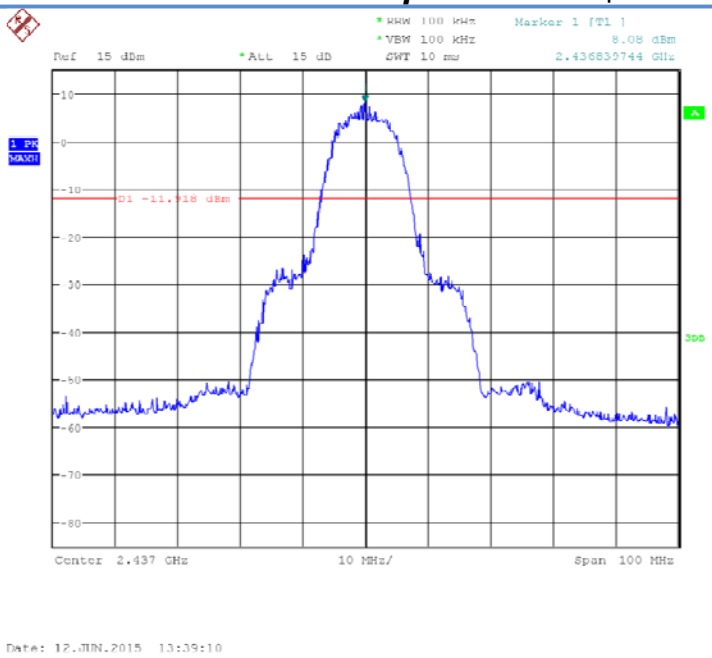


Fig.35 Conducted Spurious Emission (802.11b, Ch6)

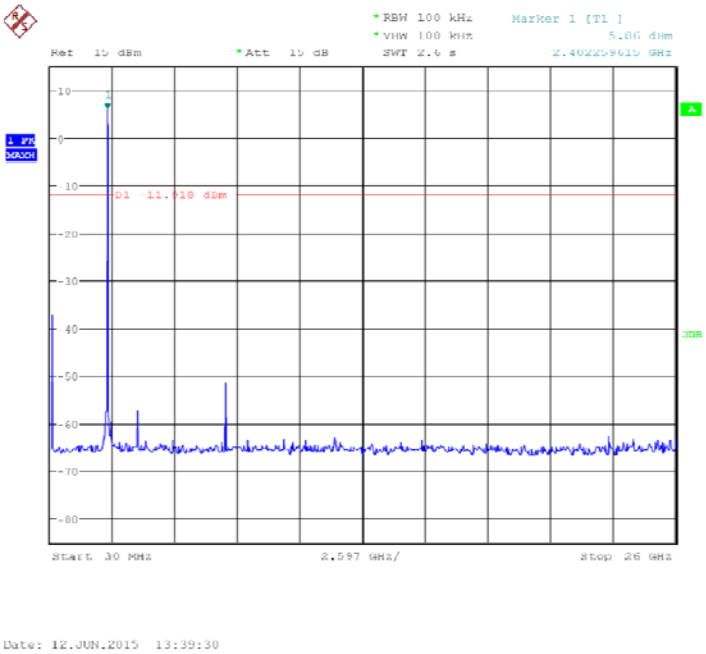


Fig.36 Conducted Spurious Emission (802.11b, Ch6, 30MHz~26GHz)

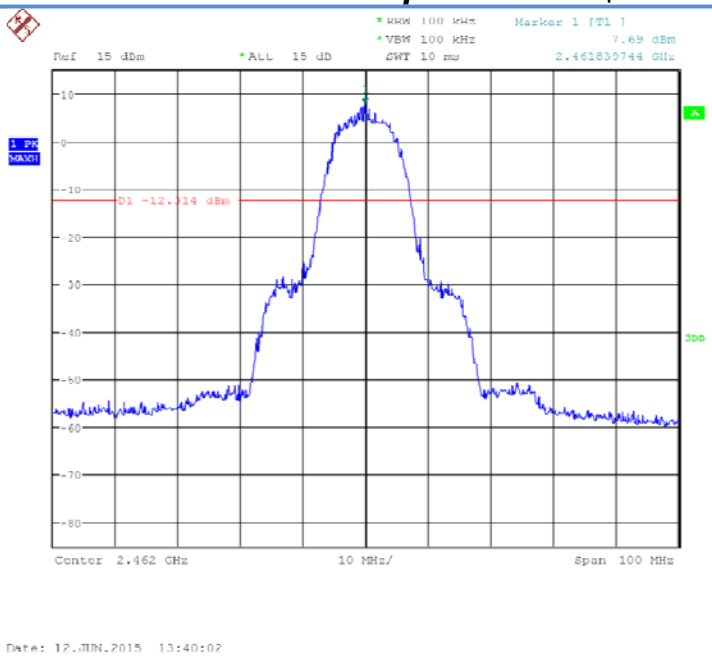


Fig.37 Conducted Spurious Emission (802.11b, Ch11)

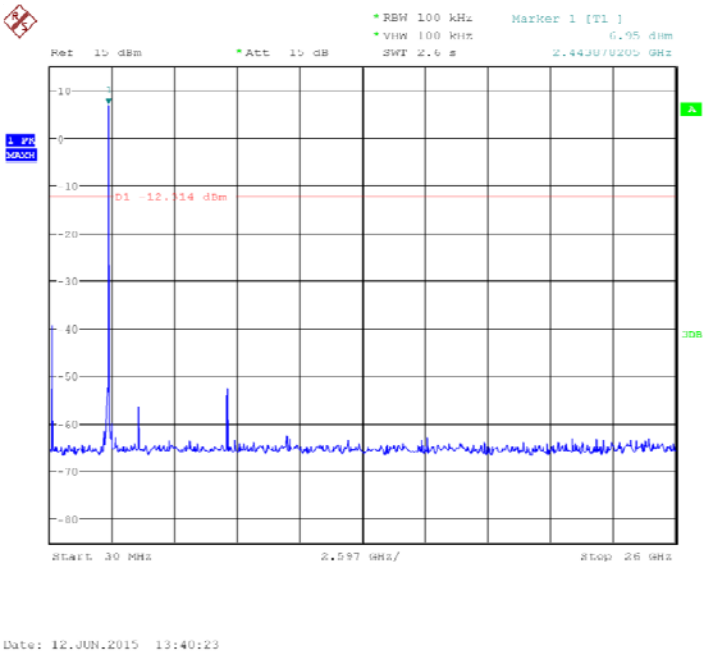


Fig.38 Conducted Spurious Emission (802.11b, Ch11, 30MHz~26GHz)

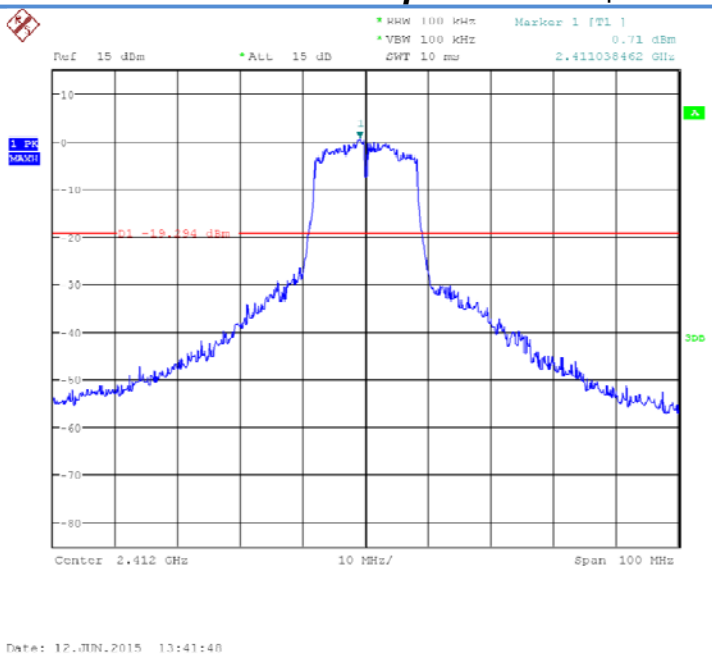


Fig.39 Conducted Spurious Emission (802.11g, Ch1)

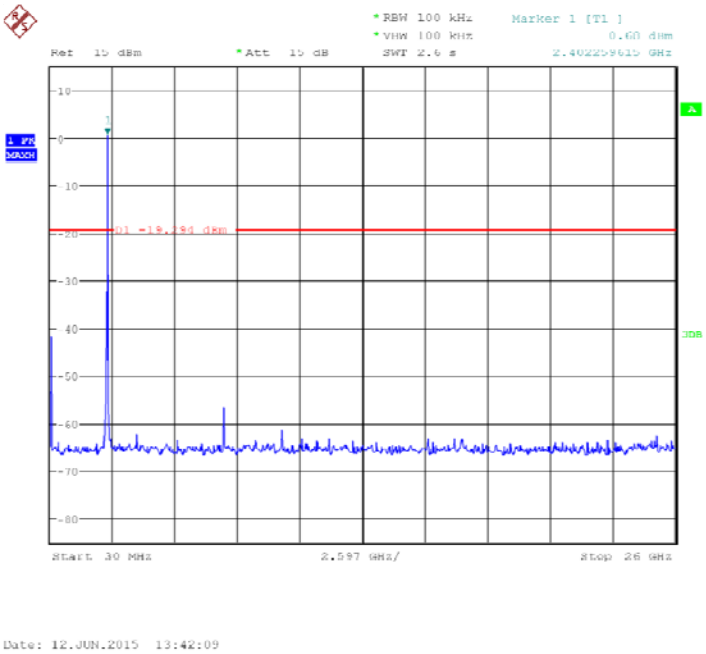


Fig.40 Conducted Spurious Emission (802.11g, Ch1, 30MHz~26GHz)

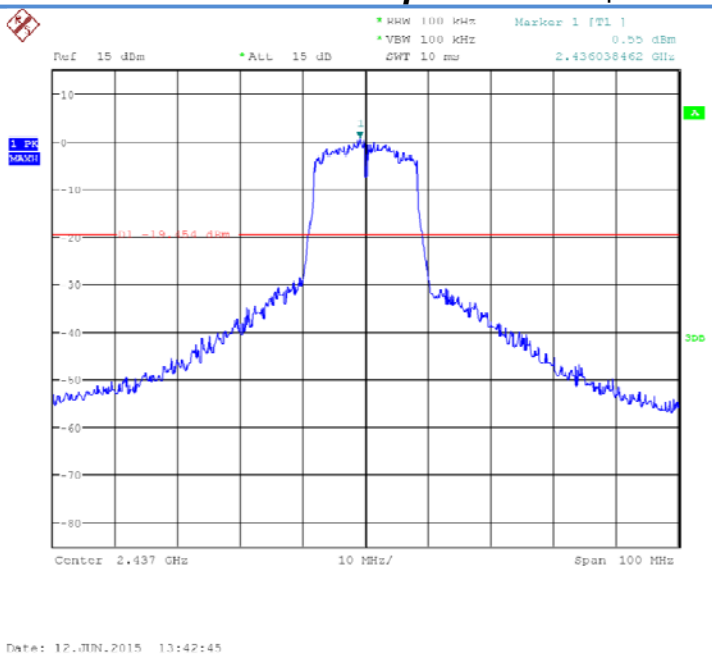


Fig.41 Conducted Spurious Emission (802.11g, Ch6)

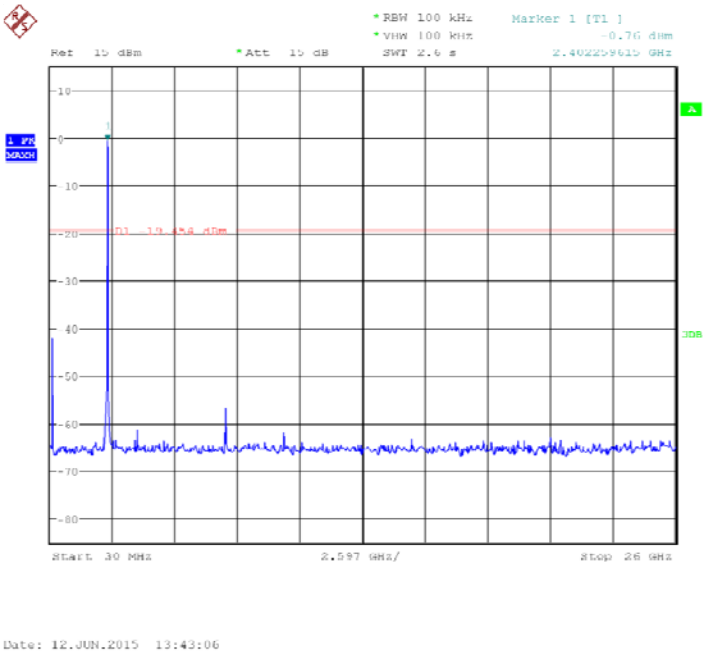


Fig.42 Conducted Spurious Emission (802.11g, Ch6, 30MHz~26GHz)

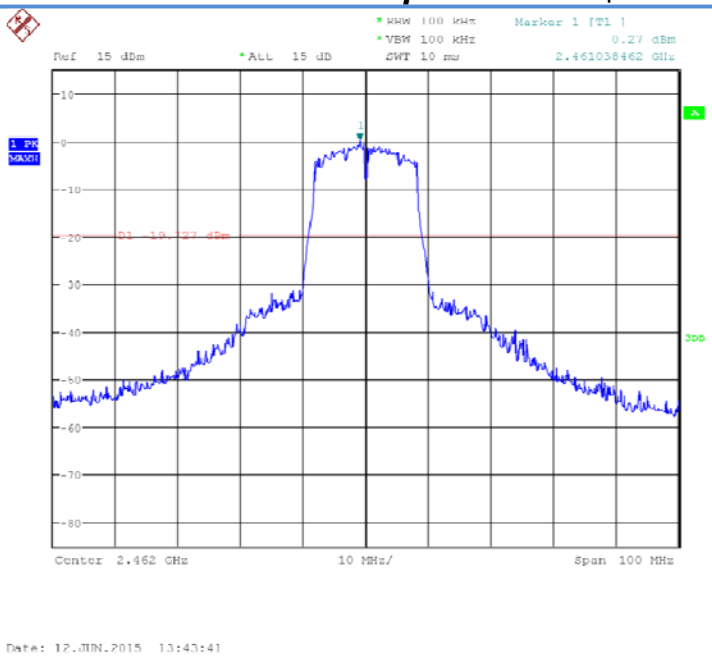


Fig.43 Conducted Spurious Emission (802.11g, Ch11)

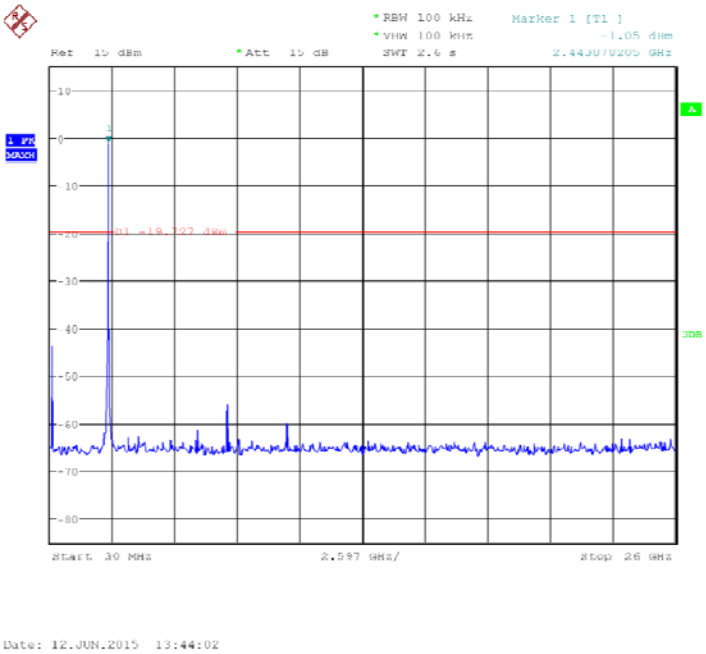


Fig.44 Conducted Spurious Emission (802.11g, Ch11, 30MHz~26GHz)

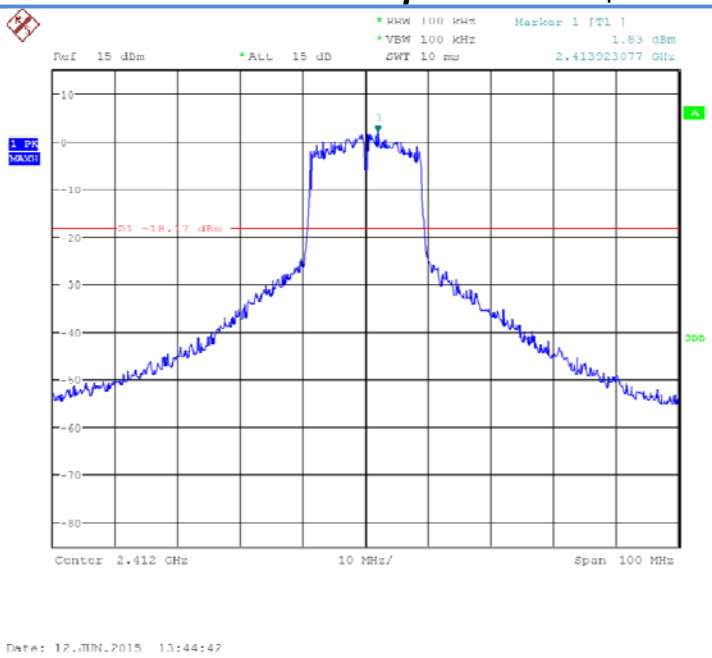


Fig.45 Conducted Spurious Emission (802.11n-20MHz, Ch1)

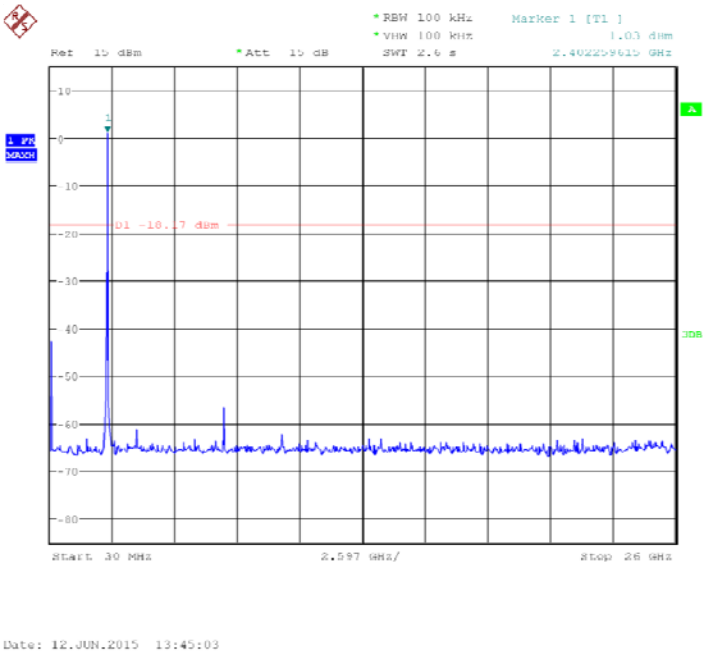


Fig.46 Conducted Spurious Emission (802.11n-20MHz, Ch1, 30MHz~26GHz)

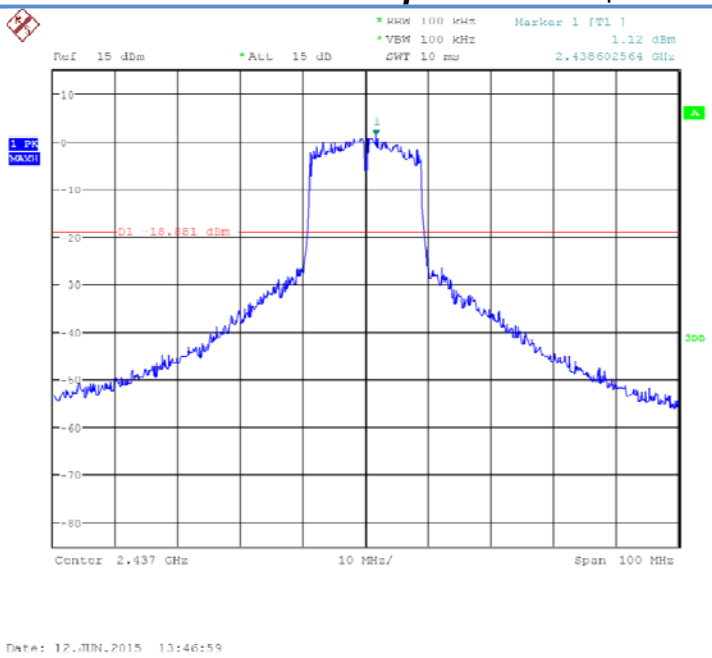


Fig.47 Conducted Spurious Emission (802.11n-20MHz, Ch6)

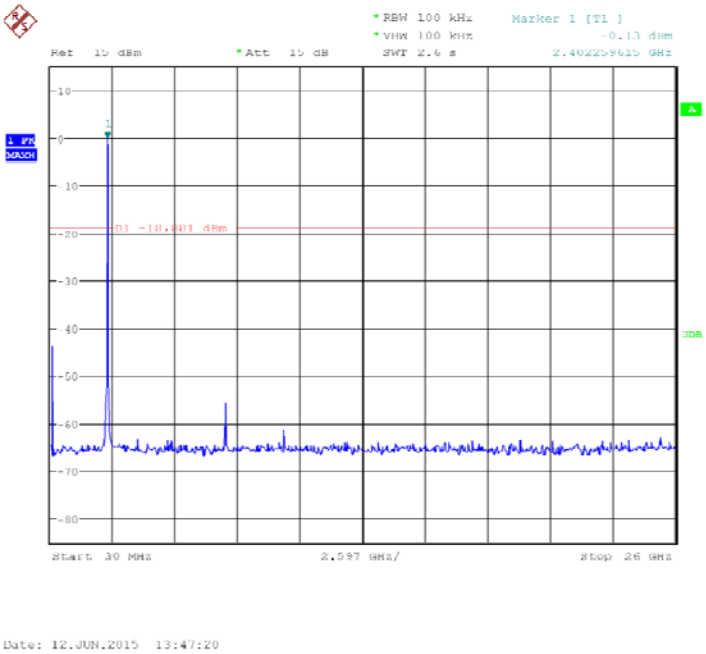


Fig.48 Conducted Spurious Emission (802.11n-20MHz, Ch6, 30MHz~26GHz)

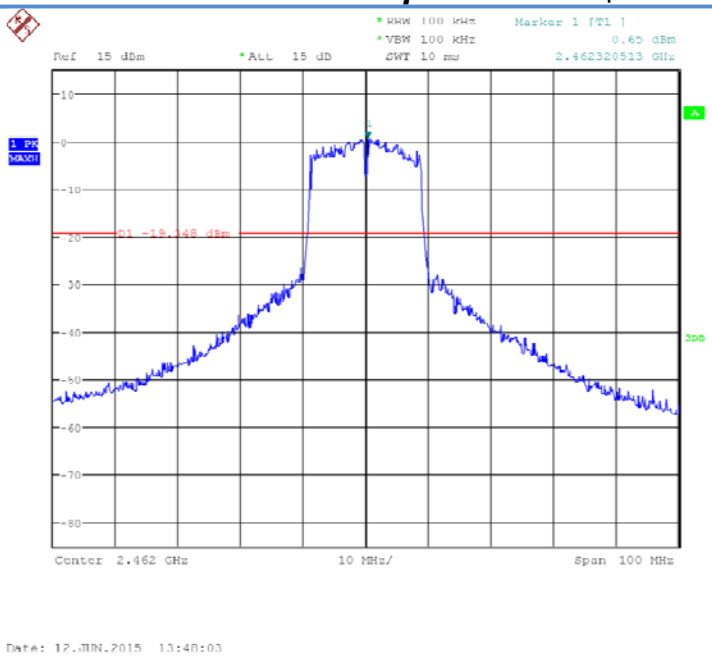


Fig.49 Conducted Spurious Emission (802.11n-20MHz, Ch11)

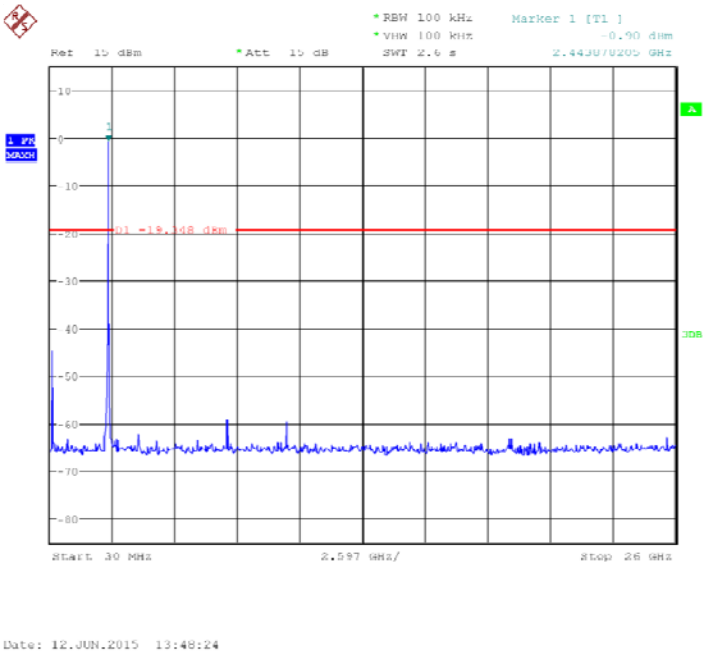


Fig.50 Conducted Spurious Emission (802.11n-20MHz, Ch11, 30MHz~26GHz)

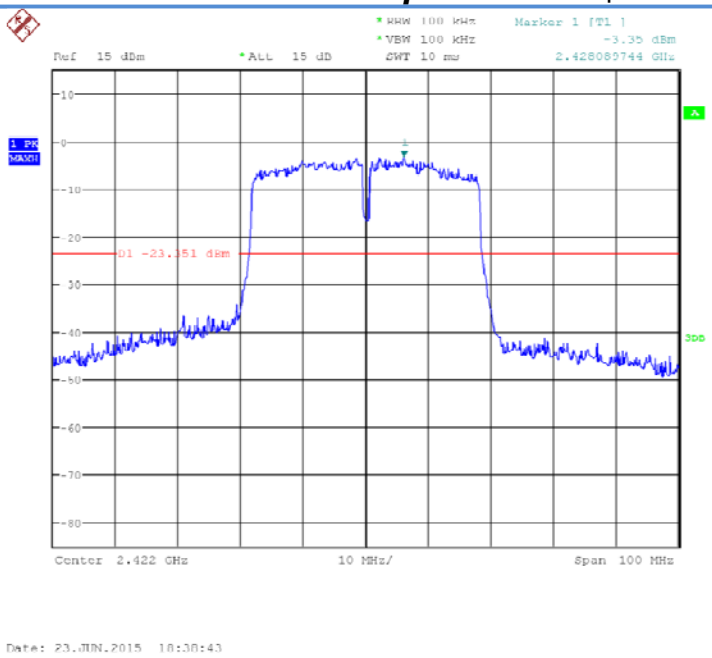


Fig.51 Conducted Spurious Emission (802.11n-40MHz, Ch3)

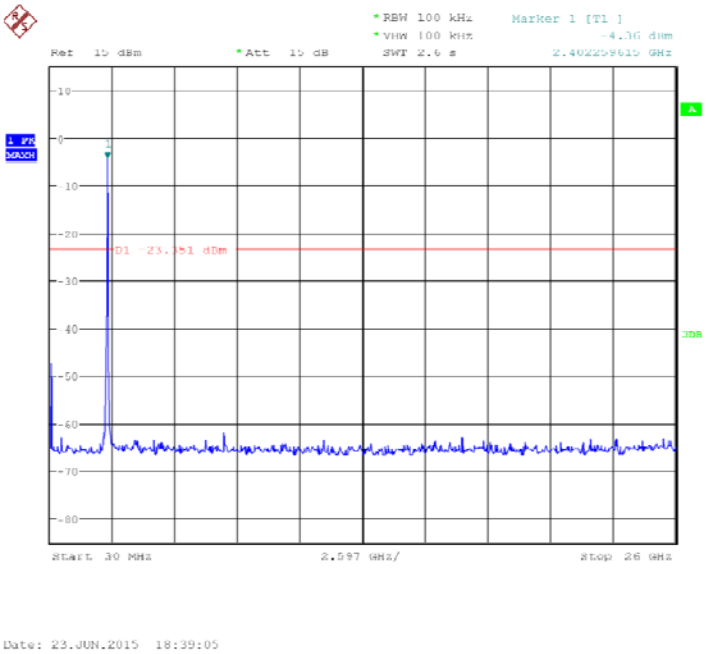


Fig.52 Conducted Spurious Emission (802.11n-40MHz, Ch11, 30MHz~26GHz)

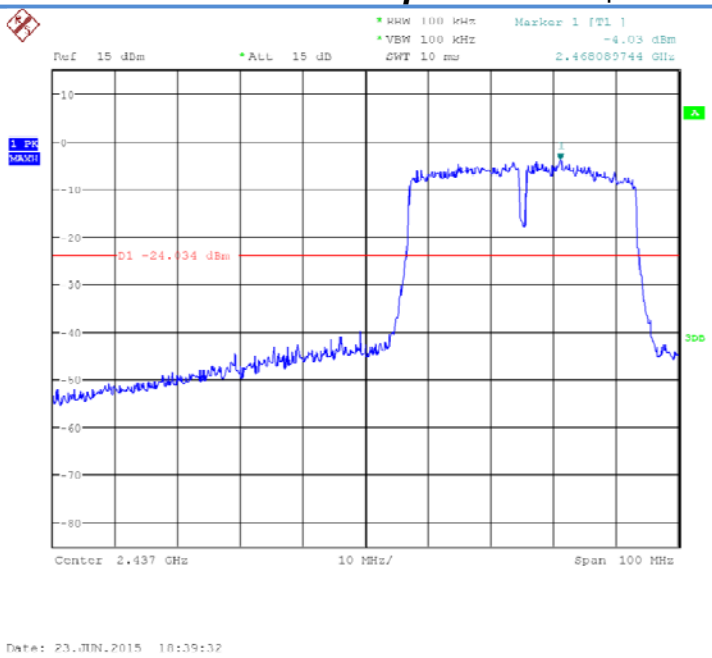


Fig.53 Conducted Spurious Emission (802.11n-40MHz, Ch6)

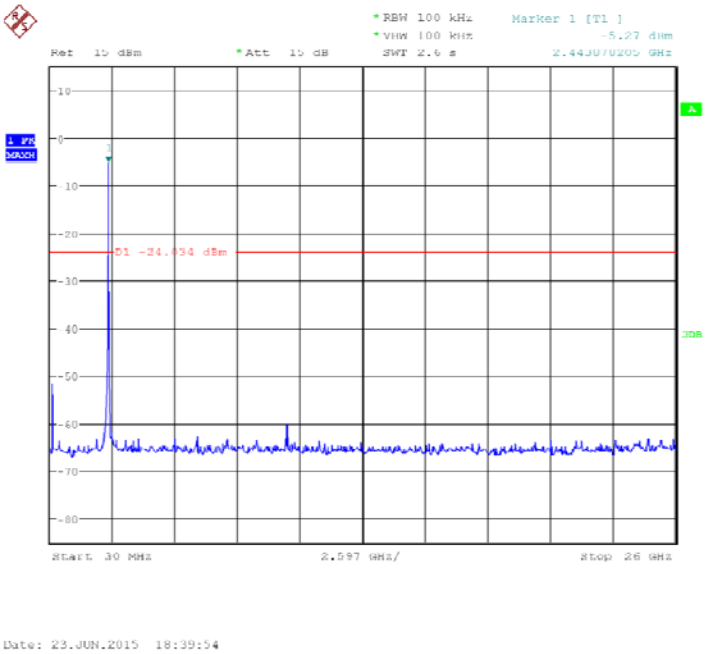


Fig.54 Conducted Spurious Emission (802.11n-40MHz, Ch11, 30MHz~26GHz)

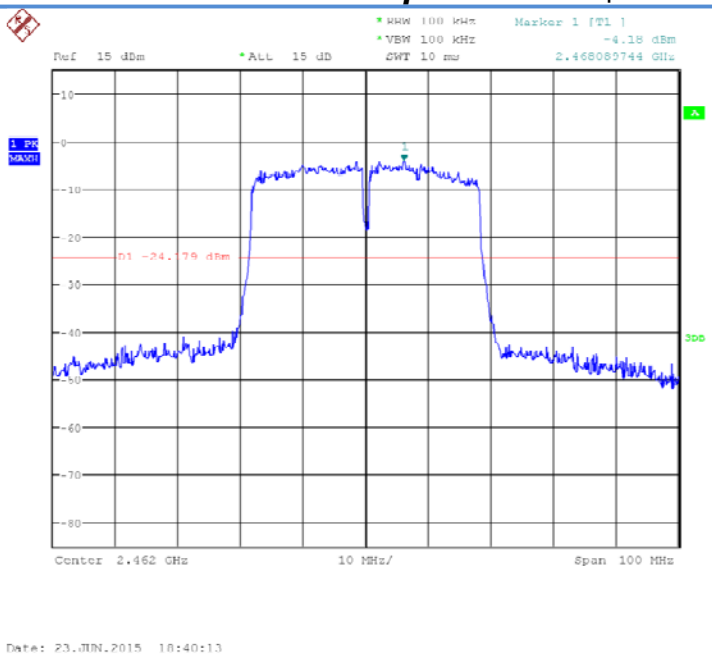


Fig.55 Conducted Spurious Emission (802.11n-40MHz, Ch11)

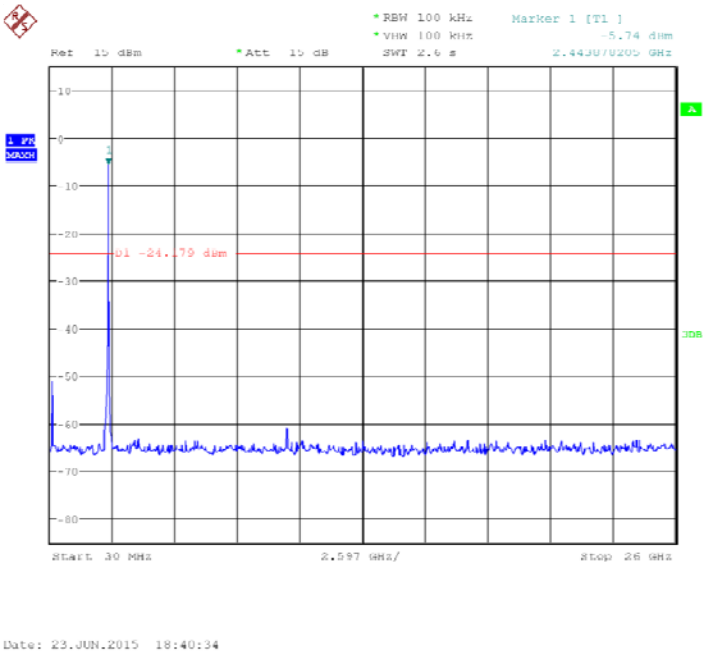


Fig.56 Conducted Spurious Emission (802.11n-40MHz, Ch11, 30MHz~26GHz)

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

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 C63.4-2009 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

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

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

802.11b/g mode

Mode	Channel	Frequency Range	Test Results	Conclusion

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

802.11n mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n(20MHz)	Power	2.38GHz~2.45GHz	Fig.67	P
	Power	2.45GHz~2.5GHz	Fig.68	P
	1	30MHz~1GHz	Fig.69	P
		1GHz~3GHz	Fig.70	P
		3GHz~18GHz	Fig.71	P
/	All channels	18GHz~26.5GHz	Fig.72	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

33.743404	14.69	-26	40.69	V
34.4582	10.53	-25.9	36.43	V
89.536432	4.79	-25.5	30.29	H
253.402256	9.54	-22	31.54	H
819.42666	19.64	-9.6	29.24	V
923.573344	22.13	-7.3	29.43	V

Ch1 1GHz~3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2666.639616	53.35	9.6	43.75	H
2718.809807	53.43	9.8	43.63	H
2767.147308	53.26	10.2	43.06	V
2819.64	53.78	10.8	42.98	V
2860.273077	54.17	11.3	42.87	V
2979.424038	55.9	13.1	42.8	V

Ch1 3GHz~18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3804.690267	42.42	-1.6	44.02	H
4431.7684	42.34	-0.1	42.44	V
7367.194933	45.56	6	39.56	H
11004.8024	51.25	14.5	36.75	H
13345.31827	53.38	17.4	35.98	V
17538.97713	62.68	29.3	33.38	V

802.11g

Ch6 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.937088	16.35	-26	42.35	V

34.7902	10.76	-25.9	36.66	V
87.234104	4.98	-26.2	31.18	H
246.690976	9.51	-22.3	31.81	H
532.97312	15.13	-14.1	29.23	V
676.104888	17.59	-11.7	29.29	H

Ch11 1GHz~3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1671.2248	43.61	0	43.61	V
1947.8408	49.68	2	47.68	H
2162.6744	47.71	4.4	43.31	H
2596.961347	52.09	8.8	43.29	V
2705.28327	52.64	9.8	42.84	H
2993.893462	57.61	13.5	44.11	H

Ch11 3GHz~18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
5797.581667	44.41	3.3	41.11	H
9096.656733	47.43	8.3	39.13	V
13101.44647	51.96	16.8	35.16	H
14890.9944	55.99	22	33.99	V
16515.42213	59.61	26.7	32.91	H
17604.64933	63.11	29.5	33.61	H

802.11n-20MHz

Ch1 30MHz~1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
33.705808	16.38	-26	42.38	V
34.4354	11.98	-25.9	37.88	V

83.799212	8.43	-27.2	35.63	V
146.028348	2.86	-27.2	30.06	H
241.162452	9	-22.6	31.6	H
817.703808	19.65	-9.6	29.25	V

Ch1 1GHz~3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2669.419616	53.63	9.6	44.03	H
2757.722116	52.74	10.1	42.64	V
2881.059615	54.52	11.4	43.12	V
2931.7525	54.58	12	42.58	V
2965.759423	55.51	12.7	42.81	H
2986.384616	56.81	13.3	43.51	V

Ch1 3GHz~18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
3648.668867	43.03	-1.5	44.53	H
7314.981933	45.3	5.5	39.8	H
7987.0088	46.19	6.9	39.29	H
10494.3162	47.67	10.7	36.97	V
16287.2788	58.72	25.2	33.52	H
17893.54713	63.05	29.7	33.35	H

All Ch 18GHz~26.5GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
21179.000000	45.48	6.97	38.51	V
22748.950000	41.63	3.05	38.58	H
23684.800000	41.59	3.05	38.54	H

24633.400000	40.05	3.05	37.00	V
25567.550000	43.01	2.90	40.11	H
26066.500000	42.06	2.90	39.16	V

Test graphs as below:

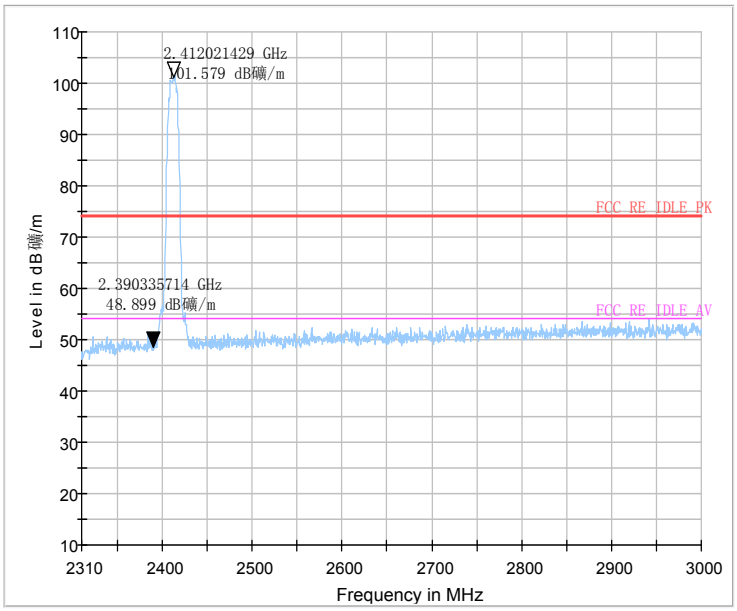


Fig.44 Radiated emission (Power): 802.11b, low channel

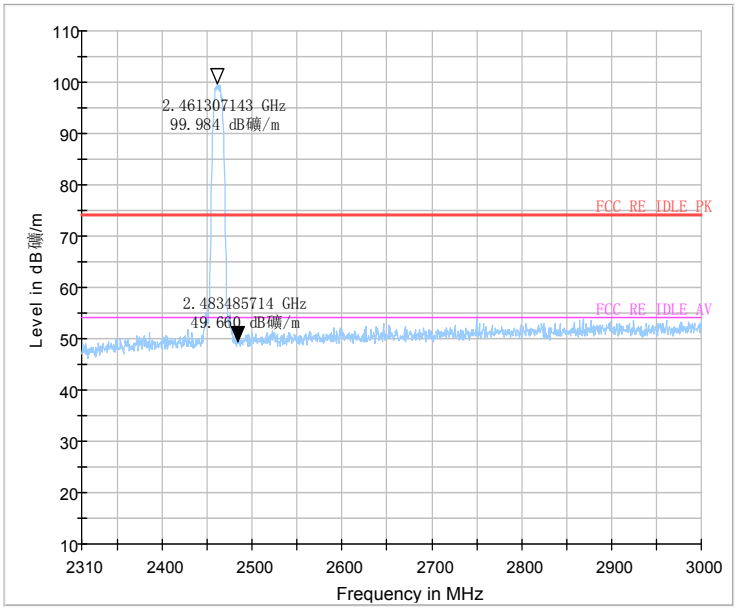


Fig.45 Radiated emission (Power): 802.11b, high channel

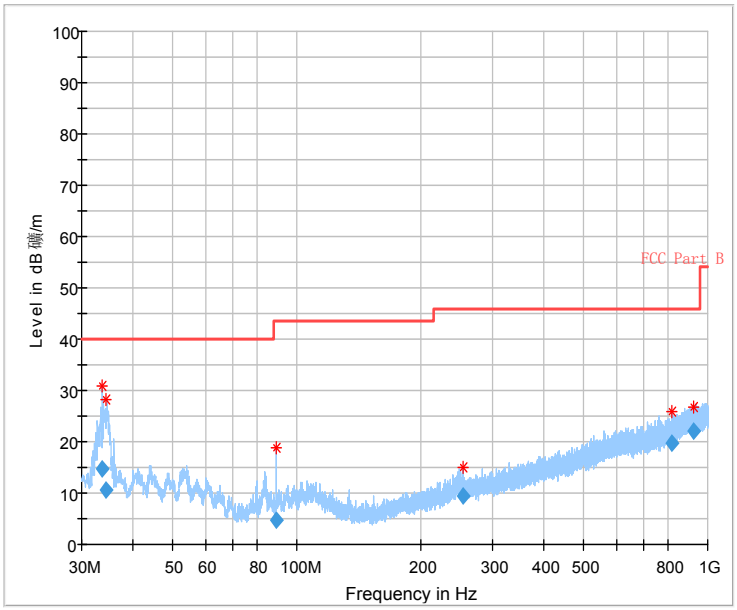


Fig.46 Radiated Spurious Emission (802.11b,Ch1,30MHz~1GHz)

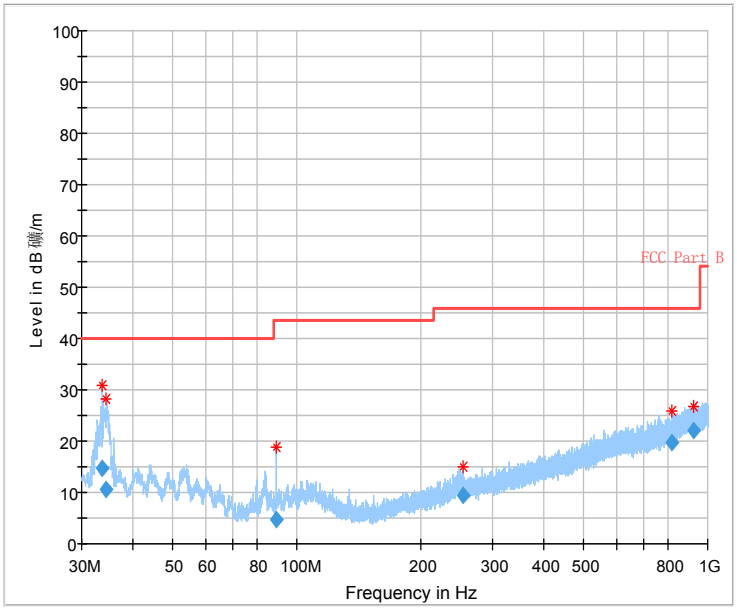


Fig.47 Radiated Spurious Emission (802.11b,Ch1,1GHz~3GHz)

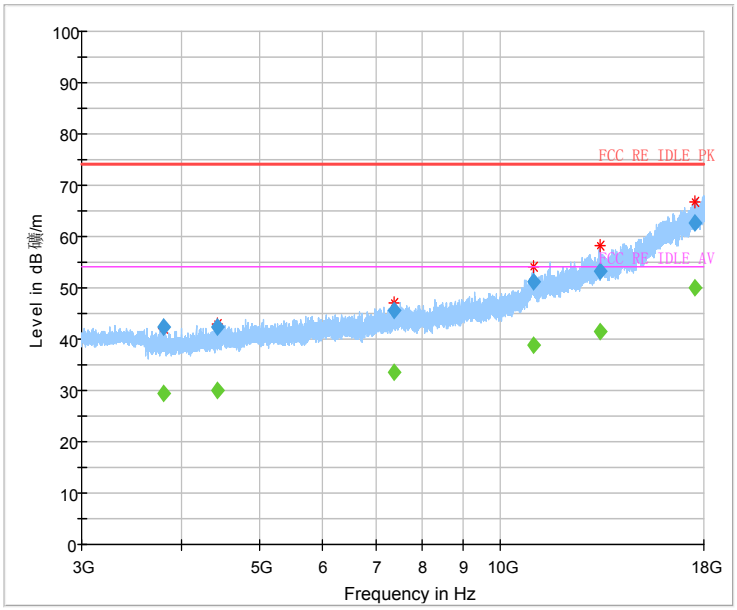
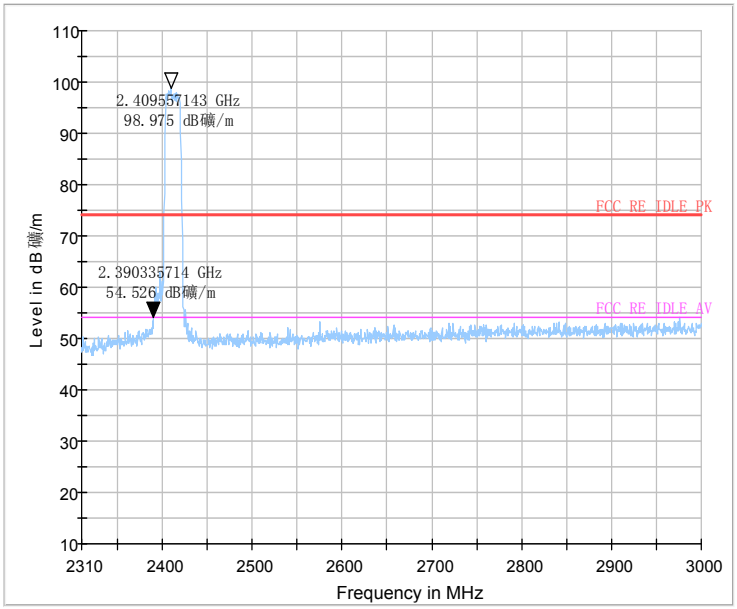
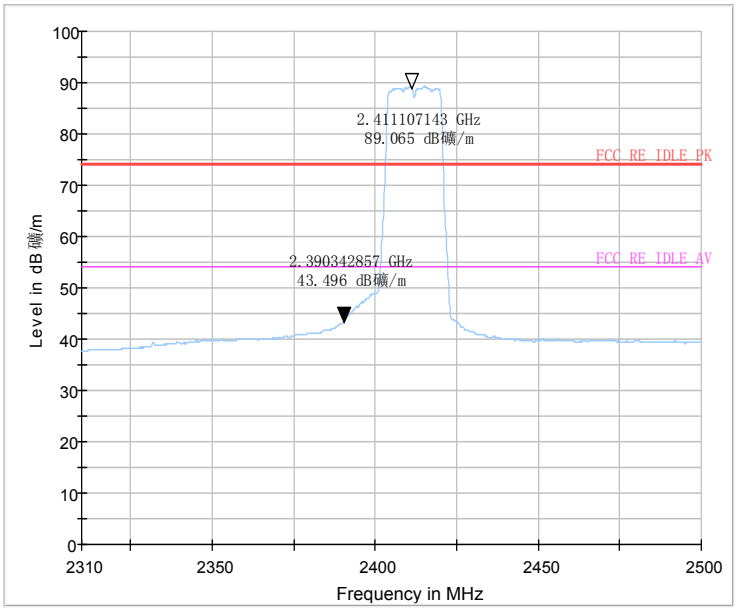


Fig.48 Radiated Spurious Emission (802.11b,Ch1,3GHz~18GHz)

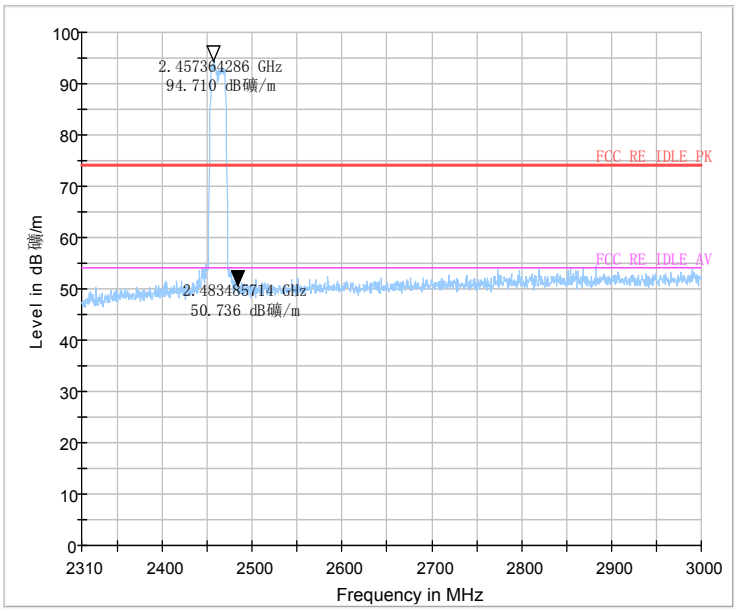


Peak detector



AV detector

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



Peak detector

Fig.50 Radiated emission (Power): 802.11g, high channel

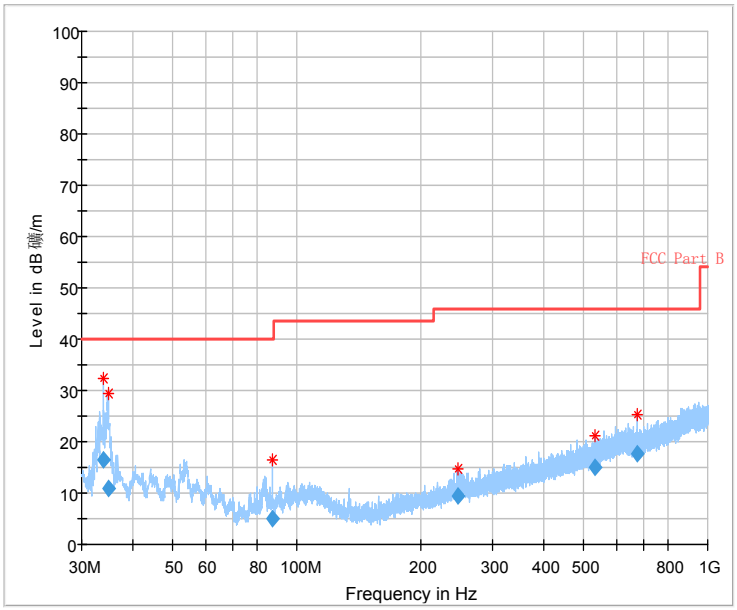


Fig.51 Radiated Spurious Emission (802.11g,Ch11,30MHz~1GHz)

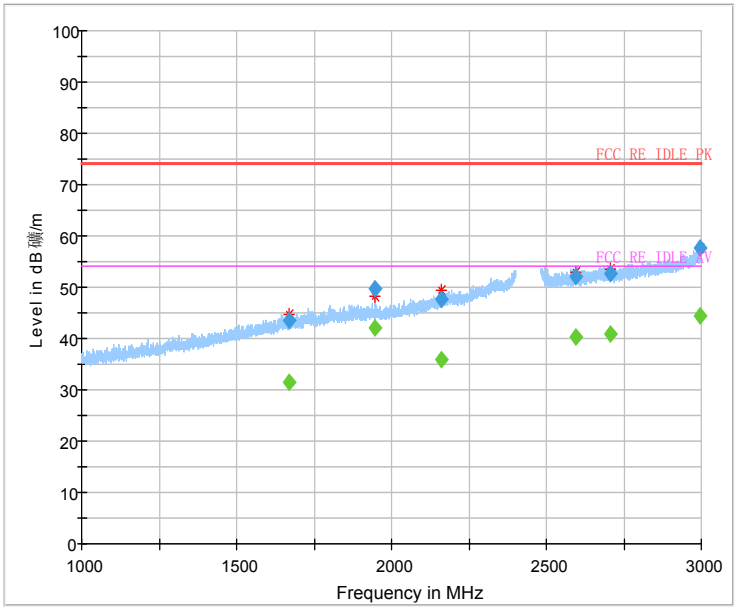


Fig.52 Radiated Spurious Emission (802.11g,Ch11,1GHz~3GHz)

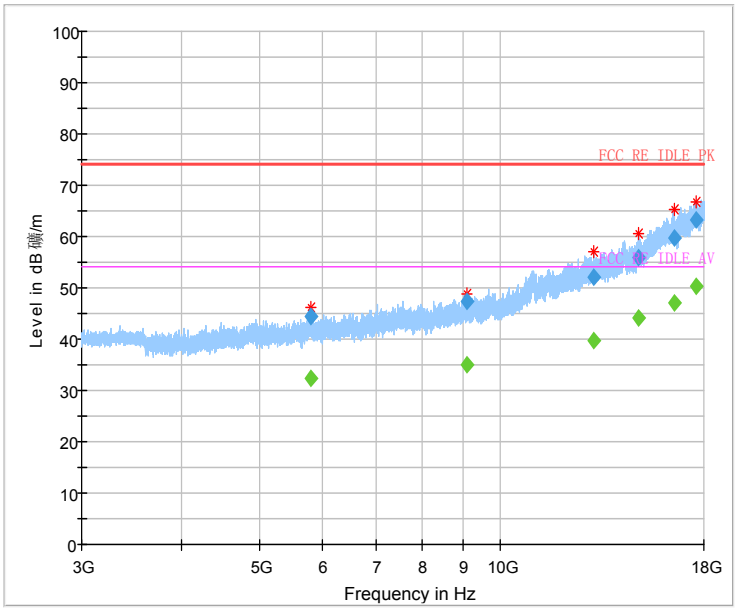
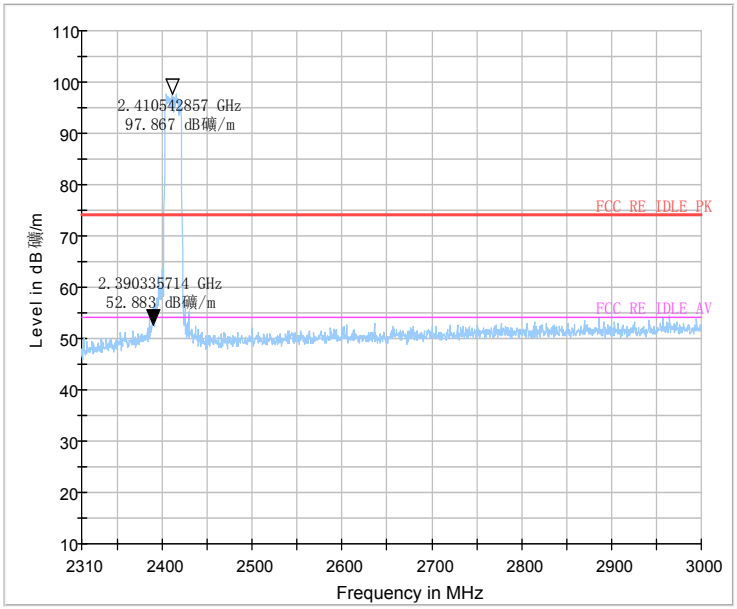
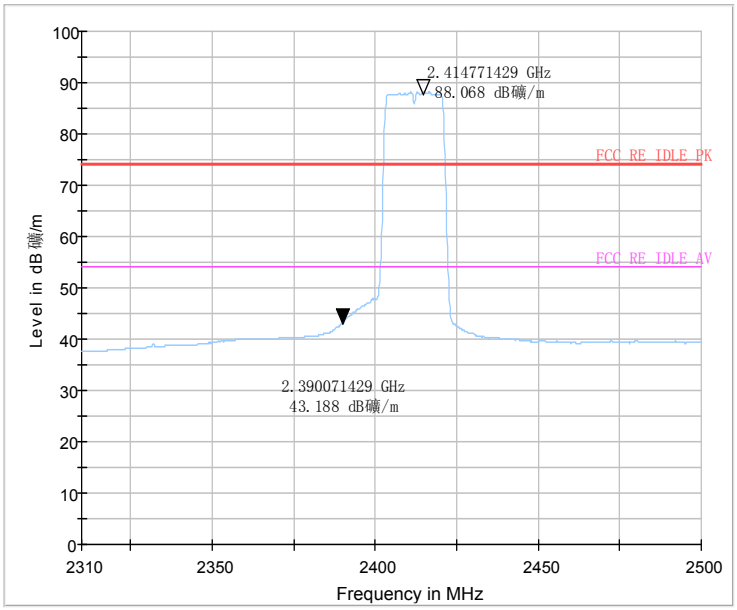


Fig.53 Radiated Spurious Emission (802.11g,Ch11,3GHz~18GHz)

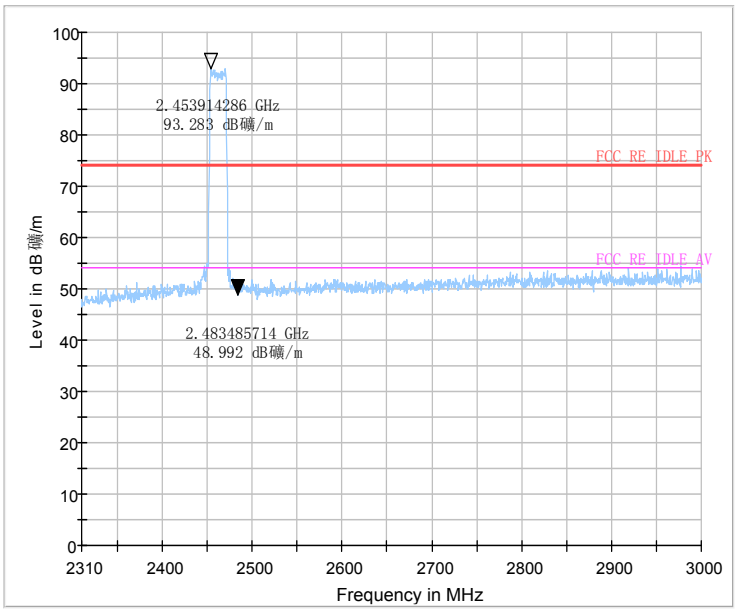


Peak detector



AV detector

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



Peak detector

Fig.55 Radiated emission (Power): 802.11n, high channel

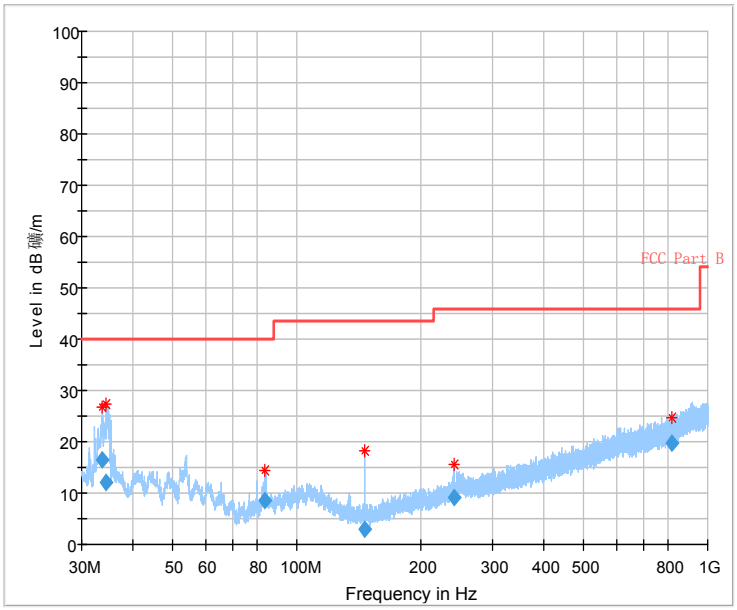


Fig.56 Radiated Spurious Emission (802.11 n-20MHz,Ch1,30MHz~1GHz)

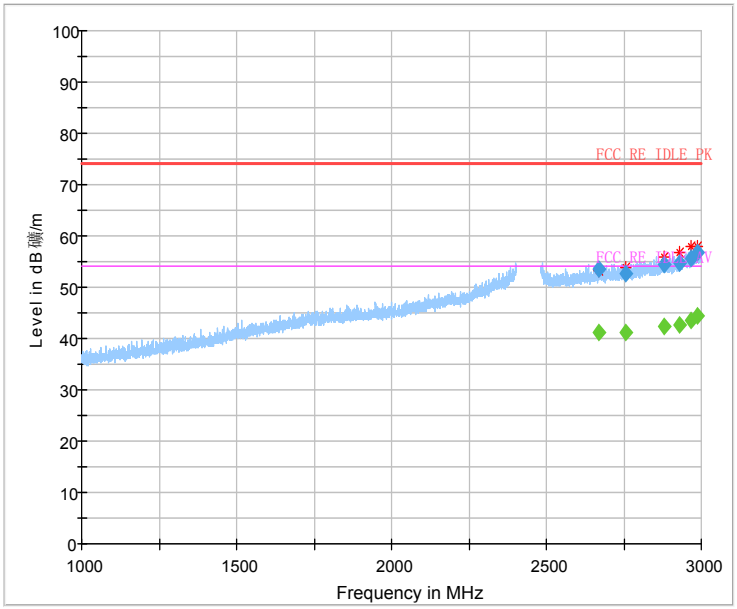


Fig.57 Radiated Spurious Emission (802.11 n-20MHz,Ch1,1GHz~3GHz)

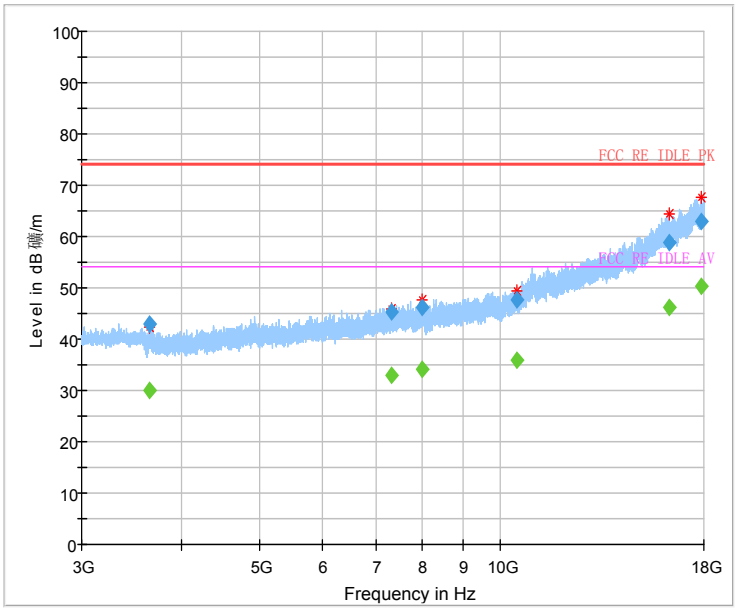


Fig.58 Radiated Spurious Emission (802.11 n-20MHz,Ch1,3GHz~18GHz)

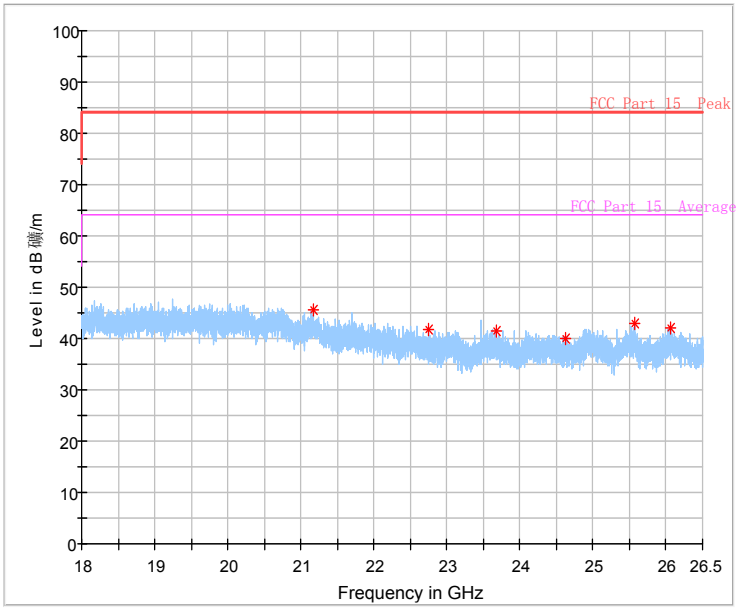


Fig.59 Radiated emission: GFSK, 18 GHz – 26.5 GHz

7. Test Equipments and Ancillaries Used For Tests

The test equipments and ancillaries used are as follows.

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Date	Cal.interval
1	Vector Signal Analyser	FSQ26	101096	Rohde&Schwarz	2015-05-13	1
2	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	2015-05-13	1

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Date	Cal.interval
1	Universal Radio Communicati	CMU200	123126	R&S	2015-05-13	1
2	Test Receiver	ESU40	100307	R&S	2015-05-13	1
3	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2014-11-05	3
4	Double Ridged Guide Antenna	ETS-3117	00135885	ETS	2014-05-06	3
5	2-Line V-Network	ENV216	101380	R&S	2015-05-13	1

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. = 30 ℃
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

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

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.8 meters×3.08 meters×3.53 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

Fully-anechoic chamber2 (Tapered Section: 8.75 meters×3.66 meters×3.66 meters, Rectangular Section: 7.32 meters×3.97 meters×3.66 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. = 35 %, Max. = 60 %

Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 30MHz to 40000MHz

ANNEX A. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

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