

FCC Test Report

Product Name : Gateway
Model No. : GW-RW01
FCC ID. : UMP-GW-RW01

Applicant : Grand Mate Co., Ltd
Address : No.30, Lugong S. 2nd Rd., Lukang Township,
Changhua County 505, Taiwan (R.O.C.)

Date of Receipt : Feb. 23, 2016
Issued Date : Jul. 10, 2017
Report No. : 1720570R-RFUSP14V00
Report Version : V1.0



The declaration results relate only to the samples calculated.

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Test Report Certification

Issued Date : Jul. 10, 2017

Report No. : 1720570R-RFUSP14V00



Product Name : Gateway
Applicant : Grand Mate Co., Ltd
Address : No.30, Lugong S. 2nd Rd., Lukang Township, Changhua
County 505, Taiwan (R.O.C.)
Manufacturer : Grand Mate Co., Ltd
Model No. : GW-RW01
FCC ID. : UMP-GW-RW01
EUT Voltage : DC 5V
Testing Voltage : DC 5V
Applicable Standard : FCC 15 Subpart C Section 15.231(b): 2015
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 :



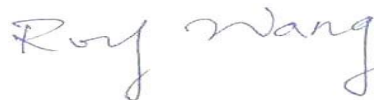
(Carol Tsai / Senior Engineering Adm. Specialist)

Reviewed By :



(Elwin Lin / Assistant Engineer)

Approved By :



(Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1720570R-RFUSP14V00	V1.0	Initial issue of report.	Jul. 10, 2017

Laboratory Information

We, **DEKRA Testing and Certification Co., Ltd.**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

Taiwan R.O.C.	:	TAF, Accreditation Number: 3024
USA	:	FCC, Registration Number: 834100
Canada	:	IC, Submission No: 181665 / IC Registration Number: 22397-1 / 22397-2 / 22397-3

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 test sites as below:

- 1 No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan (R.O.C.)
TEL:+886-3-592-8858 / FAX:+886-3-592-8859 E-Mail : info.tw@dekra.com
- 2 No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com
- 3 No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com

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1. General Information

1.1. EUT Description

Product Name	Gateway
Model No.	GW-RW01
Frequency Range	434MHz
Channel Number	1
Type of Modulation	2GFSK

Antenna Information	
Antenna Type	Helical Antenna
Antenna Gain	-0.8 dBi

Accessories Information	
Power Adapter	L.T.E, LTE05UW-S1-BS I/P: 100-240V~50/60Hz, 0.2A O/P: 5V $\pm$ 1A Cable Out: Non-Shielded, 1.85m

Working Frequency of Each Channel	
Channel	Frequency
001	434 MHz

Note:

1. This device is a Gateway including 2.4G b/g/n (1x1) 、434MHz transmitting and receiving function.
2. These tests are conducted on a sample for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.231.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
4. The function of the 2.4GHz transmitting is measured and makes a test report of the number: 1720570R-RFUSP02V00.
5. This device is a composite device in accordance with Part 15 regulations. The function receiving was measured and made a test report that the report number is 1720570R-RFUSP01V00 under Declaration of Conformity.

1.2. Test Mode

DEKRA verified the construction and function in typical operation. All the test modes are performed in normal operation and are defined as:

Test Mode	
TX	Mode 1: Transmit_Antenna 1
	Mode 2: Transmit_Antenna 2

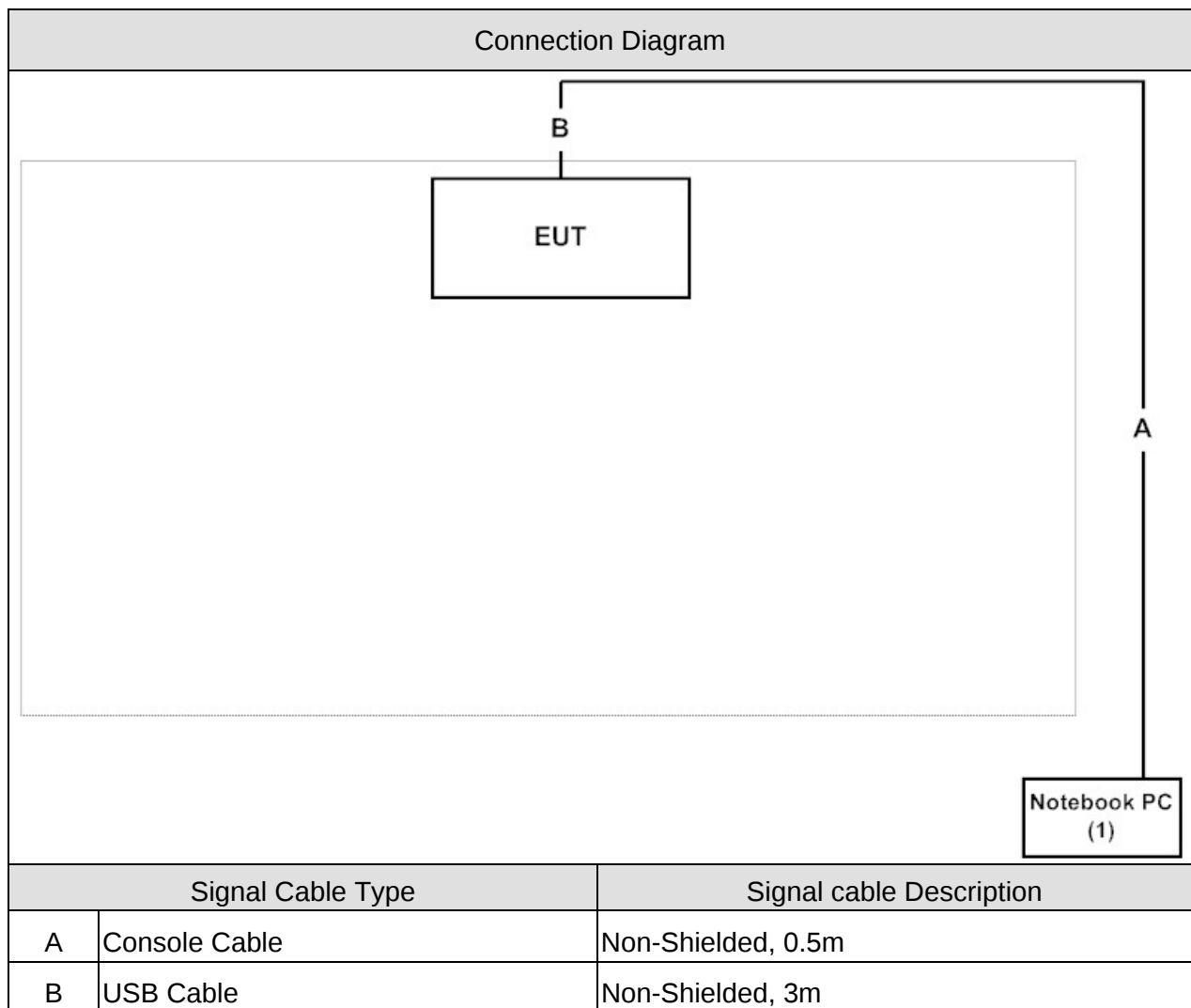
Emission		
Performed Item	Mode 1	Mode 2
Conducted Emission	Yes	Yes
Radiated Emission	Yes	Yes
Occupied Bandwidth	Yes	No
Duty cycle	Yes	No
Transmitter time	Yes	No

1.3. Tested System Details

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

Product		Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1	Notebook PC	ASUS	X522EP	E5N0CV04326 4197	DoC	Non-Shielded, 1.8m, one ferrite core bonded

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT as shown in Section 1.4.
2	Execute the test command on the Tera Term
3	Configure the test mode, the test channel, and the data rate.
4	Press "Start TX" to start the continuous transmitting.
5	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 15.231(b) Conducted Emission	15 - 35	20°C	3
Humidity (%RH)		25 - 75	50%RH	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.231(b) Radiated Emission	15 - 35	25°C	2
Humidity (%RH)		25 - 75	45%RH	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.231(b) Occupied Bandwidth	15 - 35	25°C	3
Humidity (%RH)		25 - 75	65%RH	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.231(b) Duty cycle	15 - 35	25°C	3
Humidity (%RH)		25 - 75	45%RH	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.231(b) Transmitter time	15 - 35	25°C	3
Humidity (%RH)		25 - 75	48%RH	
Barometric pressure (mbar)		860 - 1060	950-1000	

Note: Test Site information refers to Laboratory Information.

2. Conducted Emission

2.1. Test Equipment

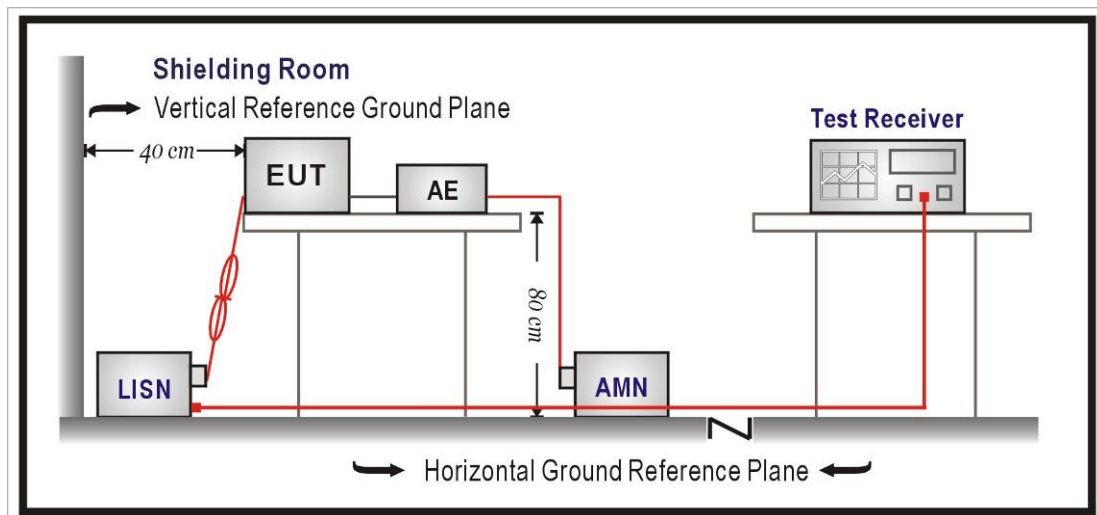
The following test equipment are used during the test:

Conducted Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2018/02/05
LISN	R&S	ENV216	100092	2017/08/16
Test Receiver	R&S	ESCS 30	836858/022	2018/04/11

Note: All equipments 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 was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

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

2.5. Test Specification

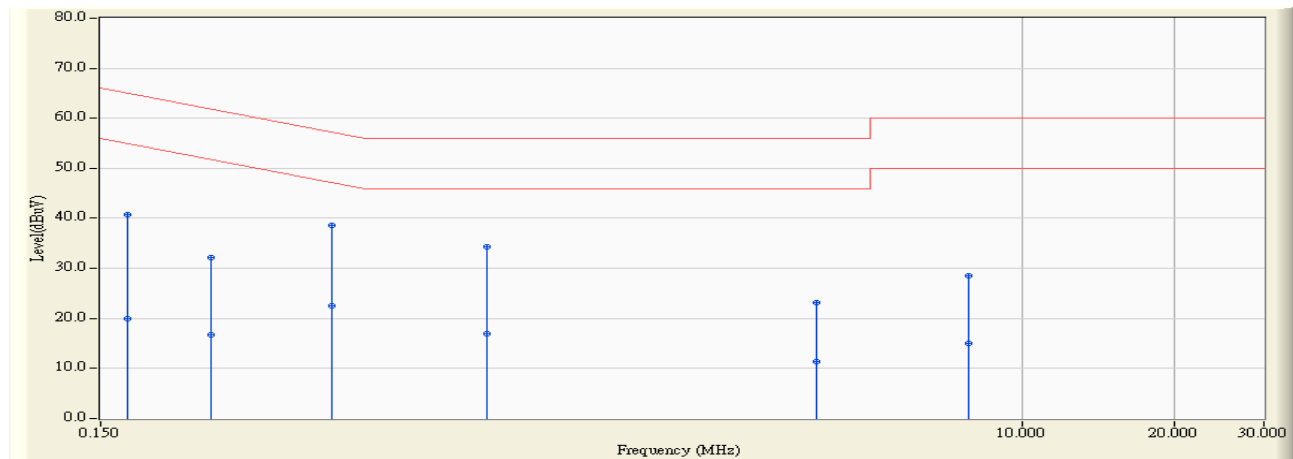
According to FCC Part 15 Subpart C Paragraph 15.207: 2014

2.6. Uncertainty

The measurement uncertainty is defined as ± 2.26 dB.

2.7. Test Result

Site : SR2-H	Time : 2017/03/22
Limit : CISPR_B_00M_QP	Margin : 10
Probe : SR2-H_LISN(16A)-6_0712 - Line1	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1

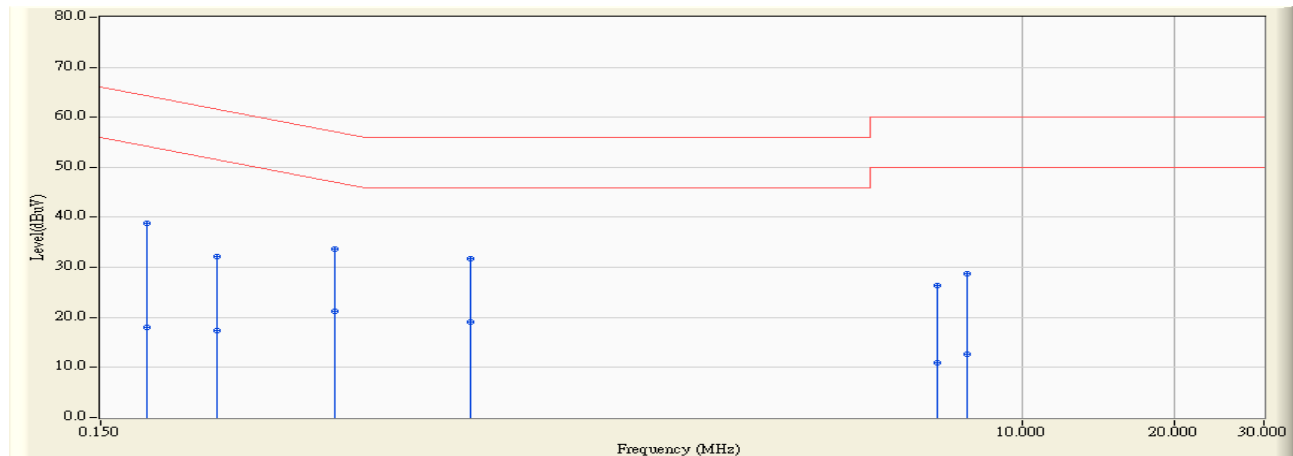


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.170	9.753	30.920	40.673	-24.310	64.983	QUASIPeAK
2		0.170	9.753	10.100	19.853	-35.130	54.983	AVERAGE
3		0.248	9.745	22.430	32.175	-29.660	61.835	QUASIPeAK
4		0.248	9.745	7.070	16.815	-35.020	51.835	AVERAGE
5	*	0.431	9.729	28.800	38.529	-18.699	57.229	QUASIPeAK
6		0.431	9.729	12.790	22.519	-24.709	47.229	AVERAGE
7		0.869	9.796	24.440	34.236	-21.764	56.000	QUASIPeAK
8		0.869	9.796	7.140	16.936	-29.064	46.000	AVERAGE
9		3.920	9.918	13.250	23.168	-32.832	56.000	QUASIPeAK
10		3.920	9.918	1.430	11.348	-34.652	46.000	AVERAGE
11		7.810	10.038	18.480	28.519	-31.481	60.000	QUASIPeAK
12		7.810	10.038	4.920	14.959	-35.041	50.000	AVERAGE

Note:

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

Site : SR2-H	Time : 2017/03/22
Limit : CISPR_B_00M_QP	Margin : 10
Probe : SR2-H_LISN(16A)-6_0712 - Line2	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.185	9.751	29.090	38.841	-25.410	64.251	QUASIPeAK
2		0.185	9.751	8.310	18.061	-36.190	54.251	AVERAGE
3		0.255	9.750	22.330	32.080	-29.497	61.577	QUASIPeAK
4		0.255	9.750	7.610	17.360	-34.217	51.577	AVERAGE
5	*	0.435	9.748	23.890	33.638	-23.515	57.154	QUASIPeAK
6		0.435	9.748	11.510	21.258	-25.895	47.154	AVERAGE
7		0.806	9.791	21.890	31.681	-24.319	56.000	QUASIPeAK
8		0.806	9.791	9.220	19.011	-26.989	46.000	AVERAGE
9		6.771	9.962	16.320	26.282	-33.718	60.000	QUASIPeAK
10		6.771	9.962	1.010	10.972	-39.028	50.000	AVERAGE
11		7.748	10.019	18.820	28.839	-31.161	60.000	QUASIPeAK
12		7.748	10.019	2.700	12.719	-37.281	50.000	AVERAGE

Note:

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

3. Radiated Emission

3.1. Test Equipment

The following test equipment are used during the test:

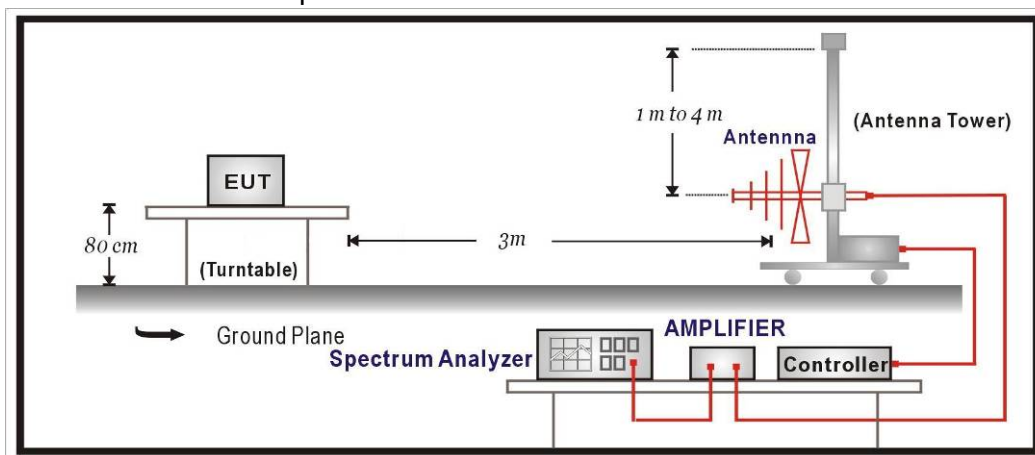
Radiated Emission / CB4-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum	Agilent	E4440A	MY46187335	2017/12/21
Bilog Antenna	Teseq	CBL6112D	23191	2017/07/04
Horn Antenna	Schwarzbeck	BBHA 9120 D	1640	2017/10/23
Pre-Amplifier	EMCI	EMC01820I	12143782	2018/03/08
Pre-Amplifier	EMCI	EMC01820I	980367	2018/02/09

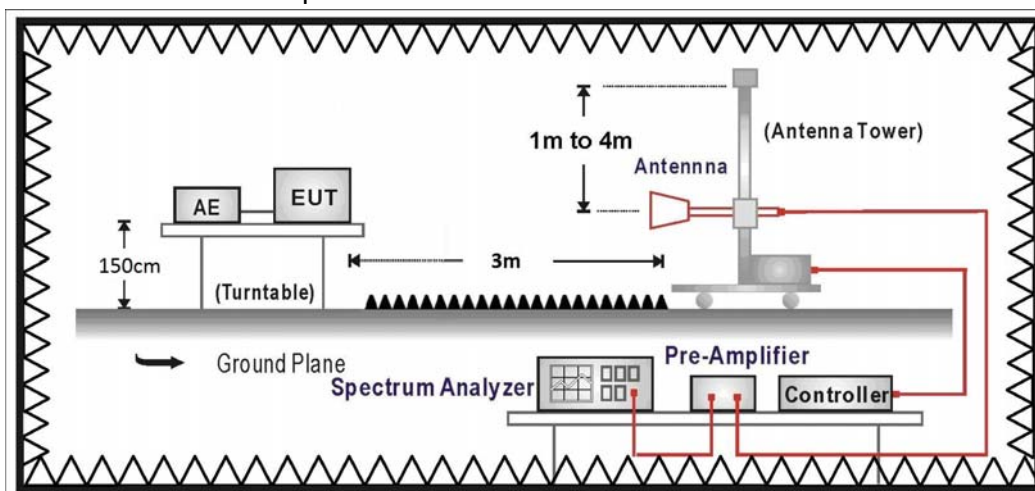
Note: All equipments that need to calibrate are with calibration period of 1 year.

3.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



3.3. Limits

➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.231(b) Limits				
Fundamental Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	uV/m	dBuV/m	uV/m	dBuV/m
40.66 - 40.70	2250	67.04	225	47.04
70 - 130	1250	61.94	125	41.94
130 - 174	1250 - 3750	61.94 - 71.48	125 - 375	41.94 - 51.48
174 - 260	3750	71.48	375	51.48
260 - 470	3750 - 12500	71.48 - 81.94	375 - 1250	51.48 - 61.94
above 470	12500	81.94	1250	61.94

Remarks: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 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.
 3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

➤ Spurious electric field strength limits

FCC Part 15 Subpart C Paragraph 15.209 Limits			
Frequency MHz	uV/m	dBuV/m	Measurement distance (meter)
0.009 - 0.490	2400/F(kHz)	See Remark ¹	300
0.490 - 1.705	24000/F(kHz)	See Remark ¹	30
1.705 - 30	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

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.

3.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 and 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 polarizations 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 resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB beamwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The frequency range from 30MHz to 10th harmonics is checked.

3.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

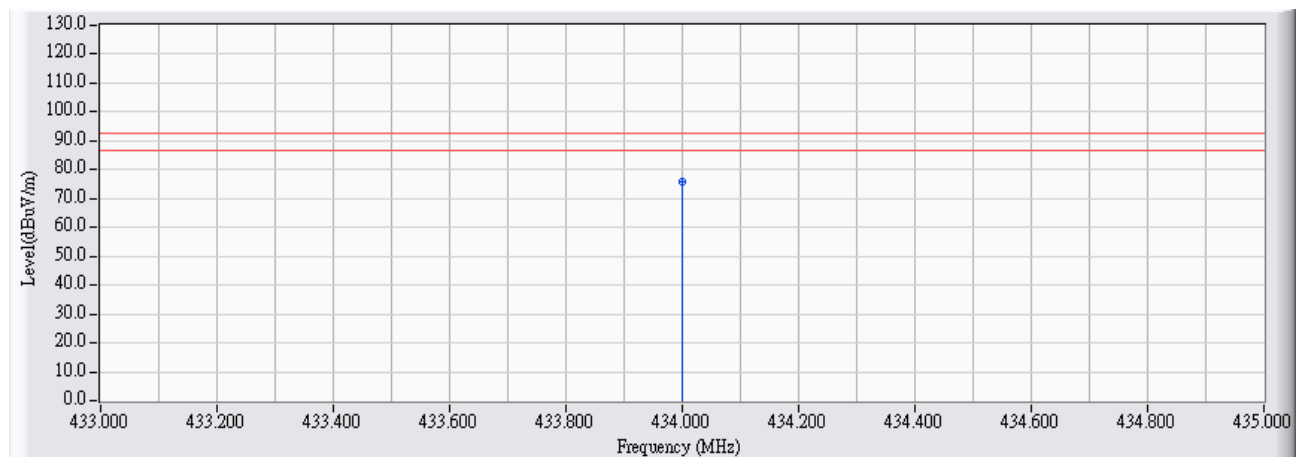
3.6. Uncertainty

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

3.7. Test Result

Site : CB4-H	Time : 2017/04/28
Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1 X axis

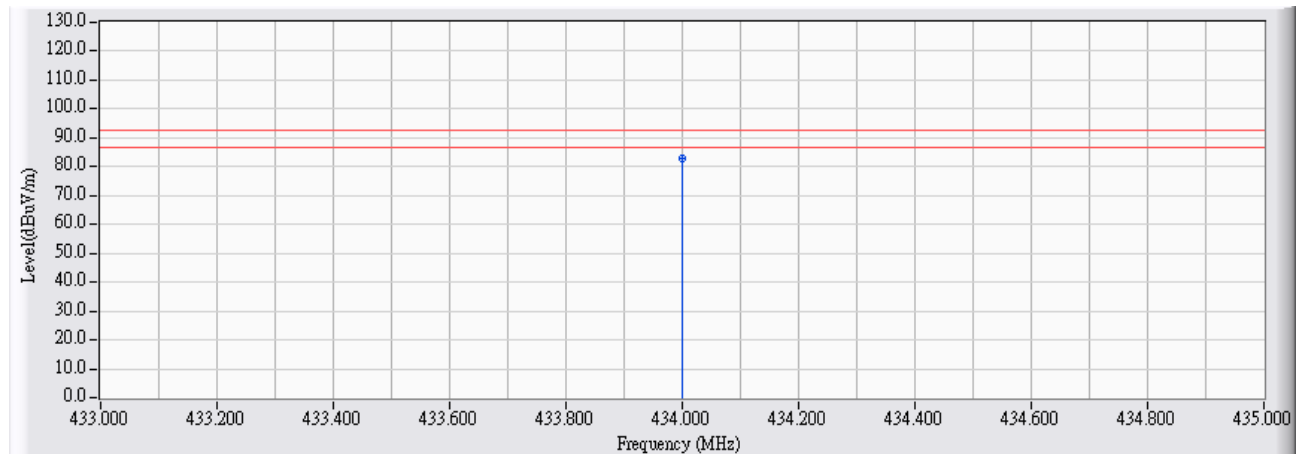


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	434.000	26.245	49.430	75.675	-17.195	92.870	PEAK

Note:

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

Site : CB4-H	Time : 2017/04/28
Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1 X axis

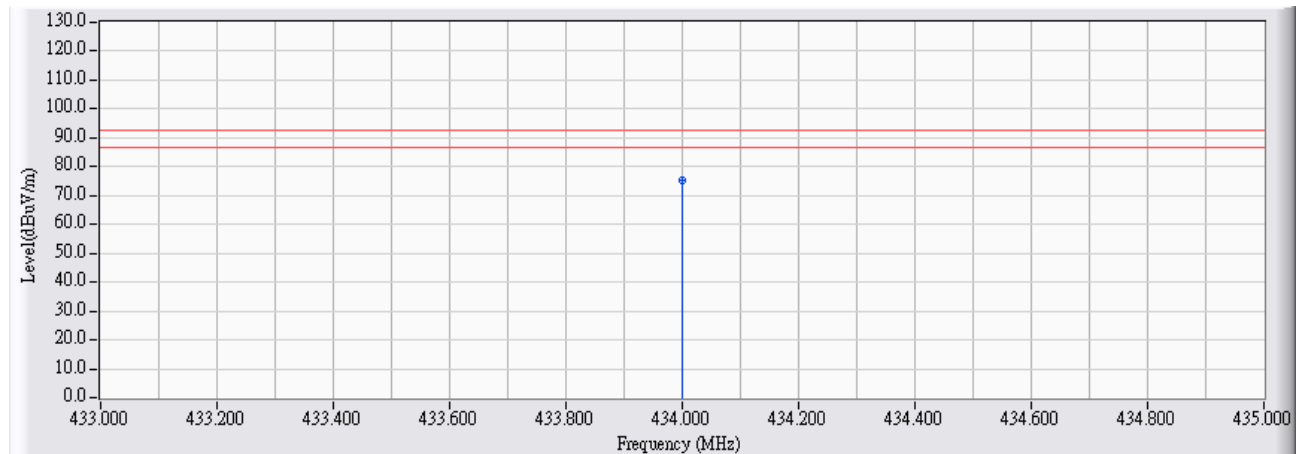


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	434.000	26.245	56.530	82.775	-10.095	92.870	PEAK

Note:

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

Site : CB4-H	Time : 2017/04/28
Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1 Y axis

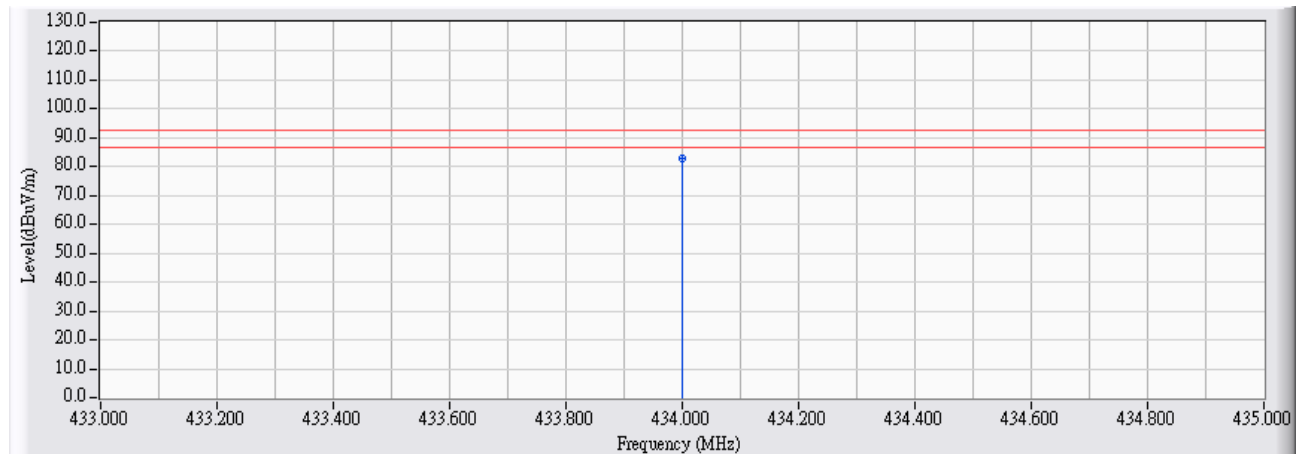


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	434.000	26.245	49.310	75.555	-17.315	92.870	PEAK

Note:

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

Site : CB4-H	Time : 2017/04/28
Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1 Y axis

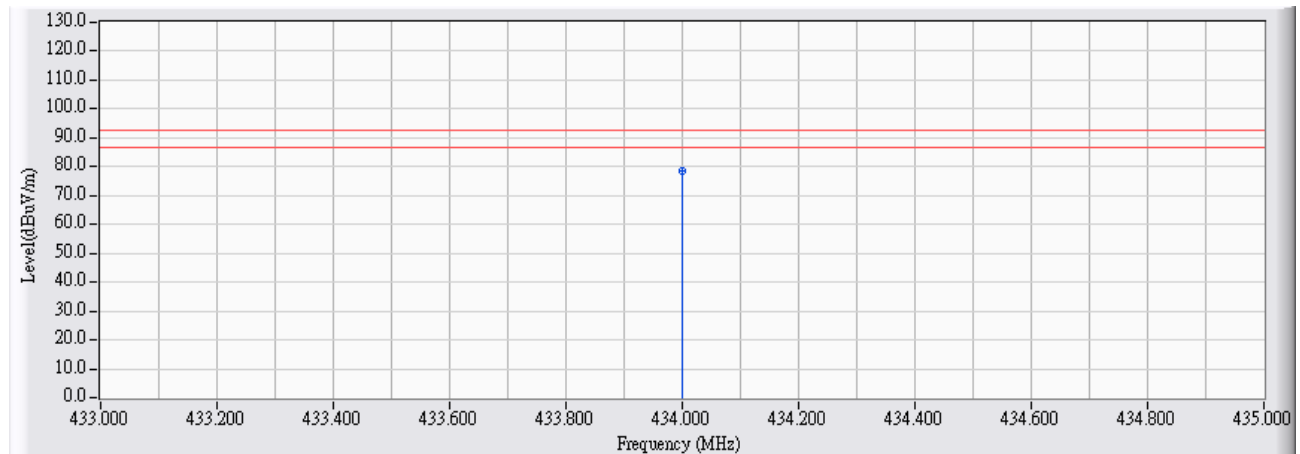


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	434.000	26.245	56.470	82.715	-10.155	92.870	PEAK

Note:

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

Site : CB4-H	Time : 2017/04/28
Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1 Z axis

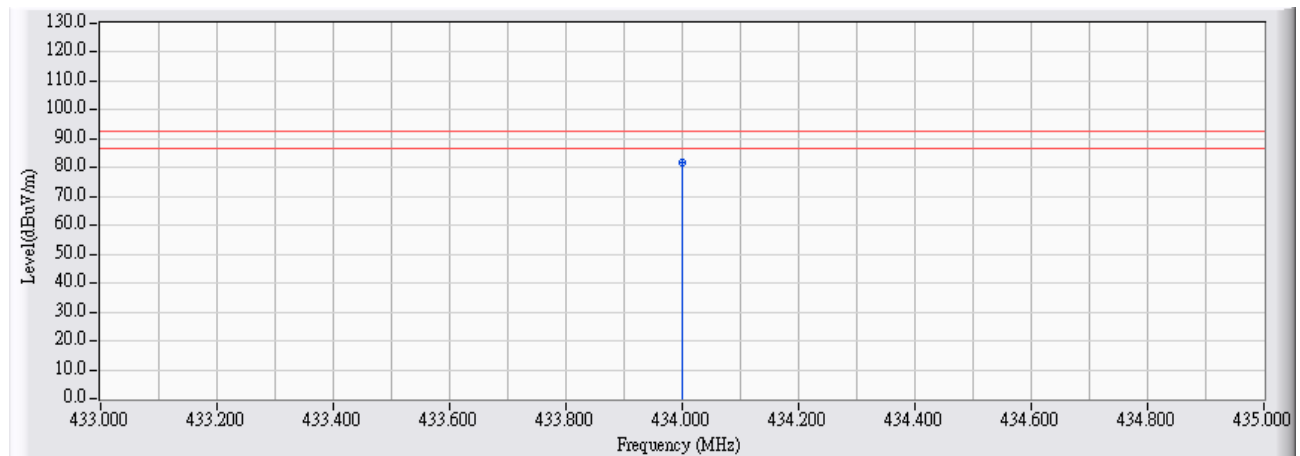


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	434.000	26.245	52.360	78.605	-14.265	92.870	PEAK

Note:

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

Site : CB4-H	Time : 2017/04/28
Limit : FCC_SpartC_15.231(e)_F_433.92MHz_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1Z axis



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	434.000	26.245	55.320	81.565	-11.305	92.870	PEAK

Note:

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

Product	Gateway		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit_Antenna 1		
Date of Test	2017/04/28	Test Site	CB4-H

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Peak Measurement Level (dBuV/m)	Average Measurement Level (dBuV/m)	Peak Limit (dBuV/m)
Horizontal					
434.000(X-axis)	26.245	49.430	75.675	56.083	92.87
434.0000(Y-axis)	26.245	49.310	75.555	55.963	92.87
434.000(Z-axis)	26.245	52.360	78.605	59.013	92.87
Vertical					
434.000(X-axis)	26.245	56.530	82.775	63.183	92.87
434.0000(Y-axis)	26.245	56.470	82.715	63.123	92.87
434.000(Z-axis)	26.245	55.320	81.565	61.973	92.87

Note1:

Peak Measurement Level = Reading Level +Correct factor

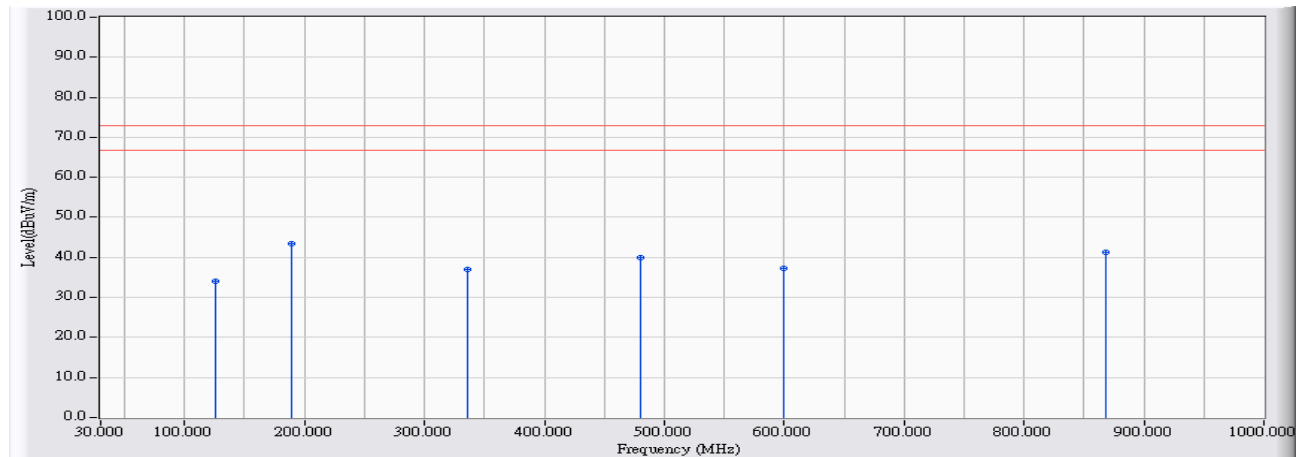
Average Measurement Level = Peak Measurement Level +20Log(Duty Cycle)

(Duty Cycle)=(Ton/(Ton+Toff))=4.9/46.75=0.1048

20Log(Duty Cycle)= -19.592

30MHz-1GHz Spurious :

Site : CB4-H	Time : 2017/04/28
Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1 434MHz

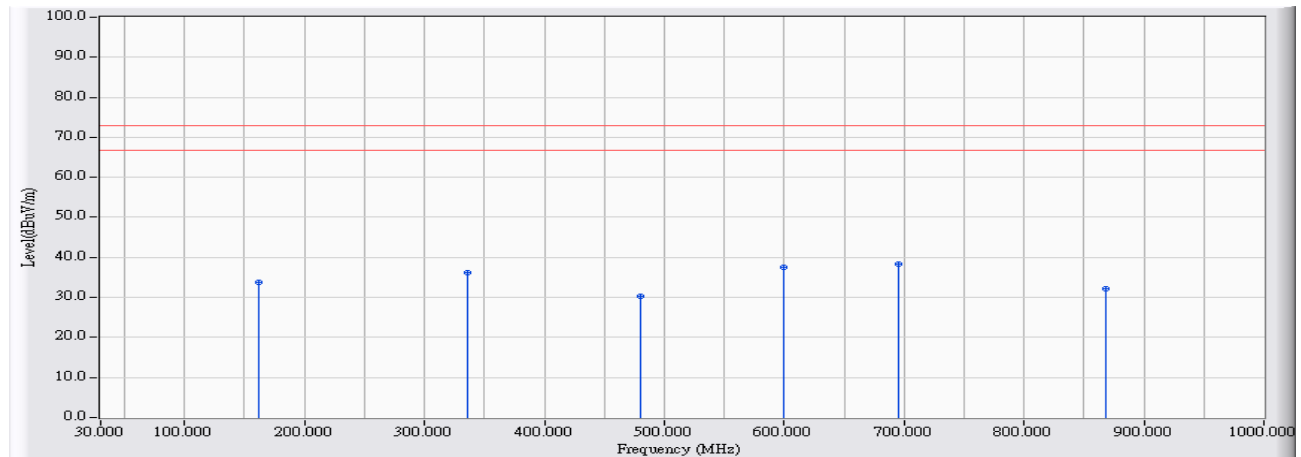


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		125.535	-21.204	55.191	33.987	-38.883	72.870	QUASIPeAK
2	*	189.161	-23.636	67.191	43.555	-29.315	72.870	QUASIPeAK
3		335.810	23.574	54.810	36.894	-35.976	72.870	QUASIPeAK
4		479.983	27.051	54.427	39.914	-32.956	72.870	QUASIPeAK
5		599.915	28.601	50.084	37.393	-35.477	72.870	QUASIPeAK
6		867.996	31.478	51.001	41.388	-31.482	72.870	QUASIPeAK

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 : 2017/04/28
Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1 434MHz

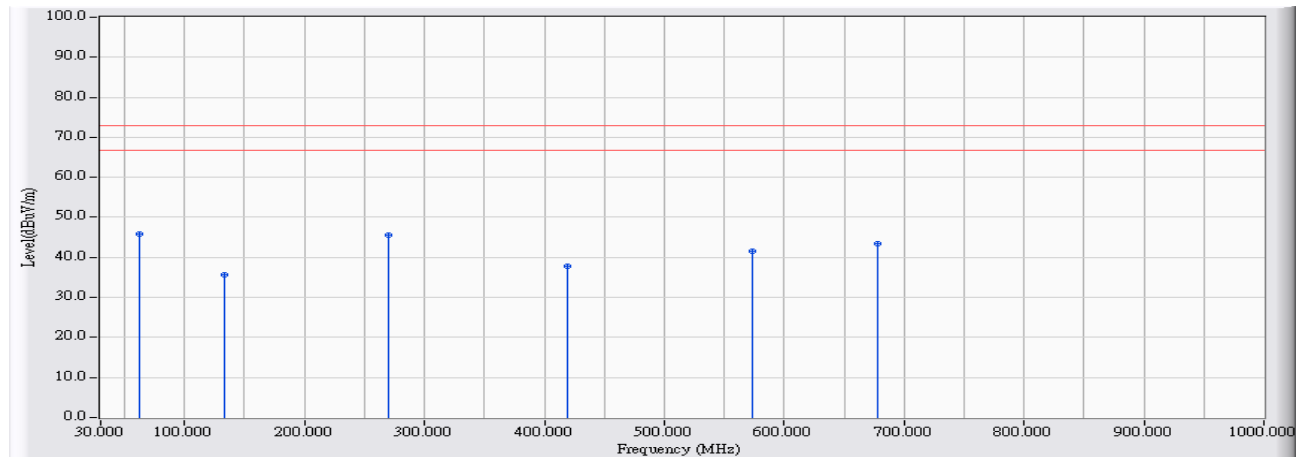


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		161.907	-22.999	56.737	33.737	-39.133	72.870	QUASIPeAK
2		335.907	-17.910	53.988	36.078	-36.792	72.870	QUASIPeAK
3		479.938	-14.513	44.913	30.400	-42.470	72.870	QUASIPeAK
4		599.818	-12.697	50.241	37.544	-35.326	72.870	QUASIPeAK
5	*	695.935	-11.884	50.091	38.206	-34.664	72.870	QUASIPeAK
6		868.093	-9.608	41.866	32.258	-40.612	72.870	QUASIPeAK

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 : CB2-H	Time : 2017/07/02
Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK	Margin : 6
Probe : CB2-H_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 5V
EUT : Gateway	Note : Mode 2: Transmit_Antenna 2 433.92MHz

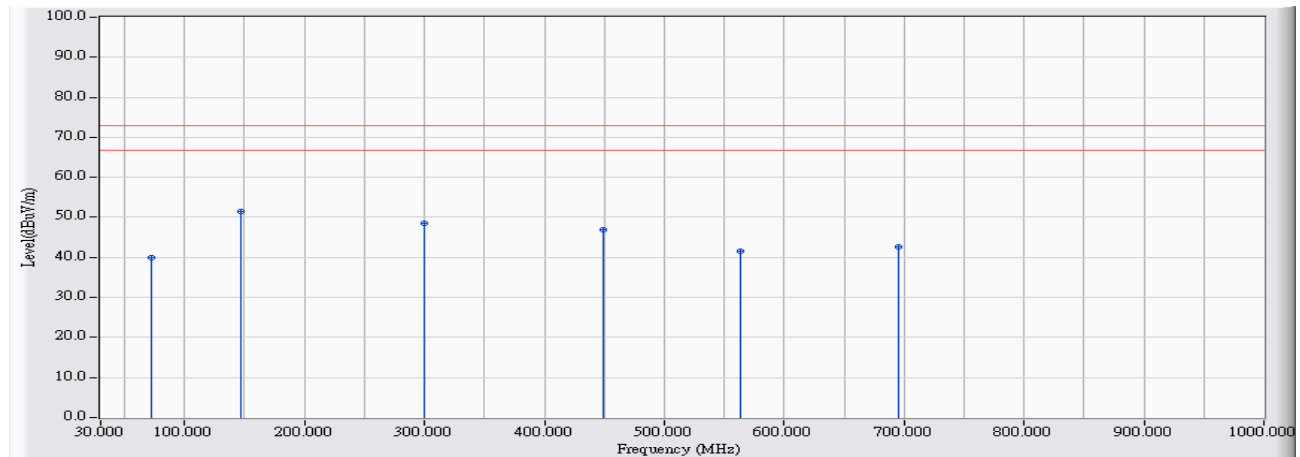


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	62.395	-25.415	71.309	45.894	-26.976	72.870	QUASIPeAK
2		132.810	-19.110	54.705	35.595	-37.275	72.870	QUASIPeAK
3		270.245	-18.464	64.144	45.681	-27.189	72.870	QUASIPeAK
4		419.028	-14.932	52.657	37.726	-35.144	72.870	QUASIPeAK
5		573.825	-12.701	54.249	41.549	-31.321	72.870	QUASIPeAK
6		677.798	-11.328	54.674	43.346	-29.524	72.870	QUASIPeAK

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 : CB2-H	Time : 2017/07/02
Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK	Margin : 6
Probe : CB2-H_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 5V
EUT : Gateway	Note : Mode 2: Transmit_Antenna 2 433.92MHz



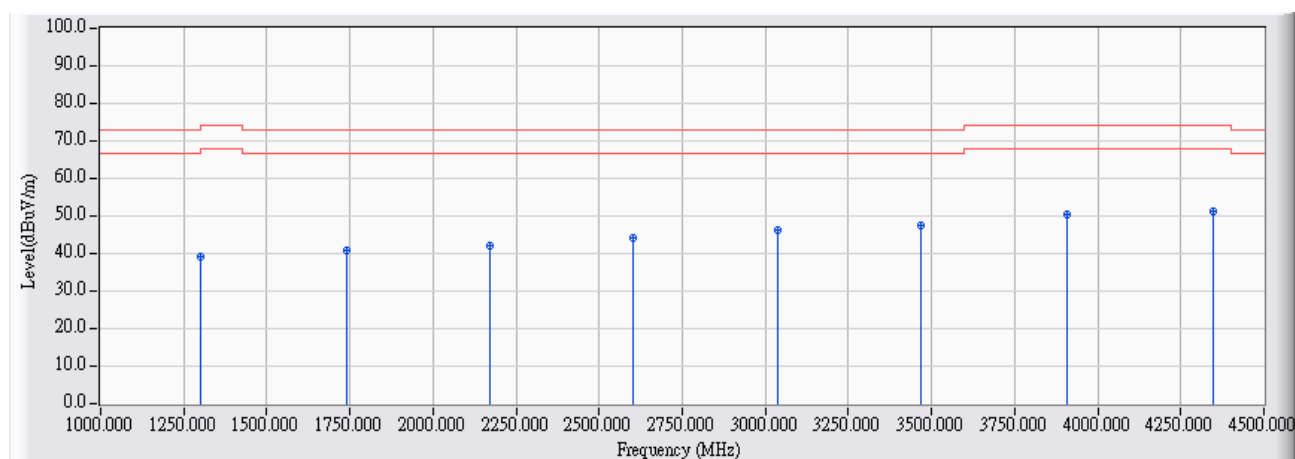
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		72.773	-24.984	64.933	39.950	-32.920	72.870	QUASIPeAK
2	*	146.776	-19.847	71.449	51.602	-21.268	72.870	QUASIPeAK
3		300.021	-18.028	66.677	48.649	-24.221	72.870	QUASIPeAK
4		448.513	-13.971	60.986	47.016	-25.854	72.870	QUASIPeAK
5		563.253	-12.615	54.286	41.671	-31.199	72.870	QUASIPeAK
6		694.772	-11.861	54.385	42.524	-30.346	72.870	QUASIPeAK

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.

Above 1GHz Spurious:

Site : CB4-H	Time : 2017/04/28
Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1 434MHz

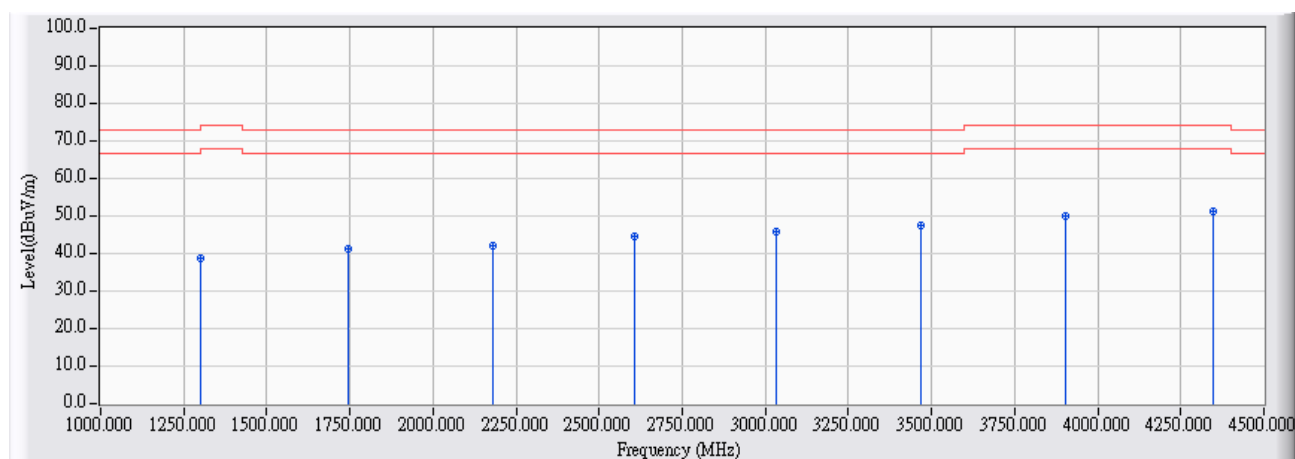


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1302.000	6.376	32.930	39.306	-34.694	74.000	PEAK
2		1740.000	7.679	33.150	40.829	-32.041	72.870	PEAK
3		2171.000	9.256	33.010	42.266	-30.604	72.870	PEAK
4		2600.000	10.833	33.530	44.363	-28.507	72.870	PEAK
5		3037.000	12.784	33.410	46.194	-26.676	72.870	PEAK
6		3470.000	13.287	34.160	47.447	-25.423	72.870	PEAK
7		3909.000	15.852	34.640	50.492	-23.508	74.000	PEAK
8	*	4346.000	17.306	33.900	51.206	-22.794	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 = 3 MHz, Sweep: Auto.
3. " * ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
 Duty Cycle(Only Ton)= Ton/ (Ton+off)=8.45/100=0.0845
 $20 \cdot \text{Log}(\text{Duty Cycle}) = -21.463$
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB4-H	Time : 2017/04/28
Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK	Margin : 6
Probe : CB4-H_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 5V
EUT : Gateway	Note : Mode 1: Transmit_Antenna 1 434MHz

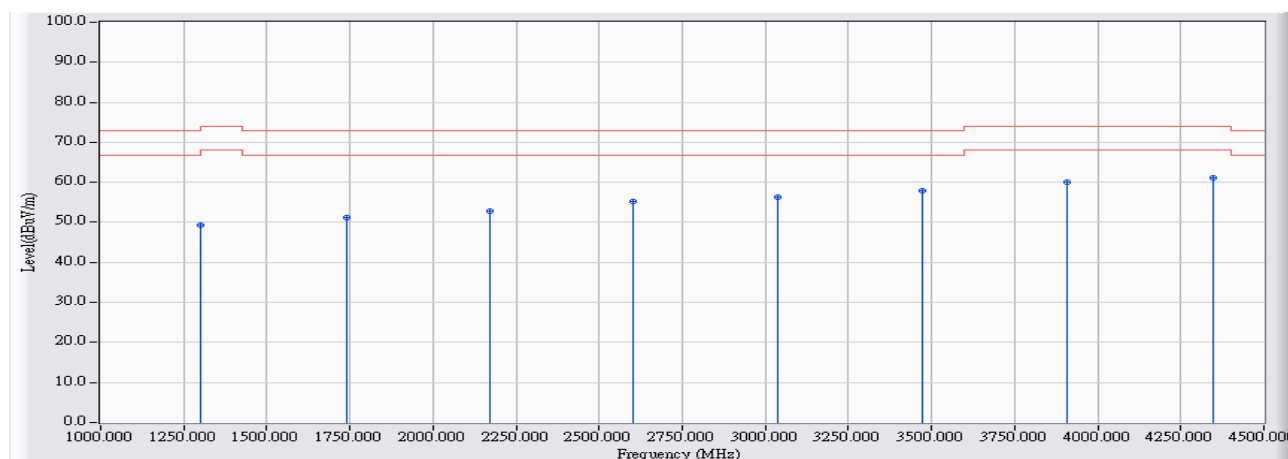


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1302.000	6.376	32.570	38.946	-35.054	74.000	PEAK
2		1744.000	7.693	33.730	41.424	-31.446	72.870	PEAK
3		2178.000	9.283	32.690	41.973	-30.897	72.870	PEAK
4		2608.000	10.856	33.550	44.406	-28.464	72.870	PEAK
5		3032.000	12.792	32.860	45.653	-27.217	72.870	PEAK
6		3467.000	13.290	34.010	47.301	-25.569	72.870	PEAK
7		3903.000	15.814	34.210	50.024	-23.976	74.000	PEAK
8	*	4347.000	17.309	34.110	51.419	-22.581	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 = 3 MHz, Sweep: Auto.
3. " * ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
Duty Cycle(Only Ton)= Ton/ (Ton+off)=8.45/100=0.0845
20*Log(Duty Cycle) = -21.463
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB2-H	Time : 2017/07/01
Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK	Margin : 6
Probe : CB2-H_FCC_EFS_B091_1-18GHz_3M_0117 - HORIZONTAL	Power : DC 5V
EUT : Gateway	Note : Mode 2: Transmit_Antenna 2 433.92MHz

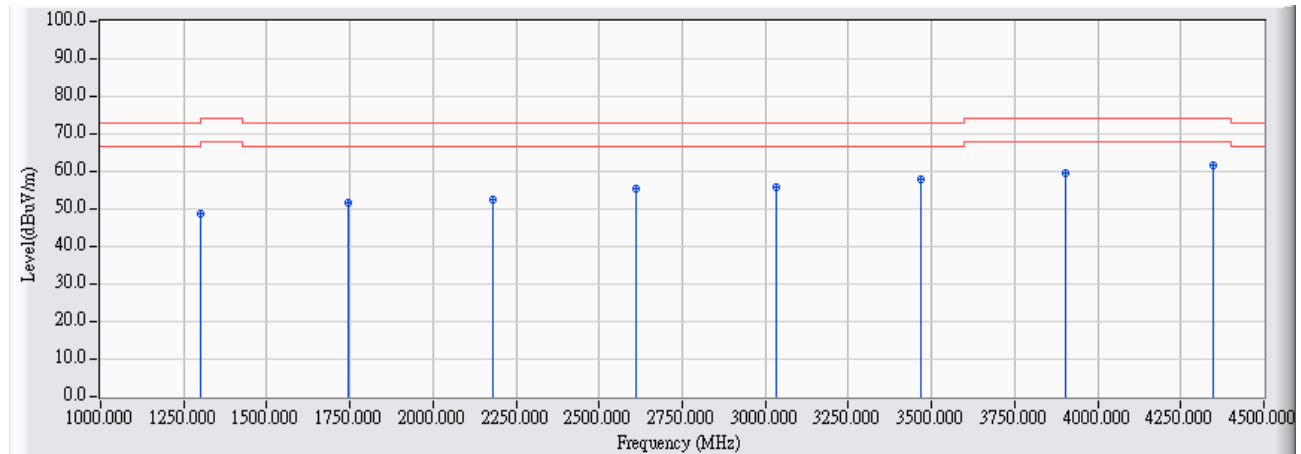


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1302.101	-13.628	62.930	49.302	-24.698	74.000	PEAK
2		1741.231	-11.988	63.150	51.162	-21.708	72.870	PEAK
3		2170.124	-10.263	63.010	52.748	-20.122	72.870	PEAK
4		2601.857	-8.305	63.530	55.224	-17.646	72.870	PEAK
5		3037.367	-7.067	63.410	56.342	-16.528	72.870	PEAK
6		3471.811	-6.272	64.160	57.888	-14.982	72.870	PEAK
7		3909.107	-4.603	64.640	60.037	-13.963	74.000	PEAK
8	*	4346.317	-2.640	63.900	61.259	-12.741	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 = 3 MHz, Sweep: Auto.
3. " * ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
Duty Cycle(Only Ton)= Ton/ (Ton+off)=8.45/100=0.0845
20*Log(Duty Cycle) = -21.463
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB2-H	Time : 2017/07/03
Limit : FCC_SpartC_15.231(e)_H_433.92MHz_03M_PK	Margin : 6
Probe : CB2-H_FCC_EFS_B091_1-18GHz_3M_0117 - VERTICAL	Power : DC 5V
EUT : Gateway	Note : Mode 2: Transmit_Antenna 2 433.92MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1302.224	-13.628	62.570	48.943	-25.057	74.000	PEAK
2		1744.524	-11.976	63.730	51.754	-21.116	72.870	PEAK
3		2178.414	-10.220	62.690	52.470	-20.400	72.870	PEAK
4		2610.314	-8.282	63.550	55.269	-17.601	72.870	PEAK
5		3032.114	-7.076	62.860	55.784	-17.086	72.870	PEAK
6		3467.152	-6.281	64.010	57.729	-15.141	72.870	PEAK
7		3903.142	-4.627	64.210	59.583	-14.417	74.000	PEAK
8	*	4347.146	-2.637	64.130	61.493	-12.507	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 = 3 MHz, Sweep: Auto.
3. " * ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
 Duty Cycle(Only Ton)= Ton/ (Ton+off)=8.45/100=0.0845
 20*Log(Duty Cycle) = -21.463
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

4. Occupied Bandwidth

4.1. Test Equipment

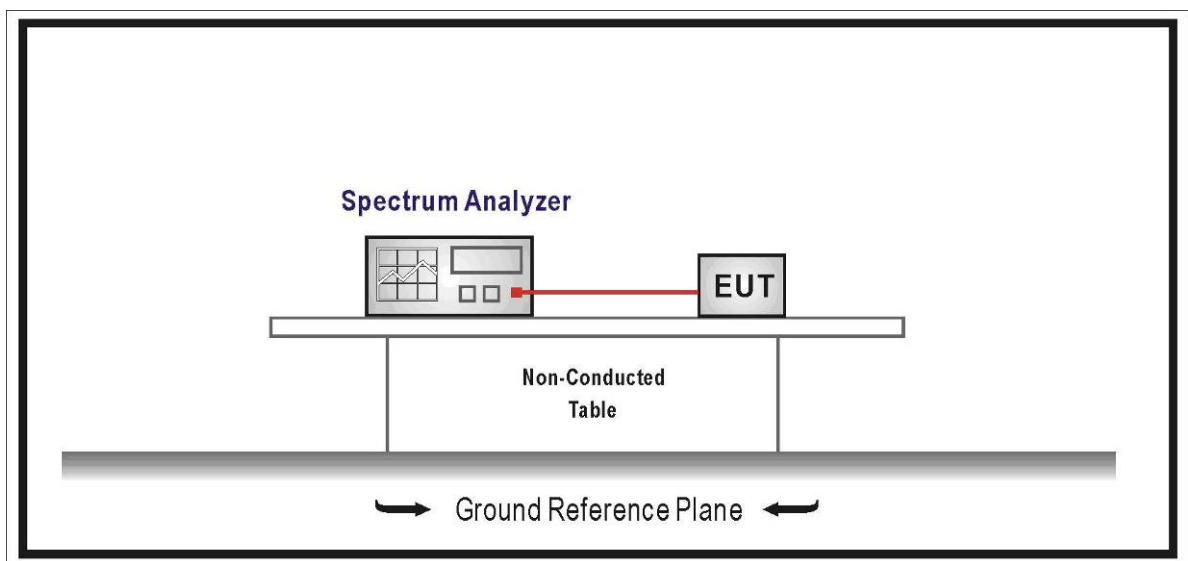
The following test equipments are used during the radiated emission tests:

Occupied Bandwidth / SR10-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2017/08/08

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

4.2. Test Setup



4.3. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

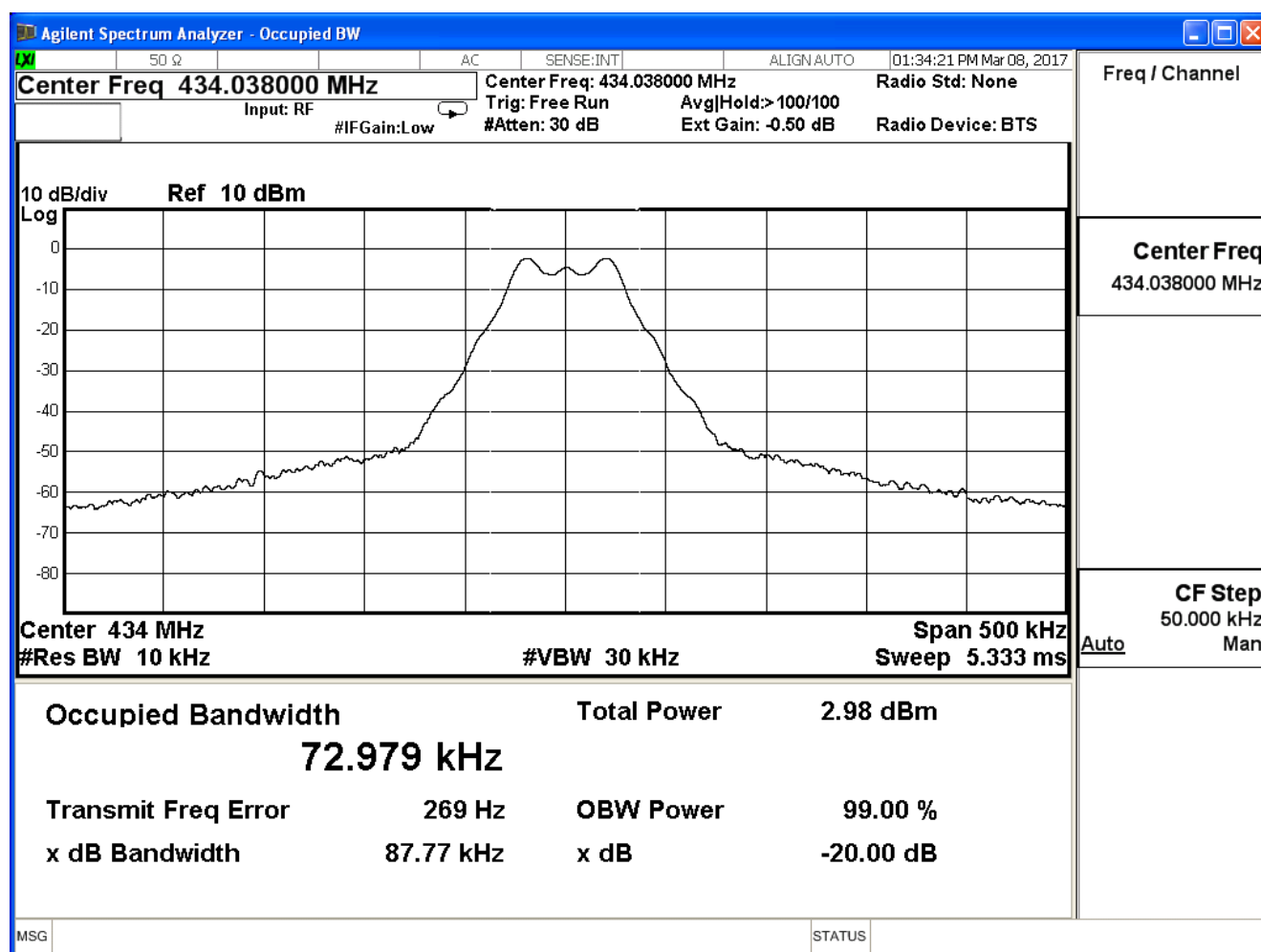
4.5. Uncertainty

± 150Hz

4.6. Test Result

Product	Gateway		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit_Antenna 1		
Date of Test	2017/03/08	Test Site	SR10-H

Center Frequency	434 MHz
Allowable Bandwidth (433.2 MHz: 0.25%)	1.085MHz
Bandwidth at 20dB down (Max)	87.77kHz
Result	PASS



5. Duty cycle

5.1. Test Equipment

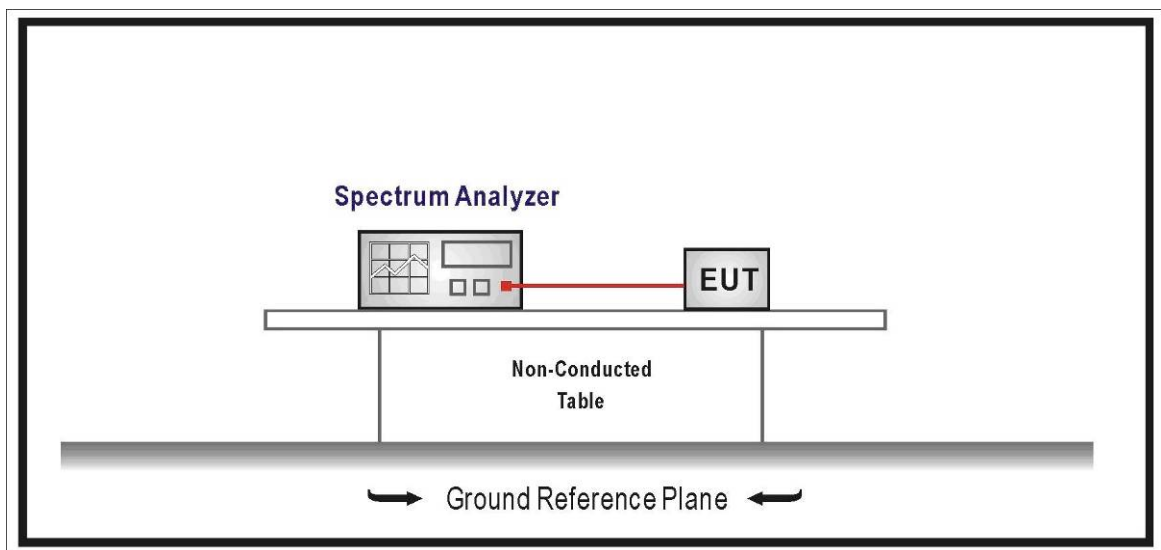
The following test equipments are used during the radiated emission tests:

Duty cycle / SR10-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2017/08/08

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

5.2. Test Setup



5.3. Limits

N/A

5.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

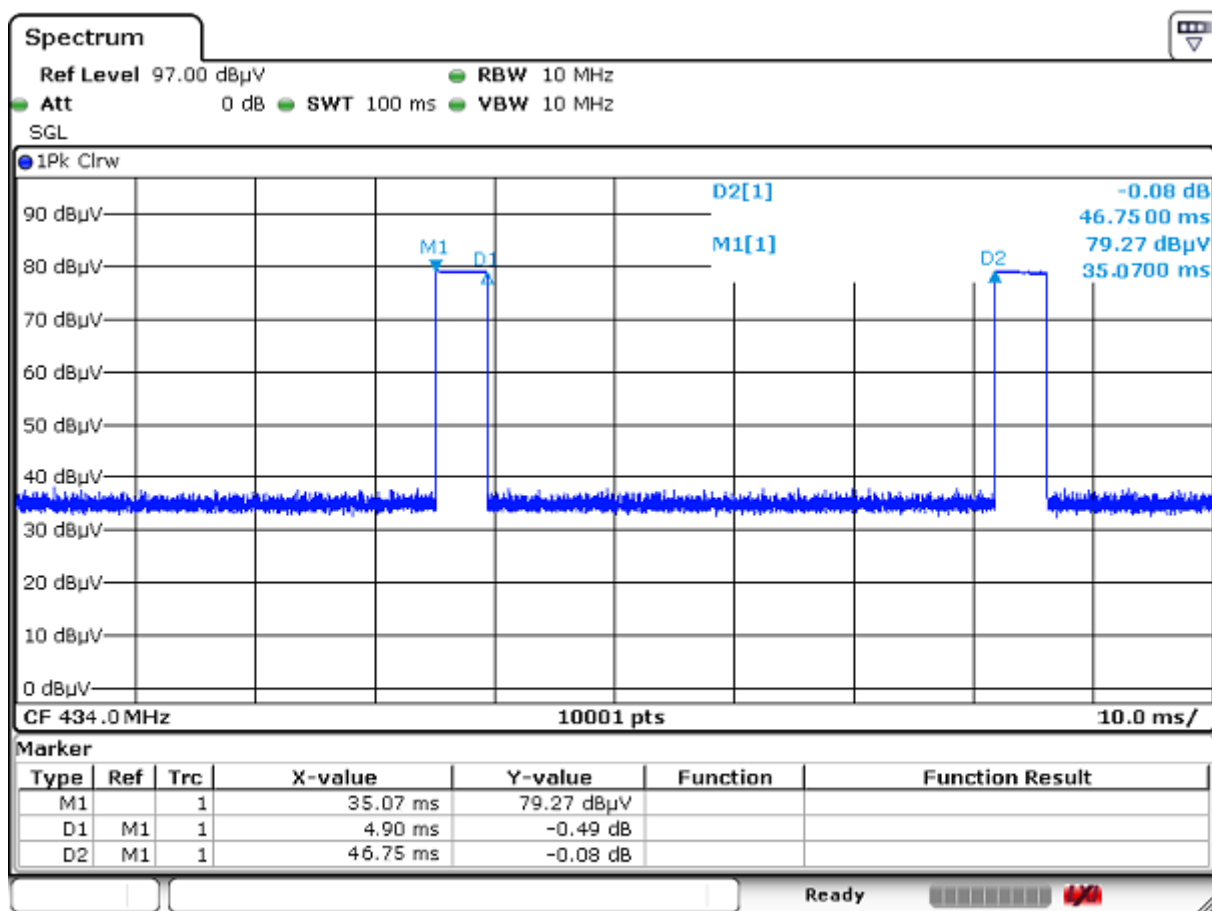
5.5. Uncertainty

± 25msec

5.6. Test Result

Product	Gateway		
Test Item	Duty Cycle		
Test Mode	Mode 1: Transmit_Antenna 1		
Date of Test	2017/03/20	Test Site	SR10-H

Frequency (MHz)	On Time(ms)	On+Off Time(ms)	Duty Cycle(%)	Duty Factor(dB)
434	4.900	46.750	10.48%	19.591711



Date: 20 MAR 2017 17:03:03

6. Transmitter time

6.1. Test Equipment

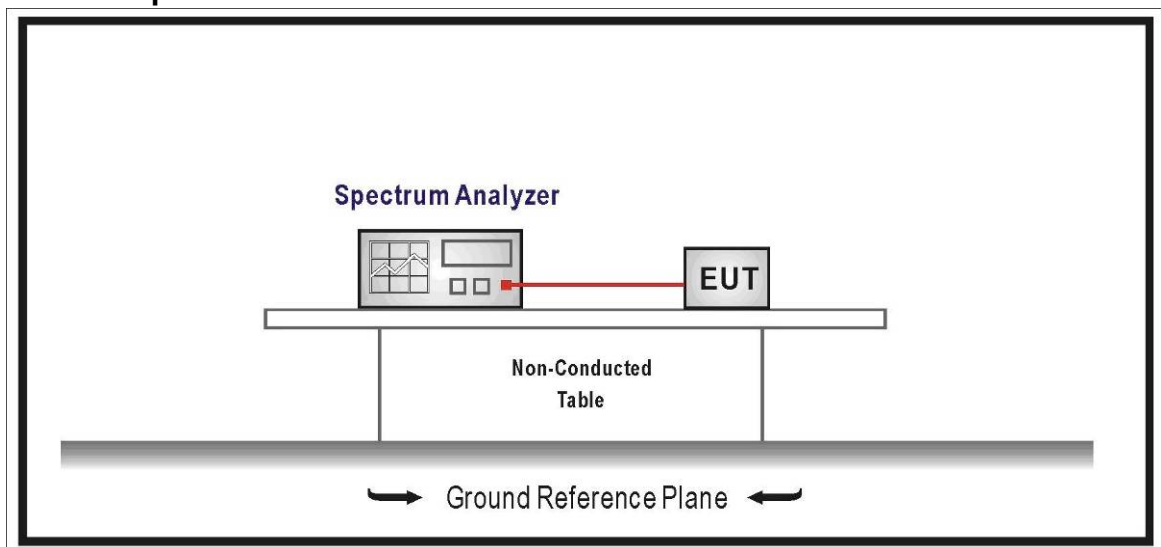
The following test equipments are used during the radiated emission tests:

Transmitter time / SR10-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2017/08/08

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

6.2. Test Setup



6.3. Limits

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. A transmitter activated automatically shall cease transmission within 5 seconds after activation.

6.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

6.5. Uncertainty

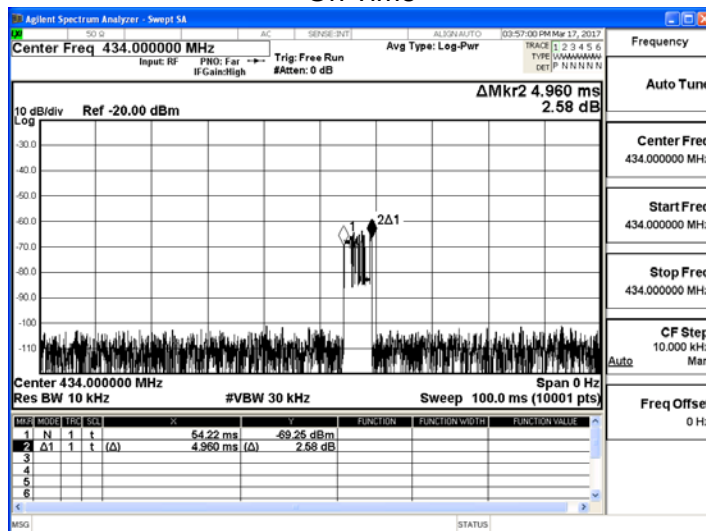
± 25msec

6.6. Test Result

Product	Gateway		
Test Item	Transmitter time		
Test Mode	Mode 1: Transmit_Antenna 1		
Date of Test	2017/03/20	Test Site	SR10-H

Frequency (MHz)	Transmitter time (ms.)	
	Measure value	Limit
434	4.96	≤ 1000
Frequency (MHz)	Silent period (sec.)	
	Measure value	Limit
434	88.74	≥ 10
Frequency (MHz)	Total duration of transmissions per hour (sec.)	
	Measure value	Limit
434	0.2	≤ 2

On Time



Sweep Time 10sec

