

FCC Test Report

Product Name	Wireless Remote Control
Model No.	882756
FCC ID	X96882756

Applicant	COMEUP INDUSTRIES INC.
Address	NO. 112, NANYANG ST., XIZHI DIST., NEW TAIPEI CITY 22152, TAIWAN

Date of Receipt	Jan. 19, 2015
Issued Date	April 15, 2015
Report No.	1510380R-RFUSP15V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Test Report

Issued Date: April 15, 2015

Report No.: 1510380R-RFUSP15V00



Product Name	Wireless Remote Control
Applicant	COMEUP INDUSTRIES INC.
Address	NO. 112, NANYANG ST., XIZHI DIST., NEW TAIPEI CITY 22152, TAIWAN
Manufacturer	COMEUP INDUSTRIES INC.
Model No.	882756
EUT Rated Voltage	DC 8-24V
EUT Test Voltage	DC 12V (Power by battery)
Trade Name	COMEUP
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2014 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :

Rita Huang

(Senior Adm. Specialist / Rita Huang)

Tested By :

Nova chu

(Engineer / Nova Chu)

Approved By :

Vincent Lin

(Director / Vincent Lin)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless Remote Control
Trade Name	COMEUP
Model No.	882756
FCC ID	X96882756
Frequency Range	2402~2480MHz
Channel Number	79
Type of Modulation	GFSK
Channel Control	Auto
Antenna Type	PCB Antenna
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	COMEUP	N/A	1.89 dBi for 2.4 GHz

Note: The antenna of EUT is conform to FCC 15.203

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 with a built-in 2.4GHz transceiver.
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 of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.249 for spread spectrum devices.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit
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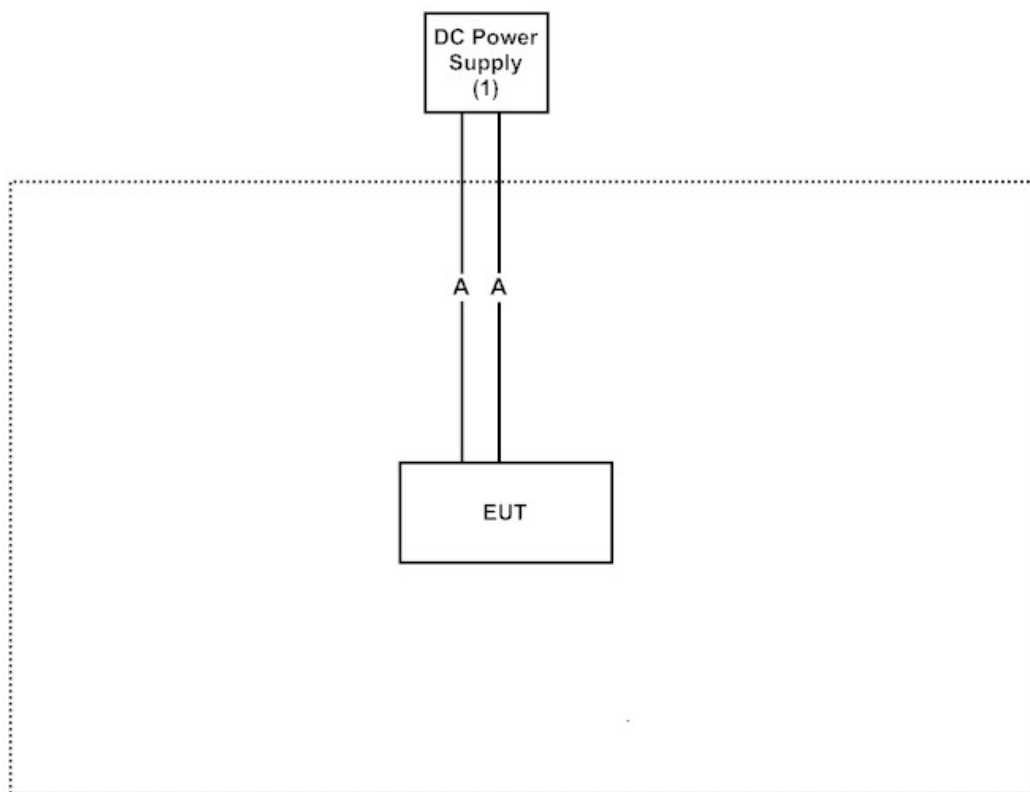
1.3. Tested System Details

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 DC Power Supply	Topward	6303D	743452	Non-Shielded, 1.8m

Signal Cable Type	Signal cable Description
A Power Cable	Non-Shielded, 1.0m, two PCS.

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4.
- (2) Provide the DC Power Source and Press the button.
- (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://www.quietek.com/tw/ctg/cts/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

Site Name: Quietek Corporation
Site Address: No.5-22, Ruishukeng, Linkou Dist.,
New Taipei City 24451,
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E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

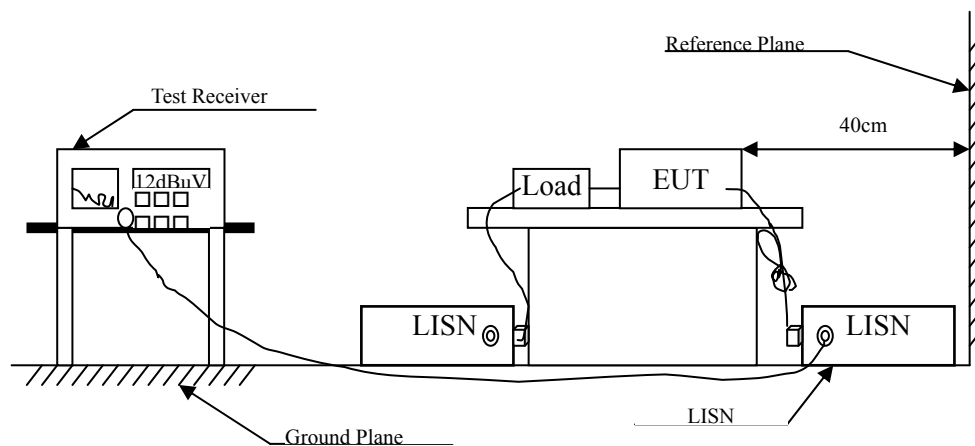
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2014	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2015	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2015	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2015	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2015	
	No.1 Shielded Room				

Note:

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

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Owing to the EUT use vehicle battery supply voltage, this test item is not performed.

3. Radiated Emission

3.1. Test Equipment

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

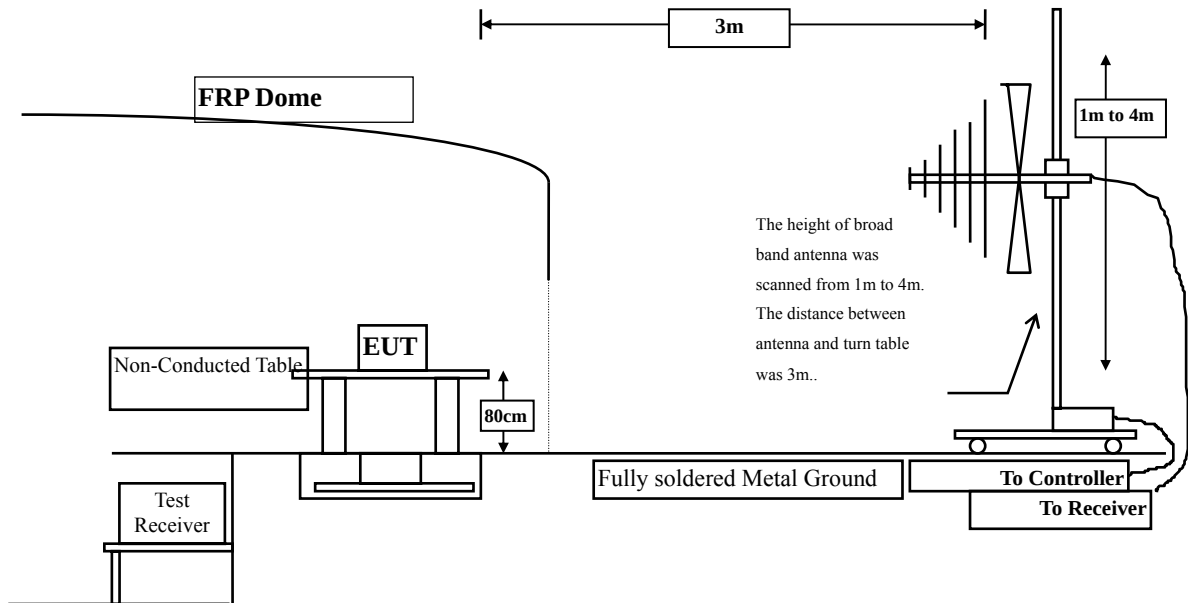
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep, 2014
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun, 2014
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun, 2014
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun, 2014
	X	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun, 2014

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2014
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar, 2015
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2015
	X	Horn Antenna	TRC	AH-0801/95051	Aug, 2014
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan, 2015
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul, 2014
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul, 2014

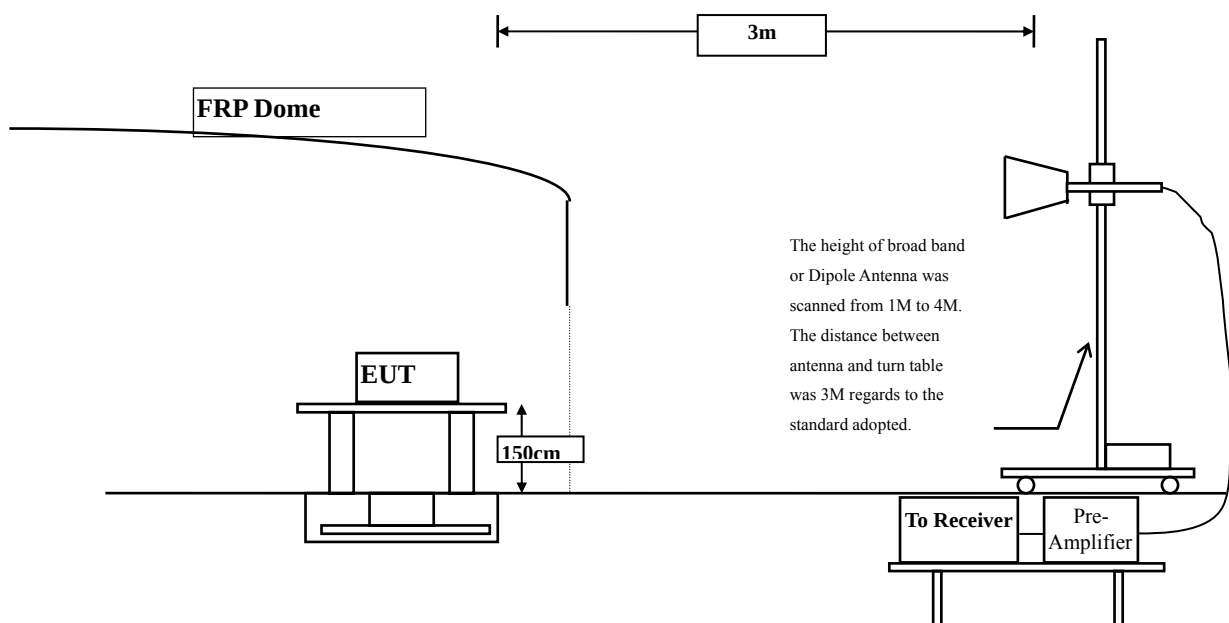
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.3. Limits

➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.249 Limits				
Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m @3m)	(dBuV/m @3m)	(uV/m @3m)	(dBuV/m @3m)
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

Remarks : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB 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	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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

3.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.249 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 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 C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~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 from 9kHz - 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 : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (X-Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2402.000	31.573	54.320	85.894	-28.106	114.000
2441.000	31.860	54.400	86.260	-27.740	114.000
2480.000	32.155	53.990	86.146	-27.854	114.000
Vertical					
Peak Detector:					
2402.000	30.917	46.140	77.057	-36.943	114.000
2441.000	31.146	46.910	78.056	-35.944	114.000
2480.000	31.412	48.080	79.492	-34.508	114.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. 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					
Average Detector:					
2402	85.894	-30.949	54.945	-39.055	94.000
2441	86.26	-30.949	55.311	-38.689	94.000
2480	86.146	-30.949	55.197	-38.803	94.000
Vertical					
Average Detector:					
2402	77.057	-30.949	46.108	-47.892	94.000
2441	78.056	-30.949	47.107	-46.893	94.000
2480	79.492	-30.949	48.543	-45.457	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : Wireless Remote Control
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (Y-Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2402.000	31.573	48.720	80.294	-33.706	114.000
2441.000	31.860	49.000	80.860	-33.140	114.000
2480.000	32.155	48.670	80.826	-33.174	114.000
Vertical					
Peak Detector:					
2402.000	30.917	51.280	82.197	-31.803	114.000
2441.000	31.146	51.170	82.316	-31.684	114.000
2480.000	31.412	50.370	81.782	-32.218	114.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. 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	Duty Cycle	Measurement	Margin	Limit
MHz	Measurement	Correct Factor	Level		
	dBuV/m	dB	dBuV/m	dB	dBuV/m

Horizontal

Average Detector:

2402	80.294	-30.949	49.345	-44.655	94.000
2441	80.86	-30.949	49.911	-44.089	94.000
2480	80.826	-30.949	49.877	-44.123	94.000

Vertical

Average Detector:

2402	82.197	-30.949	51.248	-42.752	94.000
2441	82.316	-30.949	51.367	-42.633	94.000
2480	81.782	-30.949	50.833	-43.167	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : Wireless Remote Control
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (Z-Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2402.000	31.573	50.240	81.814	-32.186	114.000
2441.000	31.860	50.640	82.500	-31.500	114.000
2480.000	32.155	50.390	82.546	-31.454	114.000
Vertical					
Peak Detector:					
2402.000	30.917	46.170	77.087	-36.913	114.000
2441.000	31.146	48.660	79.806	-34.194	114.000
2480.000	31.412	46.180	77.592	-36.408	114.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. 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

Average Detector:

2402	81.814	-30.949	50.865	-43.135	94.000
2441	82.5	-30.949	51.551	-42.449	94.000
2480	82.546	-30.949	51.597	-42.403	94.000

Vertical

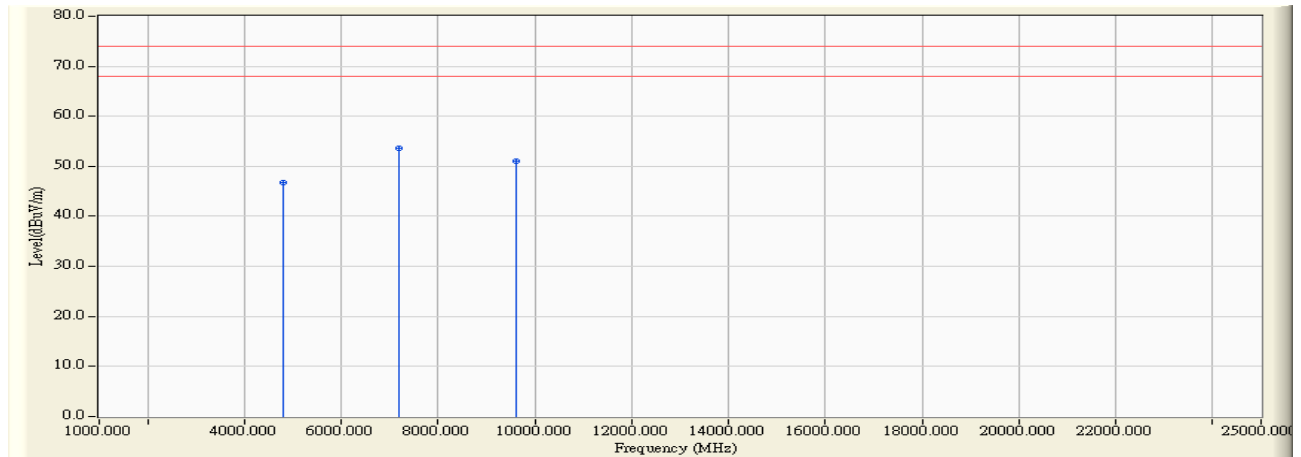
Average Detector:

2402	77.087	-30.949	46.138	-47.862	94.000
2441	79.806	-30.949	48.857	-45.143	94.000
2480	77.592	-30.949	46.643	-47.357	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

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

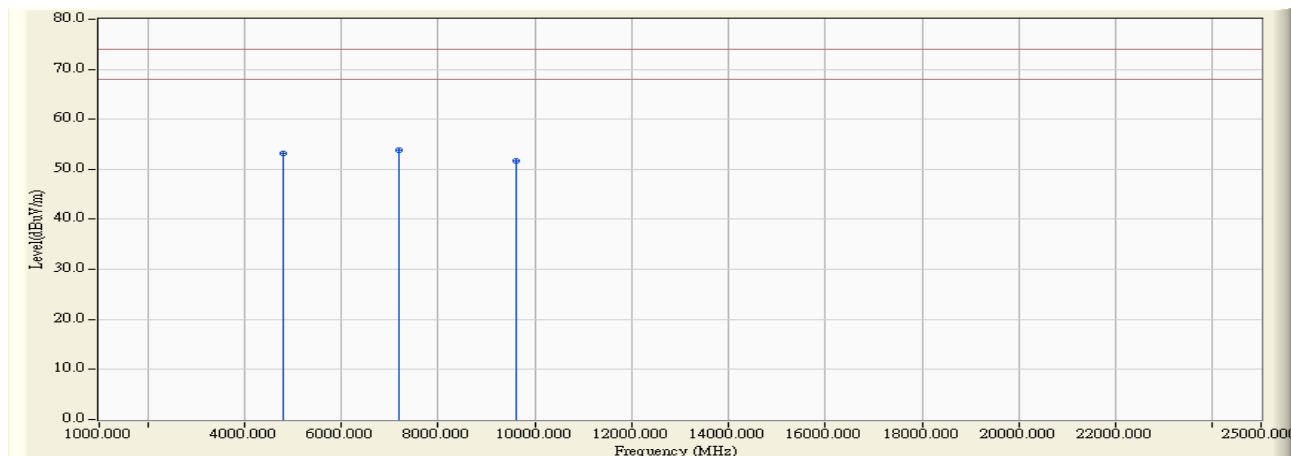


Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4804.000	3.327	43.510	46.837	-27.163	74.000
7206.000	10.136	43.510	53.646	-20.354	74.000
9608.000	13.706	37.260	50.966	-23.034	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

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

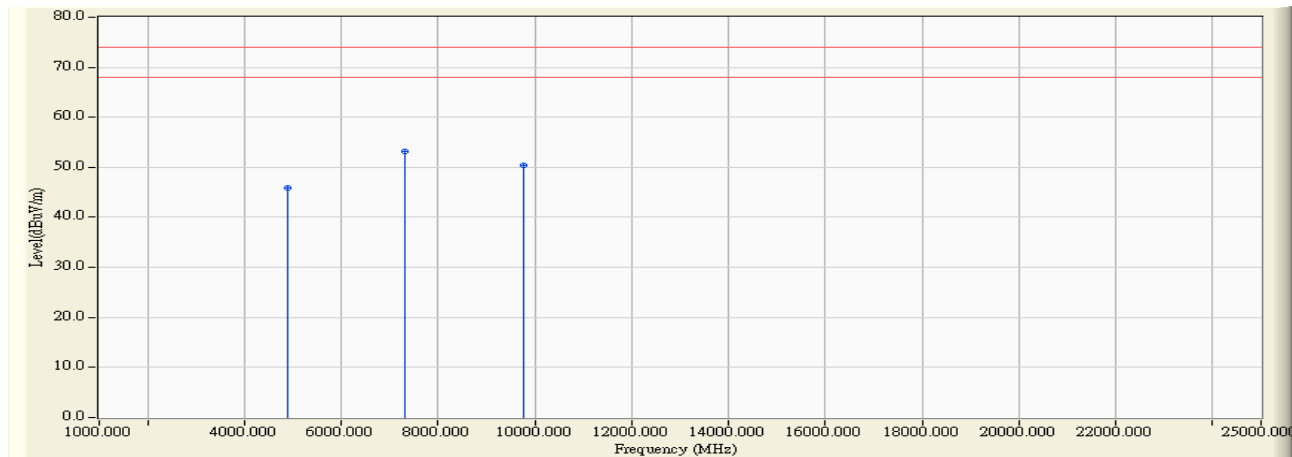


Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
4804.000	6.638	46.570	53.207	-20.793	74.000
7206.000	11.005	42.880	53.885	-20.115	74.000
9608.000	14.103	37.550	51.653	-22.347	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

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

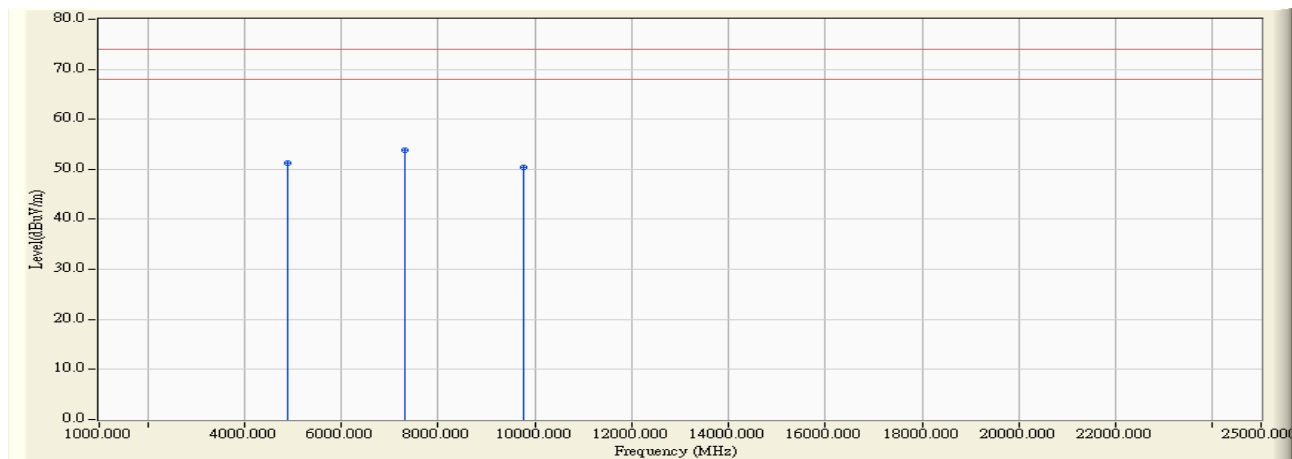


Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	Db	dBuV	dBuV/m	Db	dBuV/m
Horizontal					
Peak Detector:					
4882.000	3.001	42.840	45.841	-28.159	74.000
7323.000	11.846	41.370	53.217	-20.783	74.000
9764.000	12.563	37.880	50.443	-23.557	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

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

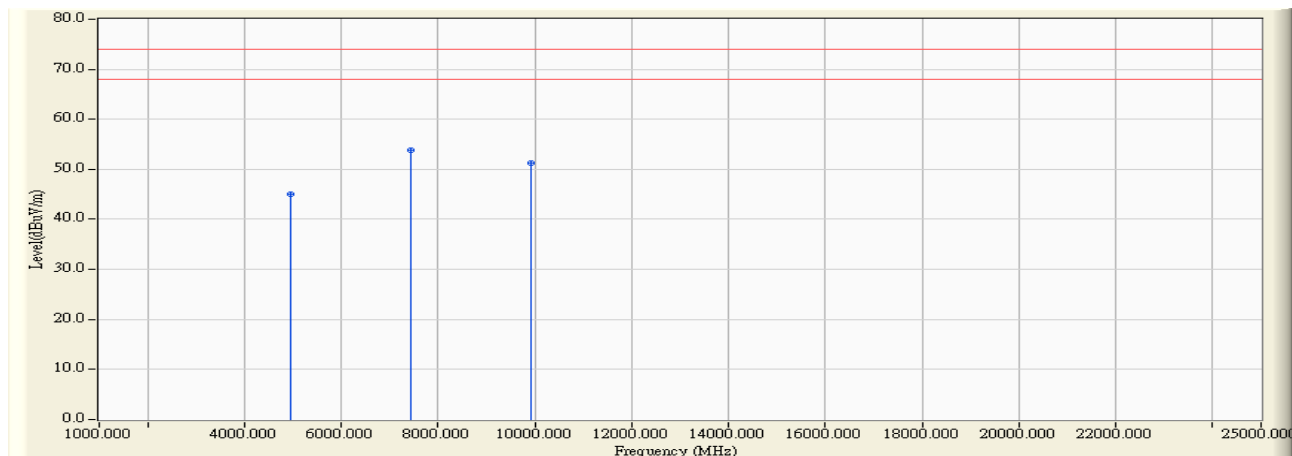


Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level	Db	dBuV/m
	Db	dBuV	dBuV/m		
Vertical					
Peak Detector:					
4882.000	5.713	45.570	51.284	-22.716	74.000
7323.000	12.727	41.090	53.818	-20.182	74.000
9764.000	13.028	37.290	50.318	-23.682	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

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

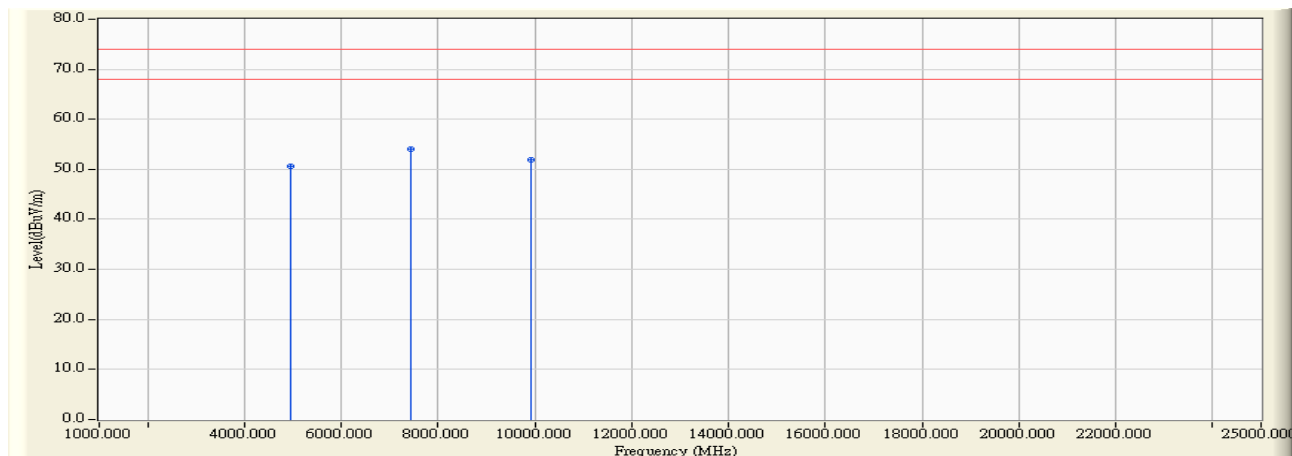


Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4960.000	2.760	42.180	44.940	-29.060	74.000
7440.000	12.567	41.240	53.806	-20.194	74.000
9920.000	13.456	37.870	51.326	-22.674	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

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



Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
4960.000	5.557	45.150	50.707	-23.293	74.000
7440.000	13.426	40.570	53.995	-20.005	74.000
9920.000	13.958	37.960	51.918	-22.082	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

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

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
142.520	-7.627	40.483	32.856	-10.644	43.500
363.680	0.189	32.166	32.355	-13.645	46.000
462.620	3.589	26.072	29.661	-16.339	46.000
596.480	3.587	26.623	30.210	-15.790	46.000
825.400	7.346	24.105	31.451	-14.549	46.000
968.960	7.356	24.871	32.227	-21.773	54.000
Vertical					
51.340	-11.633	42.962	31.329	-8.671	40.000
192.960	-10.095	35.482	25.387	-18.113	43.500
396.660	0.771	29.655	30.426	-15.574	46.000
596.480	3.587	27.445	31.032	-14.968	46.000
825.400	7.346	24.895	32.241	-13.759	46.000
976.720	7.054	23.484	30.538	-23.462	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

4. Band Edge

4.1. 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, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

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.

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

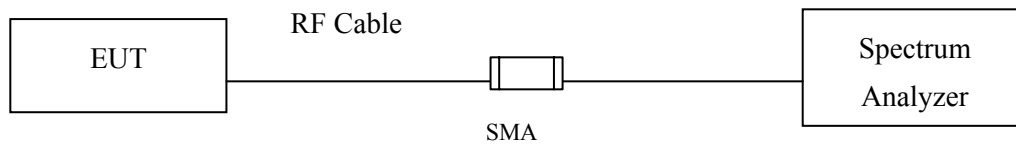
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2014
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar, 2015
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2015
	X	Horn Antenna	TRC	AH-0801/95051	Aug, 2014
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan, 2015
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul, 2014
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul, 2014

Note:

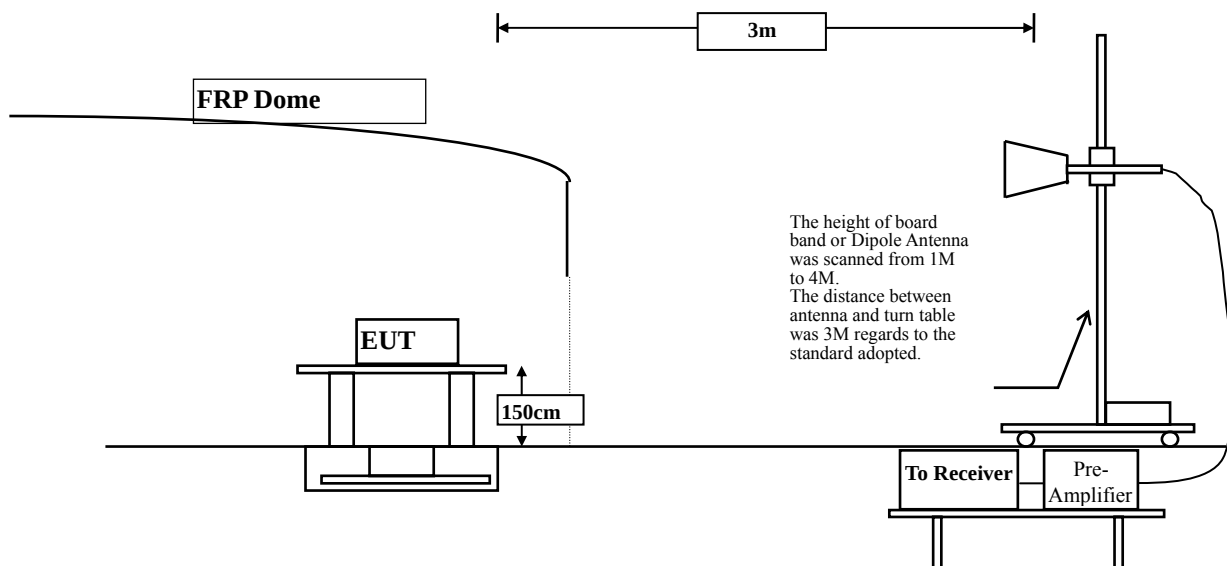
1. All equipments are calibrated every one year.
2. The test equipments marked by “X” are used to measure the final test results.

4.2. Test Setup

RF Conducted Measurement



RF Radiated 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 50 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

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table can rotate 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 can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

4.5. Uncertainty

Conducted is ± 1.27 dB

Radiated is ± 3.9 dB

4.6. Test Result of Band Edge

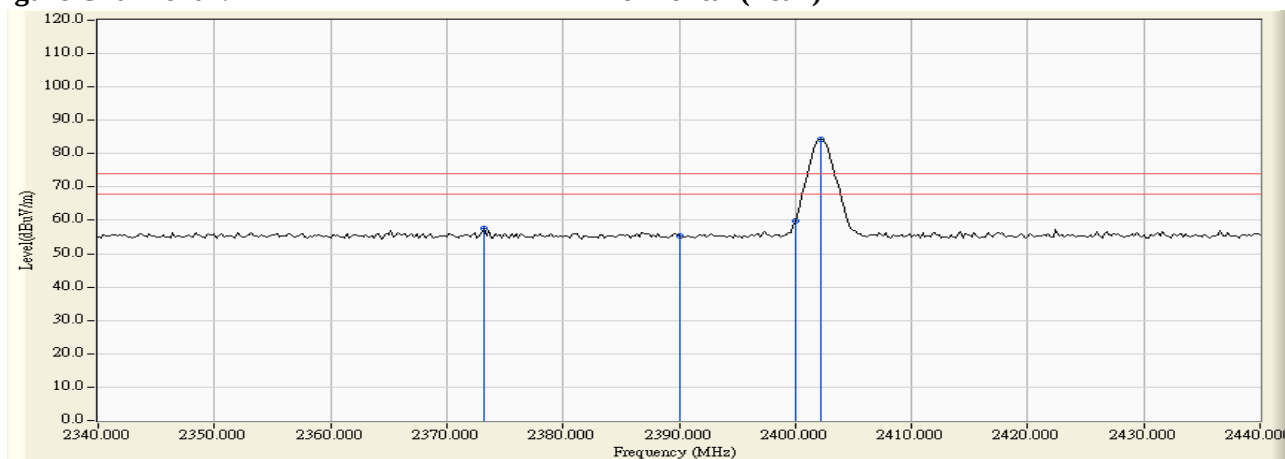
Product : Wireless Remote Control
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2402 MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
02 (Peak)	2373.200	31.444	26.260	57.704	74.00	54.00	Pass
02 (Peak)	2390.000	31.509	23.869	55.378	74.00	54.00	Pass
02 (Peak)	2400.000	31.561	28.123	59.684	74.00	54.00	Pass
02 (Peak)	2402.200	31.574	52.563	84.138	--	--	--

Figure Channel 02:

Horizontal (Peak)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Average Detector:						
Frequency	Peak	Duty Cycle	Measurement	Margin	Limit	Result
MHz	Measurement	Factor	Level			Pass
	dBμV/m	dB	dBμV/m	dB	dBμV/m	
Horizontal						
Average Detector:						
2373.2	57.704	-30.949	26.755	-27.245	54.000	Pass
2390	55.378	-30.949	24.429	-29.571	54.000	Pass
2400	59.684	-30.949	28.735	-25.265	54.000	Pass

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

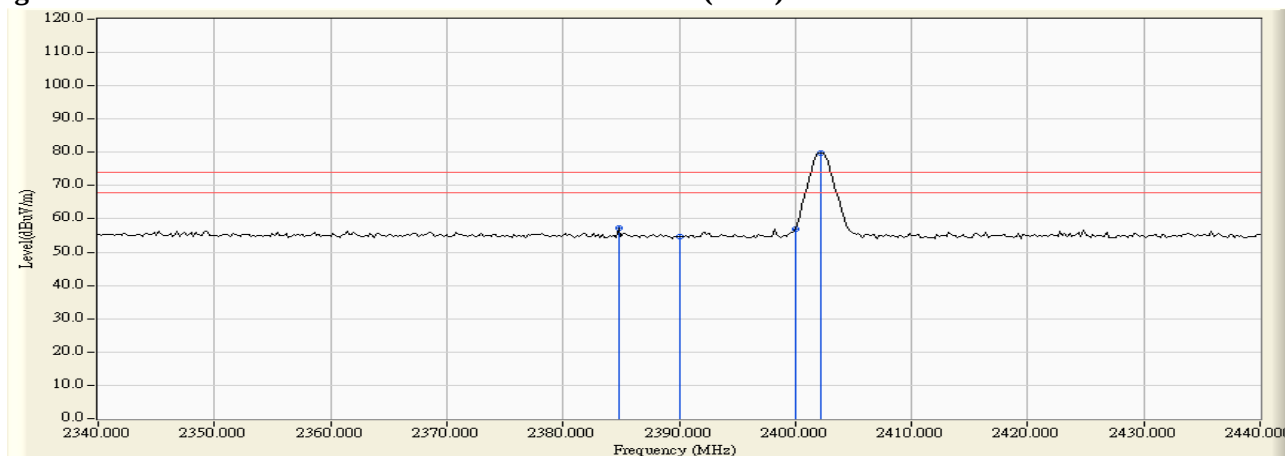
Product : Wireless Remote Control
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2402 MHz)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
02 (Peak)	2384.800	30.939	26.279	57.218	74.00	54.00	Pass
02 (Peak)	2390.000	30.915	23.836	54.751	74.00	54.00	Pass
02 (Peak)	2400.000	30.912	26.013	56.925	74.00	54.00	Pass
02 (Peak)	2402.200	30.917	49.026	79.944	--	--	--

Figure Channel 02:

Vertical (Peak)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Average Detector:

Frequency	Peak	Duty Cycle	Measurement	Margin	Limit	Result
MHz	Measurement	Factor	Level			Pass
	dBμV/m	dB	dBμV/m	dB	dBμV/m	

Vertical

Average Detector:

2384.8	57.218	-30.949	26.269	-27.731	54.000	Pass
2390	54.751	-30.949	23.802	-30.198	54.000	Pass
2400	56.925	-30.949	25.976	-28.024	54.000	Pass

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

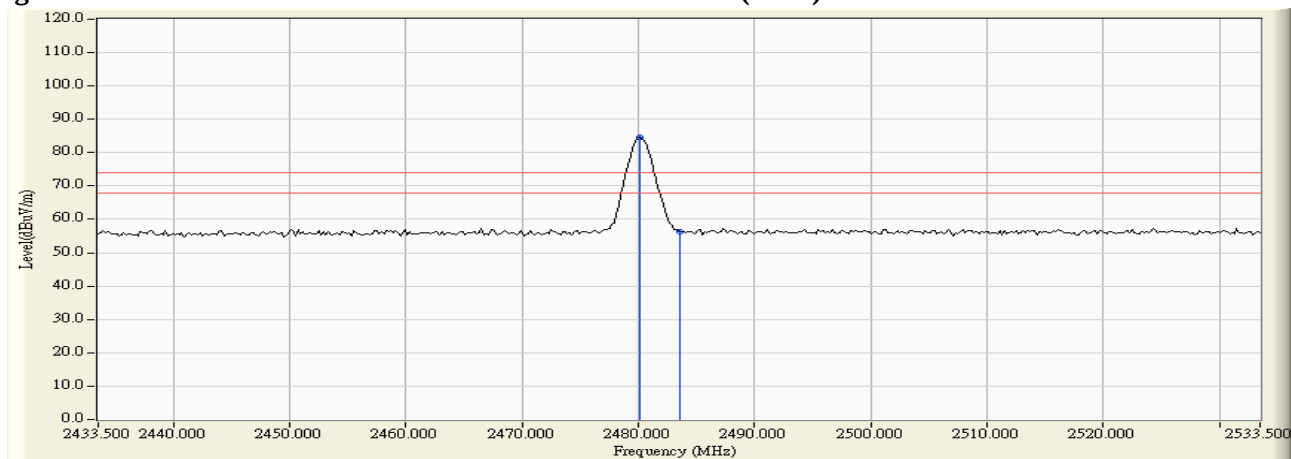
Product : Wireless Remote Control
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
80 (Peak)	2480.100	32.157	52.303	84.459	--	--	--
80 (Peak)	2483.500	32.182	24.259	56.441	74.00	54.00	Pass

Figure Channel 80:

Horizontal (Peak)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Average Detector:						
Frequency	Peak	Duty Cycle	Measurement	Margin	Limit	Result
MHz	Measurement	Factor	Level			Pass
	dBμV/m	dB	dBμV/m	dB	dBμV/m	
Horizontal						
Average Detector:						
2483.5	56.441	-30.949	25.492	-28.508	54.000	Pass

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

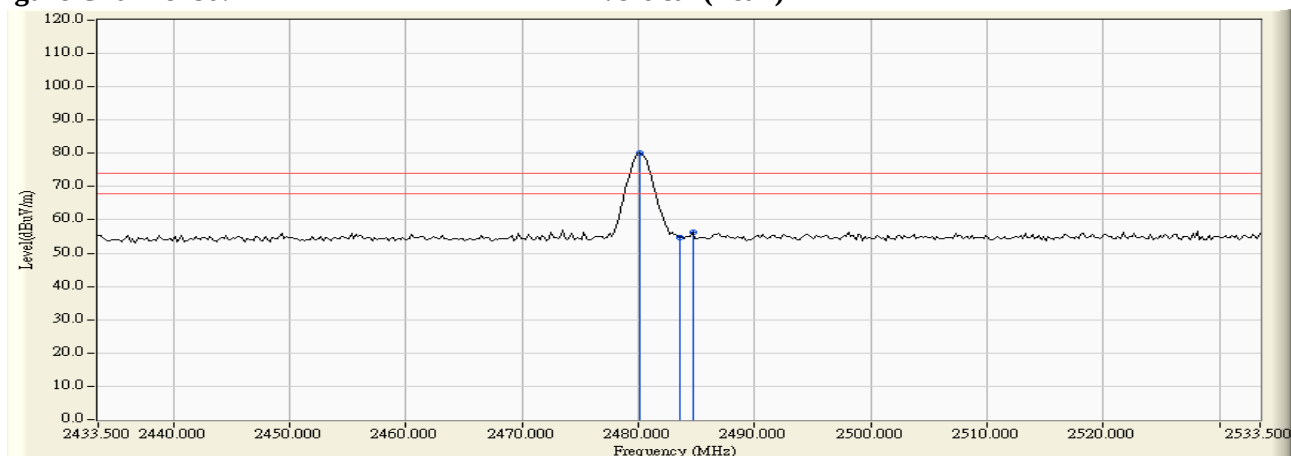
Product : Wireless Remote Control
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
80 (Peak)	2480.100	31.413	48.632	80.045	--	--	--
80 (Peak)	2483.500	31.435	23.368	54.803	74.00	54.00	Pass
80 (Peak)	2484.700	31.444	24.847	56.290	74.00	54.00	Pass

Figure Channel 80:

Vertical (Peak)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Average Detector:						
Frequency	Peak Measurement	Duty Cycle Factor	Measurement Level	Margin	Limit	Result
MHz	dBμV/m	dB	dBμV/m	dB	dBμV/m	Pass
Vertical						
Average Detector:						
2483.5	54.803	-30.949	23.854	-30.146	54.000	Pass
2484.7	56.29	-30.949	25.341	-28.659	54.000	Pass

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

5. Duty Cycle

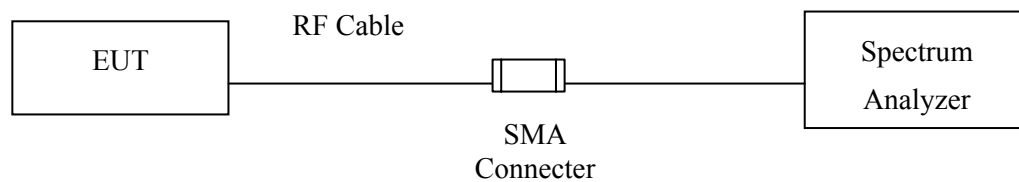
5.1. Test Equipment

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, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

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

5.2. Test Setup

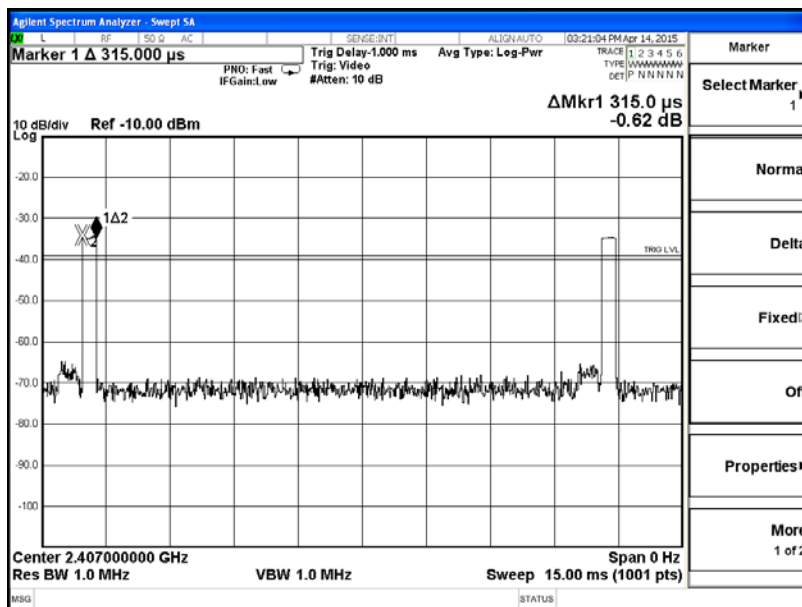
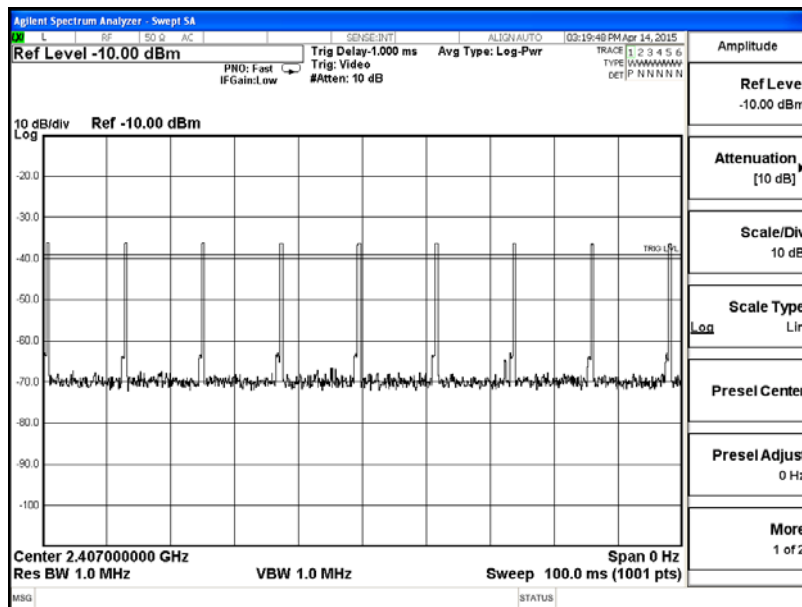


5.3. Uncertainty

$\pm 150\text{Hz}$

5.4. 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= 0.315ms*9= 2.835ms

Duty Cycle= 2.835ms / 100ms= 0.02835

Duty Cycle correction factor= 20 LOG 0.02835= -30.949 dB

Duty Cycle correction factor	-30.949	dB
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6. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs