

FCC Test Report

Product Name	WiWi module
Model No.	WIWI2GOUKI
FCC ID.	2AU93WIWI2GOUKI

Applicant	National istitute of Information and Communications technology
Address	4-2-1 Nukuikitamachi, Koganei, Tokyo, 184-8795 JAPAN

Date of Receipt	Nov. 20, 2019
Issued Date	Dec. 25, 2019
Report No.	19C0396R-RFUSP66V00
Report Version	V1.0



The test results relate only to the samples tested.

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

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.

Test Report

Issued Date: Dec. 25, 2019

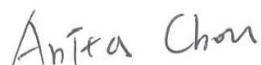
Report No. : 19C0396R-RFUSP66V00



Product Name	WiWi module
Applicant	National institute of Information and Communications technology
Address	4-2-1 Nukuikitamachi, Koganei, Tokyo, 184-8795 JAPAN
Manufacturer	National institute of Information and Communications technology
Model No.	WIWI2GOKUI
FCC ID.	2AU93WIWI2GOKUI
EUT Rated Voltage	DC 5V, 2.5A (by AC adaptor)
EUT Test Voltage	AC 120V/60Hz
Trade Name	NICT
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By

:



(Senior Engineering Adm. Specialist / Anita Chou)

Tested By

:



(Engineer / Sam Hsu)

Approved By

:



(Director / Vincent Lin)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION.....	4
1.1. EUT Description	4
1.2. Operation Description	5
1.3. Tested System Details	6
1.4. Configuration of Test System.....	6
1.5. EUT Exercise Software.....	6
1.6. Test Facility.....	7
1.7. List of Test Equipment	8
1.8. Uncertainty.....	10
2. Conducted Emission	11
2.1. Test Setup.....	11
2.2. Limits	11
2.3. Test Procedure.....	12
2.4. Uncertainty.....	12
2.5. Test Result of Conducted Emission	13
3. Radiated Emission.....	15
3.1. Test Setup.....	15
3.2. Limits	17
3.3. Test Procedure.....	18
3.4. Uncertainty.....	18
3.5. Test Result of Radiated Emission	19
4. Band Edge.....	33
4.1. Test Setup.....	33
4.2. Limit.....	34
4.3. Test Procedure.....	34
4.4. Uncertainty.....	34
4.5. Test Result of Band Edge	35
5. EMI Reduction Method During Compliance Testing	39

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	WiWi module
Trade Name	NICT
FCC ID.	2AU93WIWI2GOUKI
Model No.	WIWI2GOUKI
Frequency Range	922.5MHz-927.5MHz
Type of Modulation	GFSK
Number of Channels	26
Channel Control	Auto
Antenna Type	Dipole Antenna
AC Adaptor	MFR: Linkman, M/N: STD-05026U2 Input: AC 100-240V, 47-63Hz, 0.3A Output: DC 5V, 2.5A 12.5 Max Cable Out: Non-shielded, 1.5m, with one ferrite core bonded.
USB Cable	Non-shielded, 1m
Oscilloscope Cable	Non-shielded, 1m

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	922.5MHz	Channel 2:	922.7MHz	Channel 3:	922.9MHz
Channel 4:	923.1MHz	Channel 5:	923.3MHz	Channel 6:	923.5MHz
Channel 7:	923.7MHz	Channel 8:	923.9MHz	Channel 9:	924.1MHz
Channel 10:	924.3MHz	Channel 11:	924.5MHz	Channel 12:	924.7MHz
Channel 13:	924.9MHz	Channel 14:	925.1MHz	Channel 15:	925.3MHz
Channel 16:	925.5MHz	Channel 17:	925.7MHz	Channel 18:	925.9MHz
Channel 19:	926.1MHz	Channel 20:	926.3MHz	Channel 21:	926.5MHz
Channel 22:	926.7MHz	Channel 23:	926.9MHz	Channel 24:	927.1MHz
Channel 25:	927.3MHz	Channel 26:	927.5MHz		

Note:

1. The EUT is an WiWi module with a built-in 922.5MHz-927.5MHz GFSK transceiver.
2. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.249.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit
-----------	------------------

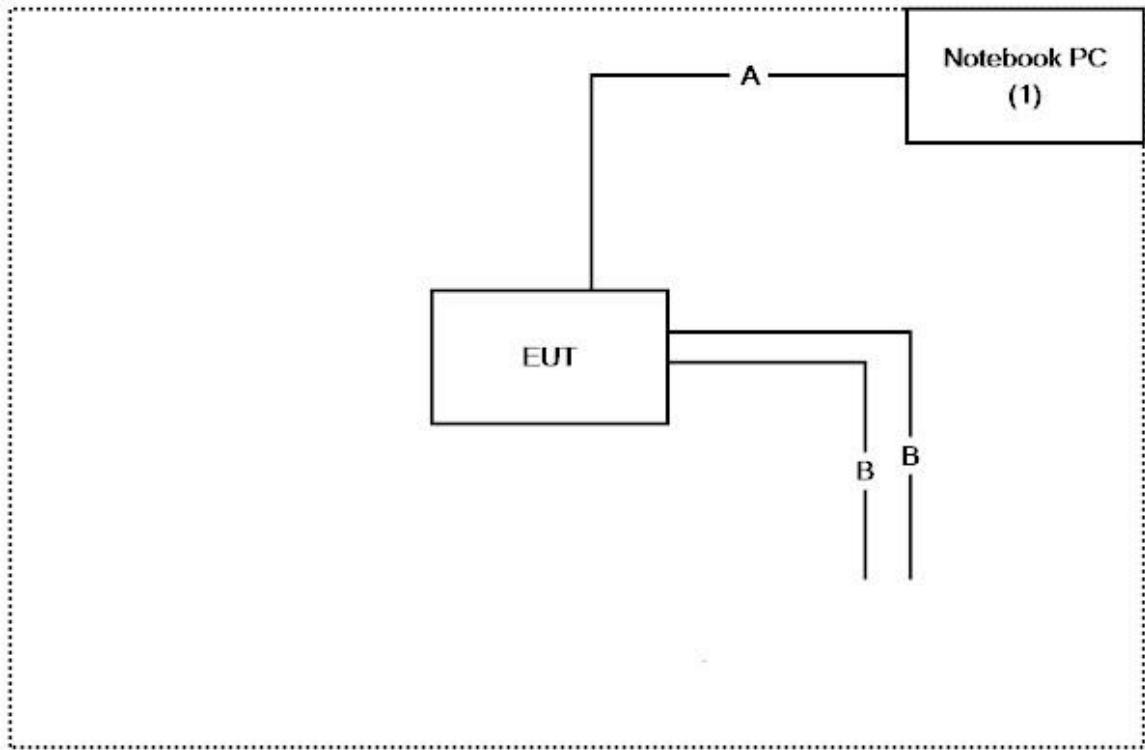
1.3. Tested System Details

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

Product	Manufacturer	Model No.	Serial No.	Power Cord
1. Notebook PC	DELL	Latitude 5491	1PL56S2	Non-Shielded, 0.8m

Signal Cable Type	Signal cable Description
A. USB Cable	Non-shielded, 1m
B Oscilloscope Cable	Non-shielded, 1m, two PCS.

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4.
- (2) Execute software “Putty v0.62.0.0” on the EUT.
- (3) Windows PC connect for USB Cable. Normally, Software driver install automatically.
- (4) Starts the continuous transmit.
- (5) Verify that the EUT works correctly.

1.6. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	10~40 °C	22.1 °C
	Humidity (%RH)	10~90 %	50 %
Radiated Emission	Temperature (°C)	10~40 °C	20 °C
	Humidity (%RH)	10~90 %	65.3 %

USA : FCC Registration Number: TW3023

Canada : IC Registration Number: 4075A

Site Description: Accredited by TAF
Accredited Number: 3023

Test Laboratory: DEKRA Testing and Certification Co., Ltd

Address: No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451,
Taiwan, R.O.C.

Phone number: 886-2-8601-3788

Fax number: 886-2-8601-3789

Email address: info.tw@dekra.com

Website: <http://www.dekra.com.tw>

1.7. List of Test Equipment

Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2019/02/26	2020/02/25
X	Spectrum Analyzer	Agilent	N9010A	MY53470892	2019/09/25	2020/09/24
	Peak Power Analyzer	Keysight	8990B	MY51000410	2019/07/30	2020/07/29
	Wideband Power Sensor	Keysight	N1923A	MY56080003	2019/07/30	2020/07/29
	Wideband Power Sensor	Keysight	N1923A	MY56080004	2019/07/30	2020/07/29
X	EMI Test Receiver	R&S	ESCS 30	100369	2019/11/19	2020/11/18
X	LISN	R&S	ENV216	101105	2019/04/10	2020/04/09
X	LISN	R&S	ESH3-Z5	836679/014	2019/04/10	2020/04/09
X	Coaxial Cable	DEKRA	RG 400	LC018-RG	2019/06/20	2020/06/19

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version :DEKRA Conduction Test SystemV9.0.5.

For Radiated measurements /Site3/CB8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Spectrum Analyzer	R&S	FSP40	100170	2019/03/11	2020/03/10
X	Loop Antenna	Teseq	HLA6121	37133	2019/10/15	2021/10/14
X	Bilog Antenna	Schaffner Chase	CBL6112B	2794	2019/06/23	2020/06/22
X	Coaxial Cable	DEKRA	L1907-001C	280280.F141.1 000D	2019/07/10	2020/07/09
X	Amplifier	EMCI	EMC001330	980254	2019/08/22	2020/08/21
	Horn Antenna	ETS-LINDGREN	3117	00228113	2019/05/02	2020/05/01
	Coaxial Cable	DEKRA	L1907-002C	280280.F141.1 000D	2019/07/10	2020/07/09
	Amplifier	EMCI	EMC05820SE	980362	2019/06/26	2020/06/25
	Amplifier	EMCI	EMC051845SE	SN980632	2019/08/08	2020/08/07
	Horn Antenna	Com-Power	AH-1840	101101	2019/10/29	2020/10/30
	Amplifier + Cable	EMCI	EMC184045SE	980369	2019/04/16	2020/04/15
	Bilog Antenna	Schaffner Chase	CBL6112B	2916	2019/06/23	2020/06/22
	Coaxial Cable	DEKRA	L1907-003C	00100A1B3A 120M	2019/07/10	2020/07/09
	Amplifier	EMCI	EMC001330	980255	2019/06/28	2020/06/27
	Filter	MICRO-TRONICS	BRM50702	G270	2019/08/08	2020/08/07
	Filter	MICRO-TRONICS	BRM50716	G196	2019/08/08	2020/08/07

Note:

1. Loop Antenna is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version :QuieTek EMI System V2.1.134.

1.8. Uncertainty

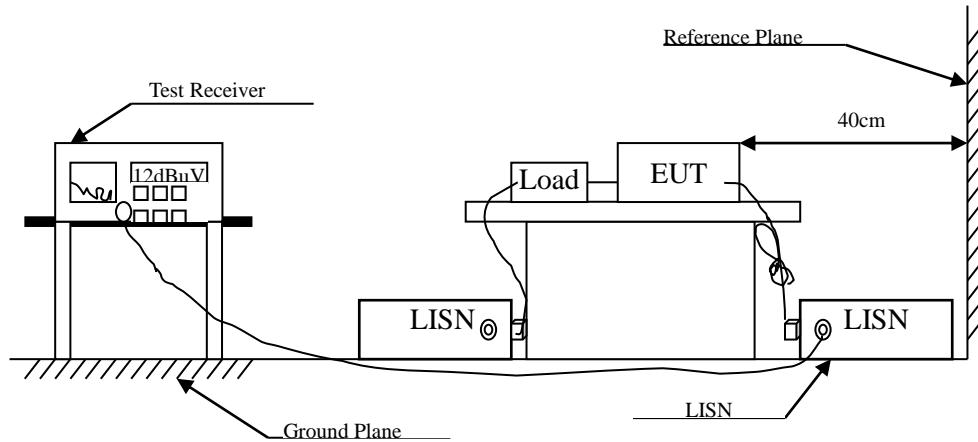
Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

2. Conducted Emission

2.1. Test Setup



2.2. Limits

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

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

2.3. Test Procedure

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

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

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

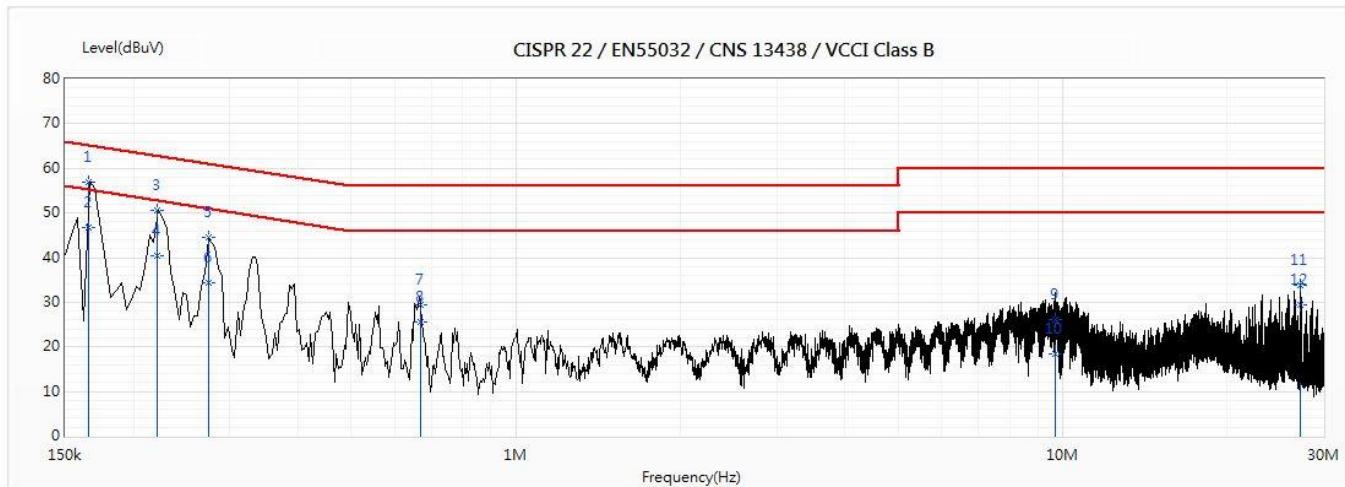
2.4. Uncertainty

± 2.26 dB

2.5. Test Result of Conducted Emission

Product : WiWi module
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Date : 2019/12/25
 Test Mode : Mode 1: Transmit (922.7MHz)

Line 1



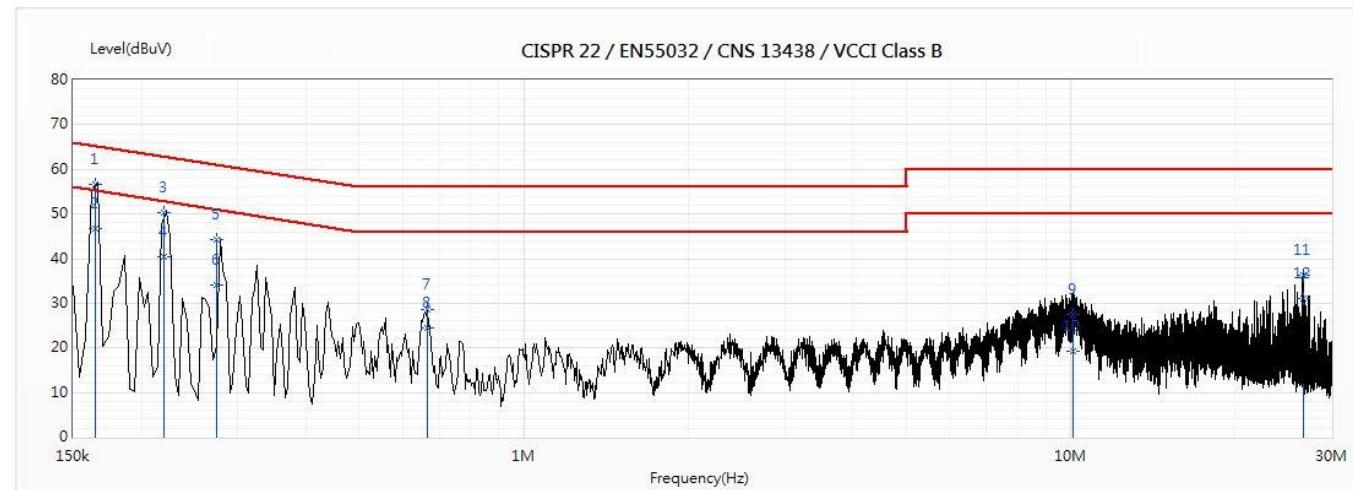
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
*1	0.165	56.98	65.20	-8.22	47.29	9.69	QP
2	0.165	46.78	55.20	-8.42	37.09	9.69	AV
3	0.22	50.49	62.81	-12.32	40.79	9.69	QP
4	0.22	40.35	52.81	-12.46	30.66	9.69	AV
5	0.275	44.55	60.98	-16.43	34.86	9.69	QP
6	0.275	34.24	50.98	-16.74	24.55	9.69	AV
7	0.668	29.38	56.00	-26.62	19.67	9.71	QP
8	0.668	25.58	46.00	-20.42	15.87	9.71	AV
9	9.694	26.04	60.00	-33.96	16.03	10.01	QP
10	9.694	18.29	50.00	-31.71	8.28	10.01	AV
11	27.159	33.88	60.00	-26.12	23.65	10.23	QP
12	27.159	29.37	50.00	-20.63	19.14	10.23	AV

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

Product : WiWi module
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Date : 2019/12/25
 Test Mode : Mode 1: Transmit (922.7MHz)

Line 2



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
*1	0.165	56.68	65.22	-8.54	46.95	9.73	QP
2	0.165	46.60	55.22	-8.62	36.87	9.73	AV
3	0.22	50.20	62.83	-12.63	40.48	9.72	QP
4	0.22	40.34	52.83	-12.48	30.62	9.72	AV
5	0.274	44.33	60.99	-16.66	34.61	9.72	QP
6	0.274	34.18	50.99	-16.82	24.45	9.72	AV
7	0.667	28.50	56.00	-27.50	18.75	9.74	QP
8	0.667	24.59	46.00	-21.41	14.85	9.74	AV
9	10.092	27.48	60.00	-32.52	17.39	10.09	QP
10	10.092	19.32	50.00	-30.68	9.22	10.09	AV
11	26.609	36.25	60.00	-23.75	25.79	10.47	QP
12	26.609	30.94	50.00	-19.06	20.47	10.47	AV

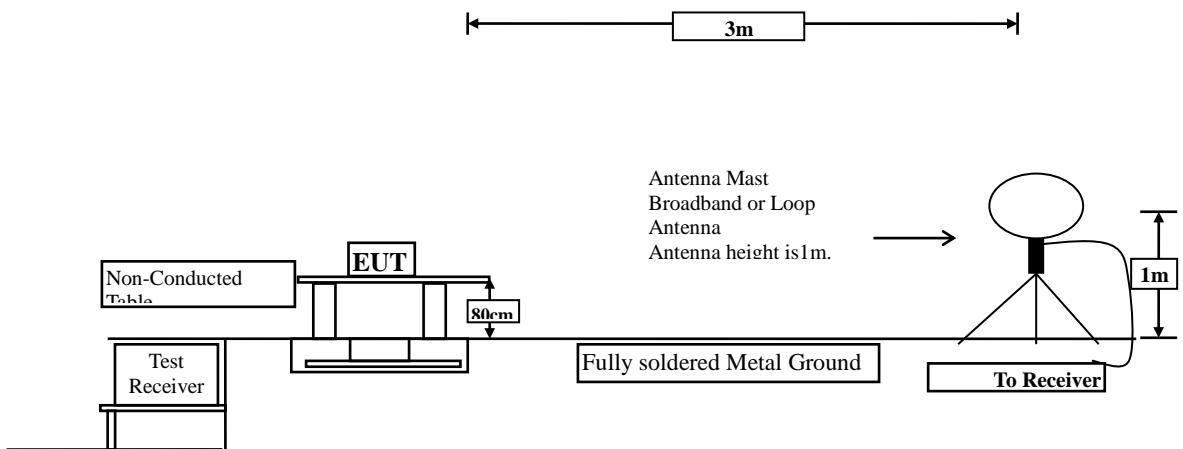
Note:

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

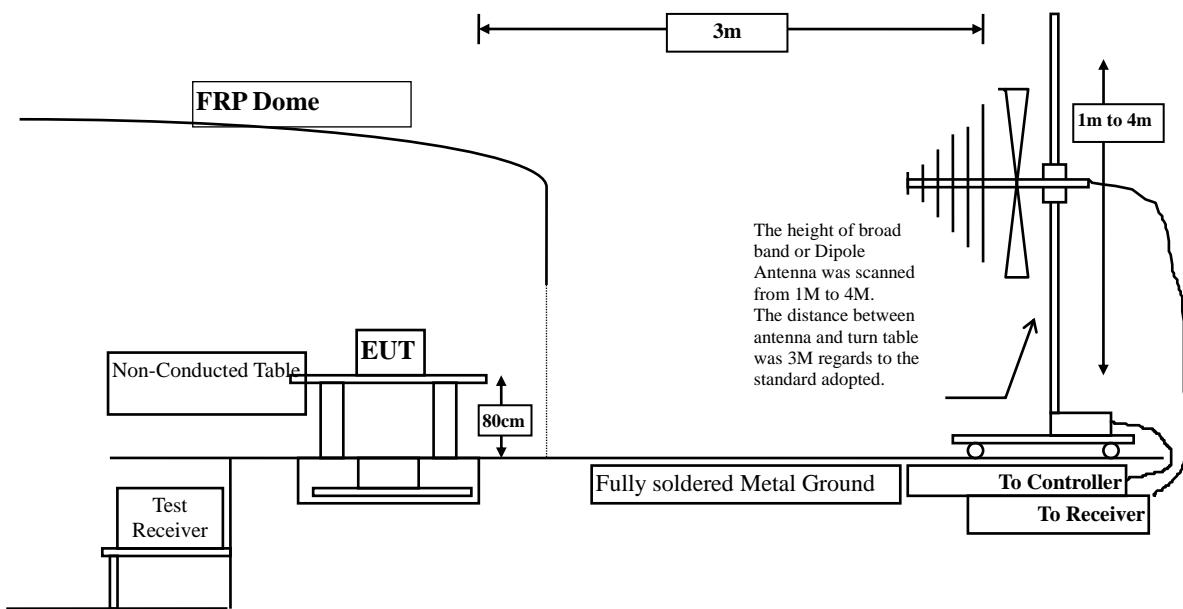
3. Radiated Emission

3.1. Test Setup

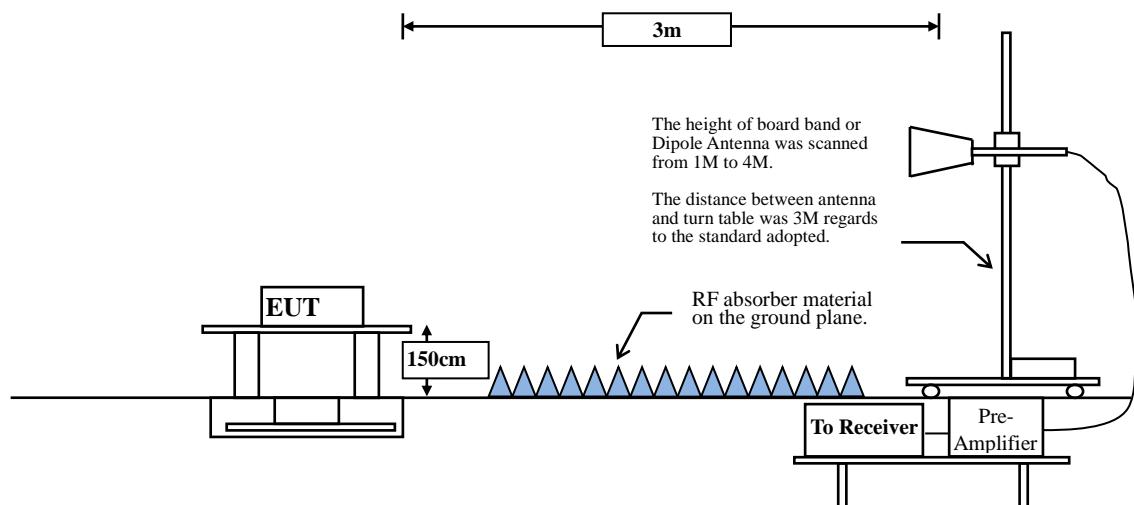
Under 30MHz



Below 1GHz



Above 1GHz



3.2. Limits

➤ Fundamental and Harmonics Emission Limits

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

Remarks : 1. RF Voltage (dBuV/m) = $20 \log_{10}$ RF Voltage (uV/m)

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

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks : 1. RF Voltage (dBuV/m) = $20 \log_{10}$ RF Voltage (uV/m)

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.

3.3. Test Procedure

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

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

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

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

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

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

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

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

3.4. Uncertainty

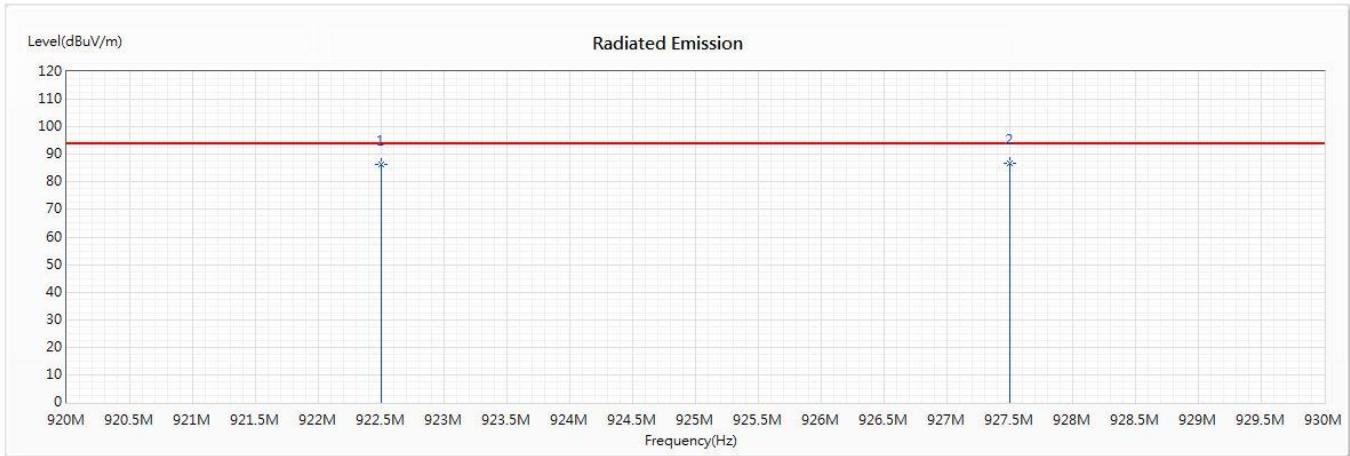
± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

3.5. Test Result of Radiated Emission

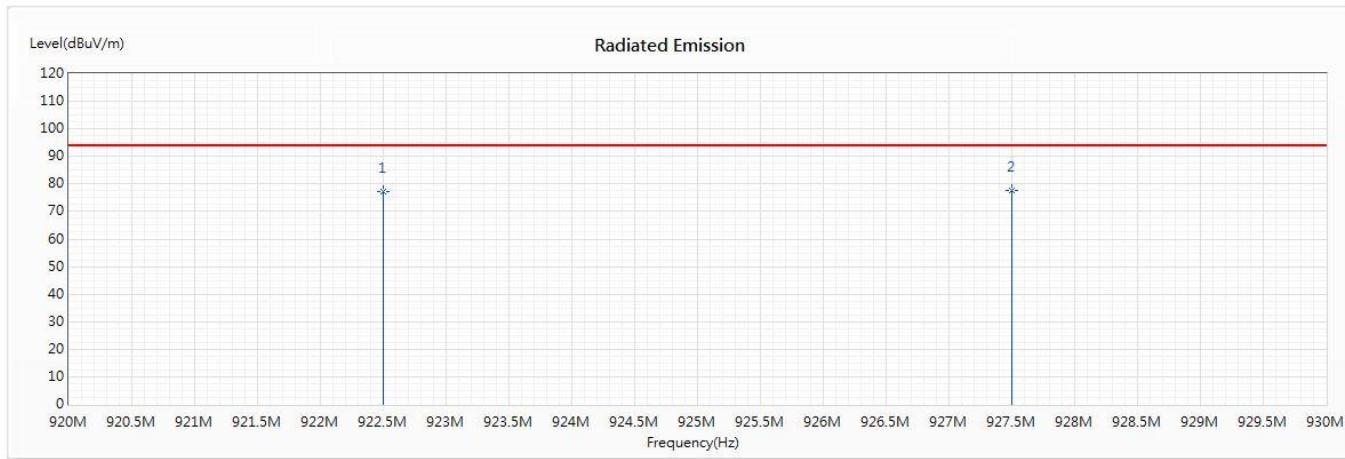
Product : WiWi module
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Date : 2019/12/05
 Test Mode : Mode 1: Transmit (X-asix)

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	922.5	86.38	94.00	-7.62	96.50	-10.12	QP
* 2	927.5	86.86	94.00	-7.14	96.60	-9.74	QP

Vertical



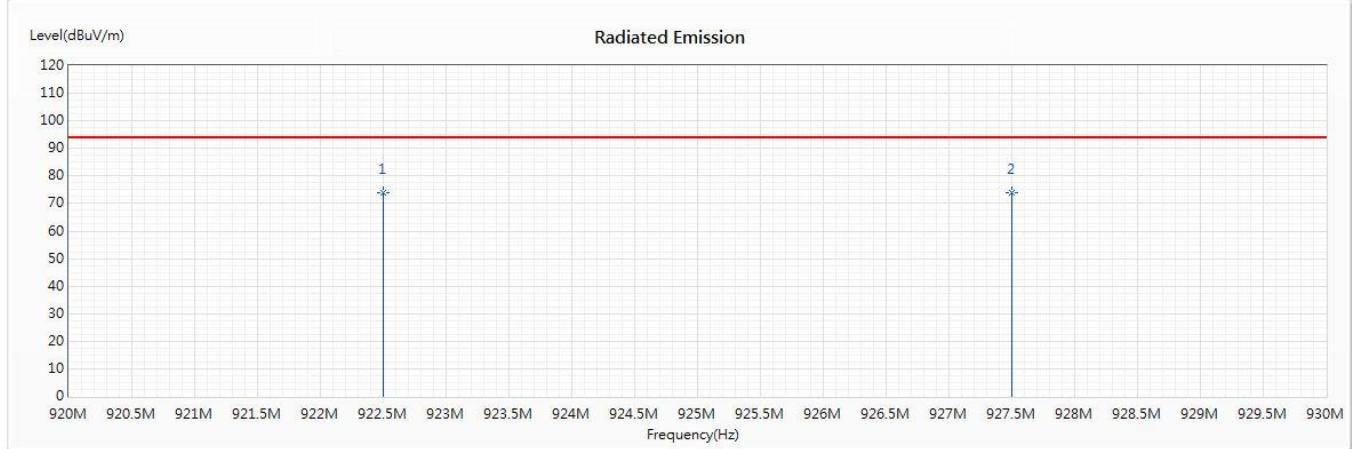
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	922.5	77.08	94.00	-16.92	87.20	-10.12	QP
* 2	927.5	77.76	94.00	-16.24	87.50	-9.74	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

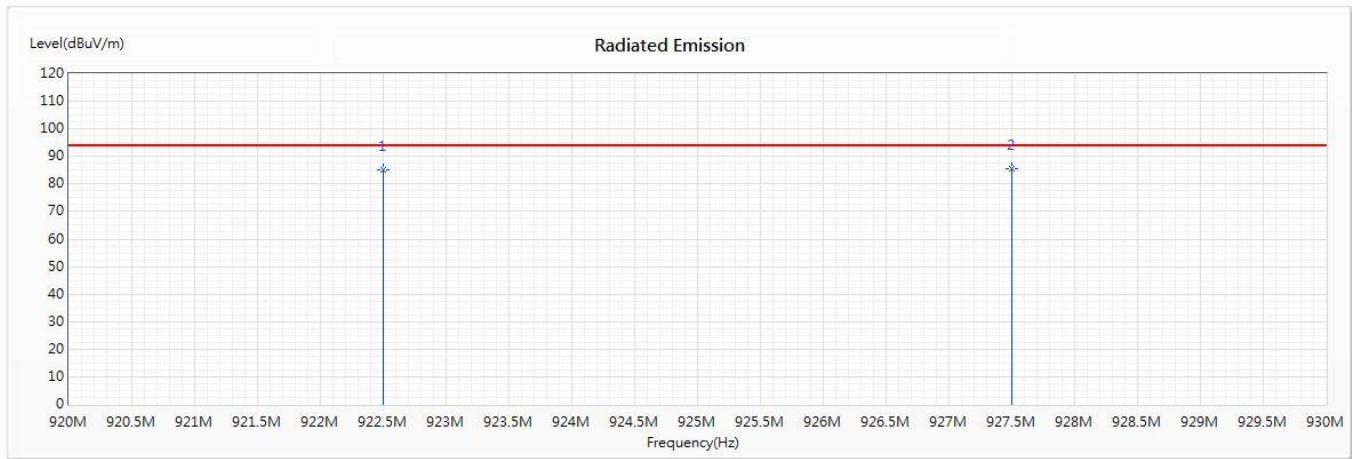
Product : WiWi module
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Date : 2019/12/05
 Test Mode : Mode 1: Transmit (Y-asix)

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	922.5	73.78	94.00	-20.22	83.90	-10.12	QP
* 2	927.5	73.86	94.00	-20.14	83.60	-9.74	QP

Vertical



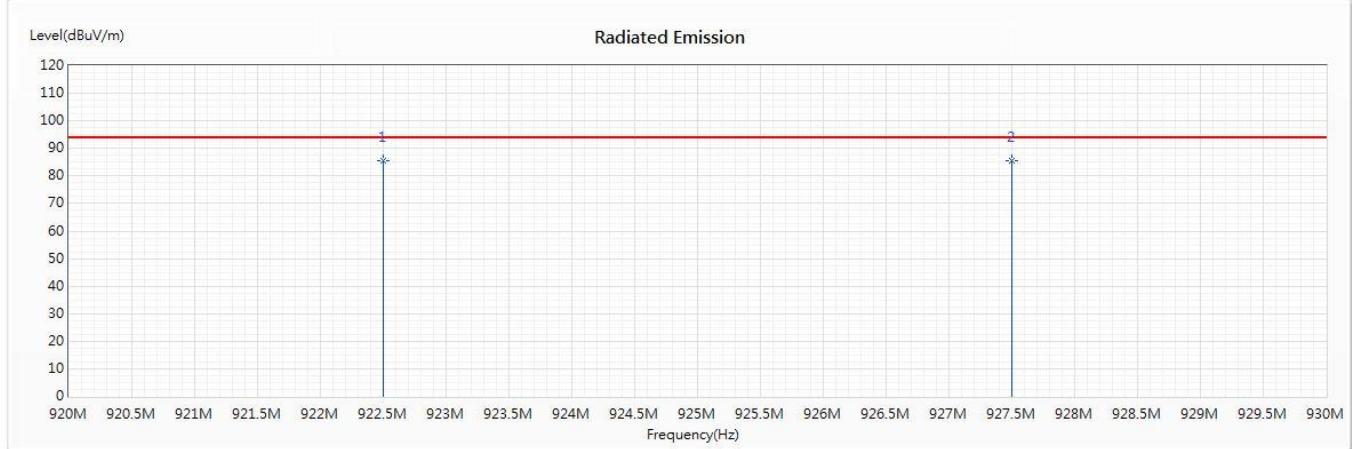
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	922.5	85.28	94.00	-8.72	95.40	-10.12	QP
* 2	927.5	85.36	94.00	-8.64	95.10	-9.74	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

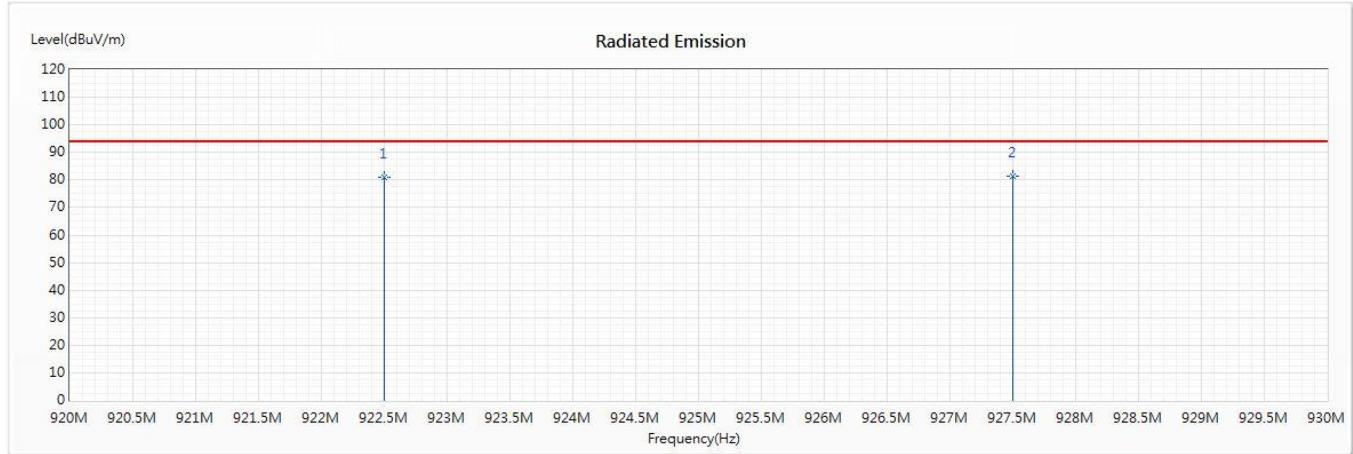
Product : WiWi module
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Date : 2019/12/05
 Test Mode : Mode 1: Transmit (Z-asix)

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	922.5	85.68	94.00	-8.32	95.80	-10.12	QP
2	927.5	85.46	94.00	-8.54	95.20	-9.74	QP

Vertical



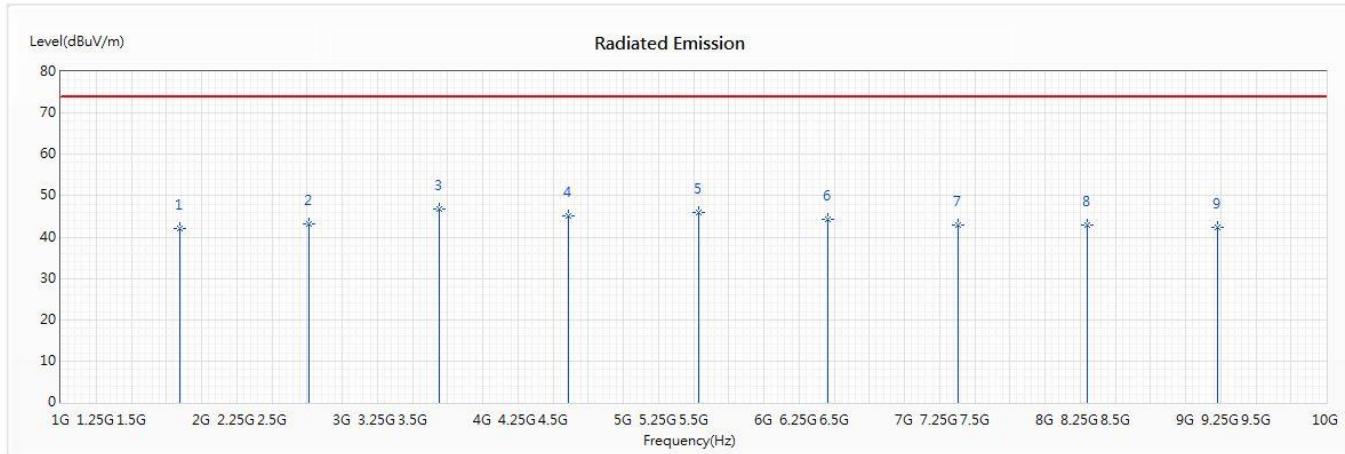
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	922.5	80.78	94.00	-13.22	90.90	-10.12	QP
* 2	927.5	81.36	94.00	-12.64	91.10	-9.74	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna Factor + Cable Loss – PreAMP.

Product : WiWi module
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (922.5MHz)

Horizontal (Peak Detector)



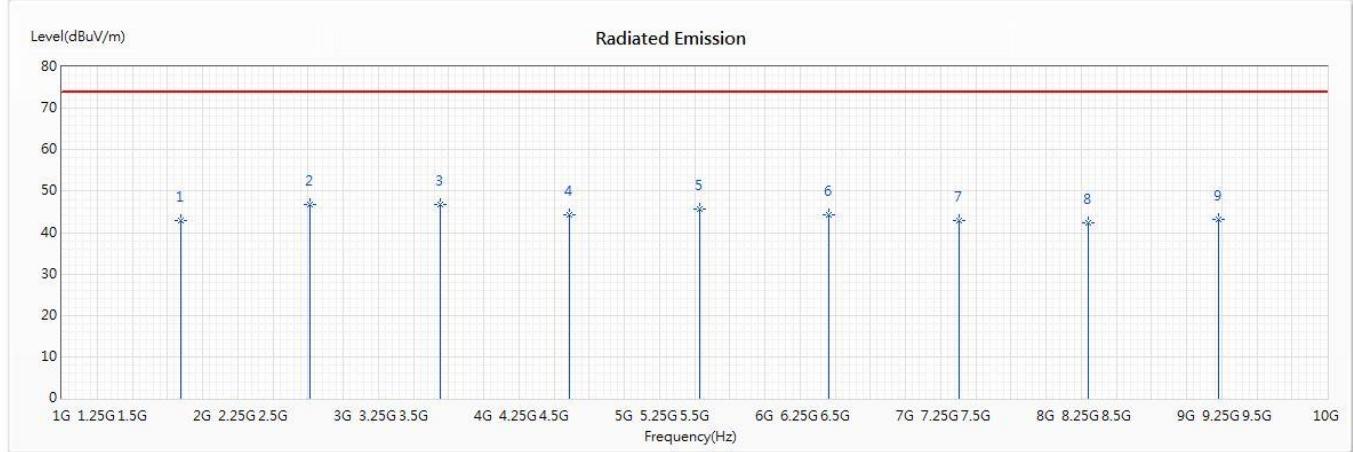
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	1845	42.20	74.00	-31.80	59.66	-17.46	PK
2	2767.5	43.32	74.00	-30.68	57.94	-14.62	PK
* 3	3690	46.72	74.00	-27.28	57.68	-10.96	PK
4	4612.5	45.02	74.00	-28.98	57.38	-12.36	PK
5	5535	45.95	74.00	-28.05	56.89	-10.94	PK
6	6457.5	44.20	74.00	-29.80	56.95	-12.75	PK
7	7380	42.85	74.00	-31.15	56.89	-14.04	PK
8	8302.5	42.82	74.00	-31.18	57.62	-14.80	PK
9	9225	42.23	74.00	-31.77	56.12	-13.89	PK

Note:

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

Product : WiWi module
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (922.5MHz)

Vertical (Peak Detector)



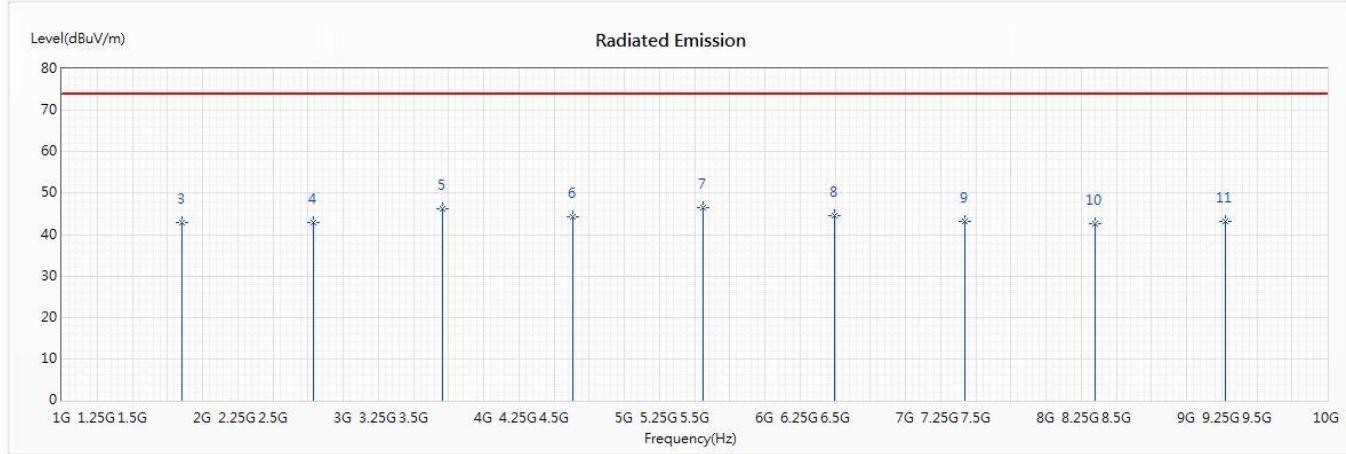
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	1845	42.97	74.00	-31.03	60.43	-17.46	PK
2	2767.5	46.65	74.00	-27.35	61.27	-14.62	PK
* 3	3690	46.87	74.00	-27.13	57.83	-10.96	PK
4	4612.5	44.37	74.00	-29.63	56.73	-12.36	PK
5	5535	45.62	74.00	-28.38	56.56	-10.94	PK
6	6457.5	44.41	74.00	-29.59	57.16	-12.75	PK
7	7380	42.78	74.00	-31.22	56.82	-14.04	PK
8	8302.5	42.36	74.00	-31.64	57.16	-14.80	PK
9	9225	43.13	74.00	-30.87	57.02	-13.89	PK

Note:

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

Product : WiWi module
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (927.5MHz)

Horizontal (Peak Detector)



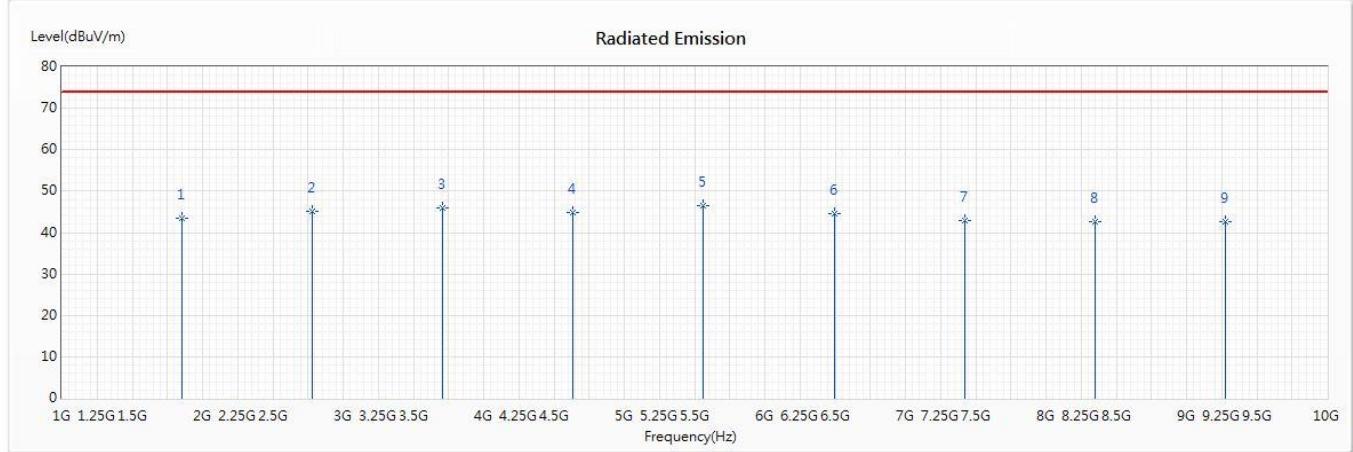
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	9.275	43.27	74.00	-30.73	65.20	-21.93	PK
2	9.275	43.27	74.00	-30.73	65.20	-21.93	PK
3	1855	42.83	74.00	-31.17	60.13	-17.30	PK
4	2785.25	42.97	74.00	-31.03	57.49	-14.52	PK
5	3710	46.26	74.00	-27.74	57.10	-10.84	PK
6	4637.5	44.16	74.00	-29.84	56.52	-12.36	PK
* 7	5565	46.42	74.00	-27.58	57.54	-11.12	PK
8	6492.5	44.67	74.00	-29.33	57.80	-13.13	PK
9	7420	43.12	74.00	-30.88	57.54	-14.42	PK
10	8347.5	42.54	74.00	-31.46	57.70	-15.16	PK
11	9275	43.27	74.00	-30.73	57.15	-13.88	PK

Note:

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

Product : WiWi module
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (927.5MHz)

Vertical (Peak Detector)



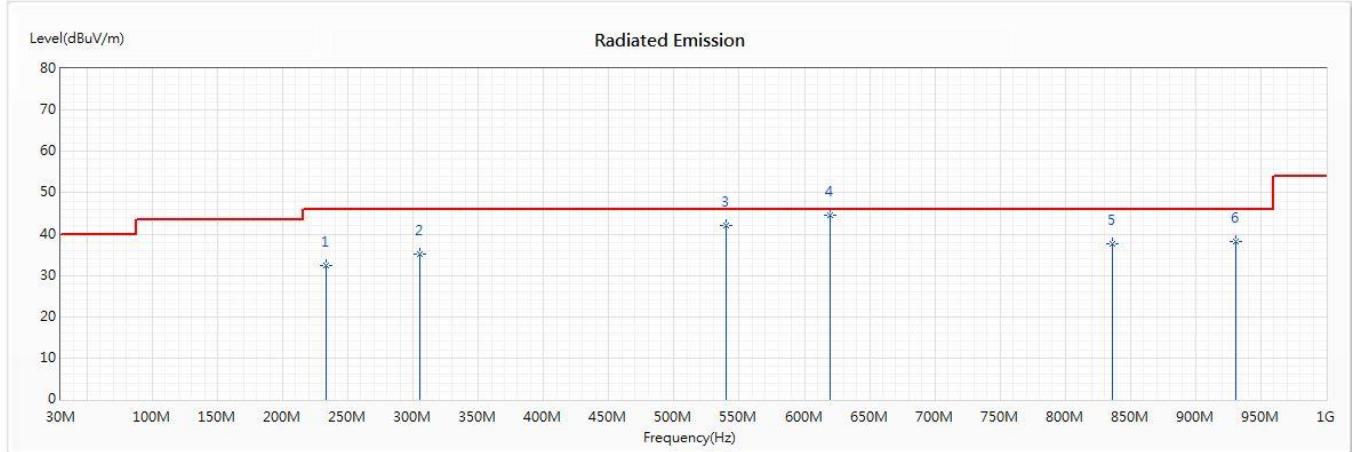
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	1855	43.43	74.00	-30.57	60.73	-17.30	PK
2	2782.5	45.17	74.00	-28.83	59.71	-14.54	PK
3	3710	45.99	74.00	-28.01	56.83	-10.84	PK
4	4637.5	44.78	74.00	-29.22	57.14	-12.36	PK
* 5	5565	46.52	74.00	-27.48	57.64	-11.12	PK
6	6492.5	44.70	74.00	-29.30	57.83	-13.13	PK
7	7420	42.84	74.00	-31.16	57.26	-14.42	PK
8	8347.5	42.62	74.00	-31.38	57.78	-15.16	PK
9	9275	42.72	74.00	-31.28	56.60	-13.88	PK

Note:

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

Product : WiWi module
 Test Item : General Radiated Emission Data (above 30MHz)
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (922.5MHz)

Horizontal



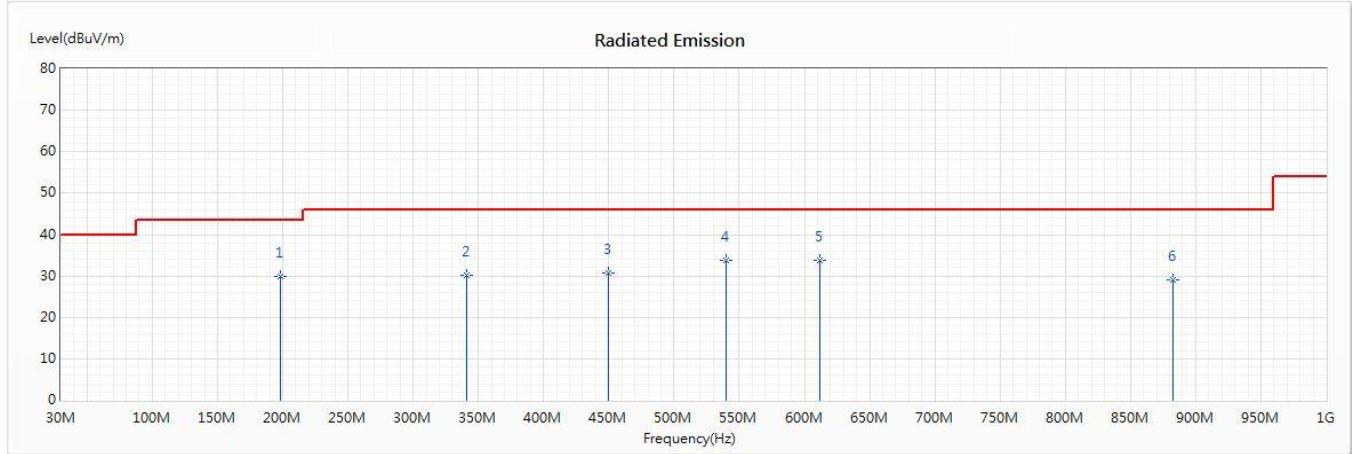
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	233.7	32.40	46.00	-13.60	50.36	-17.96	QP
2	305.48	35.18	46.00	-10.82	49.70	-14.52	QP
3	540.22	42.14	46.00	-3.86	53.54	-11.40	QP
* 4	619.76	44.63	46.00	-1.37	52.69	-8.06	QP
5	836.07	37.62	46.00	-8.38	46.15	-8.53	QP
6	931.13	38.29	46.00	-7.71	47.74	-9.45	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product : WiWi module
 Test Item : General Radiated Emission Data (above 30MHz)
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (922.5MHz)

Vertical



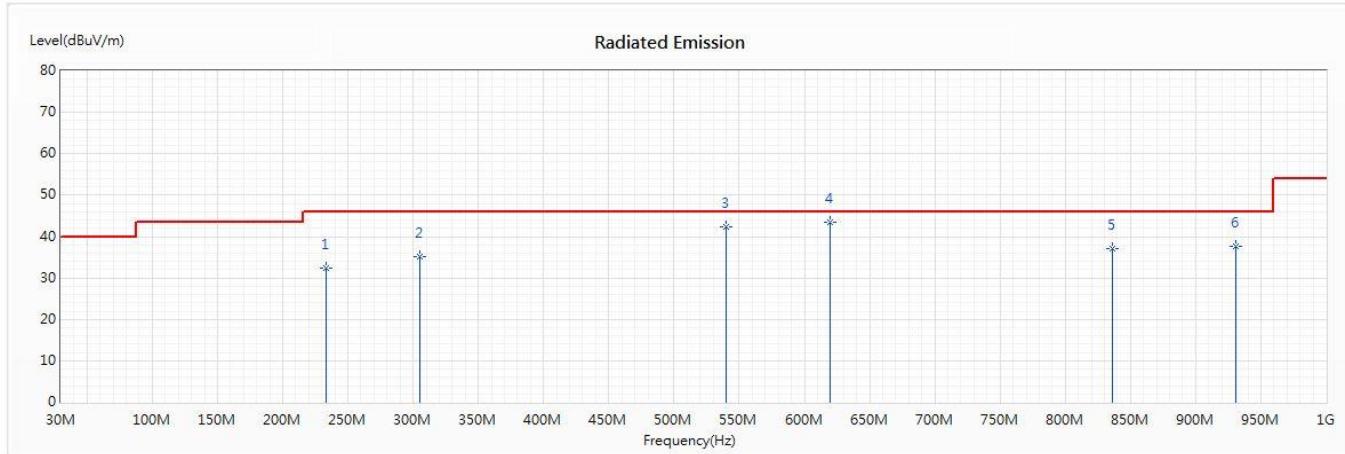
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	197.81	30.03	43.50	-13.47	48.30	-18.27	QP
2	341.37	30.04	46.00	-15.96	43.92	-13.88	QP
3	450.01	30.67	46.00	-15.33	40.80	-10.13	QP
* 4	540.22	33.79	46.00	-12.21	45.19	-11.40	QP
5	612	33.71	46.00	-12.29	41.21	-7.50	QP
6	882.63	29.09	46.00	-16.91	37.68	-8.59	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product : WiWi module
 Test Item : General Radiated Emission Data (above 30MHz)
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (927.5MHz)

Horizontal



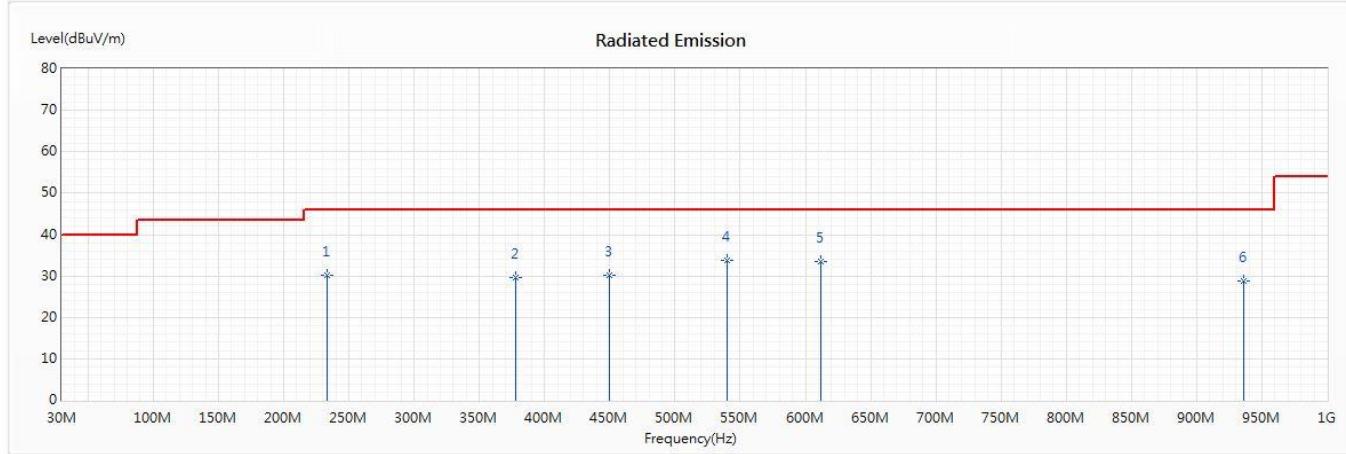
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	233.7	32.41	46.00	-13.59	50.37	-17.96	QP
2	305.48	35.05	46.00	-10.95	49.57	-14.52	QP
3	540.22	42.31	46.00	-3.69	53.71	-11.40	QP
* 4	619.76	43.47	46.00	-2.53	51.53	-8.06	QP
5	836.07	37.08	46.00	-8.92	45.61	-8.53	QP
6	931.13	37.63	46.00	-8.37	47.08	-9.45	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product : WiWi module
 Test Item : General Radiated Emission Data (above 30MHz)
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (927.5MHz)

Vertical



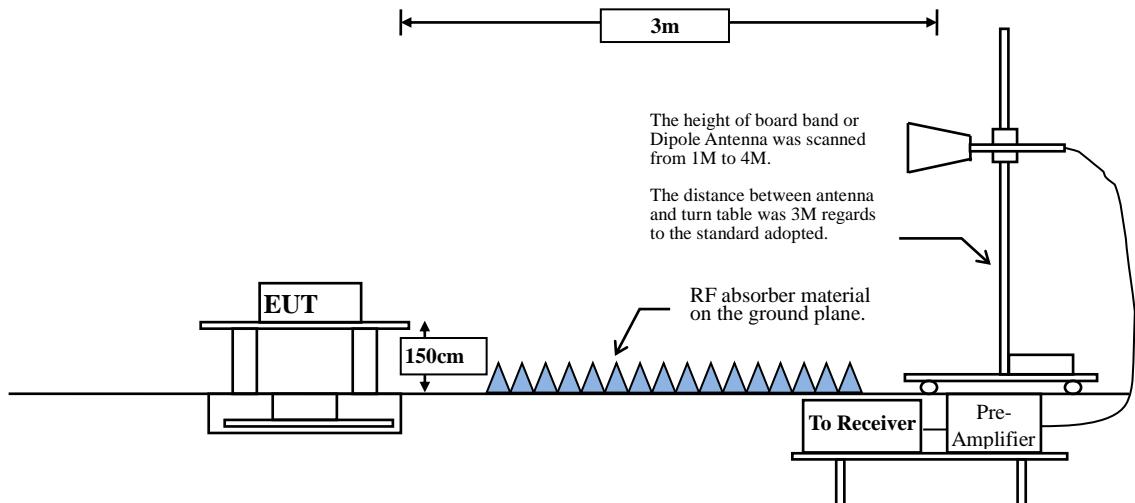
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	233.7	30.30	46.00	-15.70	48.26	-17.96	QP
2	378.23	29.51	46.00	-16.49	41.60	-12.09	QP
3	450.01	30.25	46.00	-15.75	40.38	-10.13	QP
* 4	540.22	33.90	46.00	-12.10	45.30	-11.40	QP
5	612	33.51	46.00	-12.49	41.01	-7.50	QP
6	935.98	28.82	46.00	-17.18	37.91	-9.09	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

4. Band Edge

4.1. Test Setup



4.2. Limit

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

4.3. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

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

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

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

4.4. Uncertainty

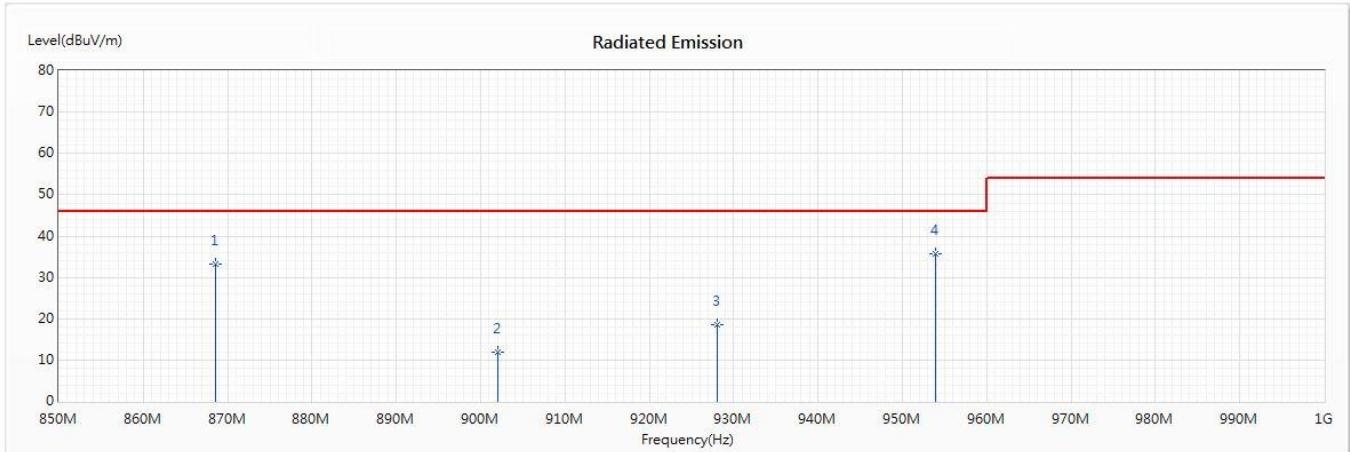
\pm 4.08 dB above 1GHz

\pm 4.22 dB below 1GHz

4.5. Test Result of Band Edge

Product : WiWi module
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (922.5MHz)

RF Radiated Measurement (Horizontal):



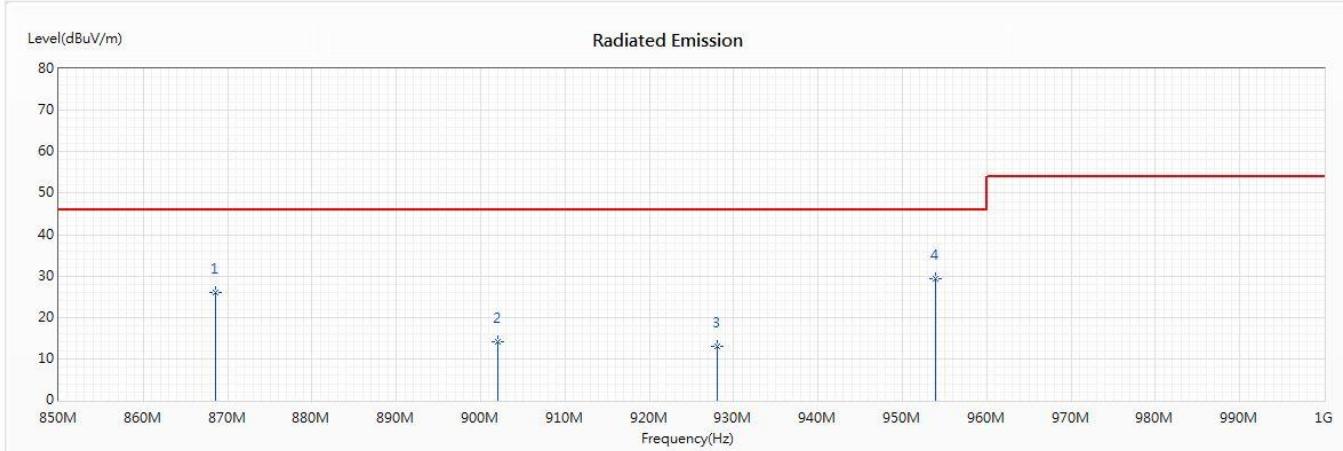
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	868.54	33.18	46.00	-12.82	41.59	-8.41	QP
2	902	12.02	46.00	-33.98	21.90	-9.88	QP
3	928	18.60	46.00	-27.40	28.31	-9.71	QP
* 4	953.99	35.66	46.00	-10.34	44.21	-8.55	QP

Note:

1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. “*”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : WiWi module
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (922.5MHz)

RF Radiated Measurement (Vertical):



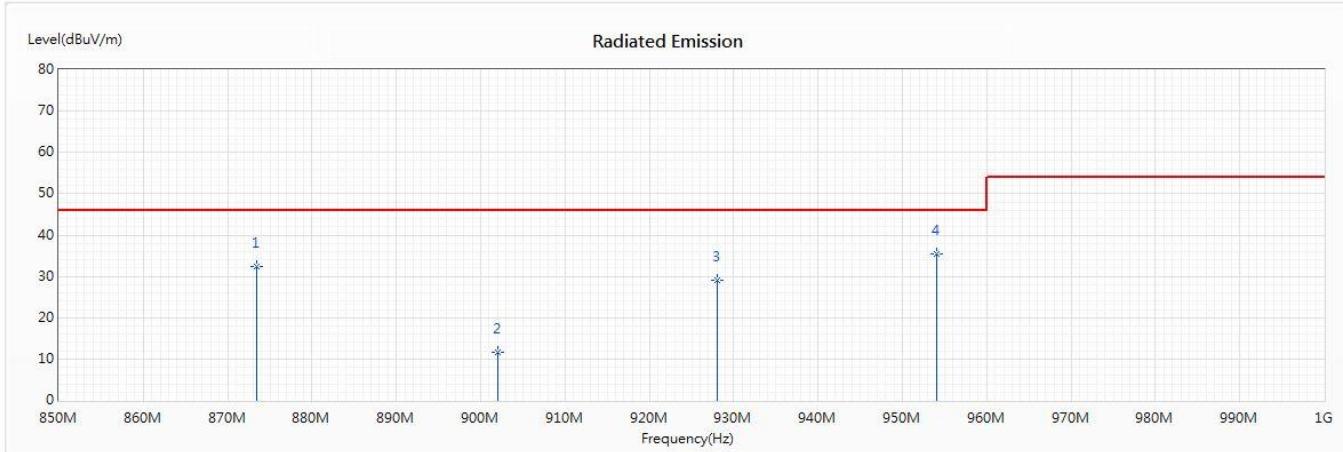
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	868.55	26.08	46.00	-19.92	34.49	-8.41	QP
2	902	14.02	46.00	-31.98	23.90	-9.88	QP
3	928	13.10	46.00	-32.90	22.81	-9.71	QP
* 4	953.99	29.26	46.00	-16.74	37.81	-8.55	QP

Note:

1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. “*”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : WiWi module
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (927.5MHz)

RF Radiated Measurement (Horizontal):



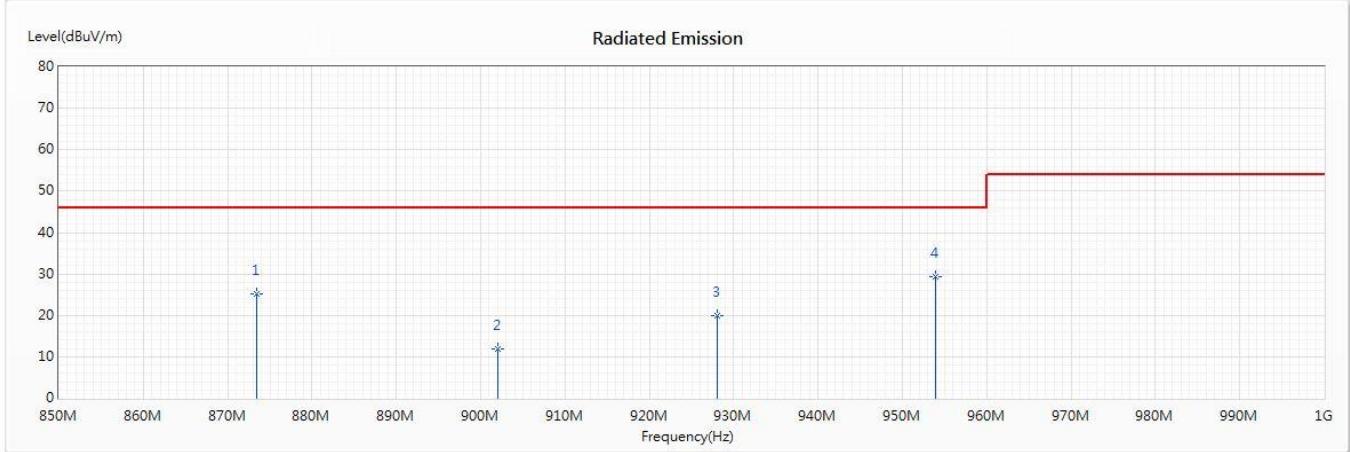
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	873.45	32.29	46.00	-13.71	40.70	-8.41	QP
2	902	11.72	46.00	-34.28	21.60	-9.88	QP
3	928	29.00	46.00	-17.00	38.71	-9.71	QP
* 4	954	35.36	46.00	-10.64	43.91	-8.55	QP

Note:

1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : WiWi module
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Date : 2019/12/06
 Test Mode : Mode 1: Transmit (927.5MHz)

RF Radiated Measurement (Vertical):



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	873.46	25.29	46.00	-20.71	33.70	-8.41	QP
2	902	11.82	46.00	-34.18	21.70	-9.88	QP
3	928	20.00	46.00	-26.00	29.71	-9.71	QP
* 4	953.99	29.36	46.00	-16.64	37.91	-8.55	QP

Note:

1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. “*”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

5. EMI Reduction Method During Compliance Testing

No modification was made during testing.