ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CERTIFICATION

Test report file number	**: E018R-013**
Applicant	**: Wingcom Co., Ltd.**
Address	**: 951-25 Bongchunbon-dong, Kwanak-gu, Seoul, 150-069, Korea**
Manufacturer	**: Wingcom Co., Ltd.**
Address	**: 951-25 Bongchunbon-dong, Kwanak-gu, Seoul, 150-069, Korea**
Type of Equipment	**: Wireless Mouse**
FCC ID	**: PR7WM-210T**
Model / Type No.	**: WM-210T**
Serial number	**: N/A**
Total page of Report	**: 10 pages (including this page)**
Date of Incoming	**: July 16, 2001**
Date of issuing	**: August 14, 2001**

SUMMARY

The equipment complies with the regulation; ***FCC PART 15 SUBPART C, Section 15.227***.

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

Reviewed by: Youm Kyoom. Nam
Y. K. Nam / Assist. Chief Engineer
EMC Dept.
ONETECH Corp.

Approved by: Young Kwon
Y. K. Kwon / Chief Engineer
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1. VERIFICATION OF COMPLIANCE

APPLICANT	: Wingcom Co., Ltd.
ADDRESS	: 951-25 Bongchunbon-dong, Kwanak-gu, Seoul, 150-069, Korea
CONTACT PERSON	: James Lee / President
TELEPHONE NO	: +82-2-874-1811
FCC ID	: PR7WM-210T
MODEL NO/NAME	: WM-210T
SERIAL NUMBER	: N/A
DATE	: August 14, 2001

DEVICE TYPE	Wireless Mouse - INTENTIONAL RADIATOR
E.U.T. DESCRIPTION	Wireless Mouse - TRANSMITTER
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/1992
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C §15.207, §15.209 and §15.227
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. GENERAL INFORMATION

2.1 Product Description

The Wingcom Co., Ltd., Model WM-210T (referred to as the EUT in this report) is a Wireless Mouse for a personal computer that transmits the signal to **the receiver, M/N: WM-210R, FCC ID: PR7WM-210R** which was connected to the mouse port of a personal computer. The product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic – Non Coated
TX FREQUENCY	27.240 MHz – 1 Channel
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	4.00 MHz, 27.240 MHz
TRANSMISSION DISTANCE	1.0m ~ 2.0m
RESOLUTION	400 DPI
ANTENNA TYPE	Built-in on the PCB in the EUT
RATED SUPPLY VOLTAGE	DC 3V (AAA size Alkaline Battery x 2)
NUMBER OF LAYERS	2 Layers

Model Differences:

-. No other model differences have been mentioned

2.2 Related Submittal(s) / Grant(s)

-. None

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2.3 Test System Details

The EUT was tested with the following all equipment used in the tested systems are: None

2.4 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4/1992. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-080 Korea. Description details of test facilities were submitted to the Commission on January 12, 1999. (Registration Number: 92819)

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
MAIN B/D	Wingcom Co., Ltd.	WM-210T	N/A

3.2 EUT exercise Software

To get a maximum radiated emission and activate continuous transmission from the EUT, the software was changes as follows.
The EUT transmits signal after sensing ‘ON” signal on one of 3 Encoder X, Y or Z. So the manufacturer changed the software in order to detect “ON” signal on one of 3 Encoder X, Y or Z continuously.

3.3 Equipment Modifications

To achieve compliance to limit levels, the following change(s) was made by ONETECH Corp during compliance testing: Not Applicable

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3.4 Configuration of Test System

Line Conducted Test: It does not need to test this requirement, because the EUT supplies from a DC battery.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4/1992 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3meter open area test site.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

3.5 Antenna Requirement

According to§15.203, 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.

Antenna Construction:

The transmitter antenna of the EUT is built-in on the PCB in the EUT, no consideration of replacement by the user.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
N/A	N/A
It is not need to test this requirement, because the power of the EUT is supplied from a DC battery.	

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
TX mode	X

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5. FINAL RESULT OF MEASURMENT

5.1 Field Strength of the Carrier Test

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 48 % Temperature : 26•

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.227(a)

Type of Test : Intentional Radiator

Result : PASSED BY – 24.60 dB

EUT : Wireless Mouse (TRANSMITTER) Date: August 13, 2000

Operating Condition : TX mode

Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Carrier Freq. (MHz)	Amp. (dBuV)	Detect Mode	Pol.	Ant. (dBuV)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
27.240	47.30	Peak	V	7.30	0.80	55.40	80.00	-24.60
27.240	36.30	Peak	H	7.30	0.80	44.40	80.00	-35.60

*Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the X, Y, and Z planes.

Tested by: Seung-Hyun, Nam / Test Engineer

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5.2 Spurious Emission Test

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 48 % Temperature : 25•

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209(a)

Type of Test : Intentional Radiator

Result : PASSED BY –4.51 dB at 217.6 MHz

EUT : Wireless Mouse (TRANSMITTER) Date: August 13, 2001

Operating Condition : TX mode

Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Carrier Freq. (MHz)	Amp. (dBuV)	Detect Mode	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
54.49	20.20	Peak	V	10.83	0.97	32.00	40.00	-8.00
81.73	19.20	Peak	V	6.66	1.03	26.89	40.00	-13.11
163.49	15.40	Peak	V	14.48	1.40	31.28	43.50	-12.22
190.72	19.40	Peak	H	16.40	1.51	37.31	43.50	-6.19
217.60	28.00	Peak	H	11.83	1.66	41.49	46.00	-4.51
245.00	27.00	Peak	H	12.29	1.80	41.09	46.00	-4.91
272.40	23.30	Peak	H	13.95	1.88	39.13	46.00	-6.87
299.80	16.90	Peak	H	15.21	2.00	34.11	46.00	-11.89
354.60	16.30	Peak	H	15.25	2.30	33.85	46.00	-12.15
463.16	12.80	Peak	V	17.29	2.58	32.67	46.00	-13.33
517.80	16.40	Peak	V	18.38	2.72	37.50	46.00	-8.50
545.20	15.70	Peak	V	18.53	2.76	36.99	46.00	-9.01
572.60	11.90	Peak	V	18.66	2.86	33.42	46.00	-12.58
600.00	12.40	Peak	V	18.78	2.90	34.08	46.00	-11.92

*Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

Tested by: Seung-Hyun, Nam / Test Engineer

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6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)

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7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	OCT/00	12MONTH	
2.	Test receiver	R/S	ESHS10	834467/007	APR/01	12MONTH	
3.	Spectrum analyzer	HP	8568B	3026A0226	SEP/00	12MONTH	
4.	RF preselector	HP	85685A	3107A01264	SEP/00	12MONTH	
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	SEP/00	12MONTH	
6.	Dipole Antenna	EMCO	3121C	9107-745	JUN/00	12MONTH	
7.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	MAR/01	12MONTH	
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	JUN/01	12MONTH	
9.	Loop Antenna	EMCO	6502	9108-2668	DEC/01	12MONTH	
10.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUN/01	12MONTH	
11.	RF Amplifier	HP	8447F	3113A04554	JUN/01	N/A	
12.	Spectrum Analyzer	HP	8591A	3131A02312	APR/01	12MONTH	
13.	Computer System Hard disk drive	HP	98581C 9153C	98543A CMC762Z9153	N/A N/A	N/A N/A	
14.	Plotter	HP	7475A	30052 22986	N/A	N/A	
15.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	
16.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	
17.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	

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