CERTIFICATION TEST REPORT FOR

FCC ID: 2AHQM- 3209

Report Reference No. ..... :	16FAB01005 51
Date of issue ..... :	2016-03-21
FCC 2.948 No ..... :	923232
Testing Laboratory ..... :	ATT Product Service Co., Ltd.
Address ..... :	No. 3, ChangLianShan Industrial Park, ChangAn Town, DongGuan City, GuangDong, China.
Applicant's name	K-Rain Manufacturing Corporation.
Address	1640 Australian Ave., Riviera Beach, FL, Zip Code: 33404, USA.
Manufacturer	Macson Limited.
Address	No. 5, Jun Da Zhong Lu,DongKeng, Dongguan, Guangdong, China.
Test specification:	
Test item description ..... :	Wifi Hub
Trade Mark ..... :	--
Model/Type reference ..... :	3209
Ratings ..... :	I/P: AC 100-240V 50-60Hz 0.5A

Tested by

Lake Hu

（Lake Hu/ Engineer）

Approved by

Brown Lu

（Brown Lu / EMC Manager）

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TEST REPORT DECLARE

Applicant	:	K-Rain Manufacturing Corporation.
Address	:	1640 Australian Ave., Riviera Beach, FL, Zip Code: 33404,USA.
Equipment under Test	:	Wifi Hub
Model No	:	3209
Trade Mark	:	--
Manufacturer	:	Macson Limited.
Address	:	No. 5, Jun Da Zhong Lu,DongKeng, Dongguan, Guangdong, China.

Test Standard Used: FCC Rules and Regulations Part 15 Subpart C : 2013.

Test procedure used: ANSI C63.10:2013, ANSI C63.4:2014, 558074 V03R05.

We Declare:

The equipment described above is tested by ATT Product Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and ATT Product Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	16EAB01005 51		
Date of Test:	2016-01-25---2016-03-21	**Date of Report**:	2016-03-22

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of ATT Product Service Co., Ltd.

1. Summary of test Standards and results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Results
6dB Bandwidth And 99% Occupied Bandwidth	§15.247 (a)(2) KDB558074	PASS
Peak Output Power	§15.247(b)(3) KDB558074	PASS
Power Spectral Density	§15.247(e) KDB558074	PASS
Spurious Emissions at Antenna Port	§15.247(d) KDB558074	PASS
Spurious Emissions	§15.205, §15.209, §15.247(d) KDB558074	PASS
100 kHz Bandwidth of Frequency Band Edge	§15.247(d) KDB558074	PASS
AC Line Conducted Emissions	§15.207 (a) KDB558074	PASS
Antenna requirement	FCC Part 15: 15.203 KDB558074	PASS

2. GENERAL TEST INFORMATION

2.1. Accresitations

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA FCC Registration Number :923232
Canada INDUSTRY CANADA Registration Number 11033A

2.2. Description of EUT

EUT* Name	:	Wifi Hub
Model Number	:	3209
Trade Mark	:	--
EUT function description	:	Please reference user manual of this device
Power supply	:	AC 120V/60Hz
Radio Specification	:	IEEE802.11b/g/n20
Operation frequency	:	IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n20: HT20: 2412MHz—2462MHz
Modulation	:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n20: HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
Antenna Type	:	PIFA antenna,maximum PK gain: 1 dBi
Date of Receipt	:	2016-01-25
Sample Type	:	Series production

Note: EUT is the ab. of equipment under test.

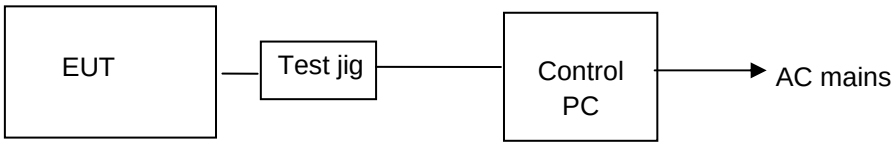
2.3. Accessories of EUT

Description of Accessories	Manufacturer	Model number or Type	Other
/	/	/	/

2.4. Assistant equipment used for test

Description of Assistant equipment	Manufacturer	Model number or Type	Other
Notebook	acer	Aspire E1-472G	FCC DoC

2.5. Block diagram of EUT configuration for test



EUT was connected to control to a special test jig provided by manufacturer which has a standard RSS-232 connector to connect to Notebook, and the Notebook will run a special test software "MP_v1.1.1" provided by manufacturer to control EUT work in test mode as blow table.

Tested mode, channel, and data rate information			
Mode	data rate (Mpbs) (see Note)	Channel	Frequency (MHz)
IEEE 802.11b	1	Low :CH1	2412
	1	Middle: CH6	2437
	1	High: CH11	2462
IEEE 802.11g	6	Low :CH1	2412
	6	Middle: CH6	2437
	6	High: CH11	2462
IEEE 802.11n HT20	MCS 0	Low :CH1	2412
	MCS 0	Middle: CH6	2437
	MCS 0	High: CH11	2462
Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.			

2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa

2.7. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.44dB
Uncertainty for Radiation Emission test (150KHz-30MHz)	3.21dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	3.14 dB (Polarize: V)
	3.16 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz to 25GHz)	2.08dB(Polarize: V)
	2.56dB (Polarize: H)
Uncertainty for radio frequency	1×10-9
Uncertainty for conducted RF Power	0.65dB

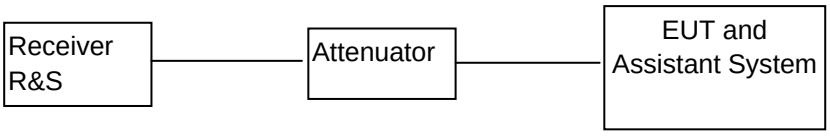
Note：This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. 6dB Bandwidth and 99% Occupied Bandwidth

3.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Cal. Interval
1	EMI Test Receiver	R&S	ESCI	101307	2016/12/19	1Y

3.2. Block diagram of test setup



3.3. Limits

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 KHz

3.4. Test Procedure

(1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

(2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

(3) Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.

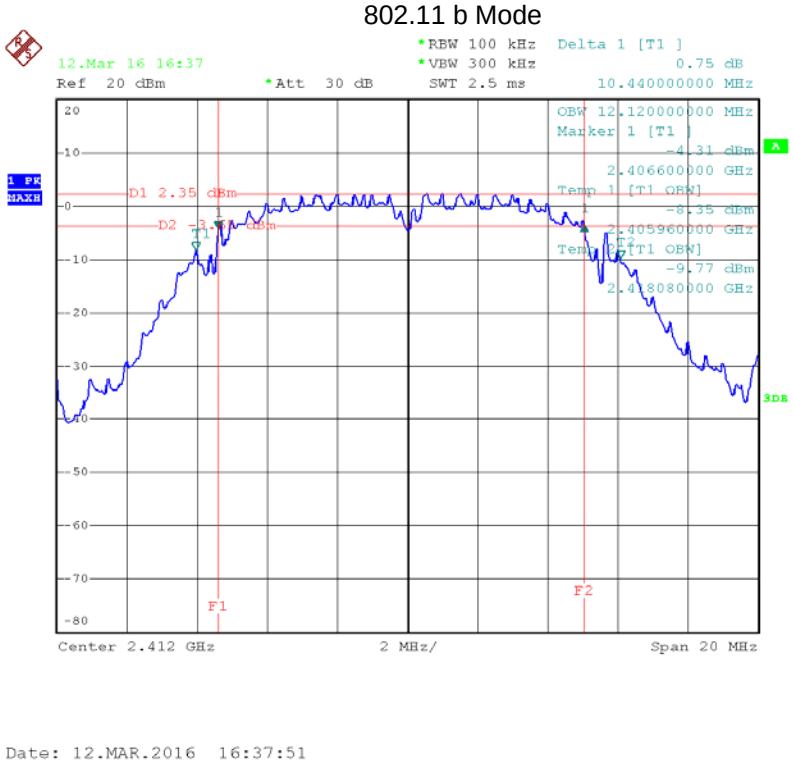
(4) Repeat above procedures until all frequencies measured were complete.

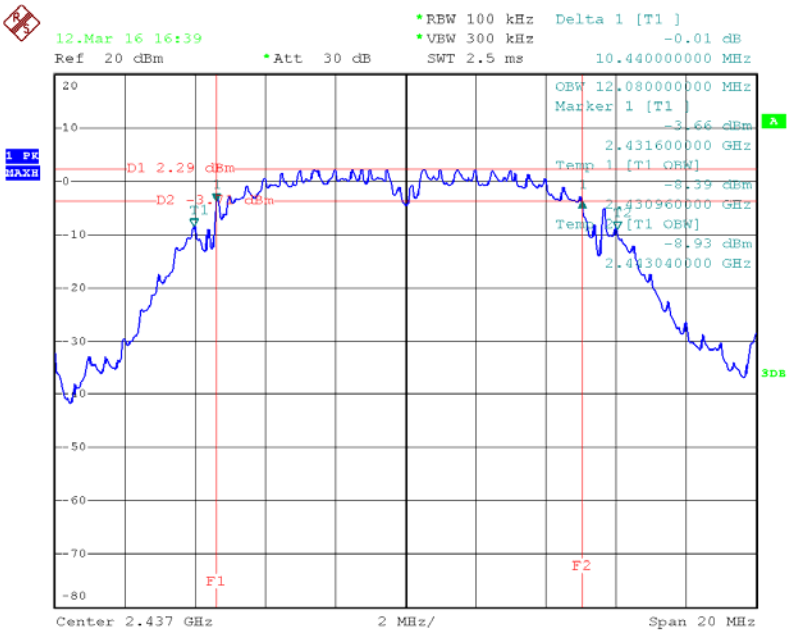
3.5. Test Result

EUT Set Mode	CH or Frequency	6 dB bandwidth	99% dB bandwidth	Limt	Conclusion
		Result (MHz)	Result (MHz)	>500KHz	PASS
11b	CH1	10.44	12.12	>500KHz	PASS
	CH6	10.44	12.08	>500KHz	PASS
	CH11	10.44	12.04	>500KHz	PASS
11g	CH1	16.44	16.44	>500KHz	PASS
	CH6	16.48	16.44	>500KHz	PASS
	CH11	16.44	16.44	>500KHz	PASS
11n HT 20	CH1	17.72	17.68	>500KHz	PASS
	CH6	17.64	17.64	>500KHz	PASS
	CH11	17.68	17.68	>500KHz	PASS

3.6. Original test data

802.11 b Mode





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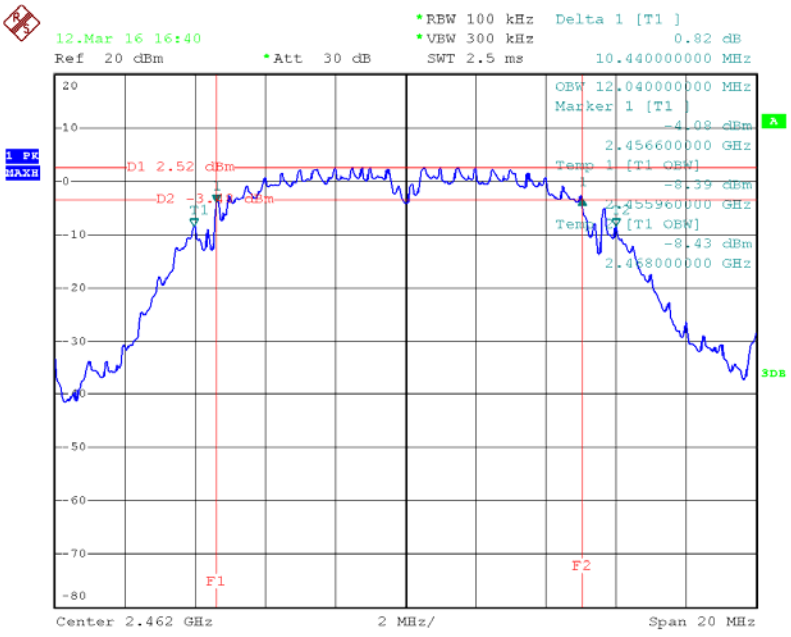

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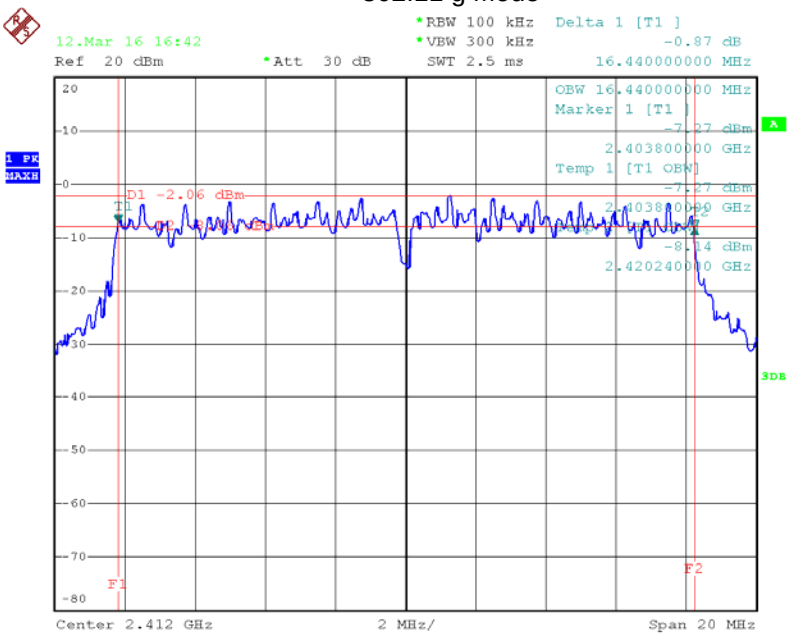
802.11 g Mode



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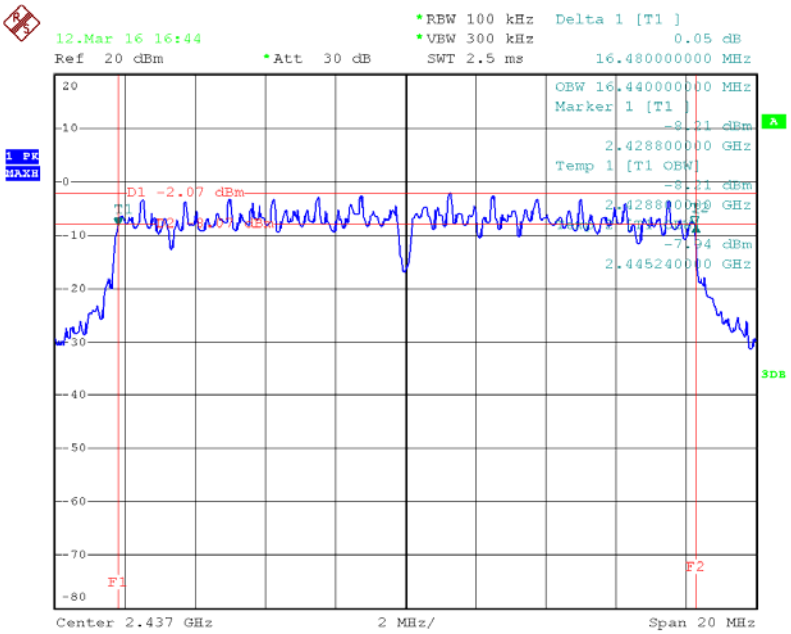

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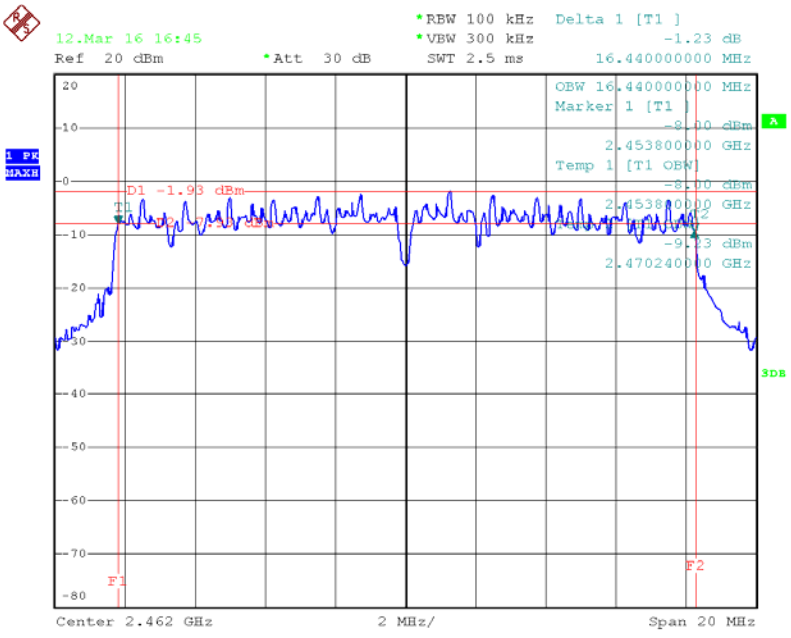

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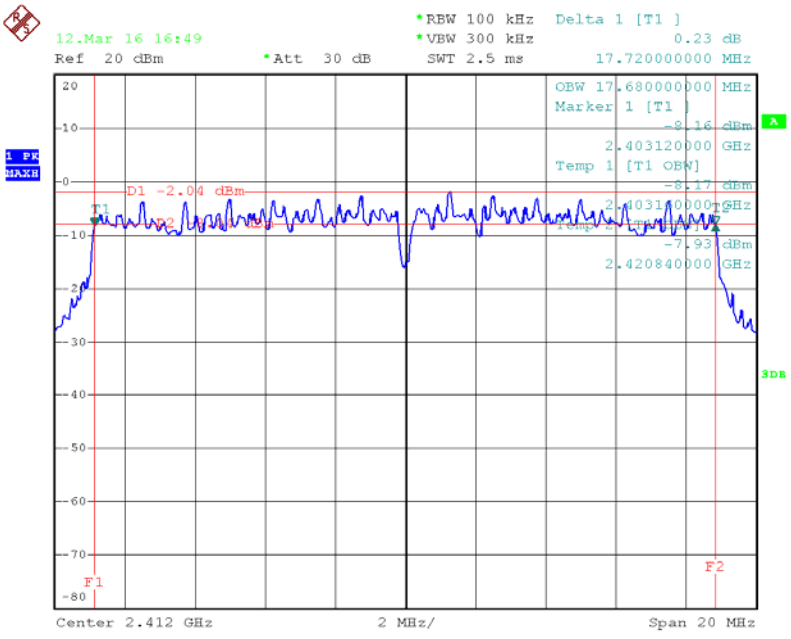
802.11 n20



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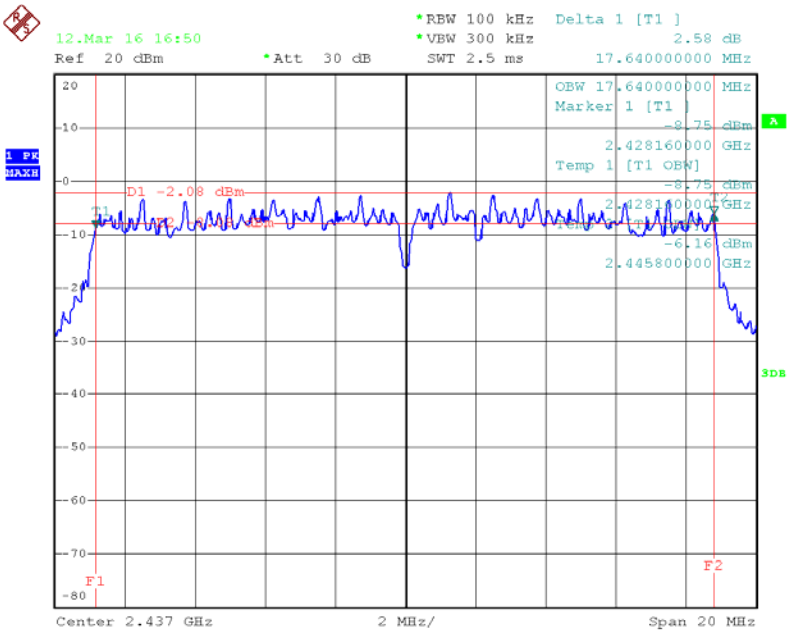

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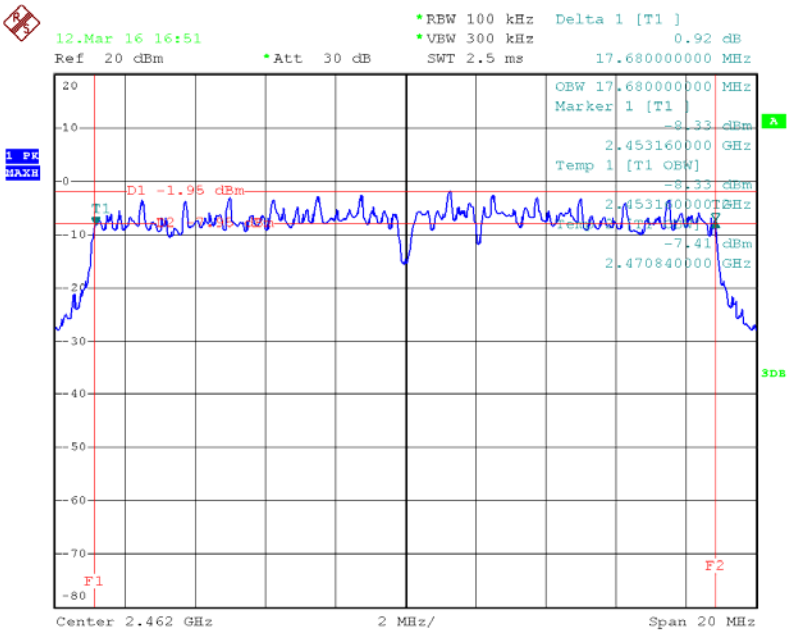

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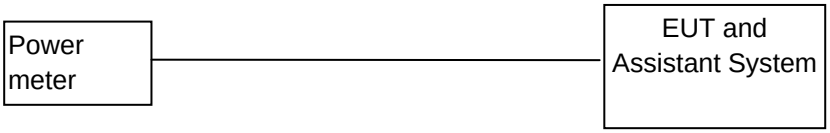
4. Maximum Peak Output Power

4.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Cal. Interval
1	Power meter	Agilent	E4417A	MY45100473	2016/12/19	1Y
2	Wireband Power sensor	Agilent	E4427A	MY5100041	2016/12/19	1Y

4.2. Block diagram of test setup



4.3. Limits

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz bands: 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.4. Test Procedure

1. Place the EUT on a bench and set it in transmitting mode. .
2. A wide band power meter with a matched thermocouple detector was used to directly measure the output power from the RF output port of the EUT in continuously transmitting mode.
3. The measurement shall be repeated at the lowest, the middle, and the highest channel of the stated frequency range.

4.5. TEST RESULT

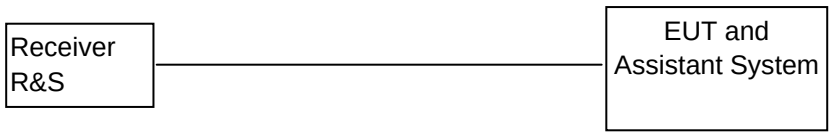
EUT Set Mode	Limit	Conclusion	CH	Result(dBm)
				Peak
11b	30dBm	PASS	CH1	15.18
			CH6	14.97
			CH11	14.98
11g	30dBm	PASS	CH1	15.11
			CH6	15.17
			CH11	15.19
11n HT20	30dBm	PASS	CH1	15.01
			CH6	15.00
			CH11	15.10

5. Power Spectral Density

5.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Cal. Interval
1	EMI Test Receiver	R&S	ESCI	101307	2016/12/19	1Y

5.2. Block diagram of test setup



5.3. Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

5.4. TEST PROCEDURE

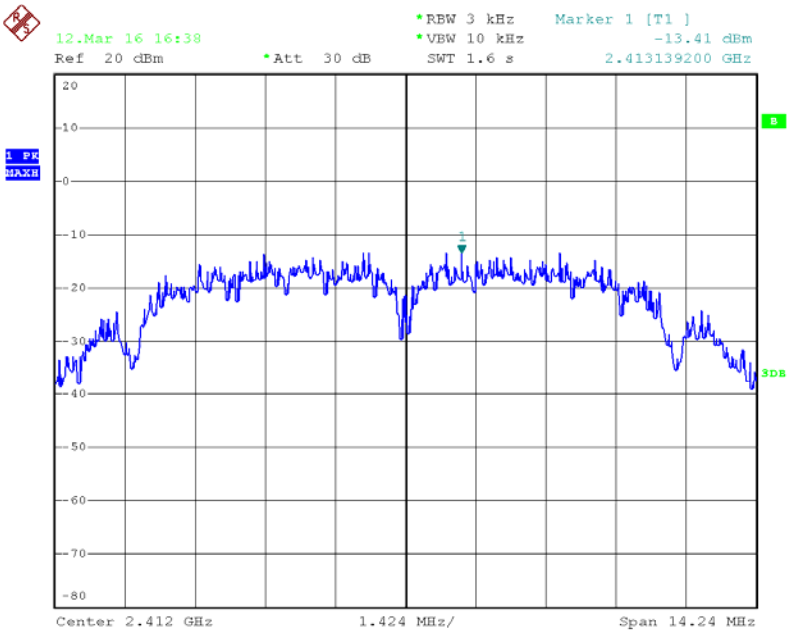
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generatorl.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range
3. According to KDB 558074 D01 DTS Meas Guidance v03, set the RBW = 3 kHz, VBW = 30 kHz, Set the span to 1.5 times the DTS channel bandwidth.
4. Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW

5.5. Test Result

EUT Set Mode	CH or Frequency	Result	Limit: <dBm/3KHz	Conclusion
11b	CH1	-13.41	8	PASS
	CH6	-13.56	8	PASS
	CH11	-13.19	8	PASS
11g	CH1	-24.06	8	PASS
	CH6	-23.92	8	PASS
	CH11	-23.92	8	PASS
11n HT 20	CH1	-20.54	8	PASS
	CH6	-21.64	8	PASS
	CH11	-20.40	8	PASS

5.6. Original test data

802.11 b Mode



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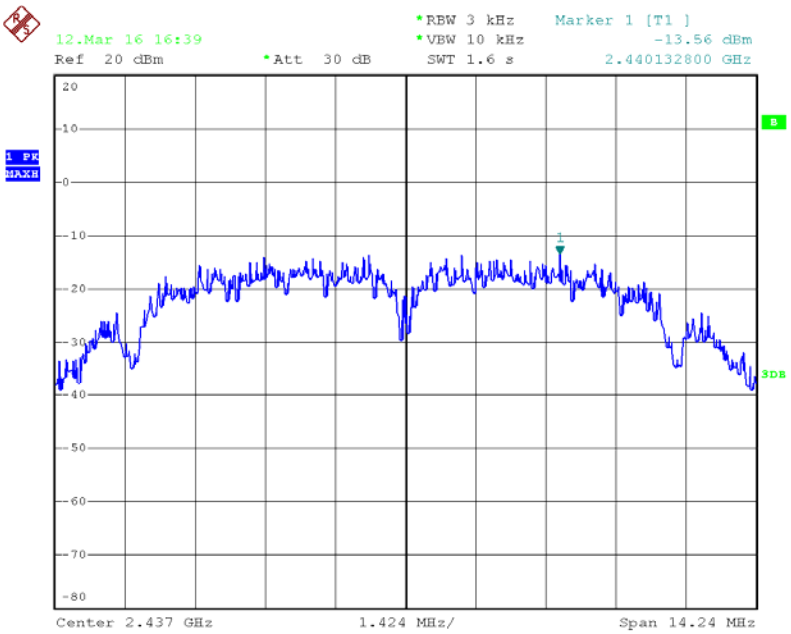

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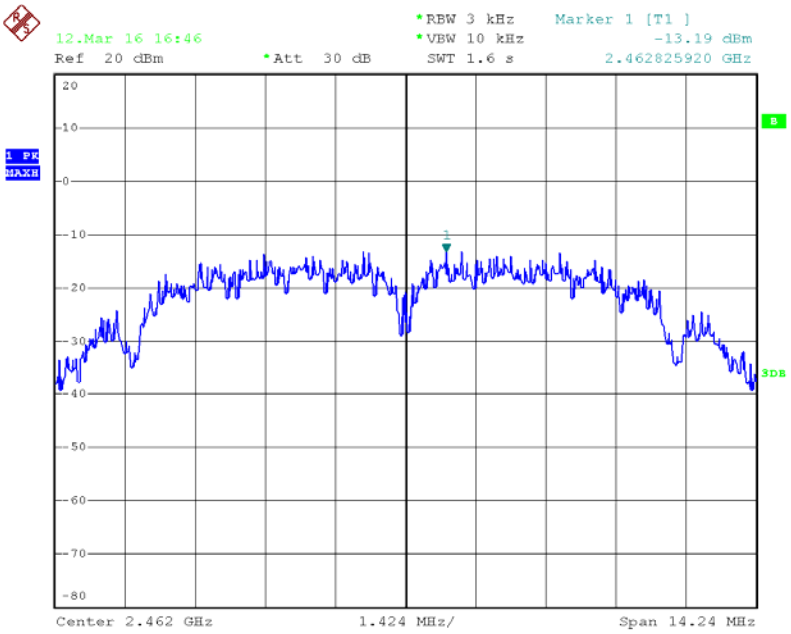
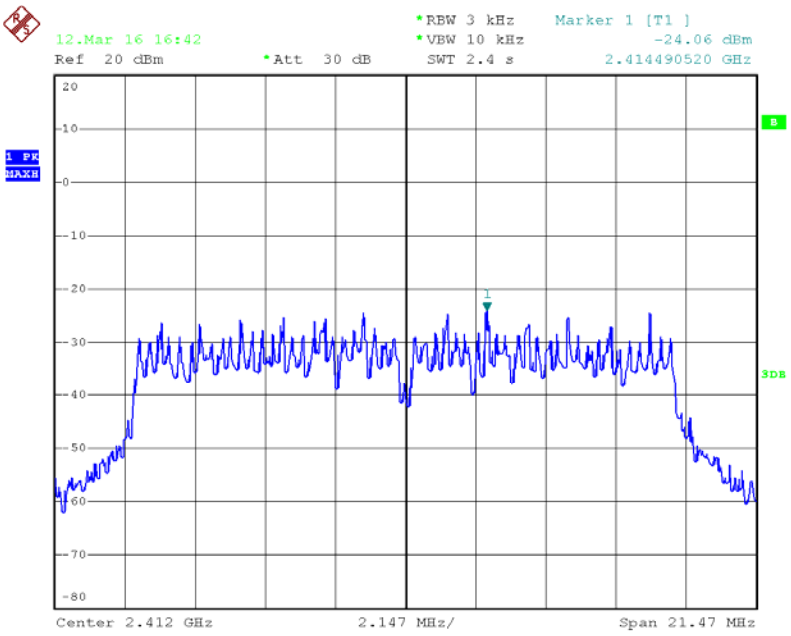
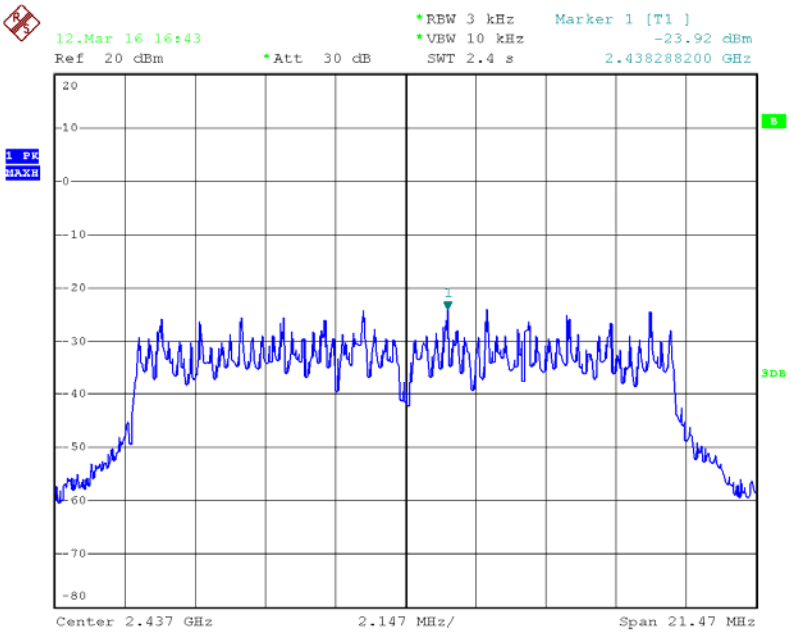

12.Mar 16 16:46
Ref 20 dBm
*Att 30 dB
*RBW 3 kHz
*VBW 10 kHz
SWT 1.6 s
Marker 1 [T1]
-13.19 dBm
2.462825920 GHz
1 PK MAXH
3DB
Center 2.462 GHz
1.424 MHz/
Span 14.24 MHz
Date: 12.MAR.2016 16:46:59

802.11 g Mode


12.Mar 16 16:42
Ref 20 dBm
*Att 30 dB
*RBW 3 kHz
*VBW 10 kHz
SWT 2.4 s
Marker 1 [T1]
-24.06 dBm
2.414490520 GHz
1 PK MAXH
3DB
Center 2.412 GHz
2.147 MHz/
Span 21.47 MHz
Date: 12.MAR.2016 16:42:43



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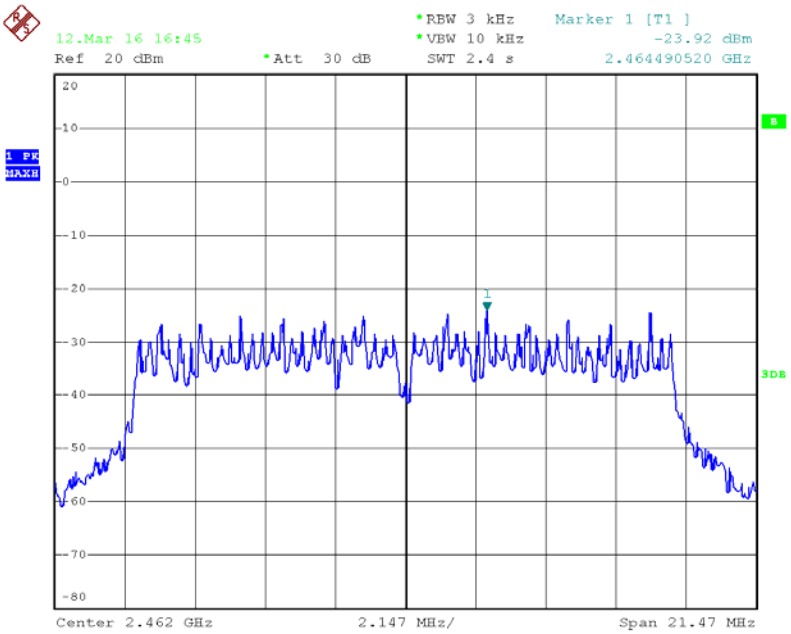

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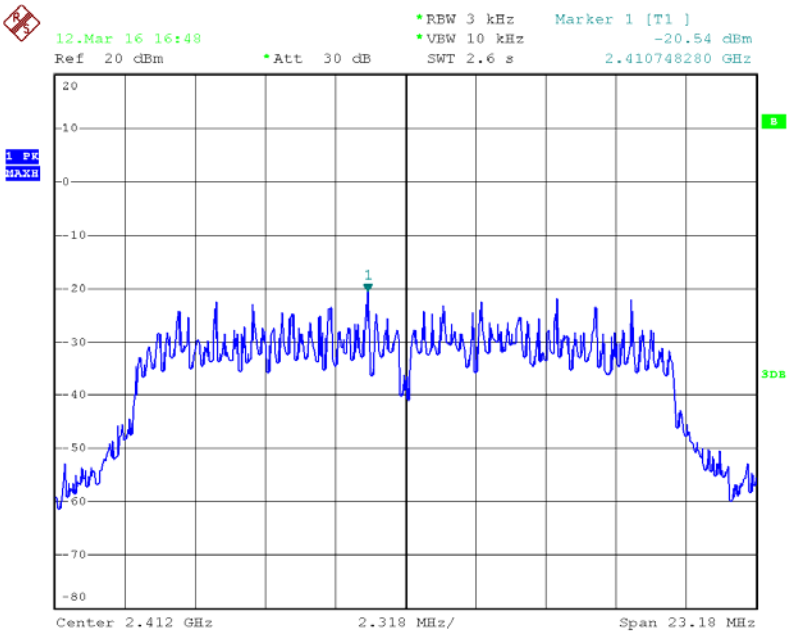
802.11 n20 Mode



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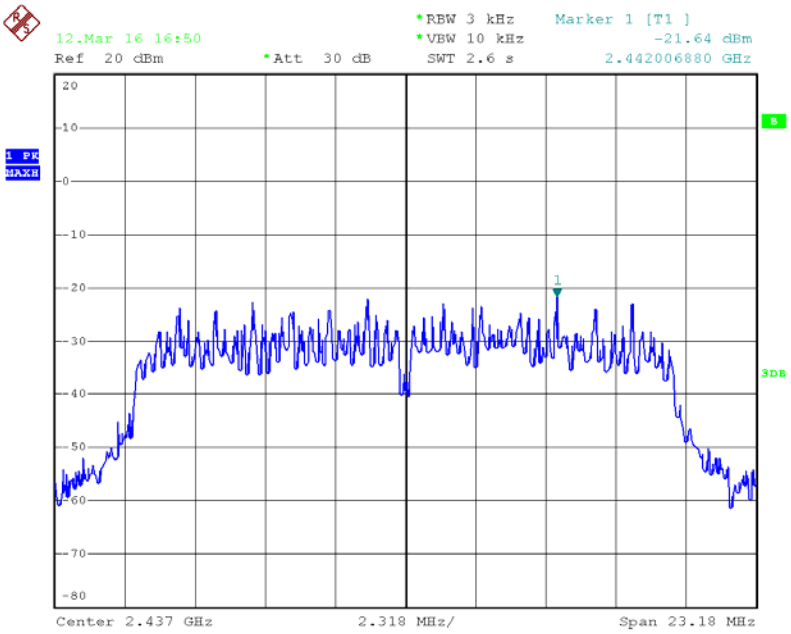

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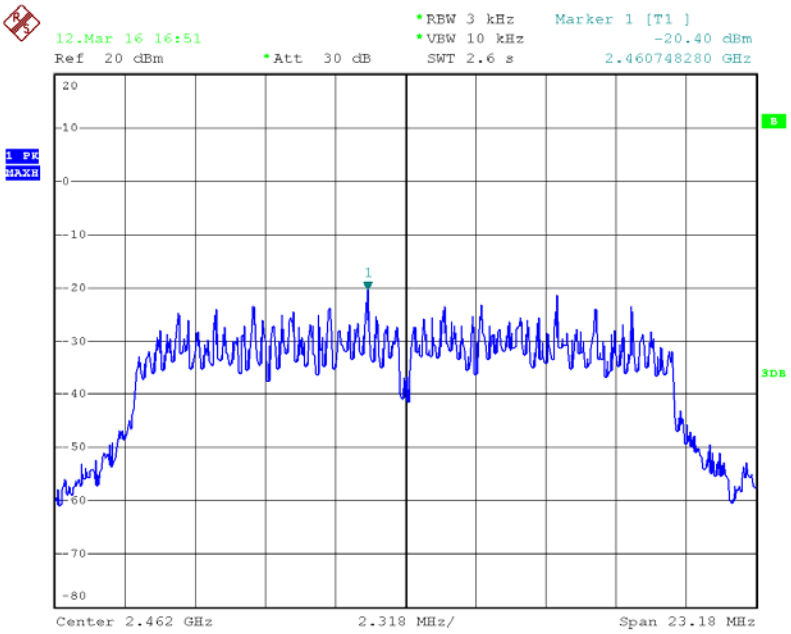

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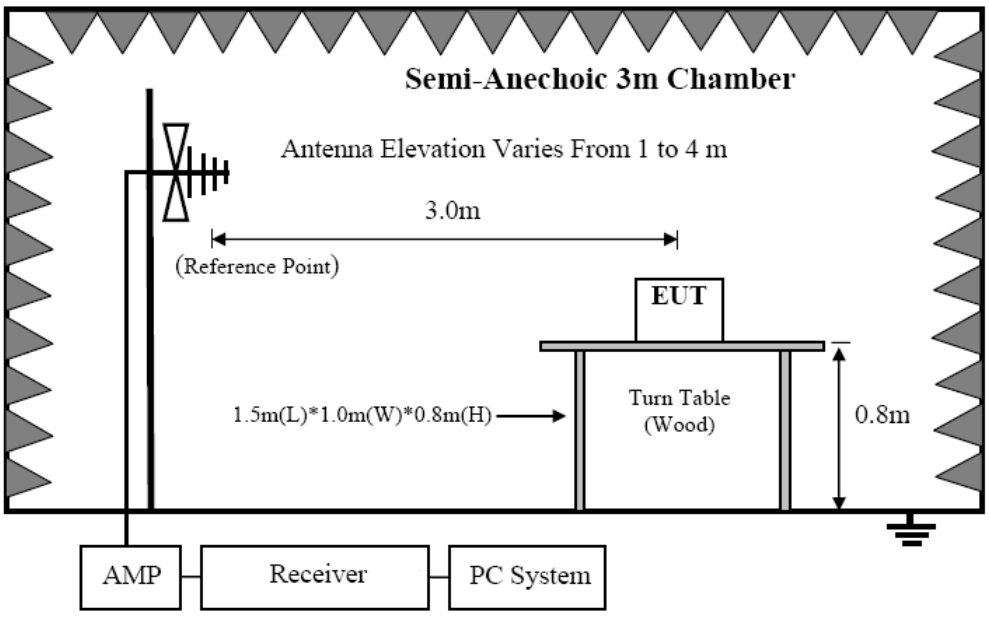
6. Spurious Emissions

6.1. Test equipment

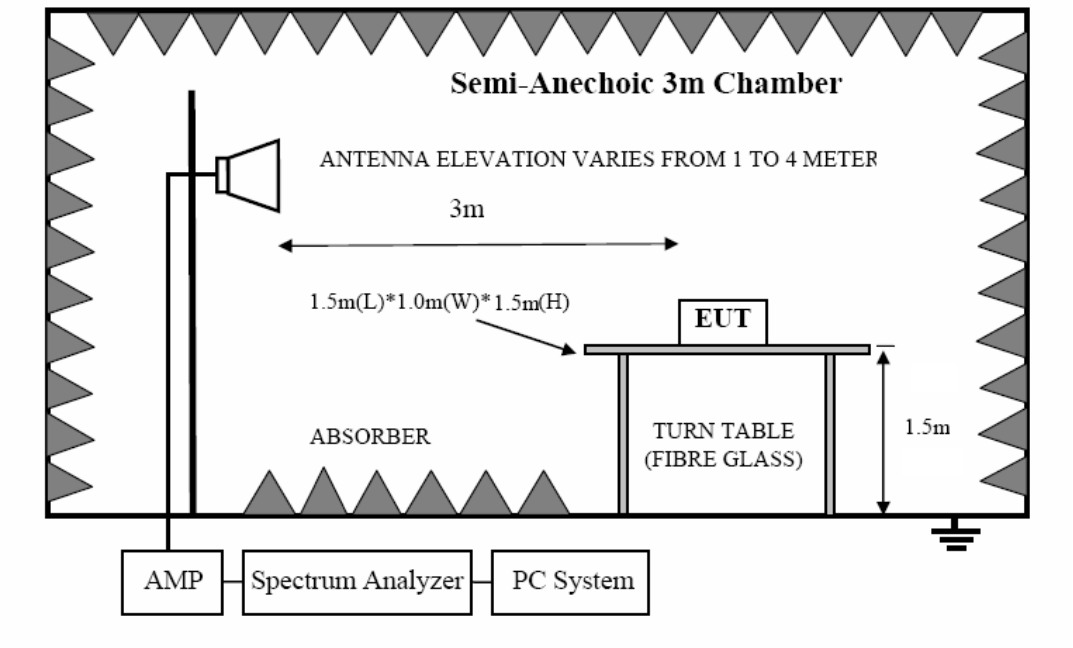
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Cal. Interval
1	EMI Test Receiver	R&S	ESCI	101307	2016/12/19	1Y
2	Spectrum analyzer	Agilent	E4407B	US40240708	2016/07/09	1Y
3	Loop antenna	Chase	HLA6120	20129	2016/12/19	1Y
4	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2016/12/19	1Y
5	Double Ridged Horn Antenna	Schwarzbeck	BBHA9120D	9120D 1065	2016/12/19	1Y
6	Pre-Amplifier	R&S	SCU-01	10049	2016/12/19	1Y
7	Pre-Amplifier	A.H.	PAM0-0118	360	2016/12/19	1Y
8	Pre-Amplifier	HP	8449B	3274A06298	2016/12/19	1Y
9	RF Cable	R&S	R01	10403	2016/12/19	1Y
10	RF Cable	R&S	R02	10512	2016/12/19	1Y
11	Horn Antenna	Schwarzbeck	BBHA 9170	9170 1248	2016/12/19	1Y

6.2. Block diagram of test setup

In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

6.3. Limit

6.3.1 FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

6.3.2 FCC 15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

6.3.3 Limit for this EUT

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the

ANSI C63.10:2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

6.4. TEST PROCEDURE

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.

(2) Setup EUT and assistant system according clause 2.4 and 8.2

(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.

(a) Change work frequency or channel of device if practicable.

(b) Change modulation type of device if practicable.

(c) Change power supply range from 85% to 115% of the rated supply voltage

(d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions

(4) Spectrum frequency from 9MHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.

(5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna

height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2009 on Radiated Emission test.

(6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 KHz.

(7)For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure, Detector is at PK; RBW is set at 1MHz, VBW is set at 3MHz for Average measure, Detector is at RMS..

6.5. Test result

PASS. (See below detailed test result)

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, and section 15.205, 15.209 and 15.247, Vertical and Horizontal mode all have been tested, Horizontal mode is the worse case .with the worst margin reading of:

6.02 dB at 2483.5 MHz in the Horizontal polarization.

Radiated Emission Test Result

Test Site : 3m Chamber
Test Date : 2016-3-12 **Tested By** : Lake Hu
EUT : Wifi Hub **Model Number** : 3209
Power Supply : AC 120V/60Hz **Test Mode** : 802.11 b
Condition : Temp:24.5'C,Humi:55% **Antenna/Distance** : 3m

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel (2412)									
2412	72.24	PK	H	28	3.65	0	103.89	N/A	N/A
2412	30.09	AV	H	28	3.65	0	61.74	N/A	N/A
2412	75.46	PK	V	28	3.65	0	107.11	N/A	N/A
2412	31.37	AV	V	28	3.65	0	63.02	N/A	N/A
2390	23.25	PK	H	28.4	3.57	0	55.22	74	18.78
2390	10.29	AV	H	28.4	3.57	0	42.26	54	11.74
2390	23.62	PK	V	28.4	3.57	0	55.59	74	18.41
2390	10.89	AV	V	28.4	3.57	0	42.86	54	11.14
4824	52.82	PK	H	32.3	5.91	31.78	59.25	74	14.75
4824	40.17	AV	H	32.3	5.91	31.78	46.6	54	7.4
4824	58.12	PK	V	32.3	5.91	31.78	64.55	74	9.45
4824	41.89	AV	V	32.3	5.91	31.78	48.32	54	5.68
7236	33.25	PK	H	36.3	6.34	30.97	44.92	74	29.08
7236	22.67	AV	H	36.3	6.34	30.97	34.34	54	19.66
7236	33.02	PK	V	36.3	6.34	30.97	44.69	74	29.31
7236	22.41	AV	V	36.3	6.34	30.97	34.08	54	19.92
9648	29.57	PK	H	37.9	8.01	30.86	44.62	74	29.38
9648	18.21	AV	H	37.9	8.01	30.86	33.26	54	20.74
9648	29.14	PK	V	37.9	8.01	30.86	44.19	74	29.81
9648	18.49	AV	V	37.9	8.01	30.86	33.54	54	20.46
1.428	23.75	QP	0°	19.56	0	0	43.31	64.51	21.2
1.759	25.17	QP	90°	19.53	0	0	44.69	69.54	24.85
329.58	34.52	QP	H	12.8	2.63	27.2	22.75	46	23.25
356.47	39.67	QP	V	12.8	2.63	27.2	27.9	46	18.1

Middle Channel (2437)									
2437	69.89	PK	H	28.7	3.74	0	102.33	N/A	N/A
2437	27.46	AV	H	28.7	3.74	0	59.9	N/A	N/A
2437	74.35	PK	V	28.7	3.74	0	106.79	N/A	N/A
2437	30.14	AV	V	28.7	3.74	0	62.58	N/A	N/A
4874	53.82	PK	H	32.6	6.15	31.78	60.79	74	13.21
4874	40.42	AV	H	32.6	6.15	31.78	47.39	54	6.61
4874	56.95	PK	V	32.6	6.15	31.78	63.92	74	10.08
4874	41.06	AV	V	32.6	6.15	31.78	48.03	54	5.97
7311	33.33	PK	H	36.7	6.22	30.97	45.28	74	28.72
7311	22.41	AV	H	36.7	6.22	30.97	34.36	54	19.64
7311	33.58	PK	V	36.7	6.22	30.97	45.53	74	28.47
7311	22.37	AV	V	36.7	6.22	30.97	34.32	54	19.68
9748	29.15	PK	H	38.2	8.11	30.86	44.6	74	29.4
9748	18.02	AV	H	38.2	8.11	30.86	33.47	54	20.53
9748	29.49	PK	V	38.2	8.11	30.86	44.94	74	29.06
9748	18.53	AV	V	38.2	8.11	30.86	33.98	54	20.02
1.764	24.61	QP	0°	19.56	0	0	44.13	69.54	25.41
1.494	26.58	QP	90°	19.53	0	0	46.13	64.12	17.99
330.15	33.94	QP	H	12.8	2.63	27.2	22.17	46	23.83
358.05	38.71	QP	V	12.8	2.63	27.2	26.94	46	19.06
High Channel (2462)									
2462	71.42	PK	H	29.1	3.81	0	104.33	N/A	N/A
2462	27.81	AV	H	29.1	3.81	0	60.72	N/A	N/A
2462	74.96	PK	V	29.1	3.81	0	107.87	N/A	N/A
2462	30.43	AV	V	29.1	3.81	0	63.34	N/A	N/A
2483.5	23.67	PK	H	28.7	3.62	0	55.99	74	18.01
2483.5	11.27	AV	H	28.7	3.62	0	43.59	54	10.41
2483.5	23.75	PK	V	28.7	3.62	0	56.07	74	17.93
2483.5	11.42	AV	V	28.7	3.62	0	43.74	54	10.26
4924	51.74	PK	H	32.8	6.17	31.78	58.93	74	15.07
4924	38.22	AV	H	32.8	6.17	31.78	45.41	54	8.59
4924	56.59	PK	V	32.8	6.17	31.78	63.78	74	10.22
4924	40.37	AV	V	32.8	6.17	31.78	47.56	54	6.44
7386	33.41	PK	H	36.8	6.26	30.97	45.5	74	28.5
7386	22.08	AV	H	36.8	6.26	30.97	34.17	54	19.83
7386	33.35	PK	V	36.8	6.26	30.97	45.44	74	28.56
7386	22.54	AV	V	36.8	6.26	30.97	34.63	54	19.37
9848	29.62	PK	H	38.4	8.17	30.86	45.33	74	28.67

9848	18.47	AV	H	38.4	8.17	30.86	34.18	54	19.82
9848	29.36	PK	V	38.4	8.17	30.86	45.07	74	28.93
9848	18.51	AV	V	38.4	8.17	30.86	34.22	54	19.78
1.653	22.89	QP	0°	19.56	0	0	42.42	63.24	20.82
1.774	24.98	QP	90°	19.53	0	0	44.50	69.54	25.04
326.97	32.64	QP	H	12.8	2.63	27.2	20.87	46	25.13
356.24	39.06	QP	V	12.8	2.63	27.2	27.29	46	18.71

Test Site : 3m Chamber
Test Date : 2016-03-12 **Tested By** : Lake Hu
EUT : Wifi Hub **Model Number** : 3209
Power Supply : AC 120V/60Hz **Test Mode** : 802.11 g
Condition : Temp:24.5'C,Humi:55% **Antenna/Distance** : 3m

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel (2412)									
2412	65.85	PK	H	28	3.65	0	97.5	N/A	N/A
2412	15.04	AV	H	28	3.65	0	46.69	N/A	N/A
2412	73.65	PK	V	28	3.65	0	105.3	N/A	N/A
2412	17.18	AV	V	28	3.65	0	48.83	N/A	N/A
2390	22.32	PK	H	28.4	3.57	0	54.29	74	19.71
2390	9.87	AV	H	28.4	3.57	0	41.84	54	12.16
2390	31.54	PK	V	28.4	3.57	0	63.51	74	10.49
2390	10.89	AV	V	28.4	3.57	0	42.86	54	11.14
4824	52.49	PK	H	32.3	5.91	31.78	58.92	74	15.08
4824	34.14	AV	H	32.3	5.91	31.78	40.57	54	13.43
4824	54.06	PK	V	32.3	5.91	31.78	60.49	74	13.51
4824	36.58	AV	V	32.3	5.91	31.78	43.01	54	10.99
7236	33.85	PK	H	36.3	6.34	30.97	45.52	74	28.48
7236	22.04	AV	H	36.3	6.34	30.97	33.71	54	20.29
7236	33.12	PK	V	36.3	6.34	30.97	44.79	74	29.21
7236	22.79	AV	V	36.3	6.34	30.97	34.46	54	19.54
9648	29.41	PK	H	37.9	8.01	30.86	44.46	74	29.54
9648	18.52	AV	H	37.9	8.01	30.86	33.57	54	20.43
9648	29.65	PK	V	37.9	8.01	30.86	44.7	74	29.3
9648	19.34	AV	V	37.9	8.01	30.86	34.39	54	19.61
1.774	23.48	QP	0°	19.56	0	0	43.00	69.54	26.54
1.652	25.03	QP	90°	19.53	0	0	44.56	63.24	18.68
327.45	33.41	QP	H	12.8	2.63	27.2	21.64	46	24.36
355.09	40.15	QP	V	12.8	2.63	27.2	28.38	46	17.62
Middle Channel (2437)									
2437	64.72	PK	H	28.7	3.74	0	97.16	N/A	N/A
2437	14.89	AV	H	28.7	3.74	0	47.33	N/A	N/A
2437	74.22	PK	V	28.7	3.74	0	106.66	N/A	N/A
2437	17.38	AV	V	28.7	3.74	0	49.82	N/A	N/A

4874	50.17	PK	H	32.6	6.15	31.78	57.14	74	16.86
4874	33.62	AV	H	32.6	6.15	31.78	40.59	54	13.41
4874	54.89	PK	V	32.6	6.15	31.78	61.86	74	12.14
4874	38.02	AV	V	32.6	6.15	31.78	44.99	54	9.01
7311	32.47	PK	H	36.7	6.22	30.97	44.42	74	29.58
7311	23.15	AV	H	36.7	6.22	30.97	35.1	54	18.9
7311	33.06	PK	V	36.7	6.22	30.97	45.01	74	28.99
7311	22.87	AV	V	36.7	6.22	30.97	34.82	54	19.18
9748	29.85	PK	H	38.2	8.11	30.86	45.3	74	28.7
9748	18.74	AV	H	38.2	8.11	30.86	34.19	54	19.81
9748	29.66	PK	V	38.2	8.11	30.86	45.11	74	28.89
9748	20.01	AV	V	38.2	8.11	30.86	35.46	54	18.54
1.592	24.09	QP	0°	19.56	0	0	43.63	63.57	19.94
1.525	25.44	QP	90°	19.53	0	0	44.99	63.94	18.95
331.74	32.75	QP	H	12.8	2.63	27.2	20.98	46	25.02
359.28	39.64	QP	V	12.8	2.63	27.2	27.87	46	18.13
High Channel (2462)									
2462	66.87	PK	H	29.1	3.81	0	99.78	N/A	N/A
2462	13.71	AV	H	29.1	3.81	0	46.62	N/A	N/A
2462	73.52	PK	V	29.1	3.81	0	106.43	N/A	N/A
2462	15.91	AV	V	29.1	3.81	0	48.82	N/A	N/A
2483.5	33.44	PK	H	28.7	3.62	0	65.76	74	8.24
2483.5	10.36	AV	H	28.7	3.62	0	42.68	54	11.32
2483.5	33.19	PK	V	28.7	3.62	0	65.51	74	8.49
2483.5	10.56	AV	V	28.7	3.62	0	42.88	54	11.12
4924	51.24	PK	H	32.8	6.17	31.78	58.43	74	15.57
4924	33.98	AV	H	32.8	6.17	31.78	41.17	54	12.83
4924	54.17	PK	V	32.8	6.17	31.78	61.36	74	12.64
4924	36.16	AV	V	32.8	6.17	31.78	43.35	54	10.65
7386	33.02	PK	H	36.8	6.26	30.97	45.11	74	28.89
7386	22.45	AV	H	36.8	6.26	30.97	34.54	54	19.46
7386	32.17	PK	V	36.8	6.26	30.97	44.26	74	29.74
7386	22.85	AV	V	36.8	6.26	30.97	34.94	54	19.06
9848	29.14	PK	H	38.4	8.17	30.86	44.85	74	29.15
9848	19.27	AV	H	38.4	8.17	30.86	34.98	54	19.02
9848	28.54	PK	V	38.4	8.17	30.86	44.25	74	29.75
9848	17.35	AV	V	38.4	8.17	30.86	33.06	54	20.94
1.387	22.85	QP	0°	19.56	0	0	42.41	64.76	22.35
2.013	26.75	QP	90°	19.53	0	0	46.24	69.54	23.30

329.79	33.65	QP	H	12.8	2.63	27.2	21.88	46	24.12
355.92	38.41	QP	V	12.8	2.63	27.2	26.64	46	19.36

Test Site : 3m Chamber
Test Date : 2016-03-12 **Tested By** : Lake Hu
EUT : Wifi Hub **Model Number** : 3209
Power Supply : AC 120V/60Hz **Test Mode** : 802.11 n20
Condition : Temp:24.5'C,Humi:55% **Antenna/Distance** : 3m

Frequency	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.247	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBμV/m)	Margin (dB)
Low Channel (2412)									
2412	66.14	PK	H	28	3.65	0	97.79	N/A	N/A
2412	15.11	AV	H	28	3.65	0	46.76	N/A	N/A
2412	73.98	PK	V	28	3.65	0	105.63	N/A	N/A
2412	17.22	AV	V	28	3.65	0	48.87	N/A	N/A
2390	22.39	PK	H	28.4	3.57	0	54.36	74	19.64
2390	10.02	AV	H	28.4	3.57	0	41.99	54	12.01
2390	32.18	PK	V	28.4	3.57	0	64.15	74	9.85
2390	11.24	AV	V	28.4	3.57	0	43.21	54	10.79
4824	50.17	PK	H	32.3	5.91	31.78	56.6	74	17.4
4824	33.02	AV	H	32.3	5.91	31.78	39.45	54	14.55
4824	54.14	PK	V	32.3	5.91	31.78	60.57	74	13.43
4824	37.25	AV	V	32.3	5.91	31.78	43.68	54	10.32
7236	33.85	PK	H	36.3	6.34	30.97	45.52	74	28.48
7236	22.04	AV	H	36.3	6.34	30.97	33.71	54	20.29
7236	32.16	PK	V	36.3	6.34	30.97	43.83	74	30.17
7236	22.74	AV	V	36.3	6.34	30.97	34.41	54	19.59
9648	30.02	PK	H	37.9	8.01	30.86	45.07	74	28.93
9648	19.45	AV	H	37.9	8.01	30.86	34.5	54	19.5
9648	29.79	PK	V	37.9	8.01	30.86	44.84	74	29.16
9648	18.34	AV	V	37.9	8.01	30.86	33.39	54	20.61
1.567	23.51	QP	0°	19.56	0	0	43.05	63.70	20.65
1.746	25.38	QP	90°	19.53	0	0	44.91	69.54	24.63
328.56	33.74	QP	H	12.8	2.63	27.2	21.97	46	24.03
356.27	37.49	QP	V	12.8	2.63	27.2	25.72	46	20.28
Middle Channel (2437)									
2437	65.78	PK	H	28.7	3.74	0	98.22	N/A	N/A
2437	15.22	AV	H	28.7	3.74	0	47.66	N/A	N/A
2437	74.01	PK	V	28.7	3.74	0	106.45	N/A	N/A
2437	17.95	AV	V	28.7	3.74	0	50.39	N/A	N/A

4874	52.01	PK	H	32.6	6.15	31.78	58.98	74	15.02
4874	34.25	AV	H	32.6	6.15	31.78	41.22	54	12.78
4874	54.15	PK	V	32.6	6.15	31.78	61.12	74	12.88
4874	37.89	AV	V	32.6	6.15	31.78	44.86	54	9.14
7311	33.06	PK	H	36.7	6.22	30.97	45.01	74	28.99
7311	22.34	AV	H	36.7	6.22	30.97	34.29	54	19.71
7311	32.17	PK	V	36.7	6.22	30.97	44.12	74	29.88
7311	22.84	AV	V	36.7	6.22	30.97	34.79	54	19.21
9748	29.68	PK	H	38.2	8.11	30.86	45.13	74	28.87
9748	18.79	AV	H	38.2	8.11	30.86	34.24	54	19.76
9748	28.63	PK	V	38.2	8.11	30.86	44.08	74	29.92
9748	17.74	AV	V	38.2	8.11	30.86	33.19	54	20.81
1.724	24.17	QP	0°	19.56	0	0	43.70	69.54	25.84
1.695	24.76	QP	90°	19.53	0	0	44.29	63.02	18.73
324.71	31.75	QP	H	12.8	2.63	27.2	19.98	46	26.02
355.98	39.04	QP	V	12.8	2.63	27.2	27.27	46	18.73
High Channel (2462)									
2462	66.33	PK	H	29.1	3.81	0	99.24	N/A	N/A
2462	14.02	AV	H	29.1	3.81	0	46.93	N/A	N/A
2462	73.69	PK	V	29.1	3.81	0	106.6	N/A	N/A
2462	15.87	AV	V	29.1	3.81	0	48.78	N/A	N/A
2483.5	34.13	PK	H	28.7	3.62	0	66.45	74	7.55
2483.5	10.96	AV	H	28.7	3.62	0	43.28	54	10.72
2483.5	33.05	PK	V	28.7	3.62	0	65.37	74	8.63
2483.5	10.88	AV	V	28.7	3.62	0	43.2	54	10.8
4924	51.78	PK	H	32.8	6.17	31.78	58.97	74	15.03
4924	34.56	AV	H	32.8	6.17	31.78	41.75	54	12.25
4924	53.02	PK	V	32.8	6.17	31.78	60.21	74	13.79
4924	36.89	AV	V	32.8	6.17	31.78	44.08	54	9.92
7386	33.62	PK	H	36.8	6.26	30.97	45.71	74	28.29
7386	22.14	AV	H	36.8	6.26	30.97	34.23	54	19.77
7386	32.06	PK	V	36.8	6.26	30.97	44.15	74	29.85
7386	22.54	AV	V	36.8	6.26	30.97	34.63	54	19.37
9848	28.76	PK	H	38.4	8.17	30.86	44.47	74	29.53
9848	17.53	AV	H	38.4	8.17	30.86	33.24	54	20.76
9848	28.78	PK	V	38.4	8.17	30.86	44.49	74	29.51
9848	19.24	AV	V	38.4	8.17	30.86	34.95	54	19.05
1.692	24.29	QP	0°	19.56	0	0	43.82	63.04	19.22
1.832	25.03	QP	90°	19.53	0	0	44.55	69.54	24.99

328.45	32.85	QP	H	12.8	2.63	27.2	21.08	46	24.92
357.82	38.17	QP	V	12.8	2.63	27.2	26.4	46	19.6

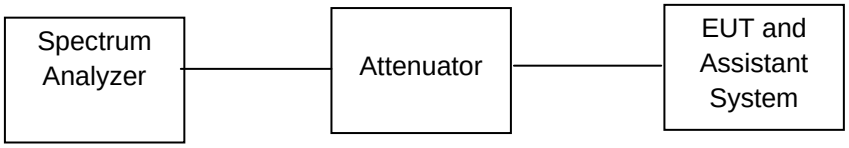
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor
2. If Peak Result comply with QP limit, QP Result is deemed to comply with QP limit

7. 100 kHz Bandwidth of Frequency Band Edge

7.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Cal. Interval
1	Spectrum analyzer	Agilent	E4407B	US40240708	2016/12/19	1Y
2	RF Cable	R&S	R02	10512	2016/12/19	1Y

7.2. Block diagram of test setup



7.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

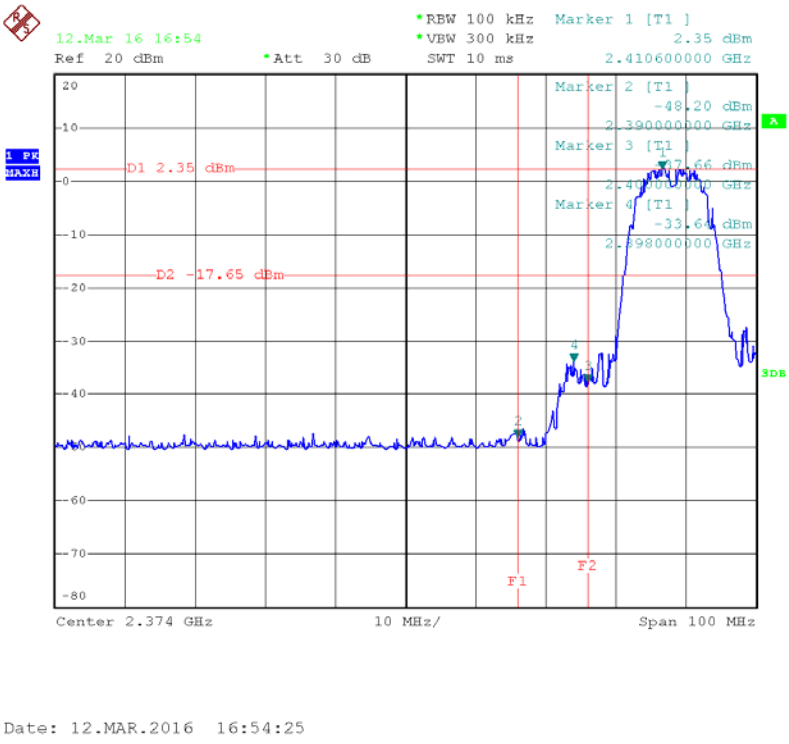
7.4. Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

7.5. Test result

PASS. (hopping on and hopping off mode all have been tested ，hopping off mode is the worse case ,See below detailed test result)

802.11 b Mode



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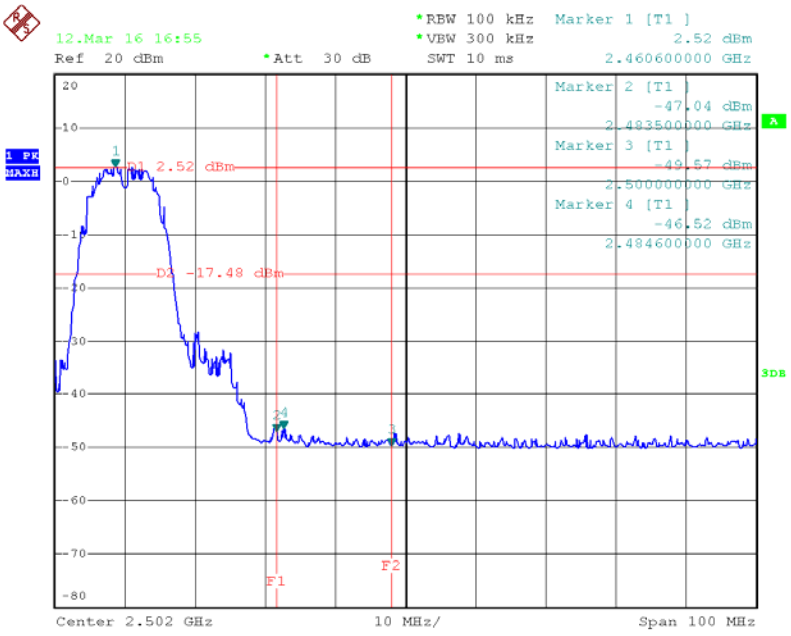
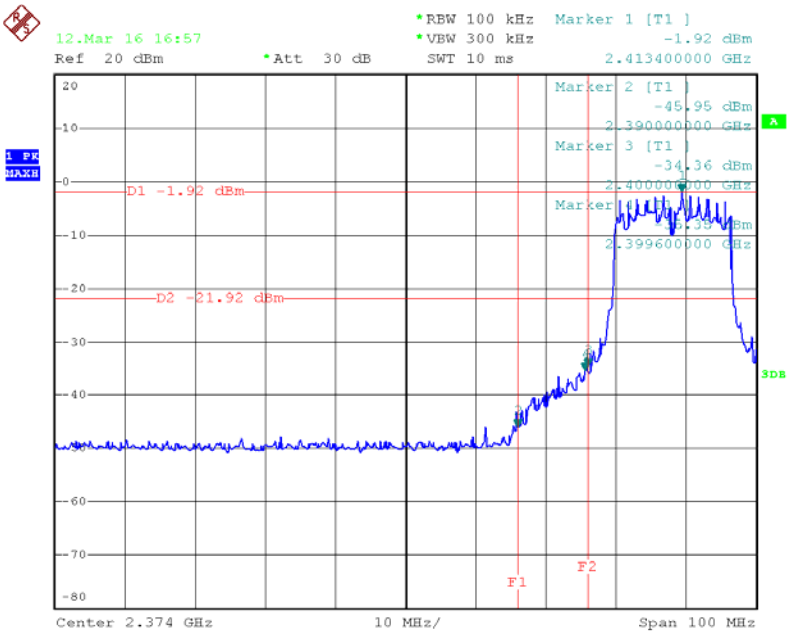
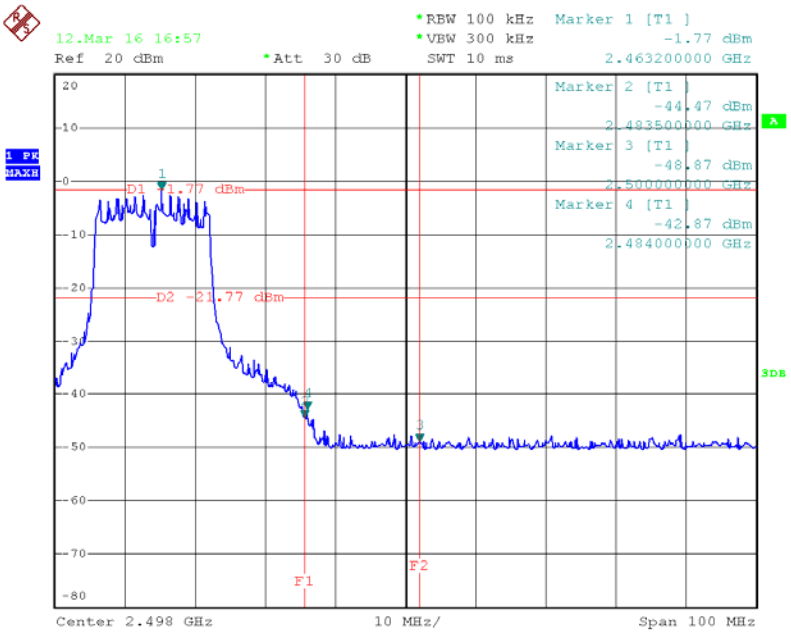


Date: 12.MAR.2016 16:55:48

802.11 g Mode

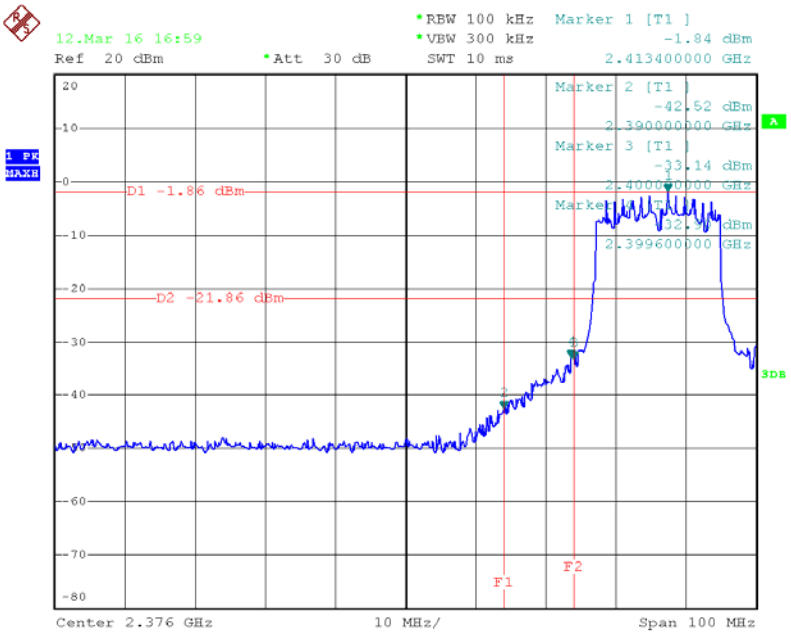


Date: 12.MAR.2016 16:57:04



Date: 12.MAR.2016 16:57:58

802.11 n20 Mode



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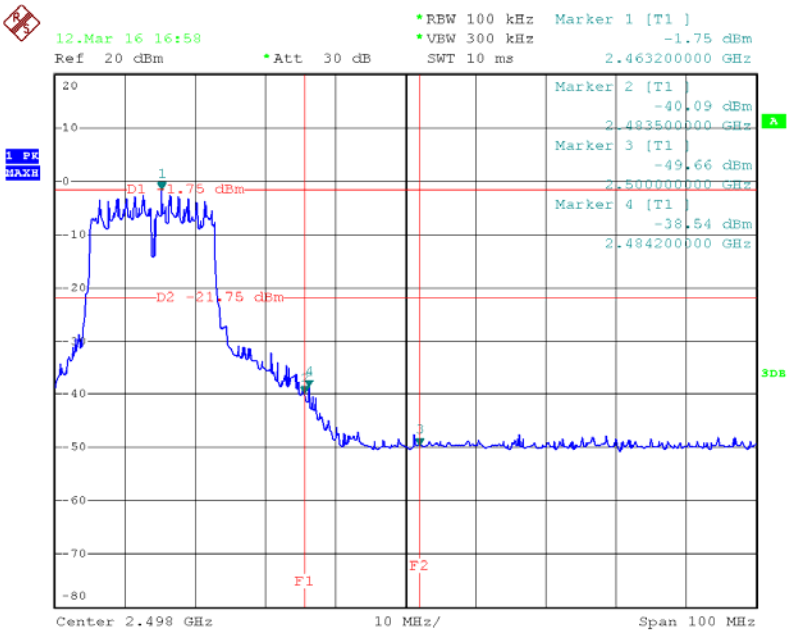


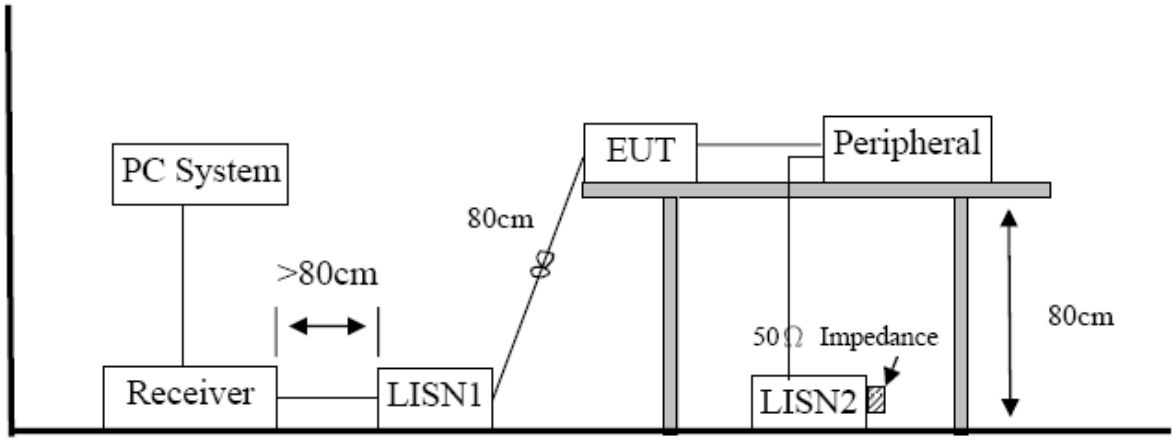
Date: 12.MAR.2016 16:58:52

8. Power Line Conducted Emission

8.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Cal. Interval
1	Test Receiver	R&S	ESCI	101308	2016/12/19	1 Year
2	LISN 1	AFJ	LS16	16011103219	2016/12/19	1 Year
3	LISN 2	R&S	ESH2-Z5	100309	2016/12/19	1 Year
4	Pulse Limiter	MTS-systemtechnik	MTS-IMP-136	261115-010-0024	2016/12/19	1 Year

8.2. Block diagram of test setup



8.3. Power Line Conducted Emission Limits(Class B)

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

8.4. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

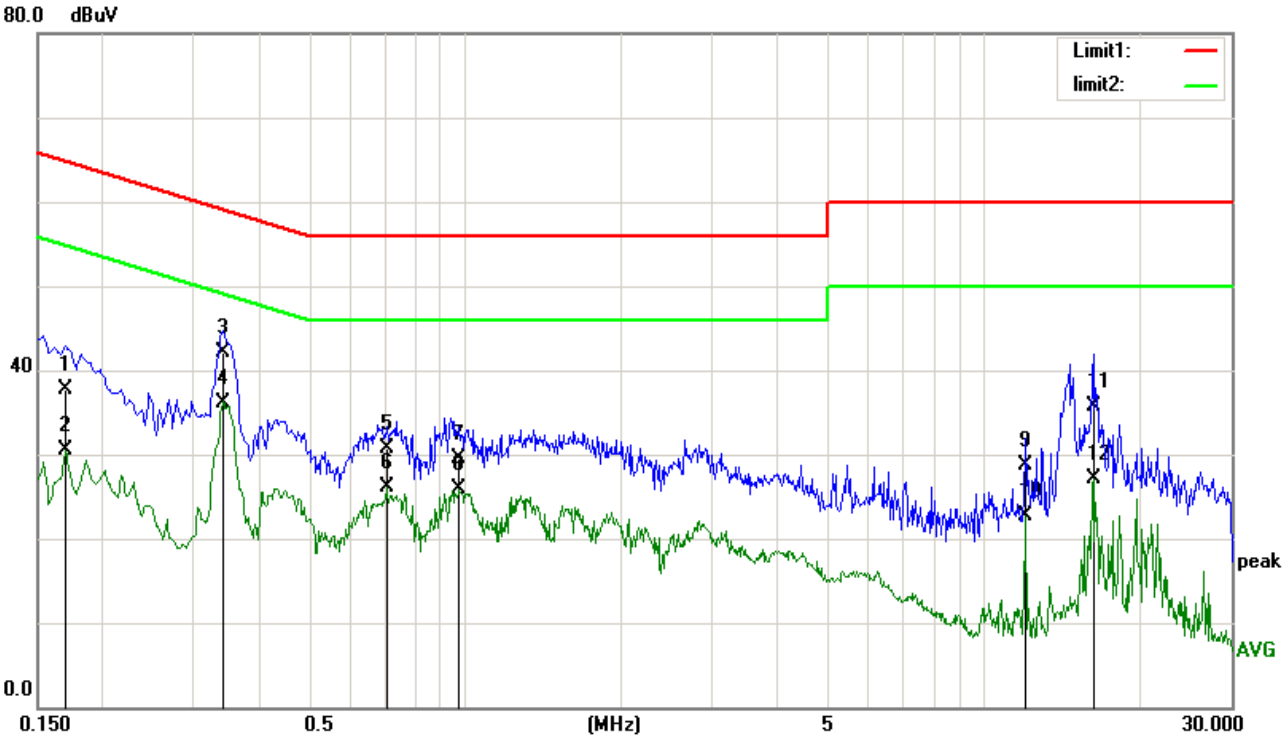
The bandwidth of test receiver is set at 9 KHz.

8.5. Test Result

pass. (See below detailed test result)

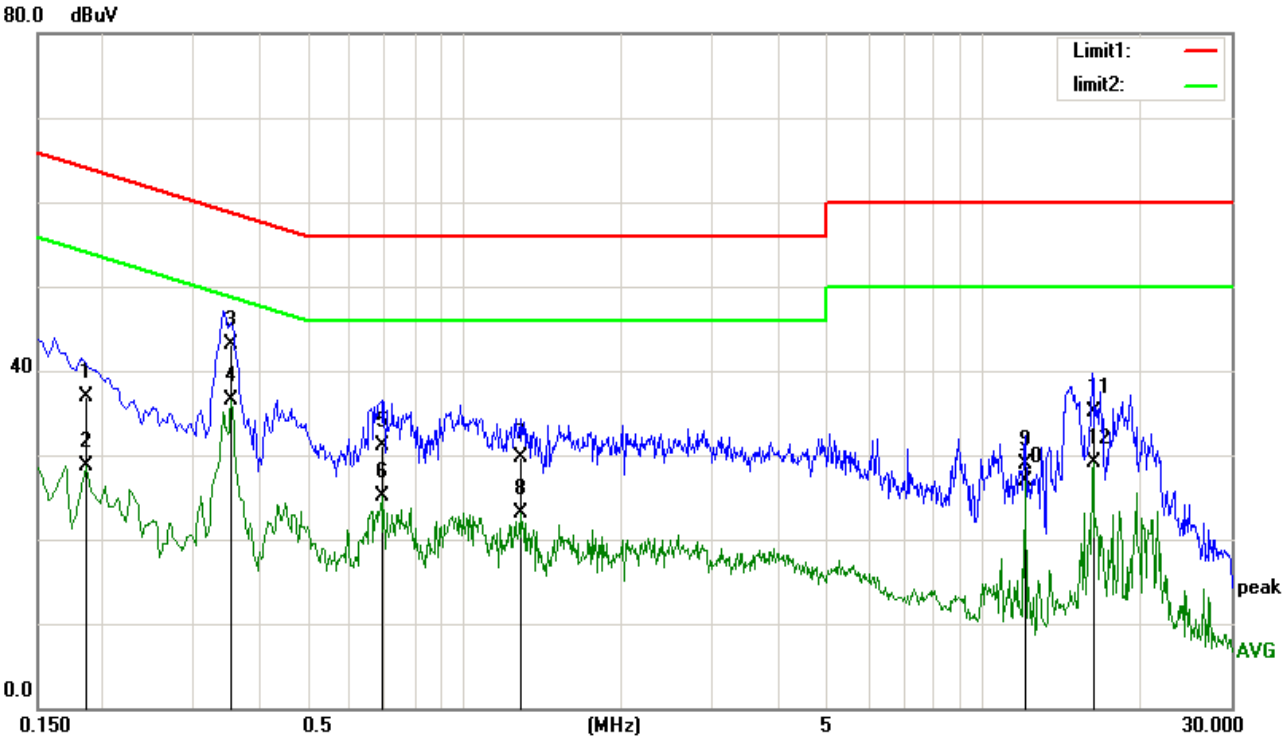
Note1: All emissions not reported below are too low against the prescribed limits.
Note2: "-----" means average detection; "-----" mans peak detection

EUT:	Wifi Hub	Model No.:	3209
Temperature:	24℃	Relative Humidity:	55%
Probe:	L1	Test Power:	AC 120V/60Hz
Standard:	FCC PART 15 class B	Test Result:	Pass
Test Mode:	TX B MODE 2412MHz	Test By:	Lake



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1700	26.36	11.33	37.69	64.96	-27.27	QP
2	0.1700	19.08	11.33	30.41	54.96	-24.55	AVG
3	0.3420	31.63	10.39	42.02	59.15	-17.13	QP
4	0.3420	25.81	10.39	36.20	49.15	-12.95	AVG
5	0.7060	20.62	10.12	30.74	56.00	-25.26	QP
6	0.7060	15.99	10.12	26.11	46.00	-19.89	AVG
7	0.9780	19.41	10.10	29.51	56.00	-26.49	QP
8	0.9780	15.78	10.10	25.88	46.00	-20.12	AVG
9	12.0020	18.46	10.16	28.62	60.00	-31.38	QP
10	12.0020	12.49	10.16	22.65	50.00	-27.35	AVG
11	16.2300	25.63	10.16	35.79	60.00	-24.21	QP
12	16.2300	17.01	10.16	27.17	50.00	-22.83	AVG

EUT:	Wifi Hub	Model No.:	3209
Temperature:	24℃	Relative Humidity:	55%
Probe:	N	Test Power:	AC 120V/60Hz
Standard:	FCC PART 15 class B	Test Result:	Pass
Test Mode:	TX B MODE 2412MHz	Test By:	Lake



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1860	25.73	11.22	36.95	64.21	-27.26	QP
2	0.1860	17.39	11.22	28.61	54.21	-25.60	AVG
3	0.3540	32.76	10.37	43.13	58.87	-15.74	QP
4	0.3540	26.18	10.37	36.55	48.87	-12.32	AVG
5	0.6900	20.93	10.12	31.05	56.00	-24.95	QP
6	0.6900	14.91	10.12	25.03	46.00	-20.97	AVG
7	1.2780	19.57	10.10	29.67	56.00	-26.33	QP
8	1.2780	13.02	10.10	23.12	46.00	-22.88	AVG
9	12.0020	18.69	10.16	28.85	60.00	-31.15	QP
10	12.0020	16.79	10.16	26.95	50.00	-23.05	AVG
11	16.2300	24.96	10.16	35.12	60.00	-24.88	QP
12	16.2300	18.88	10.16	29.04	50.00	-20.96	AVG

9. Conducted Spurious Emissions

9.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Cal. Interval
1	Spectrum analyzer	Agilent	E4407B	US40240708	2016/12/19	1Y
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2016/12/19	1 Y
3	RF Cable	Micable	C10-01-01-1	100309	2016/12/19	1Y

9.2. Limit

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

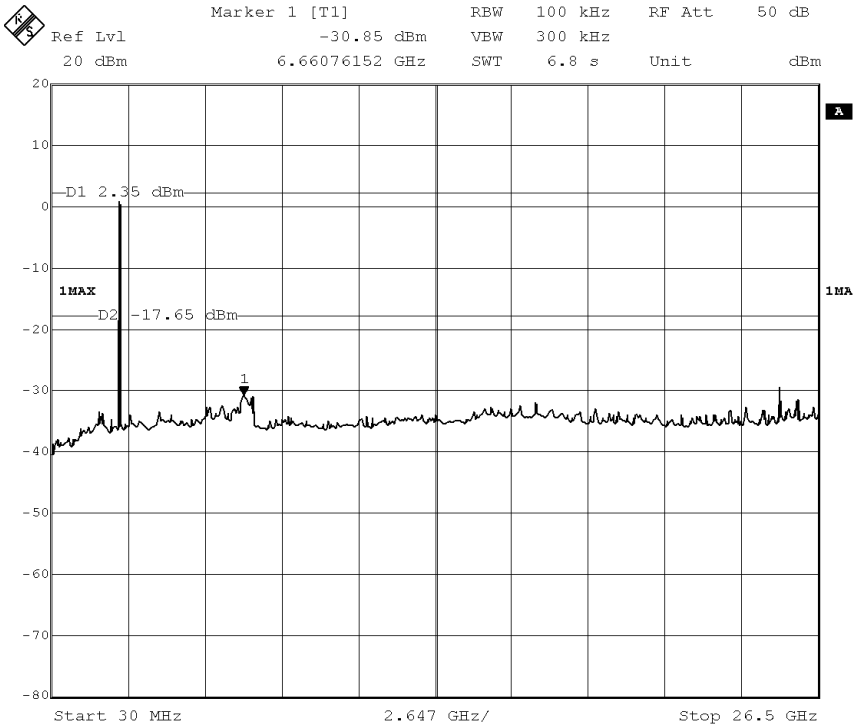
9.3. Test Procedure

The transmitter output was connected to a spectrum analyzer, The resolution bandwidth is set to 100 kHz, The video bandwidth is set to 300 kHz and measure all the emissions detected.

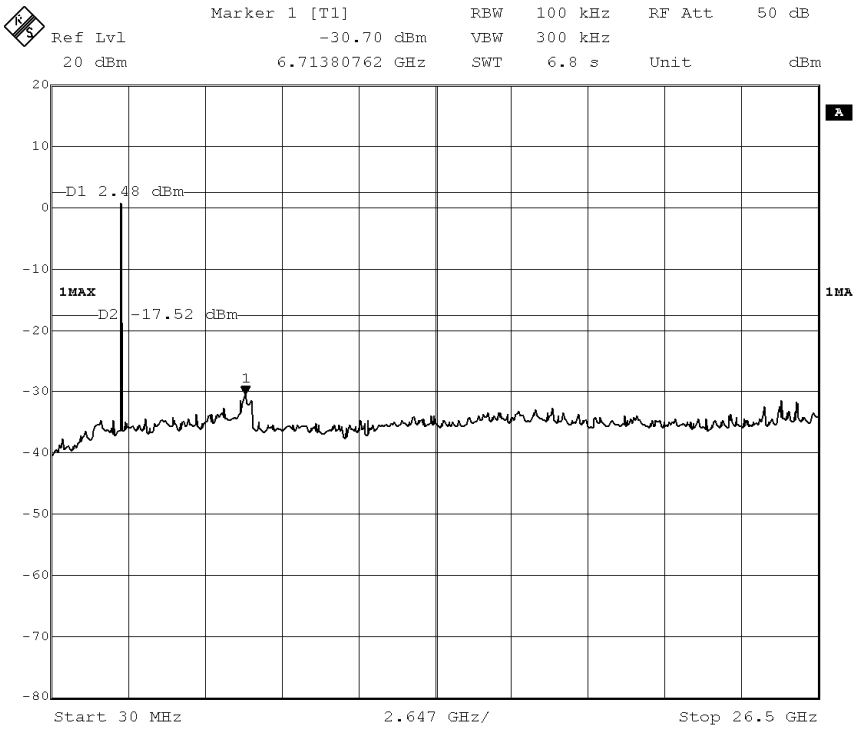
9.4. Test result

PASS (**See below detailed test result**.)

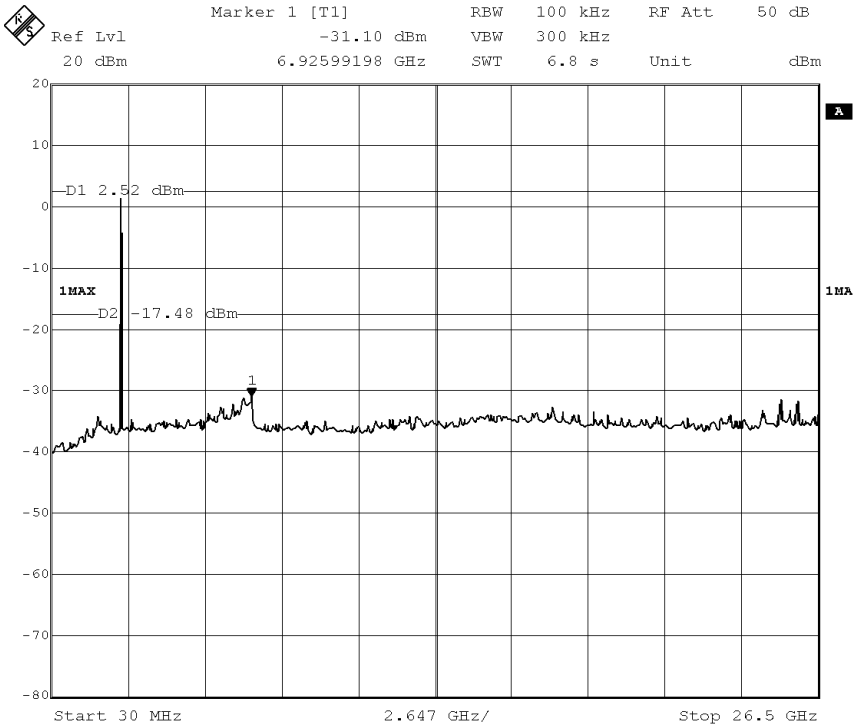
802.11 b Mode 2412MHz



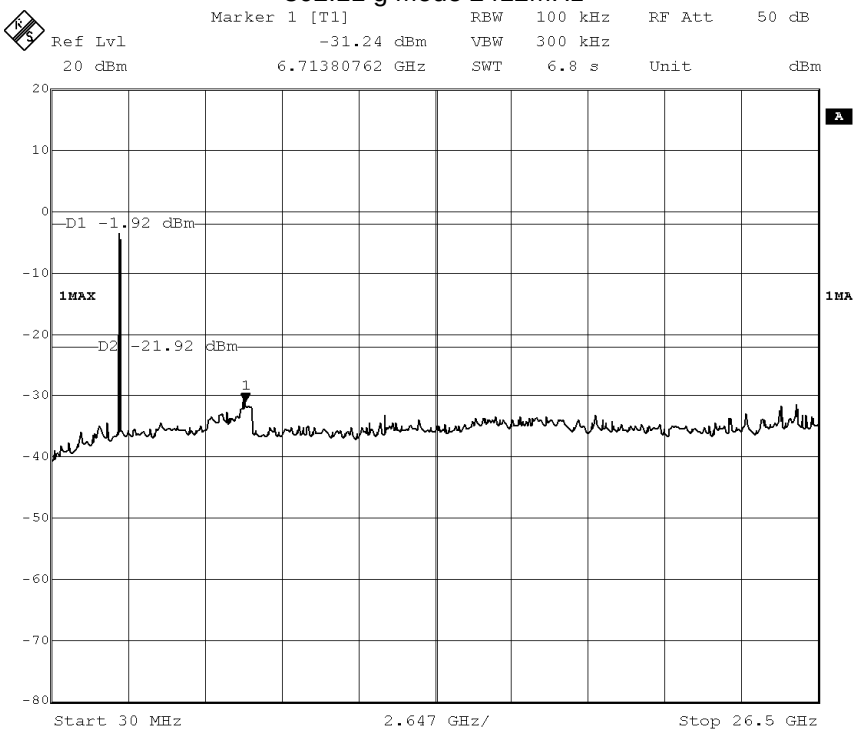
802.11 b Mode 2437MHz



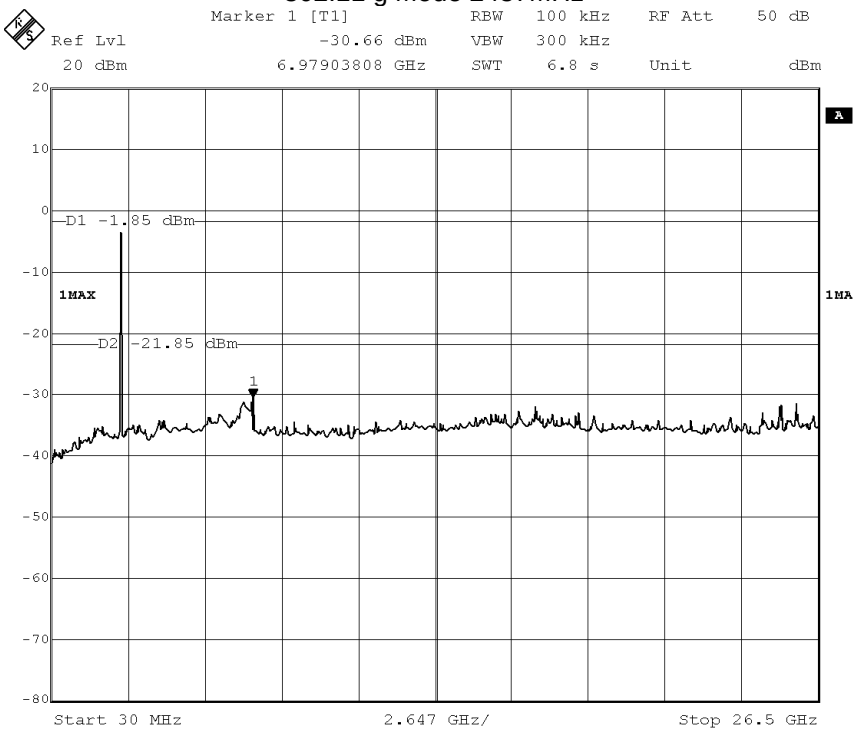
802.11 b Mode 2462MHz



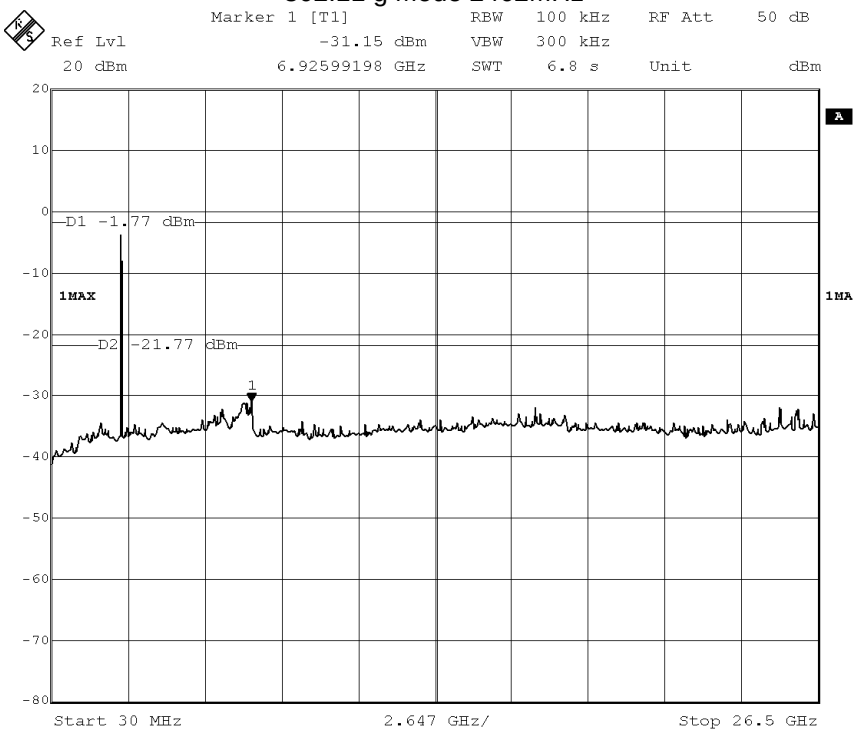
802.11 g Mode 2412MHz



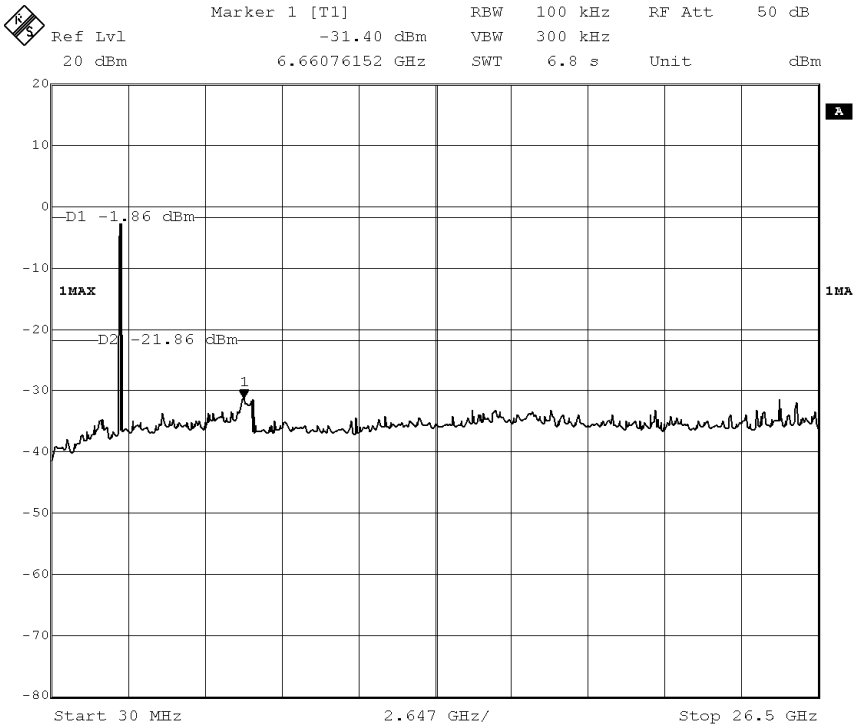
802.11 g Mode 2437MHz



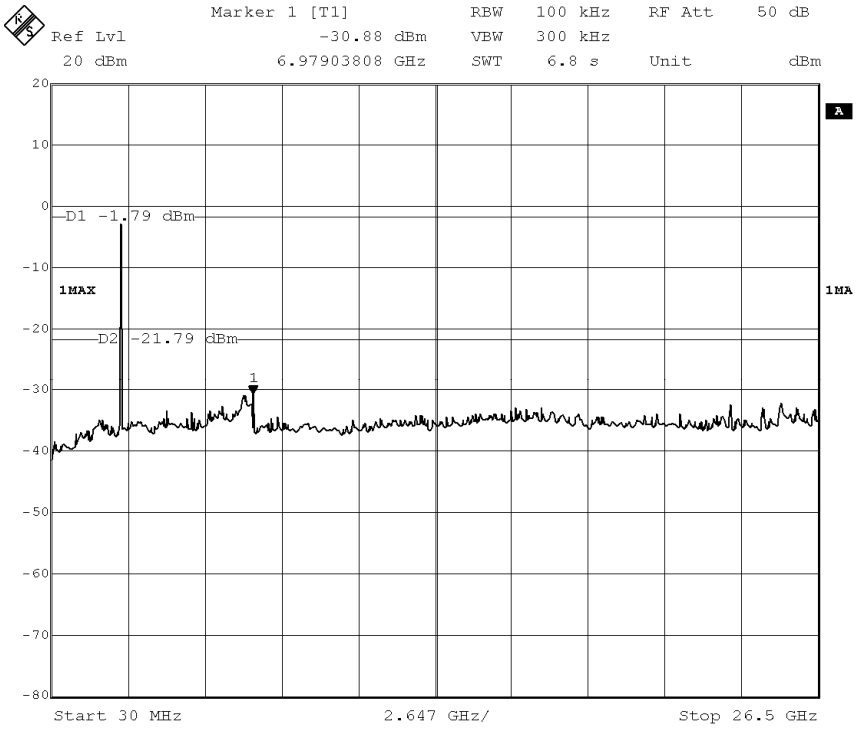
802.11 g Mode 2462MHz



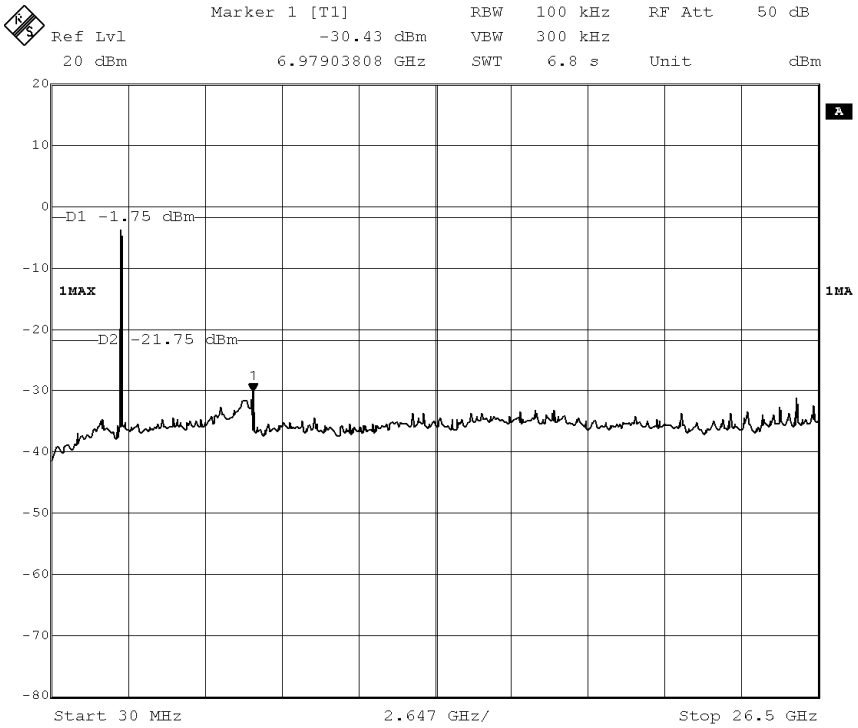
802.11 n20 Mode 2412MHz



802.11 n20 Mode 2437MHz



802.11 n20 Mode 2462MHz



10. Antenna Requirements

10.1. Limit

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2. Result

The antennas used for this product are built-in undetachable dipole antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 1dBi. The EUT has an internal antenna, the directional gain of antenna is 1 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.