Full

TEST REPORT

No. I18D00233-SRD08

For

Client :	**Shanghai Sunmi Technology Co.,Ltd.**
Production :	**Wireless data POS System**
Model Name :	**T5921**
Brand Name :	**SUNMI**
FCC ID:	**2AH25T5921**
Hardware Version:	**QP1665_MB_PCB_V1**
Software Version:	**zqp1665_V002_181121**
Issued date:	**2020-01-19**

NOTE

1. The test results in this test report relate only to the devices specified in this report.
2. This report shall not be reproduced except in full without the written approval of East China Institute of Telecommunications.
3. KDB 789033 standard has not been approved by A2LA.
4. For the test results, the uncertainty of measurement is not taken into account when judging the compliance with specification, and the results of measurement or the average value of measurement results are taken as the criterion of the compliance with specification directly.

Test Laboratory:
East China Institute of Telecommunications
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Revision Version

Report Number	Revision	Date	Memo
I18D00233-SRD08	00	2019-01-17	Initial creation of test report
I18D00233-SRD08	01	2019-01-23	Second creation of test report
I18D00233-SRD08	02	2020-01-19	third 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:	Building 4, No. 766, Jingang Road, Pudong, Shanghai, P.R. China
Postal Code:	201206
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301
FCC registration No	958356

1.2. Testing Environment

Normal Temperature:	15℃-35℃
Relative Humidity:	20%-75%

1.3. Project data

Project Leader:	Yu Anlu
Testing Start Date:	2018-12-13
Testing End Date:	2019-01-09

1.4. Signature

Liu Yan
(Prepared this test report)

Fan Songyan
(Reviewed this test report)

Zheng Zhongbin
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Telephone	18721763396
Postcode	200433

2.2. Manufacturer Information

Company Name	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai, China
Telephone	18721763396
Postcode	200433

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

3.1. About EUT

Production	Wireless data POS System
Model name	T5921
FCC ID	2AH25T5921
WLAN Frequency Range(5.8G)	ISM Bands: 5725MHz-5850MHz
GSM Frequency Band	GSM850/GSM900/GSM1800/GSM1900
UMTS Frequency Band	Band 1/2/4/5
CDMA Frequency Band	BC0/BC1
LTE Frequency Band	Band 2/4/7/17
Additional Communication Function	BT/BLE/2.4G WLAN 802.11 b/g/n20/n40/5G WLAN 802.11 a/n20/n40
WLAN type of modulation	OFDM
Extreme Temperature	-10℃-+55℃
Nominal Voltage	7.6V
Extreme High Voltage	8.7V
Extreme Low Voltage	7V

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*	Model Name	SN or IMEI	HW Version	SW Version	Date of receipt
N01	T5921	/	QP1665_MB _PCB_V1	zqp1665_V002_ 181121	2018-12-13
N07	T5921	/	QP1665_MB _PCB_V1	zqp1665_V002_ 181121	2018-12-13

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---

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

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; Subpart E—Unlicensed National Information Infrastructure Devices	2018/10/1
ANSI 63.10	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2013
UNII: KDB 789033	Information Infrastructure (U-NII) Devices - Part 15, Subpart E	2017

5. Test Results

5.1. Summary of Test Results

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

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15E	Verdict
Maximum Output Power	15.407	**P**
Power Spectral Density	15.407	**P**
Occupied 6dB Bandwidth	15.403	**P**
Band edge compliance	15.407	**P**
Transmitter Spurious Emission - Conducted	15.407	**P**
Transmitter Spurious Emission - Radiated	15.407	**P**
AC Powerline Conducted Emission	15.407	**P**

Note: Please refer to section 6 for detail; please refer to Annex A in this test report for the detailed test results.

The following terms are used in the above table.

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.

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	25℃
Voltage	Vnom	3.8V
Humidity	Hnom	47%

5.2. Notes

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

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

5.3. Statements

The T5921, supporting GSM/GPRS/EDGE/WCDMA/CDMA/LTE/BT/BLE/WLAN, manufactured by Shanghai Sunmi Technology Co.,Ltd., which is a new product for testing.

ECIT only performed test cases which identified with P/NM/NA/F results in Annex A.

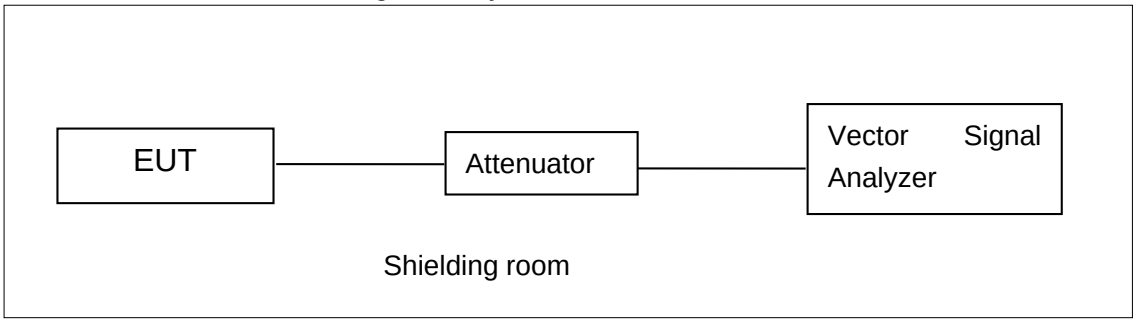
ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

6. Test result

6.1. Measurement Method

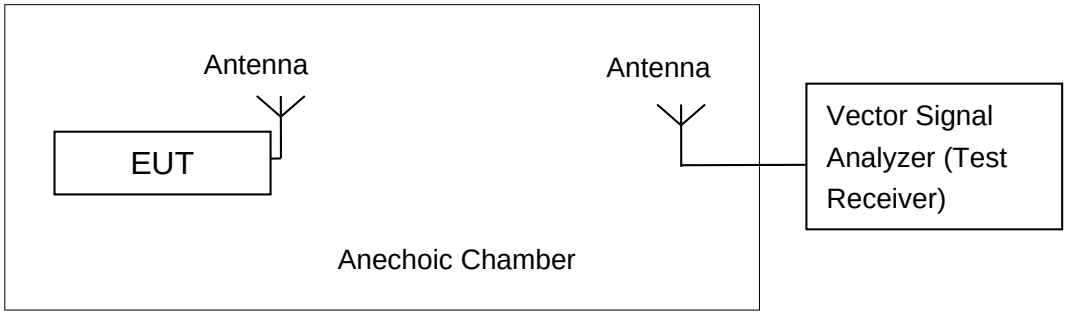
6.1.1. Conducted Measurements

1). Connect the EUT to the test system correctly.
2). Set the EUT to the required work mode.
3). Set the EUT to the required channel.
4). Set the spectrum analyzer to start measurement.
5). Record the values. Vector Signal Analyzer



6.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,
Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;
Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 10Hz;



The measurement is made according to ANSI C63.10.
The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

6.2. Maximum Average Output Power-Conducted

Measurement Limit and Method:

Standard	Limit (dBm)
FCC CRF Part 15.407(a)	< 30

Method of Measurement: See ANSI C63.10-clause 12.3.2.2 Method SA-1

Set the spectrum analyzer in the following:

Detector: RMS.

RBW=1MHz.

VBW=3MHz.

Sweep time = AUTO.

Span:30MHz (for 20MHz); 50MHz (for 40MHz).

802.11a mode

U-NII-3

Mode	Data Rate(Mbps)	Teat Result(dBm)		
		5745MHz(Ch149)	5785MHz(Ch157)	5825MHz(Ch165)
802.11a	6	13.84	13.4	15.08

The data rate 6Mbps is selected as worse condition, and the following cases are performed with this condition.

802.11n-HT20 mode

U-NII-3

Mode	Data Rate(Index)	Teat Result(dBm)		
		5745MHz	5785MHz	5825MHz
802.11n(20MHz)	MCS0	11.94	11.66	13.45

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

802.11n-HT40 mode

U-NII-3

Mode	Data Rate(Index)	Teat Result(dBm)		
		5755MHz	/	5795MHz
802.11n(40MHz)	MCS0	12.51	/	12.27

The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

Conclusion: PASS

6.3. Peak Power Spectral Density (conducted)

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.407(a)	< 30 dBm/500 kHz

The measurement is made according to ANSI C63.10 and KDB789033 D02

Measurement Results:

Mode	Channel	Power Spectral Density (dBm/500kHz)		Conclusion
802.11a	149	Fig.1	5.385	P
	157	Fig.2	3.817	P
	165	Fig.3	5.316	P
802.11n HT20	149	Fig.4	1.45	P
	157	Fig.5	0.73	P
	165	Fig.6	3.213	P
802.11n HT40	151	Fig.7	-0.638	P
	159	Fig.8	-0.966	P

Conclusion: PASS

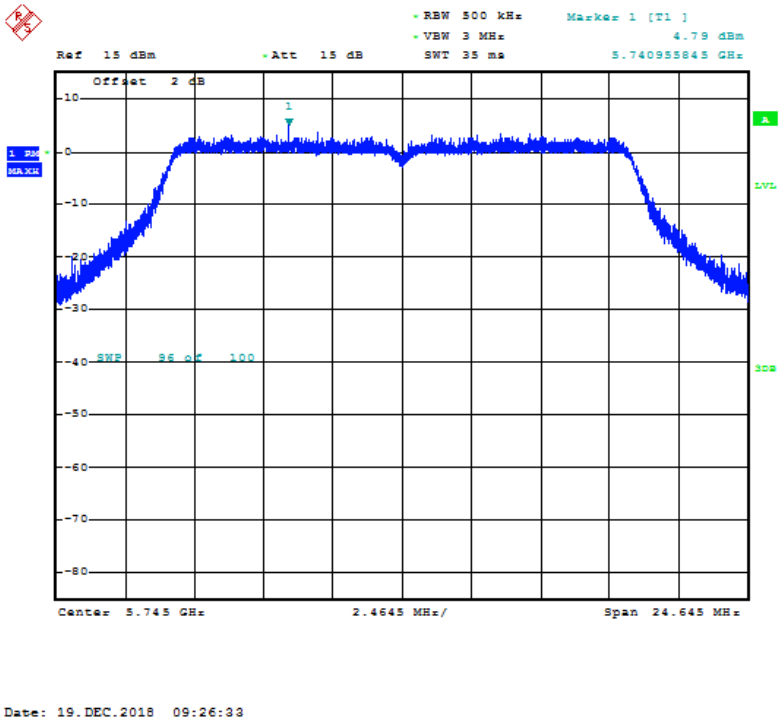


Fig. 1 Power Spectral Density (802.11a, Ch 149)

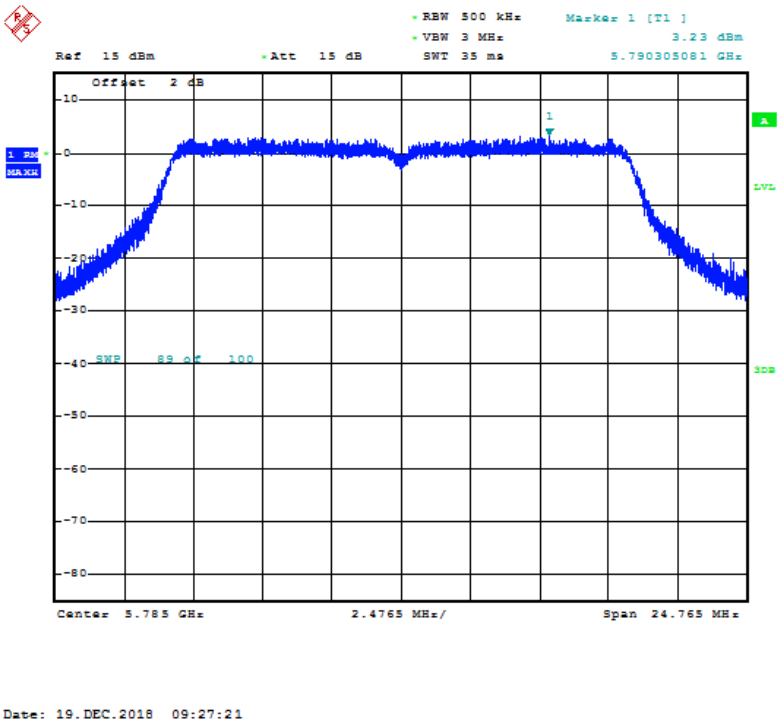


Fig. 2 Power Spectral Density (802.11a, Ch 157)

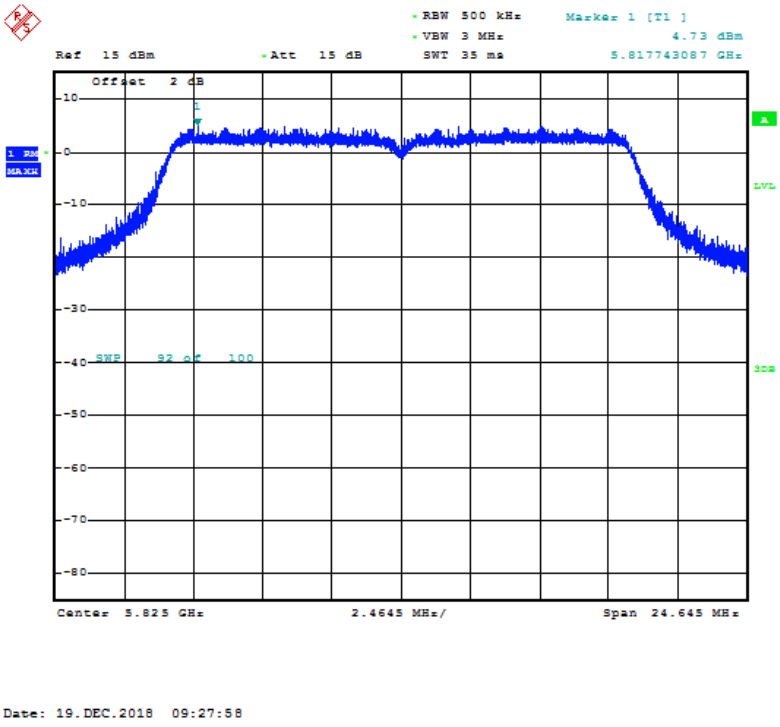


Fig. 3 Power Spectral Density (802.11a, Ch 165)

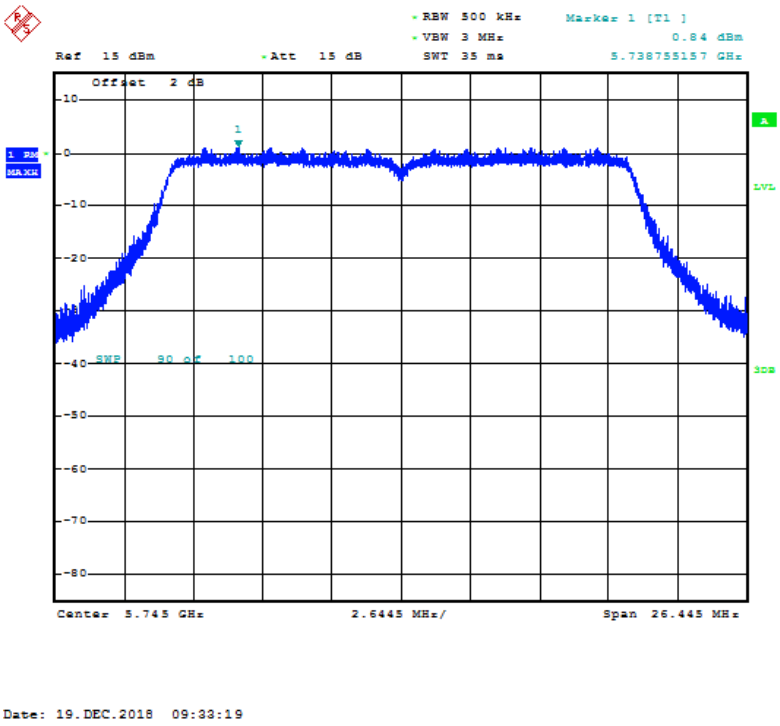


Fig. 4 Power Spectral Density (802.11n-HT20, Ch 149)

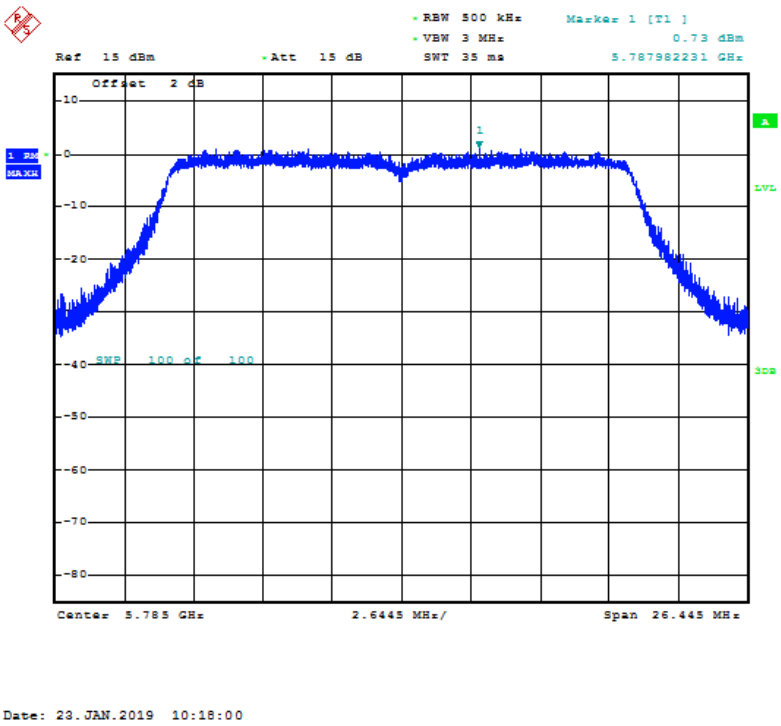


Fig. 5 Power Spectral Density (802.11n-HT20, Ch 157)

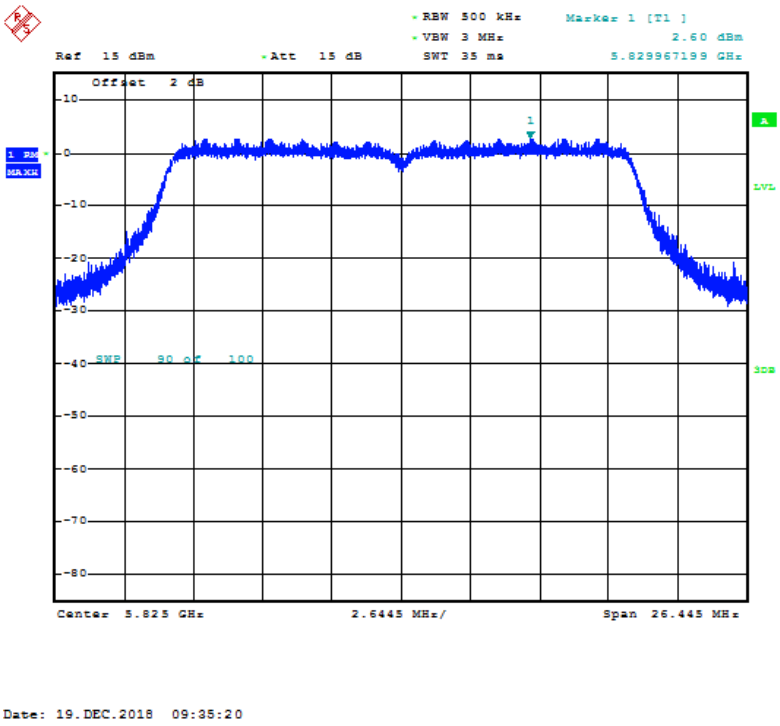


Fig. 6 Power Spectral Density (802.11n-HT20, Ch 165)

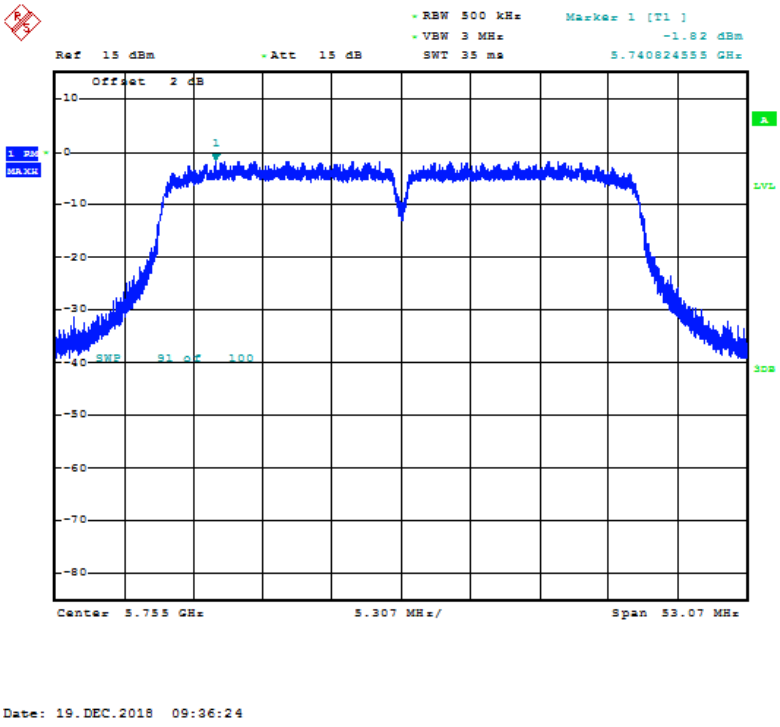


Fig. 7 Power Spectral Density (802.11n-HT40, Ch 151)

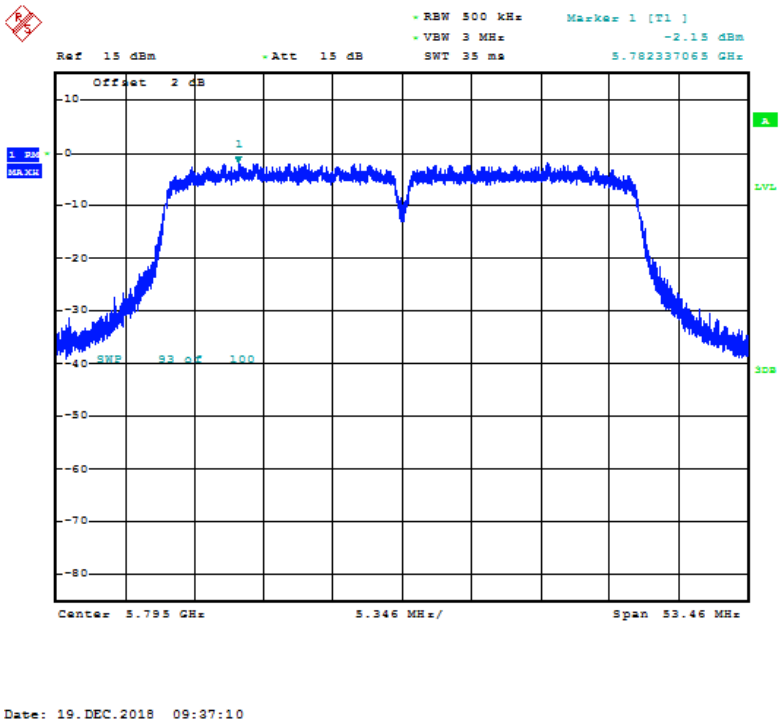


Fig. 8 Power Spectral Density (802.11n-HT40, Ch 159)

6.4. Occupied 6dB Bandwidth(conducted)

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.403 (i)	/

The measurement is made according to KDB 789033

Measurement Result:

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
802.11a	149	Fig.9	16.43	P
	157	Fig.10	16.51	P
	165	Fig.11	16.43	P
802.11n HT20	149	Fig.12	17.63	P
	157	Fig.13	17.63	P
	165	Fig.14	17.63	P
802.11n HT40	151	Fig.15	35.38	P
	159	Fig.16	35.64	P

Conclusion: PASS

Test graphs as below:

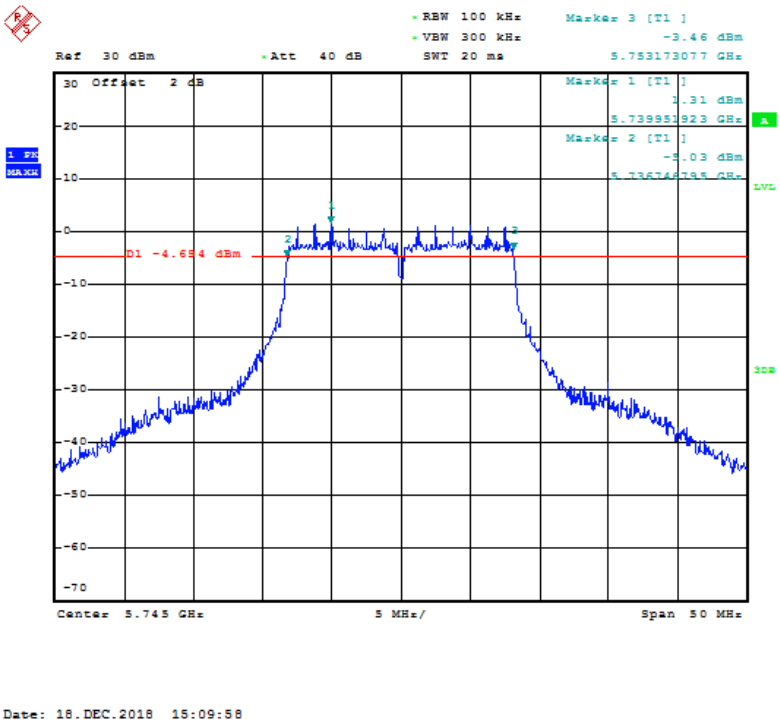


Fig. 9 Occupied 6dB Bandwidth (802.11a, Ch 149)

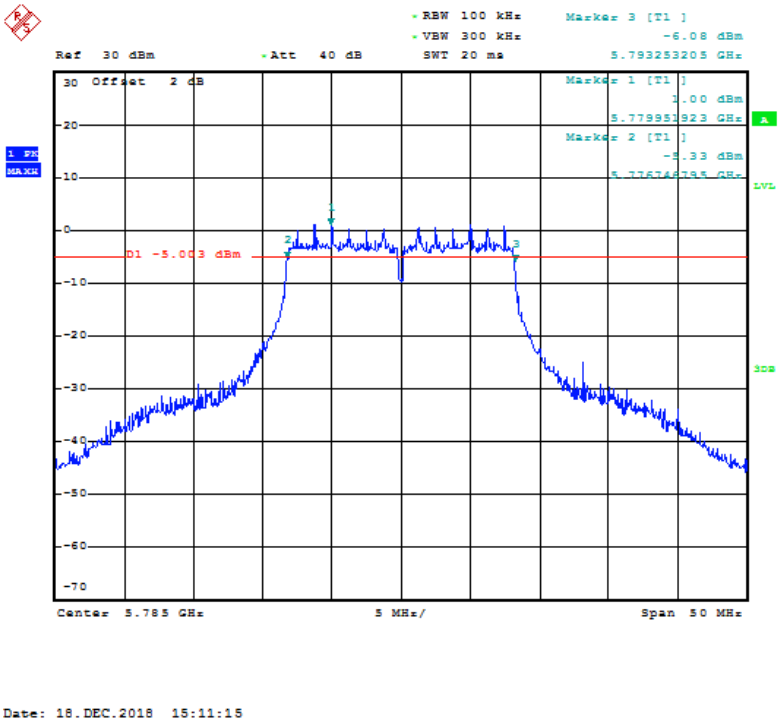


Fig. 10 Occupied 6dB Bandwidth (802.11a, Ch 157)

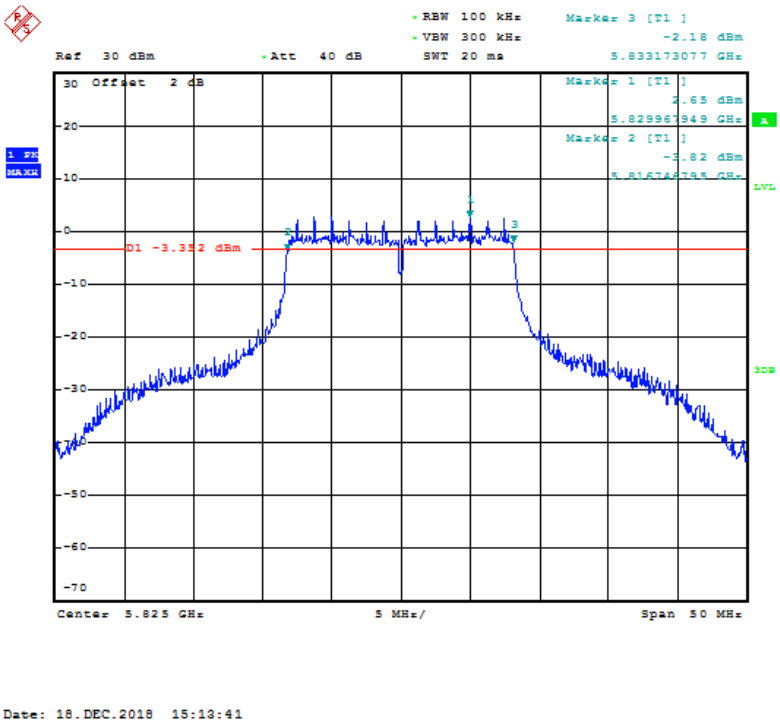


Fig. 11 Occupied 6dB Bandwidth (802.11a, Ch 165)

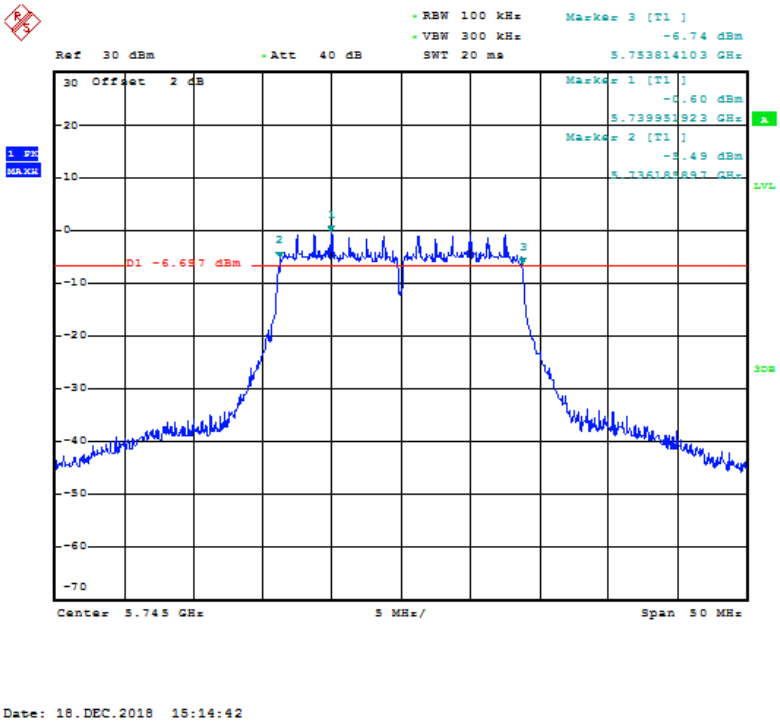


Fig. 12 Occupied 6dB Bandwidth (802.11n-HT20, Ch 149)

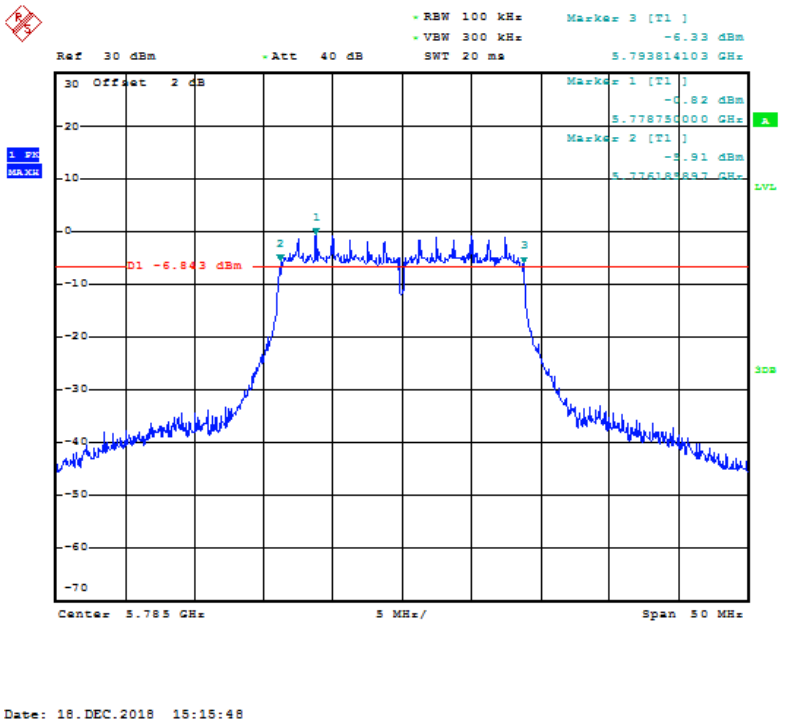


Fig. 13 Occupied 6dB Bandwidth (802.11n-HT20, Ch 157)

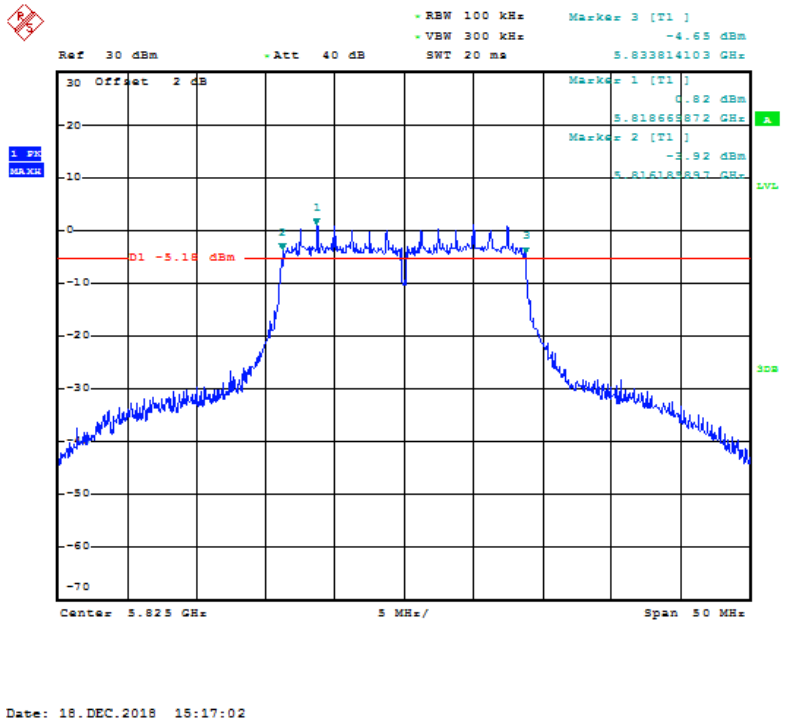


Fig. 14 Occupied 6dB Bandwidth (802.11n-HT20, Ch 165)

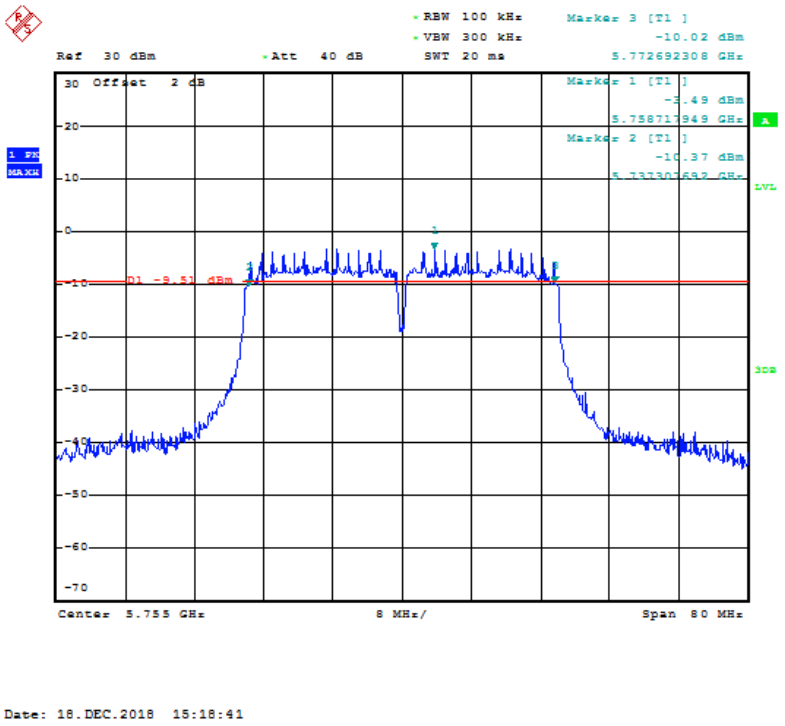


Fig. 15 Occupied 6dB Bandwidth (802.11n-HT40, Ch 151)

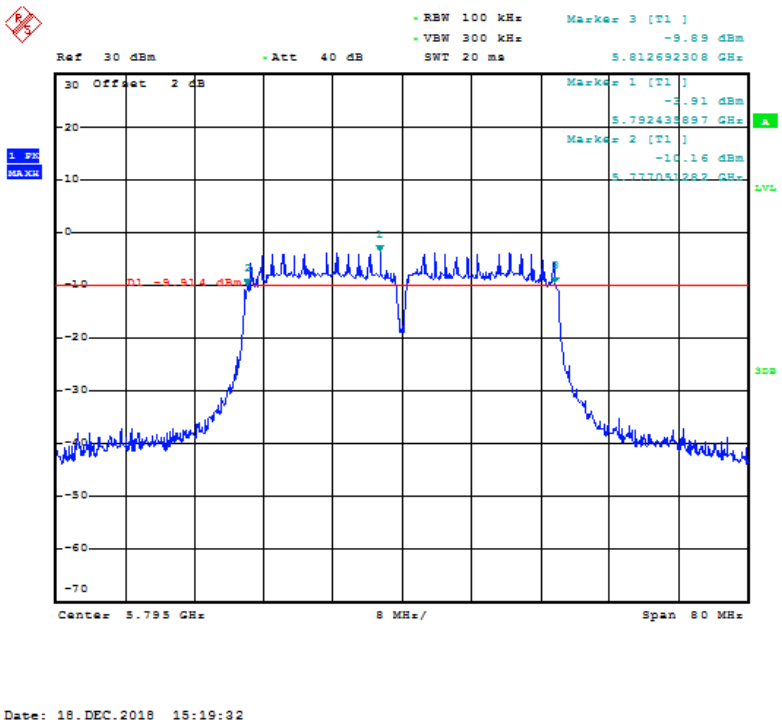


Fig. 16 Occupied 6dB Bandwidth (802.11n-HT40, Ch 159)

6.5. Transmitter Spurious Emission

Measurement Limit:

Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC 47 CFR Part 15.407	5725MHz~5850MHz	< -27

The measurement is made according to ANSI C63.10 .

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
0.009-0.490	2400/F(kHz)	/
0.490-1.705	24000/F(kHz)	/
1.705-30	30	/
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Measurement Uncertainty:

Frequency Range	Uncertainty(dB)
30MHz ≤ f ≤ 1GHz	0.63
1GHz ≤ f ≤5.6GHz	1.55
5.6GHz ≤ f ≤40GHz	1.86

6.5.1 Transmitter Spurious Emission – Conducted

Modulation type and data rate tested (Only worst case result is given below):

Mode	Data rate	Channel
802.11a	6Mbps	165(5825MHz)
802.11n-HT20	MCS0	165(5825MHz)
802.11n-HT40	MCS0	151(5755MHz)

Measurement Results:

802.11a mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11a	165(5825MHz)	30 MHz ~ 1 GHz	Fig.17	P
		1 GHz ~ 5.7 GHz	Fig.18	P
		5.9 GHz ~ 40 GHz	Fig.19	P

802.11n-HT20 mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11n HT20	165(5825MHz)	30 MHz ~ 1 GHz	Fig.20	P
		1 GHz ~ 5.7 GHz	Fig.21	P

		5.9 GHz ~ 40 GHz	Fig.22	P

802.11n-HT40 mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11n HT40	151(5755MHz)	30 MHz ~ 1 GHz	Fig.23	P
		1 GHz ~ 5.7 GHz	Fig.24	P
		5.9 GHz ~ 40 GHz	Fig.25	P

Conclusion: PASS

Test graphs as below:

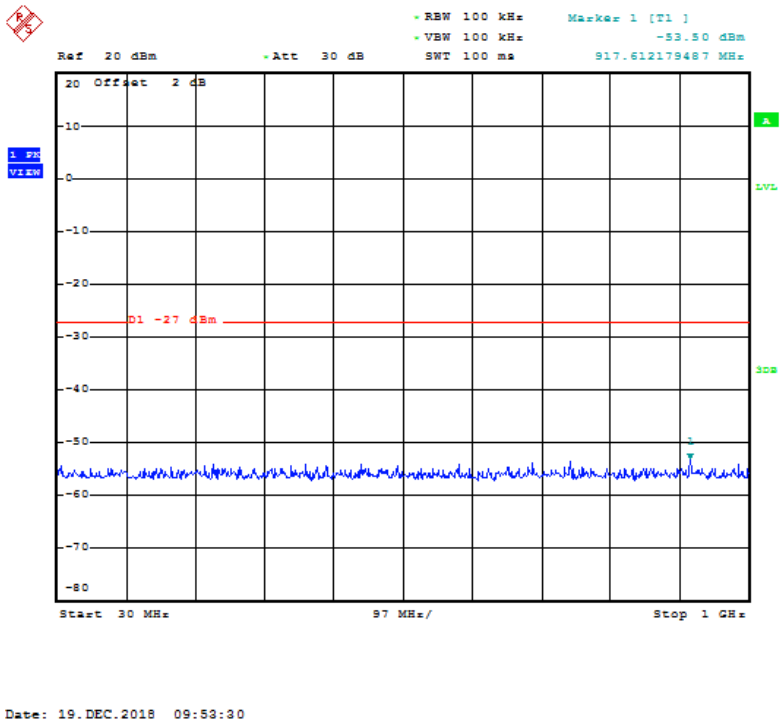


Fig. 17 Conducted Spurious Emission (802.11a, Ch165, 30 MHz-1 GHz)

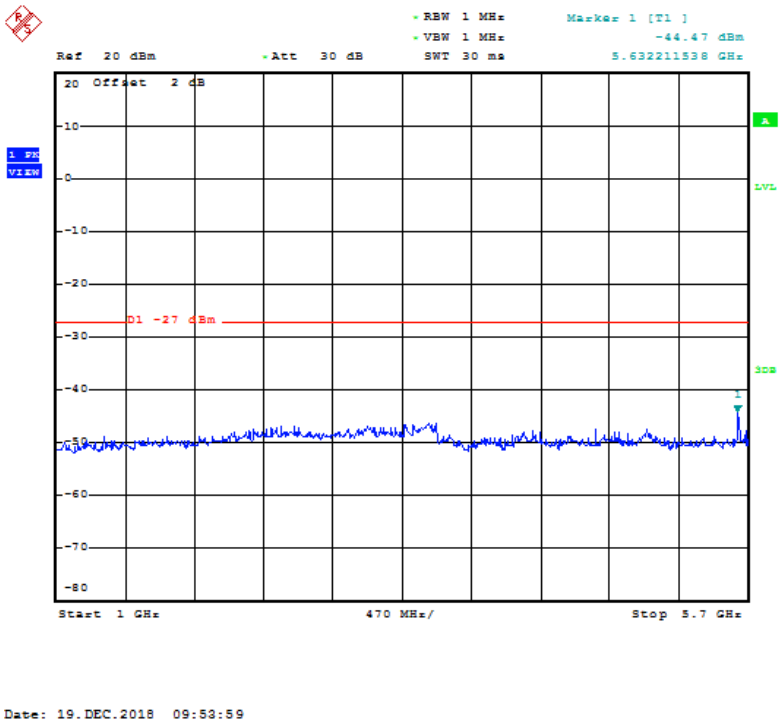


Fig. 18 Conducted Spurious Emission (802.11a, Ch165, 1 GHz -5.7 GHz)

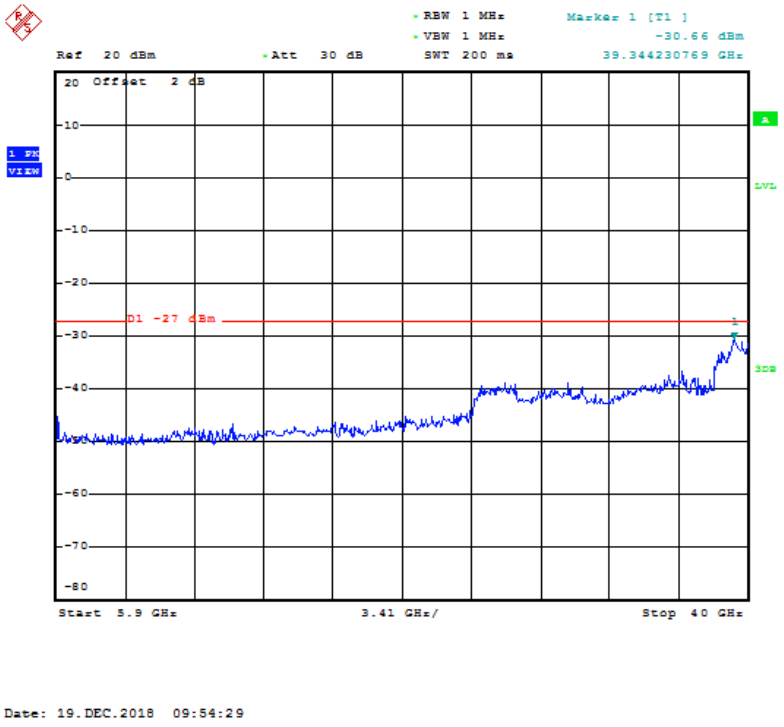


Fig. 19 Conducted Spurious Emission (802.11a, Ch165, 5.9 GHz-40 GHz)

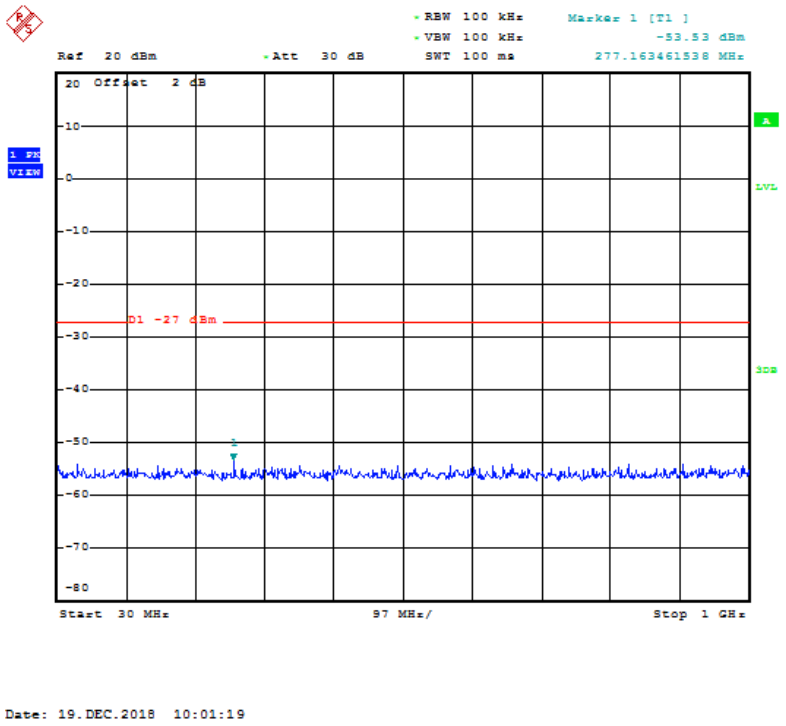


Fig. 20 Conducted Spurious Emission (802.11n-HT20, Ch165, 30 MHz-1 GHz)

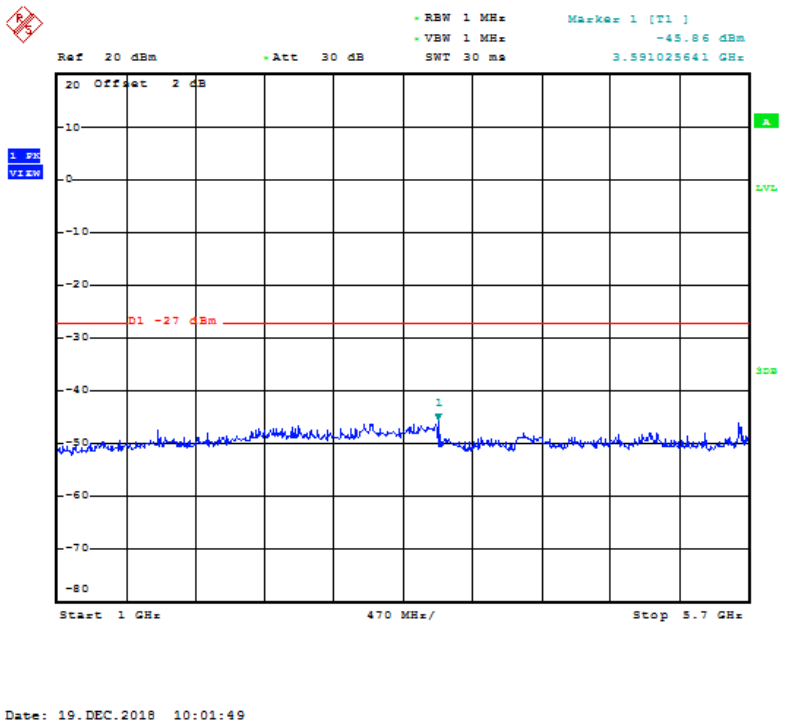


Fig. 21 Conducted Spurious Emission (802.11n-HT20, Ch165, 1 GHz -5.7 GHz)

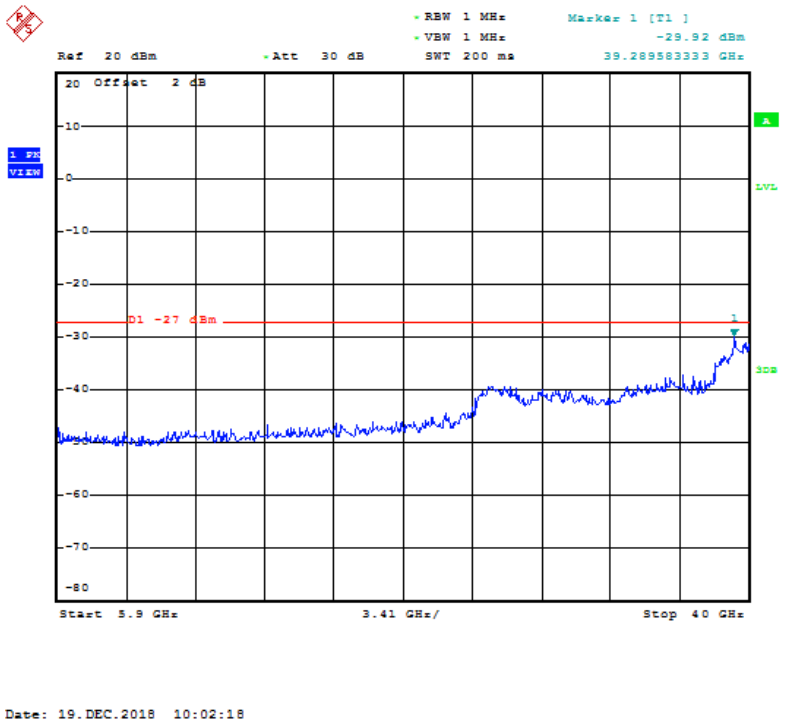


Fig. 22 Conducted Spurious Emission (802.11n-HT20, Ch165, 5.9 GHz-40 GHz)

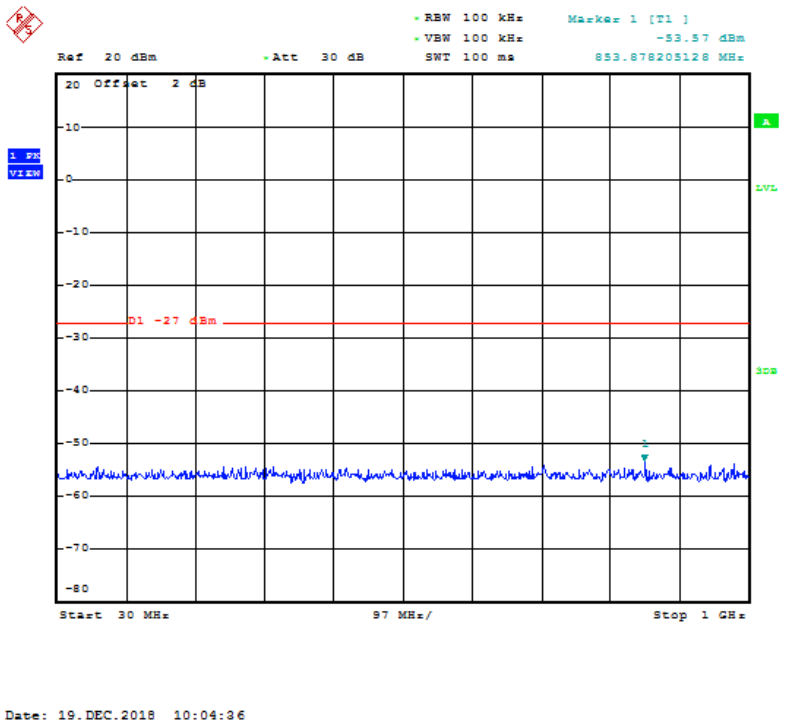


Fig. 23 Conducted Spurious Emission (802.11n-HT40, Ch151, 30 MHz-1 GHz)

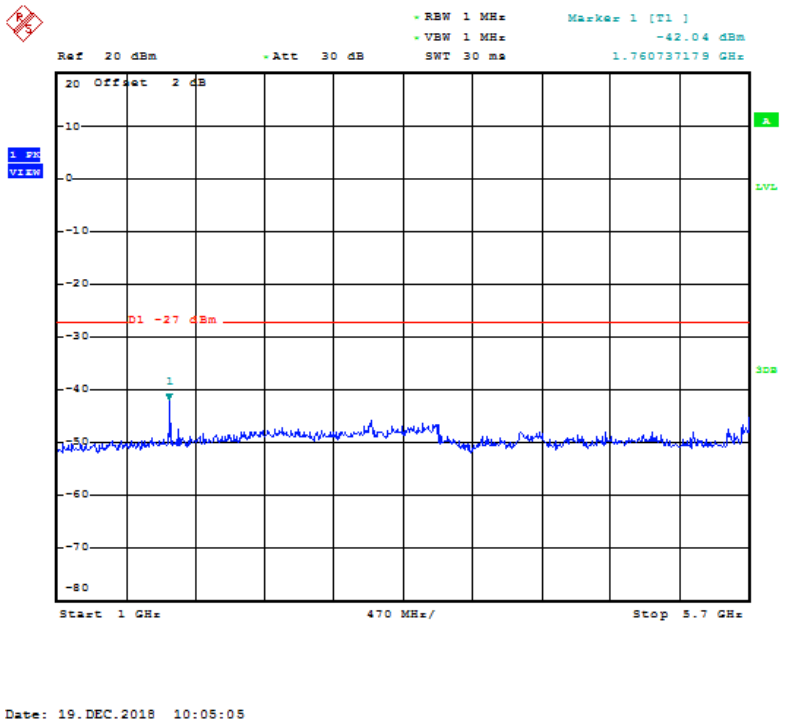


Fig. 24 Conducted Spurious Emission (802.11n-HT40, Ch151, 1 GHz -5.7 GHz)

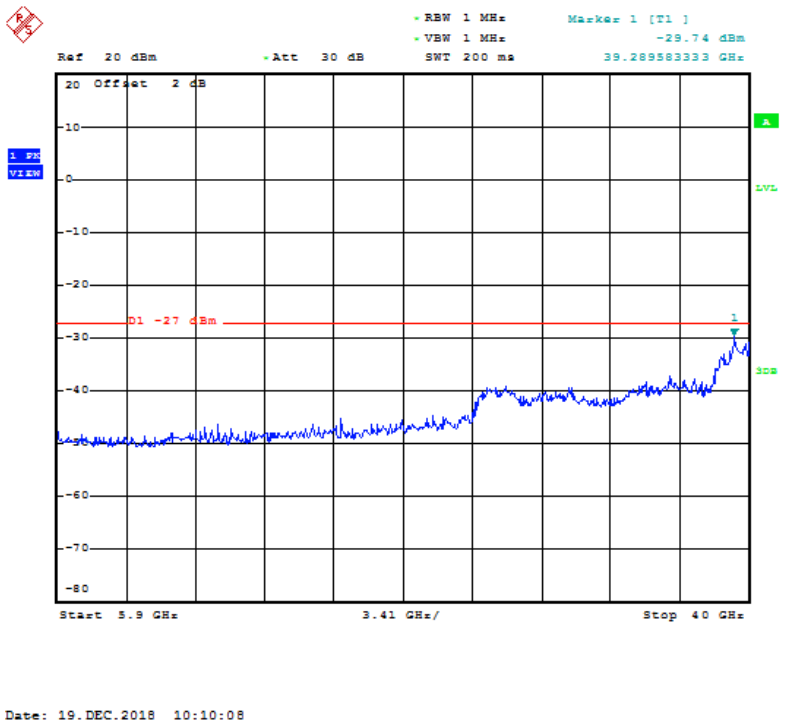


Fig. 25 Conducted Spurious Emission (802.11n-HT40, Ch151, 5.9 GHz-40 GHz)

6.5.2 Transmitter Spurious Emission - Radiated

Modulation type and data rate tested (Only worst case result is given below):

Mode	Data rate	Channel
802.11a	6Mbps	165(5825MHz)

802.11n-HT20	MCS0	165(5825MHz)
802.11n-HT40	MCS0	151(5755MHz)

Measurement Uncertainty:

Frequency Range	Uncertainty(dB)
f ≤ 1GHz	3.9
f>1GHz	4.3

Measurement Results:

802.11a mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11a	165(5825MHz)	30 MHz ~1 GHz	Fig.26	P
		1 GHz ~ 8 GHz	Fig.27	P
		8 GHz ~ 18 GHz	Fig.28	P
		18 GHz ~ 26.5 GHz	Fig.29	P
		26.5 GHz~ 40 GHz	Fig.30	P

802.11n-HT20 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	165(5825MHz)	30 MHz ~1 GHz	Fig.31	P
		1 GHz ~ 8 GHz	Fig.32	P
		8 GHz ~ 18 GHz	Fig.33	P
		18 GHz ~ 26.5 GHz	Fig.34	P
		26.5 GHz~ 40 GHz	Fig.35	P

802.11n-HT40 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT40)	151(5755MHz)	30 MHz ~1 GHz	Fig.36	P
		1 GHz ~ 8 GHz	Fig.37	P
		8 GHz ~ 18 GHz	Fig.38	P
		18 GHz ~ 26.5 GHz	Fig.39	P
		26.5 GHz~ 40 GHz	Fig.40	P

Radiated Spurious Emission (9kHz-30MHz)

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT40)	151(5755MHz)	9kHz ~ 30 MHz	Fig.41	P

Conclusion: PASS

Note:

A "reference path loss" is established and the A_{Rpl} 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.

802.11a

Channel 165 (30MHz ~ 1GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
34.0	16.26	-22	38.26	V
35.2	15.62	-21.9	37.52	V
36.4	16.85	-21.6	38.45	V
46.2	17.08	-20.1	37.18	V
260.4	18.85	-22.6	41.45	H
399.3	18	-19.1	37.1	H

Channel 165 (1GHz ~ 8GHz) (Peak)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
2996.0	61.09	-1.3	62.39	H
5368.8	51.77	4.1	47.67	H
5992.6	44.76	4.6	40.16	H
6383.4	46.41	5.6	40.81	H
6910.2	46.49	7	39.49	H
7752.4	47.53	8.4	39.13	H

Channel 165 (1GHz ~ 8GHz) (Average)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
2996.0	29.91	-1.3	31.21	H

Channel 165 (8GHz ~ 18GHz) (Peak)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
14635.4	53.98	19.6	34.38	H
15729.2	56.88	21.9	34.98	V
16104.8	56.41	22.5	33.91	H
16679.0	56.58	23.4	33.18	H
16983.0	56.61	23.7	32.91	H
17666.0	56.42	24.4	32.02	V

Channel 165 (8GHz ~ 18GHz) (Average)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
15729.2	43.36	21.9	21.46	V
16104.8	44.44	22.5	21.94	H
16679.0	43.81	23.4	20.41	H
16983.0	44.77	23.7	21.07	H
17666.0	44.56	24.4	20.16	V

Channel 165 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
18694.4	38.51	-5.6	44.11	V
19683.8	40.76	-5.1	45.86	H
20446.3	41.26	-4.4	45.66	V
21322.6	42.39	-3.6	45.99	V
22494.0	43.52	-3.1	46.62	H
23545.4	44.02	-2.8	46.82	H

Channel 165 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
30797.0	45.87	0.2	45.67	V
32801.8	44.09	0.7	43.39	H
34419.1	47.74	1.3	46.44	H
35848.8	46.19	0.9	45.29	V
36945.0	47.22	1.6	45.62	H
38385.4	47.39	2.3	45.09	V

802.11n-HT20

Channel 165 (30MHz ~ 1GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
34.3	16.3	-22	38.3	V
35.3	16.04	-22	38.04	V
46.8	14.21	-20.1	34.31	V
55.3	12.63	-21.2	33.83	V

109.1	13.82	-23.8	37.62	V
173.2	13.37	-26.2	39.57	H

Channel 165 (1GHz ~ 8GHz) (Peak)

Frequency (MHz)	Result (dBµV/m)	ARpl (dB)	PMea (dBµV/m)	Polarity
2993.6	46.29	-1.3	47.59	H
5373.4	47.76	4.1	43.66	V
5744.0	45.27	4.7	40.57	V
6438.6	47.27	5.8	41.47	V
6641.4	47.23	6.5	40.73	V
7692.6	46.58	8.1	38.48	V

Channel 165 (8GHz ~ 18GHz) (Peak)

Frequency (MHz)	Result (dBµV/m)	ARpl (dB)	PMea (dBµV/m)	Polarity
16279.0	55.67	22.6	33.07	V
16715.4	55.9	23.6	32.3	H
16893.8	56.03	23.3	32.73	V
17247.8	56.6	24.2	32.4	V
17446.0	57.33	24.3	33.03	V
17706.4	56.73	24.3	32.43	H

Channel 165 (8GHz ~ 18GHz) (Average)

Frequency (MHz)	Result (dBµV/m)	ARpl (dB)	PMea (dBµV/m)	Polarity
16279.0	43.5	22.6	20.9	V
16715.4	44.12	23.6	20.52	H
16893.8	43.6	23.3	20.3	V
17247.8	44.26	24.2	20.06	V
17446.0	44.53	24.3	20.23	V
17706.4	44.22	24.3	19.92	H

Channel 165 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dBµV/m)	ARpl (dB)	PMea (dBµV/m)	Polarity
19253.8	39.67	-5.7	45.37	H

20088.4	41.06	-4.7	45.76	V
21497.8	43.19	-3.5	46.69	H
22284.8	44.52	-3.1	47.62	H
23541.2	45.24	-2.8	48.04	H
24845.9	45.2	-2.3	47.5	V

Channel 165 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
27817.6	44.47	-0.4	44.87	H
30829.4	45.67	0.3	45.37	H
32723.5	44.06	0.5	43.56	V
34126.2	47.5	1.6	45.9	H
35927.0	46.05	0.7	45.35	H
37414.8	46.32	0.9	45.42	V

802.11n-HT40

Channel 151 (30MHz ~ 1GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
34.4	19.87	-22	41.87	V
36.5	16.35	-21.6	37.95	V
50.7	18.9	-20.2	39.1	V
72.0	18.95	-25.5	44.45	V
151.7	16.22	-27.9	44.12	H
398.6	21.26	-19.4	40.66	H

Channel 151 (1GHz ~ 8GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
2997.4	42.35	-1.3	43.65	V
5902.4	45.63	4.6	41.03	H
6259.2	45.66	5.4	40.26	H
6637.4	47.14	6.5	40.64	H
7187.4	46.7	7.2	39.5	V

7824.4	48.1	8.5	39.6	H

Channel 151 (8GHz ~ 18GHz) (Peak)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
15763.8	56.14	22	34.14	H
16259.2	55.25	22.5	32.75	V
16688.2	56.27	23.5	32.77	V
16837.2	55.38	23.4	31.98	V
17140.2	56.12	24.1	32.02	H
17897.6	57.42	24.4	33.02	V

Channel 151 (8GHz ~ 18GHz) (Average)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
15763.8	43.21	22	21.21	H
16259.2	43.48	22.5	20.98	V
16688.2	43.93	23.5	20.43	V
16837.2	43.46	23.4	20.06	V
17140.2	44.36	24.1	20.26	H
17897.6	44.76	24.4	20.36	V

Channel 151 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
18632.4	40.15	-5.7	45.85	H
19495.2	40.24	-5.4	45.64	H
20450.6	41.03	-4.4	45.43	H
21218.1	43.2	-3.9	47.1	V
21828.4	43.35	-3.4	46.75	H
22905.4	44.36	-3	47.36	V

Channel 151 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
27175.0	44.32	-1	45.32	V
29956.0	43.15	-1.4	44.55	V

30828.1	45.99	0.3	45.69	H
32554.8	44.15	0.4	43.75	H
35829.8	47.26	1	46.26	V
37868.4	45.85	1.2	44.65	H

Test graphs as below:

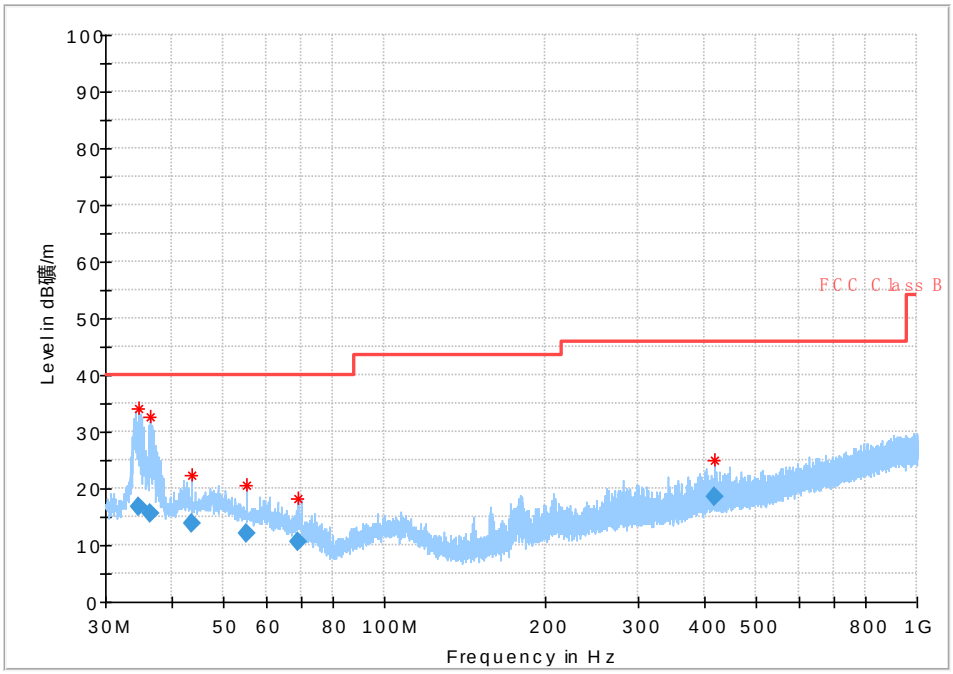


Fig. 26 Radiated Spurious Emission (802.11a, Ch165, 30 MHz-1 GHz)

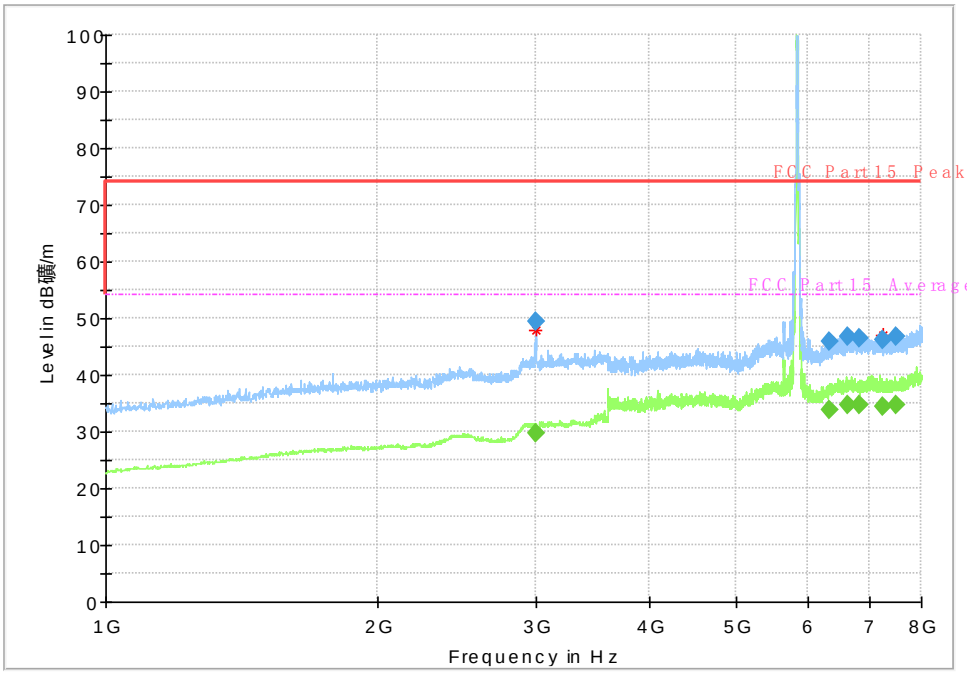


Fig. 27 Radiated Spurious Emission (802.11a, Ch165, 1 GHz-8 GHz)

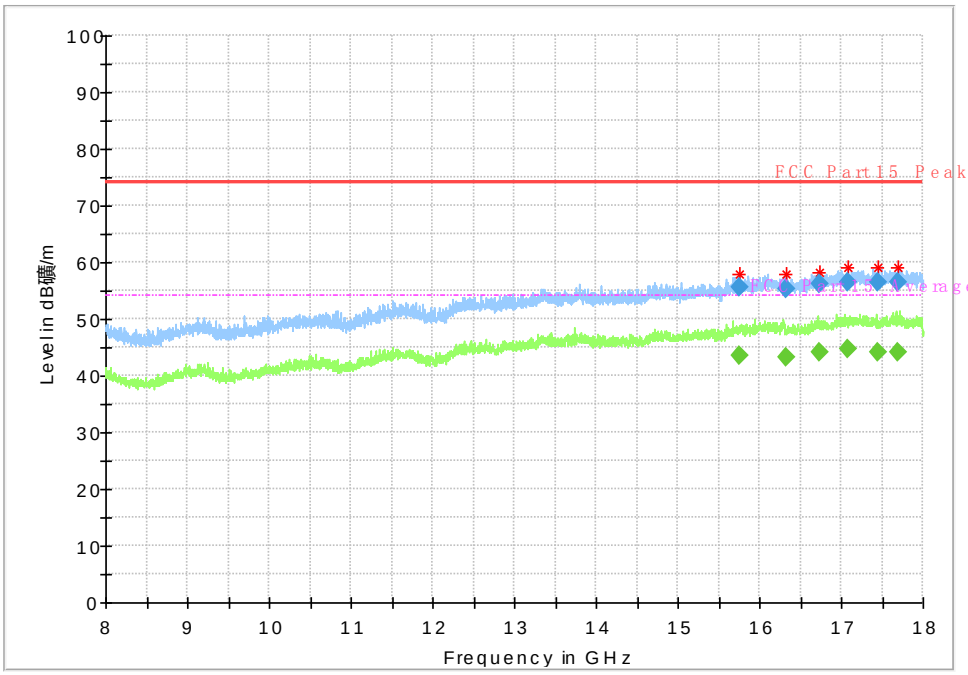


Fig. 28 Radiated Spurious Emission (802.11a, Ch165, 8 GHz-18 GHz)

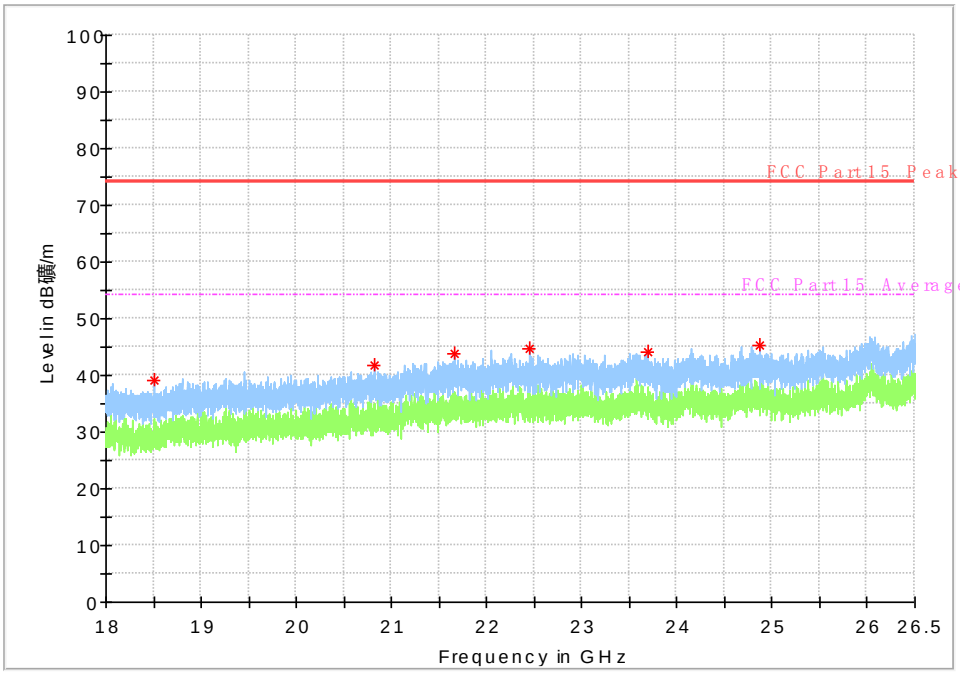


Fig. 29 Radiated Spurious Emission (802.11a, Ch165, 18 GHz-26.5 GHz)

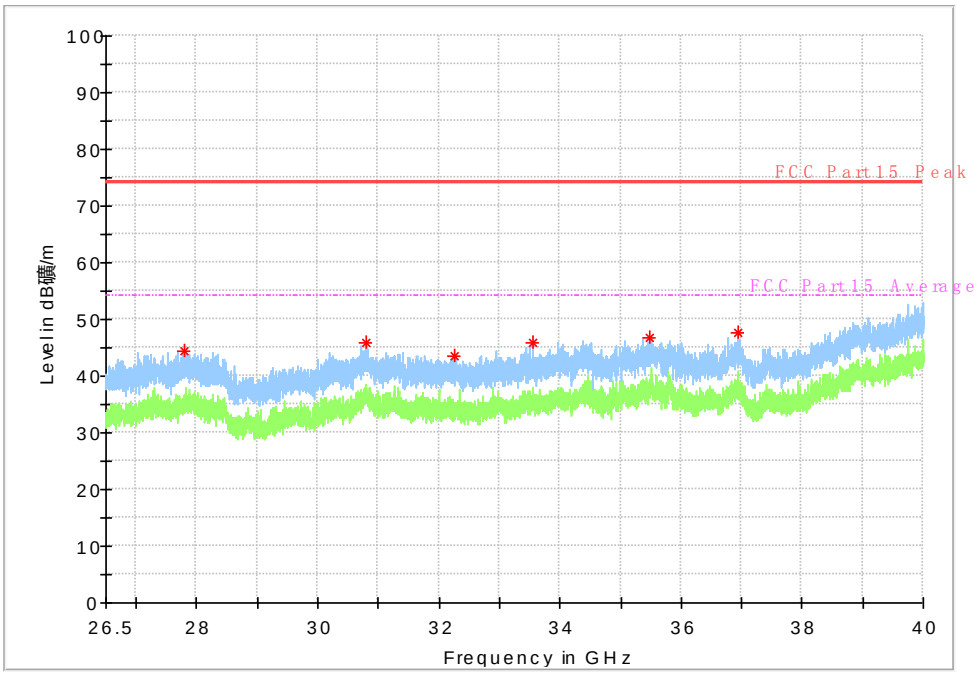


Fig. 30 Radiated emission: 802.11n, (802.11a, Ch165, 26.5 GHz - 40 GHz)

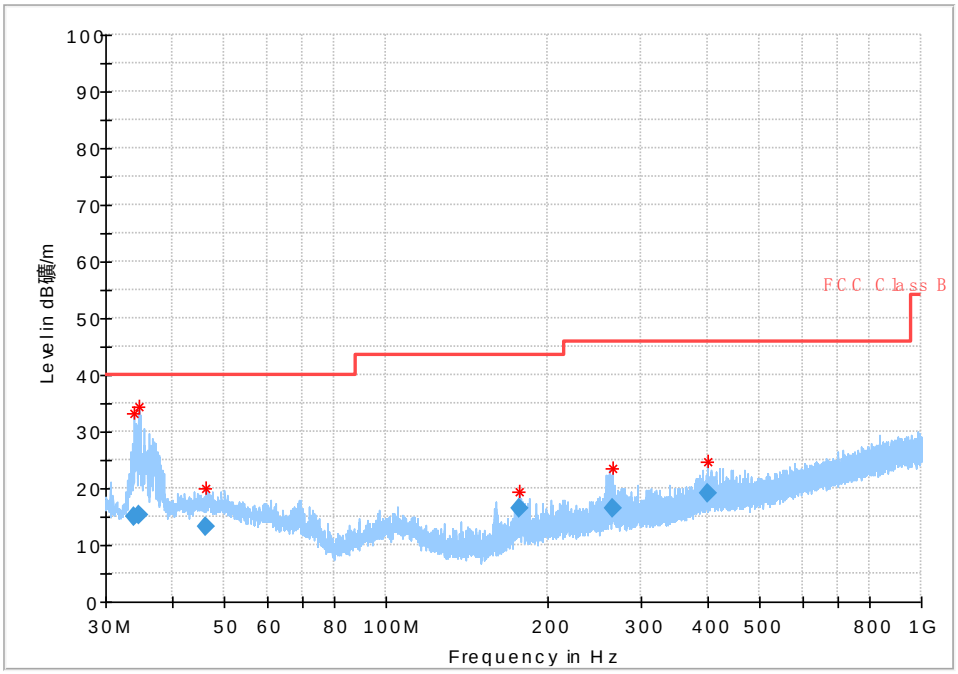


Fig. 31 Radiated Spurious Emission (802.11n-HT20, Ch165, 30 MHz-1 GHz)

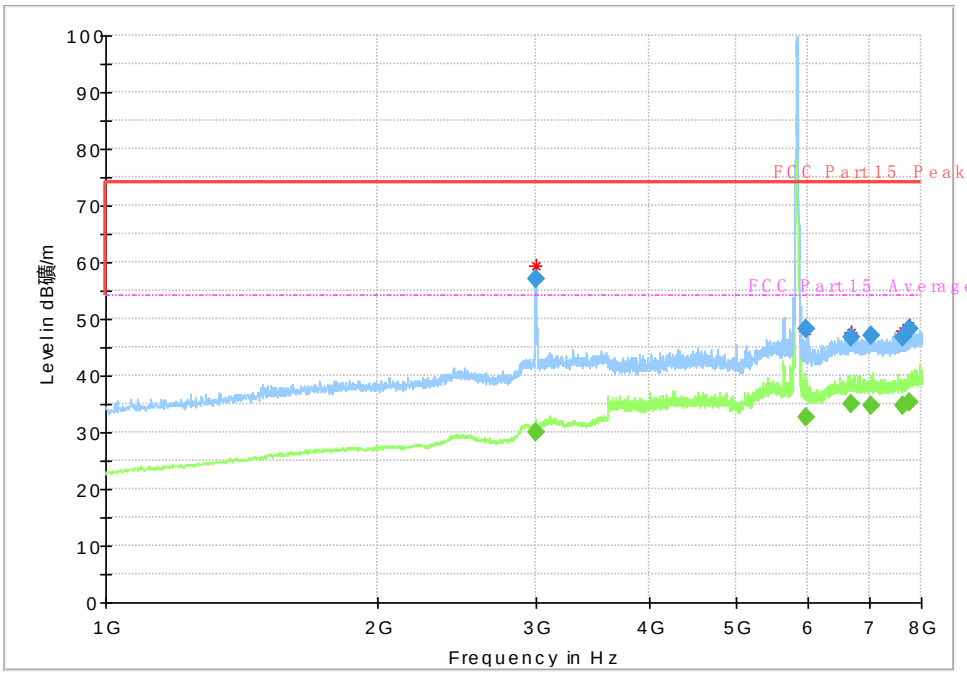


Fig. 32 Radiated Spurious Emission (802.11n-HT20, Ch165, 1 GHz-8 GHz)

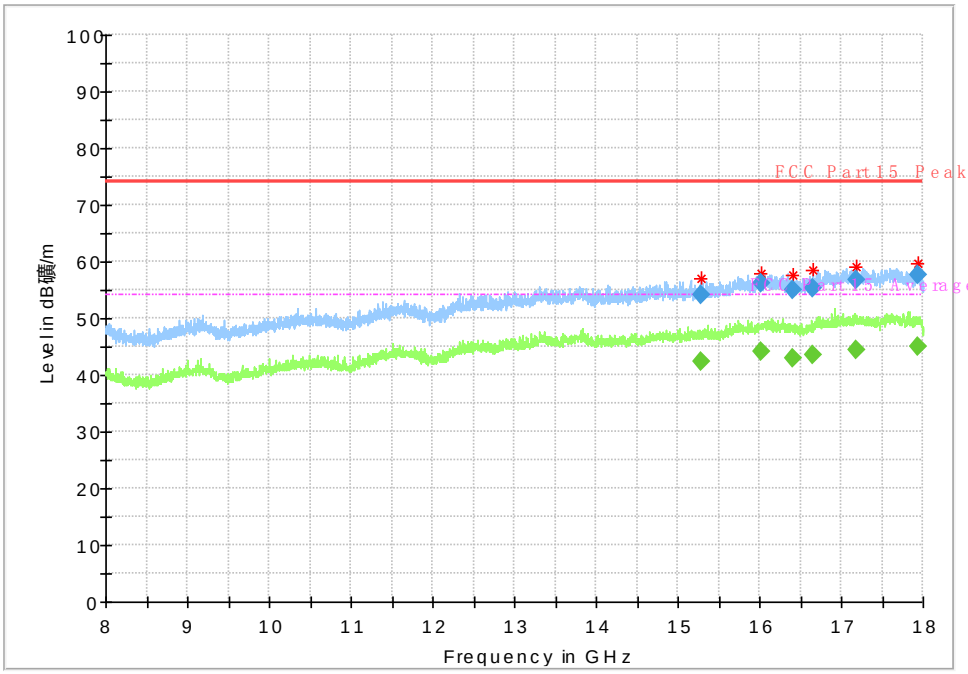


Fig. 33 Radiated Spurious Emission (802.11n-HT20, Ch165, 8 GHz-18 GHz)

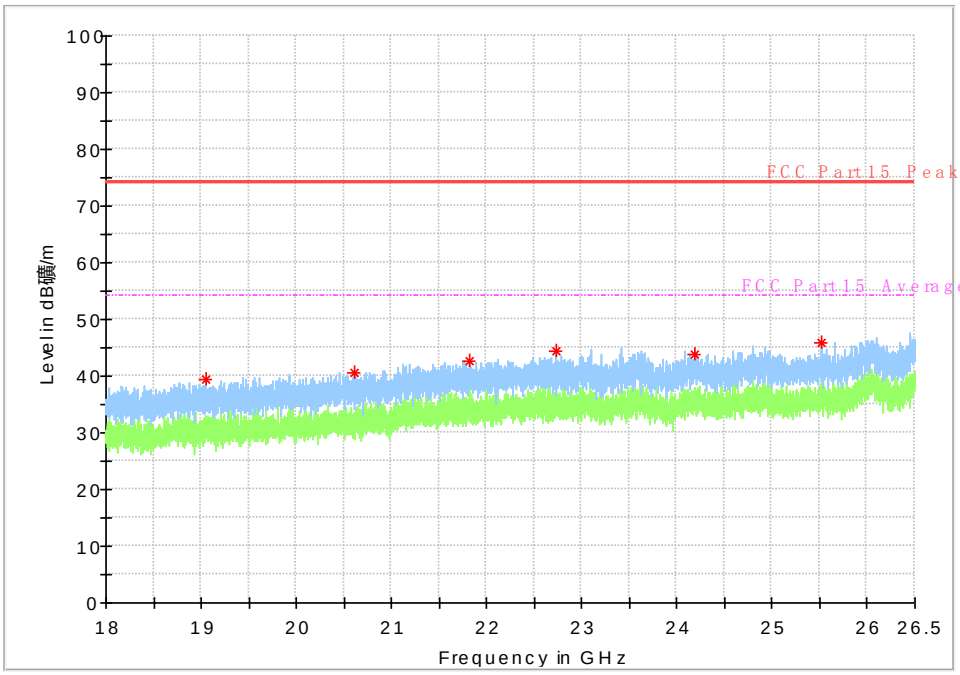


Fig. 34 Radiated Spurious Emission (802.11n-HT20, Ch165, 18 GHz-26.5 GHz)

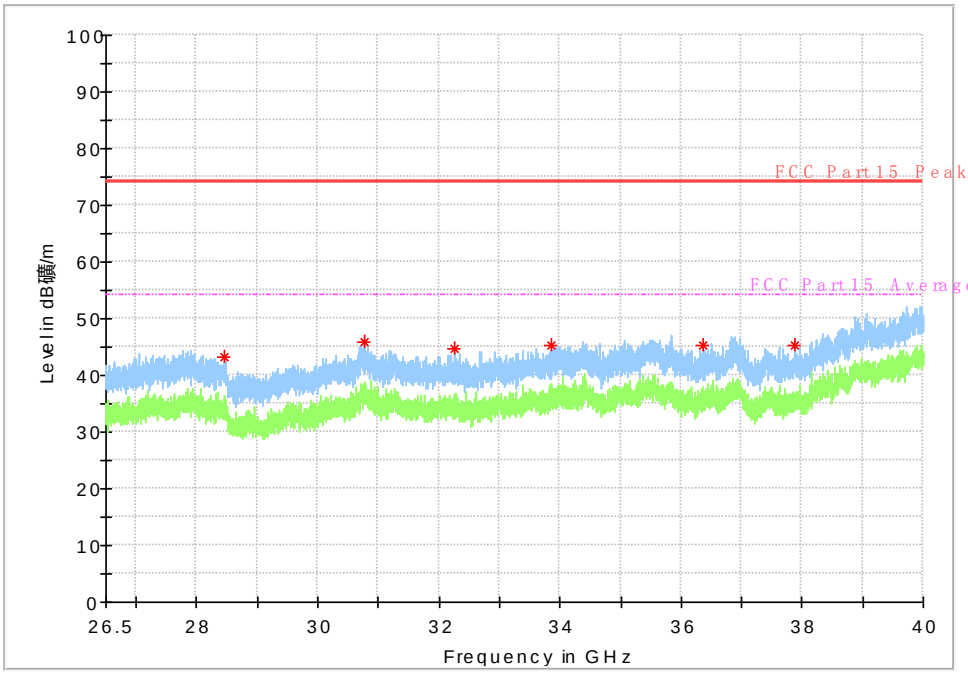


Fig. 35 Radiated emission: 802.11n, (802.11n-HT20, Ch165, 26.5 GHz - 40 GHz)

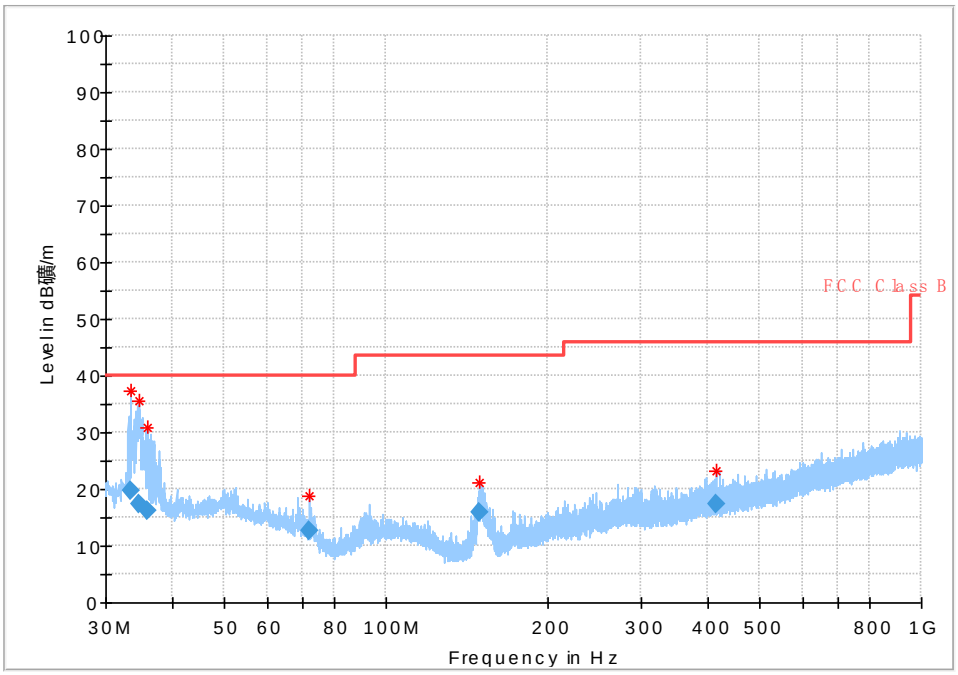


Fig. 36 Radiated Spurious Emission (802.11n-HT40, Ch151, 30 MHz-1 GHz)

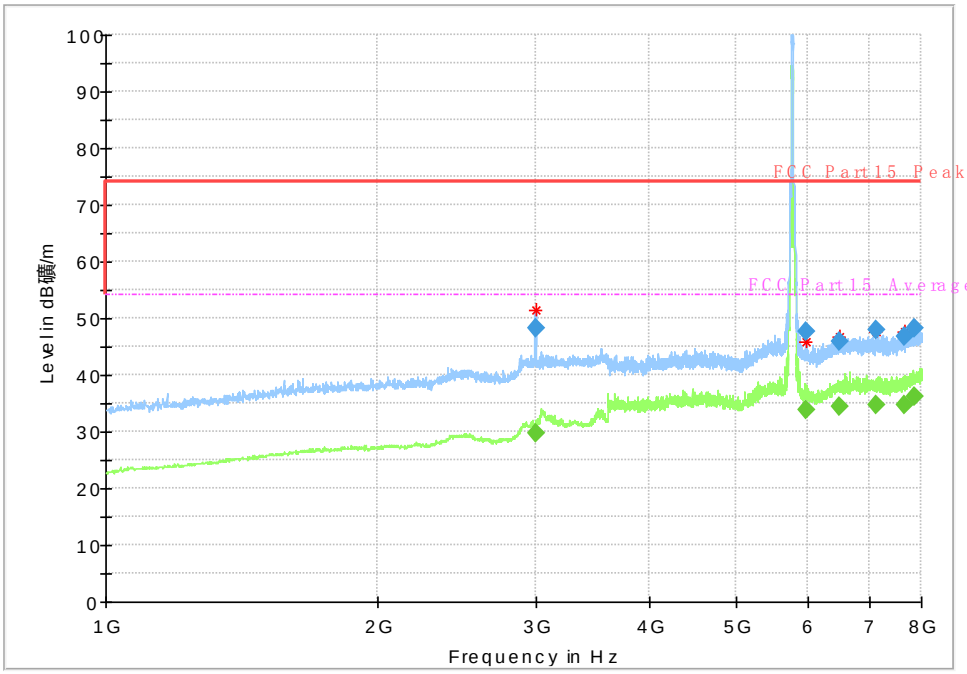


Fig. 37 Radiated Spurious Emission (802.11n-HT40, Ch151, 1 GHz-8 GHz)

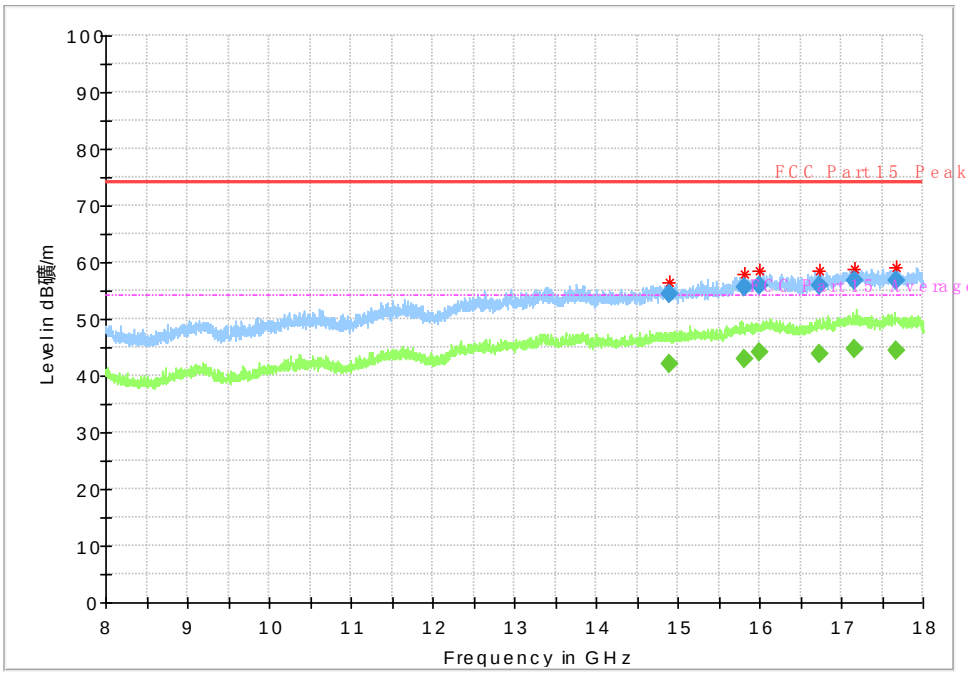


Fig. 38 Radiated Spurious Emission (802.11n-HT40, Ch151, 8 GHz-18 GHz)

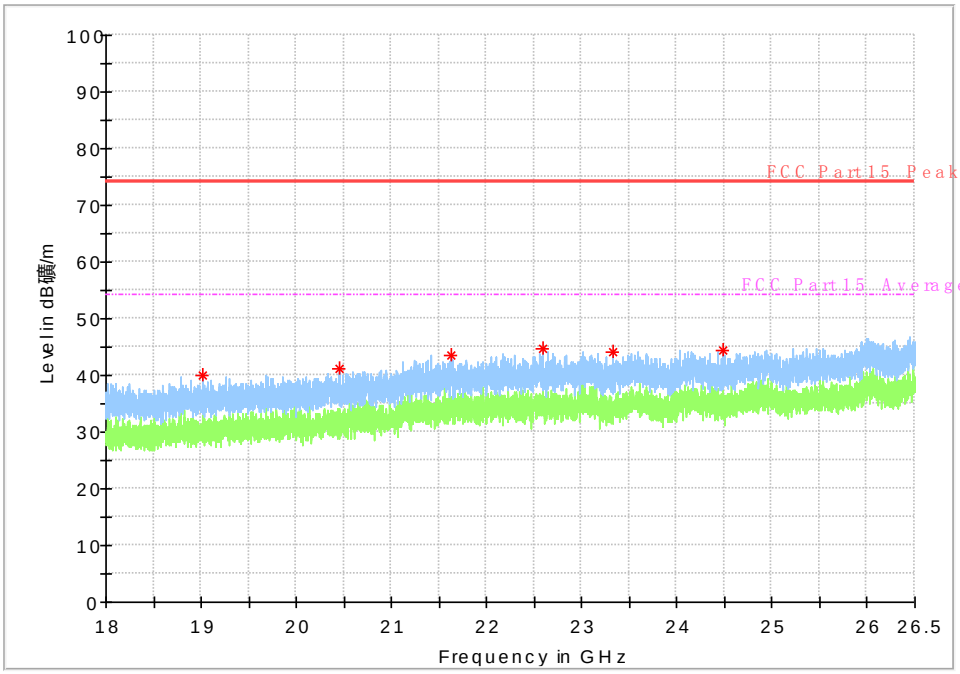


Fig. 39 Radiated Spurious Emission (802.11n-HT40, Ch151 18 GHz-26.5 GHz)

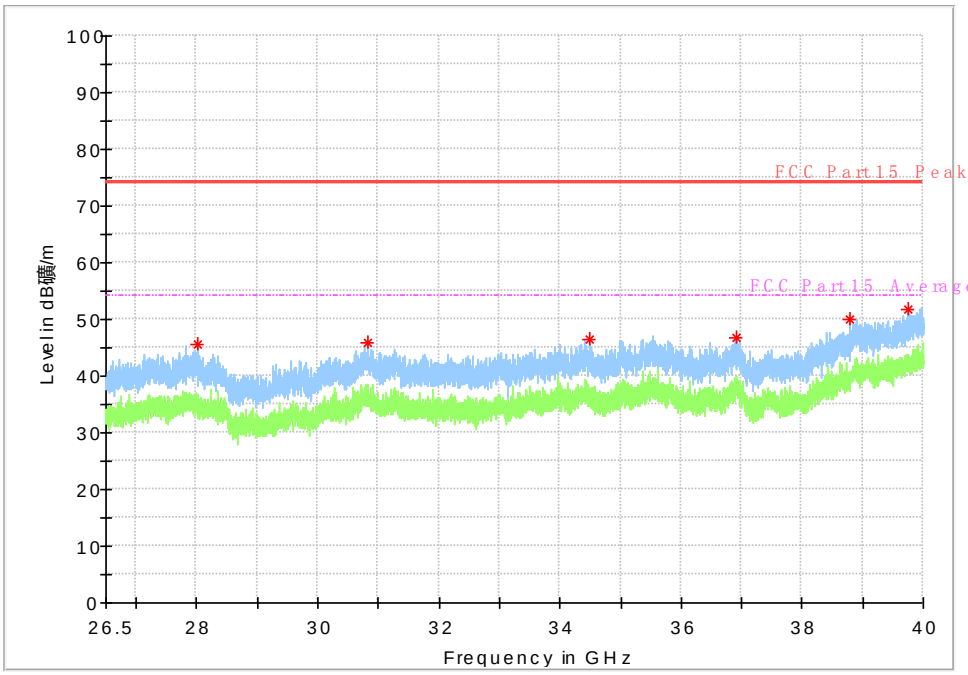


Fig. 40 Radiated emission: 802.11n, (802.11n-HT40, Ch151, 26.5 GHz - 40 GHz)

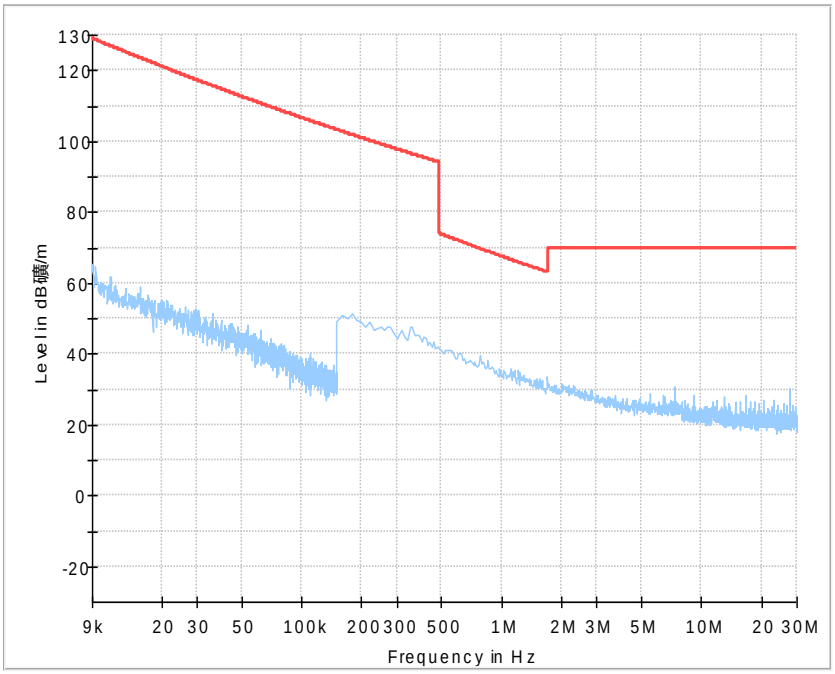


Fig. 41 Radiated Spurious Emission (9kHz-30MHz)

6.6. Band Edges Compliance

Band Edges - Radiated

Measurement Limit:

(1) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(2) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(5) In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

Set the spectrum analyzer in the following:

(a) Sweep mode :SweepAnalyzer6db.

(b) PEAK: RBW=1MHz / VBW=3MHz / Sweep=2.5ms，Sweep point;5001

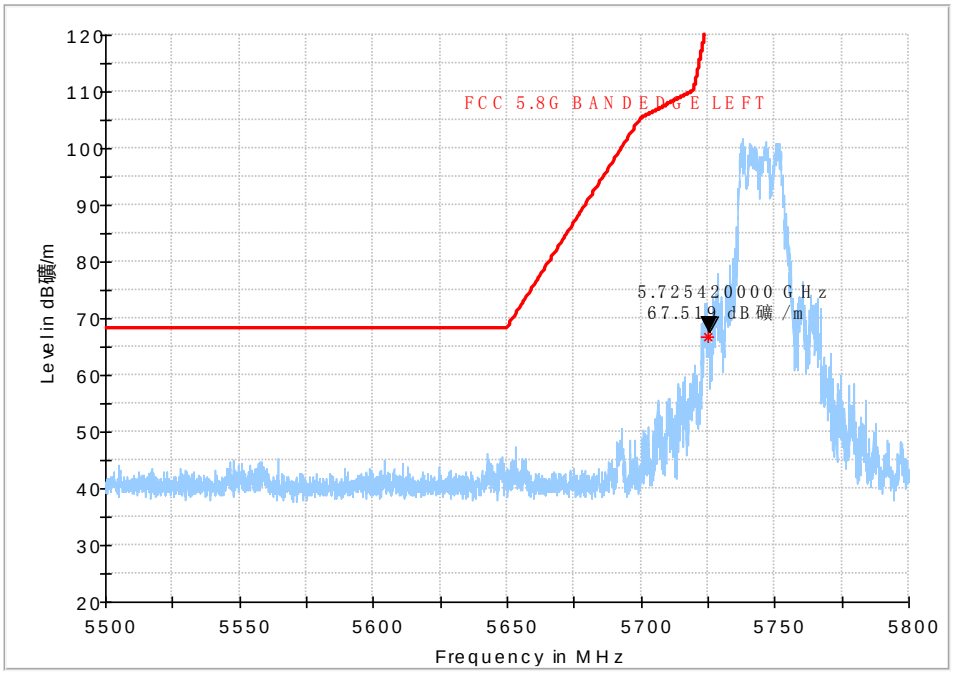
(c) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=2.5ms，Sweep point;5001

Measurement Result:

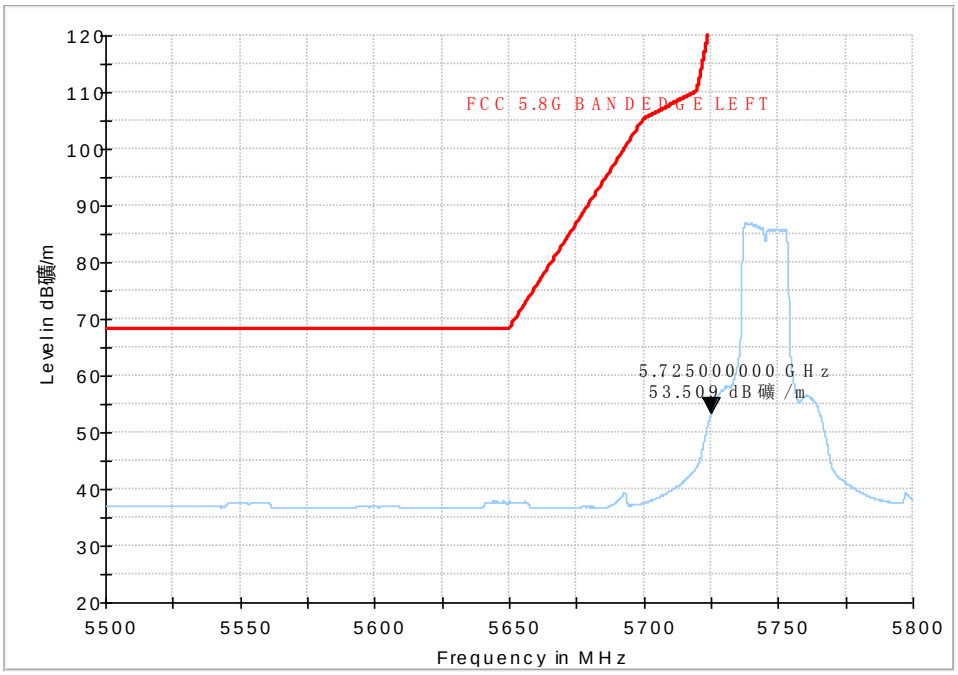
Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.42	P
	5825 MHz	Fig.43	P
802.11n HT20	5745 MHz	Fig.44	P
	5825 MHz	Fig.45	P
802.11n HT40	5755 MHz	Fig.46	P
	5795 MHz	Fig.47	P

Conclusion: PASS

Test graphs as below:

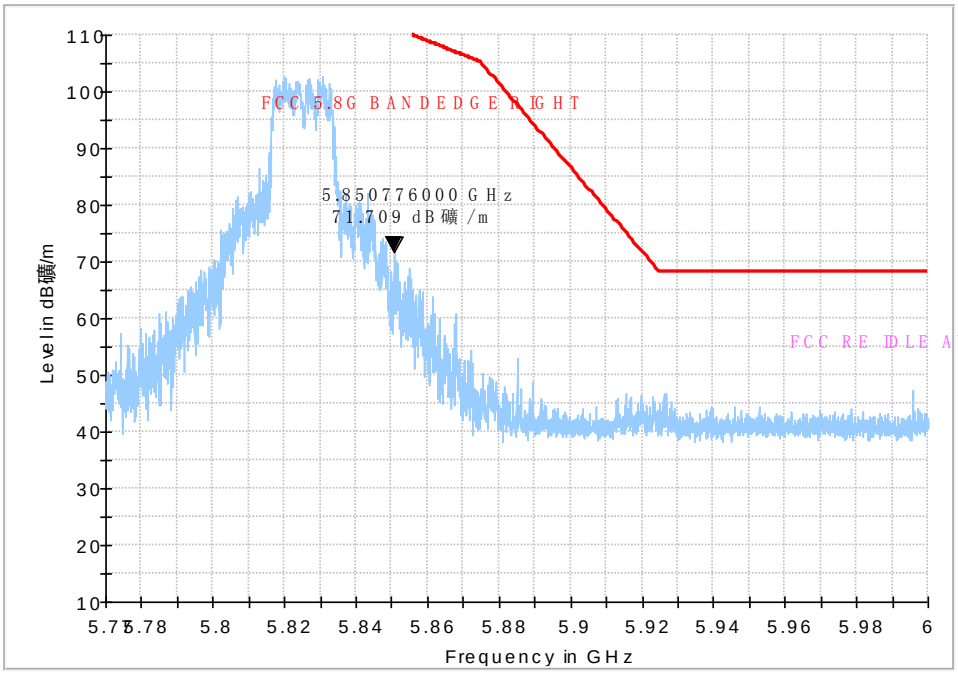


Peak

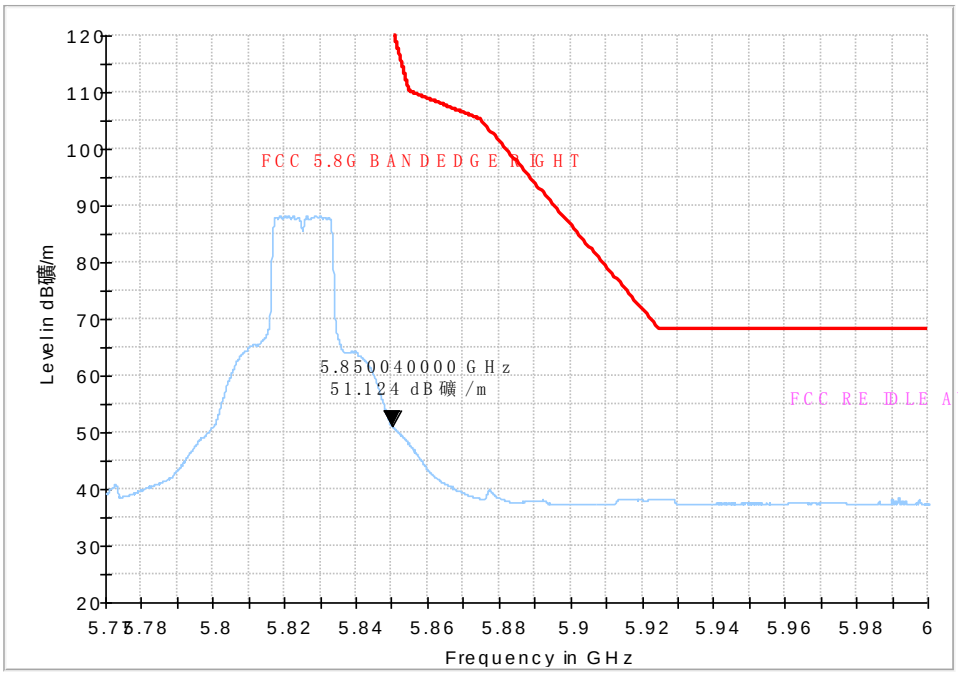


Average

Fig. 42 Band Edges (802.11a, 5745MHz)

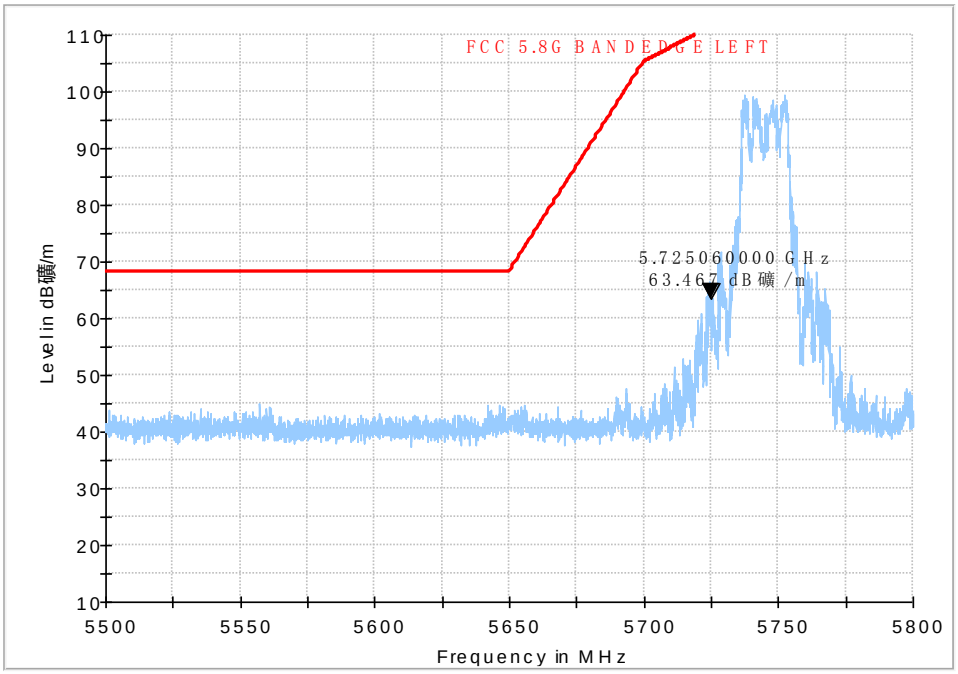


Peak

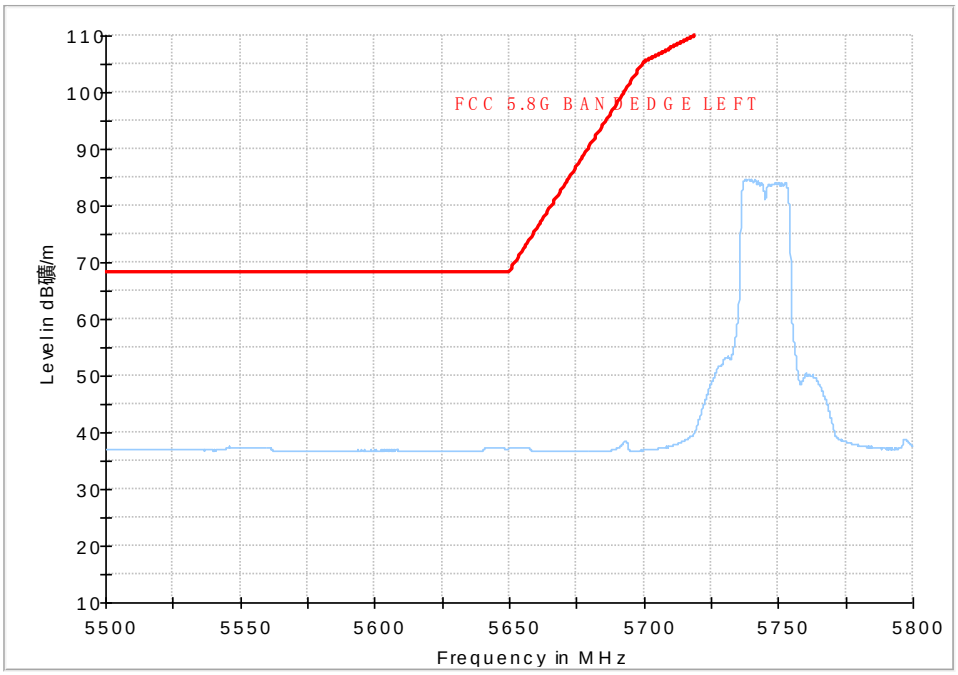


Average

Fig. 43 Band Edges (802.11a, 5825MHz)

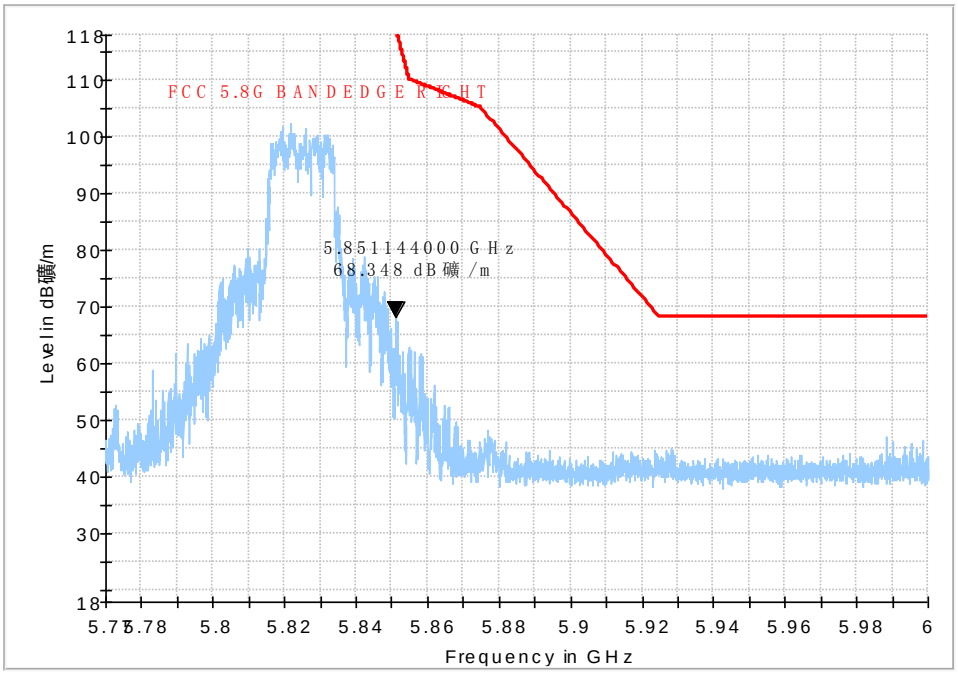


Peak

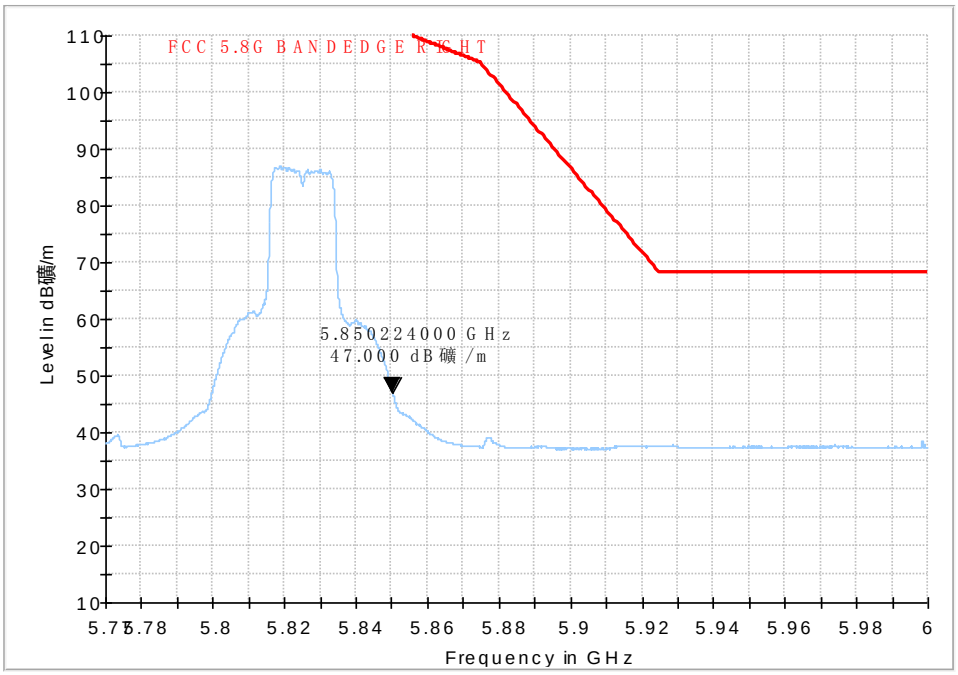


Average

Fig. 44 Band Edges (802.11n-HT20, 5745MHz)

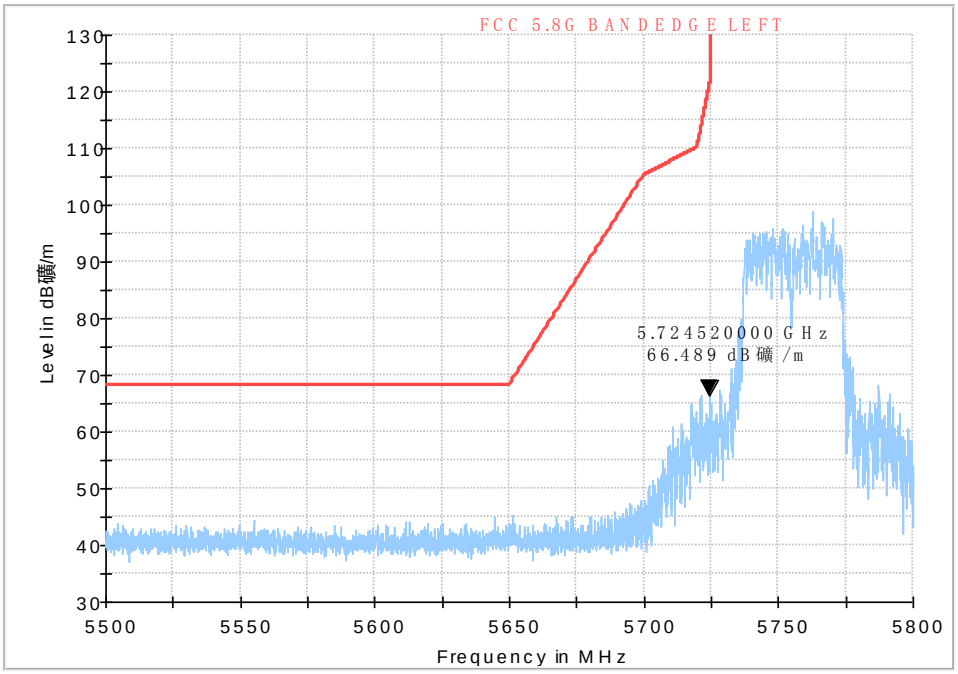


Peak

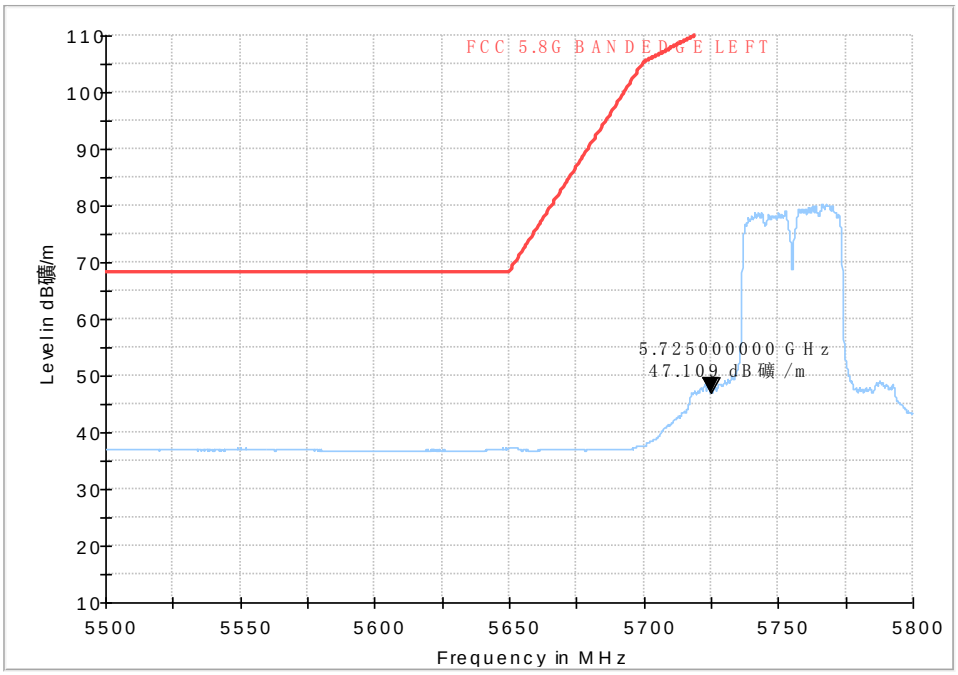


Average

Fig. 45 Band Edges (802.11n-HT20, 5825MHz)

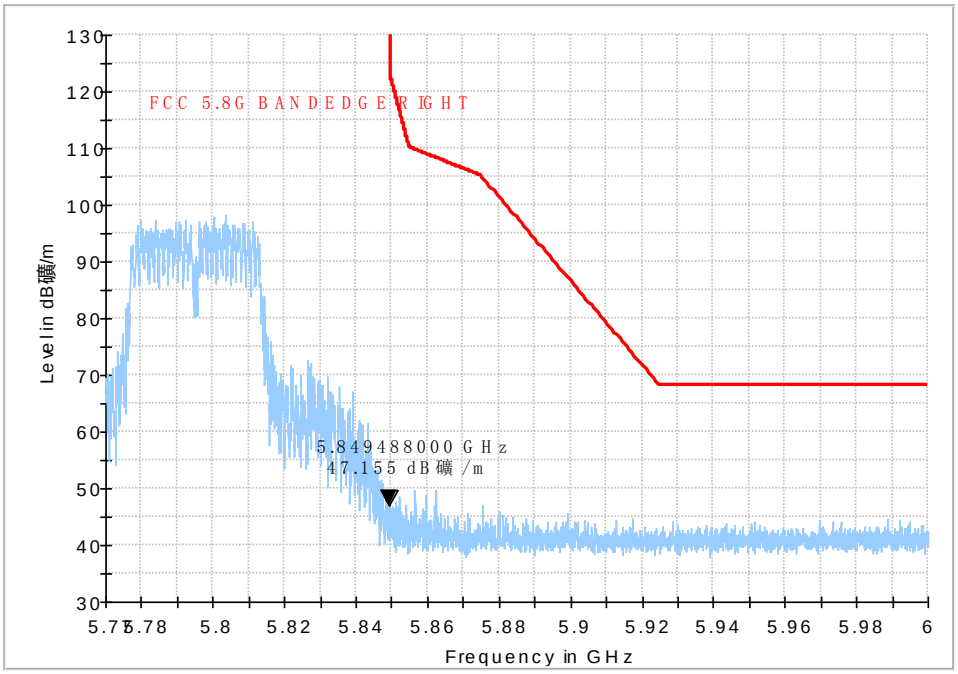


Peak

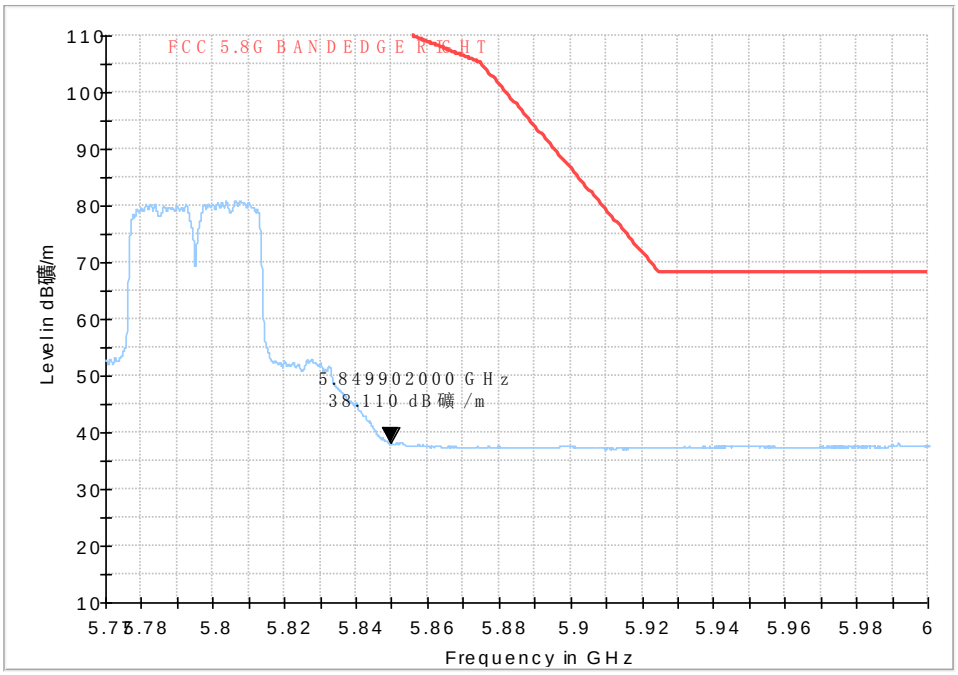


Average

Fig. 46 Band Edges (802.11n-HT40, 5755MHz)



Peak



Average

Fig. 47 Band Edges (802.11n-HT40, 5795MHz)

6.7. AC Powerline Conducted Emission

Test Condition:

Voltage（V）	Frequency（Hz）
110	60

Measurement Result and limit:

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		802.11a	Idle	
0.15 to 0.5	66 to 56	Fig.48		P
0.5 to 5	56			
5 to 30	60			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

WLAN (Average Limit)

Frequency range (MHz)	Average Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		802.11a	Idle	
0.15 to 0.5	56 to 46	Fig.48		P
0.5 to 5	46			
5 to 30	50			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

The measurement is made according to ANSI C63.10 .

Conclusion: PASS

Test graphs as below:

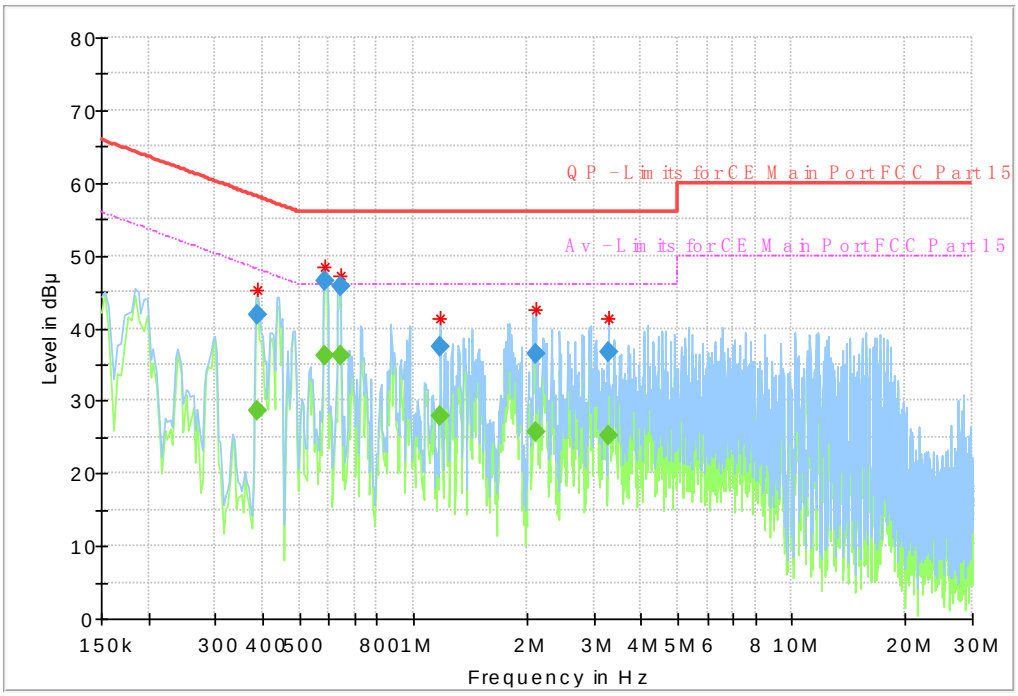


Fig. 48 AC Powerline Conducted Emission-802.11a

Measurement Result 1:

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.388800	41.72	---	58.09	16.37	1000.	9.000	N	ON	9.7
0.388800	---	28.57	48.09	19.52	1000.	9.000	N	ON	9.7
0.586556	46.47	---	56.00	9.53	1000.	9.000	L1	ON	9.7
0.586556	---	36.28	46.00	9.72	1000.	9.000	L1	ON	9.7
0.642525	45.73	---	56.00	10.27	1000.	9.000	L1	ON	9.7
0.642525	---	36.22	46.00	9.78	1000.	9.000	L1	ON	9.7
1.179825	37.40	---	56.00	18.60	1000.	9.000	L1	ON	9.7
1.179825	---	27.91	46.00	18.09	1000.	9.000	L1	ON	9.7
2.105175	36.43	---	56.00	19.57	1000.	9.000	L1	ON	9.7
2.105175	---	25.59	46.00	20.41	1000.	9.000	L1	ON	9.7
3.284250	36.60	---	56.00	19.40	1000.	9.000	L1	ON	9.7
3.284250	---	25.29	46.00	20.71	1000.	9.000	L1	ON	9.7

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	FSQ40	200063	Rohde&Schwarz	2018-12-17	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 Years
4	Double-ridged Waveguide Antenna	ETS-3117	00135890	ETS	2017-01-11	3 Years
5	2-Line V-Network	ENV216	101380	R&S	2018-05-11	1 Year
6	Loop Antenna	AL-130R	121083	COM-POWER	2016-11-21	3 Years

Anechoic chamber

Fully anechoic chamber by ETS.

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

9. Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in

ECIT documents. The detailed measurement uncertainty to see the column, k=2

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Peak Output Power-Conducted	2412MHz-2462MHz	95%	±0.544dB
Peak Power Spectral Density	2412MHz-2462MHz	95%	±0.544dB
Occupied 6dB Bandwidth	2412MHz-2462MHz	95%	±62.04Hz
Frequency Band Edges-Conducted	2412MHz-2462MHz	95%	±0.544dB
Conducted Emission	30MHz-2GHz	95%	±0.90dB
Conducted Emission	2GHz-3.6GHz	95%	±0.88dB
Conducted Emission	3.6GHz-8GHz	95%	±0.96dB
Conducted Emission	8GHz-20GHz	95%	±0.94dB
Conducted Emission	20GHz-22GHz	95%	±0.88dB
Conducted Emission	22GHz-40GHz	95%	±0.86dB
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
AC Power line Conducted Emission	0.15MHz-30MHz	95%	±3.66 dB

ANNEX A. Detailed Test Results

Annex A.1. Main Terms

Verdict	Verdict of each test cases.
Test cases	Test cases identification number and description in ETSI EN 300 328 test specification and ETSI specification.

Annex A.2. Terms used in Condition column

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

Annex A.3. Terms used in Verdict column

P	Pass,the EUT complies with the essential requirements in the standard.
NM	Not measure, the test was not measured by ECIT.
NA	Not applicable, the test was not applicable.
F	Fail, the EUT does not comply with the essential requirements in the standard.

Annex A.4. Terms used in Note column

EUT ID	EUT ID (e.g N01, N02…..) is used to identify the EUT tested used for each test cases as specified in section 3 of this test report.
Lab Code	Lab code is used to identify the subcontracted lab if this test cases is performed in the subcontracted lab.

Subcontracted test lab code: N/A

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 17025:2017 *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 April 2017*).

Presented this 6th day of May 2019.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3682.01
Valid to February 28, 2021

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

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