

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

Test Report No. : E10NR-043

AGR No : A10OA-133

Applicant : YUWON TRONIX Co., Ltd.

Address : Rm.415, Ace Highend 3, #371-50, Gasan-dong, Geumcheon-gu, Seoul, 153-787, Korea

Manufacturer : YUWON ELECTRONICS (HuiZhou) Co., Ltd

Address : Puzai Industrial, Lilin Town, Huicheng District, Huizhou City, Guangdong, China

Type of Equipment : Remote Control

FCC ID. : WXR815RF-WEBTUBE

Model Name : WR815RF-WEBTUBEHD

Serial number : None

Total page of Report : 18 pages (including this page)

Date of Incoming : November 01, 2010

Date of issue : November 12, 2010


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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Revision History

Issue Report No.	Issued Date	Revisions	Effect Section
E10NR-043	November 12, 2010	Initial Release	All

1. VERIFICATION OF COMPLIANCE

APPLICANT : YUWON TRONIX Co., Ltd.
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CONTACT PERSON : Mr. Young-Jin, Kim / Manager
TELEPHONE NO : +82-2-2068-7280
FCC ID : WXR815RF-WEBTUBE
MODEL NAME : WR815RF-WEBTUBEHD
BRAND NAME : N/A
SERIAL NUMBER : N/A
DATE : November 12, 2010

EQUIPMENT CLASS	DDX – Low Power Communications Transmitter
KIND OF EQUIPMENT	Remote Control
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.4: 2009
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 m 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. 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 1 000 MHz	Met the Limit / PASS
15.209	Radiated Emission Limits, General Requirement	Met the Limit / PASS
15.207	Conducted Limits	N/A (See Note)
15.203	Antenna Requirement	Met the Requirement / PASS

Note: This test is not performed because the EUT is operated by DC battery.

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: 2009 at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51, Daessangryung-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. Description details of test facilities were submitted to the Commission on August 21, 2008. (Registration Number: 340658)

3. GENERAL INFORMATION

3.1 Product Description

The YUWON TRONIX Co., Ltd., Model: WR815RF-WEBTUBEHD (referred to as the EUT in this report) is a Remote Control. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Portable Device
OPERATING FREQUENCY	2 403 MHz ~ 2 475 MHz
RATED RF OUTPUT POWER	0 dBm
NUMBER OF CHANNEL	5 CH (2 403 MHz, 2 423 MHz, 2 440 MHz, 2 461 MHz and 2 475 MHz)
ANTENNA TYPE	Inserted into the main board (Pattern Antenna)
MODULATION	GFSK
Tx DATA SPEED	2 Mb/s
USED RF CHIP	Maker: NORDIC, Model Name: nRF24LE1
LIST OF EACH OSC. OR CRY. FREQ.(FREQ. \geq 1 MHz)	16 MHz
RATED SUPPLY VOLTAGE	DC 3 V from a battery

3.2 Model Differences

-. None

4. EUT MODIFICATIONS

-. None

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 Board	N/A	N/A	N/A

5.2 Peripheral equipment

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

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.

For final testing, the EUT was set at Low Channel (2 403 MHz), Middle Channel (2 440 MHz), and High Channel (2 475 MHz). To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes. The EUT operated with charging mode during the test.

5.4 Configuration of Test System

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

Radiated Emission Test :Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2009 8.3.1.1 and 13.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 m 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.

5.5 Antenna Requirement

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 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)
TX Mode	X

7. RADIATED EMISSION TEST

7.1 Test set-up

The radiated emissions measurements were on the 3 m, 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 30 MHz to 1 000 MHz 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 m and 4.0 m 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 I.

7.2 Measurement uncertainty

Radiated emission electric field intensity, 30 MHz ~ 300 MHz : ± 4.43 dB

Radiated emission electric field intensity, 300 MHz ~ 1 000 MHz : ± 3.80 dB

Radiated emission electric field intensity, 1 000 MHz ~ 3 000 MHz: ± 4.4 dB

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k = 2$.

7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESVD	Rohde & Schwarz	Test Receiver	838453/018	Nov. 20, 2009 (1Y)
■ -	8564E	HP	Spectrum Analyzer	3650A00756	Jun. 10, 2010 (1Y)
■ -	83051A	Agilent	Microwave System Preamplifier	3950M00201	Jun. 11, 2010 (1Y)
■ -	MA240	HD GmbH	Antenna Master	N/A	N/A
■ -	HD100	HD GmbH	Position Controller	N/A	N/A
■ -	DS420S	HD GmbH	Turn Table	N/A	N/A
■ -	VHA9103	Schwarzbeck	Biconical Antenna	91031852	Mar. 30, 2010 (2Y)
■ -	9108-A(494)	Schwarzbeck	Log Periodic Antenna	62281001	Mar. 30, 2010 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	Jun. 17, 2009 (2Y)

All test equipment used is calibrated on a regular basis.

7.4 Final Result of Measurement

7.4.1 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 : 51 % R.H. Temperature: 15 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(a)
Result : PASSED BY -11.59 dB at 2 440.00 MHz

EUT : Remote Control Date: November 04, 2010
Operating Condition : TX mode
Distance : 3 m

Channel	Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
	Carrier Freq. (MHz)	Amplitude (dBμV)	Detect Mode	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low	2 403.00	60.50	Peak	H	27.09	5.00	92.59	113.98	-21.39
		49.67	Average	H			81.76	93.98	-12.22
		58.83	Peak	V			90.92	113.98	-23.06
		48.17	Average	V			80.26	93.98	-13.72
Middle	2 440.00	61.33	Peak	H	27.19	5.03	93.55	113.98	-20.43
		50.17	Average	H			82.39	93.98	-11.59
		59.50	Peak	V			91.72	113.98	-22.26
		49.67	Average	V			81.89	93.98	-12.09
High	2 475.00	61.00	Peak	H	27.28	5.06	93.34	113.98	-20.64
		49.83	Average	H			82.17	93.98	-11.81
		58.33	Peak	V			90.67	113.98	-23.31
		49.50	Average	V			81.84	93.98	-12.14

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



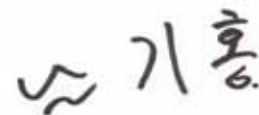
Tested by: Ki-Hong, Nam / Senior Engineer

7.4.2 Emissions Conducted Outside of the Specified Frequency Bands

Humidity Level : 51 % R.H. Temperature: 15 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(d)
Result : PASS

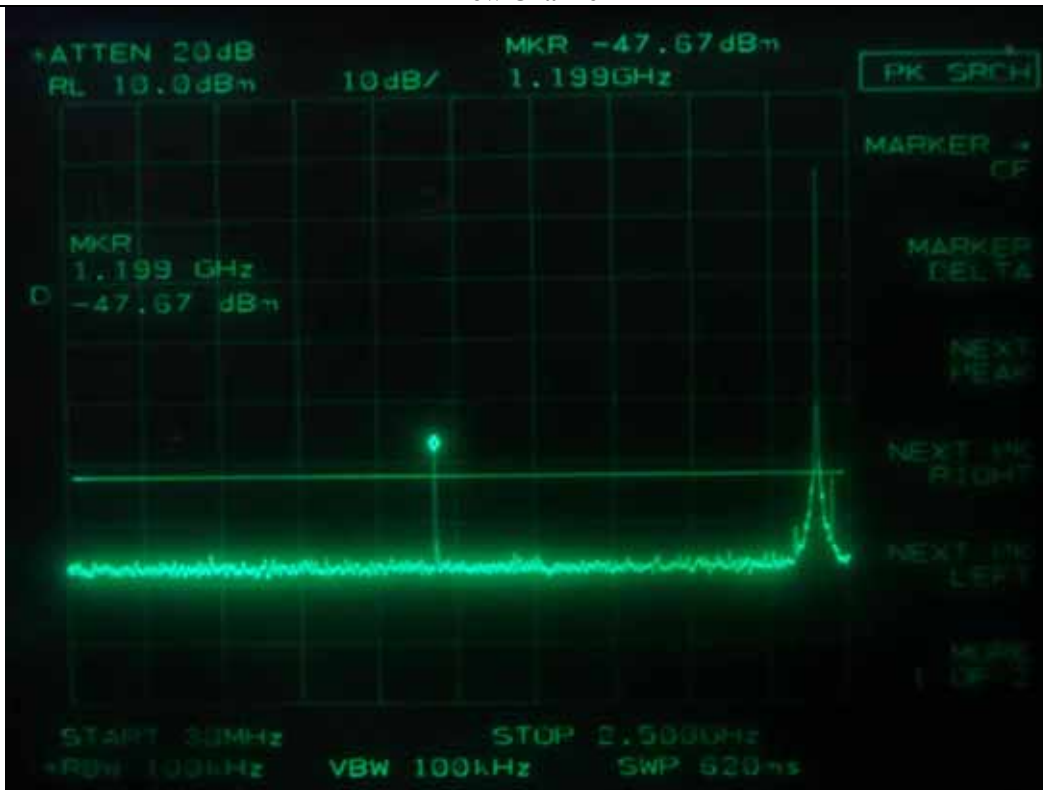
EUT : Remote Control Date: November 04, 2010
Operating Condition : TX mode
Distance : 3 m

Channel	Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
	Carrier Freq. (MHz)	Amplitude (dBμV)	Detect Mode	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low	Spurious frequencies except harmonics have margin more than 50 dB, and were scanned up to 26.5 GHz. See next page for graph data, which was obtained by conducted measurement.								
Middle									
High									

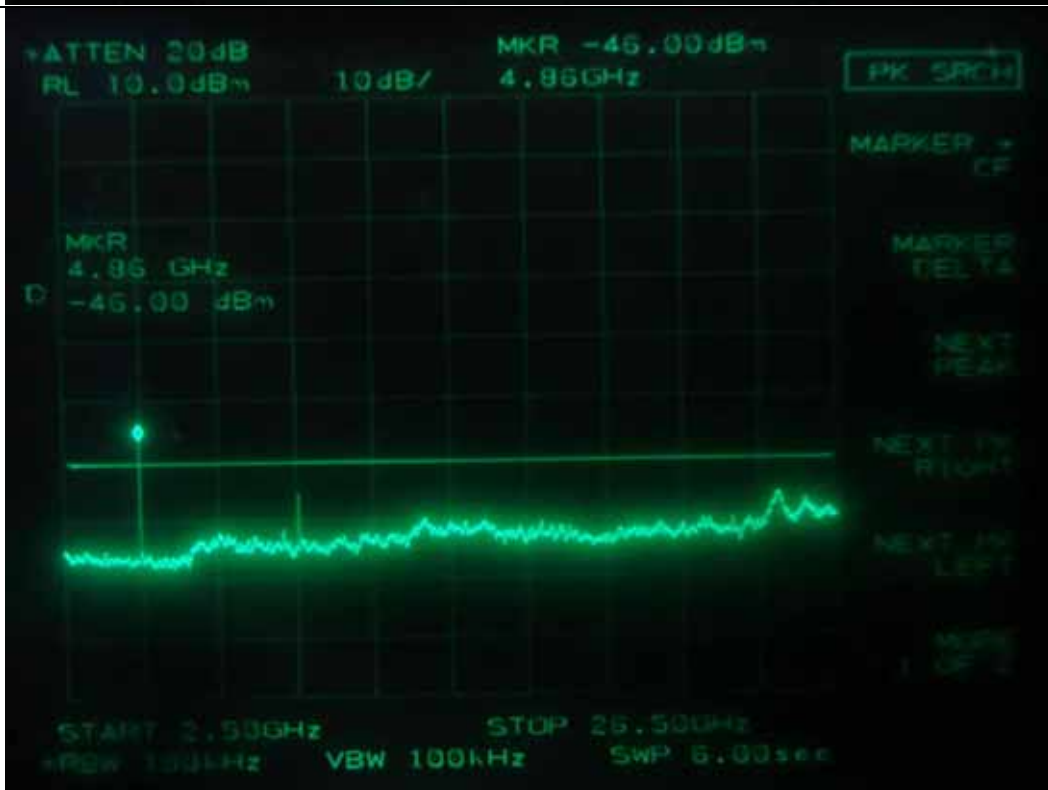


Tested by: Ki-Hong, Nam / Senior Engineer

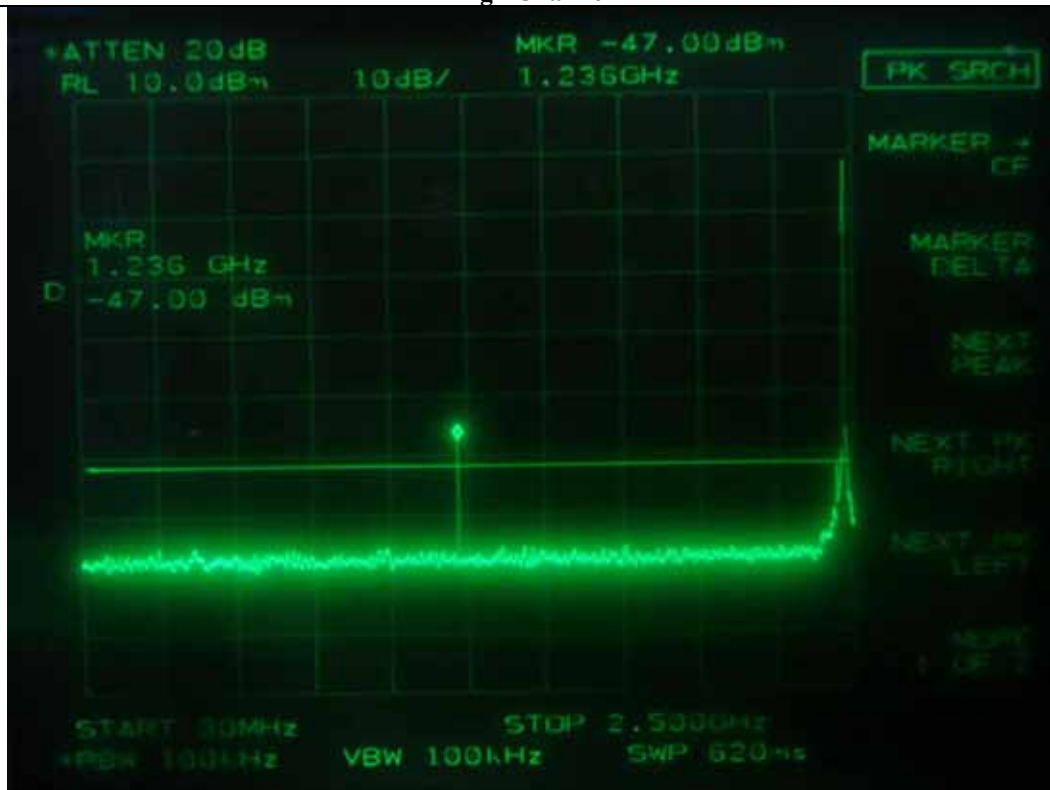
Low Channel



Middle Channel



High Channel



7.4.3 Emissions Radiated Outside of the Specified Frequency Bands

7.4.3.1 Test Data for Spurious except for Harmonic above 1 000 MHz

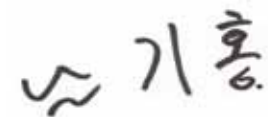
Humidity Level : 51 % R.H. Temperature: 15 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(d)
Result : PASSED BY -9.52 dB at 1 220.00

EUT : Remote Control Date: November 04, 2010
Operating Condition : TX mode
Distance : 3 m

Channel	Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Low	1 201.50*	56.33	Peak	H	25.29	3.84	30.71	54.75	73.98	-19.23
		45.17	Average	H				43.59	53.98	-10.39
		51.50	Peak	V				49.92	73.98	-24.06
		40.00	Average	V				38.42	53.98	-15.56
Middle	1 220.00*	58.67	Peak	H	25.31	3.84	30.69	57.13	73.98	-16.85
		46.00	Average	H				44.46	53.98	-9.52
		52.50	Peak	V				50.96	73.98	-23.02
		41.17	Average	V				39.63	53.98	-14.35
High	1 237.50*	54.17	Peak	H	25.32	3.84	30.67	52.66	73.98	-21.32
		42.83	Average	H				41.32	53.98	-12.66
		49.33	Peak	V				47.82	73.98	-26.16
		40.00	Average	V				38.49	53.98	-15.49

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Senior Engineer

7.4.3.2 Test Data for Harmonic

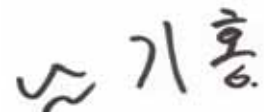
Humidity Level : 51 % R.H. Temperature: 15 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(a)
Result : PASSED BY -14.21 dB at 4 950.00 MHz

EUT : Remote Control Date: November 04, 2010
Operating Condition : TX mode
Distance : 3 m

Channel	Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Low	4 806.00*	38.67	Peak	H	31.07	6.87	28.80	47.81	73.98	-26.17
		28.50	Average	H				37.64	53.98	-16.34
		36.92	Peak	V				46.06	73.98	-27.92
		27.50	Average	V				36.64	53.98	-17.34
	Other frequencies were not found up to 26.5 GHz.									
Middle	4 880.00*	39.67	Peak	H	31.19	6.92	28.73	49.05	73.98	-24.93
		29.83	Average	H				39.21	53.98	-14.77
		37.50	Peak	V				46.88	73.98	-27.10
		28.33	Average	V				37.71	53.98	-16.27
	Other frequencies were not found up to 26.5 GHz.									
High	4 950.50*	39.67	Peak	H	31.30	6.97	28.67	49.27	73.98	-24.71
		30.17	Average	H				39.77	53.98	-14.21
		36.50	Peak	V				46.10	73.98	-27.88
		28.25	Average	V				37.85	53.98	-16.13
	Other frequencies were not found up to 26.5 GHz.									

Tabulated test data for Restricted Band

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



Tested by: Ki-Hong, Nam / Senior Engineer

7.4.3.3 Test Data for Spurious except for Harmonic below 1 000 MHz

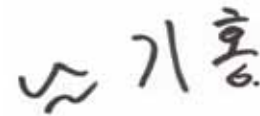
Humidity Level : 51 % R.H. Temperature: 15 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(d)
Result : PASS

EUT : Remote Control Date: November 04, 2010
Operating Condition : TX mode
Distance : 3 m

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

Tabulated test data for Radiated Electromagnetic Field

Remark: "H": Horizontal, "V": Vertical



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7.4.3.4 Test Data for other frequency

Humidity Level : 51 % R.H.

Temperature: 15 °C

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

Result : PASSED BY -5.66 dB at 622.41 MHz under low channel

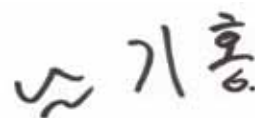
EUT : Remote Control

Date: November 04, 2010

Frequency range : 30 MHz ~ 1 000 MHz

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Low Channel									
38.85	15.67	V	1.00	300.00	15.32	1.31	32.30	40.00	-7.70
51.86	18.50	V	1.00	210.00	10.29	1.65	30.44	40.00	-9.56
130.03	16.60	V	1.00	85.00	14.14	2.50	33.24	43.52	-10.28
313.10	16.50	H	1.00	110.00	14.47	3.60	34.57	46.02	-11.45
399.90	15.80	H	1.50	330.00	17.45	4.00	37.25	46.02	-8.77
622.41	14.67	H	1.20	320.00	20.43	5.26	40.36	46.02	-5.66
Middle Channel									
38.85	15.50	V	1.00	300.00	15.32	1.31	32.13	40.00	-7.87
51.86	18.83	V	1.00	210.00	10.29	1.65	30.77	40.00	-9.23
130.03	15.17	V	1.00	85.00	14.14	2.50	31.81	43.52	-11.71
313.10	15.33	H	1.00	110.00	14.47	3.60	33.40	46.02	-12.62
399.90	15.50	H	1.50	330.00	17.45	4.00	36.95	46.02	-9.07
622.41	14.50	H	1.20	320.00	20.43	5.26	40.19	46.02	-5.83
High Channel									
38.85	15.83	V	1.00	300.00	15.32	1.31	32.46	40.00	-7.54
51.86	18.00	V	1.00	210.00	10.29	1.65	29.94	40.00	-10.06
130.03	16.60	V	1.00	85.00	14.14	2.50	33.24	43.52	-10.28
313.10	16.33	H	1.00	110.00	14.47	3.60	34.40	46.02	-11.62
399.90	15.67	H	1.50	330.00	17.45	4.00	37.12	46.02	-8.90
622.41	14.33	H	1.20	320.00	20.43	5.26	40.02	46.02	-6.00



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EMC-003(Rev.1)

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