



ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

Test report file number : E018R-012

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-210R

Model / Type No. : WM-210R

Serial number : N/A

Total page of Report : 13 pages (including this page)

Date of Incoming : July 16, 2001

Date of issuing : August 14, 2001

SUMMARY

The equipment complies with the regulation; **FCC CFR 47 PART 15 SUBPART B, Class B.**

This test report contains only the results 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:

Y. K. Nam / Assist. Chief Engineer
EMC Dept.
ONETECH Corp.

Approved by:

Y. K. Kwon / Chief Engineer
EMC Dept.
ONETECH Corp.



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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-210R
MODEL NO/NAME : WM-210R
SERIAL NUMBER : N/A
DATE : August 14, 2001

DEVICE TYPE	Peripheral Device for Class B Computing Device -Unintentional Radiator
E.U.T. DESCRIPTION	Wireless Mouse - Receiver
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 SECTION 15.101
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.



2. GENERAL INFORMATION

2.1 Product Description

The Wingcom Co., Ltd., Model WM-210R (refer to the EUT in this report) is a Receiver of the Wireless Mouse that receives the RF signal from the **transmitter**, **M/N: WM-210T, FCC ID: PR7WM-210T** which was manufactured by Wingcom Co., Ltd. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic – Non Coated
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	10.240 MHz, 16.545 MHz on the main board
NUMBER OF LAYERS	2 Layers
EXTERNAL CONNECTOR	PS/2 Port
POWER INPUT VOLTAGE & CONSUMPTION	DC 5V supplied from a PC

Model Differences:

- None

2.2 Related Submittal(s) / Grant(s)

Original submittal only.



2.3 Test System Details

The model numbers for all the equipments which were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
WM-210R	Wingcom Co., Ltd.	PR7WM-210R	RECEIVER (EUT)	PC
DCM	DELL COMPUTER	DoC	PERSONAL COMPUTER	-
AV-5T	KDS	EVOKD-1510T	MONITOR	PC
WM-210T	Wingcom Co., Ltd.	PR7WM-210T	TRANSMITTER	-
2225C	HP	DSI6XU2225	PRINTER	PC
020-0470	CARDINAL	GDE0196	MODEM	PC
SKR-1032	SEJIN	GJJSKR-1032B	KEYBOARD	PC

2.4 Test Methodology

Both conducted and 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-210R	N/A

3.2 EUT exercise Software

- 1) The EUT receives the signal from the transmitter continuously.
- 2) The windows program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. This program was included into HOST. Once loaded, this program sequentially exercises each system component in turn. The sequence used is:(1) series of "H" characters are printed on the monitor until the screen is completely full, (2) copy series of "H" characters to mass storage device (if one is used), (3) print series of "H" characters to printer. The complete cycle takes about 20 seconds and is repeated continuously.

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
RECEIVER (EUT)	N/A	N	1.2 (D)
PERSONAL COMPUTER	N	-	1.5 (P)
MONITOR	N	Y	1.5 (P), 1.5 (D)
TRANSMITTER	-	-	-
PRINTER	N	Y	1.5(P), 1.8(D)
MODEM	N	Y	1.5(P), 1.2(D)
KEYBOARD	N/A	N	1.2(D)

* The marked "(P)" means the Power Cable and "(D)" means the Data Cable.



3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
RECEIVER (EUT)	N	N/A	Y	PC END
PERSONAL COMPUTER	-	-	-	-
MONITOR	Y	BOTH END	Y	PC END
TRANSMITTER	-	-	-	-
PRINTER	N	N/A	Y	BOTH END
MODEM	N	N/A	Y	BOTH END
KEYBOARD	N	N/A	Y	PC END

3.5 Equipment Modifications

-.. None

3.6 Configuration of Test System

Line Conducted Test: The EUT was connected to mouse port of the PC, and the power line of PC was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emission test was conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3 meters open area test site.



4. PRELIMINARY TEST

4.1 Conducted Emission Test

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
STANDBY MODE	
RX MODE	X

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
STANDBY MODE	
RX MODE	X



5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1 Conducted Emission Test

Humidity Level : 49 % Temperature : 25 •
Limits apply to : FCC CFR 47, PART 15, SUBPART B
Type of Test : CLASS B
Result : PASSED BY -7.79 dB at 0.63 MHz

EUT : Wireless Mouse (RECEIVER) Date: August 14, 2001
Operating Condition : RX MODE
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Power Line Conducted Emission			FCC CLASS B	
Frequency (MHz)	Amplitude (dB _u V)	Conductor	Limit (dB _u V)	Margin (dB)
0.49	39.38	NEUTRAL	48.00	-8.62
0.56	39.82	NEUTRAL	48.00	-8.18
0.63	40.21	HOT	48.00	-7.79
0.70	39.36	HOT	48.00	-8.64
1.12	40.16	NEUTRAL	48.00	-7.84
1.19	38.05	HOT	48.00	-9.95
27.24	40.06	NEUTRAL	48.00	-7.94

Line Conducted Emission Tabulated Data

Tested by: Seung Hyun, Nam / Test Engineer



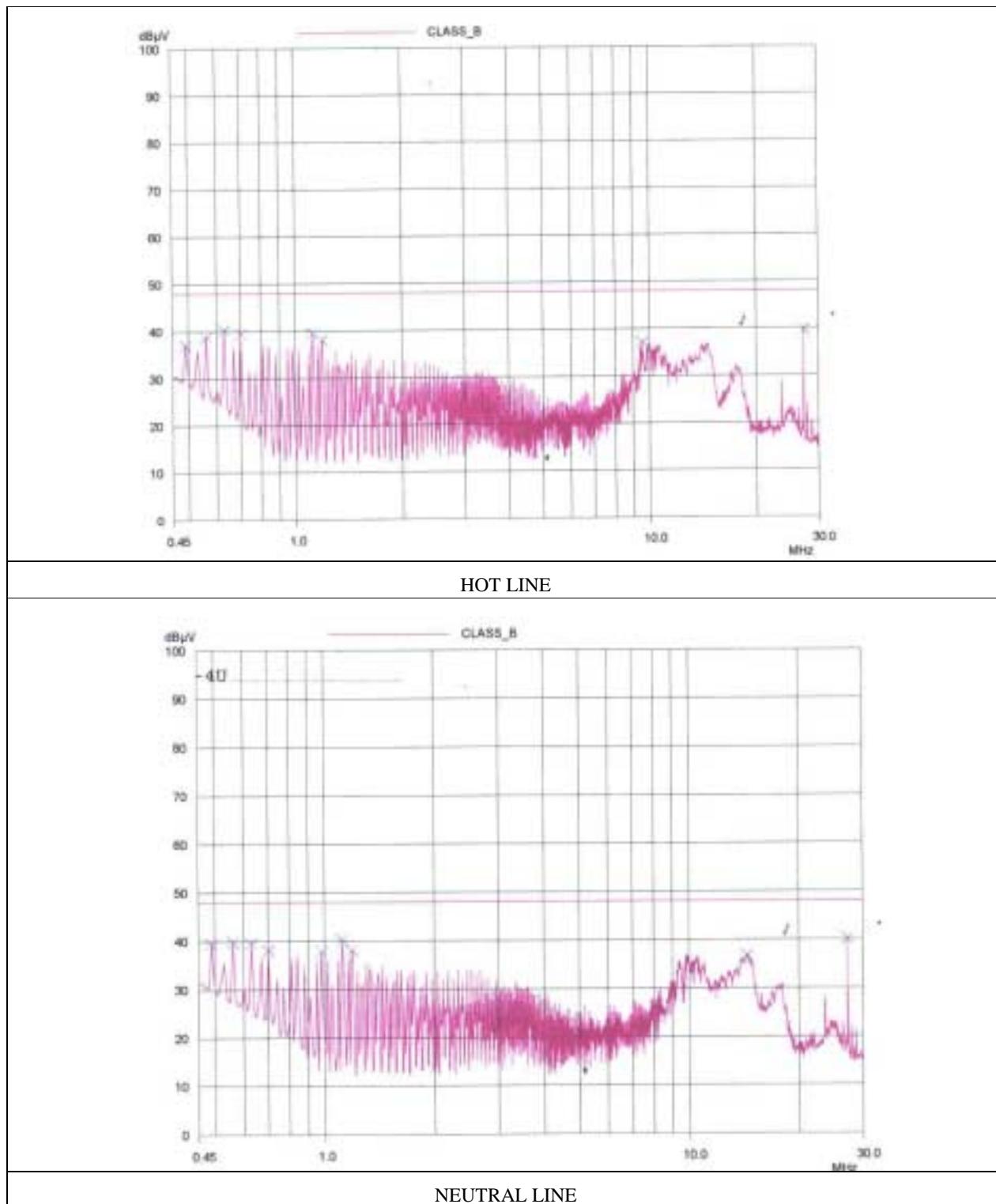
ONETECH

Testing & Evaluation Lab.

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File No.: E018R-012



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FCC-004 (Rev.0)

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-121, Korea

(TEL: 82-31-746-8500 FAX: 82-31-746-8700)

EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-860 Korea. (TEL: 82-31-765-8289 FAX: 82-31-766-2904)



5.2 Radiated Emission Test

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

Humidity Level	: <u>45 %</u>	Temperature : <u>26•</u>
Limits apply to	: <u>FCC CFR 47, PART 15, SUBPART B</u>	
Type of Test	: <u>CLASS B</u>	
Result	: <u>PASSED BY – dB at MHz</u>	

EUT	: Wireless Mouse (RECEIVER)		Date: August 13, 2001
Operating Condition	: RX MODE		
Detector	: CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)		
Distance	: 3 Meter		

Radiated Emission		Ant	Correction Factors		Total	FCC CLASS B	
Freq. (MHz)	Amp. (dBuV)		Ant. (dBuV/m)	Cable (dB)		Amp. (dBuV/m)	Limit (dBuV/m)
It was not observed any emissions from the EUT.							

Radiated Emission Tabulated Data

Tested by: Seung Hyun, Nam / Test Engineer



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)

**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.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUN/01	12MONTH	
10.	RF Amplifier	HP	8447F	3113A04554	JUN/01	N/A	
11.	Spectrum Analyzer	HP	8591A	3131A02312	APR/01	12MONTH	
12.	Computer System Hard disk drive	HP	98581C 9153C	98543A CMC762Z9153	N/A N/A	N/A N/A	
13.	Plotter	HP	7475A	30052 22986	N/A	N/A	
14.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	
15.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	
16.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	