

FCC Test Report

Product Name : Wireless System

Model No. : EWS-10T

FCC ID. : OSREWS-10T

Applicant : Eastern Mastec Corp.

Address : 5F Olympia Bldg,196,Jamsil
Bon-dong,Songpa-gu,Seoul,Korea

Date of Receipt : Aug. 01, 2017

Issued Date : Jan. 29, 2018

Report No. : 1780017R-RFUSP01V00

Report Version : V1.0



The test results relate only to the samples tested.

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Test Report Certification

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Applicant : Eastern Mastec Corp.
Address : 5F Olympia Bldg,196,Jamsil Bon-dong,Songpa-gu,Seoul,Korea
Manufacturer : Eastern Mastec Corp.
Model No. : EWS-10T
FCC ID. : OSREWS-10T
EUT Voltage : DC 24V
Testing Voltage : DC 24V
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2016
Laboratory Name : Hsin Chu Laboratory
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu
County 310, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result : Complied

Documented By :



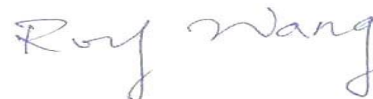
(Carol Tsai / Senior Engineering Adm. Specialist)

Tested By :



(Elwin Lin / Engineer)

Approved By :



(Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1780017R-RFUSP01V00	V1.0	Initial issue of report	Jan. 29, 2018

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1. General Information

1.1. EUT Description

Product Name	Wireless System
Model No.	EWS-10T
Frequency Range/Channel Number	2409.5MHz ~ 2469MHz / 18 Channels
Type of Modulation	GFSK

Antenna Information	
MFR./ Model Name	TRANWO/119-00007-00
Antenna Type	Dipole
Antenna Gain	2 dBi

Accessories Information	
Signal Line	Non-Shielded, 1m
Power Line	Non-Shielded, 1m

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2409.5MHz	02	2413MHz	03	2416.5MHz	04	2420MHz
05	2423.5MHz	06	2427MHz	07	2430.5MHz	08	2434MHz
09	2437.5MHz	10	2441MHz	11	2444.5MHz	12	2448MHz
13	2451.5MHz	14	2455MHz	15	2458.5MHz	16	2462MHz
17	2465.5MHz	18	2469MHz				

Note:

1. This device is a Wireless System including 2.4GHz transmitting and receiving function.
2. Regards to the frequency band operation; the lowest , middle and highest frequency of channel were selected to perform the test, and then shown on this report.

1.2. Test Mode

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Test Mode	
TX	Mode 1: Transmit

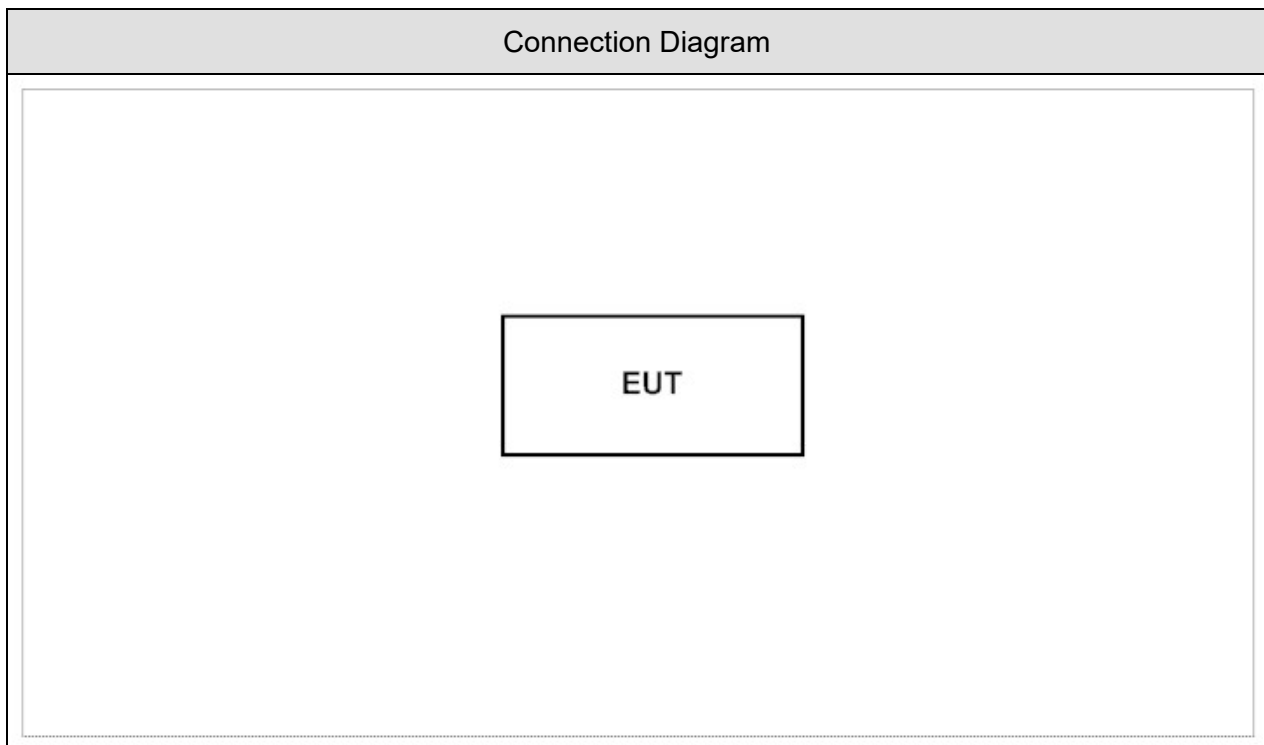
Emission	Mode 1
Conducted Emission	No
Peak Power Output	Yes
Radiated Emission	Yes
RF antenna conducted test	Yes
Band Edge	Yes
Number of hopping Frequency	Yes
Carrier Frequency Separation	Yes
Occupied Bandwidth	Yes
Dwell Time	Yes

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
N/A				

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT as shown in Section 1.4.
2	Press the button on the EUT to change the channel.
3	Configure the test mode, the test channel.
4	Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual	Test Site
Temperature (°C)	FCC PART 15 C 15.207 Conducted Emission (FHSS)	15 - 35	23	--
Humidity (%RH)		25 - 75	50	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Peak Power Output (FHSS)	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Radiated Emission (FHSS)	15 - 35	25	2
Humidity (%RH)		25 - 75	54	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Band Edge (FHSS)	15 - 35	25	2
Humidity (%RH)		25 - 75	50	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Number of hopping Frequency (FHSS)	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Carrier Frequency Separation (FHSS)	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Occupied Bandwidth (FHSS)	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 RF antenna conducted test (FHSS)	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Dwell Time (FHSS)	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	

Note: Test site information refers to Laboratory Information.

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site : http://www.dekra.com.tw/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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2. Conducted Emission

2.1. Test Equipment

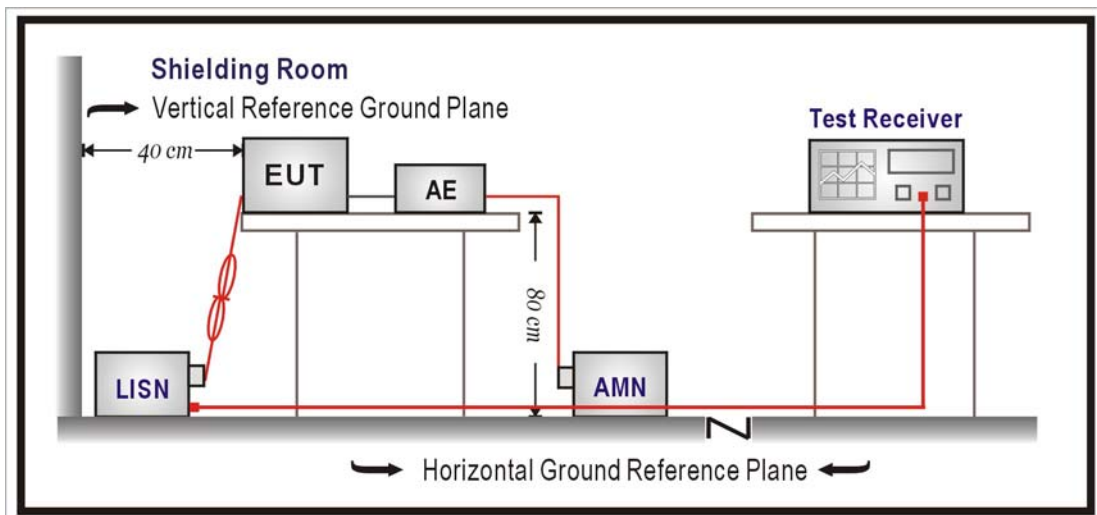
The following test equipment's are used during the test:

Conducted Emission /SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2017/02/06	2018/02/05
Test Receiver	R&S	ESCS 30	836858/022	2017/04/12	2018/04/11
LISN	R&S	ENV216	100092	2017/07/31	2018/07/30

Note: All equipment that need to calibrate are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV)		
Frequency MHz	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 refer 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 C63.10: 2013 on conducted measurement.

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

2.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.207: 2016

2.6. Uncertainty

The measurement uncertainty is defined as ± 2.26 dB.

2.7. Test Result

EUT using DC input voltage, so the project does not have to test for testing.

3. Peak Power Output

3.1. Test Equipment

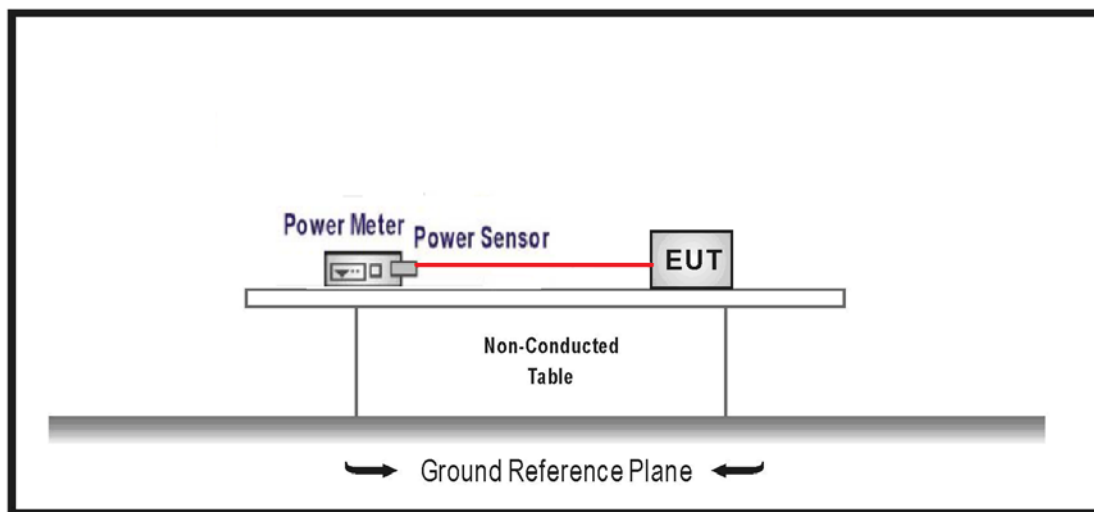
The following test equipment is used during the test:

Peak Power Output / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/23	2018/01/22
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2017/03/13	2018/03/12
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2017/01/20	2018/01/19
Pulse Power Sensor	Anritsu	MA2411B	1531043	2017/01/20	2018/01/19
Pulse Power Sensor	Anritsu	MA2411B	1531044	2017/01/20	2018/01/19

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

3.2. Test Setup



3.3. Test procedures

The EUT was setup according to ANSI C63.10:2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

3.4. Limits

For frequency hopping systems operating in the 902-928 MHz band: 1 Watt for systems employing at least 50 hopping channels; and, 0.25 Watts for systems employing less than 50 hopping channels.

For frequency hopping systems in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1Watt.

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watt.

3.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2016.

3.6. Test Result

Product	Wireless System		
Test Item	Peak Power Output		
Test Mode	Mode 1: Transmit		
Date of Test	2017/08/14	Test Site	SR10-H

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2409.5	17.381	24	Pass
10	2441.0	17.611	24	Pass
18	2469.0	17.714	24	Pass

4. Radiated Emission

4.1. Test Equipment

The following test equipment are used during the test:

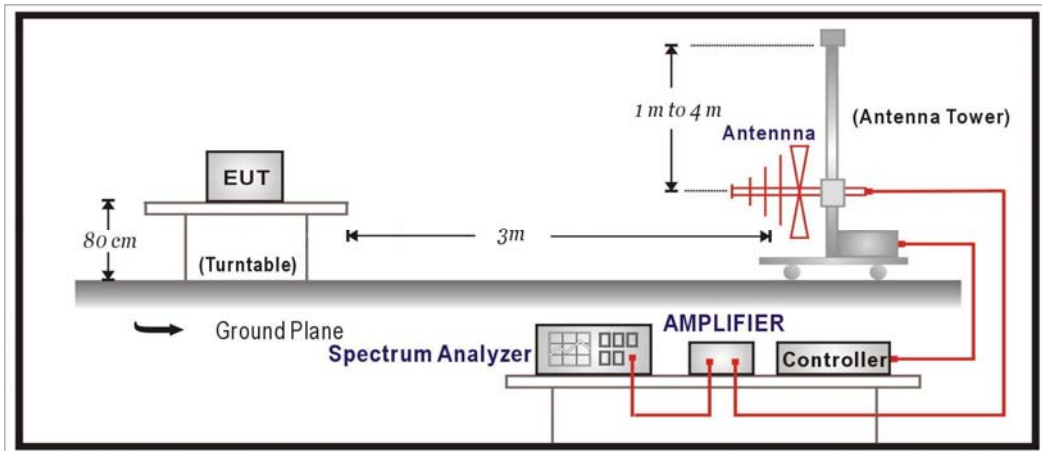
Radiated Emission / CB4-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2017/11/21	2018/11/20
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/10	2019/01/09
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2017/03/13	2018/03/12
Bilog Antenna	Teseq	CBL6112D	23191	2017/06/28	2018/06/27
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2017/06/14	2018/06/13
Horn Antenna	Schwarzbeck	BBHA 9170	202	2017/02/15	2018/02/14
Pre-Amplifier	RF Bay Inc.	LNA-1330	12162511	2017/03/09	2018/03/08
Pre-Amplifier	EMCI	EMCI 1830I	980366	2018/01/08	2019/01/07
Pre-Amplifier	MITEQ	JS44-18004000-45-8P	2014754	2017/12/13	2018/12/12

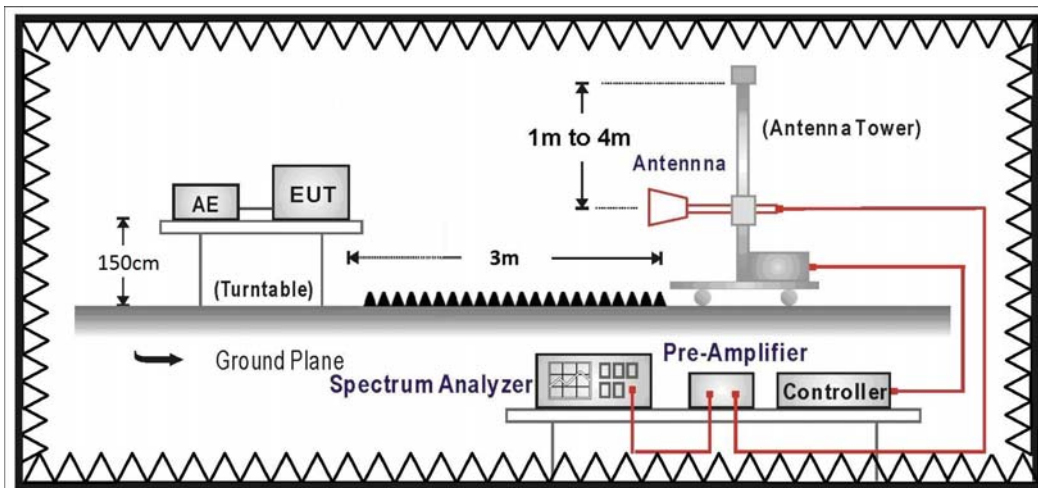
Note: All equipment's that need to calibrate are with calibration period of 1 year.

4.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. 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 Limits		
Frequency MHz	uV/m	dBuV/m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 or 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

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.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

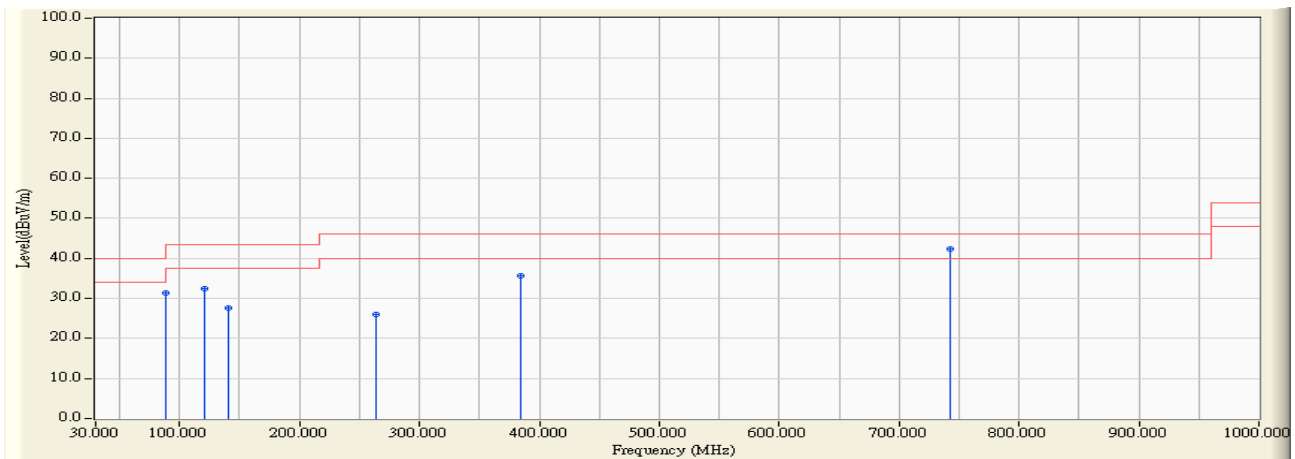
4.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2016

4.6. Test Result

30MHz-1GHz Spurious

Site : CB4-H	Time : 2018/01/24
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 24V
EUT : EWS-10T	Note : 2441MHz

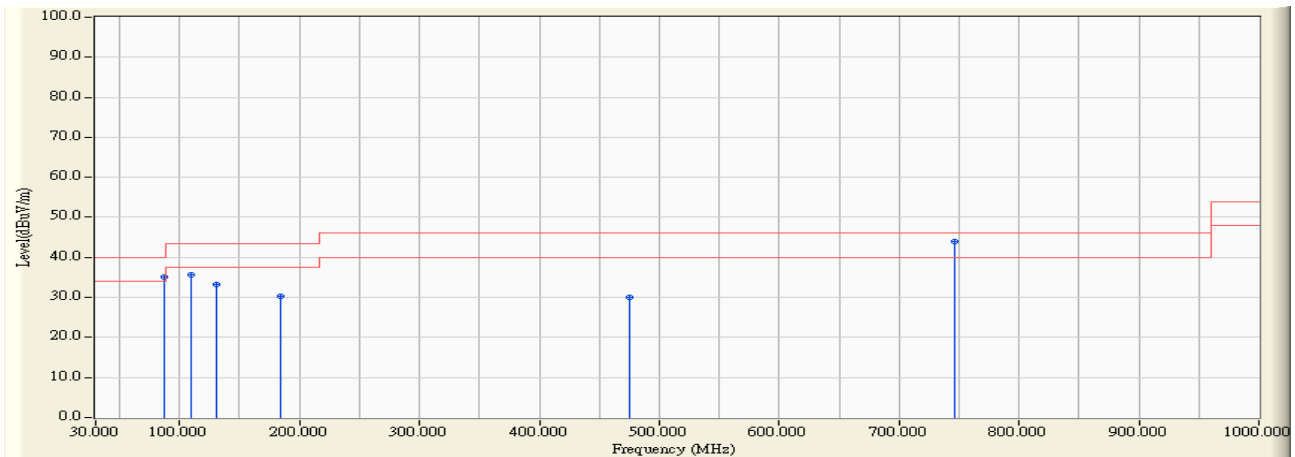


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	88.200	-24.949	56.280	31.331	-12.169	43.500	QUASPEAK
2	120.210	-20.178	52.571	32.393	-11.107	43.500	QUASPEAK
3	140.095	-21.065	48.716	27.651	-15.849	43.500	QUASPEAK
4	263.770	-20.542	46.488	25.946	-20.054	46.000	QUASPEAK
5	384.050	-16.692	52.366	35.674	-10.326	46.000	QUASPEAK
6	* 742.465	-11.876	54.353	42.477	-3.523	46.000	QUASPEAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : CB4-H	Time : 2018/01/24
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 24V
EUT : EWS-10T	Note : 2441MHz



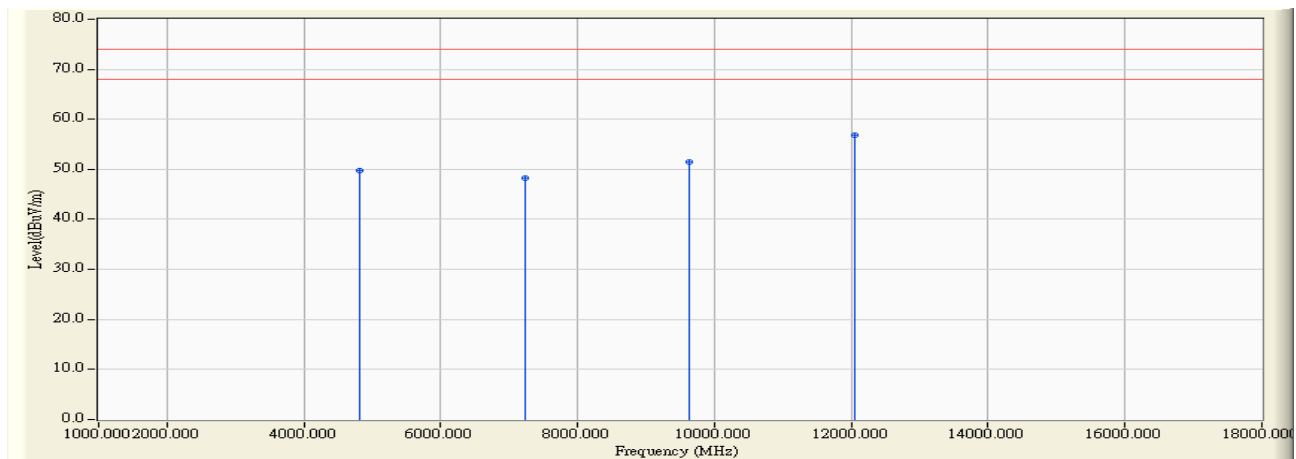
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	87.230	-25.713	60.967	35.254	-4.746	40.000	QUASPEAK
2	109.055	-21.231	56.916	35.686	-7.814	43.500	QUASPEAK
3	130.395	-21.357	54.638	33.281	-10.219	43.500	QUASPEAK
4	184.230	-23.366	53.788	30.422	-13.078	43.500	QUASPEAK
5	474.745	-15.185	45.193	30.008	-15.992	46.000	QUASPEAK
6	* 746.830	-11.806	55.695	43.889	-2.111	46.000	QUASPEAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Harmonic & Spurious:

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2409.5MHz

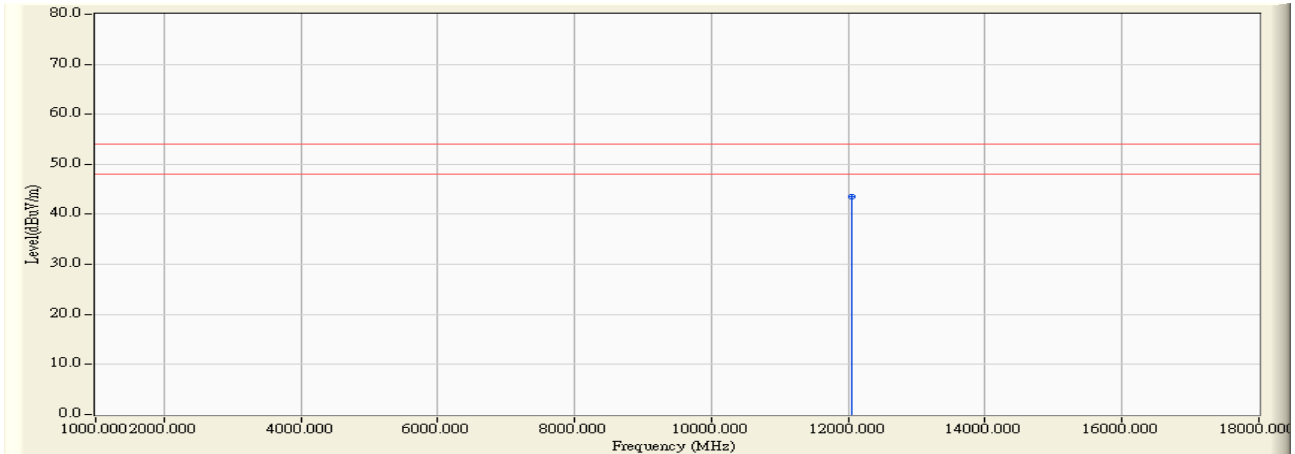


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4819.000	7.422	42.340	49.762	-24.238	74.000	PEAK
2		7228.500	16.019	32.300	48.320	-25.680	74.000	PEAK
3		9638.000	21.816	29.750	51.567	-22.433	74.000	PEAK
4	*	12047.000	26.063	30.730	56.793	-17.207	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2409.5MHz

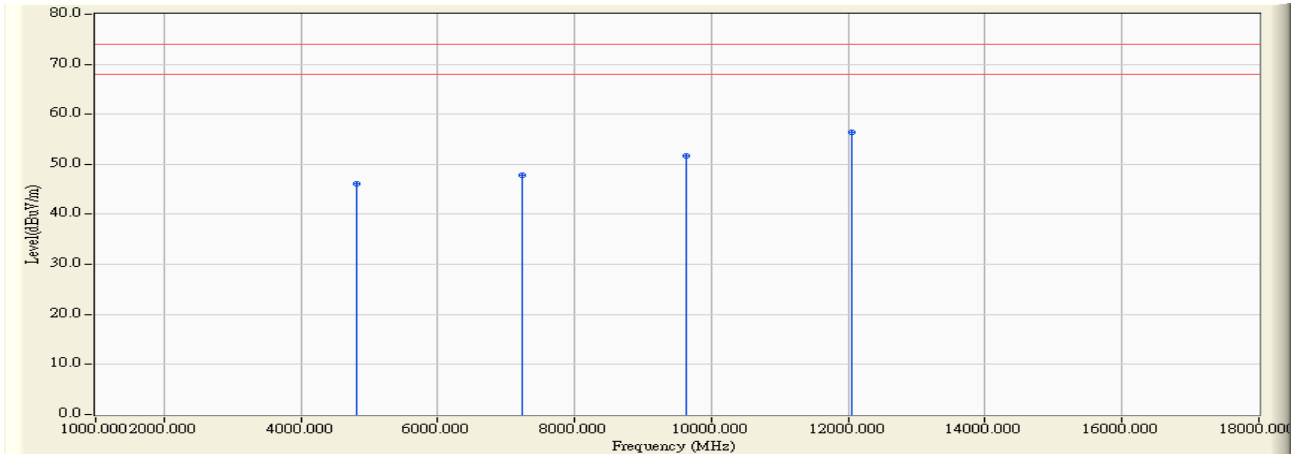


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	12047.000	26.063	17.530	43.593	-10.407	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2409.5MHz

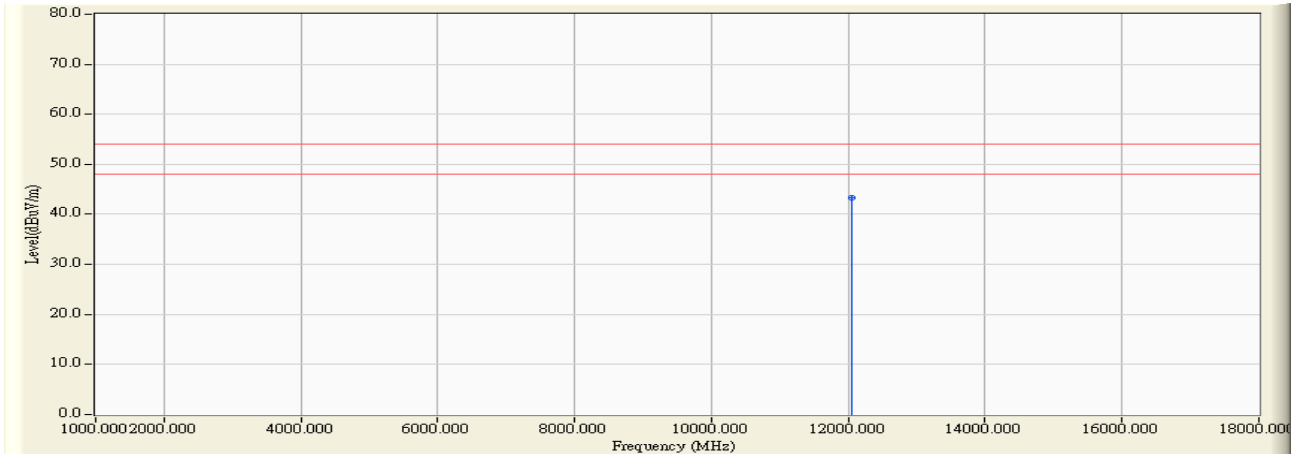


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4819.000	7.422	38.620	46.042	-27.958	74.000	PEAK
2		7228.000	16.017	31.880	47.897	-26.103	74.000	PEAK
3		9638.000	21.816	29.800	51.617	-22.383	74.000	PEAK
4	*	12047.000	26.063	30.410	56.473	-17.527	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ * ”, means this data is the worst emission level.
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7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2409.5MHz

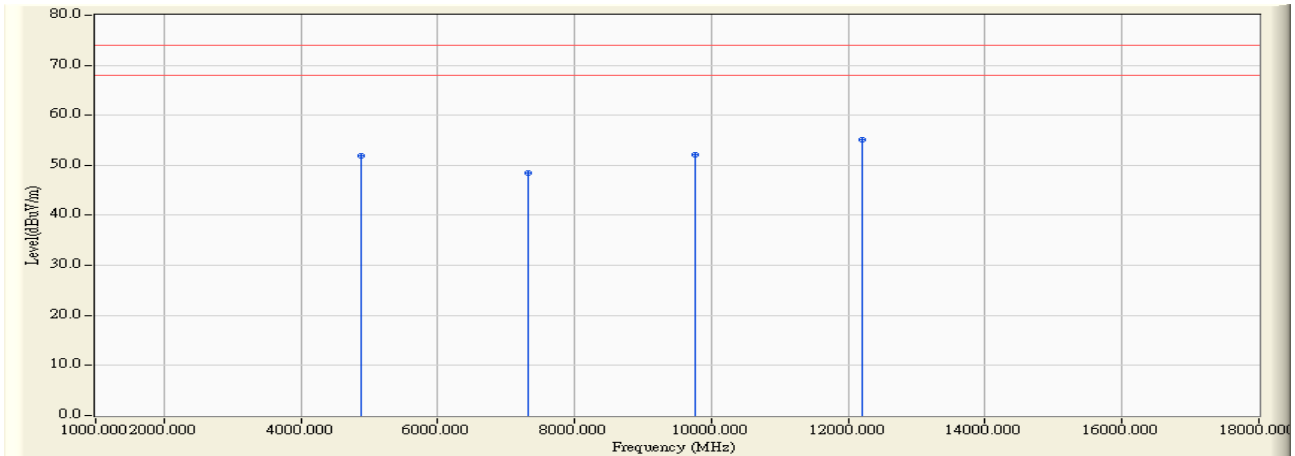


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	12047.000	26.063	17.240	43.303	-10.697	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2441MHz

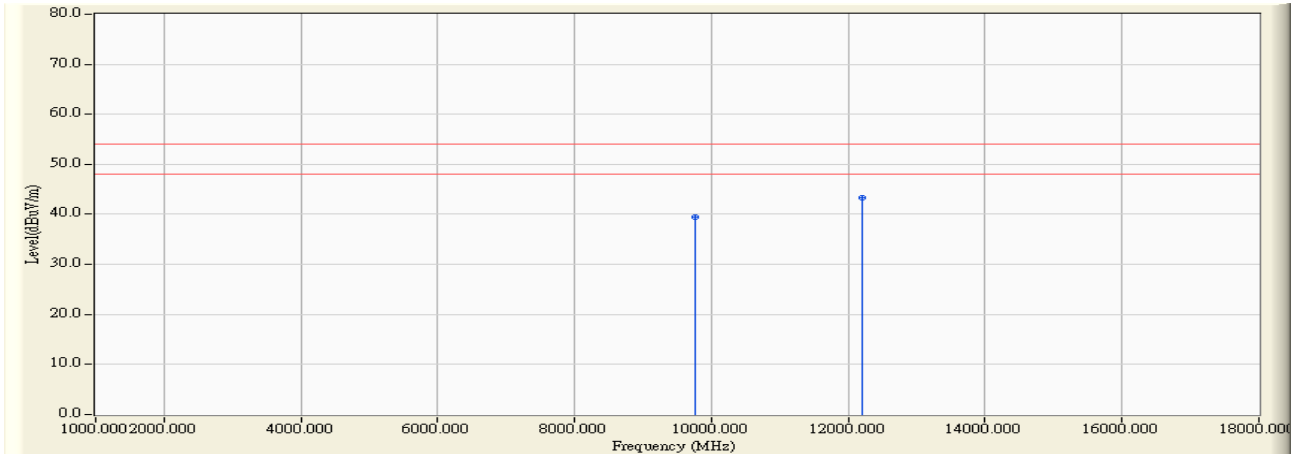


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4882.000	7.577	44.300	51.878	-22.122	74.000	PEAK
2		7323.000	16.439	31.990	48.430	-25.570	74.000	PEAK
3		9764.000	22.167	29.930	52.098	-21.902	74.000	PEAK
4	*	12205.000	25.766	29.380	55.146	-18.854	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2441MHz

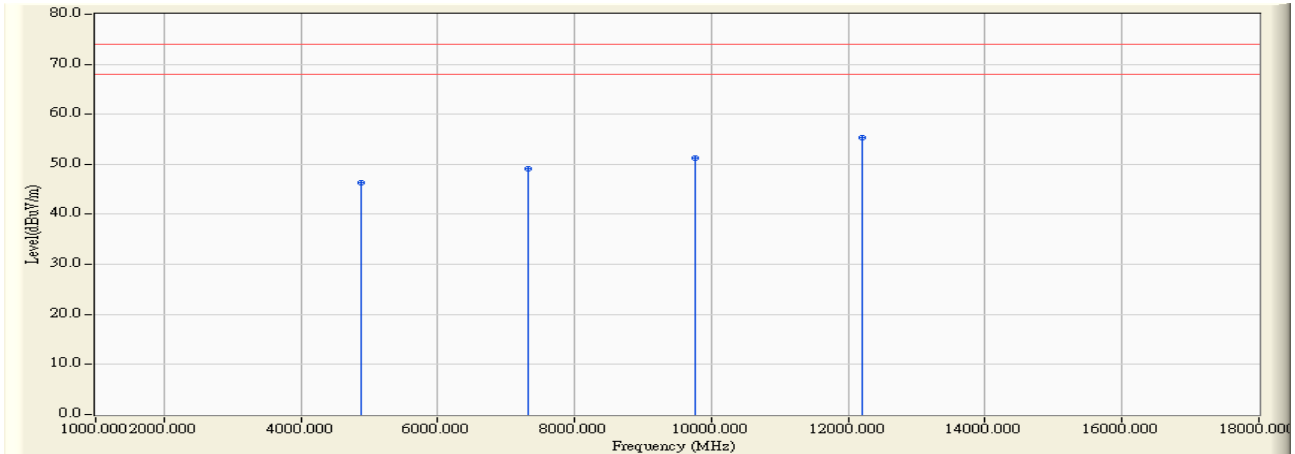


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		9764.000	22.167	17.200	39.368	-14.632	54.000	AVERAGE
2	*	12205.000	25.766	17.600	43.366	-10.634	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2441MHz

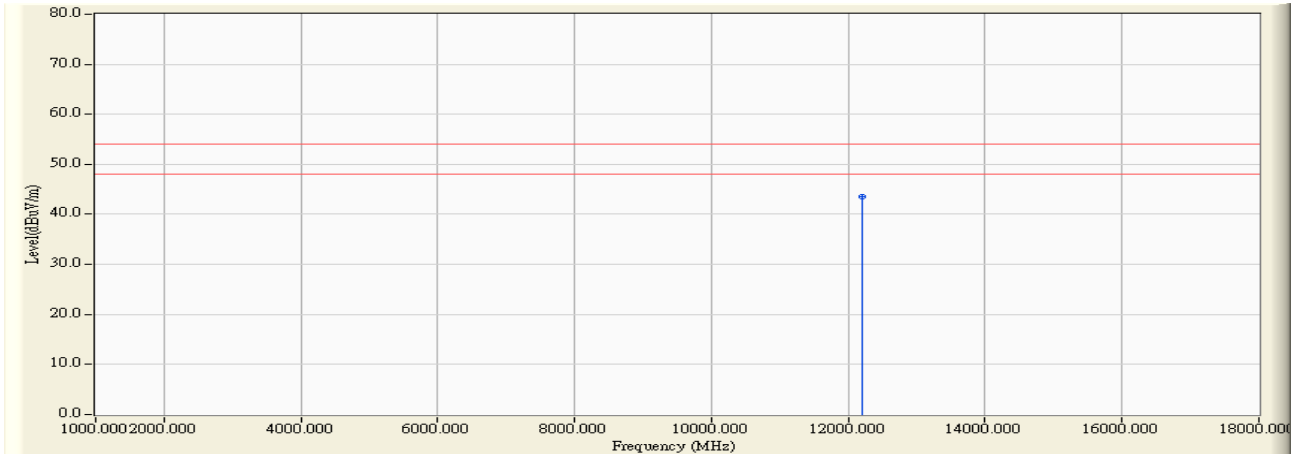


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4882.000	7.577	38.670	46.248	-27.752	74.000	PEAK
2		7323.000	16.439	32.590	49.030	-24.970	74.000	PEAK
3		9764.000	22.167	29.120	51.288	-22.712	74.000	PEAK
4	*	12205.000	25.766	29.610	55.376	-18.624	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2441MHz

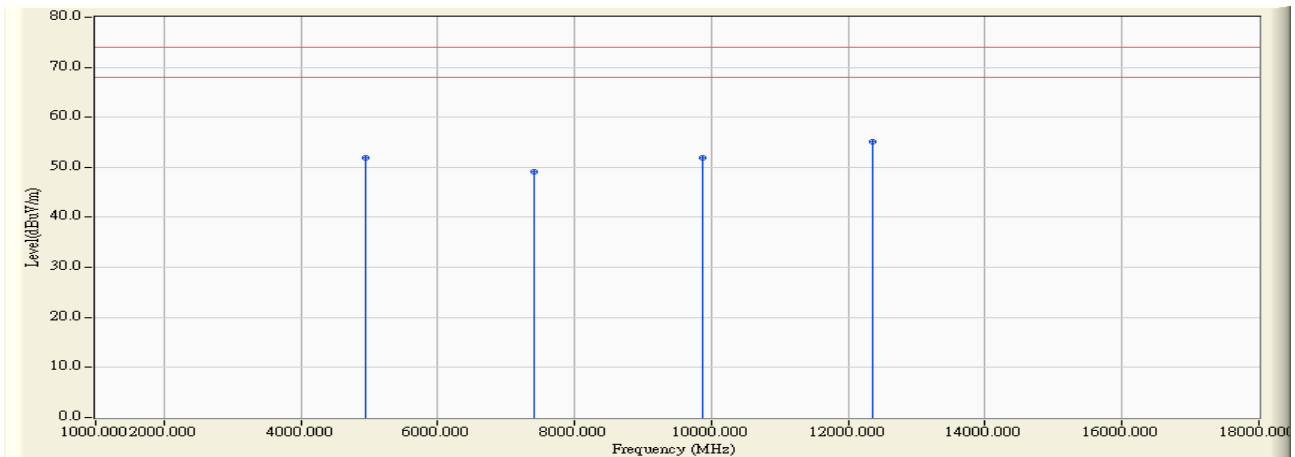


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	12205.000	25.766	17.850	43.616	-10.384	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2469MHz

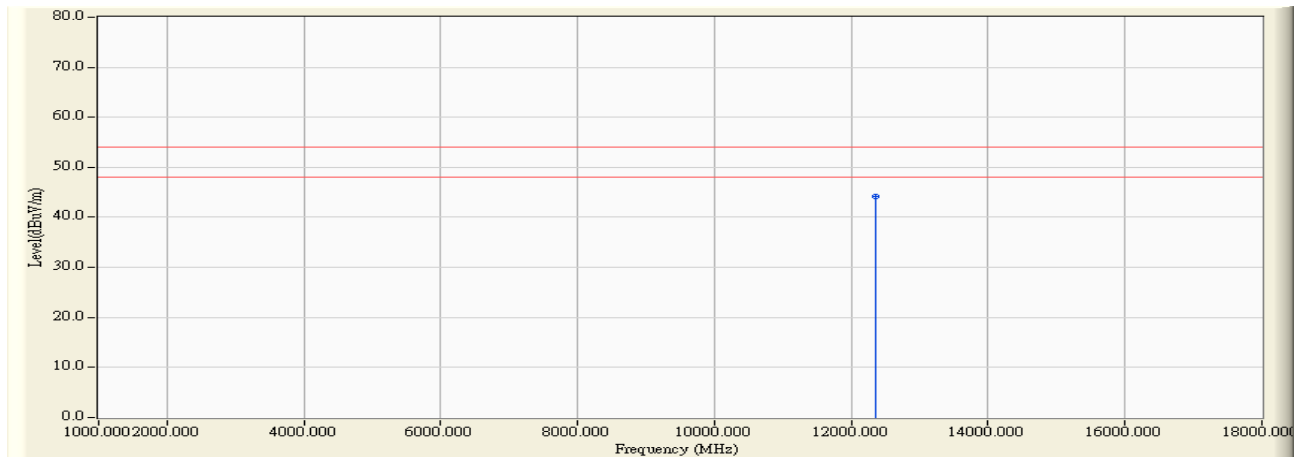


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	4938.000	7.717	44.260	51.976	-22.024	74.000	PEAK
2	7407.000	16.805	32.260	49.065	-24.935	74.000	PEAK
3	9876.000	22.416	29.490	51.905	-22.095	74.000	PEAK
4	* 12345.000	25.508	29.660	55.168	-18.832	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2469MHz

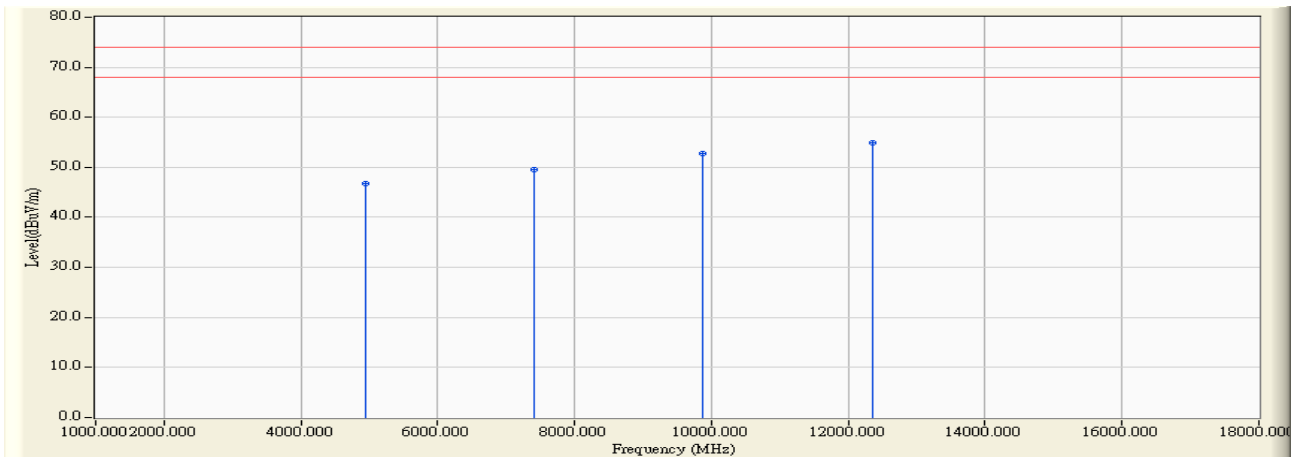


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	12345.000	25.508	18.650	44.158	-9.842	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2469MHz

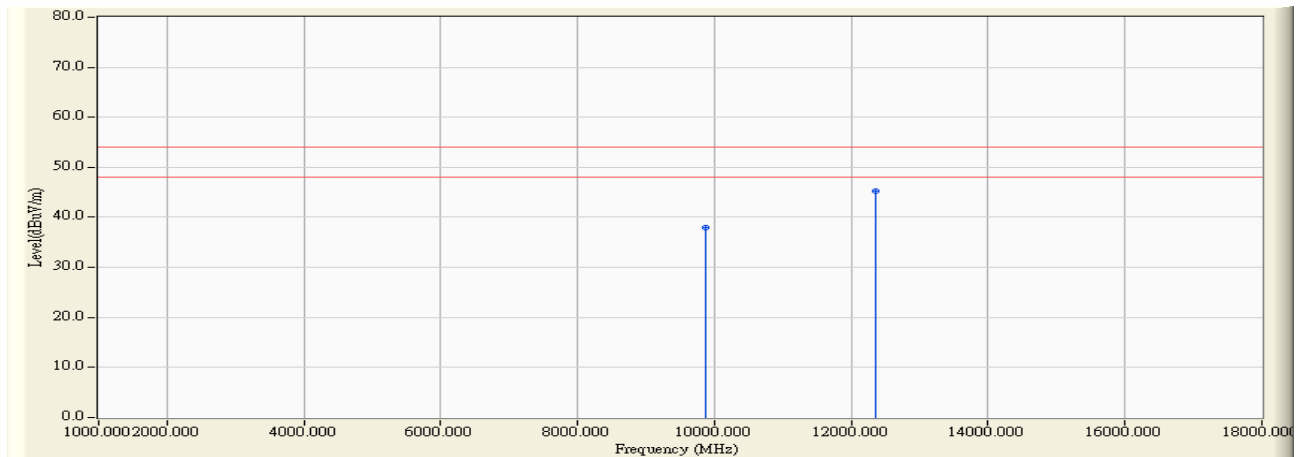


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	4938.000	7.717	39.140	46.856	-27.144	74.000	PEAK
2	7407.000	16.805	32.670	49.475	-24.525	74.000	PEAK
3	9876.000	22.416	30.280	52.695	-21.305	74.000	PEAK
4	* 12345.000	25.508	29.450	54.958	-19.042	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2469MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		9876.000	22.416	15.650	38.065	-15.935	54.000	AVERAGE
2	*	12345.000	25.508	19.650	45.158	-8.842	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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.
7. The Emission above 13GHz were not included is because their levels are too low.

5. RF antenna conducted test

5.1. Test Equipment

The following test equipment is used during the test:

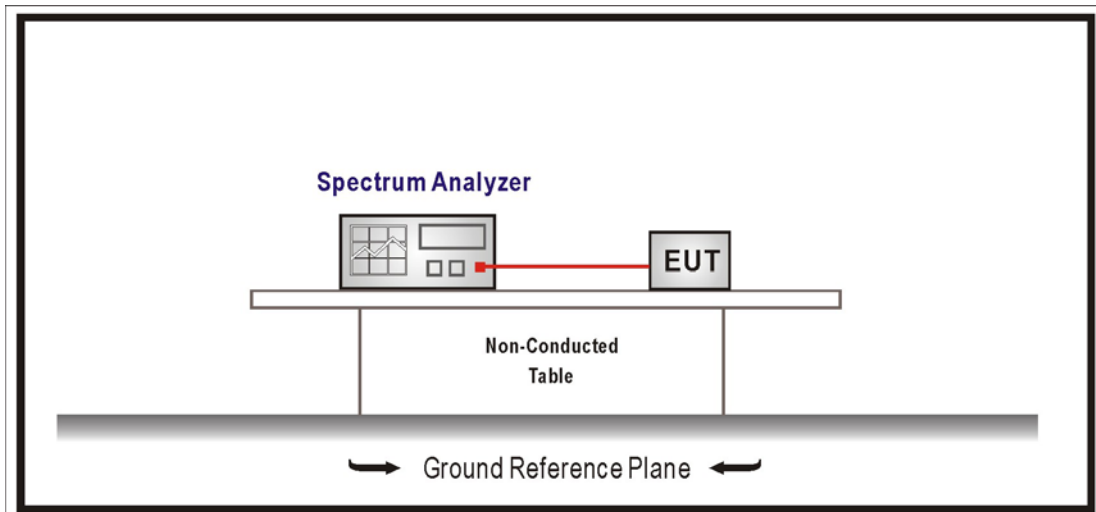
RF antenna conducted test / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/23	2018/01/22
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2017/03/13	2018/03/12

Note: All equipment that need to calibrate are with calibration period of 1 year.

5.2. Test Setup

RF Conducted Measurement:



5.3. 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 an RF conducted or 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)).

5.4. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

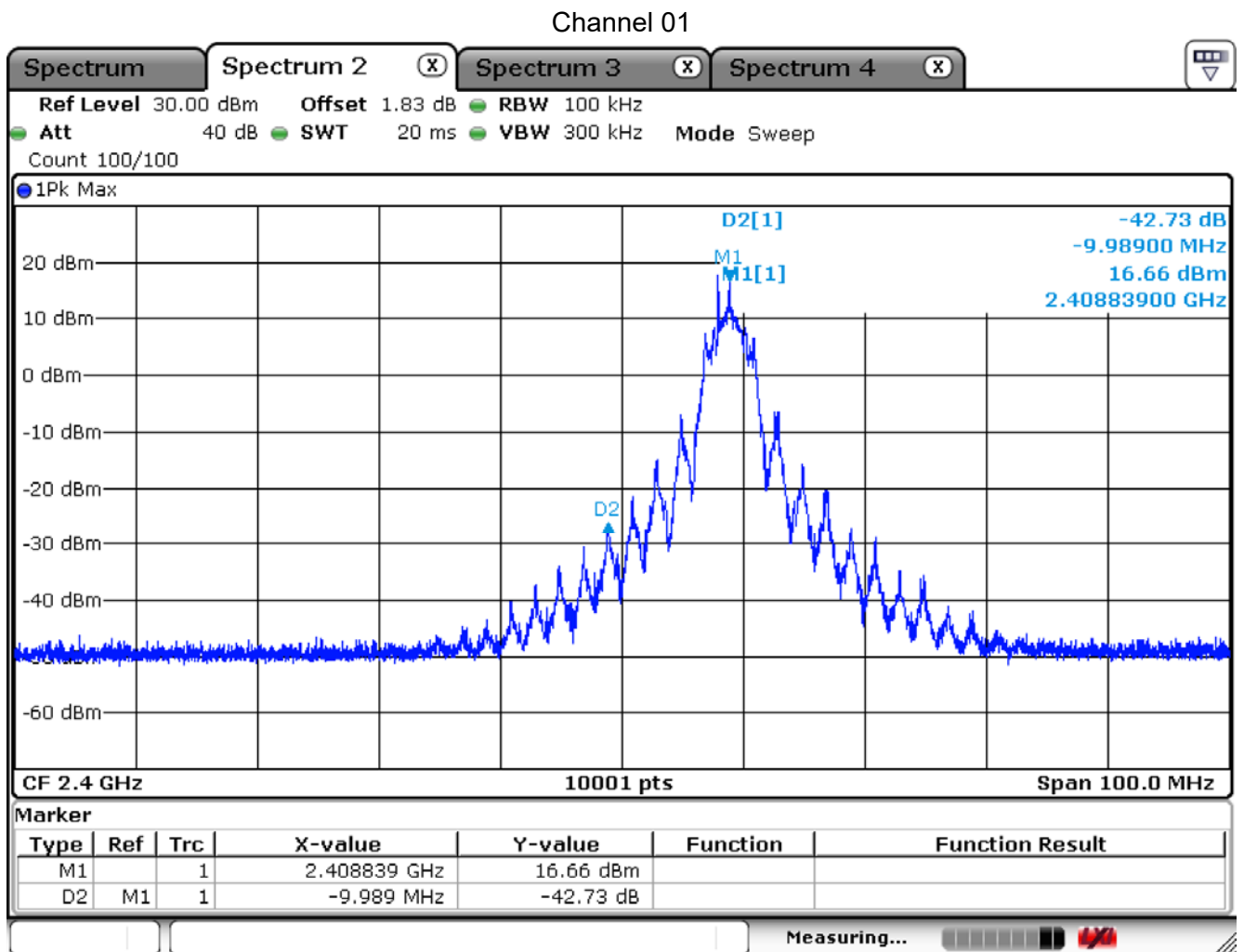
5.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2016

5.6. Test Result

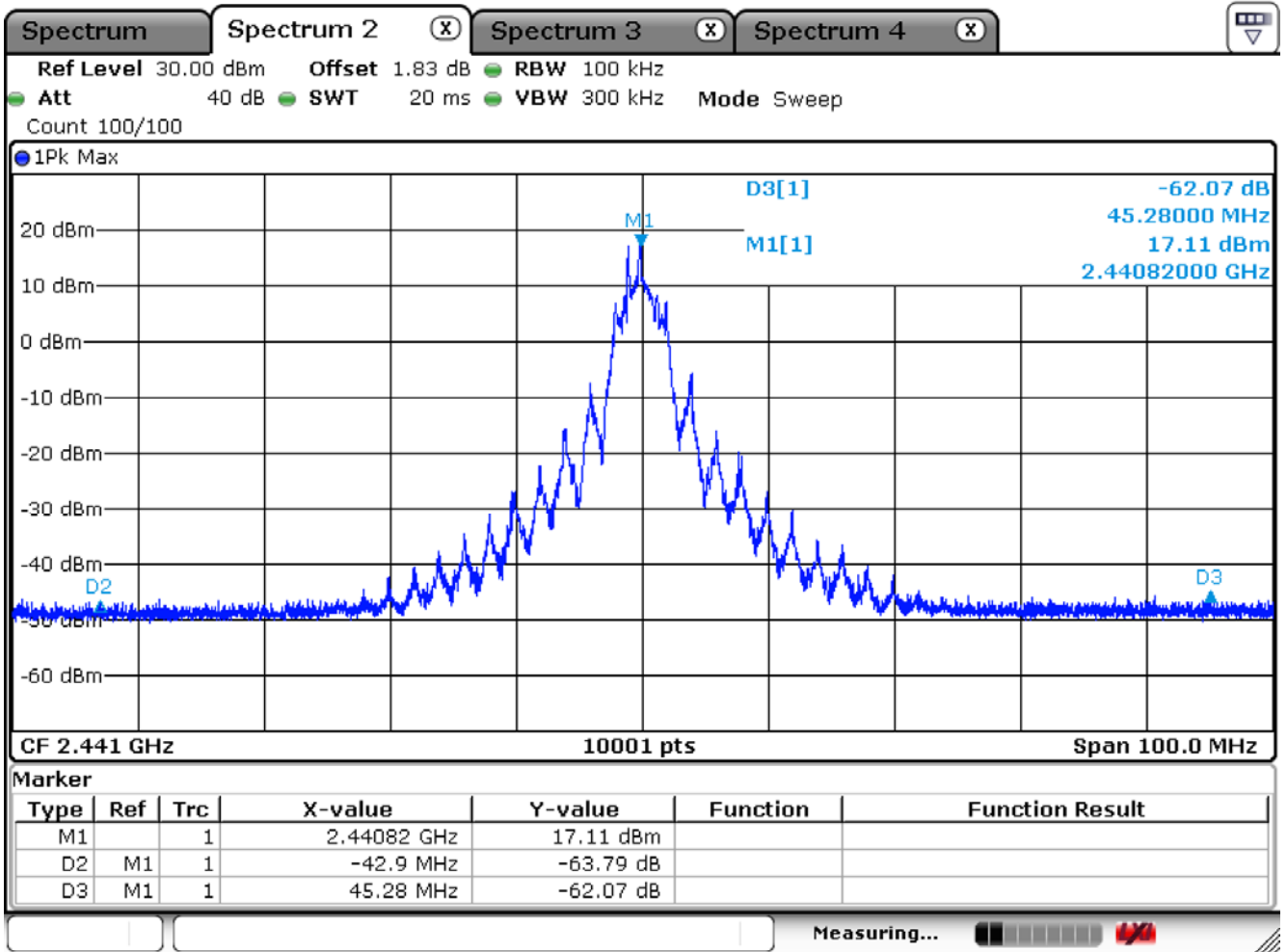
Product	Wireless System		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit		
Date of Test	2017/08/14	Test Site	SR10-H

Channel	Frequency (MHz)	Measure Level (dBc)	Limit (dBc)	Result
01	2409.5	42.730	≥ 20	Pass
10	2441	62.070	≥ 20	Pass
18	2469	54.190	≥ 20	Pass



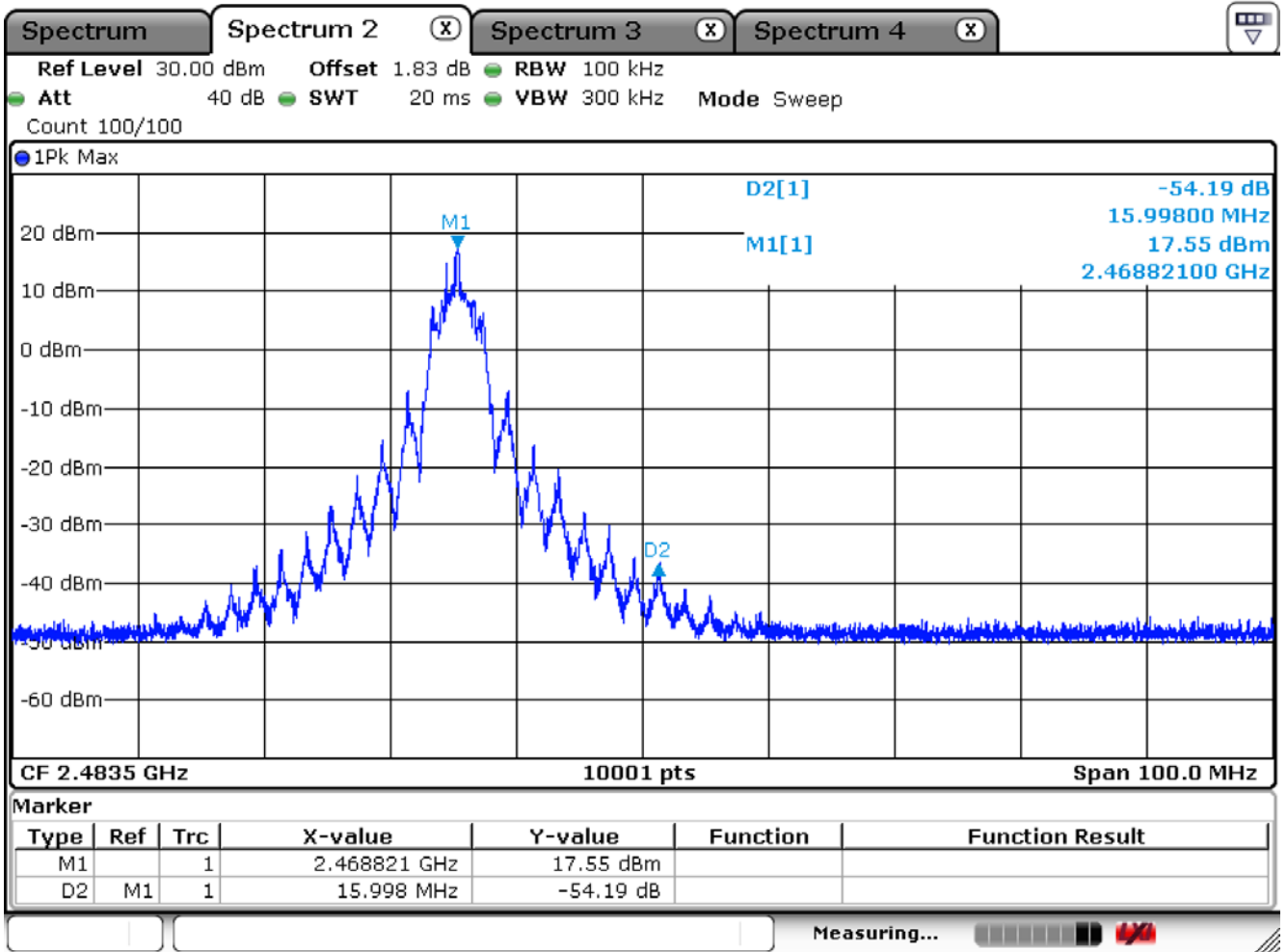
Date: 14.AUG.2017 18:48:31

Channel 10



Date: 14.AUG.2017 18:51:48

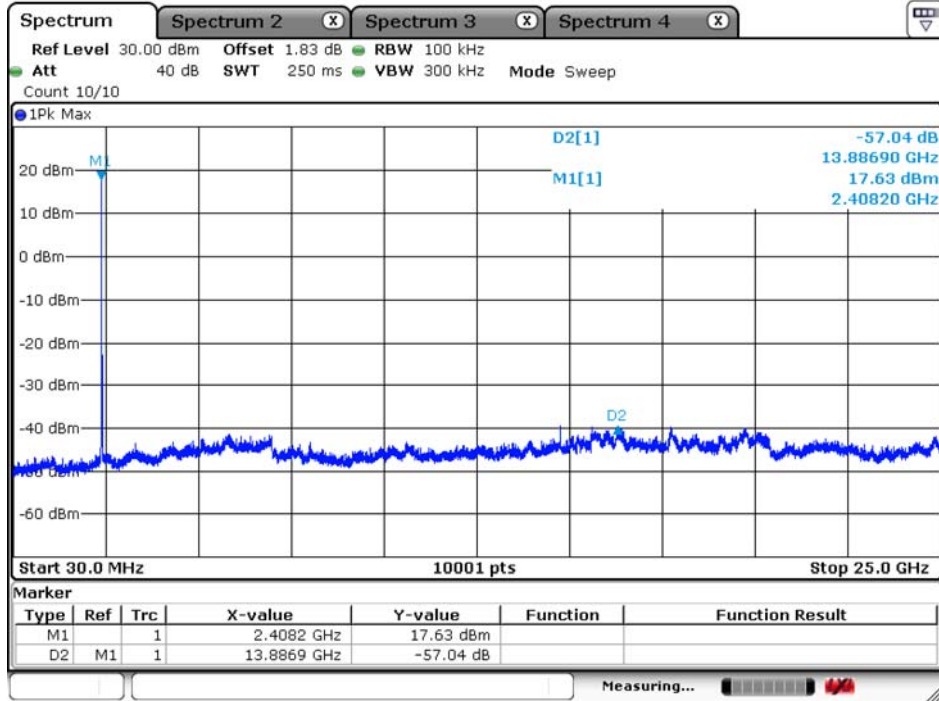
Channel 18



Date: 14.AUG.2017 18:54:25

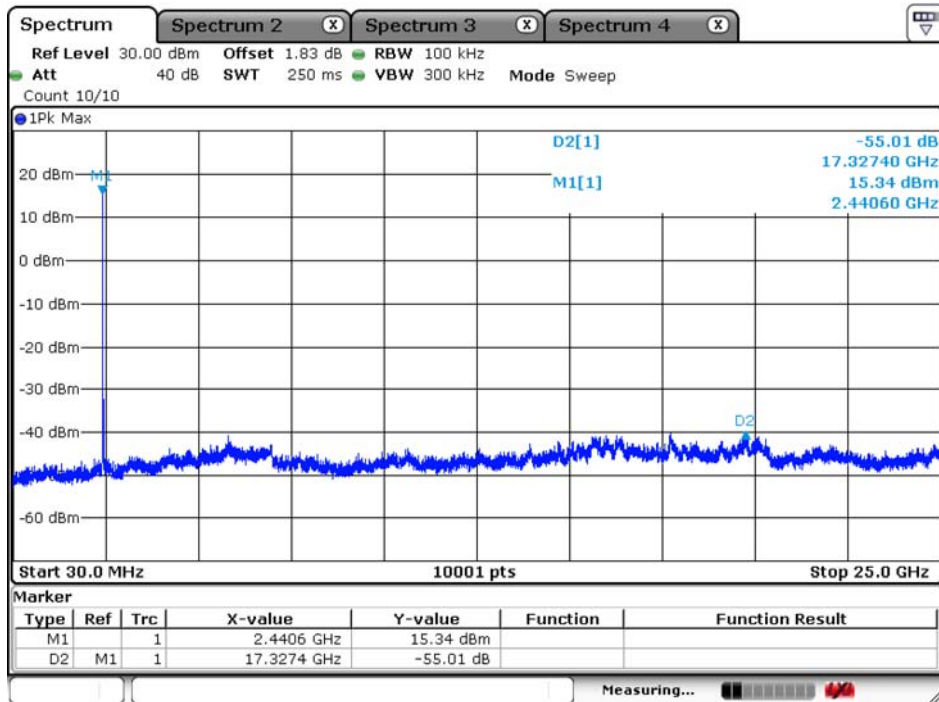
Product	Wireless System		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit		
Date of Test	2017/08/14	Test Site	SR10-H

Channel 01 (30MHz-25GHz)



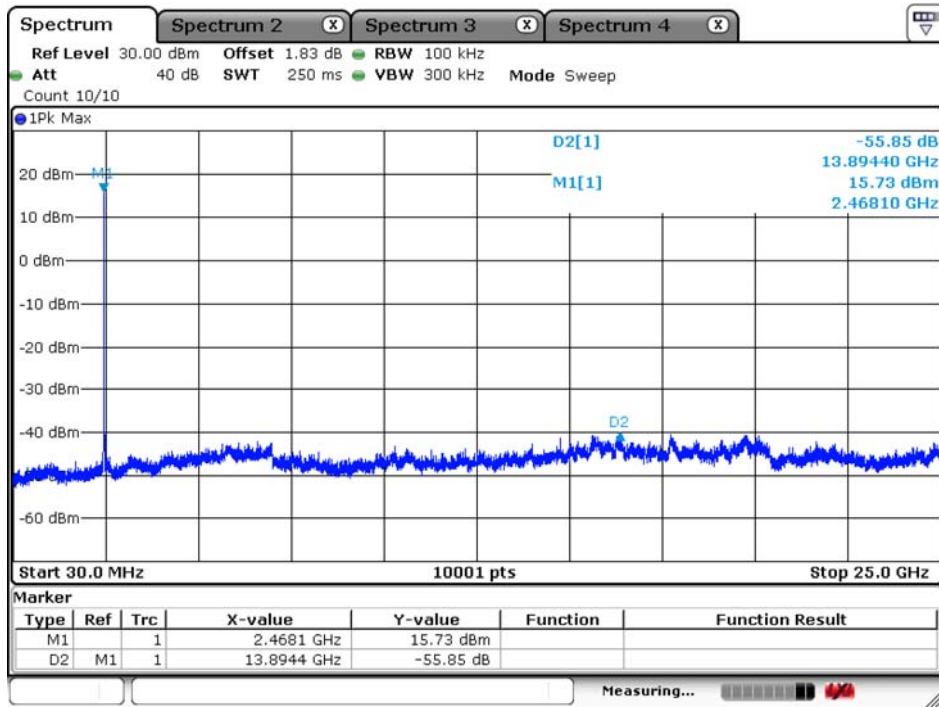
Date: 14.AUG.2017 18:47:51

Channel 10 (30MHz-25GHz)



Date: 14.AUG.2017 18:51:02

Channel 18 (30MHz-25GHz)



Date: 14.AUG.2017 18:53:57

6. Band Edge

6.1. Test Equipment

The following test equipment are used during the test:

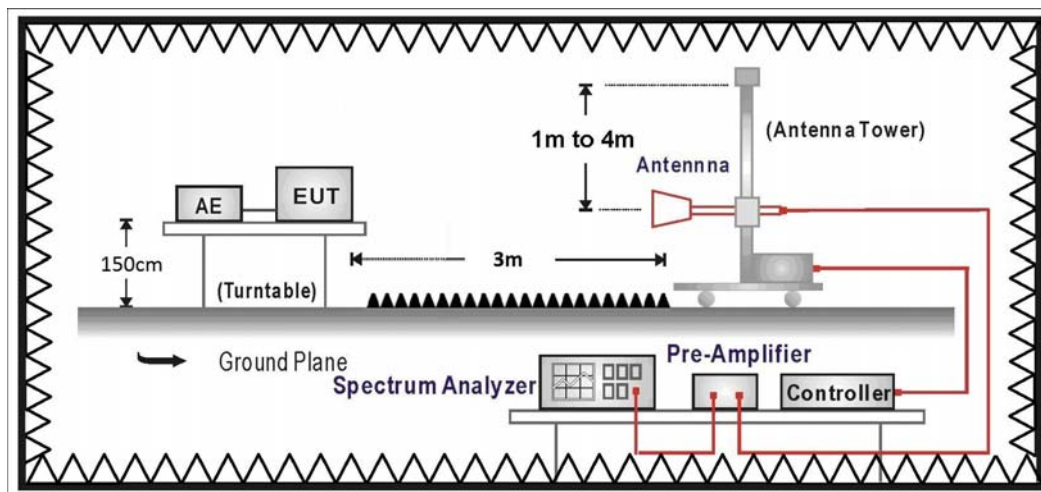
Band Edge / CB4-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2016/11/28	2017/11/27
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/23	2018/01/22
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2017/03/13	2018/03/12
Bilog Antenna	Teseq	CBL6112D	23191	2017/06/28	2018/06/27
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2017/06/14	2018/06/13
Horn Antenna	Schwarzbeck	BBHA 9170	203	2016/08/29	2017/08/28
Pre-Amplifier	RF Bay Inc.	LNA-1330	12162511	2017/03/09	2018/03/08
Pre-Amplifier	EMCI	EMCI 1830I	980366	2017/01/23	2018/01/22
Pre-Amplifier	MITEQ	JS44-45-8P	2014754	2016/12/26	2017/12/25

Note: All equipment that need to calibrate are with calibration period of 1 year.

6.2. Test Setup

RF Radiated Measurement:



6.3. 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.

6.4. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

The EUT and its simulators are 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.

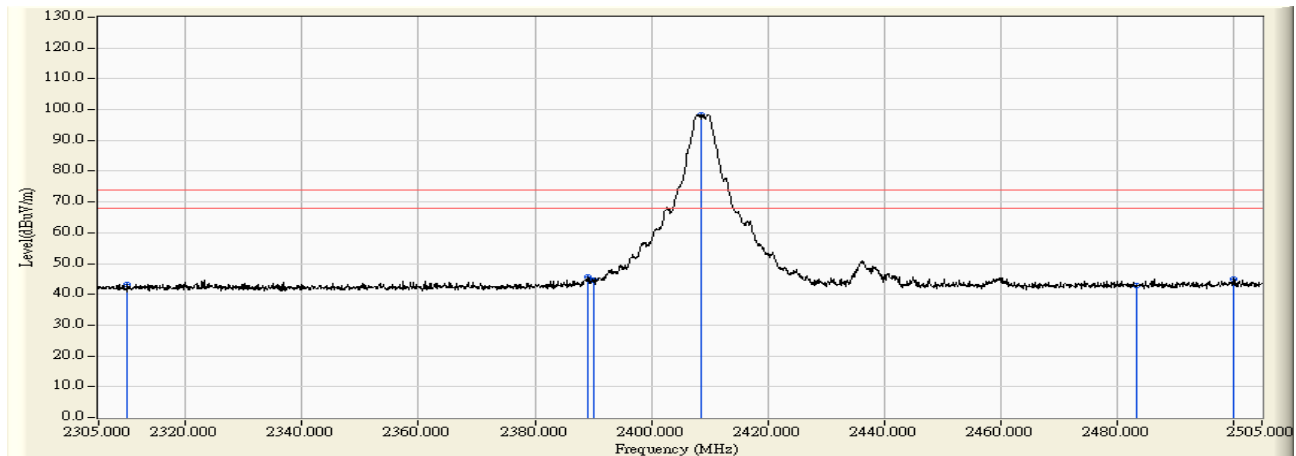
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2013 on radiated measurement.

6.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2016

6.6. Test Result

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2409.5MHz

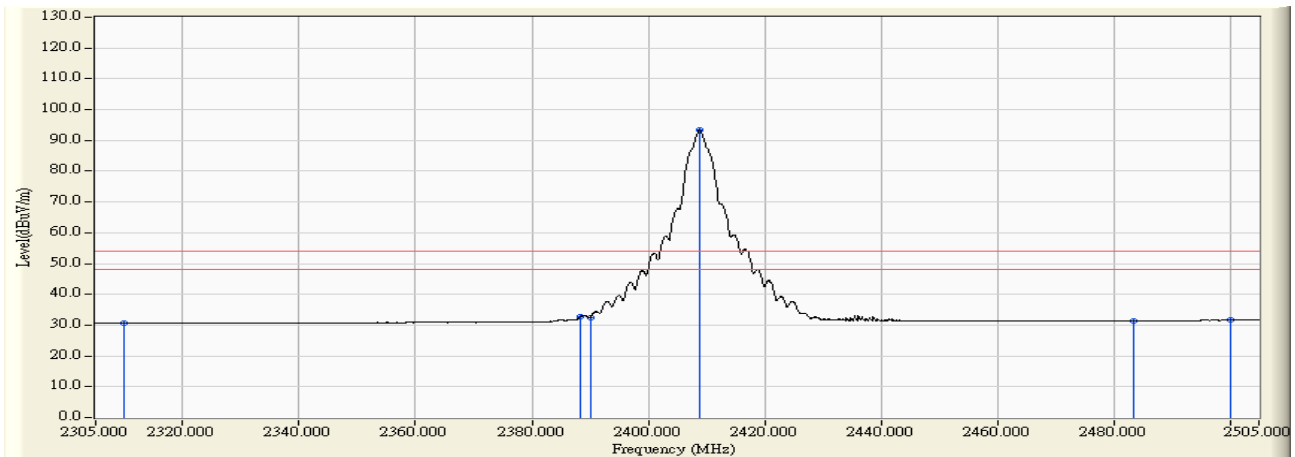


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	29.610	43.277	-30.723	74.000	PEAK
2	2389.000	14.123	31.441	45.563	-28.437	74.000	PEAK
3	2390.000	14.128	30.329	44.457	-29.543	74.000	PEAK
4	* 2408.600	14.234	84.209	98.444	24.444	74.000	PEAK
5	2483.500	14.658	28.338	42.997	-31.003	74.000	PEAK
6	2500.000	14.751	30.206	44.957	-29.043	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2409.5MHz

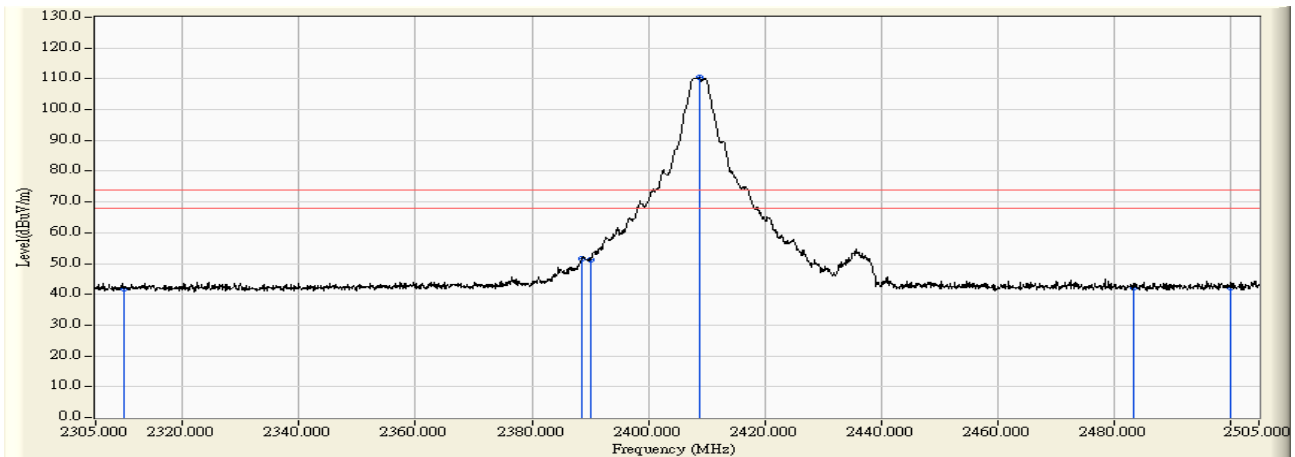


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	16.913	30.580	-23.420	54.000	AVERAGE
2	2388.400	14.119	18.657	32.776	-21.224	54.000	AVERAGE
3	2390.000	14.128	18.451	32.579	-21.421	54.000	AVERAGE
4	* 2408.900	14.236	79.203	93.439	39.439	54.000	AVERAGE
5	2483.500	14.658	16.828	31.487	-22.513	54.000	AVERAGE
6	2500.000	14.751	16.849	31.600	-22.400	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2409.5MHz

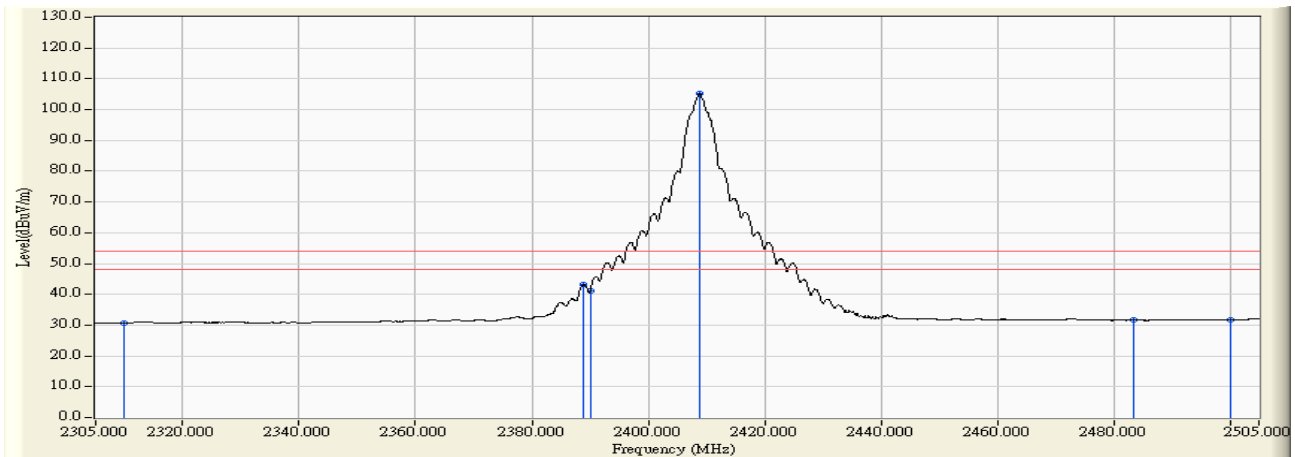


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	28.112	41.779	-32.221	74.000	PEAK
2	2388.500	14.119	37.616	51.735	-22.265	74.000	PEAK
3	2390.000	14.128	37.045	51.173	-22.827	74.000	PEAK
4	* 2408.900	14.236	96.096	110.332	36.332	74.000	PEAK
5	2483.500	14.658	27.477	42.136	-31.864	74.000	PEAK
6	2500.000	14.751	27.436	42.187	-31.813	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2409.5MHz

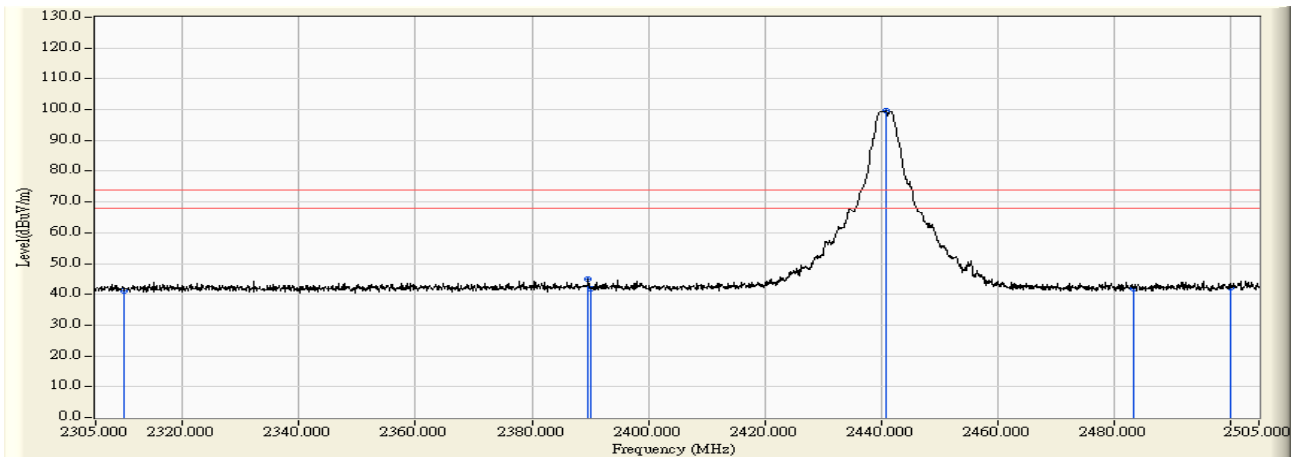


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBUV)	Measure Level (dBUV/m)	Margin (dB)	Limit (dBUV/m)	Detector Type
1	2310.000	13.667	17.079	30.746	-23.254	54.000	AVERAGE
2	2388.900	14.122	29.034	43.156	-10.844	54.000	AVERAGE
3	2390.000	14.128	27.139	41.267	-12.733	54.000	AVERAGE
4	* 2408.800	14.236	90.957	105.193	51.193	54.000	AVERAGE
5	2483.500	14.658	16.911	31.570	-22.430	54.000	AVERAGE
6	2500.000	14.751	17.031	31.782	-22.218	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2441MHz

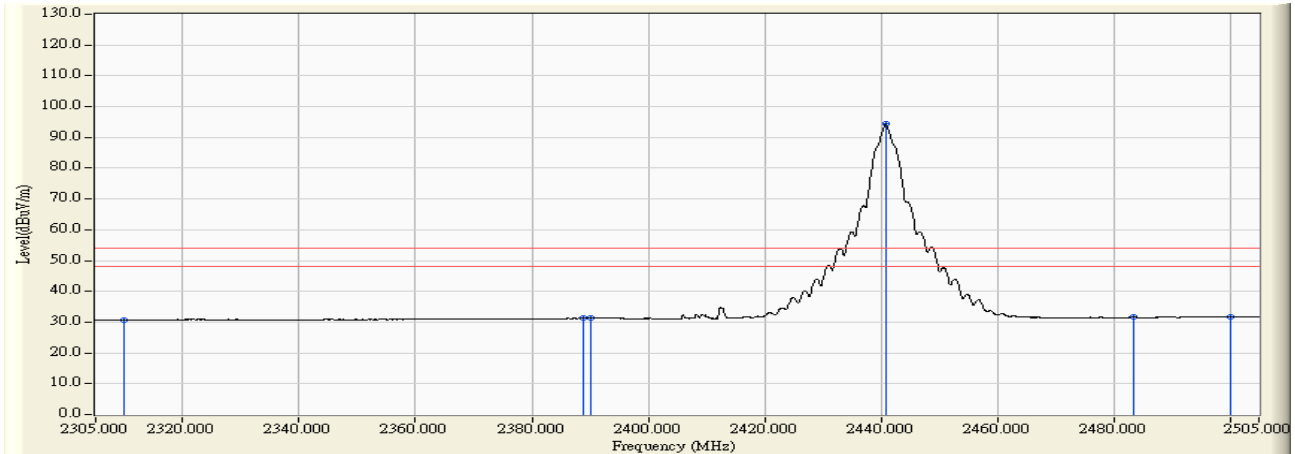


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	27.360	41.027	-32.973	74.000	PEAK
2	2389.600	14.126	30.665	44.791	-29.209	74.000	PEAK
3	2390.000	14.128	27.593	41.721	-32.279	74.000	PEAK
4	* 2440.800	14.417	85.219	99.636	25.636	74.000	PEAK
5	2483.500	14.658	27.101	41.760	-32.240	74.000	PEAK
6	2500.000	14.751	27.266	42.017	-31.983	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2441MHz

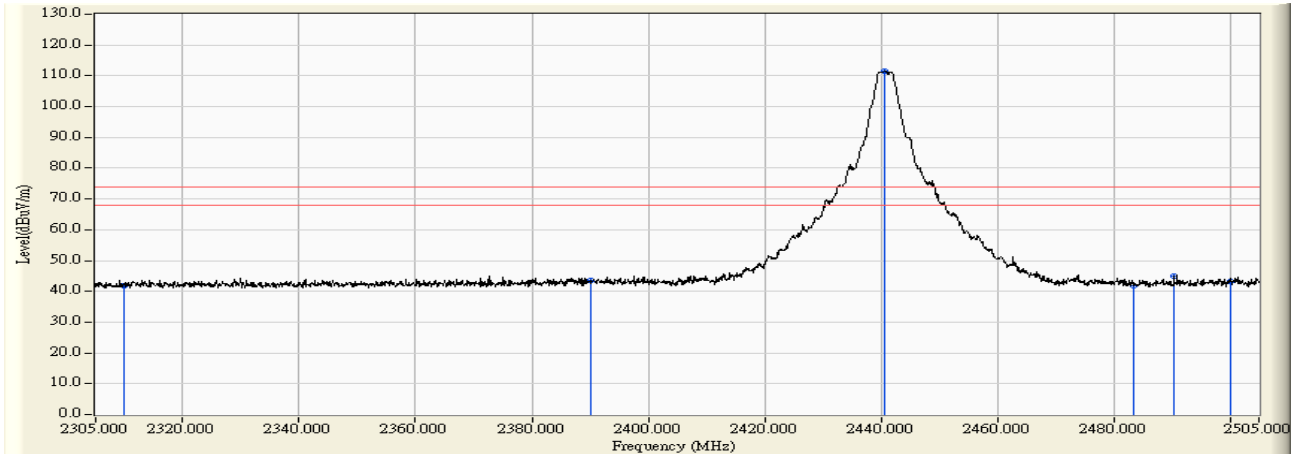


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	16.991	30.658	-23.342	54.000	AVERAGE
2	2388.742	14.121	17.098	31.219	-22.781	54.000	AVERAGE
3	2390.000	14.128	17.098	31.226	-22.774	54.000	AVERAGE
4	* 2440.868	14.418	79.885	94.302	40.302	54.000	AVERAGE
5	2483.500	14.658	16.913	31.572	-22.428	54.000	AVERAGE
6	2500.000	14.751	16.929	31.680	-22.320	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2441MHz

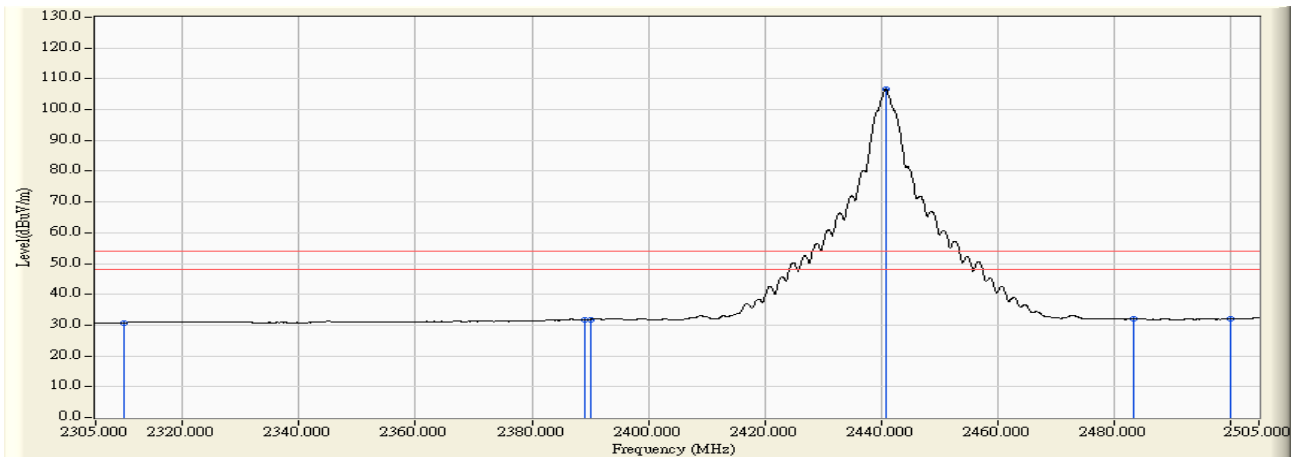


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	28.064	41.731	-32.269	74.000	PEAK
2	2390.000	14.128	29.326	43.454	-30.546	74.000	PEAK
3	* 2440.668	14.416	97.059	111.475	37.475	74.000	PEAK
4	2483.500	14.658	27.312	41.971	-32.029	74.000	PEAK
5	2490.393	14.698	30.098	44.796	-29.204	74.000	PEAK
6	2500.000	14.751	28.393	43.144	-30.856	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2441MHz

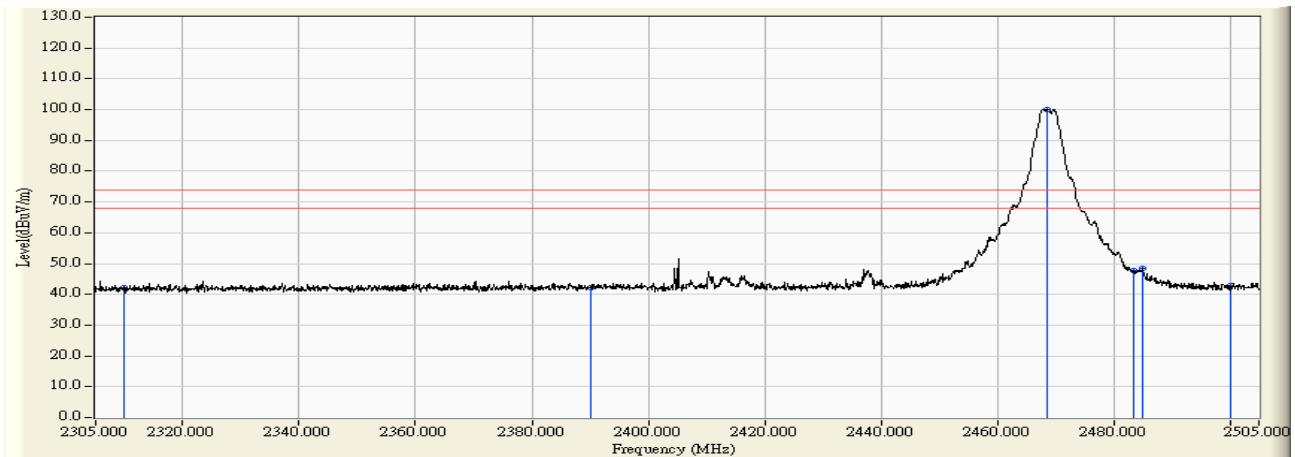


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	17.139	30.806	-23.194	54.000	AVERAGE
2	2389.042	14.123	17.565	31.688	-22.312	54.000	AVERAGE
3	2390.000	14.128	17.711	31.839	-22.161	54.000	AVERAGE
4	* 2440.868	14.418	92.207	106.624	52.624	54.000	AVERAGE
5	2483.500	14.658	17.260	31.919	-22.081	54.000	AVERAGE
6	2500.000	14.751	17.205	31.956	-22.044	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2469MHz

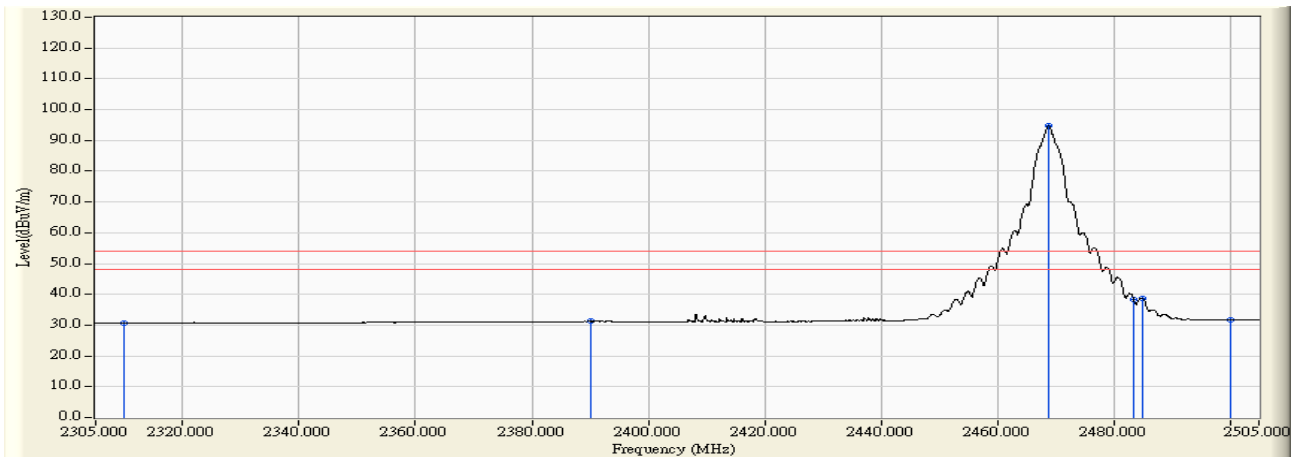


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	28.644	42.311	-31.689	74.000	PEAK
2	2390.000	14.128	28.215	42.343	-31.657	74.000	PEAK
3	* 2468.682	14.575	85.601	100.176	26.176	74.000	PEAK
4	2483.500	14.658	32.967	47.626	-26.374	74.000	PEAK
5	2485.090	14.667	33.825	48.493	-25.507	74.000	PEAK
6	2500.000	14.751	28.074	42.825	-31.175	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 24V
EUT : Wireless System	Note : 2469MHz

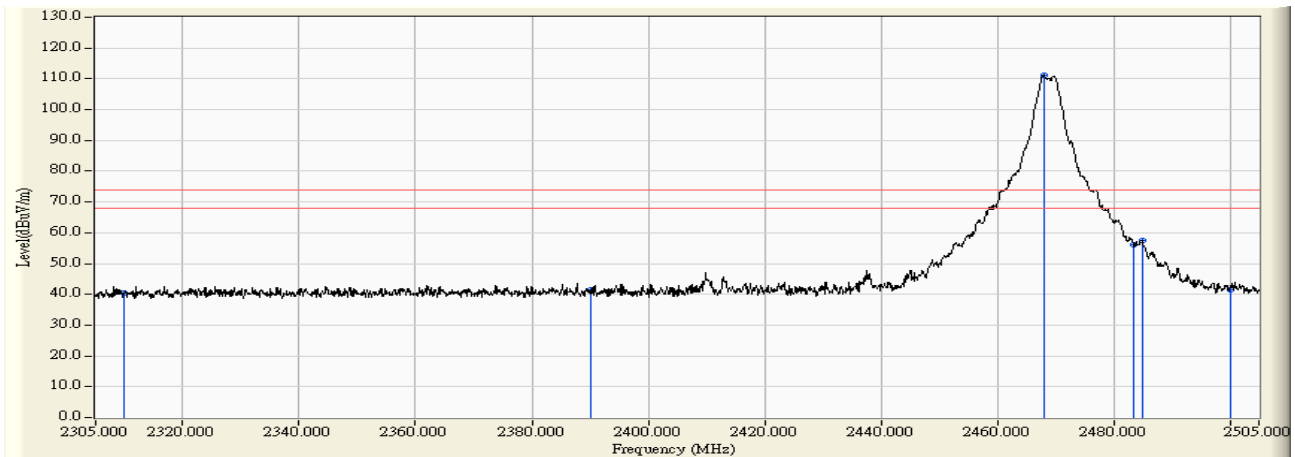


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	17.002	30.669	-23.331	54.000	AVERAGE
2	2390.000	14.128	17.092	31.220	-22.780	54.000	AVERAGE
3	* 2468.882	14.576	80.146	94.722	40.722	54.000	AVERAGE
4	2483.500	14.658	23.678	38.337	-15.663	54.000	AVERAGE
5	2484.890	14.667	24.193	38.860	-15.140	54.000	AVERAGE
6	2500.000	14.751	16.935	31.686	-22.314	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2469MHz

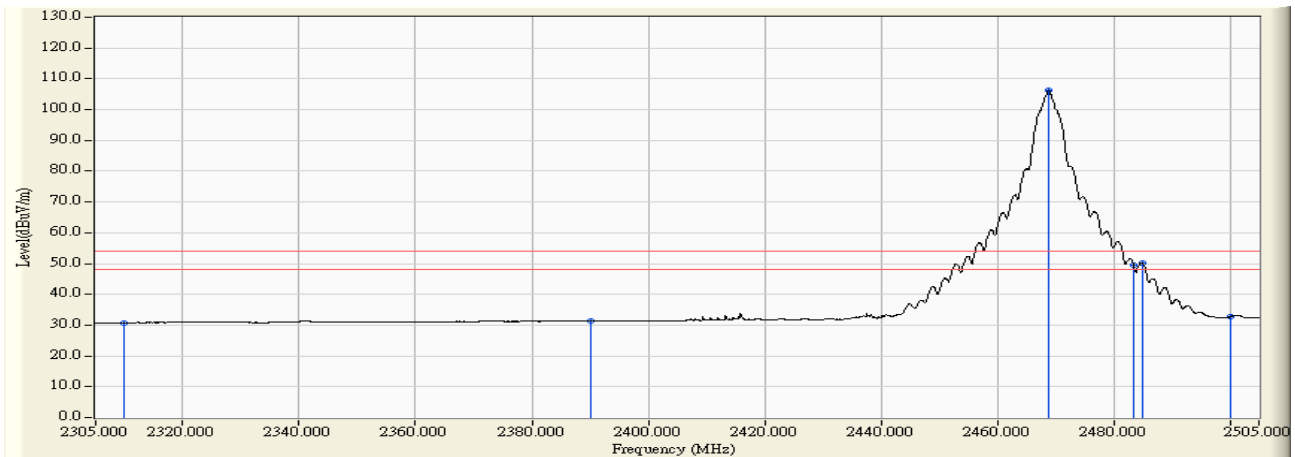


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	26.896	40.563	-33.437	74.000	PEAK
2	2390.000	14.128	27.214	41.342	-32.658	74.000	PEAK
3	* 2467.981	14.570	96.519	111.090	37.090	74.000	PEAK
4	2483.500	14.658	41.519	56.178	-17.822	74.000	PEAK
5	2484.890	14.667	42.884	57.551	-16.449	74.000	PEAK
6	2500.000	14.751	26.689	41.440	-32.560	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

Site : CB4-H	Time : 2017/08/11
Limit : FCC_SpartC_15.209_03M_AV	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 24V
EUT : Wireless System	Note : 2469MHz



	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	2310.000	13.667	17.111	30.778	-23.222	54.000	AVERAGE
2	2390.000	14.128	17.255	31.383	-22.617	54.000	AVERAGE
3	* 2468.882	14.576	91.673	106.249	52.249	54.000	AVERAGE
4	2483.500	14.658	34.781	49.440	-4.560	54.000	AVERAGE
5	2484.890	14.667	35.520	50.187	-3.813	54.000	AVERAGE
6	2500.000	14.751	17.898	32.649	-21.351	54.000	AVERAGE

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 1MHz, 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. If the readings given are average, peak measurement should also be supplied.

7. Number of hopping frequency

7.1. Test Equipment

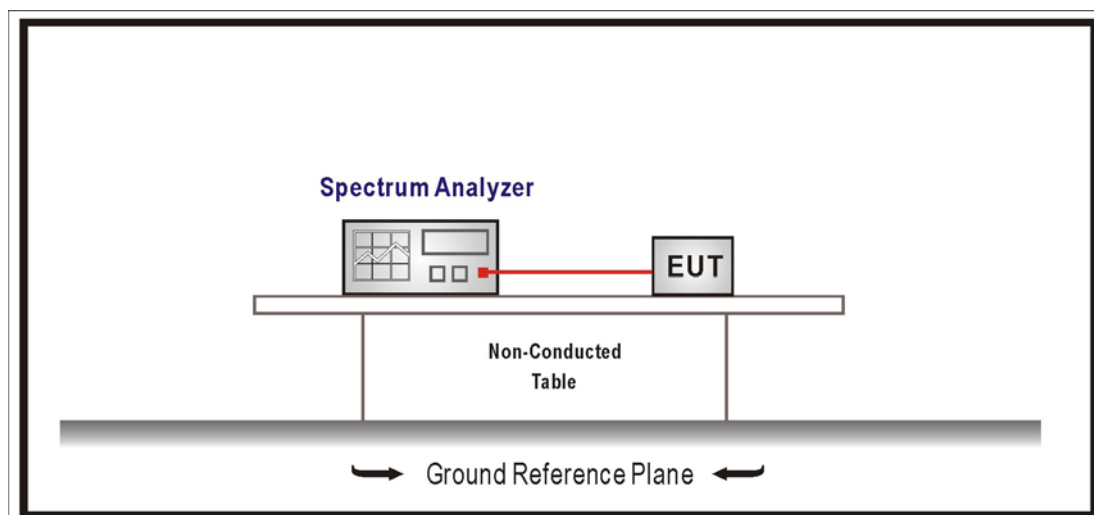
The following test equipment is used during the test:

Number of hopping frequency / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/23	2018/01/22
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2017/03/13	2018/03/12

Note: All equipment that need to calibrate are with calibration period of 1 year.

7.2. Test Setup



7.3. Limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

For frequency hopping systems operating in the 2400-2483.5 MHz bands, which use fewer than 75 hopping frequencies, may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels are used.

For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.

7.4. Test Procedures

The EUT was setup according to ANSI C63.10:2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements ,

Span = the frequency band of operation , $RBW \geq 1\%$ of the span , $VBW \geq RBW$,

Sweep = auto, Detector function = peak, Trace = max hold.

7.5. Test Specification

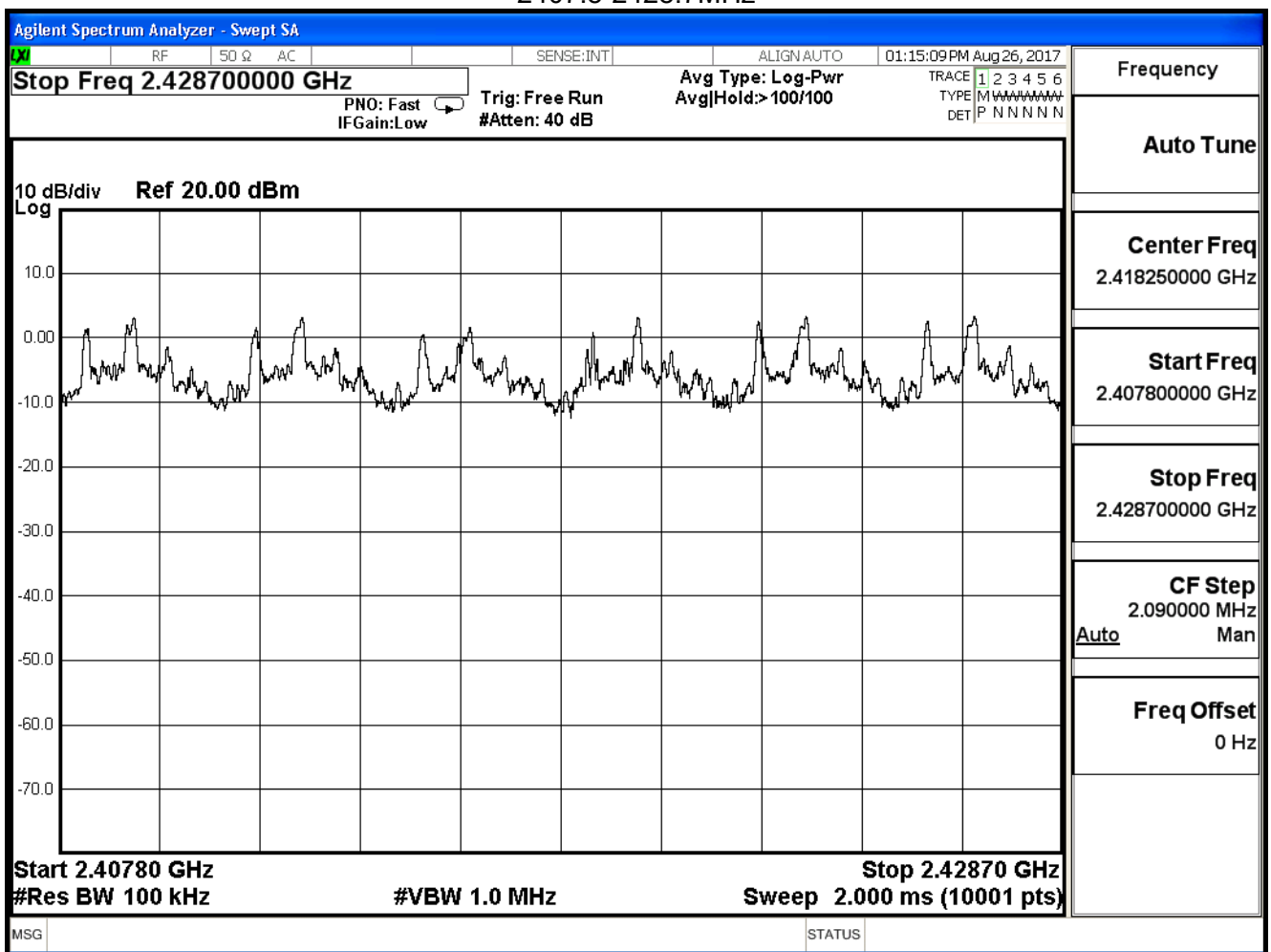
According to FCC Part 15 Subpart C Paragraph 15.247: 2016

7.6. Test Result

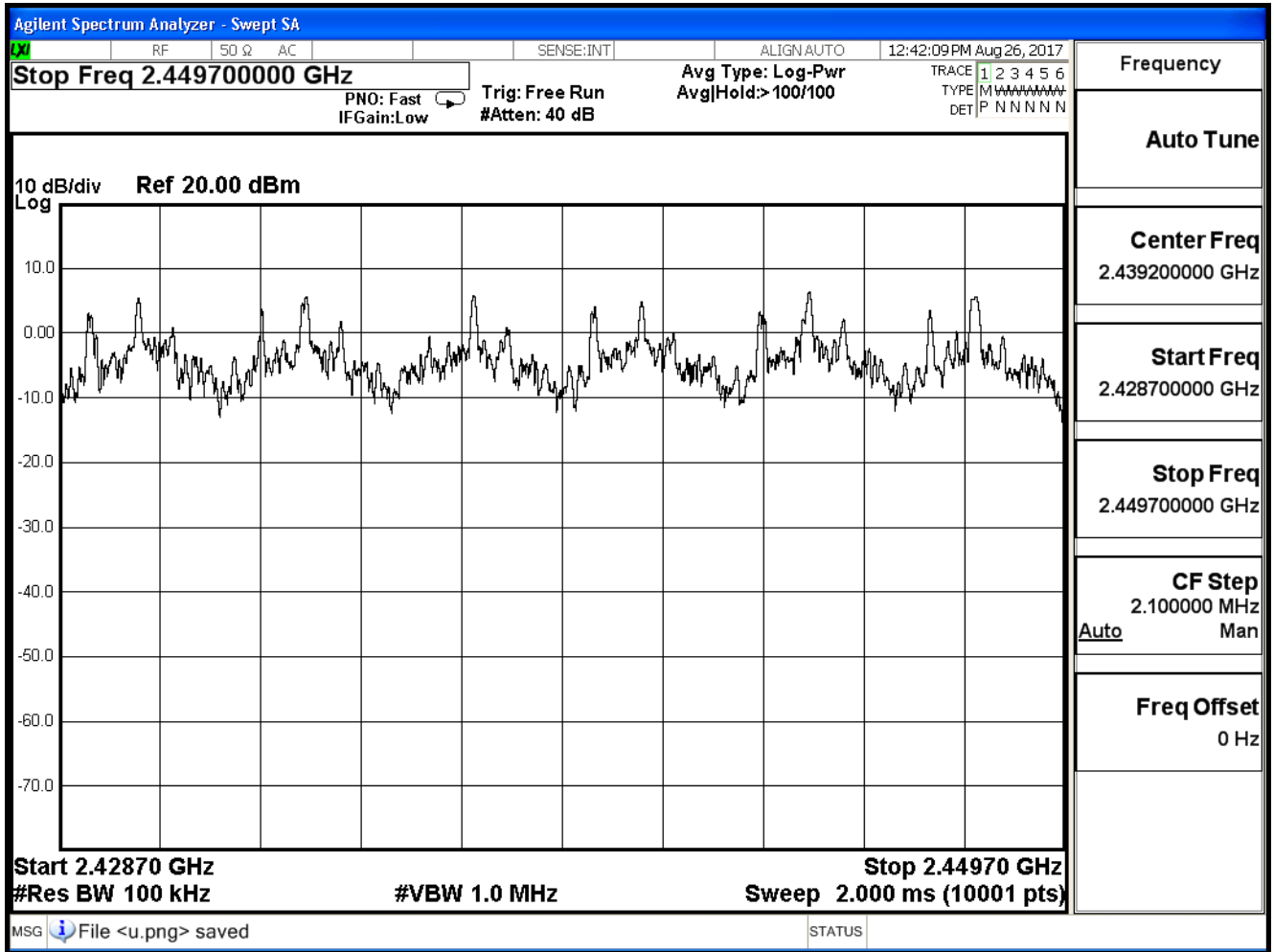
Product	Wireless System		
Test Item	Number of hopping frequency		
Test Mode	Mode 1: Transmit		
Date of Test	2017/08/26	Test Site	SR10-H

Frequency Range (MHz)	Measure Level (Channels)	Limit (Channels)	Result
2409.5 ~ 2469	18	≥ 15	Pass

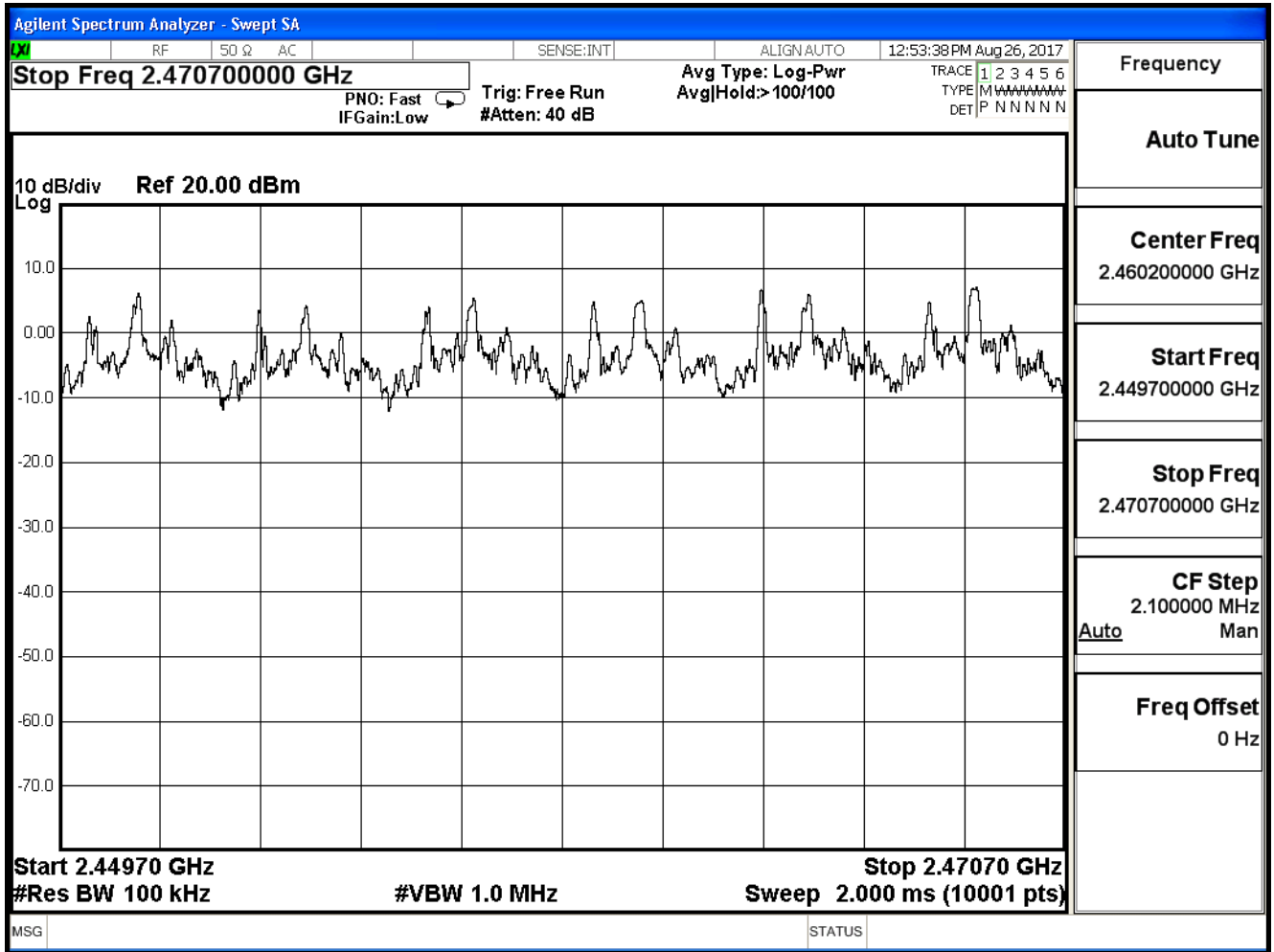
2407.8-2428.7MHz



2428.7-2449.7MHz



2449.7-2470.7MHz



8. Carrier Frequency Separation

8.1. Test Equipment

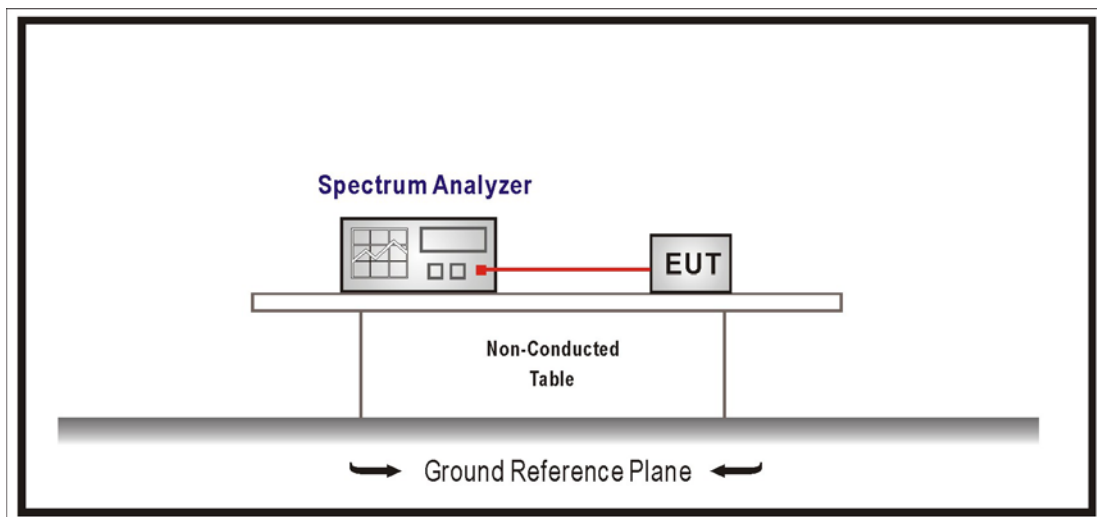
The following test equipment is used during the test:

Carrier Frequency Separation / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/23	2018/01/22
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2017/03/13	2018/03/12

Note: All equipment that need to calibrate are with calibration period of 1 year.

8.2. Test Setup



8.3. Limits

For frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

8.4. Test Procedures

The EUT was setup according to ANSI C63.10:2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Span = wide enough to capture the peaks of two adjacent channels

Resolution Bandwidth (RBW) \geq 1% of the span, VBW \geq RBW

Sweep = auto, Detector function = peak, Trace = max hold

8.5. Test Specification

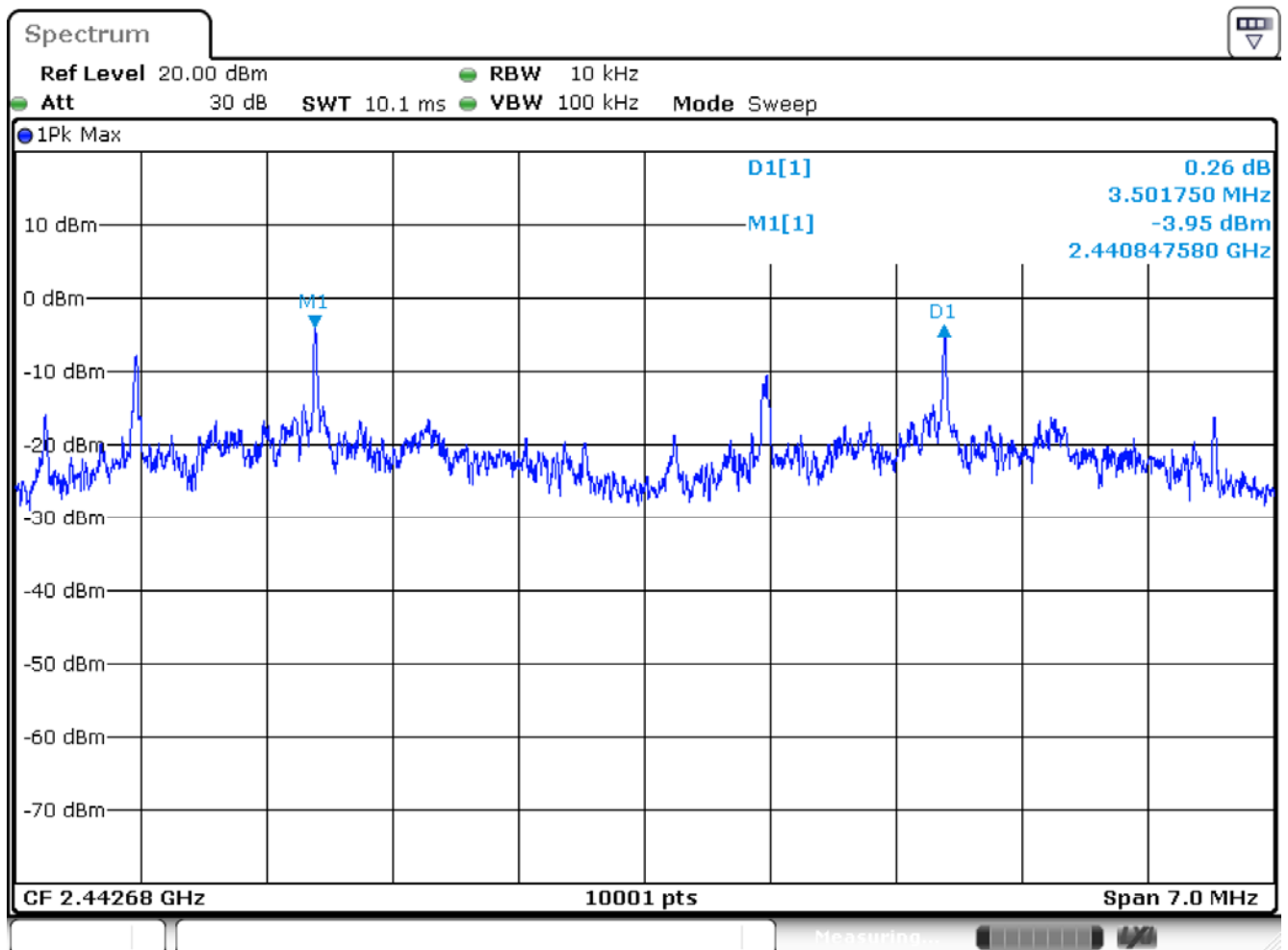
According to FCC Part 15 Subpart C Paragraph 15.247: 2016

8.6. Test Result

Product	Wireless System		
Test Item	Carrier Frequency Separation		
Test Mode	Mode 1: Transmit		
Date of Test	2017/05/03	Test Site	SR10-H

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)
01	2409.5	3.502	3.130
10	2441		3.100
18	2469		3.117

Channel 10



Date: 5.SEP.2017 15:09:30

9. Occupied Bandwidth

9.1. Test Equipment

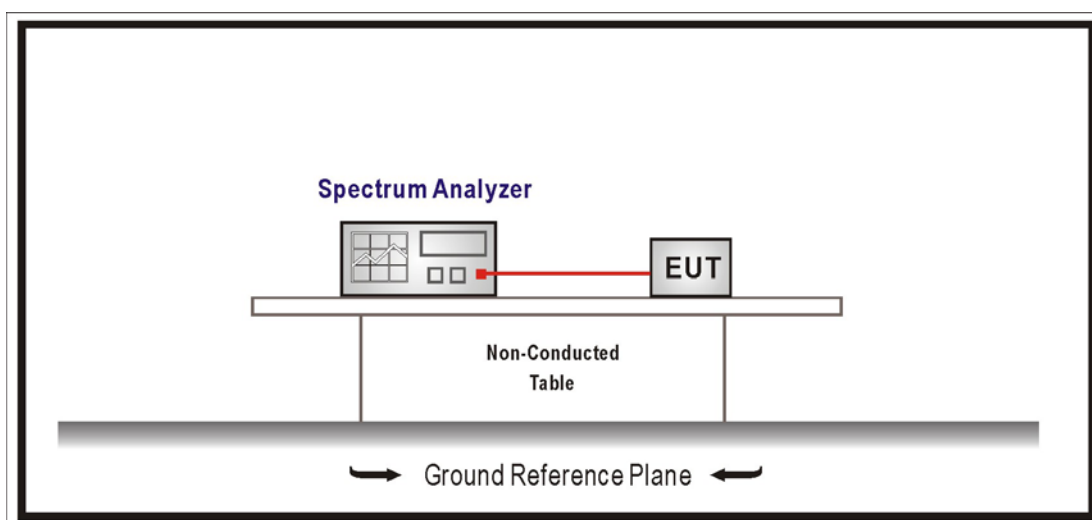
The following test equipment is used during the test:

Occupied Bandwidth / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/23	2018/01/22
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2017/03/13	2018/03/12

Note: All equipment that need to calibrate are with calibration period of 1 year.

9.2. Test Setup



9.3. Limits

N/A

9.4. Test Procedures

The EUT was setup according to ANSI C63.10:2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW \geq 1% of the 20 dB bandwidth, VBW \geq RBW , Sweep = auto, Detector function = peak,
Trace = max hold , The EUT should be transmitting at its maximum data rate.

9.5. Test Specification

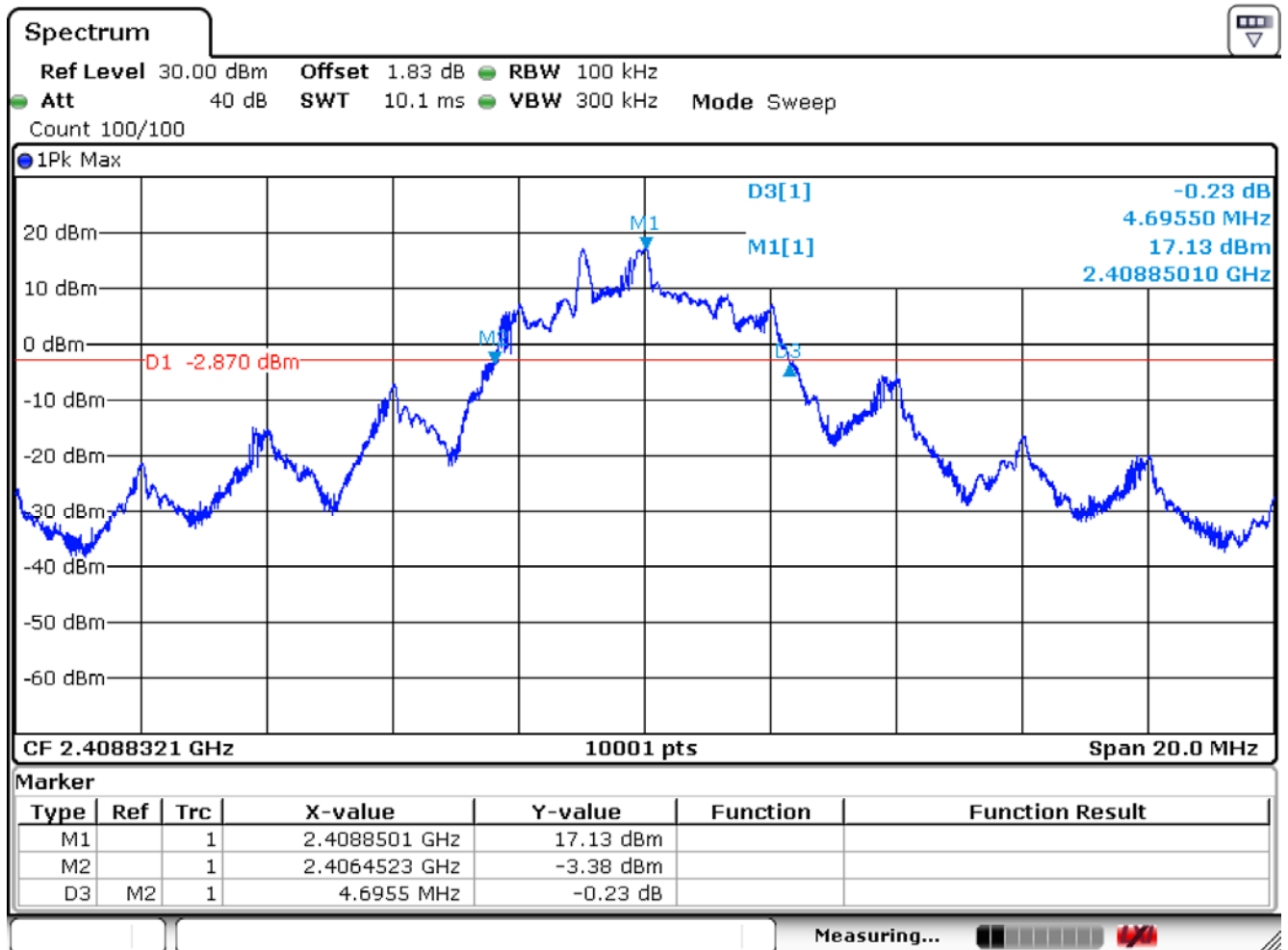
According to FCC Part 15 Subpart C Paragraph 15.247: 2016

9.6. Test Result

Product	Wireless System		
Test Item	Occupied Bandwidth (-20dB)		
Test Mode	Mode 1: Transmit		
Date of Test	2017/08/23	Test Site	SR10-H

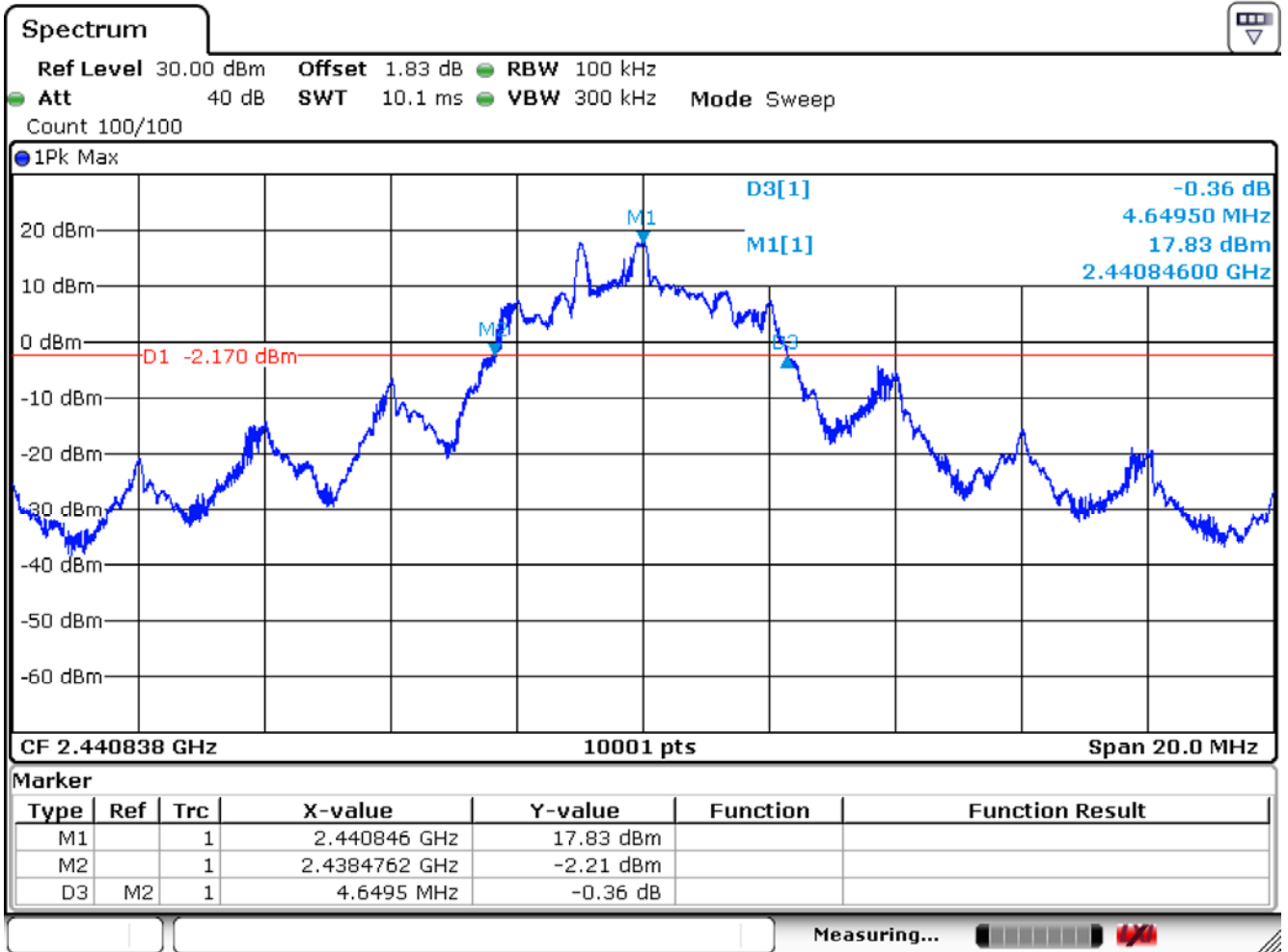
Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
1	2409.5	4.695	--	Pass
10	2441	4.650	--	Pass
18	2469	4.676	--	Pass

Channel 01



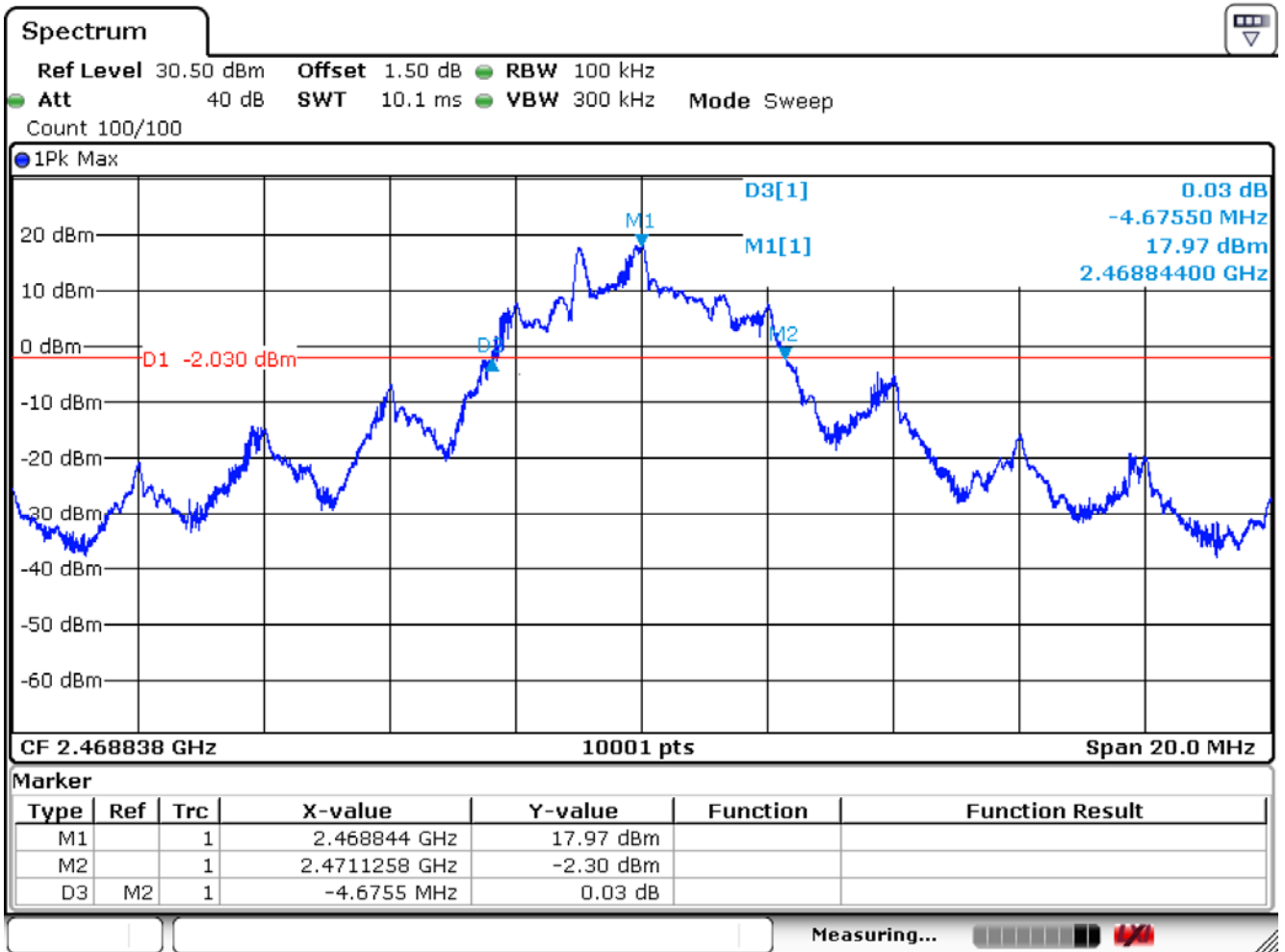
Date: 23.AUG.2017 10:34:57

Channel 10



Date: 23.AUG.2017 10:55:50

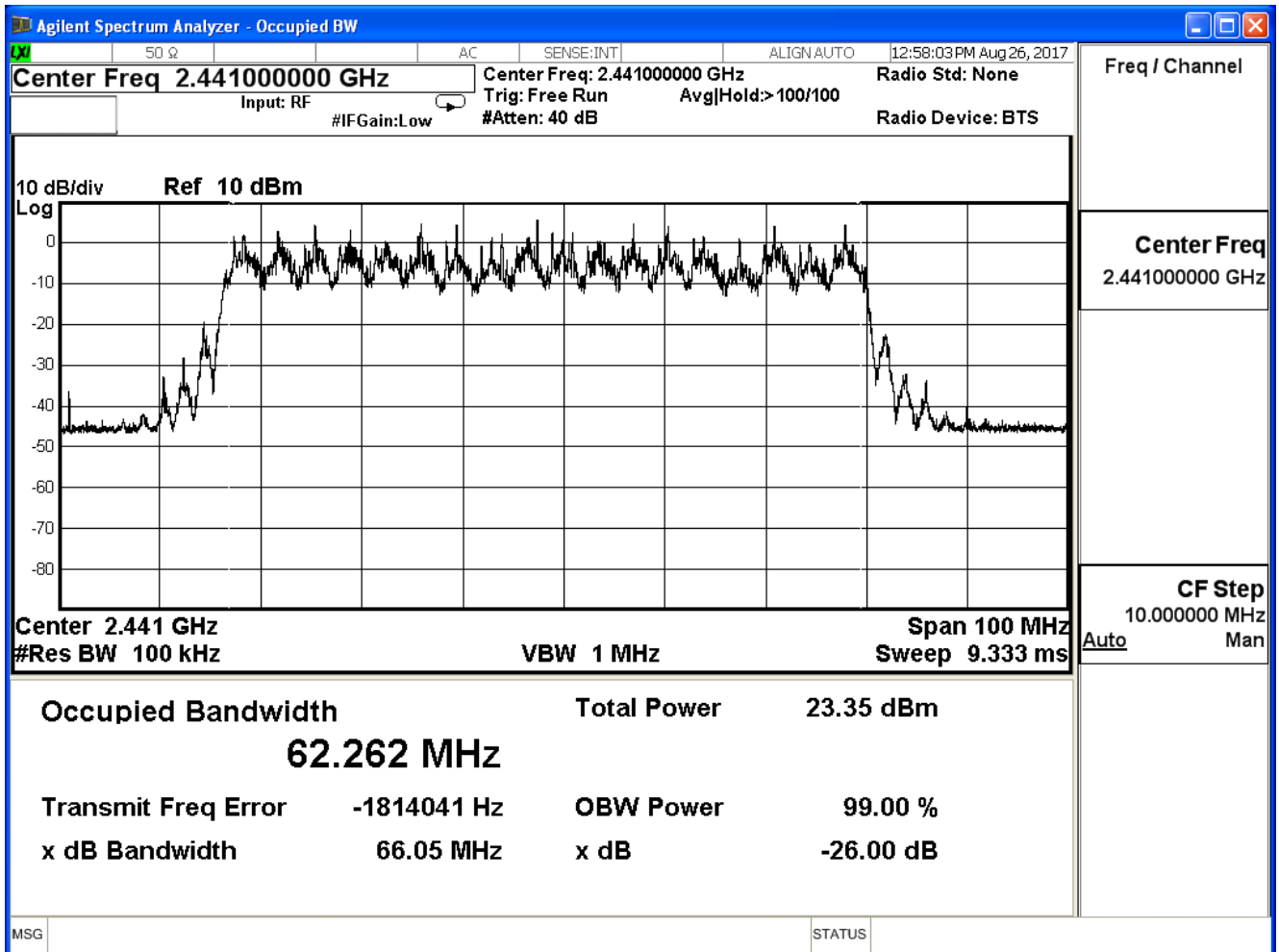
Channel 18



Date: 23.AUG.2017 10:28:11

Product	Wireless System		
Test Item	Occupied Bandwidth (99%)		
Test Mode	Mode 1: Transmit		
Date of Test	2017/08/26	Test Site	SR10-H

Frequency Range (MHz)	Measure Level (Channels)	Limit (Channels)	Result
2409.5 ~ 2469	66.05	--	Pass



10. Dwell Time

10.1. Test Equipment

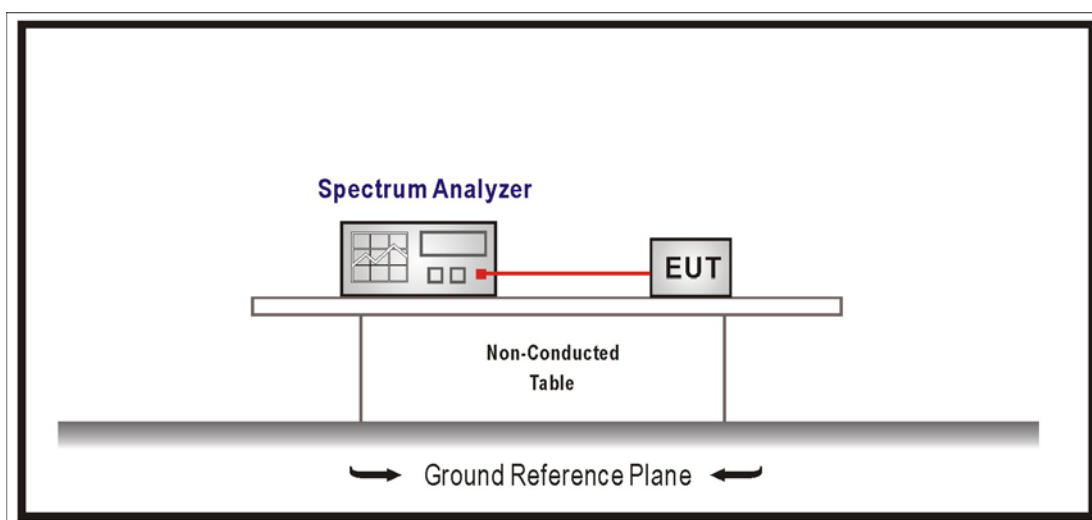
The following test equipment is used during the test:

Dwell Time / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2017/01/23	2018/01/22
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2017/03/13	2018/03/12

Note: All equipment that need to calibrate are with calibration period of 1 year.

10.2. Test Setup



10.3. Limits

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. For frequency hopping systems operating in the 2400-2483.5 MHz bands. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. For frequency hopping systems operating in the 5725-5850 MHz bands. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

10.4. Test Procedures

The EUT was setup according to ANSI C63.10:2013 and tested according to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

Span = zero span, centered on a hopping channel , RBW = 1 MHz, VBW \geq RBW ,
Sweep = as necessary to capture the entire dwell time per hopping channel ,
Detector function = peak, Trace = max hold.

10.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2016

10.6. Test Result

Product	Wireless System		
Test Item	Dwell Time		
Test Mode	Mode 1: Transmit		
Date of Test	2017/08/14	Test Site	SR10-H

Occupancy Time of Frequency Hopping System

A) 2409.5MHz Test Time Period: $0.4 \times 18 = 7.2\text{sec}$, Time slot length : 9.867 ms = 0.009867 sec

Dwell Time : 0.009867 $\times (77/18) \times 7.2 =$ 0.3039 sec ◦

B) 2441MHz Test Time Period: $0.4 \times 18 = 7.2\text{sec}$, Time slot length : 9.957 ms = 0.009957 sec

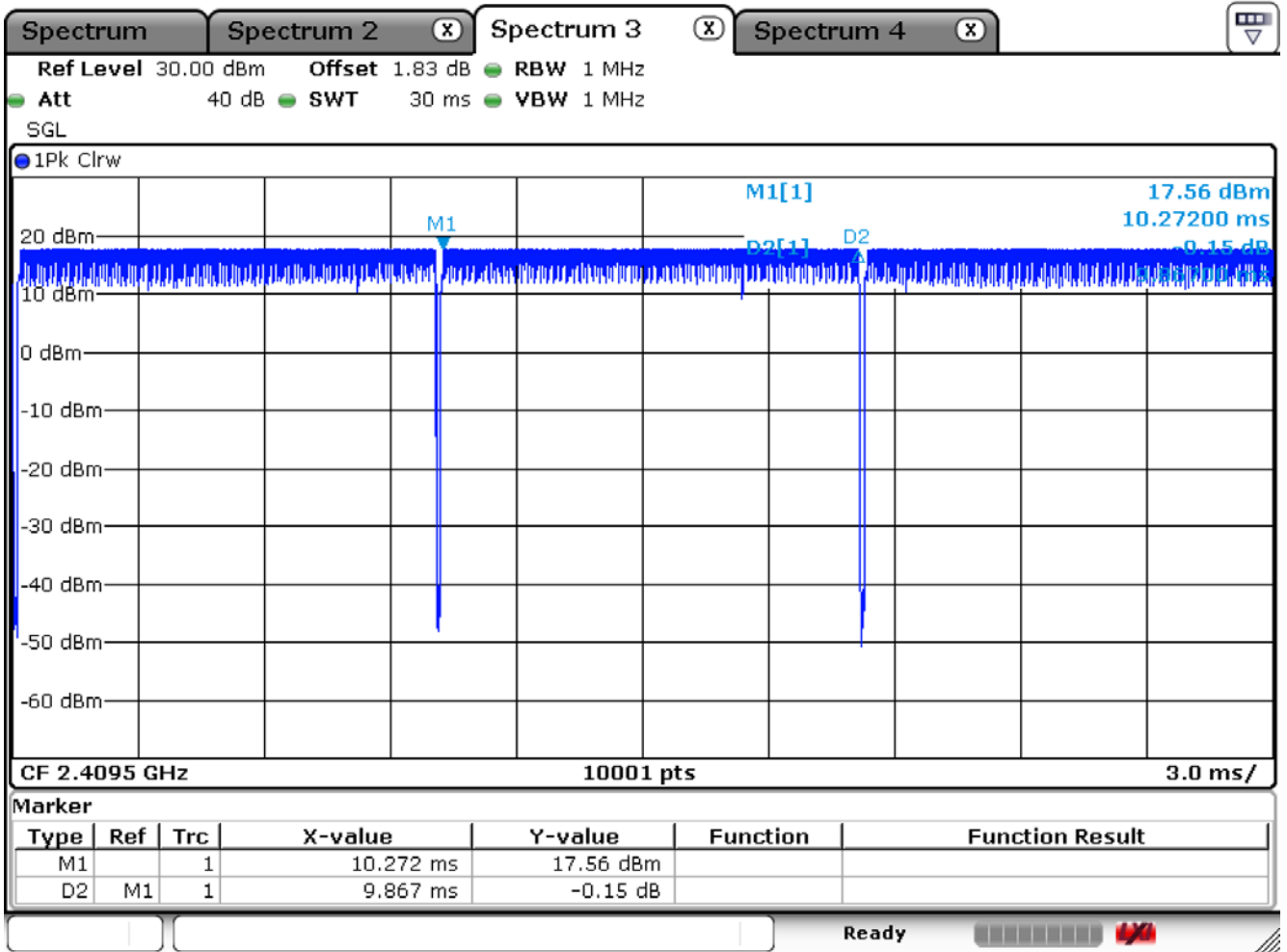
Dwell Time : 0.009957 $\times (77/18) \times 7.2 =$ 0.3067 sec ◦

C) 2469MHz Test Time Period: $0.4 \times 18 = 7.2\text{sec}$, Time slot length : 9.972 ms = 0.009972 sec

Dwell Time : 0.009972 $\times (77/18) \times 7.2 =$ 0.3071 sec ◦

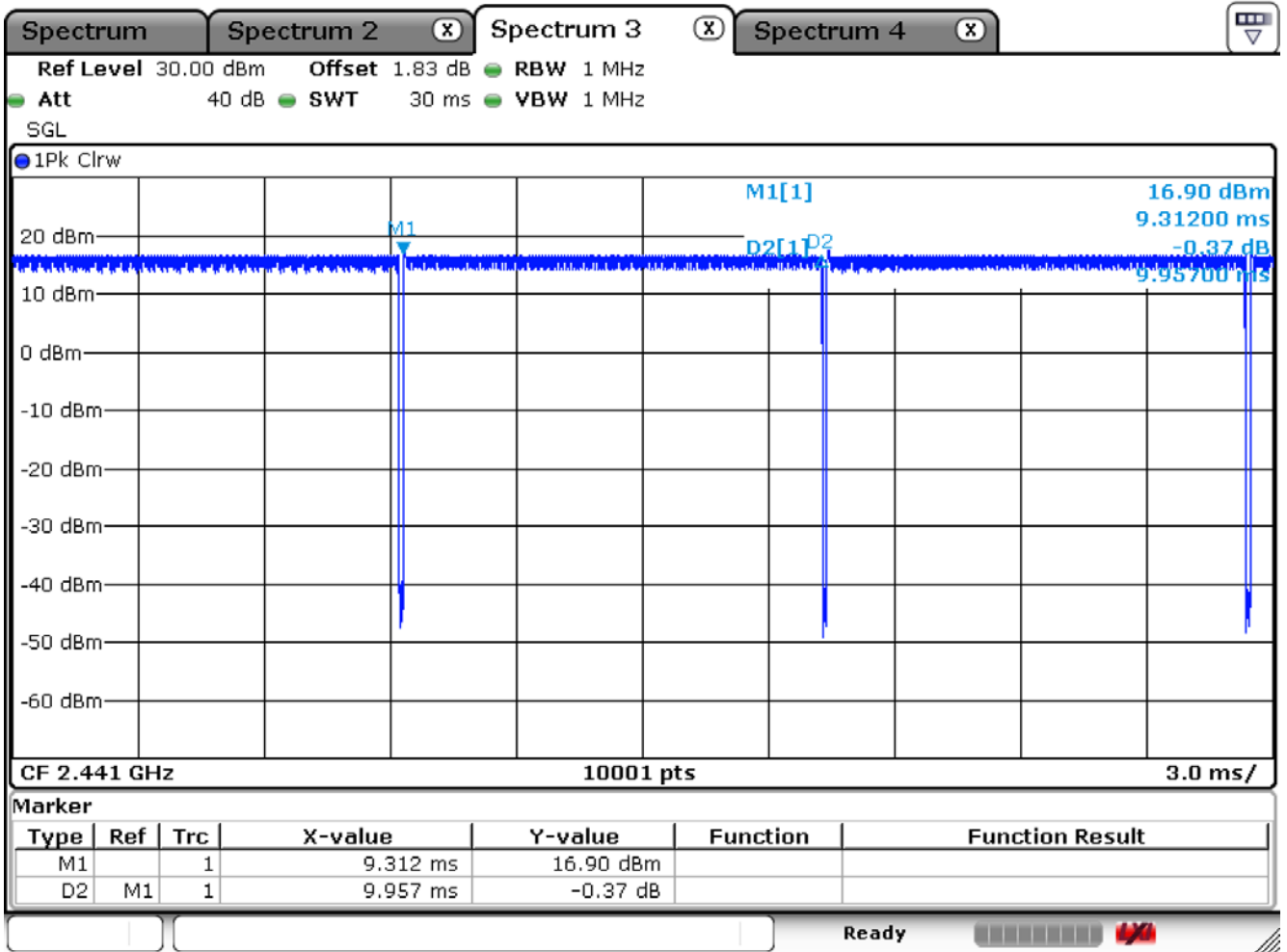
Test Result: The Average Occupancy Time of Each Highest , Middle and Lowest Channel Is Less Than 0.4sec , And Corresponds to The Standard ◦

Hop rate-2409.5MHz



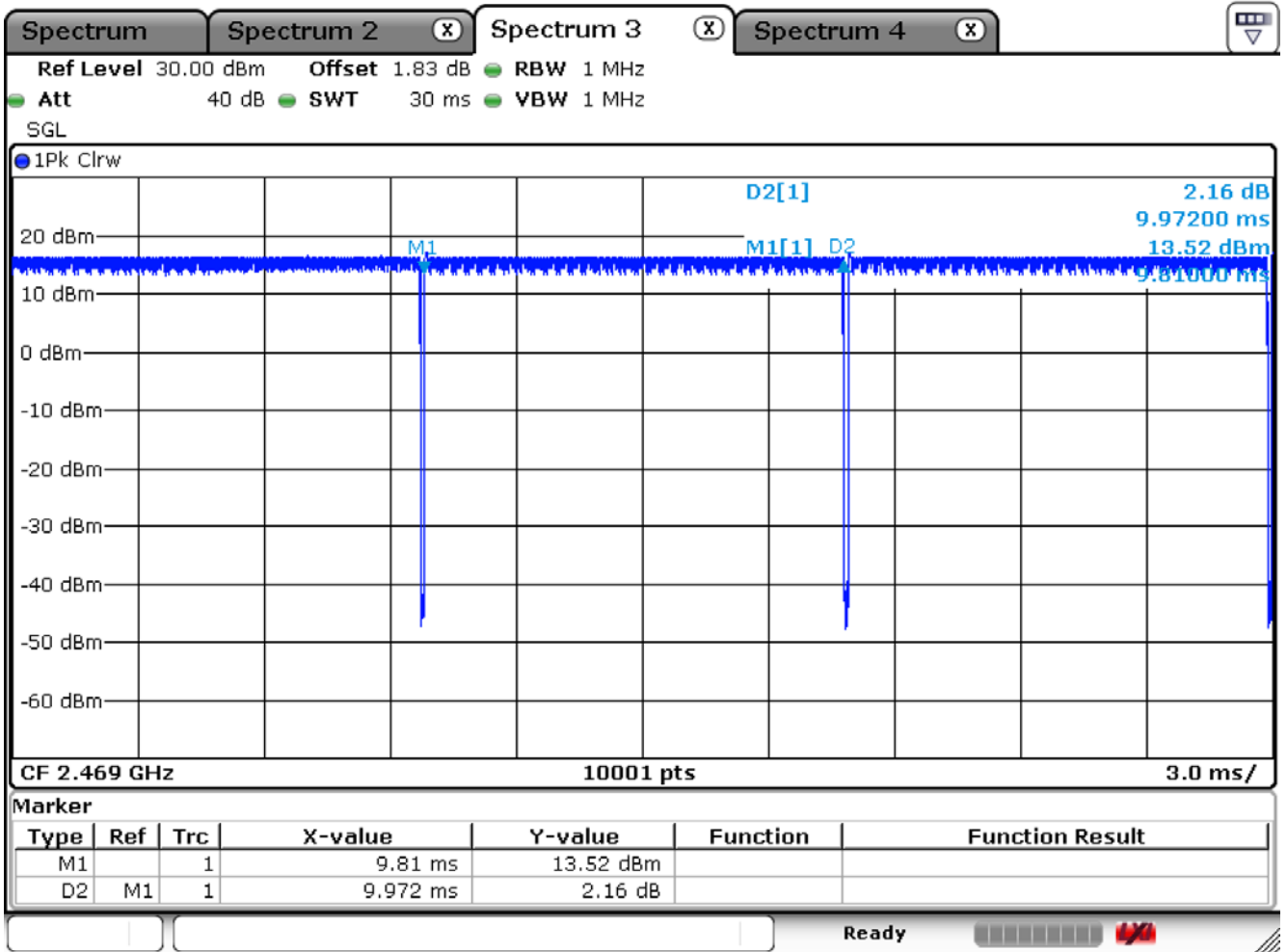
Date: 14.AUG.2017 19:13:26

Hop rate-2441MHz



Date: 14.AUG.2017 18:52:22

Hop rate-2469MHz



Date: 14.AUG.2017 18:54:58

Note: Dwell time = time slot length * hop rate / number of hopping channels * period