ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No.	**: E064R-035**
AGR No	**: A063A-124**
Applicant	**: Chois Technology Co., Ltd.**
Address	**: 305 Incheon-Venture Center, 169-1 Juan1-dong, Nam-gu, Incheon, Korea**
Manufacturer	**: Chois Technology Co., Ltd.**
Address	**: 305, Incheon-Venture Center, 169-1, Juan1-dong, Nam-gu, Incheon Korea**
Type of Equipment	**: 2.4GHz RF Wireless Presenter**
FCC ID.	**: RVBXP200T**
Model Name	**: XP200T**
Serial number	**: None**
Total page of Report	**: 17 pages (including this page)**
Date of Incoming	**: March 13, 2006**
Date of issue	**: April 17, 2006**

SUMMARY

The equipment complies with the regulation; **FCC Part 15 Subpart C Section 15.249.**

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

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

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EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do 464-860 Korea. (TEL: 82-31-765-8289 FAX: 82-31-766-2904)

CONTENTS

PAGE

1. VERIFICATION OF COMPLIANCE 4

2. TEST SUMMARY 5

2.1 TEST ITEMS AND RESULTS 5
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS 5
2.3 RELATED SUBMITTAL(S) / GRANT(S) 5
2.4 PURPOSE OF THE TEST 5
2.5 TEST METHODOLOGY 5
2.6 TEST FACILITY 5

3. GENERAL INFORMATION 6

3.1 PRODUCT DESCRIPTION 6
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT. 6

4. EUT MODIFICATIONS 6

5. SYSTEM TEST CONFIGURATION 7

5.1 JUSTIFICATION 7
5.3 PERIPHERAL EQUIPMENT 7
5.4 MODE OF OPERATION DURING THE TEST 7
5.5 CONFIGURATION OF TEST SYSTEM 8
5.6 ANTENNA REQUIREMENT 8

6. PRELIMINARY TEST 8

6.1 AC POWER LINE CONDUCTED EMISSIONS TESTS 8
6.2 GENERAL RADIATED EMISSIONS TESTS 8

7. RADIATED EMISSION TEST, GENERAL REQUIREMENT 9

7.1 OPERATING ENVIRONMENT 9
7.2 TEST SET-UP 9
7.3 MEASUREMENT UNCERTAINTY 9
7.4 TEST EQUIPMENT USED 9
7.5 FINAL RESULT OF MEASUREMENT 11
7.5.1 FIELD STRENGTH OF THE FUNDAMENTAL FREQUENCY 11
7.5.2 EMISSIONS CONDUCTED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS 12
7.5.3 EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS 16

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7.5.3.1 TEST DATA FOR SPURIOUS EXCEPT FOR HARMONIC ABOVE 1000MHZ 16
7.5.3.2 TEST DATA FOR HARMONIC 17
7.5.3.3 TEST DATA FOR SPURIOUS EXCEPT FOR HARMONIC BELOW 1000MHZ 18

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: Chois Technology Co., Ltd.
ADDRESS	: 305 Incheon-Venture Center, 169-1 Juan1-dong, Nam-gu, Incheon, Korea
CONTACT PERSON	: Mr. Chul-Ok, Yeom / Assistant Manager
TELEPHONE NO	: +82-32-246-3404
FCC ID	: RVBXP200T
MODEL NO/NAME	: XP200T
SERIAL NUMBER	: N/A
DATE	: April 17, 2006

EQUIPMENT CLASS	***DXX-Part 15 Low Power Communication Device Transmitter***
KIND OF EQUIPMENT	2.4GHz RF Wireless Presenter
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4: 2003
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 Section 15.249
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER(S) 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. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.249 (a)	Field Strength of Emission	Met the Limit / PASS
15.249 (c)	Measurement distance	Met the Requirement / PASS
15.249 (d)	Emissions Radiated Outside of the Specified Frequency Band	Met the Limit / PASS
15.249 (e)	Radiated Emissions above 1000MHz	Met the Limit / PASS
15.209	Radiated Emission Limits, General Requirement	Met the Limit / PASS
15.207	Conducted Limits	Not Applicable (See Note)
15.203	Antenna Requirement	Met the Requirement / PASS

Note. The Equipment under Test shall be operated by DC 3V (Standard AAA Type 1.5V Battery X 2).

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 2.1.

2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

The Electromagnetic compatibility measurement facilities are located on at 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyeonggi-Do, 464-08,0 Korea. Description details of test facilities were submitted to the Federal Communications Commission on January 18, 2002 (Registration Number: 92819 and 340658), accredited by KOLAS (Korea Laboratory Accreditation Scheme, No: 85) and approved by TUV, DNV and MIC (Ministry of Information and Communications in Korea) according to the requirement of ISO17025.

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3. GENERAL INFORMATION

3.1 Product Description

The Chois Technology Co., Ltd., Model: XP200T (referred to as the EUT in this report) is a 2.4GHz RF Wireless Presenter. The EUT has function for Remote controller, Laser Pointer, and a mouse and an associated receiver is manufactured by Chois Technology Co., Ltd., Model No: XP200R with DoC application. The associated receiver shall be issued another test report number. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Portable Device
OPERATING FREQUENCY	2430 ~2460 MHz
RATED RF OUTPUT POWER	Typ. 2mW
ANTENNA	Inserted into the main board (Pattern Antenna)
ANTENNA GAIN	2.0 dBi
CHANNEL	31 Channels
MODULATION	GFSK
DATA TRANSFER RATE	250kbps
USED RF CHIP	Nordic, nRF2402
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	12MHz
USED BOARD NAME	Main Board, Laser Board
NUMBER OF LAYER	Main Board: 2 Layers, Laser Board: 2 Layers
POWER REQUIREMENT	DC 3.0V (1.5V Standard AAA Type Battery X 2)
EXTERNAL CONNECTOR	None

3.2 Alternative type(s)/model(s); also covered by this test report.

No other model differences have been mentioned.

4. EUT MODIFICATIONS

None

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5. SYSTEM TEST CONFIGURATION

5.1 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 and Laser Board	Chois Technology Co., Ltd.	N/A	N/A

5.3 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested: None

5.4 Mode of operation during the test

To get a maximum radiated emission from the EUT, the button on the EUT was continuously pressed to transmit the signal.

To activate continuous transmission, place a small plastic block between rubber band and the push button on the EUT.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

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5.5 Configuration of Test System

Line Conducted Test: It is not need to test this requirement, because the EUT shall be operated by battery.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2003 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.

5.6 Antenna Requirement

For intentional device, according to section 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 a pattern antenna on the main board in the EUT, so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 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)
It is not need to test this requirement, because the power of the EUT is supplied from a DC battery.	

6.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Stand-by mode	
Continuous Transmitting mode	X

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7. RADIATED EMISSION TEST, GENERAL REQUIREMENT

7.1 Operating environment

Temperature : 21°C

Relative humidity : 42 %

7.2 Test set-up

The radiated emissions measurements were on the 3 meters, open-field test site. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30MHz to 1000MHz was scanned and emission levels maximized at each frequency recorded. The system 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.

Test set-up photos are included in appendix VI.

7.3 Measurement uncertainty

Radiated emission electric field intensity, 30 MHz ~ 200 MHz : ±4.3 dB

Radiated emission electric field intensity, 200 MHz ~ 1000 MHz : ±4.1 dB

7.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Due Cal.
■ -	ESVS10	Rohde & Schwarz	EMI Test Receiver	827864/005	Dec. 21, 2006
■ -	8574B	Hewlett Packard	Quasi-Peak Adapter	2811A01432	Apr. 14, 2006
■ -	85680B	Hewlett-Packard	Spectrum Analyzer	3001A04955	Apr. 14, 2006
■ -	85685A	Hewlett-Packard	RF Preselector	3107A01268	Apr. 14, 2006
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	July 19, 2006
■ -	83051A	Hewlett-Packard	Microwave Preamplifier	3950M00201	June 10, 2006
☐ -	8449B	Hewlett-Packard	RF Amplifier	3008A00833	June 10, 2006
☐-	8447F	Hewlett-Packard	RF Amplifier	3113A04554	June 10, 2005
■ -	MA220	HD	Turn Table	N/A	N/A
■ -	HD240	HD	Antenna Mast	N/A	N/A
■ -	VHA9103	Schwarz beck	Biconical Antenna	91031852	Feb. 14, 2007
■ -	UHALP9018A	Schwarz beck	Log Periodic Antenna	62281001	Feb. 14, 2007
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	June 06, 2006
■ -	YSE 500B	YoungShin Eng.	Frequency Converter	950413001	N/A
■ -	ETCR-10	DaeHa	Automatic Voltage Com.	N/A	N/A

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All test equipment used is calibrated on a regular basis.

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7.5 Final Result of Measurement

7.5.1 Field Strength of the Fundamental Frequency

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

Humidity Level : 42 % Temperature: 17°C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(a)

Result : PASSED BY –11.24 dB at 2430.00 MHz

EUT : 2.4GHz RF Wireless Presenter Date: April 03, 2006

Operating Condition : TX mode

Distance : 3 meters

Channel	Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
	Carrier Freq. (MHz)	Amplitude (dBuV)	Detect Mode	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	2430.00	56.50	Peak	H	27.61	1.33	85.44	113.98	-28.54
		46.10	Average	H			75.04	93.98	-18.94
		65.40	Peak	V			94.34	113.98	-19.64
		53.80	Average	V			82.74	93.98	-11.24
Middle	2445.00	54.50	Peak	H	27.60	1.33	83.43	113.98	-30.55
		43.90	Average	H			72.83	93.98	-21.15
		65.17	Peak	V			94.10	113.98	-19.88
		53.63	Average	V			82.56	93.98	-11.42
High	2460.00	54.00	Peak	H	27.60	1.33	82.93	113.98	-31.05
		43.60	Average	H			72.53	93.98	-21.45
		64.50	Peak	V			93.43	113.98	-20.55
		52.50	Average	V			81.43	93.98	-12.55

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

Tested by: Ki-Hong, Nam / Test Engineer

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7.5.2 Emissions Conducted Outside of the Specified Frequency Bands

Humidity Level : 42 % Temperature: 17°C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(d)

Result : PASS

EUT : 2.4GHz RF Wireless Presenter Date: April 03, 2006

Operating Condition : TX mode

Distance : 3 meters

Channel	Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
	Carrier Freq. (MHz)	Amplitude (dBuV)	Detect Mode	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	Spurious frequencies except harmonics have margin lower than 50dB, were not found up to 26.5 GHz. See next page for graph data, which was obtained by conducted measurement.								
Middle									
High									

Tested by: Ki-Hong, Nam / Test Engineer

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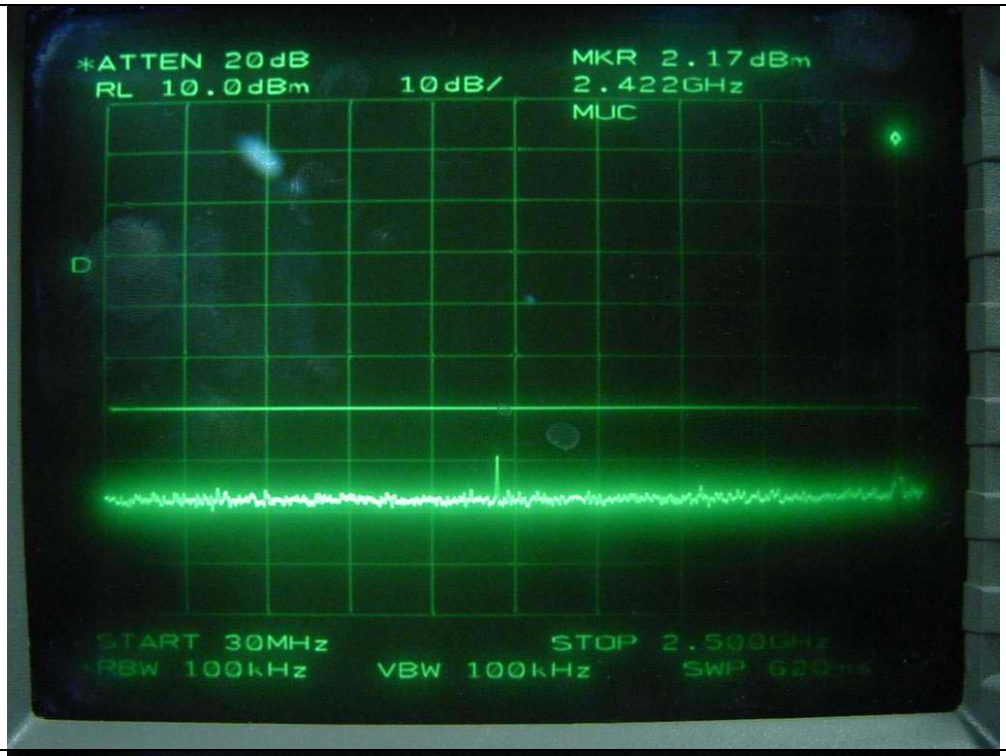
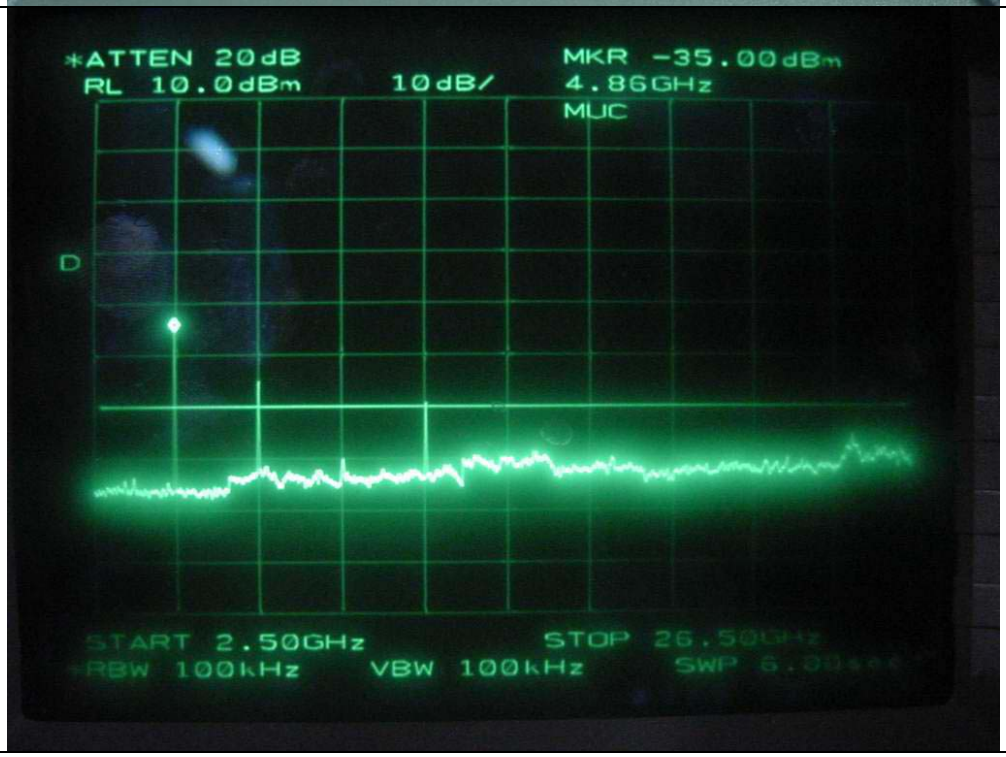
Low Channel





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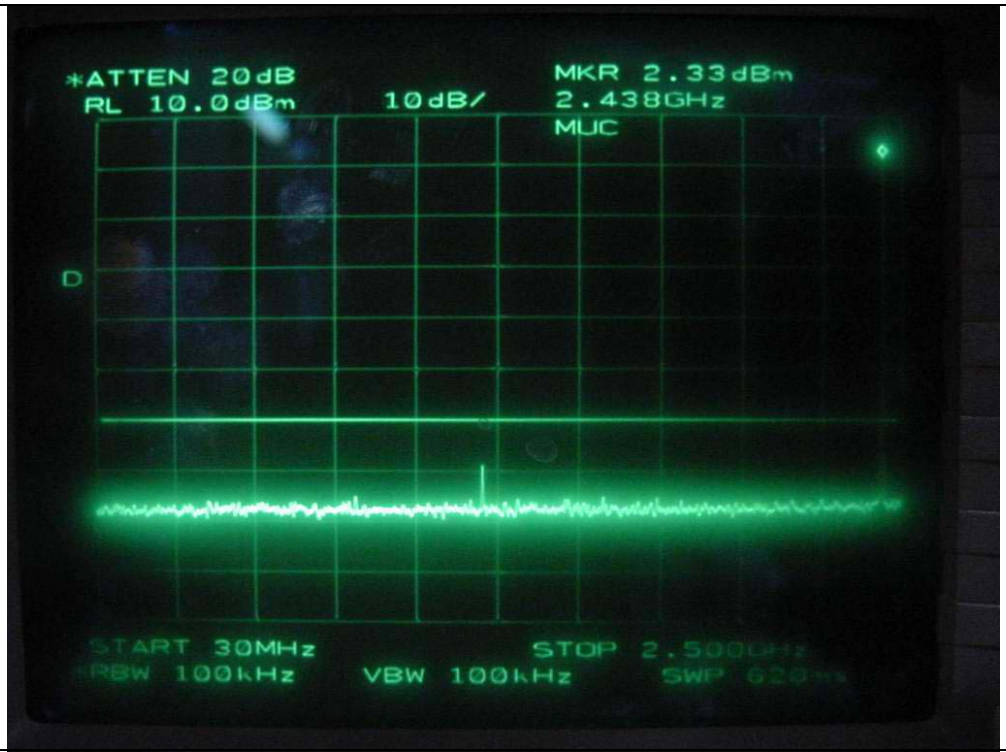
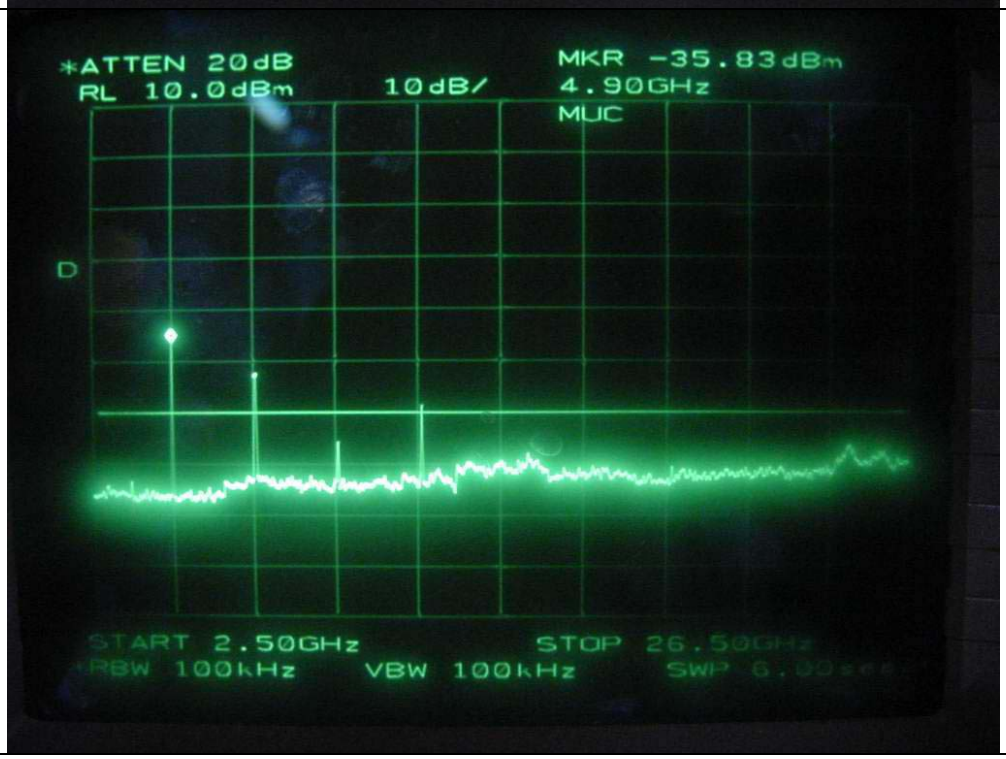
Middle Channel





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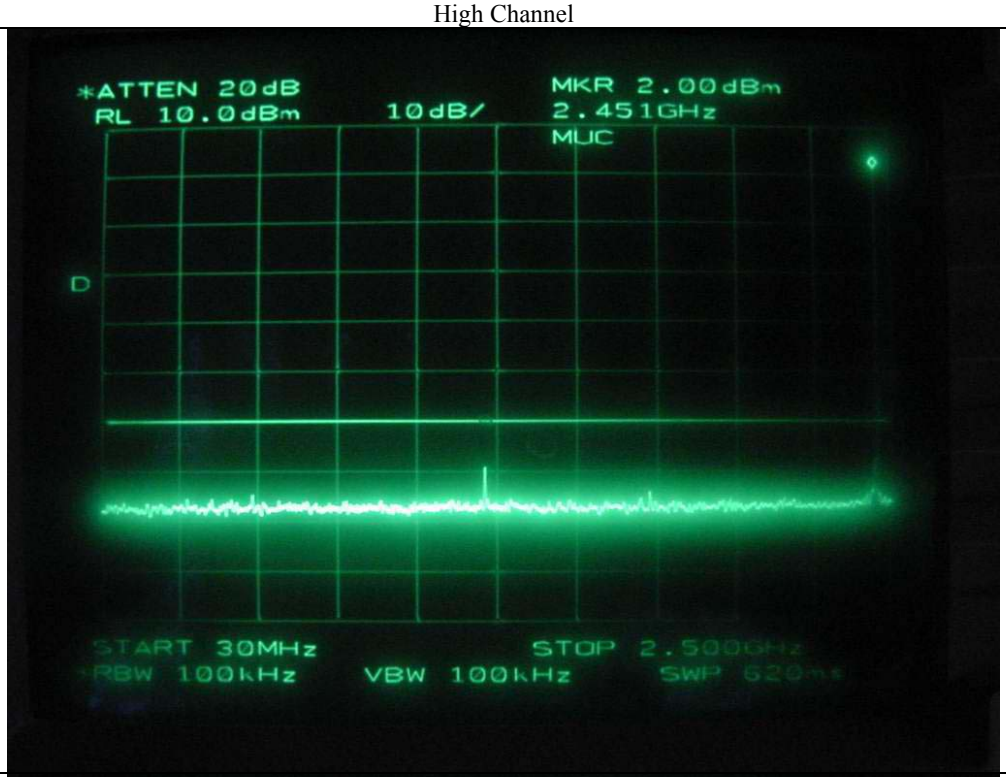
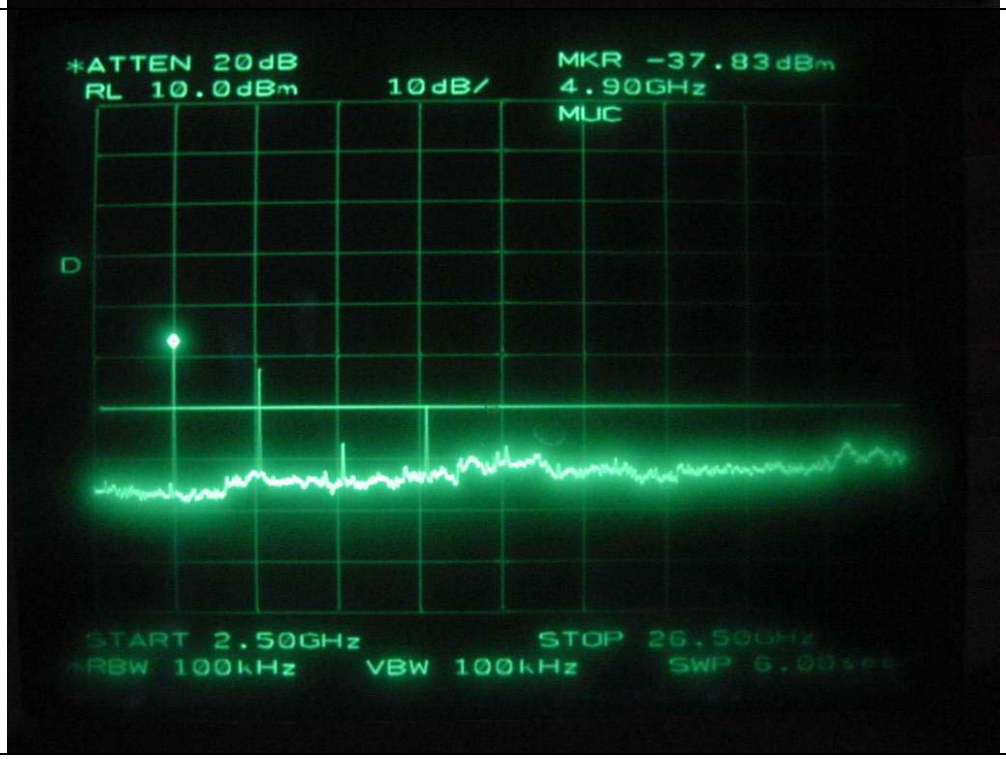
High Channel





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7.5.3 Emissions Radiated Outside of the Specified Frequency Bands

7.5.3.1 Test Data for Spurious except for Harmonic above 1000MHz

Humidity Level : 42 % Temperature: 17 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(d)

Result : PASSED BY –14.57 dB at 2492.60 / 2491.70 MHz with Average detector

EUT : 2.4GHz RF Wireless Presenter

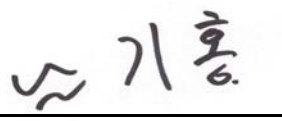
Operating Condition : TX mode

Distance : 3 meters Date: April 03, 2006

Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for Low Channel										
2378.55*	43.00	Peak	H	27.60	1.33	25.60	N/A	46.39	73.98	-27.59
	35.80	Average	H					39.19	53.98	-14.79
	45.00	Peak	V					48.39	73.98	-25.59
	36.00	Average	V					39.39	53.98	-14.59
Test Data for Middle Channel										
2492.60*	46.10	Peak	H	27.58	1.33	25.60	N/A	49.41	73.98	-24.57
	35.00	Average	H					38.31	53.98	-15.67
	48.00	Peak	V					51.31	73.98	-22.67
	36.10	Average	V					39.41	53.98	-14.57
Test Data for High Channel										
2491.70*	46.50	Peak	H	27.58	1.33	25.60	N/A	49.81	73.98	-24.17
	35.33	Average	H					38.64	53.98	-15.34
	48.13	Peak	V					51.44	73.98	-22.54
	36.10	Average	V					39.41	53.98	-14.57

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical, “*” Frequency fall in restricted band



Tested by: Ki-Hong, Nam / Test Engineer

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7.5.3.2 Test Data for Harmonic

Humidity Level : 42 % Temperature: 17°C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(a)

Result : PASSED BY –7.54dB at 4920 MHz with Average detector

EUT : 2.4GHz RF Wireless Presenter

Operating Condition : TX mode

Distance : 3 meters Date: April 03, 2006

Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for Low Channel										
4860*	49.00	Peak	H	31.35	2.67	25.50	N/A	57.52	73.98	-16.46
	37.10	Average	H					45.62	53.98	-8.36
	53.83	Peak	V					62.35	73.98	-11.63
	37.50	Average	V					46.02	53.98	-7.96
Other frequencies were not found up to 26.5GHz.										
Test Data for Middle Channel										
4890*	48.33	Peak	48.33	31.41	2.67	25.50	N/A	56.90	73.98	-17.09
	36.90	Average	36.90					45.47	53.98	-8.51
	53.50	Peak	53.50					62.07	73.98	-11.92
	37.68	Average	37.68					46.25	53.98	-7.73
Other frequencies were not found up to 26.5GHz.										
Test Data for High Channel										
4920*	49.83	Peak	H	31.44	2.67	25.50	N/A	58.44	73.98	-15.54
	37.20	Average	H					45.81	53.98	-8.17
	53.90	Peak	V					62.51	73.98	-11.47
	37.83	Average	V					46.44	53.98	-7.54
Other frequencies were not found up to 26.5GHz.										

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band

Tested by: Ki-Hong, Nam / Test Engineer

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7.5.3.3 Test Data for Spurious except for Harmonic below 1000MHz

Humidity Level : 42 % Temperature: 17°C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(d)

Result : PASS

EUT : 2.4GHz RF Wireless Presenter

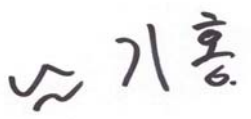
Operating Condition : TX mode

Distance : 3 meters Date: April 03, 2006

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
It was not observed any emissions from the EUT.							

Tabulated test data for Radiated Electromagnetic Field

Remark: “H”: Horizontal, “V”: Vertical



Tested by: Ki-Hong, Nam / Test Engineer

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