TEST REPORT

No. I19D00035-SRD06

For

Client :	MobiWire SAS
Production :	4G Smart Phone
Model Name :	MobiWire Sora, Altice S32
Brand Name :	MobiWire, Altice
FCC ID:	QPN-SORA
Hardware Version:	V01A
Software Version:	MOBIWIRE_GH5024_V01_20190313
Issued date:	2019-05-09

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 accredited 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
Add: 7-8F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Tel: +86 21 63843300
FAX: +86 21 63843301
E-Mail: welcome@ecit.org.cn

Revision Version

Report Number	Revision	Date	Memo
I19D00035-SRD06	00	2019-05-09	Initial creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name	East China Institute of Telecommunications
Address	7-8/F., Area G, No.668, Beijing East Road, Shanghai, China
Postal Code:	200001
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:	2019-03-15
Testing End Date:	2019-04-25

1.4. Signature

Tang Tao
(Prepared this test report)

Shi Hongqi
(Reviewed this test report)

Zheng Zhongbin
(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	+33668018722
Postcode	/

2.2. Manufacturer Information

Company Name	MobiWire SAS
Address	79 AVENUE FRANCOIS ARAGO 92017 NANTERRE CEDEX France.
Telephone	+33668018722
Postcode	/

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

3.1. About EUT

EUT Description	4G Smart Phone
Model name	MobiWire Sora, Altice S32
FCC ID	QPN-SORA
WLAN Frequency Range(5G)	ISM Bands: 5150MHz-5250MHz, 5250MHz-5350MHz 5470MHz~5725MHz
GSM Frequency Band	GSM850/GSM900/GSM1800/GSM1900
UMTS Frequency Band	Band I/II/V/VIII
CDMA Frequency Band	/
LTE Frequency Band	Band 1/2/3/7/20
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	3.8V
Extreme High Voltage	4.35V
Extreme Low Voltage	3.6V
Maximum of Antenna Gain	WIFI5Ghz: -1 dBi

Note:

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

b. The value of the antenna gain is provided by the customer. For specific antenna information, please check the antenna specifications of the customer.

3.2. Internal Identification of EUT used during the test

EUT ID*	Model Name	SN or IMEI	HW Version	SW Version	Date of receipt
N02	MobiWire Sora, Altice S32	/	V01A	MOBIWIRE_GH5024_V01_20190313	2019-03-19
N07	MobiWire Sora, Altice S32	/	V01A	MOBIWIRE_GH5024_V01_20190313	2019-03-19
N08	MobiWire Sora, Altice S32	/	V01A	MOBIWIRE_GH5024_V01_20190313	2019-03-19

*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	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency 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
KDB905462	COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION	2016

5. 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 26dB Bandwidth	15.403	**P**
Band edge compliance	15.407	**P**
Transmitter spurious emissions radiated	15.407	**P**
Spurious emissions radiated < 30 MHz	15.407	**P**
Spurious emissions conducted < 30 MHz	15.407	**P**
Peak Excursion	15.407	**P**
Frequency Stability	15.407	**NA**
Transmit Power Control	15.407	**NA**

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.

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	25℃
Voltage	Vnom	3.8V
Humidity	Hnom	47%

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.

5.2. Statements

The MobiWire Sora, Altice S32 supporting GSM/GPRS/EDGE/WCDMA/LTE/BT/BLE/WLAN, manufactured by MobiWire SAS, which is a new product for testing.

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

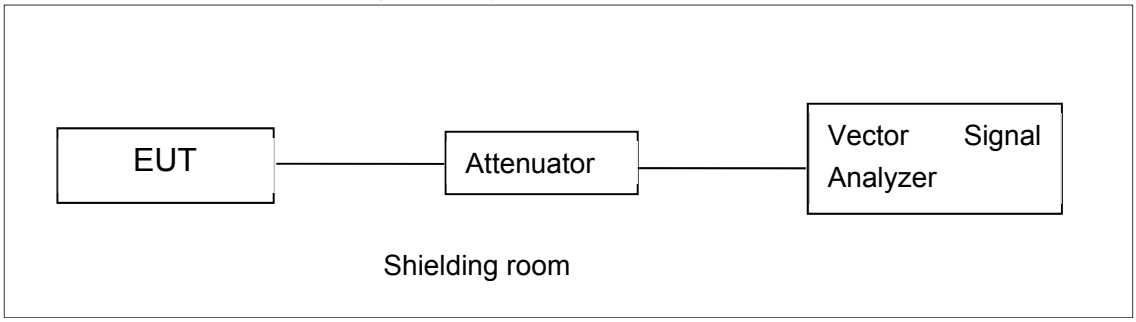
ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

6. Test result

6.1. Measurement Method

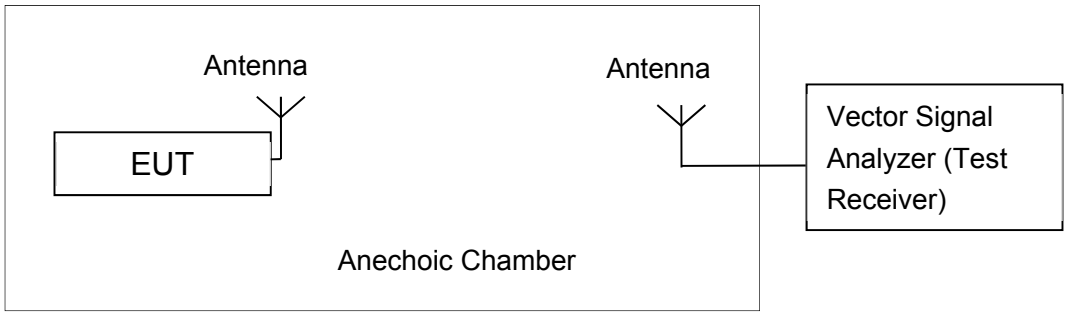
6.1.1. Conducted Measurements

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 KDB 789033
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 output Power

Measurement Limit and Method:

Standard	Frequency (MHz)	Limit (dBm)
FCC CRF Part 15.407(a)	5150MHz~5250MHz	24dBm
	5250MHz~5350MHz	24dBm or 11+10logB
	5470MHz~5725MHz	24dBm or 11+10logB

Limit use the less value, and B is the 26dB bandwidth.
The measurement method SA-1 is made according to KDB 789033.
Set the spectrum analyzer in the following:
Detector: RMS.
RBW=1MHz.
VBW=3MHz.
Sweep time = AUTO.
Span:30MHz (for 20MHz); 50MHz (for 40MHz).

Measurement Results:

802.11a mode
U-NII-1

Mode	Data Rate(Mbps)	Teat Result(dBm)		
		5180MHz	5200MHz	5240MHz
802.11a	6	13.22	13.18	13.66

U-NII-2a

Mode	Data Rate(Mbps)	Teat Result(dBm)		
		5260MHz	5300MHz	5320MHz
802.11a	6	13.49	13.23	13.22

U-NII-2c

Mode	Data Rate(Mbps)	Teat Result(dBm)		
		5500MHz	5600MHz	5700MHz
802.11a	MCS0	12.27	11.91	11.53

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

802.11n-HT20 mode
U-NII-1

Mode	Data Rate(Index)	Teat Result(dBm)		
		5180MHz	5200MHz	5240MHz
802.11n(20MHz)	MCS0	13.33	13.33	13.74

U-NII-2a

Mode	Data Rate(Index)	Teat Result(dBm)		
		5260MHz	5300MHz	5320MHz
802.11n(20MHz)	MCS0	13.53	13.4	13.28

U-NII-2c

Mode	Data Rate(Mbps)	Teat Result(dBm)		
		5500MHz	5600MHz	5700MHz
802.11n(20MHz)	MCS0	12.38	11.99	11.5

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

802.11n-HT40 mode

U-NII-1

Mode	Data Rate(Index)	Teat Result(dBm)		
		5190MHz	/	5230MHz
802.11n(40MHz)	MCS0	13.53	/	13.93

U-NII-2a

Mode	Data Rate(Index)	Teat Result(dBm)		
		5270MHz	/	5310MHz
802.11n(40MHz)	MCS0	13.85	/	13.67

U-NII-2c

Mode	Data Rate(Index)	Teat Result(dBm)		
		5510MHz	5590MHz	5670MHz
802.11n(40MHz)	MCS0	12.78	12.37	12.17

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

6.3. Peak Power Spectral Density (conducted)

Measurement Limit:

Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC CRF Part 15.407(a)	5150MHz~5250MHz	11
	5250MHz~5350MHz	11
	5470MHz~5725MHz	11

The output power measurement method SA-1 is made according to KDB 789033

Measurement Results:

Mode	Frequency	Power Spectral Density (dBm/MHz)		Conclusion
802.11a	5180 MHz	Fig.1	3.604	P
	5200 MHz	Fig.2	3.336	P
	5240 MHz	Fig.3	3.871	P
	5260 MHz	Fig.4	5.451	P
	5300 MHz	Fig.5	5.26	P
	5320 MHz	Fig.6	5.123	P
	5500 MHz	Fig.7	4.121	P
	5600 MHz	Fig.8	4.077	P
	5700 MHz	Fig.9	3.807	P
802.11n HT20	5180 MHz	Fig.10	3.39	P
	5200 MHz	Fig.11	3.445	P
	5240 MHz	Fig.12	3.962	P
	5260 MHz	Fig.13	5.333	P
	5300 MHz	Fig.14	5.558	P
	5320 MHz	Fig.15	5.361	P
	5500 MHz	Fig.16	3.774	P
	5600 MHz	Fig.17	4.558	P
	5700 MHz	Fig.18	3.38	P
802.11n HT40	5190 MHz	Fig.19	0.061	P
	5230 MHz	Fig.20	0.506	P
	5270 MHz	Fig.21	2.248	P
	5310 MHz	Fig.22	1.945	P
	5510 MHz	Fig.23	1.127	P
	5590 MHz	Fig.24	1.911	P
	5670 MHz	Fig.25	0.685	P

Conclusion: PASS

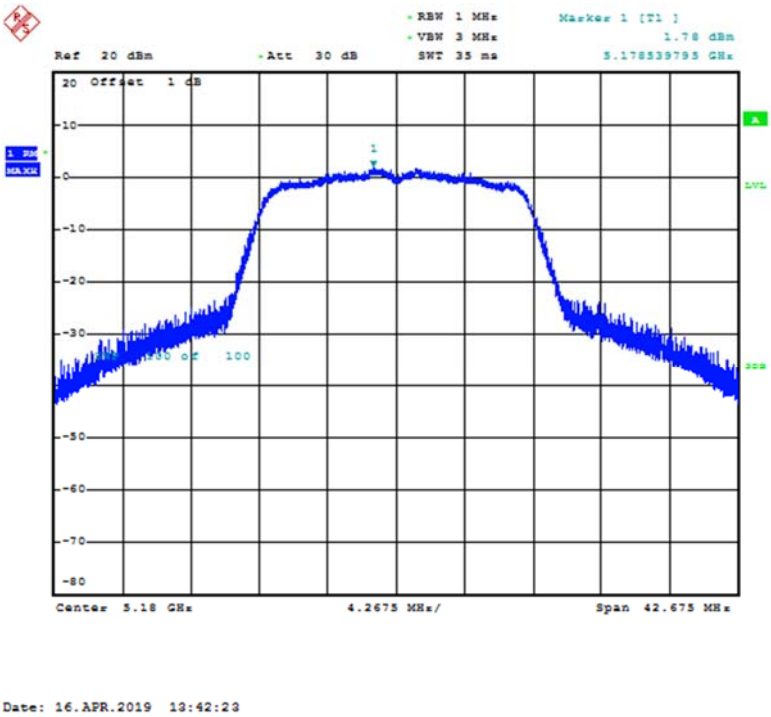


Fig. 1 Power Spectral Density (802.11a, 5180MHz)

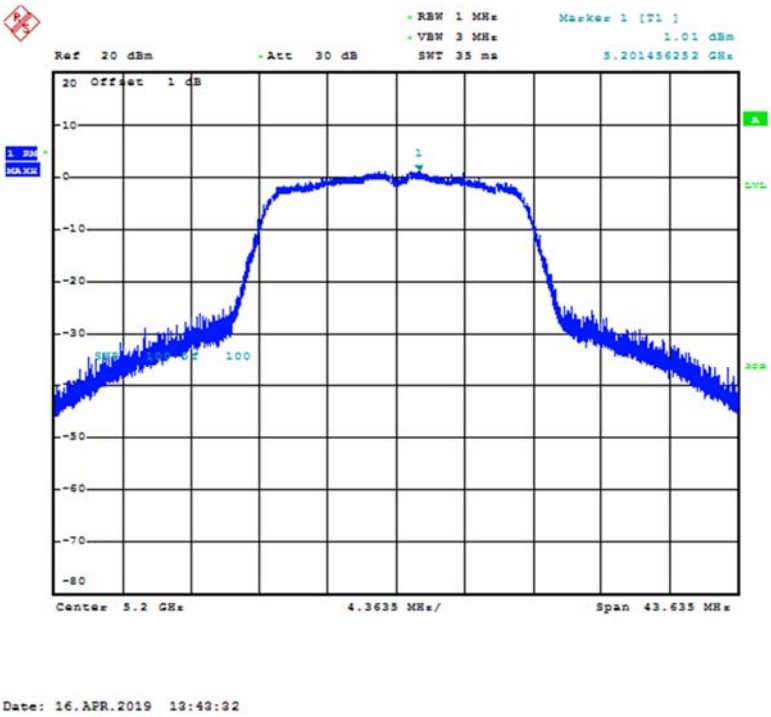


Fig. 2 Power Spectral Density (802.11a, 5200MHz)

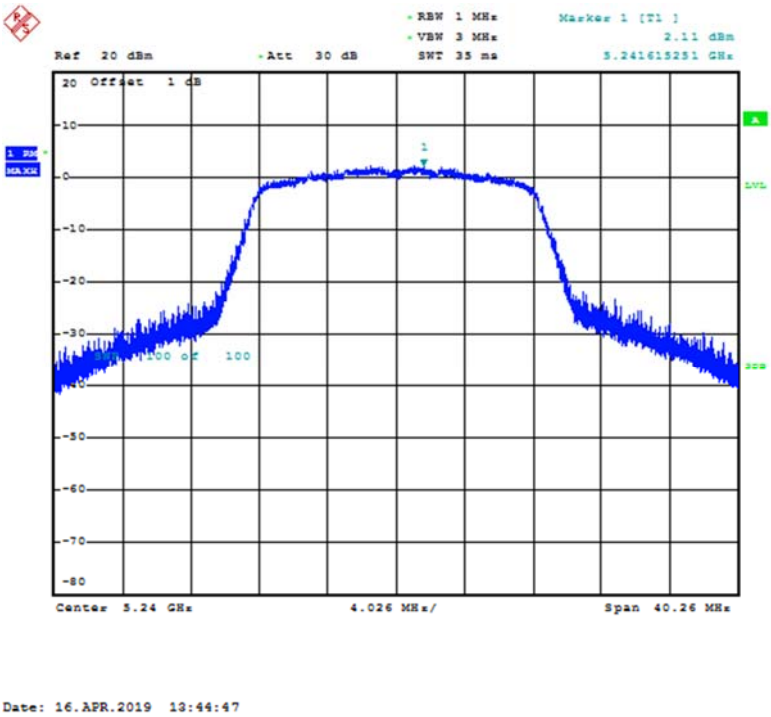


Fig. 3 Power Spectral Density (802.11a, 5240MHz)

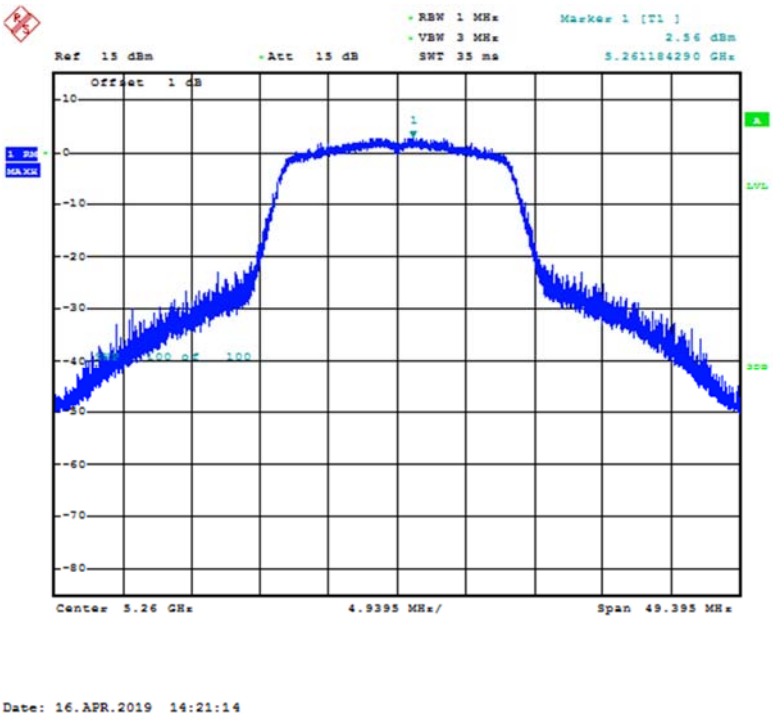


Fig. 4 Power Spectral Density (802.11a, 5260MHz)

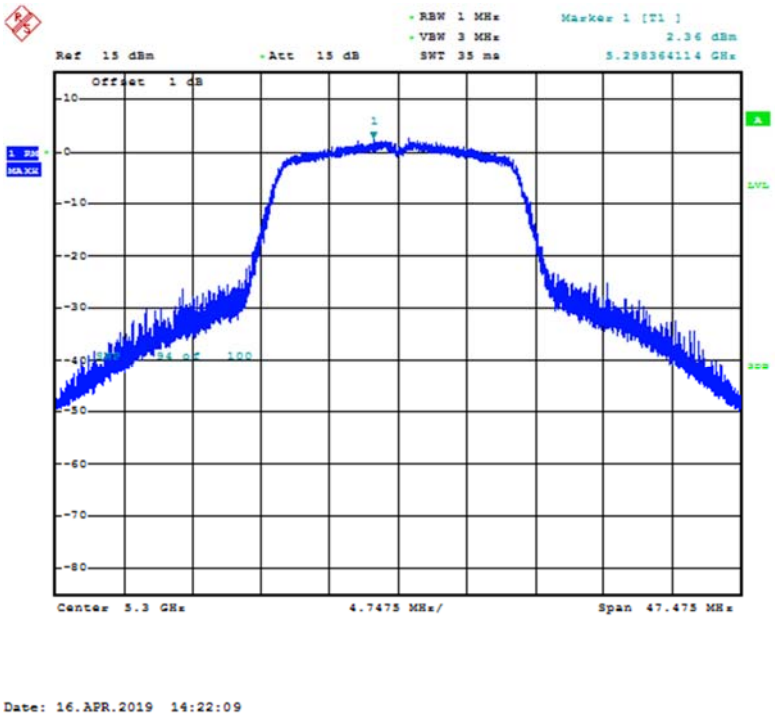


Fig. 5 Power Spectral Density (802.11a, 5300MHz)

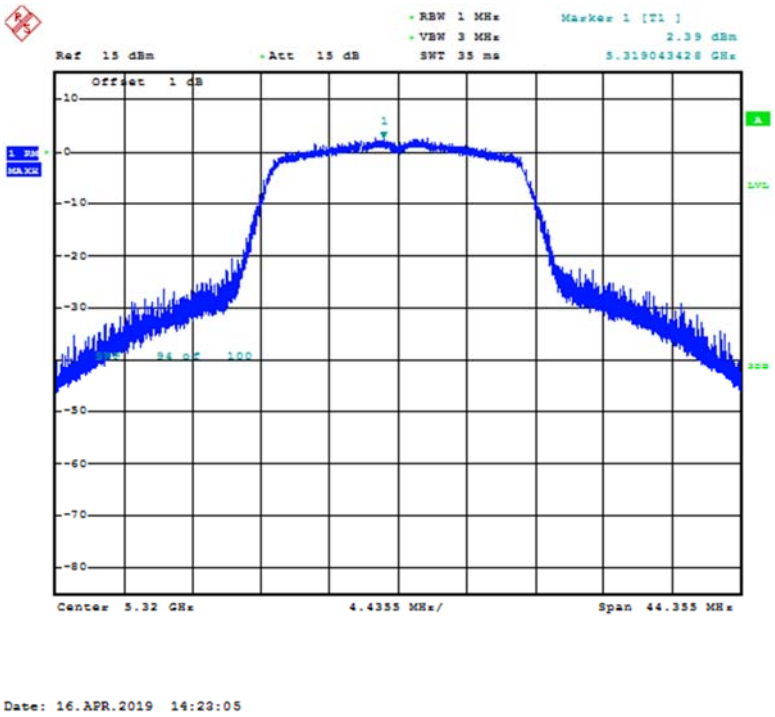


Fig. 6 Power Spectral Density (802.11a, 5320MHz)

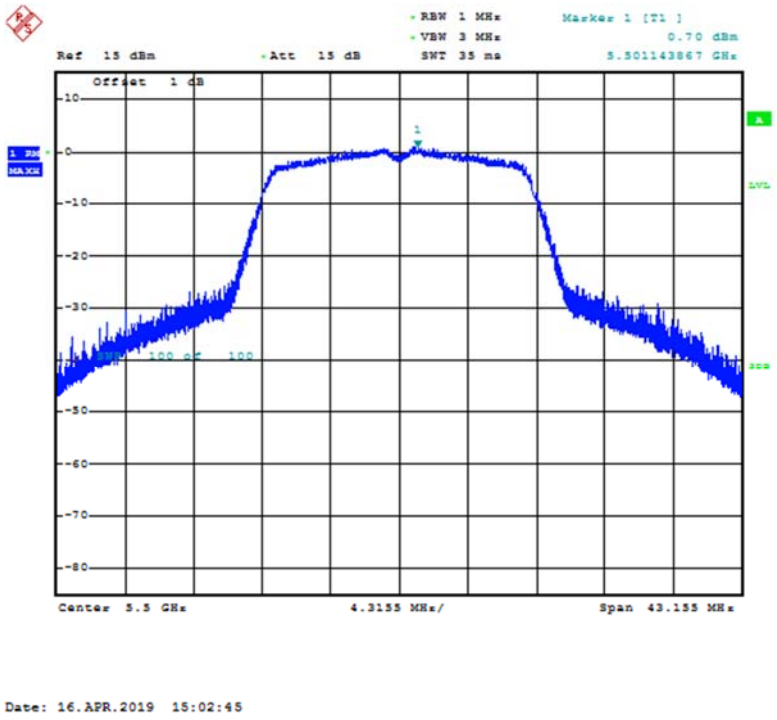


Fig. 7 Power Spectral Density (802.11a, 5500MHz)

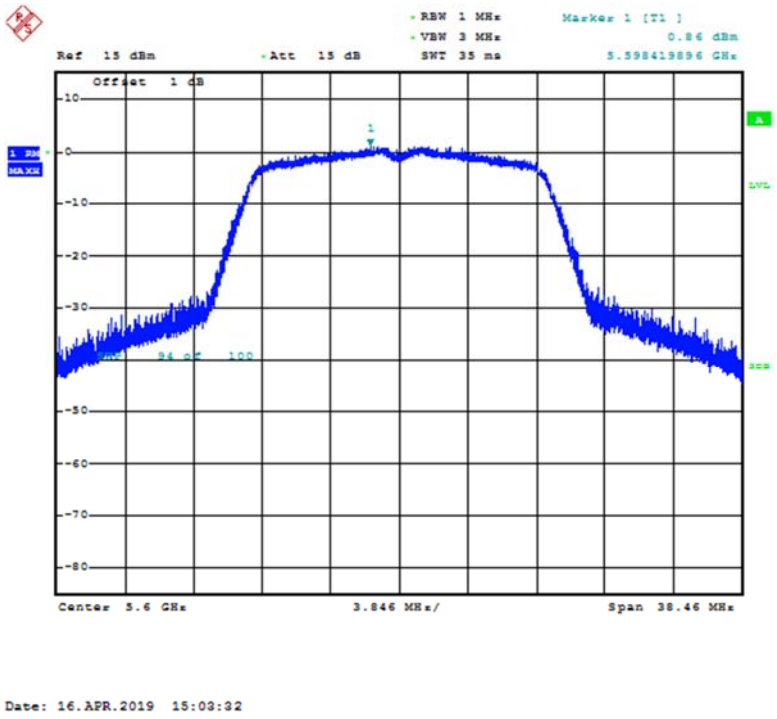


Fig. 8 Power Spectral Density (802.11a, 5600MHz)

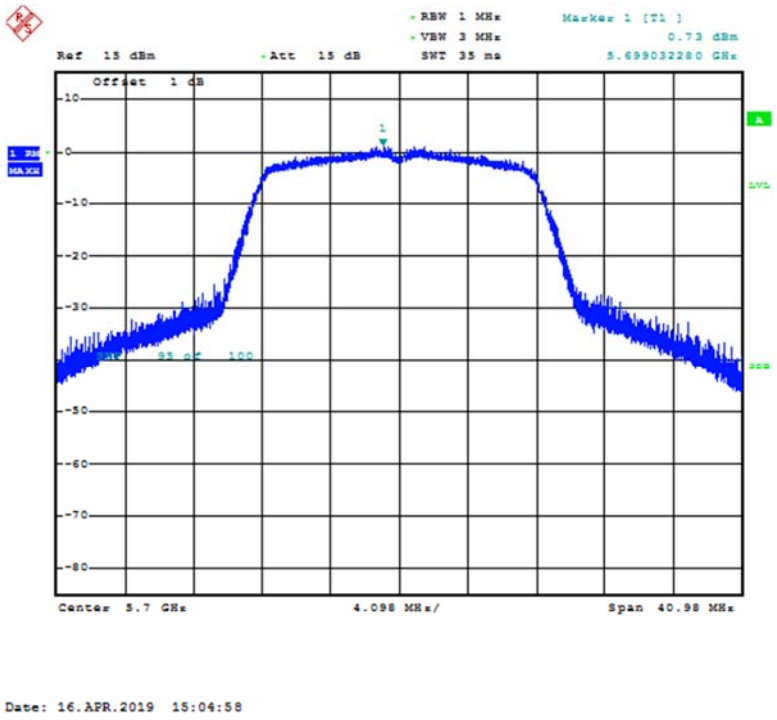


Fig. 9 Power Spectral Density (802.11a, 5700MHz)

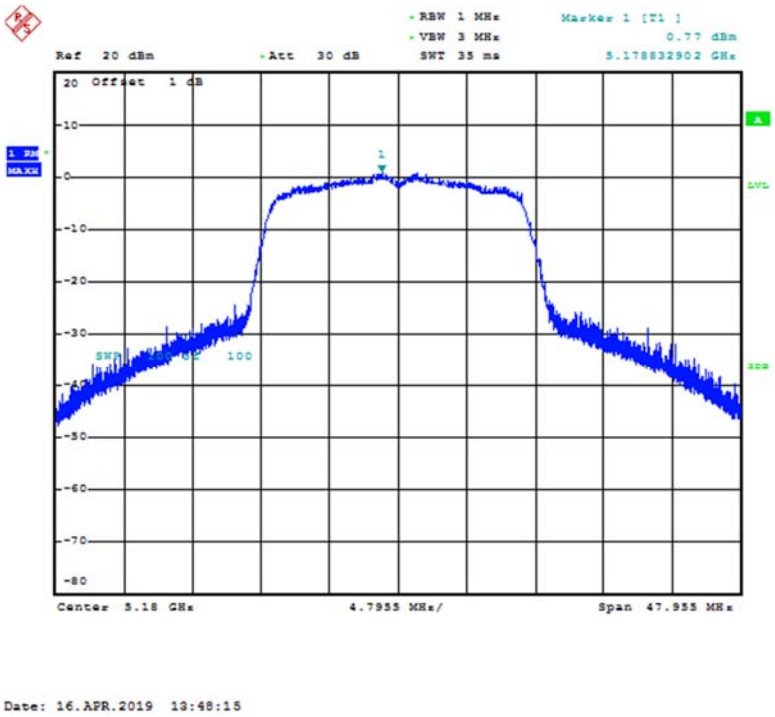


Fig. 10 Power Spectral Density (802.11n-HT20, 5180MHz)

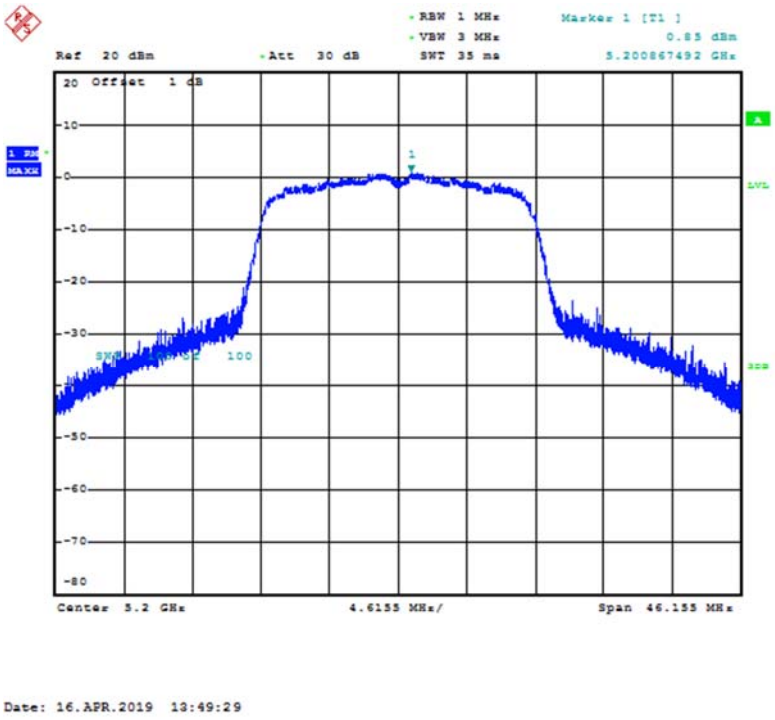


Fig. 11 Power Spectral Density (802.11n-HT20, 5200MHz)

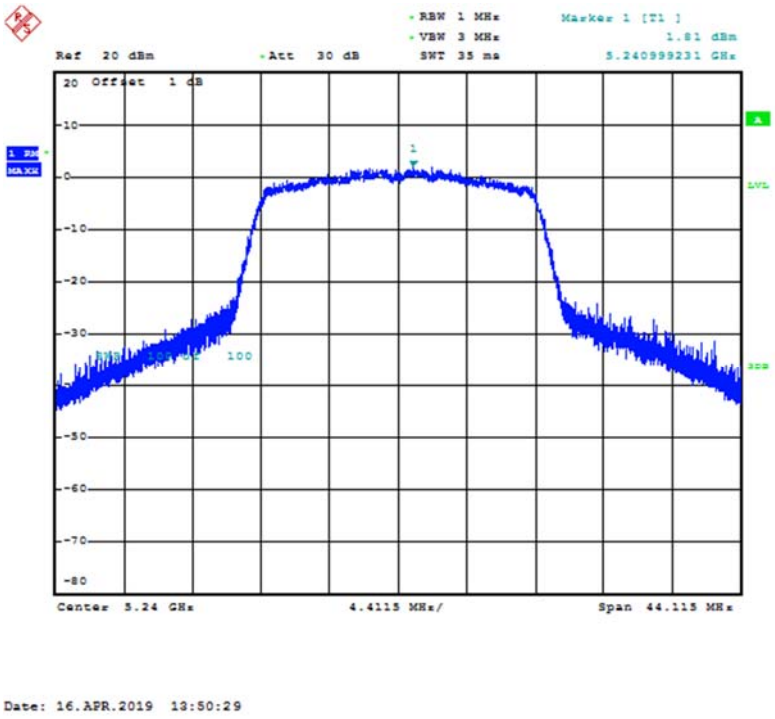


Fig. 12 Power Spectral Density (802.11n-HT20, 5240MHz)

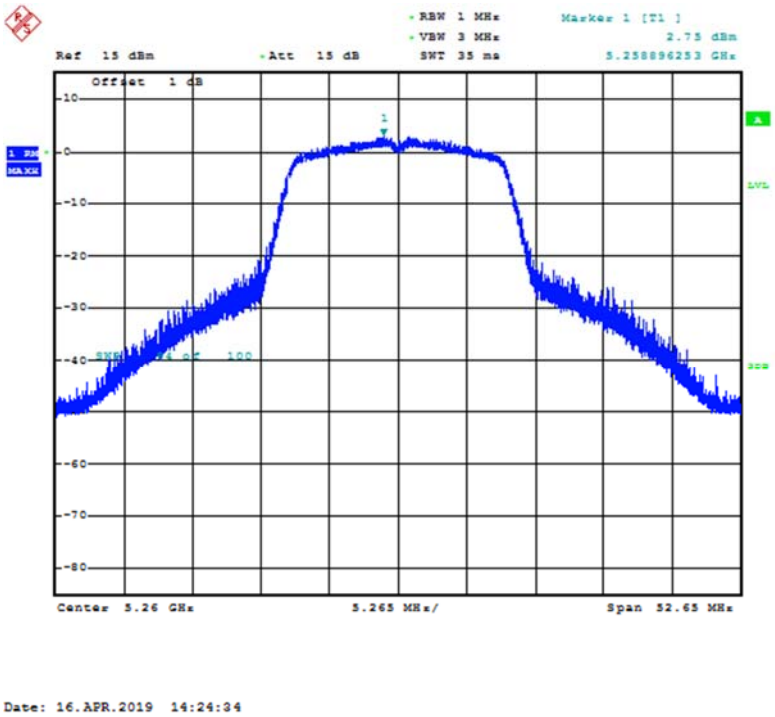


Fig. 13 Power Spectral Density (802.11n-HT20, 5260MHz)

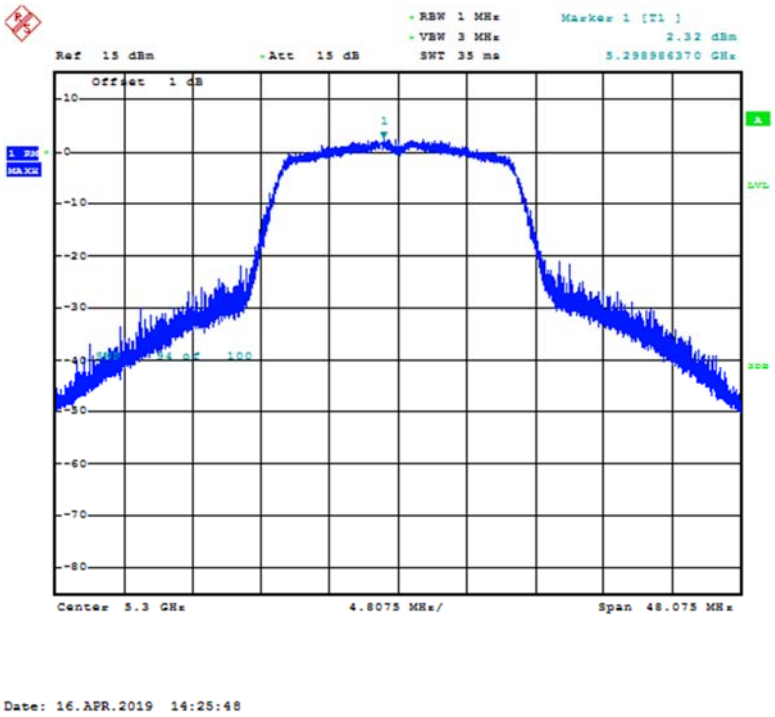


Fig. 14 Power Spectral Density (802.11n-HT20, 5300MHz)

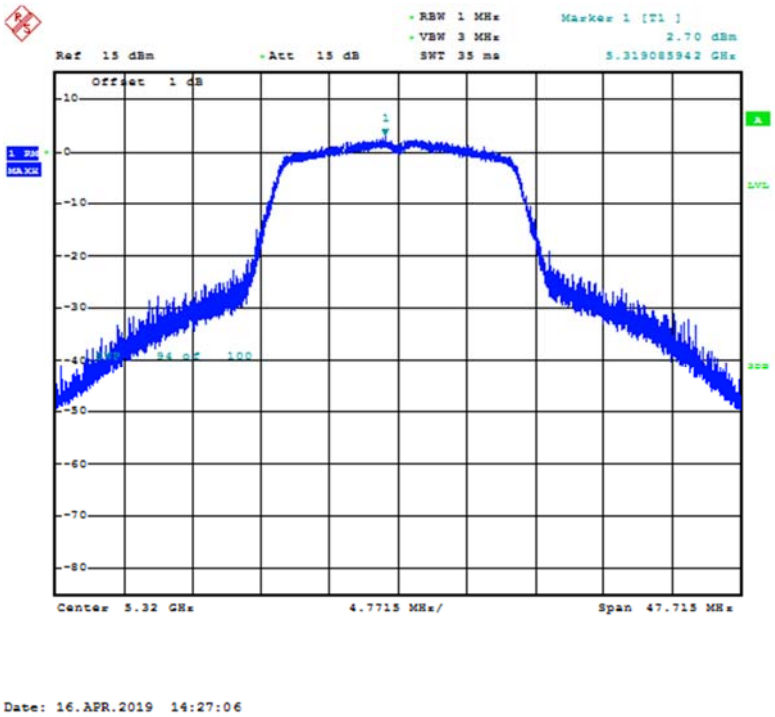


Fig. 15 Power Spectral Density (802.11n-HT20, 5320MHz)

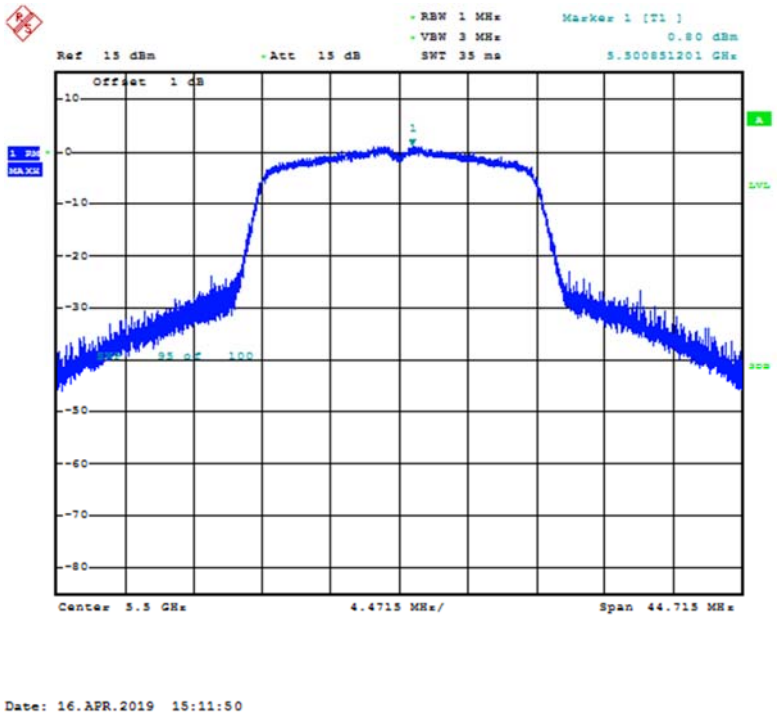


Fig. 16 Power Spectral Density (802.11n-HT20, 5500MHz)

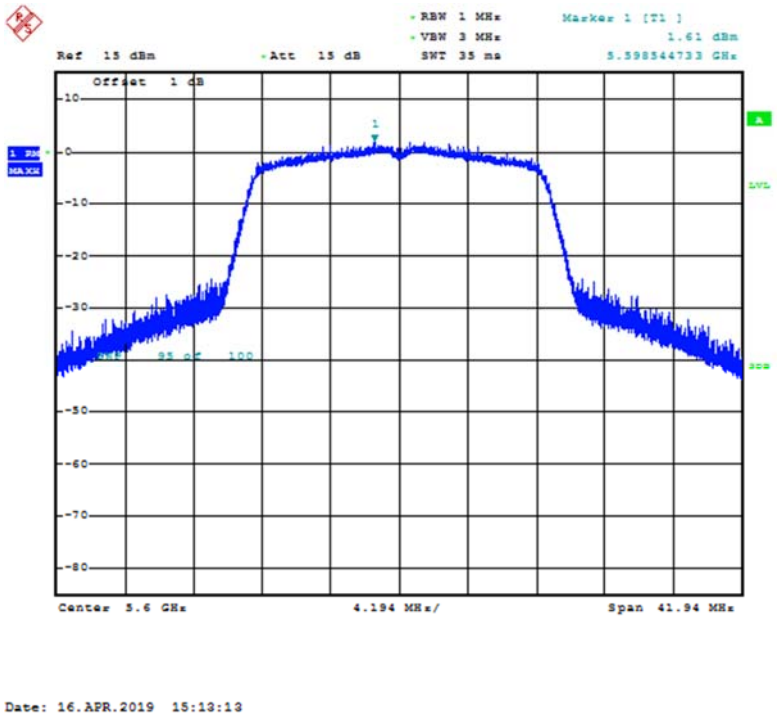


Fig. 17 Power Spectral Density (802.11n-HT20, 5600MHz)

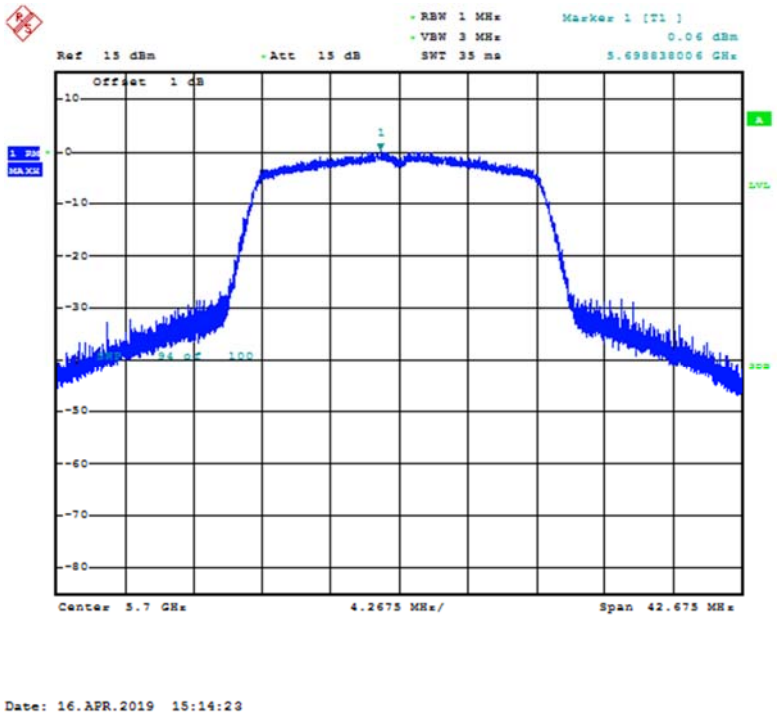


Fig. 18 Power Spectral Density (802.11n-HT20, 5700MHz)

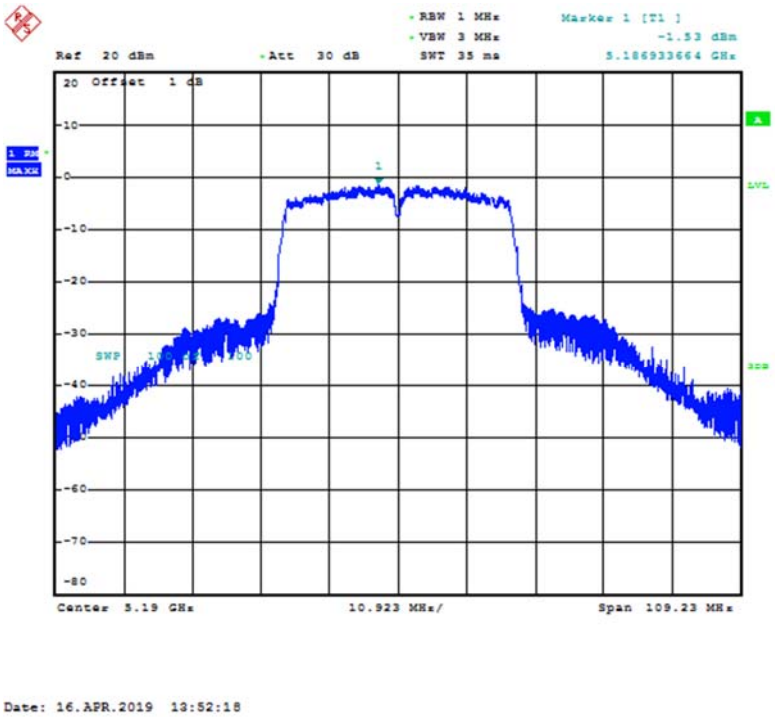


Fig. 19 Power Spectral Density (802.11n-HT40, 5190MHz)

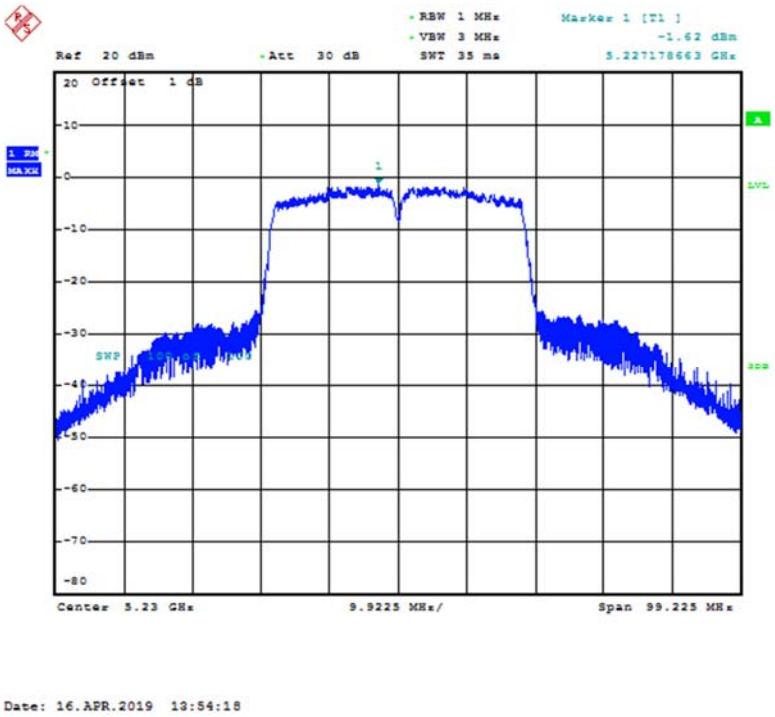


Fig. 20 Power Spectral Density (802.11n-HT40, 5230MHz)

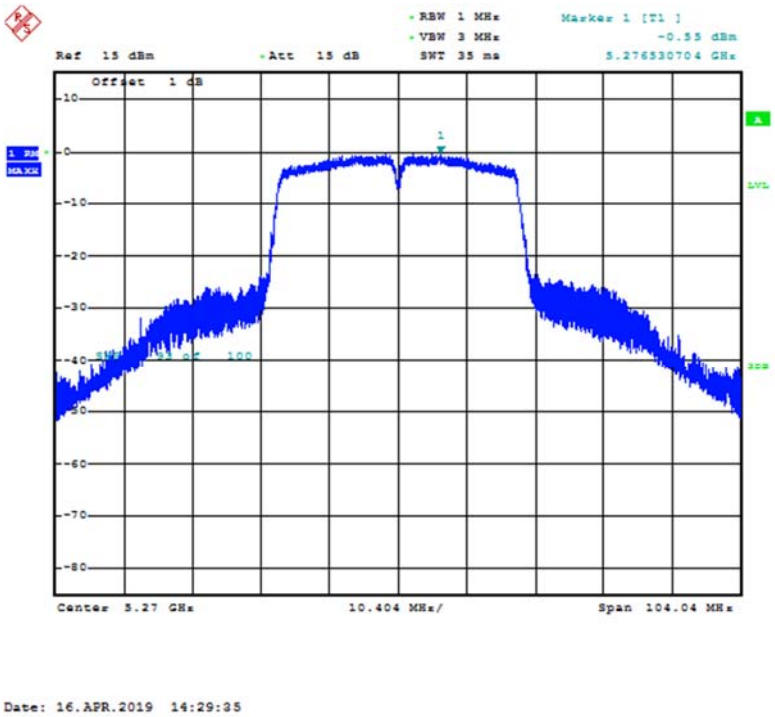


Fig. 21 Power Spectral Density (802.11n-HT40, 5270MHz)

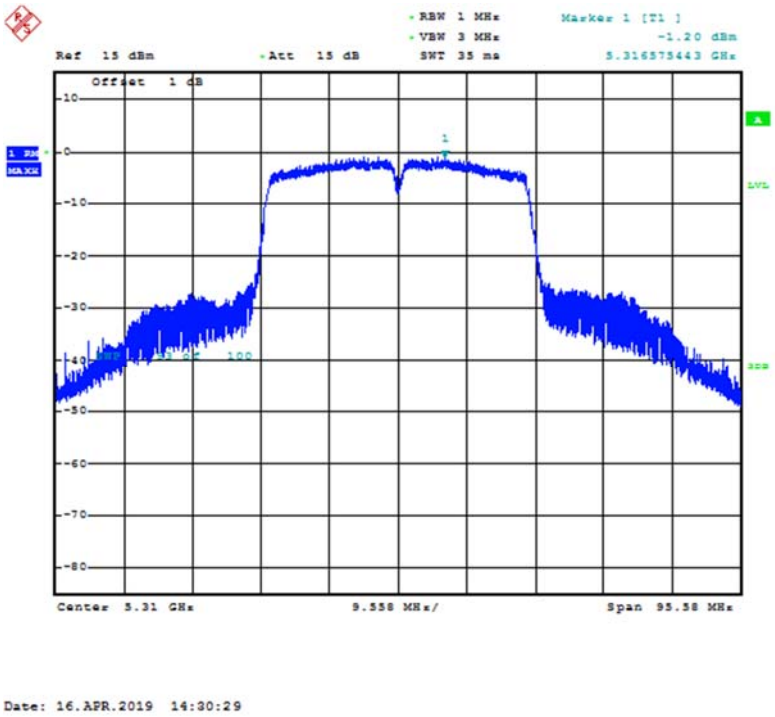


Fig. 22 Power Spectral Density (802.11n-HT40, 5310MHz)

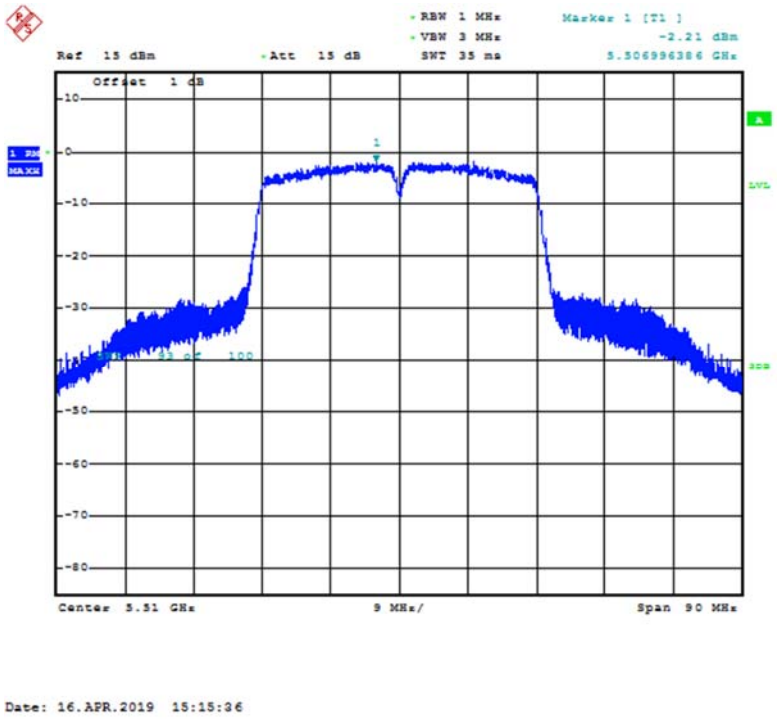


Fig. 23 Power Spectral Density (802.11n-HT40, 5510MHz)

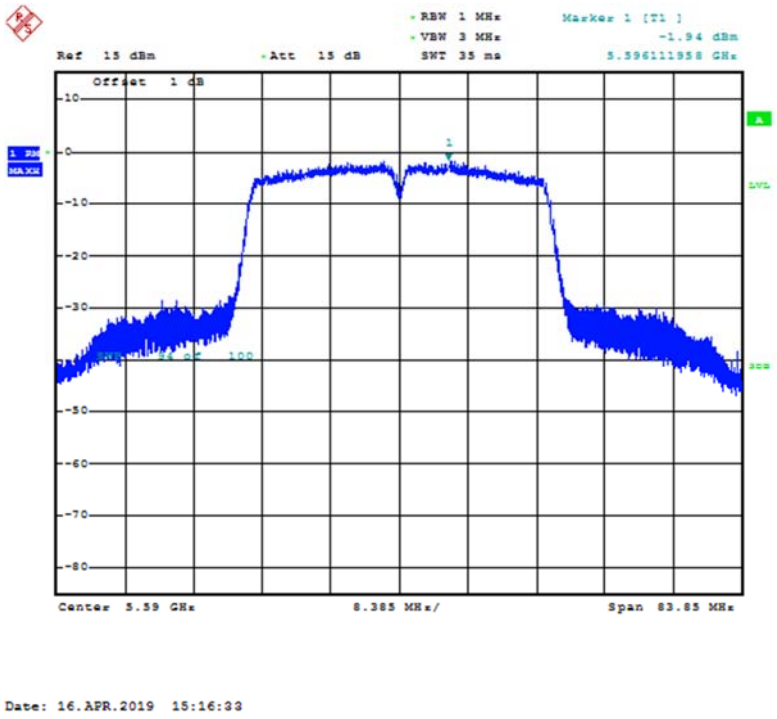


Fig. 24 Power Spectral Density (802.11n-HT40, 5590MHz)

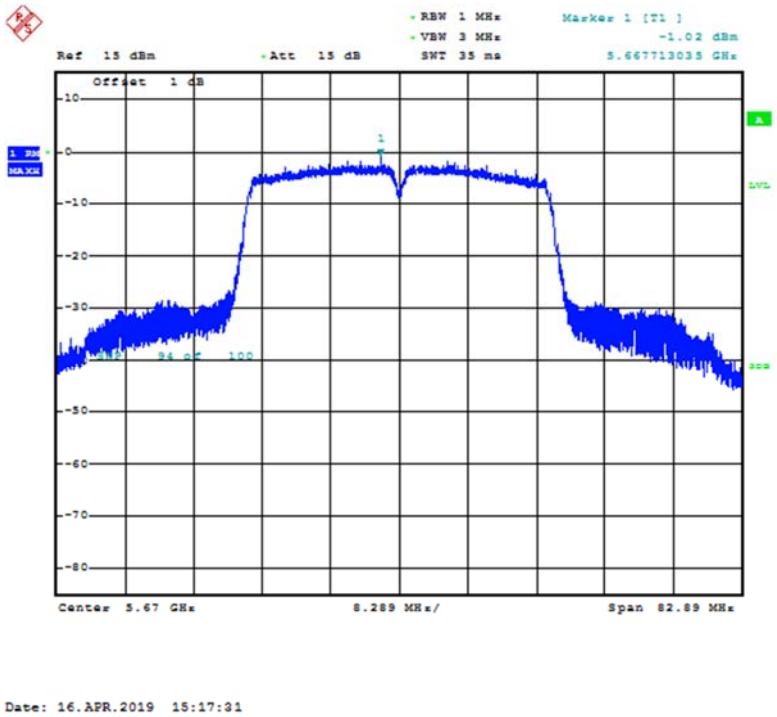


Fig. 25 Power Spectral Density (802.11n-HT40, 5670MHz)

6.4. Occupied 26dB Bandwidth(conducted)

Measurement Limit:

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

The measurement is made according to KDB 789033

Measurement Result:

Mode	Frequency	Occupied 26dB Bandwidth (dBm/MHz)		Conclusion
802.11a	5180 MHz	Fig.26	28.45	P
	5200 MHz	Fig.27	29.09	P
	5240 MHz	Fig.28	26.84	P
	5260 MHz	Fig.29	32.93	P
	5300 MHz	Fig.30	31.65	P
	5320 MHz	Fig.31	29.57	P
	5500 MHz	Fig.32	28.77	P
	5600 MHz	Fig.33	25.64	P
	5700 MHz	Fig.34	27.32	P
802.11n HT20	5180 MHz	Fig.35	31.97	P
	5200 MHz	Fig.36	30.77	P
	5240 MHz	Fig.37	29.41	P
	5260 MHz	Fig.38	35.1	P

	5300 MHz	Fig.39	32.05	P
	5320 MHz	Fig.40	31.81	P
	5500 MHz	Fig.41	29.81	P
	5600 MHz	Fig.42	27.96	P
	5700 MHz	Fig.43	28.45	P
802.11n HT40	5190 MHz	Fig.44	72.82	P
	5230 MHz	Fig.45	66.15	P
	5270 MHz	Fig.46	69.36	P
	5310 MHz	Fig.47	63.72	P
	5510 MHz	Fig.48	60	P
	5590 MHz	Fig.49	55.9	P
	5670 MHz	Fig.50	55.26	P

Conclusion: PASS

Test graphs as below:

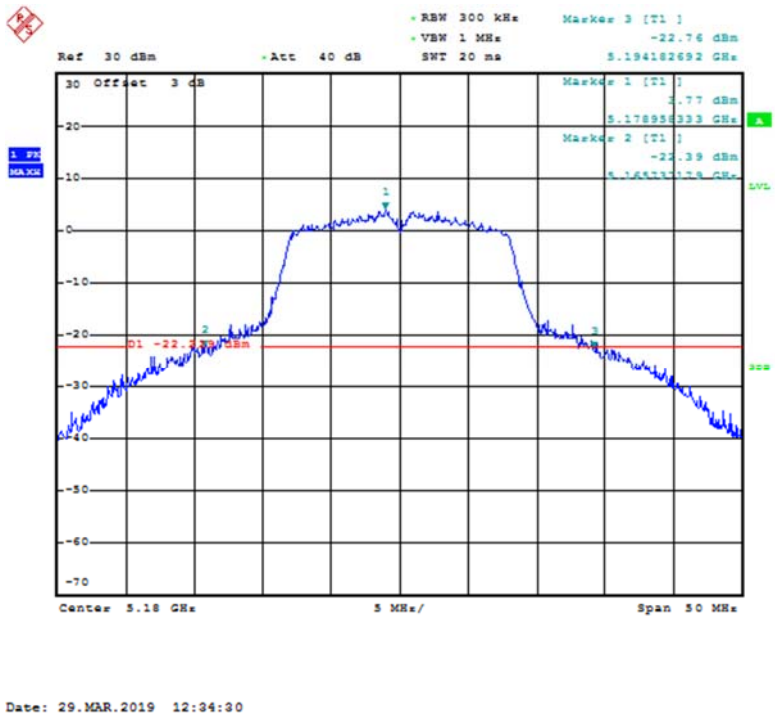


Fig. 26 Occupied 26dB Bandwidth (802.11a, 5180MHz)

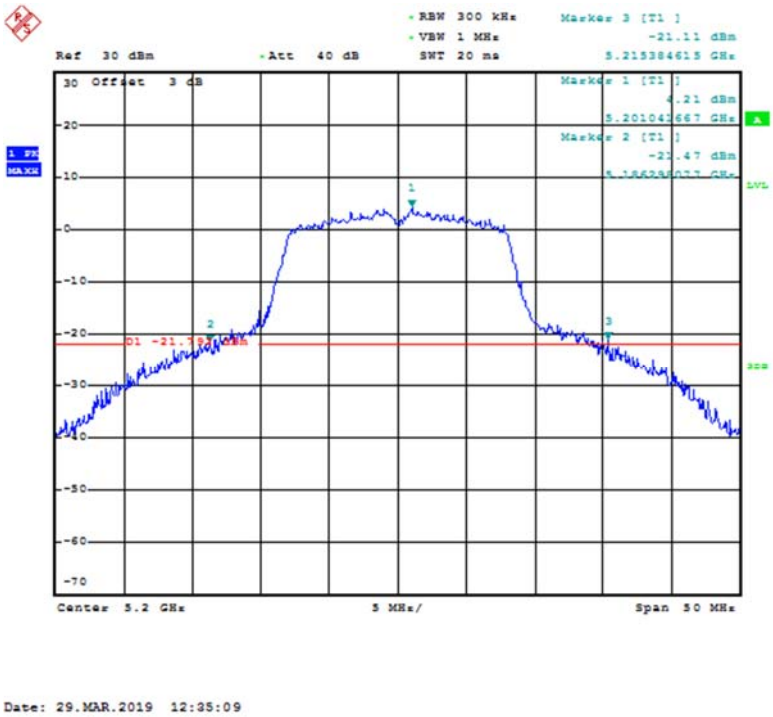


Fig. 27 Occupied 26dB Bandwidth (802.11a, 5200MHz)

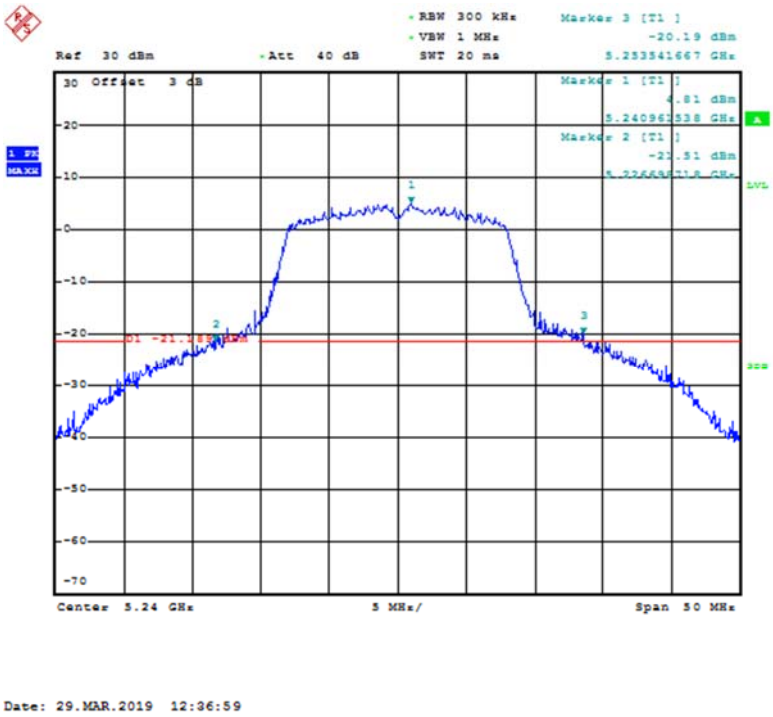


Fig. 28 Occupied 26dB Bandwidth (802.11a, 5240MHz)

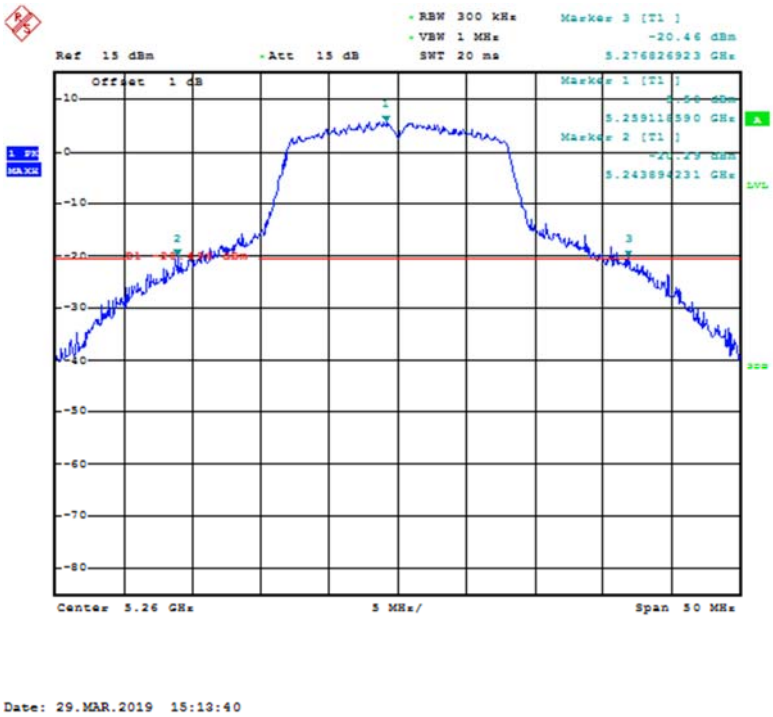


Fig. 29 Occupied 26dB Bandwidth (802.11a, 5260MHz)

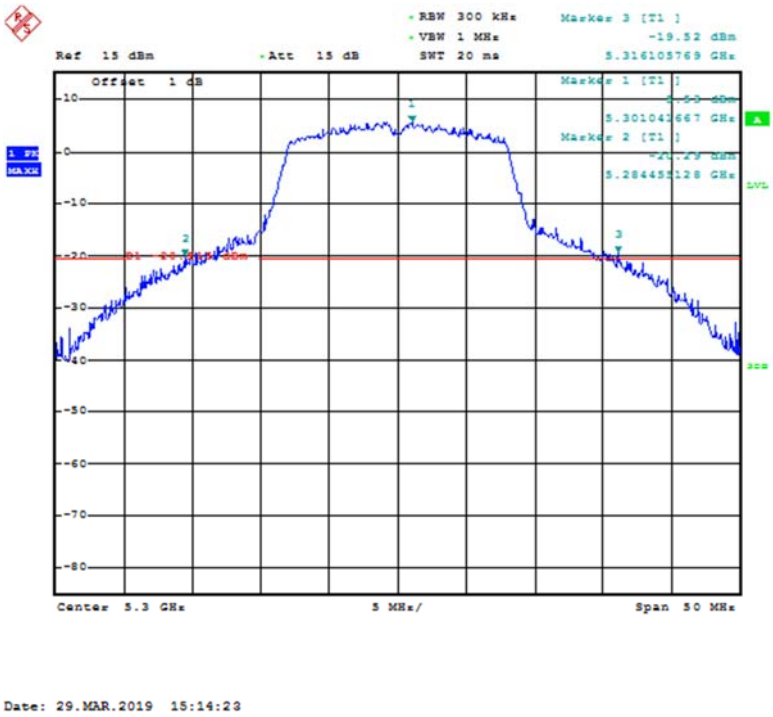


Fig. 30 Occupied 26dB Bandwidth (802.11a, 5300MHz)

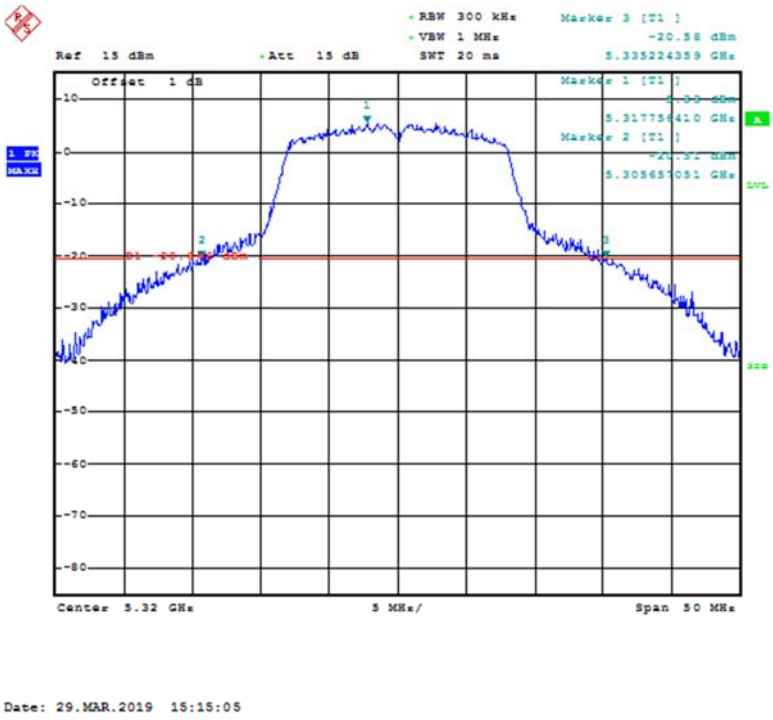


Fig. 31 Occupied 26dB Bandwidth (802.11a, 5320MHz)

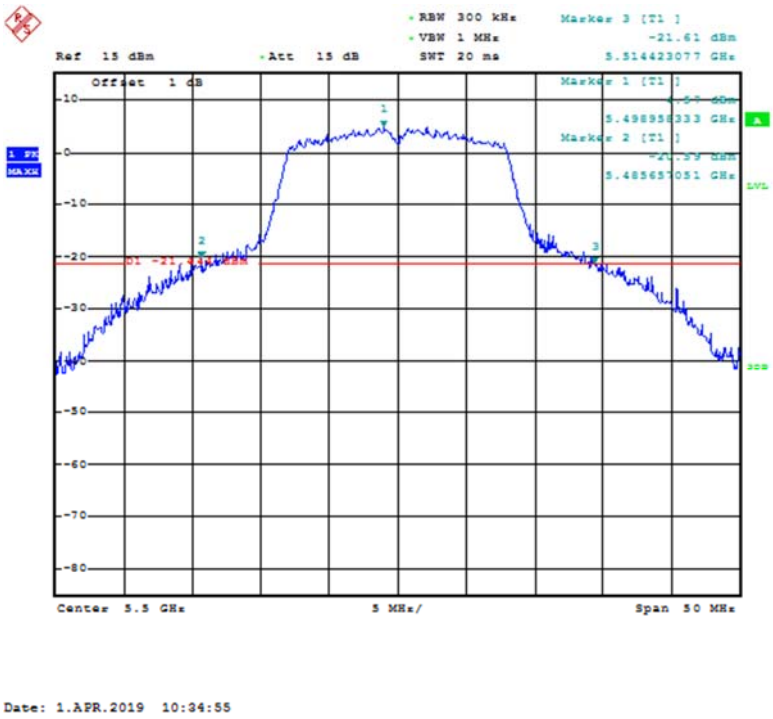


Fig. 32 Occupied 26dB Bandwidth (802.11a, 5500MHz)

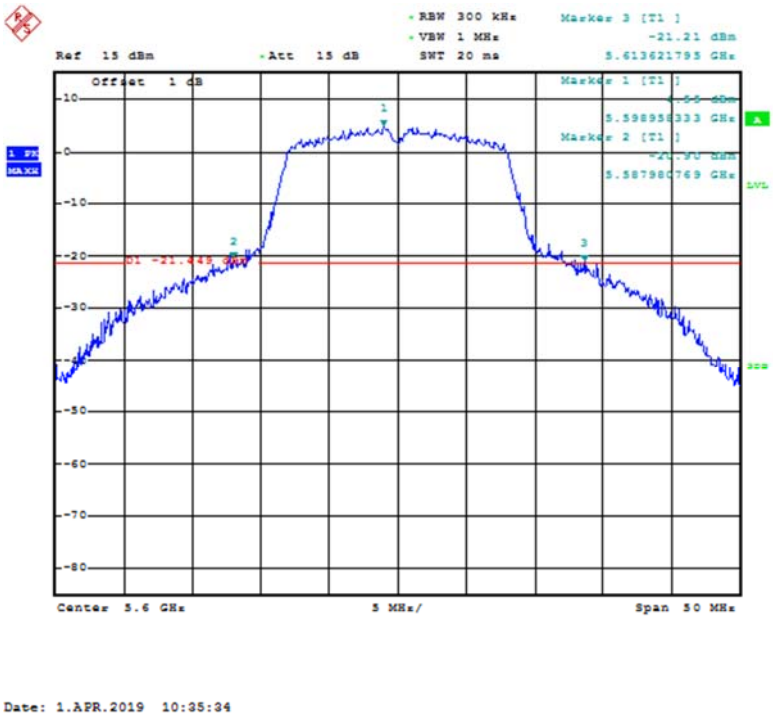


Fig. 33 Occupied 26dB Bandwidth (802.11a, 5600MHz)

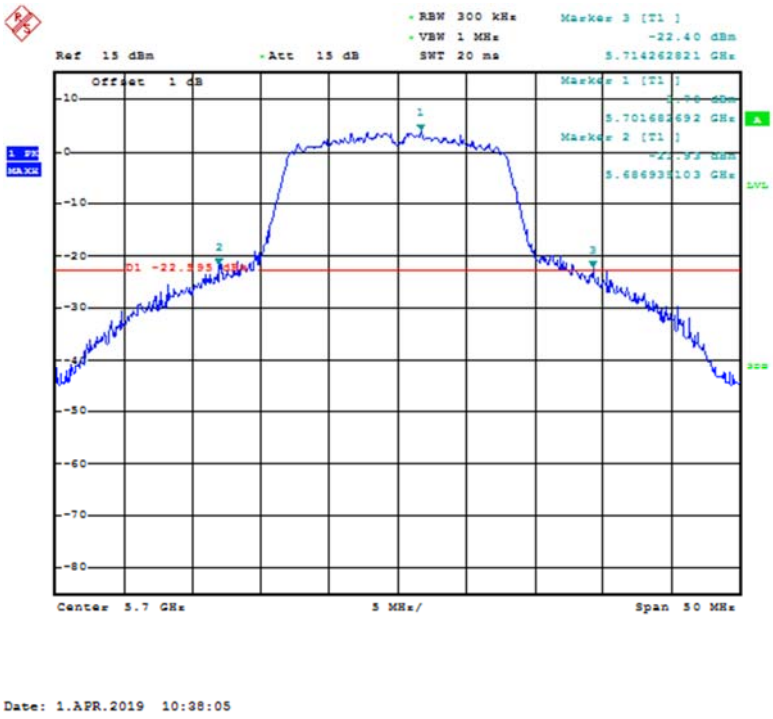


Fig. 34 Occupied 26dB Bandwidth (802.11a, 5700MHz)

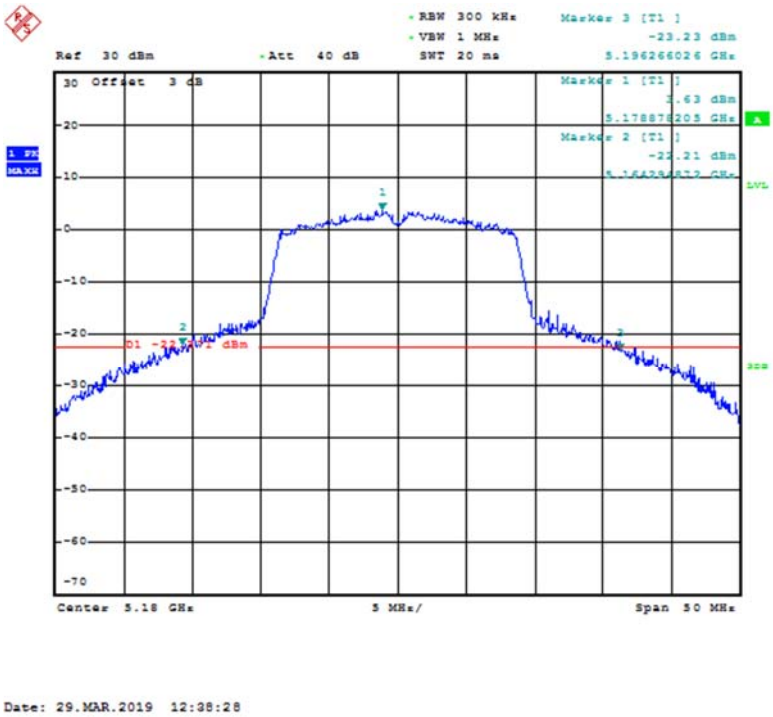


Fig. 35 Occupied 26dB Bandwidth (802.11n-HT20, 5180MHz)

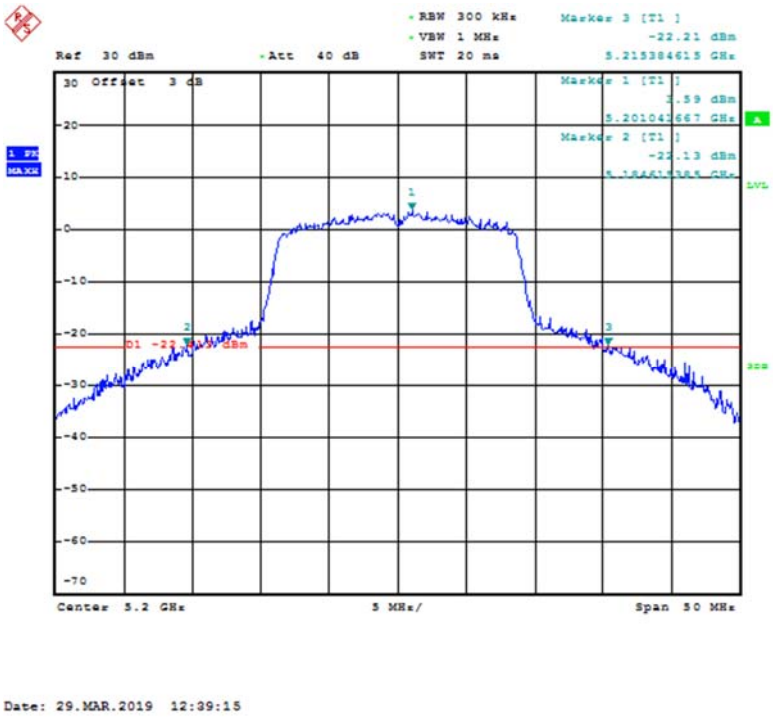


Fig. 36 Occupied 26dB Bandwidth (802.11n-HT20, 5200MHz)

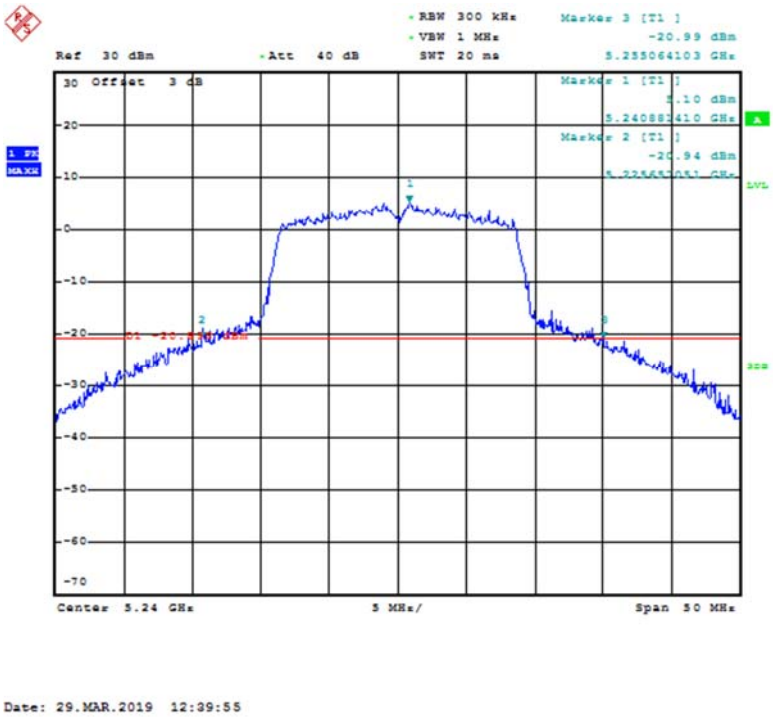


Fig. 37 Occupied 26dB Bandwidth (802.11n-HT20, 5240MHz)

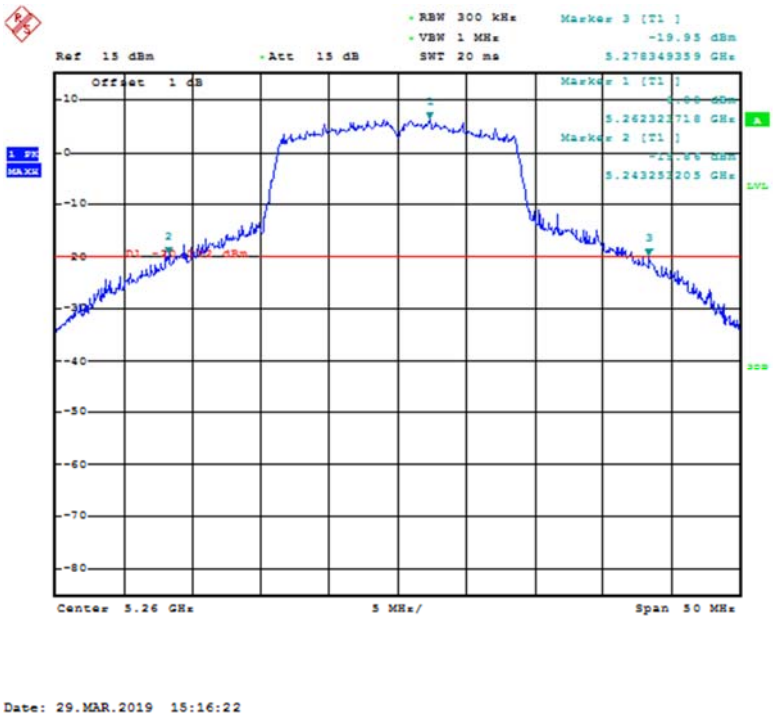


Fig. 38 Occupied 26dB Bandwidth (802.11n-HT20, 5260MHz)

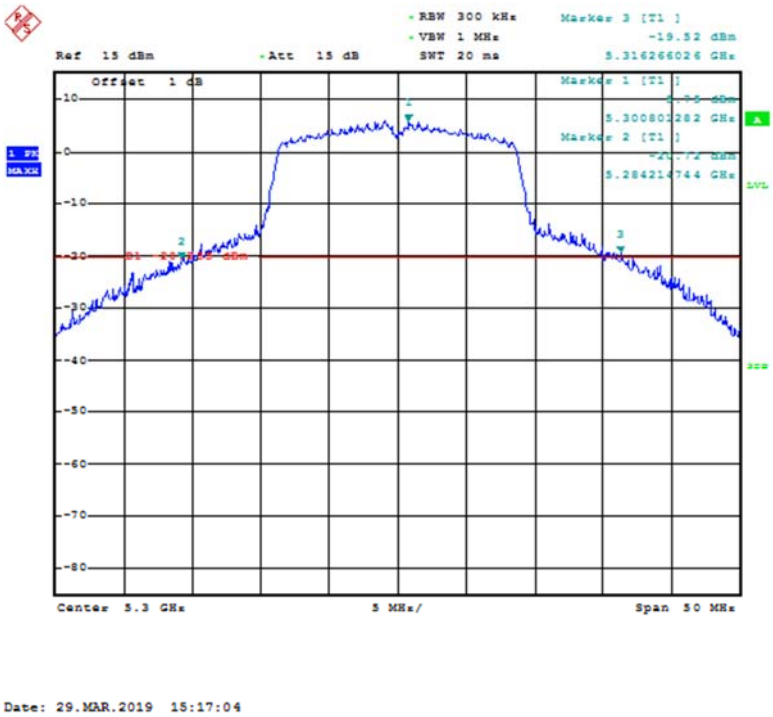


Fig. 39 Occupied 26dB Bandwidth (802.11n-HT20, 5300MHz)

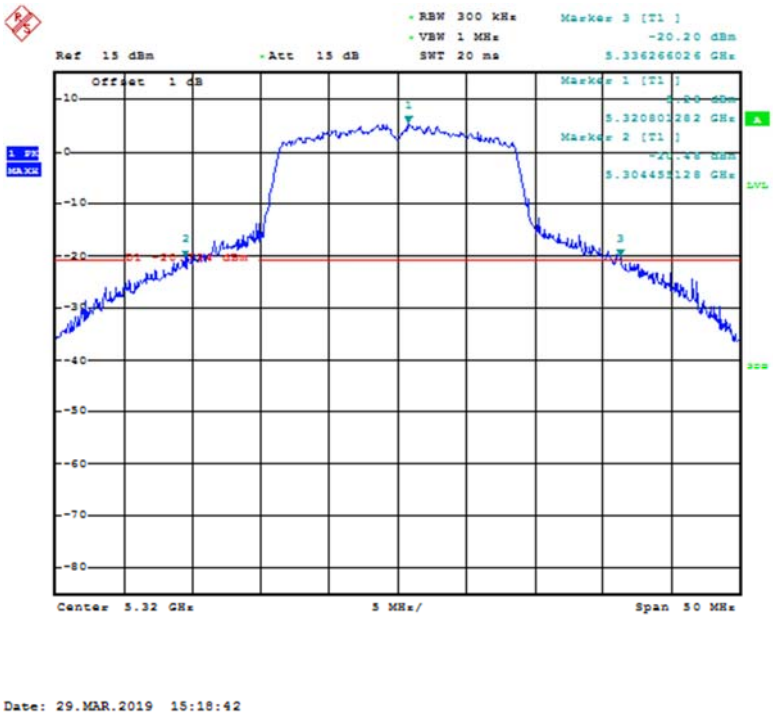


Fig. 40 Occupied 26dB Bandwidth (802.11n-HT20, 5320MHz)

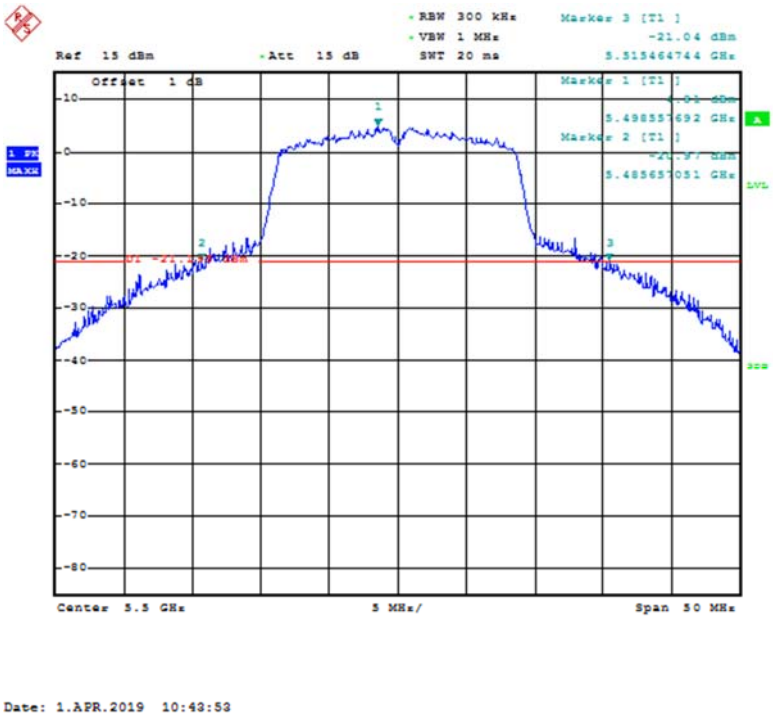


Fig. 41 Occupied 26dB Bandwidth (802.11n-HT20, 5500MHz)

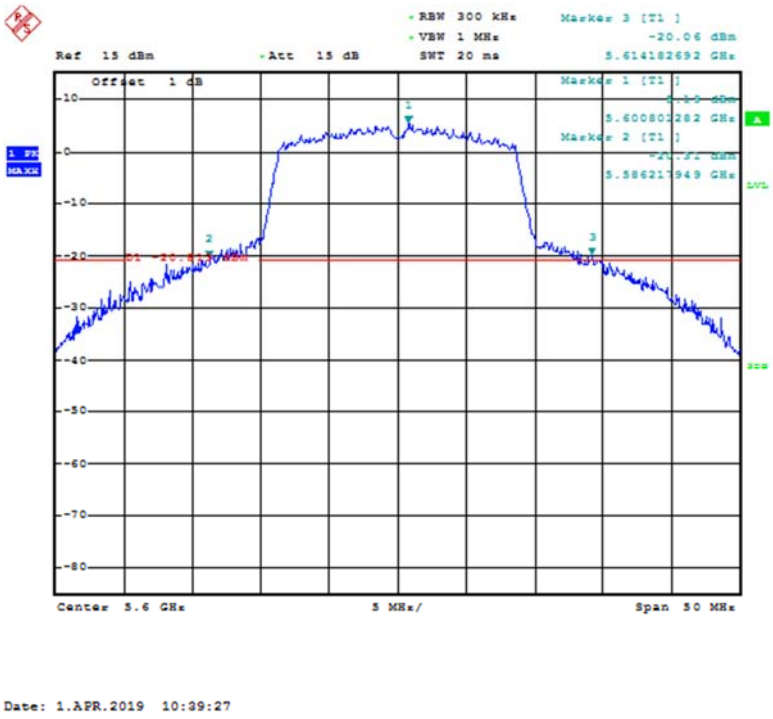


Fig. 42 Occupied 26dB Bandwidth (802.11n-HT20, 5600MHz)

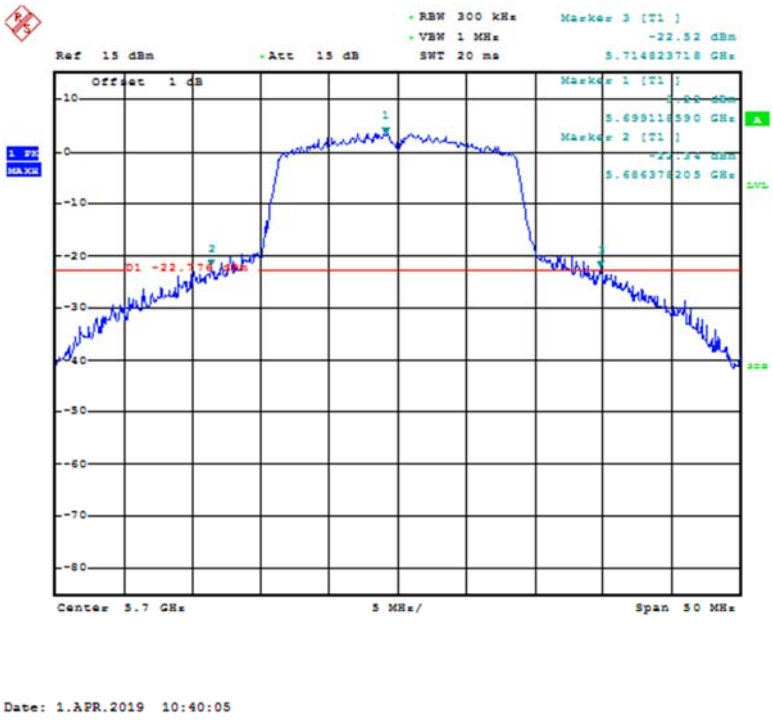


Fig. 43 Occupied 26dB Bandwidth (802.11n-HT20, 5700MHz)

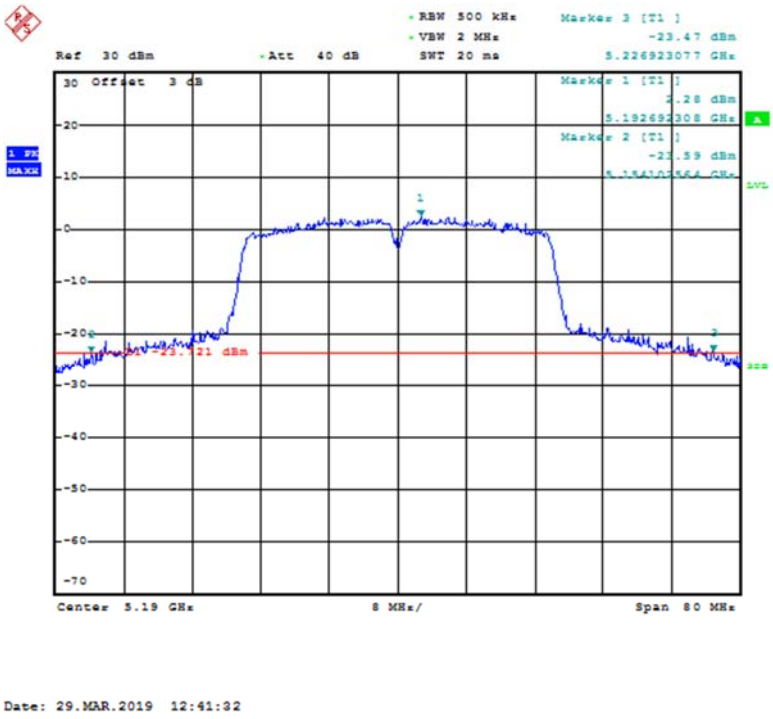


Fig. 44 Occupied 26dB Bandwidth (802.11n-HT40, 5190MHz)

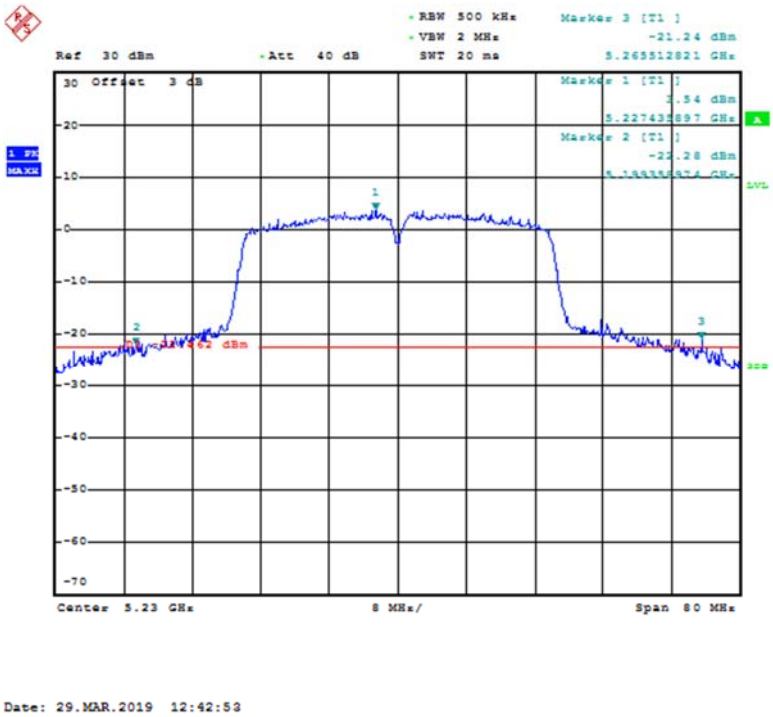


Fig. 45 Occupied 26dB Bandwidth (802.11n-HT40, 5230MHz)

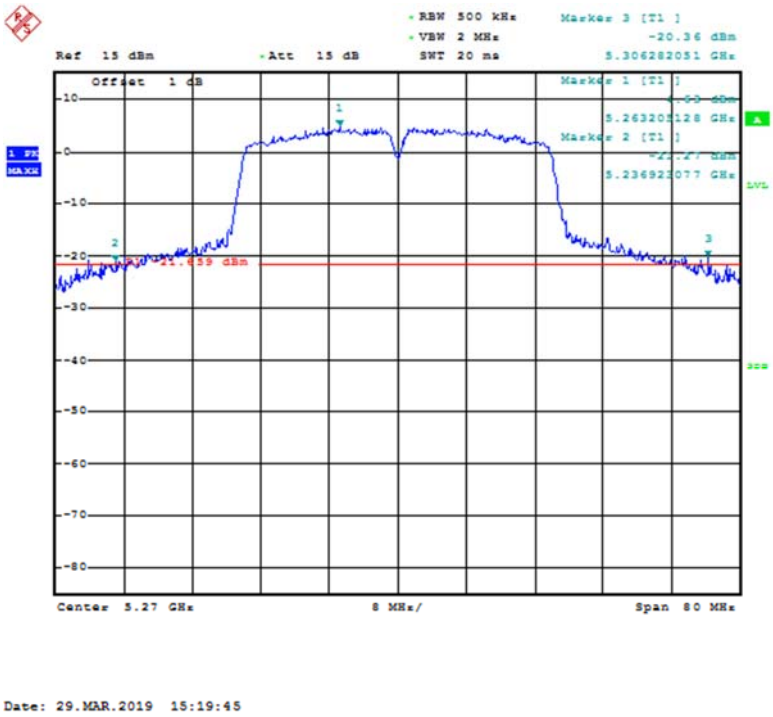


Fig. 46 Occupied 26dB Bandwidth (802.11n-HT40, 5270MHz)

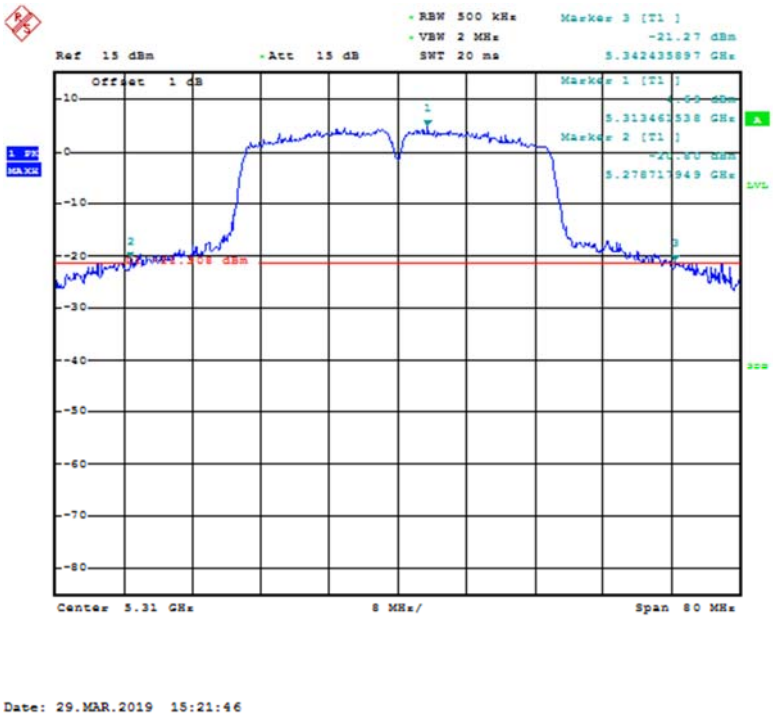


Fig. 47 Occupied 26dB Bandwidth (802.11n-HT40, 5310MHz)

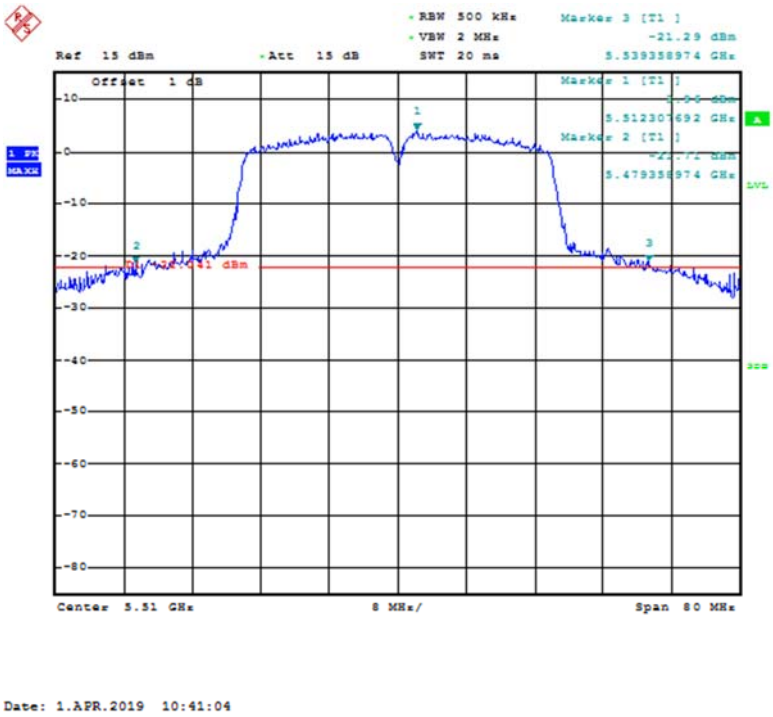


Fig. 48 Occupied 26dB Bandwidth (802.11n-HT40, 5510MHz)

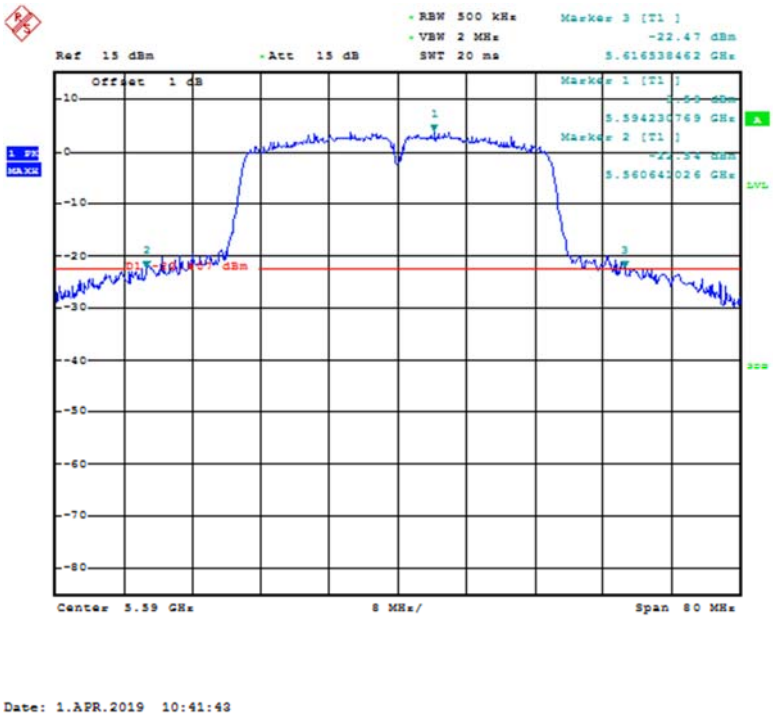


Fig. 49 Occupied 26dB Bandwidth (802.11n-HT40, 5590MHz)

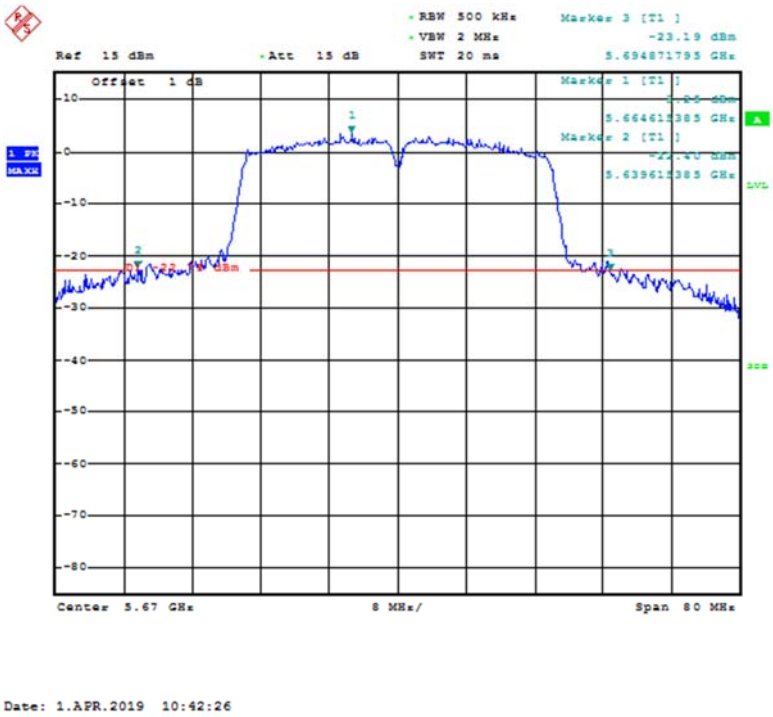


Fig. 50 Occupied 26dB Bandwidth (802.11n-HT40, 5670MHz)

6.5. 99% Occupied Bandwidth(conducted)

Measurement Limit:

Standard	Limit (MHz)
FCC 47 CFR Part 15.407 (e)	/

The measurement is made according to KDB 789033

Measurement Result:

Mode	Frequency	99% Occupied Bandwidth (dBm/MHz)		Conclusion
802.11a	5180 MHz	Fig.51	17.628	P
	5200 MHz	Fig.52	17.548	P
	5240 MHz	Fig.53	17.388	P
	5260 MHz	Fig.54	17.708	P
	5300 MHz	Fig.55	17.788	P
	5320 MHz	Fig.56	17.708	P
	5500 MHz	Fig.57	17.308	P
	5600 MHz	Fig.58	17.147	P
	5700 MHz	Fig.59	17.308	P
802.11n HT20	5180 MHz	Fig.60	18.429	P
	5200 MHz	Fig.61	18.349	P
	5240 MHz	Fig.62	18.269	P
	5260 MHz	Fig.63	18.59	P
	5300 MHz	Fig.64	18.59	P
	5320 MHz	Fig.65	18.429	P
	5500 MHz	Fig.66	18.349	P
	5600 MHz	Fig.67	18.189	P
	5700 MHz	Fig.68	18.029	P
802.11n HT40	5190 MHz	Fig.69	37.051	P
	5230 MHz	Fig.70	36.795	P
	5270 MHz	Fig.71	36.795	P
	5310 MHz	Fig.72	36.795	P
	5510 MHz	Fig.73	36.667	P
	5590 MHz	Fig.74	36.538	P
	5670 MHz	Fig.75	36.538	P

Conclusion: PASS

Test graphs as below:

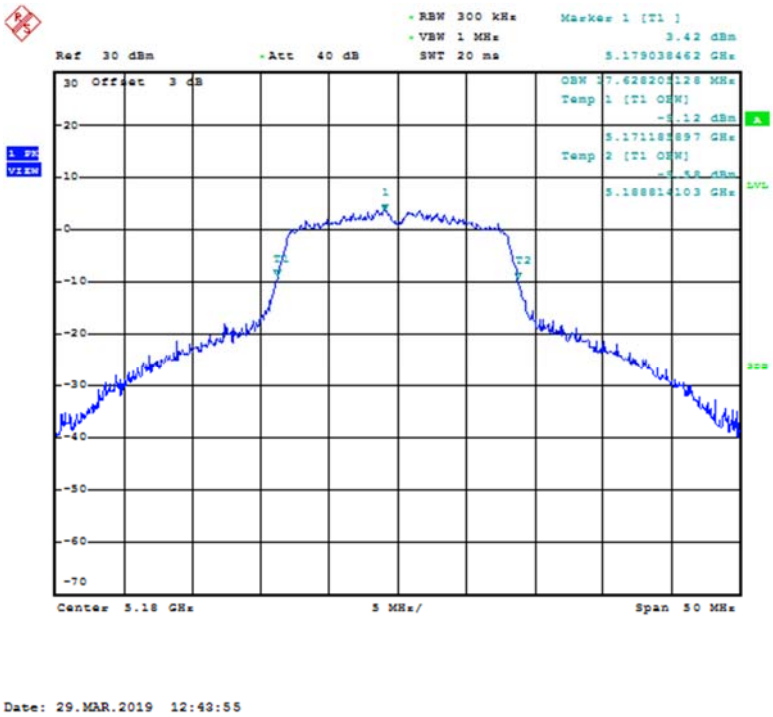


Fig. 51 99% Occupied Bandwidth (802.11a, 5180MHz)

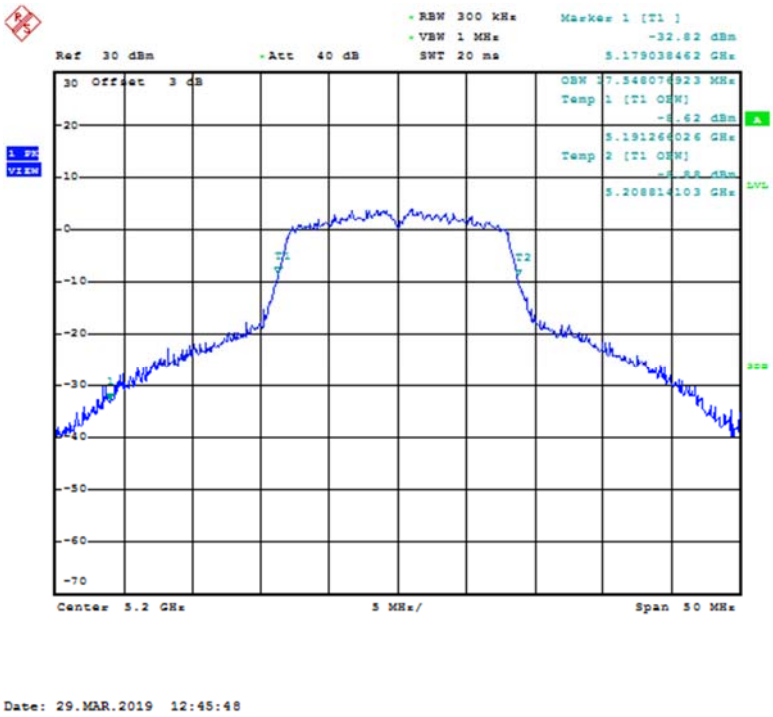


Fig. 52 99% Occupied Bandwidth (802.11a, 5200MHz)

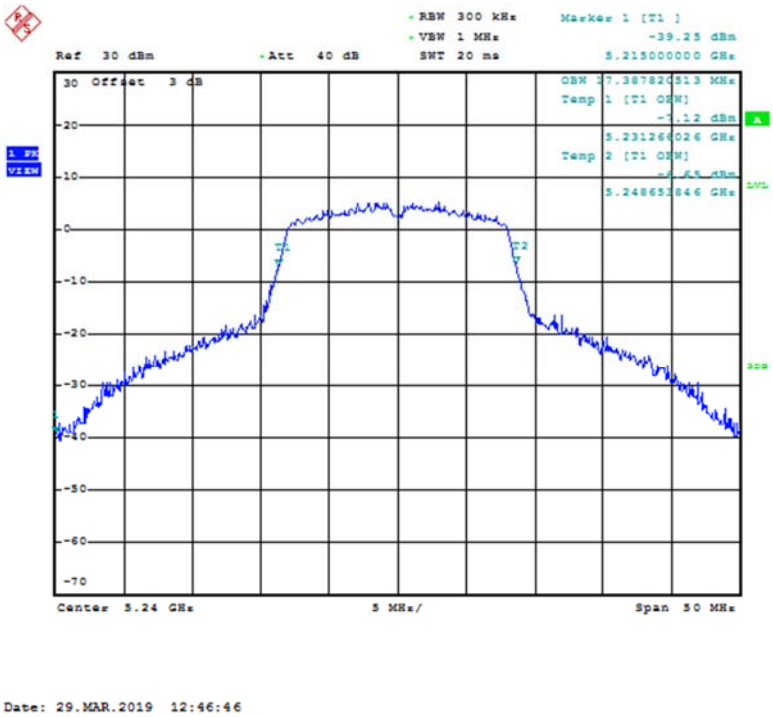


Fig. 53 99% Occupied Bandwidth (802.11a, 5240MHz)

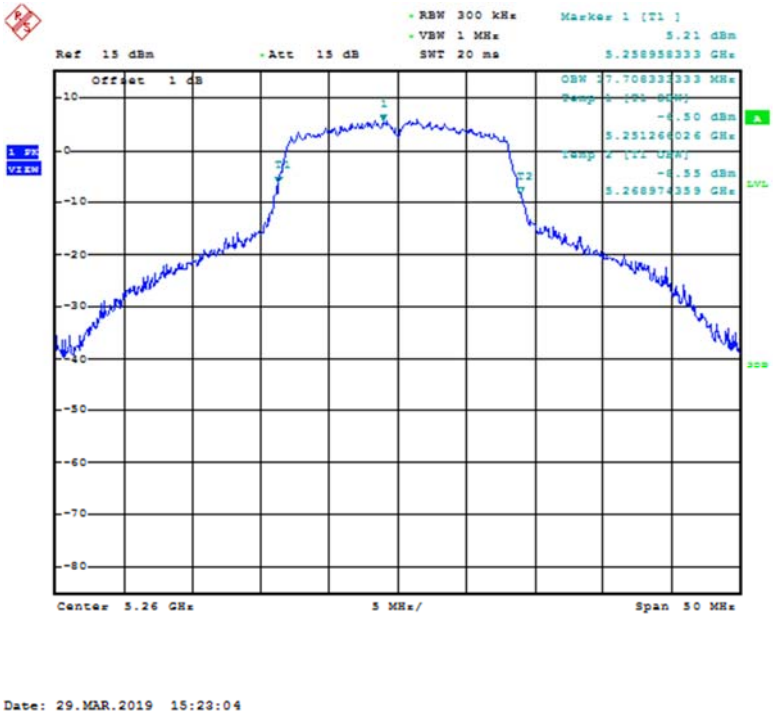


Fig. 54 99% Occupied Bandwidth (802.11a, 5260MHz)

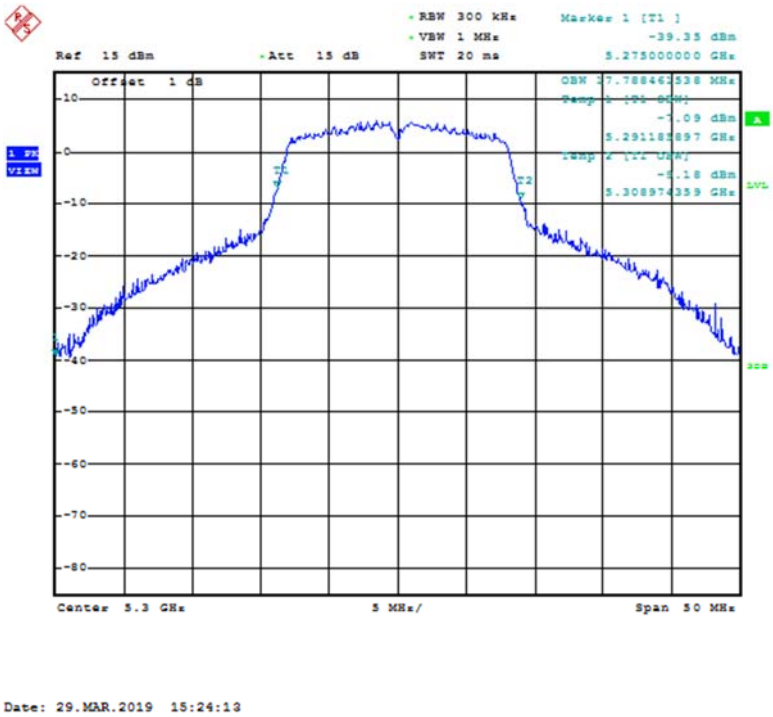


Fig. 55 99% Occupied Bandwidth (802.11a, 5300MHz)

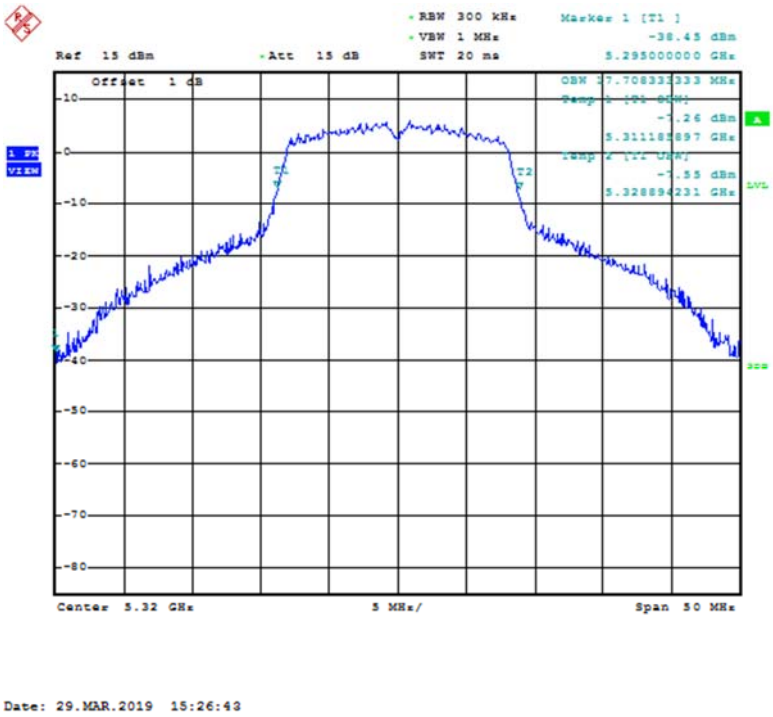


Fig. 56 99% Occupied Bandwidth (802.11a, 5320MHz)

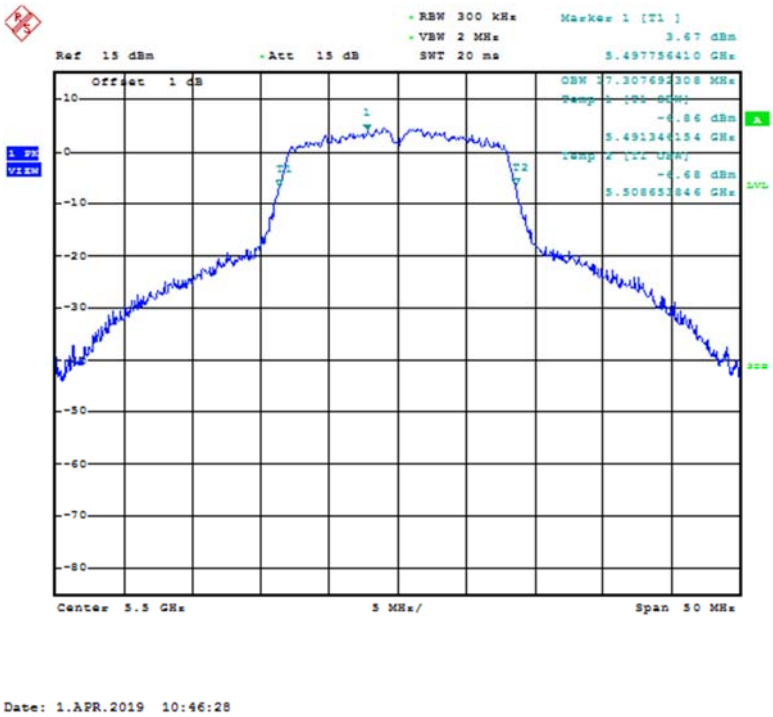


Fig. 57 99% Occupied Bandwidth (802.11a, 5500MHz)

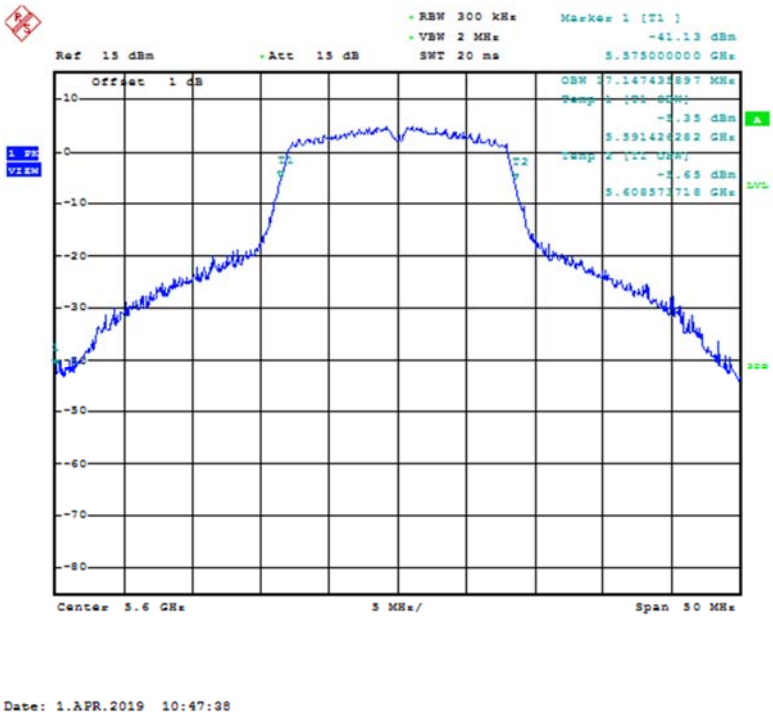


Fig. 58 99% Occupied Bandwidth (802.11a, 5600MHz)

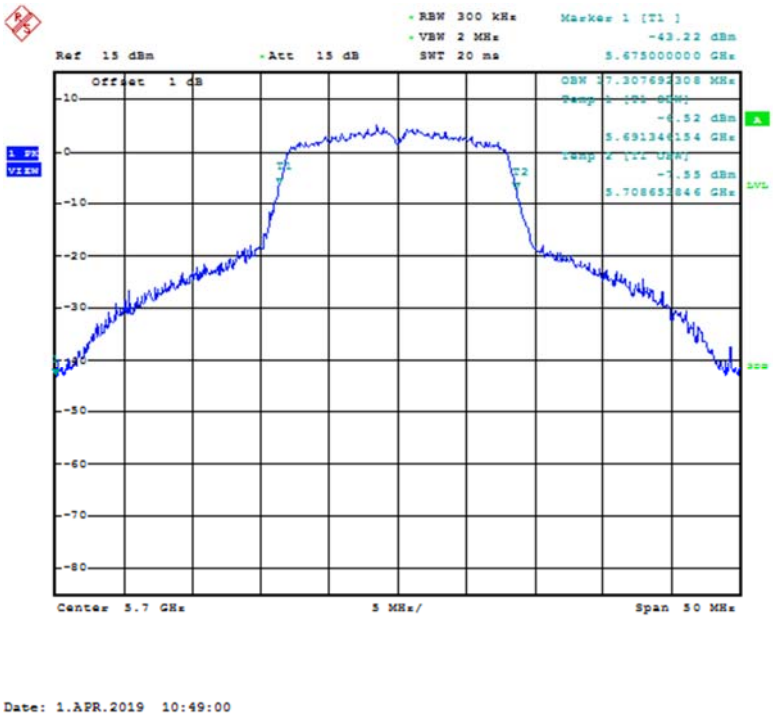


Fig. 59 99% Occupied Bandwidth (802.11a, 5700MHz)

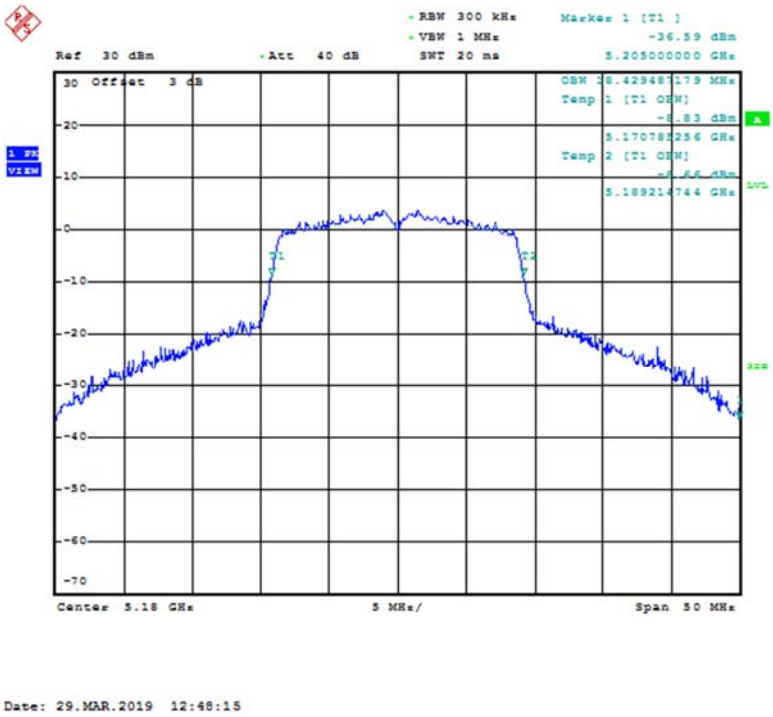


Fig. 60 99% Occupied Bandwidth (802.11n-HT20, 5180MHz)

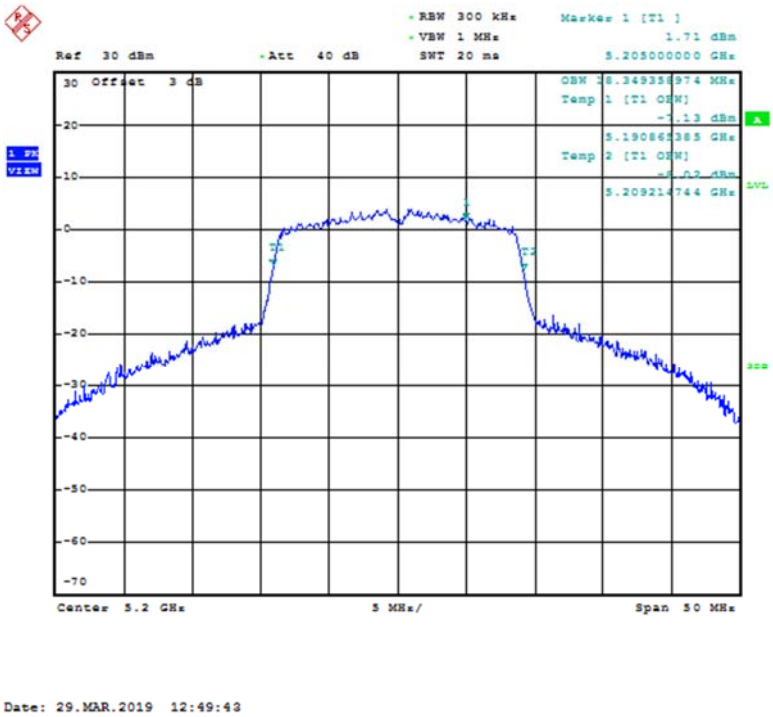


Fig. 61 99% Occupied Bandwidth (802.11n-HT20, 5200MHz)

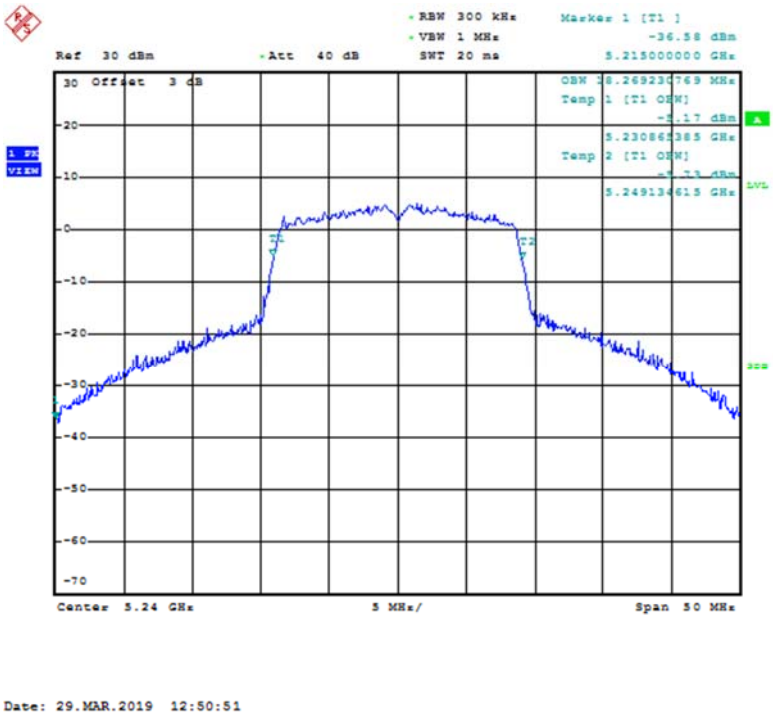


Fig. 62 99% Occupied Bandwidth (802.11n-HT20, 5240MHz)

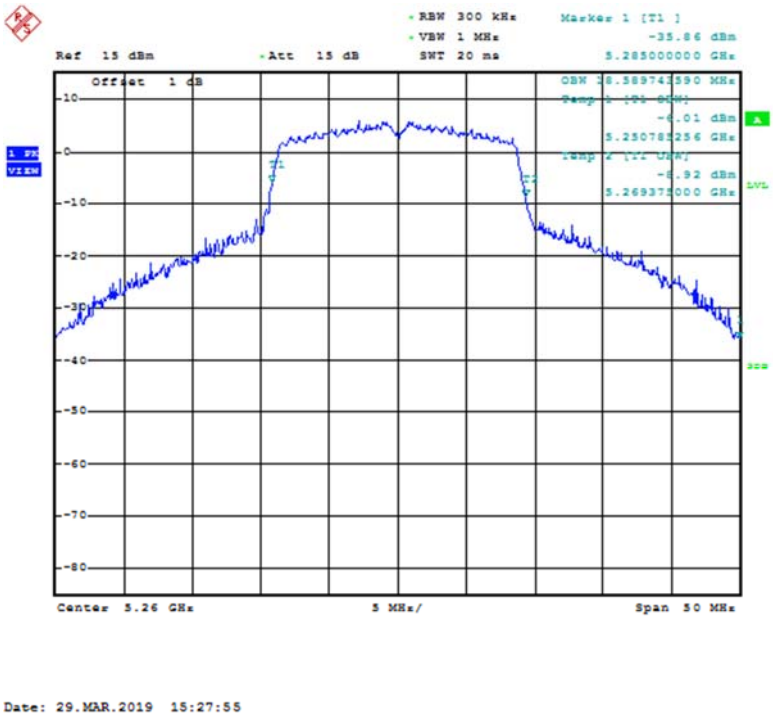


Fig. 63 99% Occupied Bandwidth (802.11n-HT20, 5260MHz)

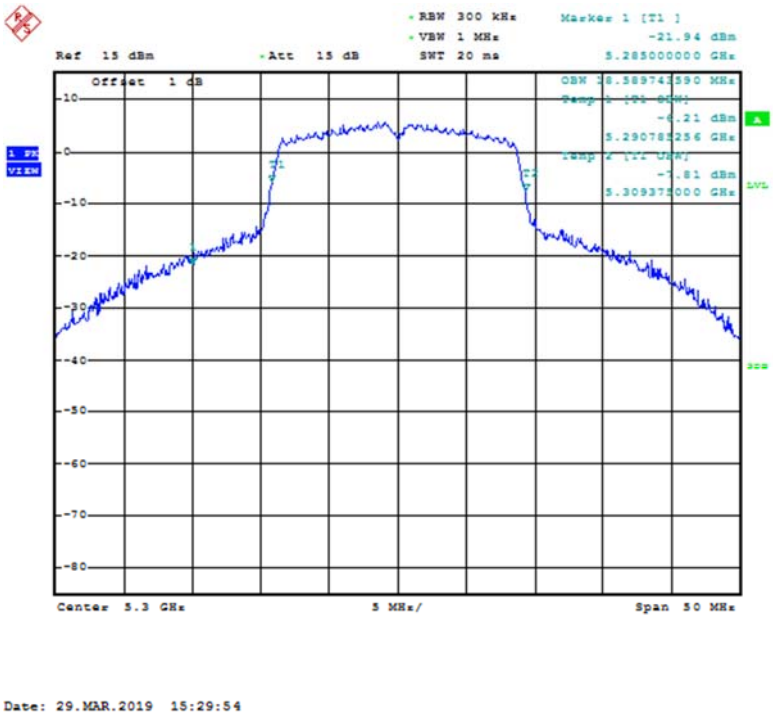


Fig. 64 99% Occupied Bandwidth (802.11n-HT20, 5300MHz)

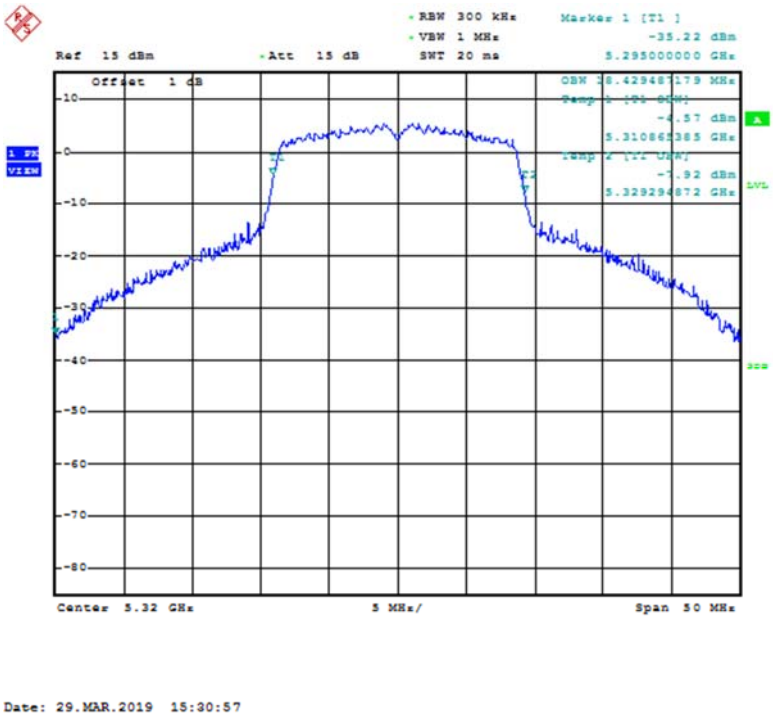


Fig. 65 99% Occupied Bandwidth (802.11n-HT20, 5320MHz)

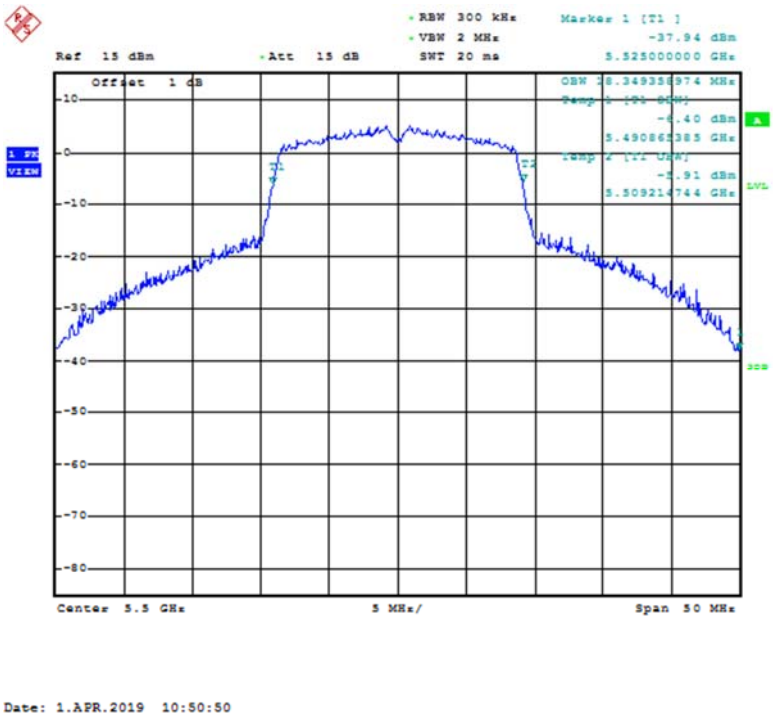


Fig. 66 99% Occupied Bandwidth (802.11n-HT20, 5500MHz)

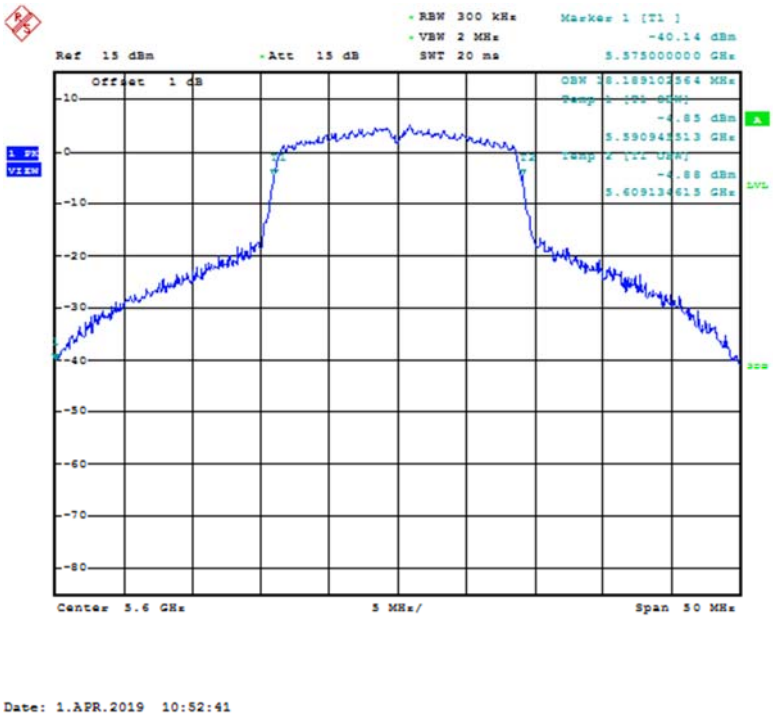


Fig. 67 99% Occupied Bandwidth (802.11n-HT20, 5600MHz)

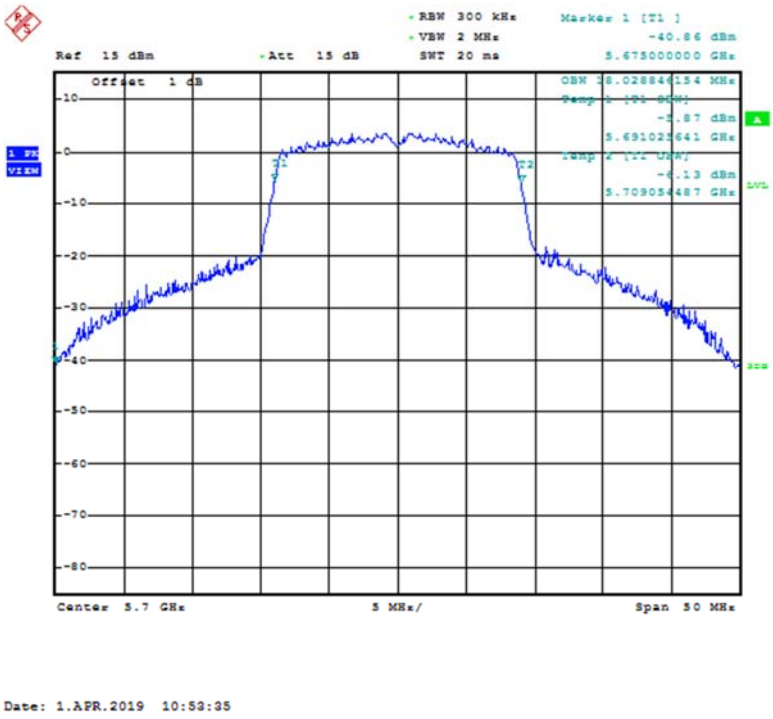


Fig. 68 99% Occupied Bandwidth (802.11n-HT20, 5700MHz)

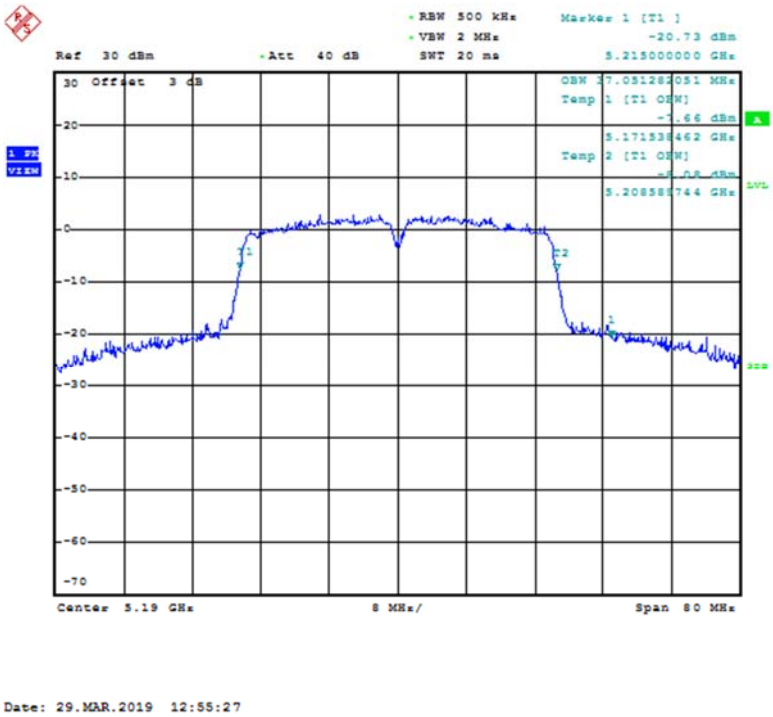


Fig. 69 99% Occupied Bandwidth (802.11n-HT40, 5190MHz)

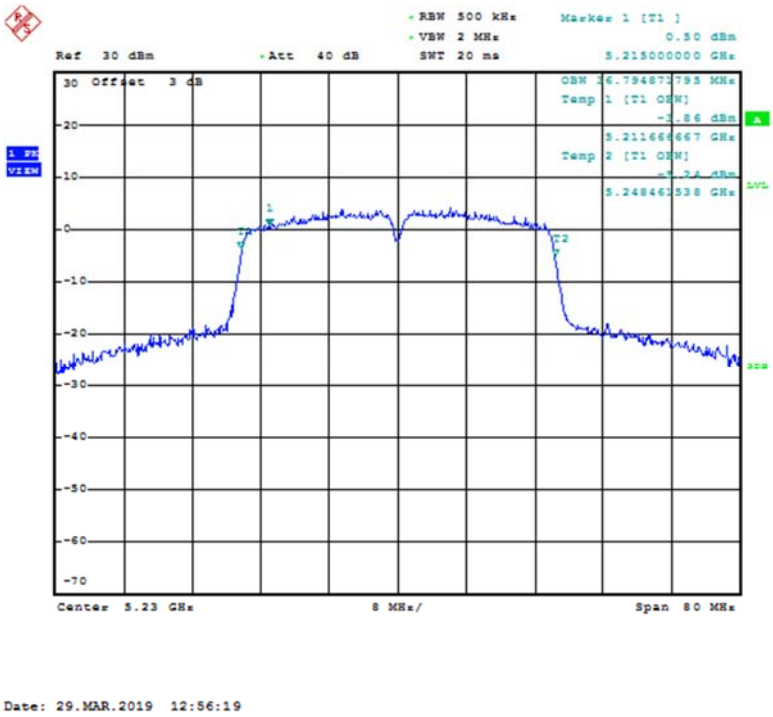


Fig. 70 99% Occupied Bandwidth (802.11n-HT40, 5230MHz)

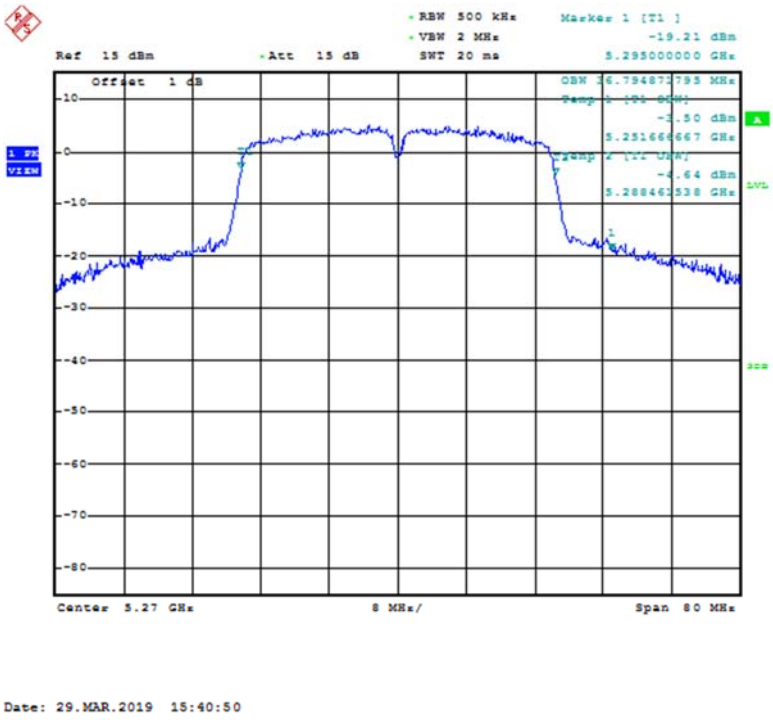


Fig. 71 99% Occupied Bandwidth (802.11n-HT40, 5270MHz)

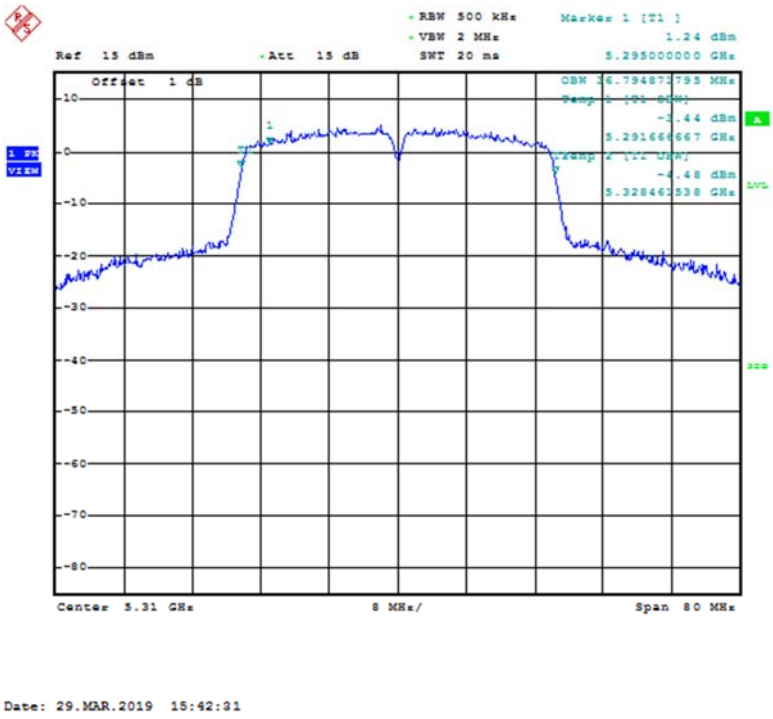


Fig. 72 99% Occupied Bandwidth (802.11n-HT40, 5310MHz)

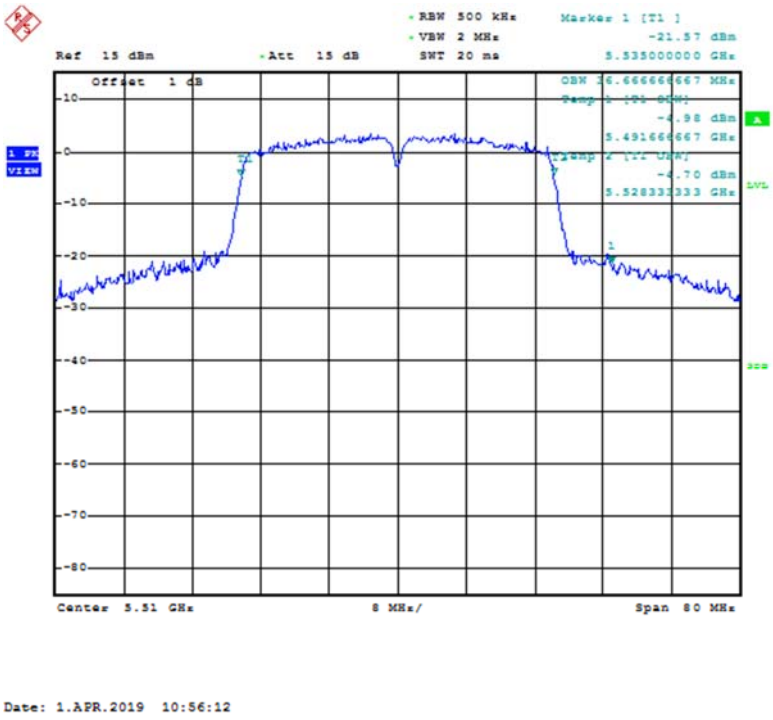


Fig. 73 99% Occupied Bandwidth (802.11n-HT40, 5510MHz)

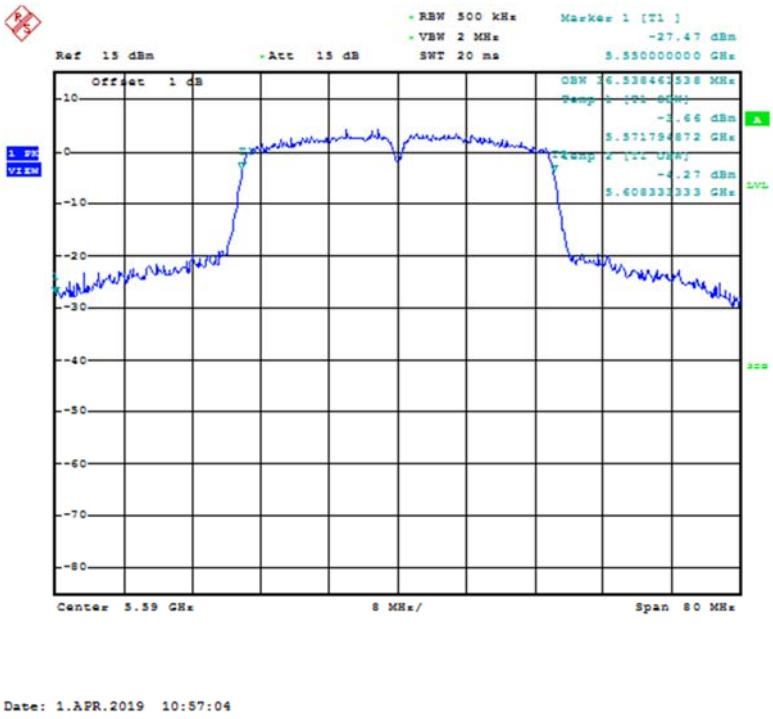


Fig. 74 99% Occupied Bandwidth (802.11n-HT40, 5590MHz)

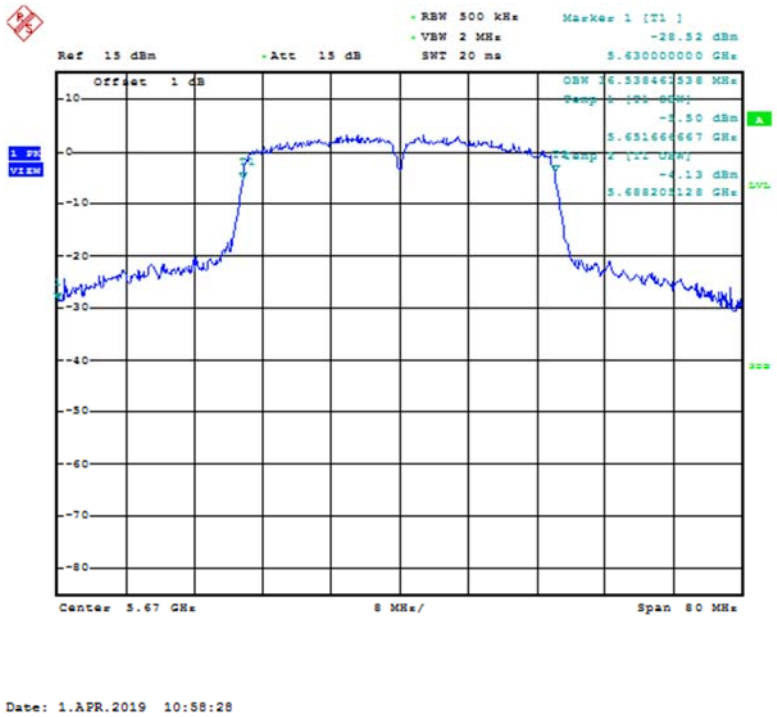


Fig. 75 99% Occupied Bandwidth (802.11n-HT40, 5670MHz)

6.6. Band Edges Compliance

6.6.1 Band Edges - conducted

Measurement Limit:

Standard	Limit (dBm/MHz)
FCC 47 CFR Part 15.407	< -27

The measurement is made according to KDB 789033

Measurement Result:

Mode	Frequency	Test Results	Conclusion
802.11a	5180 MHz	Fig.76	P
	5320 MHz	Fig.77	P
	5500 MHz	Fig.78	P
	5700 MHz	Fig.79	P
802.11n HT20	5180 MHz	Fig.80	P
	5320 MHz	Fig.81	P
	5500 MHz	Fig.82	P
	5700 MHz	Fig.83	P
802.11n HT40	5190 MHz	Fig.84	P
	5310 MHz	Fig.85	P

	5510 MHz	Fig.86	P
	5670 MHz	Fig.87	P

Conclusion: PASS

Test graphs as below:

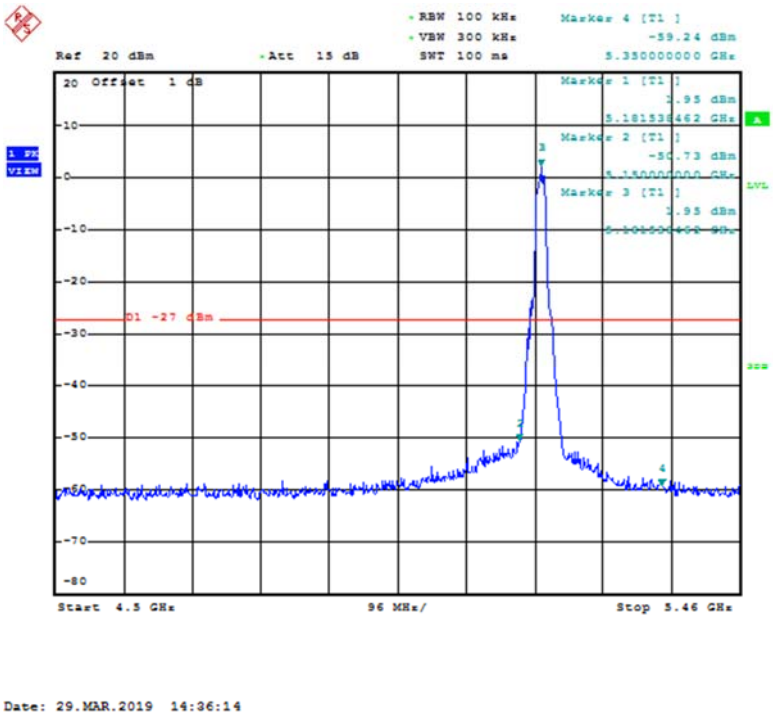


Fig. 76 Band Edges (802.11a, 5180MHz)

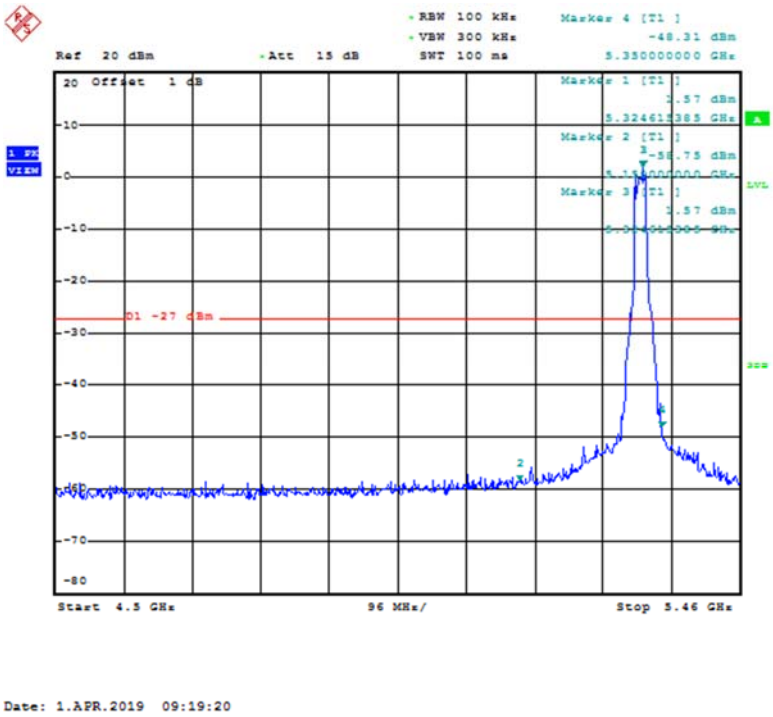


Fig. 77 Band Edges (802.11a, 5320MHz)

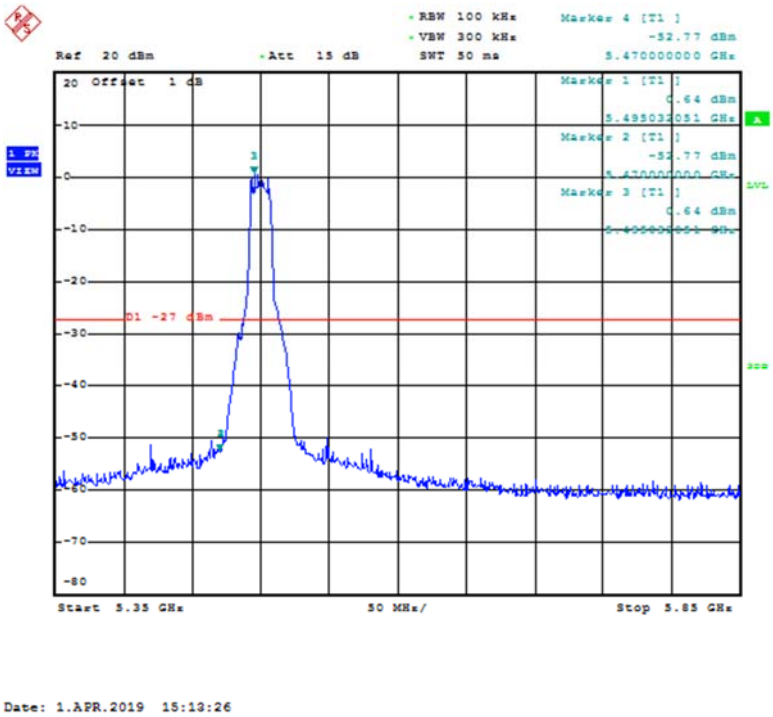


Fig. 78 Band Edges (802.11a, 5500MHz)

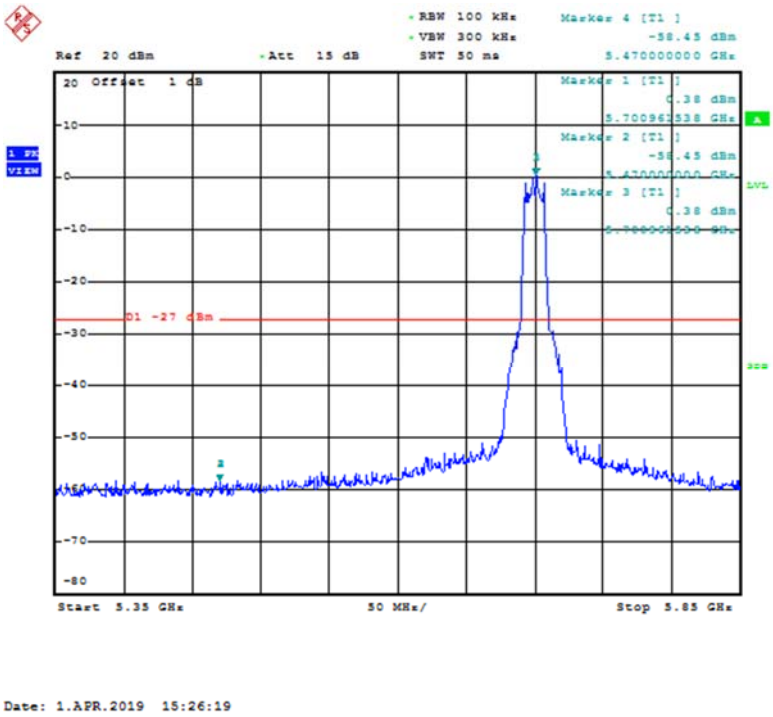


Fig. 79 Band Edges (802.11a, 5700MHz)

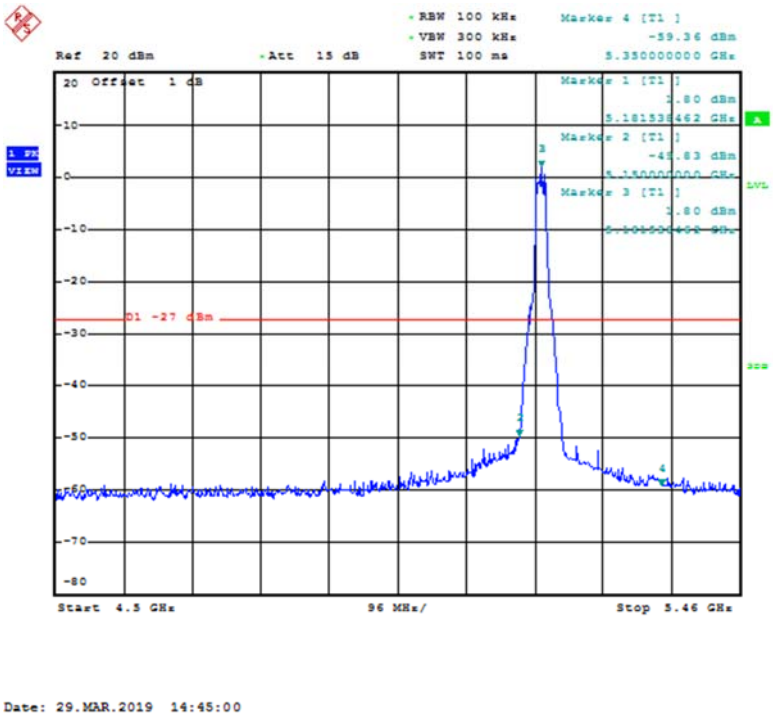


Fig. 80 Band Edges (802.11n-HT20, 5180MHz)

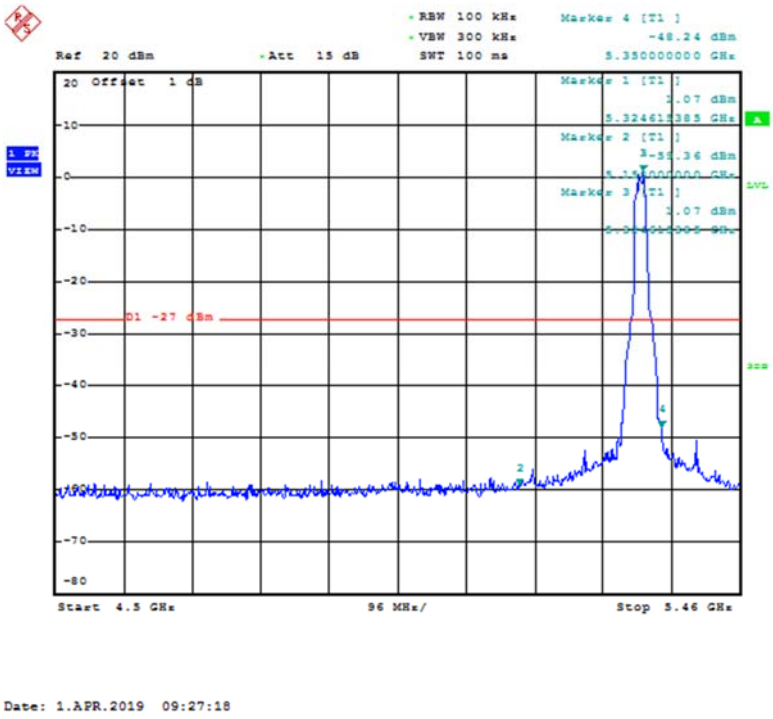


Fig. 81 Band Edges (802.11n-HT20, 5320MHz)

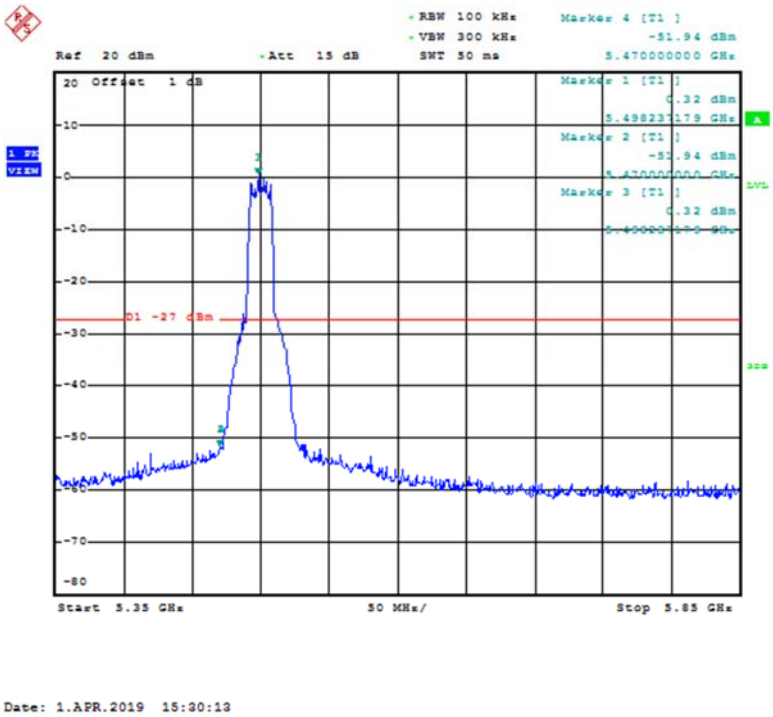


Fig. 82 Band Edges (802.11n-HT20, 5500MHz)

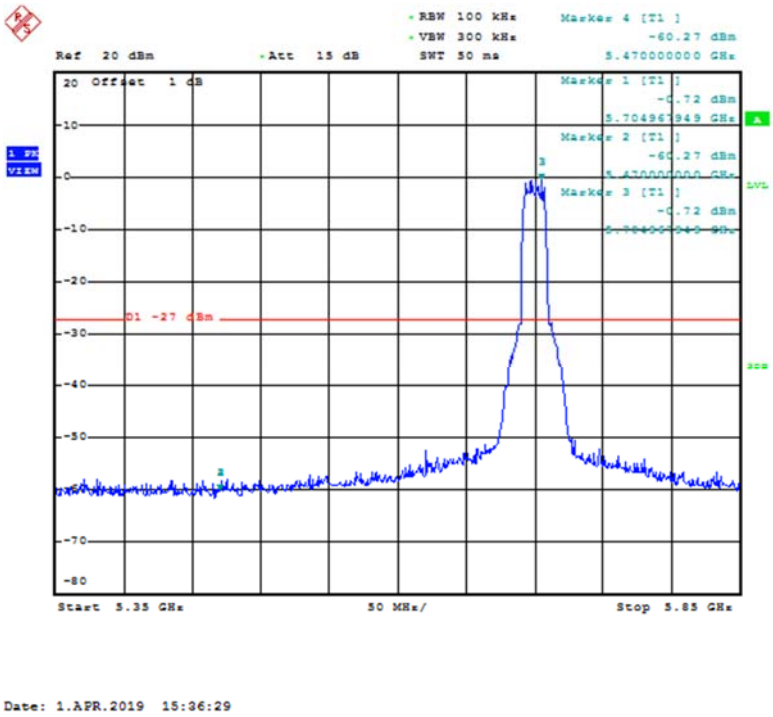


Fig. 83 Band Edges (802.11n-HT20, 5700MHz)

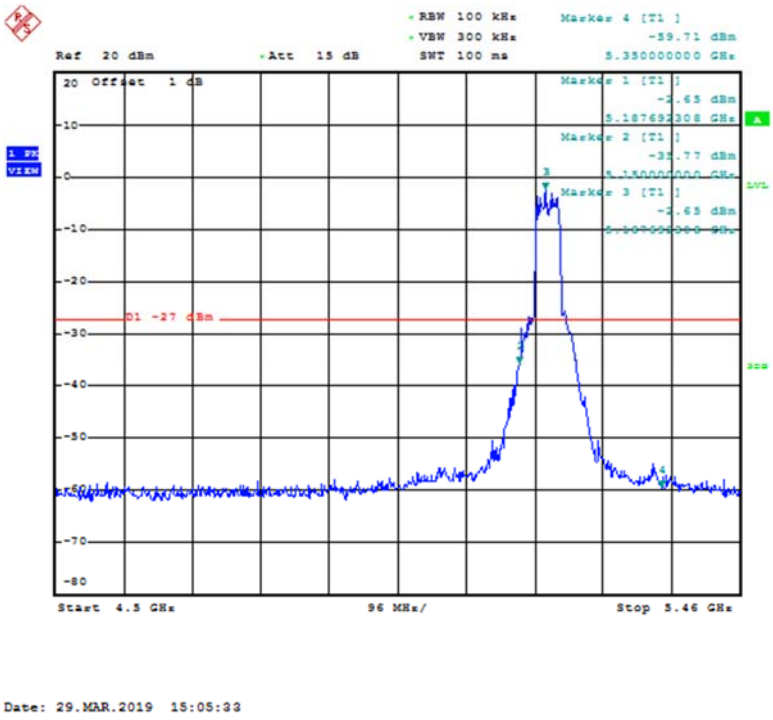


Fig. 84 Band Edges (802.11n-HT40, 5190MHz)

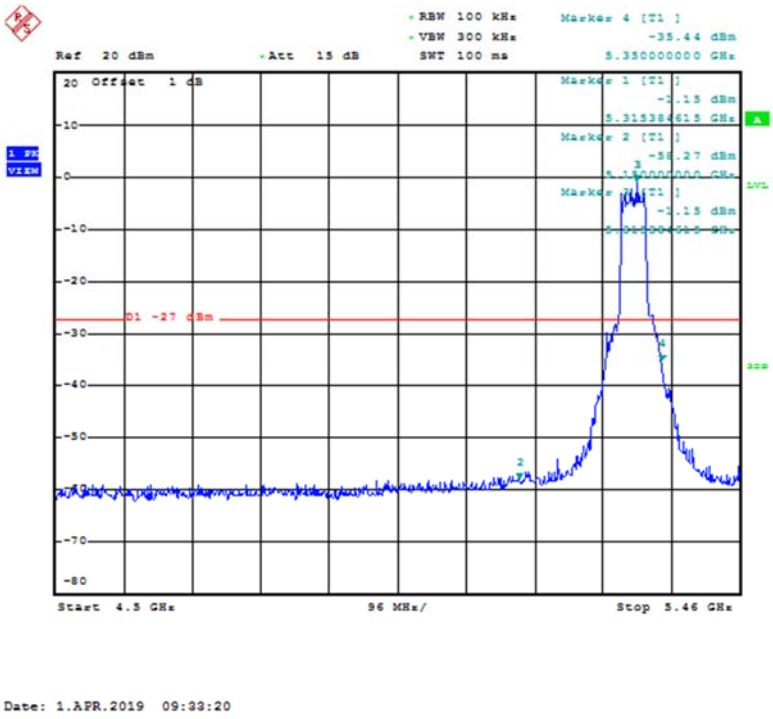


Fig. 85 Band Edges (802.11n-HT40, 5310MHz)

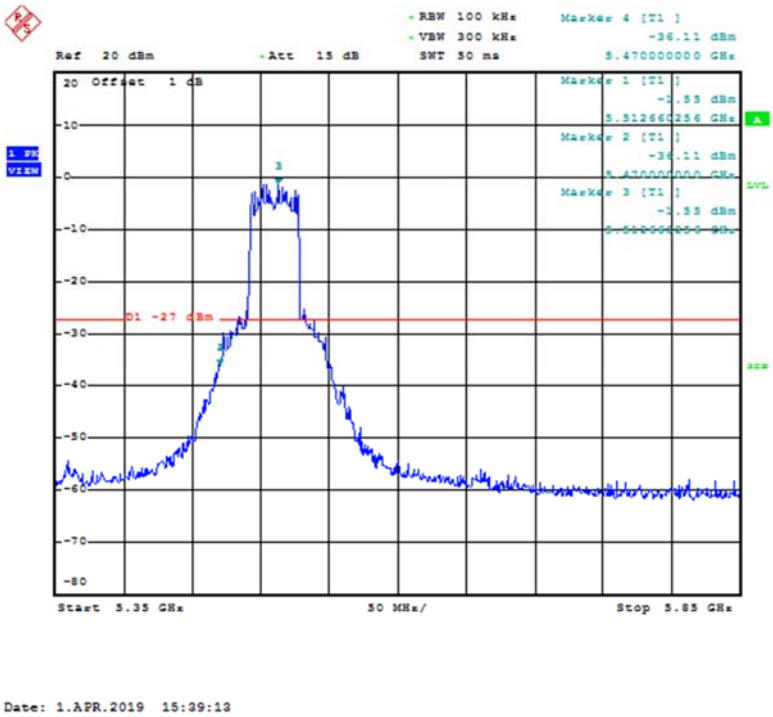


Fig. 86 Band Edges (802.11n-HT40, 5510MHz)

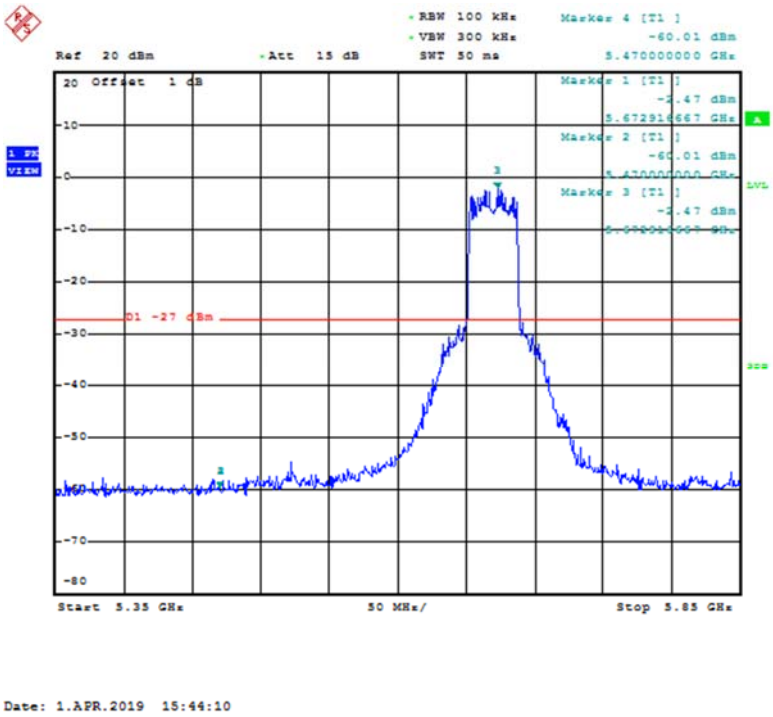


Fig. 87 Band Edges (802.11n-HT40, 5670MHz)

6.6.2 Band Edges - Radiated

Measurement Limit:

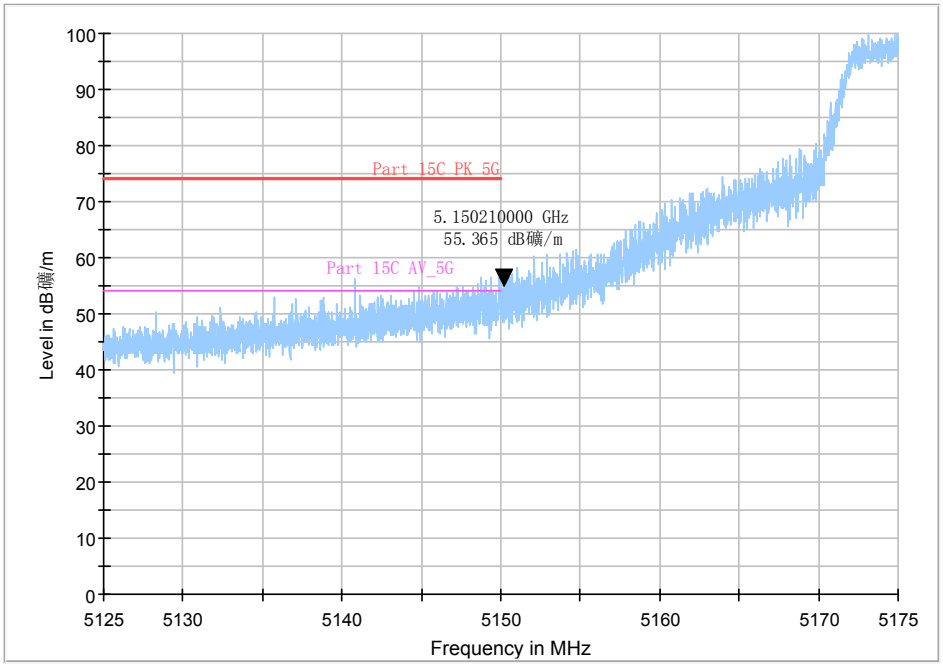
Standard	Limit (dB μ V/m)	
FCC 47 CFR Part 15.209	Peak	74
	Average	54

The measurement is made according to KDB 789033.
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)).

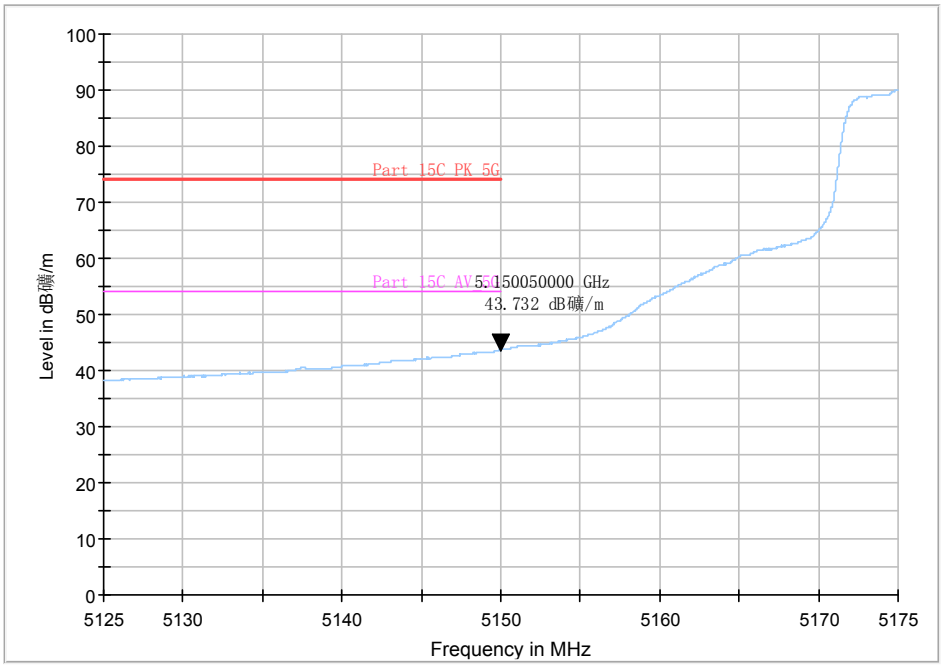
Measurement Result:

Mode	Frequency	Test Results	Conclusion
802.11a	5180 MHz	Fig.88	P
	5320 MHz	Fig.89	P
	5500 MHz	Fig.90	P
	5700 MHz	Fig.91	P
802.11n HT20	5180 MHz	Fig.92	P
	5320 MHz	Fig.93	P
	5500 MHz	Fig.94	P
	5700 MHz	Fig.95	P
802.11n HT40	5190 MHz	Fig.96	P
	5310 MHz	Fig.97	P
	5510 MHz	Fig.98	P
	5670 MHz	Fig.99	P

Conclusion: PASS
Test graphs as below:

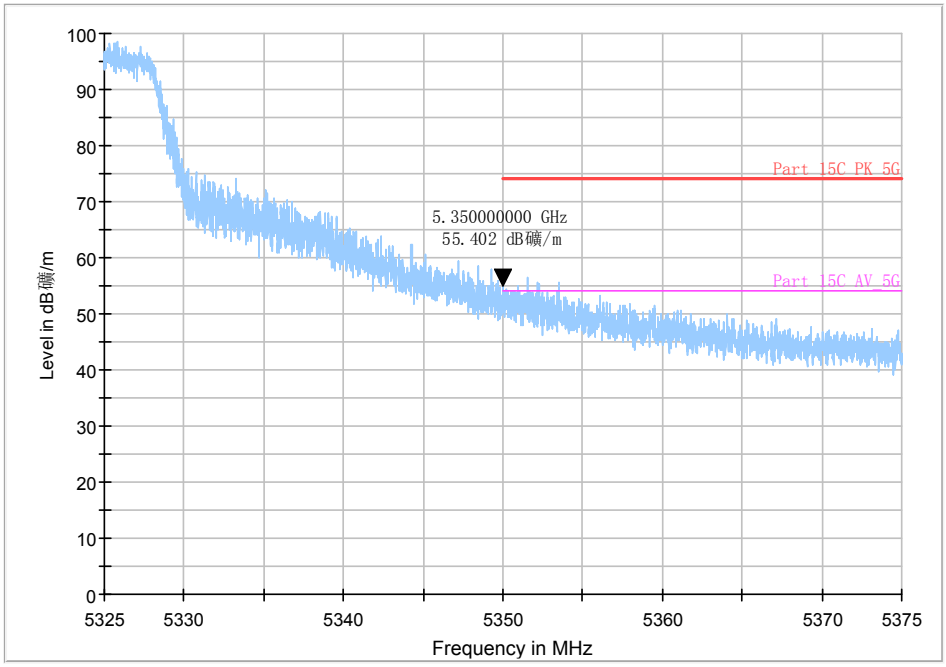


Peak

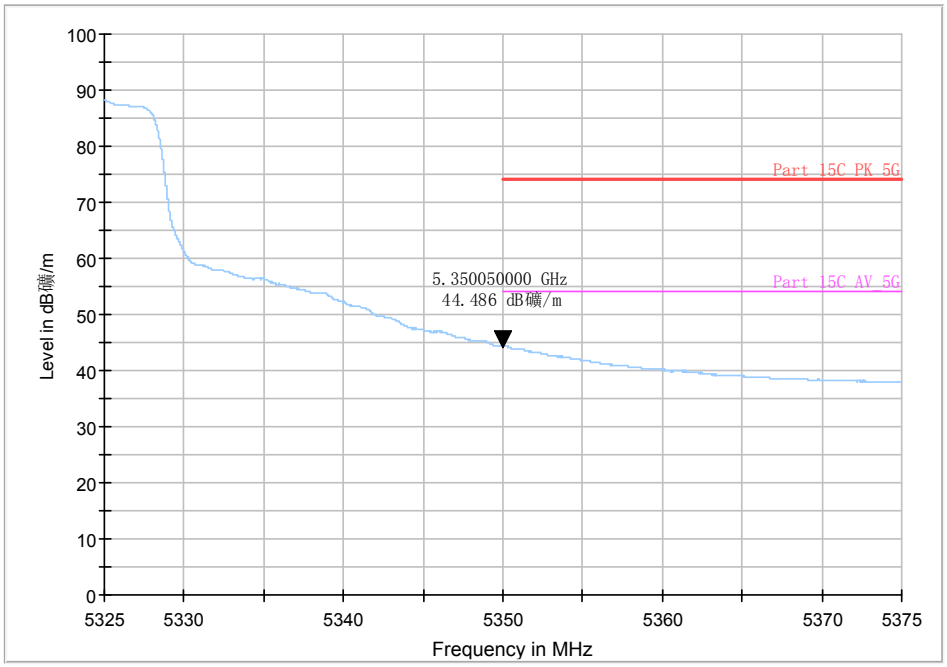


Average

Fig. 88 Band Edges (802.11a, 5180MHz)

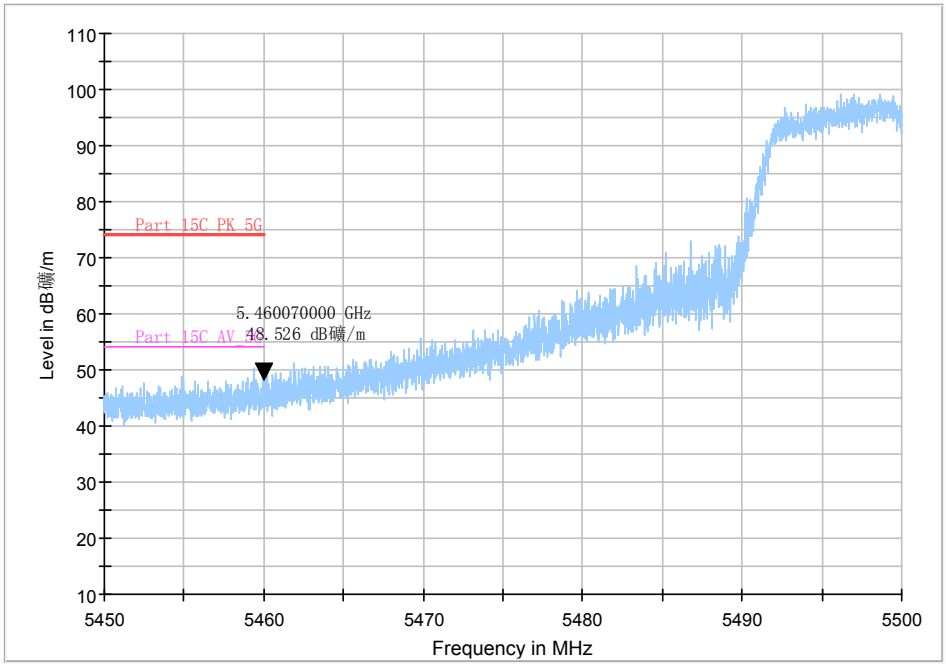


Peak

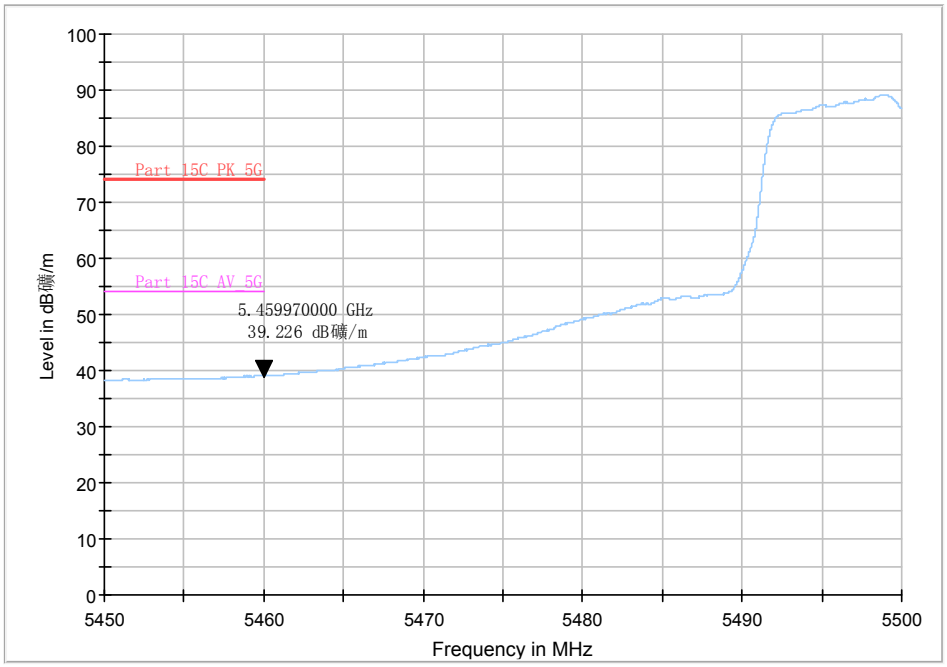


Average

Fig. 89 Band Edges (802.11a, 5320MHz)

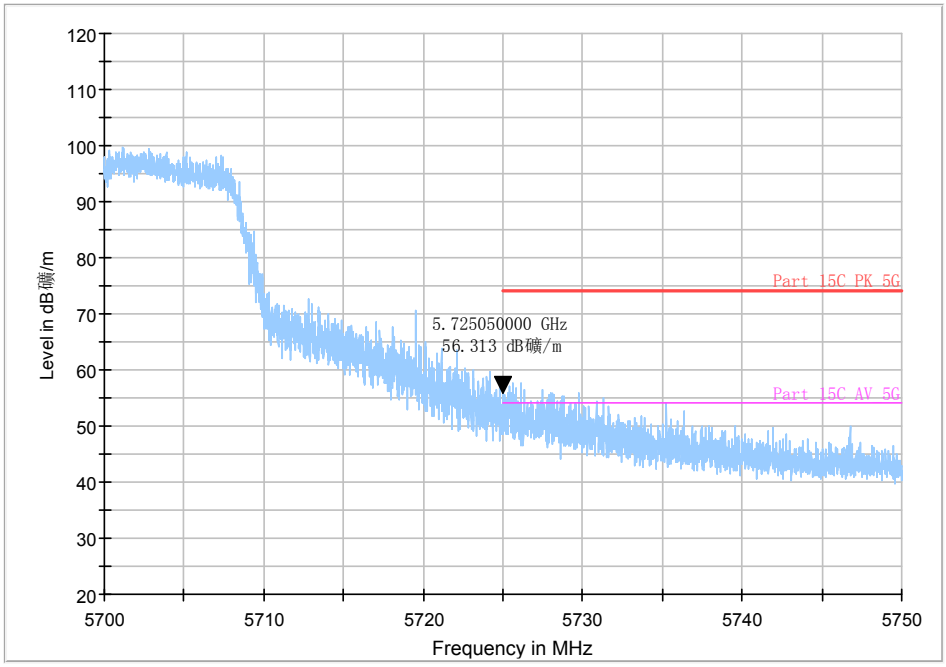


Peak

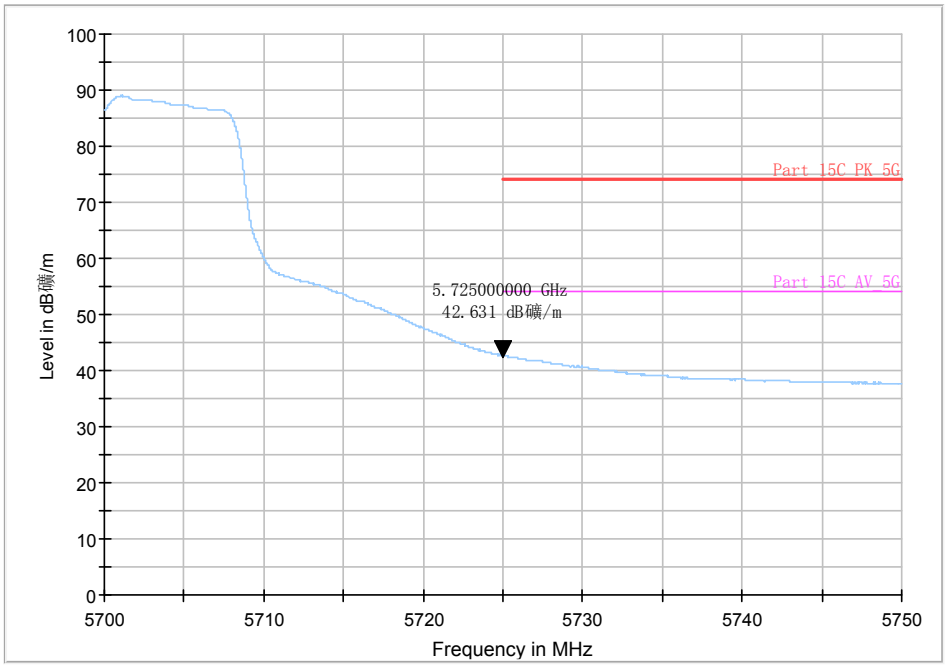


Average

Fig. 90 Band Edges (802.11a, 5500MHz)

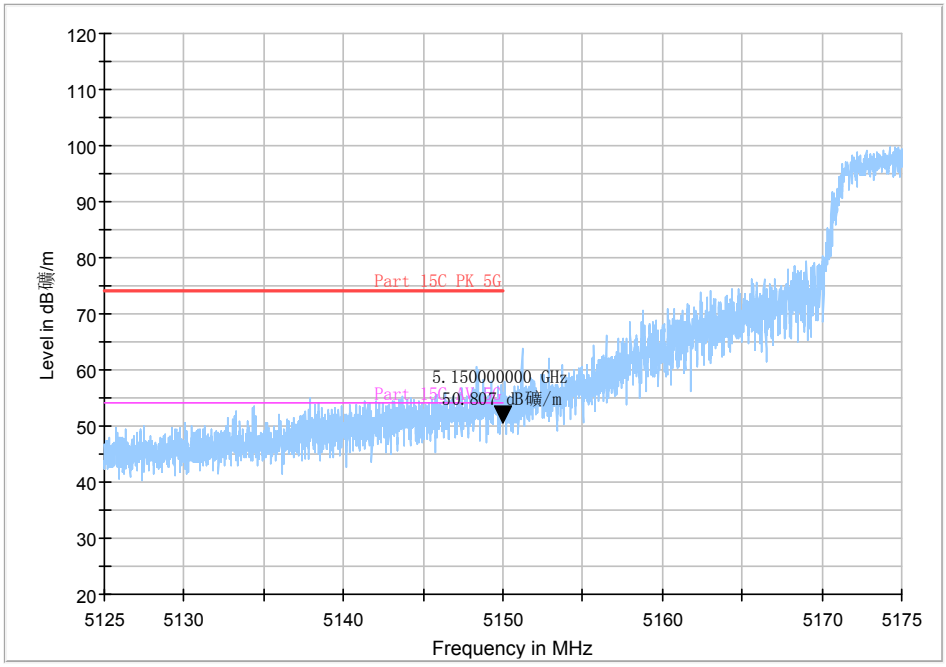


Peak

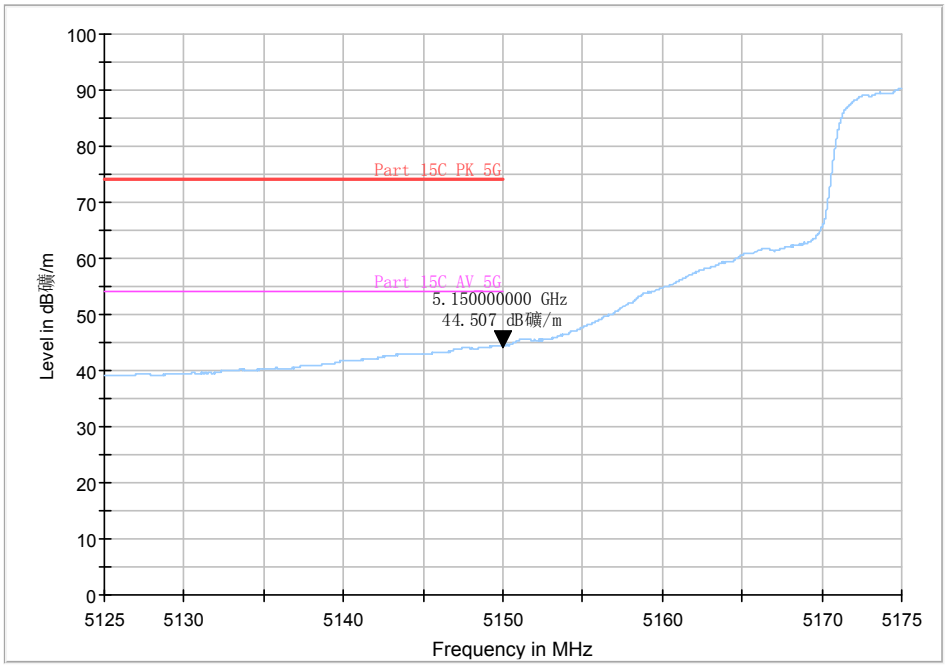


Average

Fig. 91 Band Edges (802.11a, 5700MHz)

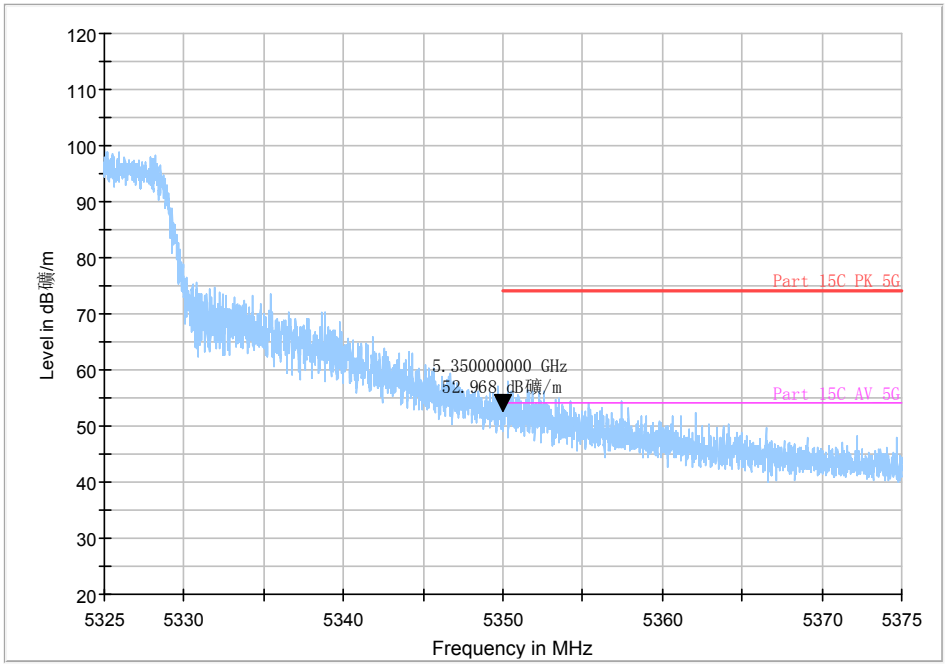


Peak

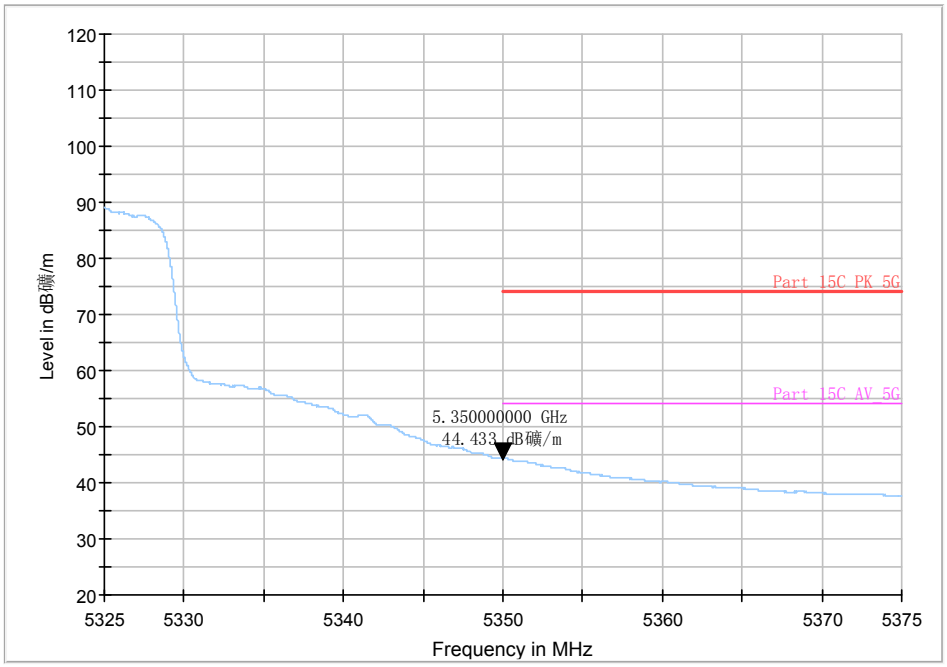


Average

Fig. 92 Band Edges (802.11n-HT20, 5180MHz)

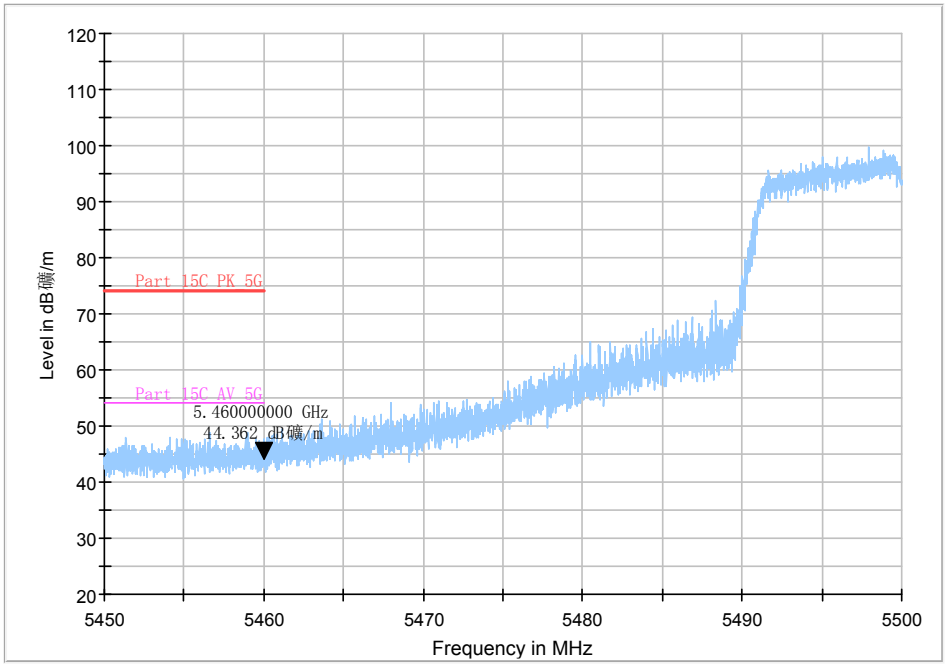


Peak

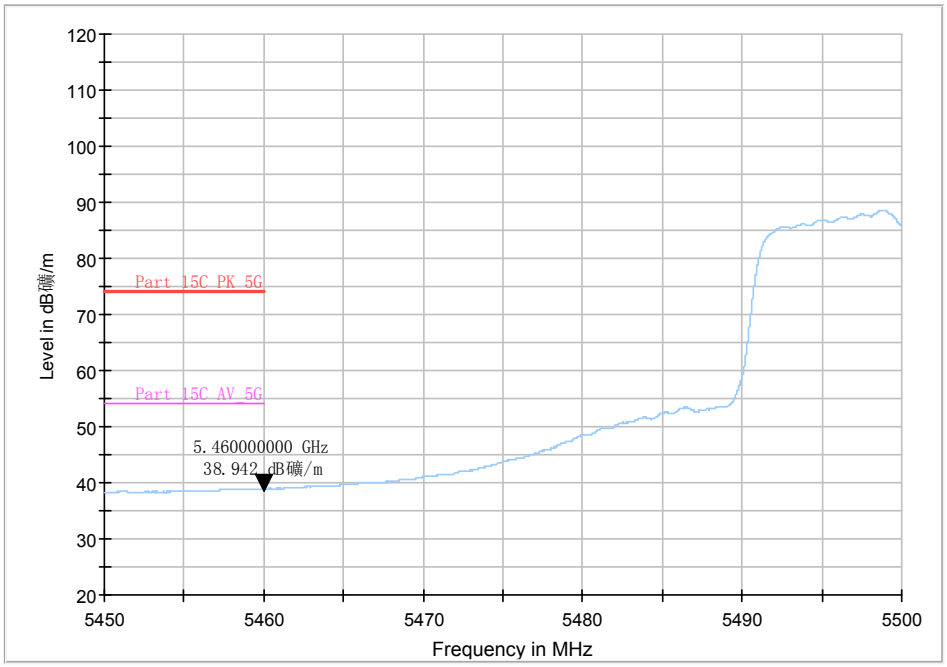


Average

Fig. 93 Band Edges (802.11n-HT20, 5320MHz)

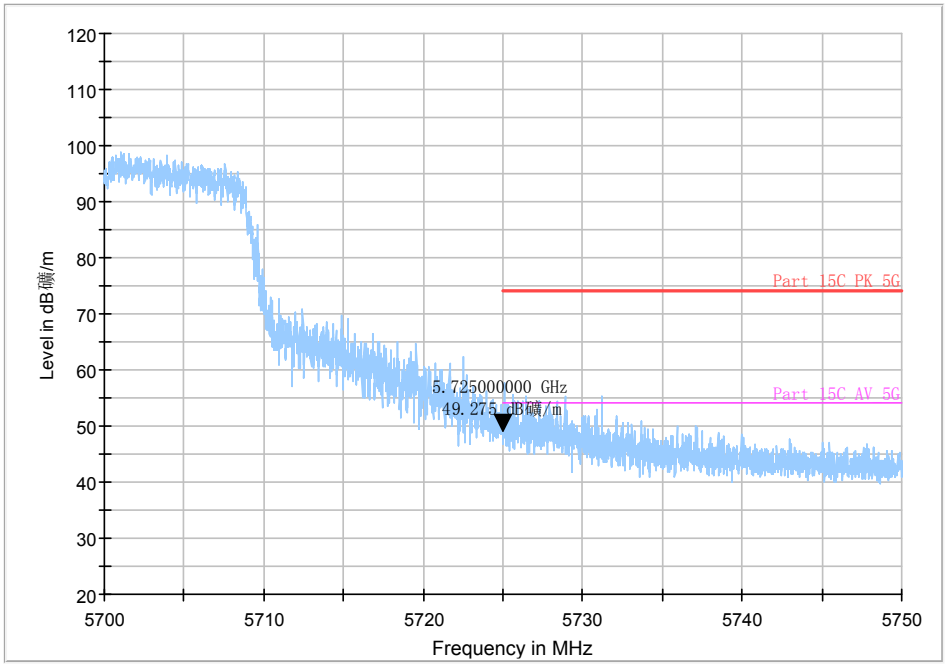


Peak

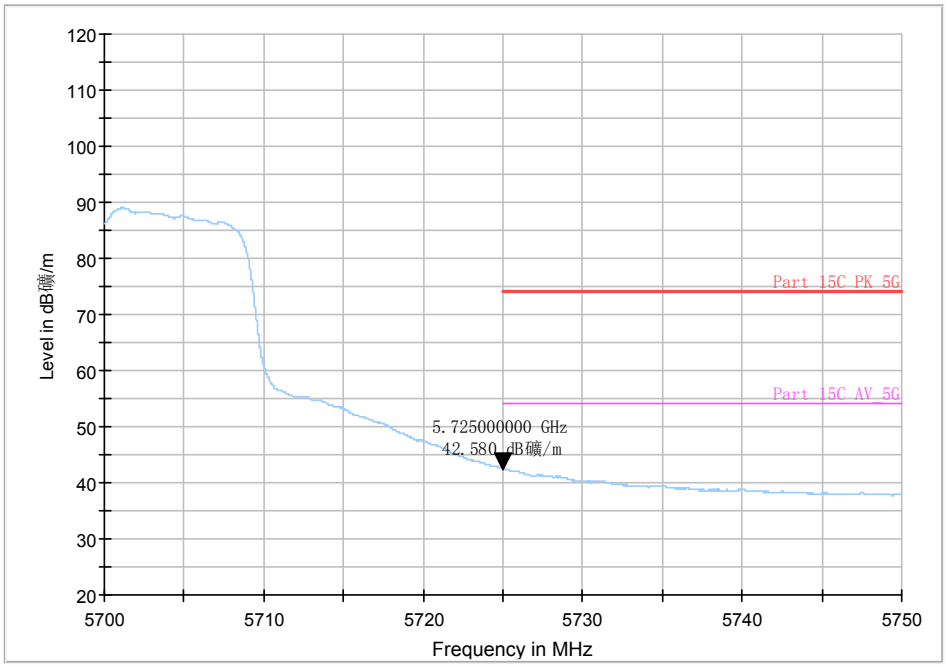


Average

Fig. 94 Band Edges (802.11n-HT20, 5500MHz)

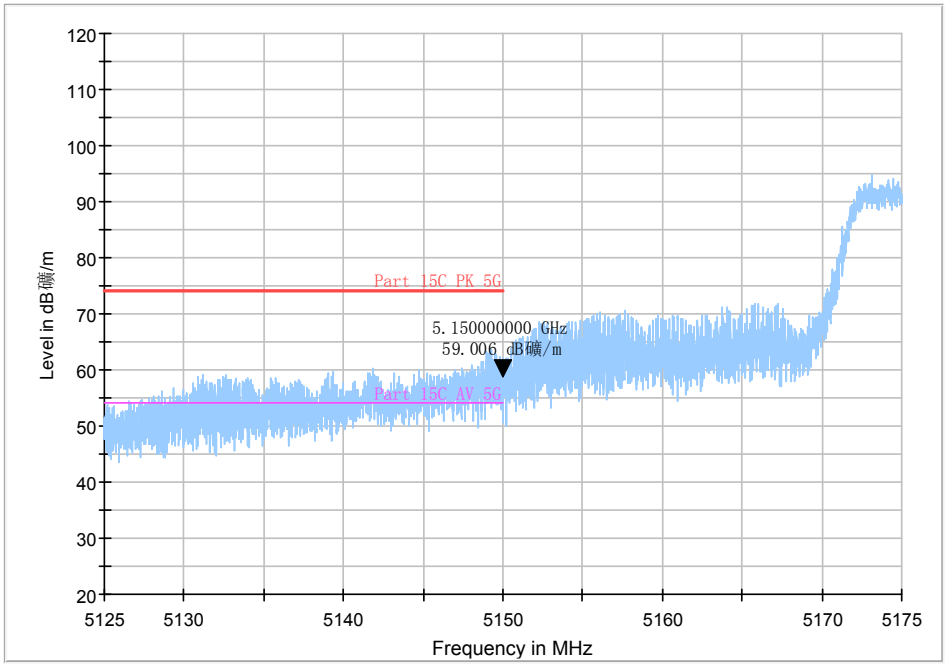


Peak

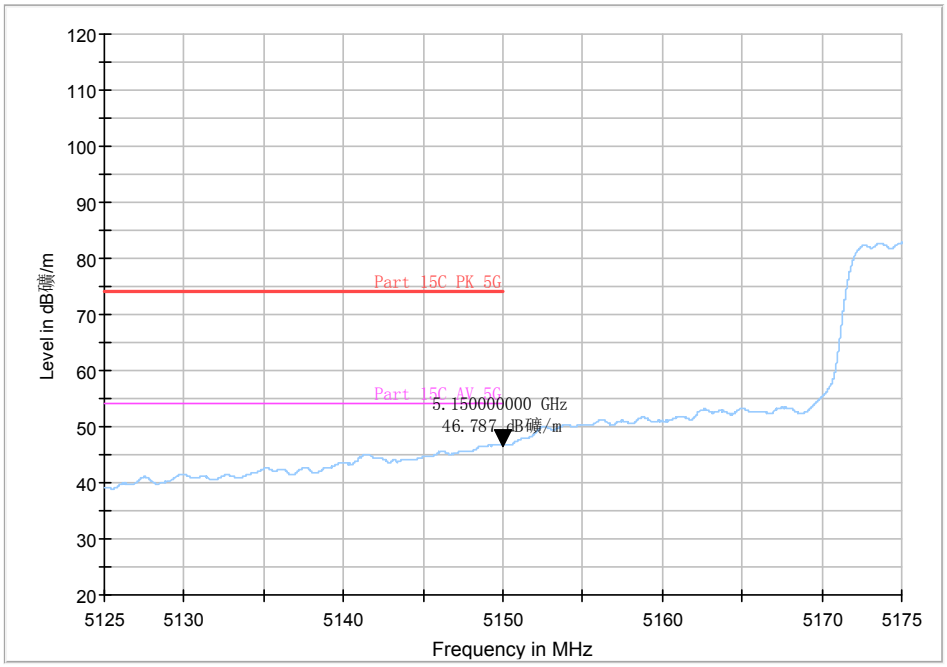


Average

Fig. 95 Band Edges (802.11n-HT20, 5700MHz)

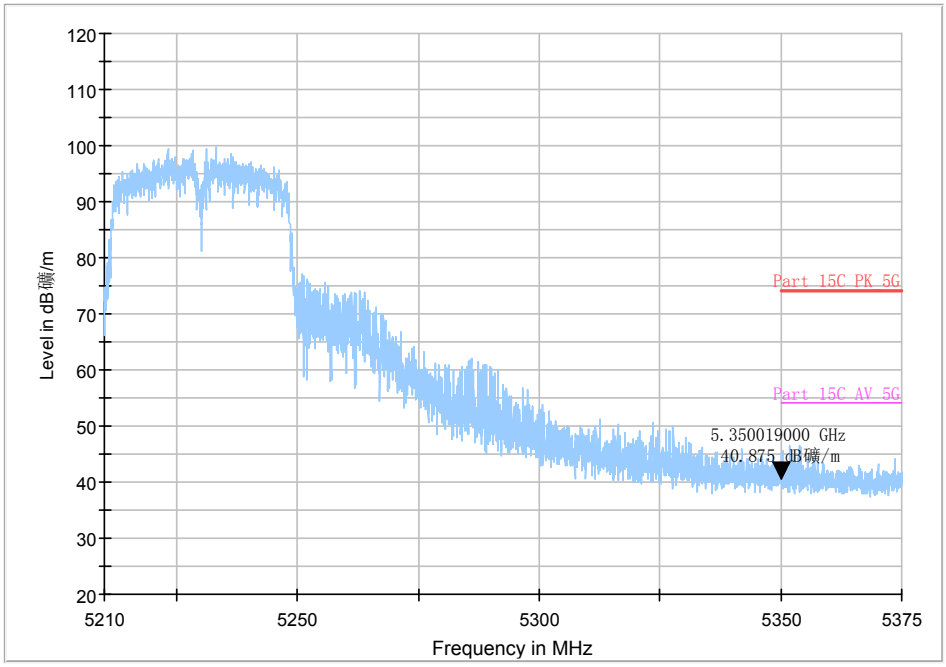


Peak

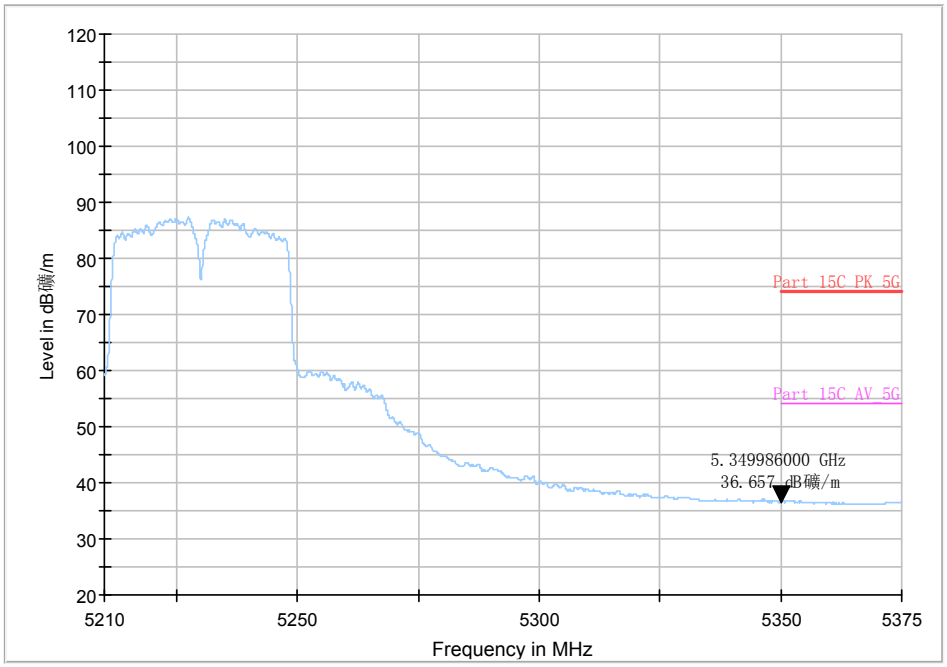


Average

Fig. 96 Band Edges (802.11n-HT40, 5190MHz)

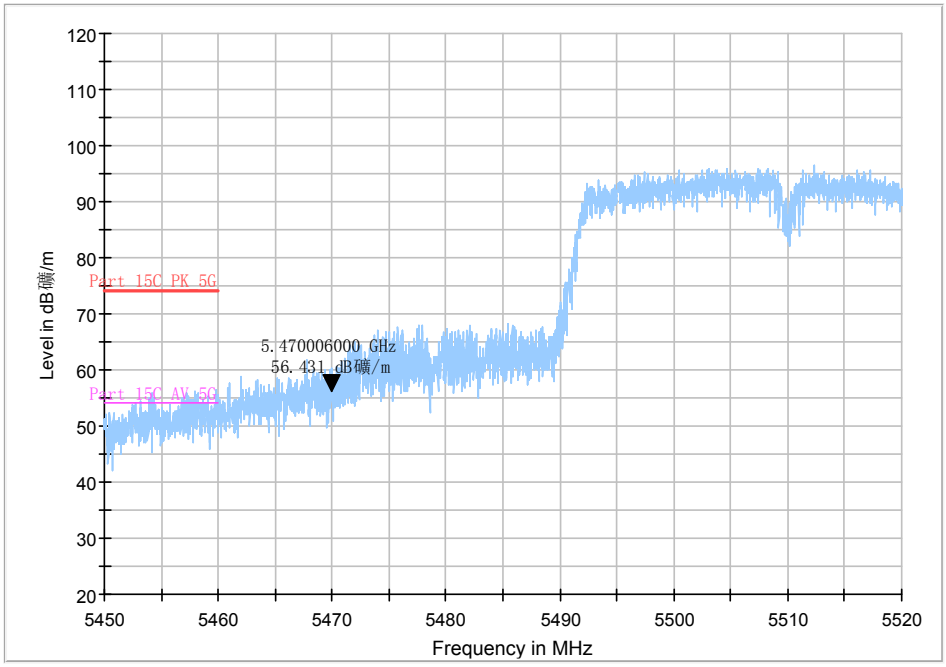


Peak

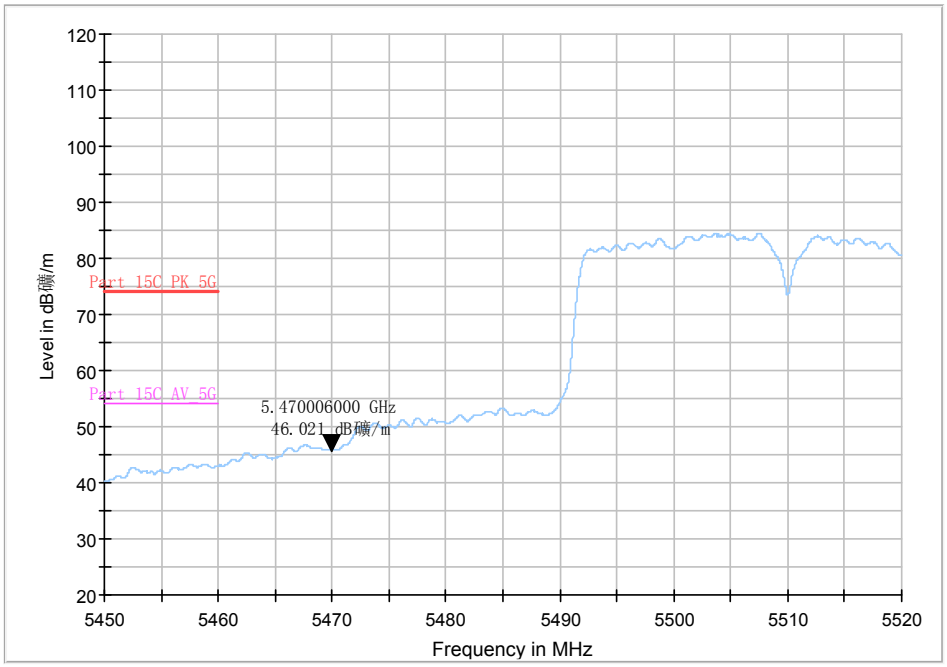


Average

Fig. 97 Band Edges (802.11n-HT40, 5230MHz)

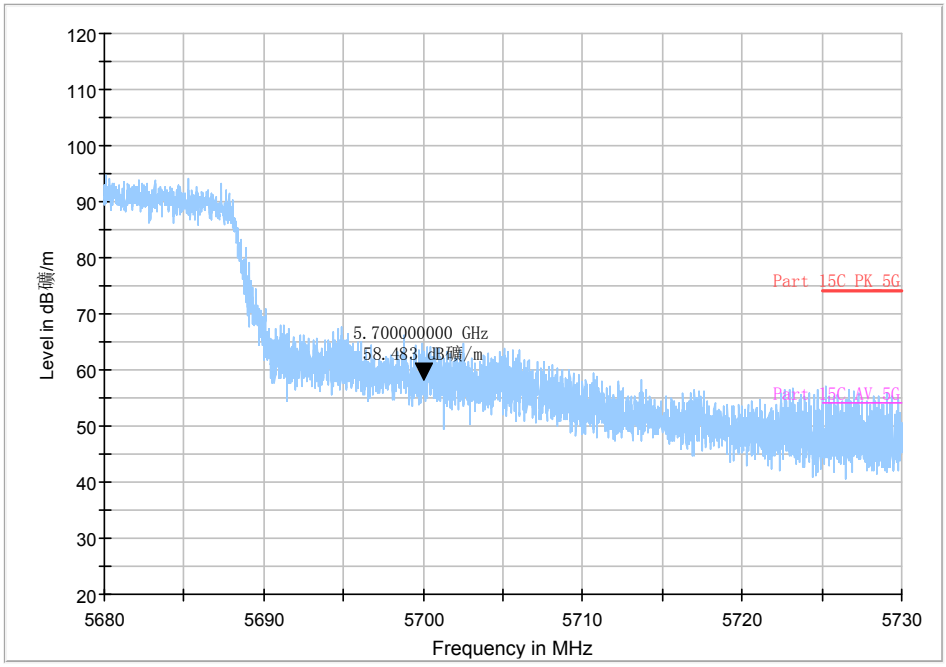


Peak

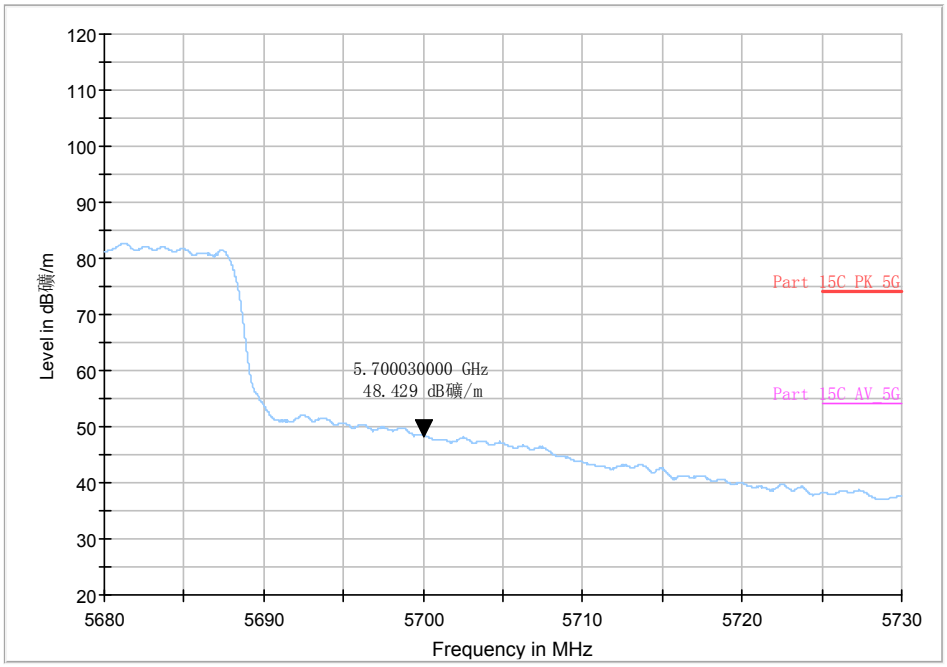


Average

Fig. 98 Band Edges (802.11n-HT40, 5510MHz)



Peak



Average

Fig. 99 Band Edges (802.11n-HT40, 5670MHz)

6.7. Transmitter Spurious Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.407	-27 dBm/MHz

The measurement is made according to KDB 789033
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)).
The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.
During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.
Set the spectrum analyzer in the following:
Below 1GHz(detector: Peak and Quasi-Peak)
RBW=100kHz / VBW=300kHz / Sweep=AUTO
Above 1GHz(detector: Peak):
(a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=3MHz / Sweep= AUTO

Limit in restricted band:

Frequency of emission (MHz)	Field strength(dBμV/m)	Measurement distance(m)
0.009-0.490	129-94	3
0.490-1.705	74-63	3
1.705-30	70	3
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

Note: for frequency range below 960MHz, the limit in 15.209 is defined in 10m test distance. The limit used above is calculated from 10m to 3m

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

Mode	**Data rate**	**Channel**
802.11a	6Mbps	40(5200MHz)
802.11n-HT20	MCS0	40(5200MHz)

802.11n-HT40	MCS0	46(5260MHz)

Measurement Results:

802.11a mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11a	40(5200MHz)	30 MHz ~ 1 GHz	Fig.100	P
		1 GHz ~ 8 GHz	Fig.101	P
		8 GHz ~ 18 GHz	Fig.102	P
		18 GHz ~ 26.5 GHz	Fig.103	P
		26.5 GHz ~ 40 GHz	Fig.104	P

802.11n-HT20 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n-HT20	40(5200MHz)	30 MHz ~ 1 GHz	Fig.105	P
		1 GHz ~ 8 GHz	Fig.106	P
		8 GHz ~ 18 GHz	Fig.107	P
		18 GHz ~ 26.5 GHz	Fig.108	P
		26.5 GHz ~ 40 GHz	Fig.109	P

802.11n-HT40 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n HT40	46(5260MHz)	30 MHz ~ 1 GHz	Fig.110	P
		1 GHz ~ 8 GHz	Fig.111	P
		8 GHz ~ 18 GHz	Fig.112	P
		18 GHz ~ 26.5 GHz	Fig.113	P
		26.5 GHz ~ 40 GHz	Fig.114	P

Radiated Spurious Emission (9kHz-30MHz)

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n HT40	38(5190MHz)	9kHz~30 MHz	Fig.115	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.

The measurement results are obtained as described below:

Result=P_{Mea}+A_{Rpl}= P_{Mea}+Cable Loss+Antenna Factor

802.11a

Channel 40 (30MHz ~1GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
34.0	12.58	-27.7	40.28	V
34.8	12.96	-27.7	40.66	V
51.7	14.12	-25.7	39.82	V
220.9	13.21	-27.9	41.11	V
334.7	12.04	-25.4	37.44	H
791.1	20.77	-16.7	37.47	H

Channel 40 (1GHz ~ 8GHz) (Peak)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
5659.8	45.57	4.7	40.87	V
5957.8	44.79	4.6	40.19	V
6393.4	45.93	5.7	40.23	V
6872.2	46.51	6.9	39.61	H
7204.2	46.73	7.3	39.43	V
7637.2	46.53	7.8	38.73	H

Channel 40 (1GHz ~ 8GHz) (Average)

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

Channel 40 (8GHz ~ 18GHz) (Peak)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
8319.0	50.64	8.9	41.74	V
9616.6	48.19	11	37.19	V
11208.6	51.86	13.8	38.06	V
12206.6	52.82	15.5	37.32	H
13687.4	54.44	18.8	35.64	V
15606.0	66.24	21.3	44.94	V

Channel 40 (8GHz ~ 18GHz)(Average)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
13687.4	42.29	18.8	23.49	V
15606.0	50.8	21.3	29.5	V

Channel 40 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
19482.4	41	-5.4	46.4	H
20763.4	42.86	-4.3	47.16	H
22392.0	43.9	-3.3	47.2	V
23835.2	43.49	-2.7	46.19	V
25095.0	44.46	-2.4	46.86	H
26473.6	47.2	-1.7	48.9	V

Channel 40 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
28002.6	45.64	-0.3	45.94	V
30797.0	45.86	0.2	45.66	V
32980.0	44.48	1.1	43.38	H
35450.5	47.83	1.5	46.33	V
36950.4	47.42	1.6	45.82	V
39117.1	50.35	4.2	46.15	V

802.11n-HT20

Channel 40 (30MHz ~1GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
34.3	12.78	-27.7	40.48	V
57.0	11.11	-26.8	37.91	H
105.0	9.15	-27.6	36.75	H
180.9	7.3	-29.4	36.7	H
319.8	11.68	-25.7	37.38	V

650.9	18.74	-19	37.74	H

Channel 40 (1GHz ~ 8GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
5923.8	44.73	4.7	40.03	H
6351.8	45.59	5.6	39.99	V
6675.0	47.44	6.5	40.94	V
6995.6	46.74	7.2	39.54	H
7439.2	48.05	7.3	40.75	V
7779.8	47.79	8.5	39.29	H

Channel 40 (8GHz ~ 18GHz) (Peak)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
8319.0	50.46	8.9	41.56	H
9867.8	49.21	11.2	38.01	H
11216.6	51.59	13.8	37.79	V
13707.0	54.84	18.8	36.04	V
15597.8	64.41	21.3	43.11	H
17448.8	56	24.3	31.7	H

Channel 40 (8GHz ~ 18GHz)(Average)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
13707.0	42.71	18.8	23.91	V
15597.8	50.44	21.3	29.14	H
17448.8	44.18	24.3	19.88	H

Channel 40 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
19000.4	39.55	-5.5	45.05	H
19938.8	39.95	-5	44.95	V
21587.8	43.68	-3.4	47.08	V

23066.8	43.68	-3	46.68	V
24873.1	45.44	-2.3	47.74	V
26422.6	46.86	-1.8	48.66	V

Channel 40 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
28491.2	43.64	-1.1	44.74	V
30733.6	45.21	0.1	45.11	H
32679.0	43.82	0.4	43.42	V
34456.9	46.52	1.2	45.32	H
36961.2	46.6	1.6	45	V
38911.9	49.71	3.8	45.91	V

802.11n-HT40

Channel 46 (30MHz ~ 1GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
34.1	12.35	-27.7	40.05	V
43.1	12.81	-26.1	38.91	V
76.8	6.1	-31.4	37.5	V
167.0	6.22	-30.2	36.42	H
258.4	9.78	-27.3	37.08	V
633.6	18.28	-19.4	37.68	H

Channel 46 (1GHz ~ 8GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
5641.2	46.9	4.7	42.2	V
6064.4	44.81	4.7	40.11	H
6484.8	47.18	6	41.18	H
6898.8	47.05	7	40.05	H
7262.6	47.09	7.3	39.79	V
7526.8	45.99	7.5	38.49	H

Channel 46 (8GHz ~ 18GHz)(Peak)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
8367.0	49.46	8.9	40.56	H
9996.6	50.82	11.3	39.52	H
11651.2	52.37	15.2	37.17	V
13690.8	55.23	18.8	36.43	V
15687.0	64.61	21.7	42.91	H
17135.6	57.91	24	33.91	H

Channel 46 (8GHz ~ 18GHz)(Average)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
13690.8	42.84	18.8	24.04	V
15687.0	50.57	21.7	28.87	H
17135.6	44.97	24	20.97	H

Channel 46 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
19181.5	39.63	-5.6	45.23	V
20685.2	41.87	-4.4	46.27	H
22151.4	44.44	-3	47.44	H
23497.0	44.67	-2.8	47.47	H
24955.6	45.5	-2.4	47.9	H
25843.0	46.73	-2	48.73	V

Channel 46 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
27809.5	45.51	-0.4	45.91	H
30786.2	45.47	0.2	45.27	H
33324.2	44.02	1	43.02	V
35391.1	46.85	1.6	45.25	H

36900.4	47.38	1.9	45.48	V
39053.6	49.94	4.2	45.74	H

Test graphs as below:

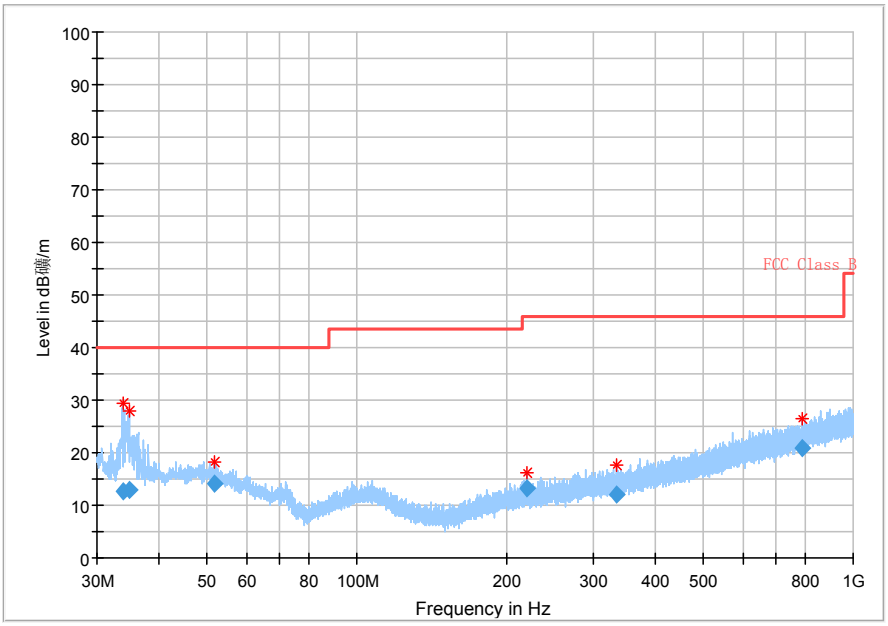


Fig. 100 Radiated Spurious Emission (802.11a, ch40, 30 MHz-1 GHz)

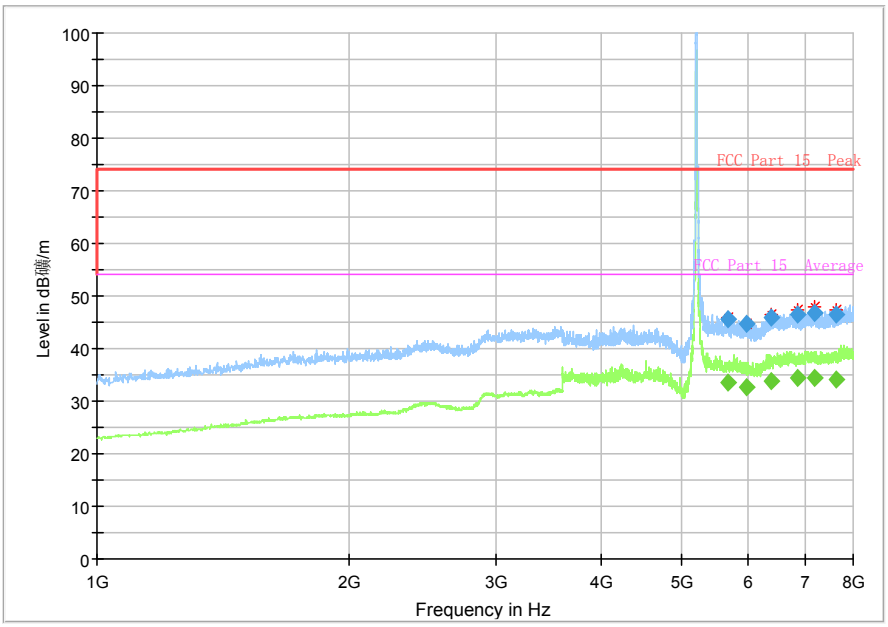


Fig. 101 Radiated Spurious Emission (802.11a, ch40, 1 GHz-8 GHz)

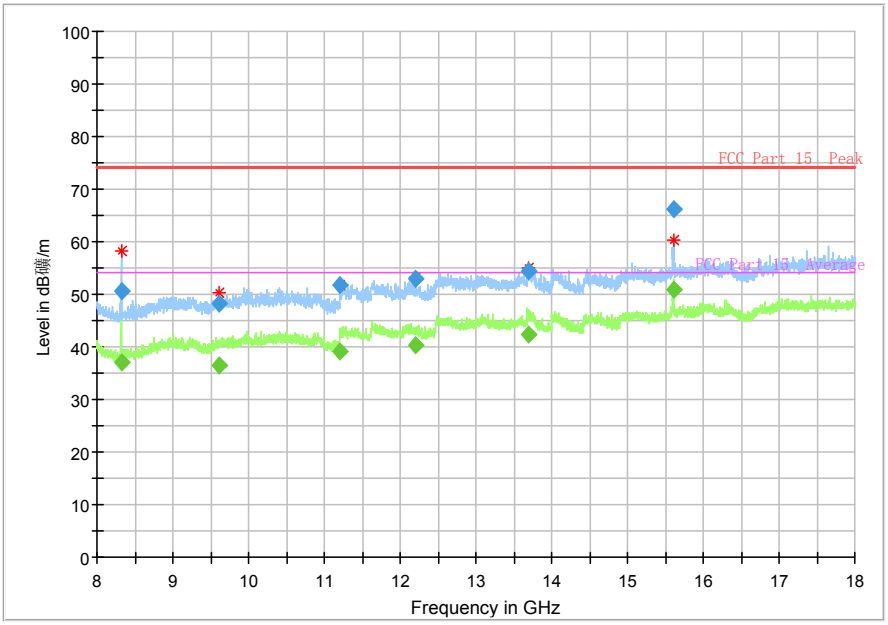


Fig. 102 Radiated Spurious Emission (802.11a, ch40, 8 GHz-18 GHz)

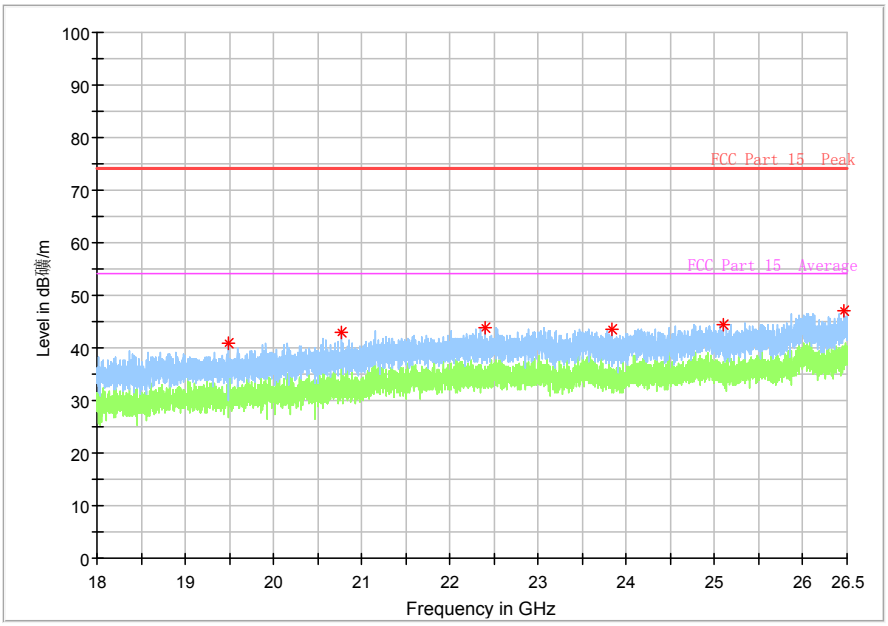


Fig. 103 Radiated Spurious Emission (802.11a, ch40, 18 GHz-26.5 GHz)

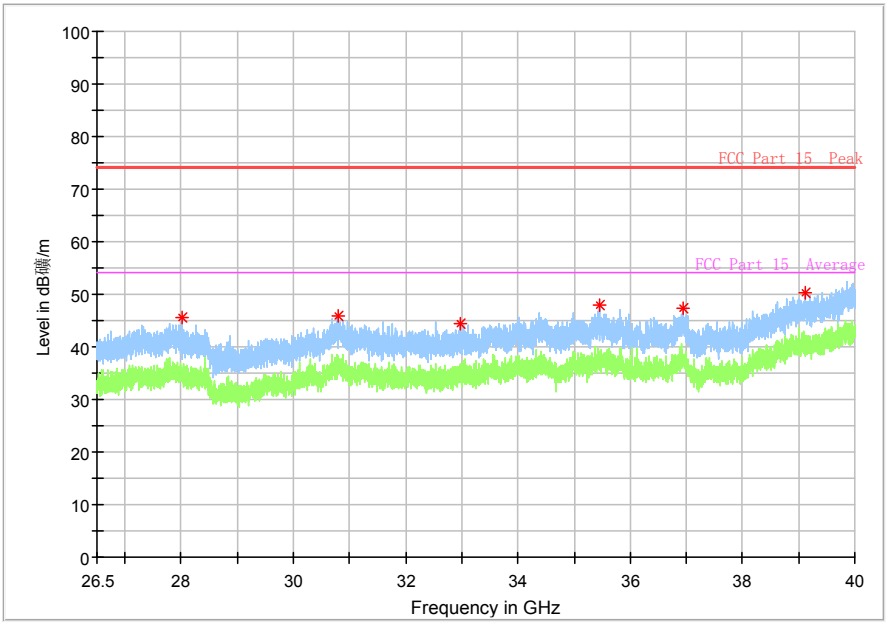


Fig. 104 Radiated Spurious Emission (802.11a, ch40, 26.5 GHz-40 GHz)

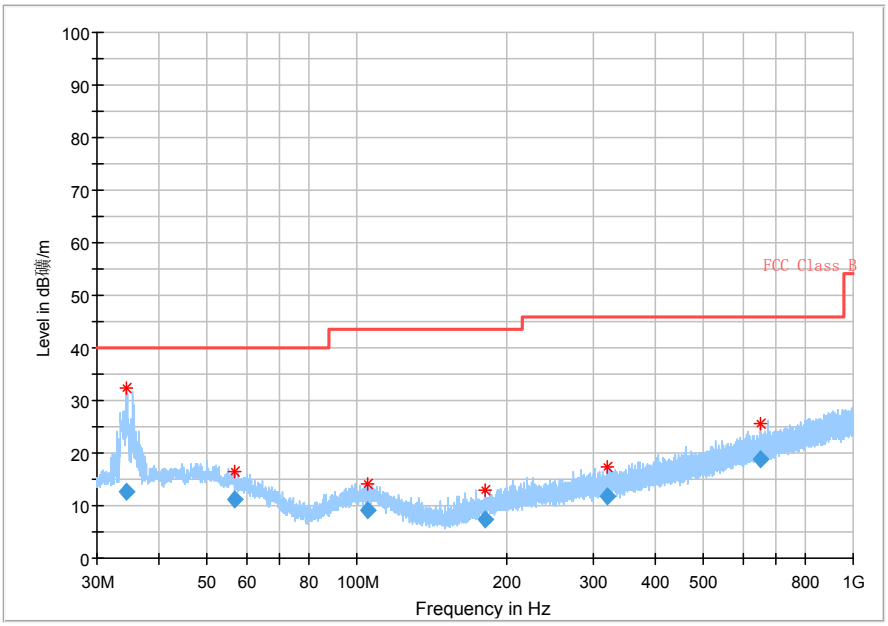


Fig. 105 Radiated Spurious Emission (802.11n-HT20, ch40, 30 MHz-1 GHz)

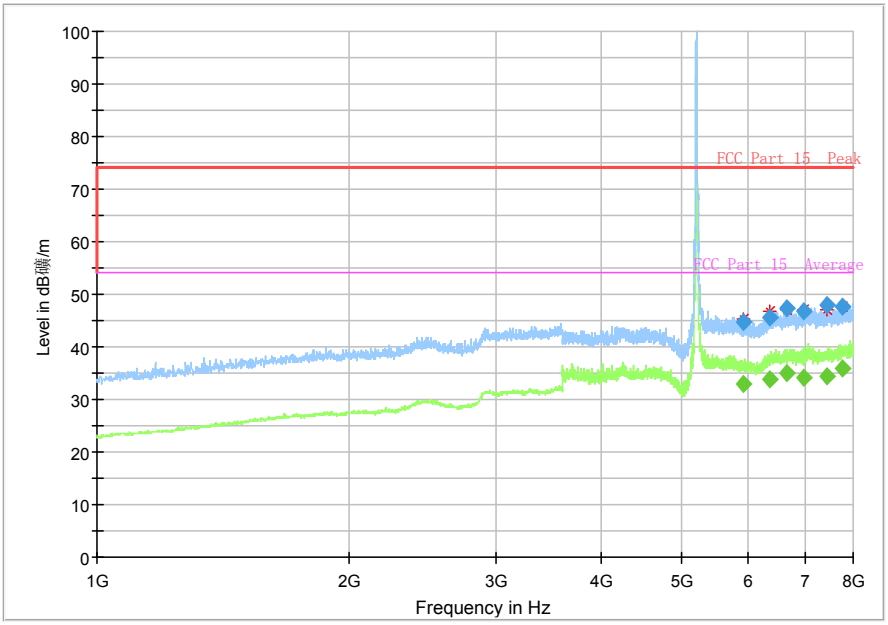


Fig. 106 Radiated Spurious Emission (802.11n-HT20, ch40, 1 GHz-8 GHz)

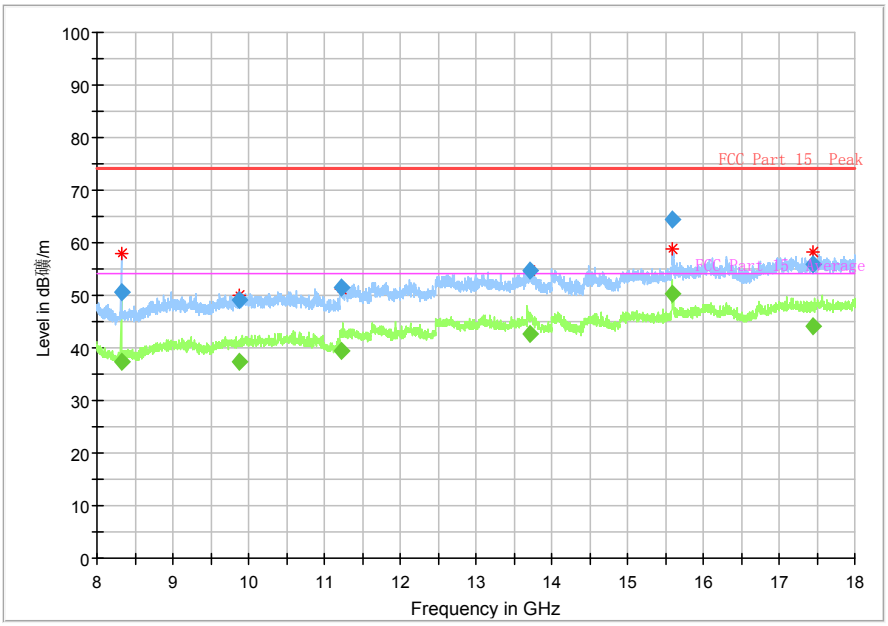


Fig. 107 Radiated Spurious Emission (802.11n-HT20, ch40, 8 GHz-18 GHz)

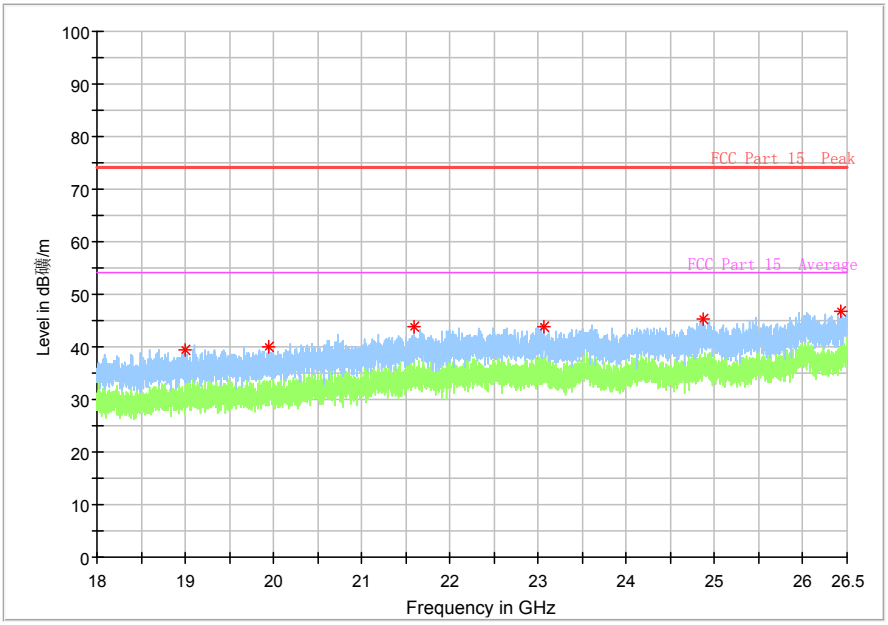


Fig. 108 Radiated Spurious Emission (802.11n-HT20, ch40, 18 GHz-26.5 GHz)

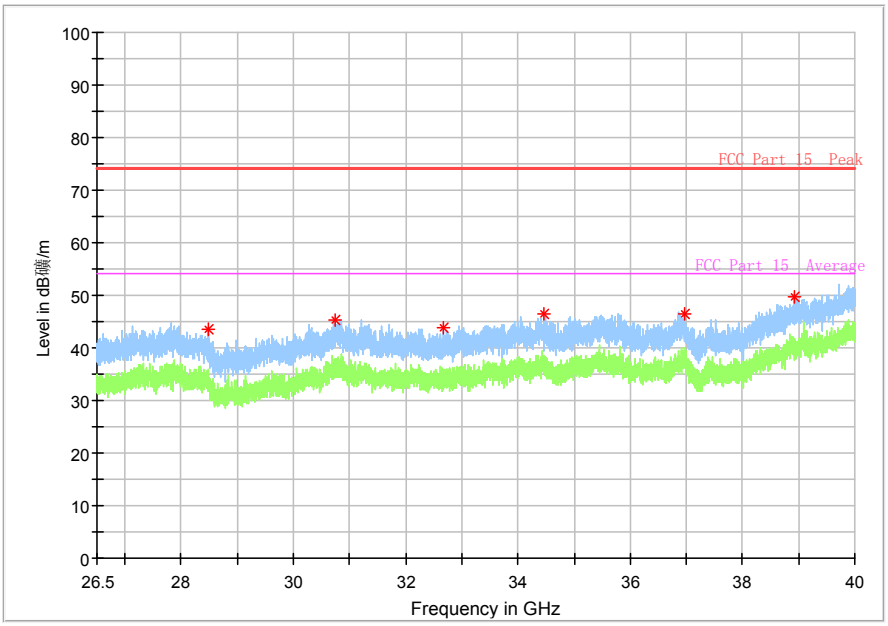


Fig. 109 Radiated Spurious Emission (802.11n-HT20, ch40, 26.5 GHz-40 GHz)

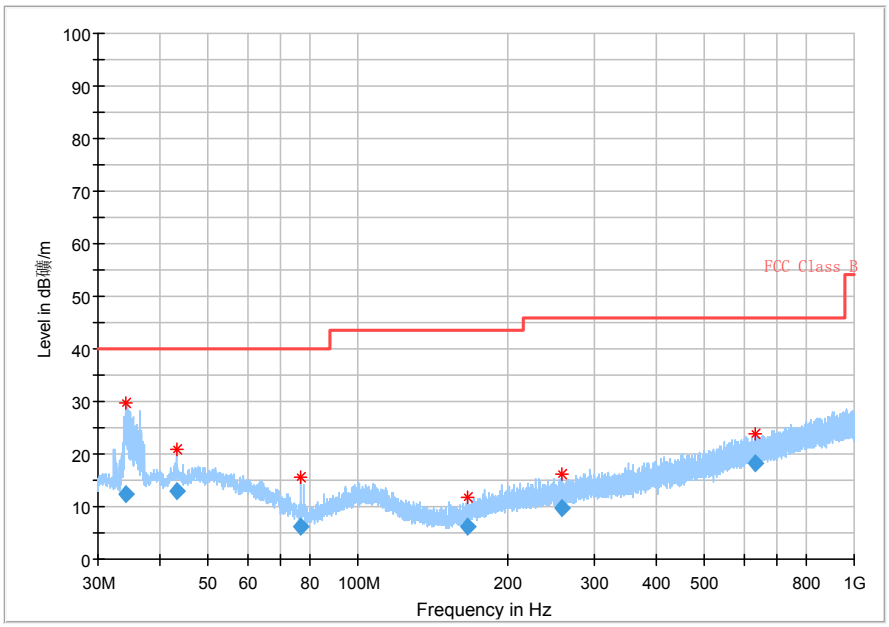


Fig. 110 Radiated Spurious Emission (802.11n-HT40, ch46, 30 MHz-1 GHz)

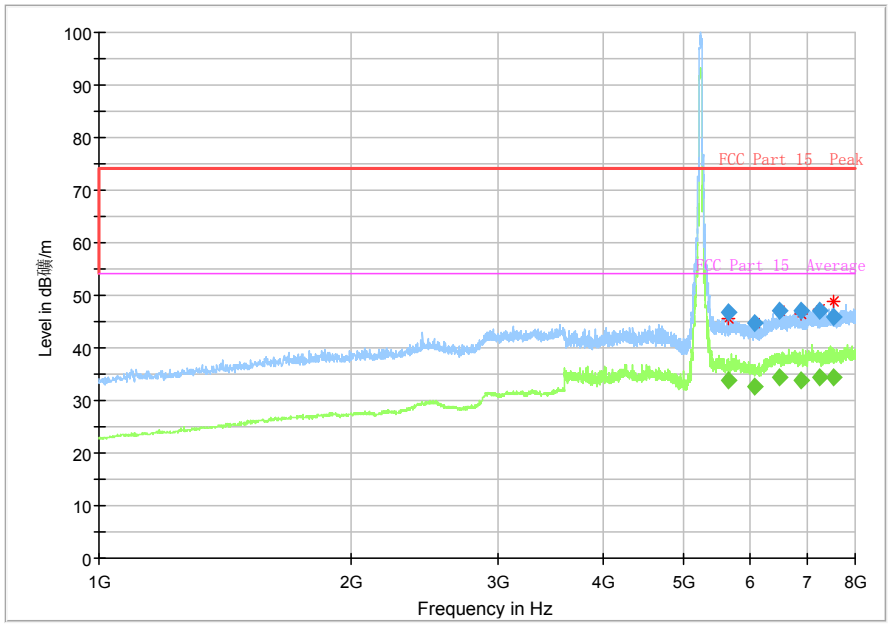


Fig. 111 Radiated Spurious Emission (802.11n-HT40, ch46, 1 GHz-8 GHz)

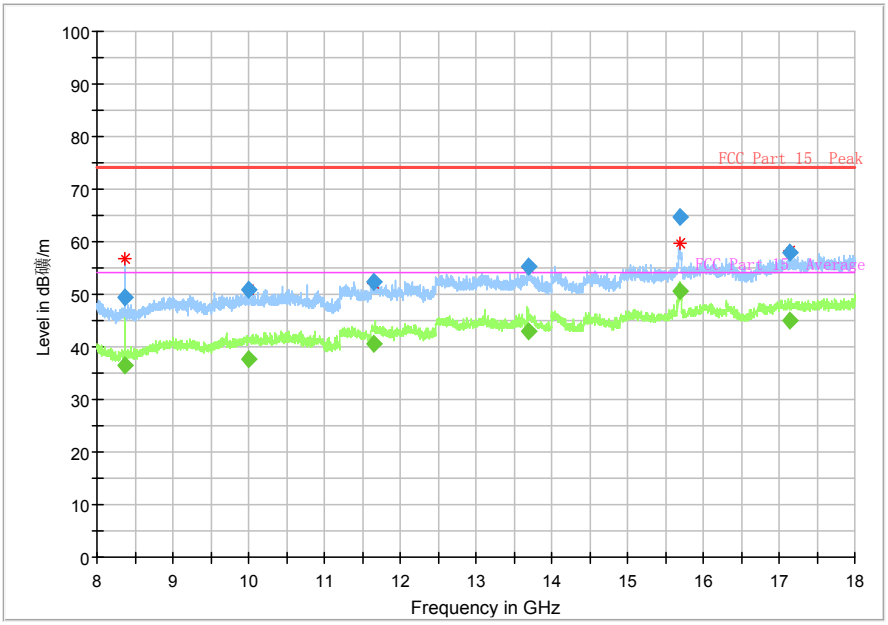


Fig. 112 Radiated Spurious Emission (802.11n-HT40, ch46, 8 GHz-18 GHz)

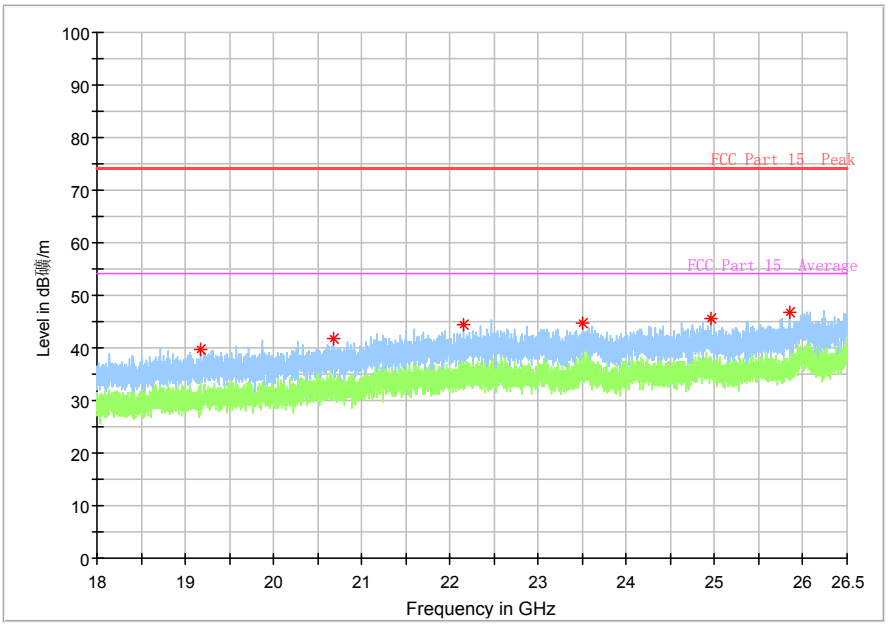


Fig. 113 Radiated Spurious Emission (802.11n-HT40, ch46, 18 GHz-26.5 GHz)

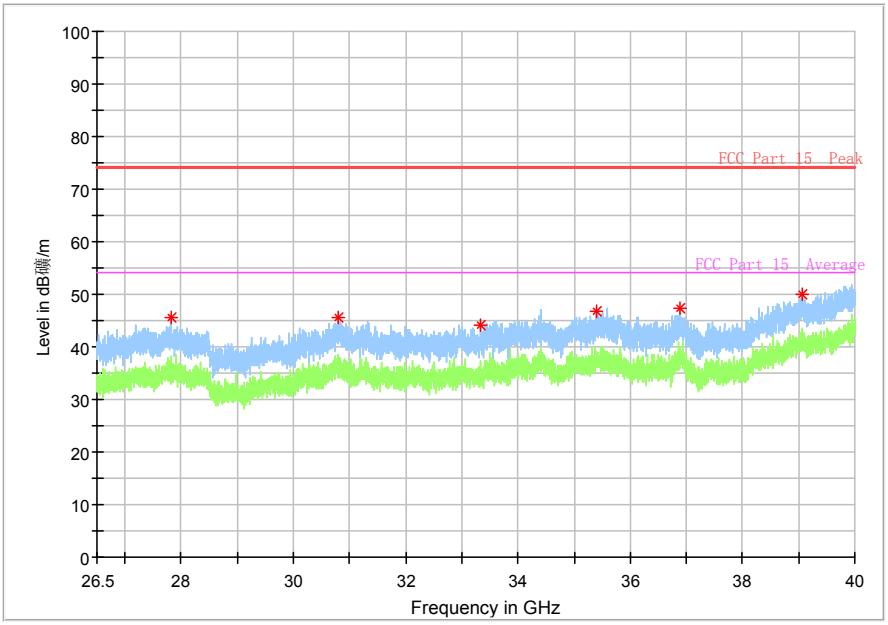


Fig. 114 Radiated Spurious Emission (802.11n-HT40, ch46, 26.5 GHz-40 GHz)

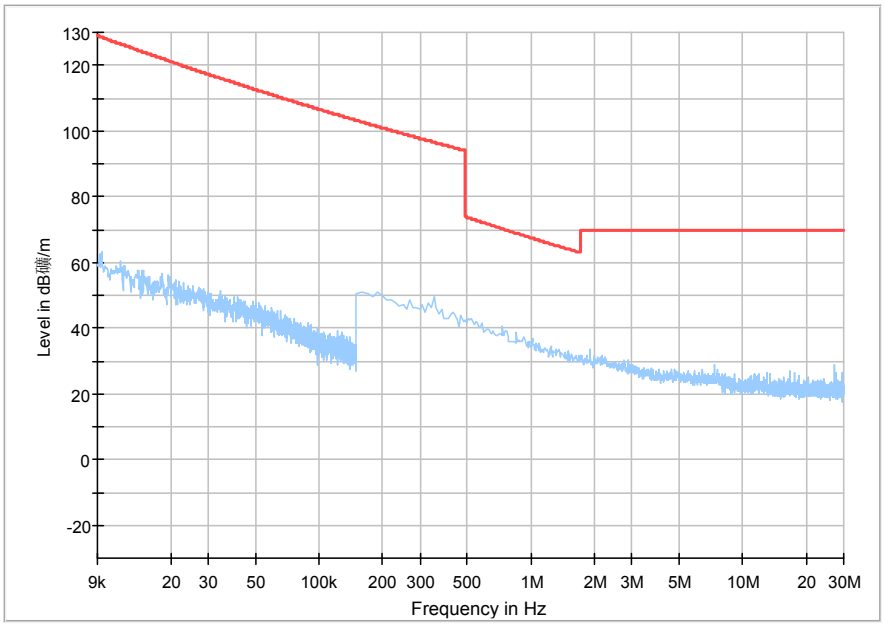


Fig. 115 Radiated Spurious Emission (9kHz-30MHz)

6.8. Conducted Emission (150kHz- 30MHz)

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		
		11a mode	Idle	
0.15 to 0.5	66 to 56	Fig.116		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		
		11a mode	Idle	
0.15 to 0.5	56 to 46	Fig.116		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.				

Conclusion: PASS

Test graphs as below:

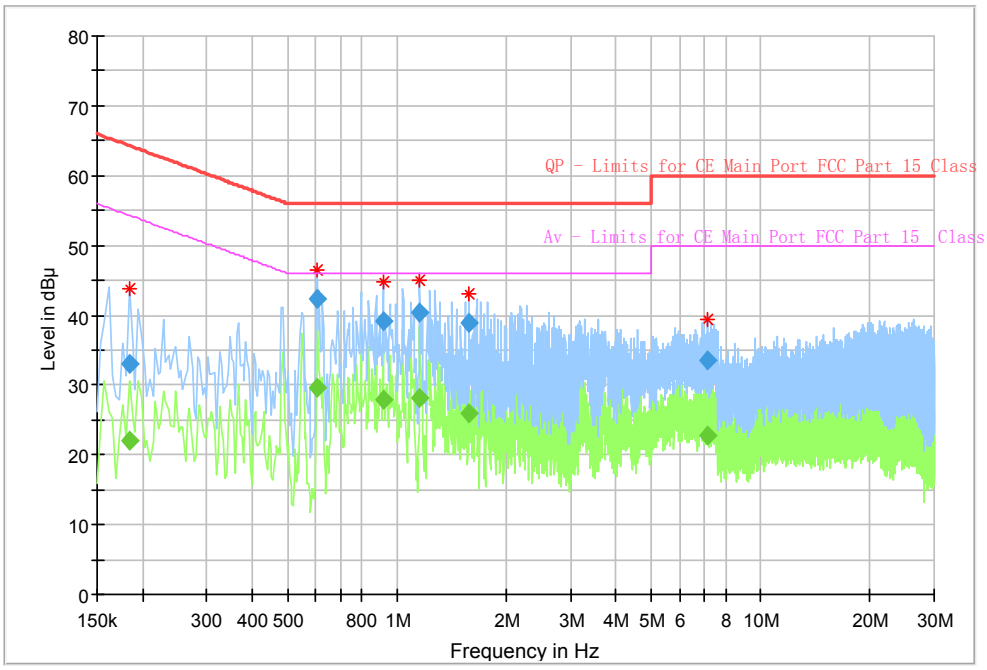


Fig. 116 Conducted Emission(802.11a, TX)

Measurement Result:

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.183581	33.11	---	64.32	31.22	15000.0	9.000	N	ON	9.7
0.183581	---	22.08	54.32	32.24	15000	9.000	N	ON	9.7
0.605213	42.21	---	56.00	13.79	15000	9.000	L1	ON	9.7
0.605213	---	29.63	46.00	16.37	15000.0	9.000	L1	ON	9.7
0.914906	39.06	---	56.00	16.94	15000	9.000	L1	ON	9.7
0.914906	---	27.93	46.00	18.07	15000.0	9.000	L1	ON	9.7
1.153706	40.25	---	56.00	15.75	15000	9.000	L1	ON	9.7
1.153706	---	28.04	46.00	17.96	15000	9.000	L1	ON	9.7
1.579069	38.94	---	56.00	17.06	15000	9.000	L1	ON	9.7
1.579069	---	25.99	46.00	20.01	15000	9.000	L1	ON	9.7
7.161019	33.39	---	60.00	26.61	15000	9.000	L1	ON	9.8
7.161019	---	22.78	50.00	27.22	15000	9.000	L1	ON	9.8

6.9. Frequency Stability

Manufacturers ensured the EUT meet the requirement of frequency stability, such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

6.10. Power control

A Transmission Power Control mechanism is not required for systems with an e.i.r.p. of less than 27dBm (500 mW).

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	TDL-Lambda	2018-05-11	1 Year
3	Universal Radio Communication Tester	CMW50	104178	R&S	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

6	Loop Antenna	AL-130R	121083	COM-POWER	2016-11-21	3 Year

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-26GHz	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 17025:2005 *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 May 31, 2019
Revised April 26, 2019

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

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