CTK Co., Ltd.
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TEST REPORT For FCC / IC

FCC Standards : FCC 47CFR part 15 subpart C
Industry Canada Standards :RSS-247 Issue 1 & RSS-GEN Issue 4

Test Report No.	:	CTK-2016-01535
Date of Issue	:	2016-12-14
FCC ID	:	ZKJ-WCATA004
Certification Number IC	:	10229A-WCATA004
Model/Type No.	:	WCATA004
Kind of Product	:	Wi-Fi Module
Applicant	:	Haier US Appliance Solutions, Inc.
Applicant Address	:	Appliance Park, AP2-226, Louisville, KY 40225, United States
Manufacturer	:	Haier US Appliance Solutions, Inc.
Manufacturer Address	:	Appliance Park, AP2-226, Louisville, KY 40225, United States
Contact Person	:	Park Hansung / Hardware RF Engineer
Telephone	:	+82–31-8094-6732
Received Date	:	2016-11-23
Test period	:	Start : 2016-12-05 End : 2016-12-13

The test results presented in this report relate only to the object tested.

Tested by

Won-Jae, Hwang
Test Engineer
Date: 2016-12-14

Reviewed by

Young-Joon, Park
Technical Manager
Date: 2016-12-14

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REPORT REVISION HISTORY

Date	Revision	Page No
2016-12-14	Issued (CTK-2016-01535)	All

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1.0 General Product Description

Equipment model name	WCATA004
Serial number	Prototype
EUT condition	Pre-production, not damaged
Frequency Range	802.11b/g/n_HT20 : 2412 MHz - 2462 MHz

RF output power :

Mode	Channel Bandwidth (MHz)	Frequency Range (MHz)	RF output power (dBm)
802.11b	20	2412 - 2462	16.93
802.11g	20		12.58
802.11n	20		11.53

Number of channels	11
Transfer Rate	802.11b : 11 / 5.5 / 2 / 1 Mbps 802.11g : 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps 802.11n : up to 72.2 Mbps
Type of Modulation	802.11b : DSSS 802.11g/n : OFDM
Power Source	DC 5 V
Duty Cycle	802.11b : 98.4 % 802.11g : 97.7 % 802.11n_HT20 : 97.7 %
Antenna Type	Chip Antenna
Antenna Gain	1.47 dBi
Hardware Rev	1.4
Software Rev	4.26

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1.1 Test mode

Test Item	Modulation	Data Rate
6 dB Bandwidth Maximum Output Power Conducted Spurious emission Band Edge Power Spectral Density Radiated Emissions Below 1GHz Radiated Emissions Above 1GHz	802.11b	1 Mbps
	802.11g	6 Mbps
	802.11n	MCS 0
AC Conducted Emissions	Nomal Mode	Auto

1.2 EUT Operation Test Setup

For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

1.3 Tested Frequency

802.11b, 802.11g, 802.11n_HT20

	LOW	MID	HIGH
Frequency (MHz)	2412	2437	2462

1.4 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.5 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	TOSHIBA CORPORATION	PSLB0K-02900V	58084408Q
AC/DC ADAPTER	DELTA ELECTRONICS(JIANG SU), LTD.	ADP-75SB BB	T8W00746330531

1.6 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.7 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

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1.8 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	**FCC**	3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements	805871
JAPAN	**VCCI**	3 m & 10 m SAC and Conducted Test Site	R-948, C-986, T-1843
KOREA	**MSIP**	EMI (Electromagnetic Interference / Emission) EMS (Electromagnetic Susceptibility / Immunity)	No. 51, KR0025
International	**KOLAS**	EMC	

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2.0 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	6 dB Bandwidth	> 500 kHz	Conducted	C
15.247(b)	Maximum Output Power	< 1 Watt		C
15.247(d)	Conducted Spurious emission	> 30 dBc		C
15.247(d)	Band Edge	> 30 dBc		C
15.247(e)	Transmitter Power Spectral Density	< 8 dBm @ 3 kHz		C
				C
15.209	Field Strength of Harmonics	15.209(a)	Radiated	C
15.207	AC Conducted Emissions	15.207(a)	Line Conducted	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:
- FCC Part 15.247, ANSI C63.10-2013

The tests were performed according to the method of measurements prescribed in KDB No.558074

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2.1 Technical Characteristic Test

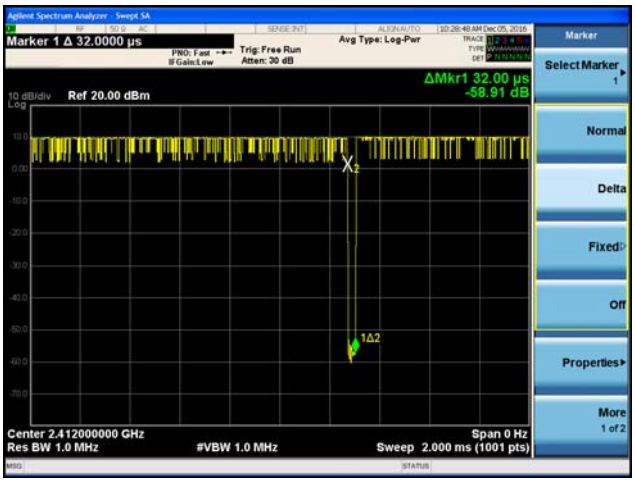
2.1.1 ON Time, Duty Cycle

Procedure:

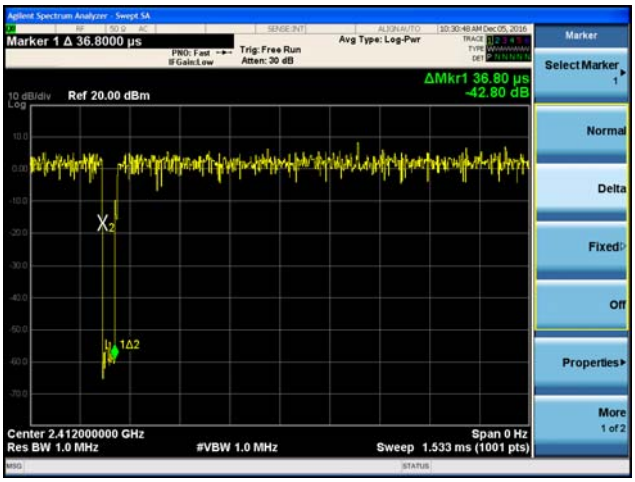
KDB 558074 Zero-Span Spectrum Analyzer Method.

Measurement Data:

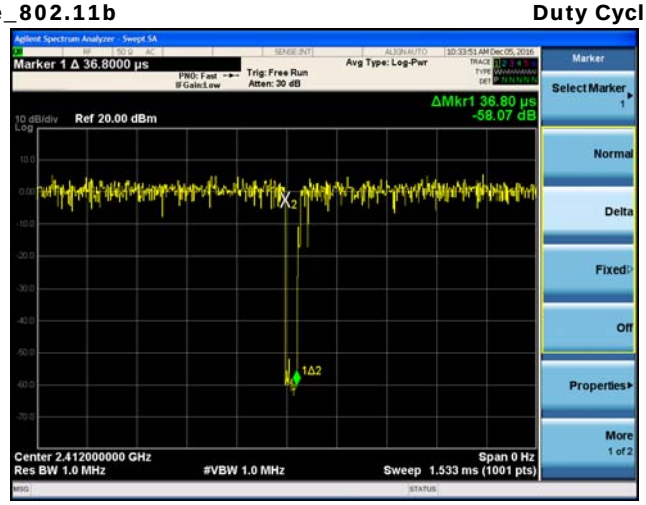
	ON Time (ms)	Period (ms)	TX OFF (ms)	Duty Cycle (linear)	Duty Cycle (%)
802.11b	1.968	2.000	0.032	0.984	98.4
802.11g	1.496	1.533	0.037	0.977	97.7
802.11n_HT20	1.496	1.533	0.037	0.977	97.7



Duty Cycle_802.11b



Duty Cycle_802.11g



Duty Cycle_802.11n_HT20

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2.1.2 6dB Bandwidth and 99% Bandwidth

Procedure:

The bandwidth at 6dB below the highest in-band spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 6dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

VBW = 300 kHz (3 x RBW)

Trace = max hold

Span = 50 MHz

Sweep = auto

Detector function = peak

Measurement Data:

	6 dB Bandwidth and 99% Bandwidth (MHz)					
Frequency	2412 MHz		2437 MHz		2462 MHz	
Mode	6dB	99%	6dB	99%	6dB	99%
802.11b	9.116	14.004	9.086	13.979	8.618	14.001
802.11g	15.540	16.436	15.720	16.435	15.830	16.423
802.11n HT20	16.050	17.610	15.500	17.611	15.720	17.600
Measurement uncertainty	± 3 dB					

Minimum Standard:

6 dB Bandwidth > 500kHz

See next pages for actual measured spectrum plots.

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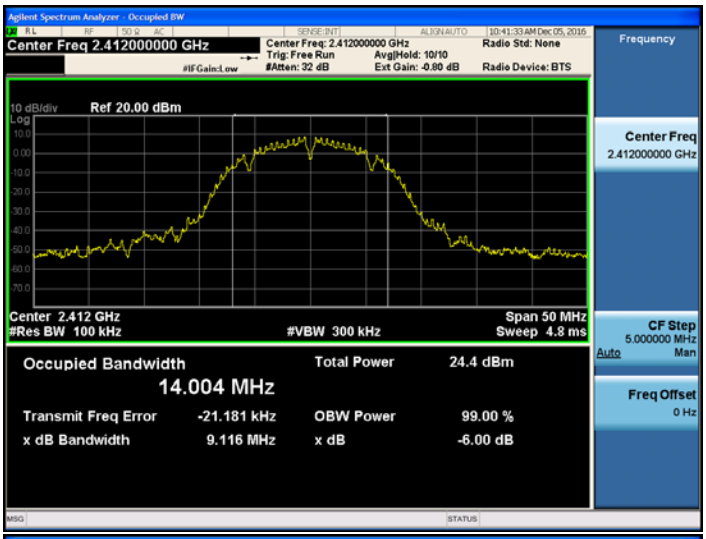

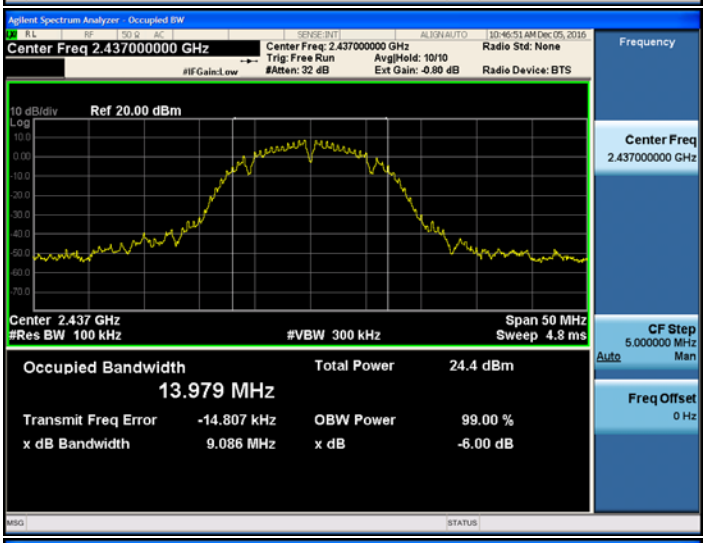

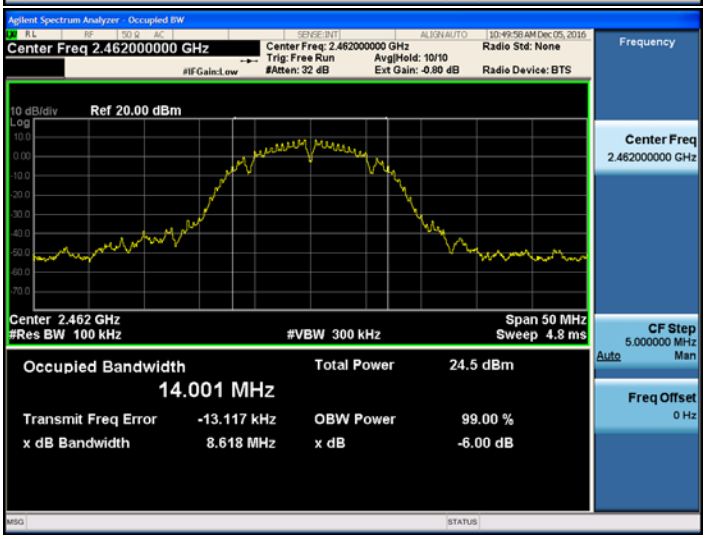

802.11b

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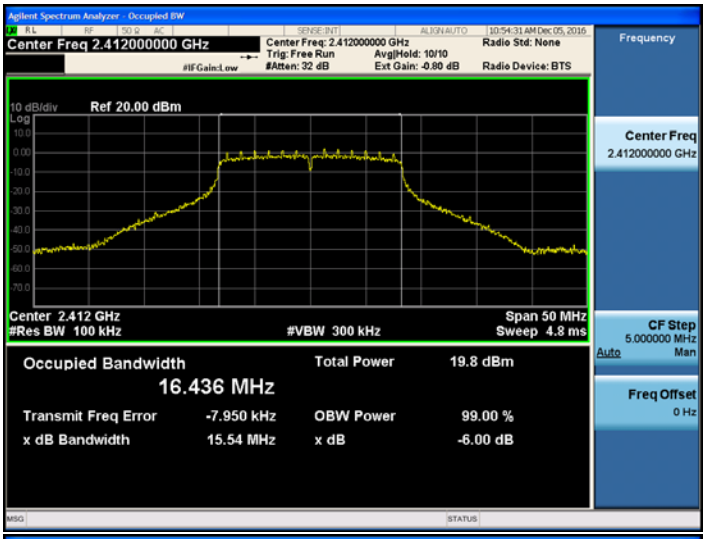

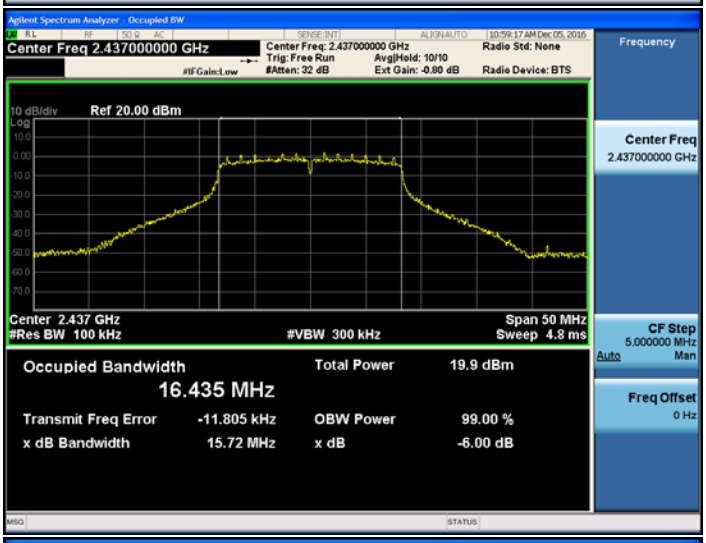

802.11g

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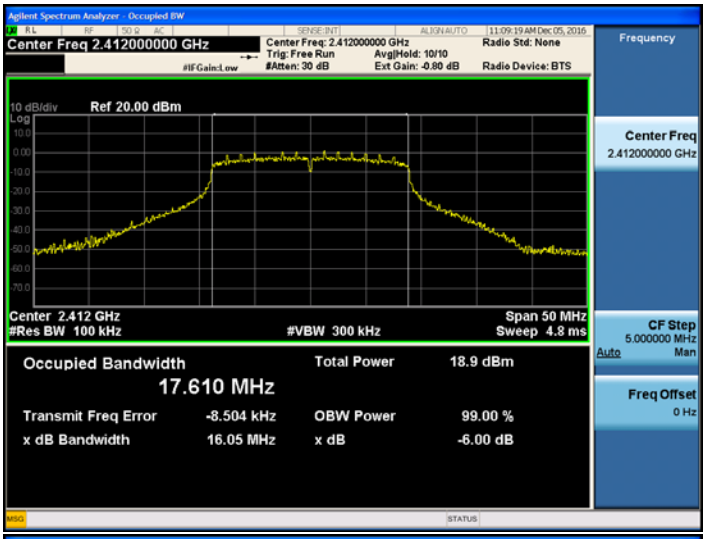

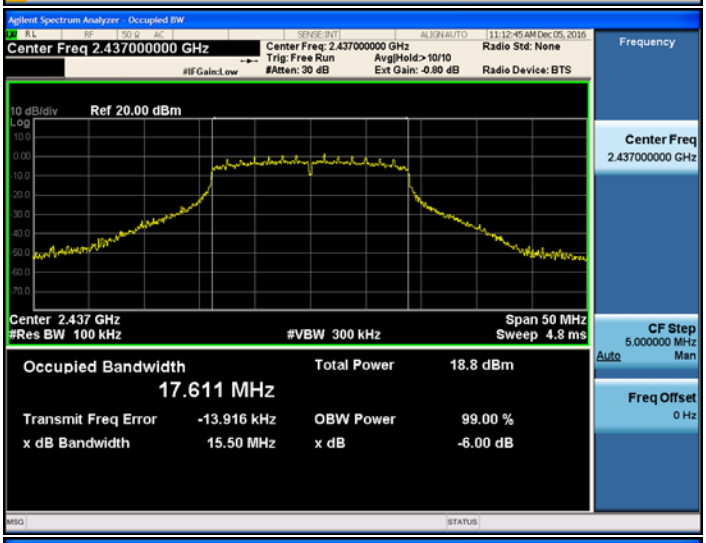

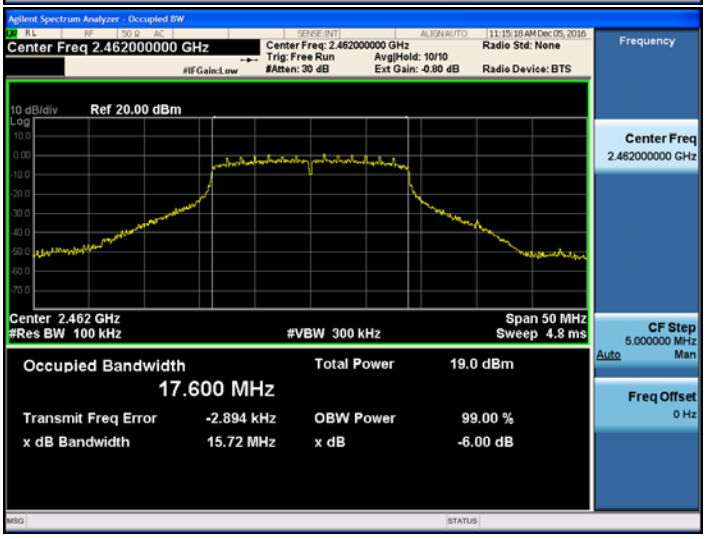

802.11n_HT20

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2.1.3 OUTPUT POWER

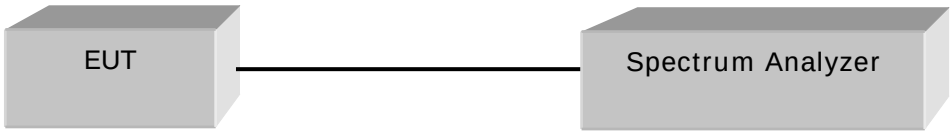
Test Location

RF Test Room

Test Procedures

Average Power(Procedure 9.2.2.2 in KDB 558074, Method AVGSA-1)

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 1 MHz

VBW = 3 MHz (3 x RBW)

Trace = average at least 100

Span = about 36 MHz, 50 MHz

Sweep = auto

Detector function = RMS

Limit

< 1 W

Test Results

	Measured Output Power (dBm)		
Mode	2412 MHz	2437 MHz	2462 MHz
802.11b	16.66	16.75	16.93
802.11g	12.45	12.49	12.58
802.11n HT20	11.36	11.42	11.53
Measurement uncertainty	± 3 dB		

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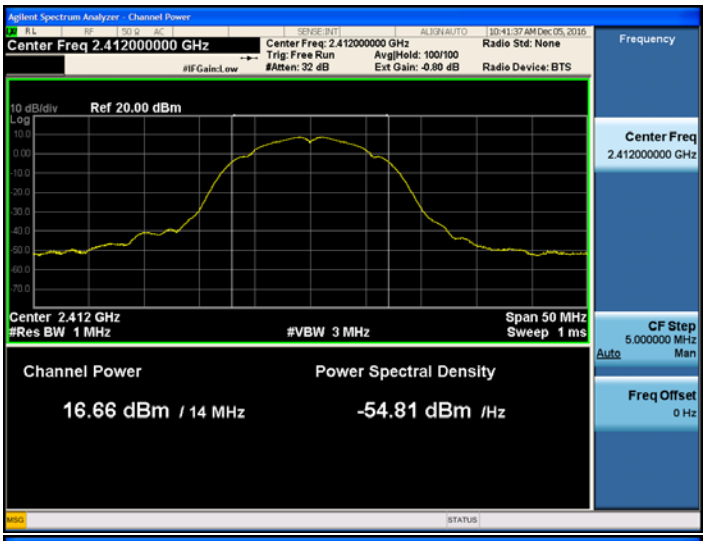

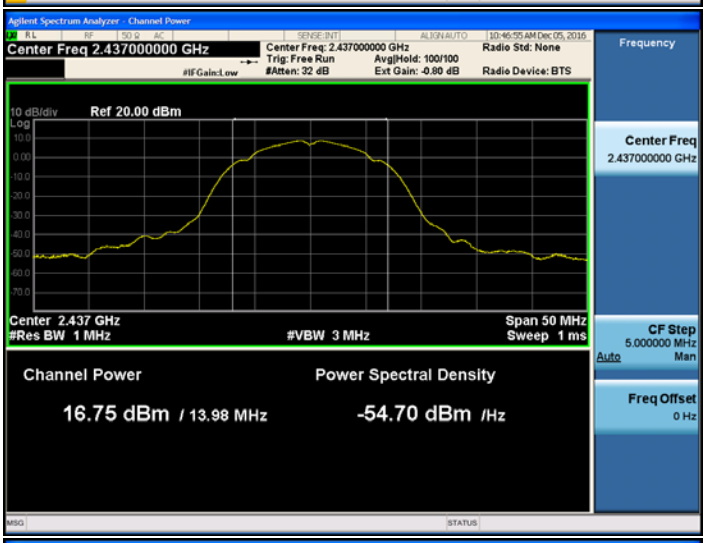

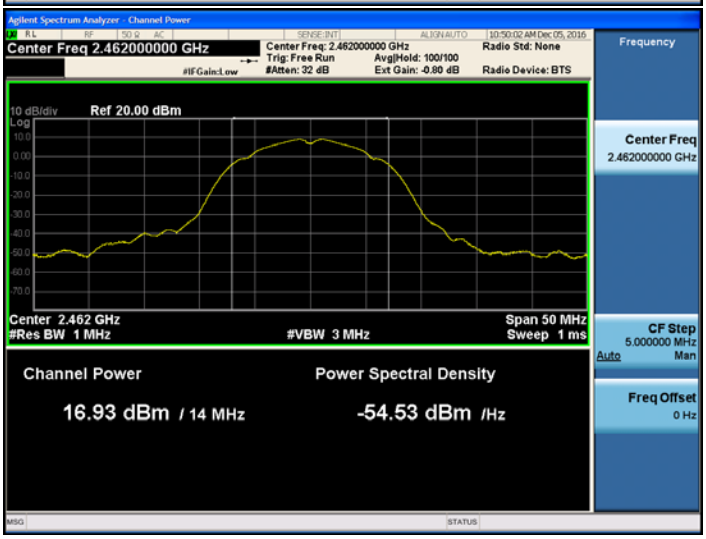

802.11b

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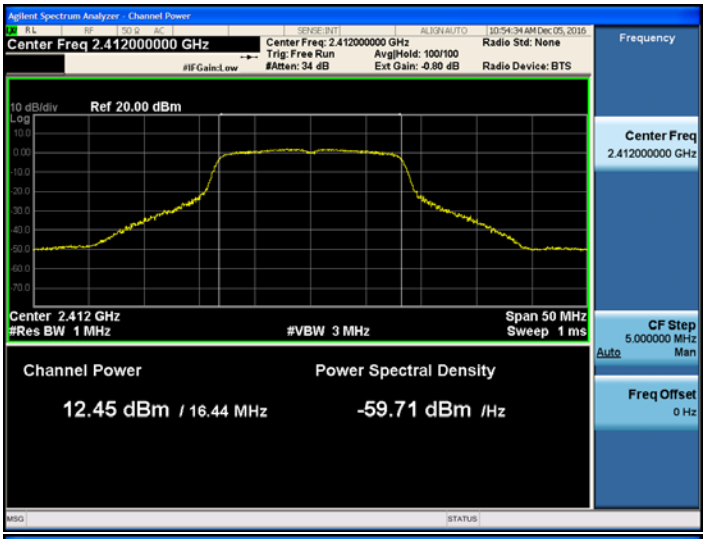

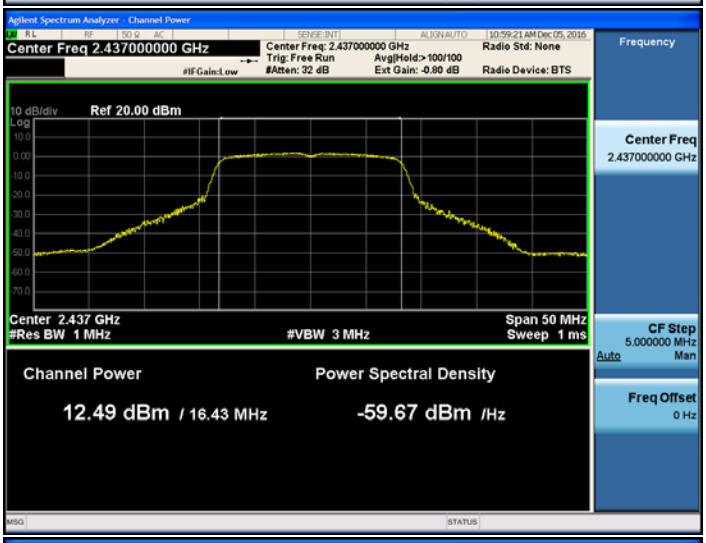

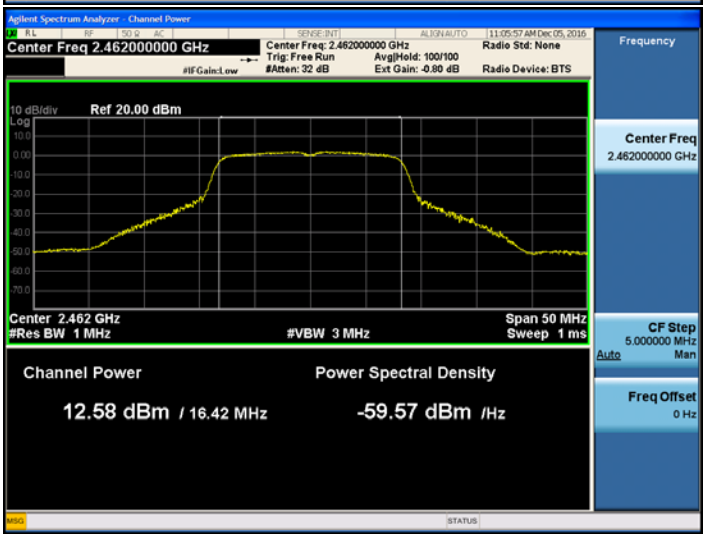

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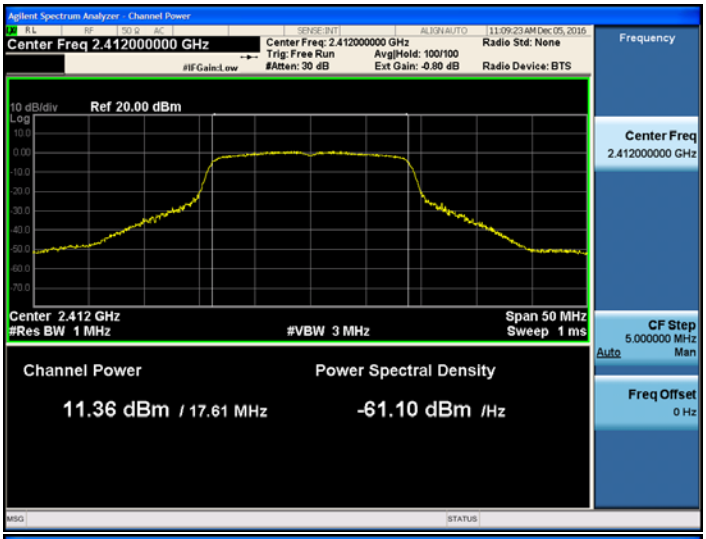

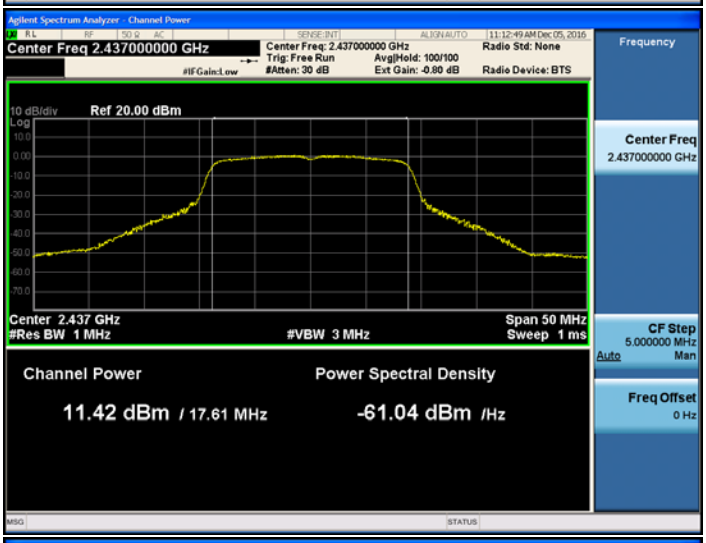

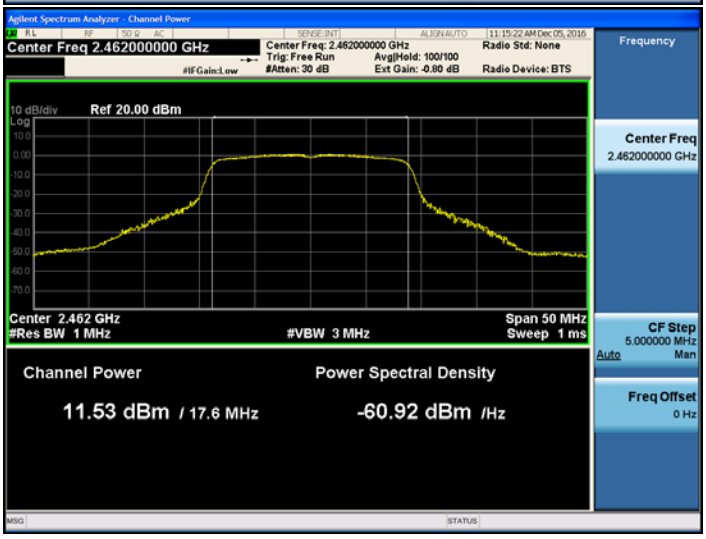

802.11n_HT20

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2.1.4 Power Spectral Density

Procedure:

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The spectrum analyzer is set to:

RBW = 3 kHz VBW = 10 kHz

Sweep = Auto Span = 30 MHz

Detector function = peak Trace = max hold

Limit

Minimum Standard:

Power Spectral Density	< 8dBm @ 3 kHz BW

See next pages for actual measured spectrum plots.

Test Results

	Measured Power Density (dBm)		
Mode	2412 MHz	2437 MHz	2462 MHz
802.11b	-5.391	-6.147	-5.347
802.11g	-12.064	-11.870	-12.345
802.11n HT20	-13.282	-13.027	-13.324
Measurement uncertainty	± 3 dB		

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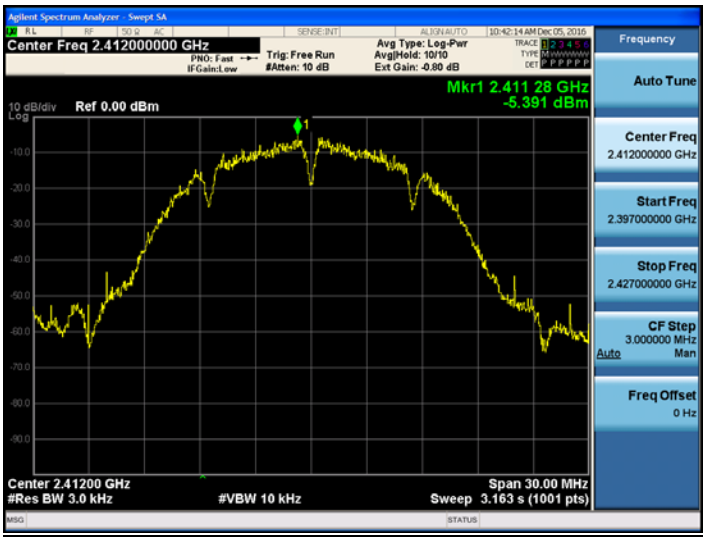

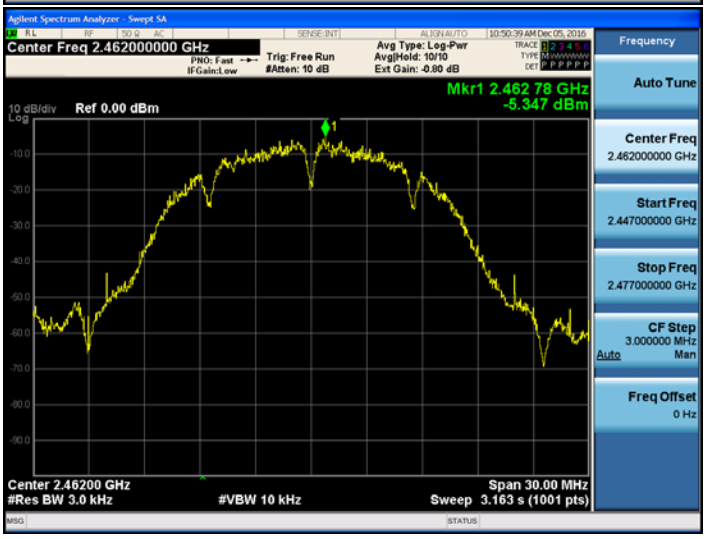

802.11b

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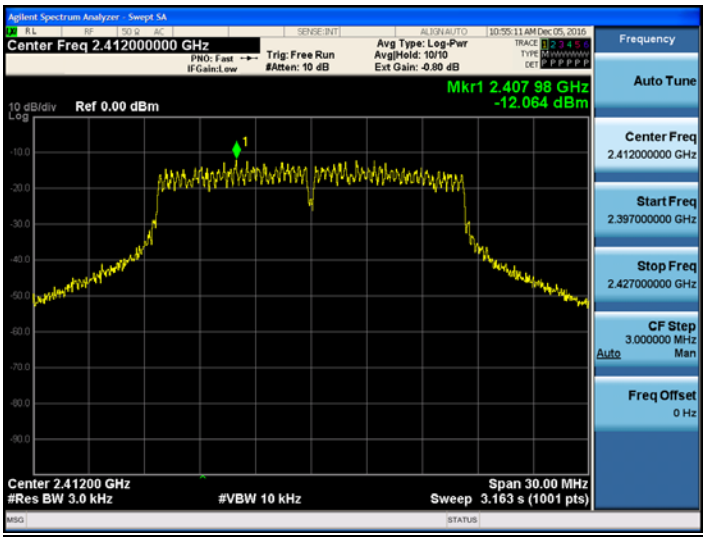

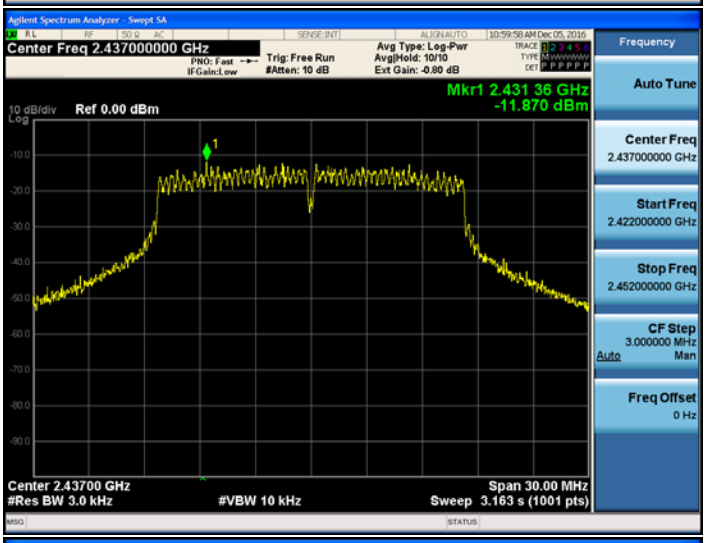

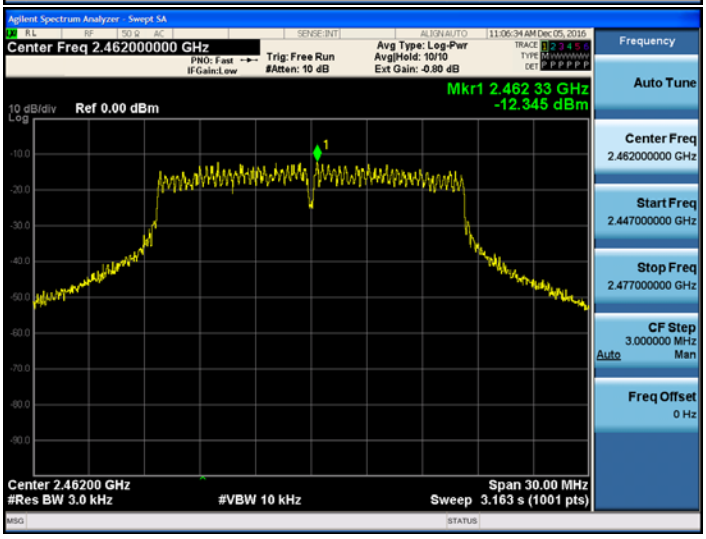

802.11g

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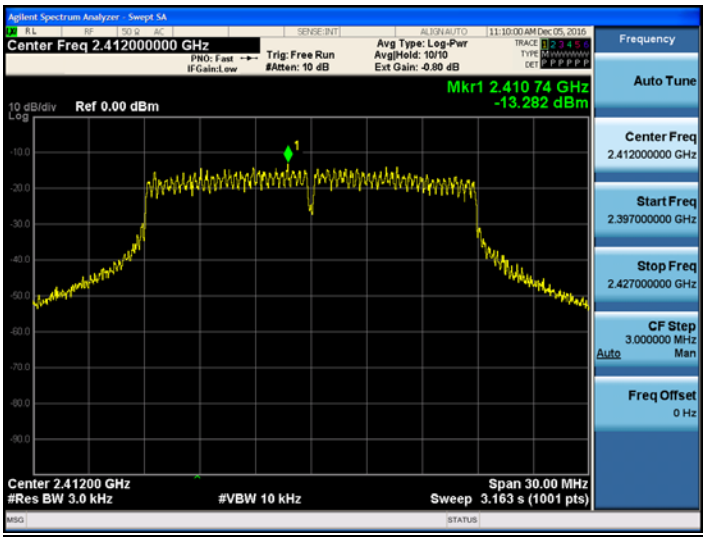

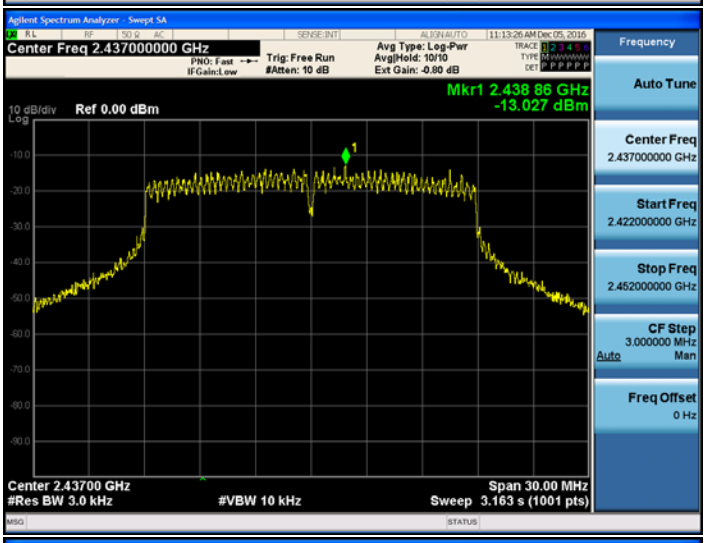

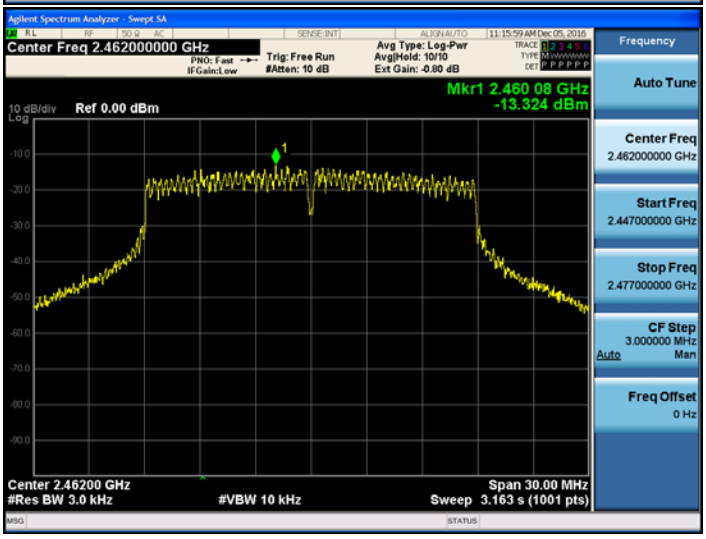

802.11n_HT20

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2.1.5 Band - edge

Procedure:

The bandwidth at 30dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

After the trace being stable, Use the marker-to-peak function to measure 30 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz	VBW = 300 kHz
Span = 50 MHz	Detector function = peak
Trace = max hold	Sweep = auto

Measurement Data: Complies

- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.

Minimum Standard:	> 30 dBc

See next pages for actual measured spectrum plots.

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802.11b

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802.11g

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802.11n_HT20

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2.1.6 Field Strength of Emissions

Test Location

☒ 10 m SAC (test distance : ☐ 10 m, ☒ 3 m)
☒ 3 m SAC (test distance : 3 m)

Test Procedures

1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
2) In the frequency rage above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

The spectrum analyzer is set to:

Frequency Range = 9 kHz ~ 25 GHz (2.4 GHz 10th harmonic)
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz, 9 kHz for f < 30 MHz
VBW ≥ RBW
Sweep = auto

Limit

- **15.209(a)**

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m	Deasurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705-30	30	-	30
30-88	100**	40	3
88-216	150**	43.5	3
216-960	200**	46	3
Above 960	500	54	3

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Note :
1) For above 1 GHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
2) For above 1 GHz, limit field strength of harmonics : 54 dBuV/m@3m (AV) and 74 dBuV/m@3m (PK)

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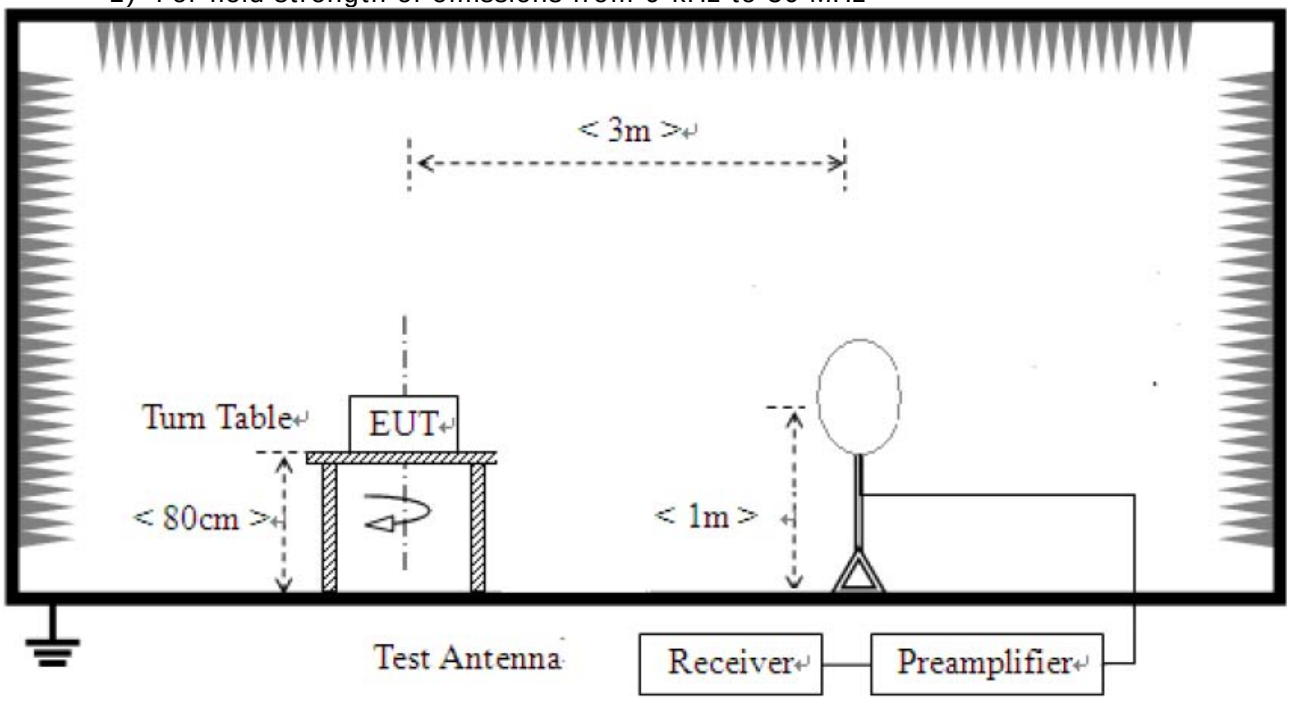
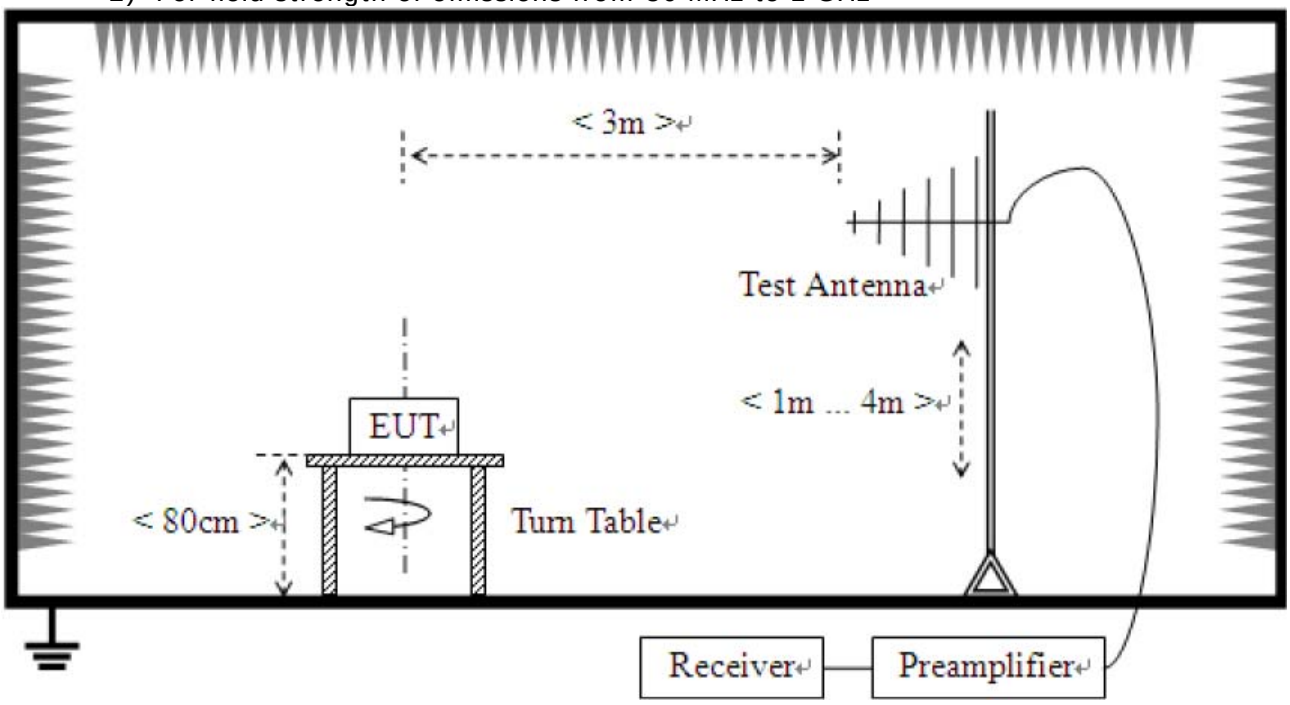
Test Setup:

1) For field strength of emissions from 9 kHz to 30 MHz



2) For field strength of emissions from 30 MHz to 1 GHz



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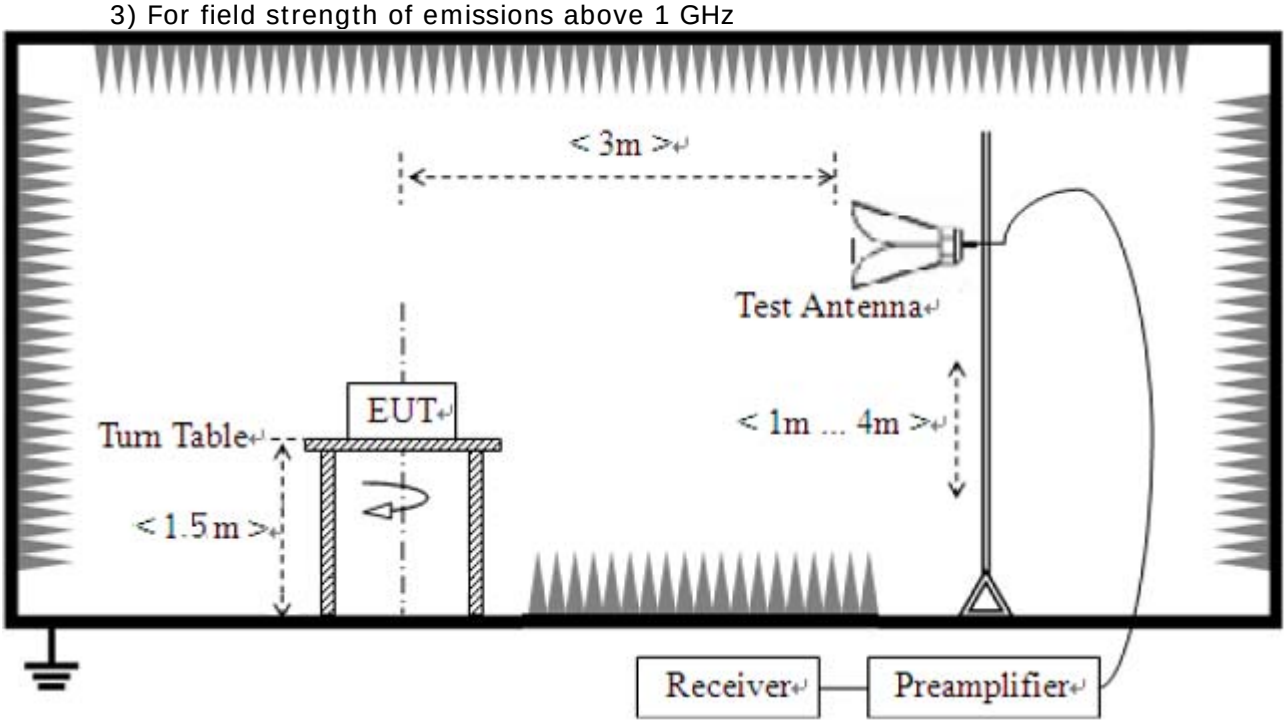
3) For field strength of emissions above 1 GHz



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Test Results

1) 9 kHz to 30 MHz

EUT	Wi-Fi Module	Measurement Detail	
Model	WCATA004	Frequency Range	9 kHz – 30 MHz
Test mode	802.11b,802.11g, 802.11n	Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	See note

Note :
The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.
Distance extrapolation factor = 40 log (specific distance / test distance) (dB)

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2) 30 MHz to 1 GHz

Test mode : 802.11b

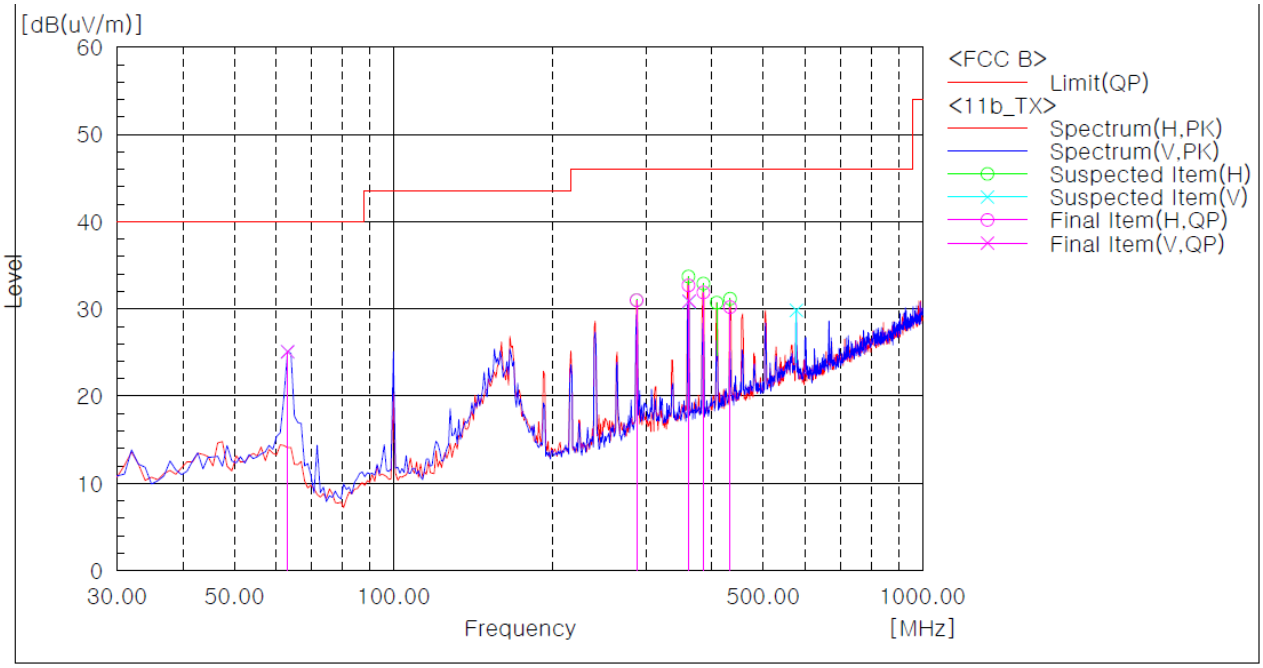
EUT	Wi-Fi Module	Measurement Detail	
Model	WCATA004	Frequency Range	Below 1000MHz
		Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
360.770	32.7	13.3	Quasi-peak

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Angle [deg]
1	62.980	V	40.1	-15.0	25.1	40.0	14.9	295.2
2	288.020	H	42.9	-11.9	31.0	46.0	15.0	307.9
3	360.770	H	42.7	-10.0	32.7	46.0	13.3	196.8
4	361.740	V	40.9	-10.0	30.9	46.0	15.1	269.2
5	385.020	H	41.5	-9.6	31.9	46.0	14.1	210.8
6	432.550	H	39.1	-8.9	30.2	46.0	15.8	225.3

Remark :
1. The field strength of spurious emission was measured in the following position: EUT and antenna stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

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Test mode : 802.11g

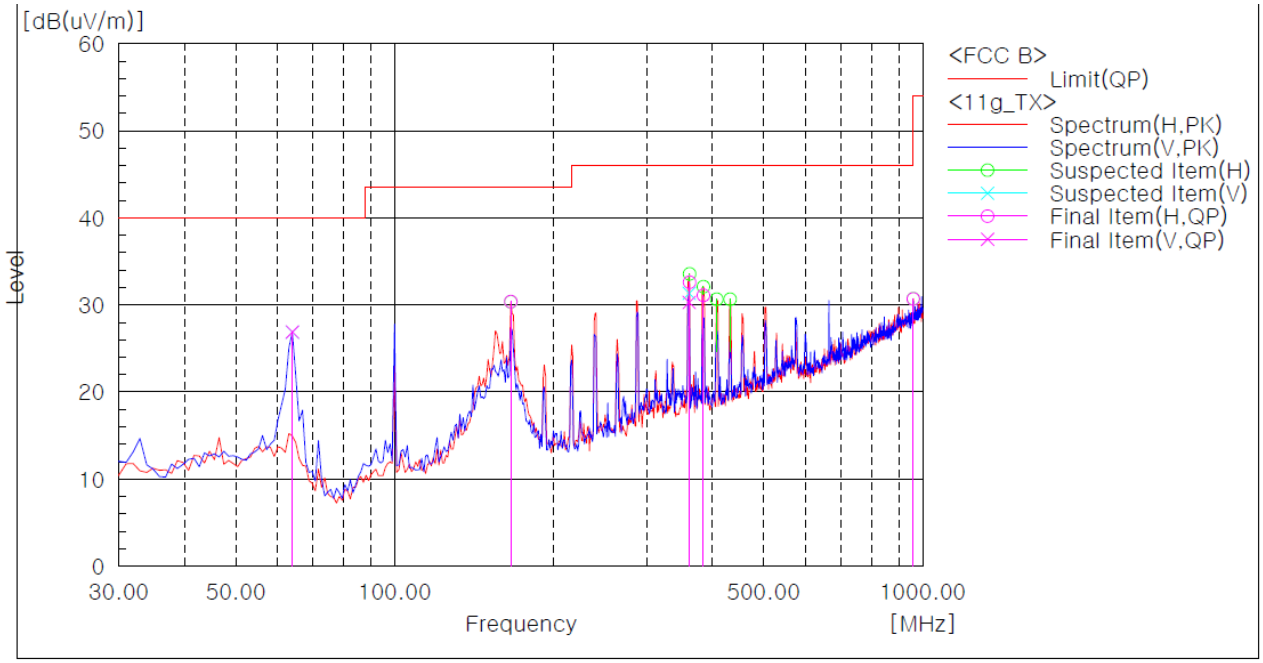
EUT	Wi-Fi Module	Measurement Detail	
Model	WCATA004	Frequency Range	Below 1000MHz
		Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
63.950	26.9	13.1	Quasi-peak

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Angle [deg]
1	63.950	V	42.3	-15.4	26.9	40.0	13.1	223.9
2	165.800	H	37.3	-6.9	30.4	43.5	13.1	15.1
3	360.770	V	40.3	-10.0	30.3	46.0	15.7	289.3
4	361.740	H	42.6	-10.0	32.6	46.0	13.4	193.4
5	384.050	H	40.7	-9.6	31.1	46.0	14.9	219.4
6	959.260	H	30.4	0.3	30.7	46.0	15.3	128.5

Remark :
1. The field strength of spurious emission was measured in the following position: EUT and antenna stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

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Test mode : 802.11n

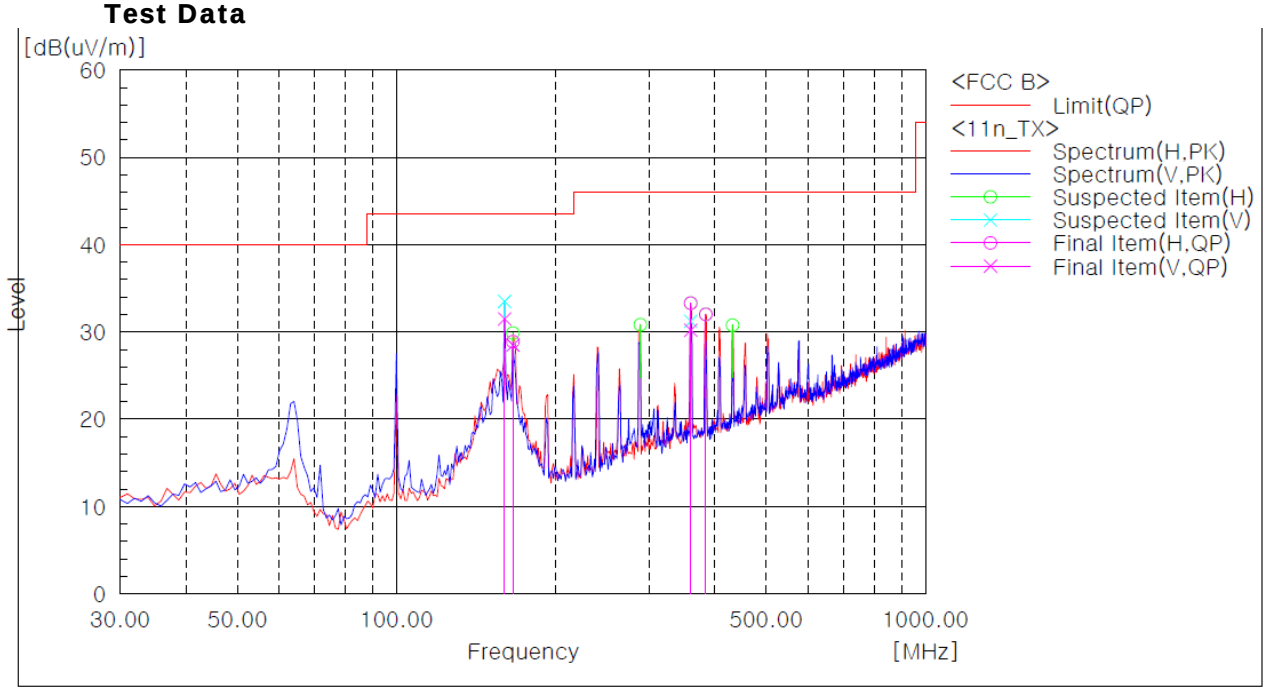
EUT	Wi-Fi Module	Measurement Detail	
Model	WCATA004	Frequency Range	Below 1000MHz
		Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
159.980	31.5	12.0	Quasi-peak

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Angle [deg]
1	159.980	V	37.7	-6.2	31.5	43.5	12.0	137.2
2	165.800	H	35.8	-6.9	28.9	43.5	14.6	182.4
3	165.800	V	35.4	-6.9	28.5	43.5	15.0	111.2
4	359.800	H	43.3	-10.0	33.3	46.0	12.7	208.4
5	359.800	V	40.2	-10.0	30.2	46.0	15.8	267.6
6	384.050	H	41.6	-9.6	32.0	46.0	14.0	208.4

Remark :
1. The field strength of spurious emission was measured in the following position: EUT and antenna stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

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3) above 1 GHz

Test mode : 802.11b

EUT	Wi-Fi Module	Measurement Detail	
Model	WCATA004	Frequency Range	1-25GHz
		Detector function	Average / Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
9748.00	45.80	8.20	Average

Ch.1(2412 MHz)

Frequency [MHz]	(P)	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]
4824.00	H	54.00	74.00	41.77	49.07	12.23	24.93
4824.00	V	54.00	74.00	36.20	46.10	17.81	27.90
7236.00	H	54.00	74.00	43.27	53.86	10.73	20.14
7236.00	V	54.00	74.00	40.17	51.72	13.83	22.28
9648.00	H	54.00	74.00	44.88	54.79	9.12	19.21
9648.00	V	54.00	74.00	42.82	54.10	11.18	19.91
2390.00	H	54.00	74.00	39.50	49.34	14.50	24.66
2390.00	V	54.00	74.00	41.96	52.62	12.04	21.38
2483.50	V	54.00	74.00	34.64	46.46	19.36	27.54

Ch.6(2437 MHz)

Frequency [MHz]	(P)	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]
4874.00	H	54.00	74.00	40.87	47.96	13.13	26.04
4874.00	V	54.00	74.00	36.12	46.30	17.89	27.70
7311.00	H	54.00	74.00	45.12	54.63	8.88	19.37
7311.00	V	54.00	74.00	41.63	52.41	12.38	21.59
9748.00	H	54.00	74.00	45.80	54.52	8.20	19.48
9478.00	V	54.00	74.00	41.93	54.00	12.07	20.00
2390.00	H	54.00	74.00	35.48	46.94	18.52	27.06
2390.00	V	54.00	74.00	38.38	48.95	15.63	25.05
2483.50	V	54.00	74.00	34.63	47.07	19.37	26.93

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Ch.11(2462 MHz)

Frequency [MHz]	(P)	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]
4924.00	H	54.00	74.00	39.84	47.31	14.16	26.69
4924.00	V	54.00	74.00	35.26	46.94	18.74	27.06
7386.00	H	54.00	74.00	45.70	54.12	8.30	19.88
7386.00	V	54.00	74.00	41.43	51.96	12.57	22.04
9848.00	H	54.00	74.00	45.53	54.37	8.47	19.63
9848.00	V	54.00	74.00	41.20	53.20	12.80	20.80
2390.00	H	54.00	68.20	37.11	46.77	16.89	21.43
2390.00	V	54.00	68.20	38.43	48.41	15.57	19.79
2483.50	H	54.00	68.20	36.23	48.08	17.77	20.12
2483.50	V	54.00	68.20	39.59	51.00	14.41	17.20

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Test mode : 802.11g

EUT	Wi-Fi Module	Measurement Detail	
Model	WCATA004	Frequency Range	1-25GHz
		Detector function	Average / Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
9848.00	45.25	8.75	Average

Ch.1(2412 MHz)

Frequency [MHz]	(P)	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]
9648.00	H	54.00	74.00	44.58	53.95	9.42	20.05
9648.00	V	54.00	74.00	42.07	54.60	11.93	19.40
2390.00	H	54.00	74.00	37.59	57.06	16.41	16.94
2390.00	V	54.00	74.00	42.97	60.37	11.03	13.63

Ch.6(2437 MHz)

Frequency [MHz]	(P)	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]
9748.00	H	54.00	74.00	45.20	53.90	8.80	20.10
9478.00	V	54.00	74.00	41.42	53.77	12.58	20.23
2390.00	V	54.00	74.00	37.76	50.35	16.25	23.65
2483.50	V	54.00	74.00	34.71	47.62	19.29	26.38

Ch.11(2462 MHz)

Frequency [MHz]	(P)	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]
9848.00	H	54.00	74.00	45.25	53.65	8.75	20.35
9848.00	V	54.00	74.00	40.73	54.35	13.27	19.65
2390.00	V	54.00	68.20	34.78	46.19	19.22	22.01
2483.50	H	54.00	68.20	36.49	53.58	17.51	14.62
2483.50	V	54.00	68.20	39.35	57.84	14.66	10.36

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Test mode : 802.11n

EUT	Wi-Fi Module	Measurement Detail	
Model	WCATA004	Frequency Range	1-25GHz
		Detector function	Average / Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
9748.00	45.31	8.70	Average

Ch.1(2412 MHz)

Frequency [MHz]	(P)	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]
9648.00	H	54.00	74.00	44.51	53.94	9.49	20.06
9648.00	V	54.00	74.00	41.88	53.60	12.13	20.40
2390.00	H	54.00	74.00	37.36	54.73	16.64	19.27
2390.00	V	54.00	74.00	42.62	60.60	11.38	13.40

Ch.6(2437 MHz)

Frequency [MHz]	(P)	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]
9748.00	H	54.00	74.00	45.31	54.66	8.70	19.34
9478.00	V	54.00	74.00	41.58	53.67	12.43	20.33
2390.00	V	54.00	74.00	37.08	49.99	16.92	24.01
2483.50	V	54.00	74.00	34.39	47.10	19.61	26.90

Ch.11(2462 MHz)

Frequency [MHz]	(P)	Limit AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Level AV [dB(uV/m)]	Level PK [dB(uV/m)]	Margin AV [dB]	Margin PK [dB]
9848.00	H	54.00	74.00	45.20	54.31	8.80	19.69
9848.00	V	54.00	74.00	40.68	53.56	13.32	20.44
2390.00	V	54.00	68.20	34.18	46.92	19.83	21.28
2483.50	H	54.00	68.20	35.74	52.97	18.26	15.23
2483.50	V	54.00	68.20	38.50	57.52	15.50	10.68

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Test Results

1) 9 kHz to 30 MHz

Test mode : Receiver

EUT	Wi-Fi Module	Measurement Detail	
Model	WCATA004	Frequency Range	9 kHz – 30 MHz
		Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	See note

Note :
The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.
Distance extrapolation factor = 40 log (specific distance / test distance) (dB)

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2) 30 MHz to 1 GHz

Test mode : Receiver

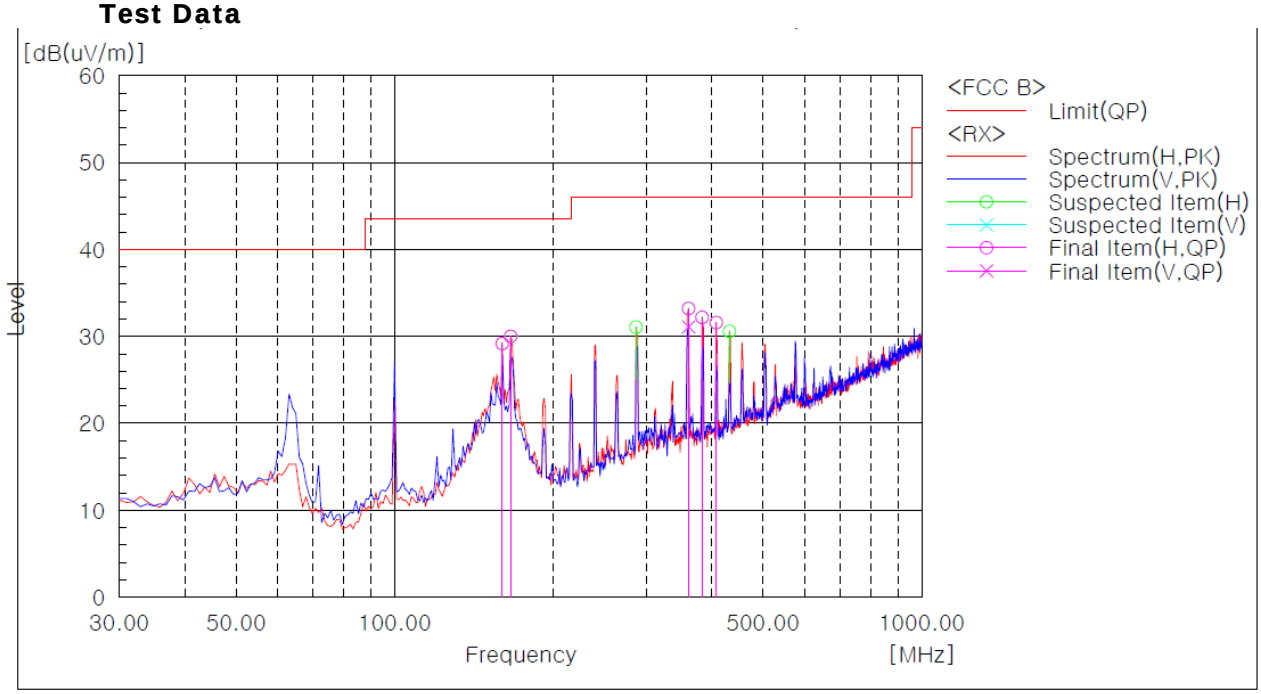
EUT	Wi-Fi Module	Measurement Detail	
Model	WCATA004	Frequency Range	Below 1000MHz
		Detector function	Quasi-Peak / Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
360.770	33.2	12.8	Quasi-Peak

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Angle [deg]
1	159.980	H	35.4	-6.2	29.2	43.5	14.3	7.9
2	165.800	H	36.9	-6.9	30.0	43.5	13.5	32.9
3	360.770	H	43.2	-10.0	33.2	46.0	12.8	196.7
4	360.770	V	41.1	-10.0	31.1	46.0	14.9	266.4
5	383.080	H	41.8	-9.6	32.2	46.0	13.8	196.7
6	407.330	H	40.9	-9.3	31.6	46.0	14.4	222.7

Remark :

1. The field strength of spurious emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

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Test mode : Receiver

EUT	Wi-Fi Module	Measurement Detail	
Model	WCATA004	Frequency Range	1-25GHz
		Detector function	Average / Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
No emissions were detected at a level greater than 20dB below limit.			

Frequency [MHz]	Pol.	Reading [dBuV/m] AV/Peak	Correction Factor [dB]	Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
No emissions were detected at a level greater than 20dB below limit.						

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2.1.7 AC Conducted Emissions

Test Location
Shielded Room

Frequency Range of Measurement
150 kHz to 30 MHz

Instrument Settings
IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

- **15.207(a)**

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency.

Test Results
The requirements are:

☒ **Complies**

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
0.186 000	53.1	11.1	Quasi-peak

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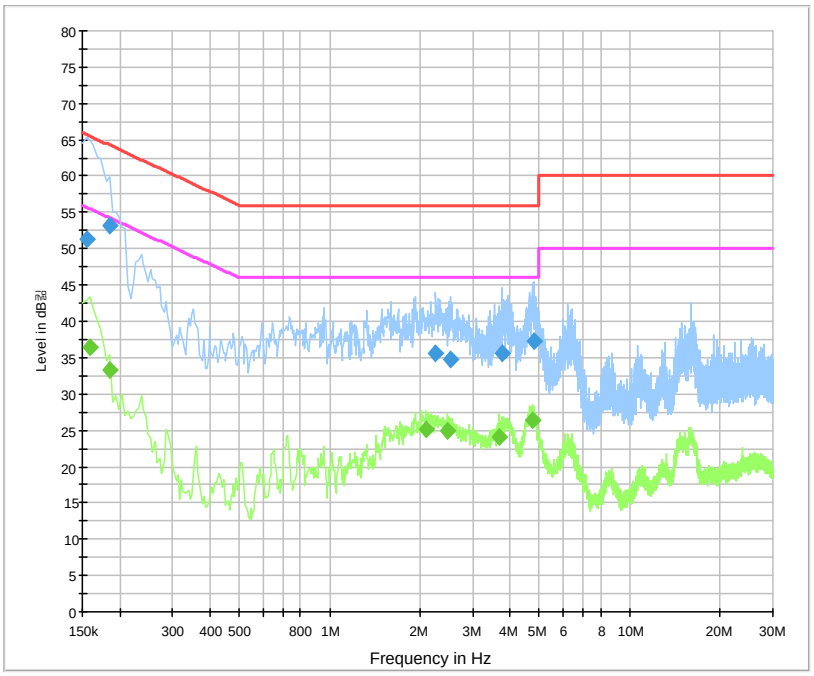
Test Data

[HOT]
Class B_L1



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154500	51.3	1000.0	9.000	On	L1	9.7	14.4	65.8
0.186000	53.1	1000.0	9.000	On	L1	9.8	11.1	64.2
2.260500	35.6	1000.0	9.000	On	L1	9.7	20.4	56.0
2.535000	34.8	1000.0	9.000	On	L1	9.7	21.2	56.0
3.772500	35.5	1000.0	9.000	On	L1	9.7	20.5	56.0
4.776000	37.3	1000.0	9.000	On	L1	9.7	18.7	56.0

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.159000	36.4	1000.0	9.000	On	L1	9.8	19.1	55.5
0.186000	33.3	1000.0	9.000	On	L1	9.8	20.9	54.2
2.098500	25.1	1000.0	9.000	On	L1	9.7	20.9	46.0
2.472000	24.9	1000.0	9.000	On	L1	9.7	21.1	46.0
3.682500	24.2	1000.0	9.000	On	L1	9.7	21.8	46.0
4.753500	26.3	1000.0	9.000	On	L1	9.7	19.7	46.0

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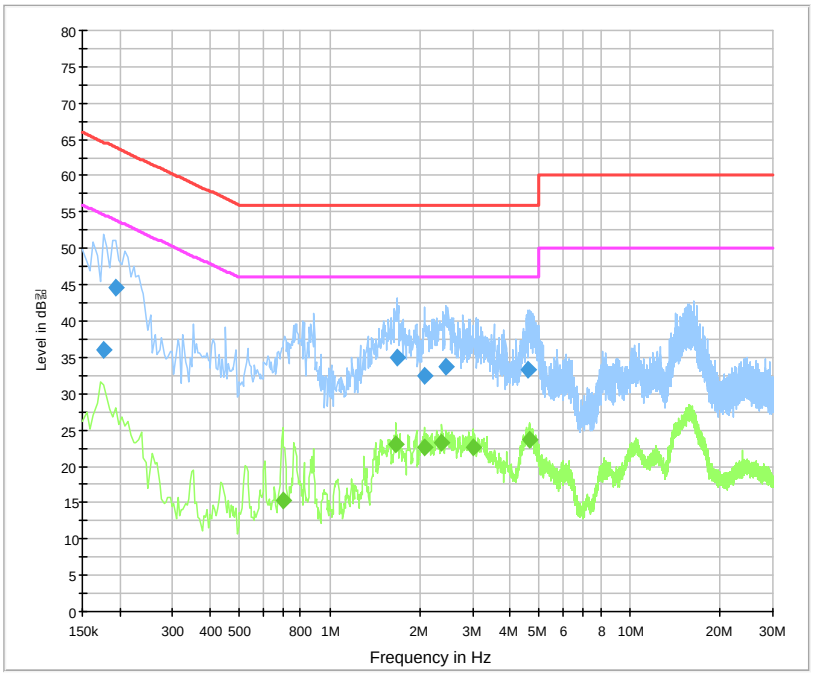
[NEUTRAL]

Class B_N



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.177000	36.1	1000.0	9.000	On	N	9.8	28.5	64.6
0.195000	44.7	1000.0	9.000	On	N	9.8	19.1	63.8
1.675500	34.9	1000.0	9.000	On	N	9.7	21.1	56.0
2.076000	32.5	1000.0	9.000	On	N	9.7	23.5	56.0
2.440500	33.8	1000.0	9.000	On	N	9.7	22.2	56.0
4.587000	33.4	1000.0	9.000	On	N	9.7	22.6	56.0

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.699000	15.4	1000.0	9.000	On	N	9.8	30.6	46.0
1.662000	23.0	1000.0	9.000	On	N	9.7	23.0	46.0
2.067000	22.7	1000.0	9.000	On	N	9.7	23.3	46.0
2.368500	23.1	1000.0	9.000	On	N	9.7	22.9	46.0
3.016500	22.6	1000.0	9.000	On	N	9.7	23.4	46.0
4.659000	23.7	1000.0	9.000	On	N	9.7	22.3	46.0

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APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Signal Analyzer	Agilent	N9020A	MY50510324	2016-03-11	2017-03-11
2	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2016-11-01	2017-11-01
3	Signal Generator	Rohde & Schwarz	SMB100A	175528	2016-11-01	2017-11-01
4	EMI Test Receiver	Rohde & Schwarz	ESCI7	100816	2016-10-31	2017-10-31
5	LISN	Rohde & Schwarz	ENV216	101760	2016-02-05	2017-02-05
6	EMI Test Receiver	Rohde & Schwarz	ESCI7	100814	2016-11-01	2017-11-01
7	Trilog Broadband Antenna	SCHWARZBECK	VULB 9161 SE	9161-4133	2015-06-18	2017-06-18
8	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-126	2016-05-16	2018-05-16
9	6dB Attenuator	R&S	DNF	272.4110.50-1	2016-02-04	2017-02-04
10	6dB Attenuator	R&S	DNF	272.4110.50-2	2016-11-01	2017-11-03
11	AMPLIFIER	SONOMA	310	291721	2016-02-02	2017-02-02
12	EMI Test Receiver	Rohde & Schwarz	ESU40	100336	2015-05-14	2017-05-14
13	PREAMPLIFIER	Agilent	8449B	3008A02011	2016-12-01	2017-12-01
14	Horn Antenna	ETS-Lindgren	3115	00078894	2015-09-02	2017-09-02
15	Horn Antenna	ETS-Lindgren	3116	00062504	2015-09-04	2017-09-04
16	Horn Antenna	ETS-Lindgren	3116	00062916	2015-04-30	2017-04-30
17	Horn Antenna	ETS-Lindgren	3117	00154525	2015-09-02	2017-09-02
18	Band Reject Filter	Micro Tronics	BRM50702	G233	2016-05-16	2017-05-16

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