Full

TEST REPORT

No. I17D00060-WLA

For

Client : Mobiwire SAS

Production : 3G SmartPhone

Model Name : H5015 MobiWire Kayeta, ALTICE STARNAUTE 4

FCC ID: QPN-KAYETA

Hardware Version: V02

Software Version: V01

Issued date: 2017-05-15

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
I17D00060-WLA	00	2017-04-28	Initial creation of test report
I17D00060-WLA	01	2017-05-09	Second creation of test report
I17D00060-WLA	02	2017-05-15	Tertiary creation of test report

CONTENTS

1. TEST LABORATORY 5
1.1. TESTING LOCATION 5
1.2. TESTING ENVIRONMENT 5
1.3. PROJECT DATA 5
1.4. SIGNATURE 5
2. CLIENT INFORMATION 6
2.1. APPLICANT INFORMATION 6
2.2. MANUFACTURER INFORMATION 6
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) 7
3.1. ABOUT EUT 7
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST 7
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST 7
4. REFERENCE DOCUMENTS 8
4.1. REFERENCE DOCUMENTS FOR TESTING 8
5. SUMMARY OF TEST RESULTS 9
5.1. NOTES 10
5.2. STATEMENTS 10
6. TEST RESULT 11
6.1. MAXIMUM OUTPUT POWER 11
6.2. PEAK POWER SPECTRAL DENSITY 13
6.3. OCCUPIED 6DB BANDWIDTH 20
6.4. BAND EDGES COMPLIANCE 27
6.5. TRANSMITTER SPURIOUS EMISSION-CONDUCTED 32
6.6. TRANSMITTER SPURIOUS EMISSION-RADIATED 46
6.7. AC POWERLINE CONDUCTED EMISSION 68

7. TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS 71

8. TEST ENVIRONMENT 72

ANNEX A. DEVIATIONS FROM PRESCRIBED TEST METHODS 73

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:	200001
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:	2017-04-01
Testing End Date:	2017-04-17

1.4. Signature

Zhang Shiyu
(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:	Mobiwire SAS
Address:	79 AVENUE FRANCOIS ARAGO 92017 NANTERRE CEDEX France.
Telephone:	+33 1 78 14 09 33
Email:	Di.Ai@mobiwire.com

2.2. Manufacturer Information

Company Name:	MOBIWIRE MOBILES (NINGBO) CO.,LTD
Address:	No.999,Dacheng East Road,Fenghua City,Zhejiang
Telephone:	0574 59555707
Email:	Leander.xu@mobiwire.com.cn

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

3.1. About EUT

EUT Description	3G SmartPhone
Model name	H5015 MobiWire Kayeta, ALTICE STARNAUTE 4
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	3.8V
Extreme High Voltage	3.6V
Extreme Low Voltage	4.35V

Note: Photographs of EUT are shown in ANNEX A of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N01	358109080000034	V02	V01	2017-03-28

*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	---
AE2	---	---

*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	3.7V
Humidity	Hnom	32%
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.

The following deviation from, additions to, or exclusions from the test specifications have been made. See section 3.

5.2. Statements

The product name H5015 MobiWire Kayeta, ALTICE STARNAUTE 4, supporting GSM/GPRS/WCDMA/HSDPA/HSUPA/HSPA+/WLAN/BT/BLE/GPS, manufactured by MOBIWIRE MOBILES (NINGBO) 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	16.74	16.91	16.98
	2	16.97	17.05	17.19
	5.5	18.10	18.39	18.45
	11	19.55	19.64	19.70
802.11g	6	20.05	20.00	19.94
	9	20.21	20.24	20.27
	12	20.21	20.26	20.30
	18	19.54	19.73	19.85

	24	20.25	20.39	20.41
	36	19.68	19.74	19.88
	48	19.81	19.98	20.07
	54	19.90	20.05	20.14

The data rate 11Mbps and 24Mbps 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	17.95	18.02	18.04
	MCS1	17.74	17.79	17.88
	MCS2	17.72	17.82	17.84
	MCS3	17.67	17.74	17.82
	MCS4	17.68	17.77	17.84
	MCS5	18.01	18.04	18.19
	MCS6	18.11	18.27	18.32
	MCS7	17.97	17.99	18.02
Mode	**Data Rate(Index)**	**Teat Result(dBm)**		
		2422MHz(Ch3)	**2437MHz(Ch6)**	**2452MHz(Ch9)**
802.11n(40MHz)	MCS0	17.96	18.04	18.20
	MCS1	17.84	17.93	17.98
	MCS2	17.86	18.06	18.18
	MCS3	18.01	18.16	18.22
	MCS4	18.17	18.28	18.34
	MCS5	18.40	18.55	18.60
	MCS6	18.44	18.59	18.69

	MCS7	18.11	18.14	18.24

The data rate MCS6 for 802.11n(20M)and MCS6 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	12.38	12.31	12.49
802.11g	11.45	11.30	11.72

802.11n mode

Mode	Test Result(dBm)		
	2412MHz(Ch1)	2437MHz(Ch6)	2462MHz(Ch11)
802.11n(20MHz)	9.63	9.04	9.66
Mode	Test Result(dBm)		
	2422MHz(Ch3)	2437MHz(Ch6)	2452MHz(Ch9)
802.11n(40MHz)	10.08	9.99	10.14

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	-13.6	P
	6	Fig.2	-14.219	P
	11	Fig.3	-13.652	P
802.11g	1	Fig.4	-17.403	P
	6	Fig.5	-17.202	P
	11	Fig.6	-17.424	P

802.11n mode

Mode	Channel	Power Spectral Density(dBm/3kHz)		Conclusion
802.11n(20MHz)	1	Fig.7	-19.618	P
	6	Fig.8	-20.07	P
	11	Fig.9	-20.45	P
802.11g(40MHz)	3	Fig.10	-22.982	P
	6	Fig.11	-23.236	P
	9	Fig.12	-23.665	P

Conclusion: PASS

Test graphs as below:

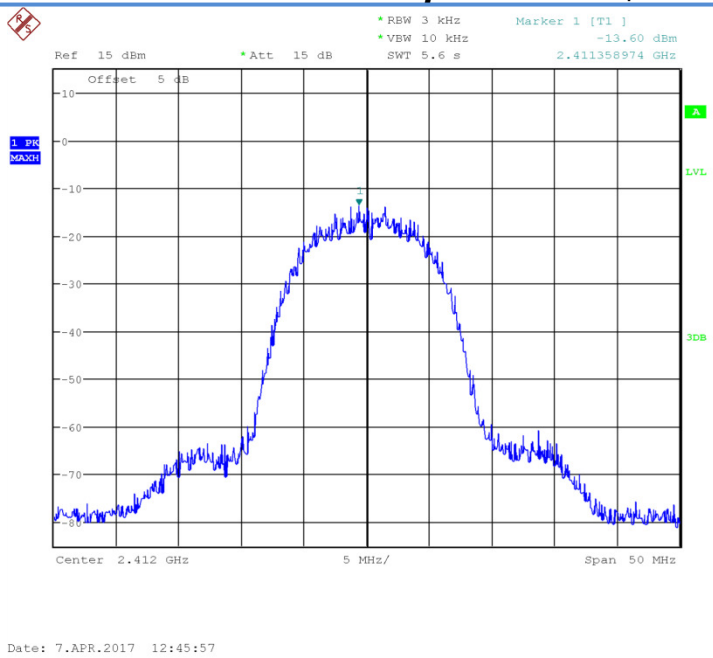


Fig.1 Power Spectral Density (802.1b,Ch1)

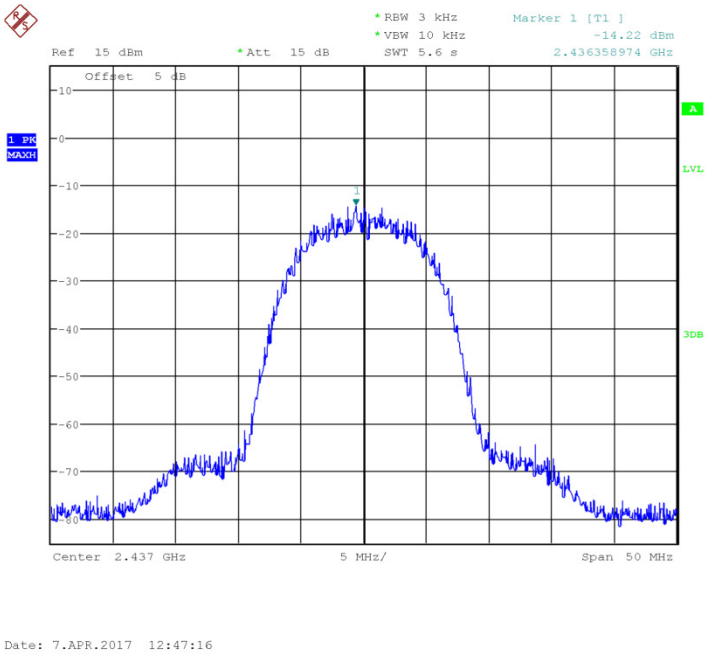


Fig.2 Power Spectral Density (802.1b,Ch6)

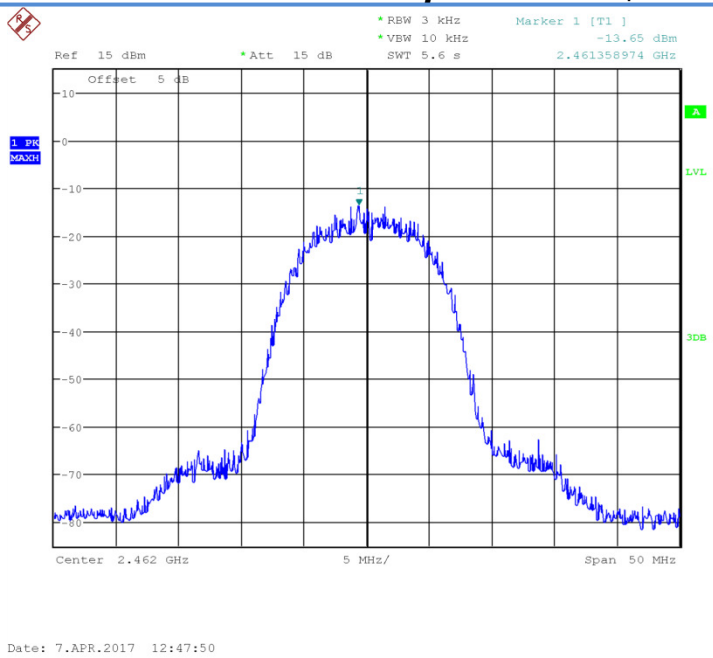


Fig.3 Power Spectral Density (802.1b,Ch11)

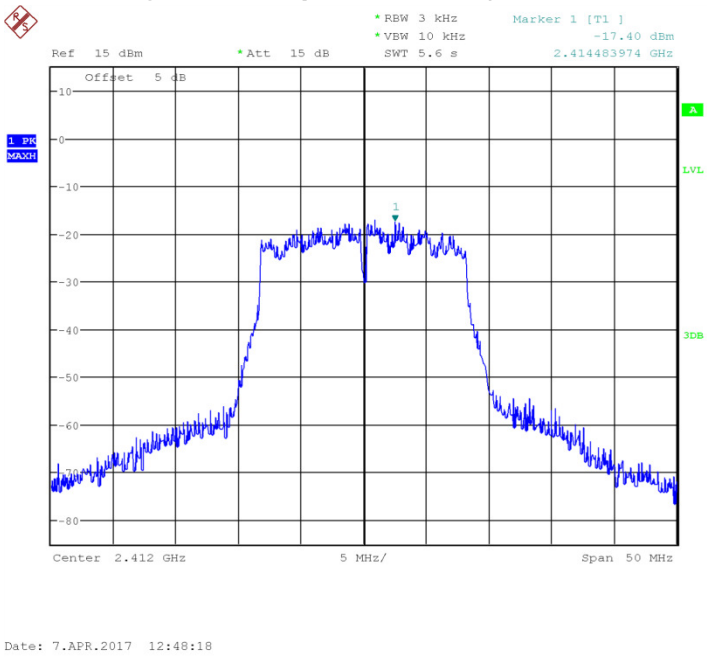


Fig.4 Power Spectral Density (802.1g,Ch1)

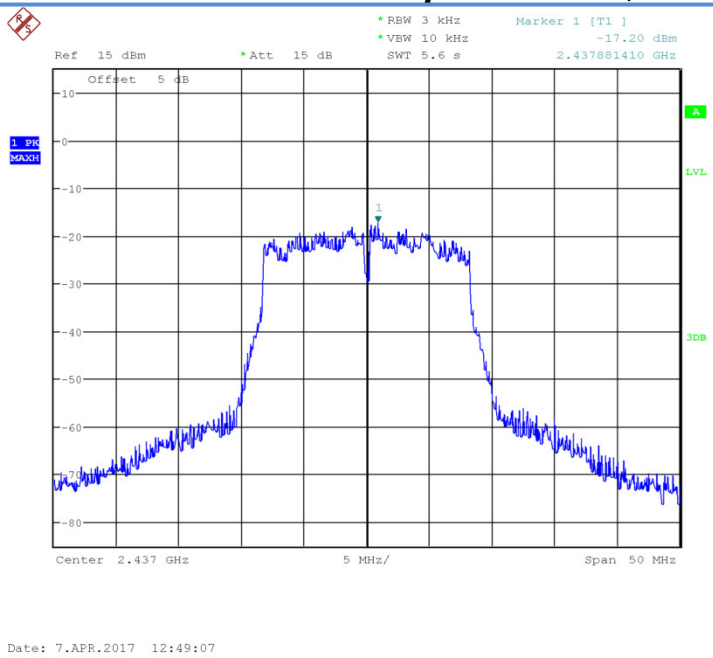


Fig.5 Power Spectral Density (802.1g,Ch6)

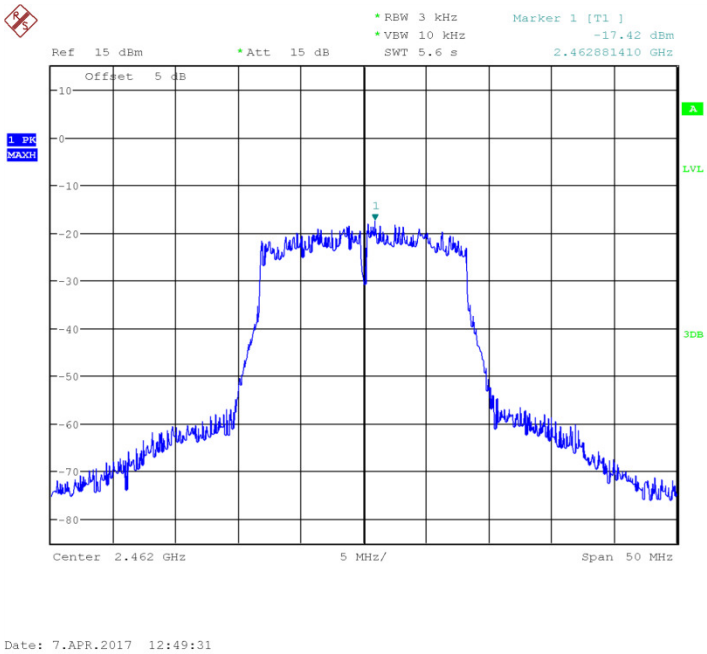


Fig.6 Power Spectral Density (802.1g,Ch11)

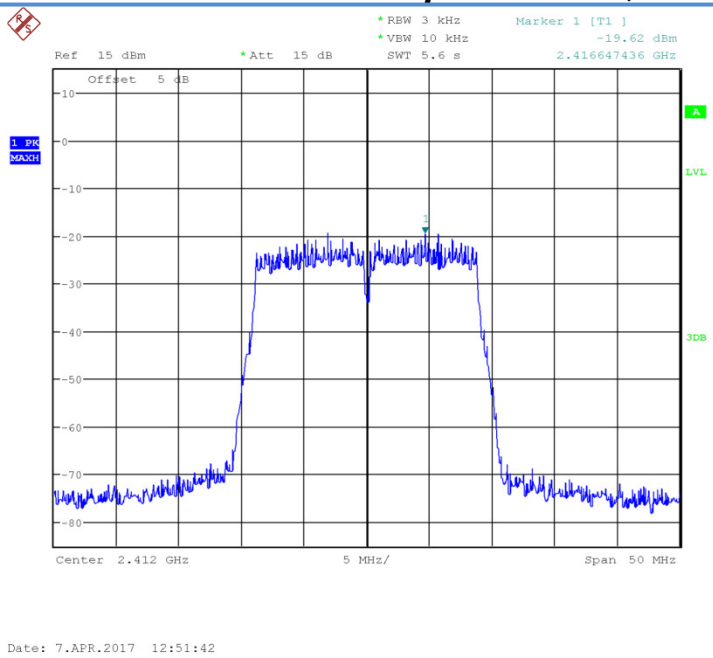


Fig.7 Power Spectral Density (802.1n-20MHz,Ch1)

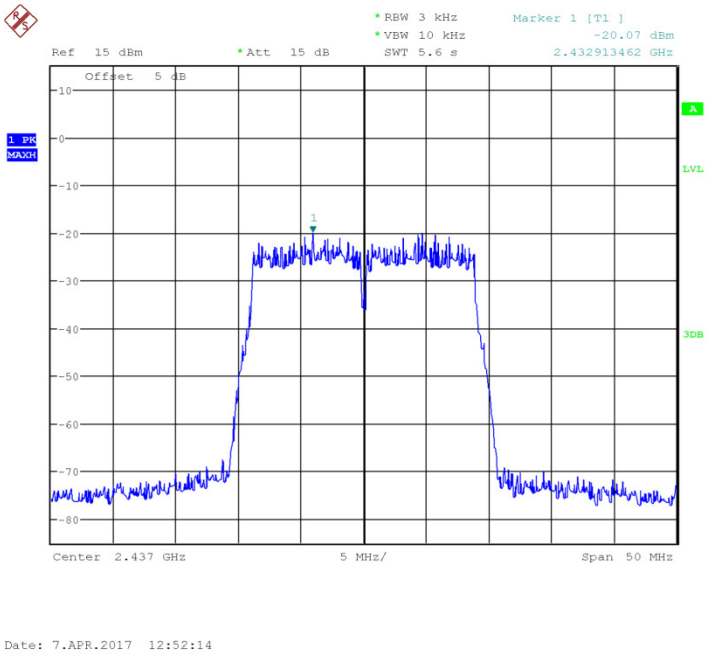


Fig.8 Power Spectral Density (802.1n-20MHz,Ch6)

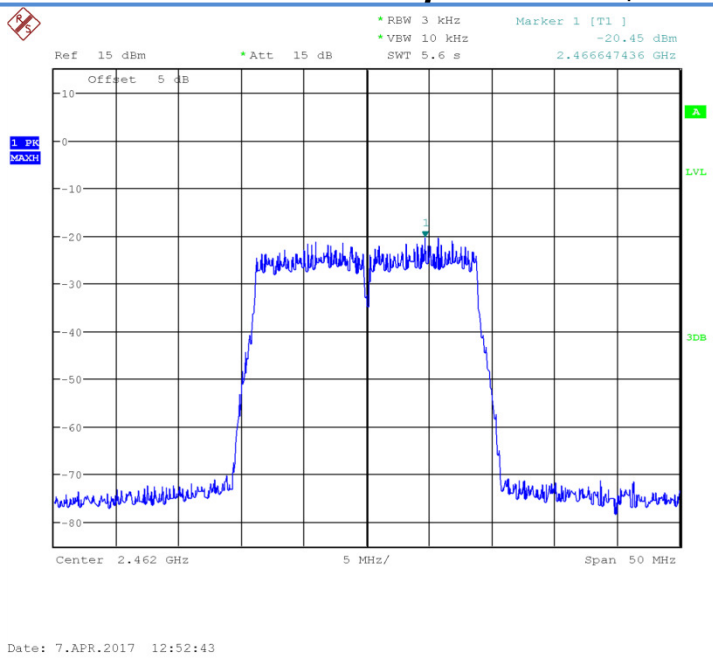


Fig.9 Power Spectral Density (802.1n-20MHz,Ch11)

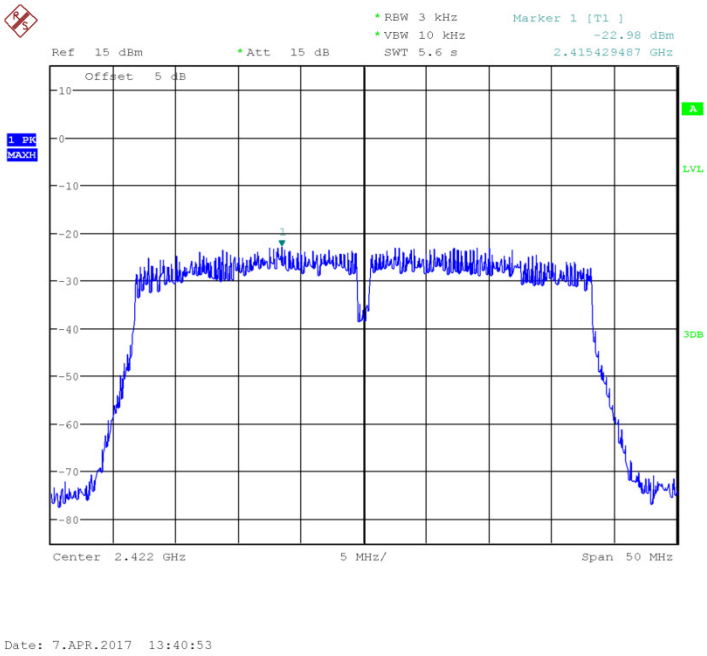


Fig.10 Power Spectral Density (802.1n-40MHz,Ch3)

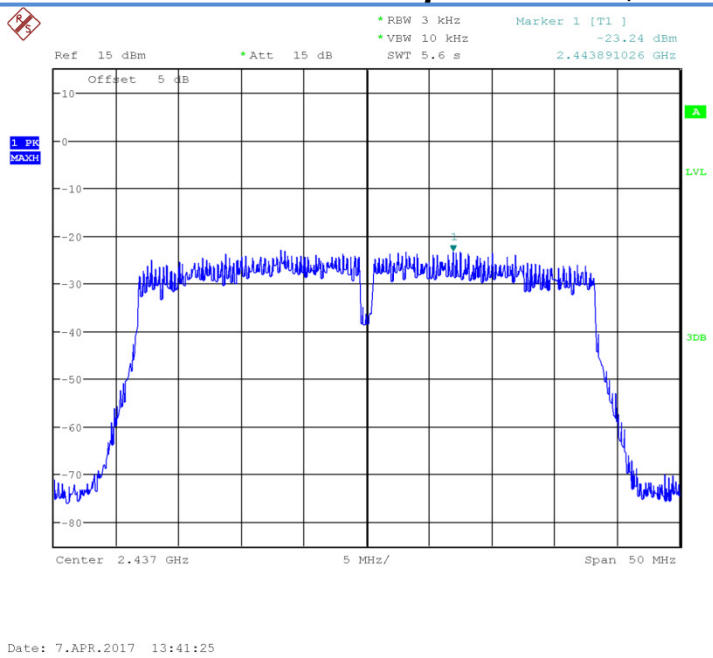


Fig.11 Power Spectral Density (802.1n-40MHz,Ch6)

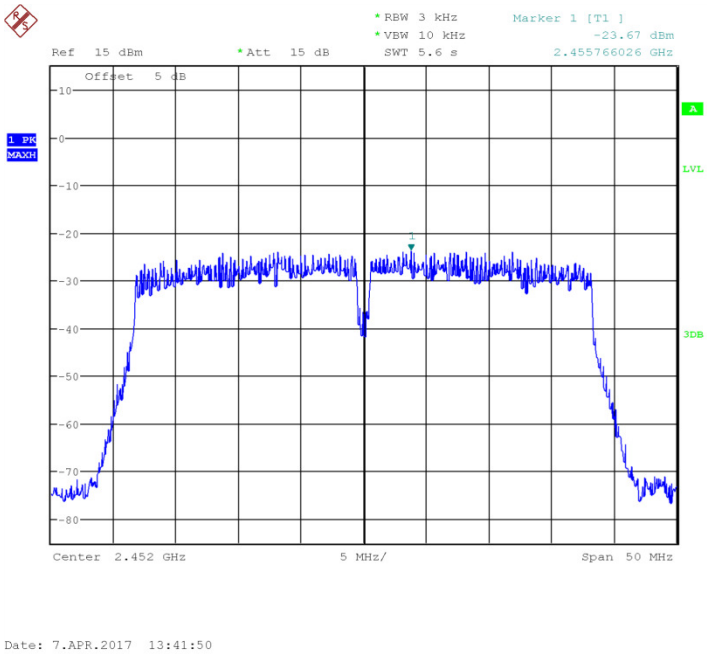


Fig.12 Power Spectral Density (802.1n-40MHz,Ch9)

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	8.894	P
	6	Fig.14	8.894	P
	11	Fig.15	8.974	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	17.869	P
	6	Fig.20	17.949	P
	11	Fig.21	17.869	P
802.11n(40MHz)	3	Fig.22	36.058	P

	6	Fig.23	36.138	P
	9	Fig.24	36.138	P

Conclusion: PASS

Test graphs as below:

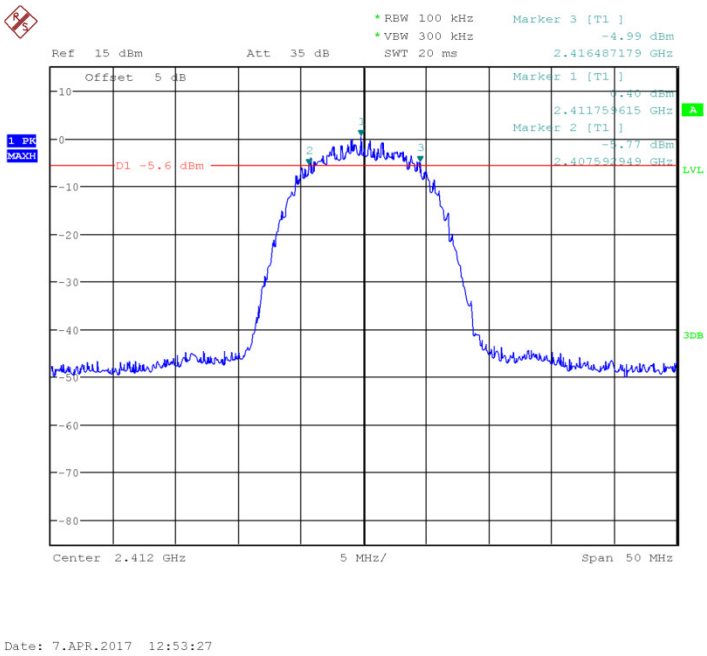


Fig.13 Occupied 6dB Bandwidth (802.11b, Ch1)

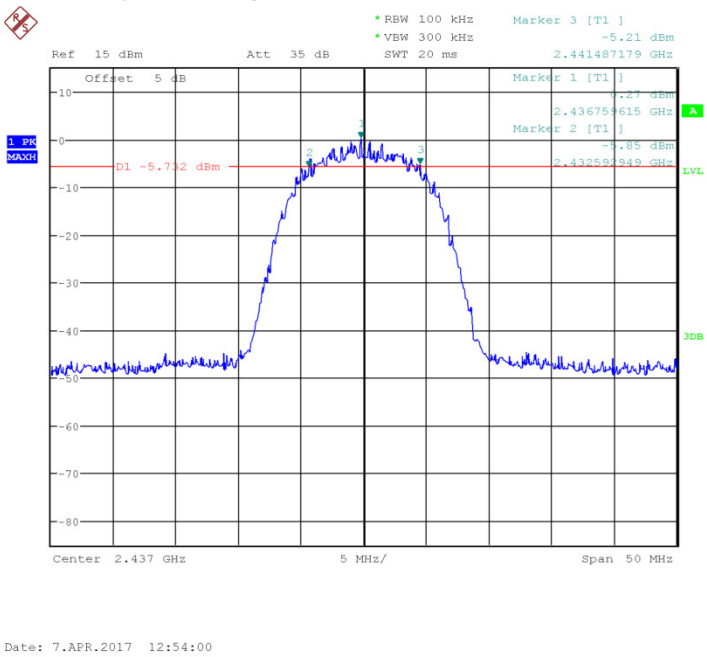


Fig.14 Occupied 6dB Bandwidth (802.11b, Ch6)

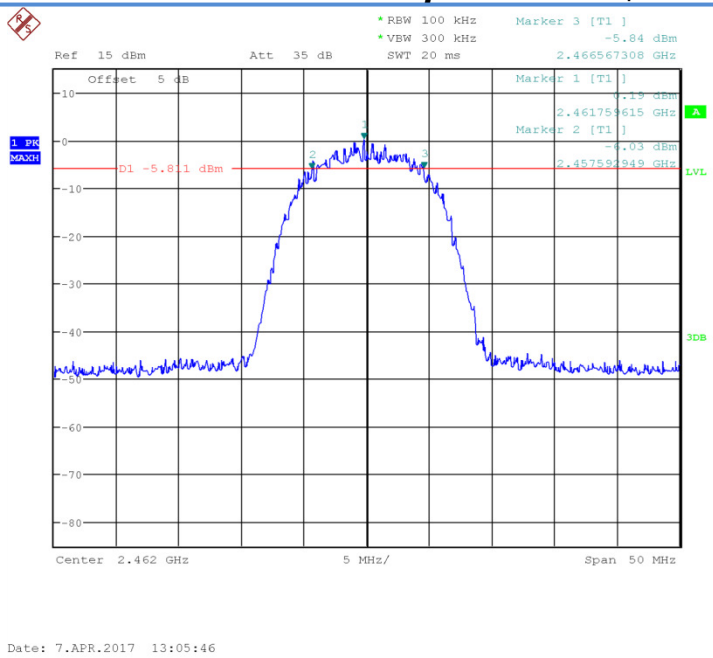


Fig.15 Occupied 6dB Bandwidth (802.11b, Ch11)

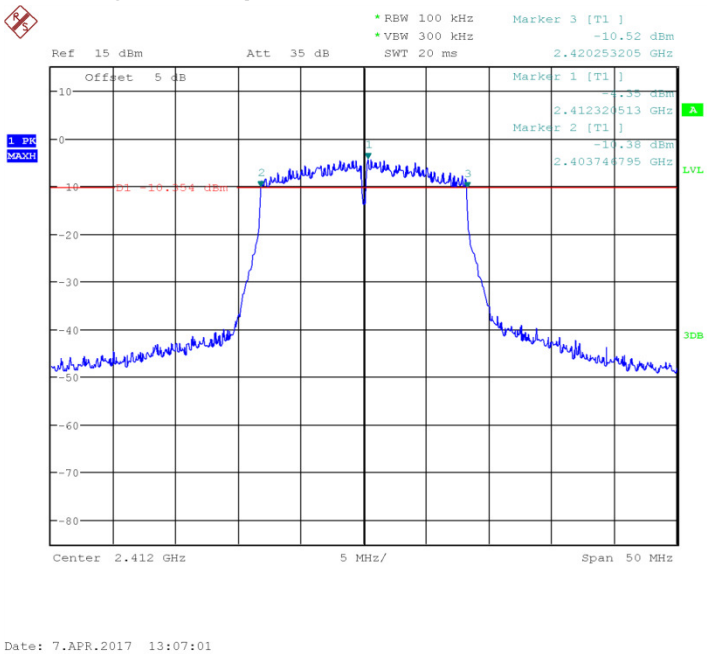


Fig.16 Occupied 6dB Bandwidth (802.11g, Ch1)

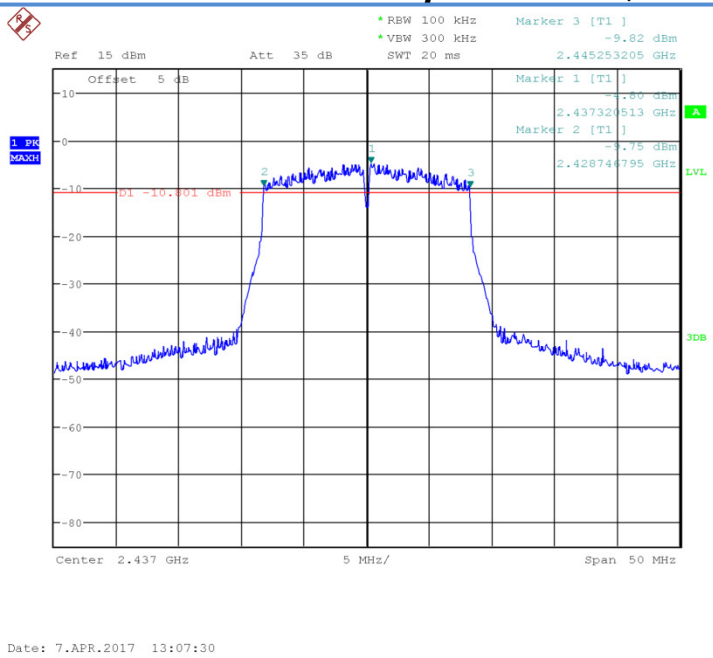


Fig.17 Occupied 6dB Bandwidth (802.11g, Ch6)

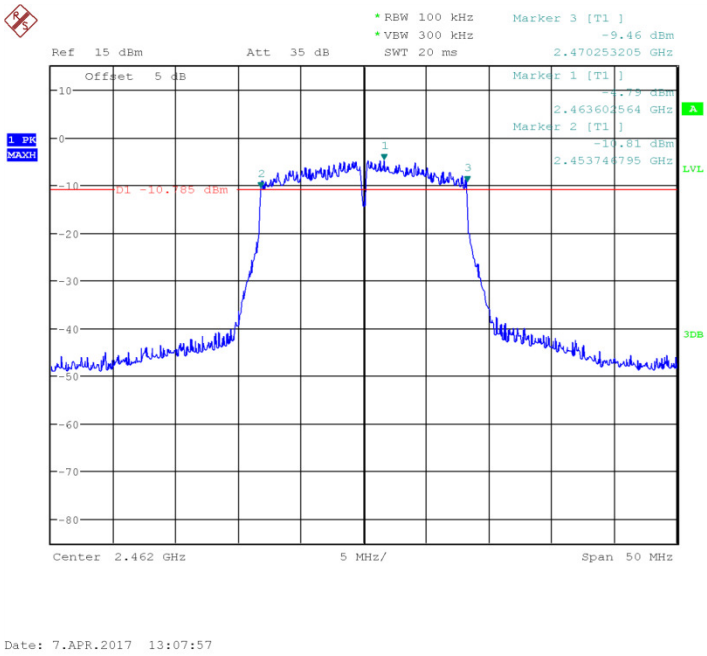


Fig.18 Occupied 6dB Bandwidth (802.11g, Ch11)

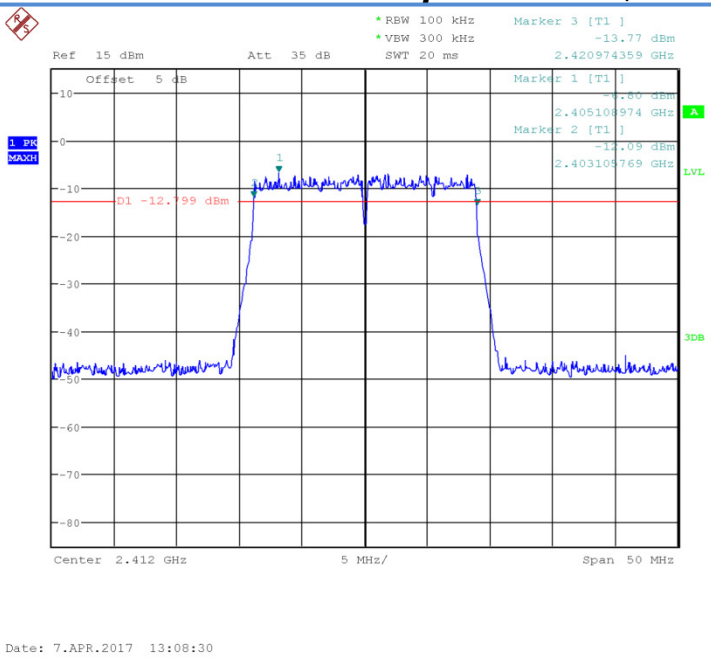


Fig.19 Occupied 6dB Bandwidth (802.11n-20MHz, Ch1)

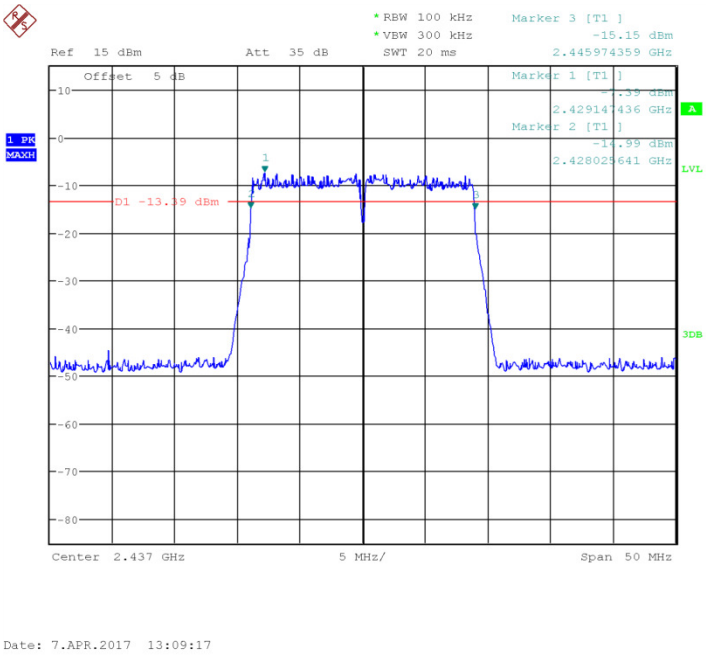


Fig.20 Occupied 6dB Bandwidth (802.11n-20MHz, Ch6)

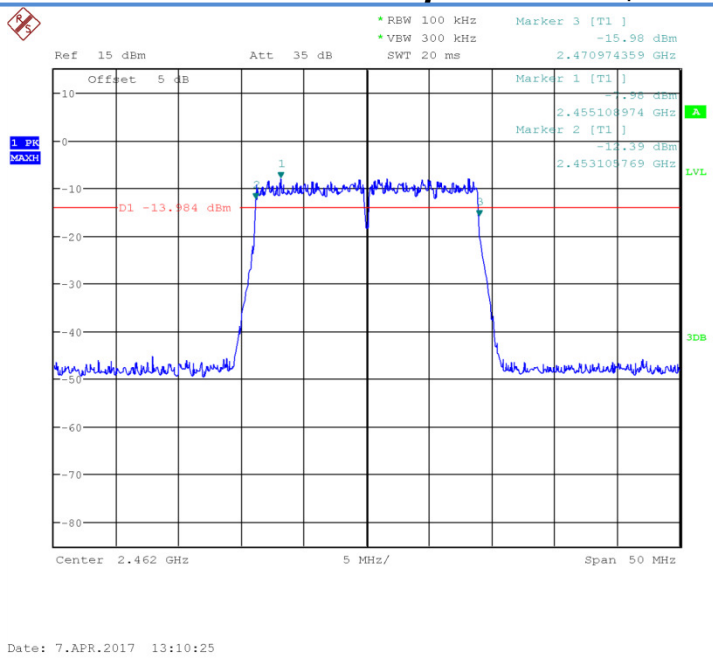


Fig.21 Occupied 6dB Bandwidth (802.11n-20MHz, Ch11)

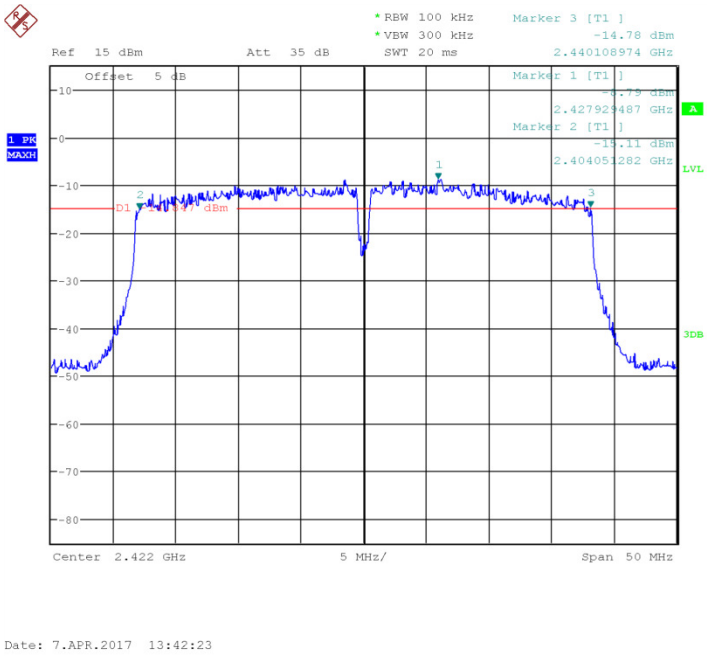


Fig.22 Occupied 6dB Bandwidth (802.11n-40MHz, Ch3)

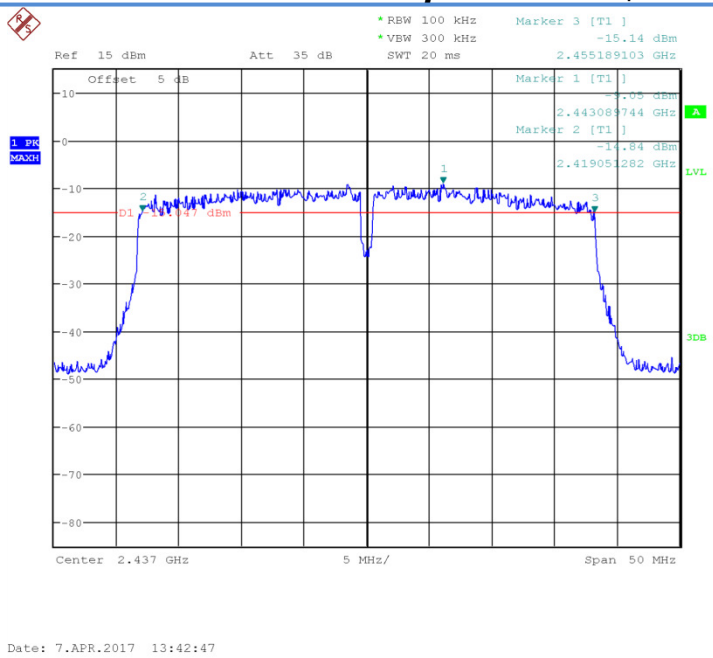


Fig.23 Occupied 6dB Bandwidth (802.11n-40MHz, Ch6)

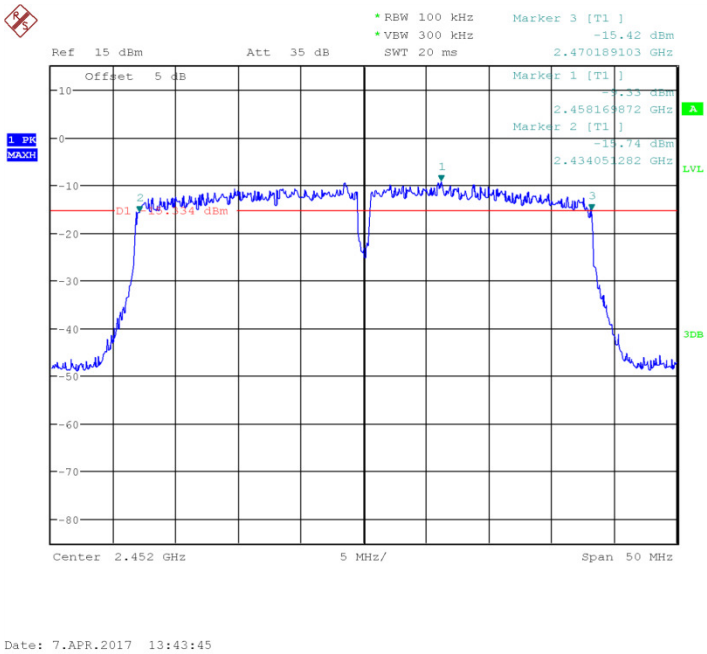


Fig.24 Occupied 6dB Bandwidth (802.11n-40MHz, Ch9)

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

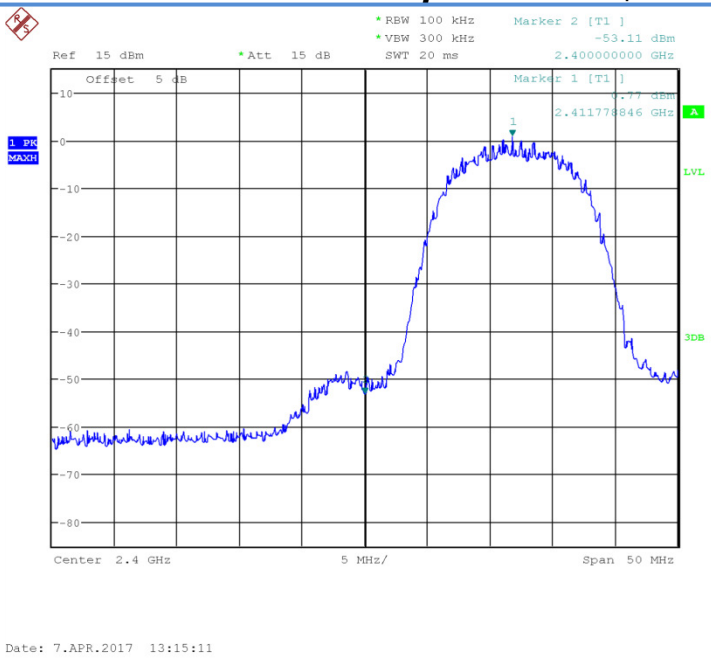
Mode	Channel	Test Results	Conclusion
802.11b	1	Fig.25	P
	11	Fig.26	P
802.11g	1	Fig.27	P
	11	Fig.28	P

802.11n mode

Mode	Channel	Test Results	Conclusion
802.11n(20MHz)	1	Fig.29	P
	11	Fig.30	P
802.11(40MHz)	3	Fig.31	P
	9	Fig.32	P

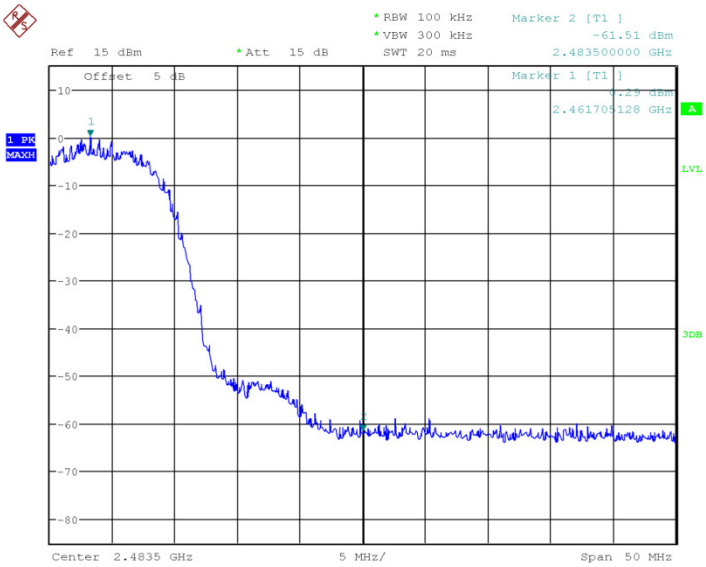
Conclusion: PASS

Test graphs as blew:



Date: 7.APR.2017 13:15:11

Fig.25 Band Edges (802.11b, Ch1)



Date: 7.APR.2017 13:15:45

Fig.26 Band Edges (802.11b, Ch11)

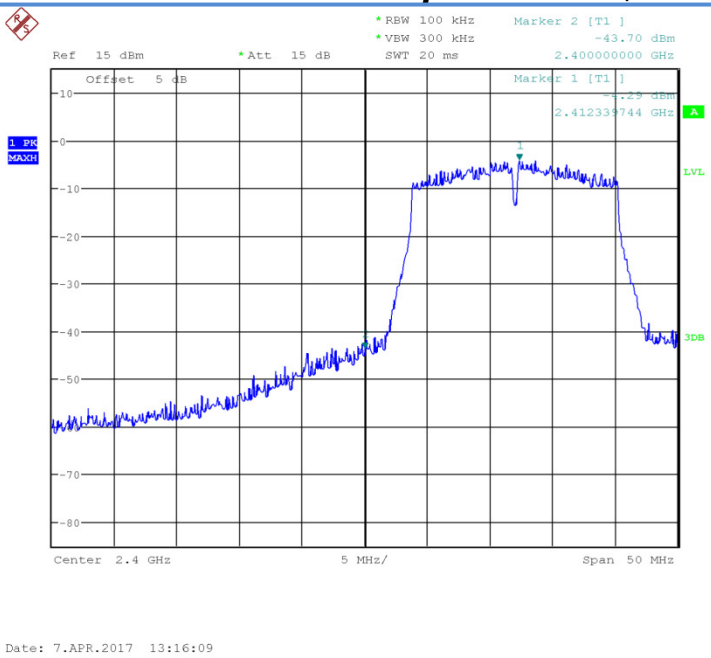


Fig.27 Band Edges (802.11g, Ch1)

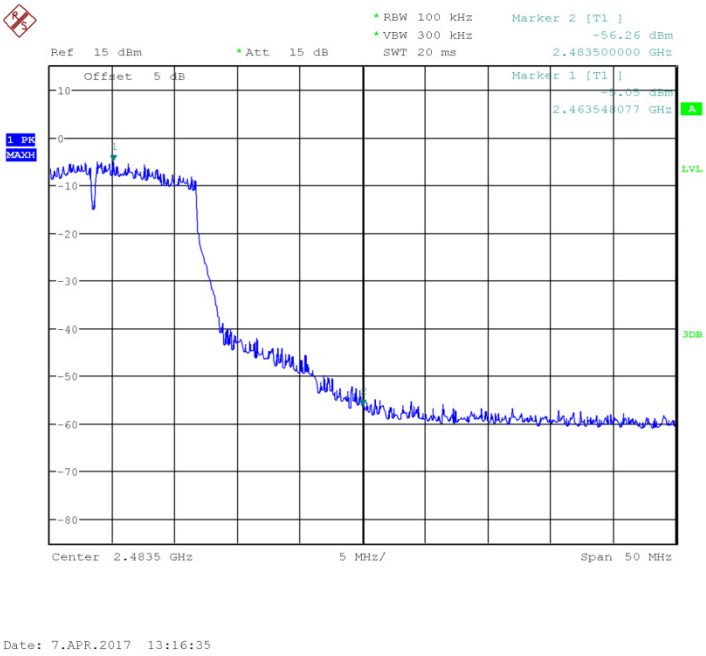


Fig.28 Band Edges (802.11g, Ch11)

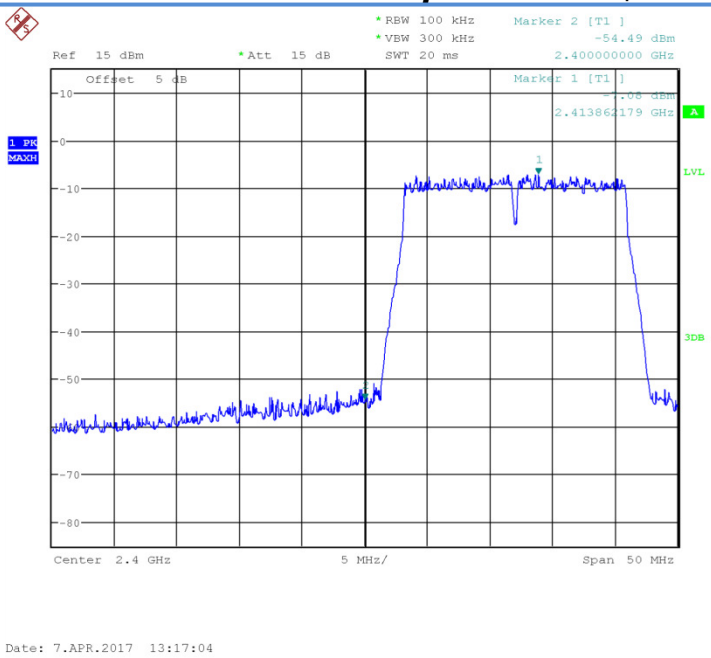


Fig.29 Band Edges (802.11n-20MHz, Ch1)

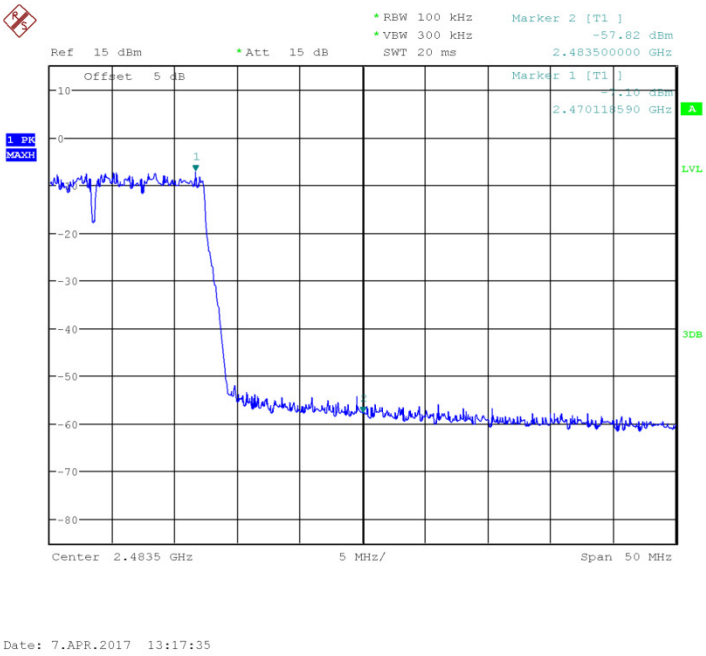


Fig.30 Band Edges (802.11b-20MHz, Ch11)

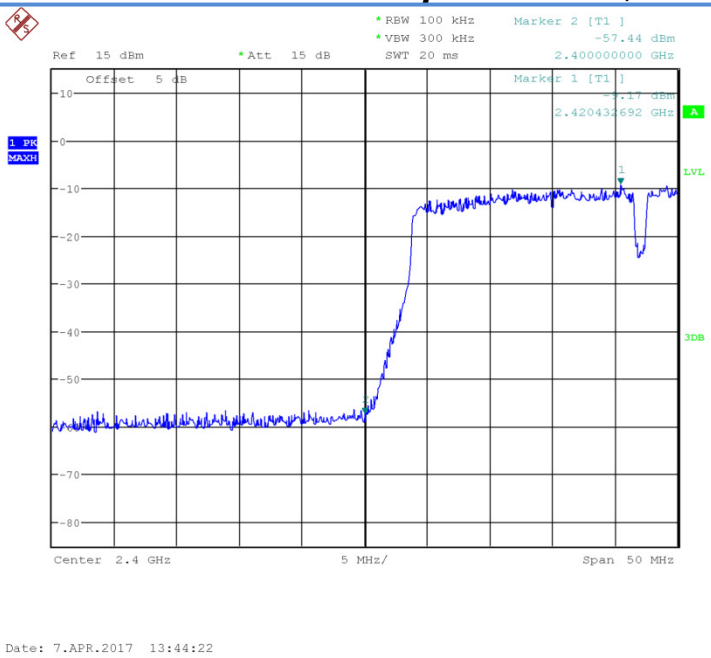


Fig.31 Band Edges (802.11n-40MHz, Ch3)

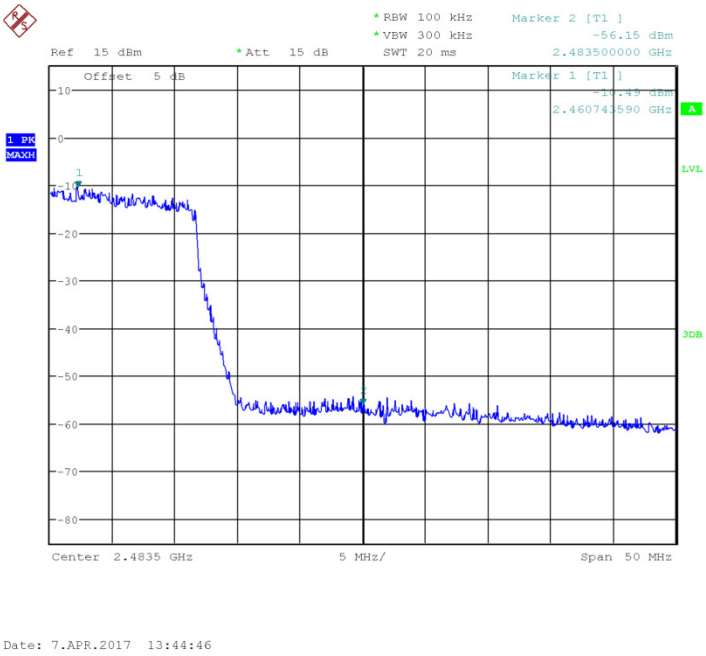


Fig.32 Band Edges (802.11b-40MHz, Ch9)

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	2.462GHz	Fig.55	P
		30MHz~26GHz	Fig.56	P

Conclusion: PASS

Test graphs as below:

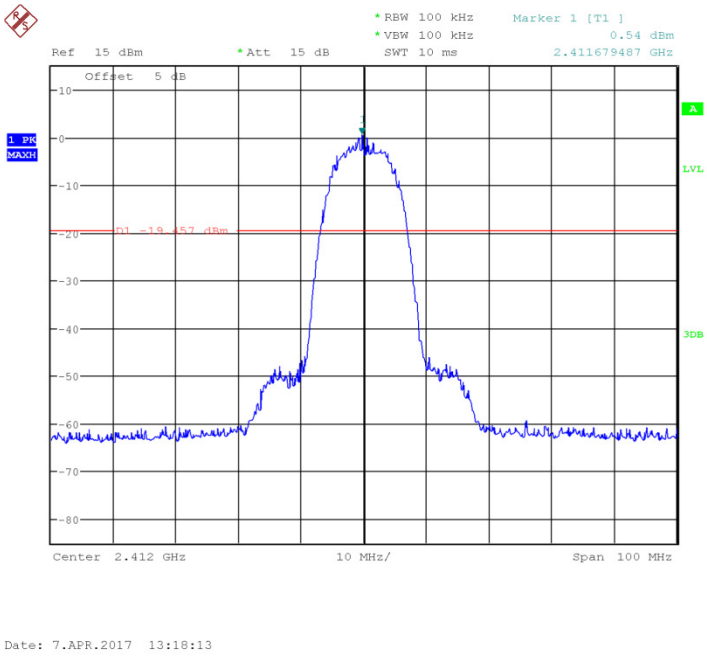


Fig.33 Conducted Spurious Emission (802.11b, Ch1)

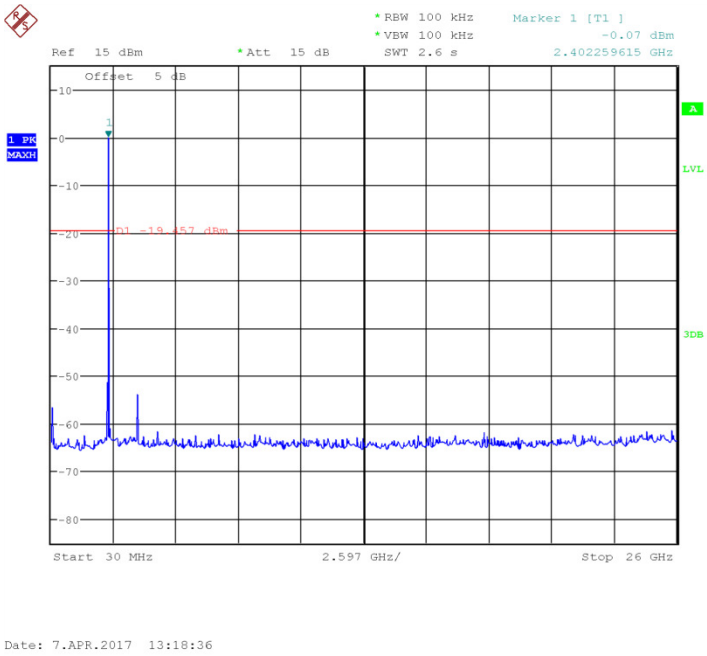


Fig.34 Conducted Spurious Emission (802.11b, Ch1, 30MHz~26GHz)

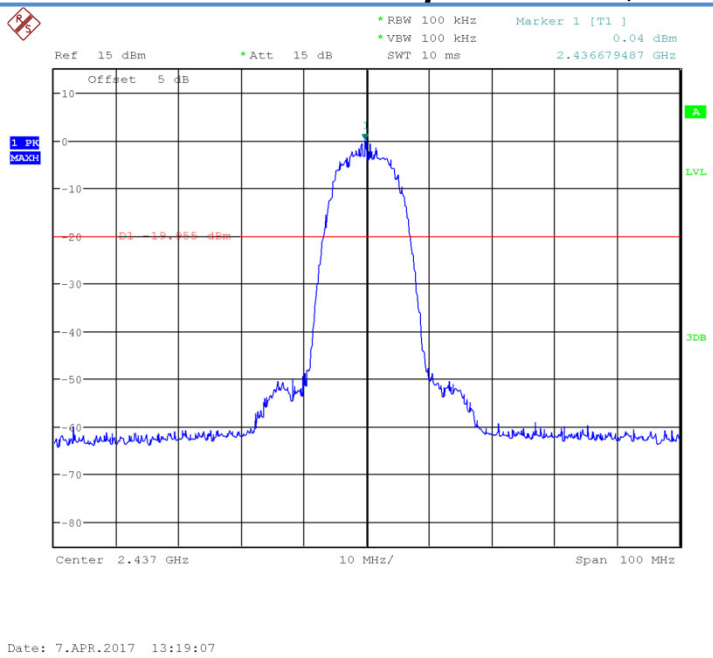


Fig.35 Conducted Spurious Emission (802.11b, Ch6)

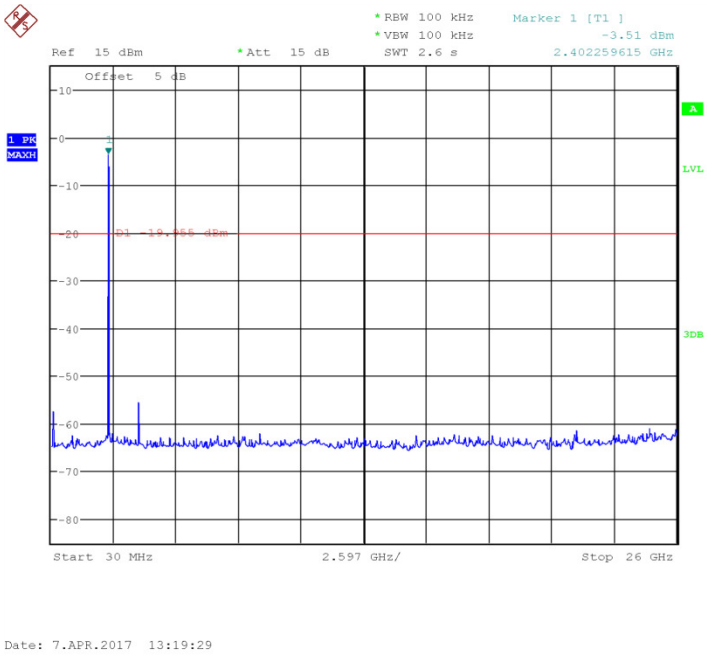


Fig.36 Conducted Spurious Emission (802.11b, Ch6, 30MHz~26GHz)

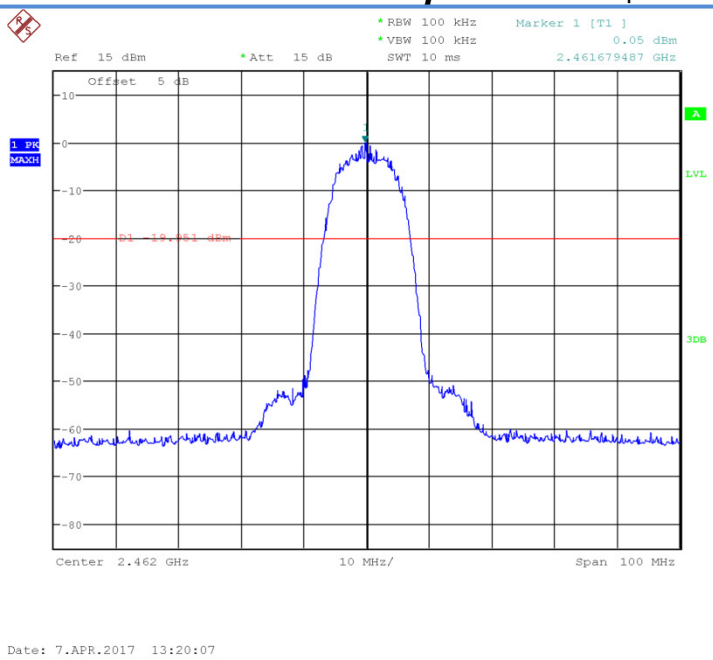


Fig.37 Conducted Spurious Emission (802.11b, Ch11)

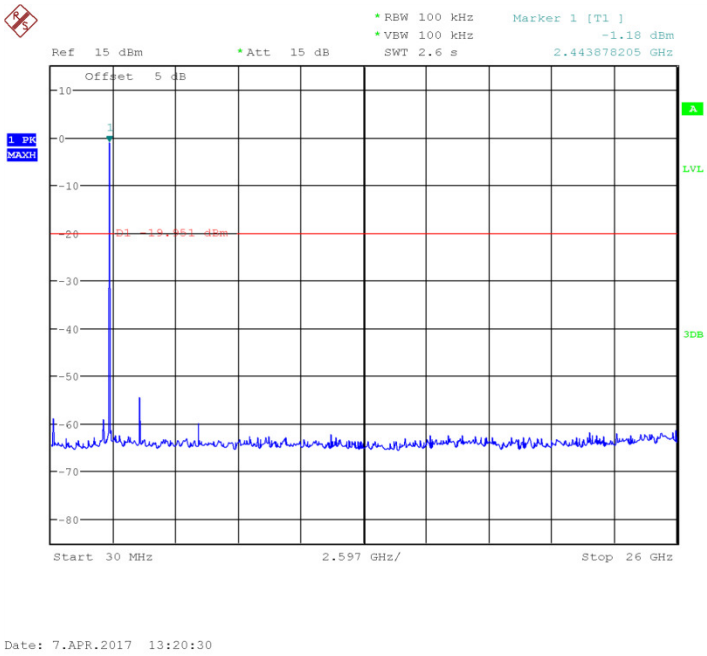


Fig.38 Conducted Spurious Emission (802.11b, Ch11, 30MHz~26GHz)

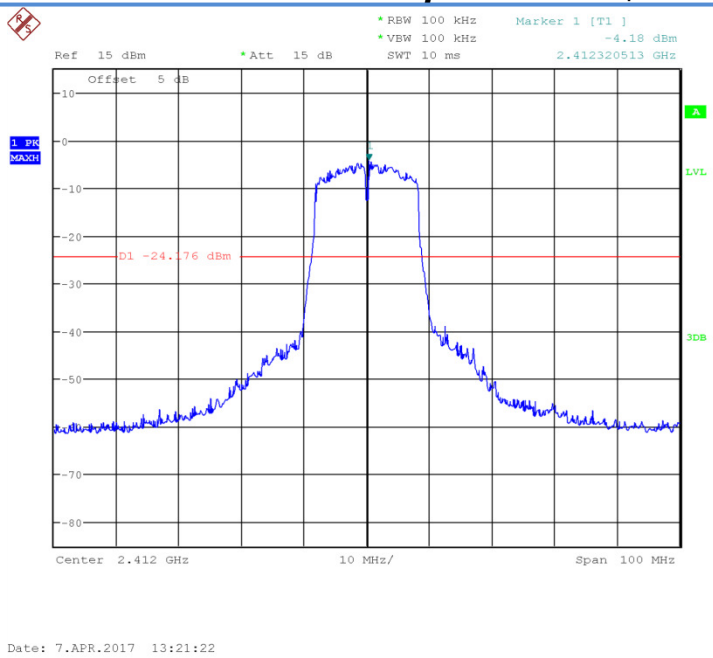


Fig.39 Conducted Spurious Emission (802.11g, Ch1)

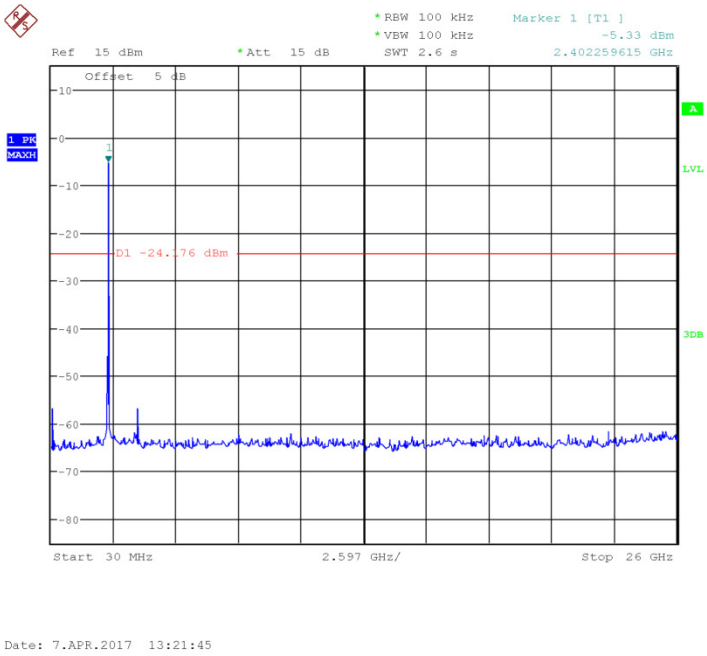


Fig.40 Conducted Spurious Emission (802.11g, Ch1, 30MHz~26GHz)

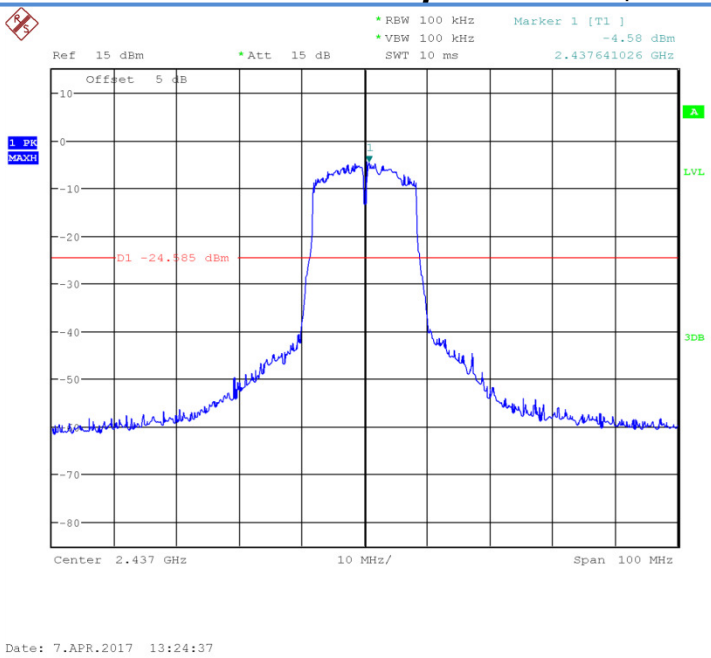


Fig.41 Conducted Spurious Emission (802.11g, Ch6)

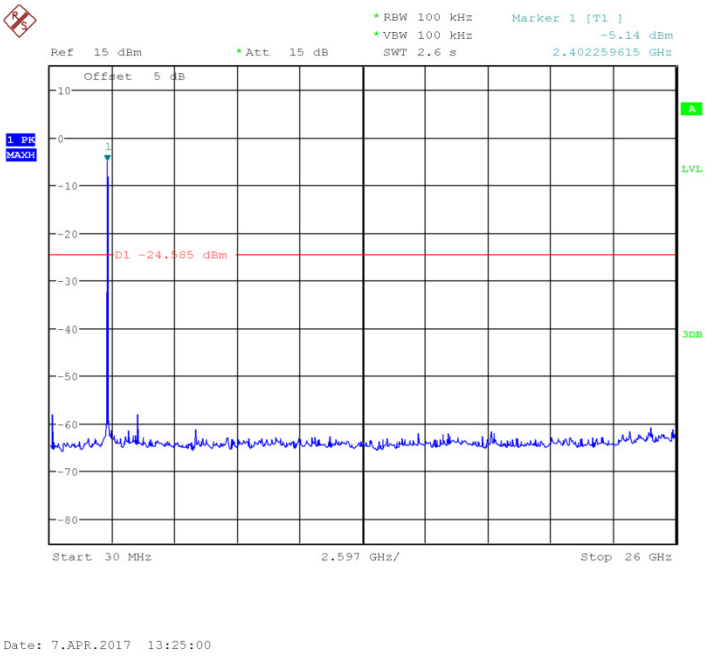


Fig.42 Conducted Spurious Emission (802.11g, Ch6, 30MHz~26GHz)

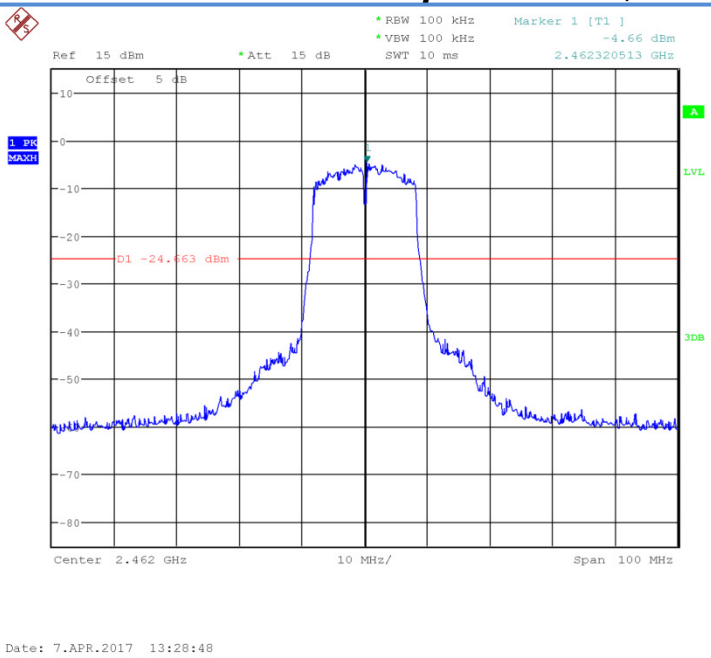


Fig.43 Conducted Spurious Emission (802.11g, Ch11)

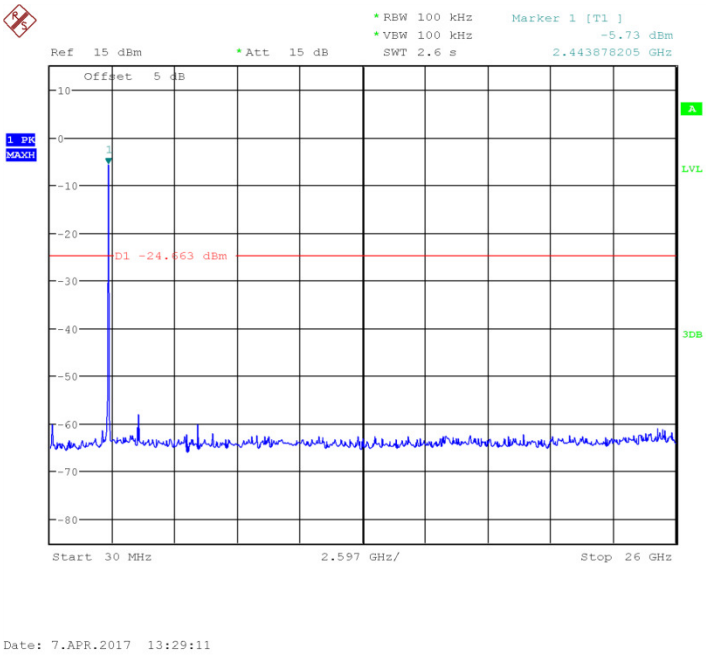


Fig.44 Conducted Spurious Emission (802.11g, Ch11, 30MHz~26GHz)

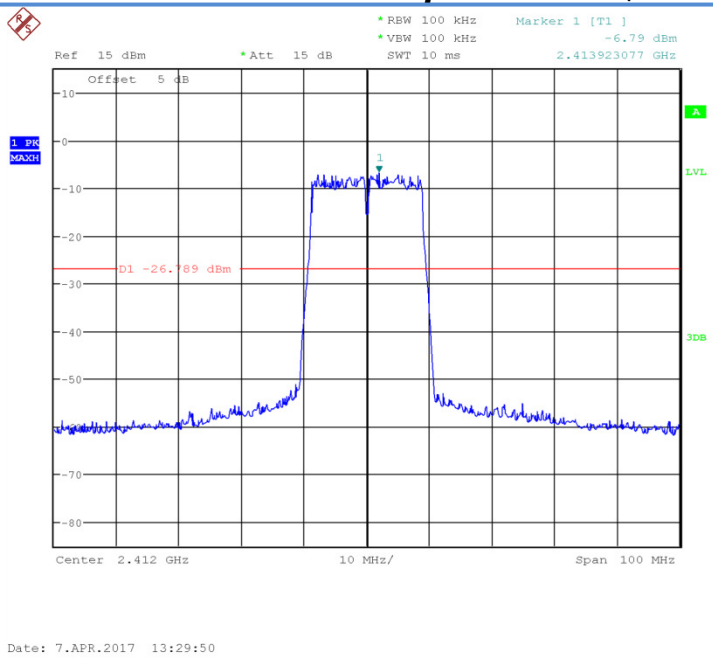


Fig.45 Conducted Spurious Emission (802.11n-20MHz, Ch1)

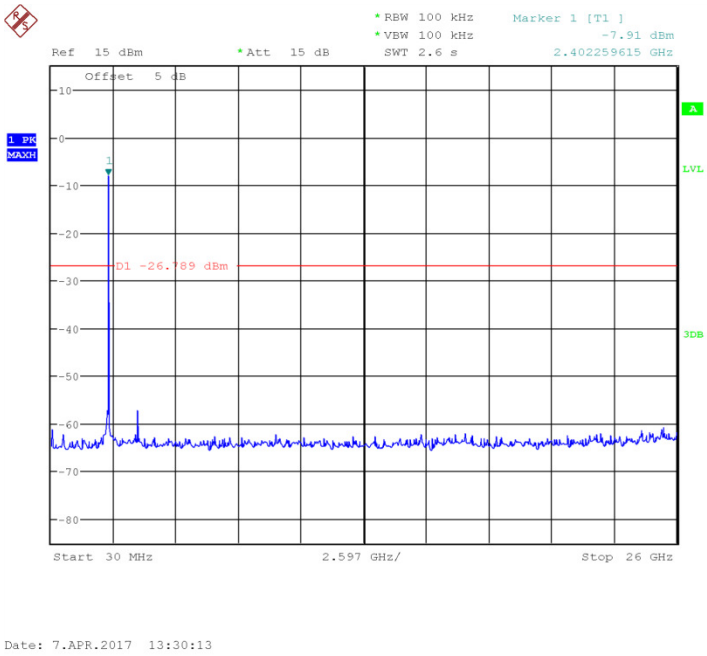


Fig.46 Conducted Spurious Emission (802.11n-20MHz, Ch1, 30MHz~26GHz)

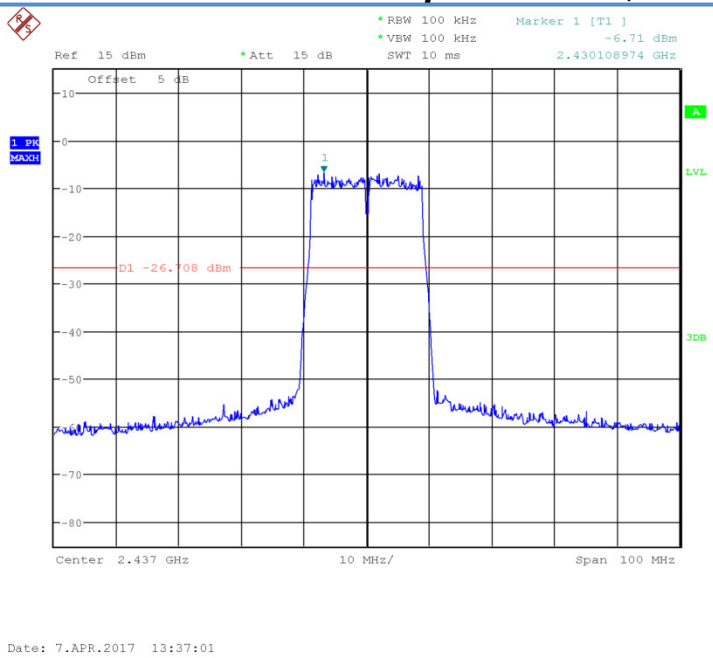


Fig.47 Conducted Spurious Emission (802.11n-20MHz, Ch6)

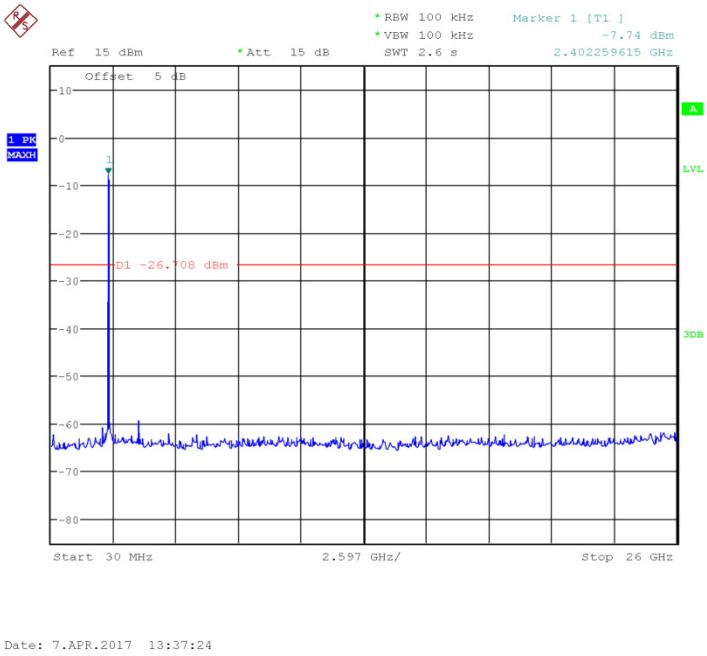


Fig.48 Conducted Spurious Emission (802.11n-20MHz, Ch6, 30MHz~26GHz)

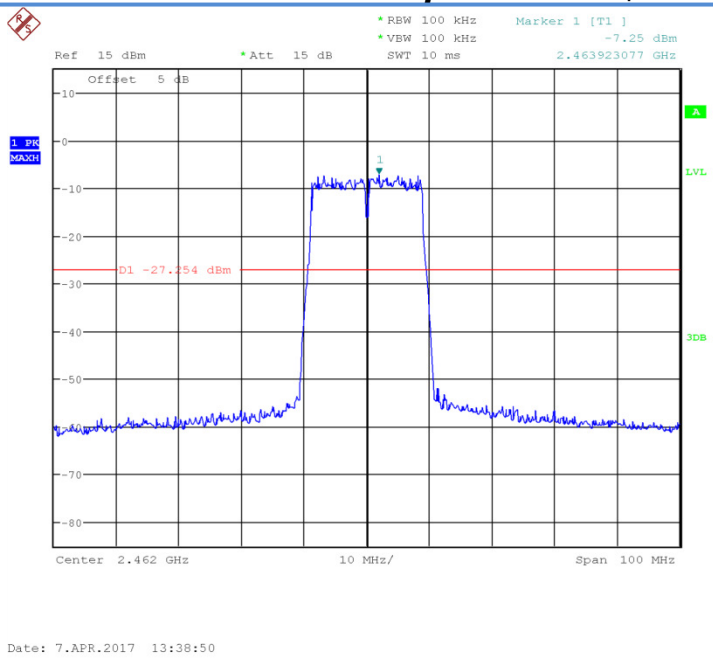


Fig.49 Conducted Spurious Emission (802.11n-20MHz, Ch11)

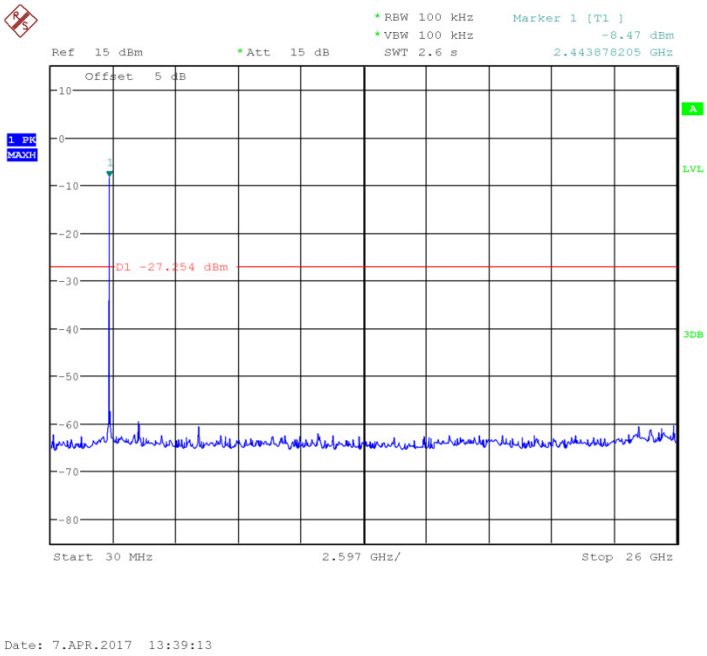


Fig.50 Conducted Spurious Emission (802.11n-20MHz, Ch11, 30MHz~26GHz)

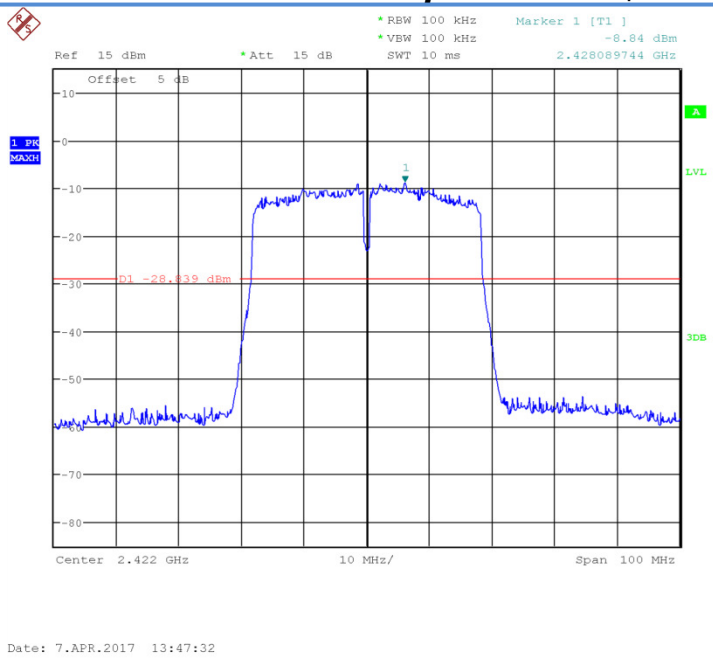


Fig.51 Conducted Spurious Emission (802.11n-40MHz, Ch3)

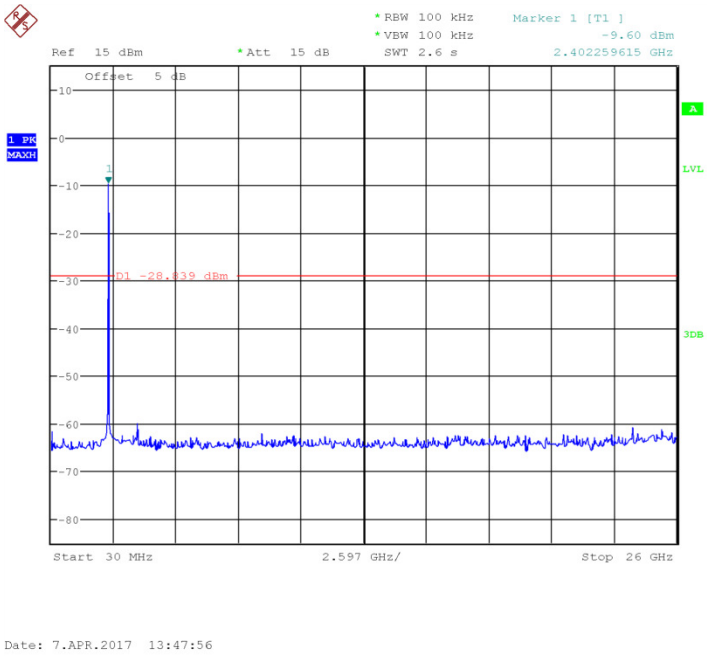


Fig.52 Conducted Spurious Emission (802.11n-40MHz, Ch3, 30MHz~26GHz)

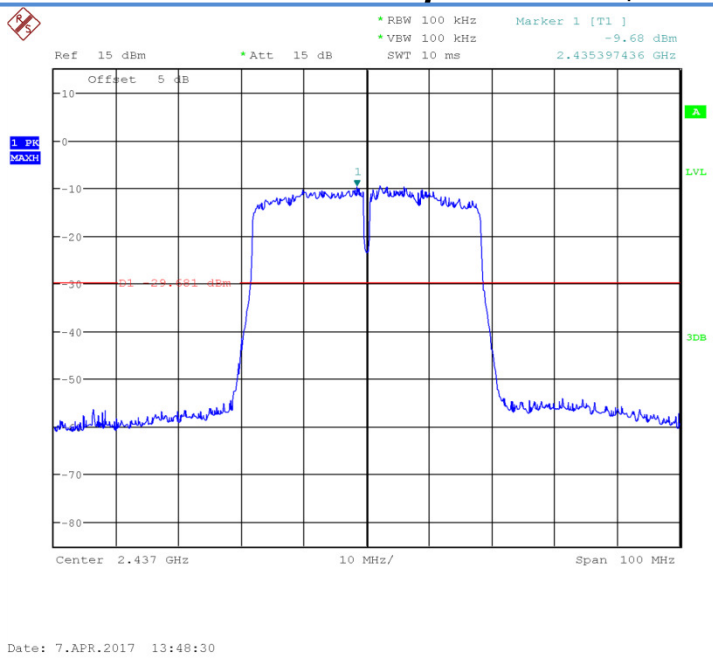


Fig.53 Conducted Spurious Emission (802.11n-40MHz, Ch6)

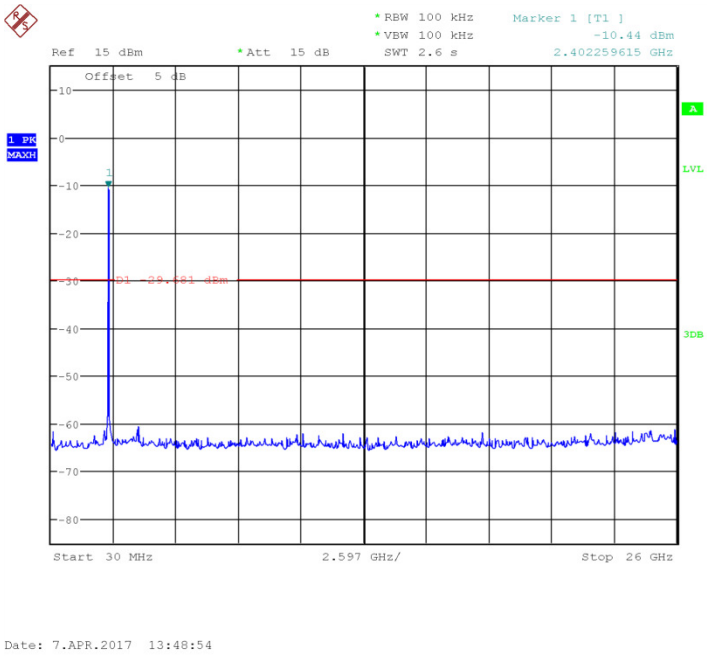


Fig.54 Conducted Spurious Emission (802.11n-40MHz, Ch6, 30MHz~26GHz)

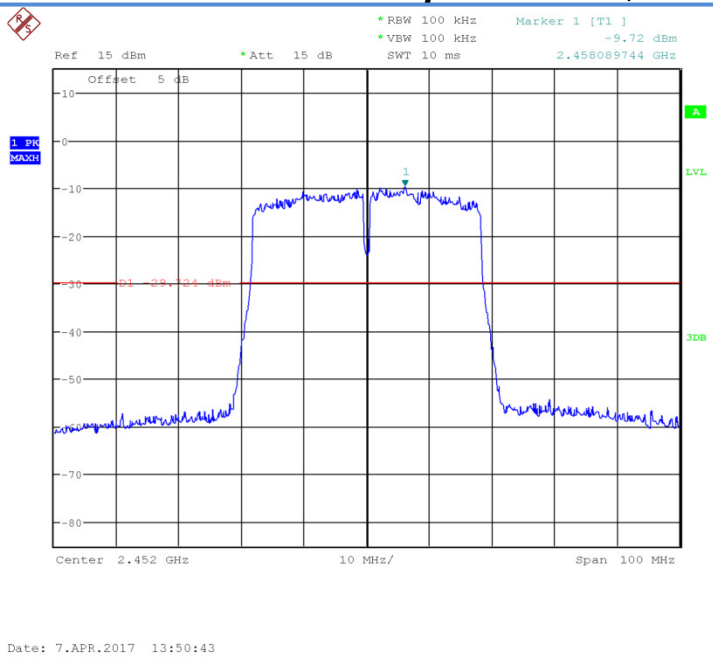


Fig.55 Conducted Spurious Emission (802.11n-40MHz, Ch9)

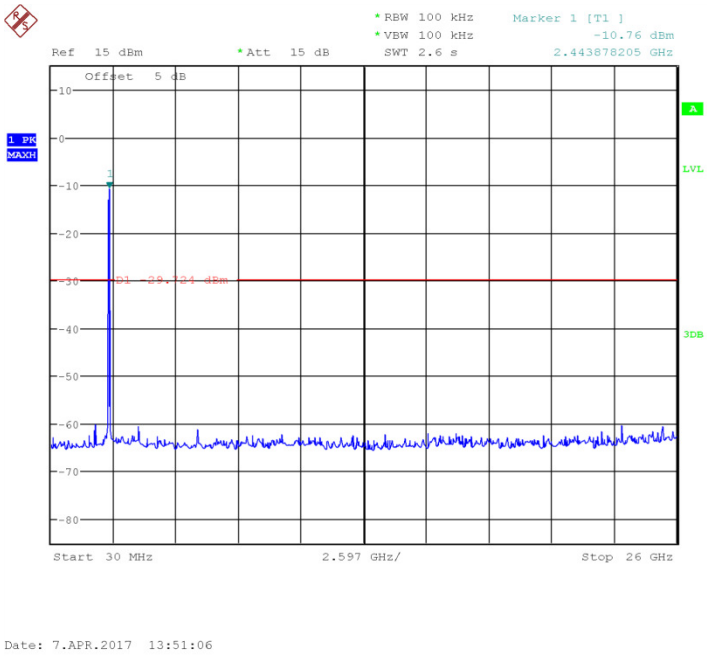


Fig.56 Conducted Spurious Emission (802.11n-40MHz, Ch9, 30MHz~26GHz)

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

Note: We choose 11Mbps,24Mbps,MCS6 as worse condition, and the following case are performed with this condition.

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
	1	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
	3	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
32.986	16.4	-26.5	42.9	V
42.813	18	-24.2	42.2	V
43.191	19	-24.1	43.1	V
58.772	13.4	-25	38.4	V
60.255	11.6	-25.3	36.9	V

Ch1 1GHz~3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2299.2	44	0.1	43.9	H
2492.2	46.6	2.5	44.1	H
2613.6	47.1	3.1	44	H
2778.8	47.3	3.6	43.7	H
2860.8	47.1	3.9	43.2	V
2915.4	47.6	4.3	43.3	H

Ch1 3GHz~18GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
7237.275	50.9	2.9	48	H
11609.9	49.1	8.3	40.8	V
13794.275	53.1	12.7	40.4	H
14752.5	54	13.7	40.3	V
16905.225	59.6	19.8	39.8	V

17486.975	61.3	21	40.3	H

Ch1 3GHz~18GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
15795.8	43.5	16.3	27.2	H
16911.15	46.8	19.8	27	V
17477.25	48	21	27	H

802.11g

Ch1 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
30.33	14.7	-26.7	41.4	V
42.813	19.5	-24.2	43.7	V
43.47	19.4	-24.1	43.5	V
62.505	17.1	-25.8	42.9	V
84.557	15.4	-28.4	43.8	H
187.518	19.6	-26.1	45.7	V

Ch1 1GHz~3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2299.2	44	0.1	43.9	H
2492.2	46.6	2.5	44.1	H
2613.6	47.1	3.1	44	H
2778.8	47.3	3.6	43.7	H
2860.8	47.1	3.9	43.2	V
2915.4	47.6	4.3	43.3	H

Ch1 3GHz~18GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
7233.875	50.7	3	47.7	H

11638.65	49.9	8.1	41.8	H
13395.65	52.3	11.4	40.9	V
15306.65	55.1	14.9	40.2	H
17430.9	60.5	20.9	39.6	H
17829.325	61.6	22	39.6	V

Ch1 3GHz~18GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
15306.65	42.2	14.9	27.3	H
17430.9	47.8	20.9	26.9	H
17829.325	48.7	22	26.7	V

802.11n-20MHz

Ch1 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.01	16.2	-26.5	42.7	V
42.813	19.8	-24.2	44	V
43.375	21.1	-24.1	45.2	V
59.555	14	-25.2	39.2	V
62.505	15.9	-25.8	41.7	V
187.518	20.1	-26.1	46.2	V

Ch1 1GHz~3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2307	45	0.2	44.8	V
2503.2	49.6	2.7	46.9	V
2636.6	47	3.2	43.8	H
2738.6	47.2	3.7	43.5	H
2841.2	47.4	3.9	43.5	H
2927.4	47.9	4.3	43.6	H

Ch1 3GHz~18GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
7237	49.7	2.9	46.8	H
11617.725	49.2	8.2	41	V
13537.225	51.9	11.2	40.7	H
14627.025	54.5	13.9	40.6	V
15905.5	56.5	16.2	40.3	H
17455.95	61.6	21	40.6	V

Ch1 3GHz~18GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
7237	49.7	13.9	35.8	V
11617.725	49.2	16.2	33	H
13537.225	51.9	21	30.9	V

802.11n-40MHz

Ch3 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.854	15.4	-26.5	41.9	V
42.793	18.8	-24.2	43	V
43.395	20.6	-24.1	44.7	V
62.495	17.7	-25.8	43.5	V
187.518	19.6	-26.1	45.7	V
976.041	19.1	-10.6	29.7	V

Ch3 1GHz~3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2580.4	47.5	2.9	44.6	V

2644.2	47.4	3.2	44.2	V
2697.8	47.6	3.5	44.1	V
2758.2	47.4	3.7	43.7	V
2874.6	48	4.1	43.9	V
2938.2	48	4.4	43.6	V

Ch3 3GHz~18GHz(Peak)

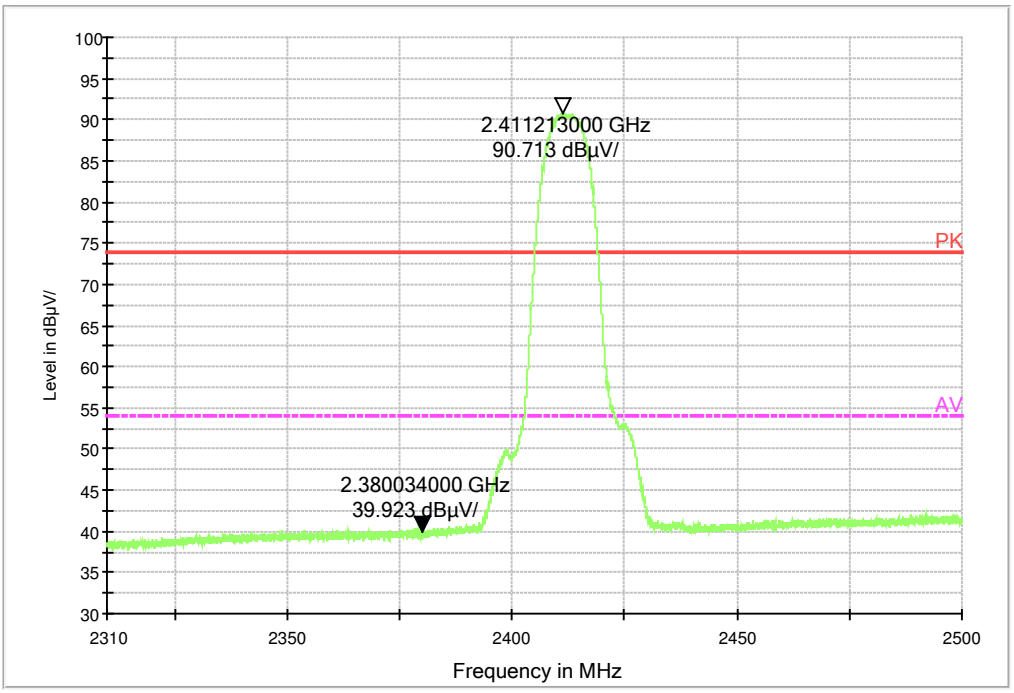
Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14876.2	54.5	13.9	40.6	V
15807.45	56.9	16.4	40.5	V
16373.225	57.2	17.4	39.8	V
16934.525	60	19.9	40.1	V
17387.65	60.8	20.6	40.2	H
17846.425	61.7	21.9	39.8	V

Ch3 3GHz~18GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14876.2	41.2	13.9	27.3	V
15807.45	43.5	16.4	27.1	V
16373.225	44.4	17.4	27	V
16934.525	46.9	19.9	27	V
17387.65	47.6	20.6	27	H
17846.425	48.5	21.9	26.6	V

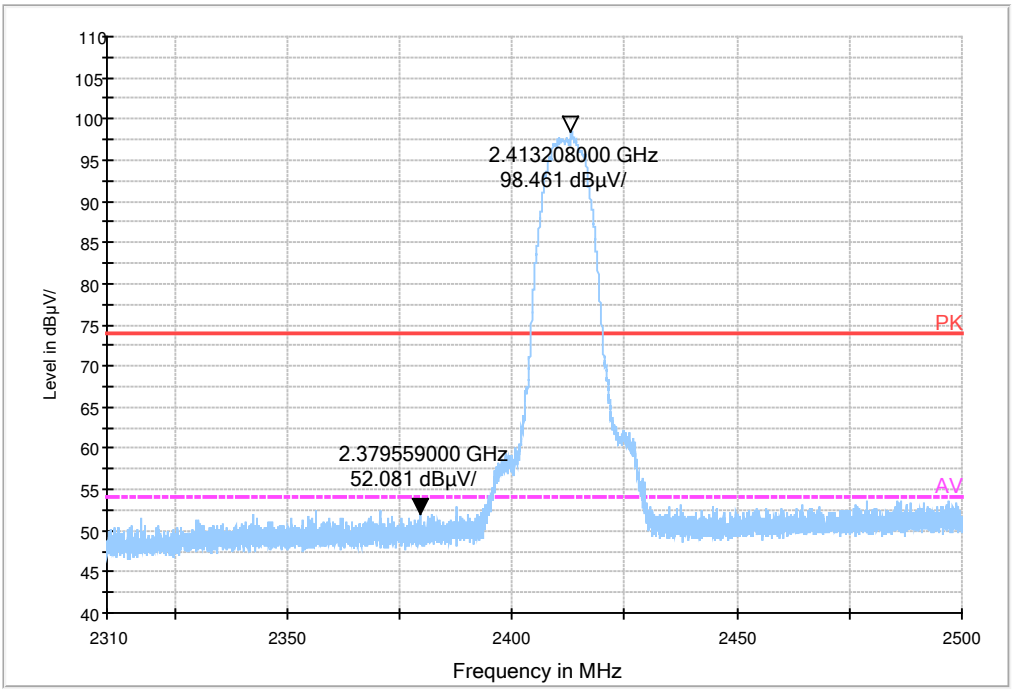
Test graphs as below:

BAND EDGERE 1GHz-3GHz 2380-2450



Average

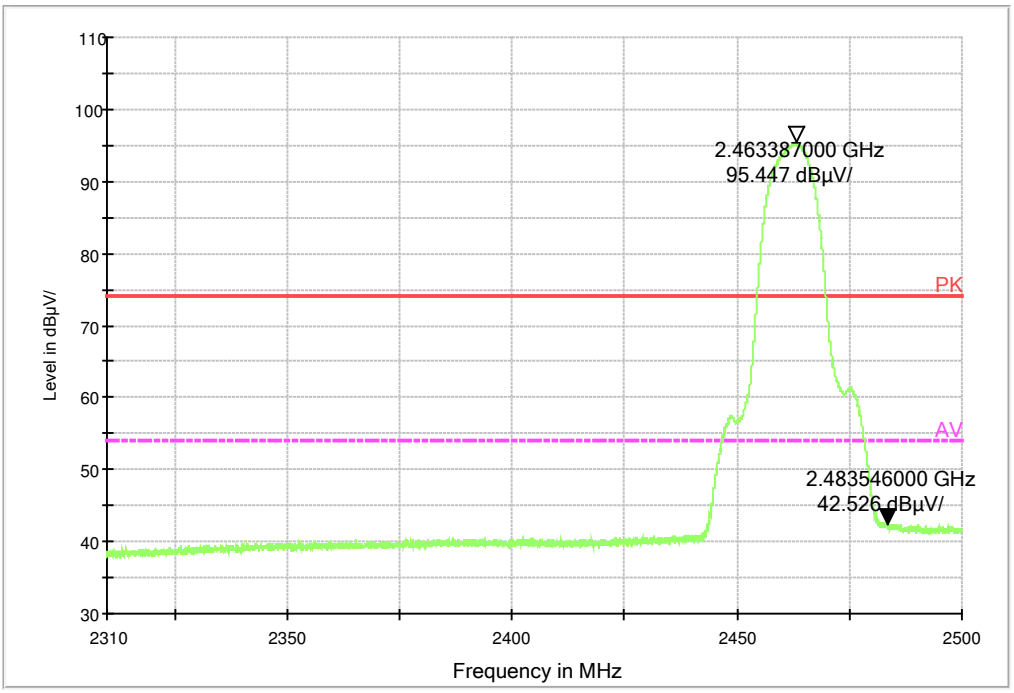
BAND EDGERE 1GHz-3GHz 2380-2450



Peak detector

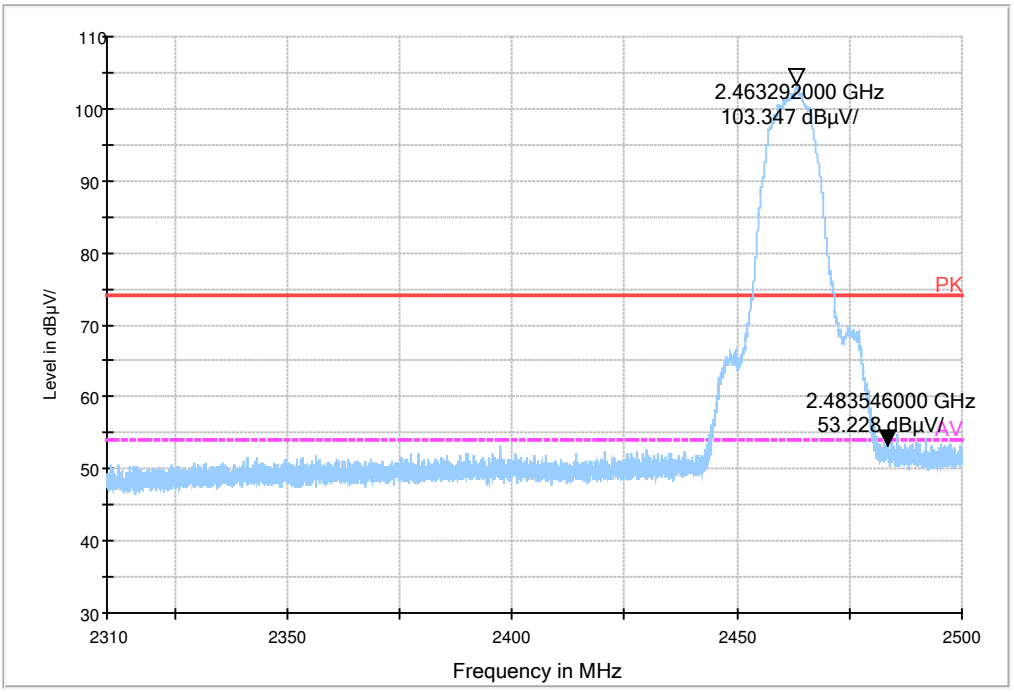
Fig.57 Radiated emission (Power): 802.11b, low channel

BAND EDGERE 1GHz-3GHz 2483.5-2500



Average

BAND EDGERE 1GHz-3GHz 2483.5-2500



Peak detector

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

RE 30MHz-1GHz

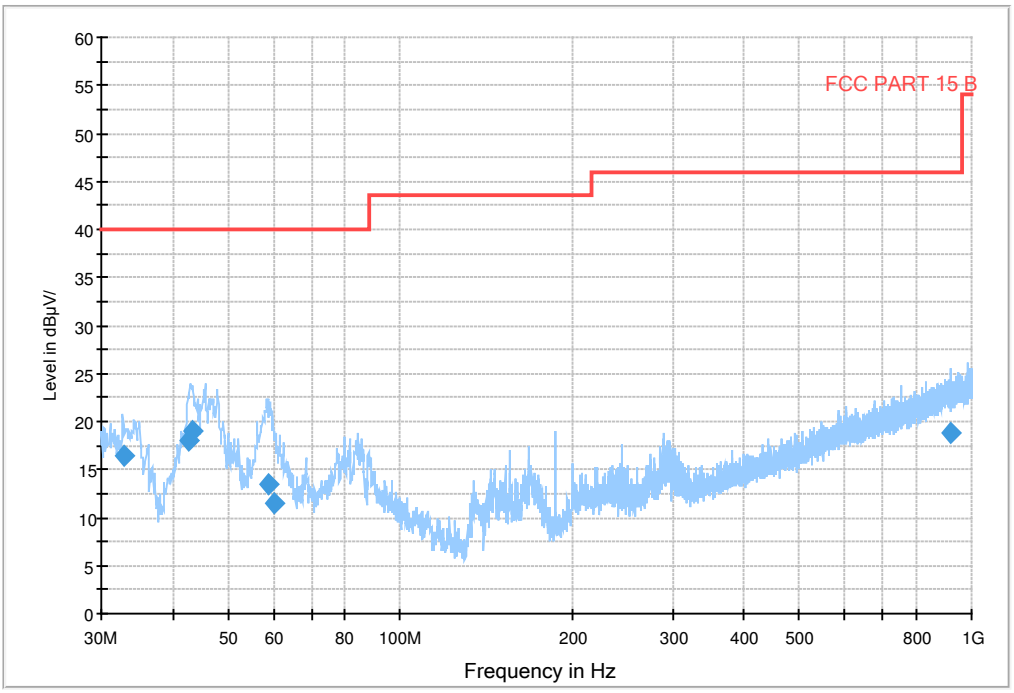


Fig.59 Radiated Spurious Emission (802.11b,Ch1,30MHz~1GHz)

RE 1GHz-3GHz

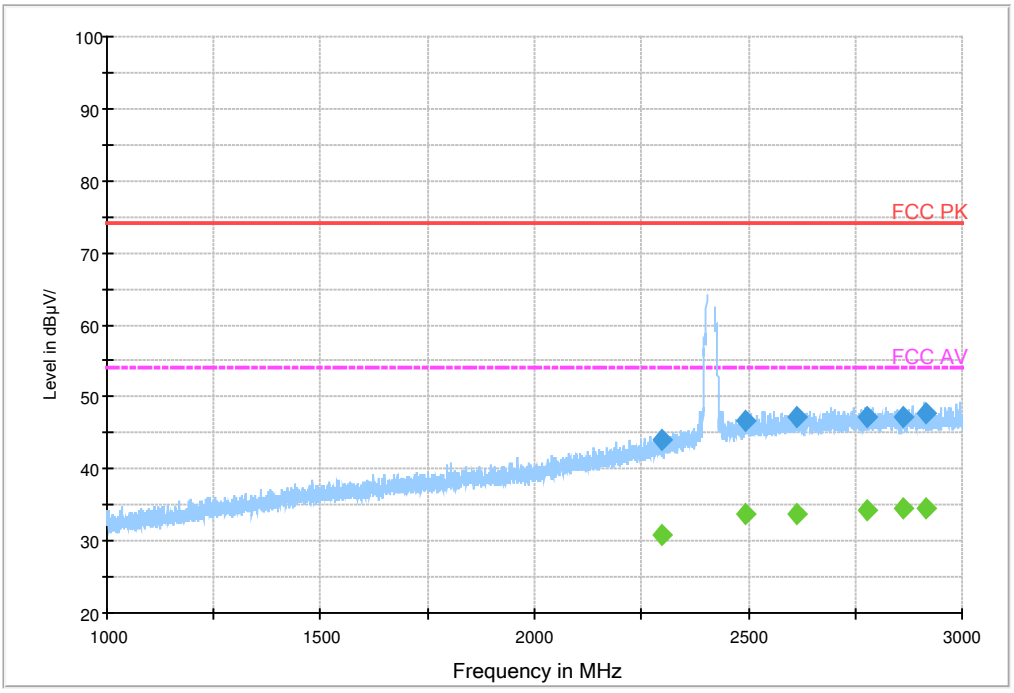


Fig.60 Radiated Spurious Emission (802.11b,Ch1,1GHz~3GHz)

RE 3GHz-18GHz

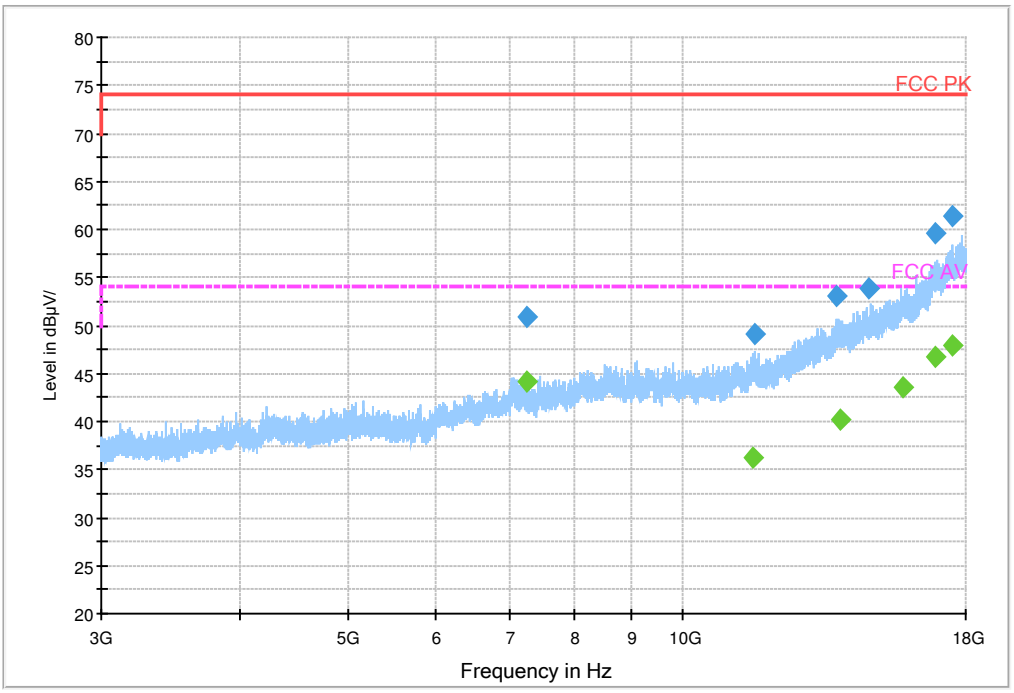
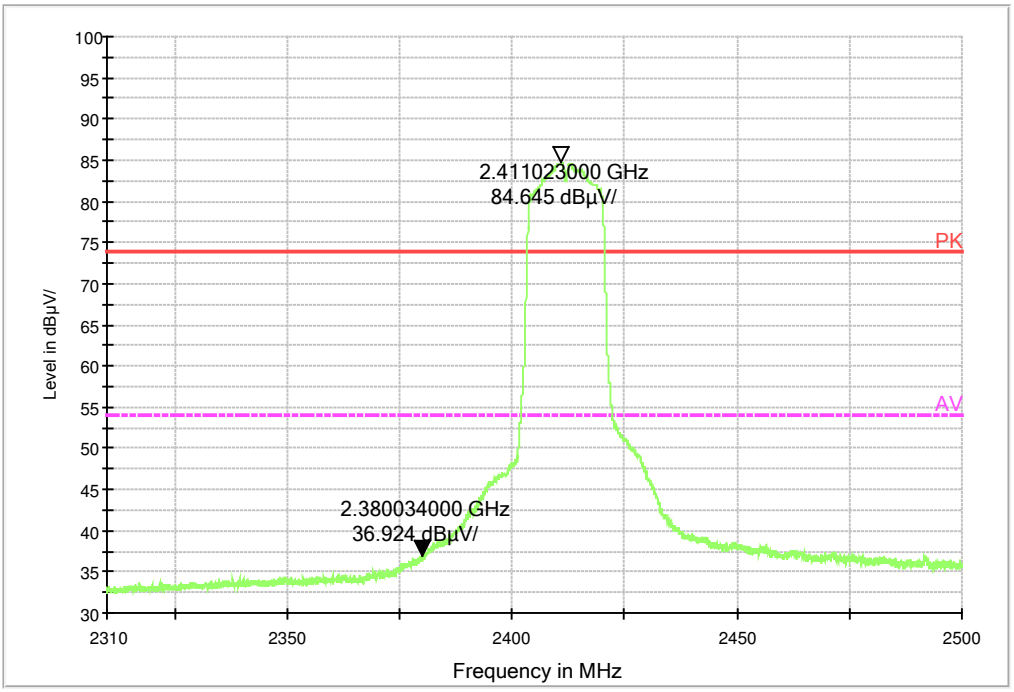


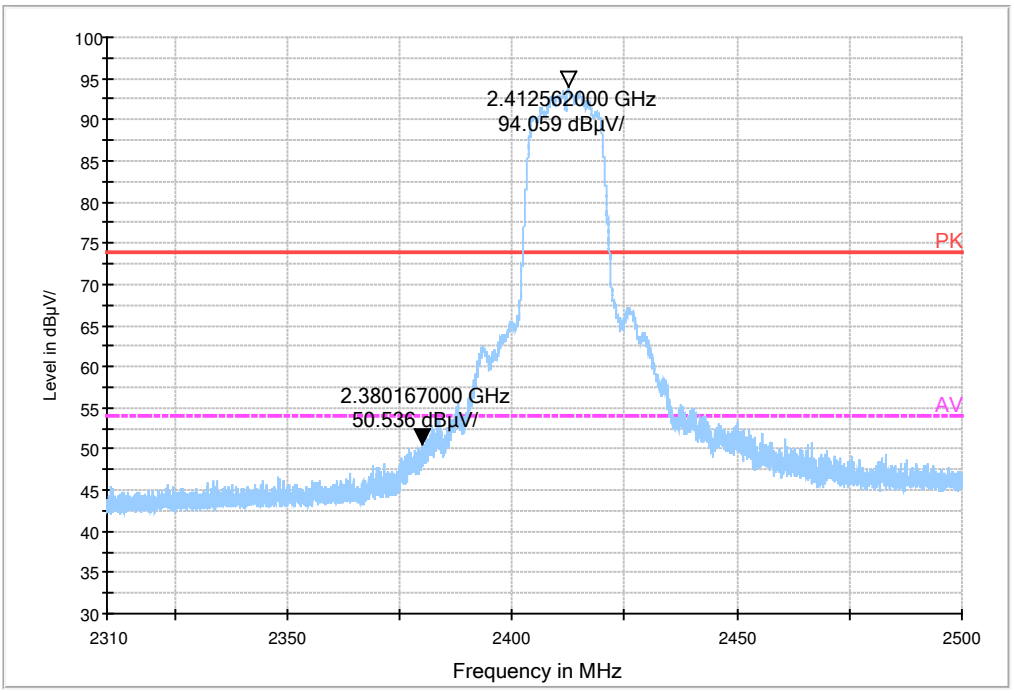
Fig.61 Radiated Spurious Emission (802.11b,Ch1,3GHz~18GHz)

BAND EDGERE 1GHz-3GHz 2380-2450



Average

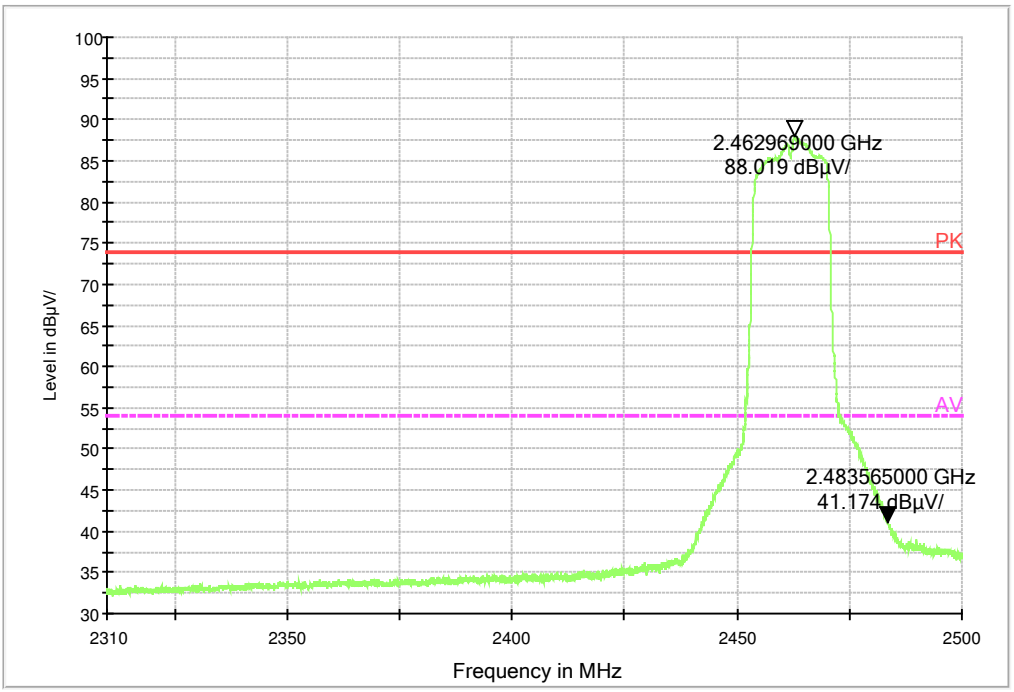
BAND EDGERE 1GHz-3GHz 2380-2450



Peak detector

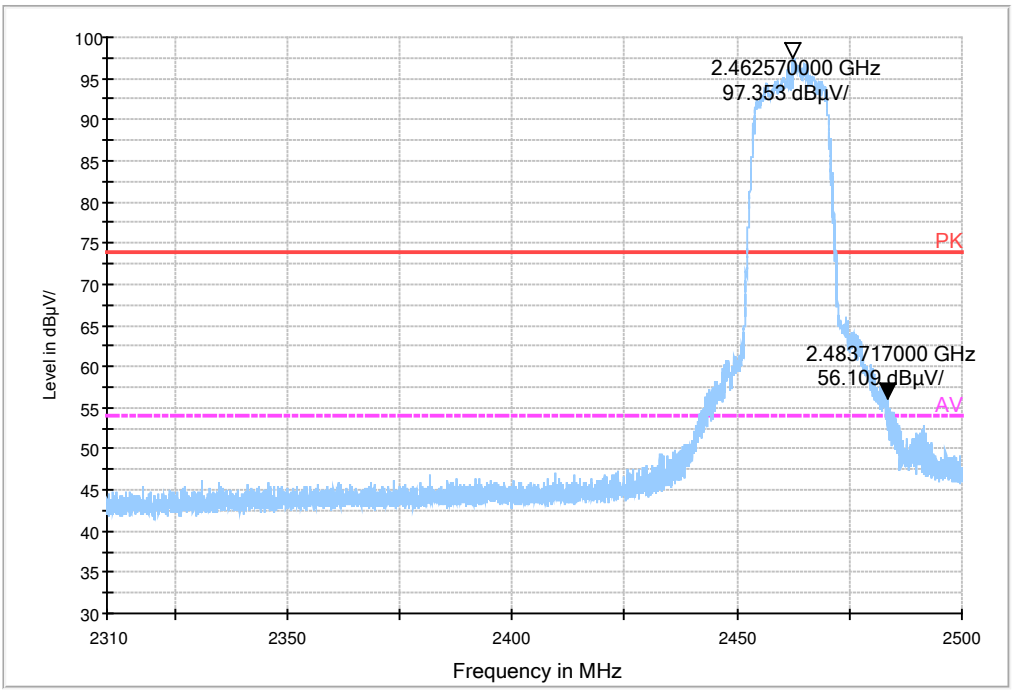
Fig.62 Radiated emission (Power): 802.11g, low channel

BAND EDGERE 1GHz-3GHz 2483.5-2500



Average

BAND EDGERE 1GHz-3GHz 2483.5-2500



Peak detector

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

RE 30MHz-1GHz

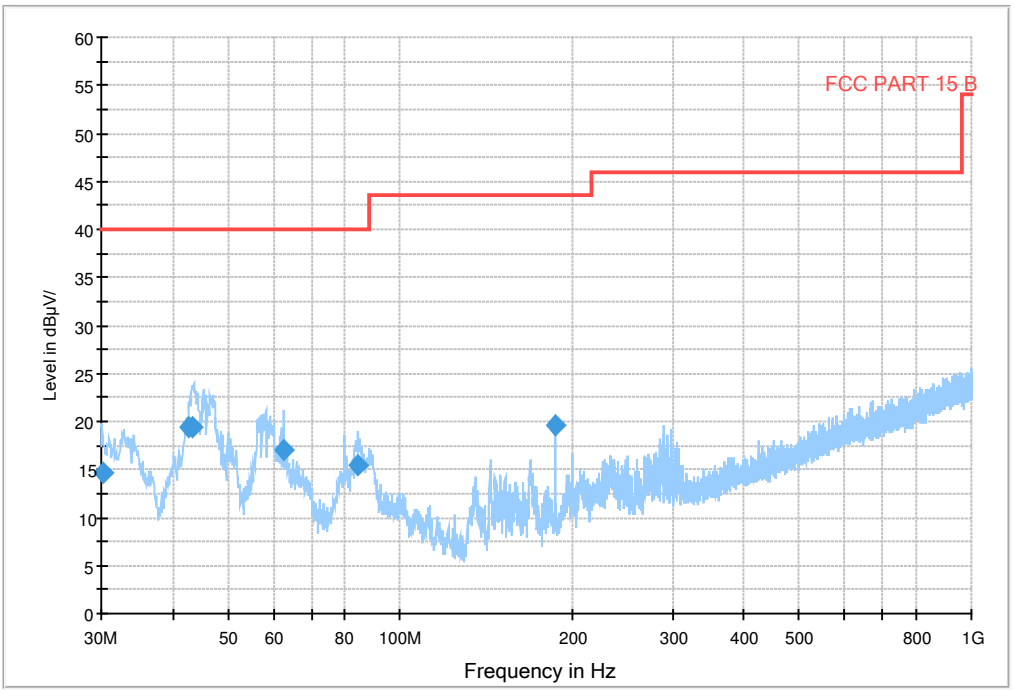


Fig.64 Radiated Spurious Emission (802.11g,Ch1,30MHz~1GHz)

RE 1GHz-3GHz

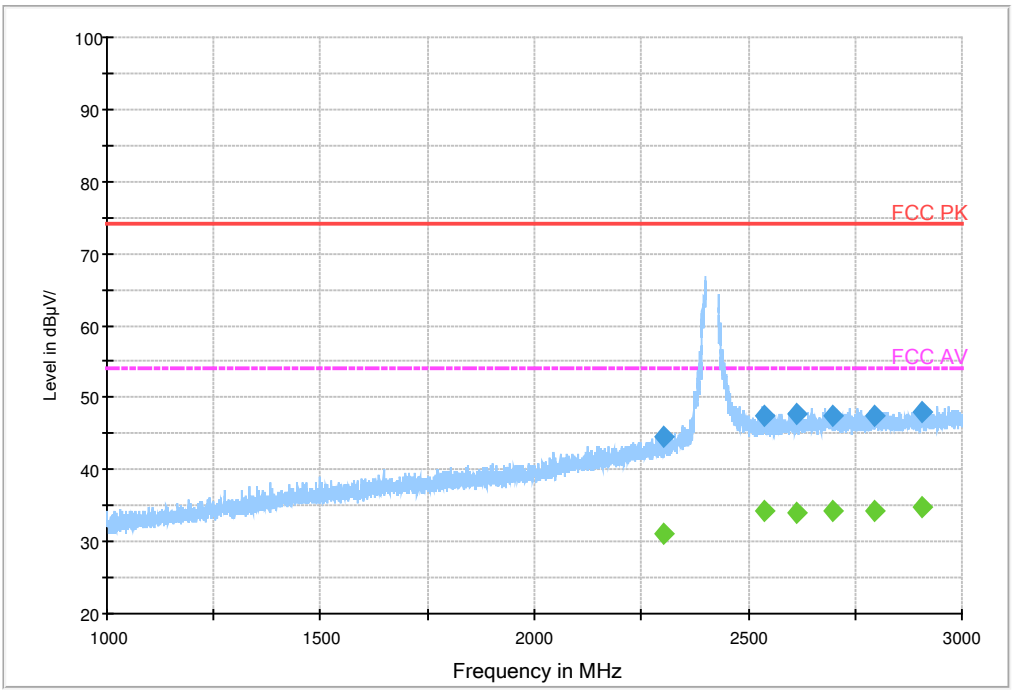


Fig.65 Radiated Spurious Emission (802.11g,Ch1,1GHz~3GHz)

RE 3GHz-18GHz

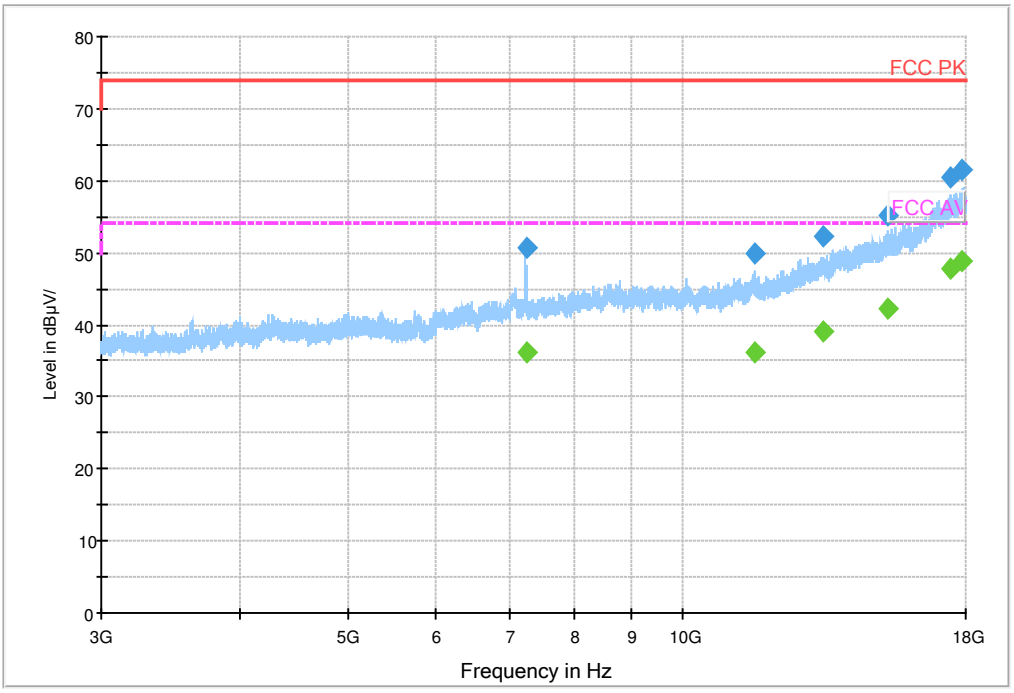
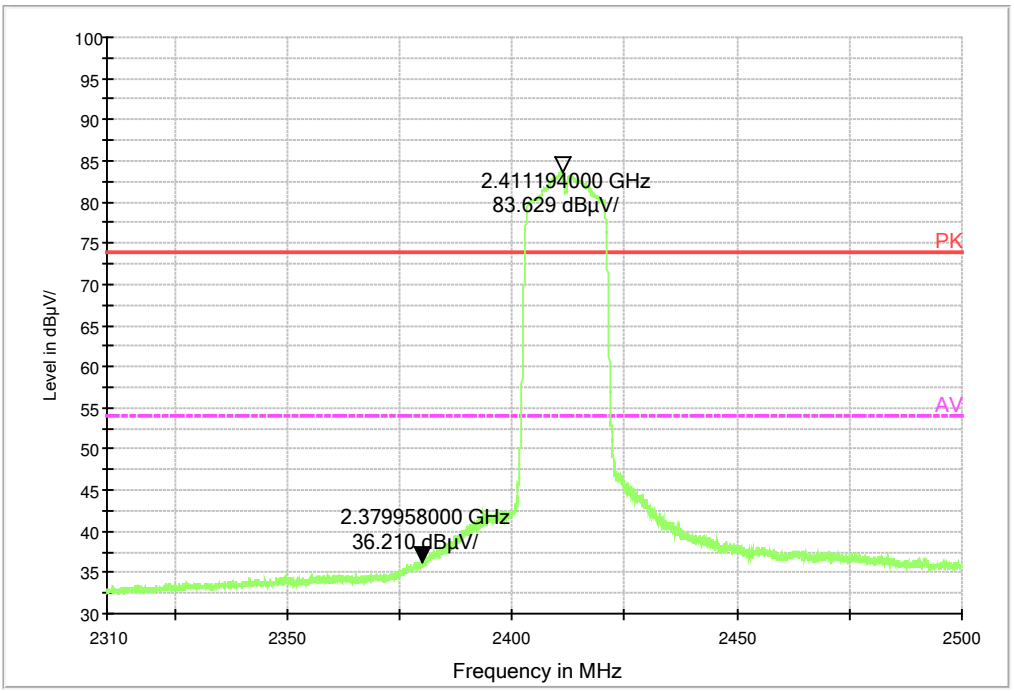


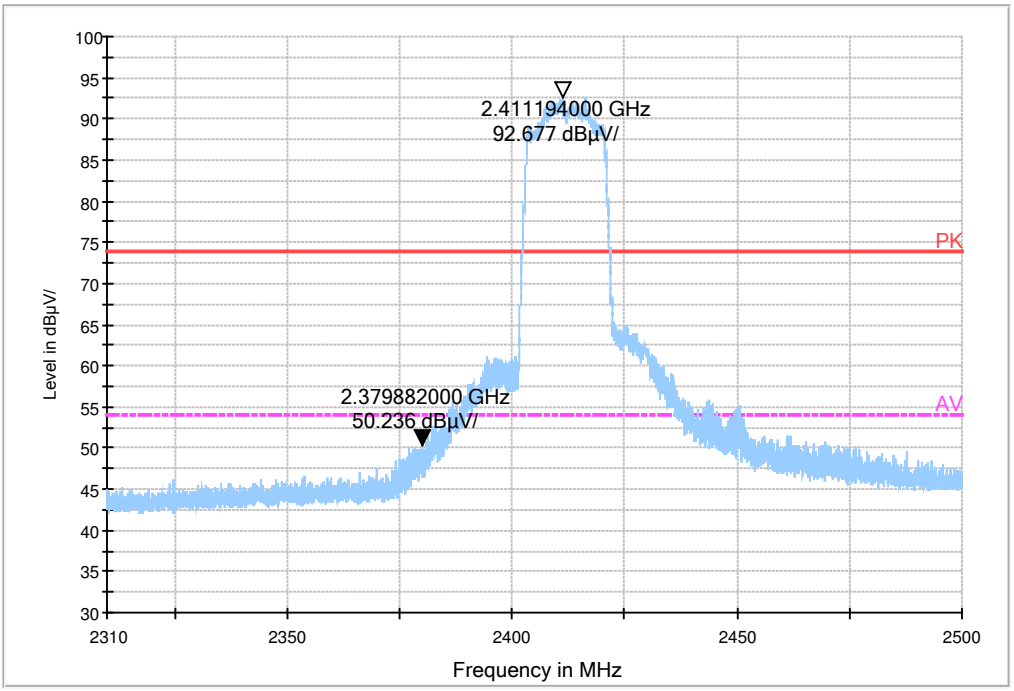
Fig.66 Radiated Spurious Emission (802.11g,Ch1,3GHz~18GHz)

BAND EDGERE 1GHz-3GHz 2380-2450



Average

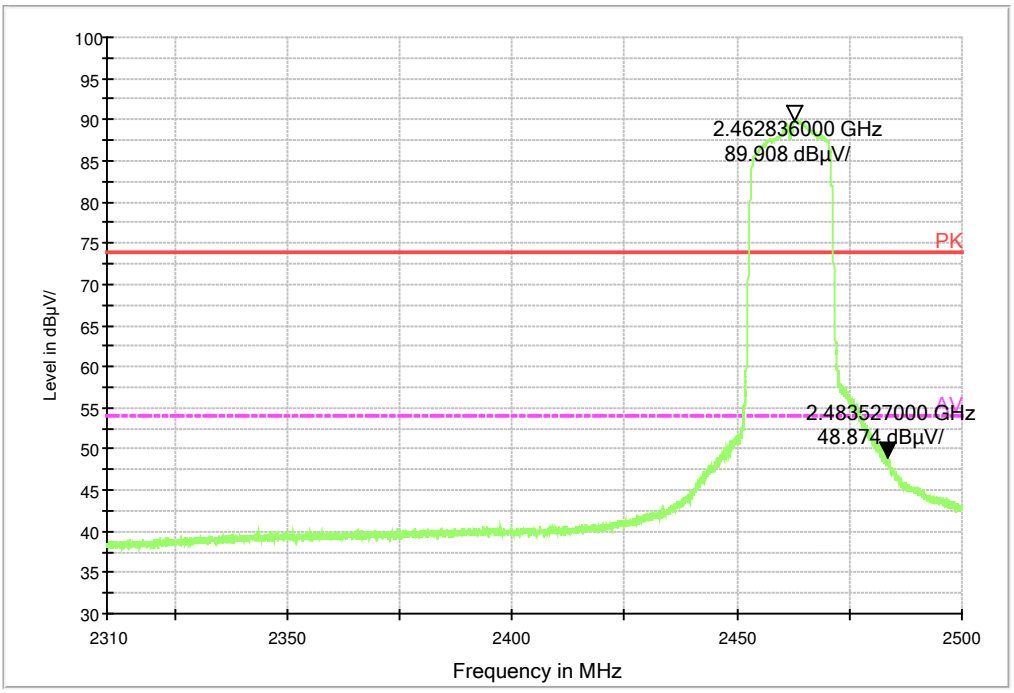
BAND EDGERE 1GHz-3GHz 2380-2450



Peak detector

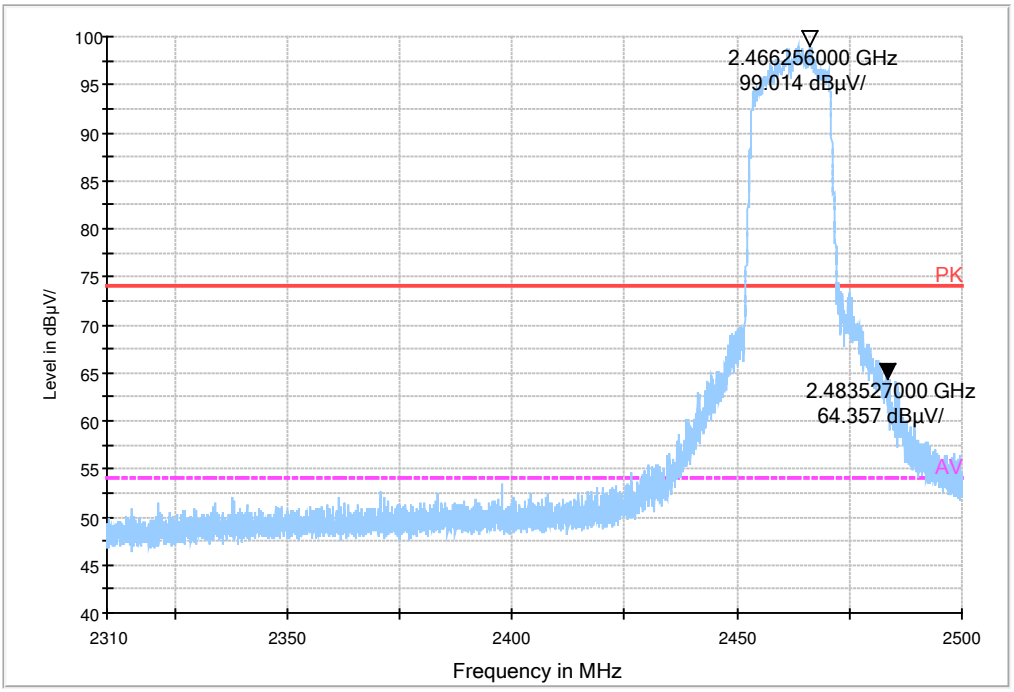
Fig.67 Radiated emission (Power): 802.11n, low channel

BAND EDGERE 1GHz-3GHz 2483.5-2500



Average

BAND EDGERE 1GHz-3GHz 2483.5-2500



Peak detector

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

RE 30MHz-1GHz

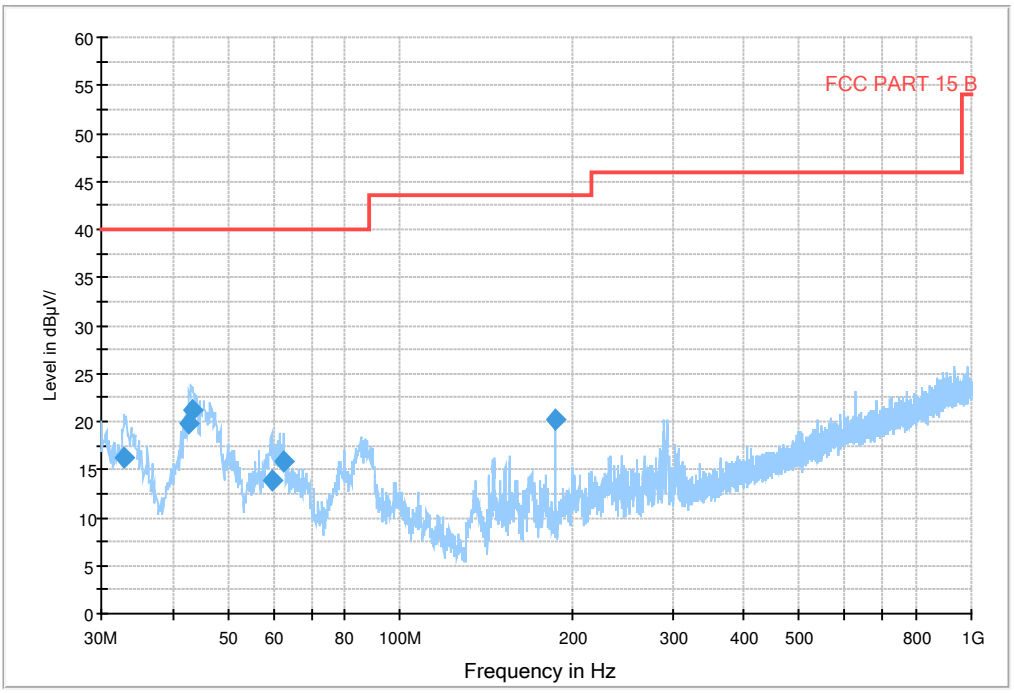


Fig.69 Radiated Spurious Emission (802.11 n-20MHz,Ch1,30MHz~1GHz)

RE 1GHz-3GHz

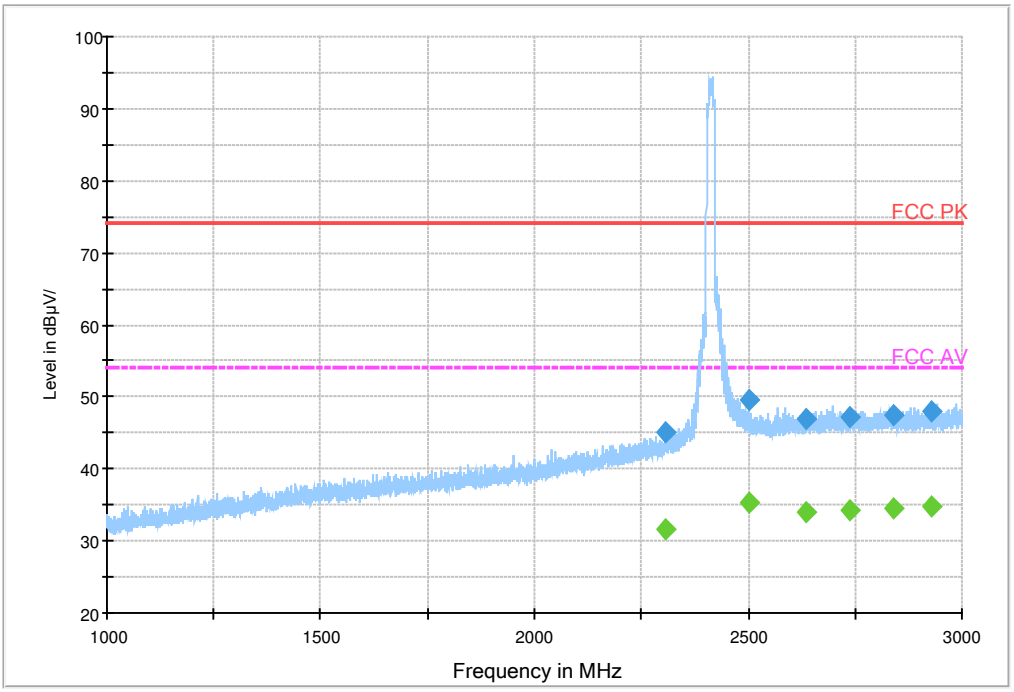


Fig.70 Radiated Spurious Emission (802.11 n-20MHz,Ch1,1GHz~3GHz)

RE 3GHz-18GHz

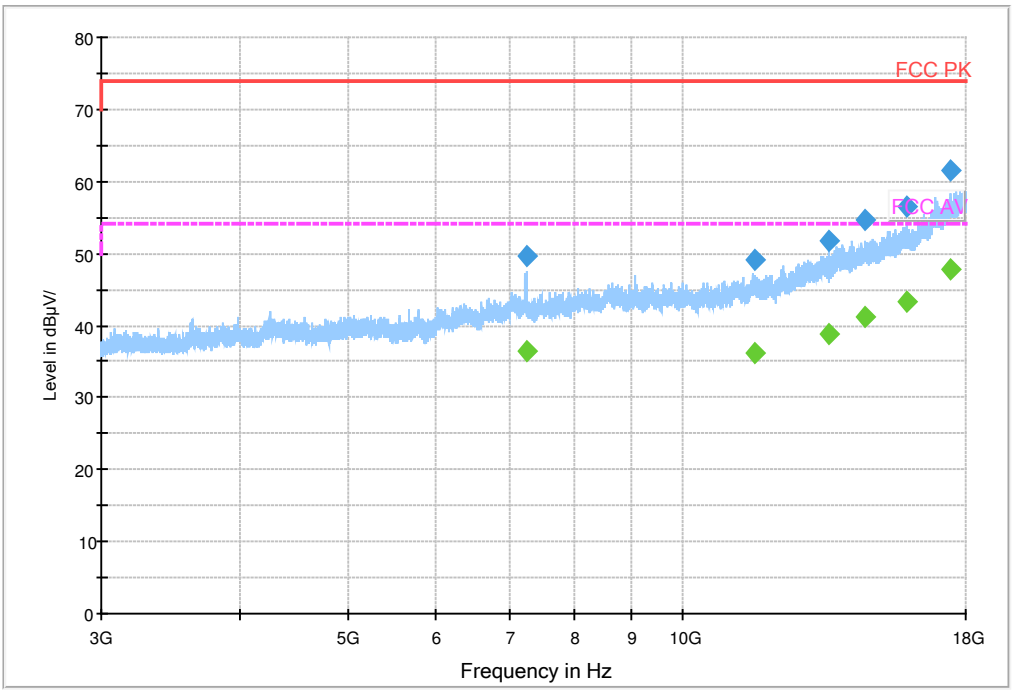
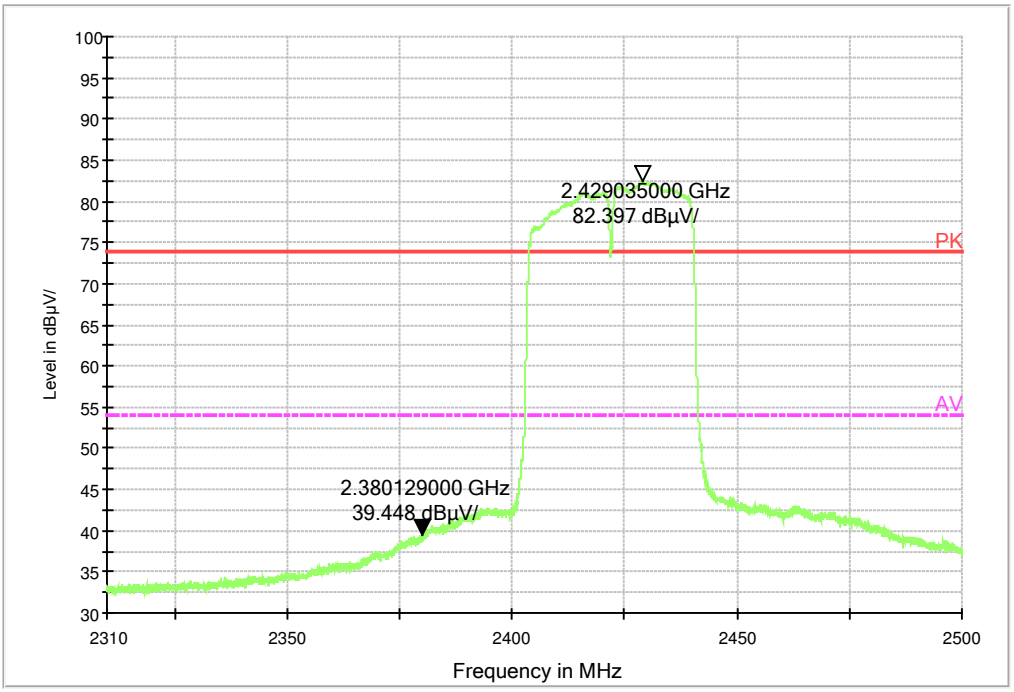


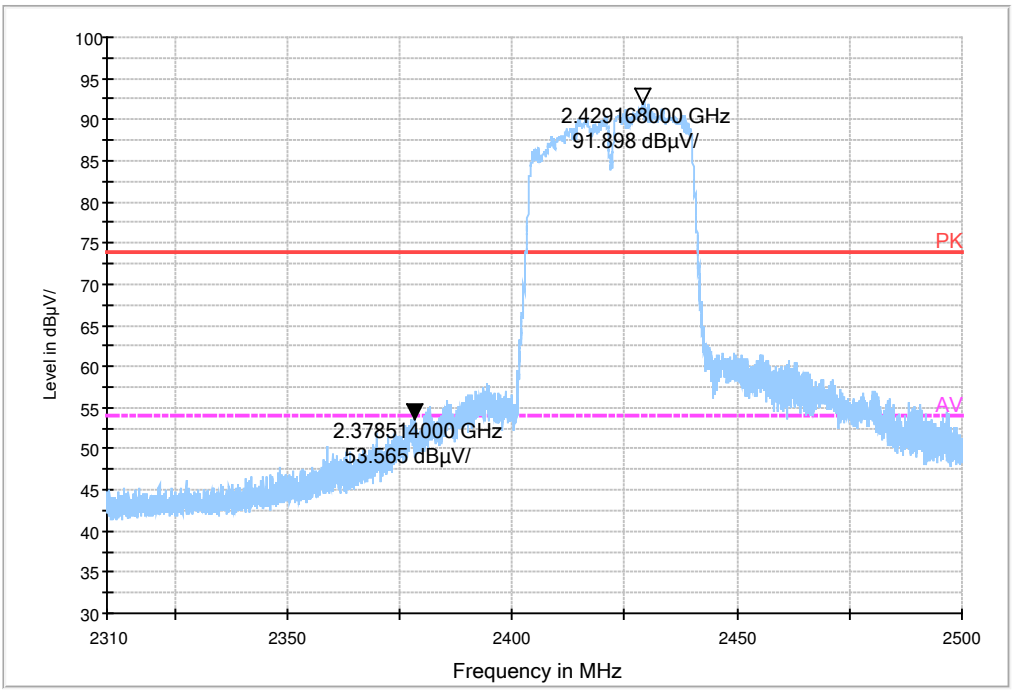
Fig.71 Radiated Spurious Emission (802.11 n-20MHz,Ch1,3GHz~18GHz)

BAND EDGERE 1GHz-3GHz 2380-2450



Average

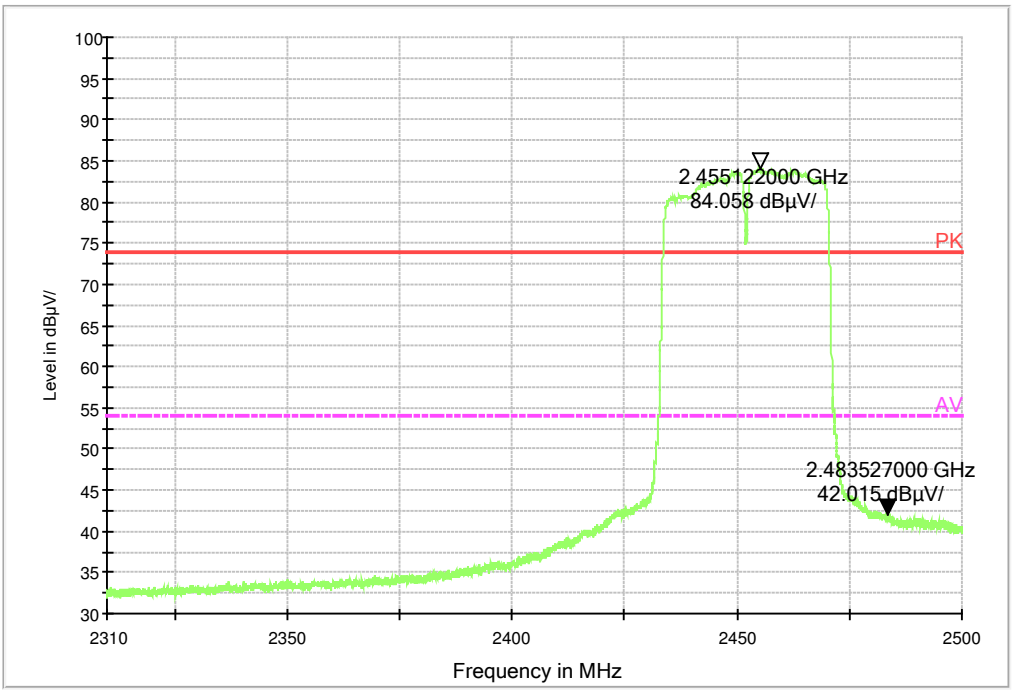
BAND EDGERE 1GHz-3GHz 2380-2450



Peak detector

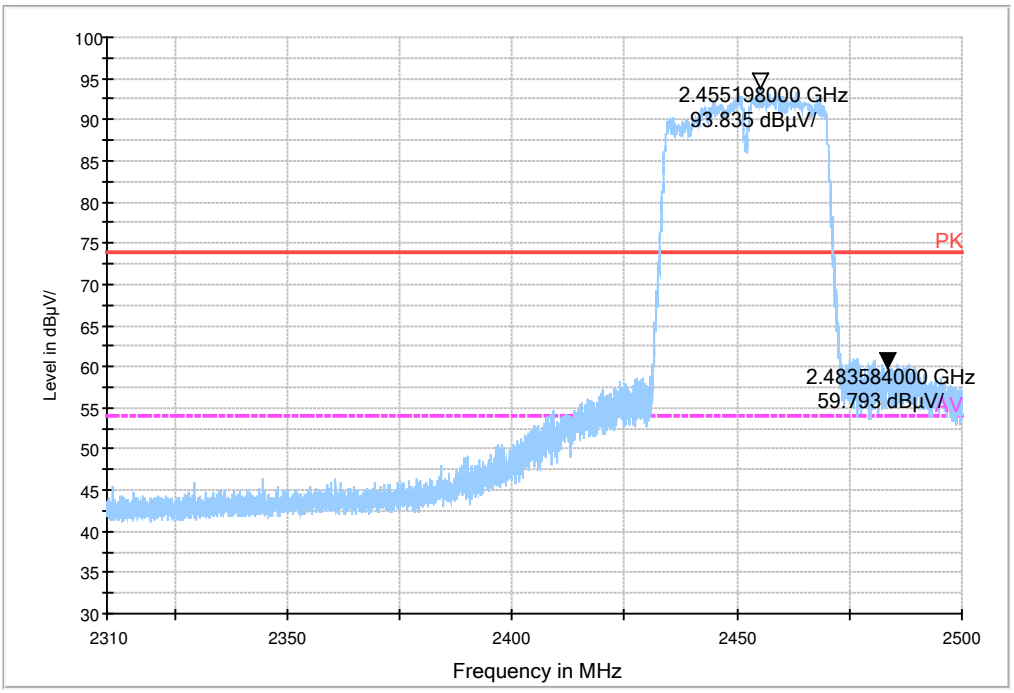
Fig.72 Radiated emission (Power): 802.11n（40M）, low channel

BAND EDGERE 1GHz-3GHz 2483.5-2500



Average

BAND EDGERE 1GHz-3GHz 2483.5-2500



Peak detector

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

RE 30MHz-1GHz

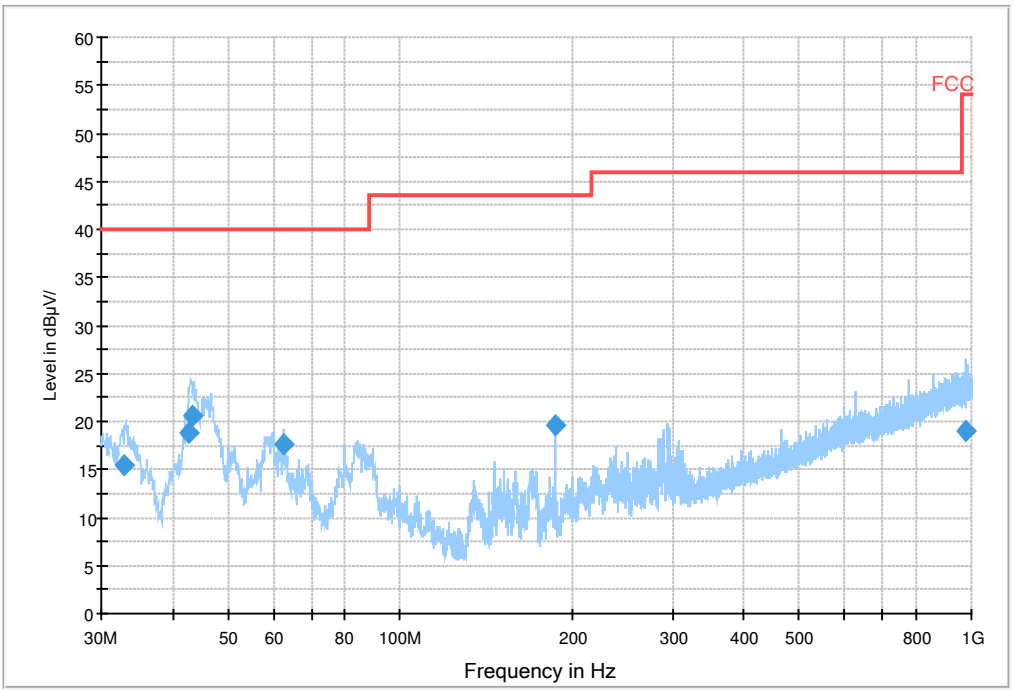


Fig.74 Radiated Spurious Emission (802.11 n-40MHz,Ch3,30MHz~1GHz)

RE 1GHz-3GHz

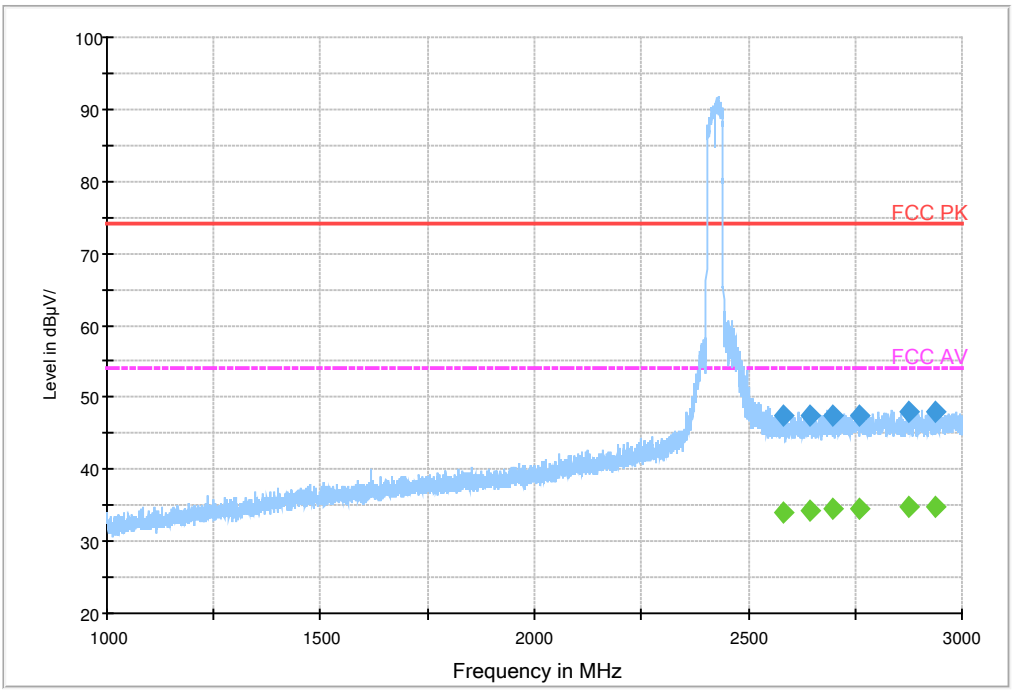


Fig.75 Radiated Spurious Emission (802.11 n-40MHz,Ch3,1GHz~3GHz)

RE 3GHz-18GHz

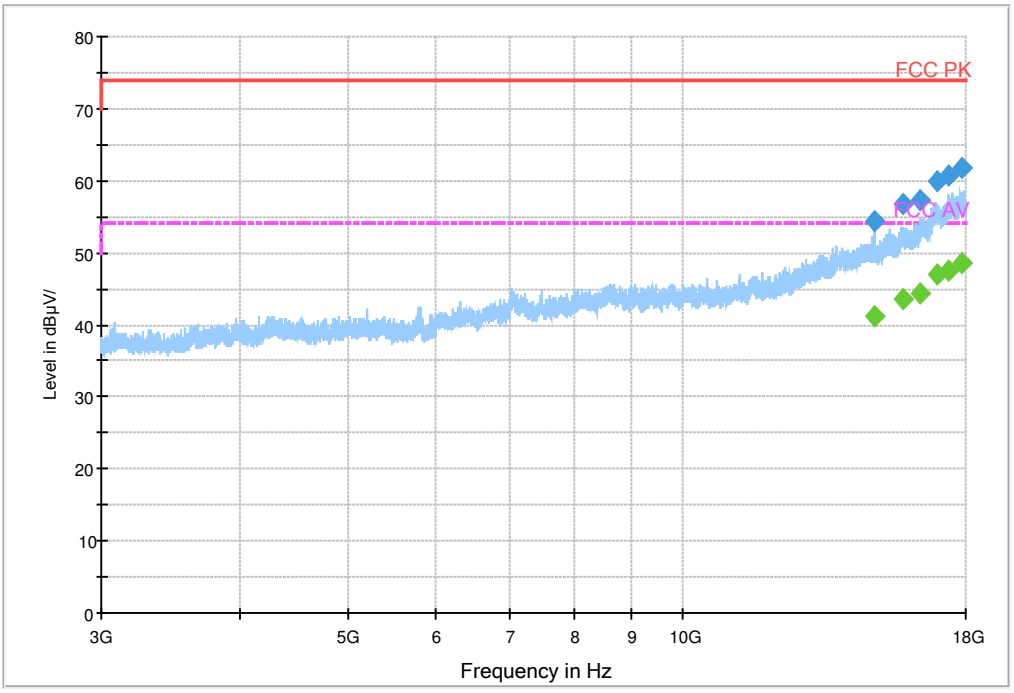


Fig.76 Radiated Spurious Emission (802.11 n-40MHz,Ch3,3GHz~18GHz)

6.7. AC Powerline Conducted Emission

Method of Measurement: See ANSI C63.10-2013-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)

First Supply

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.77	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

First Supply

CISPR N&L1 Voltage 150k to 30MHz-Class B

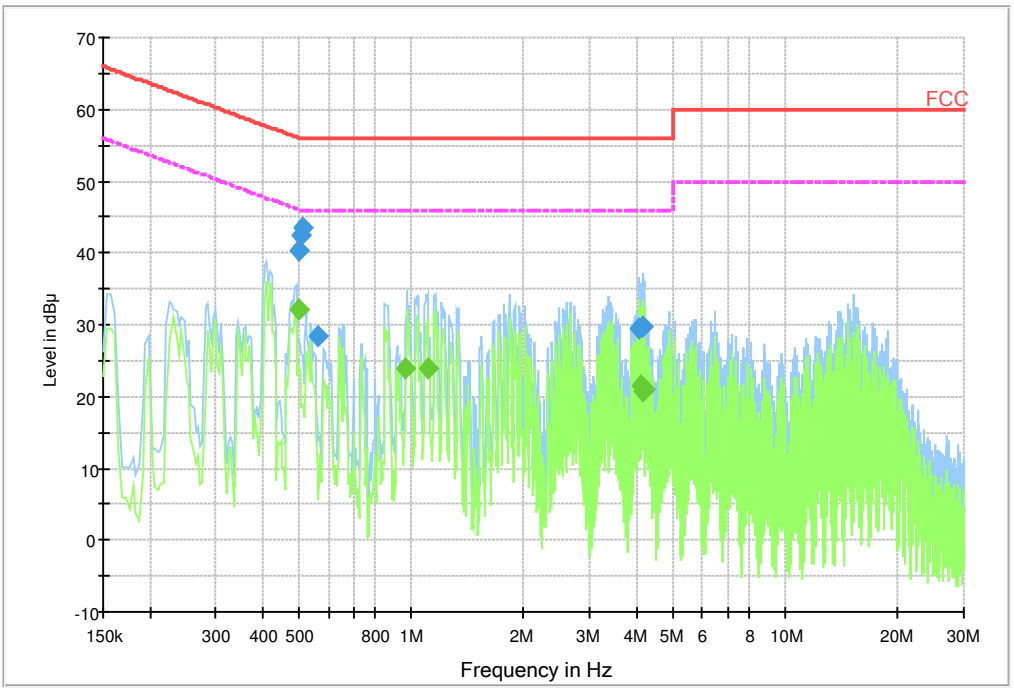


Fig.77 AC Powerline Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dB µ V)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB
0.501188	40.4	1000.0	9.000	On	L1	9.6	15.6	56.0
0.507544	42.5	1000.0	9.000	On	L1	9.6	13.5	56.0
0.513125	43.5	1000.0	9.000	On	L1	9.6	12.5	56.0
0.564525	28.3	1000.0	9.000	On	L1	9.6	27.7	56.0
4.058081	29.6	1000.0	9.000	On	L1	9.7	26.4	56.0
4.137750	29.8	1000.0	9.000	On	L1	9.7	26.2	56.0

Final Result 2

Frequency (MHz)	CAverage (dB µ V)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB µ
0.501188	32.2	1000.0	9.000	On	L1	9.6	13.8	46.0
0.964606	24.0	1000.0	9.000	On	L1	9.7	22.0	46.0
1.107169	23.9	1000.0	9.000	On	L1	9.7	22.1	46.0
4.114350	21.6	1000.0	9.000	On	L1	9.7	24.4	46.0

4.154019	**20.7**	**1000.0**	**9.000**	**On**	**L1**	**9.7**	**25.3**	**46.0**
4.213781	**21.1**	**1000.0**	**9.000**	**On**	**L1**	**9.7**	**24.9**	**46.0**

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	FSQ26	101096	R&S	2016-05-12	1 Year
2	DC Power Supply	ZUP60-14	LOC-220Z006	TDL-Lambda	2016-05-12	1 Year

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Cal.interval
1	Universal Radio Communication Tester	CMU200	123101	R&S	2016-05-12	1 Year
3	Test Receiver	ESU40	100307	R&S	2016-05-12	1 Year
4	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2014-11-05	3 Year
5	Double Ridged Guide Antenna	ETS-3117	135885	ETS	2014-05-06	3 Year
8	2-Line V-Network	ENV216	101380	R&S	2016-05-12	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. = 25 %, Max. = 75 %
Shielding effectiveness	> 110 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	> 110 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.

************End The Report************