Full

TEST REPORT

No. I17D00239-SRD03

For

Client : Shanghai Sunmi Technology Co.,Ltd.

Production : POS System

Model Name : W1301

FCC ID: 2AH25W1301

Hardware Version: B3.2

Software Version: SUNMI_T1mini_GLOBAL_000009_170913

Issued date: 2018-01-09

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

Add: 7-8F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

Tel: (+86)-021-63843300, E-Mail: welcome@ecit.org.cn

Revision Version

Report Number	Revision	Date	Memo
I17D00239-SRD03	00	2017-12-28	Initial creation of test report
I17D00239-SRD03	01	2018-01-09	Second creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200433
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301

1.2. Testing Environment

Normal Temperature:	15-35℃
Extreme Temperature:	-10/+55℃
Relative Humidity:	20-75%

1.3. Project data

Project Leader:	Zhou Yan
Testing Start Date:	2017-11-07
Testing End Date:	2017-12-28

1.4. Signature

Wu Jiashen
(Prepared this test report)

Ding Li
(Reviewed this test report)

Zheng Zhongbin
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Shanghai Sunmi Technology Co.,Ltd.
Address:	Room 605, Block 7, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Postcode:	200433
Telephone:	18721763396

2.2. Manufacturer Information

Company Name:	Shanghai Sunmi Technology Co.,Ltd.
Address:	Room 605, Block 7, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Postcode:	200433
Telephone:	18721763396

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	POS System
Model name	W1301
WLAN Frequency	2412MHz-2462MHz
WLAN Channel	Channel1-Channel11
WLAN type of modulation	802.11b:DSSS 802.11g/n: OFDM
Extreme Temperature	-10/+55℃
Nominal Voltage	24V
Extreme High Voltage	25.2V
Extreme Low Voltage	22.8V

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N02	H6CDU16613000248	B3.2	SUNMI_T1mini_GLOBAL_000009_170913	2017-11-01

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---

*AE ID: is used to identify the test sample in the lab internally.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15,Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.	Jun,2016 Edition
ANSI 63.10	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9KHz to 40GHz	2013

5. Summary of Test Results

A brief summary of the tests carried out is shown as following.

Measurement Items	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.247(a)	/	P
Peak Power Spectral Density	15.247(e)	/	P
Occupied 6dB Bandwidth	15.247(d)	/	P
Band Edges Compliance	15.247(b)	/	P
Transmitter Spurious Emission-Conducted	15.247	/	P
Transmitter Spurious Emission-Radiated	15.247,15.209,	/	P
AC Powerline Conducted Emission	15.107,15.207	/	P

Please refer to part 5 for detail.

The measurements are according to Public notice KDB558074 and ANSI C63.4.

Terms used in Verdict column

P	Pass, the EUT complies with the essential requirements in the standard.
NP	Not Perform, the test was not performed by ECIT.
NA	Not Applicable, the test was not applicable.
F	Fail, the EUT does not comply with the essential requirements in the standard.

Test Conditions

Tnom	Normal temperature
Tmin	Low Temperature
Tmax	High Temperature
Vnom	Normal Voltage
Vmin	Low Voltage
Vmax	High Voltage
Hnom	Norm Humidity
Anom	Norm Air Pressure

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	Tnom	22℃
Voltage	Vnom	24V
Humidity	Hnom	48%
Air Pressure	Anom	1010hPa

5.1. Notes

All reported tests were carried out on a sample equipment to demonstrate limited compliance with section 3.

The test results of this test report relate exclusively to the item(s) tested as specified in section 5.

5.2. Statements

The W1301, supporting WLAN/BT/BLE, manufactured by Shanghai Sunmi Technology Co.,Ltd. is a new product for testing.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

6. Test result

6.1. Maximum Output Power

6.1.1 Measurement Limit and method:

Standard	Limit(dBm)
FCC CRF 15.247(b)	< 30

6.1.2 Test procedure

The measurement is according to ANSI C63.10 clause 11.2

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set RBW ⩾ OBW, VBW ⩾ 3RBW.
4. Detector : Peak.
5. Trace mode: Max Hold

6.1.3 Measurement Uncertainty:

Measurement Uncertainty	0.75dB

6.1.4 Maximum Peak Output Power-conducted

Measurement Results:

802.11b/g mode

Mode	Data Rate(Mbps)	Teat Result(dBm)		
		2412MHz(Ch1)	2437MHz(Ch6)	2462MHz(Ch11)
802.11b	1	17.16	/	/
	2	17.40	/	/
	5.5	18.85	/	/
	11	20.44	20.15	20.38
802.11g	6	19.71	/	/
	9	19.75	/	/
	12	20.21	/	/
	18	20.08	/	/

	24	20.49	19.55	20.45
	36	20.38	/	/
	48	20.31	/	/
	54	20.24	/	/

The data rate 11 Mbps and 24 Mbps are selected as worse condition, and the following cases are performed with this condition.

802.11n mode

Mode	Data Rate(Index)	Teat Result(dBm)		
		2412MHz(Ch1)	2437MHz(Ch6)	2462MHz(Ch11)
802.11n(20MHz)	MCS0	18.32	/	/
	MCS1	18.36	/	/
	MCS2	18.35	/	/
	MCS3	18.82	/	/
	MCS4	18.88	/	/
	MCS5	18.86	/	/
	MCS6	19.01	18.62	18.97
	MCS7	18.95	/	/
Mode	**Data Rate(Index)**	**Teat Result(dBm)**		
		2422MHz(Ch3)	**2437MHz(Ch6)**	**2452MHz(Ch9)**
802.11n(40MHz)	MCS0	17.38	/	/
	MCS1	17.55	/	/
	MCS2	17.86	/	/
	MCS3	17.92	/	/
	MCS4	17.90	/	/
	MCS5	17.91	17.75	17.98
	MCS6	17.85	/	/

	MCS7	17.88	/	/

The data rate MCS6 for 802.11n (20M) and MCS5 for 802.11n(40M) are selected as worse condition, and the following case are performed with this condition.

6.1.5 Maximum Average Output Power-conducted

802.11b/g mode

Mode	Test Result(dBm)		
	2412MHz (Ch1)	**2437MHz (Ch6)**	**2462MHz (Ch11)**
802.11b	16.56	16.21	16.65
802.11g	14.58	14.08	14.63

802.11n mode

Mode	Test Result(dBm)		
	2412MHz (Ch1)	**2437MHz (Ch6)**	**2462MHz (Ch11)**
802.11n(20MHz)	13.10	12.83	13.15
Mode	**Test Result(dBm)**		
	2422MHz (Ch3)	**2437MHz (Ch6)**	**2452MHz (Ch9)**
802.11n(40MHz)	12.01	11.68	12.05

Conclusion: PASS

6.2. Peak Power Spectral Density

6.2.1 Measurement Limit:

Standard	Limit
FCC CFR Part 15.247(e)	< 8dBm/3 KHz

6.2.2 Test procedures

The measurement is according to ANSI C63.10 clause 11.10.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set analyzer center frequency to DTS channel center frequency.
4. Set the span to 1.5 times the DTS bandwidth.
5. Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
6. Set the VBW ≥ [3 × RBW].
7. Detector = peak.
8. Sweep time = auto couple.
9. Trace mode = max hold.
10. Allow trace to fully stabilize.
11. Use the peak marker function to determine the maximum amplitude level within the RBW.
12. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

6.2.3 Measurement Uncertainty:

Measurement Uncertainty	0.75dB

6.2.4 Measurement Results:

802.11b/g mode

Mode	Channel	Power Spectral Density(dBm/3kHz)		Conclusion
802.11b	1	Fig 1.	-11.43	P
	6	Fig 2.	-11.91	P
	11	Fig 3.	-11.22	P
802.11g	1	Fig 4.	-16.71	P
	6	Fig 5.	-17.10	P
	11	Fig 6.	-16.35	P

802.11n mode

Mode	Channel	Power Spectral Density(dBm/3kHz)		Conclusion
802.11n(20MHz)	1	Fig 7.	-17.99	P
	6	Fig 8.	-19.36	P
	11	Fig 9.	-17.50	P
802.11n(40MHz)	3	Fig 10.	-23.17	P
	6	Fig 11.	-24.26	P
	9	Fig 12.	-23.05	P

Conclusion: PASS

Test graphs as below:

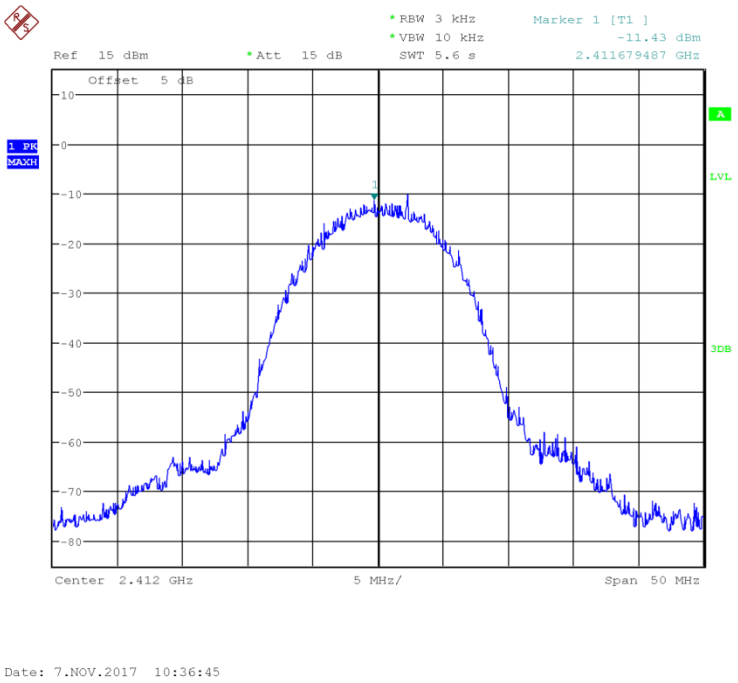


Fig 1. Power Spectral Density (802.1b,Ch1)

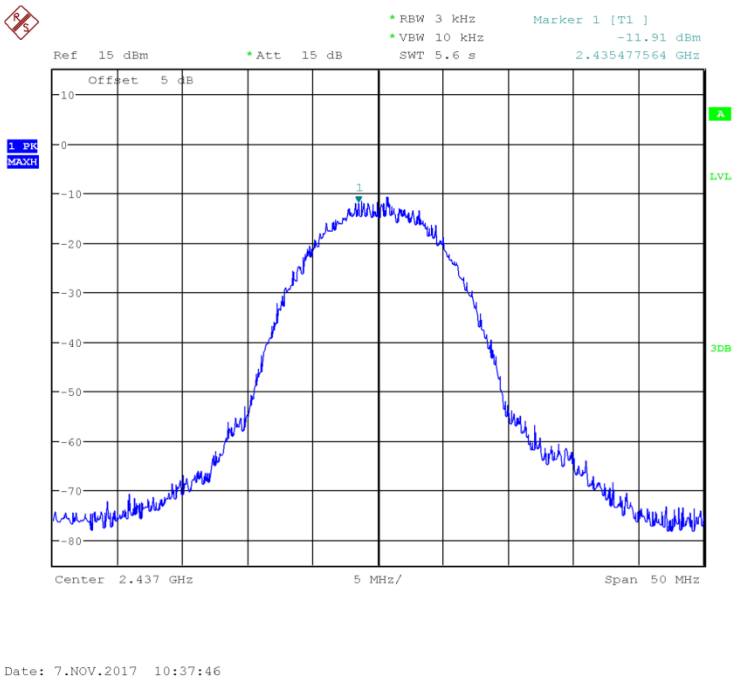


Fig 2. Power Spectral Density (802.1b,Ch6)

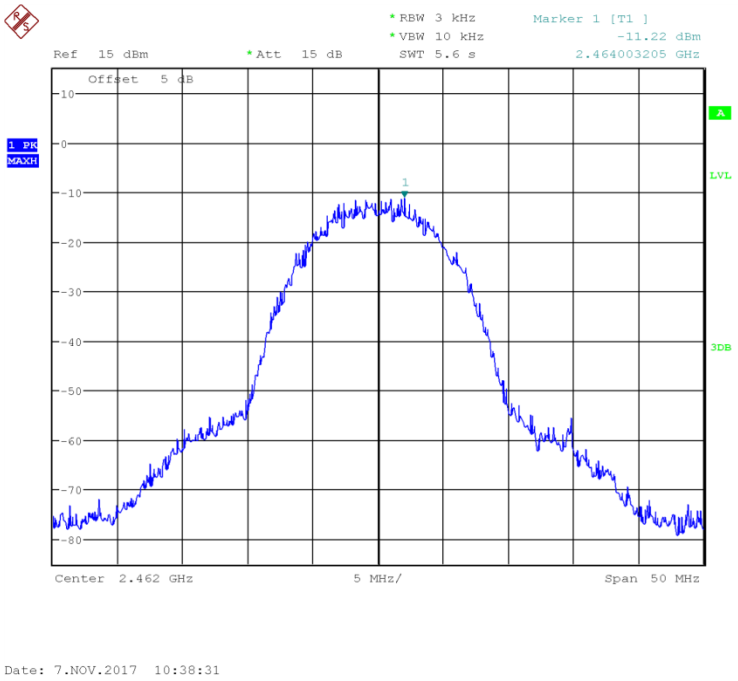


Fig 3. Power Spectral Density (802.1b,Ch11)

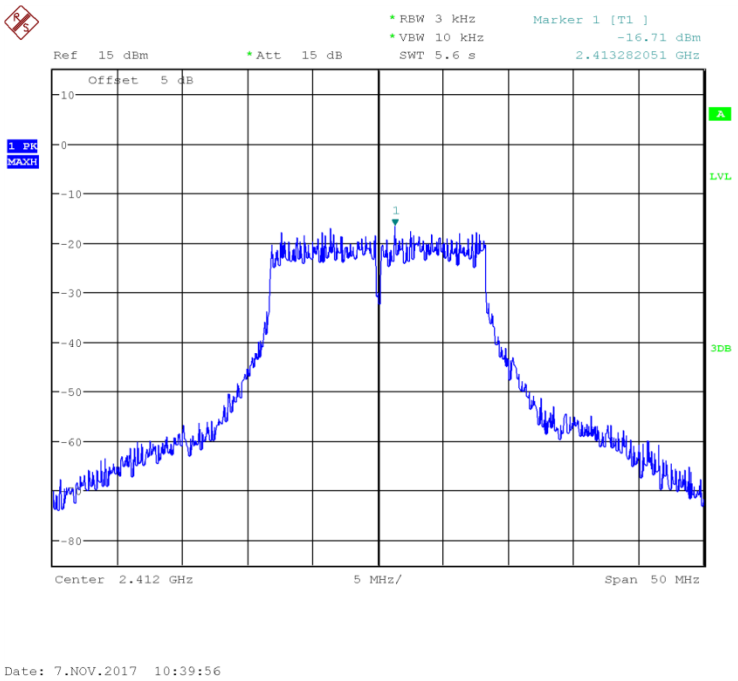


Fig.4 Power Spectral Density (802.1g,Ch1)

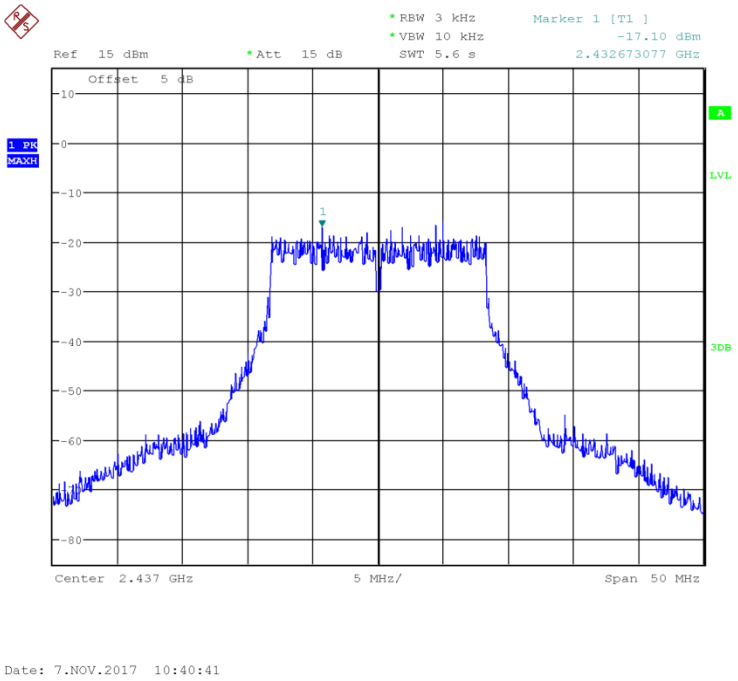


Fig.5 Power Spectral Density (802.1g,Ch6)

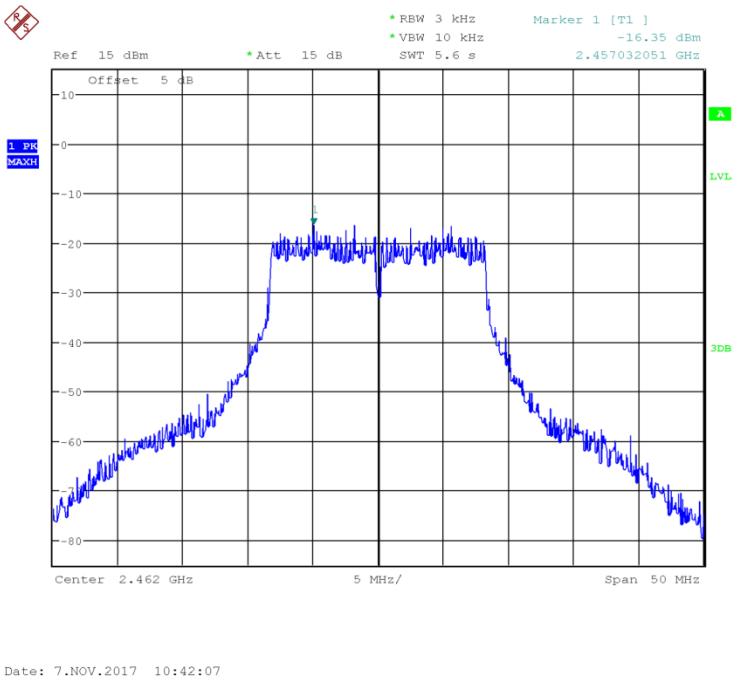


Fig.6 Power Spectral Density (802.1g,Ch11)

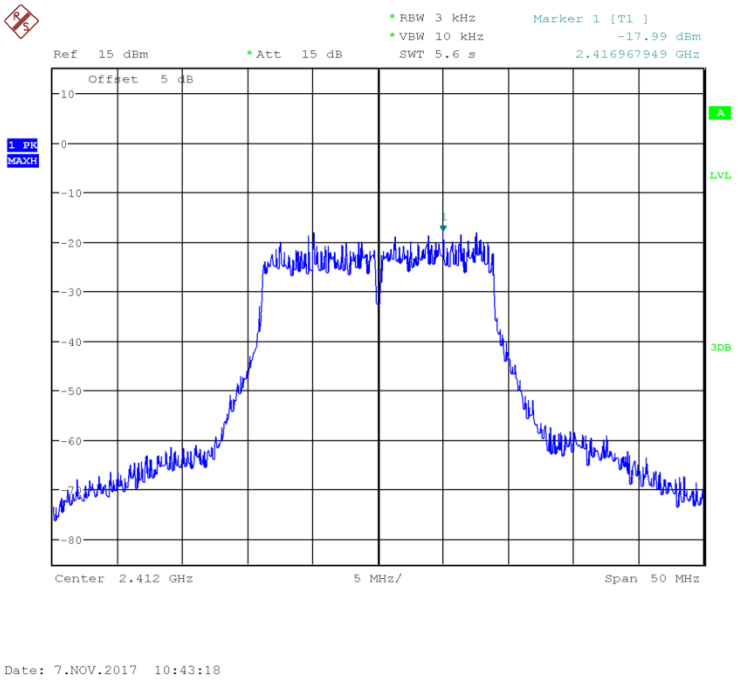


Fig.7 Power Spectral Density (802.1n-20MHz,Ch1)

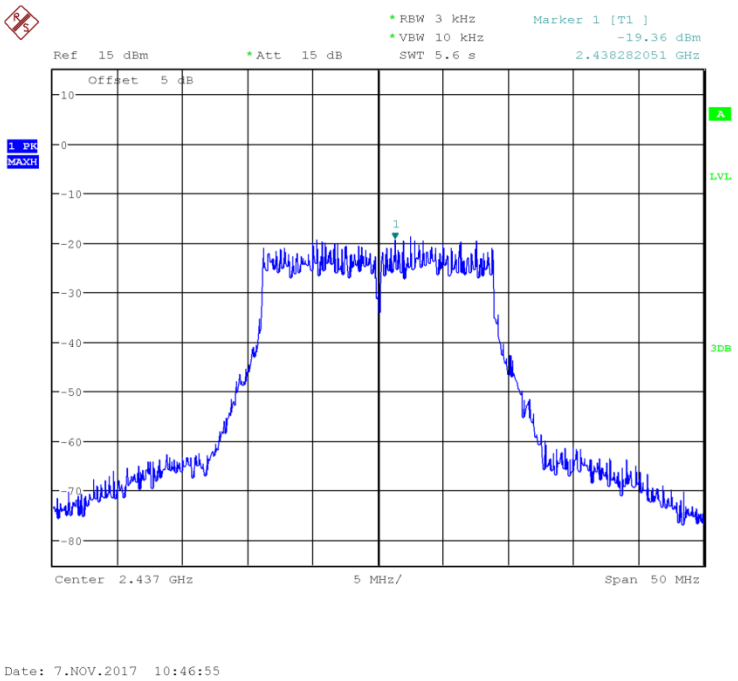


Fig.8 Power Spectral Density (802.1n-20MHz,Ch6)

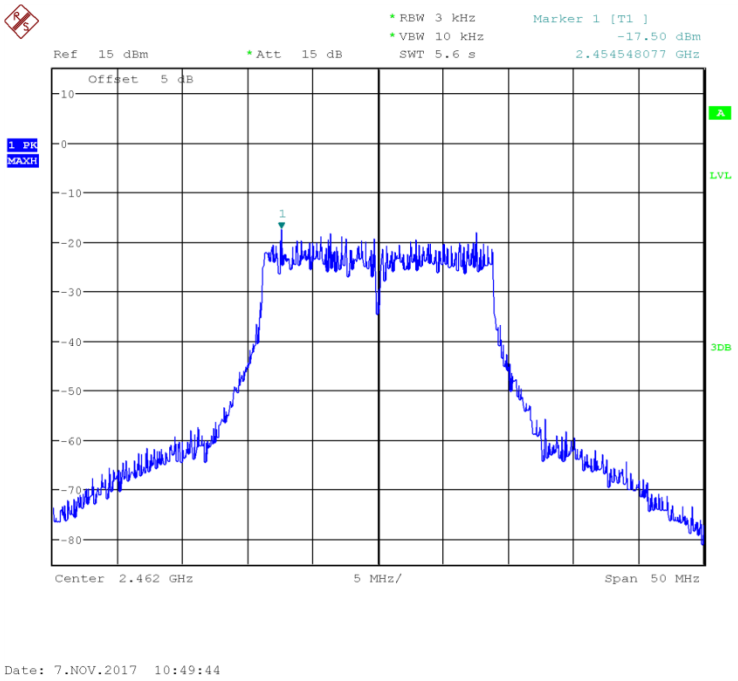


Fig.9 Power Spectral Density (802.1n-20MHz,Ch11)

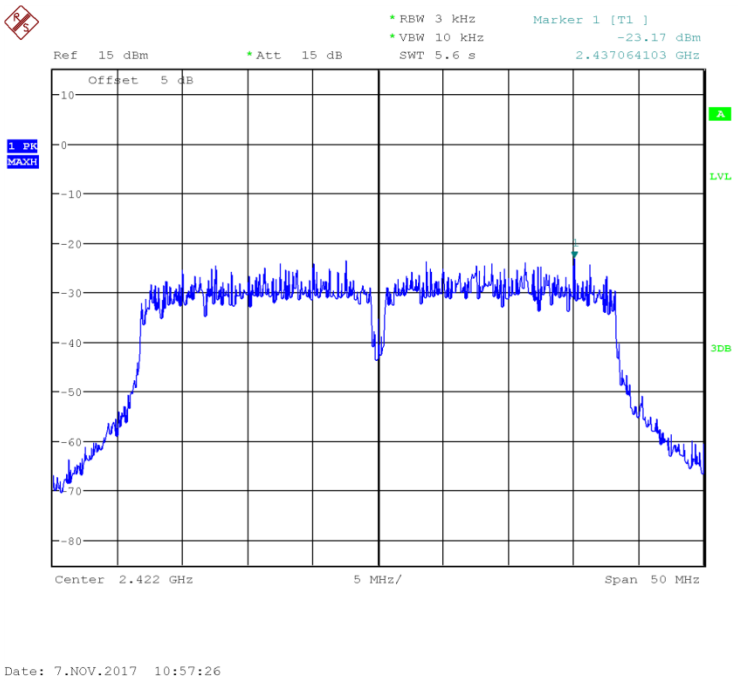


Fig.10 Power Spectral Density (802.1n-40MHz,Ch3)

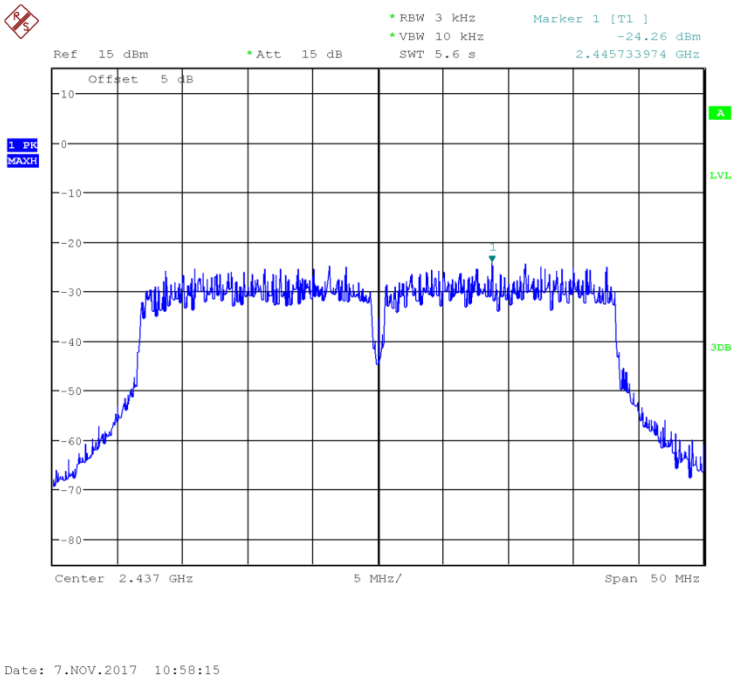


Fig.11 Power Spectral Density (802.1n-40MHz,Ch6)

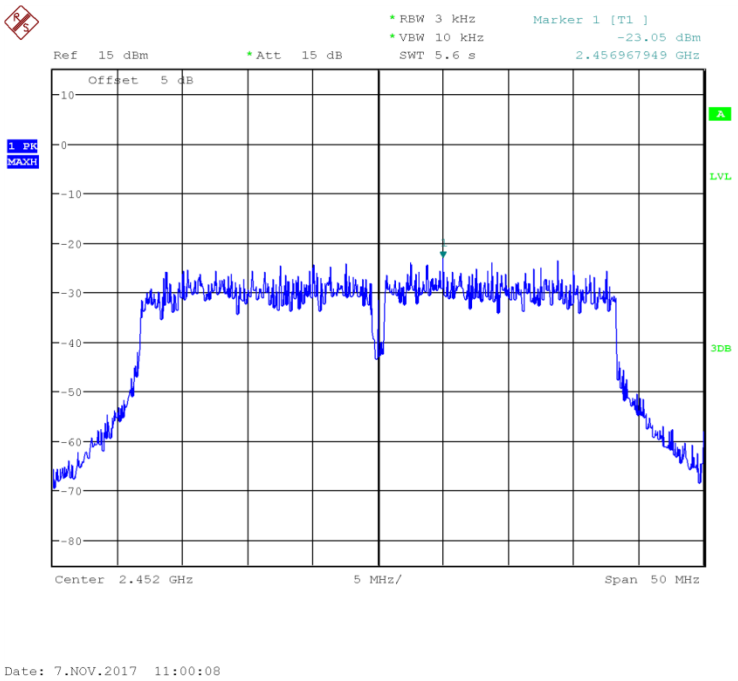


Fig.12 Power Spectral Density (802.1n-40MHz,Ch9)

6.3. Occupied 6dB Bandwidth

6.3.1 Measurement Limit:

Standard	Limit(KHz)
FCC 47 CFR Part 15.247(a)	≥500

6.3.2 Test procedure

The measurement is according to ANSI C63.10 clause 11.8.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set RBW = 100 kHz.
4. Set the VBW ⩾ [3 × RBW].
5. Detector = peak.
6. Trace mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize.
9. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3.4 Measurement Uncertainty:

Measurement Uncertainty	60.80Hz

6.3.5 Measurement Result:

802.11b/g mode

Mode	Channel	Occupied 6dB Bandwidth(MHz)		Conclusion
802.11b	1	Fig 13.	8.41	P
	6	Fig 14.	8.81	P
	11	Fig 15.	8.57	P
802.11g	1	Fig 16.	16.506	P
	6	Fig 17.	16.506	P
	11	Fig 18.	16.506	P

802.11n mode

Mode	Channel	Occupied 6dB Bandwidth(MHz)		Conclusion
802.11n(20MHz)	1	Fig 19.	16.426	P
	6	Fig 20.	17.708	P
	11	Fig 21.	17.788	P
802.11n(40MHz)	3	Fig 22.	35.737	P
	6	Fig 23.	35.497	P
	9	Fig 24.	35.497	P

Conclusion: PASS

Test graphs as below:

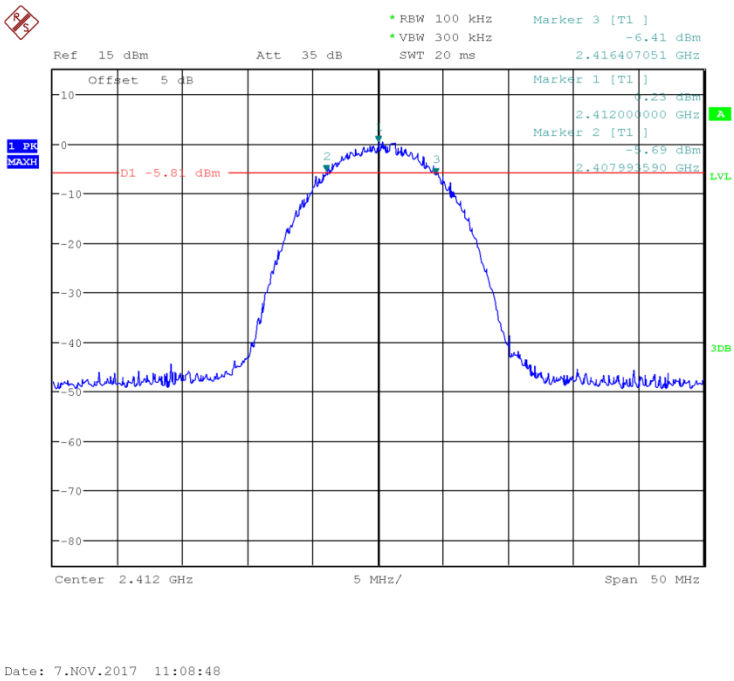


Fig.13 Occupied 6dB Bandwidth (802.11b, Ch1)

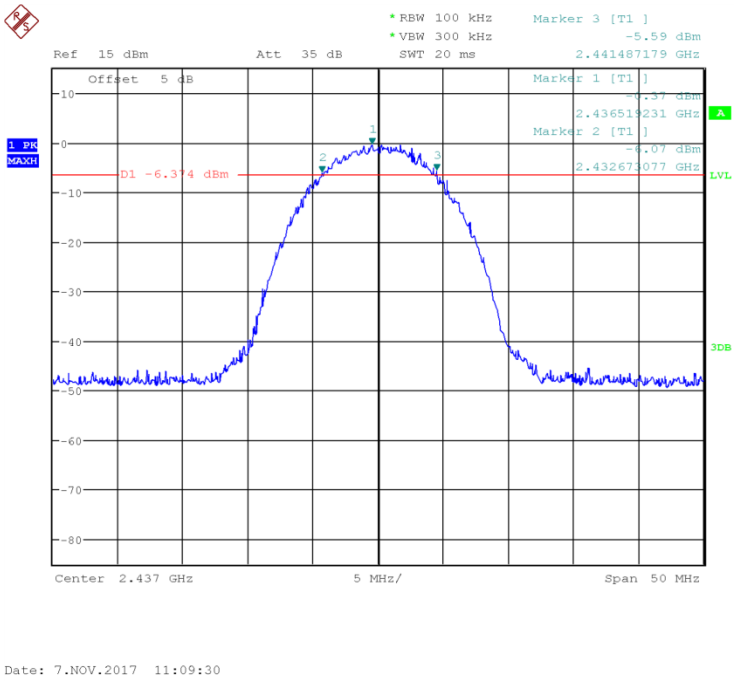


Fig.14 Occupied 6dB Bandwidth (802.11b, Ch6)

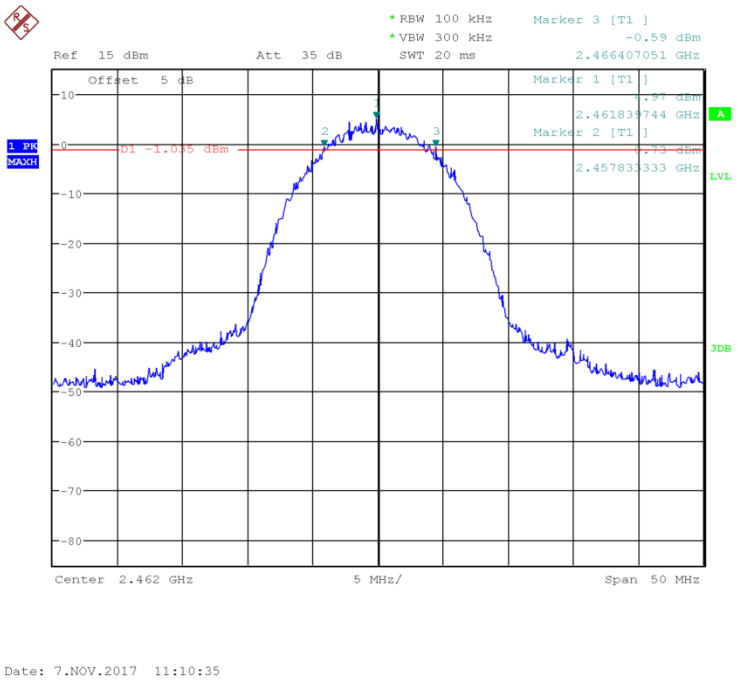


Fig.15 Occupied 6dB Bandwidth (802.11b, Ch11)

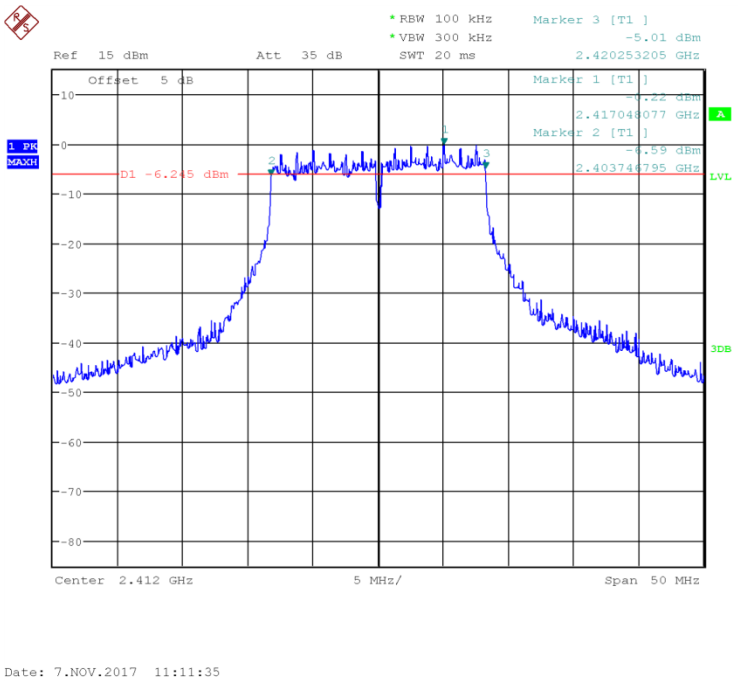


Fig.16 Occupied 6dB Bandwidth (802.11g, Ch1)

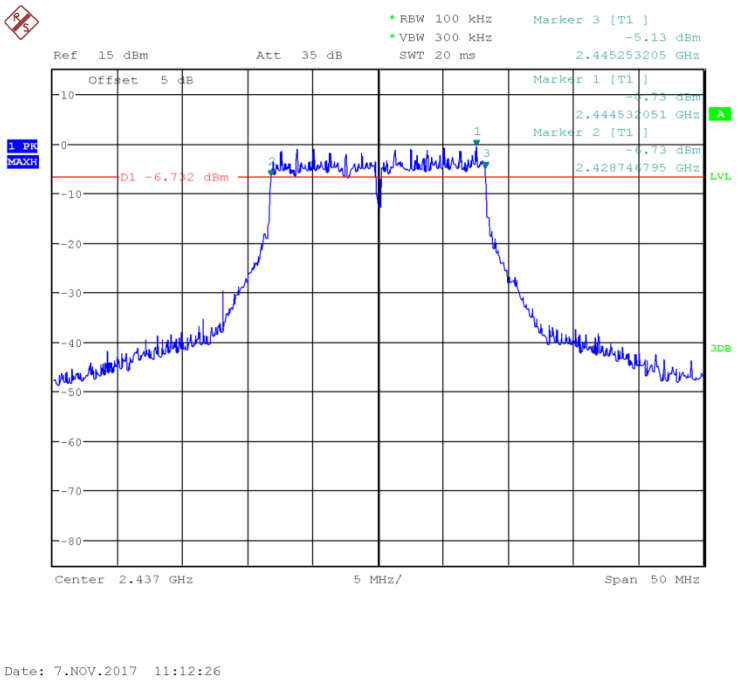


Fig.17 Occupied 6dB Bandwidth (802.11g, Ch6)

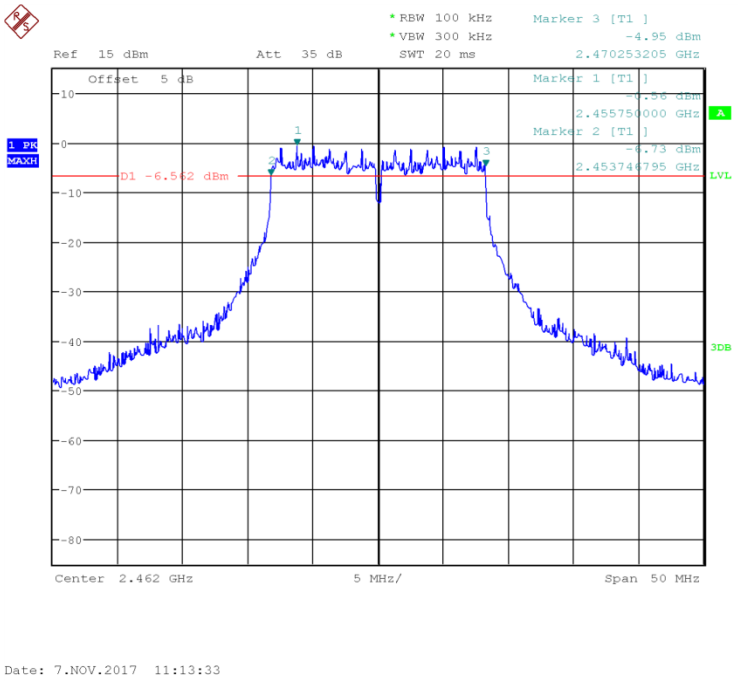


Fig.18 Occupied 6dB Bandwidth (802.11g, Ch11)

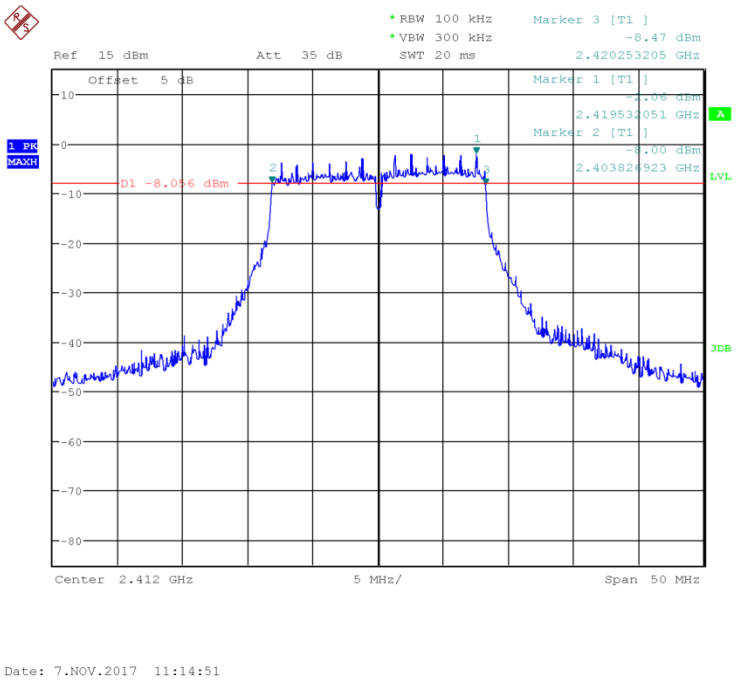


Fig.19 Occupied 6dB Bandwidth (802.11n-20MHz, Ch1)

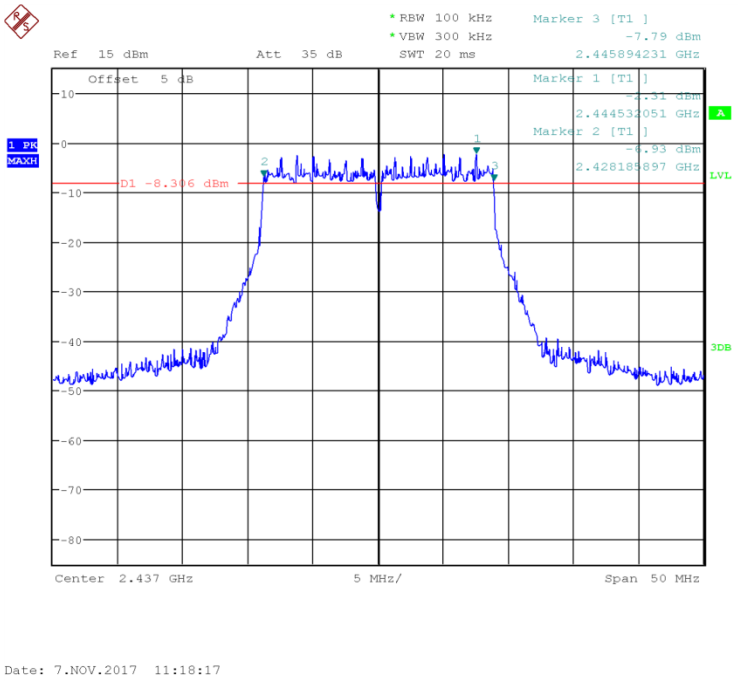


Fig.20 Occupied 6dB Bandwidth (802.11n-20MHz, Ch6)

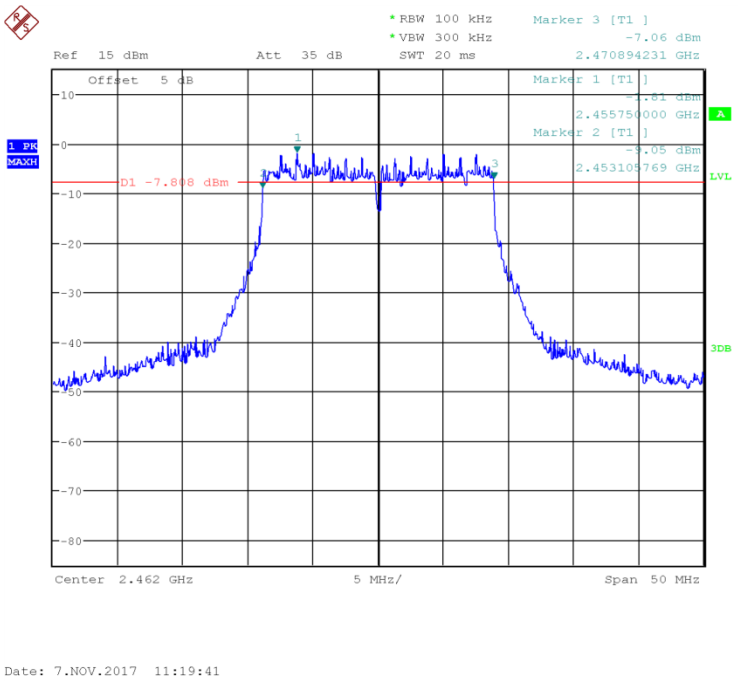


Fig.21 Occupied 6dB Bandwidth (802.11n-20MHz, Ch11)

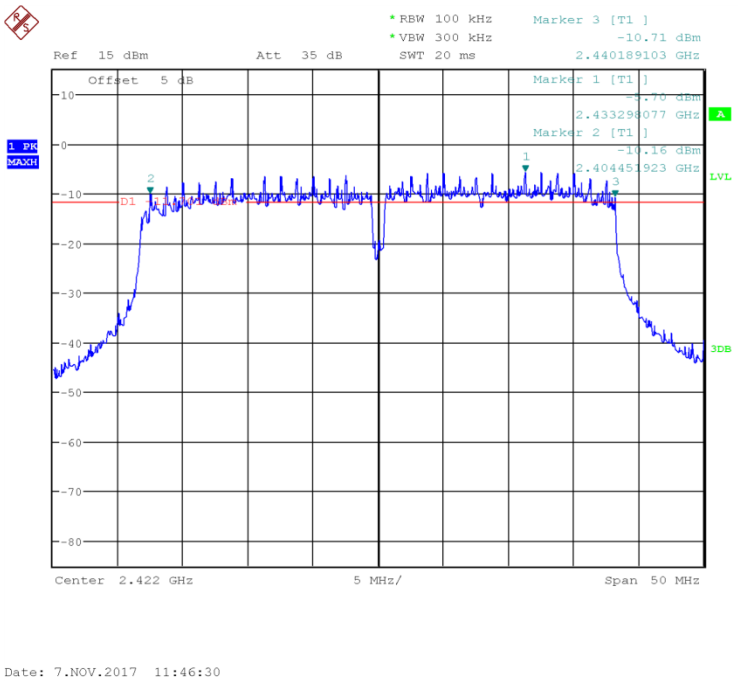


Fig.22 Occupied 6dB Bandwidth (802.11n-40MHz, Ch3)

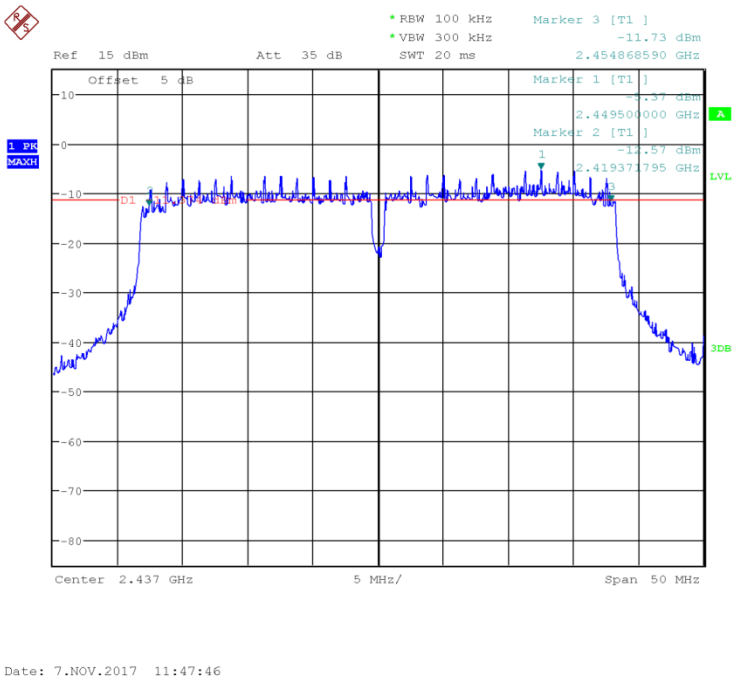


Fig.23 Occupied 6dB Bandwidth (802.11n-40MHz, Ch6)

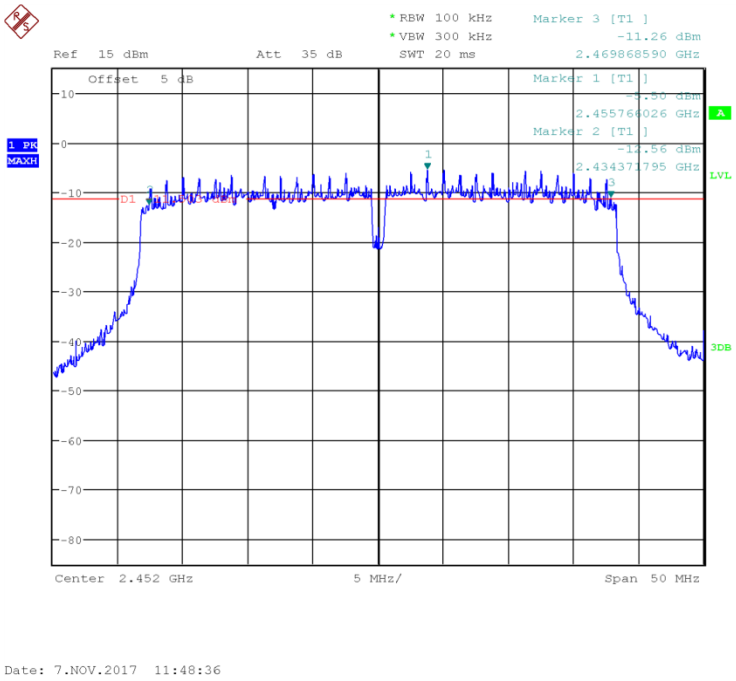


Fig.24 Occupied 6dB Bandwidth (802.11n-40MHz, Ch9)

6.4. Band Edges Compliance

6.4.1 Measurement Limit:

Standard	Limited(dBc)
FCC 47 CFR Part 15.247(d)	>20

6.4.2 Test procedures

The measurement is according to ANSI C63.10 clause11.13.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Set instrument center frequency to the frequency of the emission to be measured (must be within 2MHz of the authorized band edge).
4. Set span to 2 MHz.
5. RBW = 100 kHz.
6. VBW ⩾ [3 × RBW].
7. Detector = peak.
8. Sweep time = auto.
9. Trace mode = max hold.
10. Allow sweep to continue until the trace stabilizes

6.4.3 Measurement Uncertainty:

Measurement Uncertainty	0.75dB

6.4.4 Measurement results

802.11b/g mode

Mode	Channel	Test Results	Conclusion
802.11b	1	Fig 25.	P
	11	Fig 26.	P
802.11g	1	Fig 27.	P
	11	Fig 28.	P

802.11n mode

Mode	Channel	Test Results	Conclusion
802.11n(20MHz)	1	Fig 29.	P
	11	Fig 30.	P

802.11n(40MHz)	3	Fig 31.	P
	9	Fig 32.	P

Conclusion: PASS

Test graphs as blew:

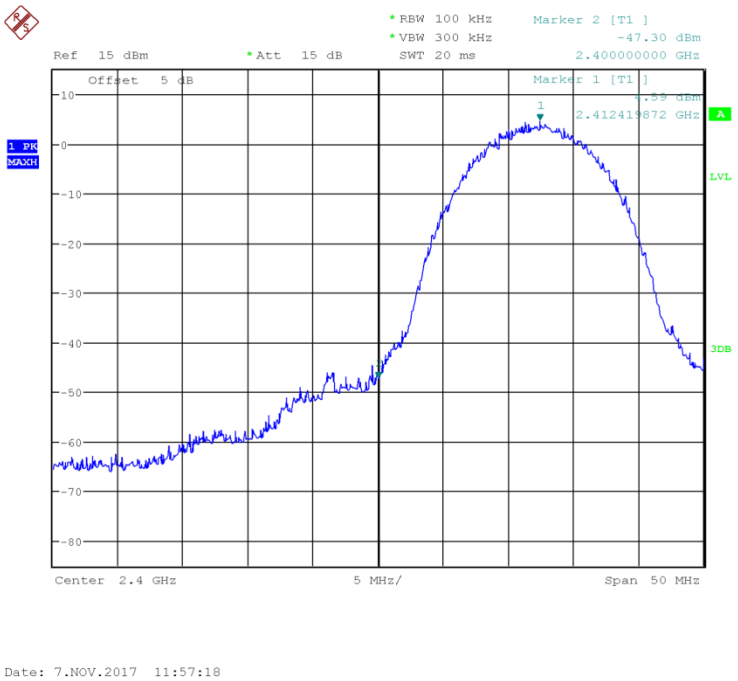


Fig.25 Band Edges (802.11b, Ch1)

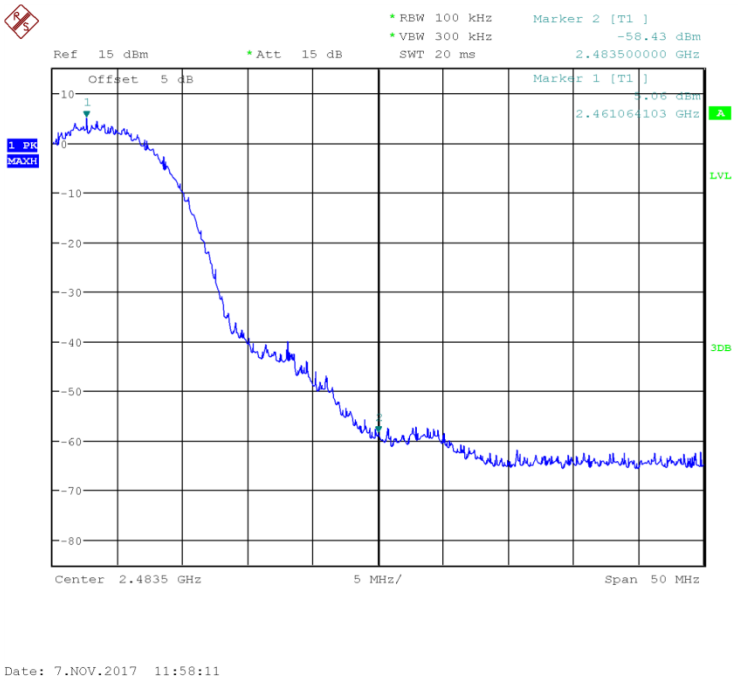


Fig.26 Band Edges (802.11b, Ch11)

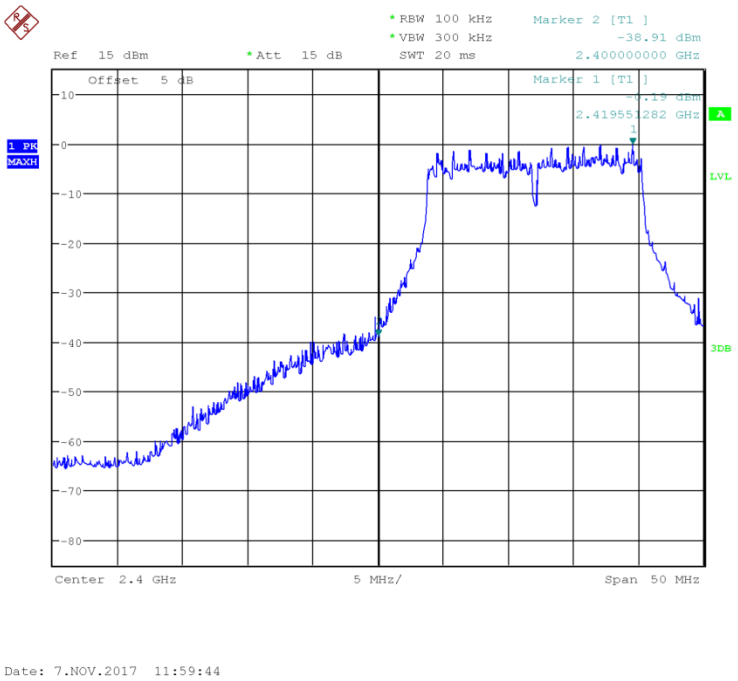


Fig.27 Band Edges (802.11g, Ch1)

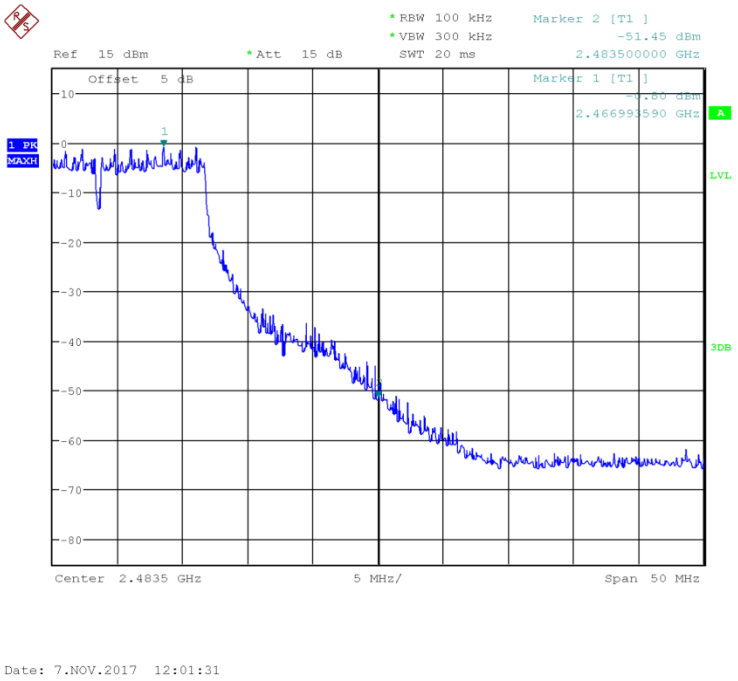


Fig.28 Band Edges (802.11g, Ch11)

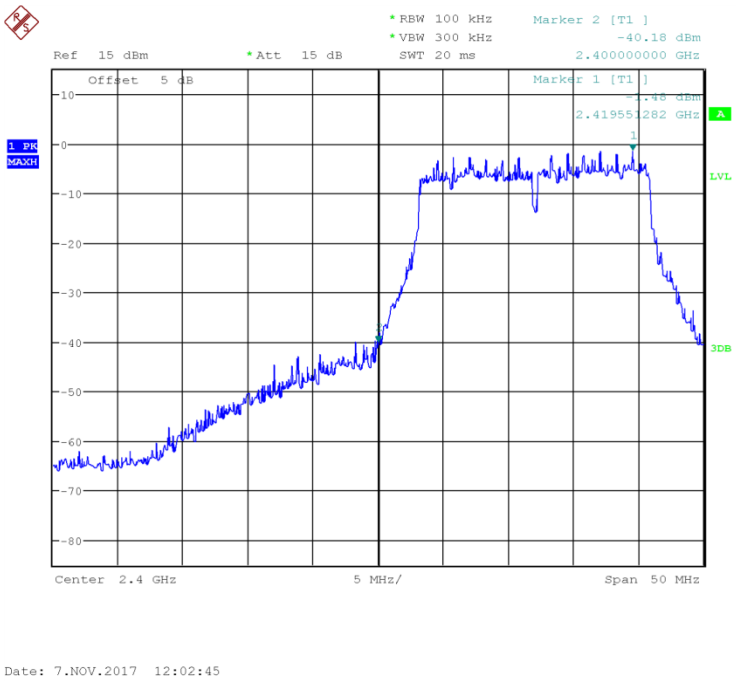


Fig.29 Band Edges (802.11n-20MHz, Ch1)

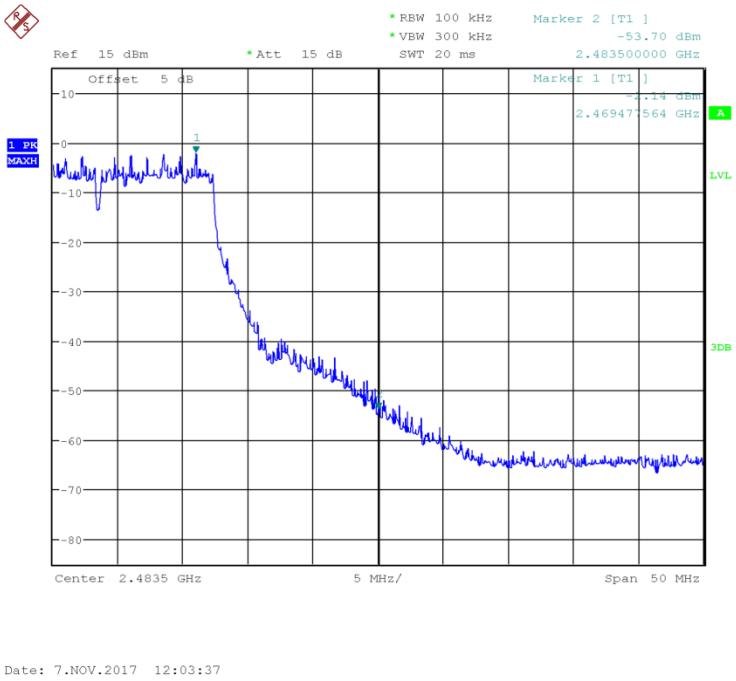


Fig.30 Band Edges (802.11b-20MHz, Ch11)

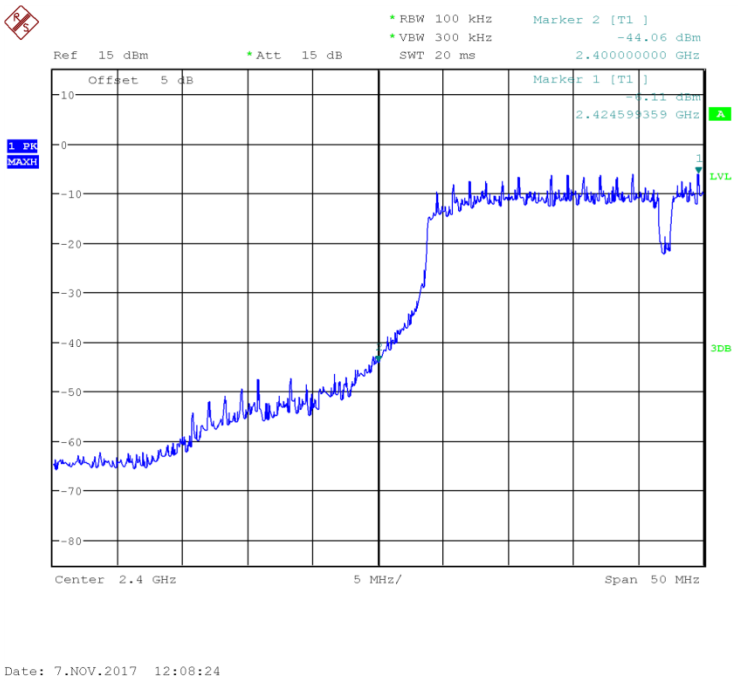


Fig.31 Band Edges (802.11n-40MHz, Ch3)

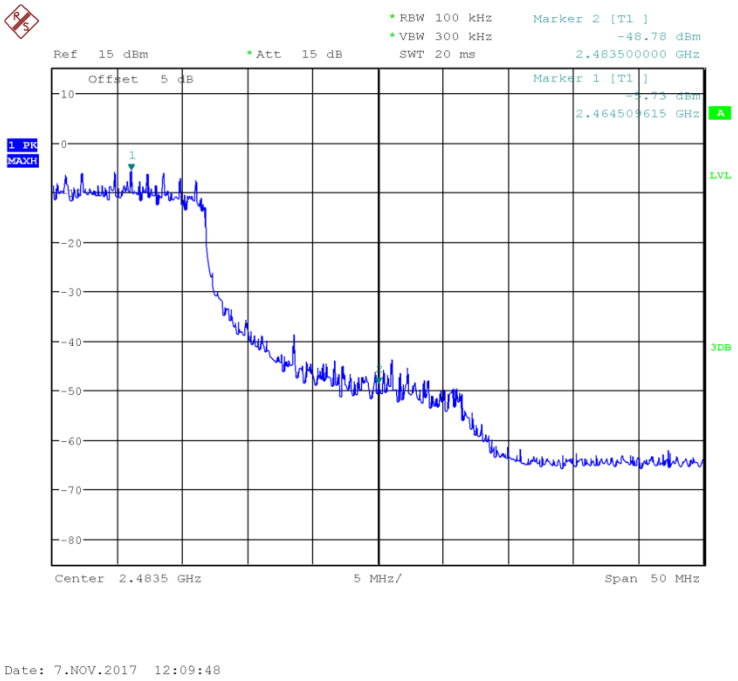


Fig.32 Band Edges (802.11b-40MHz, Ch9)

6.5. Transmitter Spurious Emission-conducted

6.5.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247(d)	20dB below peak output power in 100KHz bandwidth

6.5.2 Test procedures

This measurement is according to ANSI C63.10 clause 11.11.

1. The output power of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.

Reference level measurement

3. Set instrument center frequency to DTS channel center frequency.
4. Set the span to ≥ 1.5 times the DTS bandwidth.
5. Set the RBW = 100 kHz.
6. Set the VBW ≥ [3 × RBW].
7. Detector = peak.
8. Sweep time = auto couple.
9. Trace mode = max hold.
10. Allow trace to fully stabilize.
11. Use the peak marker function to determine the maximum PSD level.

Emission level measurement

12. Set the center frequency and span to encompass frequency range to be measured.
13. Set the RBW = 100 kHz.
14. Set the VBW ≥ [3 × RBW].
15. Detector = peak.
16. Sweep time = auto couple.
17. Trace mode = max hold.
18. Allow trace to fully stabilize.
19. Use the peak marker function to determine the maximum amplitude level.

6.5.3 Measurement Uncertainty:

Frequency Range	Uncertainty
30MHz≤ f ≤2GHz	0.63
2GHz≤ f ≤3.6GHz	0.82
3.6GHz≤ f ≤8GHz	1.55
8GHz≤ f ≤20GHz	1.86

20GHz≤ f ≤22GHz	1.90
22GHz≤ f ≤26GHz	2.20

6.5.4 Measurement Result:

802.11b/g mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11b	1	2.412GHz	Fig 33.	P
		30MHz~26GHz	Fig 34.	P
	6	2.437GHz	Fig 35.	P
		30MHz~26GHz	Fig 36.	P
	11	2.462GHz	Fig 37.	P
		30MHz~26GHz	Fig 38.	P
802.11g	1	2.412GHz	Fig 39.	P
		30MHz~26GHz	Fig 40.	P
	6	2.437GHz	Fig 41.	P
		30MHz~26GHz	Fig 42.	P
	11	2.462GHz	Fig 43.	P
		30MHz~26GHz	Fig 44.	P

802.11n mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n(20MHz)	1	2.412GHz	Fig 45.	P
		30MHz~26GHz	Fig 46.	P
	6	2.437GHz	Fig 47.	P
		30MHz~26GHz	Fig 48.	P
	11	2.462GHz	Fig 49.	P
		30MHz~26GHz	Fig 50.	P

802.11n(40MHz)	3	2.422GHz	Fig 51.	P
		30MHz~26GHz	Fig 52.	P
	6	2.437GHz	Fig 53.	P
		30MHz~26GHz	Fig 54.	P
	9	2.452GHz	Fig 55.	P
		30MHz~26GHz	Fig 56.	P

Conclusion: PASS

Test graphs as below:

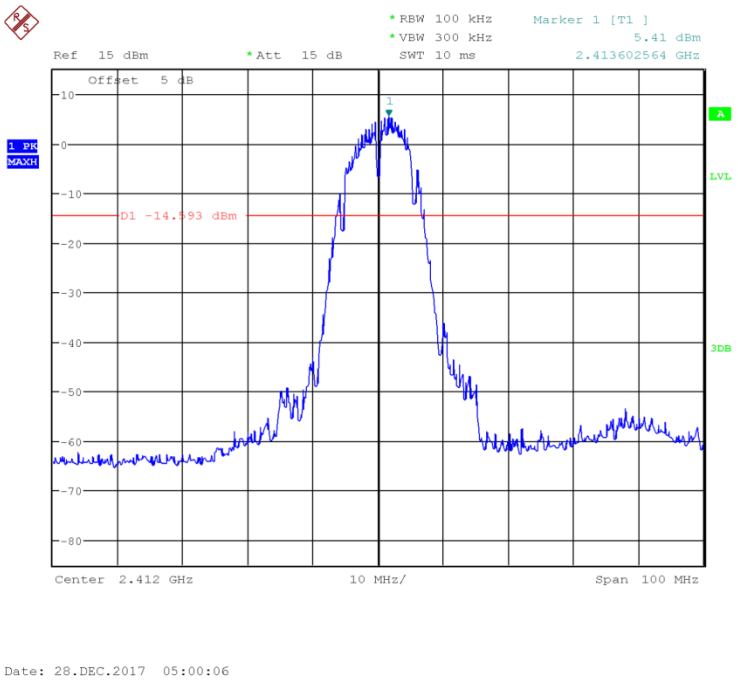


Fig.33 Conducted Spurious Emission (802.11b, Ch1)

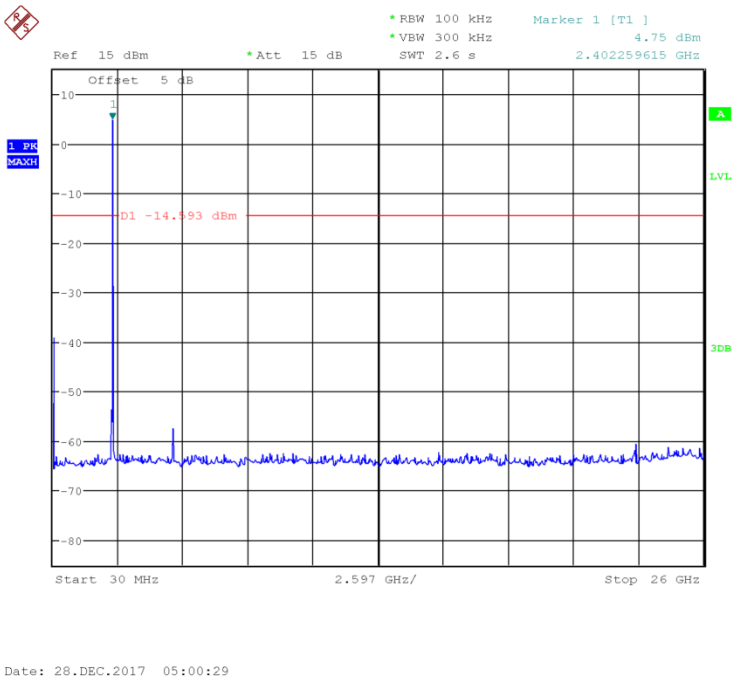


Fig.34 Conducted Spurious Emission (802.11b, Ch1, 30MHz~26GHz)

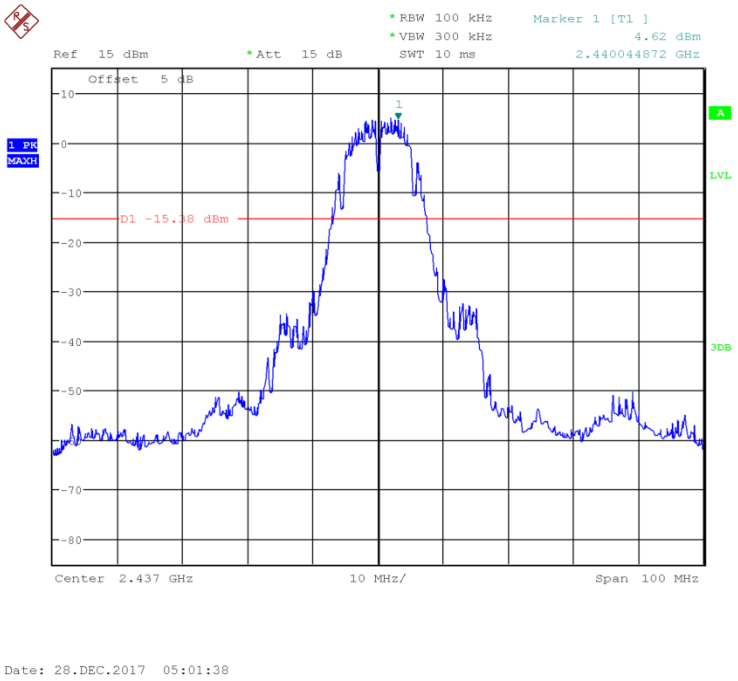


Fig.35 Conducted Spurious Emission (802.11b, Ch6)

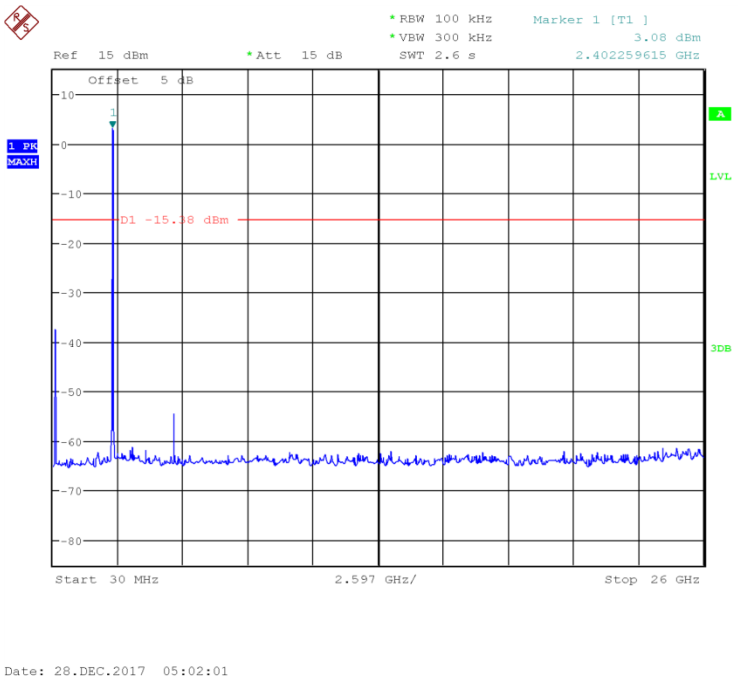


Fig.36 Conducted Spurious Emission (802.11b, Ch6, 30MHz~26GHz)

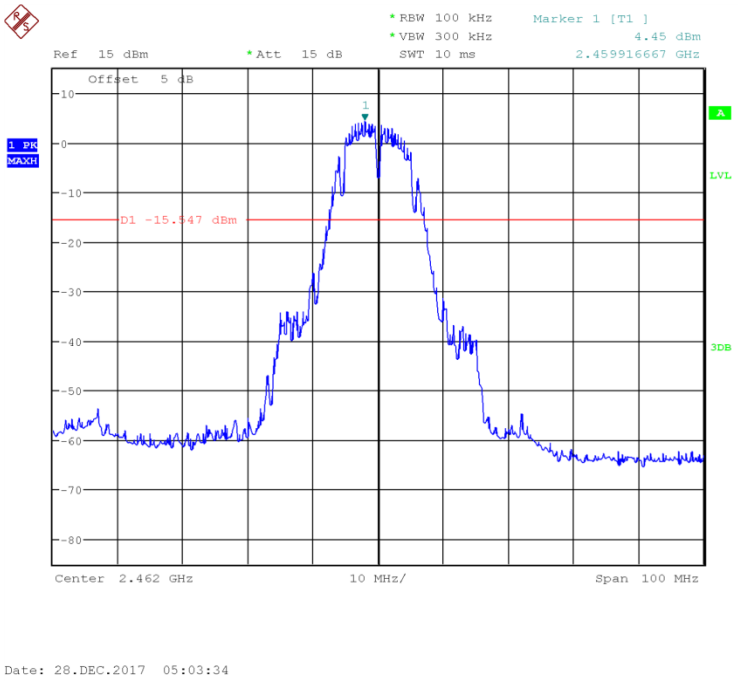


Fig.37 Conducted Spurious Emission (802.11b, Ch11)

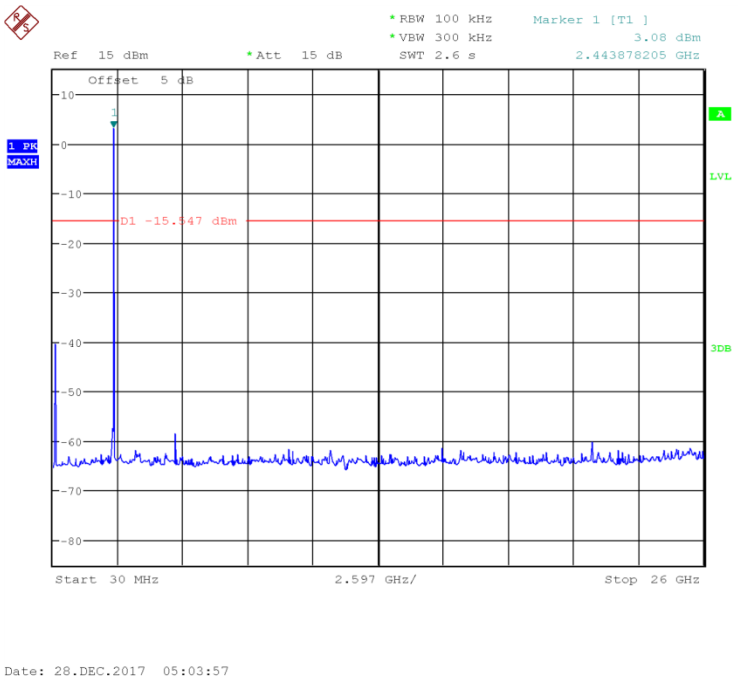


Fig.38 Conducted Spurious Emission (802.11b, Ch11, 30MHz~26GHz)

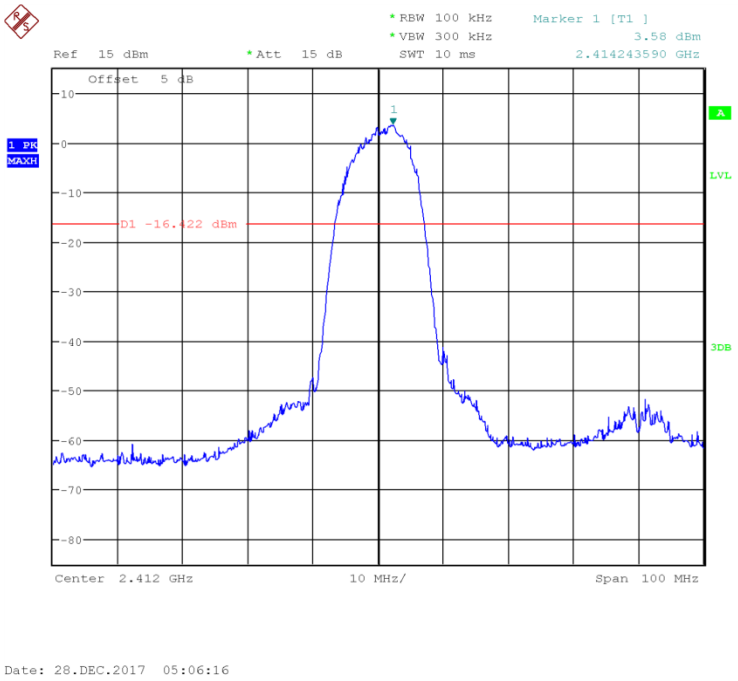


Fig.39 Conducted Spurious Emission (802.11g, Ch1)

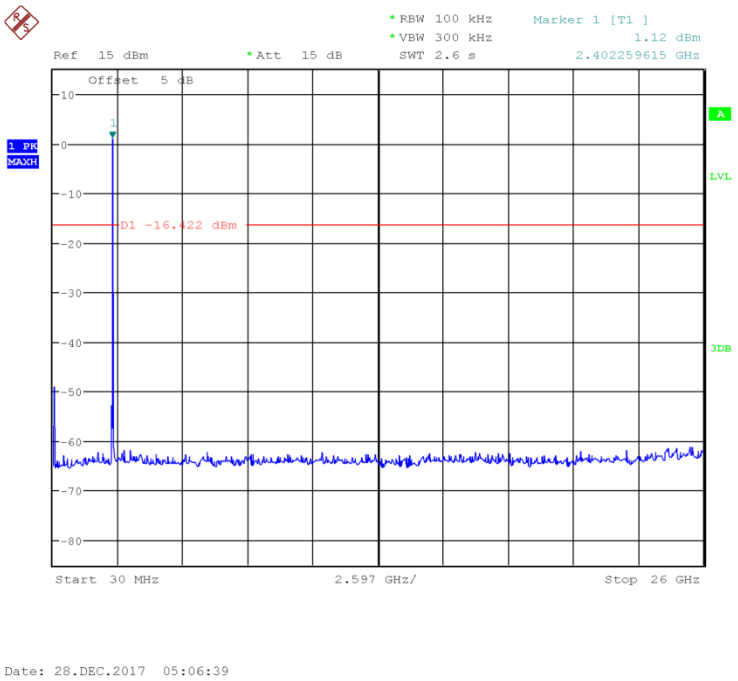


Fig.40 Conducted Spurious Emission (802.11g, Ch1, 30MHz~26GHz)

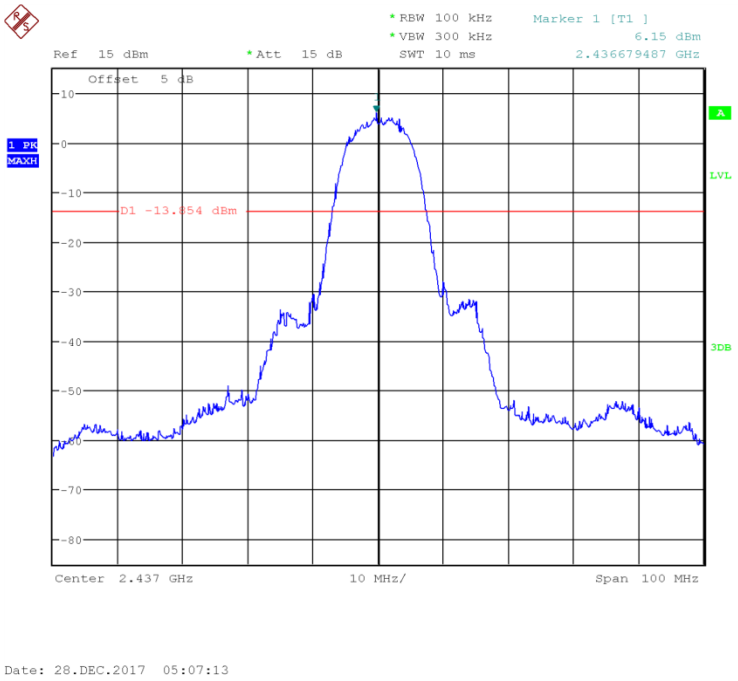


Fig.41 Conducted Spurious Emission (802.11g, Ch6)

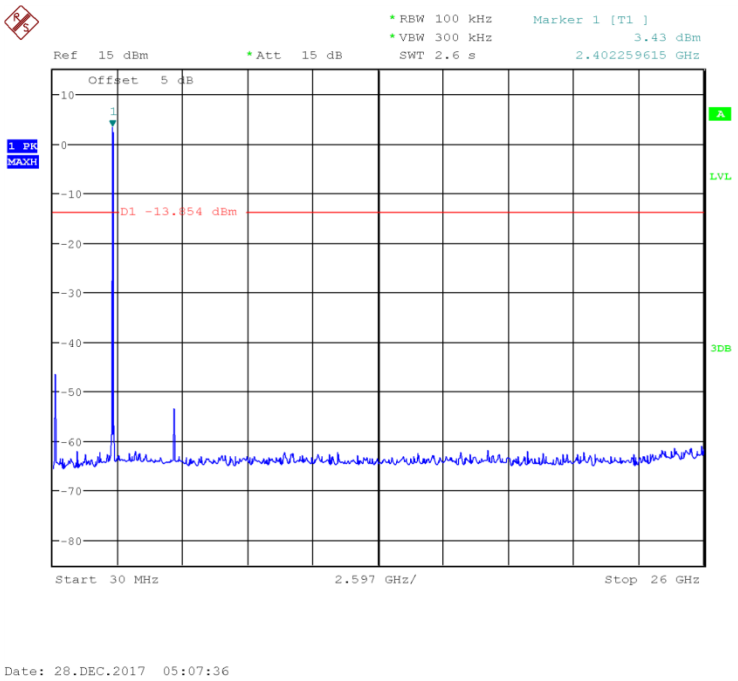


Fig.42 Conducted Spurious Emission (802.11g, Ch6, 30MHz~26GHz)

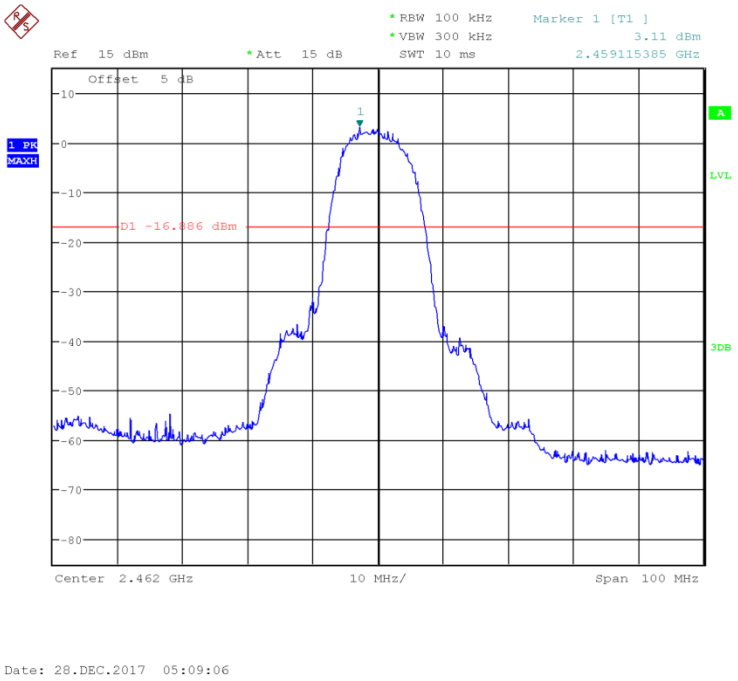


Fig.43 Conducted Spurious Emission (802.11g, Ch11)

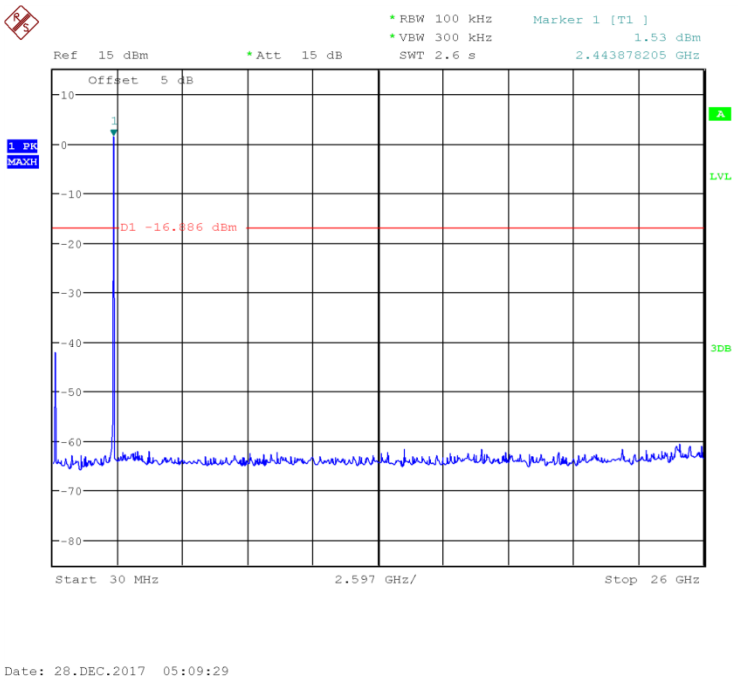


Fig.44 Conducted Spurious Emission (802.11g, Ch11, 30MHz~26GHz)

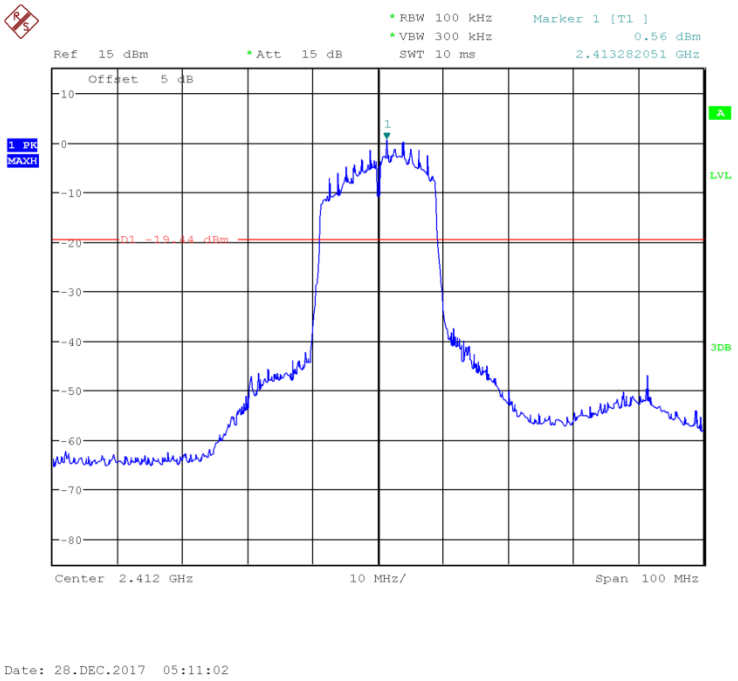


Fig.45 Conducted Spurious Emission (802.11n-20MHz, Ch1)

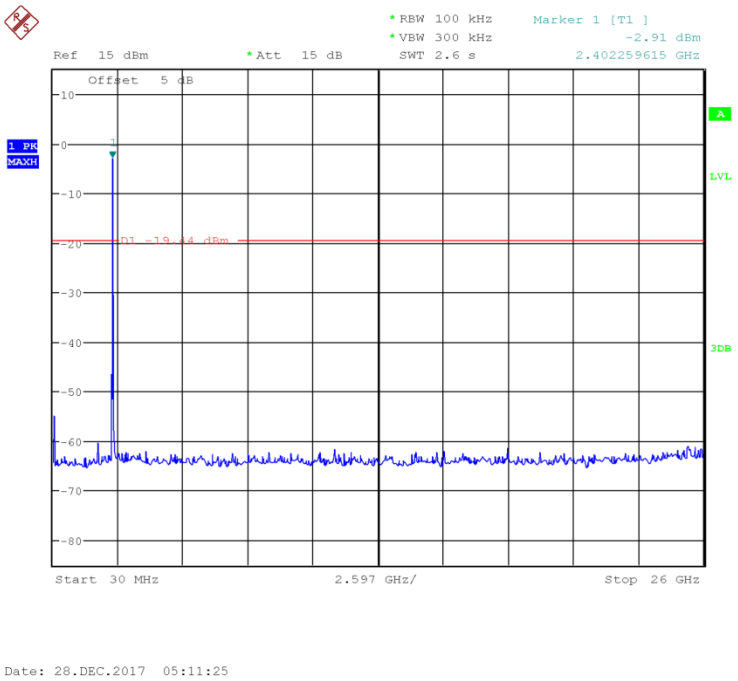


Fig.46 Conducted Spurious Emission (802.11n-20MHz, Ch1, 30MHz~26GHz)

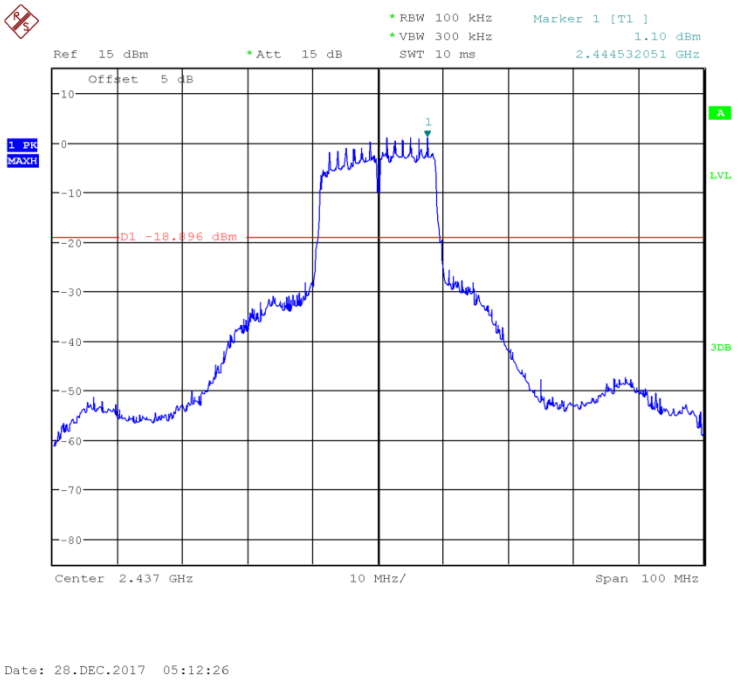


Fig.47 Conducted Spurious Emission (802.11n-20MHz, Ch6)

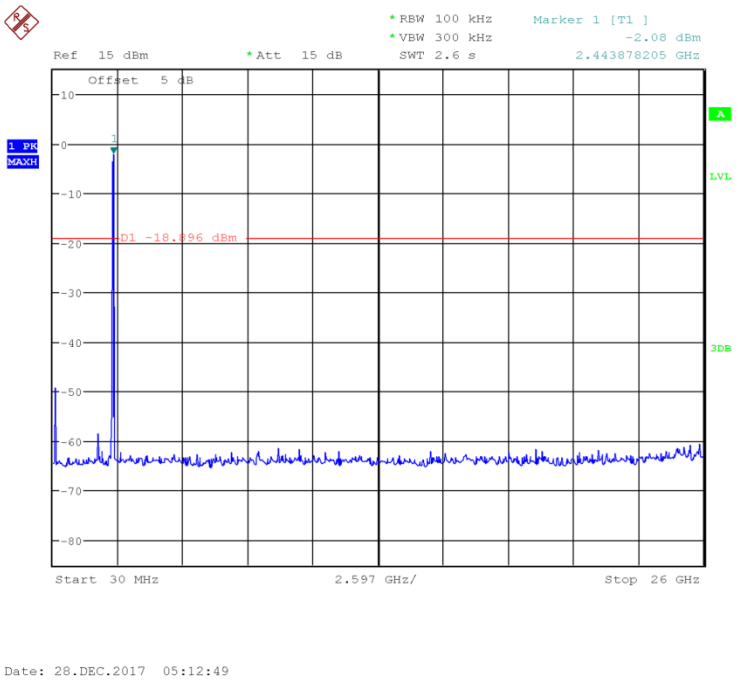


Fig.48 Conducted Spurious Emission (802.11n-20MHz, Ch6, 30MHz~26GHz)

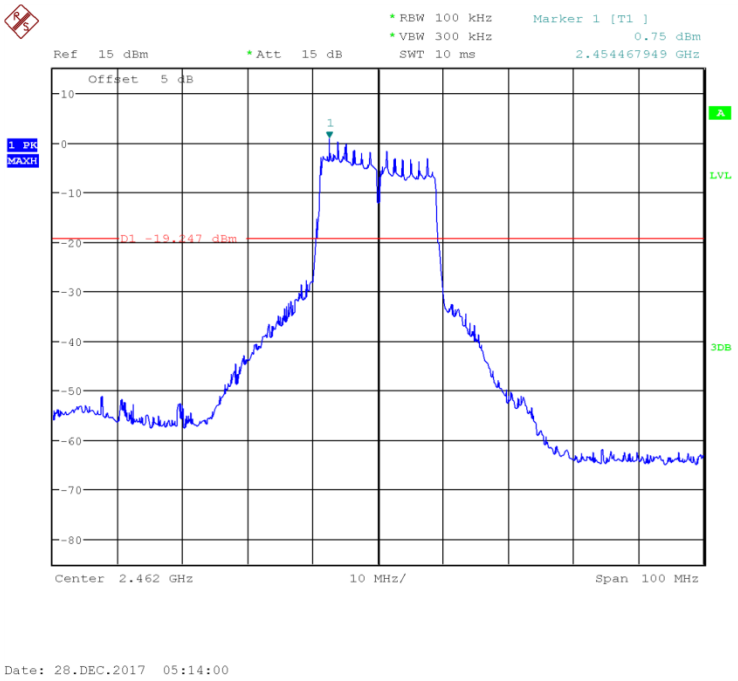


Fig.49 Conducted Spurious Emission (802.11n-20MHz, Ch11)

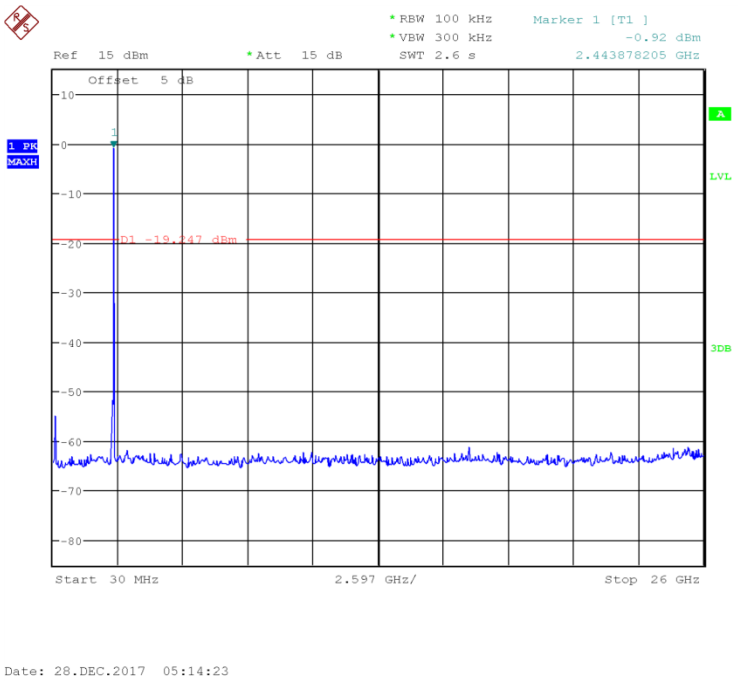


Fig.50 Conducted Spurious Emission (802.11n-20MHz, Ch11, 30MHz~26GHz)

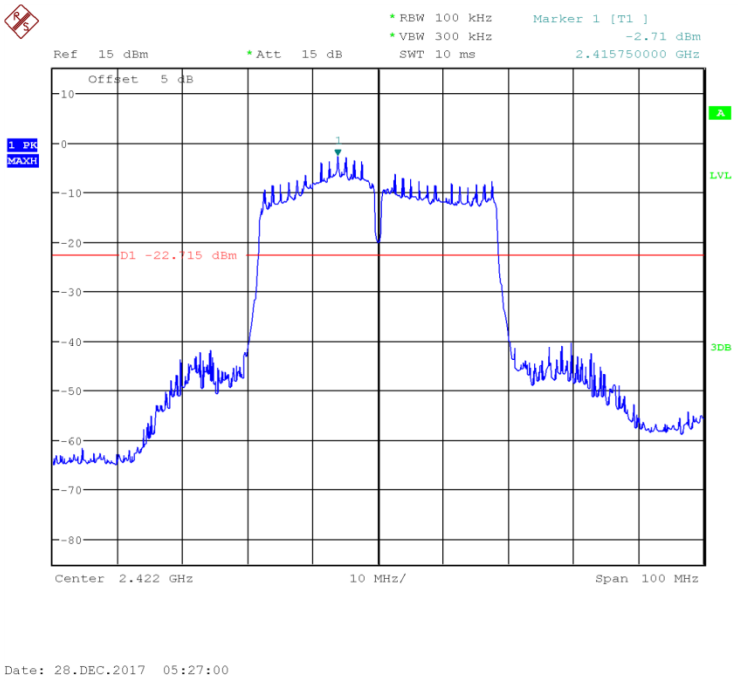


Fig.51 Conducted Spurious Emission (802.11n-40MHz, Ch3)

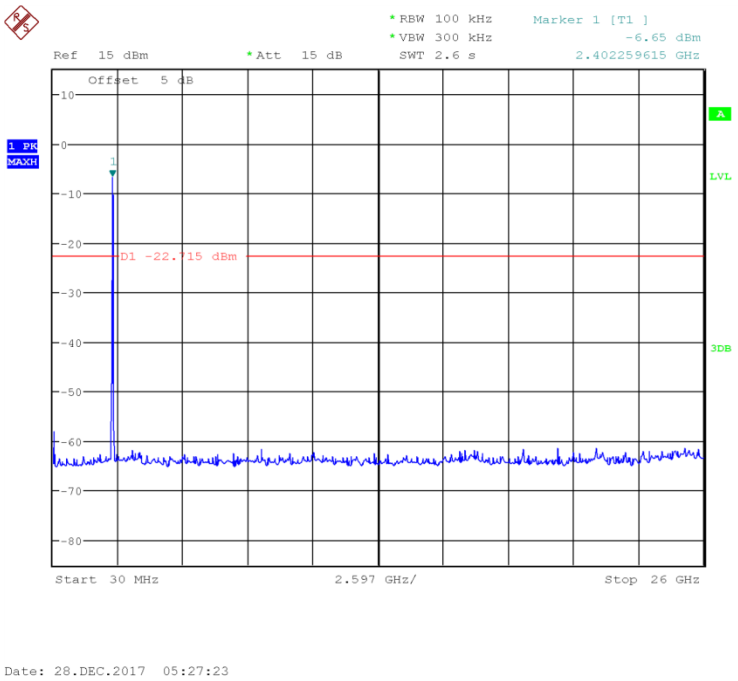


Fig.52 Conducted Spurious Emission (802.11n-40MHz, Ch3, 30MHz~26GHz)

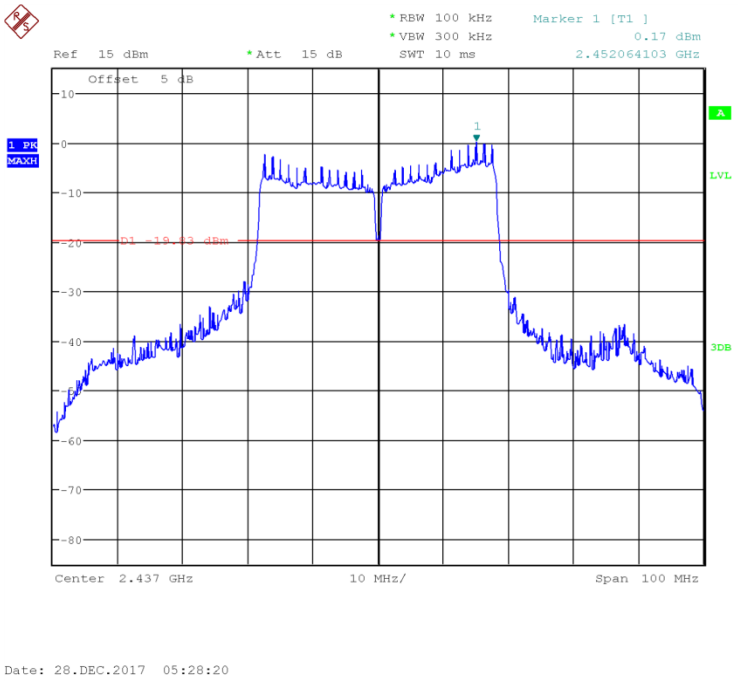


Fig.53 Conducted Spurious Emission (802.11n-40MHz, Ch6)

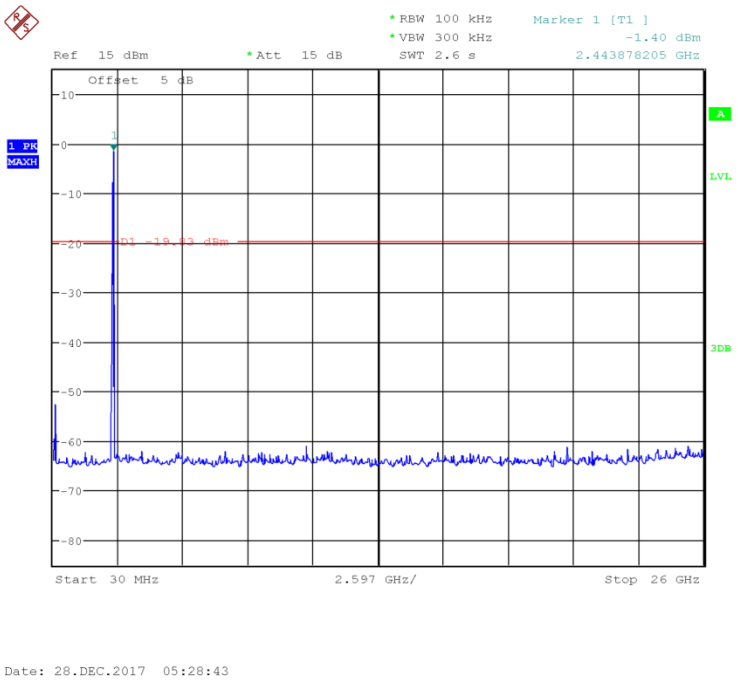


Fig.54 Conducted Spurious Emission (802.11n-40MHz, Ch6, 30MHz~26GHz)

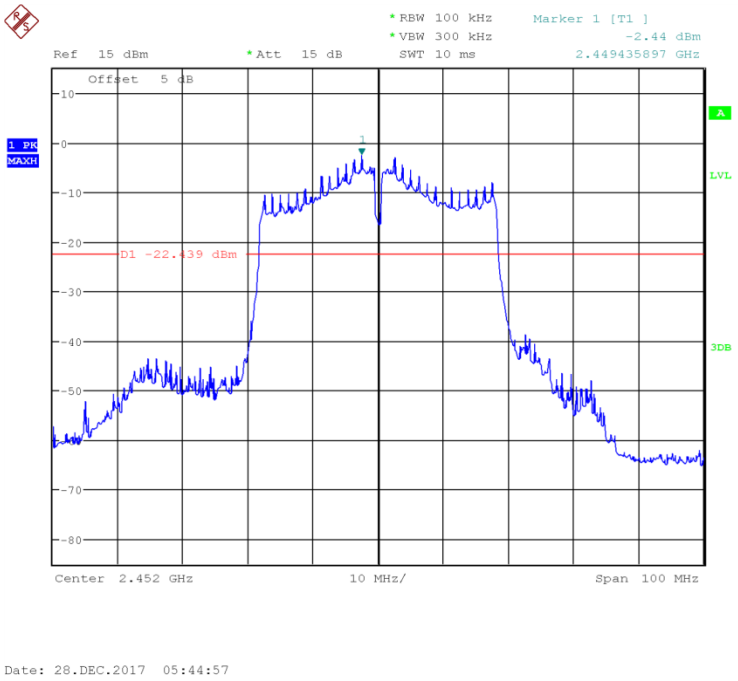


Fig.55 Conducted Spurious Emission (802.11n-40MHz, Ch9)

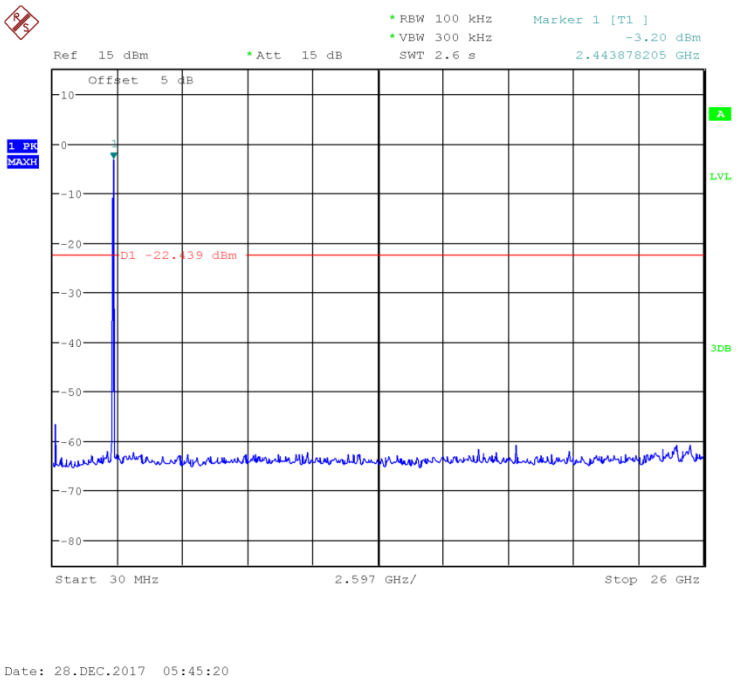


Fig.56 Conducted Spurious Emission (802.11n-40MHz, Ch9, 30MHz~26GHz)

6.6. Transmitter Spurious Emission-Radiated

6.6.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247,15.205,15.209	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in 25.205(a), must also comply with the radiated emission limits specified in 15.209(a)(see 15.205(c)). The measurement is according to ANSI C63.10 clause 11.11 and 11.12.

6.6.2 Limit in restricted band:

Frequency of emission(MHz)	Field strength(uV/m)	Field strength(dBuV/m)
30~88	100	40
88~216	150	43.5
216~960	200	46
Above 960	500	54

6.6.3 Test procedures

Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a nonconducting platform, the

top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m, but it may be larger or smaller to accommodate various sized EUTs. For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also ANSI C63.4-2013 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During testing, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emission from the EUT. This maximization process was repeated with the EUT positioned in each of its three rthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Times (s)
30~1000	100KHz/300KHz	5
1000~4000	1MHz/1MHz	15
4000~18000	1MHz/1MHz	40
18000~26500	1MHz/1MHz	20

802.11b/g mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11b	Power	2.38GHz~2.45GHz	Fig 57.	P
	Power	2.45GHz~2.5GHz	Fig 58.	P
	1	30MHz~1GHz	Fig 59.	P
		1GHz~3GHz	Fig 60.	P
		3GHz~18GHz	Fig 61.	P
802.11g	Power	2.38GHz~2.45GHz	Fig 62.	P
	Power	2.45GHz~2.5GHz	Fig 63.	P
	11	30MHz~1GHz	Fig 64.	P
		1GHz~3GHz	Fig 65.	P
		3GHz~18GHz	Fig 66.	P

802.11n mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n(20MHz)	Power	2.38GHz~2.45GHz	Fig 67.	P
	Power	2.45GHz~2.5GHz	Fig 68.	P
	1	30MHz~1GHz	Fig 69.	P
		1GHz~3GHz	Fig 70.	P
		3GHz~18GHz	Fig 71.	P
802.11n(40MHz)	Power	2.38GHz~2.45GHz	Fig 72.	P
	Power	2.45GHz~2.5GHz	Fig 73.	P
	9	30MHz~1GHz	Fig 74.	P
		1GHz~3GHz	Fig 75.	P
		3GHz~18GHz	Fig 76.	P

Conclusion: PASS

Note:

A ”reference path loss” is established and A_{Rpi} is the attenuation of “reference path loss”, and including the gain of receive antenna , the gain of the preamplifier, the cable loss.

P_{Mea} is the field strength recorded from the instrument.

The measurement results are obtained as described below:

ARpi = Cable loss + Antenna Gain-Preamplifier gain

Result = P_{Mea} + Cable loss + Antenna Gain-Preamplifier gain = P_{Mea} + ARpi .

802.11b mode

Ch1 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
40.060704	23.11	-10.4	33.51	V
48.819548	25.63	-9.1	34.73	V
61.467384	25.78	-11	36.78	V
74.28298	21.21	-13.8	35.01	V
498.66378	29.69	-1	30.69	H

930.059132	22.16	6.8	15.36	V

Ch1 1GHz~3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1872.3564	50.57	21.3	29.27	V
2647.814615	55.15	24.9	30.25	H
2739.689808	53.87	25.1	28.77	V
2813.044615	54.56	25.6	28.96	H
2910.496346	54.62	26.3	28.32	H
2950.545385	55.06	26.4	28.66	H

Ch1 1GHz~3GHz (Average)

2647.814615	42.21	24.9	17.31	H
2813.044615	42.14	25.6	16.54	H
2910.496346	42.67	26.3	16.37	H
2950.545385	42.56	26.4	16.16	H

Ch1 3GHz~18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
13148.67787	51.47	16.4	35.07	H
14273.2258	54.63	19.8	34.83	V
15512.86153	56.68	22.7	33.98	V
16221.91693	58.37	25	33.37	V
16786.4878	60.06	26.7	33.36	H
17526.4772	62.49	28.5	33.99	V

Ch1 3GHz~18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14273.2258	42.3	19.8	22.5	V
15512.86153	43.97	22.7	21.27	V
16221.91693	46.35	25	21.35	V

16786.4878	47.42	26.7	20.72	H
17526.4772	49.02	28.5	20.52	V

802.11g

Ch11 30MHz~1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
40.76014	23.36	-10.3	33.66	V
48.671368	25.95	-9.2	35.15	V
61.561548	26.13	-11	37.13	V
143.989412	23.15	-14	37.15	H
237.458652	26.29	-8.4	34.69	H
491.46134	27.99	-1.2	29.19	H

Ch11 1GHz~3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1843.8308	53.15	20.2	32.95	V
1903.41	49.54	20.1	29.44	H
2249.2892	50.43	20.7	29.73	H
2679.882692	55.12	25	30.12	V
2862.354423	55.8	26.1	29.7	V
2969.065961	56.18	26.5	29.68	H

Ch11 1GHz~3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2679.882692	42.14	25	17.14	V
2862.354423	42.68	26.1	16.58	V
2969.065961	43.42	26.5	16.92	H

Ch11 3GHz~18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
11975.47907	50.99	14.9	36.09	V
12758.8252	51.97	16.2	35.77	V

13373.3838	52.73	16.9	35.83	H
14335.1718	54.09	19.8	34.29	V
15652.14267	57.01	22.8	34.21	V
16510.19393	59.09	26.3	32.79	H

Ch11 3GHz~18GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14335.1718	41.86	19.8	22.06	V
15652.14267	44.57	22.8	21.77	V
16510.19393	46.75	26.3	20.45	H

802.11n-20MHz

Ch1 30MHz~1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.333052	18.53	-12	30.53	V
40.817844	22.57	-10.3	32.87	V
48.917852	25.42	-9.1	34.52	V
61.743856	25.66	-11	36.66	V
73.56826	19.84	-13.6	33.44	V
491.018736	26.87	-1.2	28.07	H

Ch1 1GHz~3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1877.8776	49.74	20.8	28.94	H
2271.8608	50.68	21.4	29.28	H
2602.865384	54.47	24.5	29.97	V
2682.040385	54.14	25	29.14	H
2813.4975	54.08	25.6	28.48	H
2920.328269	54.29	26.3	27.99	H

Ch1 1GHz~3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity

2602.865384	41.47	24.5	16.97	V
2682.040385	42.07	25	17.07	H
2813.4975	42.06	25.6	16.46	H
2920.328269	42.36	26.3	16.06	H

Ch1 3GHz~18GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
12840.38533	52.47	16.1	36.37	V
13423.32093	53.02	17.3	35.72	V
14354.63313	53.98	19.6	34.38	H
15484.13213	56.54	22.7	33.84	V
15971.05927	58.3	24.5	33.8	H
16827.72053	60.03	26.9	33.13	H

Ch1 3GHz~18GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
15484.13213	44.11	22.7	21.41	V
15971.05927	46.31	24.5	21.81	H
16827.72053	47.59	26.9	20.69	H

802.11n-40MHz

Ch9 30MHz~1GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.41502	18.8	-12	30.8	V
49.000768	27.98	-9.1	37.08	V
62.306916	25.44	-11.2	36.64	V
237.581464	26.32	-8.3	34.62	H
451.436048	29.32	-2.2	31.52	H
687.992844	18.39	2.7	15.69	V

Ch9 1GHz~3GHz (Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1867.8676	50.58	21	29.58	V
2586.613654	53.84	24.4	29.44	V
2661.416923	53.49	25	28.49	H
2765.571346	54.2	25.2	29	H
2868.574423	54.28	26.1	28.18	V
2944.848846	54.52	26.4	28.12	H

Ch9 1GHz~3GHz (Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2765.571346	41.57	25.2	16.37	H
2868.574423	42.31	26.1	16.21	V
2944.848846	42.31	26.4	15.91	H

Ch9 3GHz~18GHz (Peak)

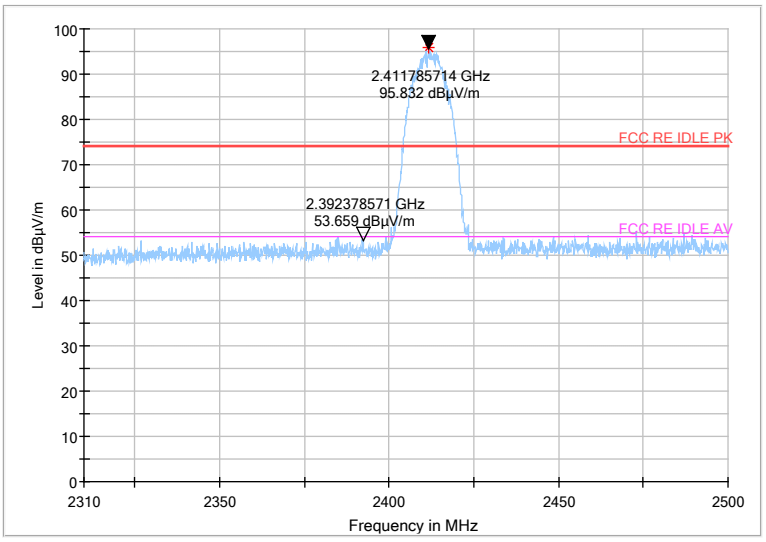
Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
4550.9344	40.94	-0.6	41.54	H
5989.806	42.74	2	40.74	H
9751.580933	47.86	9	38.86	H
11535.2972	51.69	14.3	37.39	V
14421.60667	54.04	19.1	34.94	V
15763.57947	56.96	23.7	33.26	H

Ch9 3GHz~18GHz (Average)

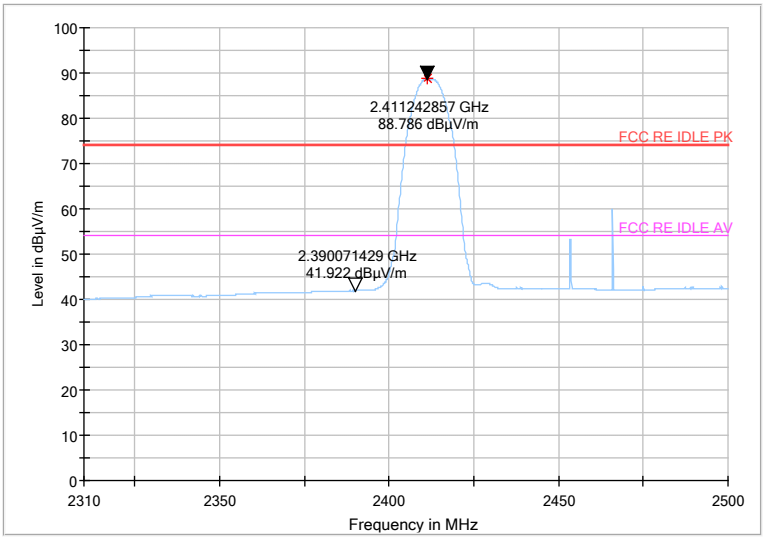
Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14421.60667	41.63	19.1	22.53	V
15763.57947	44.96	23.7	21.26	H

Note: Only the worst case is written in the report.

Test graphs as below:

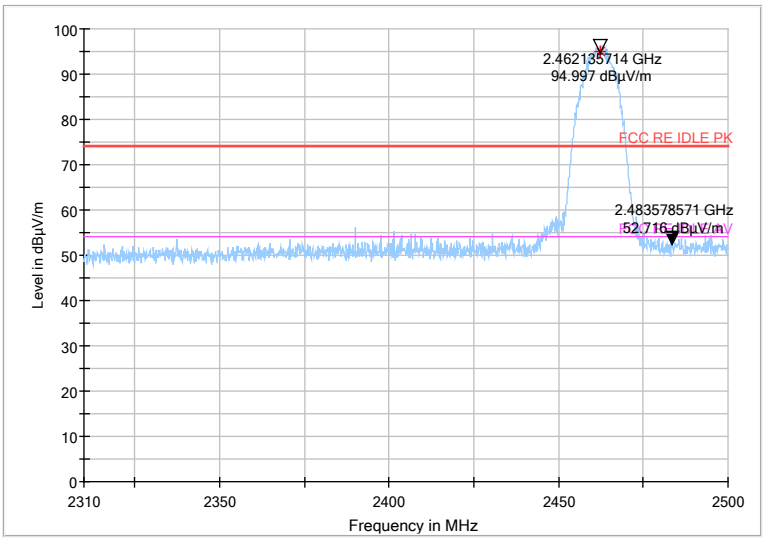


Peak detector

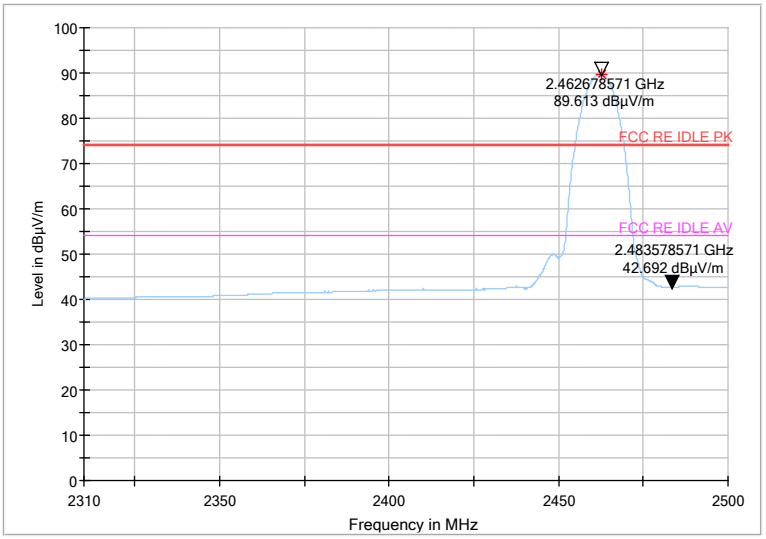


AV detector

Fig.57 Radiated emission (Power): 802.11b, low channel



Peak detector



AV detector

Fig.58 Radiated emission (Power): 802.11b, high channel

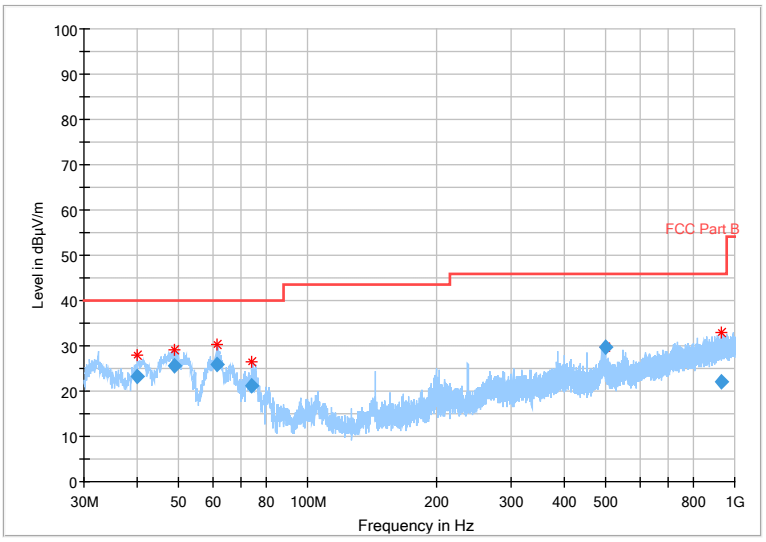


Fig.59 Radiated Spurious Emission (802.11b,Ch1,30MHz~1GHz)

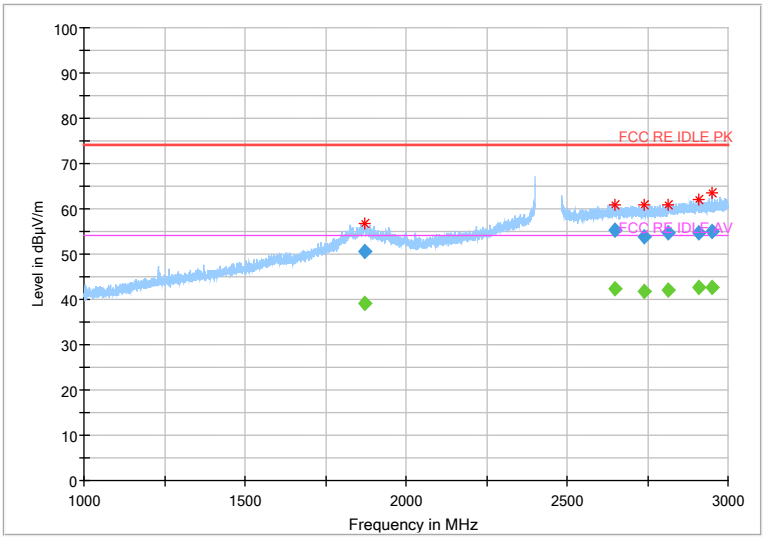


Fig.60 Radiated Spurious Emission (802.11b,Ch1,1GHz~3GHz)

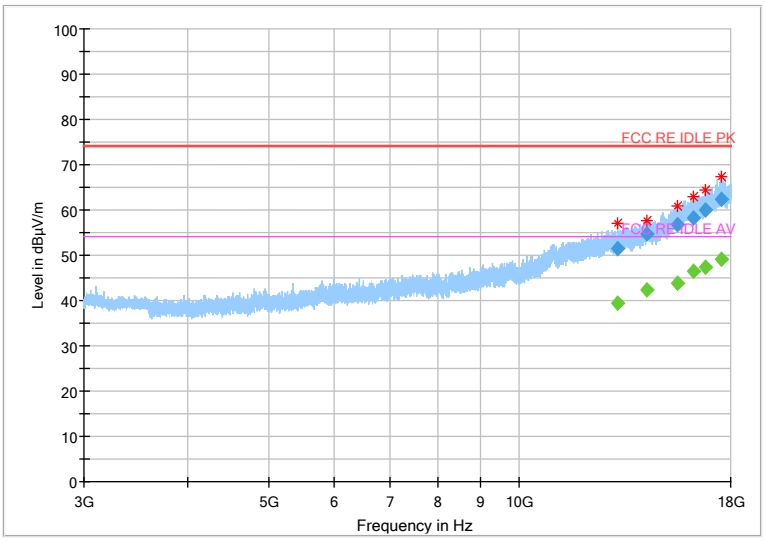
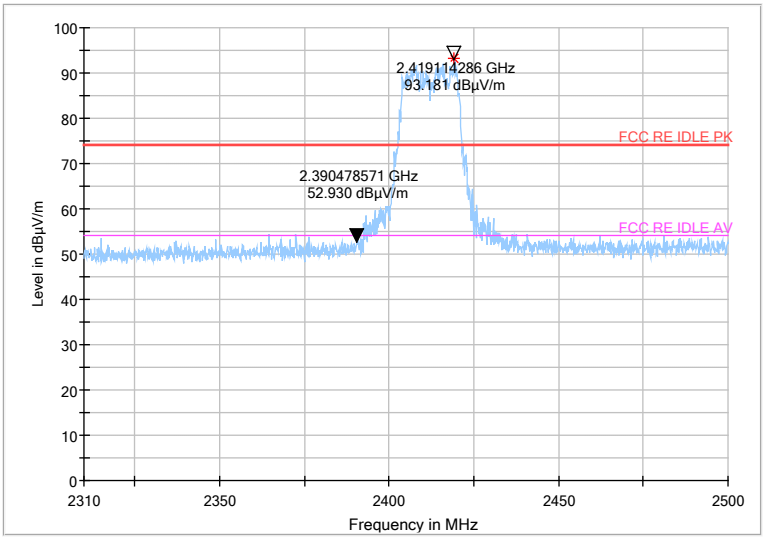
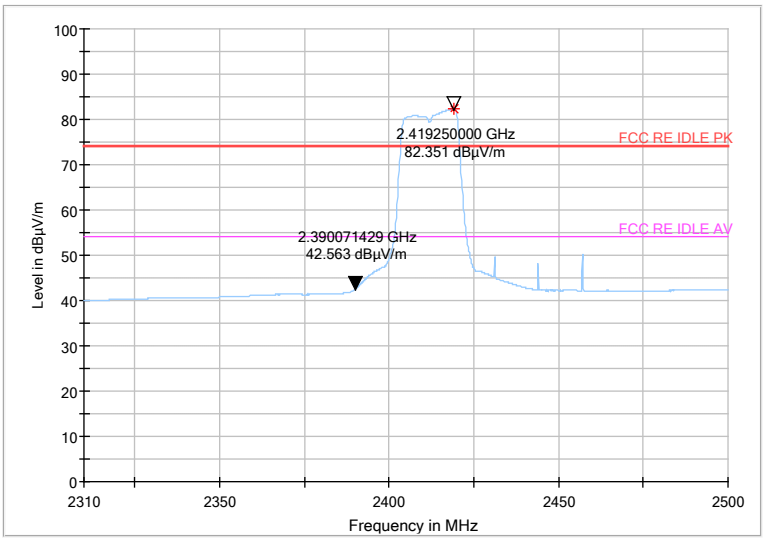


Fig.61 Radiated Spurious Emission (802.11b,Ch1,3GHz~18GHz)

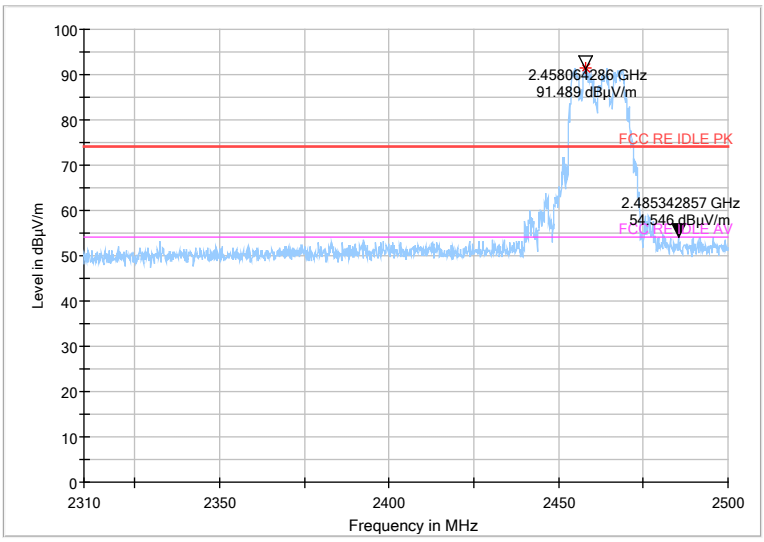


Peak detector

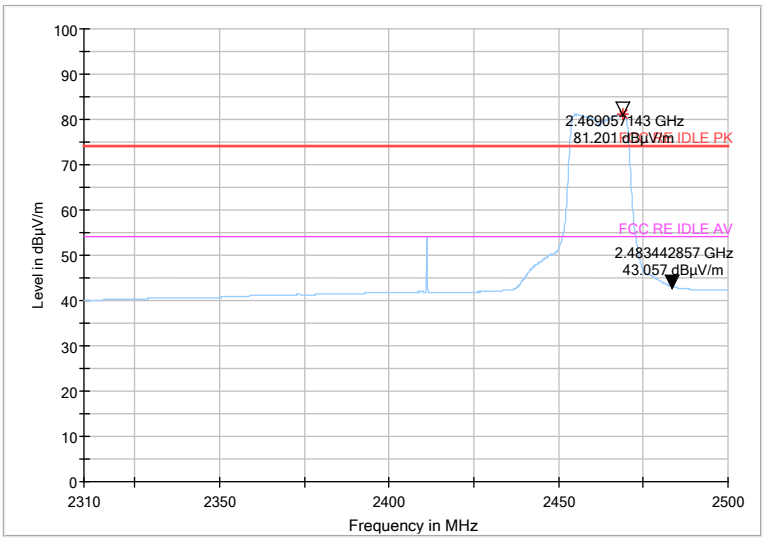


AV detector

Fig.62 Radiated emission (Power): 802.11g, low channel



Peak detector



AV detector

Fig.63 Radiated emission (Power): 802.11g, high channel

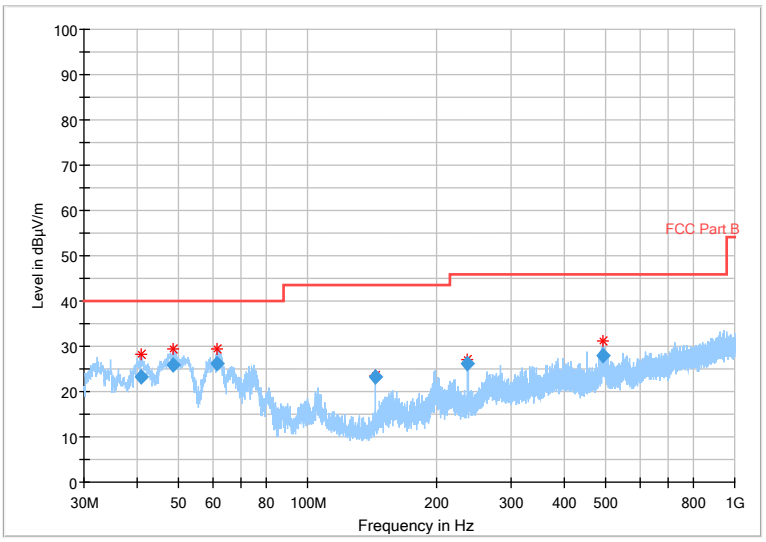


Fig.64 Radiated Spurious Emission (802.11g,Ch11,30MHz~1GHz)

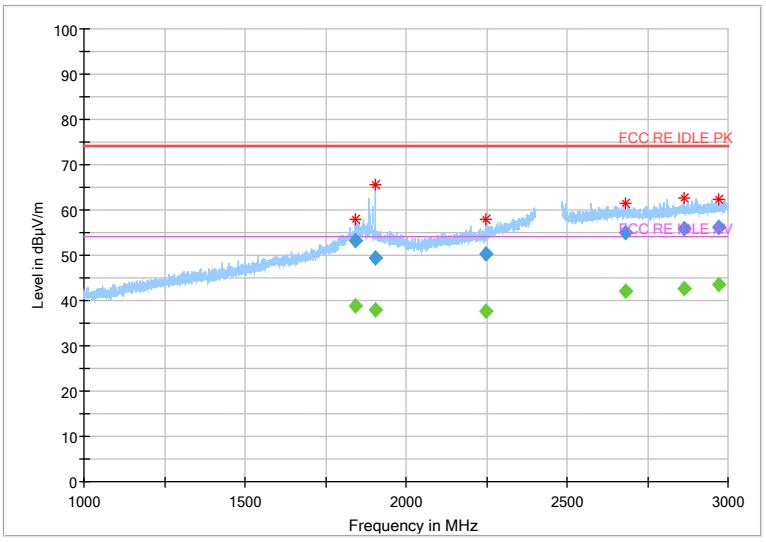


Fig.65 Radiated Spurious Emission (802.11g,Ch11,1GHz~3GHz)

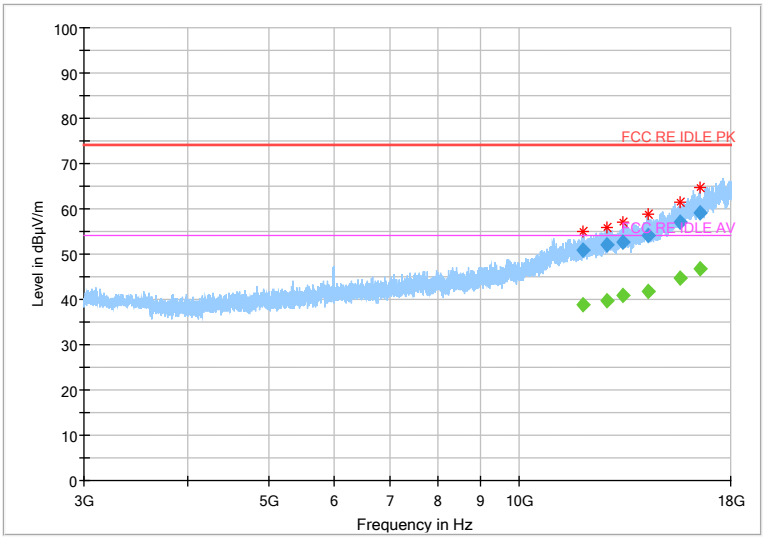
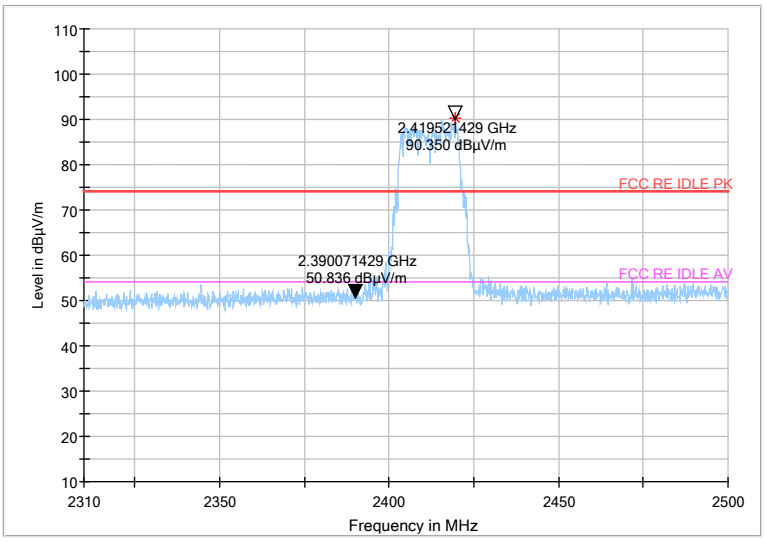
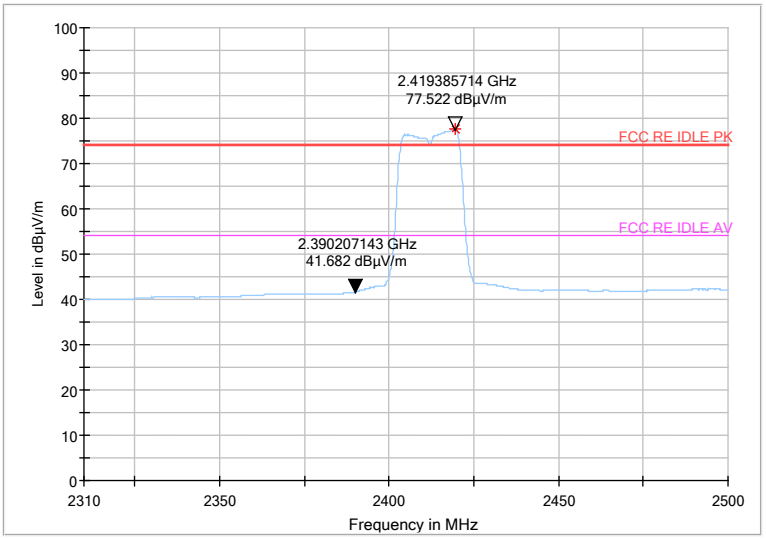


Fig.66 Radiated Spurious Emission (802.11g,Ch11,3GHz~18GHz)

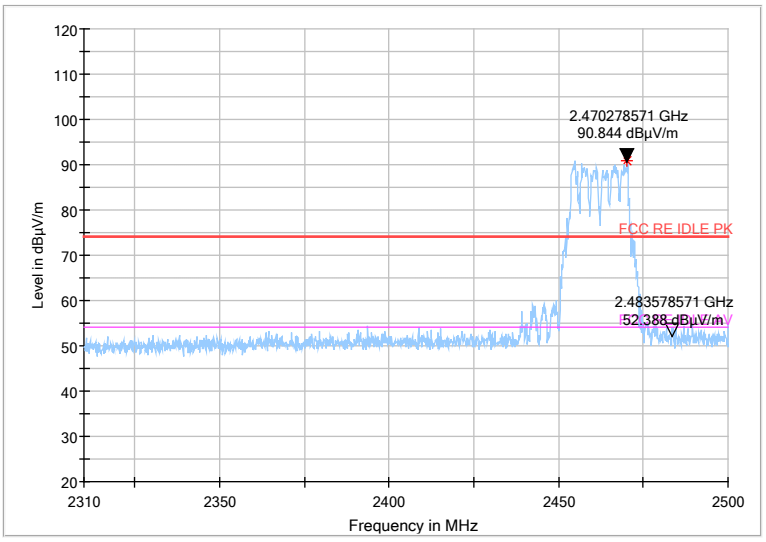


Peak detector

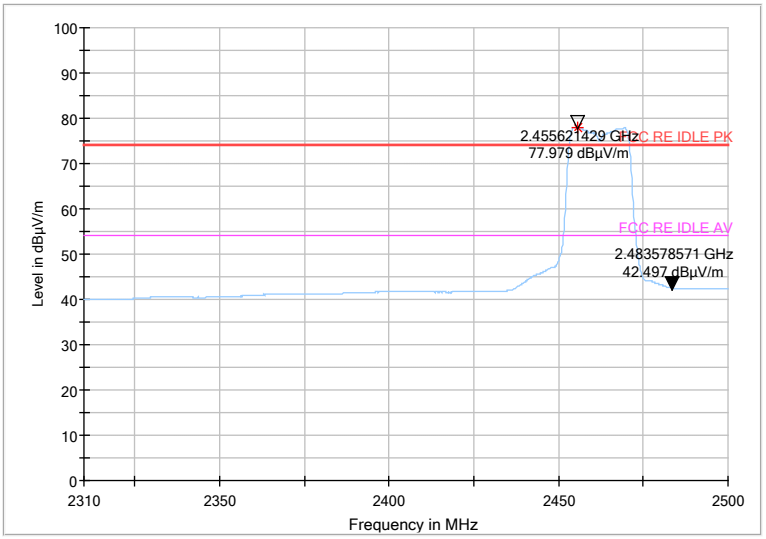


AV detector

Fig.67 Radiated emission (Power): 802.11n, low channel



Peak detector



AV detector

Fig.68 Radiated emission (Power): 802.11n, high channel

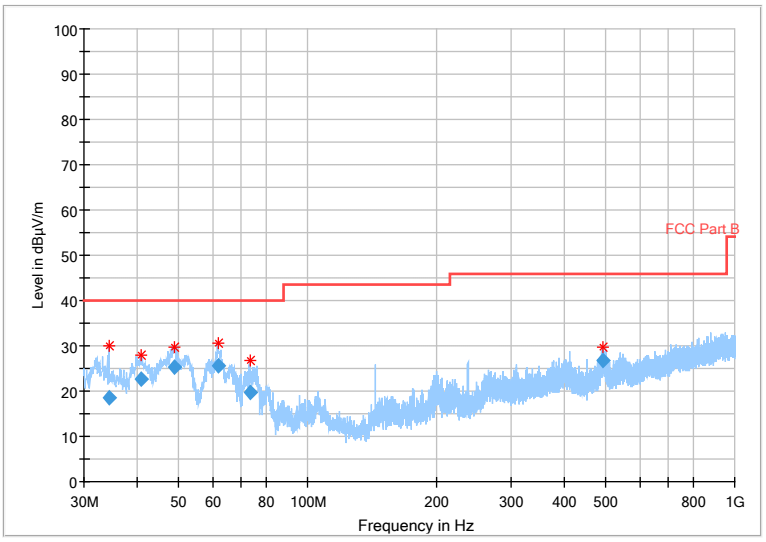


Fig.69 Radiated Spurious Emission (802.11 n-20MHz,Ch1,30MHz~1GHz)

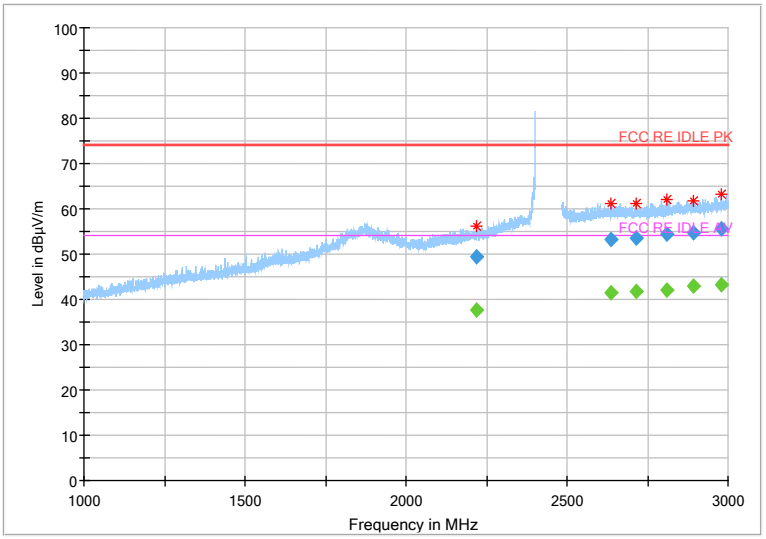


Fig.70 Radiated Spurious Emission (802.11 n-20MHz,Ch1,1GHz~3GHz)

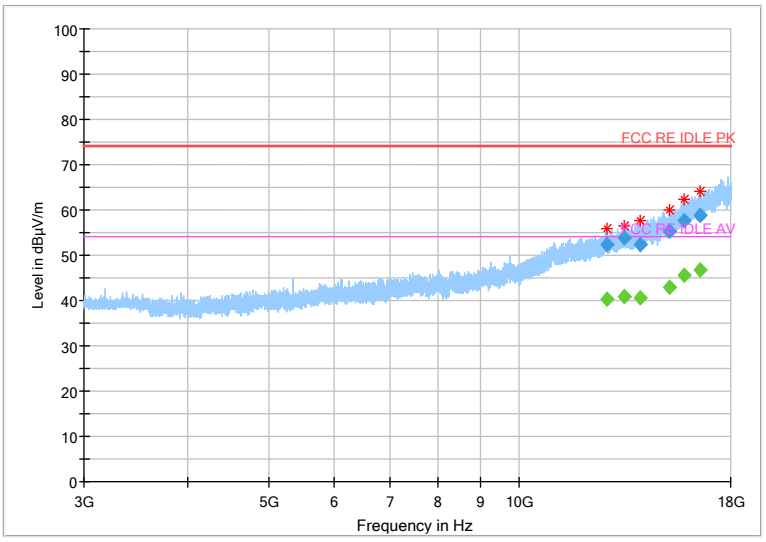
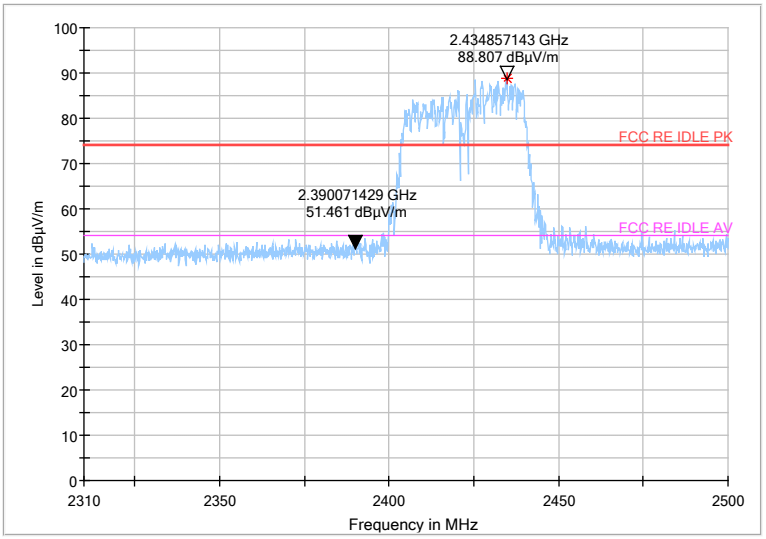
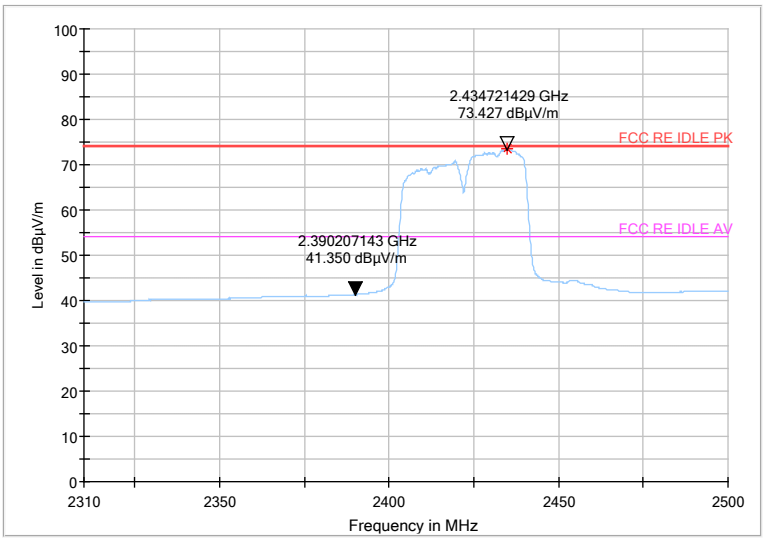


Fig.71 Radiated Spurious Emission (802.11 n-20MHz,Ch1,3GHz~18GHz)

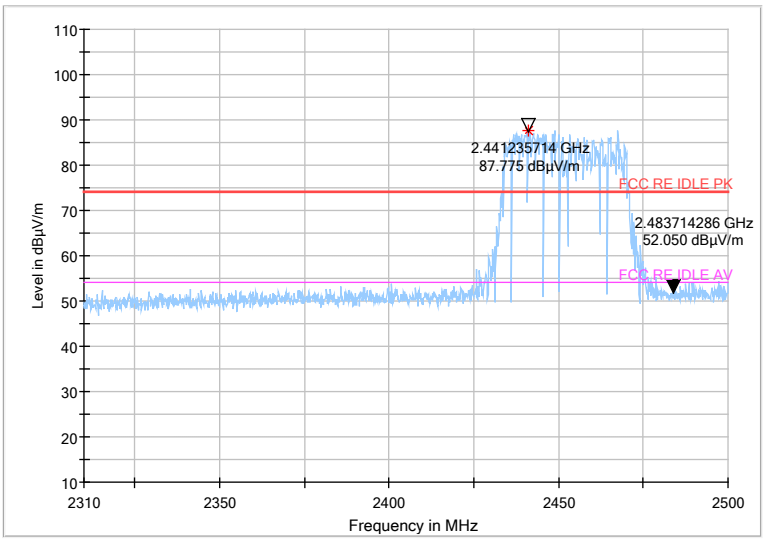


Peak detector

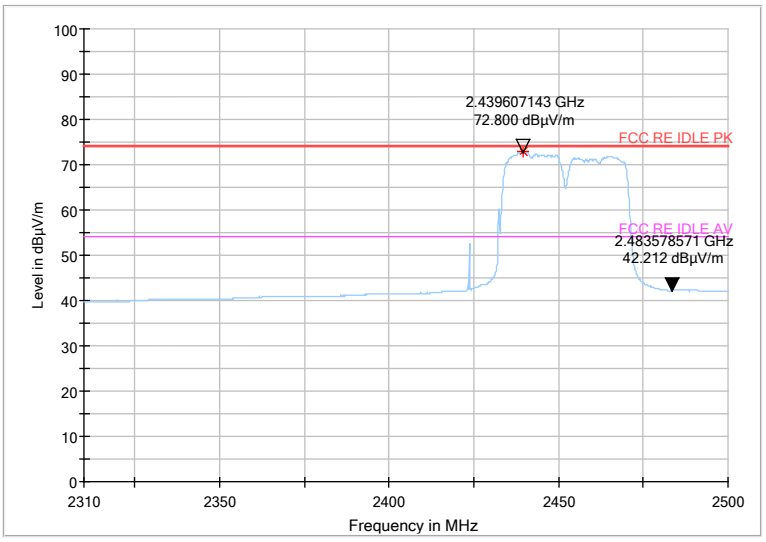


Average detector

Fig.72 Radiated emission (Power): 802.11n（40M）, low channel



Peak detector



Average detector

Fig.73 Radiated emission (Power): 802.11n（40M）, high channel

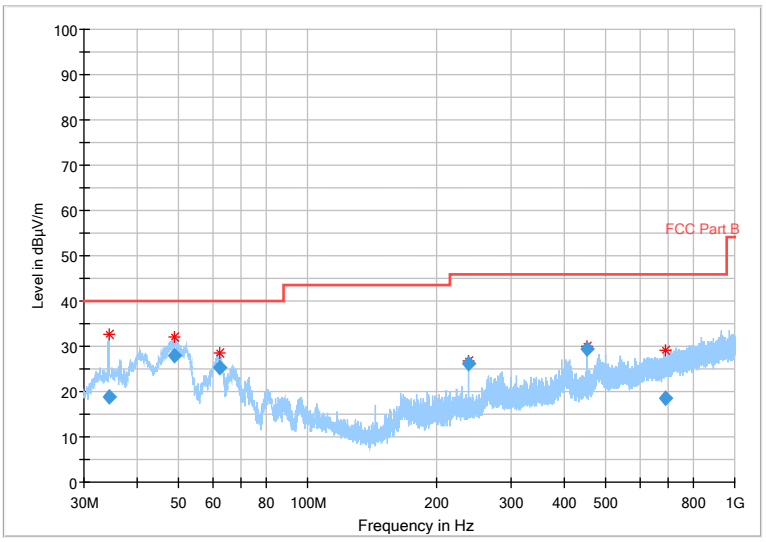


Fig.74 Radiated Spurious Emission (802.11 n-40MHz,Ch9,30MHz~1GHz)

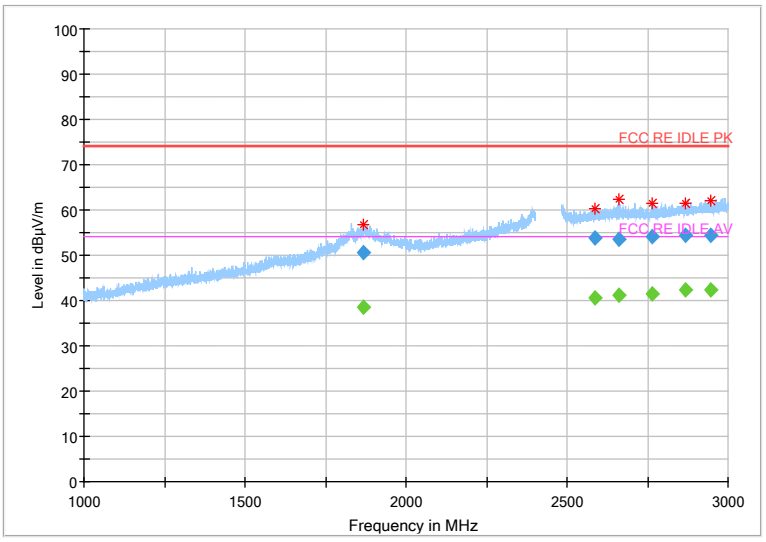


Fig.75 Radiated Spurious Emission (802.11 n-40MHz,Ch9,1GHz~3GHz)

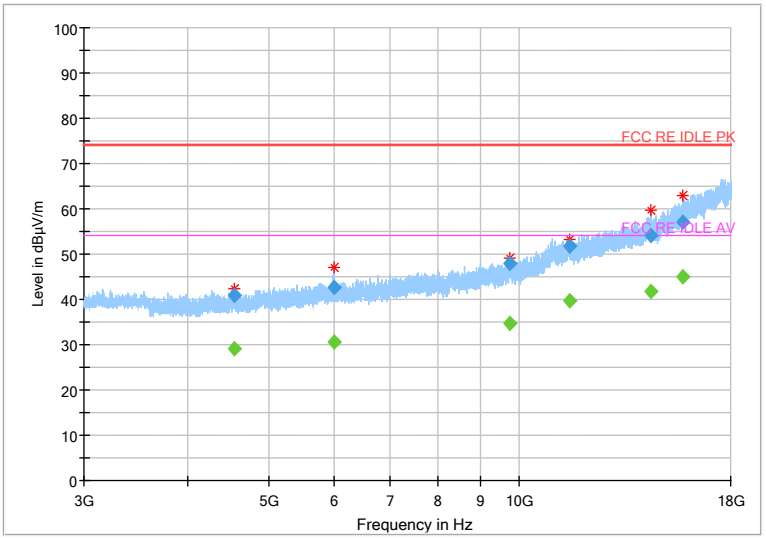


Fig.76 Radiated Spurious Emission (802.11 n-40MHz,Ch9,3GHz~18GHz)

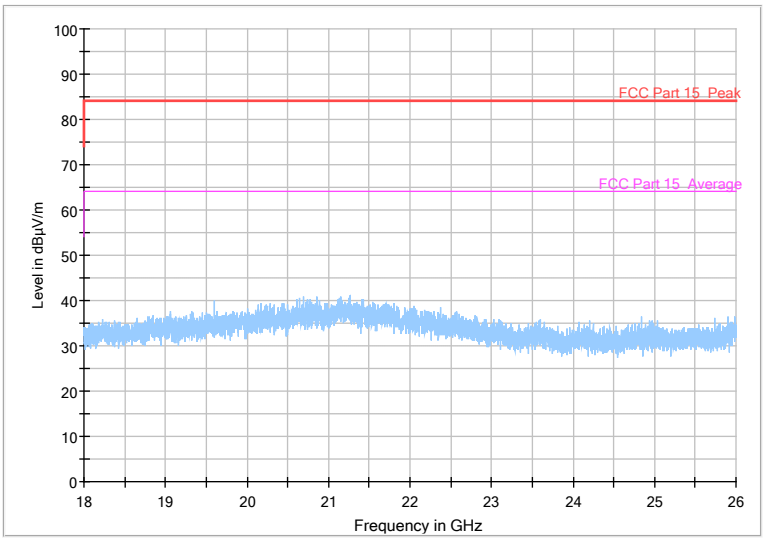


Fig.77 18GHz~26GHz

6.7. AC Power line Conducted Emission

Method of Measurement: See ANSI C63.10 clause 6.2

1 The one EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is selected for the final measurement, while applying the appropriate modulating signal to the EUT.

2 If the EUT is relocated from an exploratory test site to a final test site, the highest emissions shall be remaximized at the final test location before final ac power-line conducted emission measurements are performed.

3 The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) is then performed for the full frequency range for which the EUT is being tested for compliance without further variation of the EUT arrangement, cable positions, or EUT mode of operation.

4 If the EUT is comprised of equipment units that have their own separate ac power connections, e.g., floor-standing equipment with independent power cords for each shelf that are able to connect directly to the ac power network, each current-carrying conductor of one unit is measured while the other units are connected to a second (or more) LISN(s). All units shall be separately measured. If a power strip is provided by the manufacturer, to supply all of the units making up the EUT, only the conductors in the power cord of the power strip shall be measured.

If the EUT uses a detachable antenna, these measurements shall be made with a suitable dummy load connected to the antenna output terminals; otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended. When measuring the ac conducted emissions from a device that operates between 150 kHz and 30 MHz a non-detachable antenna may be replaced with a dummy load for the measurements within the fundamental emission band of the transmitter, but only for those measurements.36 Record the six highest EUT emissions relative to the limit of each of the current-carrying conductors of the power cords of the equipment that comprises the EUT over the frequency range specified by the procuring or regulatory agency. Diagram or photograph the test setup that was used. See Clause 8 for full reporting requirements.

Test Condition:

Voltage（V）	Frequency（Hz）
120	60

Measurement Result and limit:

(Quasi-peak-average Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Average Limit (dBμV)	Result (dBμV) With charger 802.11b	Conclusion
0.15 to 0.5	66 to 56	56 to 46	Fig 78.	P
0.5 to 5	56	46		
5 to 30	60	50		

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Conclusion: Pass

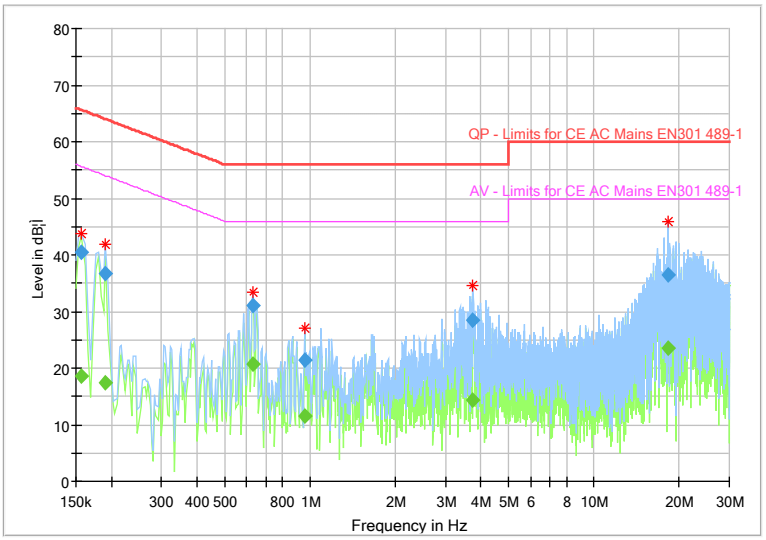


Fig.78 AC Power line Conducted Emission

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.157462	---	18.58	55.60	37.02	1000.0	9.000	L1	ON	9.6
0.157462	40.55	---	65.60	25.05	1000.0	9.000	L1	ON	9.6
0.191044	---	17.47	53.99	36.52	1000.0	9.000	N	ON	9.6
0.191044	36.68	---	63.99	27.31	1000.0	9.000	N	ON	9.6
0.631331	31.01	---	56.00	24.99	1000.0	9.000	N	ON	9.7
0.631331	---	20.65	46.00	25.35	1000.0	9.000	N	ON	9.7
0.959681	21.32	---	56.00	34.68	1000.0	9.000	L1	ON	9.7
0.959681	---	11.58	46.00	34.42	1000.0	9.000	L1	ON	9.7
3.758119	---	14.29	46.00	31.71	1000.0	9.000	L1	ON	9.7
3.758119	28.37	---	56.00	27.63	1000.0	9.000	L1	ON	9.7
18.231638	---	23.50	50.00	26.50	1000.0	9.000	L1	ON	9.9
18.231638	36.53	---	60.00	23.47	1000.0	9.000	L1	ON	9.9

7. Test Equipment and Ancillaries Used For Tests

The test equipment and ancillaries used are as follows.

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Vector Signal Analyzer	FSQ26	101096	Rohde&Schwarz	2017-05-11	1 Year
2	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	2017-05-11	1 Year

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	2017-05-11	1 Year
2	EMI Test Receiver	ESU40	100307	R&S	2017-05-11	1 Year
3	TRILOG Broadband Antenna	VULB9163	VULB9163-515	Schwarzbeck	2017-02-25	3 Year
4	Double-ridged Waveguide Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Year
5	2-Line V-Network	ENV216	101380	R&S	2017-05-11	1 Year

Anechoic chamber

Fully anechoic chamber by Frankonia German.

8. Test Environment

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Ground system resistance	< 0.5 Ω

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. =25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

ANNEX A. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

ANNEX B. Accreditation Certificate

ilac-MRA A2LA

Accredited Laboratory

A2LA has accredited

EAST CHINA INSTITUTE OF TELECOMMUNICATIONS

Shanghai, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 15th day of March 2017.

President and CEO
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2019

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

********** END OF REPORT **********