Test Report

Product Name	Wireless Remote Control
Model No	881103
FCC ID.	X96881103

Applicant	COMEUP INDUSTRIES INC.
Address	No. 112, Nan Yuan Str. Hsi Chih Taipei, Taiwan 22152

Date of Receipt	Mar. 10, 2010
Issue Date	Mar. 24, 2010
Report No.	103174R-RFUSP42V01-A
Report Version	V1.0

Test Report Certification

Issue Date: Mar. 24, 2010
Report No.: 103174R-RFUSP42V01-A

Accredited by NIST (NVLAP)
NVLAP Lab Code: 200533-0

Product Name	Wireless Remote Control
Applicant	COMEUP INDUSTRIES INC.
Address	No. 112, Nan Yuan Str. Hsi Chih Taipei, Taiwan 22152
Manufacturer	COMEUP INDUSTRIES INC.
Model No.	881103
EUT Rated Voltage	DC 8~24V
EUT Test Voltage	DC 12V
Trade Name	COME-UP WIN2H
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2009 ANSI C63.4: 2003 NVLAP Lab Code: 200533-0
Test Result	Complied

The test results relate only to the samples tested.
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.
This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented By : Jinn Chen
(Adm. Specialist / Jinn Chen)

Tested By : NoNo Chang
(Engineer / NoNo Chang)

Approved By :
(Manager / Vincent Lin)

Testing Laboratory
0914

TABLE OF CONTENTS

	Description	Page
1.	**GENERAL INFORMATION**	**5**
1.1.	EUT Description	5
1.2.	Operational Description	7
1.3.	Tested System Details	8
1.4.	Configuration of Tested System	8
1.5.	EUT Exercise Software	8
1.6.	Test Facility	9
2.	**Peak Power Output**	**10**
2.1.	Test Equipment	10
2.2.	Test Setup	10
2.3.	Limits	10
2.4.	Test Procedure	10
2.5.	Uncertainty	10
2.6.	Test Result of Peak Power Output	11
3.	**Radiated Emission**	**12**
3.1.	Test Equipment	12
3.2.	Test Setup	13
3.3.	Limits	14
3.4.	Test Procedure	14
3.5.	Uncertainty	14
3.6.	Test Result of Radiated Emission	15
4.	**RF antenna conducted test**	**19**
4.1.	Test Equipment	19
4.2.	Test Setup	19
4.3.	Limits	19
4.4.	Test Procedure	20
4.5.	Uncertainty	20
4.6.	Test Result of RF antenna conducted test	21
5.	**Band Edge**	**23**
5.1.	Test Equipment	23
5.2.	Test Setup	24
5.3.	Limits	24
5.4.	Test Procedure	25
5.5.	Uncertainty	25
5.6.	Test Result of Band Edge	26
6.	**Occupied Bandwidth**	**30**
6.1.	Test Equipment	30
6.2.	Test Setup	30
6.3.	Limits	30
6.4.	Test Procedure	30
6.5.	Uncertainty	30
6.6.	Test Result of Occupied Bandwidth	31

7. Power Density 34

7.1. Test Equipment 34
7.2. Test Setup 34
7.3. Limits 34
7.4. Test Procedure 34
7.5. Uncertainty 34
7.6. Test Result of Power Density 35

8. Duty Cycle 38

8.1. Test Equipment 38
8.2. Test Setup 38
8.3. Uncertainty 38
8.4. Test Result of Duty Cycle 39

9. EMI Reduction Method During Compliance Testing 41

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless Remote Control
Trade Name	
Model No.	881103
FCC ID.	X96881103
Frequency Range	2402-2480MHz
Number of Channels	79CH
Channel Separation	1MHz
Type of Modulation	GFSK
Antenna Type	Printed on PCB
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	COMEUP	N/A	-0.51dBi for 2.4 GHz

Note: The antenna of EUT is conform to FCC 15.203

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 2:	2402 MHz	Channel 23:	2423 MHz	Channel 44:	2444 MHz	Channel 65:	2465 MHz
Channel 3:	2403 MHz	Channel 24:	2424 MHz	Channel 45:	2445 MHz	Channel 66:	2466 MHz
Channel 4:	2404 MHz	Channel 25:	2425 MHz	Channel 46:	2446 MHz	Channel 67:	2467 MHz
Channel 5:	2405 MHz	Channel 26:	2426 MHz	Channel 47:	2447 MHz	Channel 68:	2468 MHz
Channel 6:	2406 MHz	Channel 27:	2427 MHz	Channel 48:	2448 MHz	Channel 69:	2469 MHz
Channel 7:	2407 MHz	Channel 28:	2428 MHz	Channel 49:	2449 MHz	Channel 70:	2470 MHz
Channel 8:	2408 MHz	Channel 29:	2429 MHz	Channel 50:	2450 MHz	Channel 71:	2471 MHz
Channel 9:	2409 MHz	Channel 30:	2430 MHz	Channel 51:	2451 MHz	Channel 72:	2472 MHz
Channel 10:	2410 MHz	Channel 31:	2431 MHz	Channel 52:	2452 MHz	Channel 73:	2473 MHz
Channel 11:	2411 MHz	Channel 32:	2432 MHz	Channel 53:	2453 MHz	Channel 74:	2474 MHz
Channel 12:	2412 MHz	Channel 33:	2433 MHz	Channel 54:	2454 MHz	Channel 75:	2475 MHz
Channel 13:	2413 MHz	Channel 34:	2434 MHz	Channel 55:	2455 MHz	Channel 76:	2476 MHz
Channel 14:	2414 MHz	Channel 35:	2435 MHz	Channel 56:	2456 MHz	Channel 77:	2477 MHz
Channel 15:	2415 MHz	Channel 36:	2436 MHz	Channel 57:	2457 MHz	Channel 78:	2478 MHz
Channel 16:	2416 MHz	Channel 37:	2437 MHz	Channel 58:	2458 MHz	Channel 79:	2479 MHz
Channel 17:	2417 MHz	Channel 38:	2438 MHz	Channel 59:	2459 MHz	Channel 80:	2480 MHz
Channel 18:	2418 MHz	Channel 39:	2439 MHz	Channel 60:	2460 MHz		
Channel 19:	2419 MHz	Channel 40:	2440 MHz	Channel 61:	2461 MHz		
Channel 20:	2420 MHz	Channel 41:	2441 MHz	Channel 62:	2462 MHz		
Channel 21:	2421 MHz	Channel 42:	2442 MHz	Channel 63:	2463 MHz		
Channel 22:	2422 MHz	Channel 43:	2443 MHz	Channel 64:	2464 MHz		

Note:

1. The EUT is a Wireless Remote Control.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. These tests are conducted on a sample for the purpose of demonstrating compliance of 2.4GHz transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

1.2. Operational Description

The EUT is a Wireless Remote Control, The Number of the channels is 79 in 2402~2480MHz. The device operation band in 2.4GHz, modulation is GFSK. The Antenna is Printed on PCB.

Test Mode:	Mode 1: Transmit

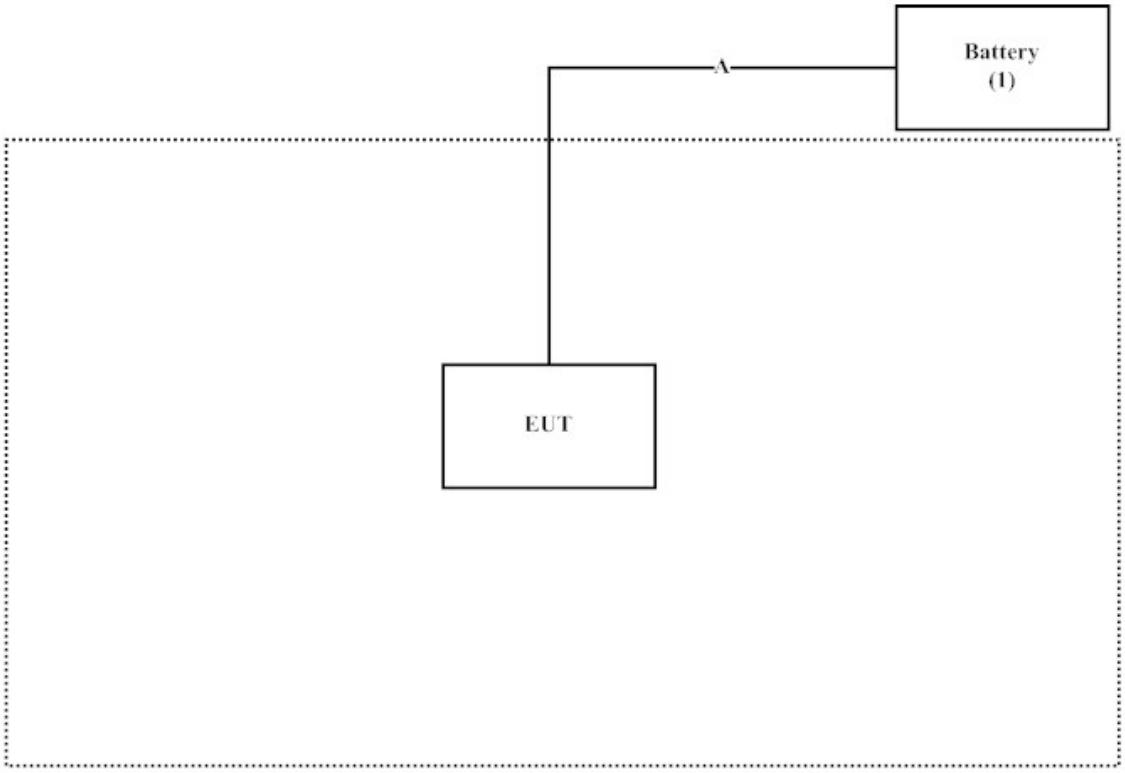
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Battery	TRANE	12B50PE	N/A	N/A

Signal Cable Type		Signal cable Description
A	Power Cable	Non-shielded, 1.8m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in section 1.4.
(2) Provide the DC Power Source.
(3) Start transmits continually.
(4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : http://tw.quietek.com/tw/emc/accreditations/accreditations.htm
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Accreditation on NVLAP
NVLAP Lab Code: 200533-0

Site Name: Quietek Corporation
Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,
Lin-Kou Shiang, Taipei,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

Testing Laboratory
0914

2. Peak Power Output

2.1. Test Equipment

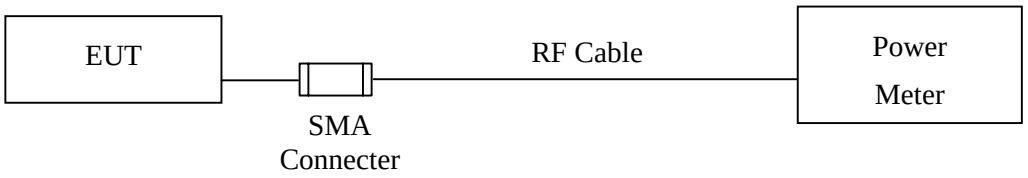
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2009
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2009

Note: 1. All instruments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup

Conducted Measurement



2.3. Limits

The maximum peak power shall be less 1 Watt.

2.4. Test Procedure

The EUT was tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

2.5. Uncertainty

± 1.27 dB

2.6. Test Result of Peak Power Output

Product : Wireless Remote Control
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
02	2402.00	0.83	<30dBm	Pass
41	2441.00	0.96	<30dBm	Pass
80	2480.00	0.86	<30dBm	Pass

Note: Peak Power Output Value =Reading value on peak power meter + cable loss

3. Radiated Emission

3.1. Test Equipment

The following test equipment are used during the radiated emission test:

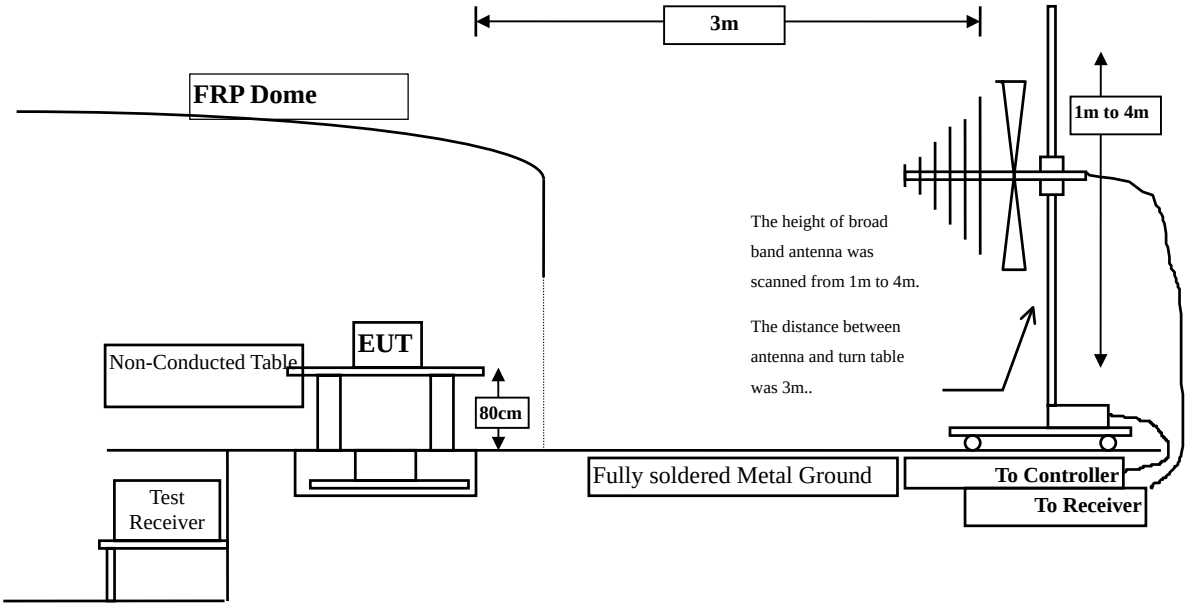
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2009
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2009
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2009
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2010
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

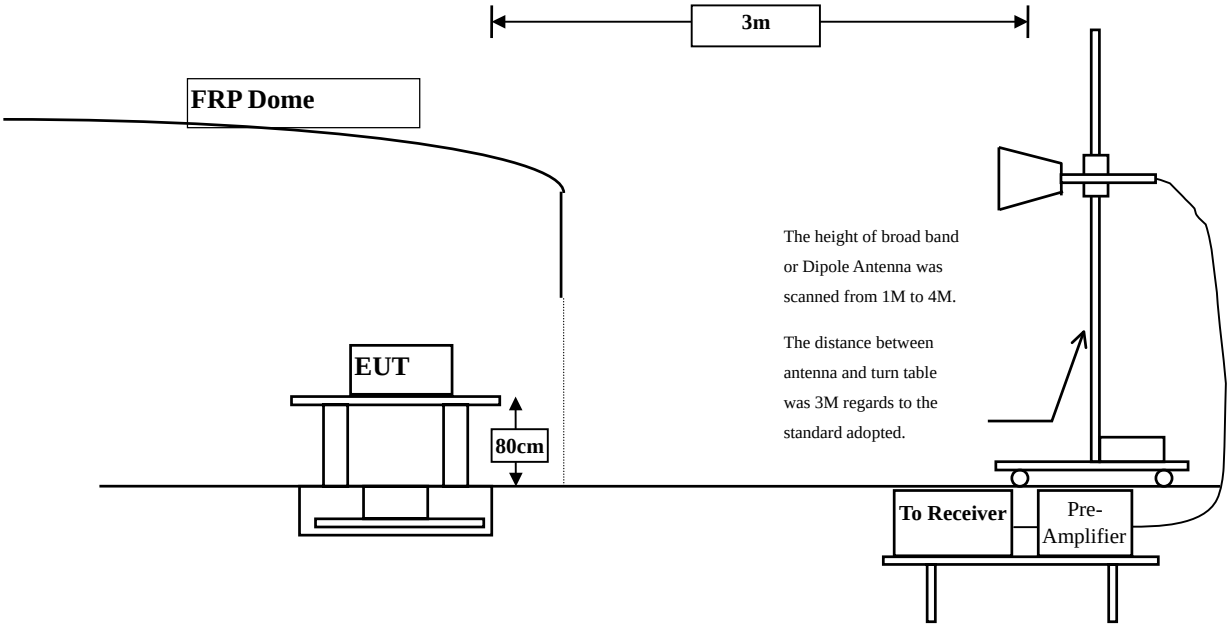
2. The test instruments marked with “X” are used to measure the final test results.

3.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks:E field strength (dBuV/m) = 20 log E field strength (uV/m)

3.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.
The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.
The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.
Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.
The measurement is divided into the Preliminary Measurement and the Final Measurement.
The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.
The measurement frequency range form 30MHz - 10th Harmonic of fundamental was investigated.

3.5. Uncertainty

± 3.9 dB above 1GHz
± 3.8 dB below 1GHz

3.6. Test Result of Radiated Emission

Product : Wireless Remote Control
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2402MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4804.000	3.327	49.820	53.147	-20.853	74.000
7206.000	10.136	39.500	49.636	-24.364	74.000
9608.000	13.706	35.740	49.446	-24.554	74.000
Vertical					
Peak Detector:					
4804.000	6.638	52.870	59.507	-14.493	74.000
7206.000	11.005	41.480	52.485	-21.515	74.000
9608.000	14.103	35.780	49.883	-24.117	74.000

Note:

1. Correct factor = Antenna Factor + Cable Loss – Pre-amplifier Gain
2. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Average Detector:

Frequency	Peak Measurement	Duty Cycle Correct Factor	Measurement Level	Margin	Limit
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
--	--	--	--	--	--
Vertical					
4804	59.507	-15.810	43.697	-10.303	54.000

Note:

1. AVG Measurement=Peak Measurement - Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 9.
3. If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.

Product : Wireless Remote Control
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4882.000	3.001	50.340	53.341	-20.659	74.000
7323.000	11.846	36.820	48.667	-25.333	74.000
9764.000	12.563	35.290	47.853	-26.147	74.000
Vertical					
Peak Detector:					
4882.000	5.713	51.860	57.574	-16.426	74.000
7323.000	12.727	37.220	49.948	-24.052	74.000
9764.000	13.028	35.200	48.228	-25.772	74.000

Note:

1. Correct factor = Antenna Factor + Cable Loss – Pre-amplifier Gain
2. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Average Detector:

Frequency	Peak Measurement	Duty Cycle Correct Factor	Measurement Level	Margin	Limit
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
--	--	--	--	--	--
Vertical					
4882	57.574	-15.810	41.764	-12.236	54.000

Note:

1. AVG Measurement=Peak Measurement - Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 9.
3. If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.

Product : Wireless Remote Control
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2480MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4960.000	2.760	49.850	52.610	-21.390	74.000
7440.000	12.567	36.290	48.856	-25.144	74.000
9920.000	13.456	34.280	47.736	-26.264	74.000
Vertical					
Peak Detector:					
4960.000	5.557	51.470	57.027	-16.973	74.000
7440.000	13.426	38.250	51.675	-22.325	74.000
9920.000	13.958	36.050	50.008	-23.992	74.000

Note:

1. Correct factor = Antenna Factor + Cable Loss – Pre-amplifier Gain
2. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Average Detector:

Frequency	Peak Measurement	Duty Cycle Correct Factor	Measurement Level	Margin	Limit
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
--	--	--	--	--	--
Vertical					
4960	57.027	-15.810	41.217	-12.783	54.000

Note:

1. AVG Measurement=Peak Measurement - Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 9.
3. If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.

Product : Wireless Remote Control
Test Item : General Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
95.960	-7.820	37.616	29.796	-13.704	43.500
233.700	-8.619	32.077	23.458	-22.542	46.000
305.480	-2.929	31.053	28.124	-17.876	46.000
458.740	0.833	25.651	26.484	-19.516	46.000
610.060	4.101	28.658	32.759	-13.241	46.000
922.400	6.334	25.448	31.782	-14.218	46.000
Vertical					
95.960	-2.790	37.616	34.826	-8.674	43.500
233.700	-9.199	32.698	23.499	-22.501	46.000
334.580	-4.891	29.750	24.859	-21.141	46.000
610.060	-1.579	28.658	27.079	-18.921	46.000
745.860	1.828	26.155	27.983	-18.017	46.000
968.960	8.191	24.296	32.487	-21.513	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

4. RF antenna conducted test

4.1. Test Equipment

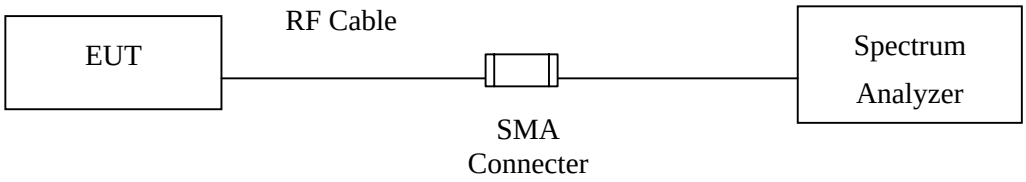
The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2009
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2009
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr.,2009

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

4.2. Test Setup

RF antenna Conducted Measurement:



4.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

4.4. Test Procedure

The EUT was tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

4.5. Uncertainty

The measurement uncertainty
Conducted is defined as ± 1.27dB

4.6. Test Result of RF antenna conducted test

Product : Wireless Remote Control
Test Item : RF antenna conducted test
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Channel 02 (2402MHz) 30M-25GHz

Channel 41 (2441MHz) 30M-25GHz

Channel 80 (2480MHz) 30M-25GHz

5. Band Edge

5.1. Test Equipment

RF Conducted Measurement

The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2009
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2009
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr.,2009

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

RF Radiated Measurement:

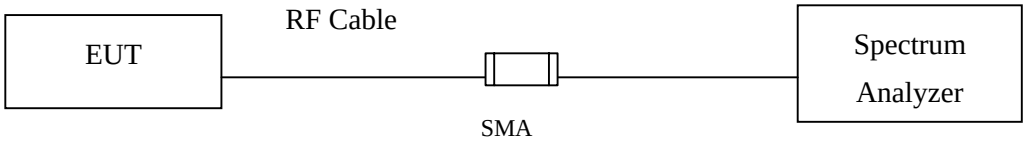
The following test equipments are used during the band edge tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2009
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2009
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2009
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2010
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

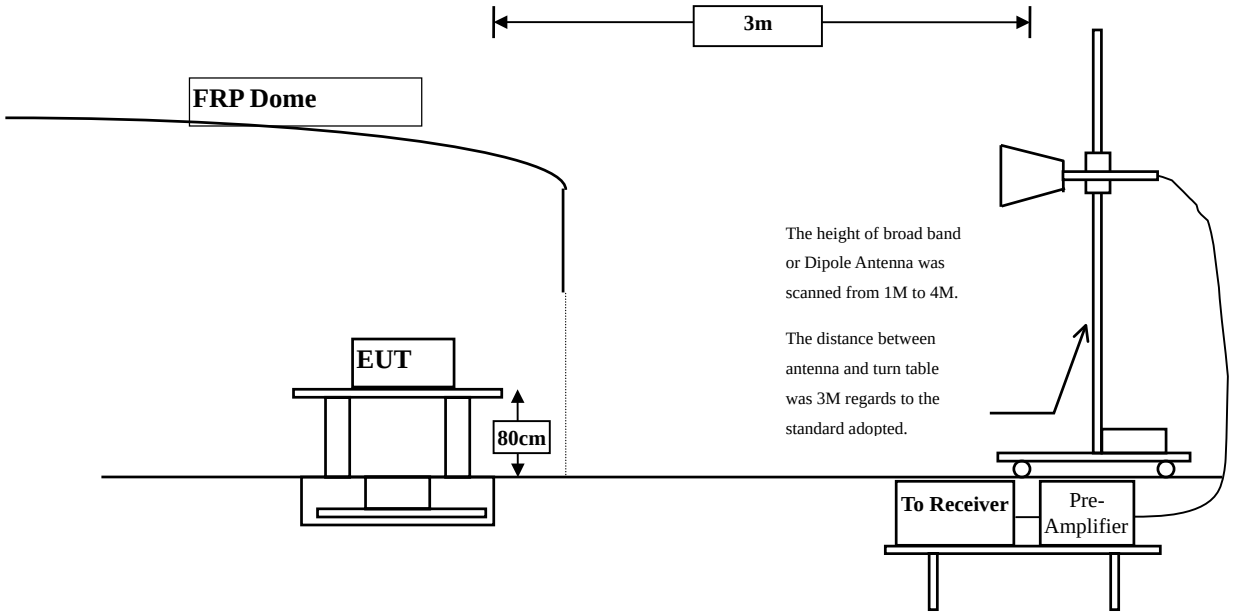
Note: 1. All instruments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

5.2. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



5.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

5.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.
The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

5.5. Uncertainty

± 3.9 dB above 1GHz
± 3.8 dB below 1GHz

5.6. Test Result of Band Edge

Product : Wireless Remote Control
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2402	31.573	51.56	83.134	Peak
Horizontal	2402	--	--	--	Average
Vertical	2402	30.917	53.590	84.507	Peak
Vertical	2402	--	--	--	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2389.9	83.134	36.101	47.033	Peak
Horizontal	2389.9	--	--	--	Average
Vertical	2389.9	84.507	36.101	48.406	Peak
Vertical	2389.9	--	--	--	Average

Note:

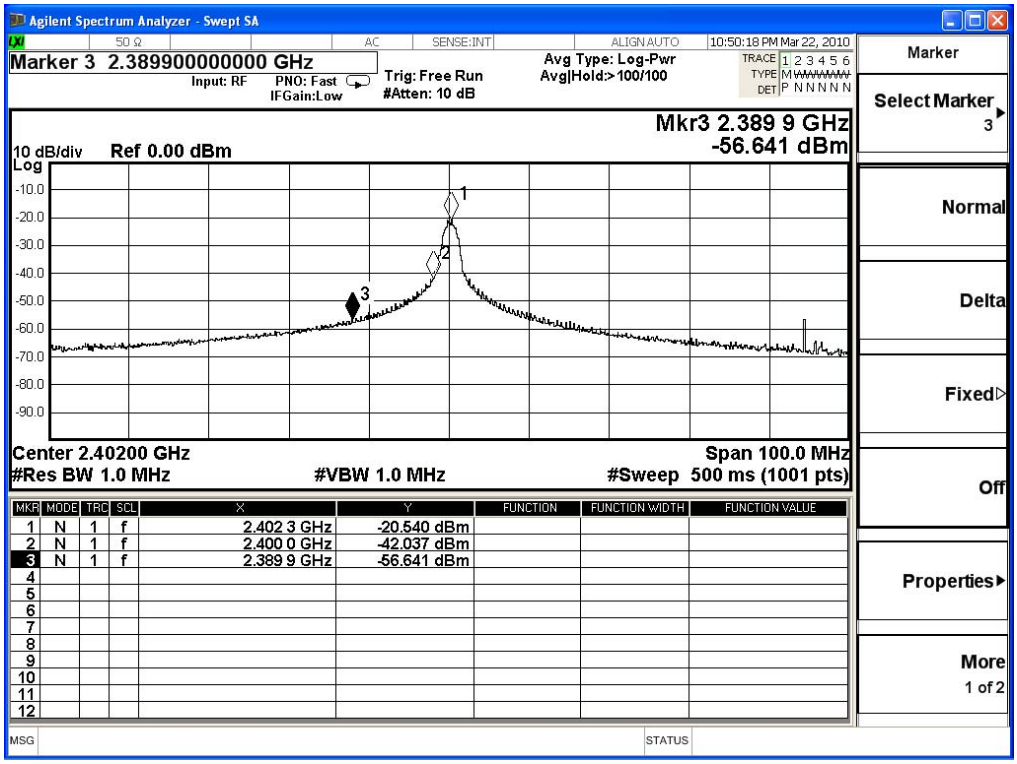
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



Product : Wireless Remote Control
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2480	31.412	47.120	78.532	Peak
Horizontal	2480	--	--	--	Average
Vertical	2480	31.412	52.950	84.362	Peak
Vertical	2480	--	--	--	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2483.5	78.532	25.28	53.243	Peak
Horizontal	2483.5	--	--	--	Average
Vertical	2483.5	84.362	25.28	59.082	Peak
Vertical	2483.5	--	--	--	Average

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

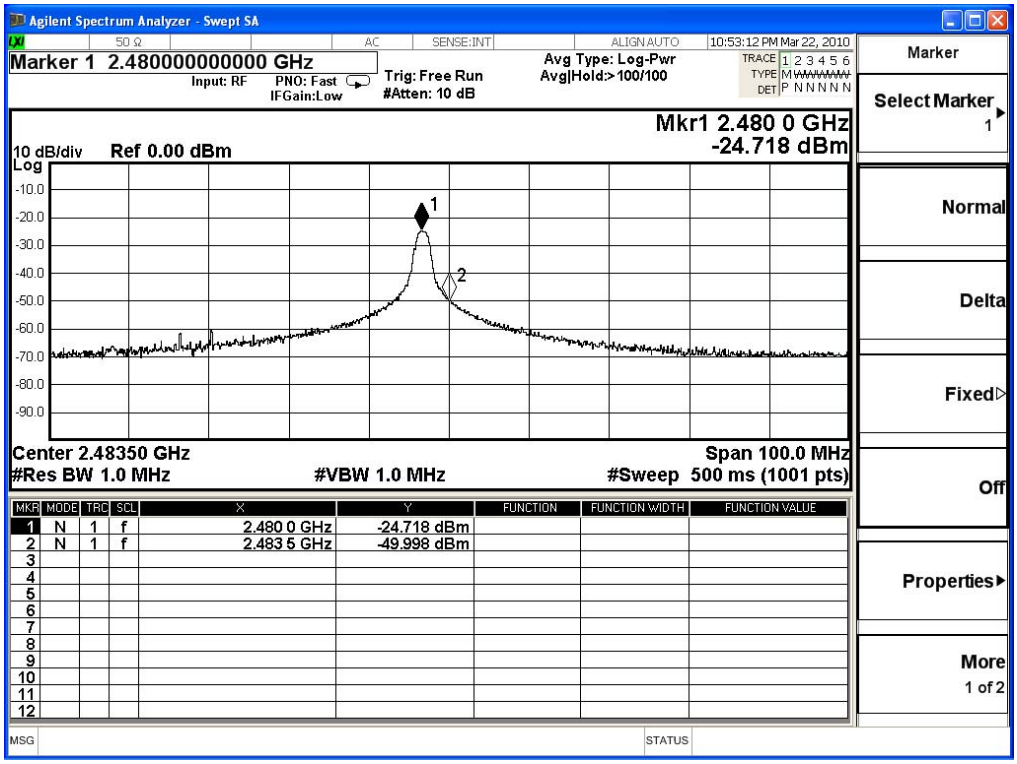
Average Detector:

Frequency	Peak Measurement	Duty Cycle Correct Factor	Measurement Level	Margin	Limit
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
--	--	--	--	--	--
Vertical					
2483.5	59.082	-15.619	43.463	-10.537	54.000

Note:

1. AVG Measurement=Peak Measurement - Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 9.
3. If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Peak Detector of conducted Band Edge Delta



6. Occupied Bandwidth

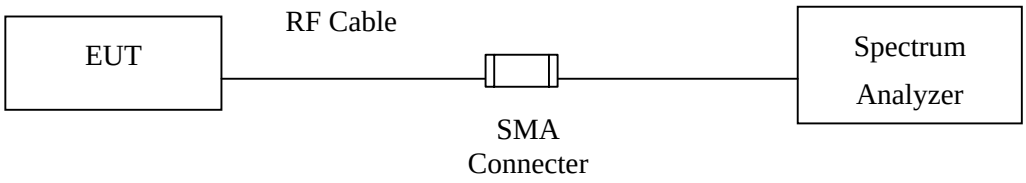
6.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2009
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2009
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr.,2009

Note: 1. All instruments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

6.2. Test Setup



6.3. Limits

The minimum bandwidth shall be at least 500 kHz.

6.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Span greater than RBW.

6.5. Uncertainty

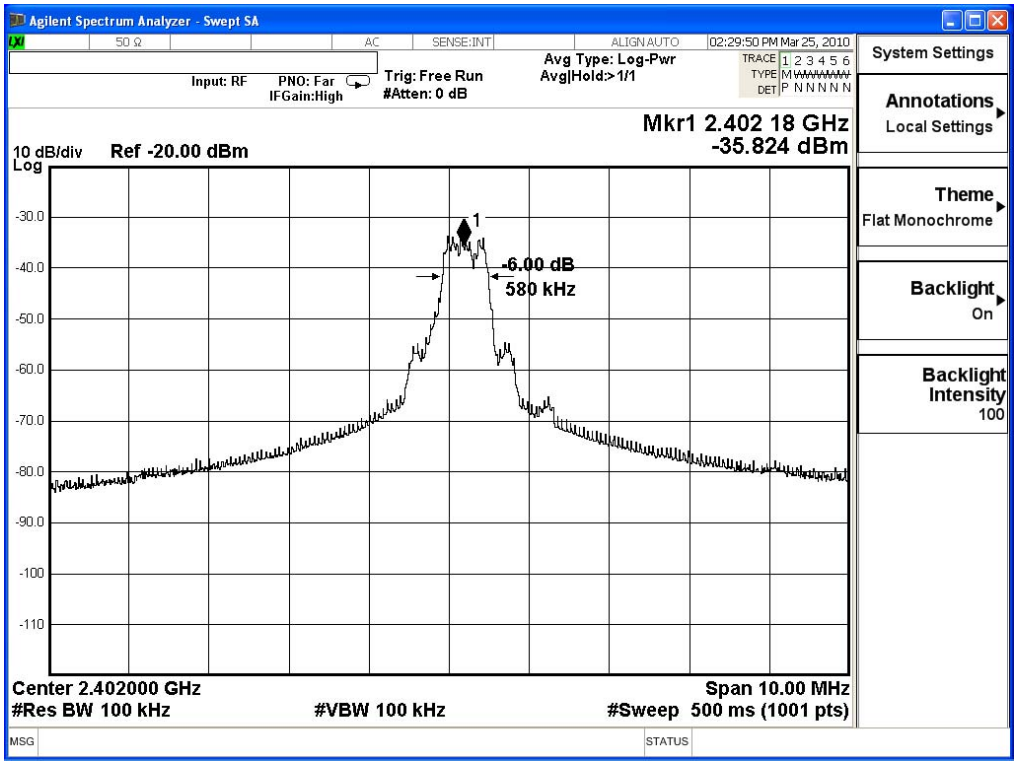
± 150Hz

6.6. Test Result of Occupied Bandwidth

Product : Wireless Remote Control
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
02	2402.00	580	>500	Pass

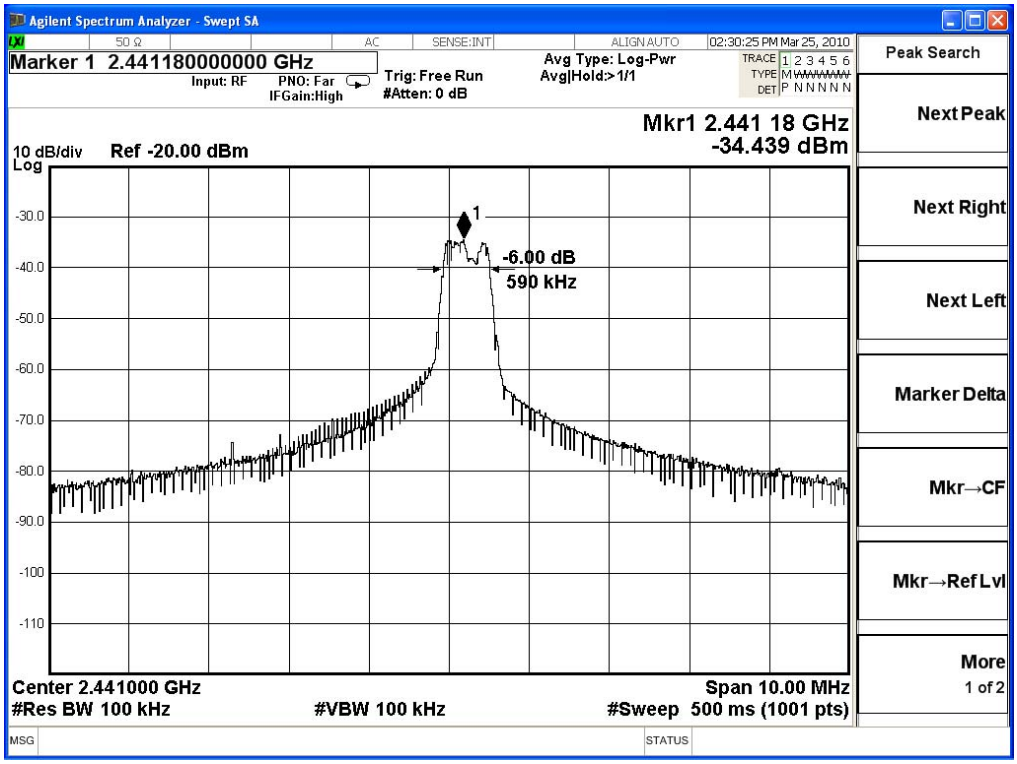
Figure Channel 02:



Product : Wireless Remote Control
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
41	2441.00	590	>500	Pass

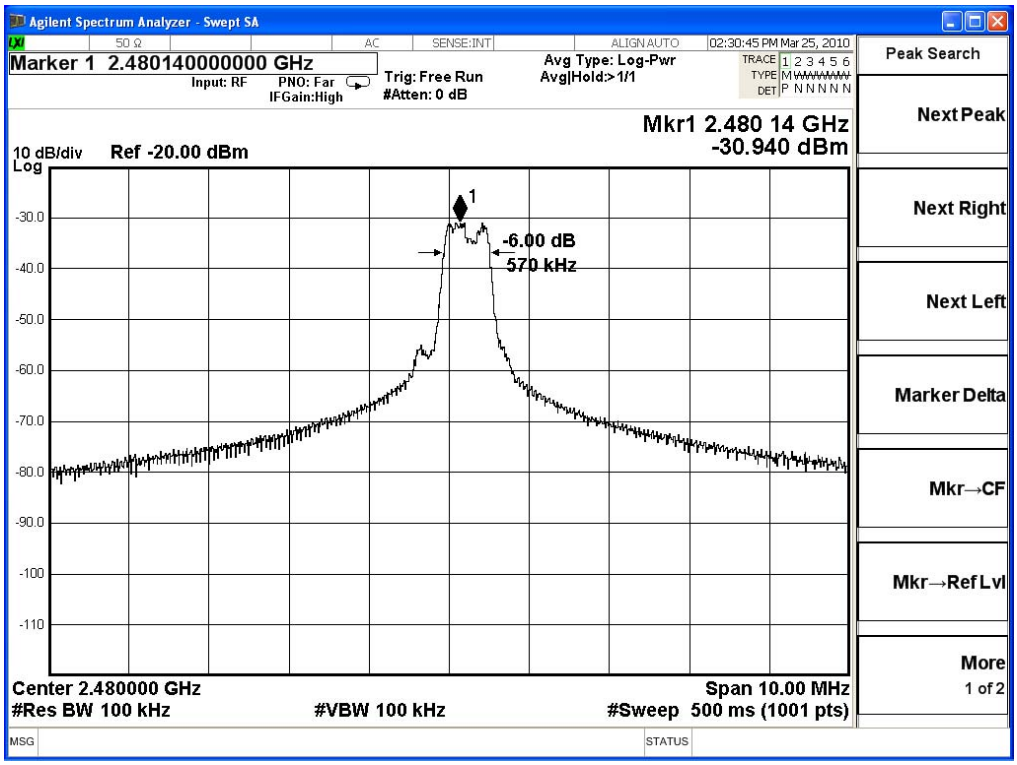
Figure Channel 41:



Product : Wireless Remote Control
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
80	2480.00	570	>500	Pass

Figure Channel 80:



7. Power Density

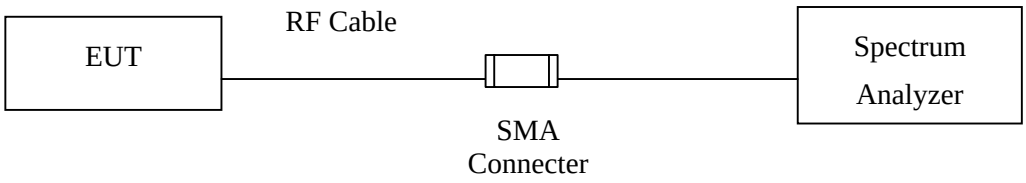
7.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2009
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2009
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr.,2009

Note: 1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

7.2. Test Setup



7.3. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

7.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW= 3 kHz, VBW=10KHz, Sweep time=(SPAN/3KHz), detector=Peak detector

7.5. Uncertainty

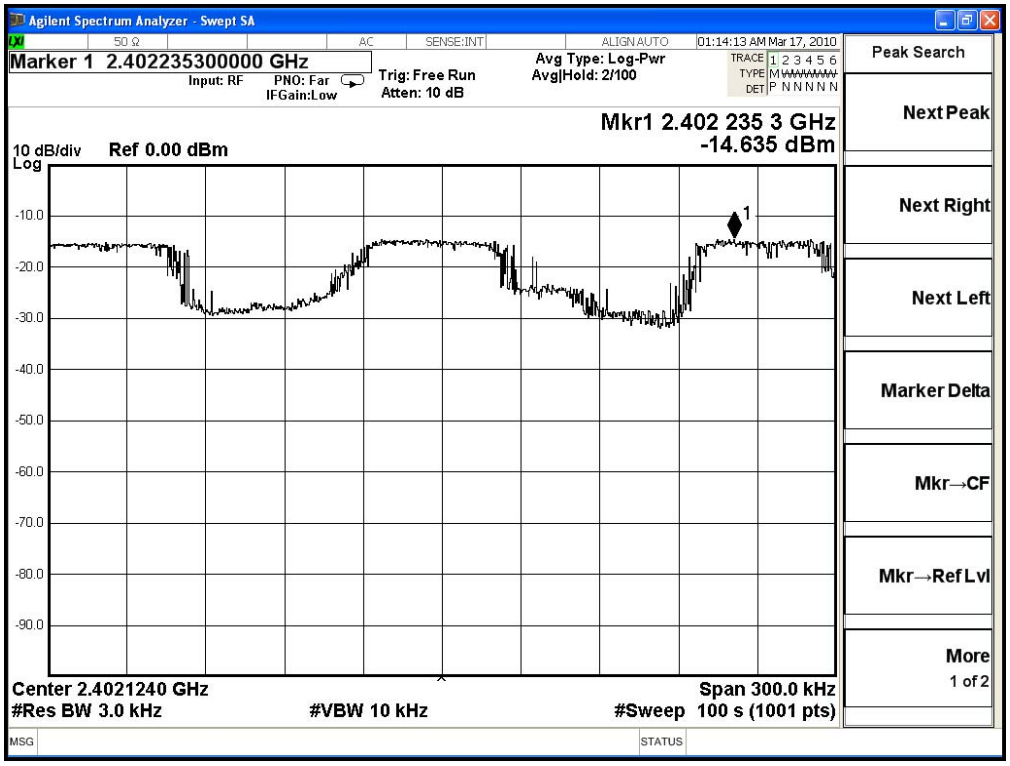
± 1.27 dB

7.6. Test Result of Power Density

Product : Wireless Remote Control
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit(2402MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
02	2402.00	-14.635	< 8dBm	Pass

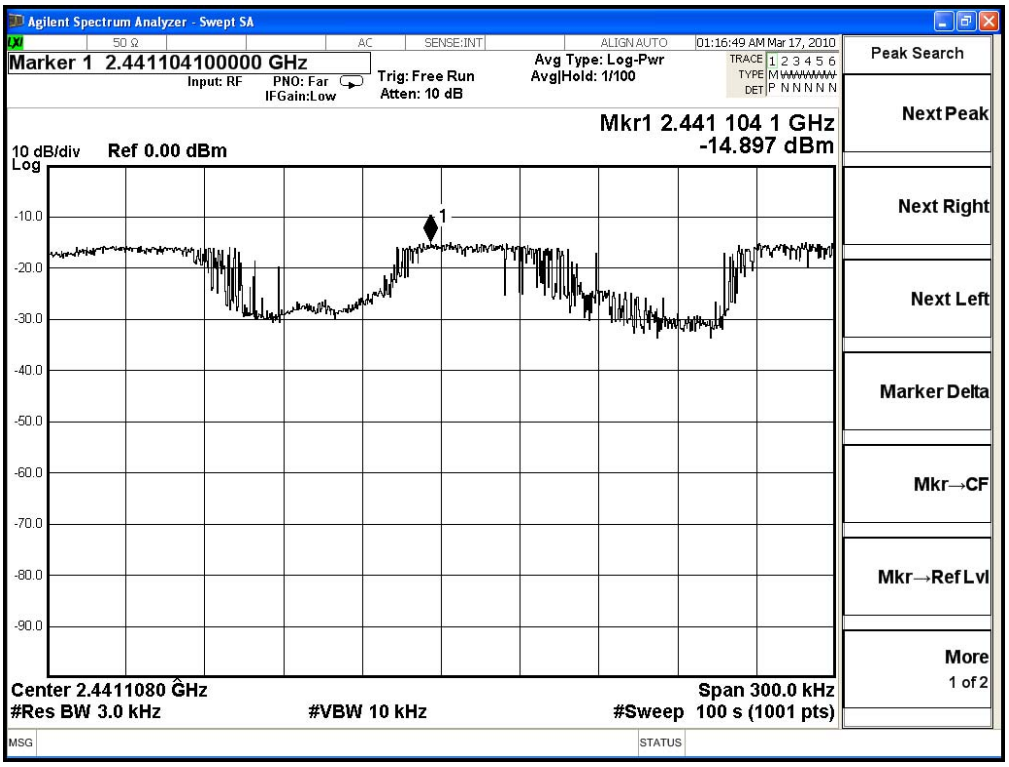
Figure Channel 02:



Product : Wireless Remote Control
Test Item : Power Density Data
Test Site : No.3OATS
Test Mode : Mode 1: Transmit (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
41	2441	-14.897	< 8dBm	Pass

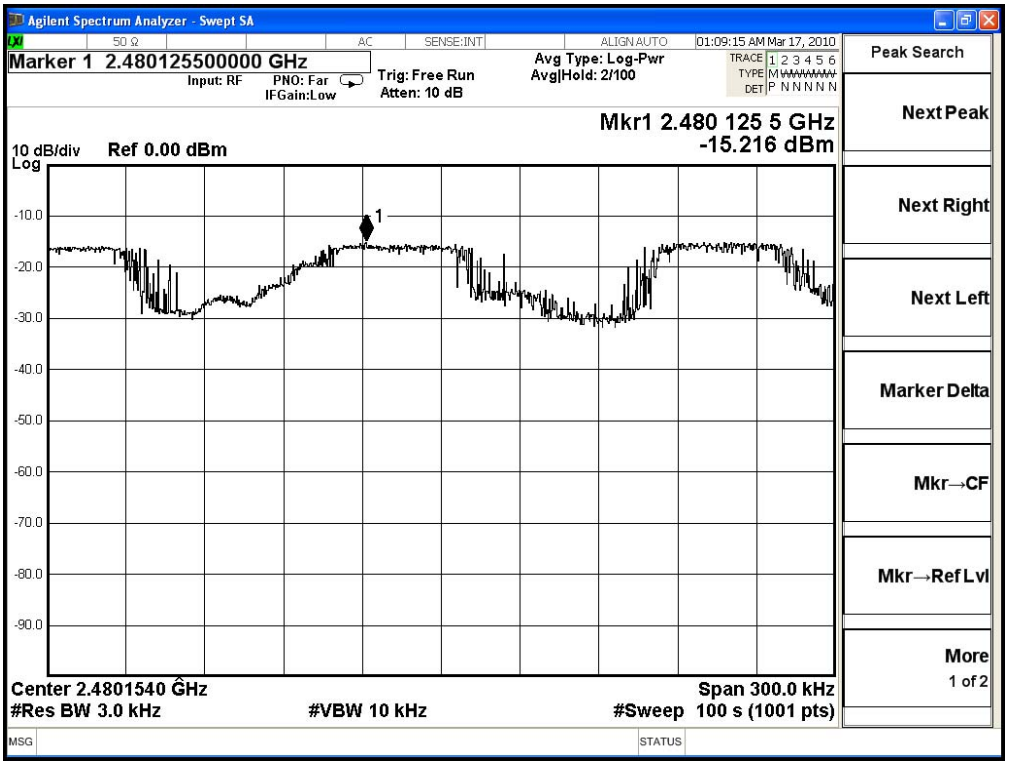
Figure Channel 41:



Product : Wireless Remote Control
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit (2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
80	2480.00	-15.216	< 8dBm	Pass

Figure Channel 80:



8. Duty Cycle

8.1. Test Equipment

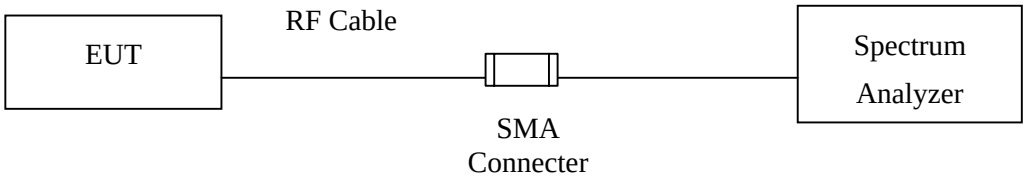
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2009
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2009
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2009

Note: 1. All equipments are calibrated every one year.

2. The test equipments marked by "X" are used to measure the final test results.

8.2. Test Setup

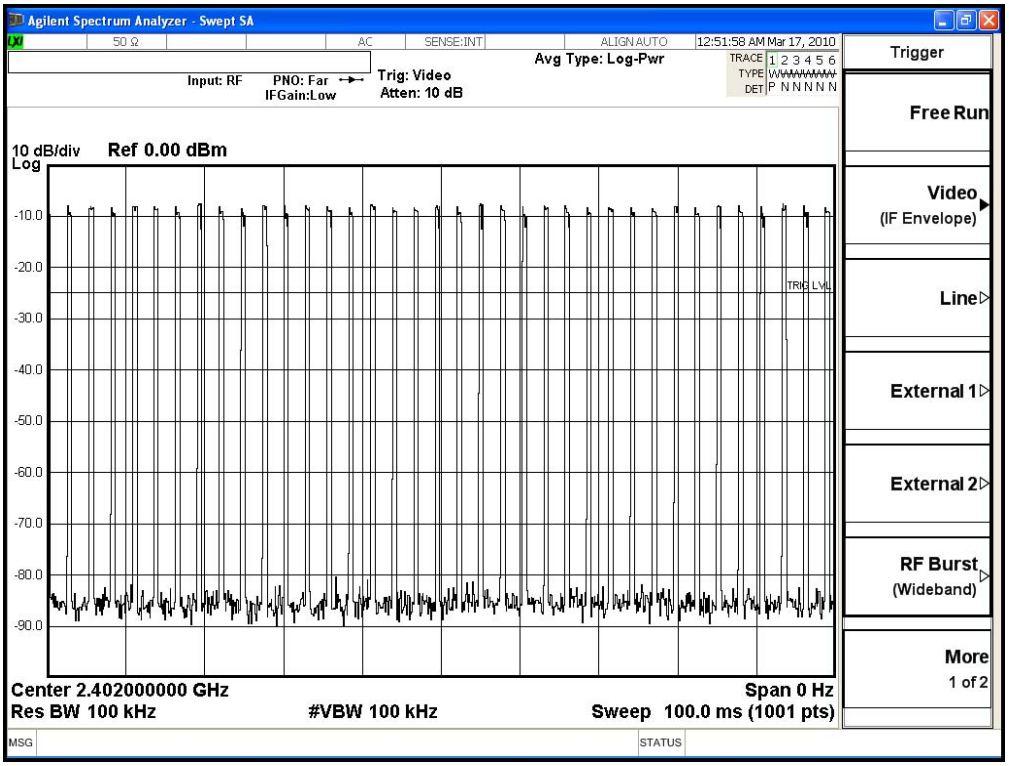


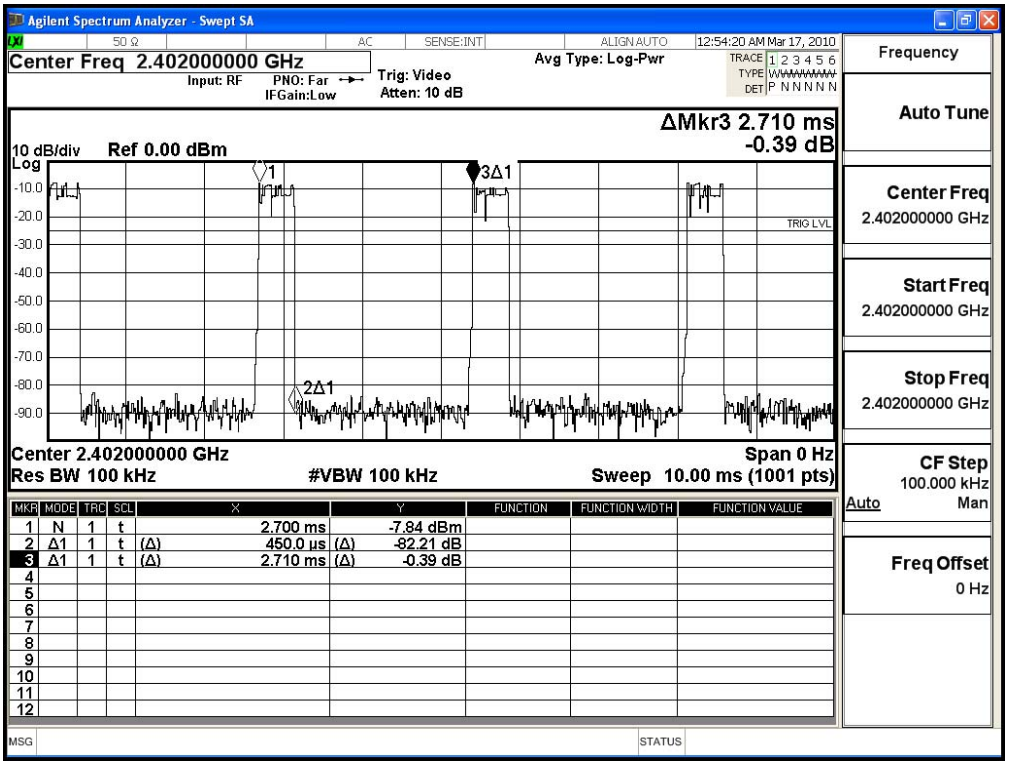
8.3. Uncertainty

± 150Hz

8.4. Test Result of Duty Cycle

Product : Wireless Remote Control
Test Item : Duty Cycle Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit





Time on of 100ms= (450us*36) = 16.200 ms

Duty Cycle= 16.2ms / 100ms= 0.162

Duty Cycle correction factor= 20 LOG 0.162= -15.810 dB

Duty Cycle correction factor	**-15.810**	**dB**

Remark:

If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.

9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs