Full

TEST REPORT

No. I17D00153-SRD03

For

Client : Mobiwire SAS

Production : 4G Smartphone

Model Name : MobiWire Waneta, ALTICE S60

FCC ID: QPN-WANETA

Hardware Version: V01

Software Version: WE552_ALTICE_S60

Issued date: 2017-07-05

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

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Revision Version

Report Number	Revision	Date	Memo
I17D00153-SRD03	00	2017-07-05	Initial 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:	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:	2017-06-22
Testing End Date:	2017-07-03

1.4. Signature

Yang Dejun
(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:	+33 178 14 09 33
Email:	alexandre.minazio@mobiwire.com

2.2. Manufacturer Information

Company Name:	Mobiwire SAS
Address:	79 AVENUE FRANCOIS ARAGO 92017 NANTERRE CEDEX France.
Telephone:	+33 178 14 09 33
Email:	alexandre.minazio@mobiwire.com

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

3.1. About EUT

EUT Description	4G Smartphone
Model name	MobiWire Waneta, ALTICE S60
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	4.35V
Extreme Low Voltage	3.4V

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	N/A	V01	WE552_ALTICE_S60	2017-06-22

*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	Inveracious battery	---

*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 MobiWire Waneta, ALTICE S60, supporting GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA/HSPA+/WLAN/BT/BLE/GPS, manufactured by Mobiwire SAS, is a variant product for testing. According to the variant description, all the test results please refer to I17D00122-SRD03 which is the test report for the initial product of MobiWire Waneta+, ALTICE S70..

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	17.75	/	/
	2	17.97	/	/
	5.5	19.25	/	/
	11	20.68	20.85	20.92
802.11g	6	20.18	/	/
	9	18.21	/	/
	12	20.50	20.57	20.77
	18	20.14	/	/

	24	18.81	/	/
	36	18.28	/	/
	48	20.06	/	/
	54	20.21	/	/

The data rate 11 Mbps and 12 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	20.29	20.33	20.66
	MCS1	20.17	/	/
	MCS2	19.99	/	/
	MCS3	20.08	/	/
	MCS4	20.09	/	/
	MCS5	19.83	/	/
	MCS6	19.93	/	/
	MCS7	19.81	/	/
Mode	**Data Rate(Index)**	**Teat Result(dBm)**		
		2422MHz(Ch3)	**2437MHz(Ch6)**	**2452MHz(Ch9)**
802.11n(40MHz)	MCS0	19.86	/	/
	MCS1	19.68	/	/
	MCS2	19.76	/	/
	MCS3	20.07	/	/
	MCS4	20.23	20.27	20.33
	MCS5	19.14	/	/
	MCS6	19.01	/	/

	MCS7	18.74	/	/

The data rate MCS0 for 802.11n(20M)and MCS4 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	15.37	15.46	15.64
802.11g	16.81	17.22	17.67

802.11n mode

Mode	Test Result(dBm)		
	2412MHz (Ch1)	**2437MHz (Ch6)**	**2462MHz (Ch11)**
802.11n(20MHz)	15.96	16.25	16.46
Mode	**Test Result(dBm)**		
	2422MHz (Ch3)	**2437MHz (Ch6)**	**2452MHz (Ch9)**
802.11n(40MHz)	15.66	16.17	16.80

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.	-8.55	P
	6	Fig 2.	-8.482	P
	11	Fig 3.	-8.258	P
802.11g	1	Fig 4.	-13.988	P
	6	Fig 5.	-13.879	P
	11	Fig 6.	-13.353	P

802.11n mode

Mode	Channel	Power Spectral Density(dBm/3kHz)		Conclusion
802.11n(20MHz)	1	Fig 7.	-15.473	P
	6	Fig 8.	-15.233	P
	11	Fig 9.	-14.97	P

802.11n(40MHz)	3	Fig 10.	-18.464	P
	6	Fig 11.	-18.243	P
	9	Fig 12.	-17.277	P

Conclusion: PASS

Test graphs as below:

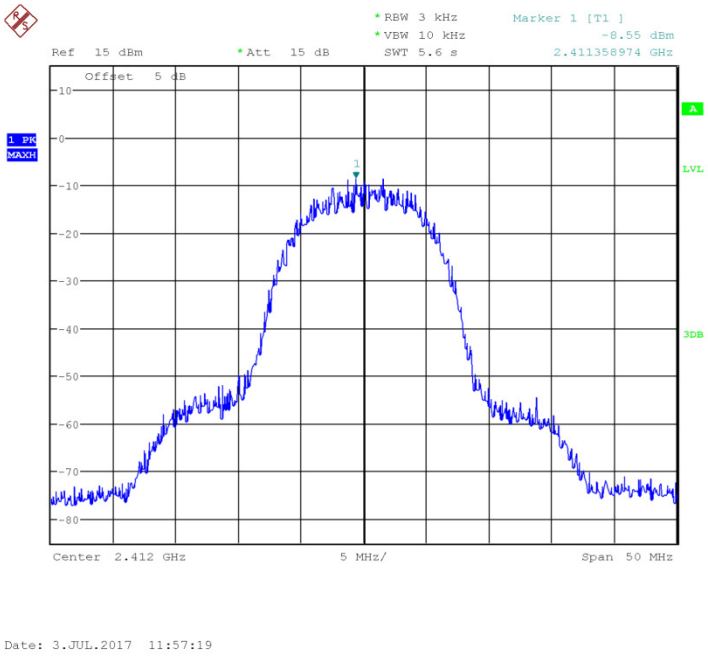

Fig 1. Power Spectral Density (802.1b,Ch1)

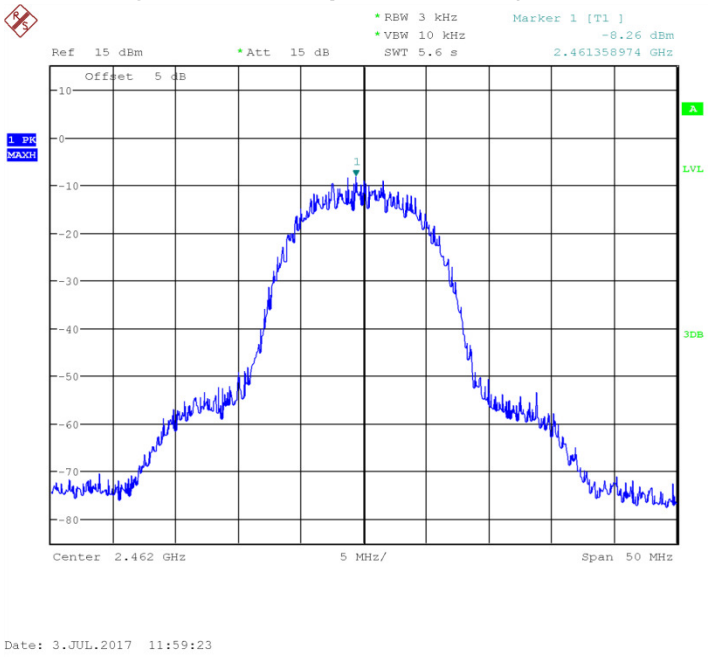

Fig 2. Power Spectral Density (802.1b,Ch6)

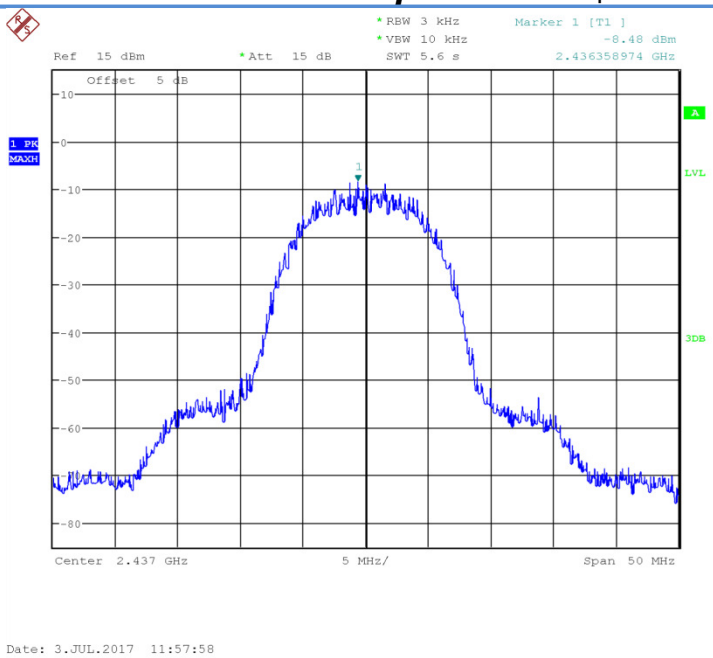

Fig 3. Power Spectral Density (802.1b,Ch11)

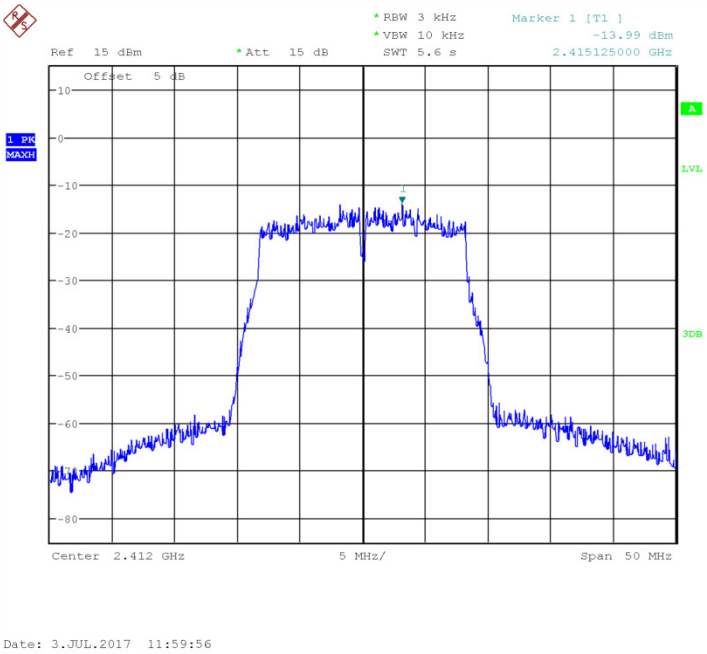

Fig.6 Power Spectral Density (802.1g,Ch1)

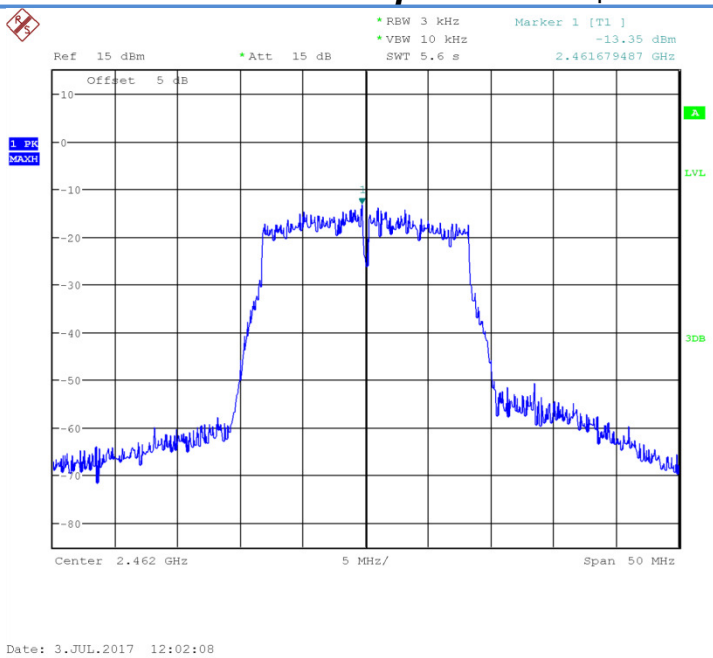

Fig.7 Power Spectral Density (802.1g,Ch6)

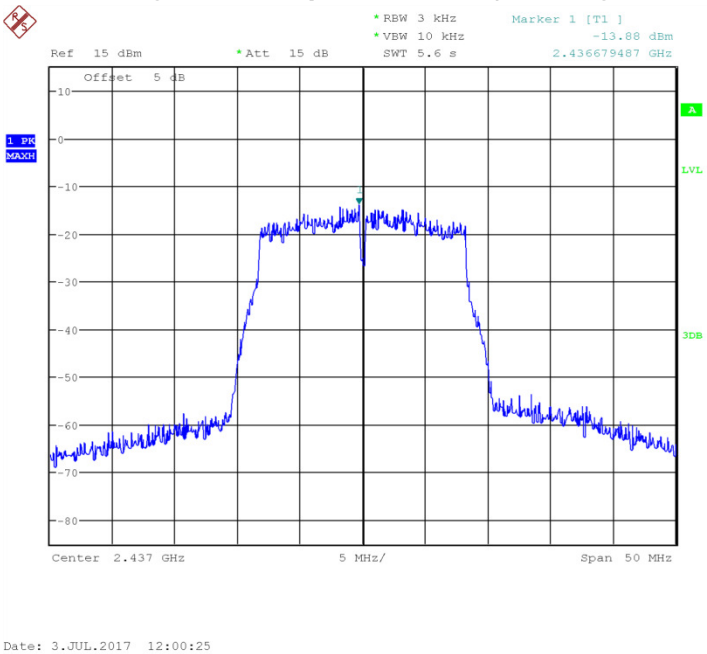

Fig.8 Power Spectral Density (802.1g,Ch11)

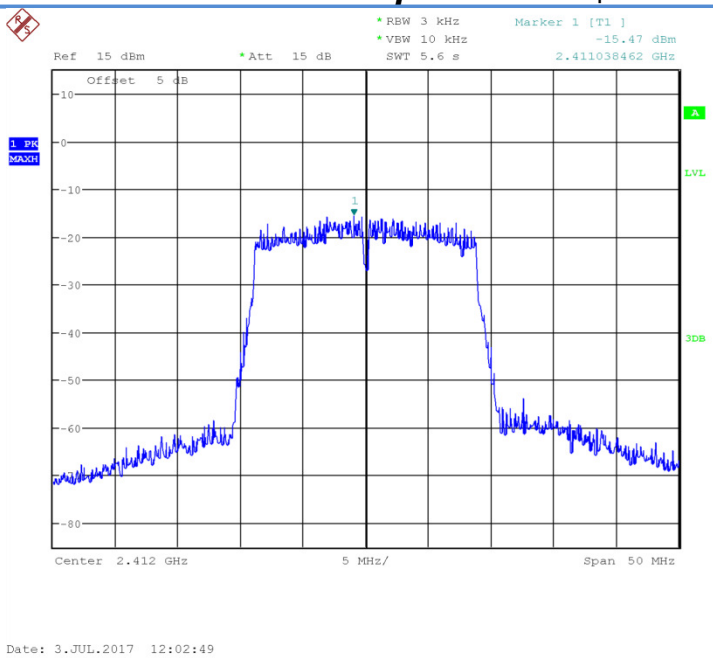

Fig.11 Power Spectral Density (802.1n-20MHz,Ch1)

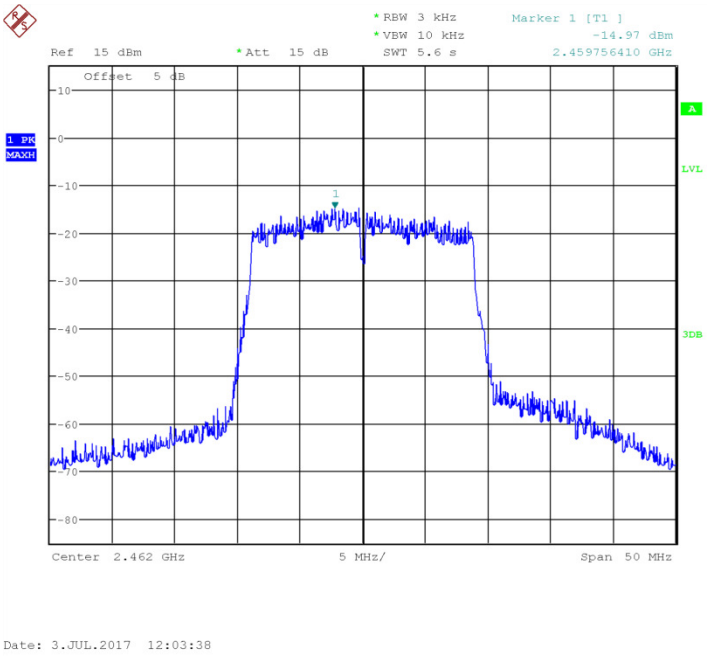

Fig.12 Power Spectral Density (802.1n-20MHz,Ch6)

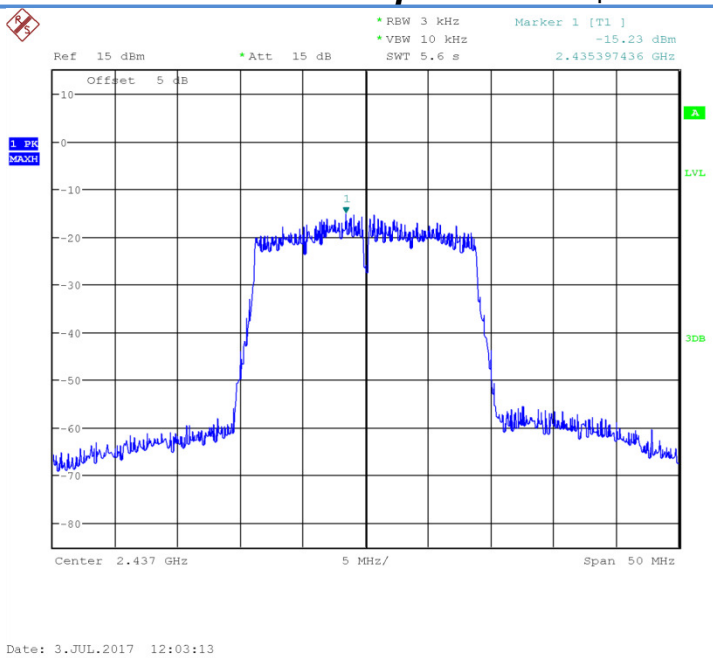

Fig.13 Power Spectral Density (802.1n-20MHz,Ch11)

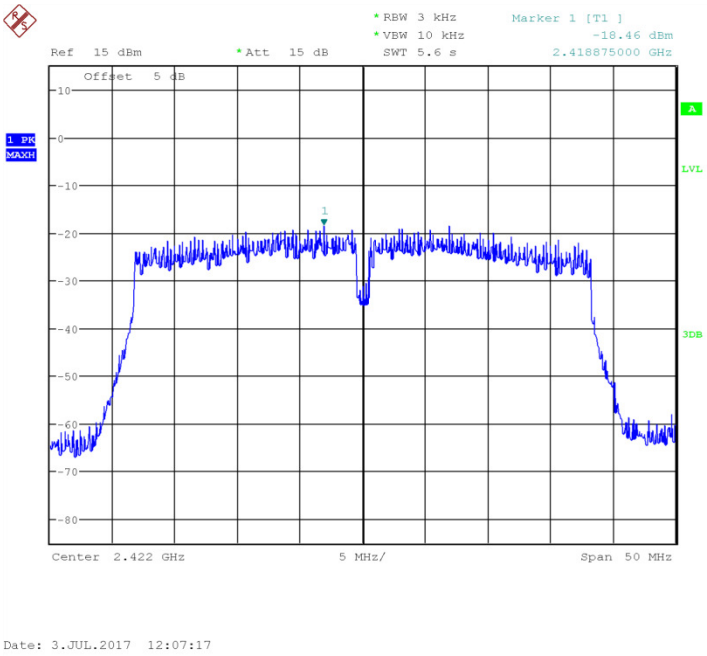

Fig.16 Power Spectral Density (802.1n-40MHz,Ch3)

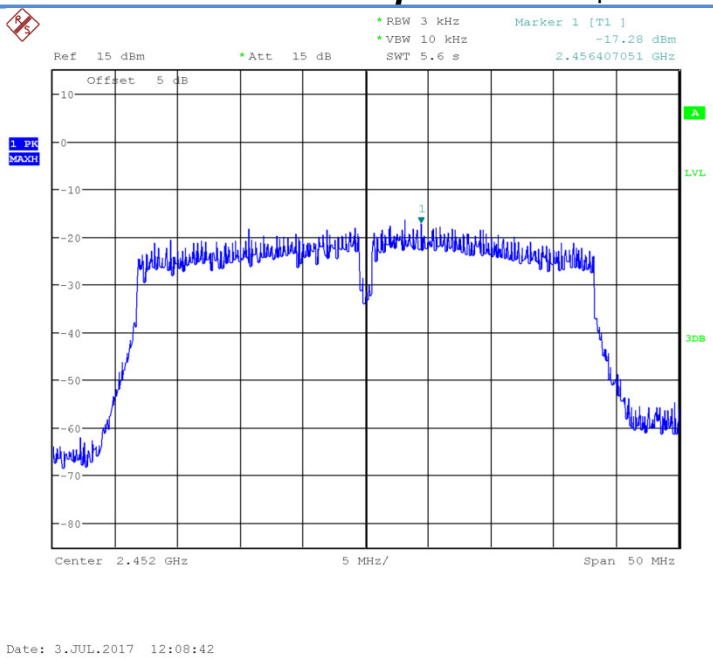

Fig.17 Power Spectral Density (802.1n-40MHz,Ch6)

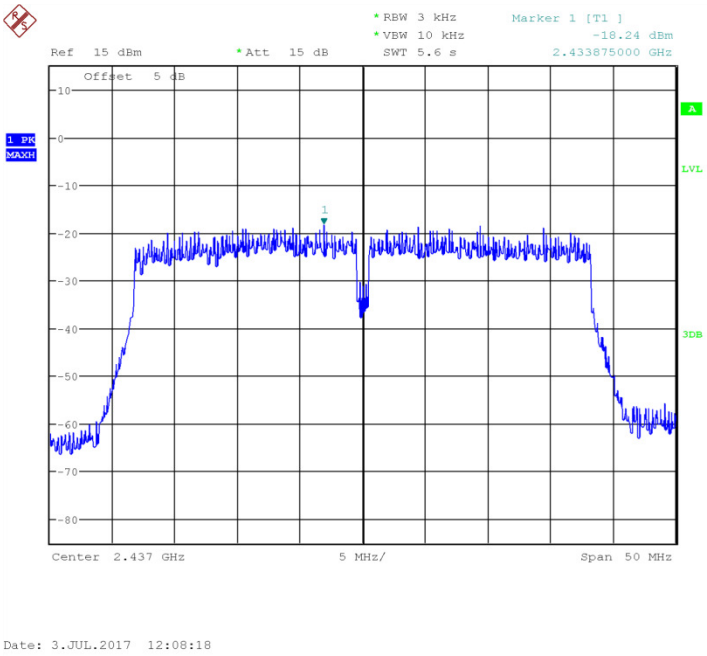

Fig.18 Power Spectral Density (802.1n-40MHz,Ch9)

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 21.	8.974	P
	6	Fig 22.	9.455	P
	11	Fig 23.	9.535	P
802.11g	1	Fig 24.	16.506	P
	6	Fig 25.	16.506	P
	11	Fig 26.	16.506	P

802.11n mode

Mode	Channel	Occupied 6dB Bandwidth(MHz)		Conclusion
802.11n(20MHz)	1	Fig 27.	17.788	P
	6	Fig 28.	17.708	P
	11	Fig 29.	17.708	P
802.11n(40MHz)	3	Fig 30.	36.138	P
	6	Fig 31.	36.458	P
	9	Fig 32.	36.058	P

Conclusion: PASS

Test graphs as below:

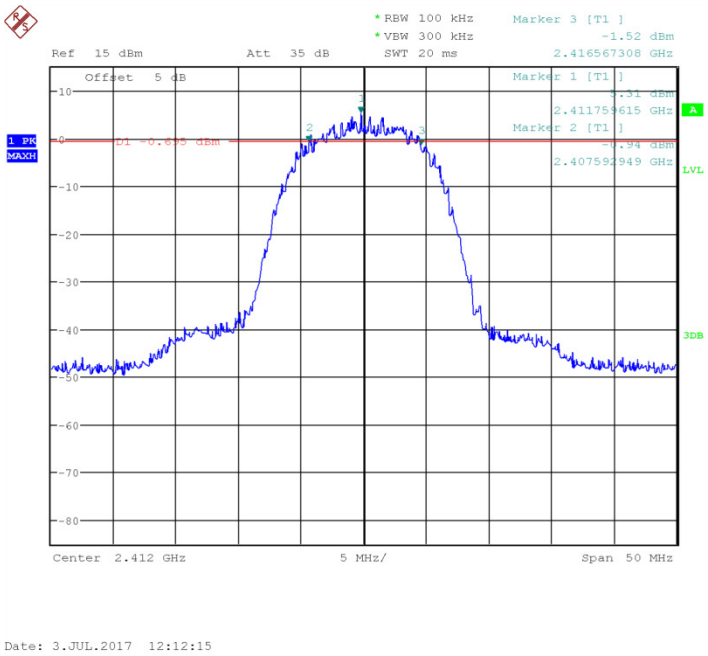

Fig.21 Occupied 6dB Bandwidth (802.11b, Ch1)

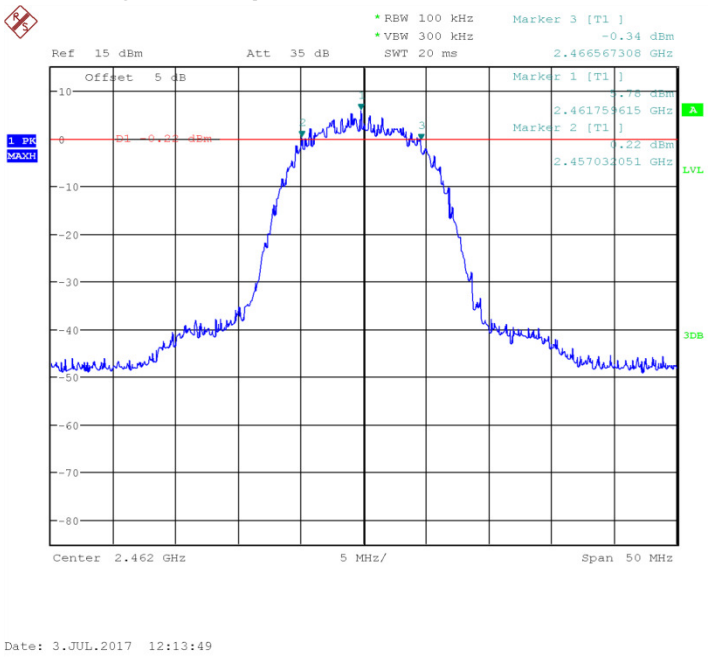

Fig.22 Occupied 6dB Bandwidth (802.11b, Ch6)

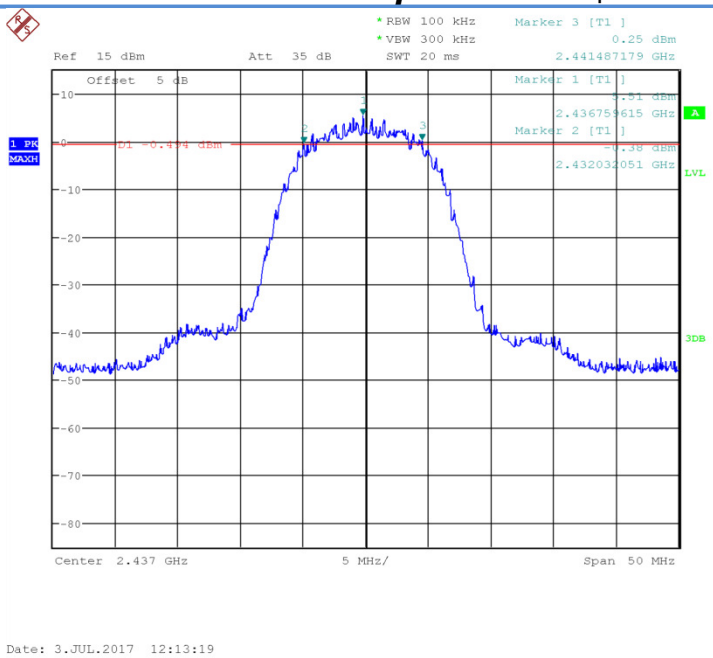

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Fig.23 Occupied 6dB Bandwidth (802.11b, Ch11)

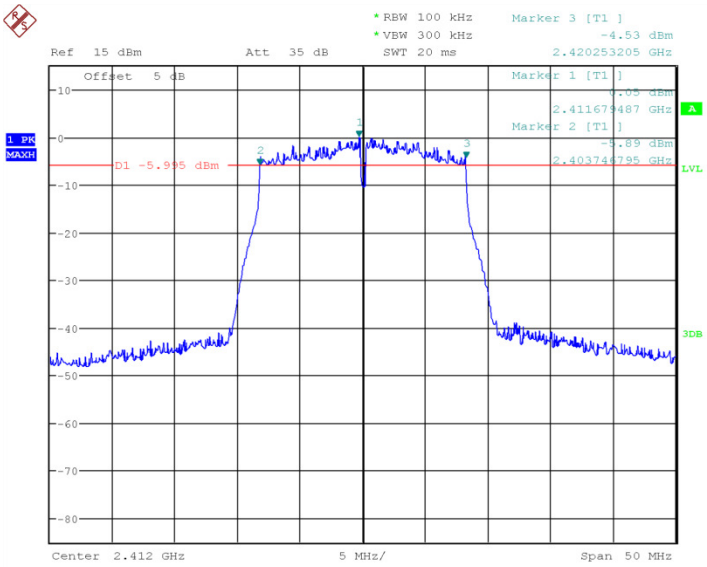

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Fig.26 Occupied 6dB Bandwidth (802.11g, Ch1)

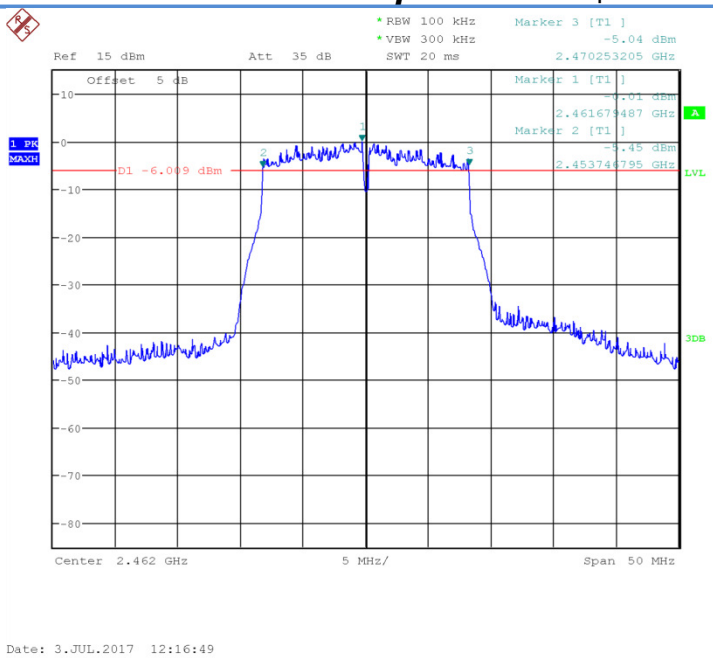


Fig.27 Occupied 6dB Bandwidth (802.11g, Ch6)

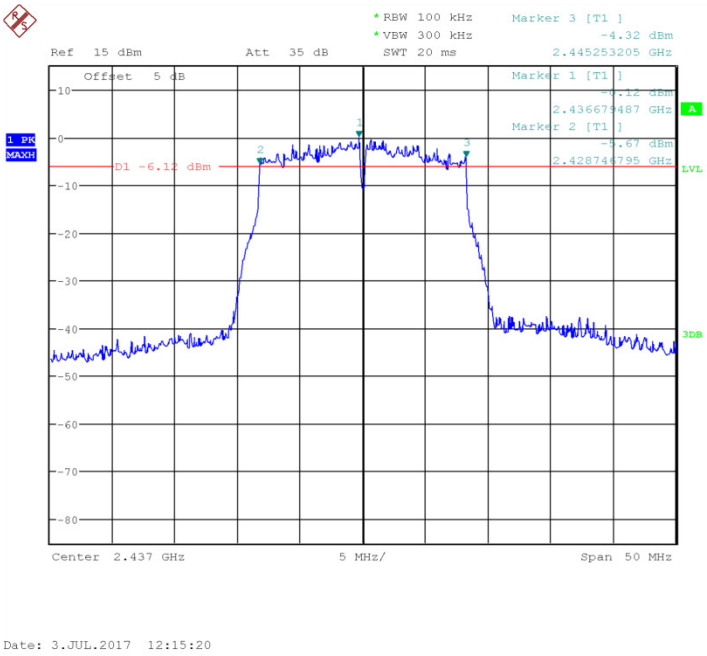


Fig.28 Occupied 6dB Bandwidth (802.11g, Ch11)

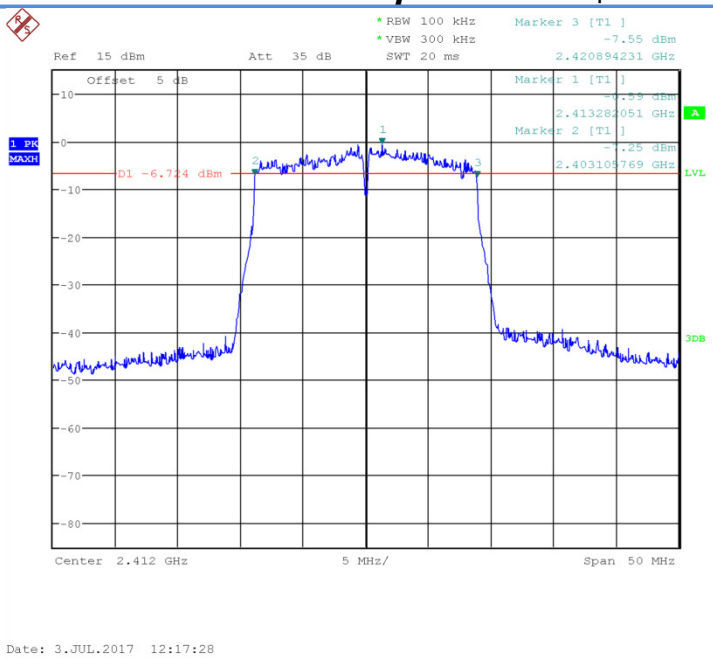


Fig.31 Occupied 6dB Bandwidth (802.11n-20MHz, Ch1)

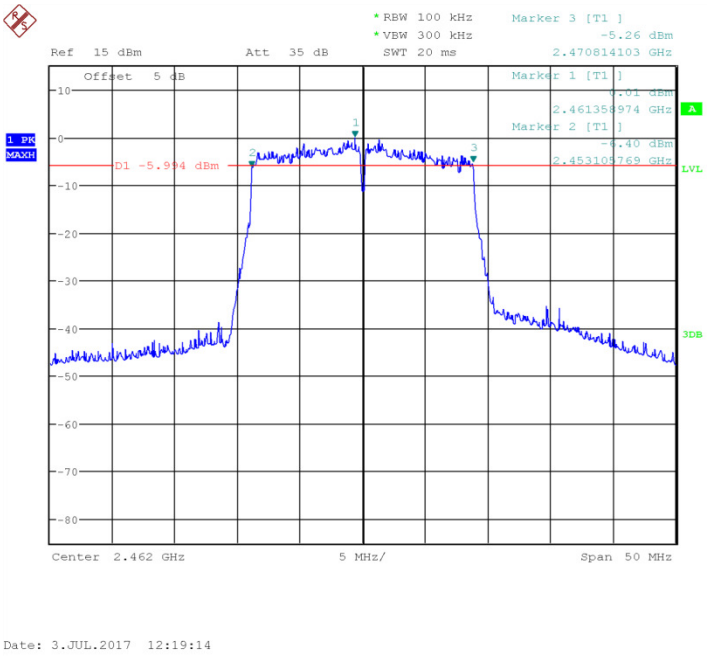


Fig.32 Occupied 6dB Bandwidth (802.11n-20MHz, Ch6)

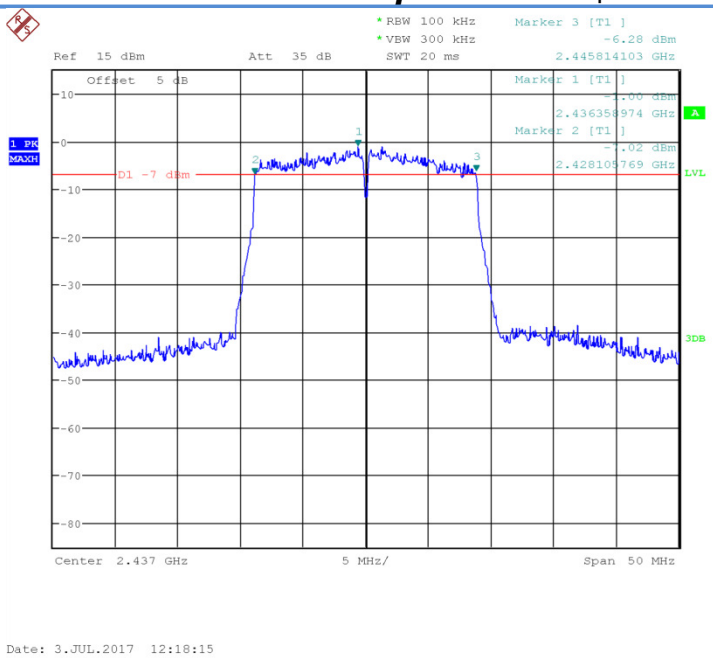


Fig.33 Occupied 6dB Bandwidth (802.11n-20MHz, Ch11)

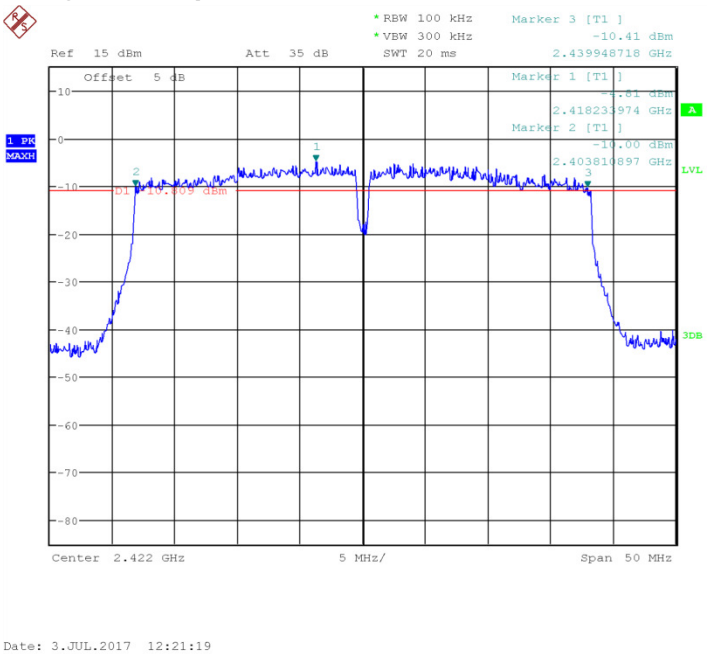


Fig.36 Occupied 6dB Bandwidth (802.11n-40MHz, Ch3)

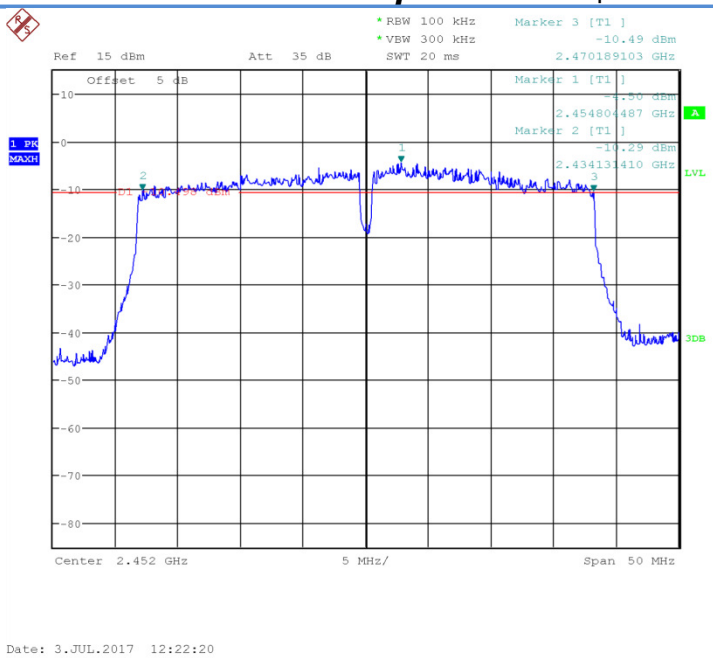


Fig.37 Occupied 6dB Bandwidth (802.11n-40MHz, Ch6)

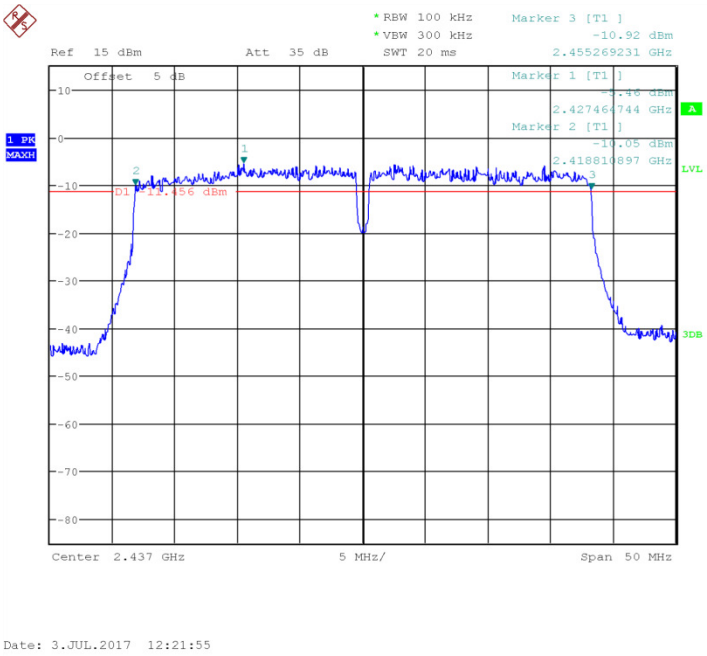


Fig.38 Occupied 6dB Bandwidth (802.11n-40MHz, Ch9)

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 33.	P
	11	Fig 34.	P
802.11g	1	Fig 35.	P
	11	Fig 36.	P

802.11n mode

Mode	Channel	Test Results	Conclusion
802.11n(20MHz)	1	Fig 37.	P
	11	Fig 38.	P
802.11n(40MHz)	3	Fig 39.	P
	9	Fig 40.	P

Conclusion: PASS

Test graphs as blew:

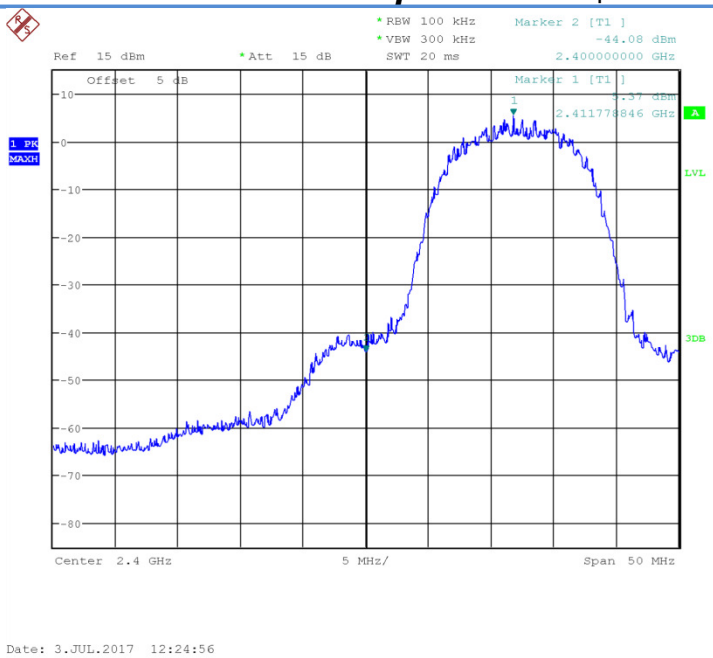


Fig.41 Band Edges (802.11b, Ch1)

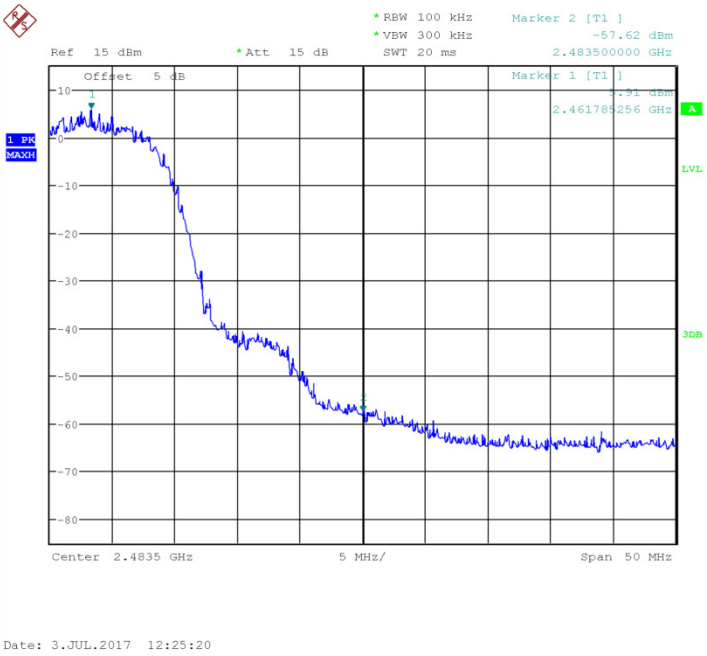


Fig.42 Band Edges (802.11b, Ch11)

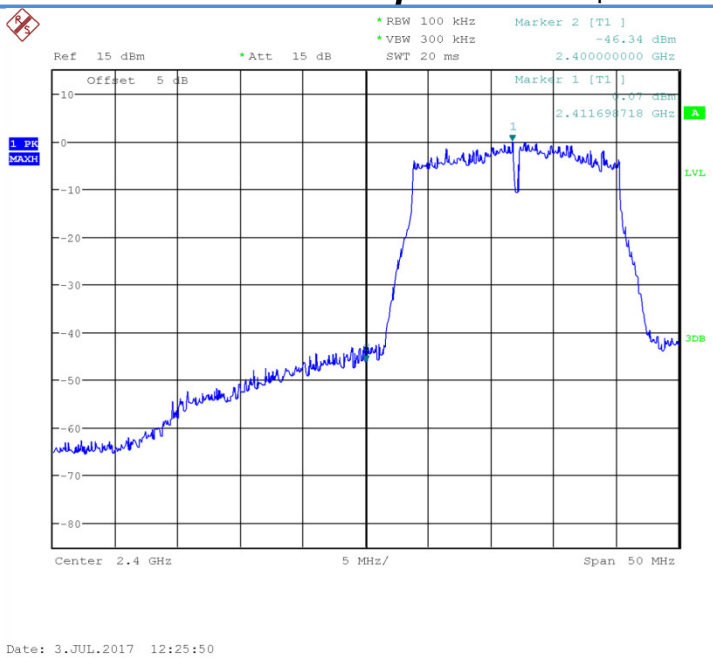


Fig.45 Band Edges (802.11g, Ch1)

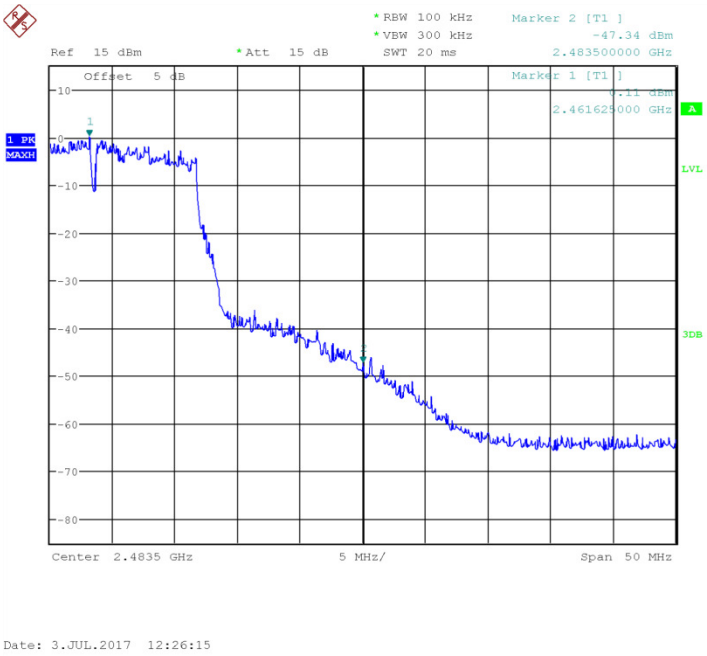


Fig.46 Band Edges (802.11g, Ch11)

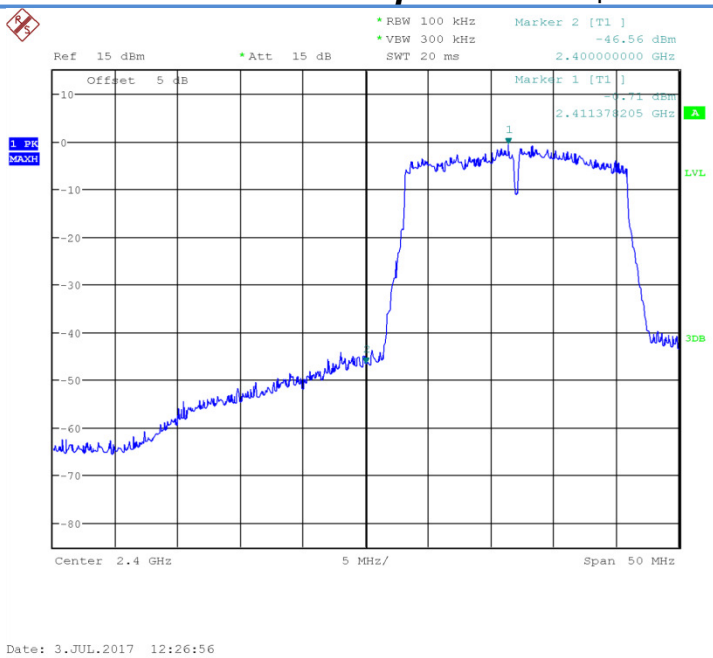


Fig.49 Band Edges (802.11n-20MHz, Ch1)

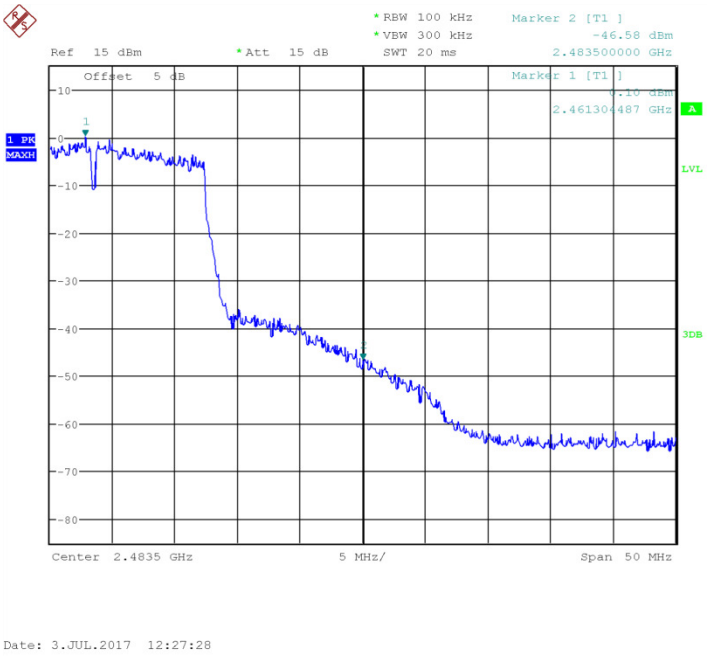


Fig.50 Band Edges (802.11b-20MHz, Ch11)

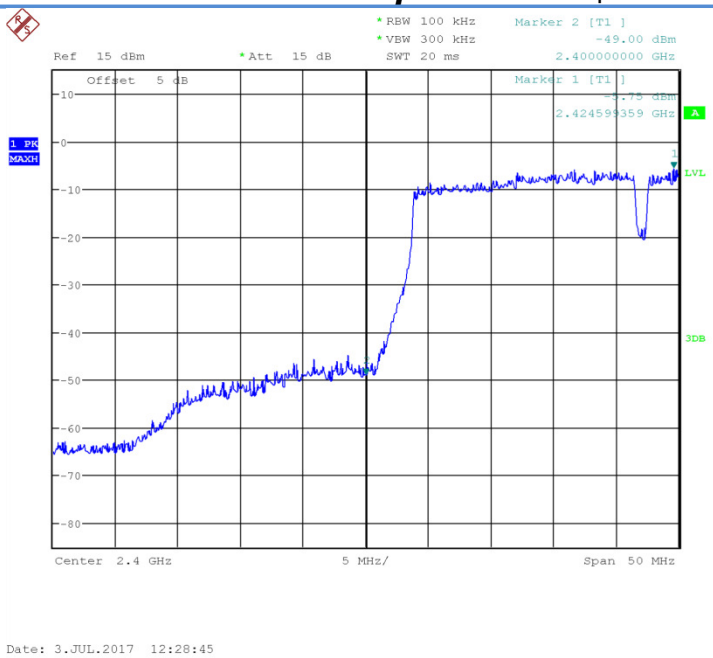


Fig.53 Band Edges (802.11n-40MHz, Ch3)

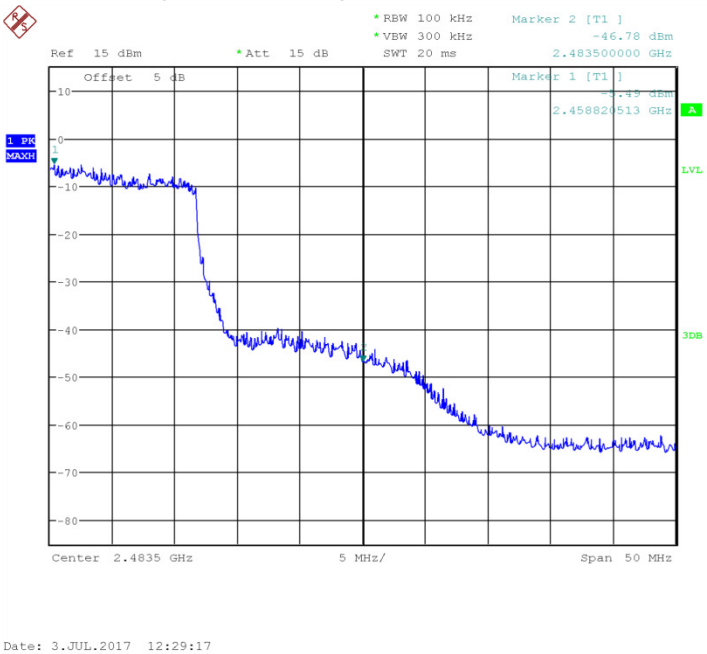


Fig.54 Band Edges (802.11b-40MHz, Ch9)

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 41.	P
		30MHz~26GHz	Fig 42.	P
	6	2.437GHz	Fig 43.	P
		30MHz~26GHz	Fig 44.	P
	11	2.462GHz	Fig 45.	P
		30MHz~26GHz	Fig 46.	P
802.11g	1	2.412GHz	Fig 47.	P
		30MHz~26GHz	Fig 48.	P
	6	2.437GHz	Fig 49.	P
		30MHz~26GHz	Fig 50.	P
	11	2.462GHz	Fig 51.	P
		30MHz~26GHz	Fig 52.	P

802.11n mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n(20MHz)	1	2.412GHz	Fig 53.	P
		30MHz~26GHz	Fig 54.	P
	6	2.437GHz	Fig 55.	P
		30MHz~26GHz	Fig 56.	P
	11	2.462GHz	Fig 57.	P
		30MHz~26GHz	Fig 58.	P
802.11n(40MHz)	3	2.422GHz	Fig 59.	P
		30MHz~26GHz	Fig 60.	P
	6	2.437GHz	Fig 61.	P
		30MHz~26GHz	Fig 62.	P
	9	2.452GHz	Fig 63.	P
		30MHz~26GHz	Fig 64.	P

Conclusion: PASS

Test graphs as below:

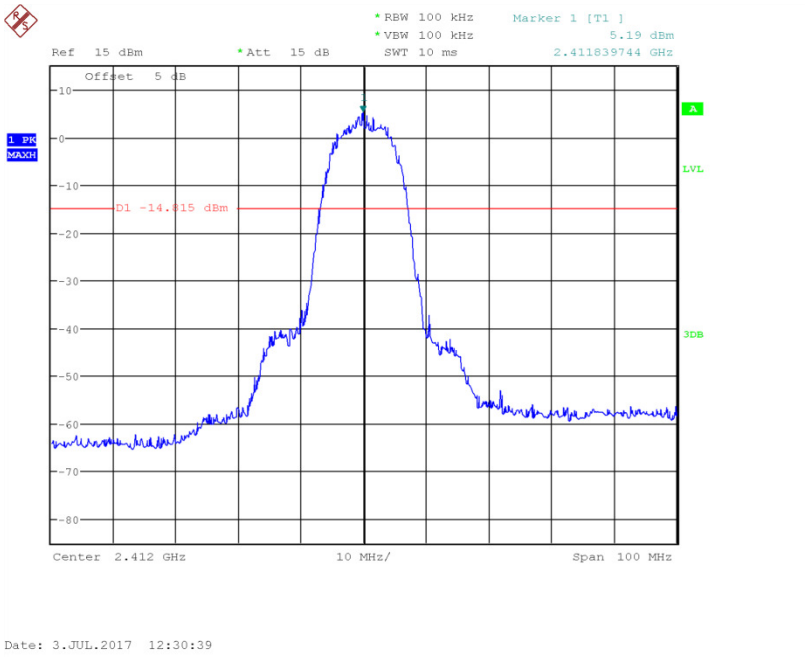


Fig.57 Conducted Spurious Emission (802.11b, Ch1)

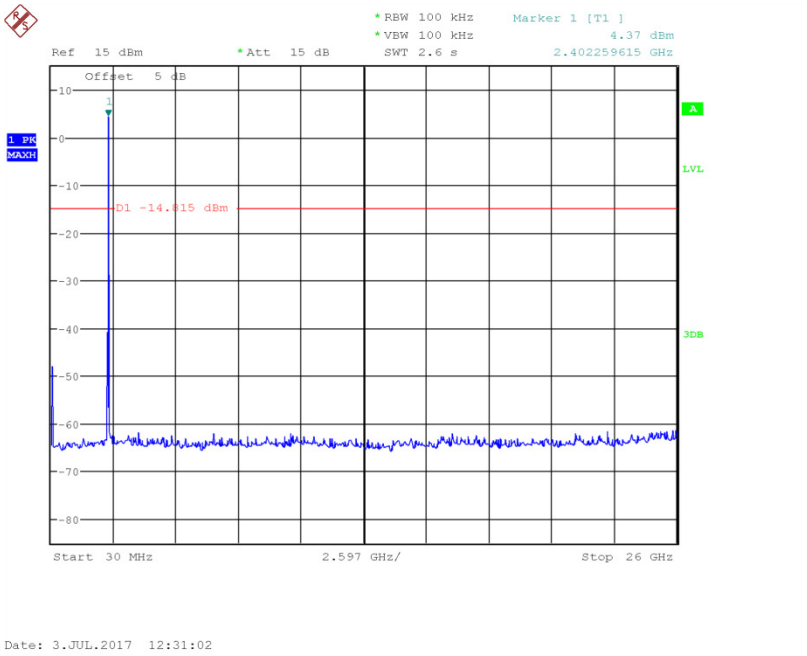


Fig.58 Conducted Spurious Emission (802.11b, Ch1, 30MHz~26GHz)

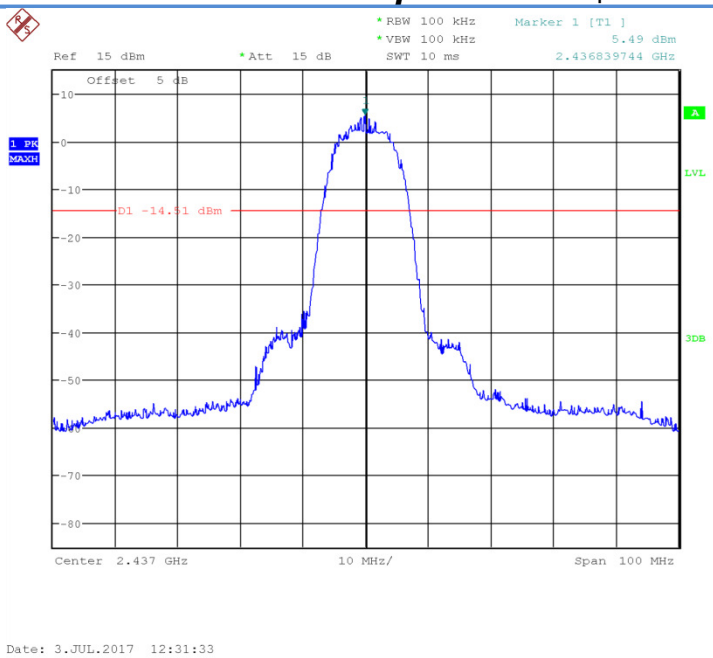


Fig.59 Conducted Spurious Emission (802.11b, Ch6)

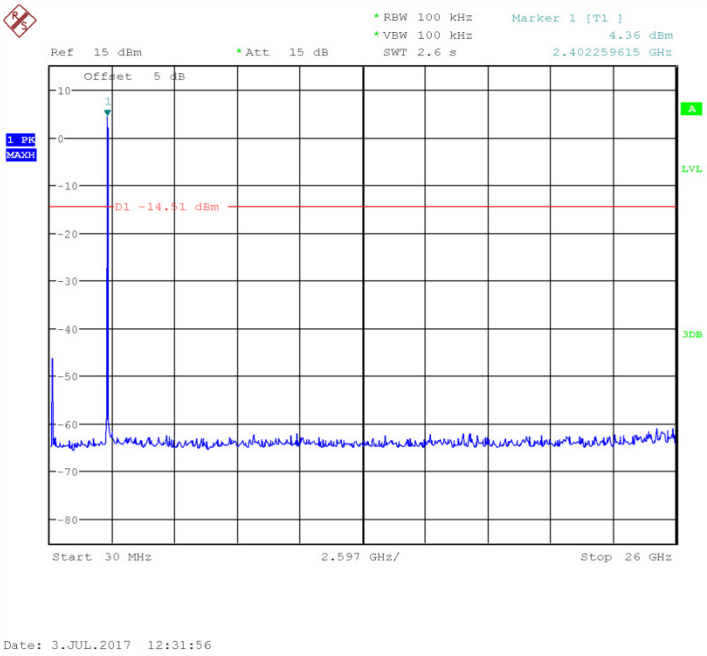


Fig.60 Conducted Spurious Emission (802.11b, Ch6, 30MHz~26GHz)

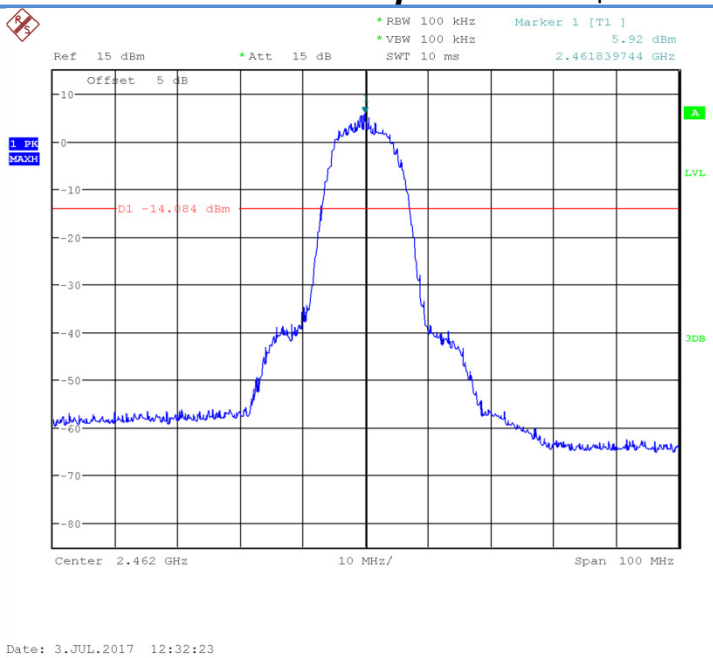


Fig.61 Conducted Spurious Emission (802.11b, Ch11)

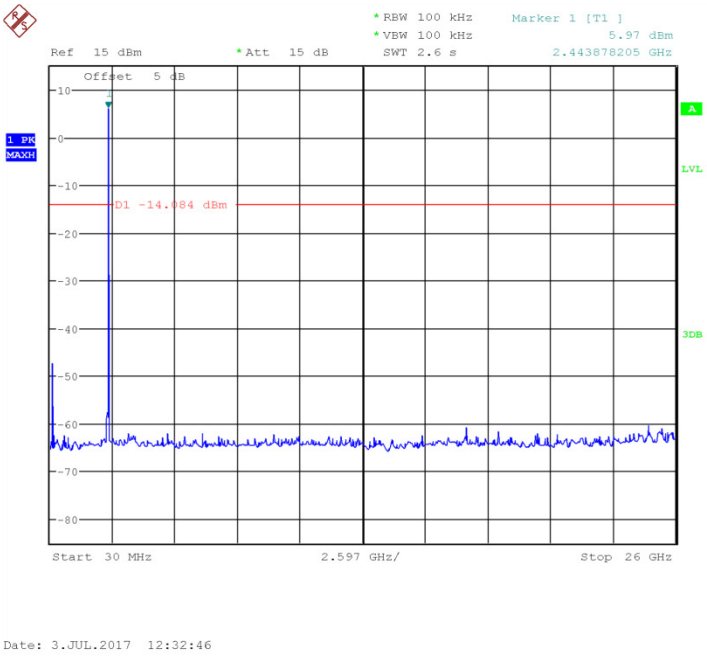


Fig.62 Conducted Spurious Emission (802.11b, Ch11, 30MHz~26GHz)

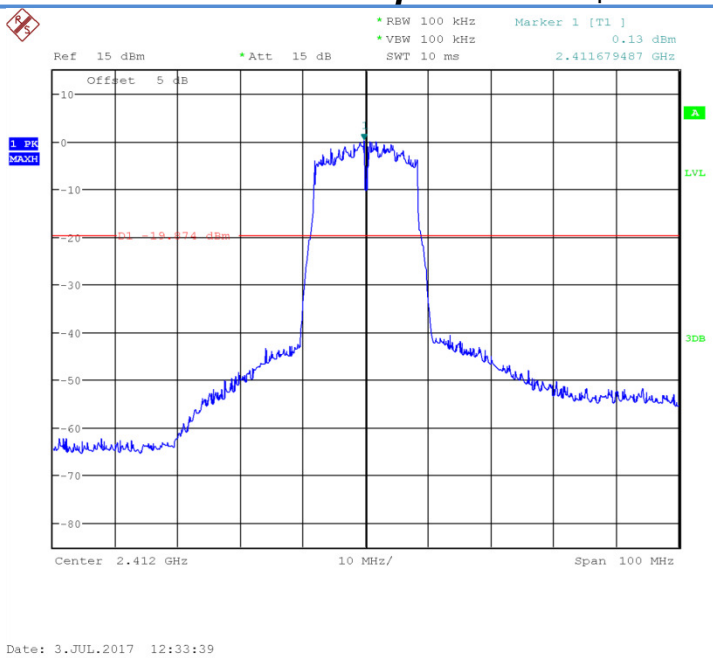


Fig.67 Conducted Spurious Emission (802.11g, Ch1)

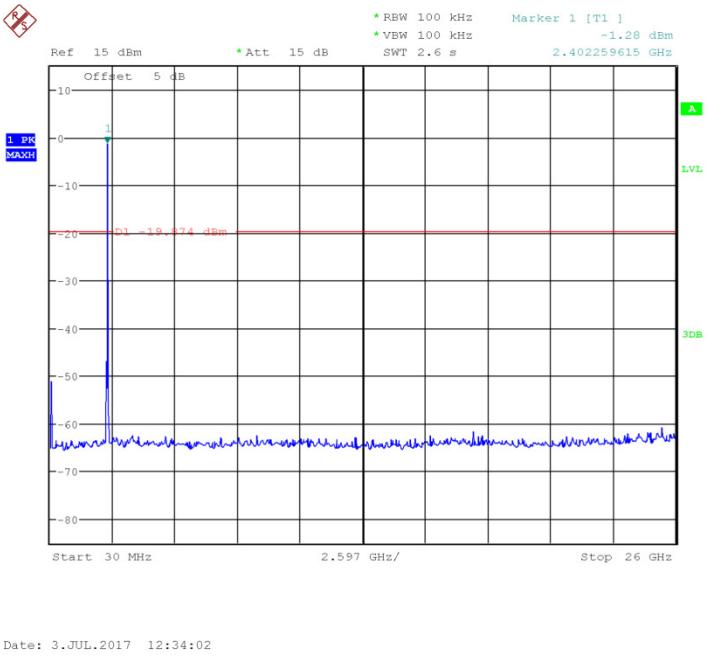


Fig.68 Conducted Spurious Emission (802.11g, Ch1, 30MHz~26GHz)

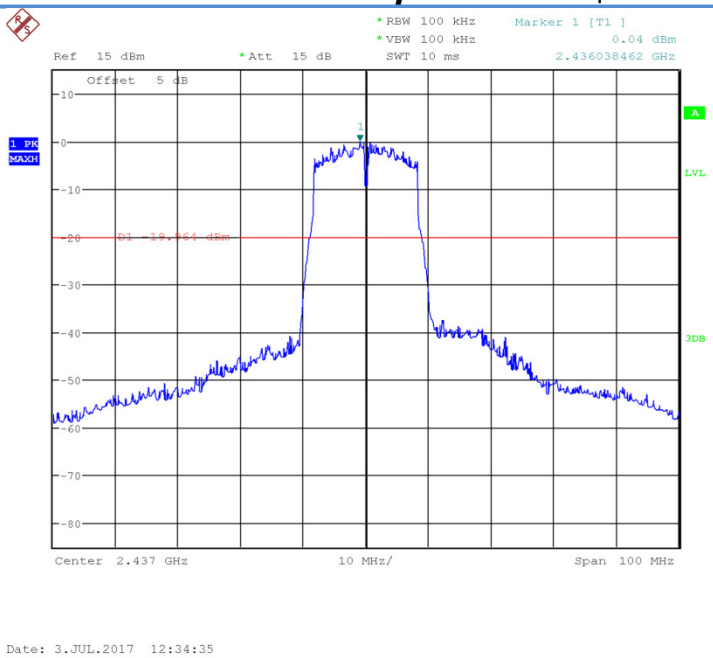


Fig.69 Conducted Spurious Emission (802.11g, Ch6)

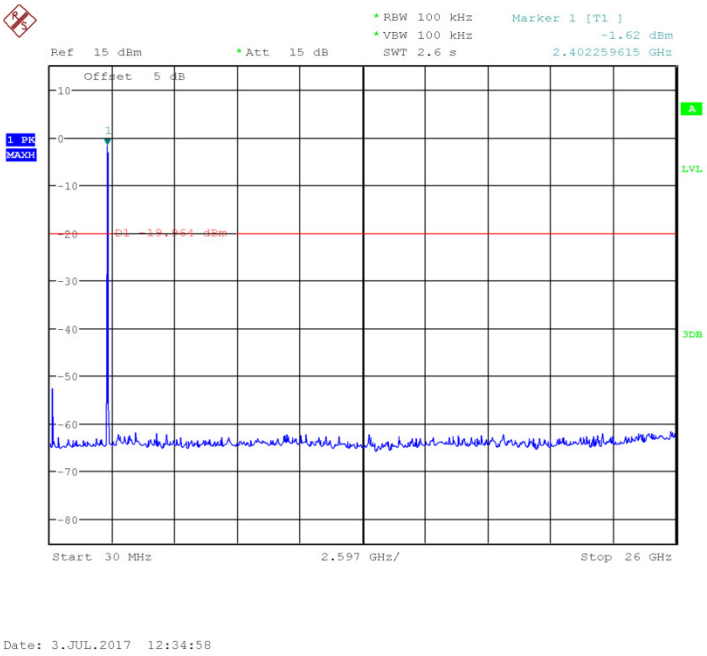


Fig.70 Conducted Spurious Emission (802.11g, Ch6, 30MHz~26GHz)

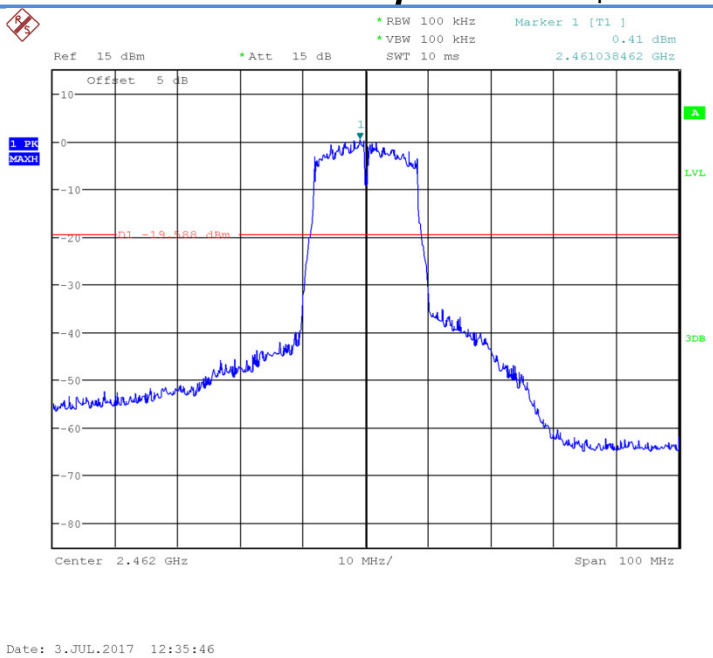


Fig.71 Conducted Spurious Emission (802.11g, Ch11)

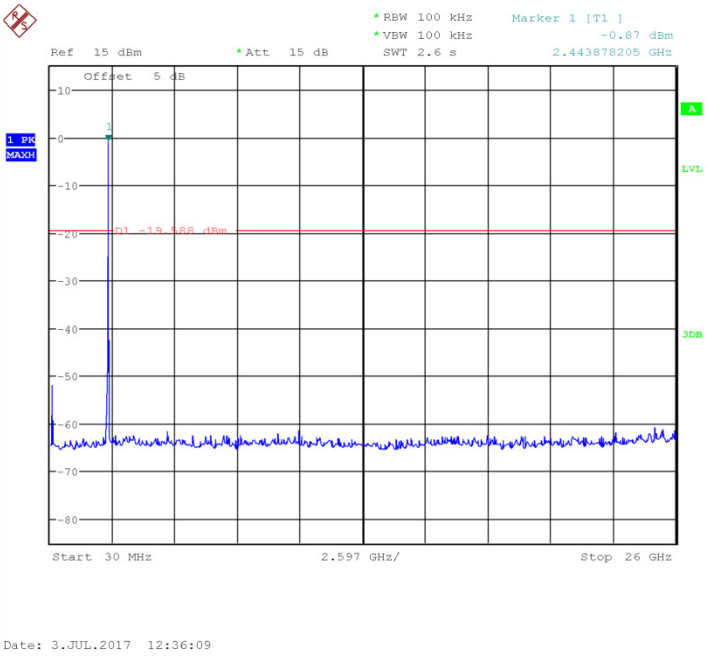


Fig.72 Conducted Spurious Emission (802.11g, Ch11, 30MHz~26GHz)

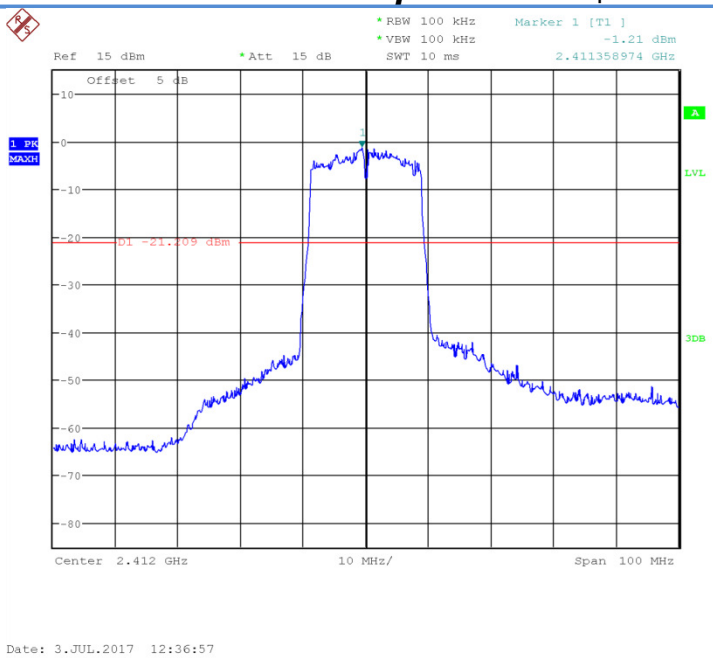


Fig.77 Conducted Spurious Emission (802.11n-20MHz, Ch1)

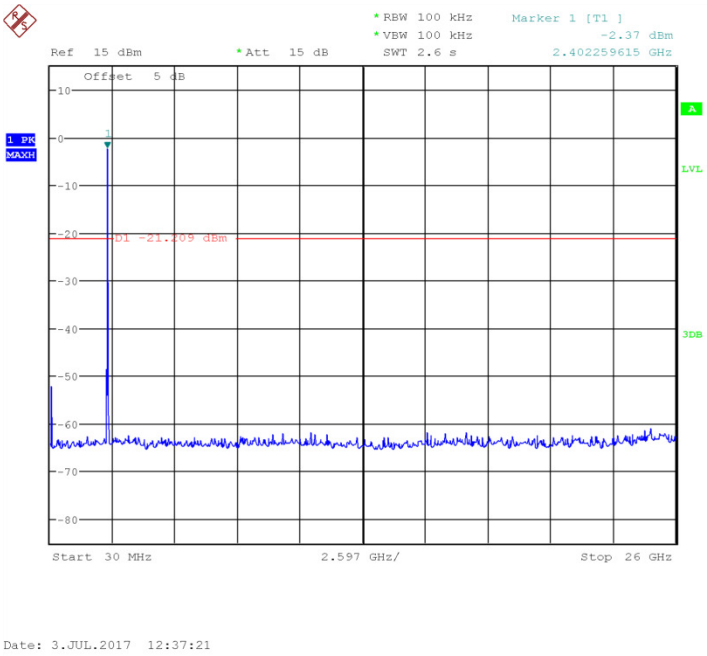


Fig.78 Conducted Spurious Emission (802.11n-20MHz, Ch1, 30MHz~26GHz)

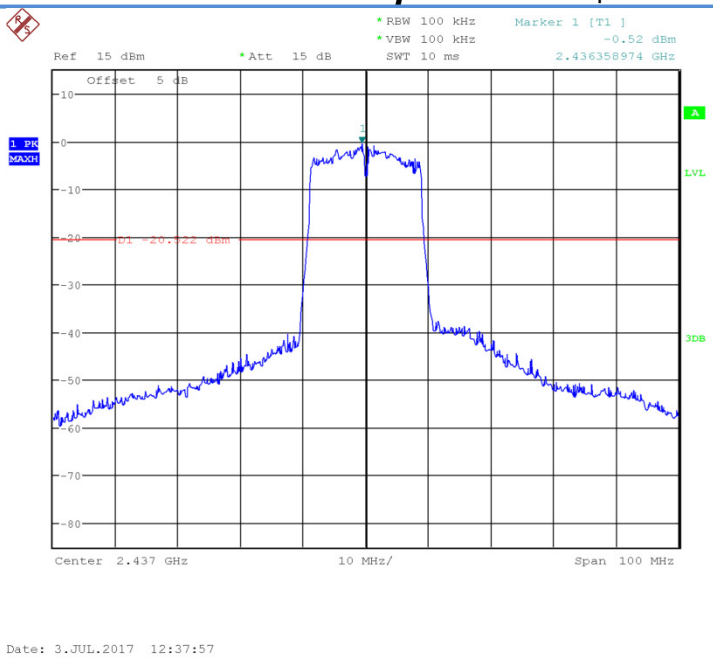


Fig.79 Conducted Spurious Emission (802.11n-20MHz, Ch6)

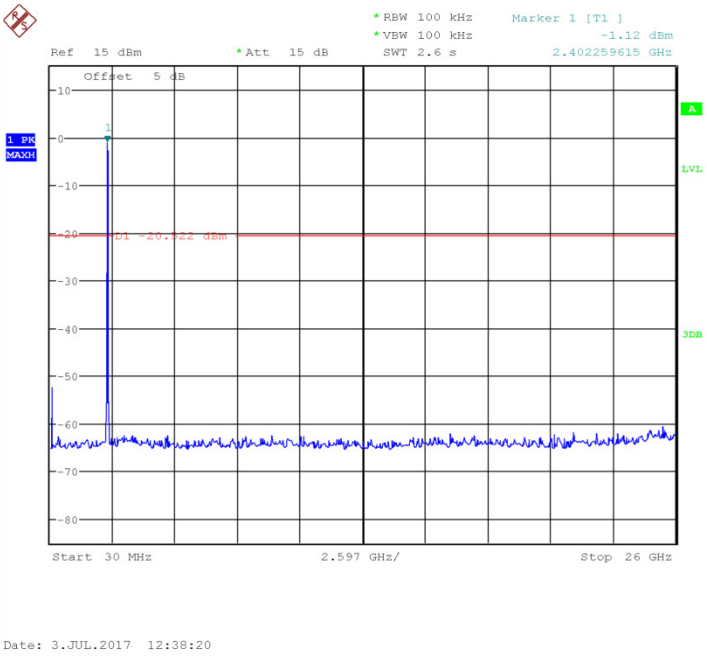


Fig.80 Conducted Spurious Emission (802.11n-20MHz, Ch6, 30MHz~26GHz)

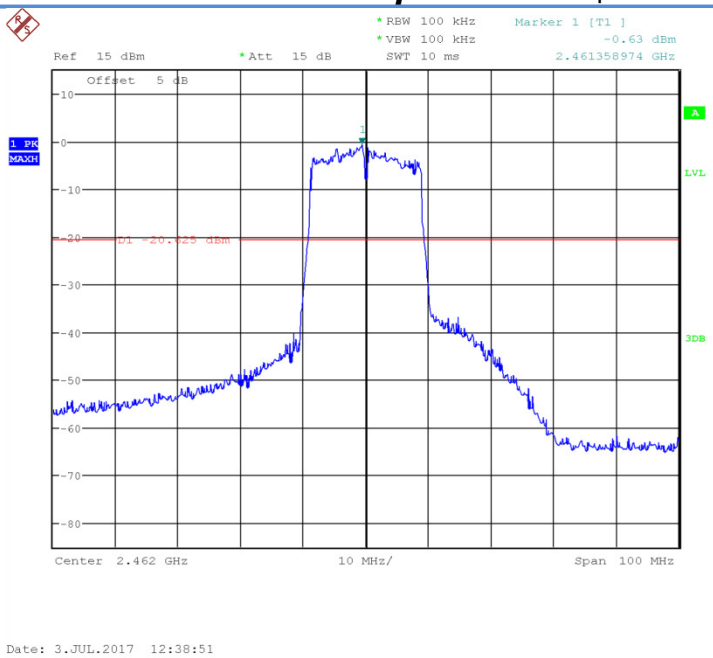


Fig.81 Conducted Spurious Emission (802.11n-20MHz, Ch11)

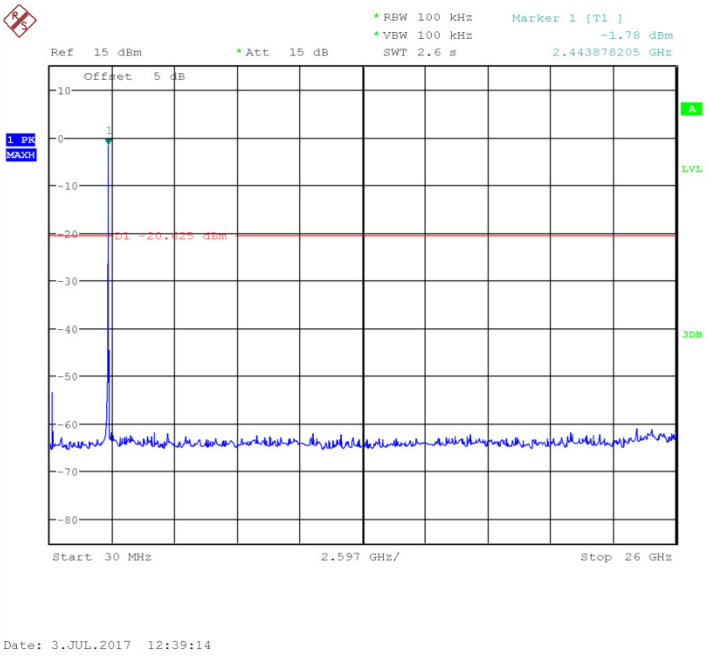


Fig.82 Conducted Spurious Emission (802.11n-20MHz, Ch11, 30MHz~26GHz)

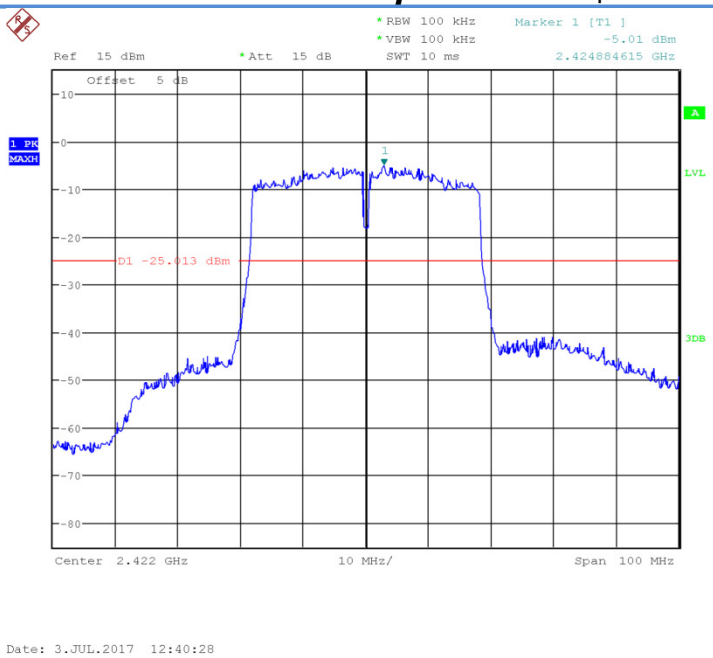


Fig.87 Conducted Spurious Emission (802.11n-40MHz, Ch3)

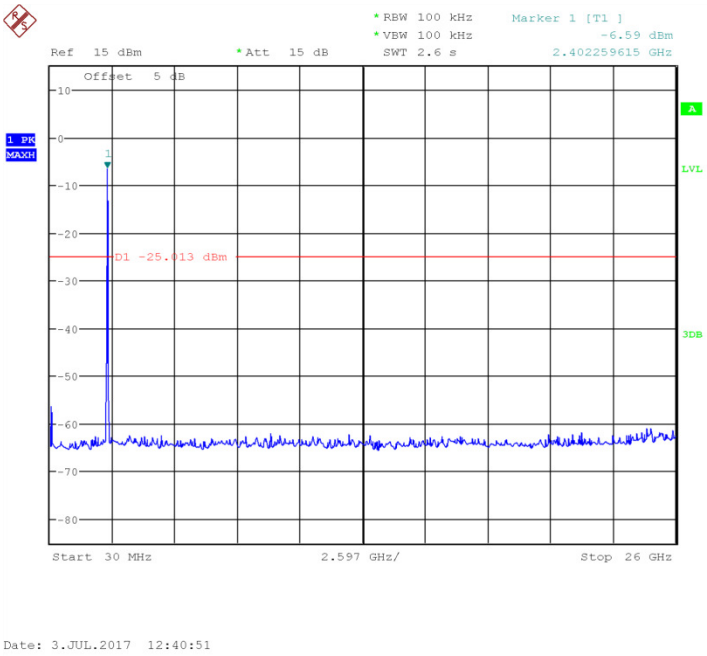


Fig.88 Conducted Spurious Emission (802.11n-40MHz, Ch3, 30MHz~26GHz)

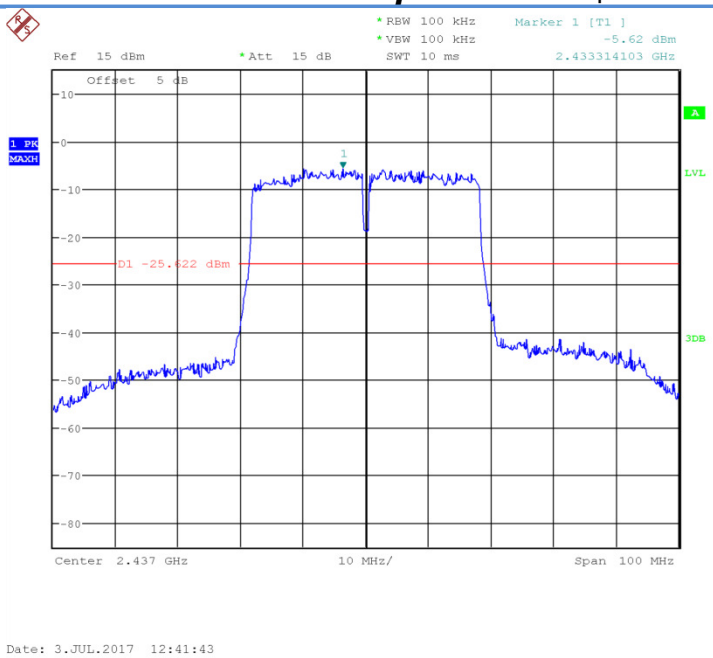


Fig.89 Conducted Spurious Emission (802.11n-40MHz, Ch6)

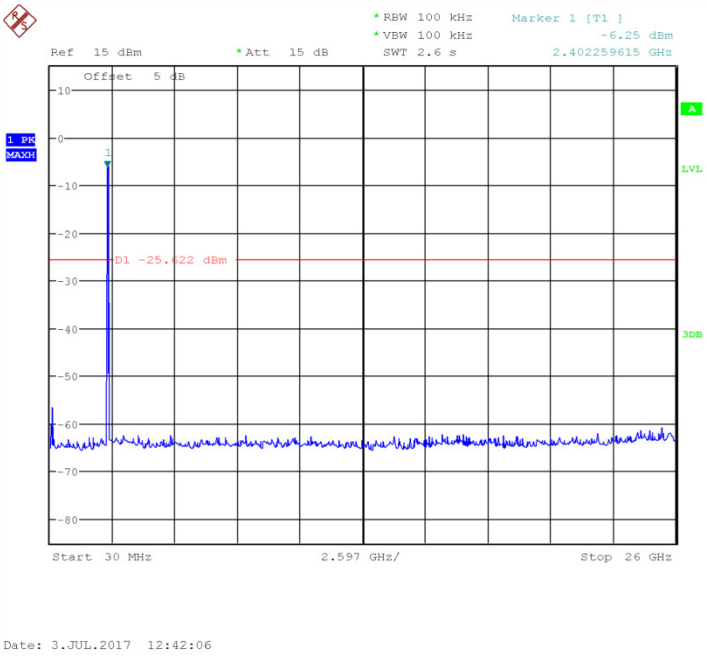


Fig.90 Conducted Spurious Emission (802.11n-40MHz, Ch6, 30MHz~26GHz)

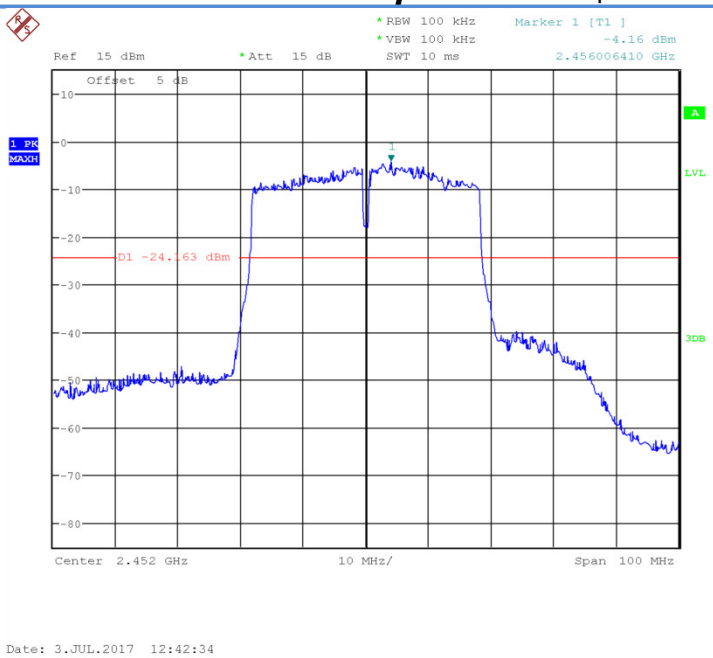


Fig.91 Conducted Spurious Emission (802.11n-40MHz, Ch9)

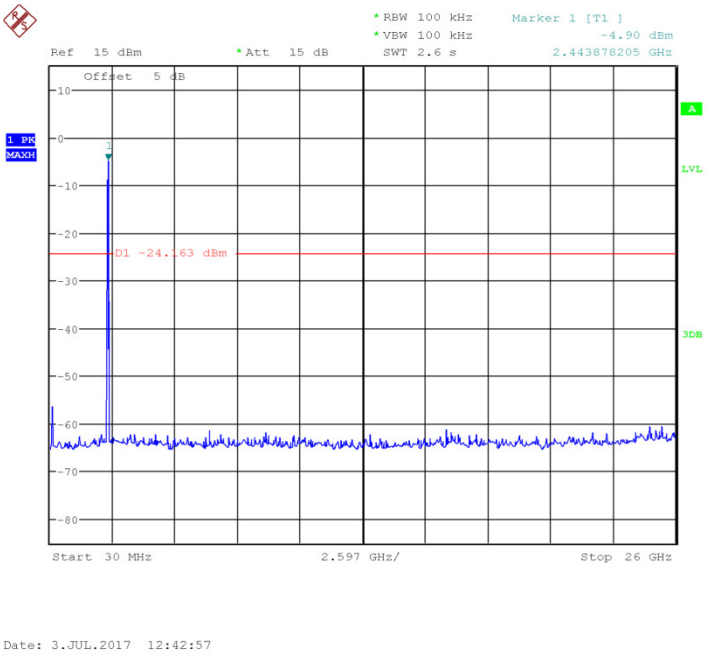


Fig.92 Conducted Spurious Emission (802.11n-40MHz, Ch9, 30MHz~26GHz)

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 65.	P
	Power	2.45GHz~2.5GHz	Fig 66.	P
	1	30MHz~1GHz	Fig 67.	P
		1GHz~3GHz	Fig 68.	P
		3GHz~18GHz	Fig 69.	P
802.11g	Power	2.38GHz~2.45GHz	Fig 70.	P
	Power	2.45GHz~2.5GHz	Fig 71.	P
	1	30MHz~1GHz	Fig 72.	P
		1GHz~3GHz	Fig 73.	P
		3GHz~18GHz	Fig 74.	P

802.11n mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n(20MHz)	Power	2.38GHz~2.45GHz	Fig 75.	P
	Power	2.45GHz~2.5GHz	Fig 76.	P
	1	30MHz~1GHz	Fig 77.	P
		1GHz~3GHz	Fig 78.	P
		3GHz~18GHz	Fig 79.	P
802.11n(40MHz)	Power	2.38GHz~2.45GHz	Fig 80.	P
	Power	2.45GHz~2.5GHz	Fig 81.	P
	3	30MHz~1GHz	Fig 82.	P
		1GHz~3GHz	Fig 83.	P
		3GHz~18GHz	Fig 84.	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

Ch11 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.89046	9.13	-26.6	35.73	V
60.9163	7.57	-24.6	32.17	V
246.680388	6.73	-22.7	29.43	V
313.381656	8.35	-20.6	28.95	H
369.171408	9.44	-18.9	28.34	V
927.227904	19.85	-8.6	28.45	H

Ch11 1GHz~3GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2760.062884	51.35	9.5	41.85	H
2802.479423	51.66	9.8	41.86	V
2849.748462	52.56	10.8	41.76	H
2882.305384	52.75	10.7	42.05	H
2911.877693	52.45	10.6	41.85	V
2985.470192	53.09	11	42.09	H

Ch11 3GHz~18GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
16091.5562	57.62	24.1	33.52	H
16483.82047	59.48	26.2	33.28	V
16824.47333	60	26.9	33.1	V

17281.81187	59.96	27.5	32.46	H
17534.19467	60.83	28.5	32.33	V
17689.00973	60.32	27.8	32.52	V

Ch11 3GHz~18GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
16091.5562	45.83	24.1	21.73	H
16483.82047	46.32	26.2	20.12	V
16824.47333	47.19	26.9	20.29	V
17281.81187	47.89	27.5	20.39	H
17534.19467	48.7	28.5	20.2	V
17689.00973	48.17	27.8	20.37	V

802.11g

Ch11 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.876712	9.15	-26.6	35.75	V
47.522024	7.26	-23.4	30.66	V
722.93944	16.14	-12.4	28.54	V
798.054024	17.38	-11	28.38	V
877.25104	18.79	-9.6	28.39	V
914.267592	19.4	-9	28.4	V

Ch11 1GHz~3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2592.965	51.51	8.7	42.81	H
2680.290192	51.4	9.4	42	H
2774.149038	51.8	9.6	42.2	H
2853.727692	52.68	10.8	41.88	H
2945.76673	52.58	10.5	42.08	H
2984.439615	52.77	11	41.77	H

Ch11 3GHz~18GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14901.00873	55.21	21.7	33.51	H
15348.9696	54.69	21.9	32.79	V
15770.1988	56.54	23.8	32.74	V
16524.97553	59.33	26.1	33.23	V
17307.52473	59.88	27.8	32.08	H
17612.2422	61.61	28.6	33.01	H

Ch11 3GHz~18GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14901.00873	43.52	21.7	21.82	H
15348.9696	43.02	21.9	21.12	V
15770.1988	44.61	23.8	20.81	V
16524.97553	46.48	26.1	20.38	V
17307.52473	47.94	27.8	20.14	H
17612.2422	48.91	28.6	20.31	H

802.11n-20MHz

Ch11 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.682328	6.88	-26.7	33.58	V
40.646692	10.55	-23.6	34.15	H
702.570544	15.73	-12.7	28.43	V
790.865684	17.26	-11.2	28.46	V
869.907696	18.58	-9.8	28.38	H
969.359292	19.93	-8.4	28.33	H

Ch11 1GHz~3GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2632.681923	51.26	9.2	42.06	H

2685.93	51.79	9.4	42.39	V
2745.176346	52.19	9.4	42.79	H
2844.704808	52.34	10.7	41.64	V
2897.455577	53.03	10.7	42.33	H
2930.904423	52.33	10.6	41.73	V

Ch11 3GHz~18GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14308.88867	53.93	20.1	33.83	H
15417.6096	55.77	22.6	33.17	H
16212.64333	57.83	25	32.83	V
16839.489	60.39	26.9	33.49	V
17577.97133	60.53	28.7	31.83	H
17898.31867	61.52	28.7	32.82	H

Ch11 3GHz~18GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
15417.6096	43.64	22.6	21.04	H
16212.64333	45.74	25	20.74	V
16839.489	47.59	26.9	20.69	V
17577.97133	49.01	28.7	20.31	H
17898.31867	49.04	28.7	20.34	H

802.11n-40MHz

Ch9 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.62158	6.89	-26.7	33.59	V
687.358096	15.87	-12.7	28.57	V
766.76988	16.66	-11.6	28.26	H
854.980452	18.48	-10.1	28.58	H
948.078164	19.65	-8.8	28.45	V

996.447272	20.58	-8	28.58	V

Ch9 1GHz~3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2587.764808	50.46	8.6	41.86	H
2684.204615	53.03	9.4	43.63	H
2764.86173	51.42	9.5	41.92	H
2828.031539	52.8	10.3	42.5	V
2963.564039	53.5	10.7	42.8	H
2990.146154	53.51	11.1	42.41	V

Ch9 3GHz~18GHz(Peak)

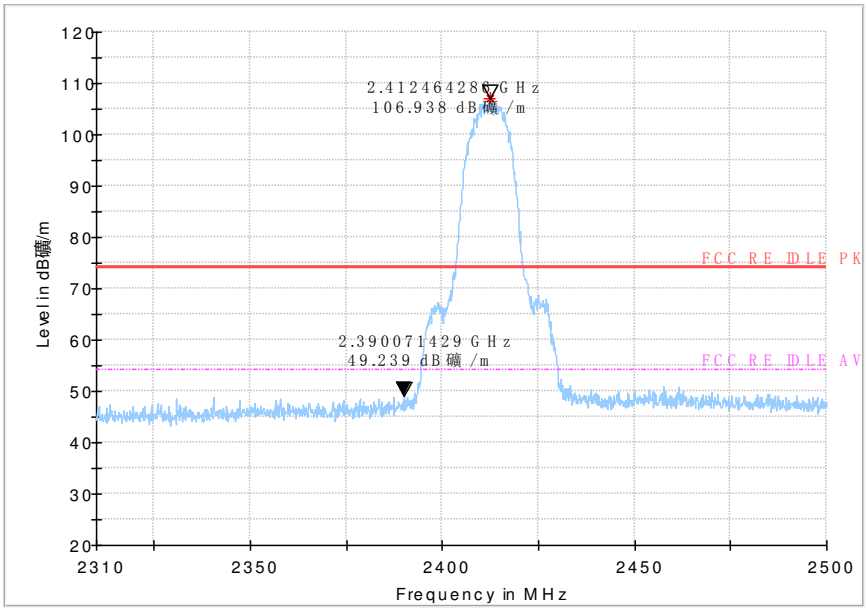
Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14936.59553	55.42	21.5	33.92	H
15595.937	56.53	22.3	34.23	H
16194.9792	58.91	25	33.91	H
16492.72	58.78	26.3	32.48	H
16825.83647	59.09	26.9	32.19	V
17591.31407	60.71	28.7	32.01	V

Ch9 3GHz~18GHz(Average)

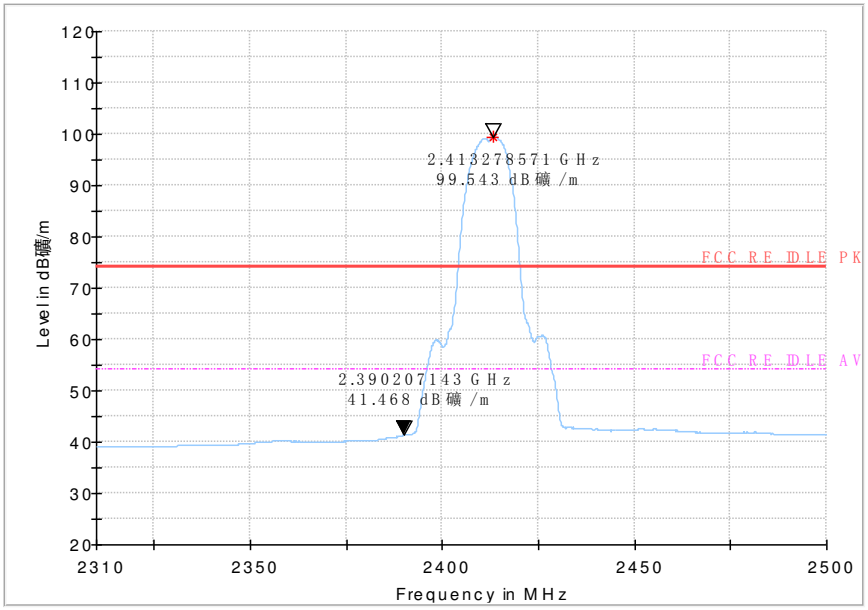
Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14936.59553	43.14	21.5	21.64	H
15595.937	43.92	22.3	21.62	H
16194.9792	45.89	25	20.89	H
16492.72	46.55	26.3	20.25	H
16825.83647	47.17	26.9	20.27	V
17591.31407	48.87	28.7	20.17	V

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

Test graphs as below:

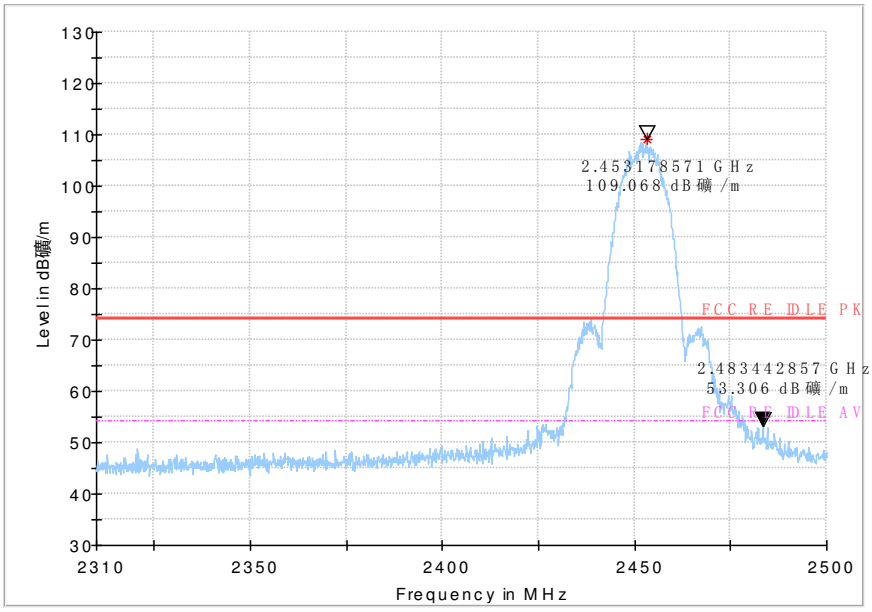


Peak detector

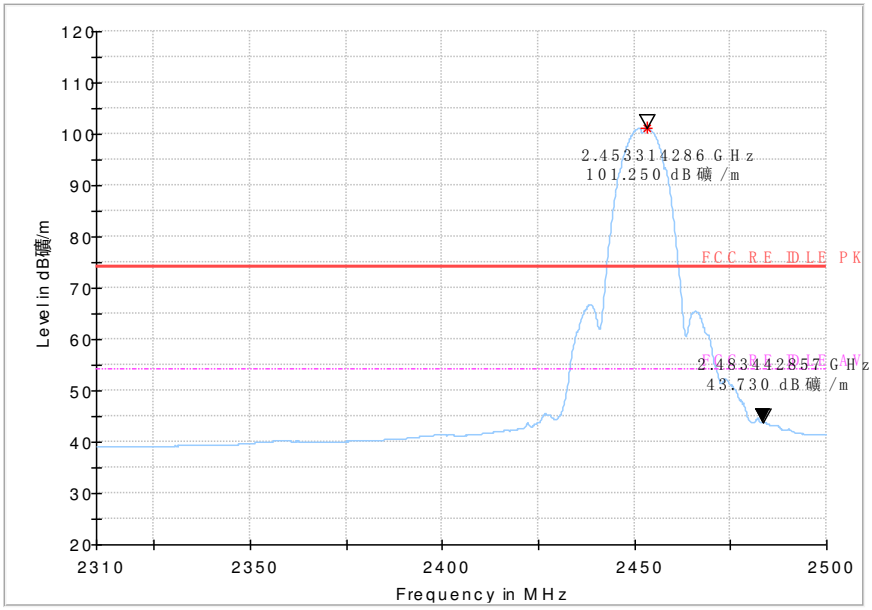


AV detector

Fig.97 Radiated emission (Power): 802.11b, low channel



Peak detector



AV detector

Fig.98 Radiated emission (Power): 802.11b, high channel

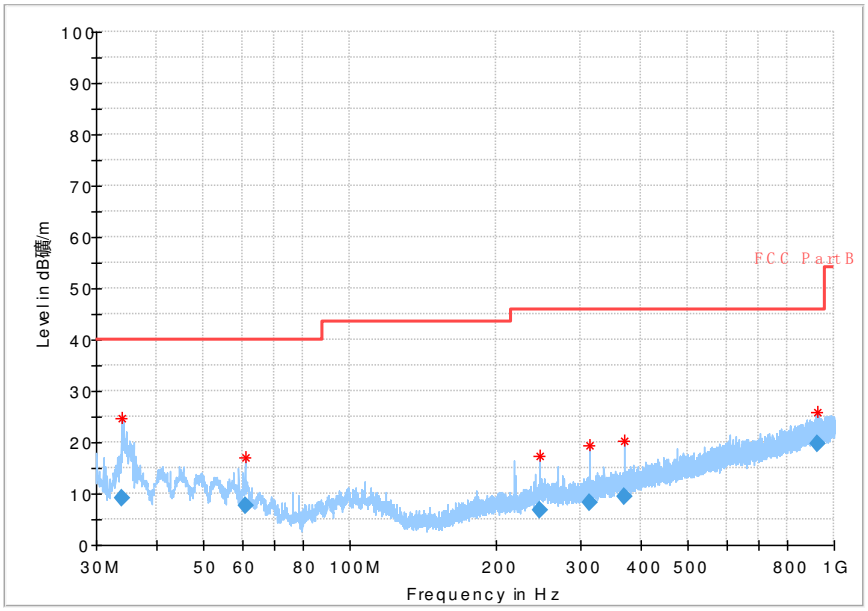


Fig.99 Radiated Spurious Emission (802.11b,Ch11,30MHz~1GHz)

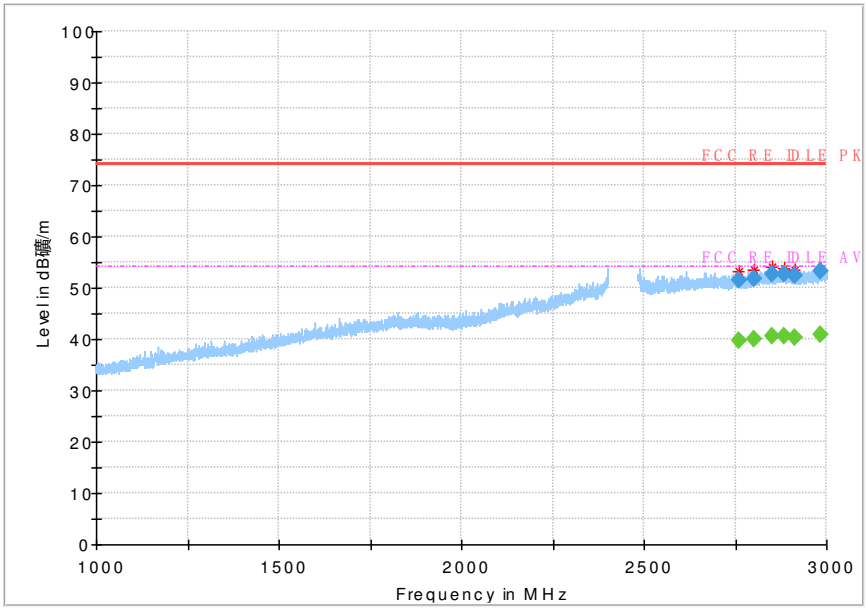


Fig.100 Radiated Spurious Emission (802.11b,Ch11,1GHz~3GHz)

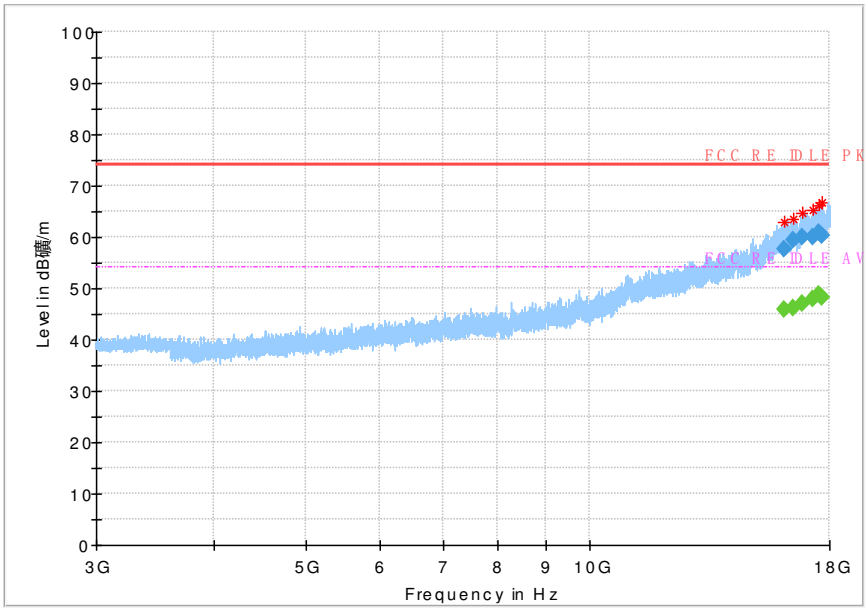
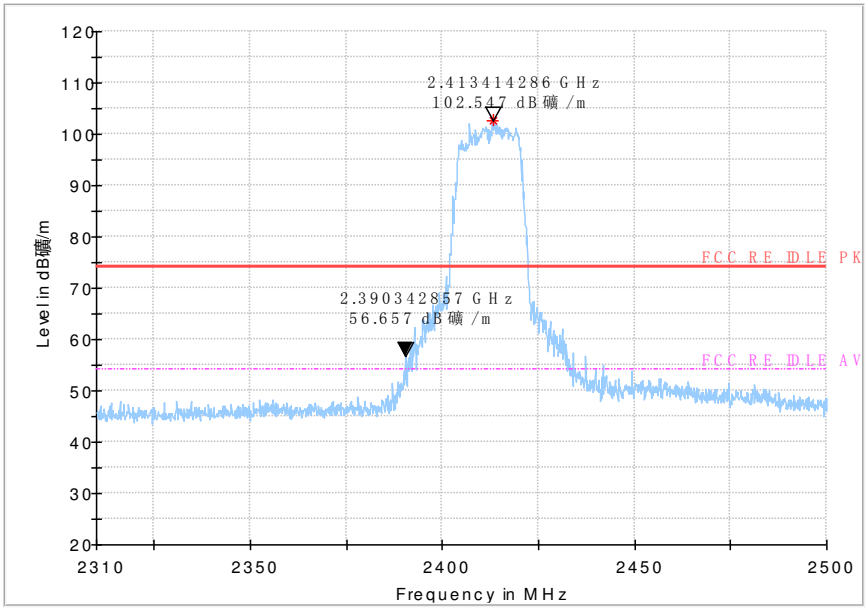
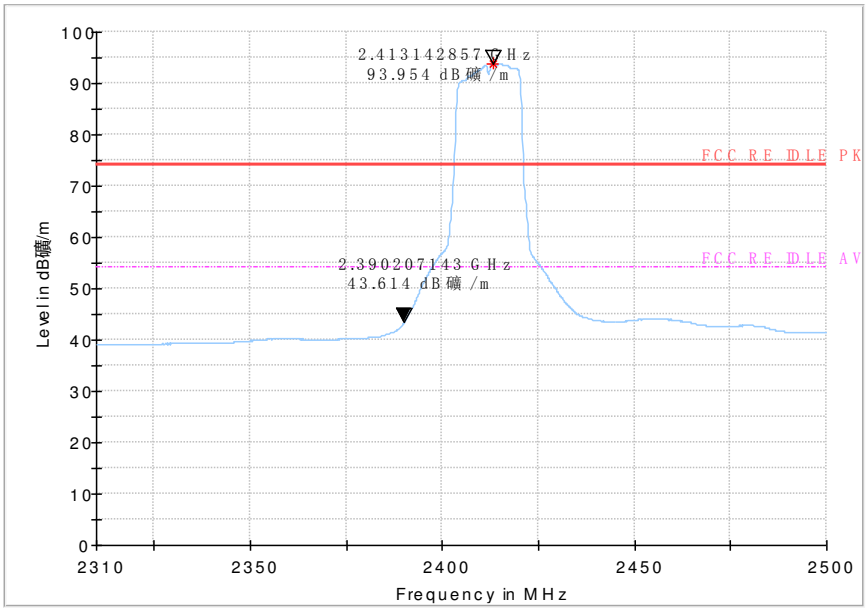


Fig.101 Radiated Spurious Emission (802.11b,Ch11,3GHz~18GHz)

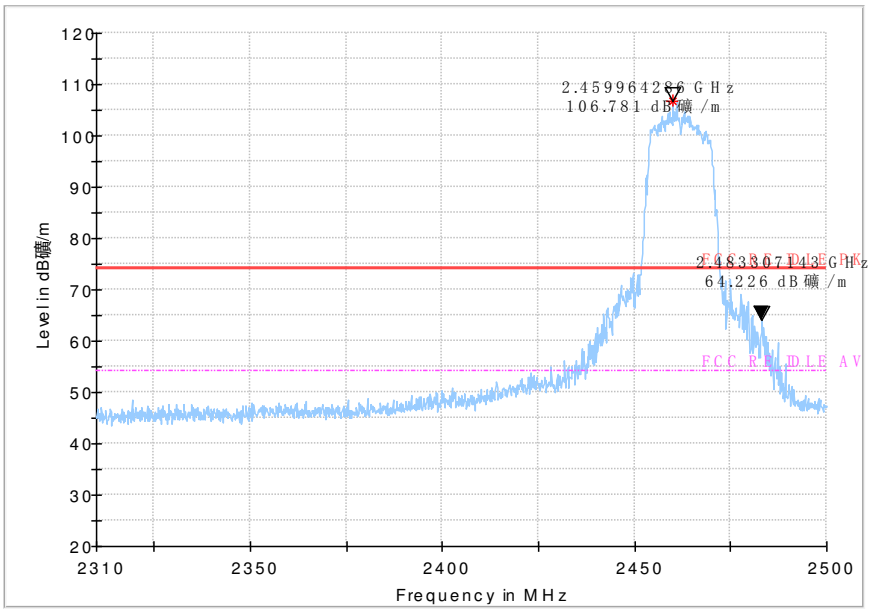


Peak detector

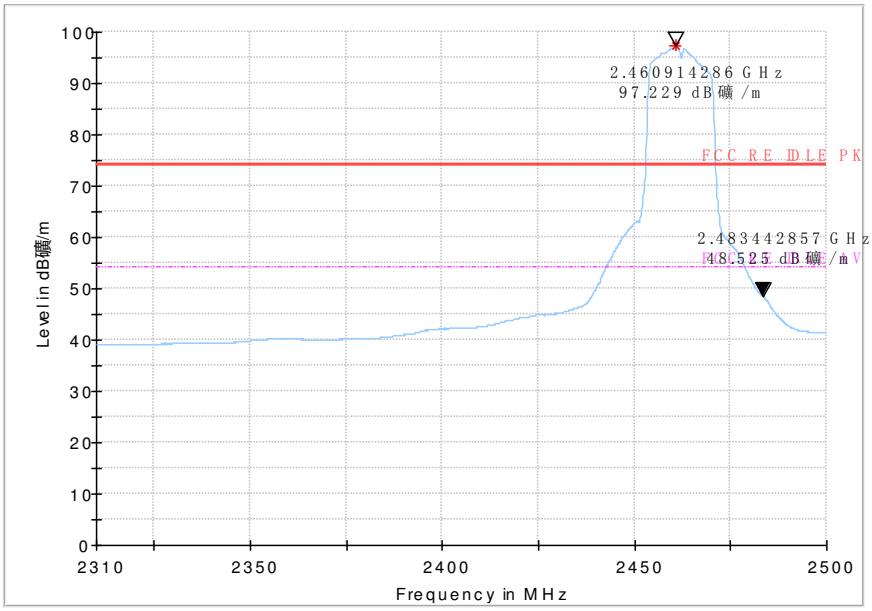


AV detector

Fig.102 Radiated emission (Power): 802.11g, low channel



Peak detector



AV detector

Fig.103 Radiated emission (Power): 802.11g, high channel

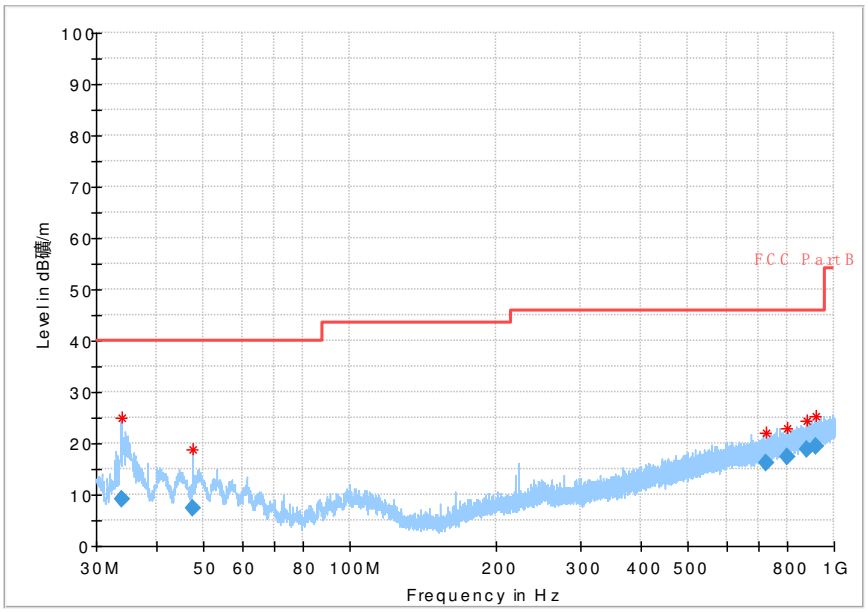


Fig.104 Radiated Spurious Emission (802.11g,Ch11,30MHz~1GHz)

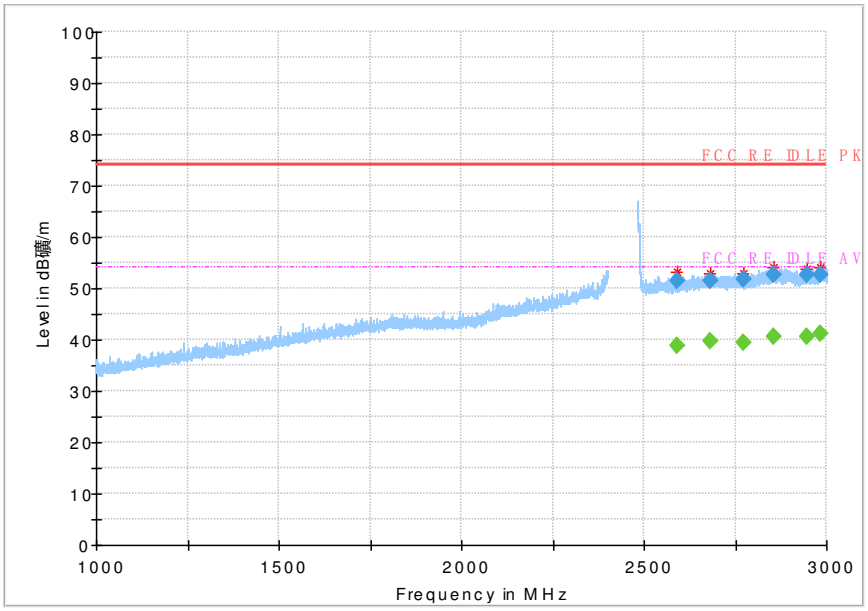


Fig.105 Radiated Spurious Emission (802.11g,Ch11,1GHz~3GHz)

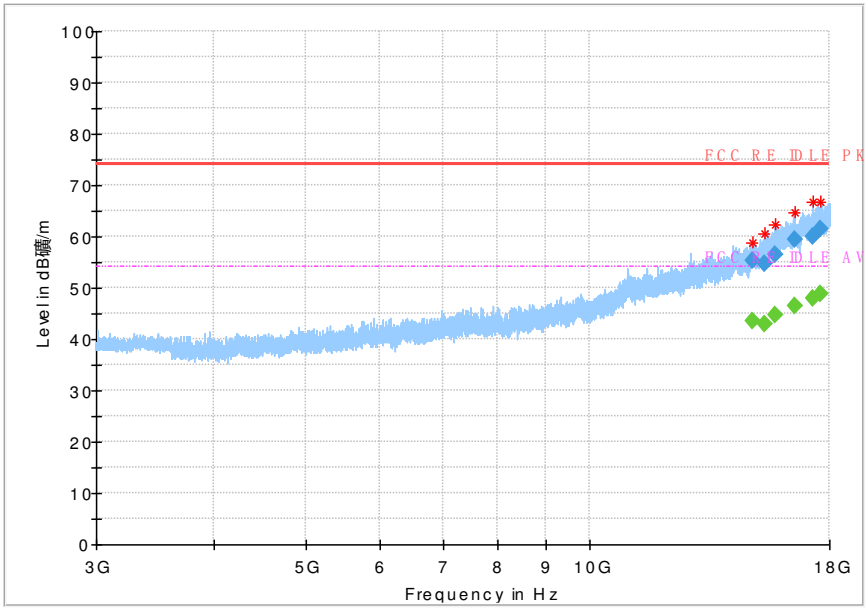
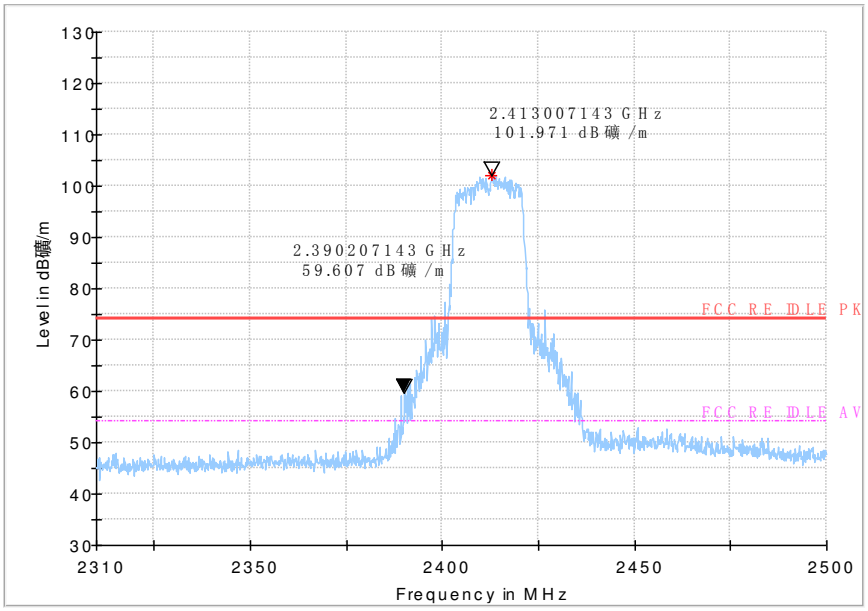
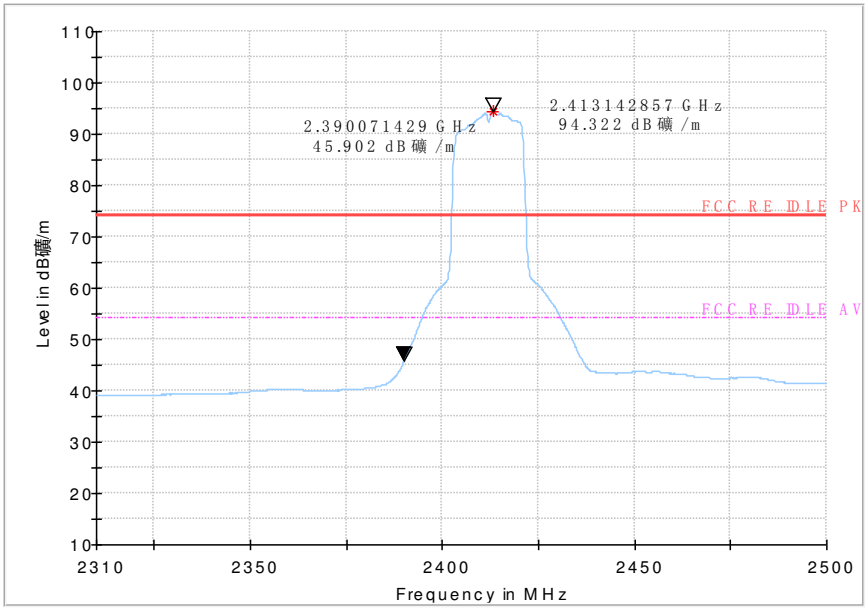


Fig.106 Radiated Spurious Emission (802.11g,Ch11,3GHz~18GHz)

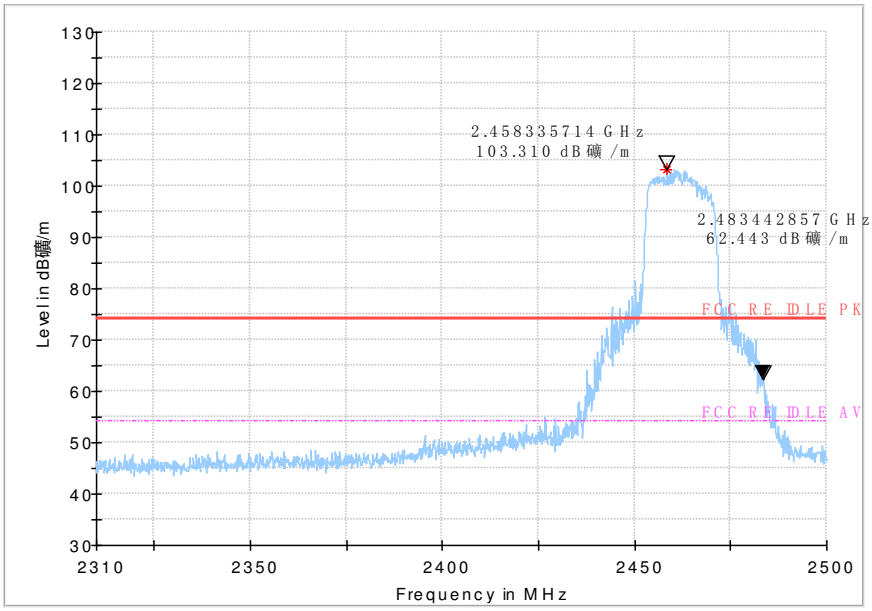


Peak detector

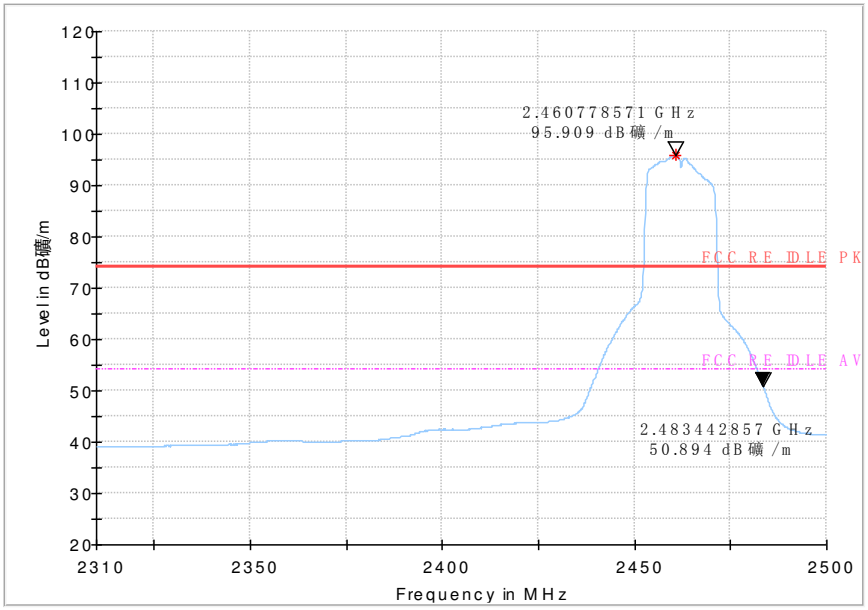


AV detector

Fig.107 Radiated emission (Power): 802.11n, low channel



Peak detector



AV detector

Fig.108 Radiated emission (Power): 802.11n, high channel

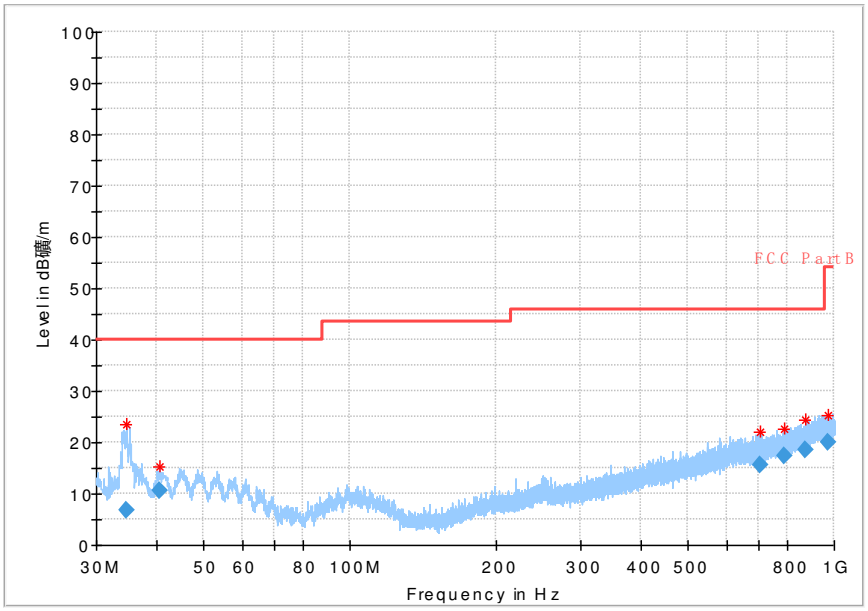


Fig.109 Radiated Spurious Emission (802.11 n-20MHz,Ch11,30MHz~1GHz)

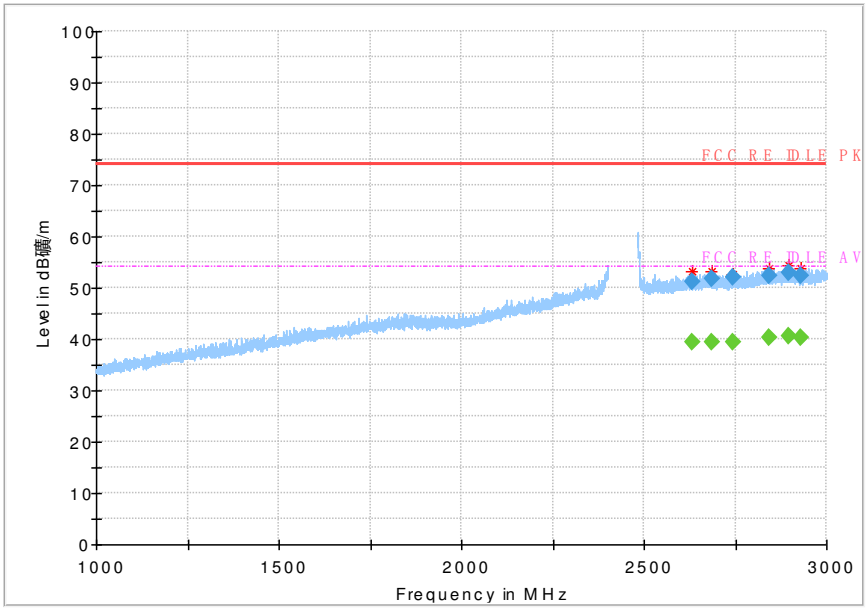


Fig.110 Radiated Spurious Emission (802.11 n-20MHz,Ch11,1GHz~3GHz)

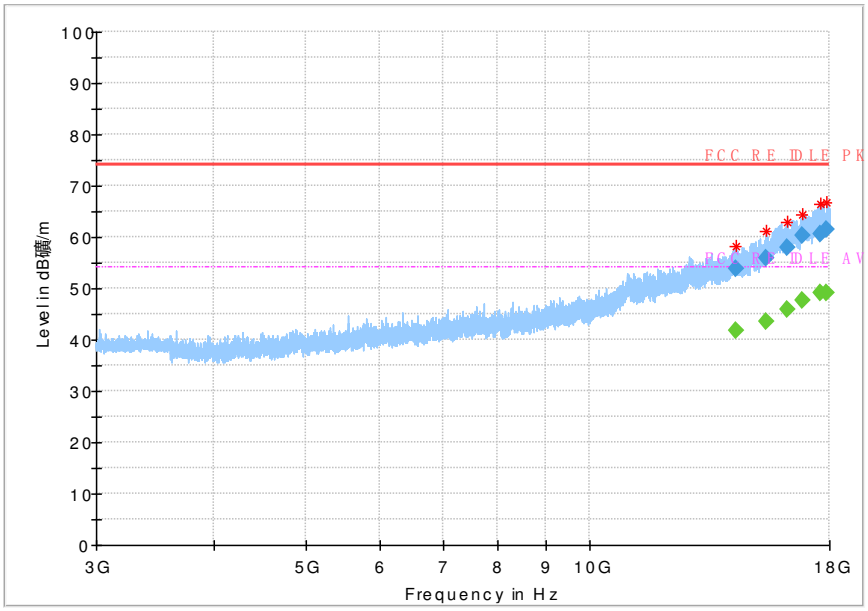
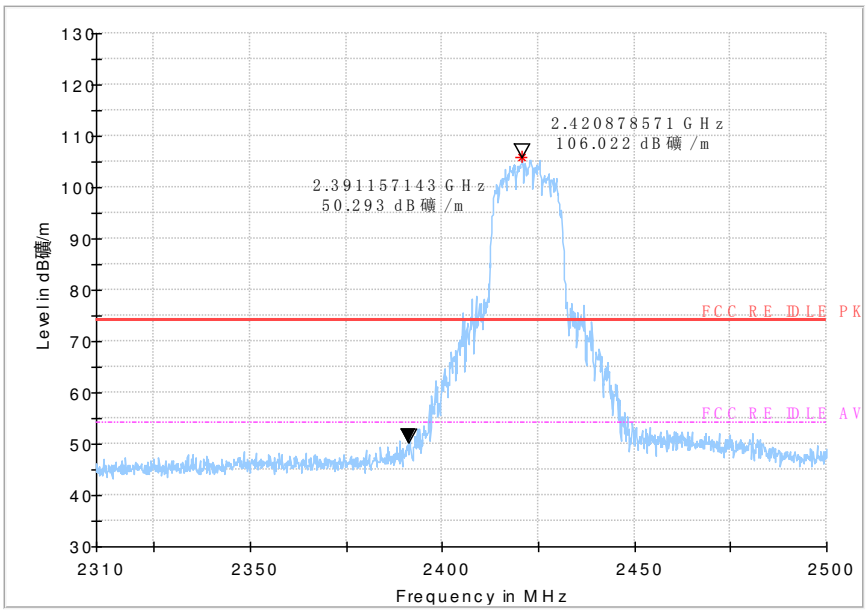
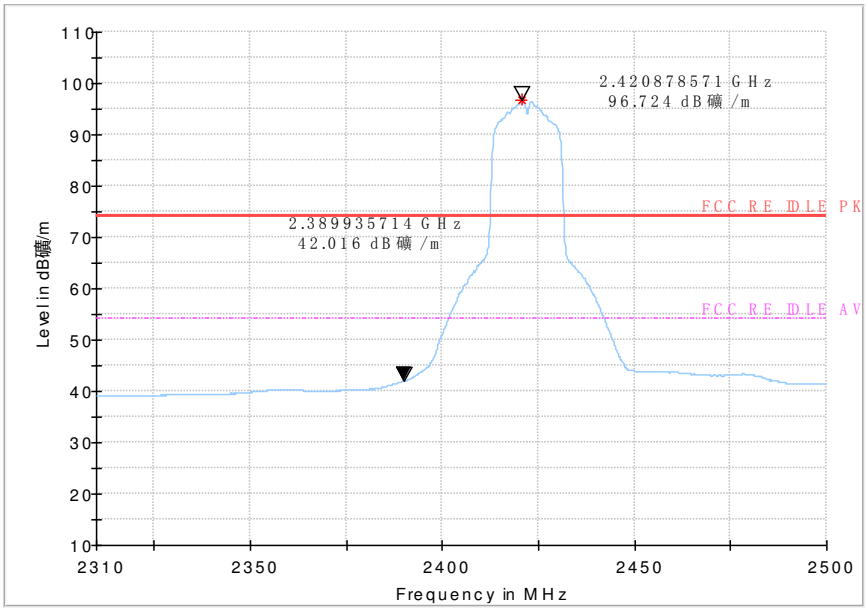


Fig.111 Radiated Spurious Emission (802.11 n-20MHz,Ch11,3GHz~18GHz)

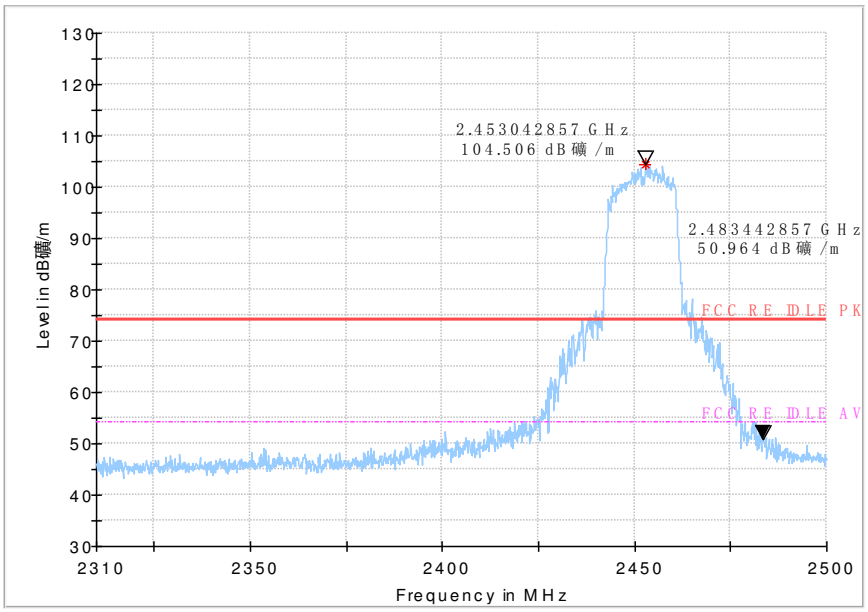


Peak detector

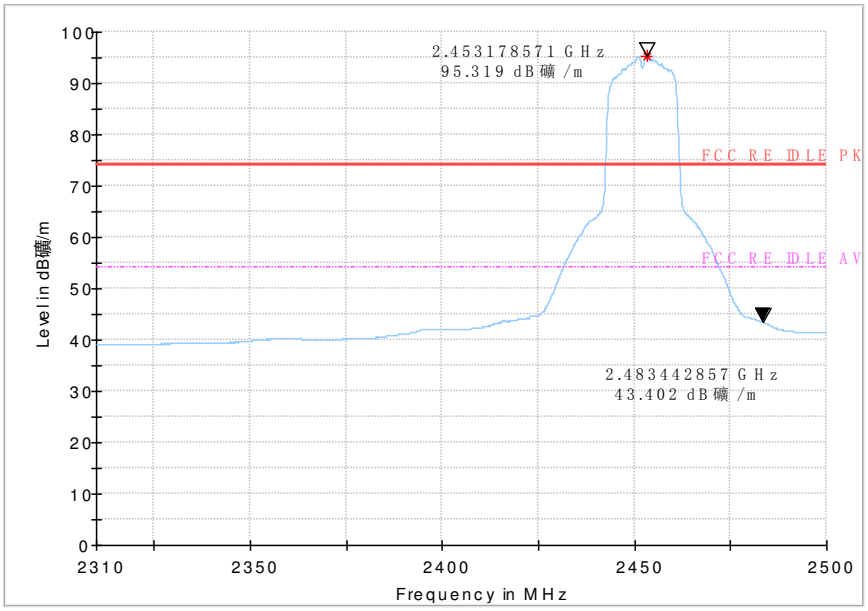


Average detector

Fig.112 Radiated emission (Power): 802.11n（40M）, low channel



Peak detector



Average detector

Fig.113 Radiated emission (Power): 802.11n（40M）, high channel

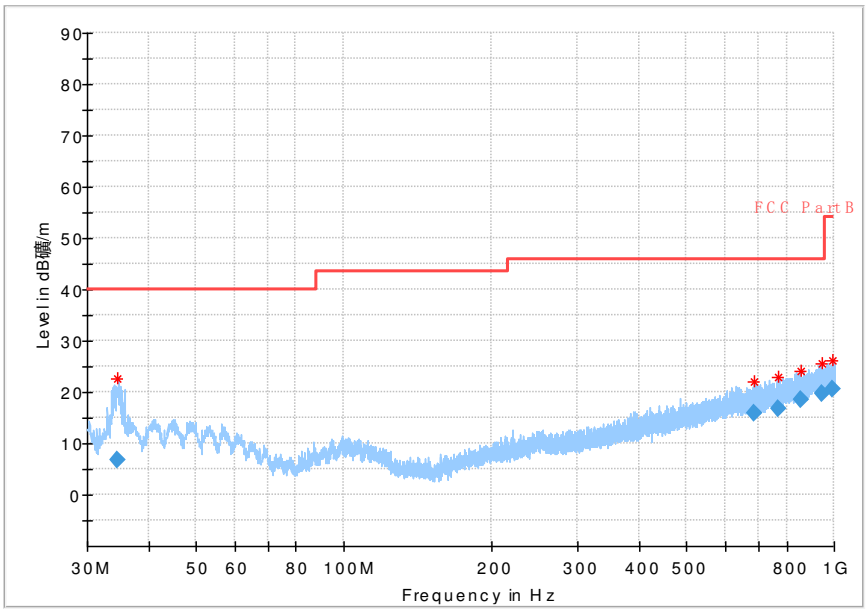


Fig.114 Radiated Spurious Emission (802.11 n-40MHz,Ch3,30MHz~1GHz)

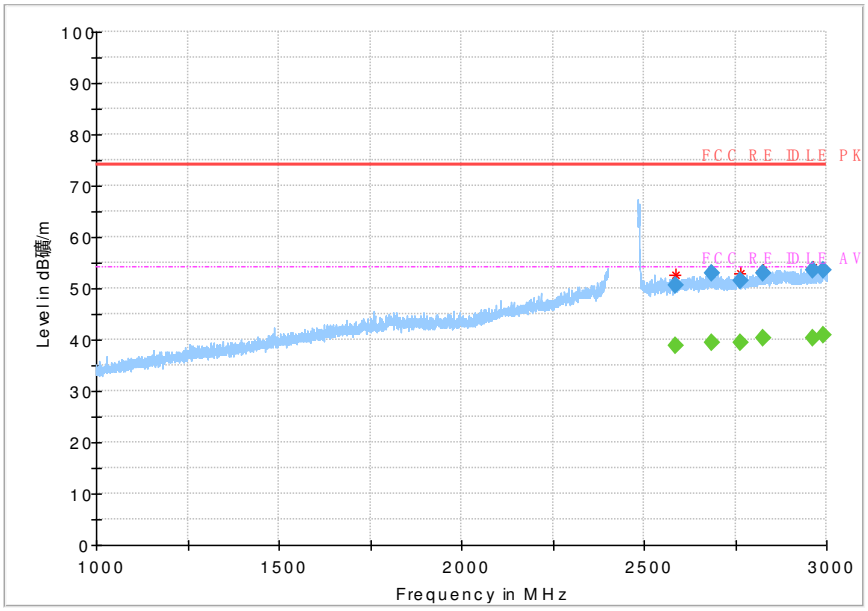


Fig.115 Radiated Spurious Emission (802.11 n-40MHz,Ch3,1GHz~3GHz)

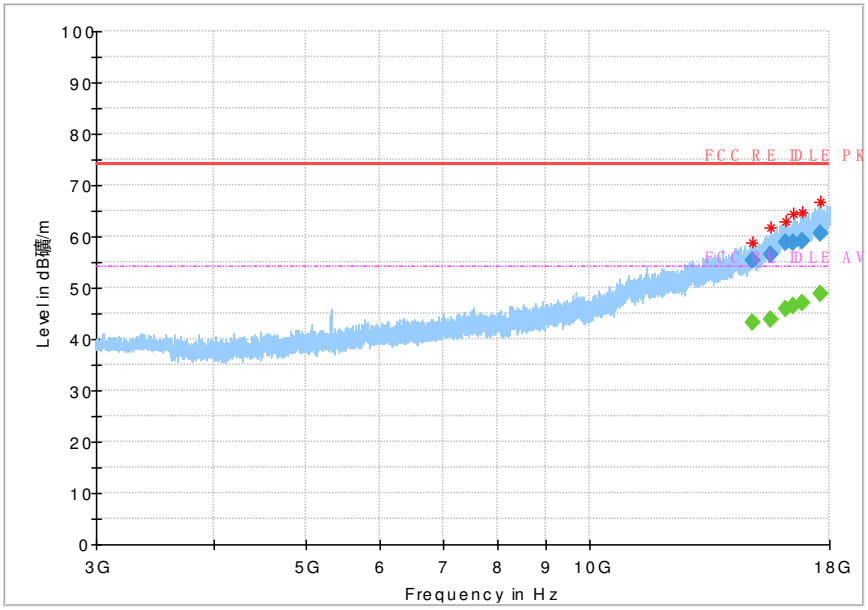
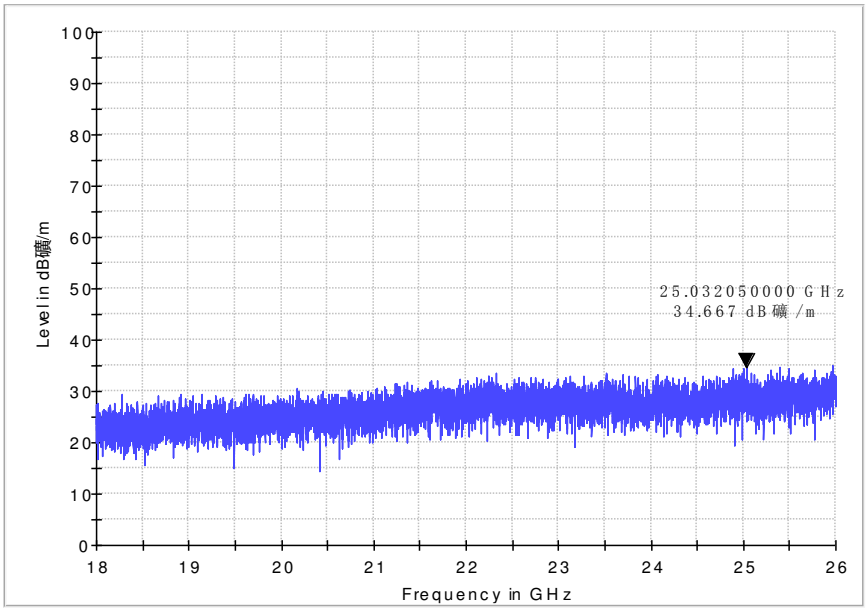


Fig.116 Radiated Spurious Emission (802.11 n-40MHz,Ch3,3GHz~18GHz)



All Channel

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)

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 158.	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

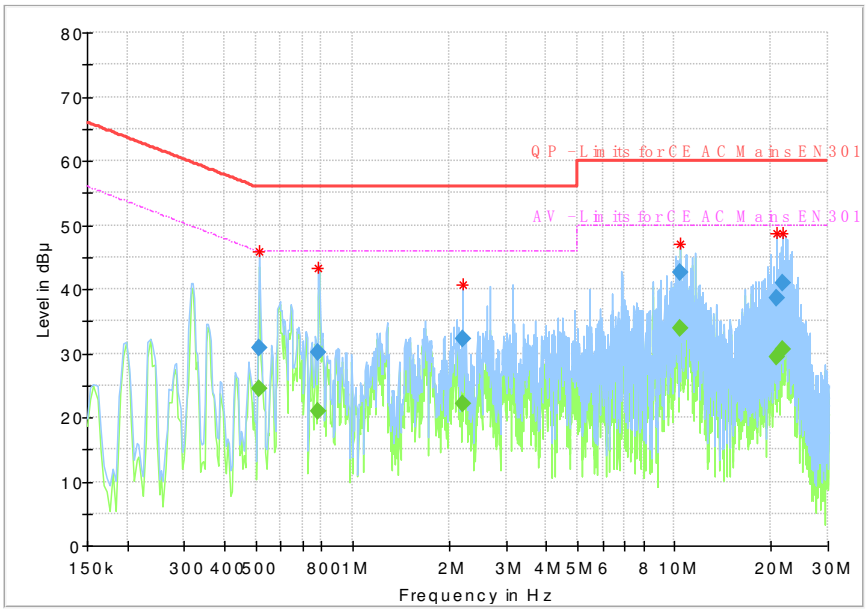


Fig.158 AC Powerline Conducted Emission

Frequency (MHz)	QuasiPeak (dB μ V)	Average (dB μ V)	Limit (dB μ	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.515662	---	24.52	46.00	21.48	1000.0	9.000	L1	ON	9.6
0.515662	30.71	---	56.00	25.29	1000.0	9.000	L1	ON	9.6
0.784312	---	20.97	46.00	25.03	1000.0	9.000	L1	ON	9.7
0.784312	30.15	---	56.00	25.85	1000.0	9.000	L1	ON	9.7
2.202188	32.20	---	56.00	23.80	1000.0	9.000	N	ON	9.7
2.202188	---	22.15	46.00	23.85	1000.0	9.000	N	ON	9.7
10.437056	42.54	---	60.00	17.46	1000.0	9.000	L1	ON	9.8
10.437056	---	33.80	50.00	16.20	1000.0	9.000	L1	ON	9.8
20.847244	---	29.49	50.00	20.51	1000.0	9.000	N	ON	10.0
20.847244	38.59	---	60.00	21.41	1000.0	9.000	N	ON	10.0
21.649462	---	30.59	50.00	19.41	1000.0	9.000	N	ON	10.0
21.649462	41.04	---	60.00	18.96	1000.0	9.000	N	ON	10.0

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 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.

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