

FCC EVALUATION REPORT FOR CERTIFICATION

Manufacturer : OHSUNG ELECTRONICS CO., LTD
#181 Gongdan-Dong, Gumi-Si
Gyeongsangbuk-Do, Korea
Attn : Mr. Kwang-Jae Ok / Team Leader of Q.C

Date of Issue : August 9, 2006
Test Report S/N : GETEC-E3-06-058
Test Site : Gumi College EMC Center

FCC ID

OZ5URCRFX250

APPLICANT

OHSUNG ELECTRONICS CO., LTD


Rule Part(s) : FCC Part 15 Subpart B
Equipment Class : Communications Receiver used with Part 15 Transmitter (CYY)
EUT Type : Remote Control Receiver
Trade Name : URC
Model No. : RFX-250

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003


I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the vest of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by,

Reviewed by,



Jae-Hoon Jeong, Senior Engineer
GUMI College EMC center



Tae-Sig Park, Technical Manger
GUMI College EMC center

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Scope: Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.

1. General Information

Applicant: OHSUNG ELECTRONICS CO., LTD.

Applicant Address: #181 Gongdan-Dong, Gumi-Si, Gyeongsangbuk-do, Korea

Manufacturer: OHSUNG ELECTRONICS CO., LTD

Manufacturer Address: #181 Gongdan-Dong, Gumi-Si, Gyeongsangbuk-do, Korea

Contact Person: Mr. Kwang-Jae Ok / Team Leader Q.C

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- **FCC ID.** OZ5URCRFX250
- **Equipment Class** Communications Receiver used with Part 15 Transmitter (CYY)
- **EUT Type** Remote Control Receiver
- **Power Source** DC 5V
- **Model No.** RFX-250
- **Rule Part(s)** FCC Part 15, Subpart B
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.4 (2003)
- **Dates of Test** July 27, 2006
- **Place of Test** **Gumi College EMC Center** (FCC Registration No.: 100749)
407, Bugok-Dong, Gumi-si, Gyeongsangbuk-Do, Korea
- **Test Report No.** GETEC-E3-06-058
- **Dates of Issue** August 9, 2006

2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **OHSUNG ELECTRONICS CO., LTD. Remote Control Receiver (Model No.: RFX-250)**

These measurement tests were conducted at **Gumi College EMC Center**.

The site address is 407, Bugok-Dong, Gumi-si, Gyeongsangbuk-Do, Korea

This test site is one of the highest point of Gumi 1 college at about 200 kilometers away from Seoul city and 40 kilometers away from Daege city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 on October 19, 1992



Fig 1. The map above shows the Gumi College in vicinity area.

3. Product Information

3.1 Description of EUT

The Equipment Under Test (EUT) is the **OHSUNG ELECTRONICS CO., LTD. Remote Control Receiver (Model No.: RFX-250) FCC ID.:OZ5URCRFX250**

Power Supply	: DC 5V
RF Receiving Frequency	: 418MHz
External Connector	: Phone Jack, 3Pin terminal Wafer.
TV or FM Turner RF module	: KTA418M0OSKI (OH SUNG ELECTRONICS CO.,LTD)
Crystal, Clock Frequency	: 6.364063MHz
Number of Layer	: 2 Layer

3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model No.	S/N & FCC ID
Base station	OH SUNG Electronics Inc	MRF-300	S/N: N/A FCC ID: DoC
RF remote transmitter	OH SUNG Electronics Inc	MX-850	S/N: N/A FCC ID: OZ5URCMX700

See "Appendix E – Test Setup Photographs" for actual system test set-up

3.2.2 Used Cable(s)

Cable No.	Condition	Description
Power cable	Connected to the EUT and Base station	1.8m unshielded
Signal & Power cable	Connected to the Base station	3.6m shielded
ANT cable	Connected to the EUT	0.18m shielded

3.3 Modification Item(s)

- None

4. Description of tests

4.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used. The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.

The representative and worst test mode(s) were noted in the test report.

- Test Voltage / Frequency : DC 5V
- Test Mode(s)
 - . RF receiving mode.

4.2 Radiated Emission

Preliminary measurements were conducted 3m semi anechoic chamber using broadband antennas to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The technology configuration, mode of operation and turntable azimuth with respect to antenna was note for each frequency found.

The spectrum was scanned from 30 to 1000MHz using bicornical log antenna (Schwarzbeck, VULB9160). Above 1GHz, horn antenna (Schwarzbeck, BBHA9120D) was used.

Final measurements were made outdoors at 3m/10m-test range.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was re-examined and investigated using EMI test receiver.

The detector function was set to CISPR quasi-peak mode average mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency or type of signal.

The EUT, support equipment and interconnecting cables were reconfigured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8m high non-metallic 1.0×1.5 meter table.

The turntable containing the test sample was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission.

Each EME reported was calibrated using the R/S signal generator

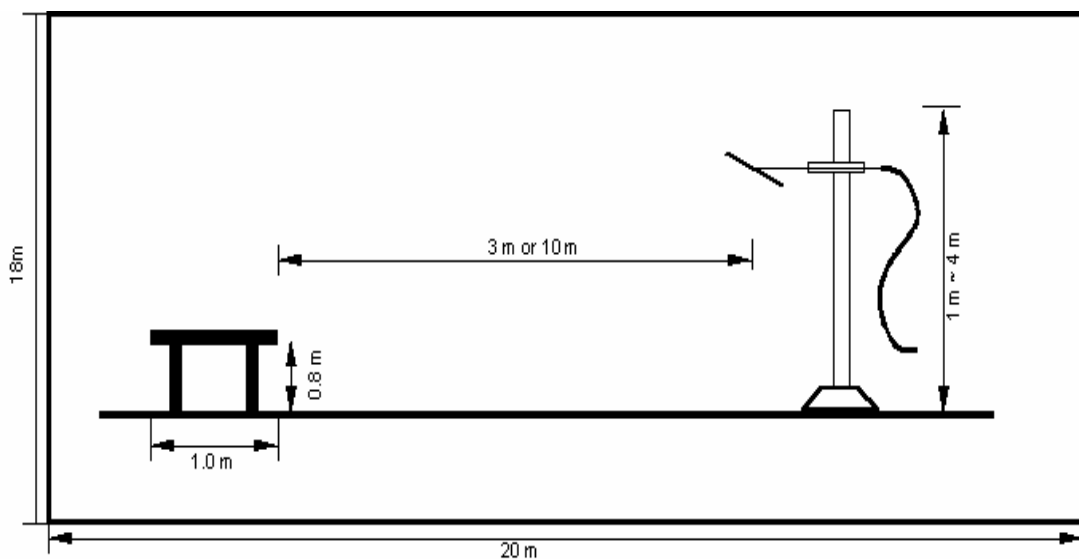


Fig 2. Dimensions of Open Site Test Area

4.3 Conducted Emission

This equipment is supplied DC power from the base station. Therefore, no conducted limits apply for this equipment.

5. Radiated Emission

5.1 Operating environment

Temperature : 26°C
 Relative humidity : 40 %

5.2 Test set-up

A preliminary scan with peak mode was performed in the semi anechoic chamber using the procedure in ANSI C63.4/2003 13.1.4.1 and found frequency for open area test site.

The formal radiated emission was measured at 3m-distance open area test site.

The EUT was placed on a non-conductive turntable approximately 0.8 meters above the ground plane.

The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 and 4.0 meters in order to determine the maximum emission levels.

This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

5.3 Measurement uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.

The measurement uncertainty was given with a confidence of 95%.

Contribution	Probability Distribution	Uncertainty (dB)			
		Biconical Ant.		Log-periodic Ant.	
		3m	10m	3m	10m
Ambient signal					
Antenna factor calibration	Normal (k=2)	0.50	0.50	0.50	0.50
Receiver specification	Rectangular	0.50	0.50	0.50	0.50
Antenna directivity	Rectangular	0.25	0.00	1.50	0.25
Antenna phase center variation	Rectangular	0.00	0.00	1.00	0.20
Antenna factor frequency interpolation	Rectangular	0.25	0.25	0.25	0.25
Measure distance variation	Rectangular	0.60	0.40	0.60	0.40
Site imperfections	Rectangular	1.46	-2.32	2.26	2.94
Mismatch					
Receiver VRC : $\Gamma_l = 0.09$	U-shaped	0.33	0.33	0.33	0.33
Antenna VRC : $\Gamma_g = 0.43$ (Bi) 0.23 (Lp)		-0.35	-0.35	-0.18	-0.18
Uncertainty limits $20\log(1 \pm \Gamma_l \Gamma_g)$					
System repeatability	Std Deviation	0.18	0.18	0.17	0.17
Cable loss calibration	Normal (k=2)	0.05	0.05	0.05	0.05
Combined standard uncertainty $U_c(y)$	Normal	1.05	1.45	1.78	1.80
		-1.05	-1.45	-1.77	-1.78
Extended uncertainty U	Normal (k=2)	2.11	2.90	3.55	3.59
		-2.11	-2.90	-3.53	-3.57

5.4 Limit

Frequency (MHz)	FCC Limit @ 3m. dB μ V/m	CISPR Limit @ 10m. dB μ V/m
30 – 88	40.0	30.0
88 – 216	43.5	30.0
216 – 230	46.0	30.0
230 – 960	46.0	37.0
960 – 1000	54.0	37.0

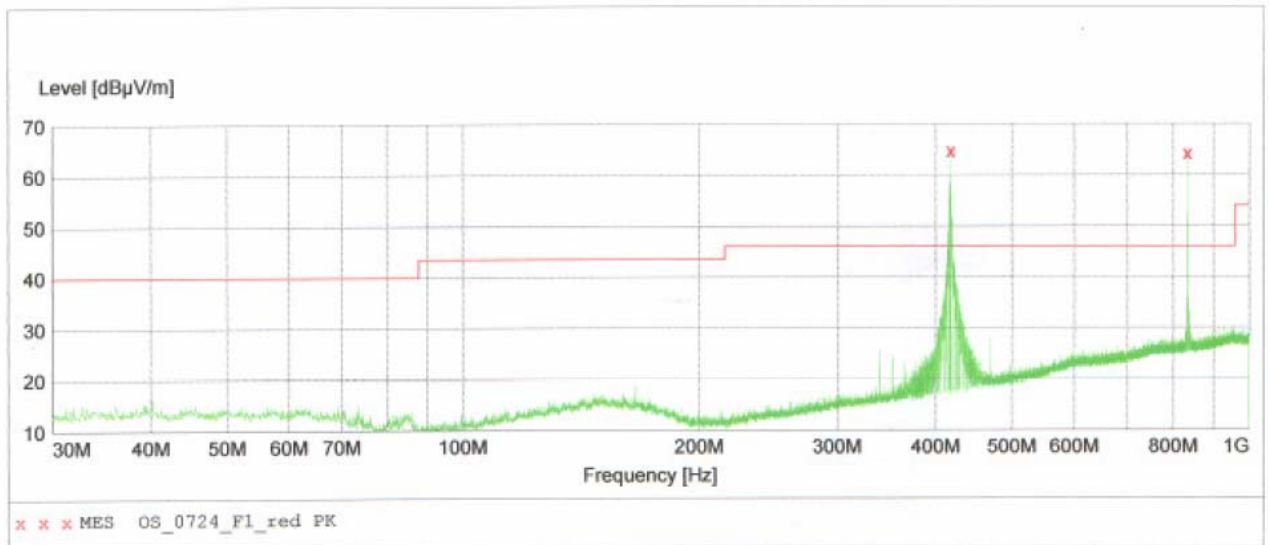
5.5 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESI	Rohde & Schwarz	EMI test receiver	830482/010	12. 02. 2006
■ - ESCS30	Rohde & Schwarz	EMI test receiver	839809/003	12. 14. 2006
■ - HK116	Rohde & Schwarz	Biconical ANT	826861/018	12. 02. 2006
■ - HL223	Rohde & Schwarz	Log-periodic antenna	829228/011	12. 02. 2006
■ - HD100	HD GmbH	Position Controller	100/692/01	N/A
■ - DS415S	HD GmbH	Turntable	415/657/01	N/A
■ - MA240	HD GmbH	Antenna Mast	240/565/01	N/A
■ - BBHA9120D	Schwarzbeck	Horn ANT	207	11.26.2006
■ - 87405A	Agilent	Preamplifier	MY39500777	N/A

5.6 Radiated emission test data

- Test Date : July 27, 2006
- Reference standard : Part 15 Subpart B
- Operating condition : RF receiver mode
- Measuring Distance : 3m
- Detector mode : Peak detector mode
- Power Source : DC 5V

Frequency (MHz)	Measurement Level				Limit (dBuV/m)	Margin (dBuV/m)	Positioning System		
	Reading Value(dBuV)	Antenna Factor(dB)	Cable Loss(dB)	Test Result (dBuV/m)			Pol. (H/V)	Height (cm)	Angle (deg)
No emissions found									



* The noise at 418MHz, 836MHz were emitted from RF transmitter (MX-850)

6. Sample Calculations

$$\begin{aligned} \text{dB}\mu\text{V} &= 20 \text{ Log}_{10}(\mu\text{V}/\text{m}) \\ \text{dB}\mu\text{V} &= \text{dBm} + 107 \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)} \end{aligned}$$

6.1 Example 1 :

■ 20.3 MHz

Class B Limit	=	250 μV	=	48 dB μV
Reading	=	- 67.8 dBm(Calibrated level)		
Convert to dB μV	=	- 67.8 dBm + 107	=	39.2 dB μV
$10^{(39.2\text{dB}\mu\text{V}/20)}$	=	91.2 μV		
Margin	=	39.2 – 48	=	-8.8
	=	8.8 dB below Limit		

6.2 Example 2 :

■ 66.7 MHz

Class B Limit	=	100 $\mu\text{V}/\text{m}$	=	40.0 dB $\mu\text{V}/\text{m}$
Reading	=	- 76.0 dBm(Calibrated level)		
Convert to dB $\mu\text{V}/\text{m}$	=	- 76.8 dBm + 107	=	31.0 dB $\mu\text{V}/\text{m}$
Antenna Factor + Cable Loss	=	5.8 dB		
		Total	=	36.8 dB $\mu\text{V}/\text{m}$
Margin	=	36.8 – 40.0	=	-3.2
	=	3.2 dB below Limit		

7. Recommendation & conclusion

The data collected shows that the Gumi College EMC Center.

OH SUNG ELECTRONICS CO., LTD. Remote Control Receiver (Model No.: RFX-250) was complies with § 15.109 of the FCC Rules.