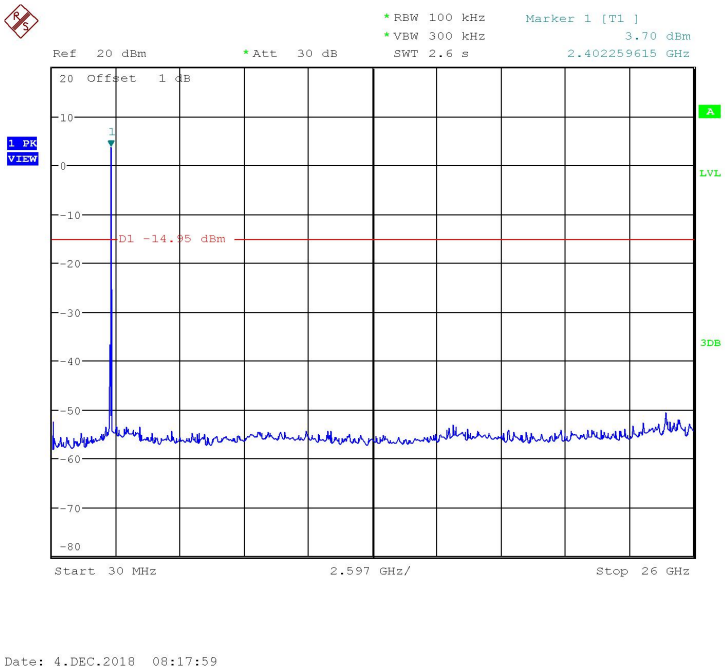


Fig 32. Conducted Spurious Emission (802.11g, Ch1, 30MHz~26GHz)

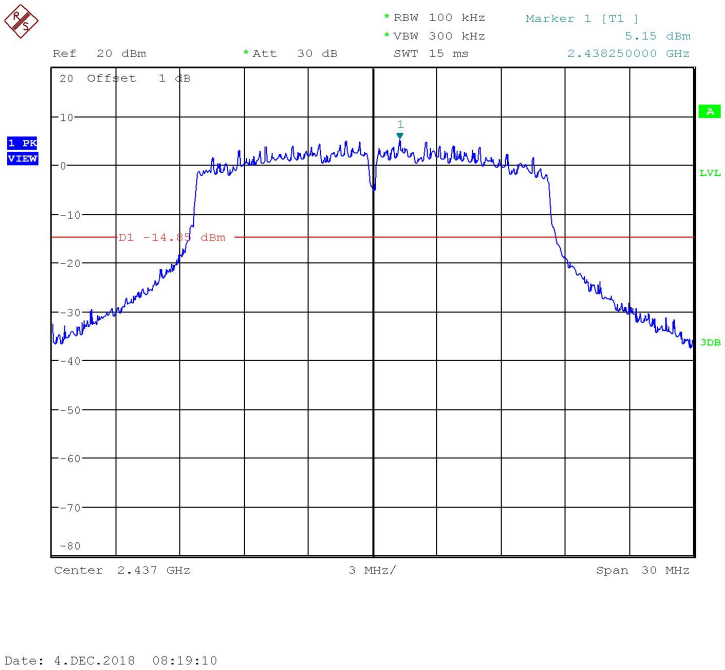


Fig 33. Conducted Spurious Emission (802.11g, Ch6)

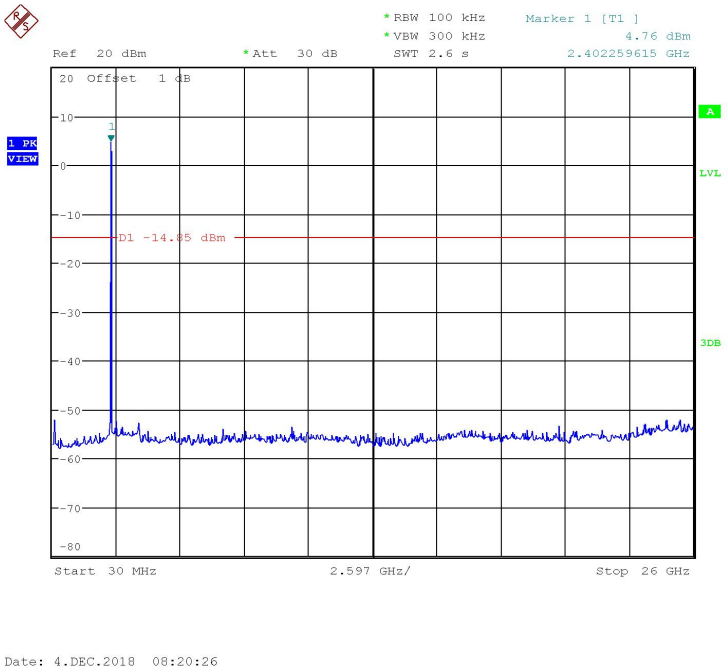


Fig 34. Conducted Spurious Emission (802.11g, Ch6, 30MHz~26GHz)

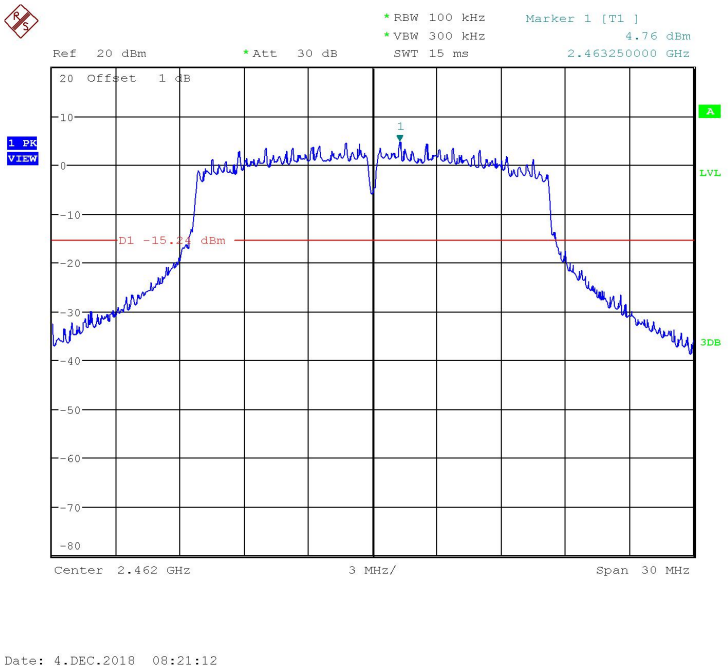


Fig 35. Conducted Spurious Emission (802.11g, Ch11)

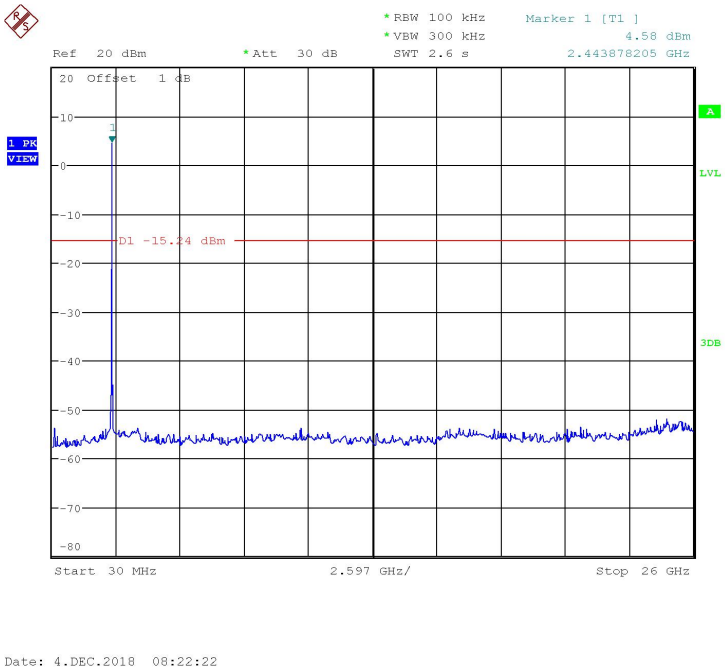


Fig 36. Conducted Spurious Emission (802.11g, Ch11, 30MHz~26GHz)

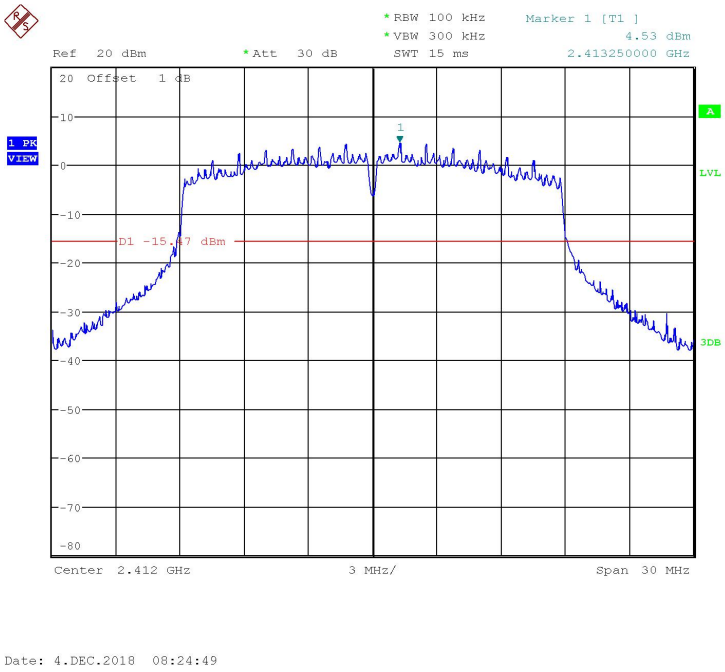


Fig 37. Conducted Spurious Emission (802.11n-20MHz, Ch1)

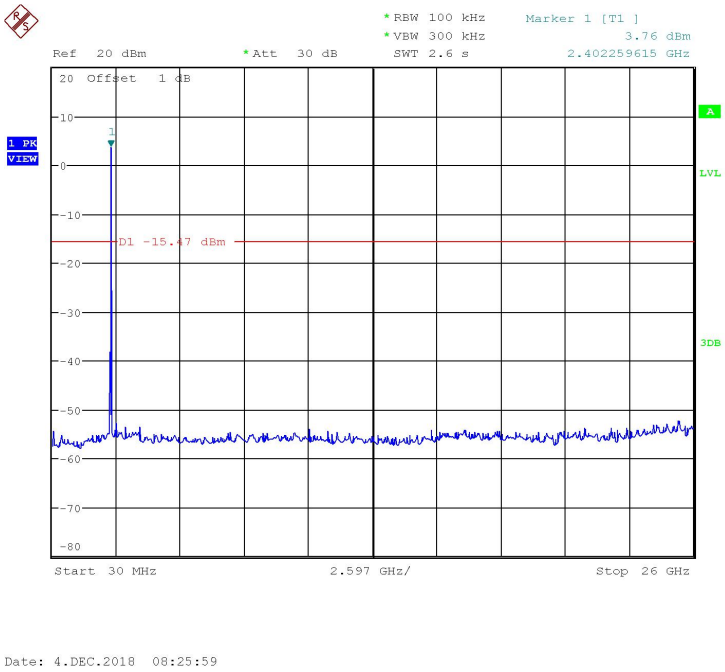


Fig 38. Conducted Spurious Emission (802.11n-20MHz, Ch1, 30MHz~26GHz)

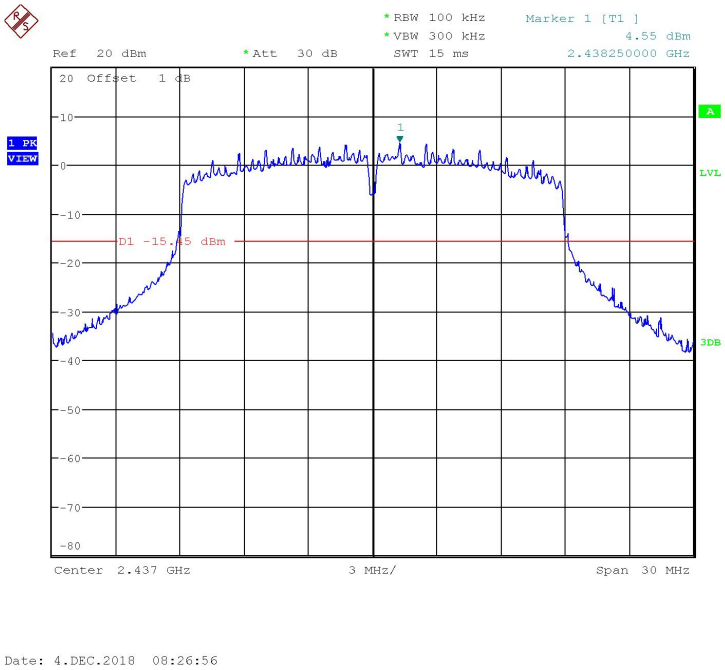


Fig 39. Conducted Spurious Emission (802.11n-20MHz, Ch6)

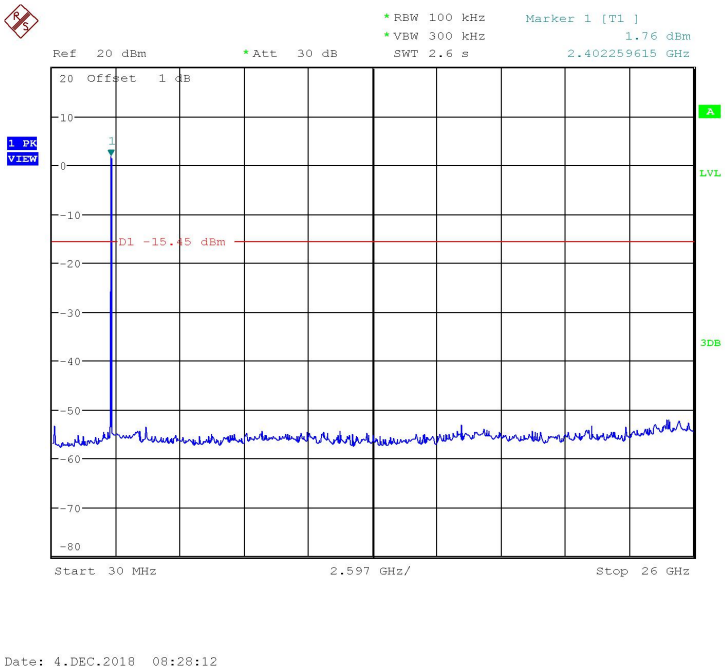


Fig 40. Conducted Spurious Emission (802.11n-20MHz, Ch6, 30MHz~26GHz)

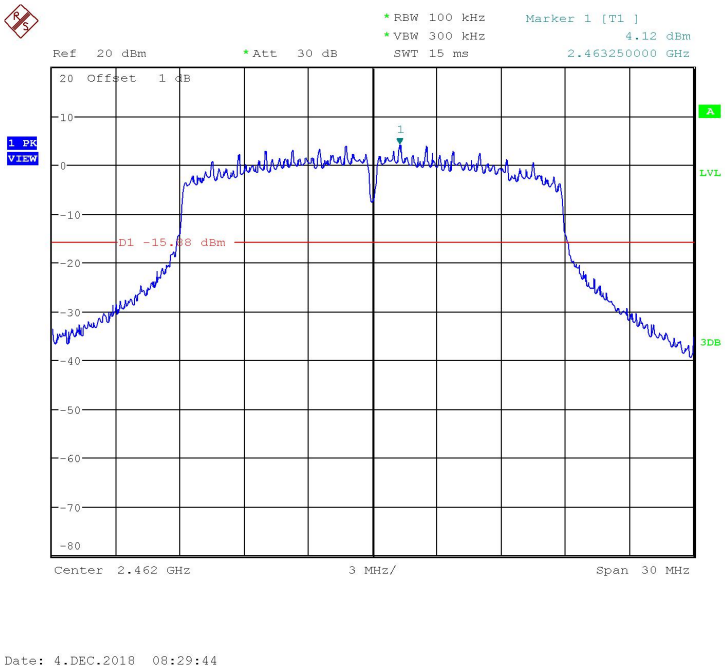


Fig 41. Conducted Spurious Emission (802.11n-20MHz, Ch11)

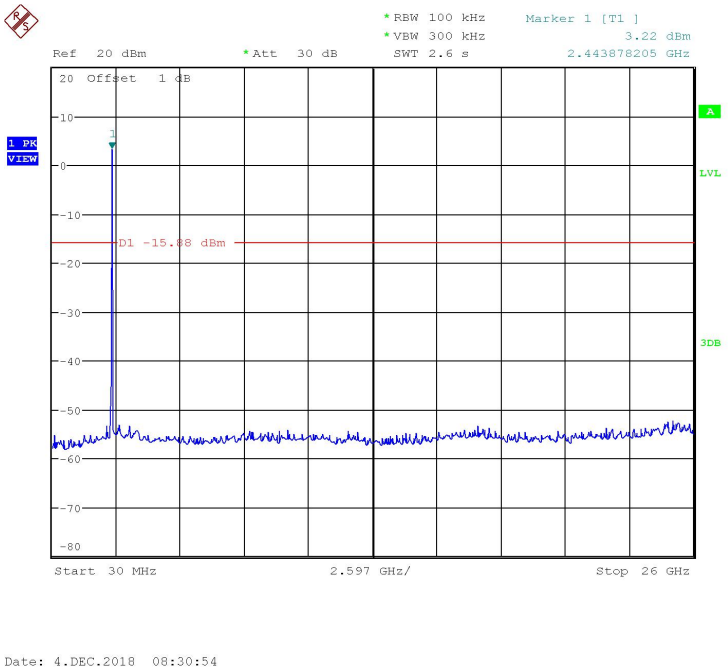


Fig 42. Conducted Spurious Emission (802.11n-20MHz, Ch11, 30MHz~26GHz)

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

Measurement Uncertainty

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	±5.66db

Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	±4.98db
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	±5.06db
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	±5.20db

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, For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 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/3MHz	15
4000~18000	1MHz/3MHz	40
18000~26500	1MHz/3MHz	20

802.11b/g mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11b	Power（low）	2.31GHz~2.5GHz	Fig 43.	P
	Power（high）	2.31GHz~2.5GHz	Fig 44.	P

	1	30MHz~1GHz	Fig 45.	P
		1GHz~3GHz	Fig 46.	P
		3GHz~18GHz	Fig 47.	P
802.11g	Power（low）	2.31GHz~2.5GHz	Fig 48.	P
	Power（high）	2.31GHz~2.5GHz	Fig 49.	P
	1	30MHz~1GHz	Fig 50.	P
		1GHz~3GHz	Fig 51.	P
		3GHz~18GHz	Fig 52.	P

802.11n mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n(20MHz)	Power（low）	2.31GHz~2.5GHz	Fig 53.	P
	Power（high）	2.31GHz~2.5GHz	Fig 54.	P
	1	30MHz~1GHz	Fig 55.	P
		1GHz~3GHz	Fig 56.	P
		3GHz~18GHz	Fig 57.	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
99.7	27.75	-23.5	51.25	V
214.5	35.42	-24.2	59.62	H

252.0	43.34	-22.8	66.14	H
371.2	35.82	-20	55.82	H
396.0	37.02	-19.3	56.32	H
684.0	40.59	-12.9	53.49	H

Ch1 1GHz~3GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2583.4	53.7	7.3	46.4	H
2624.5	54.39	7.5	46.89	H
2662.5	54.2	7.8	46.4	V
2733.0	55.51	7.8	47.71	V
2828.0	55.2	8.1	47.1	H
2880.4	55.97	8.7	47.27	V

Ch1 1GHz~3GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2624.5	42.11	7.5	34.61	H
2662.5	42.6	7.8	34.8	V
2733.0	42.54	7.8	34.74	V
2828.0	42.78	8.1	34.68	H
2880.4	43.34	8.7	34.64	V

Ch1 3GHz~18GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14315.7	54.53	20.5	34.03	H
15039.5	54.7	20.9	33.8	V
15412.3	56.65	22.7	33.95	H
16114.7	58.49	24.8	33.69	V
16792.1	60.04	27.1	32.94	H

17445.3	59.12	27	32.12	V

Ch1 3GHz~18GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14315.7	42.33	20.5	21.83	H
15039.5	43.05	20.9	22.15	V
15412.3	43.94	22.7	21.24	H
16114.7	46.79	24.8	21.99	V
16792.1	47.38	27.1	20.28	H
17445.3	47.1	27	20.1	V

802.11g

Ch1 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
88.8	29.18	-25.4	54.58	H
252.0	43.38	-22.8	66.18	H
297.1	34.26	-21.9	56.16	H
396.0	32.48	-19.3	51.78	H
511.2	31.5	-16.6	48.1	V
684.0	40.2	-12.9	53.1	H

Ch1 1GHz~3GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2508.9	53.48	7.2	46.28	V
2599.1	54.3	7.3	47	H
2640.8	54.31	7.6	46.71	V
2720.3	54.6	7.8	46.8	H
2832.3	55.38	8.2	47.18	V
2851.0	54.76	8.3	46.46	H

Ch1 1GHz~3GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2599.1	41.97	7.3	34.67	H
2640.8	42.25	7.6	34.65	V
2720.3	42.34	7.8	34.54	H
2832.3	42.69	8.2	34.49	V
2851.0	42.81	8.3	34.51	H

Ch1 3GHz~18GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14315.3	54.32	20.5	33.82	V
14706.1	55.35	21.1	34.25	V
15364.3	55.46	22.3	33.16	H
16411.5	58.18	25.7	32.48	V
16816.2	59.15	27.2	31.95	H
17800.1	60.09	28.5	31.59	H

Ch1 3GHz~18GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
14315.3	42.38	20.5	21.88	V
14706.1	43.36	21.1	22.26	V
15364.3	43.38	22.3	21.08	H
16411.5	45.84	25.7	20.14	V
16816.2	47.45	27.2	20.25	H
17800.1	47.82	28.5	19.32	H

802.11n-20MHz

Ch1 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
99.8	28.35	-23.5	51.85	H

222.7	36.24	-23.9	60.14	H
252.0	43.25	-22.8	66.05	H
296.9	34.46	-21.9	56.36	H
396.0	35.18	-19.3	54.48	H
684.0	39.93	-12.9	52.83	H

Ch1 1GHz~3GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2538.7	54.67	7	47.67	H
2628.5	54.12	7.5	46.62	V
2703.8	54.04	7.9	46.14	V
2747.9	54.01	7.7	46.31	V
2841.1	55.22	8.2	47.02	H
2936.6	55.81	8.7	47.11	V

Ch1 1GHz~3GHz(Average)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2538.7	41.85	7	34.85	H
2628.5	42.1	7.5	34.6	V
2703.8	42.35	7.9	34.45	V
2747.9	42.48	7.7	34.78	V
2841.1	42.8	8.2	34.6	H
2936.6	43.59	8.7	34.89	V

Ch1 3GHz~18GHz(Peak)

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
12612.0	52.95	16.1	36.85	V
13780.9	53.72	18.4	35.32	V
14315.0	53.88	20.6	33.28	V

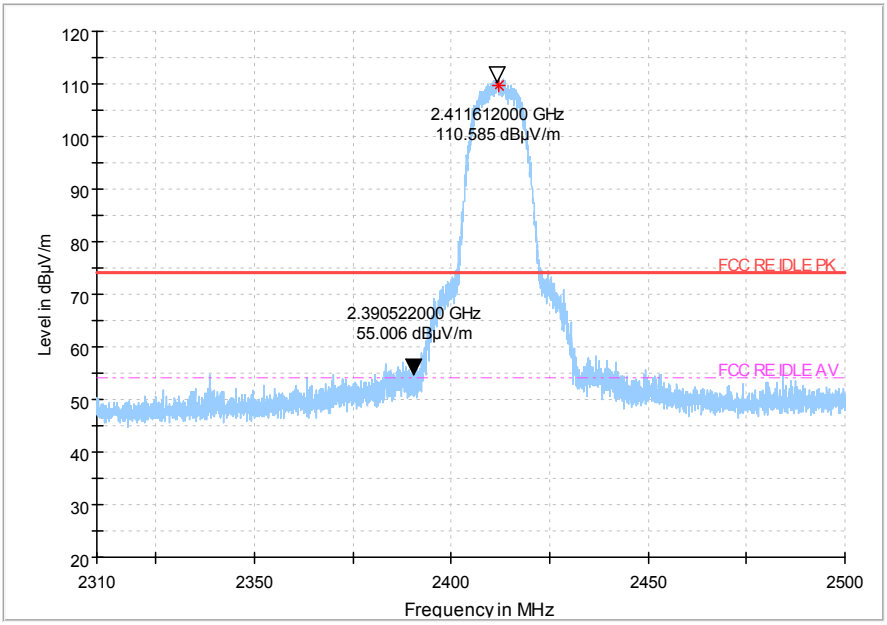
15498.9	55.84	22.6	33.24	H
16275.5	58.27	25.6	32.67	H
17793.0	59.78	28.4	31.38	V

Ch1 3GHz~18GHz(Average)

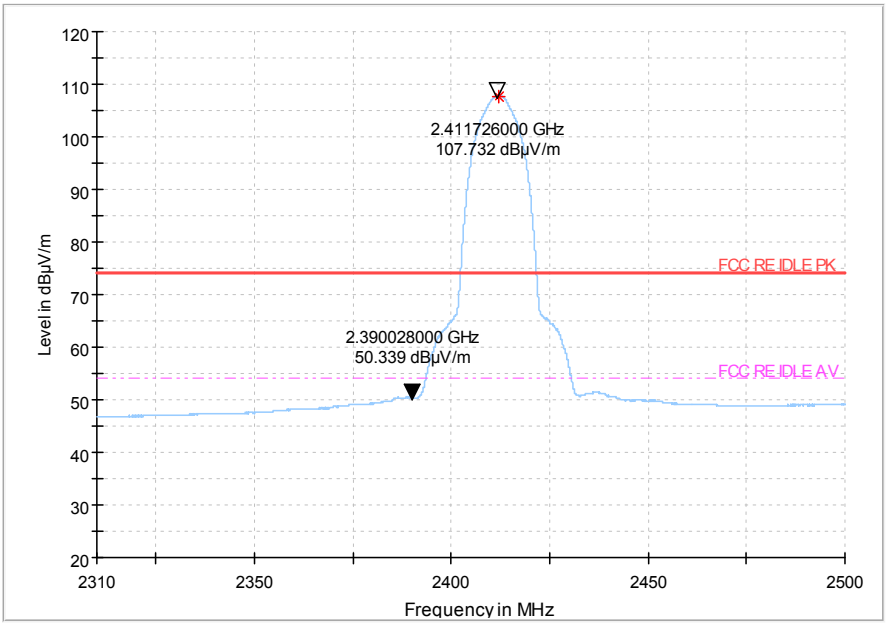
Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
15498.9	43.84	22.6	21.24	H
16275.5	46.33	25.6	20.73	H
17793.0	47.64	28.4	19.24	V

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

Test graphs as below:

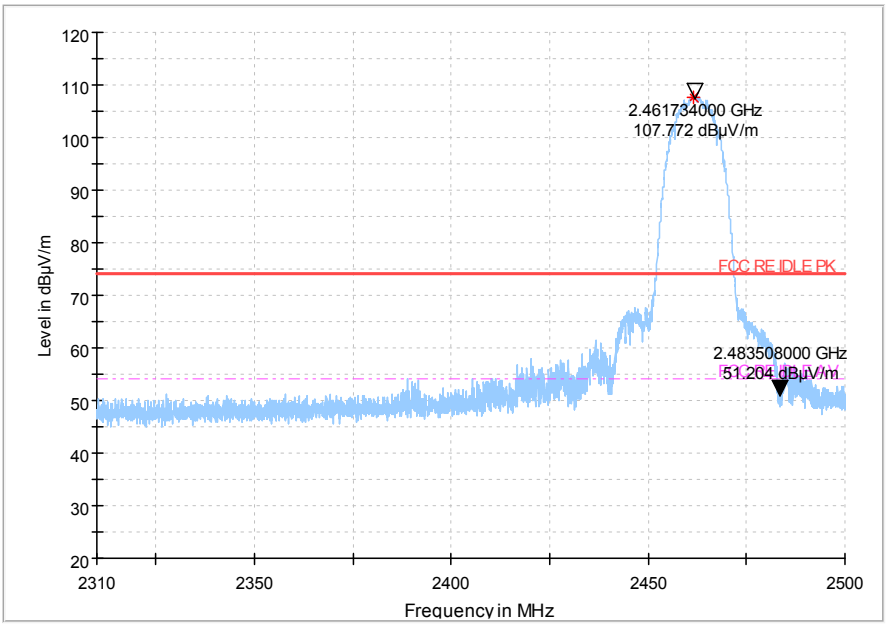


Peak detector

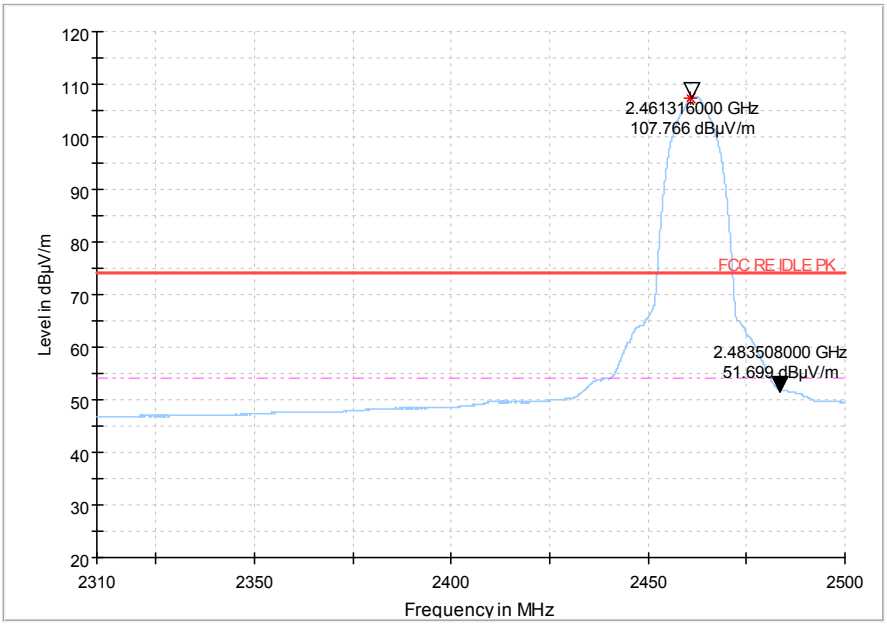


AV detector

Fig 43. Radiated emission (Power): 802.11b, low channel



Peak detector



AV detector

Fig 44. Radiated emission (Power): 802.11b, high channel

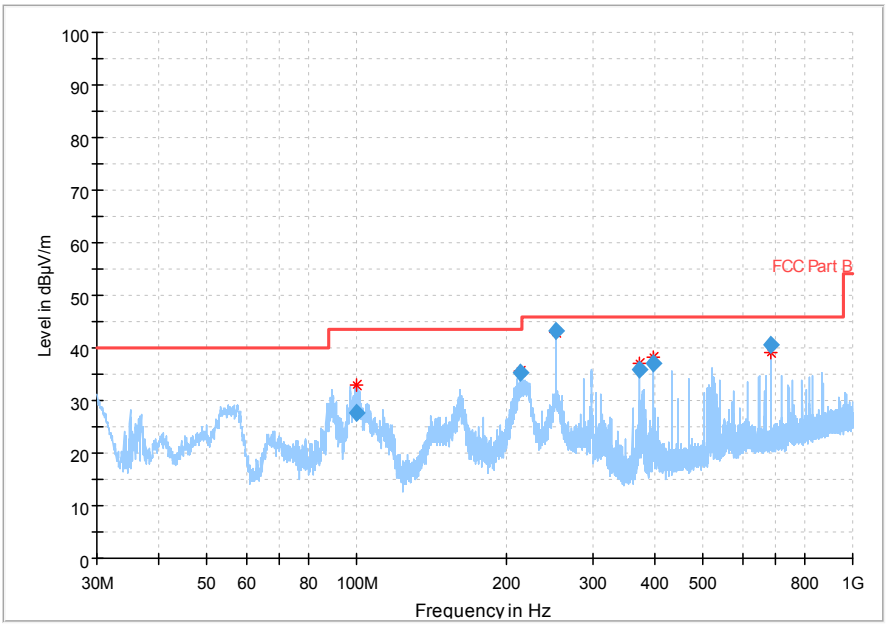


Fig 45. Radiated Spurious Emission (802.11b,Ch1,30MHz~1GHz)

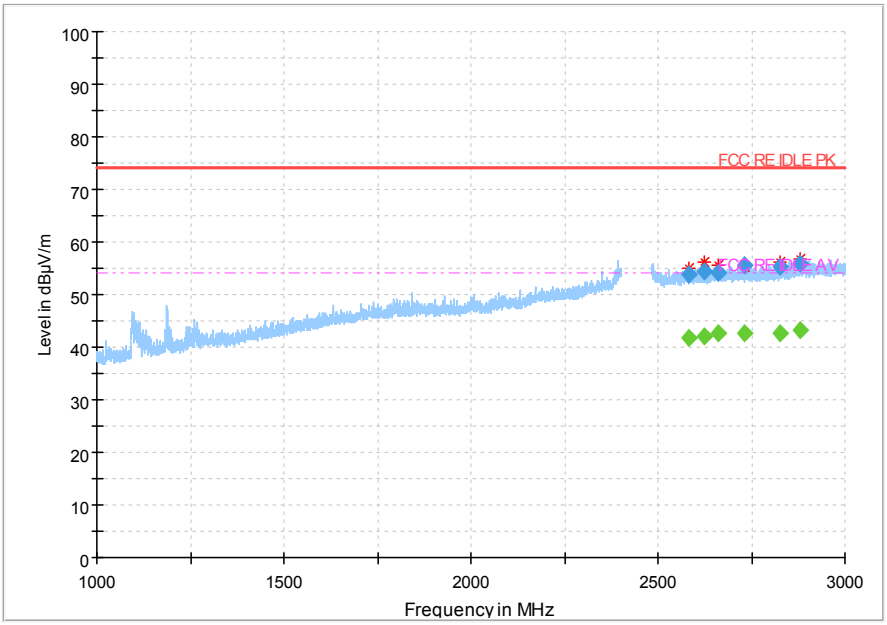


Fig 46. Radiated Spurious Emission (802.11b,Ch1,1GHz~3GHz)

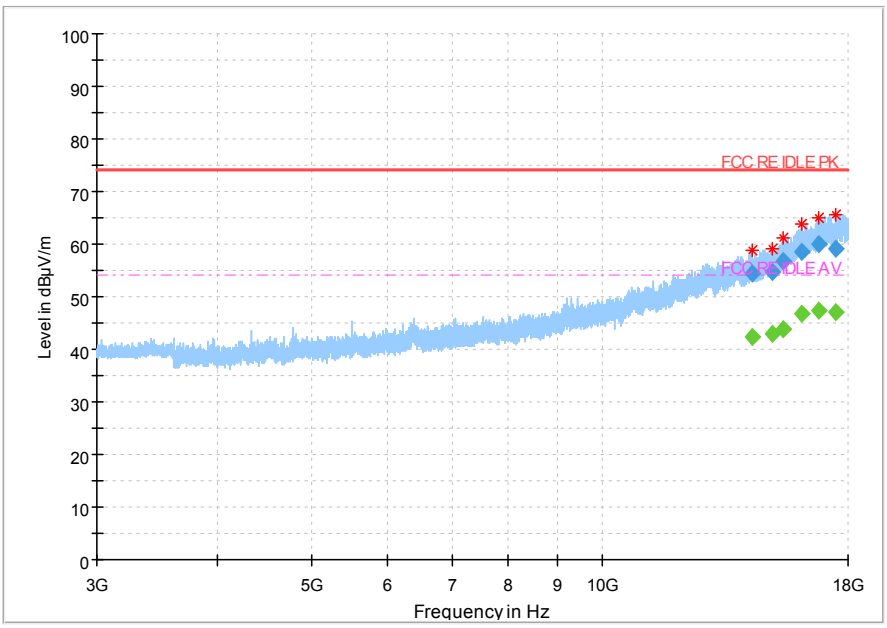
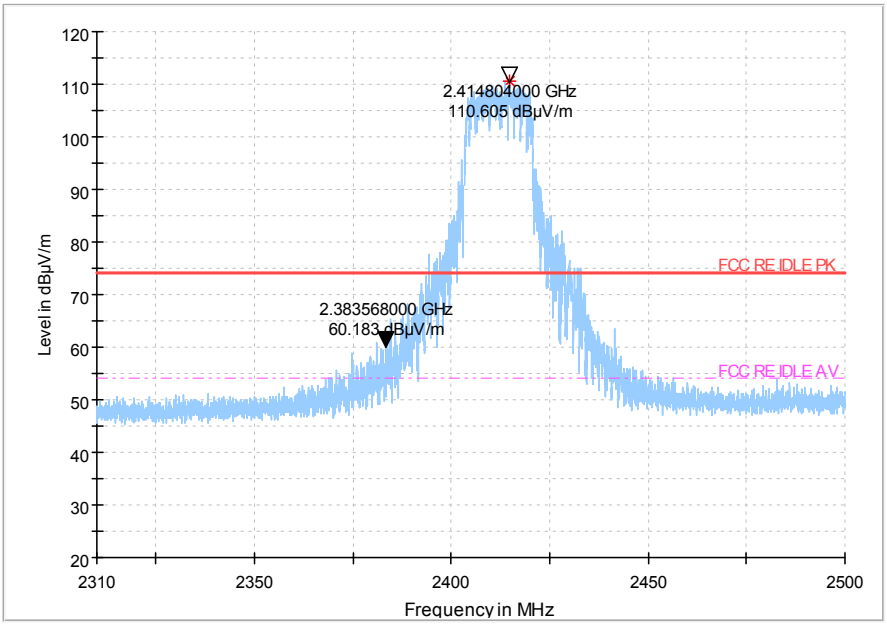
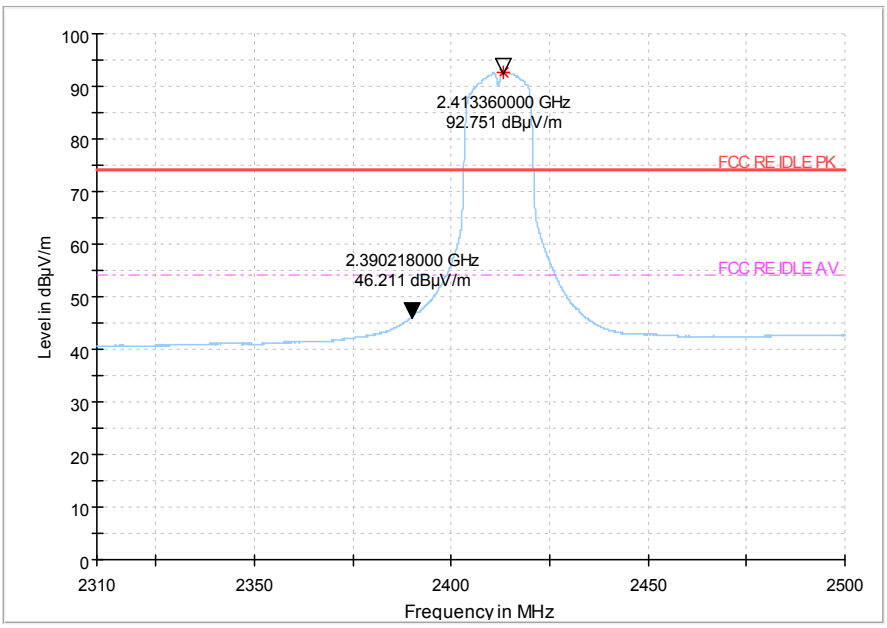


Fig 47. Radiated Spurious Emission (802.11b,Ch1,3GHz~18GHz)

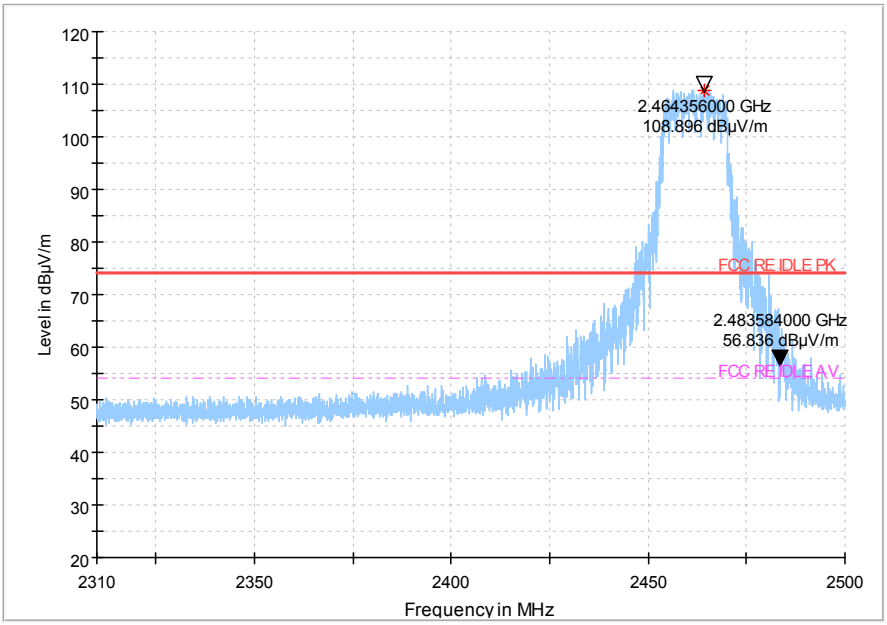


Peak detector

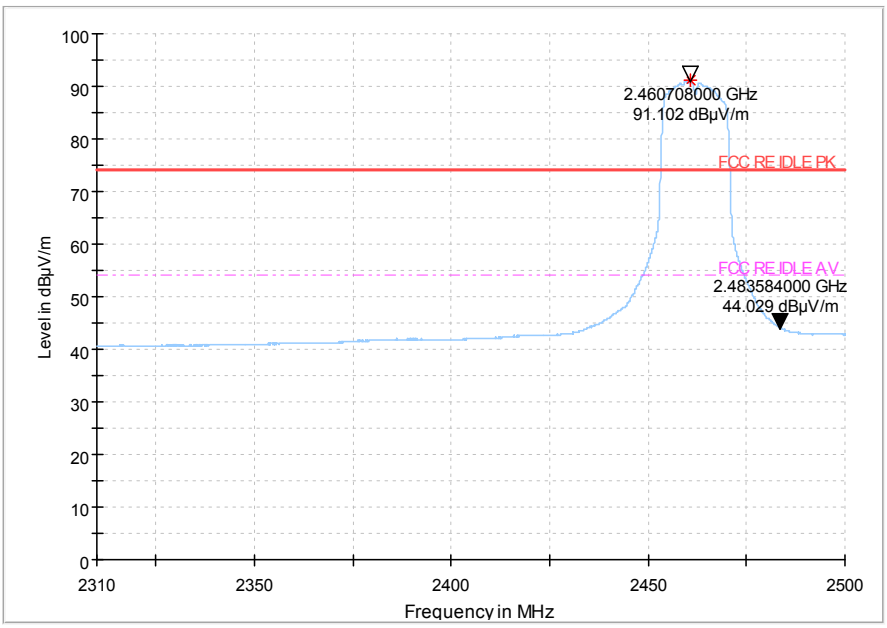


AV detector

Fig 48. Fig.102 Radiated emission (Power): 802.11g, low channel



Peak detector



AV detector

Fig 49. Radiated emission (Power): 802.11g, high channel

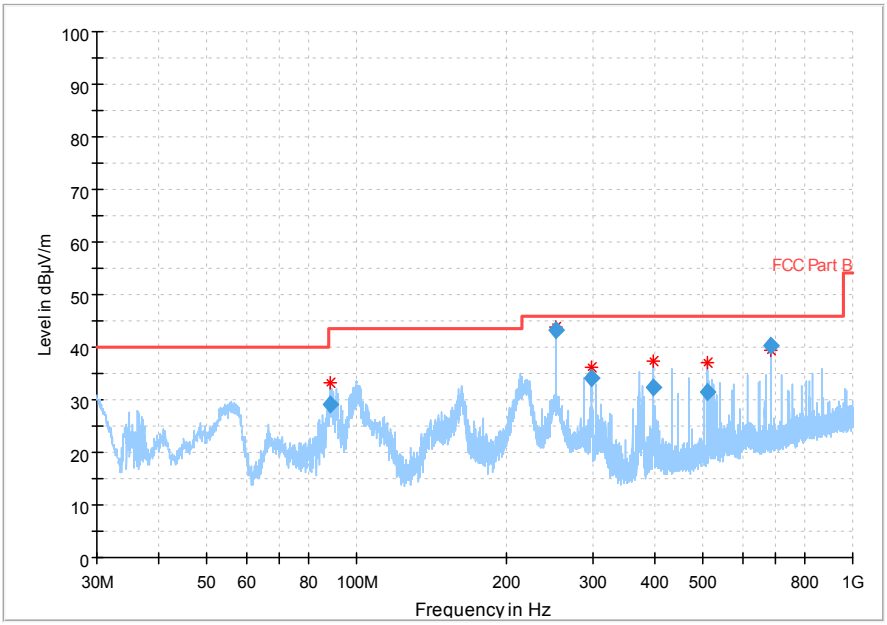


Fig 50. Radiated Spurious Emission (802.11g,Ch1,30MHz~1GHz)

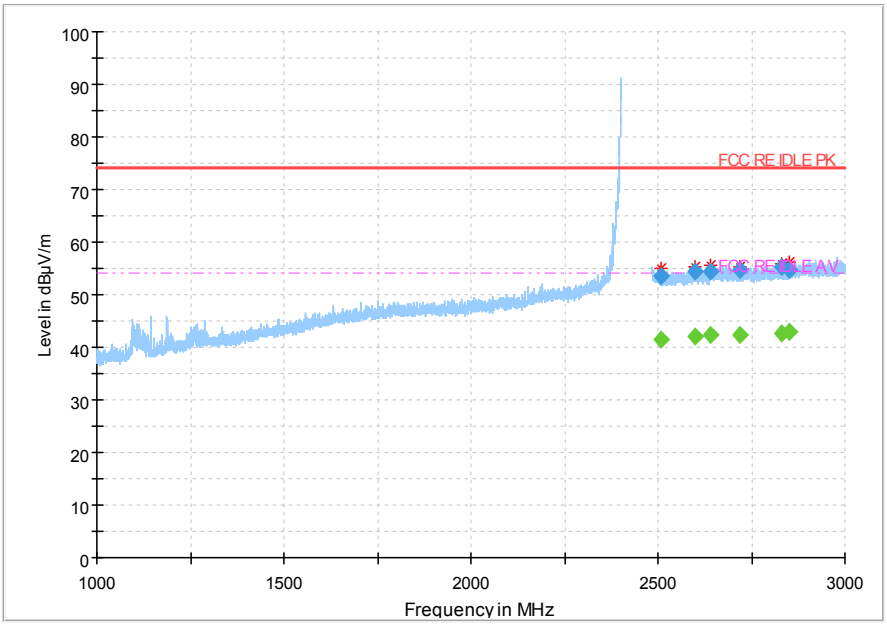


Fig 51. Radiated Spurious Emission (802.11g,Ch1,1GHz~3GHz)

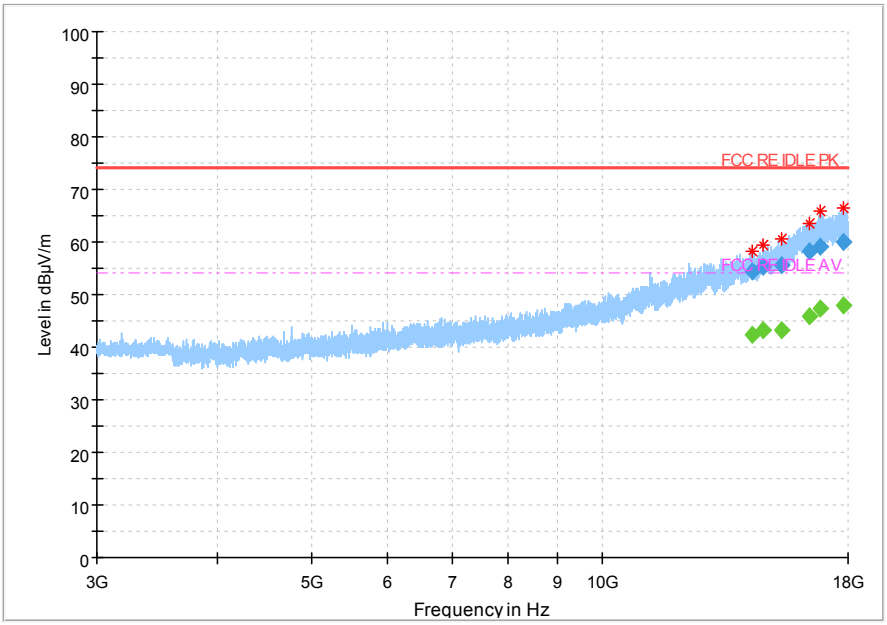
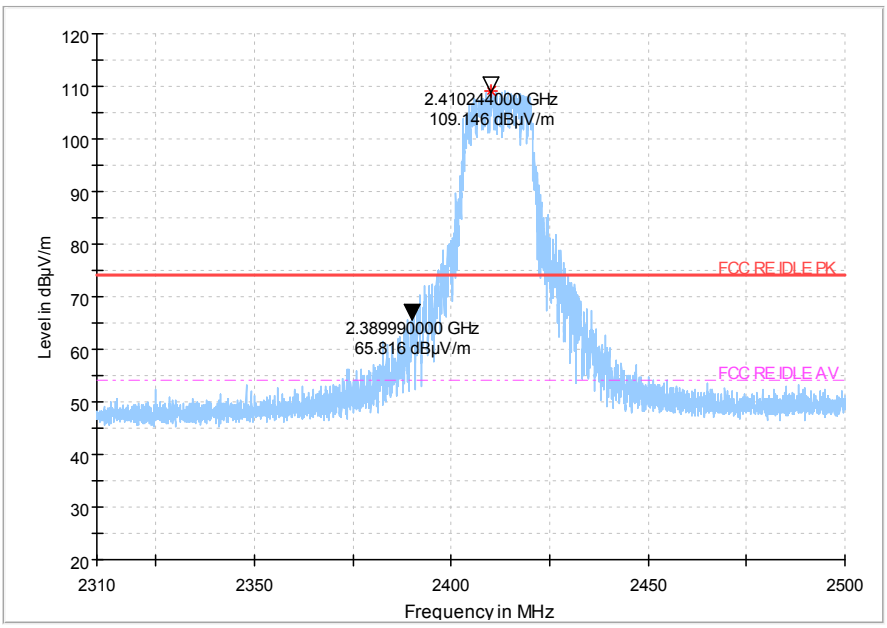
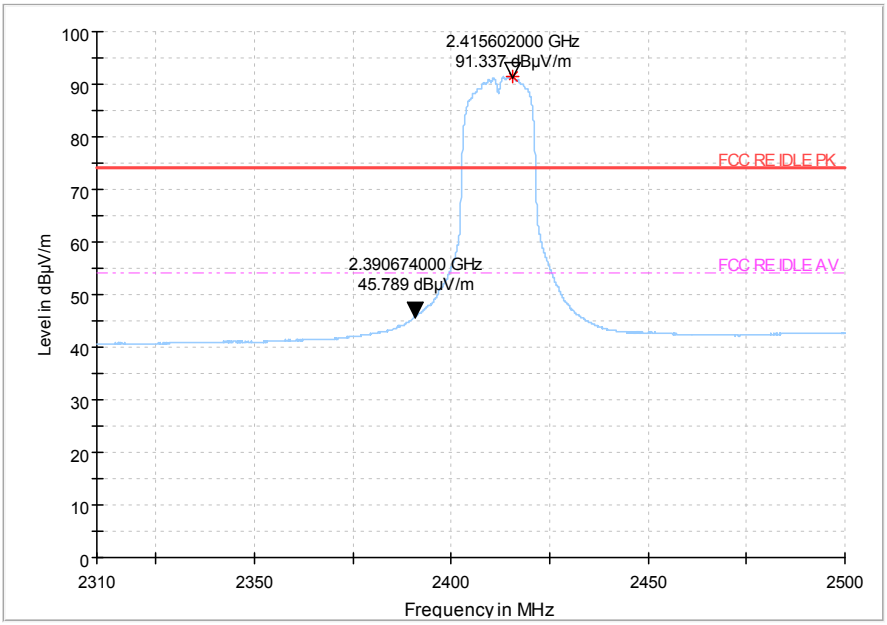


Fig 52. Radiated Spurious Emission (802.11g,Ch1,3GHz~18GHz)

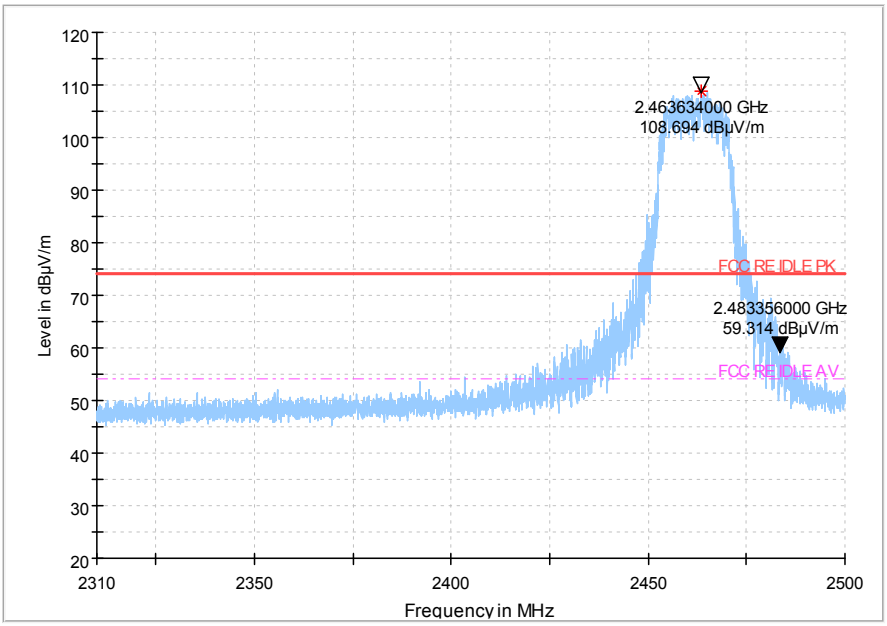


Peak detector

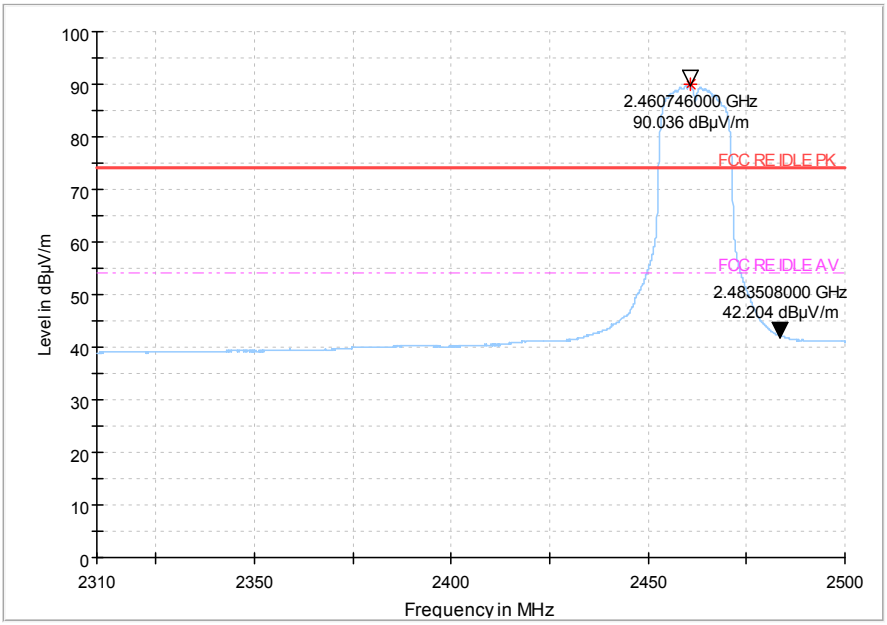


AV detector

Fig 53. Radiated emission (Power): 802.11n, low channel



Peak detector



AV detector

Fig 54. Radiated emission (Power): 802.11n, high channel

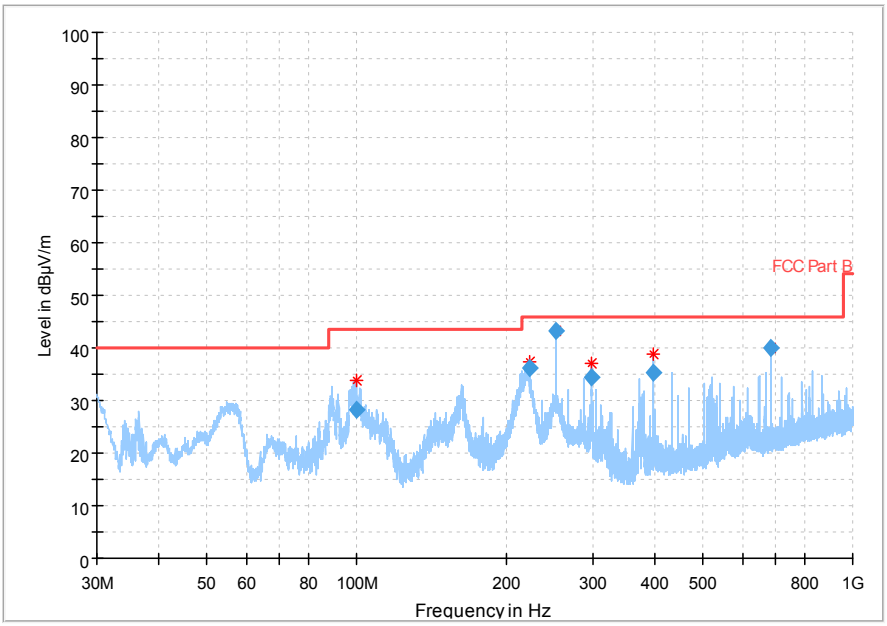


Fig 55. Radiated Spurious Emission (802.11 n-20MHz,Ch1,30MHz~1GHz)

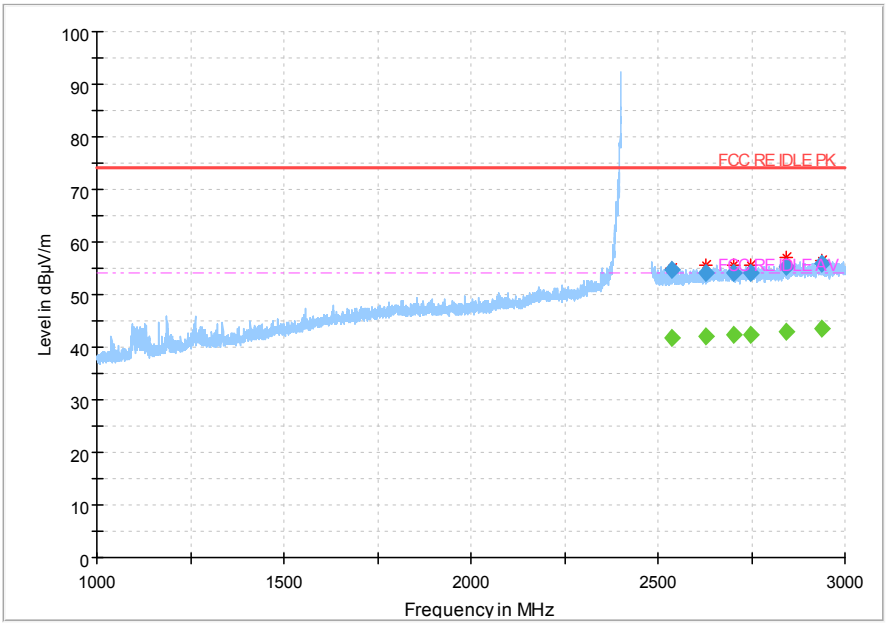


Fig 56. Radiated Spurious Emission (802.11 n-20MHz,Ch1,1GHz~3GHz)

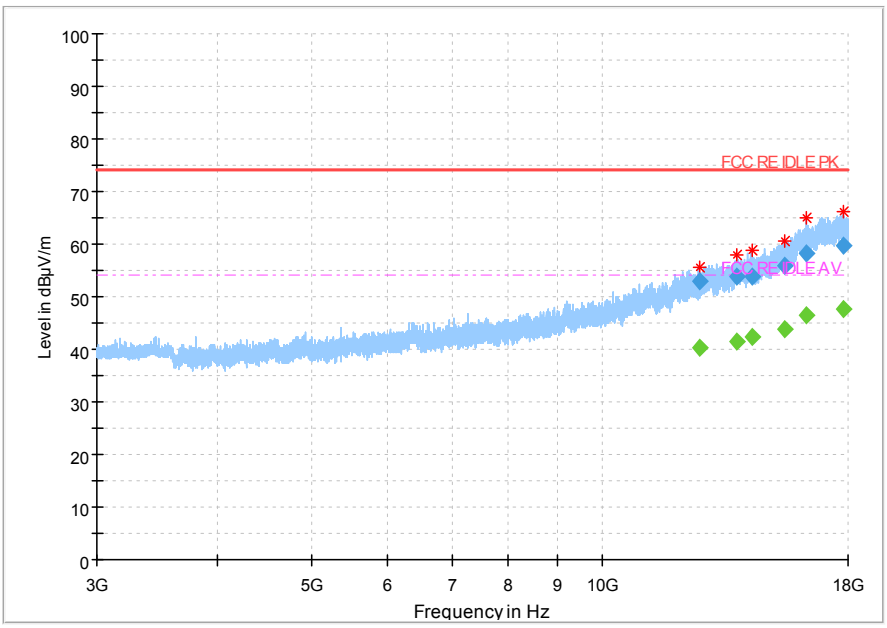
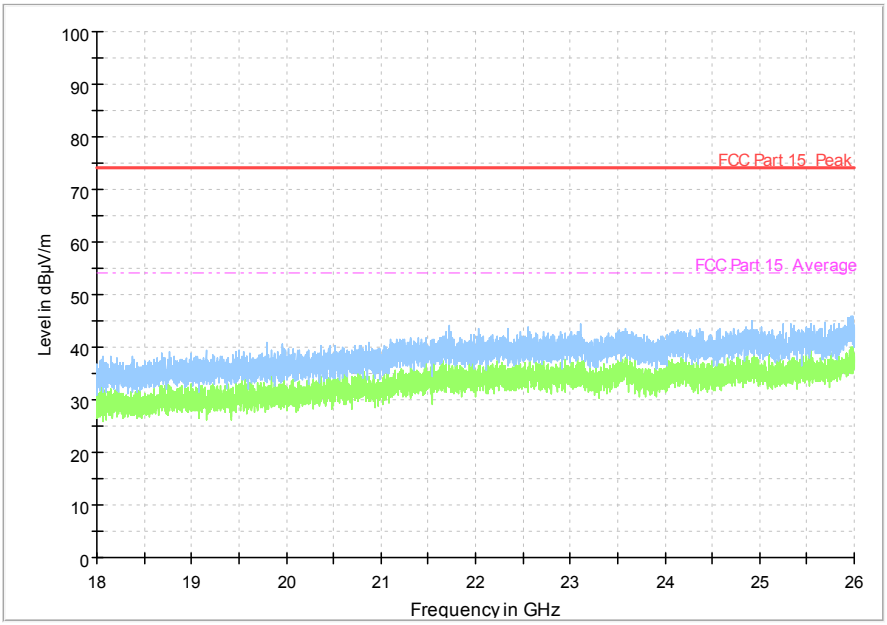


Fig 57. Radiated Spurious Emission (802.11 n-20MHz,Ch1,3GHz~18GHz)



All Channel

6.7. AC Powerline Conducted Emission

Method of Measurement: See ANSI C63.10 clause 6.2

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

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

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

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

If the EUT uses a detachable antenna, these measurements shall be made with a suitable dummy load connected to the antenna output terminals; otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended. When measuring the ac conducted emissions from a device that operates between 150 kHz and 30 MHz a

non-detachable antenna may be replaced with a dummy load for the measurements within the fundamental emission band of the transmitter, but only for those measurements.36 Record the six highest EUT emissions relative to the limit of each of the current-carrying conductors of the power cords of the equipment that comprises the EUT over the frequency range specified by the procuring or regulatory agency. Diagram or photograph the test setup that was used. See Clause 8 for full reporting requirements.

Test Condition:

Voltage（V）	Frequency（Hz）
120	60

Measurement Uncertainty

Measurement Items	Range	Confidence Level	Calculated Uncertainty
AC Power line Conducted Emission	0.15MHz-30MHz	95%	±5.66 db

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 58.	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

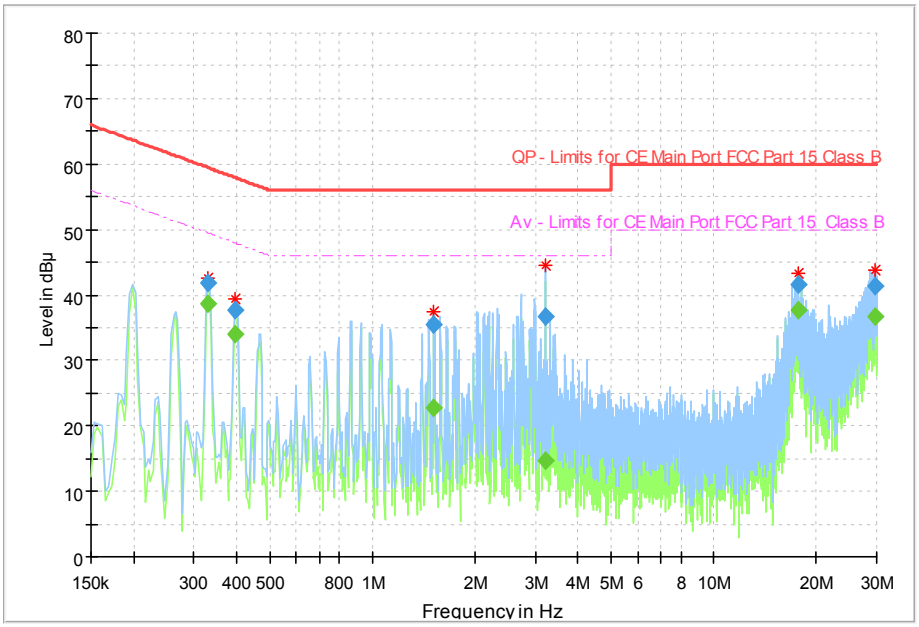


Fig 58. AC Powerline Conducted Emission

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.329100	41.89	---	59.47	17.58	1000.0	9.000	N	ON	9.7
0.329100	---	38.60	49.47	10.87	1000.0	9.000	N	ON	9.7
0.396263	37.75	---	57.93	20.19	1000.0	9.000	L1	ON	9.7
0.396263	---	33.95	47.93	13.98	1000.0	9.000	L1	ON	9.7
1.515638	---	22.72	46.00	23.28	1000.0	9.000	N	ON	9.7
1.515638	35.44	---	56.00	20.56	1000.0	9.000	N	ON	9.7
3.213356	---	14.60	46.00	31.40	1000.0	9.000	N	ON	9.7
3.213356	36.66	---	56.00	19.34	1000.0	9.000	N	ON	9.7
17.739113	---	37.59	50.00	12.41	1000.0	9.000	N	ON	9.9
17.739113	41.49	---	60.00	18.51	1000.0	9.000	N	ON	9.9
29.682844	---	36.66	50.00	13.34	1000.0	9.000	N	ON	9.9
29.682844	41.30	---	60.00	18.70	1000.0	9.000	N	ON	9.9

7. Test Equipment and Ancillaries Used For Tests

The test equipment and ancillaries used are as follows.

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Cal.interval
1	Vector Signal Analyzer	FSQ26	101096	Rohde&Schwarz	2018-05-11	1 Year
2	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	2018-05-11	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	2018-05-11	1 Year
2	EMI Test Receiver	ESU40	100307	R&S	2018-05-11	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	2018-05-11	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

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 k
Ground system resistance	< 0.5

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 k
Ground system resistance	< 0.5
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

ANNEX A. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

ANNEX B. Accreditation Certificate

Accredited Laboratory

A2LA has accredited

EAST CHINA INSTITUTE OF TELECOMMUNICATIONS

Shanghai, People's Republic of China

for technical competence in the field of

Electrical Testing

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

Presented this 15th day of March 2017.

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

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

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