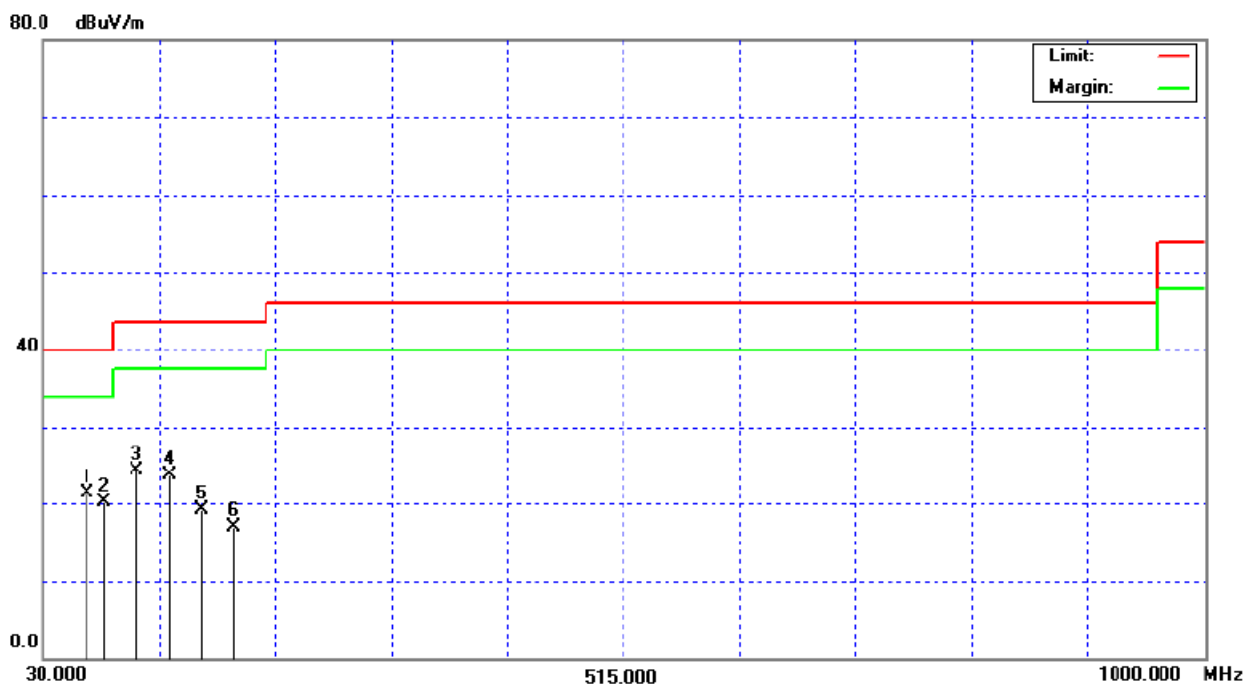
4.3.7.TEST RESULTS (30MHz~1GHz)

EUT :	27MHz Wireless Mouse	Model Name :	MS-112OR
Temperature :	26 °C	Relative Humidity :	60%
Pressure :	1010 hPa	Test Power :	DC 3V
Test Mode :	TX Mode 27.045MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
66.86	V	44.30	-22.94	21.36	40.00	- 18.64	
80.44	V	42.25	-22.13	20.12	40.00	- 19.88	
107.60	V	45.40	-21.04	24.36	43.50	- 19.14	
134.76	V	45.47	-21.69	23.78	43.50	- 19.72	
161.92	V	39.04	-20.00	19.04	43.50	- 24.46	
189.08	V	36.48	-19.52	16.96	43.50	- 26.54	

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz .
- (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 .

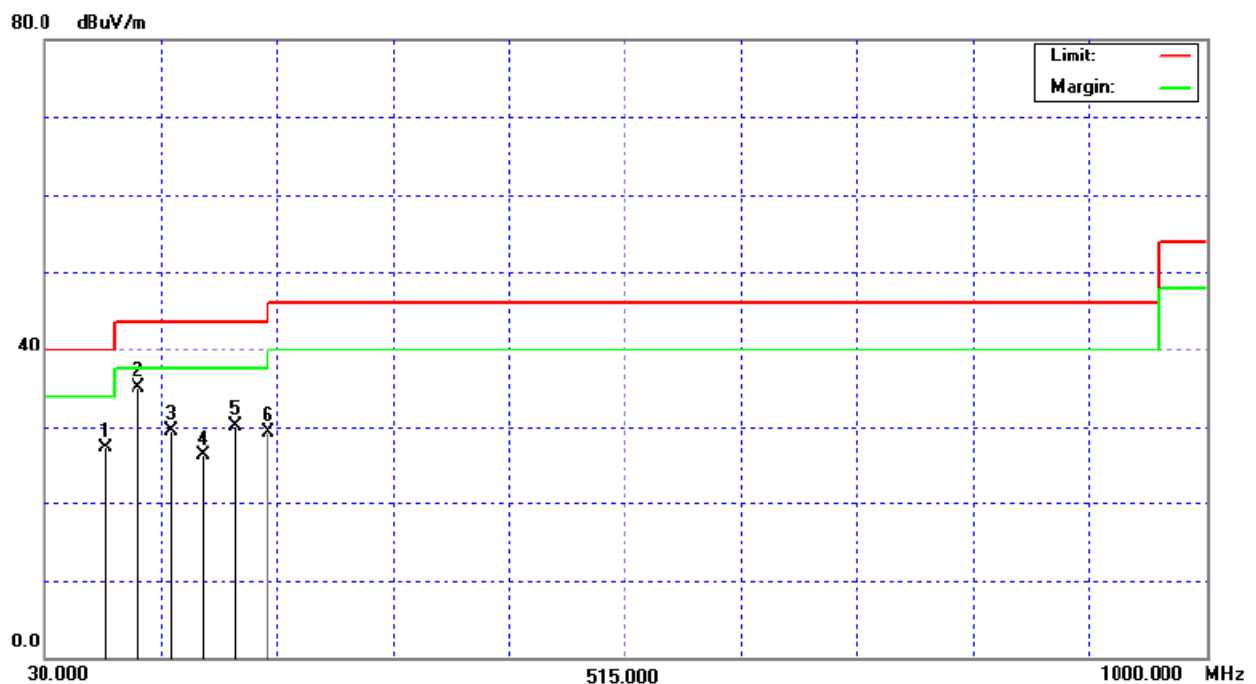


EUT :	27MHz Wireless Mouse	Model Name :	MS-112OR
Temperature :	26 °C	Relative Humidity :	60%
Pressure :	1010 hPa	Test Power :	DC 3V
Test Mode :	TX Mode 27.045MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
80.44	H	49.50	-22.13	27.37	40.00	- 12.63	
107.60	H	56.22	-21.04	35.18	43.50	- 8.32	
134.76	H	51.16	-21.69	29.47	43.50	- 14.03	
161.92	H	46.31	-20.00	26.31	43.50	- 17.19	
189.08	H	49.61	-19.52	30.09	43.50	- 13.41	
216.24	H	47.76	-18.37	29.39	46.00	- 16.61	

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz .
- (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 .



4.4. BAND EDGE EMISSION MEASUREMENT

4.4.1. LIMIT

Band edge emissions outside of the frequency bands shown in below table.

Outside Frequency Band Edge	Limit (dBuV/m) at 3m
Low band edge	69.54 (QP)
High band edge	69.54 (QP)

4.4.2. MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the receiver.

Receiver Parameter	Setting
Attenuation	Auto
Center Frequency	Fundamental Frequency
RB	9 KHz
Detector	QP or Peak

4.4.3. TEST PROCEDURES

The test procedure is the same as section 4.2.3, only the frequency range investigated is limited to 2MHz around bandedges.

4.4.4. TEST SETUP LAYOUT

This test setup layout is the same as that shown in section 4.2.4.

4.4.5. TEST DEVIATION

There is no deviation with the original standard.

4.4.6. EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.

4.4.7. TEST RESULT OF BAND EDGE AND FUNDAMENTAL EMISSIONS

EUT :	27MHz Wireless Mouse	Model Name :	MS-112OR
Temperature :	26 °C	Relative Humidity :	60%
Pressure :	1010 hPa	Test Power :	DC 3V
Test Mode :	TX Mode 27.045MHz		

Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
26.96	V	36.70	-9.71	26.99	69.50	- 42.51	E/QP
27.28	V	31.39	-9.85	21.54	69.50	- 47.96	E/QP

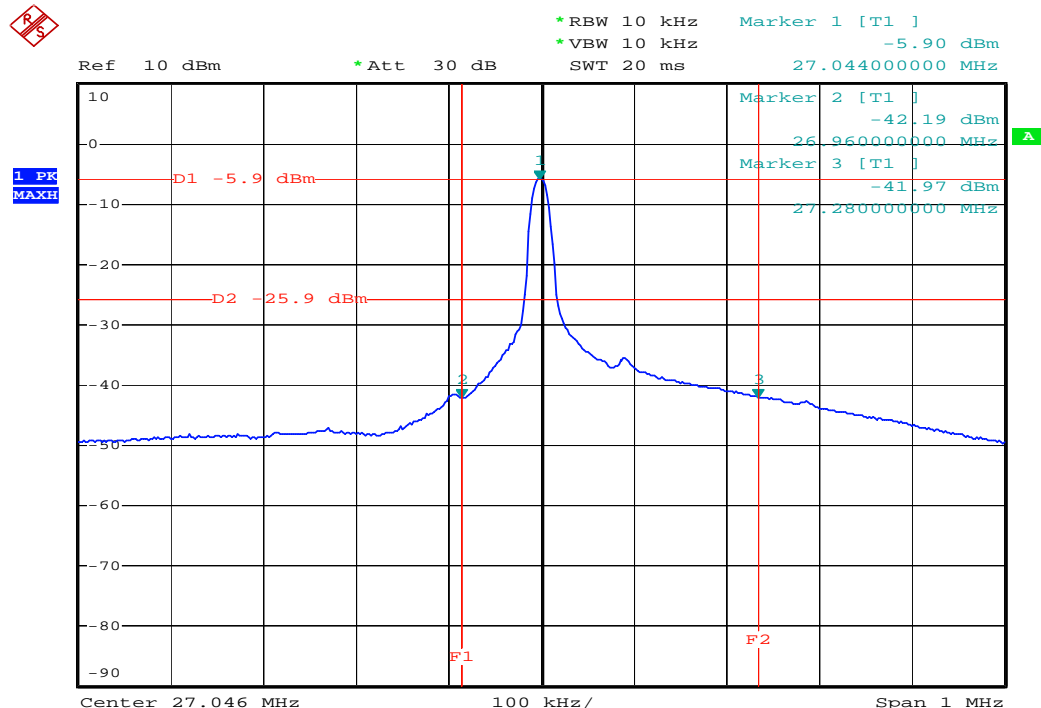
Freq. (MHz)	Ant. H/V	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Margin (dB)	Note
26.96	H	44.88	-9.71	35.17	69.50	- 34.33	E/QP
27.28	H	38.15	-9.85	28.30	69.50	- 41.20	E/QP

Note:

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

Low /High Band Edge Plot on 27.045 MHz



Date: 23.APR.2008 05:10:32

4.5. ANTENNA REQUIREMENTS

4.5.1. LIMITS

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.5.2. ANTENNA CONNECTOR CONSTRUCTION

Please refer to section 3.3 in this test report, all antenna connectors comply with the requirements.

5. EUT TEST PHOTO

Radiated Measurement Photos

