



TEST REPORT

No. I19D0071-SRD07

For

Client: Toast, Inc.

Production: Data Processing Machine

Model Name: TT200/TK200/TT201/TT202

Brand Name: Toast

FCC ID: 2AMNG-TT200

IC ID: 23177-TT200

Hardware Version: CT541MB80C

Software Version: 1.2.6/121

Issued date: 2019-09-09

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

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Revision Version

Report Number	Revision	Date	Memo
I19D00071-SRD07	00	2019-08-12	Initial creation of test report
I19D00071-SRD07	01	2019-08-23	Second creation of test report
I19D00071-SRD07	02	2019-09-06	Third creation of test report
I19D00071-SRD07	03	2019-09-09	Fourth 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 21 63843300
Fax	+86 21 63843301
ISED CAB Identifier	CN0067

1.2. Testing Environment

Normal Temperature	15°C-35°C
Relative Humidity	20%-75%

1.3. Project Data

Project Leader	Zhou Yan
Testing Start Date	2019-05-18
Testing End Date	2019-06-24

1.4. Signature



Wang Liang

(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	Toast, Inc.
Address	401 Park Drive, Suite 801, Boston, MA 02215, USA
Telephone	(562) 546-2272
Postcode	/

2.2. Manufacturer Information

Company Name	Toast, Inc.
Address	401 Park Drive, Suite 801, Boston, MA 02215, USA
Telephone	(562) 546-2272
Postcode	/

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

3.1. About EUT

Production	Data Processing Machine
Model name	TT200/TK200/TT201/TT202
WLAN (5G)	802.11 a/n20/n40/ac20/ac40/ac80
Frequency Range	ISM Bands: 5150MHz-5250MHz
WLAN type of modulation	OFDM
Extreme Temperature	0/+80℃
Nominal Voltage	24V
Extreme High Voltage	28V
Extreme Low Voltage	20V
Maximum of Antenna Gain	WIFI5 Ghz: 2.29 dBi

Note:

- Photographs of EUT are shown in ANNEX A of this test report.
- 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*	SN or IMEI	HW Version	SW Version	Date of receipt
N01	/	CT541MB80C	1.2.6/121	2019-05-14
N06	/	CT541MB80C	1.2.6/121	2019-05-14

*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	Type	Manufacturer
AE1	RF cable	---	AE1

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

4. Reference Documents

4.1. Documents supplied by applicant

All technical documents are supplied by the client or manufacturer, which is the basis of testing.

4.2. 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	2018-10-01
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
RSS-247	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices	2017
RSS-Gen	General Requirements for Compliance of Radio Apparatus	2018
KDB 789033	Information Infrastructure (U-NII) Devices - Part 15, Subpart E	2017
KDB 905462	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. Test Results

5.1. Summary of Test Results

Measurement Items	Sub-clause of Part15E	Sub-clause of IC	Verdict
Maximum Output Power	15.407	RSS-247,6.2	P
Power Spectral Density	15.407	RSS-247,6.2	P
Occupied 26dB Bandwidth	15.403	RSS-GEN,6.7	P
Band edge compliance	15.407	RSS-247,6.2	P
Transmitter spurious emissions radiated	15.407	RSS-GEN,8.8	P
Spurious emissions radiated < 30 MHz	15.407	RSS-GEN,7.1.2	P
Spurious emissions conducted < 30 MHz	15.407	RSS-GEN,8.8	P
Peak Excursion	15.407	RSS-247,6.2	P
Frequency Stability	15.407	RSS-247,6.2	P
Transmit Power Control	15.407	RSS-247,6.2	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.

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	48%
Air Pressure	Anom	1010hPa

5.2. Statements

The TT200/TK200/TT201/TT202 is an initial product for testing.

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

ECIT has verified that the compliance of the tested device specified in section 3 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 4 of this test report.

6. Test Equipments and software Utilized

6.1. Conducted Test System

Item	Instrument Name	Type	SN	Manufacturer	Cal. Date	Cal. interval
1	Vector Signal Analyzer	FSQ40	200063	R&S	2019-05-10	1 year
2	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	2019-05-10	1 year
3	Universal Radio Communication Tester	CMW500	104178	R&S	2019-05-10	1 year

6.2. Radiated Emission Test System

Item	Instrument Name	Type	SN	Manufacturer	Cal. Date	Cal. interval
1	Universal Radio Communication Tester	CMU200	123123	R&S	2019-05-10	1 year
2	EMI Test Receiver	ESU40	100307	R&S	2019-05-10	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	2019-05-10	1 year
6	Loop Antenna	AL-130R	121083	COM-POWER	2016-11-21	3 years

6.3. Conducted Test Software

Software Name	Version
Eagle1.0	2018-11-12

6.4. Radiated Test Software

Software Name	Version
EMC32	V10.35.02

Anechoic chamber

Fully anechoic chamber by ETS.

7. Measurement Uncertainty

Measurement uncertainty for all the testing in this report are within the limit specified in ECIT documents .
The detailed measurement uncertainty is defined in ECIT documents.

Measurement Items	Range	Confidence Level	Calculated Uncertainty
Peak Output Power-Conducted	5100MHz-5850MHz	95%	$\pm 1.024\text{dB}$
Peak Power Spectral Density	5100MHz-5850MHz	95%	$\pm 1.024\text{dB}$
Occupied 6dB Bandwidth	5100MHz-5850MHz	95%	$\pm 62.04\text{Hz}$
Frequency Band Edges-Conducted	5100MHz-5850MHz	95%	$\pm 1.024\text{dB}$
Conducted Emission	30MHz-2GHz	95%	$\pm 0.90\text{dB}$
Conducted Emission	2GHz-3.6GHz	95%	$\pm 0.88\text{dB}$
Conducted Emission	3.6GHz-8GHz	95%	$\pm 0.96\text{dB}$
Conducted Emission	8GHz-20GHz	95%	$\pm 0.94\text{dB}$
Conducted Emission	20GHz-22GHz	95%	$\pm 0.88\text{dB}$
Conducted Emission	22GHz-26GHz	95%	$\pm 0.86\text{dB}$
Transmitter Spurious Emission-Radiated	9KHz-30MHz	95%	$\pm 5.66\text{dB}$
Transmitter Spurious Emission-Radiated	30MHz-1000MHz	95%	$\pm 4.98\text{dB}$
Transmitter Spurious Emission-Radiated	1000MHz -18000MHz	95%	$\pm 5.06\text{dB}$
Transmitter Spurious Emission-Radiated	18000MHz -40000MHz	95%	$\pm 5.20\text{dB}$
AC Power line Conducted Emission	0.15MHz-30MHz	95%	$\pm 3.66\text{ dB}$

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 °C, Max. = 35 °C
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 °C, Max. = 35 °C
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 k Ω
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:

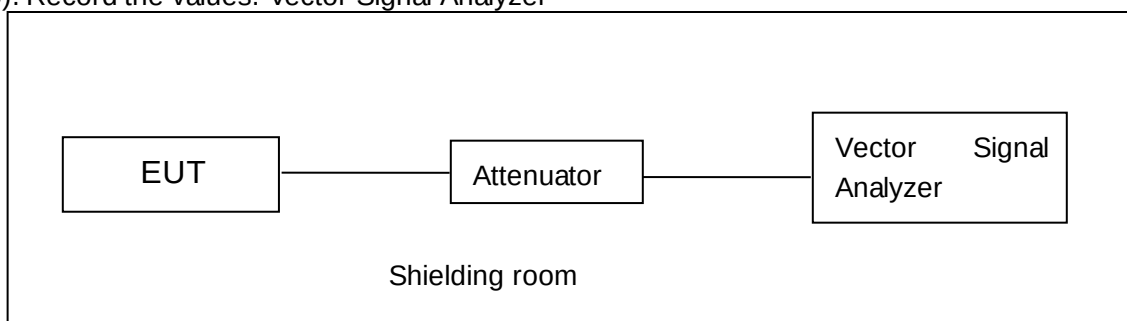
Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 25 %, Max. = 75 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 10 k Ω
Ground system resistance	< 0.5 Ω
VSWR	Between 0 and 6 dB, from 1GHz to 18GHz
Site Attenuation Deviation	Between -4 and 4 dB,30MHz to 1GHz
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

ANNEX A. Detailed Test Results

ANNEX A.1. Measurement Method

A.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

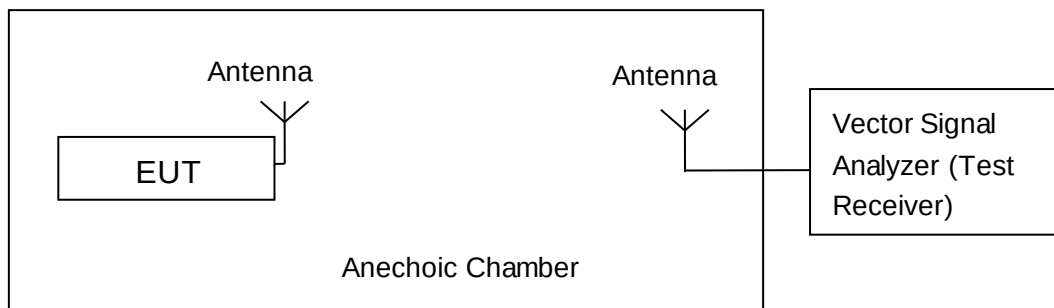


A.1.2. Radiated Emission Measurements

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.

ANNEX A.2. Maximum output Power

Measurement Limit and Method:

Standard	Frequency (MHz)	Limit (dBm)
FCC CRF Part 15.407(a)	5150MHz~5250MHz	24dBm

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	Test Level	Data Rate(Mbps)	Output power(dBm)		
			5180MHz	5200MHz	5240MHz
802.11a	PCL17	6	13.17	13.53	13.17
Mode	Test Level	Data Rate(Mbps)	EIRP(dBm)		
			5180MHz	5200MHz	5240MHz
802.11a	PCL17	6	15.46	15.82	15.46

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

802.11n-HT20 mode U-NII-1

Mode	Test Level	Data Rate(Index)	Output power(dBm)		
			5180MHz	5200MHz	5240MHz
802.11n(20MHz)	PCL17	MCS0	13.14	12.87	12.23
Mode	Test Level	Data Rate(Index)	EIRP(dBm)		
			5180MHz	5200MHz	5240MHz
802.11n(20MHz)	PCL17	MCS0	15.43	15.16	14.52

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	Test Level	Data Rate(Index)	Output power(dBm)		
			5190MHz	/	5230MHz
802.11n(40MHz)	PCL16.5	MCS0	16.56	/	16.28
Mode	Test Level	Data Rate(Index)	EIRP(dBm)		
			5190MHz	/	5230MHz
802.11n(40MHz)	PCL16.5	MCS0	18.85	/	18.57

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

802.11ac-VHT20 mode U-NII-1

Mode	Test Level	Data Rate(Mbps)	Output power(dBm)		
			5180MHz	5200MHz	5240MHz
802.11ac(20MHz)	PCL17	6	12.94	13.50	13.10
Mode	Test Level	Data Rate(Mbps)	EIRP(dBm)		
			5180MHz	5200MHz	5240MHz
802.11ac(20MHz)	PCL17	6	15.23	15.79	15.39

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

802.11ac-VHT40 mode U-NII-1

Mode	Test Level	Data Rate(Index)	Output power(dBm)		
			5190MHz	/	5230MHz
802.11ac (40MHz)	PCL16.5	MCS0	16.56	/	16.28
Mode	Test Level	Data Rate(Index)	EIRP(dBm)		
			5190MHz	/	5230MHz
802.11ac (40MHz)	PCL16.5	MCS0	18.85	/	18.57

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

802.11ac-VHT80 mode U-NII-1

Mode	Test Level	Data Rate(Index)	Output power(dBm)		
			/	5210MHZ	/
802.11ac(80MHz)	PCL16	MCS0	/	11.18	/
Mode	Test Level	Data Rate(Index)	EIRP(dBm)		
			/	5210MHZ	/
802.11ac(80MHz)	PCL16	MCS0	/	13.47	/

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

ANNEX A.3. Peak Power Spectral Density (conducted)

Measurement Limit:

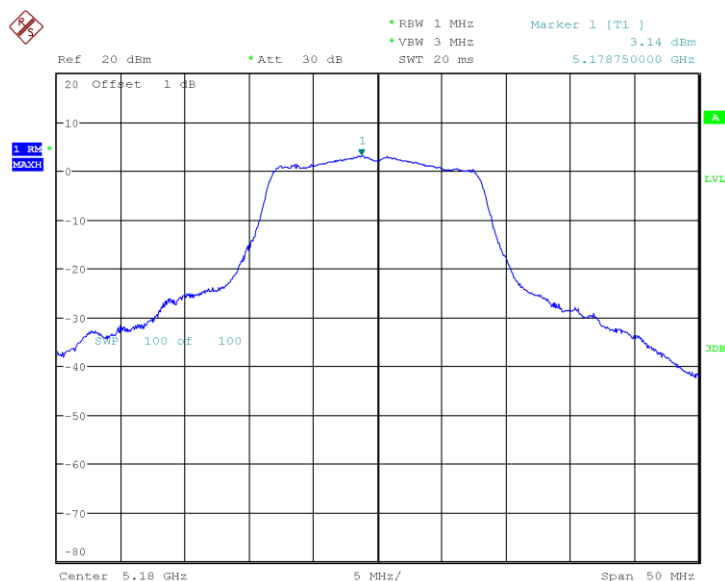
Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC CRF Part 15.407(a)	5150MHz~5250MHz	11

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

Measurement Results:

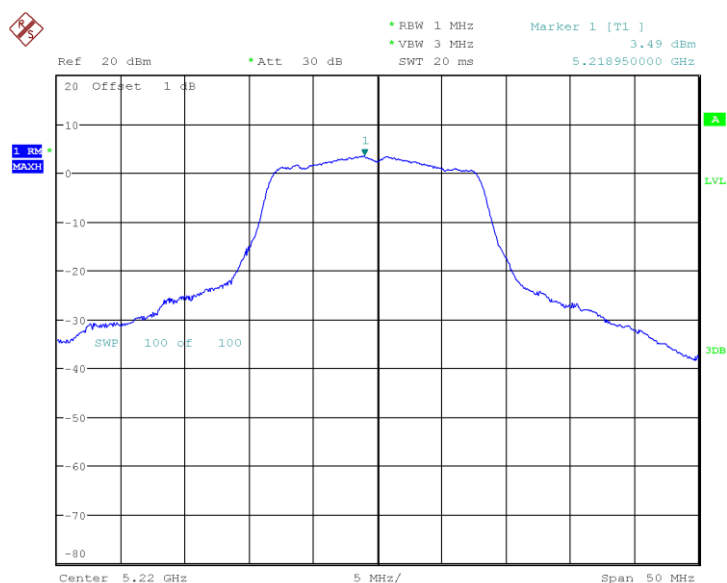
Mode	Data Rate	Channel	Power Spectral Density (dBm/MHz)		Conclusion
802.11a	6Mbps	5180 MHz	Fig.1	3.447	P
		5220 MHz	Fig.2	3.799	P
		5240 MHz	Fig.3	3.418	P
802.11nHT20	MCS0	5180 MHz	Fig.4	3.514	P
		5220 MHz	Fig.5	3.960	P
		5240 MHz	Fig.6	3.503	P
802.11nHT40	MCS0	5190 MHz	Fig.7	-5.049	P
		5230 MHz	Fig.8	-5.283	P
802.11acVHT20	MCS0	5180 MHz	Fig.9	2.949	P
		5200 MHz	Fig.10	3.718	P
		5240 MHz	Fig.11	3.100	P
802.11acHT40	MCS0	5190 MHz	Fig.12	-0.025	P
		5230 MHz	Fig.13	0.176	P
802.11acHT80	MCS0	5210MHz	Fig.14	-8.11	P

Conclusion: PASS



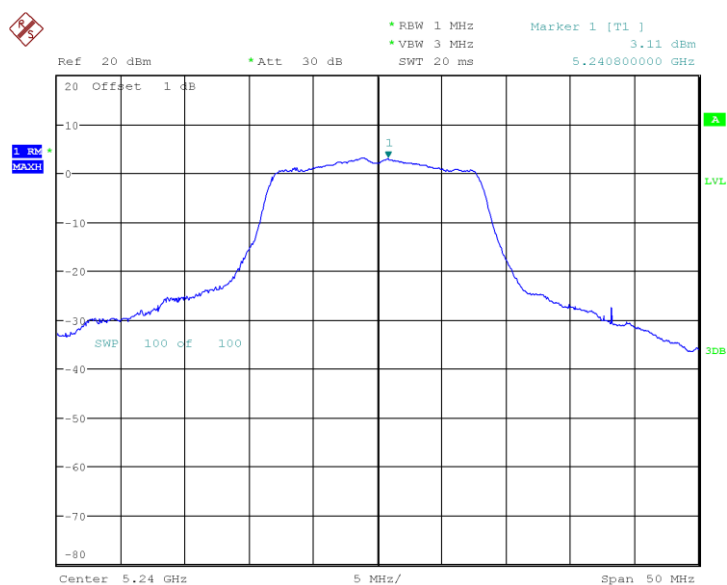
Date: 6.JUN.2019 08:25:50

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



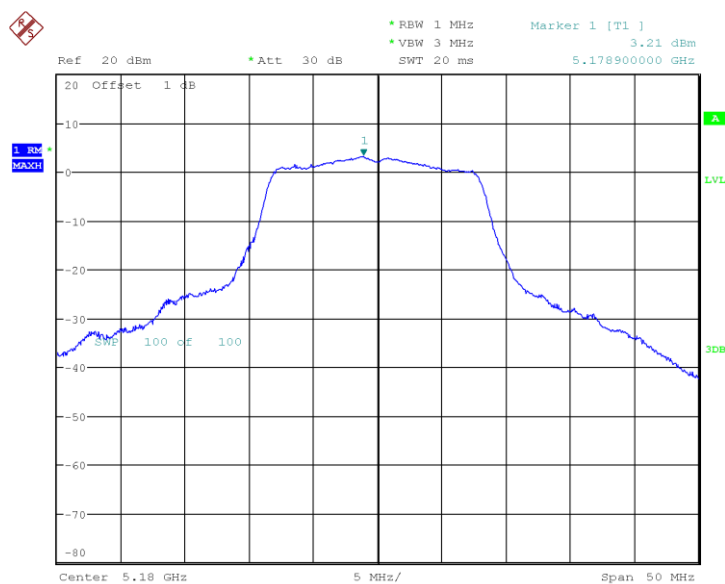
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Fig. 2 Power Spectral Density (802.11a, 5220MHz)



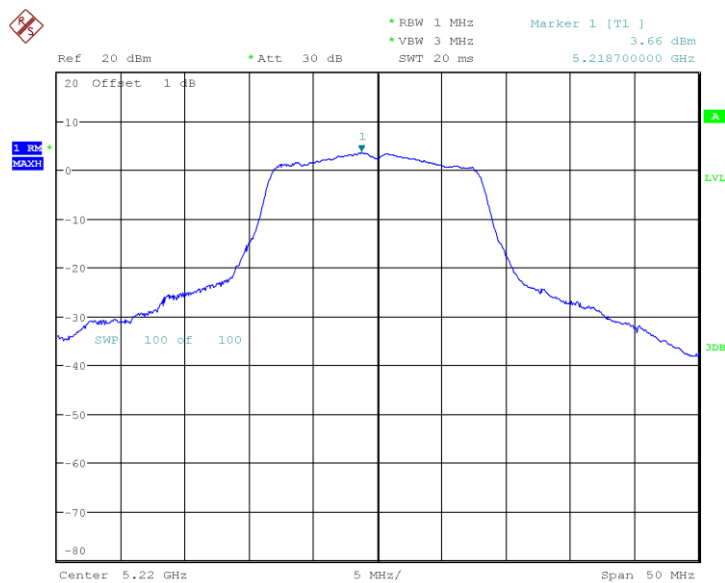
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Fig. 3 Power Spectral Density (802.11a, 5240MHz)



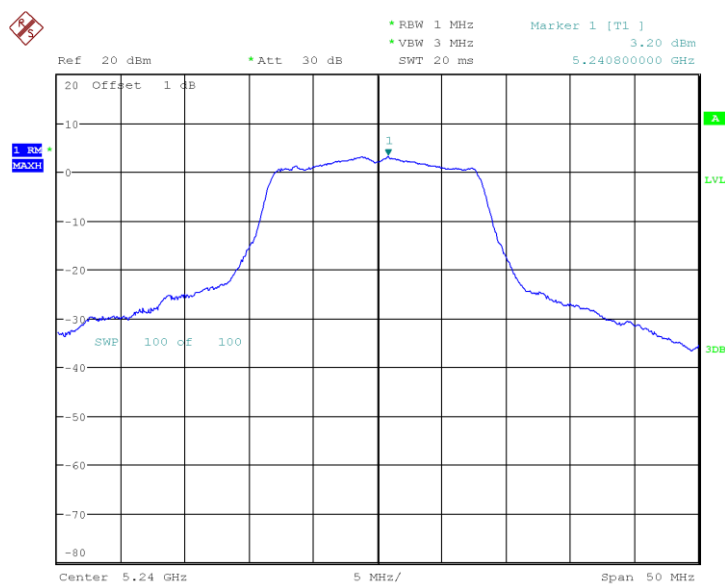
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Fig. 4 Power Spectral Density (802.11n-HT20, 5180MHz)



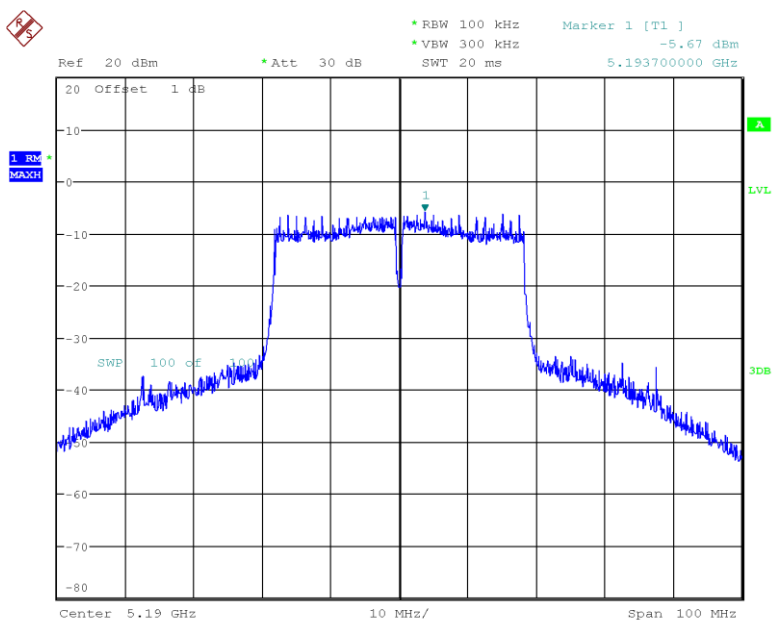
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Fig. 5 Power Spectral Density (802.11n-HT20, 5220MHz)



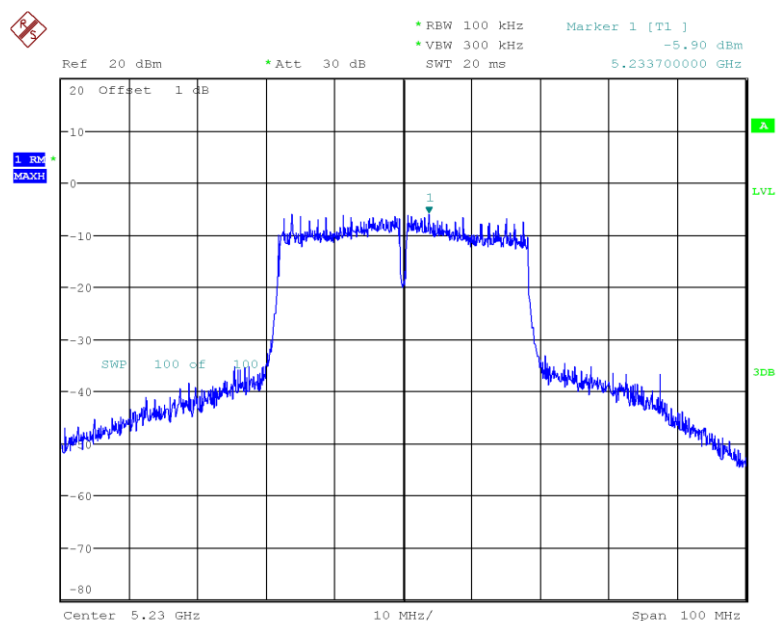
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Fig. 6 Power Spectral Density (802.11n-HT20, 5240MHz)



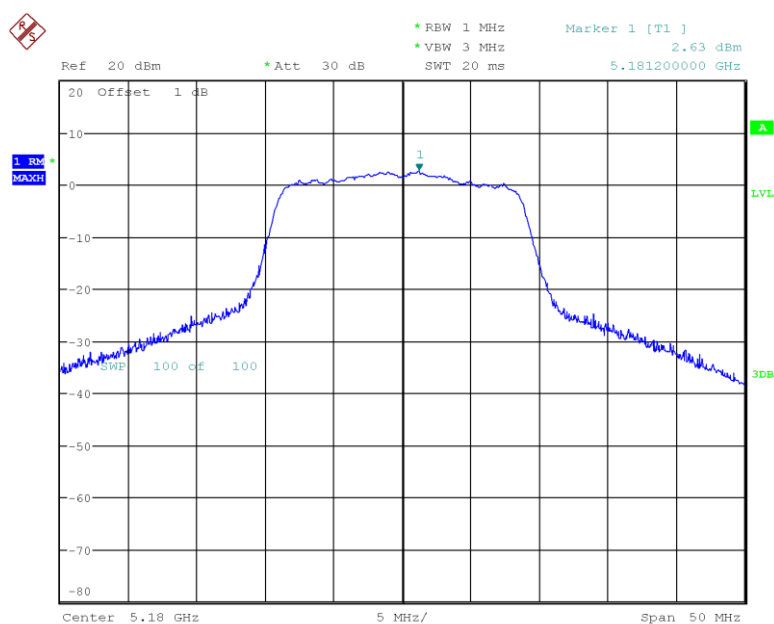
Date: 11.JUN.2019 02:10:13

Fig. 7 Power Spectral Density (802.11n-HT40, 5190MHz)



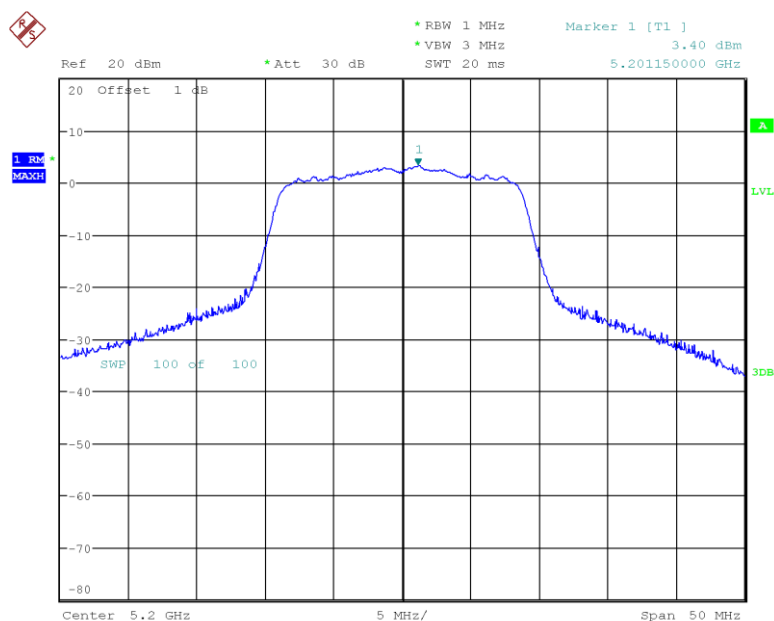
Date: 11.JUN.2019 02:11:40

Fig. 8 Power Spectral Density (802.11n-HT40, 5230MHz)



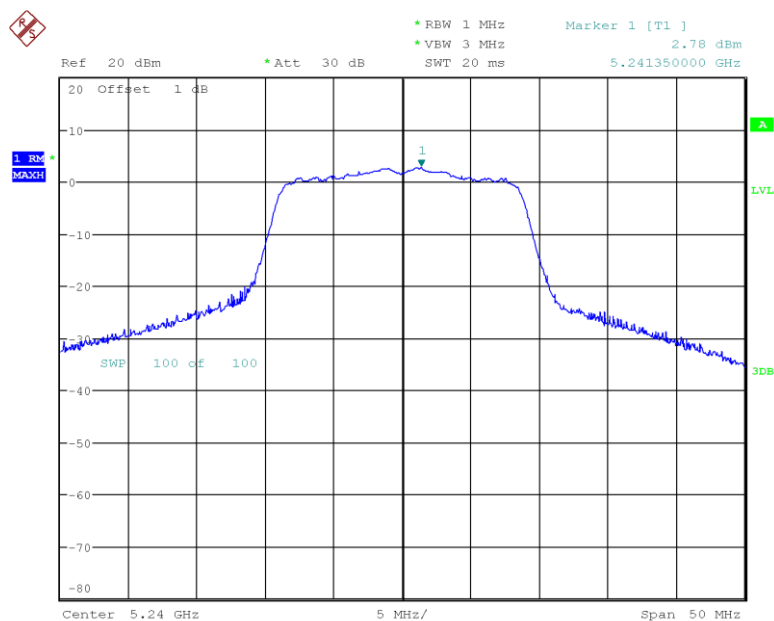
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Fig. 9 Power Spectral Density (802.11ac-HT20, 5180MHz)



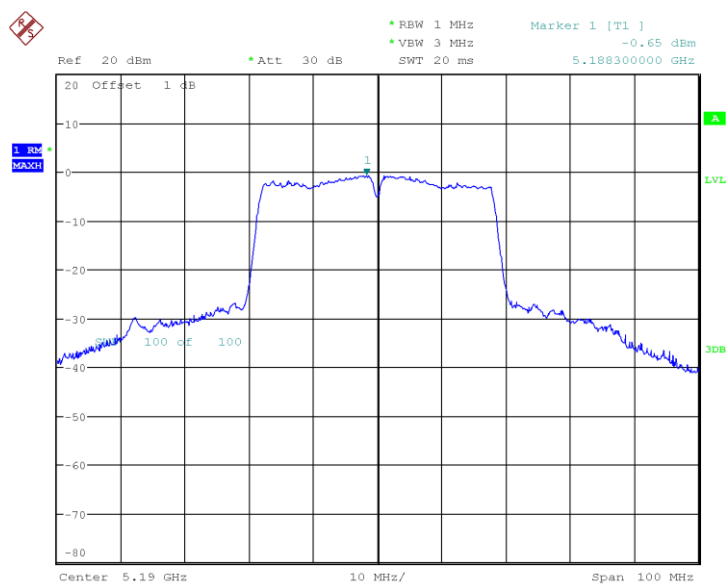
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Fig. 10 Power Spectral Density (802.11ac-HT20, 5200MHz)



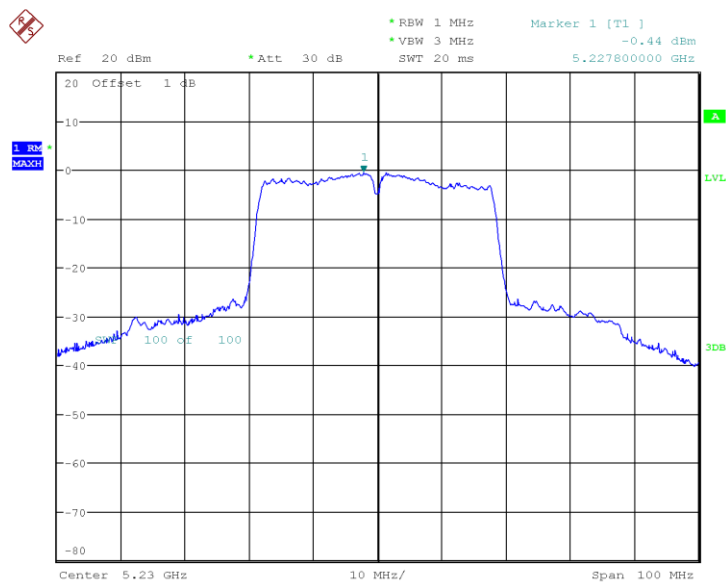
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Fig. 11 Power Spectral Density (802.11ac-HT20, 5240MHz)



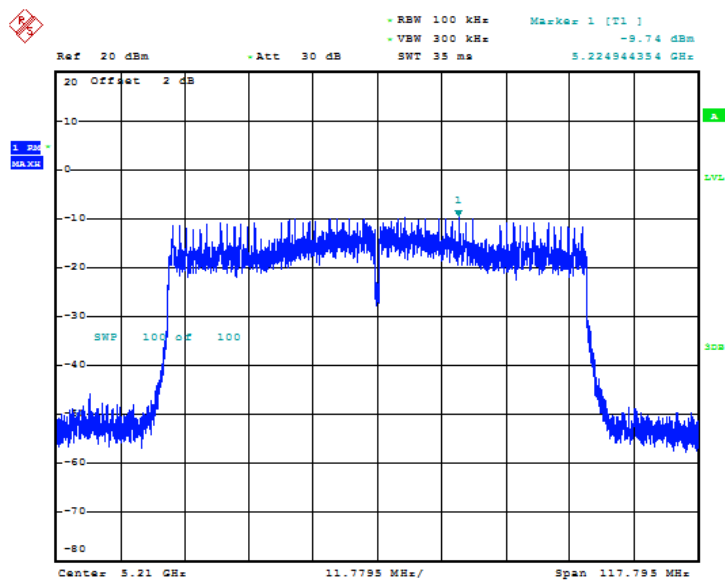
Date: 11.JUN.2019 05:29:03

Fig. 12 Power Spectral Density (802.11ac-HT40, 5190MHz)



Date: 11.JUN.2019 05:30:56

Fig. 13 Power Spectral Density (802.11ac-HT40, 5230MHz)



Date: 11.JUN.2019 18:15:59

Fig. 14 Power Spectral Density (802.11ac-HT80, 5210MHz)

ANNEX A.4. Occupied Bandwidth(conducted)

Measurement Limit:

Standard	Limit (MHz)
FCC 47 CFR Part 15.403 (i)/15.407 (e)	/

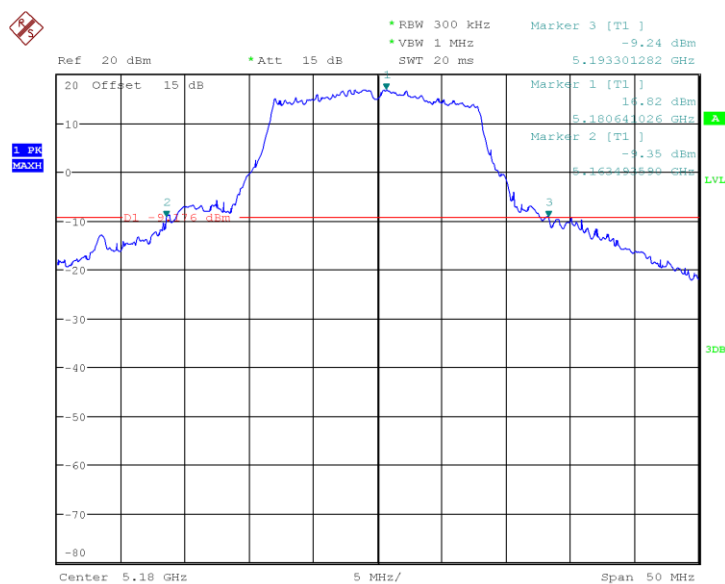
The measurement is made according to KDB 789033

Measurement Result:

Mode	Data Rate	Channel	Occupied 26dB Bandwidth (MHz)		99% Occupied Bandwidth (MHz)		conclusion
802.11a	6Mbps	5180 MHz	Fig.15	29.81	Fig.29	16.827	P
		5200 MHz	Fig.16	29.09	Fig.30	16.747	P
		5240 MHz	Fig.17	30.05	Fig.31	16.827	P
802.11n HT20	MCS0	5180 MHz	Fig.18	28.93	Fig.32	16.747	P
		5200 MHz	Fig.19	28.29	Fig.33	16.747	P
		5240 MHz	Fig.20	31.65	Fig.34	16.907	P
802.11n HT40	MCS0	5210 MHz	Fig.21	50.00	Fig.35	36.859	P
		5230 MHz	Fig.22	50.00	Fig.36	36.699	P
802.11ac VHT20	MCS0	5180 MHz	Fig.23	30.45	Fig.37	18.830	P
		5200 MHz	Fig.24	31.01	Fig.38	18.830	P
		5240 MHz	Fig.25	31.17	Fig.39	18.910	P
802.11ac VHT40	MCS0	5190 MHz	Fig.26	50.96	Fig.40	36.538	P
		5230 MHz	Fig.27	48.56	Fig.41	36.538	P
802.11ac VHT80	MCS0	5210MHZ	Fig.28	78.53	Fig.42	75.321	P

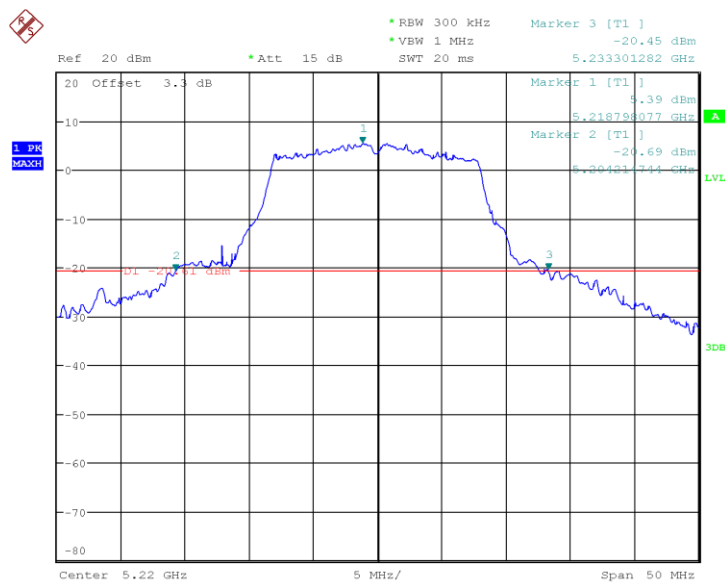
Conclusion: PASS

Test graphs as below:



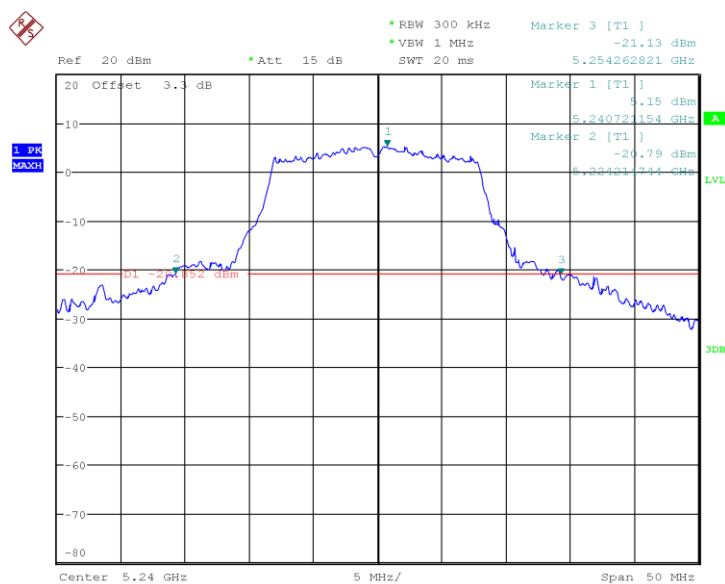
Date: 5.JUN.2019 01:38:21

Fig. 15 Occupied 26dB Bandwidth (802.11a, 5180MHz)



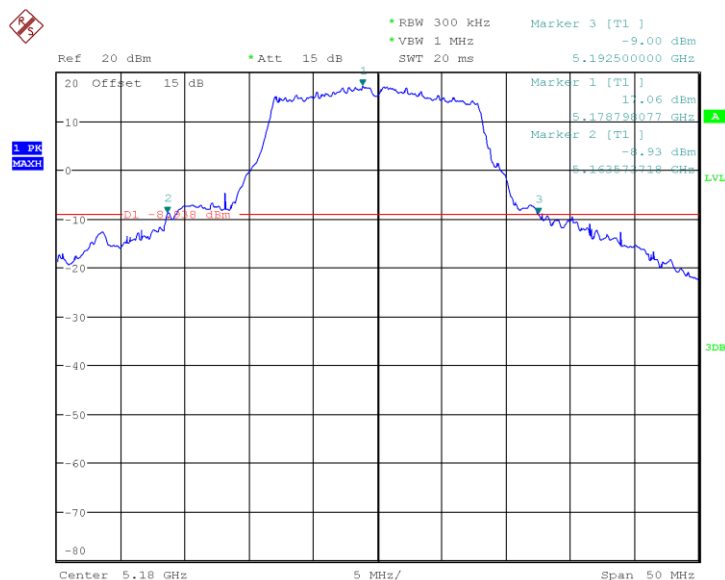
Date: 5.JUN.2019 01:43:20

Fig. 16 Occupied 26dB Bandwidth (802.11a, 5220MHz)



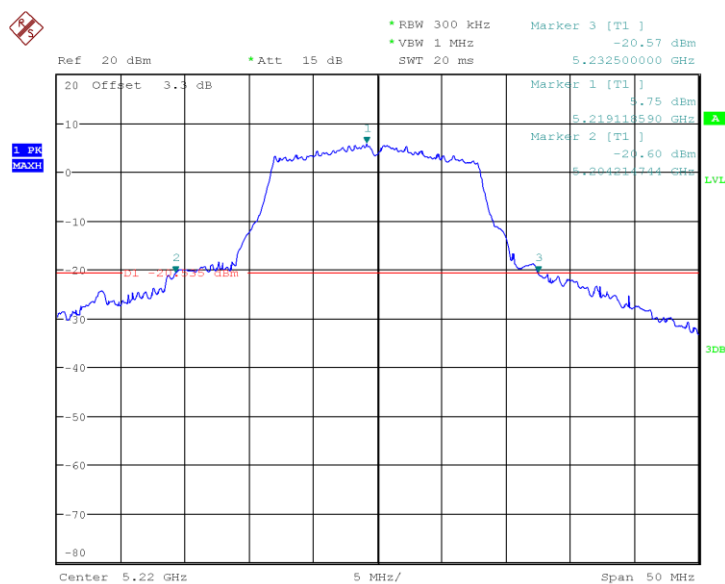
Date: 5.JUN.2019 01:46:10

Fig. 17 Occupied 26dB Bandwidth (802.11a, 5240MHz)



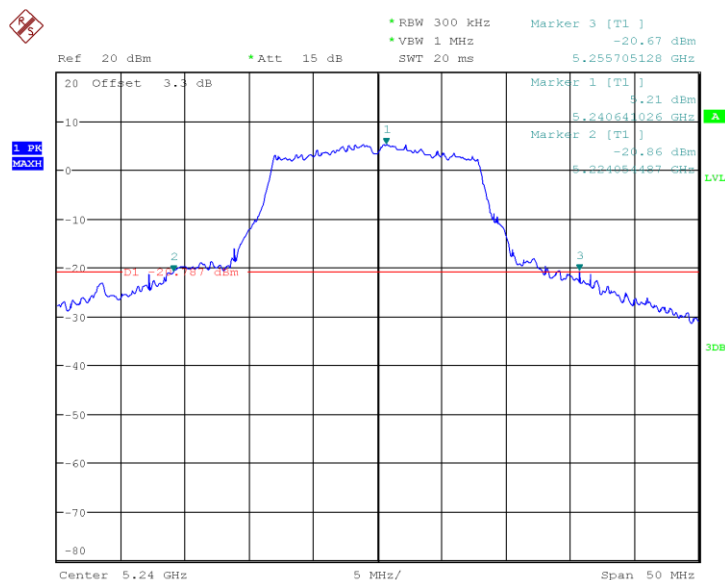
Date: 5.JUN.2019 01:49:18

Fig. 18 Occupied 26dB Bandwidth (802.11n-HT20, 5180MHz)



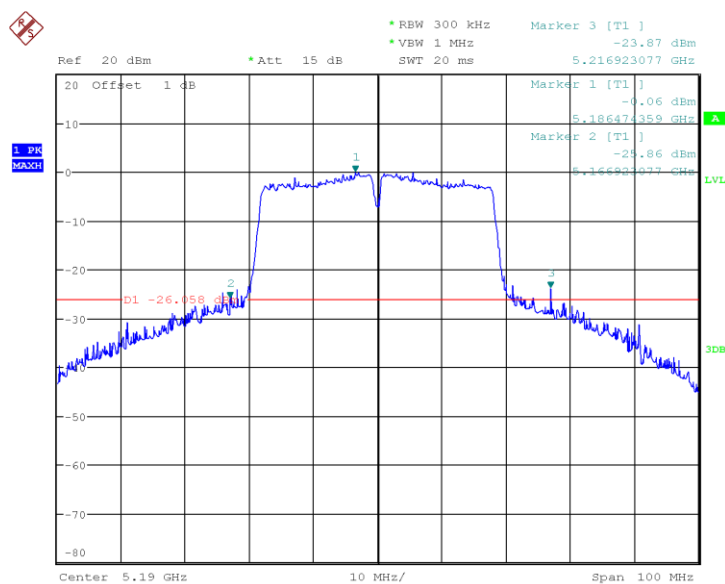
Date: 5.JUN.2019 01:51:32

Fig. 19 Occupied 26dB Bandwidth (802.11-HT20, 5220MHz)n



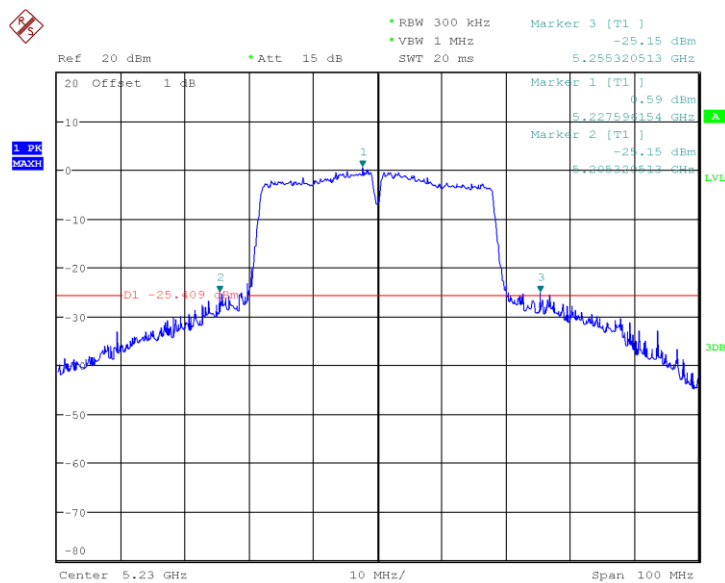
Date: 5.JUN.2019 01:53:53

Fig. 20 Occupied 26dB Bandwidth (802.11n-HT20, 5240MHz)



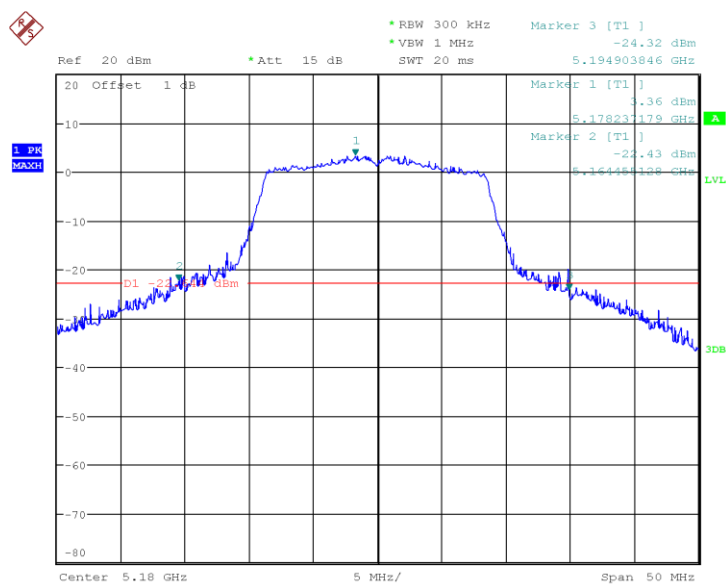
Date: 11.JUN.2019 00:26:49

Fig. 21 Occupied 26dB Bandwidth (802.11n-HT40, 5190MHz)



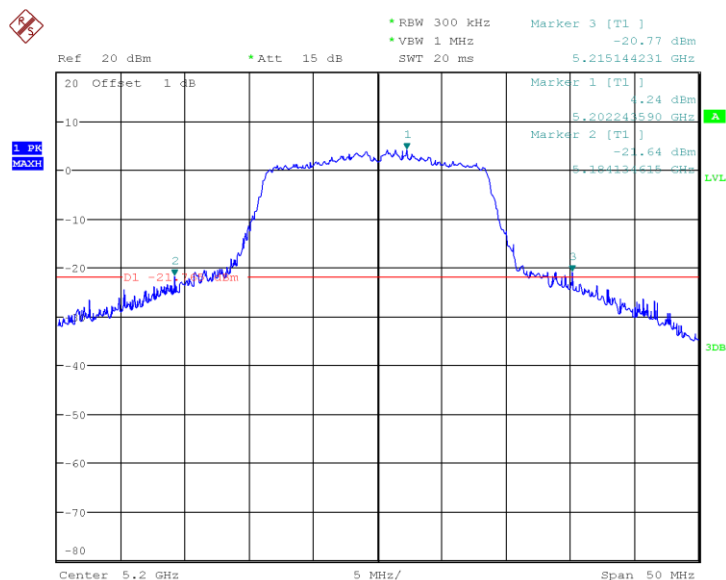
Date: 11.JUN.2019 00:27:50

Fig. 22 Occupied 26dB Bandwidth (802.11n-HT40, 5230MHz)



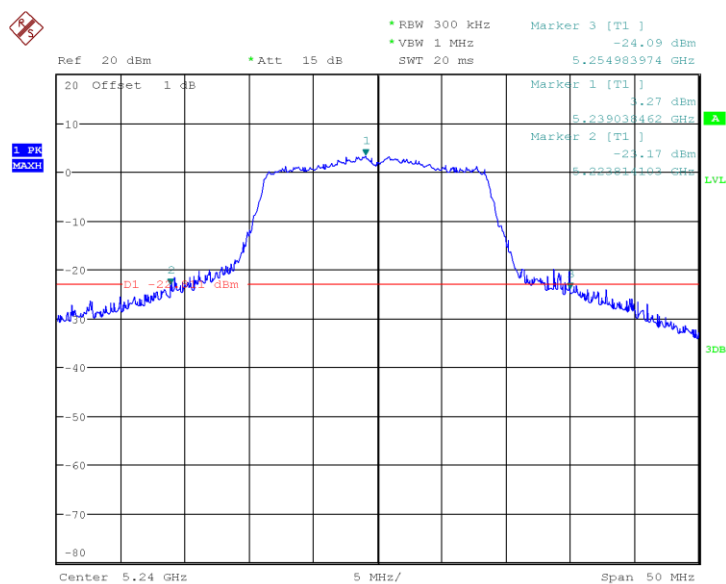
Date: 11.JUN.2019 04:35:58

Fig. 23 Occupied 26dB Bandwidth (802.11ac-HT20, 5180MHz)



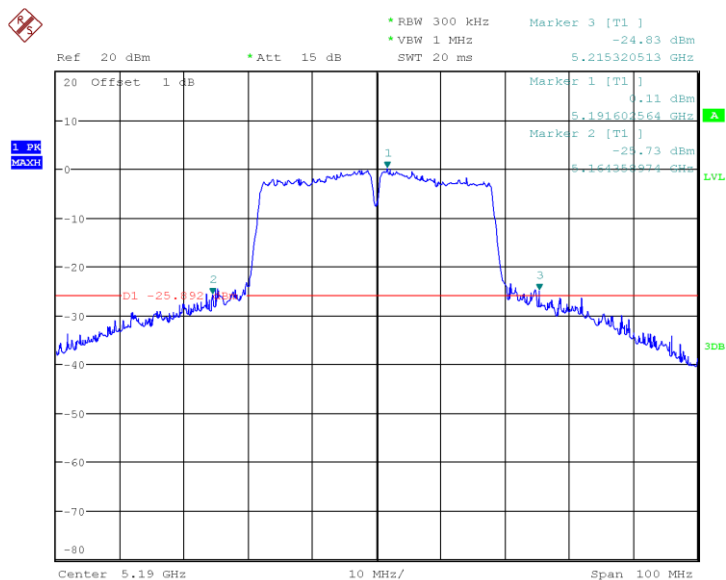
Date: 11.JUN.2019 04:37:40

Fig. 24 Occupied 26dB Bandwidth (802.11ac-HT20, 5200MHz)



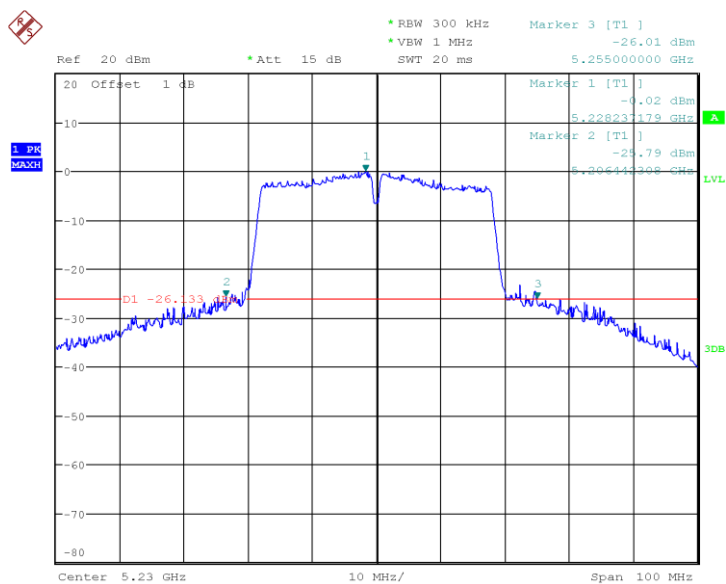
Date: 11.JUN.2019 04:38:24

Fig. 25 Occupied 26dB Bandwidth (802.11ac-HT20, 5240MHz)



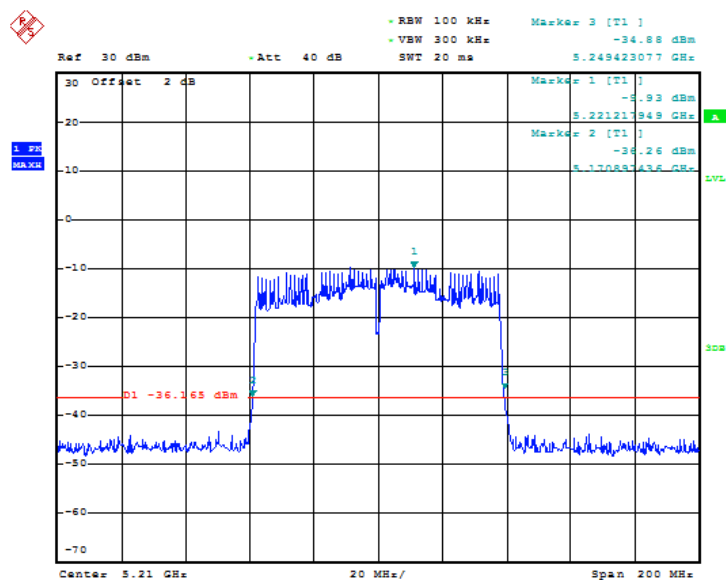
Date: 11.JUN.2019 05:13:50

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



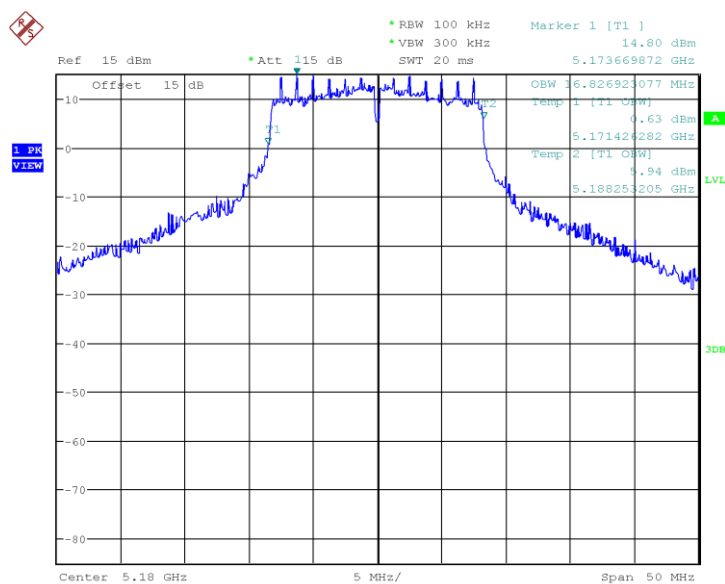
Date: 11.JUN.2019 05:14:47

Fig. 27 Occupied 26dB Bandwidth (802.11ac-HT40, 5230MHz)



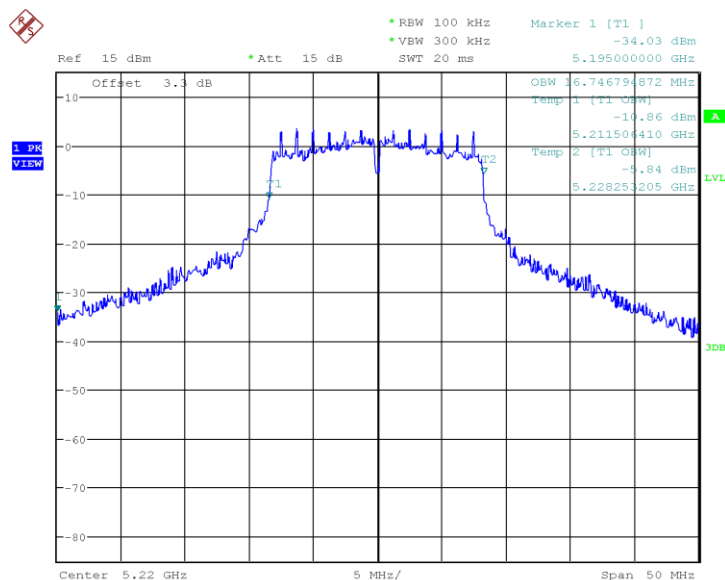
Date: 11.JUN.2019 18:10:58

Fig. 28 Occupied 26dB Bandwidth (802.11ac-HT80, 5210MHz)



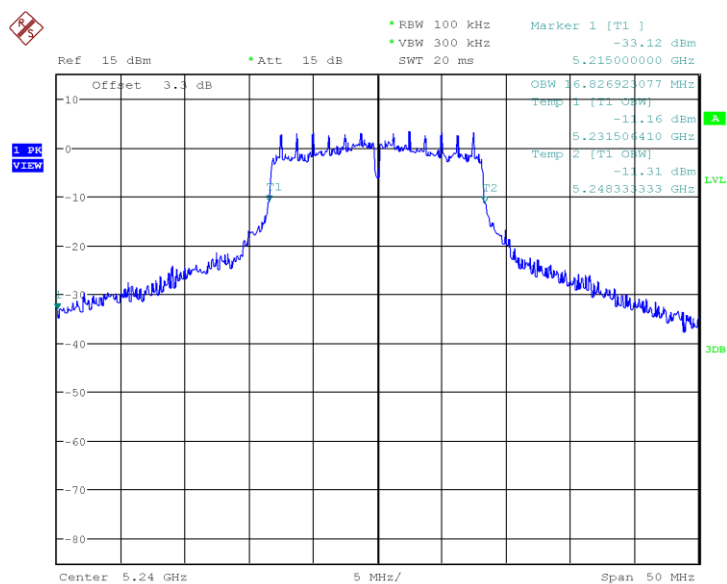
Date: 5.JUN.2019 05:05:15

Fig. 29 99% Occupied Bandwidth (802.11a, 5180MHz)



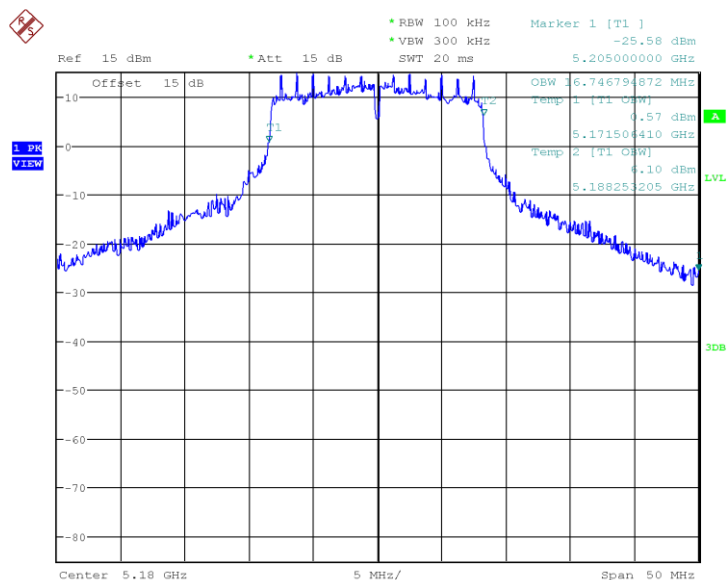
Date: 5.JUN.2019 05:06:28

Fig. 30 99% Occupied Bandwidth (802.11a, 5220MHz)



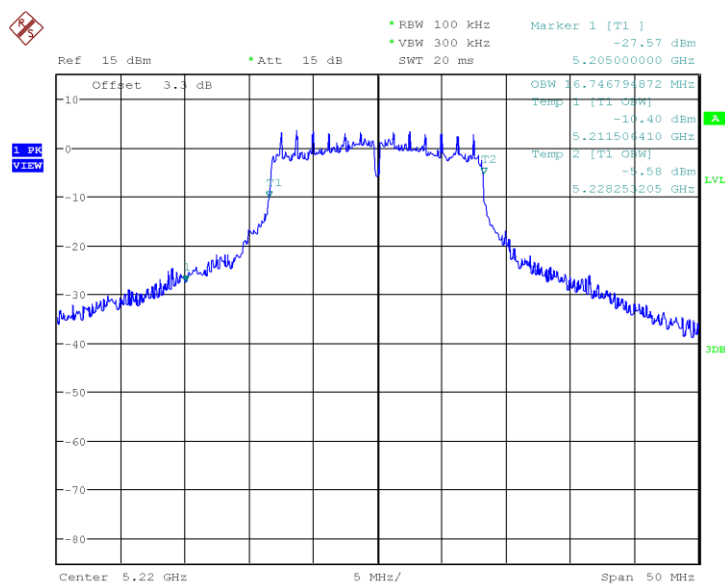
Date: 5.JUN.2019 05:12:25

Fig. 31 99% Occupied Bandwidth (802.11a, 5240MHz)



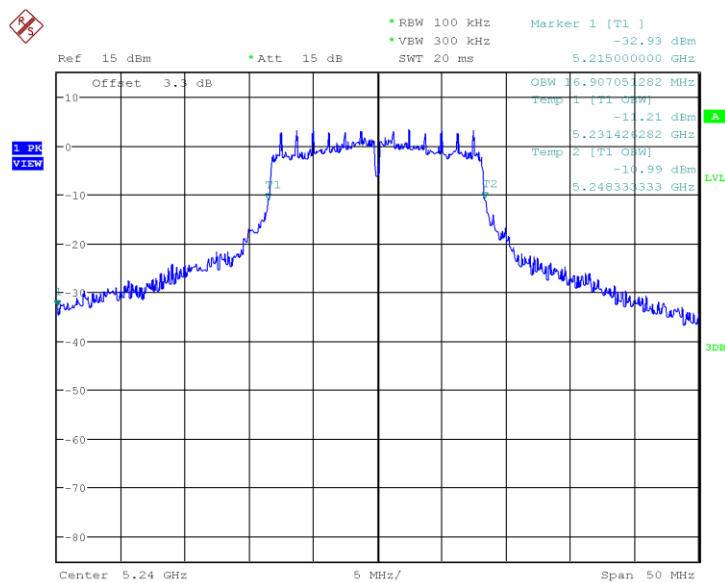
Date: 5.JUN.2019 05:16:59

Fig. 32 99% Occupied Bandwidth (802.11n-HT20, 5180MHz)



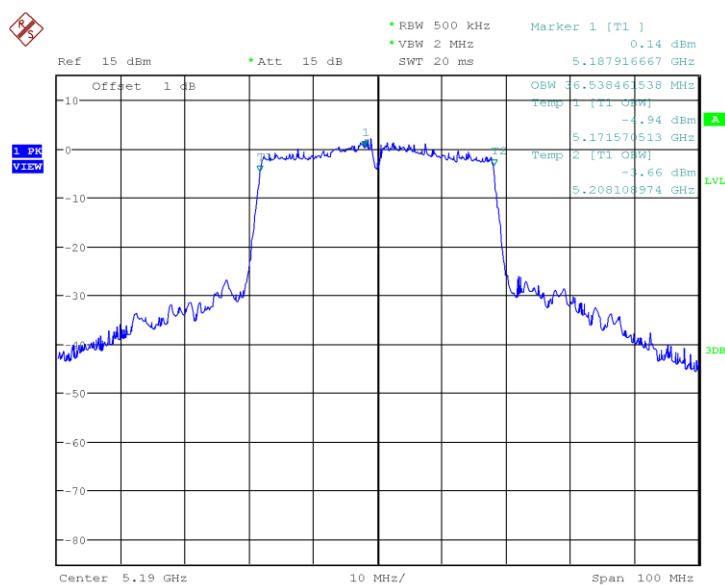
Date: 5.JUN.2019 05:20:40

Fig. 33 99% Occupied Bandwidth (802.11n-HT20, 5220MHz)



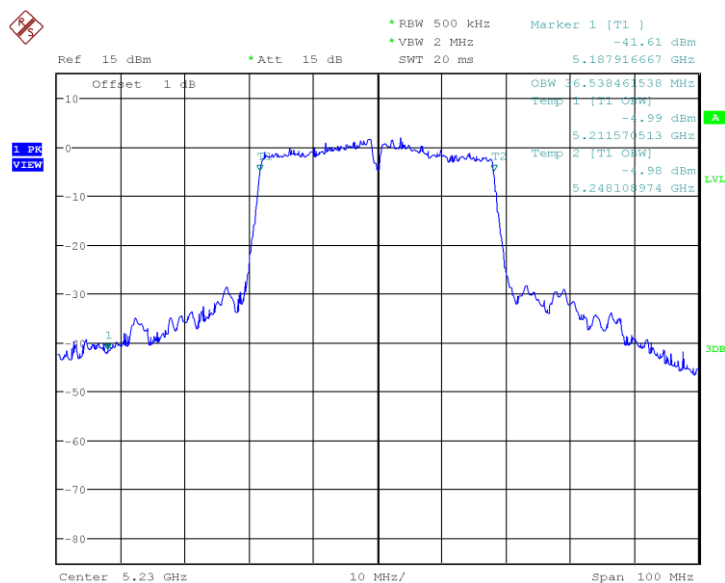
Date: 5.JUN.2019 05:21:44

Fig. 34 99% Occupied Bandwidth (802.11n-HT20, 5240MHz)



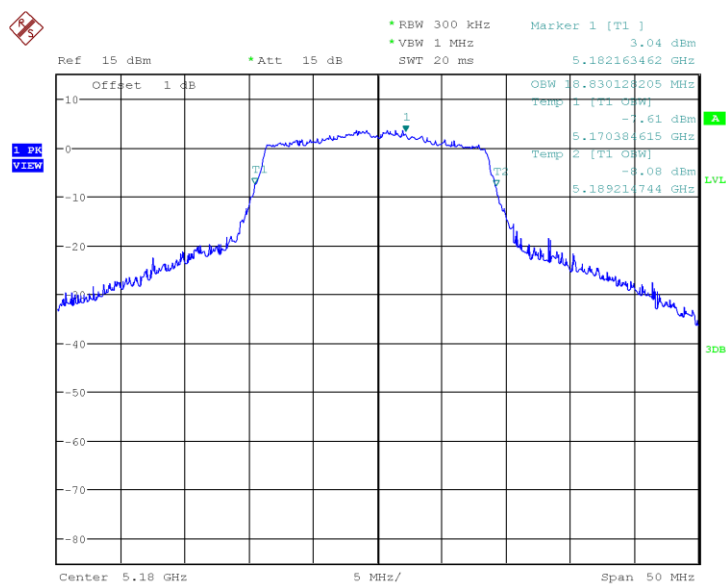
Date: 6.JUN.2019 06:40:50

Fig. 35 99% Occupied Bandwidth (802.11n-HT40, 5190MHz)



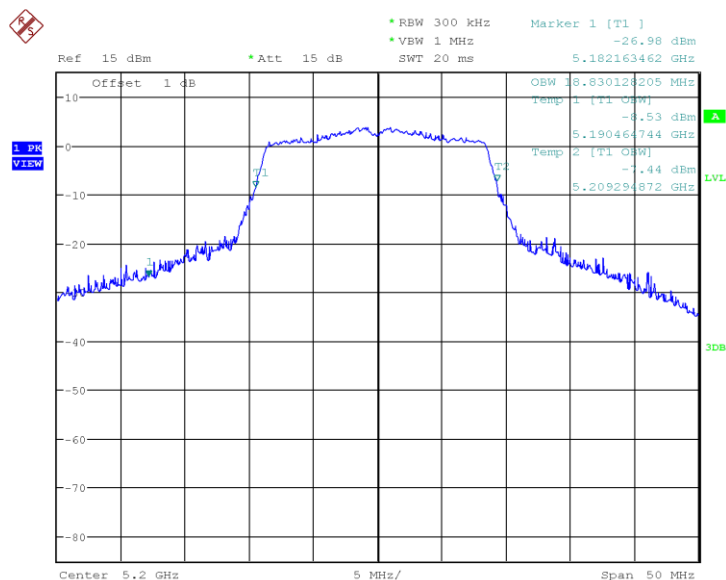
Date: 6.JUN.2019 06:41:55

Fig. 36 99% Occupied Bandwidth (802.11n-HT40, 5230MHz)



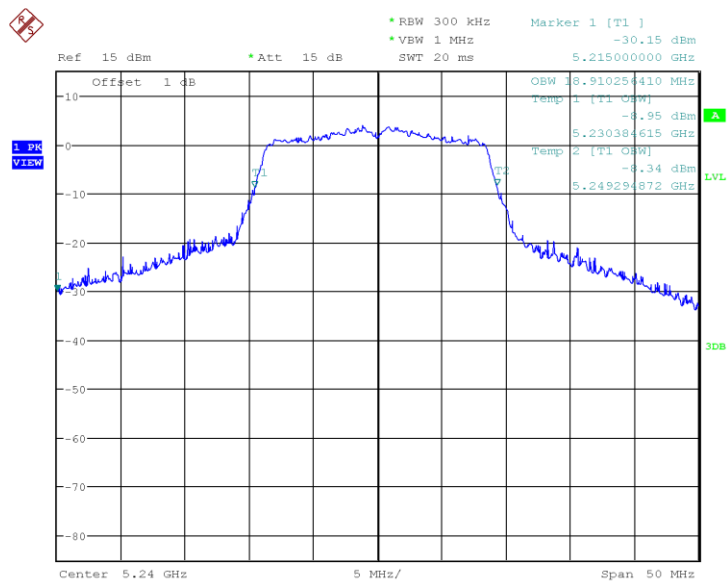
Date: 11.JUN.2019 04:40:14

Fig. 37 99% Occupied Bandwidth (802.11ac-HT20, 5180MHz)



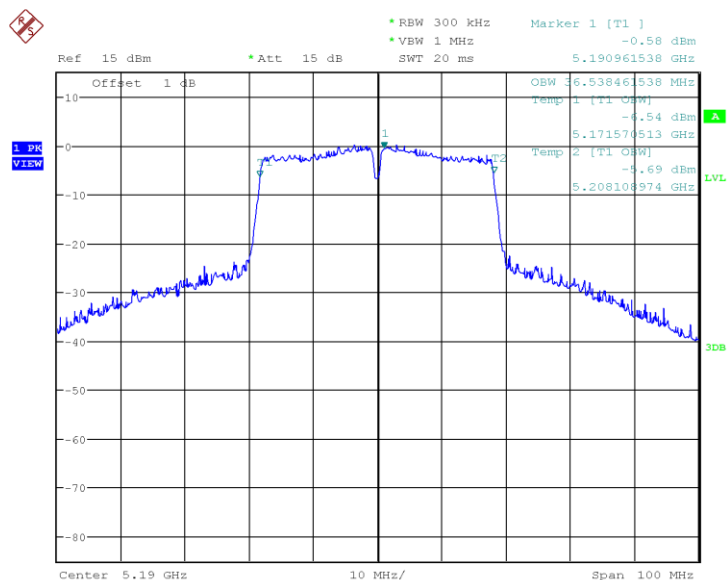
Date: 11.JUN.2019 04:41:17

Fig. 38 99% Occupied Bandwidth (802.11ac-HT20, 5200MHz)



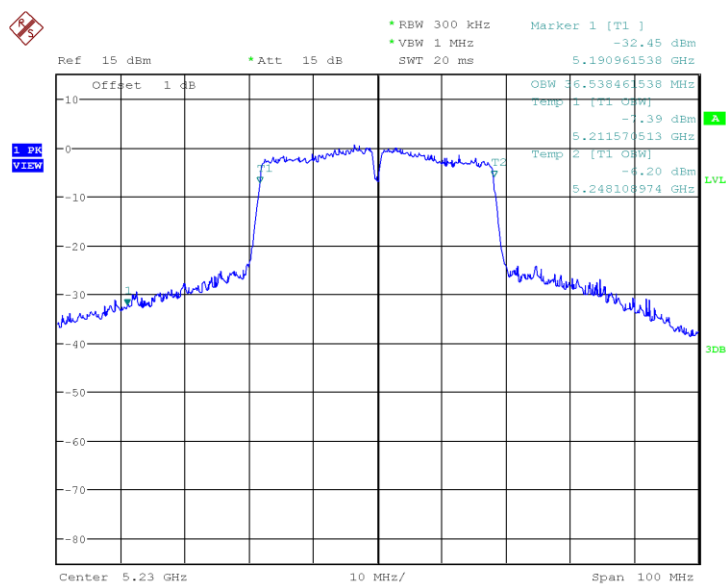
Date: 11.JUN.2019 04:42:42

Fig. 39 99% Occupied Bandwidth (802.11ac-HT20, 5240MHz)



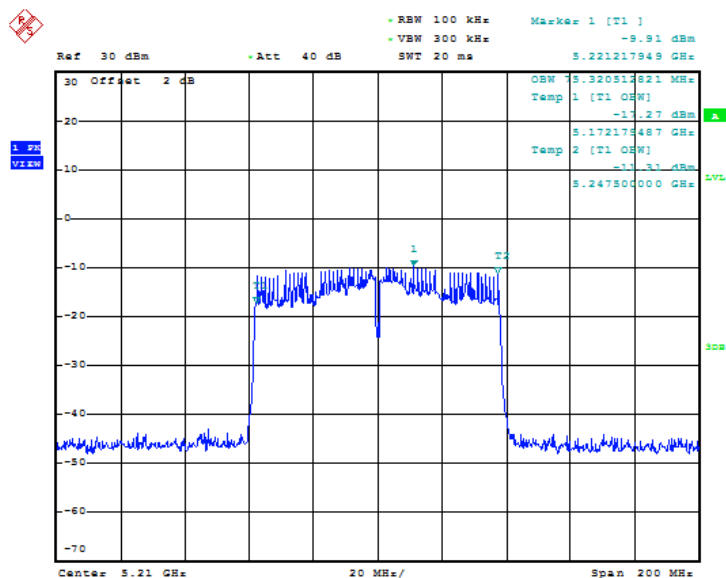
Date: 11.JUN.2019 05:18:00

Fig. 40 99% Occupied Bandwidth (802.11ac-HT40, 5190MHz)



Date: 11.JUN.2019 05:19:09

Fig. 41 99% Occupied Bandwidth (802.11ac-HT40, 5230MHz)



Date: 11.JUN.2019 18:12:41

Fig. 42 99% Occupied Bandwidth (802.11ac-HT80, 5210MHz)

ANNEX A.5. Band Edges Compliance

A.6.1 Band Edges - conducted

Measurement Limit:

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

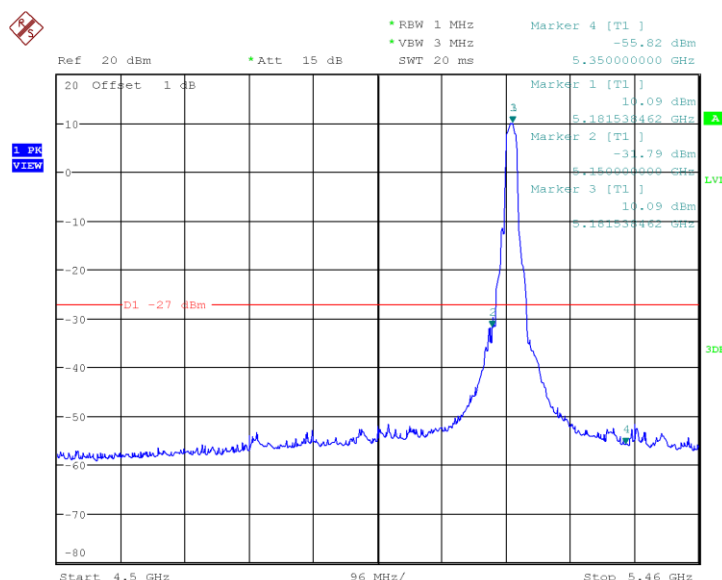
The measurement is made according to KDB 789033

Measurement Result:

Mode	Data Rate	Channel	Test Results	Conclusion
802.11a	6Mbps	5180 MHz	Fig.43	P
		5240 MHz	Fig.44	P
802.11n HT20	MCS0	5180 MHz	Fig.45	P
		5240 MHz	Fig.46	P
802.11n HT40	MCS0	5190 MHz	Fig.47	P
		5230 MHz	Fig.48	P
802.11ac HT20	MCS0	5180 MHz	Fig.49	P
		5240 MHz	Fig.50	P
802.11ac HT40	MCS0	5190 MHz	Fig.51	P
		5230 MHz	Fig.52	P
802.11ac HT80	MCS0	5210MHz	Fig.53	P

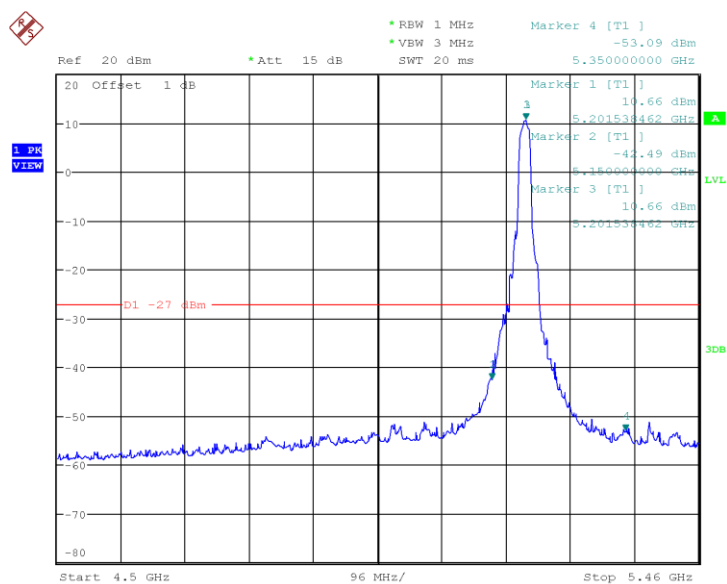
Conclusion: PASS

Test graphs as below:



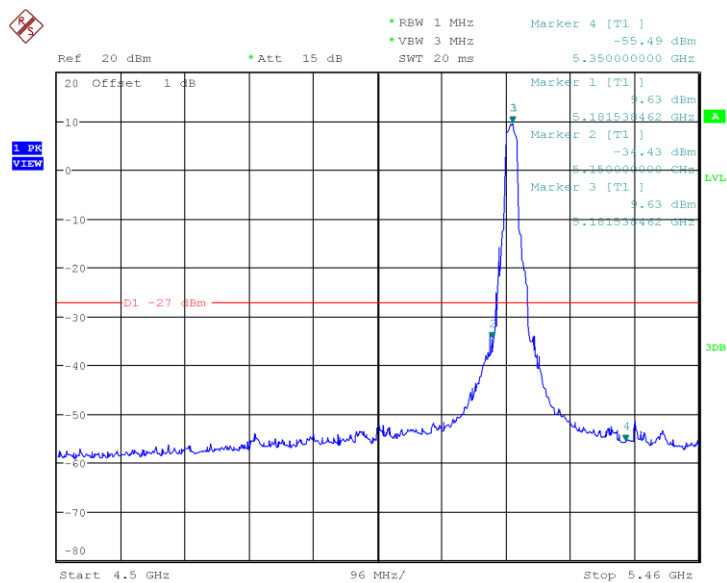
Date: 11.JUN.2019 06:08:11

Fig. 43 Band Edges (802.11a, 5180MHz)



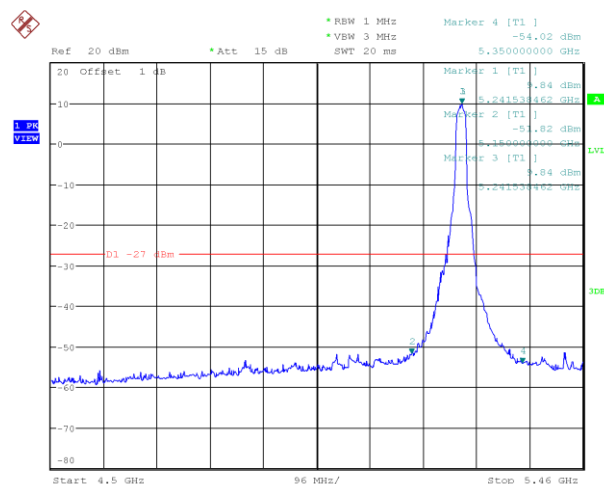
Date: 11.JUN.2019 06:11:06

Fig. 44 Band Edges (802.11a, 5240MHz)



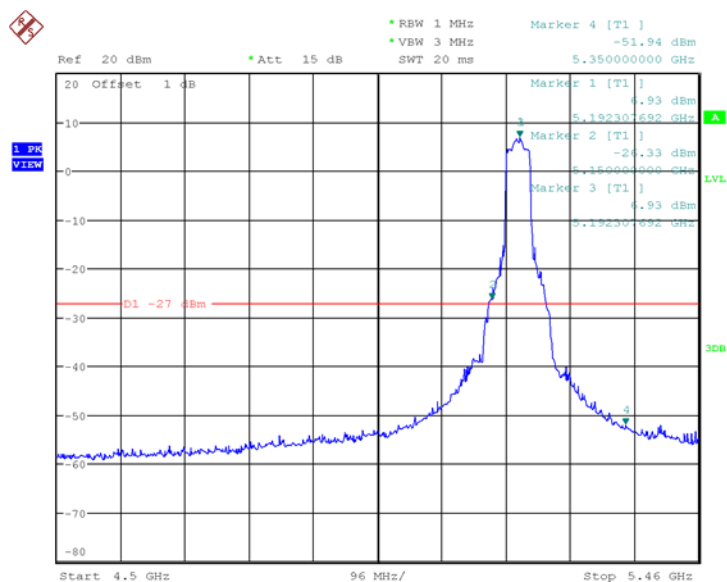
Date: 11.JUN.2019 06:16:55

Fig. 45 Band Edges (802.11n-HT20, 5180MHz)



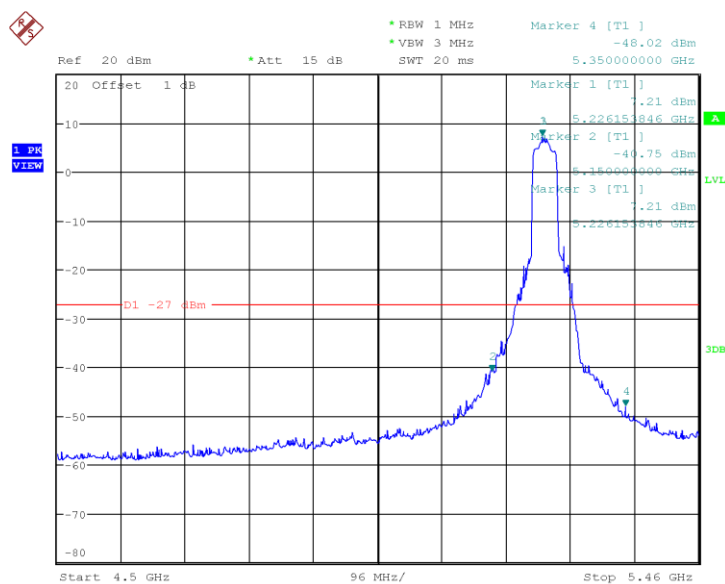
Date: 11.JUN.2019 06:22:38

Fig. 46 Band Edges (802.11n-HT20, 5240MHz)



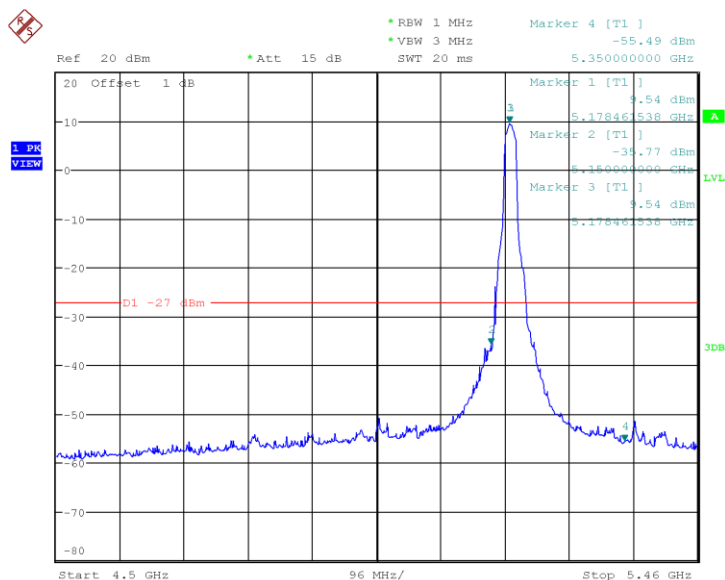
Date: 11.JUN.2019 06:44:09

Fig. 47 Band Edges (802.11n-HT40, 5190MHz)



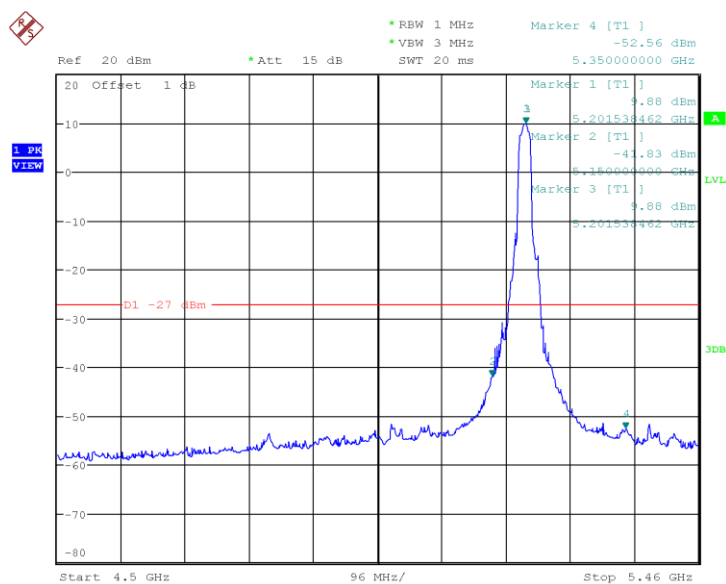
Date: 11.JUN.2019 06:29:46

Fig. 48 Band Edges (802.11n-HT40, 5230MHz)



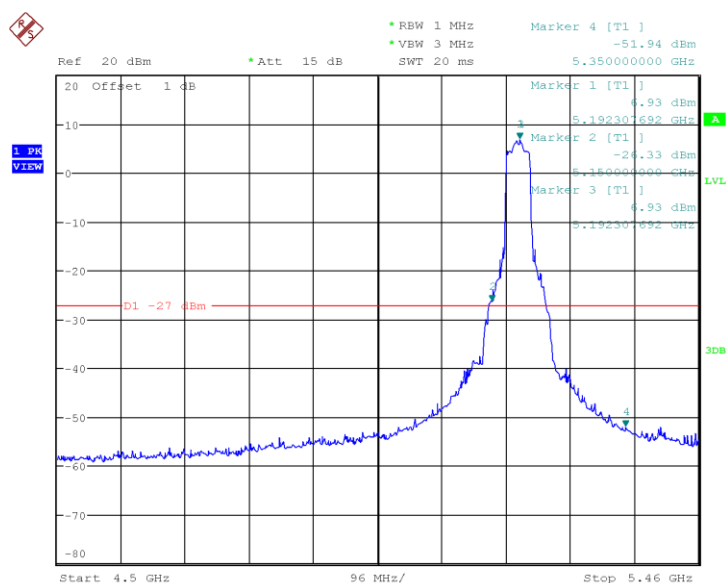
Date: 11.JUN.2019 06:33:09

Fig. 49 Band Edges (802.11ac-HT20, 5180MHz)



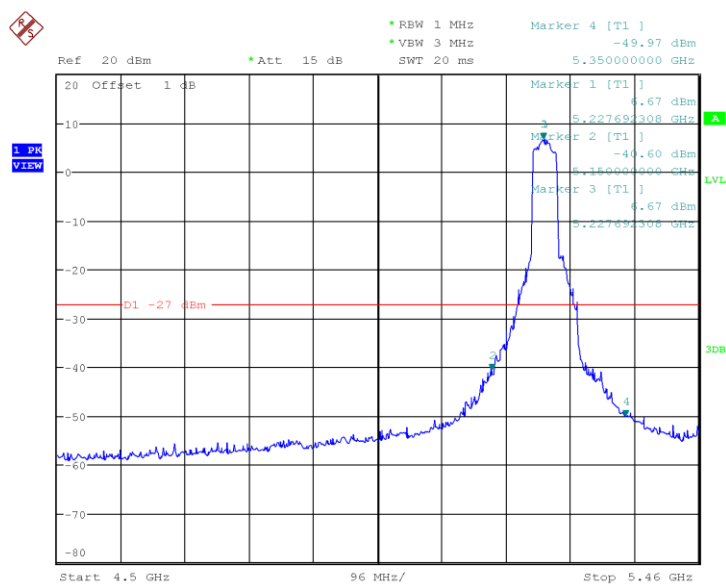
Date: 11.JUN.2019 06:35:59

Fig. 50 Band Edges (802.11ac-HT20, 5240MHz)



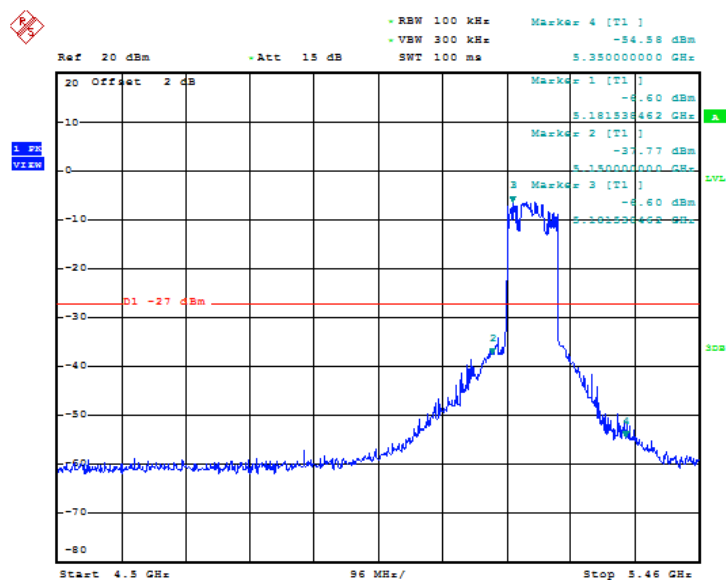
Date: 11.JUN.2019 06:44:09

Fig. 51 Band Edges (802.11ac-HT40, 5190MHz)



Date: 11.JUN.2019 06:46:54

Fig. 52 Band Edges (802.11ac-HT40, 5230MHz)



Date: 11.JUN.2019 18:23:48

Fig. 53 Band Edges (802.11ac-HT80, 5210MHz)

A.6.2 Band Edges - Radiated**Measurement Limit:**

Standard	Limit (dB μ V/m)	
	Peak	74
	Average	54

The measurement is made according to KDB 789033.

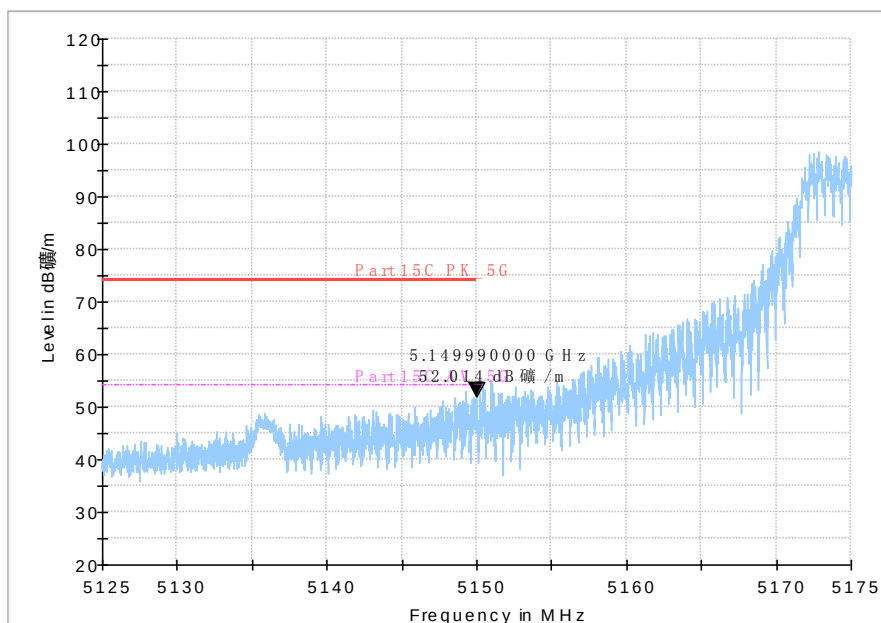
In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Measurement Result:

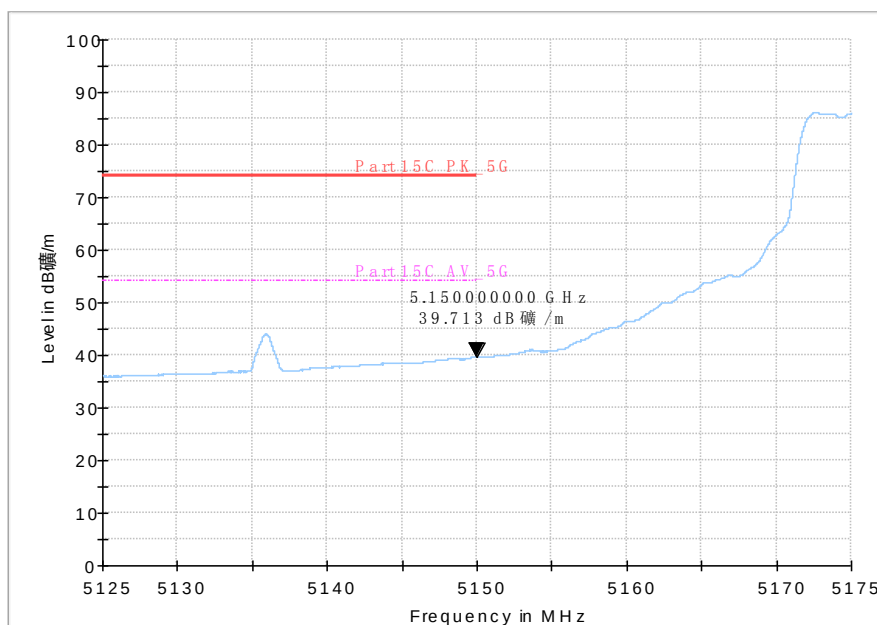
Mode	Channel	Test Results	Conclusion
802.11a	5180 MHz	Fig.54	P
	5240 MHz	Fig.55	P
802.11n HT20	5180 MHz	Fig.56	P
	5240 MHz	Fig.57	P
802.11n HT40	5190 MHz	Fig.58	P
	5230 MHz	Fig.59	P
802.11ac HT20	5180 MHz	Fig.60	P
	5240 MHz	Fig.61	P
802.11ac HT40	5190 MHz	Fig.62	P
	5230 MHz	Fig.63	P
802.11ac HT80	5210MHz	Fig.64	P

Conclusion: PASS

Test graphs as below:

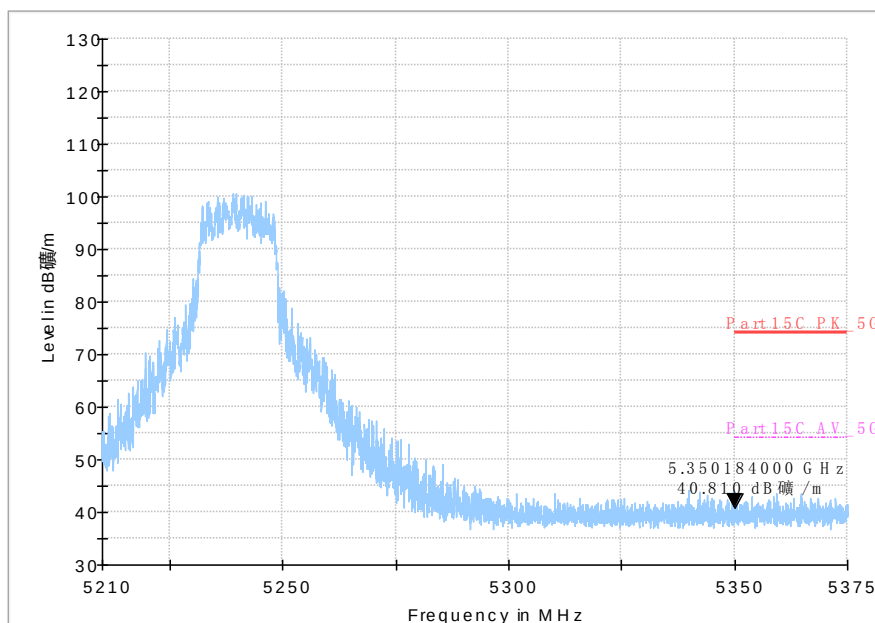


Peak

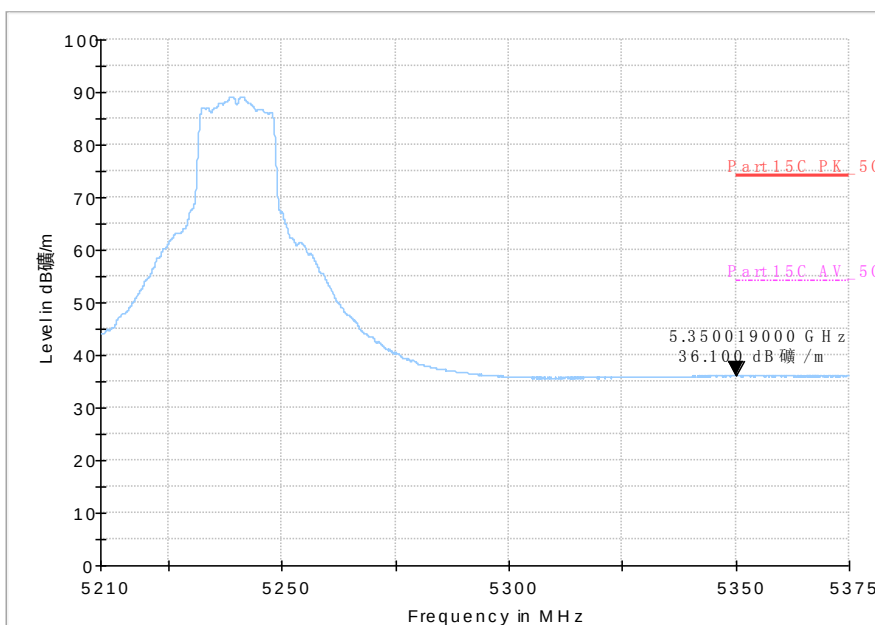


Average

Fig. 54 Band Edges (802.11a, 5180MHz)

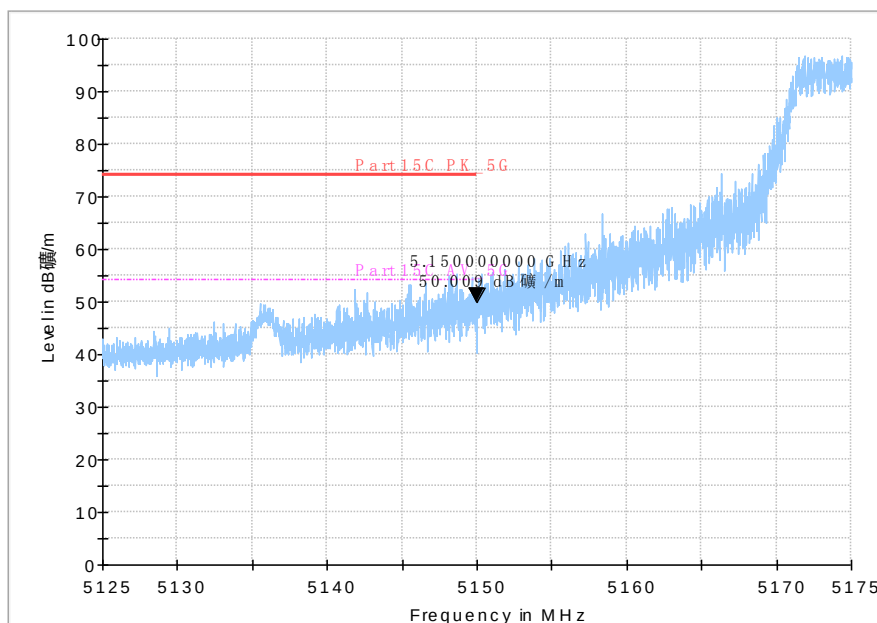


Peak

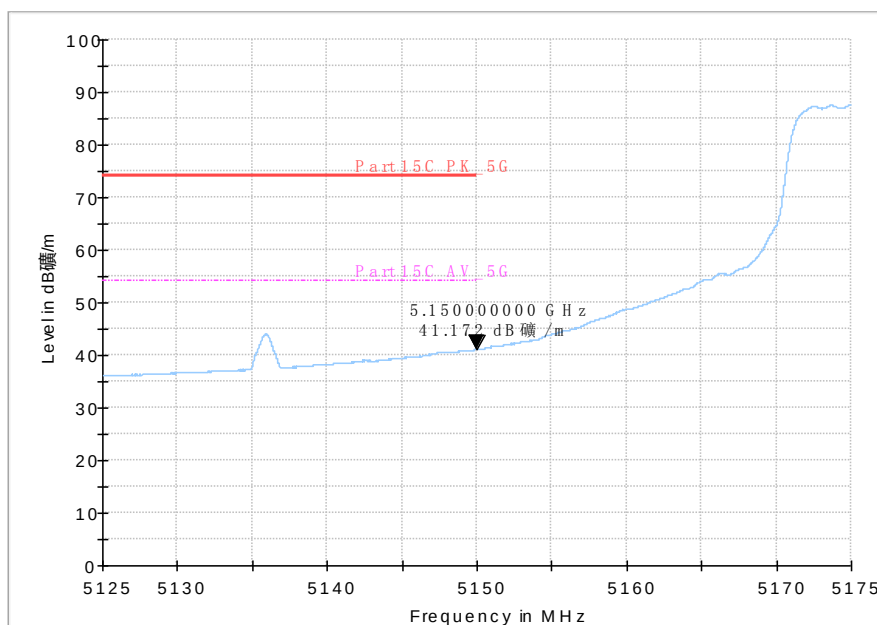


Average

Fig. 55 Band Edges (802.11a, 5240MHz)

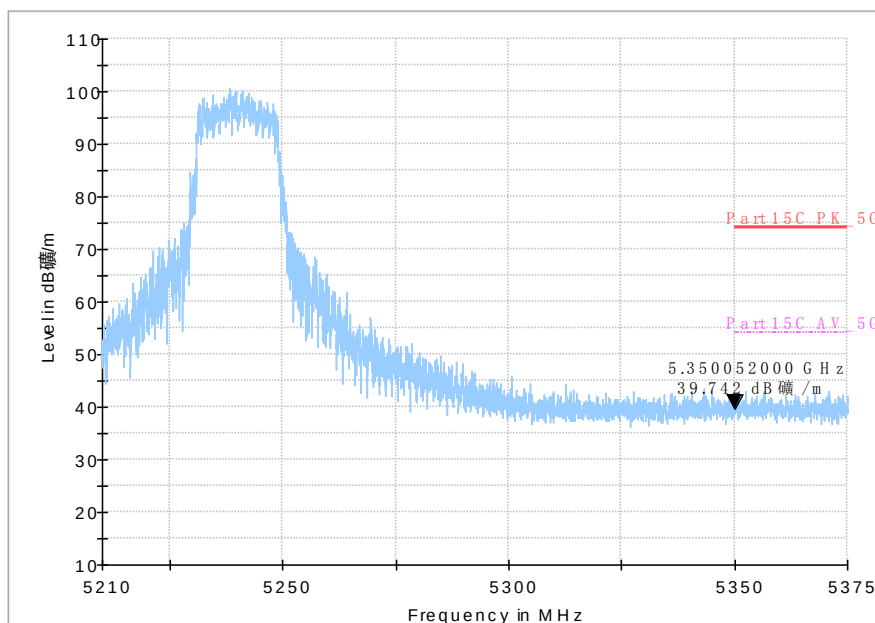


Peak

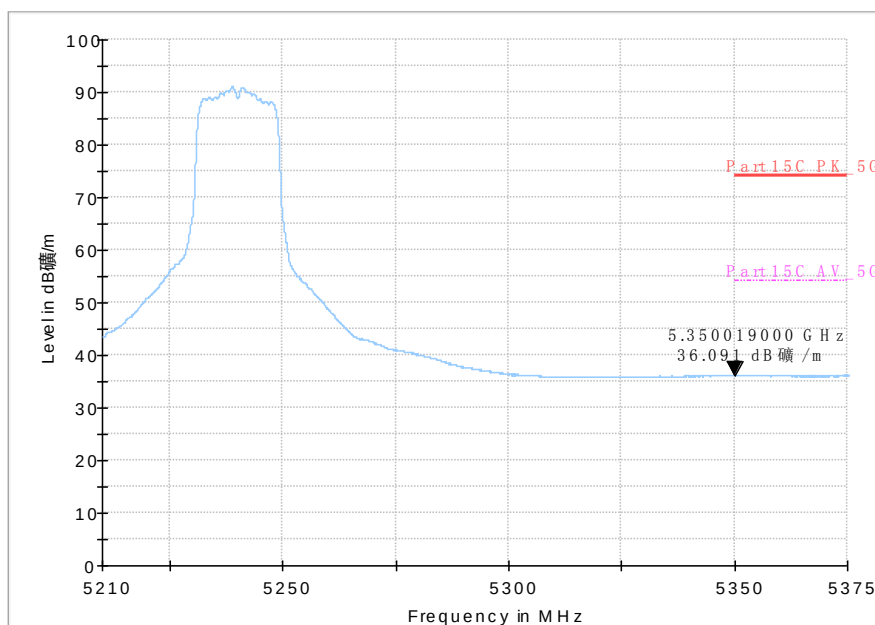


Average

Fig. 56 Band Edges (802.11n-HT20, 5180MHz)

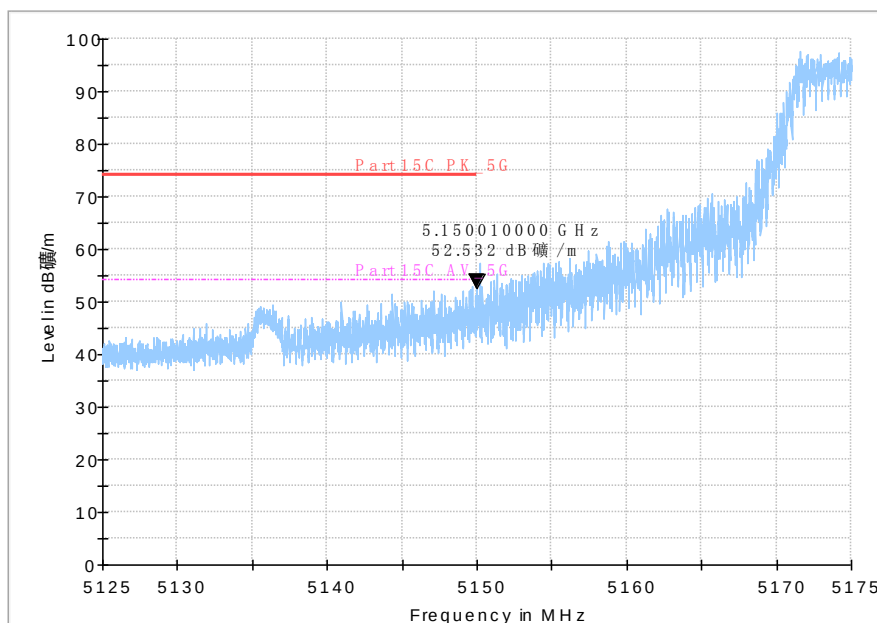


Peak

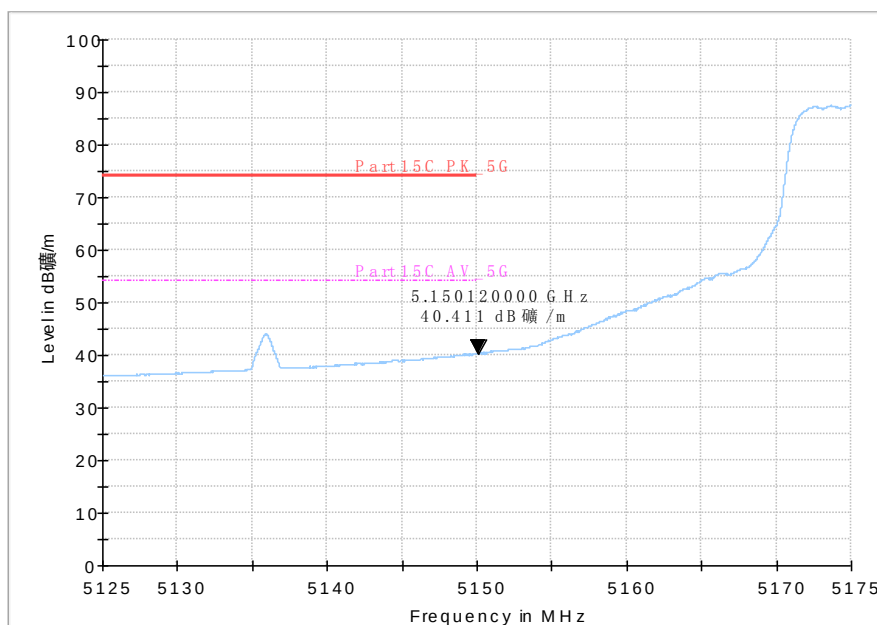


Average

Fig. 57 Band Edges (802.11n-HT20, 5240MHz)

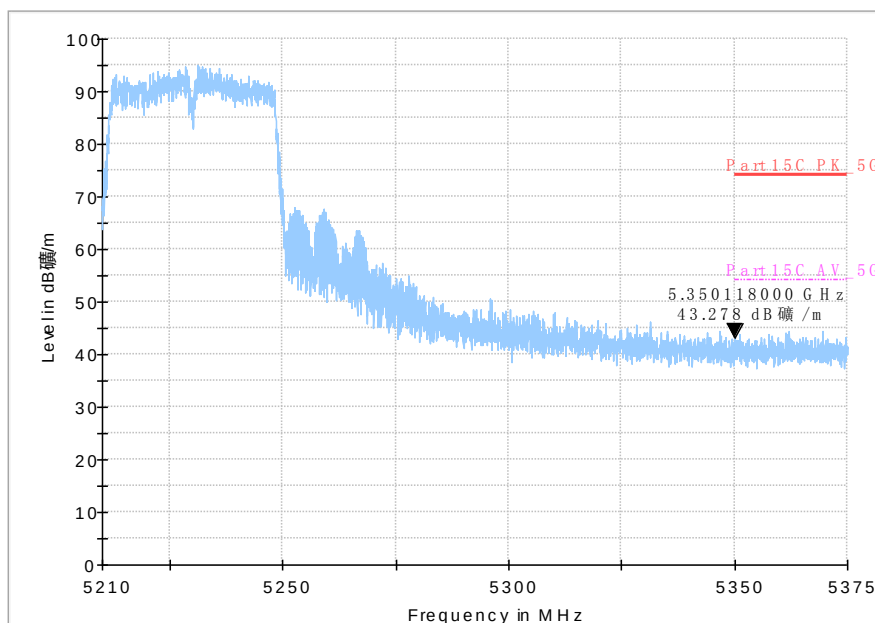


Peak

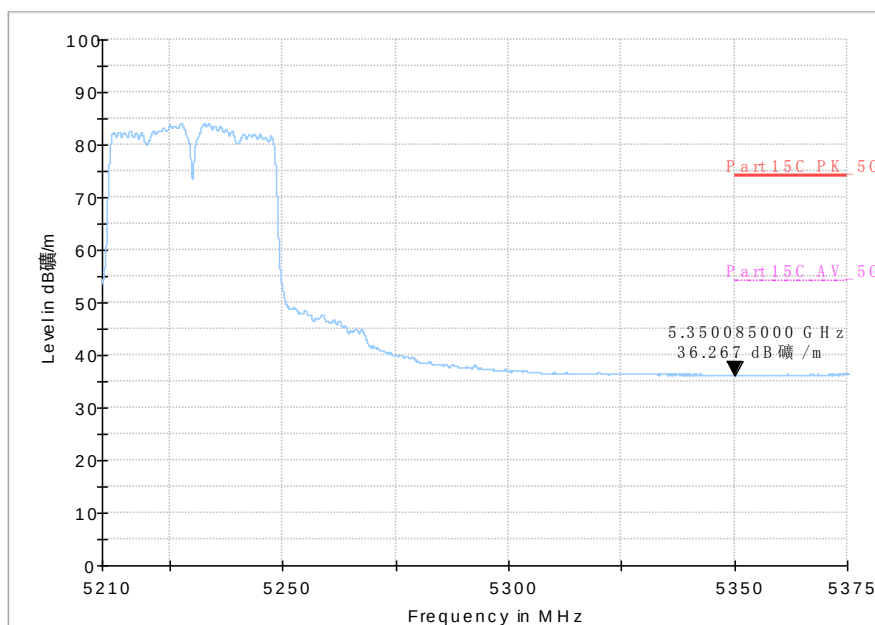


Average

Fig. 58 Band Edges (802.11n-HT40, 5190MHz)

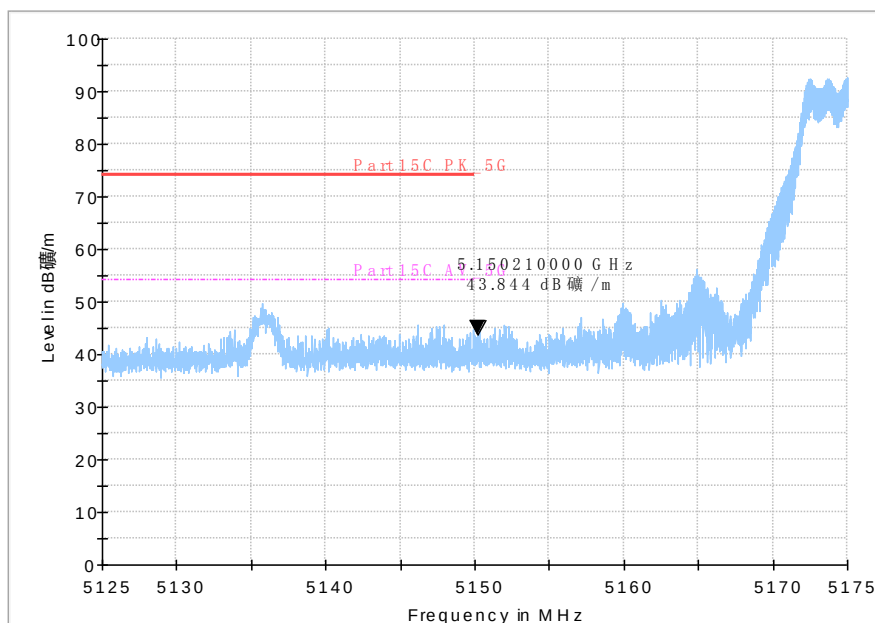


Peak

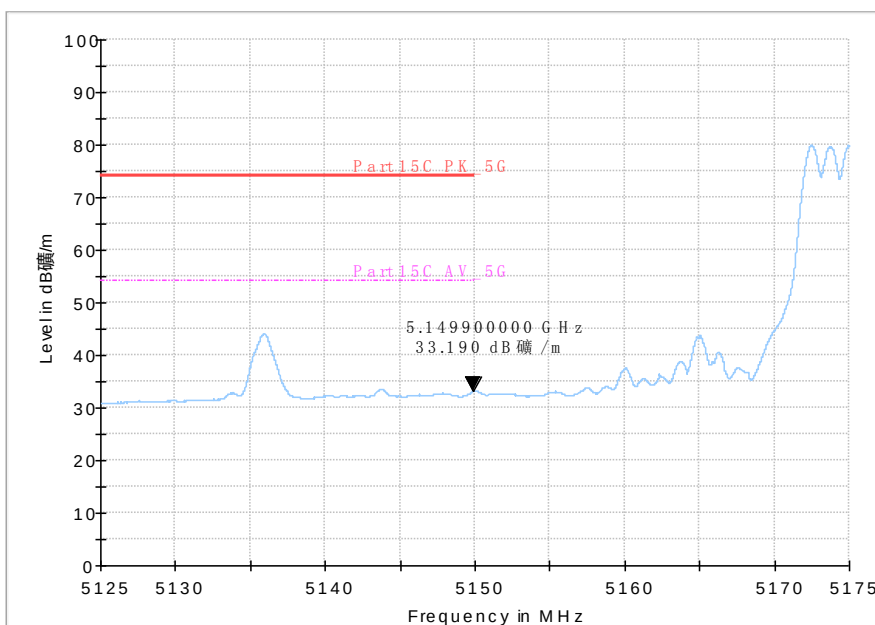


Average

Fig. 59 Band Edges (802.11n-HT40, 5230MHz)

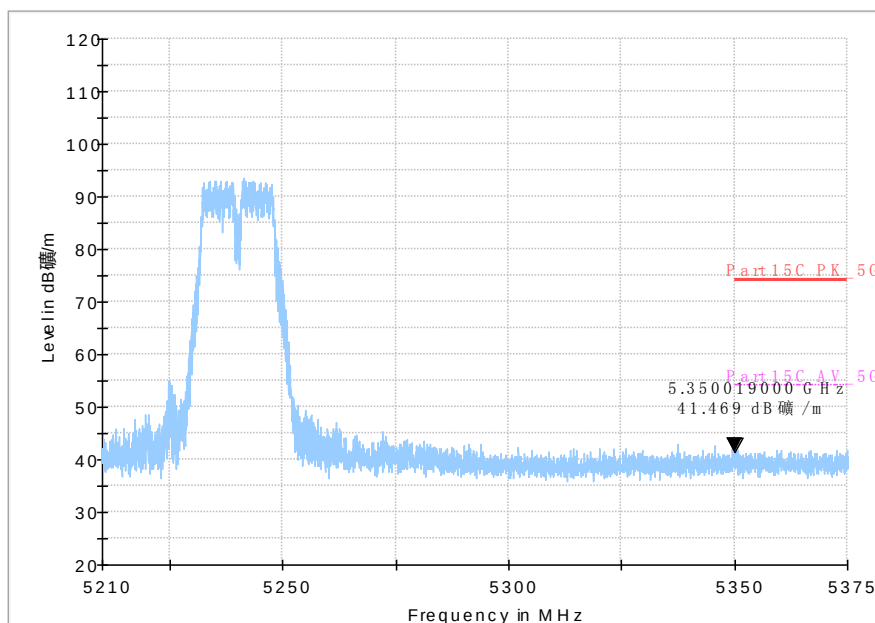


Peak

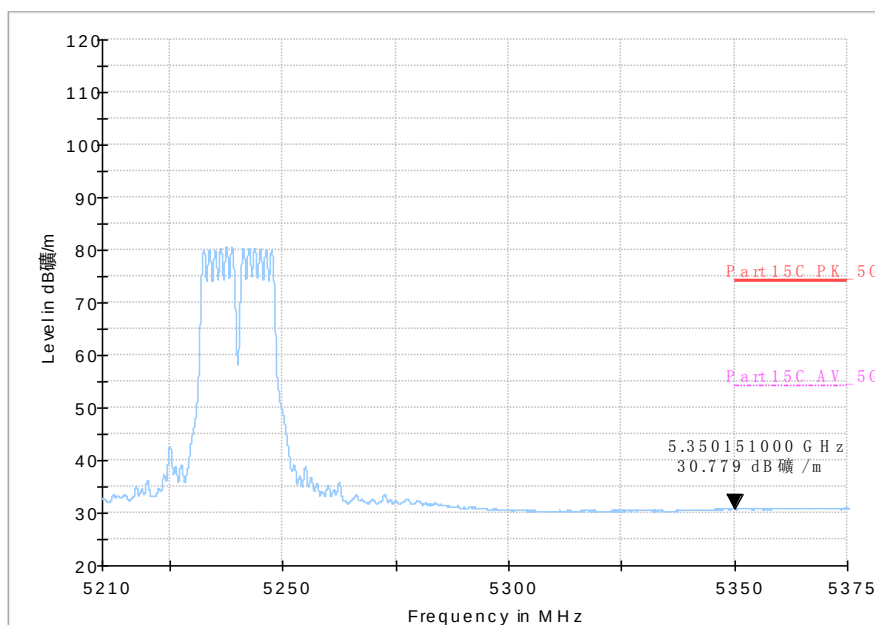


Average

Fig. 60 Band Edges (802.11ac-HT20, 5810MHz)

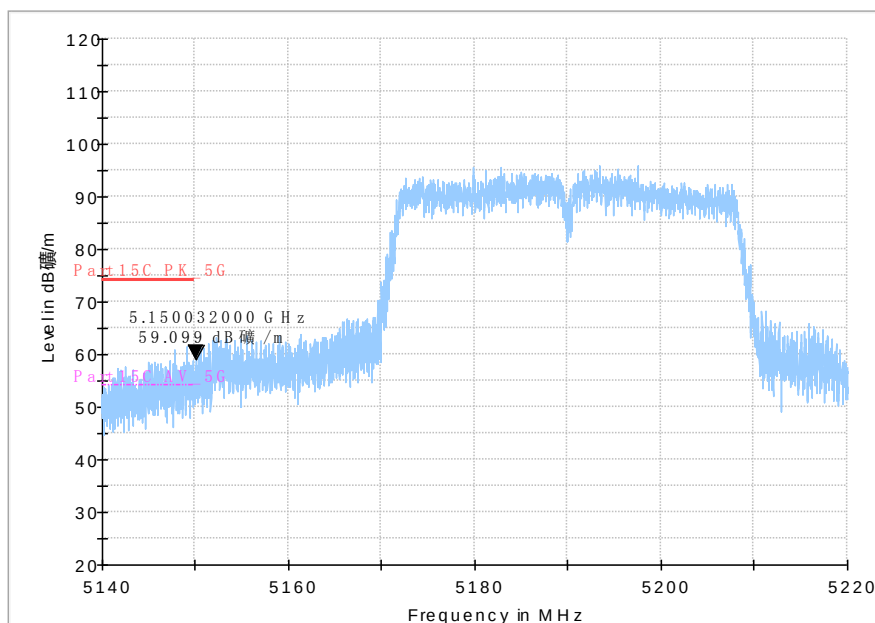


Peak

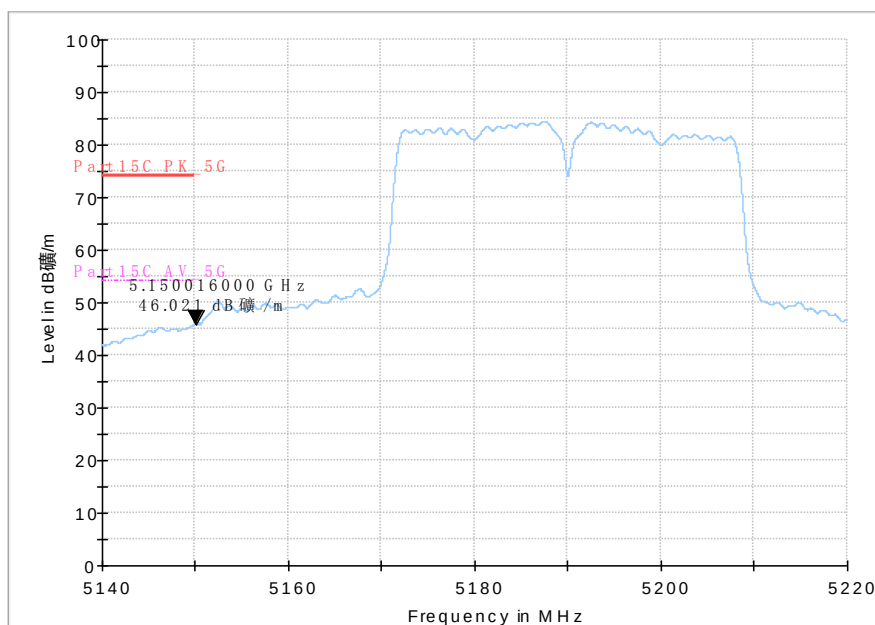


Average

Fig. 61 Band Edges (802.11ac-HT20, 5240MHz)

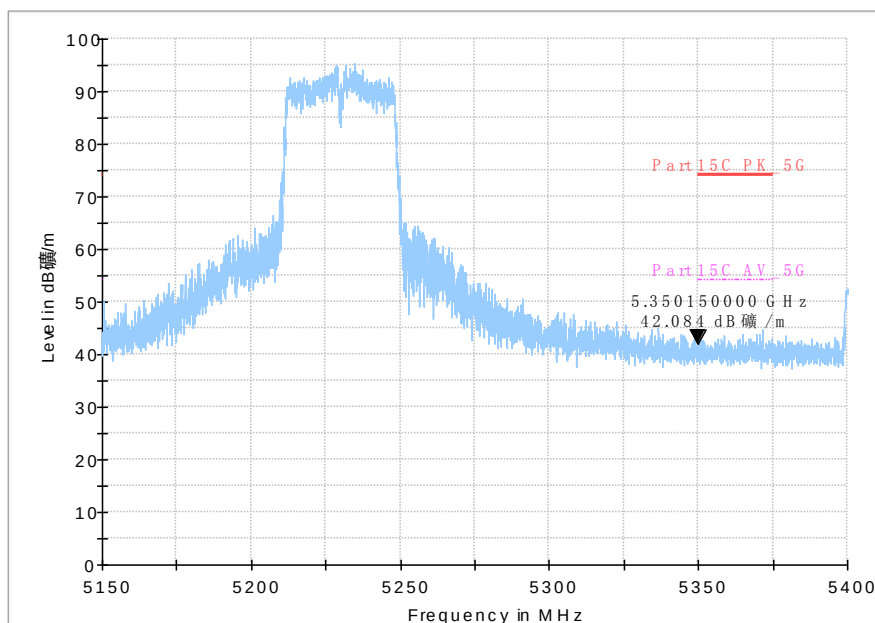


Peak

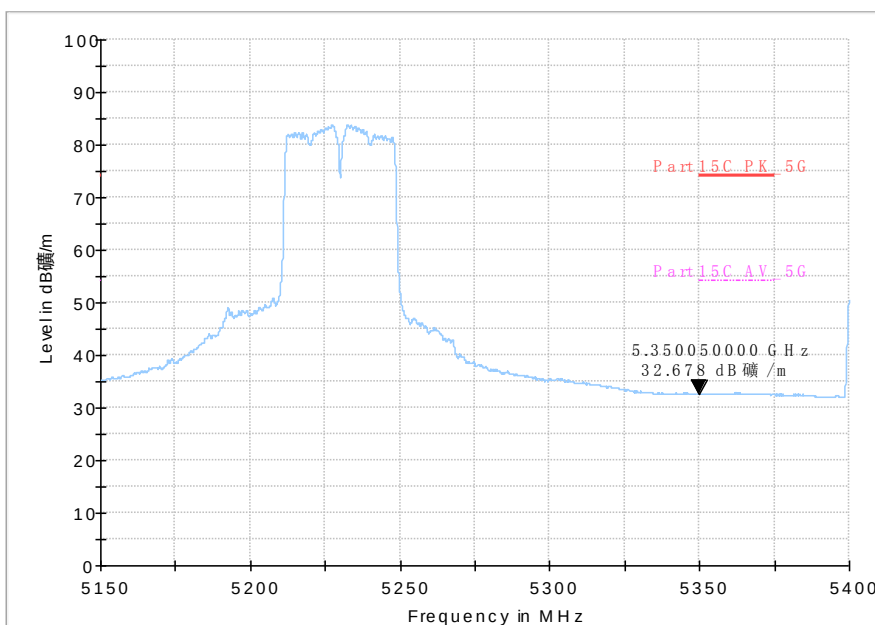


Average

Fig. 62 Band Edges (802.11ac-HT40, 5190MHz)

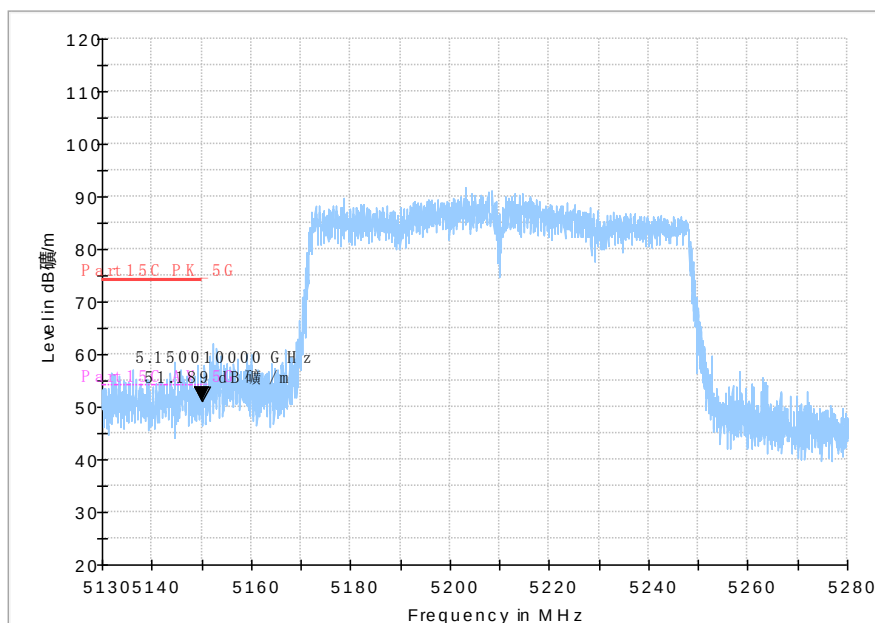


Peak

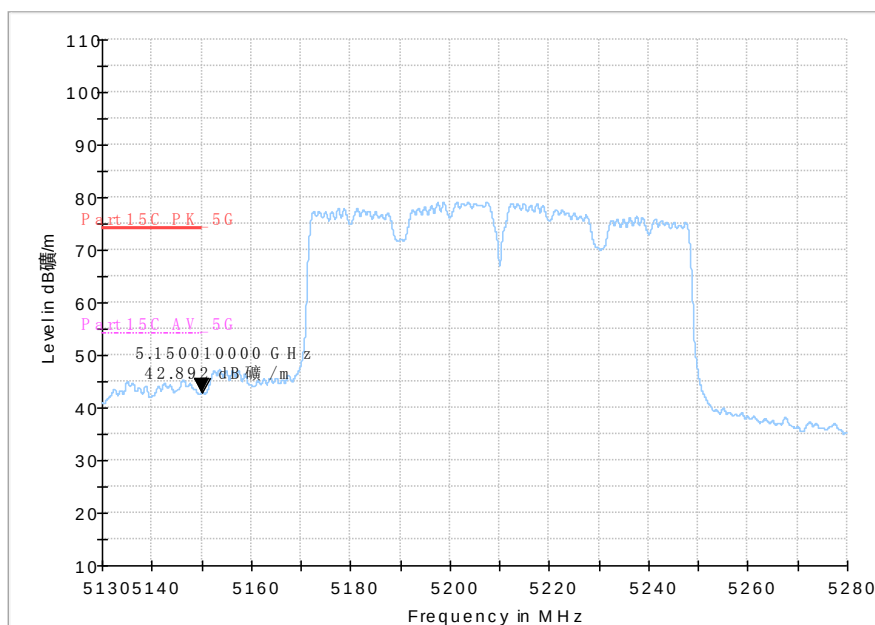


Average

Fig. 63 Band Edges (802.11ac-HT40, 5230MHz)



Peak



Average

Fig. 64 Band Edges (802.11ac-HT80, 5210MHz)

ANNEX A.6. 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	36(5180MHz)
802.11n-HT20	MCS0	36(5180MHz)
802.11n-HT40	MCS0	38(5190MHz)
802.11ac-HT20	MCS0	36(5180MHz)
802.11ac-HT40	MCS0	38(5190MHz)

802.11ac-HT80	MCS0	42(5210MHz)
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Measurement Results:

802.11a mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11a	36(5180MHz)	30 MHz ~ 1 GHz	Fig.65	P
		1 GHz ~ 8 GHz	Fig.66	P
		8 GHz ~ 18 GHz	Fig.67	P
		18 GHz ~ 26.5 GHz	Fig.68	P
		26.5 GHz ~ 40 GHz	Fig.69	P

802.11n-HT20 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n-HT20	36(5180MHz)	30 MHz ~ 1 GHz	Fig.70	P
		1 GHz ~ 8 GHz	Fig.71	P
		8 GHz ~ 18 GHz	Fig.72	P
		18 GHz ~ 26.5 GHz	Fig.73	P
		26.5 GHz ~ 40 GHz	Fig.74	P

802.11n-HT40 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n-HT40	38(5190MHz)	30 MHz ~ 1 GHz	Fig.75	P
		1 GHz ~ 8 GHz	Fig.76	P
		8 GHz ~ 18 GHz	Fig.77	P
		18 GHz ~ 26.5 GHz	Fig.78	P
		26.5 GHz ~ 40 GHz	Fig.79	P

802.11ac-HT20 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11ac-(HT20)	36(5180MHz)	30 MHz ~1 GHz	Fig.80	P
		1 GHz ~ 8 GHz	Fig.81	P
		8 GHz ~ 18 GHz	Fig.82	P
		18 GHz ~ 26.5 GHz	Fig.83	P
		26.5 GHz~ 40 GHz	Fig.84	P

802.11ac-HT40 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11ac-(HT40)	38(5190MHz)	30 MHz ~1 GHz	Fig.85	P
		1 GHz ~ 8 GHz	Fig.86	P
		8 GHz ~ 18 GHz	Fig.87	P
		18 GHz ~ 26.5 GHz	Fig.88	P
		26.5 GHz~ 40 GHz	Fig.89	P

802.11ac-HT80 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11ac (HT40)	42(5210MHz)	30 MHz ~1 GHz	Fig.90	P
		1 GHz ~ 8 GHz	Fig.91	P
		8 GHz ~ 18 GHz	Fig.92	P
		18 GHz ~ 26.5 GHz	Fig.93	P
		26.5 GHz~ 40 GHz	Fig.94	P

Radiated Spurious Emission (9kHz-30MHz)

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n HT40	38(5190MHz)	9kHz~30 MHz	Fig.95	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 36 (30MHz ~1GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
40.9	38.85	-26.3	65.15	V
44.7	31.78	-25.8	57.58	V
125.0	24.62	-29.9	54.52	H
304.0	34.12	-25.7	59.82	H
375.0	40.52	-24.5	65.02	H
500.0	33.36	-22.2	55.56	V

Channel 36 (1GHz ~ 8GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
3040.0	57.02	-1.1	58.12	H
3799.8	51.63	0.4	51.23	V
4279.8	49.75	1.6	48.15	H
5400.0	54.92	4.3	50.62	V
6480.0	48.91	6	42.91	V
7020.2	49.12	7.3	41.82	H

Channel 36 (8GHz ~ 18GHz) (Peak)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
10545.2	50.81	13.1	37.71	H
12316.8	52.32	16	36.32	V
13163.4	53.9	17.7	36.2	H
14903.8	53.43	20.1	33.33	V
16065.0	55.63	22.5	33.13	V
17214.8	57.3	24.2	33.1	H

Channel 36 (8GHz ~ 18GHz)(Average)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
16065.0	43.82	22.5	21.32	V

17214.8	44.56	24.2	20.36	H
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Channel 36 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
19017.4	39.04	-5.5	44.54	H
20260.2	39.83	-4.8	44.63	H
21423.0	42.05	-3.5	45.55	V
22594.2	43.46	-2.9	46.36	H
23789.4	43.11	-2.7	45.81	H
24895.2	44.36	-2.3	46.66	H

Channel 36 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
27588.1	44.71	-0.8	45.51	H
30770.0	45.73	0.2	45.53	V
32886.8	44.5	0.9	43.6	V
34382.6	46.07	1.5	44.57	H
36930.1	46.02	1.7	44.32	V
39099.6	50.31	4.2	46.11	V

802.11n-HT20

Channel 36 (30MHz ~1GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
44.8	33.68	-25.8	59.48	V
52.8	31.09	-26	57.09	V
60.0	23.83	-27.4	51.23	V
304.0	32.93	-25.7	58.63	H
375.0	41.03	-24.5	65.53	H
500.0	29.35	-22.2	51.55	H

Channel 36 (1GHz ~ 8GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
3039.8	52.35	-1.1	53.45	V
3424.0	48.48	-0.3	48.78	V
3800.2	48.7	0.4	48.3	H
4280.2	50.36	1.6	48.76	H
5400.0	56.17	4.3	51.87	V
7221.0	46.68	7.3	39.38	V

Channel 36 (8GHz ~ 18GHz) (Peak)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
9235.8	49.15	10.5	38.65	V
10563.8	50.41	13.1	37.31	H
11693.2	50.91	15.1	35.81	H
13740.2	54.59	18.8	35.79	V
15143.8	53.76	20.6	33.16	H
16291.0	56	22.6	33.4	V

Channel 36 (8GHz ~ 18GHz)(Average)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
13740.2	41.81	18.8	23.01	V
16291.0	43.33	22.6	20.73	V
13740.2	41.81	18.8	23.01	V

Channel 36 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
19402.5	38.97	-5.6	44.57	V
20321.4	40.54	-4.7	45.24	H
21188.4	42.21	-4	46.21	V
22647.8	44.63	-2.8	47.43	H

23996.8	43.64	-2.8	46.44	V
25410.3	46.08	-2.7	48.78	V

Channel 36 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
28296.8	43.27	-0.8	44.07	H
30749.8	44.9	0.1	44.8	H
32997.6	44.39	1.1	43.29	H
34139.6	47.34	1.6	45.74	V
35820.4	46.7	1	45.7	V
38891.6	49.67	3.7	45.97	V

802.11n-HT40

Channel 38 (30MHz ~ 1GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
44.6	34.37	-25.8	60.17	V
52.6	30.43	-25.9	56.33	V
112.2	20	-28	48	V
304.0	30.83	-25.7	56.53	V
375.0	41.27	-24.5	65.77	V
500.0	31.31	-22.2	53.51	H

Channel 38 (1GHz ~ 8GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
3039.8	55.29	-1.1	56.39	H
3116.0	48.32	-0.9	49.22	H
3424.0	47.69	-0.3	47.99	V
3799.8	50.86	0.4	50.46	V
4280.0	49.05	1.6	47.45	V
5400.0	54.41	4.3	50.11	V

Channel 38 (8GHz ~ 18GHz)(Peak)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
9270.8	48.94	10.6	38.34	H
11607.6	51.18	15.2	35.98	V
13279.0	53.36	18.2	35.16	V
14727.4	54.52	19.9	34.62	V
15715.2	55.62	21.9	33.72	V
17053.6	56.66	23.9	32.76	V

Channel 38 (8GHz ~ 18GHz)(Average)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
14727.4	41.81	19.9	21.91	V
15715.2	43.1	21.9	21.2	V
17053.6	44.33	23.9	20.43	V

Channel 38 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
19890.4	39.85	-5.1	44.95	H
21593.0	43.7	-3.4	47.1	V
23052.4	43.01	-3	46.01	H
24099.6	44.31	-2.8	47.11	V
24947.0	44.54	-2.4	46.94	H
26054.6	47.27	-2	49.27	H

Channel 38 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
28467.0	43.72	-1.1	44.82	V
30871.3	44.9	0.3	44.6	H
32980.0	45.17	1.1	44.07	H
34555.4	45.94	0.8	45.14	V

36861.2	46.73	2.1	44.63	H
38917.3	49.71	3.8	45.91	V

802.11ac-HT20

Channel 36 (30MHz ~1GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
44.6	35.16	-25.8	60.96	V
52.7	31.36	-25.9	57.26	V
112.1	18.97	-28	46.97	V
304.0	35	-25.7	60.7	H
375.0	41.57	-24.5	66.07	V
500.0	31.63	-22.2	53.83	V

Channel 36 (1GHz ~ 8GHz)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
3040.0	56.58	-1.1	57.68	H
3424.0	46.73	-0.3	47.03	V
3800.0	51.47	0.4	51.07	V
4280.0	50.1	1.6	48.5	H
5400.0	55.25	4.3	50.95	V
7019.8	50.64	7.3	43.34	V

Channel 36 (8GHz ~ 18GHz)(Peak)

Frequency (MHz)	Result (dBμV/m)	ARpl (dB)	PMea (dBμV/m)	Polarity
9167.8	49.83	10.4	39.43	V
11222.2	51.48	13.9	37.58	V
12664.4	53.12	16.8	36.32	H
13693.4	54.44	18.8	35.64	V
15192.6	54.65	20.7	33.95	V
17252.0	56.43	24.2	32.23	V

Channel 36(8GHz ~ 18GHz)(Average)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
13693.4	41.83	18.8	23.03	V
15192.6	42.06	20.7	21.36	V
17252.0	44.54	24.2	20.34	V

Channel 36 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
19673.6	39.66	-5.1	44.76	H
21088.9	41.51	-4.2	45.71	H
22580.6	43.54	-2.9	46.44	V
23565.8	43.78	-2.8	46.58	H
24522.0	43.64	-2.6	46.24	V
26045.2	46.26	-2	48.26	V

Channel 36 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
27918.8	44.34	-0.3	44.64	H
29671.2	43.38	-0.9	44.28	V
31739.4	45.01	0.5	44.51	V
33980.4	45.06	1.5	43.56	V
35828.5	46.82	1	45.82	H
39068.5	51.5	4.3	47.2	V

802.11ac-HT40

Channel 38 (30MHz ~1GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
44.3	35.93	-25.9	61.83	V
53.0	32.27	-26	58.27	V
112.5	18.71	-28.1	46.81	V
304.0	36.42	-25.7	62.12	V

375.0	41.89	-24.5	66.39	H
500.0	31.18	-22.2	53.38	H

Channel 38 (1GHz ~ 8GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
3039.8	57.22	-1.1	58.32	H
3424.0	47.04	-0.3	47.34	V
3800.0	50.82	0.4	50.42	H
4279.8	49.12	1.6	47.52	H
5400.0	55.99	4.3	51.69	H
7020.6	51.04	7.3	43.74	H

Channel 38 (8GHz ~ 18GHz)(Peak)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
10009.8	49.22	11.3	37.92	V
11668.4	51.2	15.1	36.1	V
12890.2	52.74	17.5	35.24	H
13745.4	53.33	18.8	34.53	H
15845.0	55.48	21.9	33.58	H
16718.8	55.72	23.6	32.12	H

Channel 38(8GHz ~ 18GHz)(Average)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
15845.0	43.16	21.9	21.26	H
16718.8	43.81	23.6	20.21	H

Channel 38 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
18986.0	39.13	-5.4	44.53	V
20141.2	40.98	-4.8	45.78	V
21502.8	42.75	-3.5	46.25	H

22528.0	44.84	-3	47.84	V
24165.0	44.71	-2.8	47.51	H
26018.9	47.26	-2	49.26	H

Channel 38 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
27952.6	43.84	-0.3	44.14	V
30628.3	44.7	-0.1	44.8	H
32697.8	43.56	0.4	43.16	H
34388.0	45.31	1.4	43.91	V
36865.3	46.25	2	44.25	V
39091.4	49.8	4.3	45.5	V

802.11ac-HT80

Channel 42 (30MHz ~1GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
44.4	36.39	-25.8	62.19	V
50.0	29.99	-25.4	55.39	V
111.8	19.45	-27.9	47.35	V
304.0	33.45	-25.7	59.15	H
375.0	39.83	-24.5	64.33	H
500.0	31.92	-22.2	54.12	H

Channel 42 (1GHz ~ 8GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
3039.8	56.49	-1.1	57.59	V
3423.8	47.61	-0.3	47.91	V
3800.0	51.09	0.4	50.69	V
4280.4	48.22	1.6	46.62	V
5400.0	55.34	4.3	51.04	V
7019.8	50.38	7.3	43.08	V

Channel 42 (8GHz ~ 18GHz)(Peak)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
9158.2	49.39	10.4	38.99	V
10784.4	49.77	12.9	36.87	V
12265.6	52.15	15.8	36.35	V
13748.0	53.92	18.8	35.12	V
15484.8	54.59	21.2	33.39	H
17087.0	56.63	24	32.63	H

Channel 42 (18GHz ~ 26.5GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
19398.2	39.69	-5.6	45.29	V
21010.7	41.43	-4.1	45.53	H
22151.4	43.18	-3	46.18	V
23548.8	44.69	-2.8	47.49	H
24681.0	44.66	-2.3	46.96	H
26035.0	46.43	-2	48.43	H

Channel 42 (26.5GHz ~ 40GHz)

Frequency (MHz)	Result (dB μ V/m)	ARpl (dB)	PMea (dB μ V/m)	Polarity
27858.1	44.23	-0.4	44.63	H
30342.1	44.07	-0.7	44.77	H
32322.6	43.91	0.5	43.41	V
34014.1	45.7	1.5	44.2	V
36560.2	45.52	1.4	44.12	H
38694.6	48.16	3.1	45.06	H

Test graphs as below:

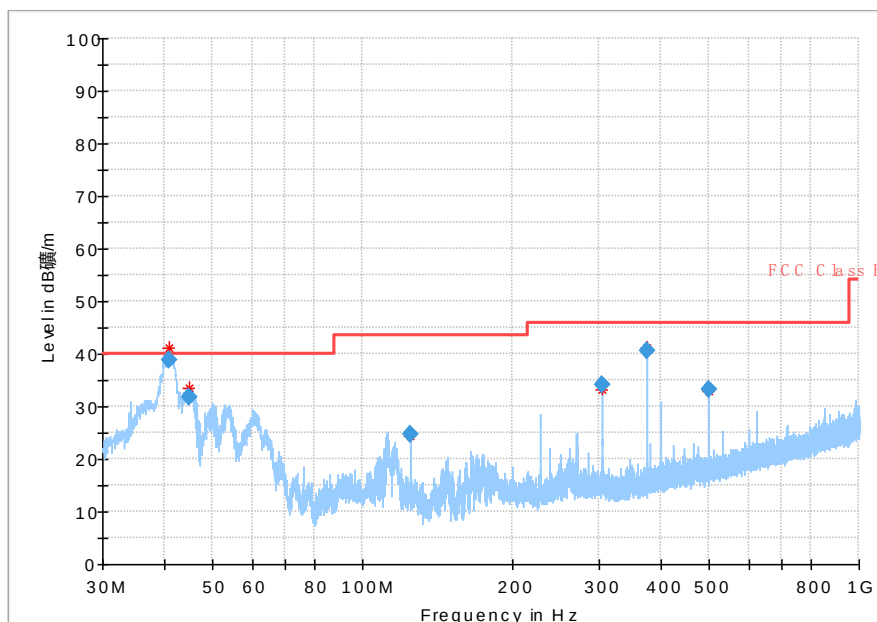


Fig. 65 Radiated Spurious Emission (802.11a, ch36, 30 MHz-1 GHz)

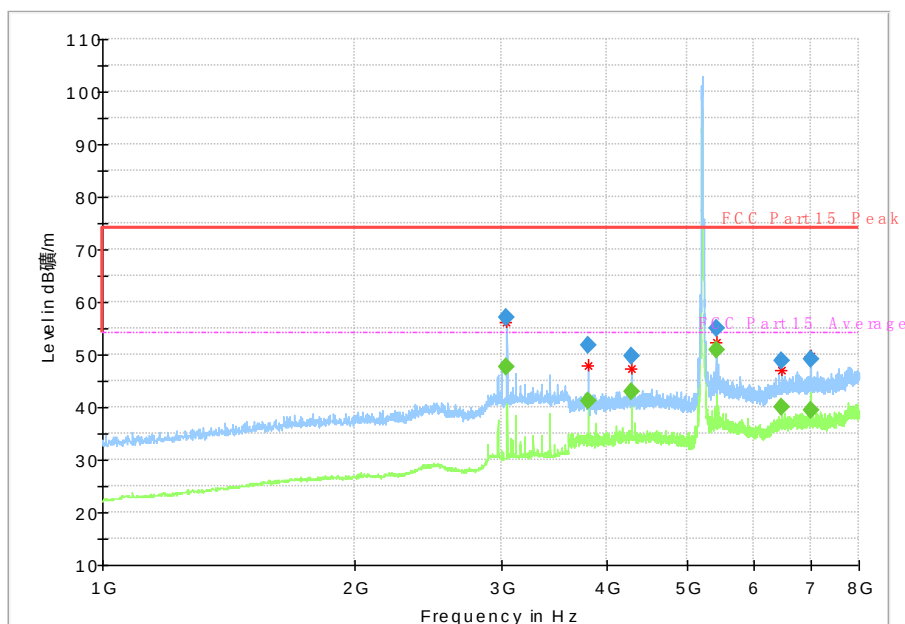


Fig. 66 Radiated Spurious Emission (802.11a, ch36, 1 GHz-8 GHz)

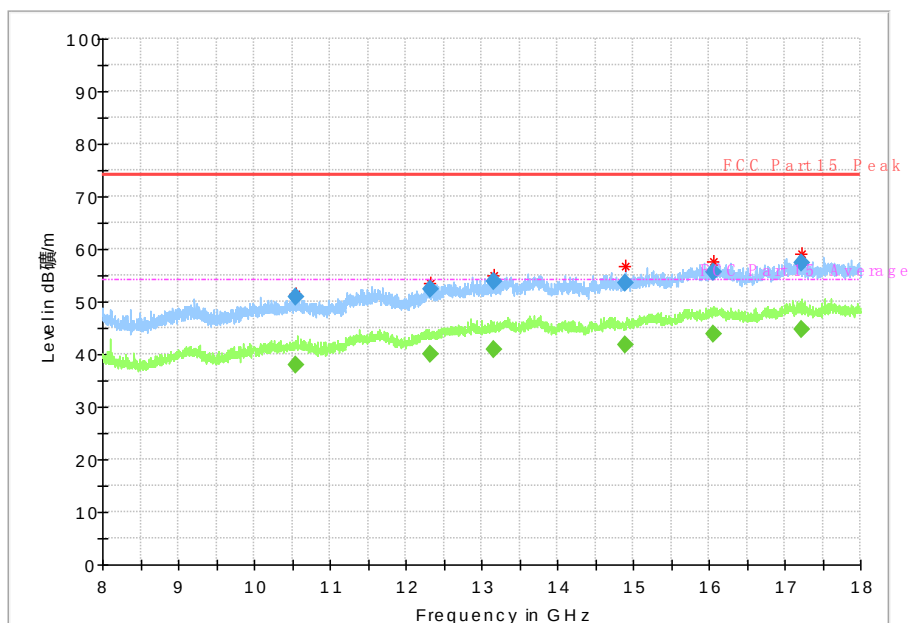


Fig. 67 Radiated Spurious Emission (802.11a, ch36, 8 GHz-18 GHz)

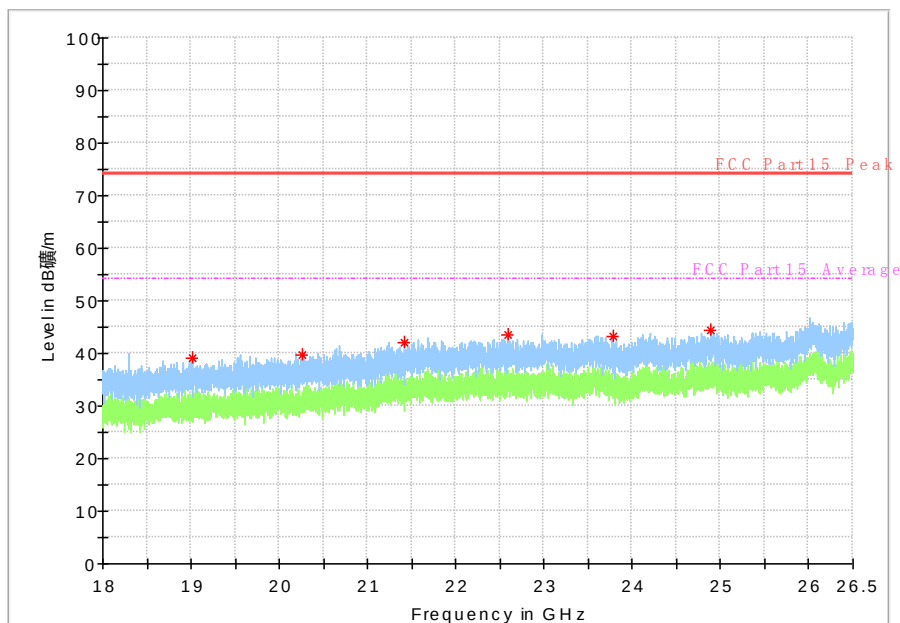


Fig. 68 Radiated Spurious Emission (802.11a, ch36, 18 GHz-26.5 GHz)

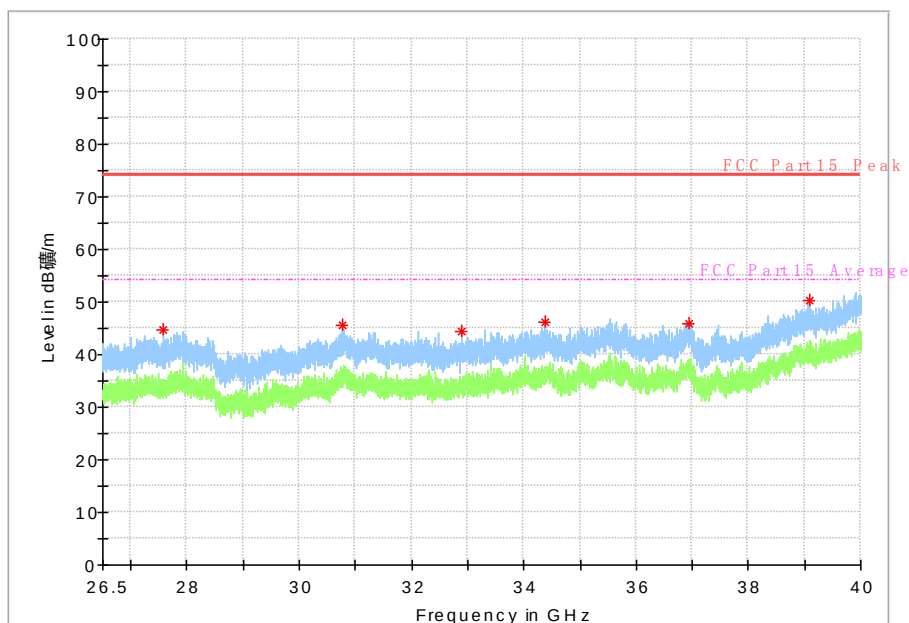


Fig. 69 Radiated Spurious Emission (802.11a, ch36, 26.5 GHz-40 GHz)

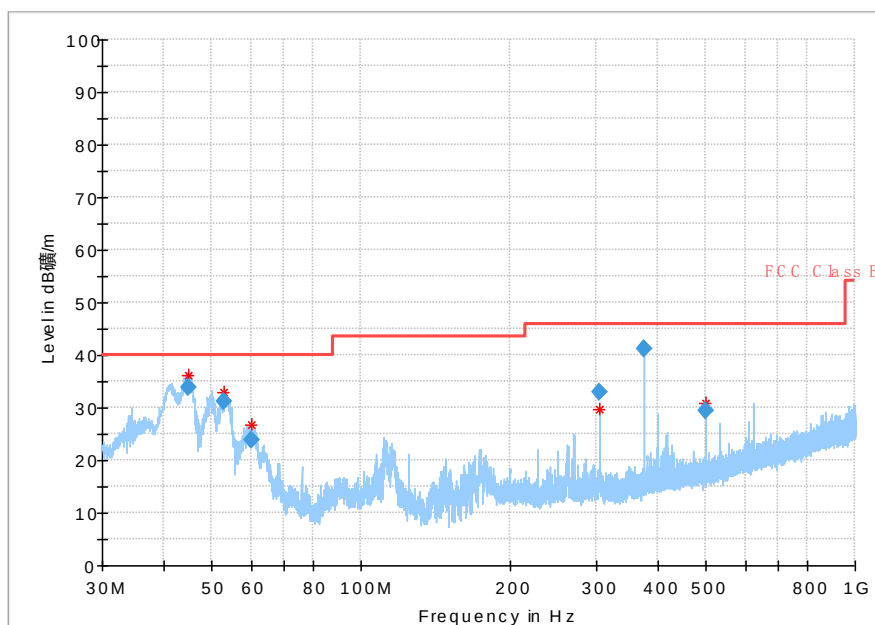


Fig. 70 Radiated Spurious Emission (802.11n-HT20, ch36, 30 MHz-1 GHz)

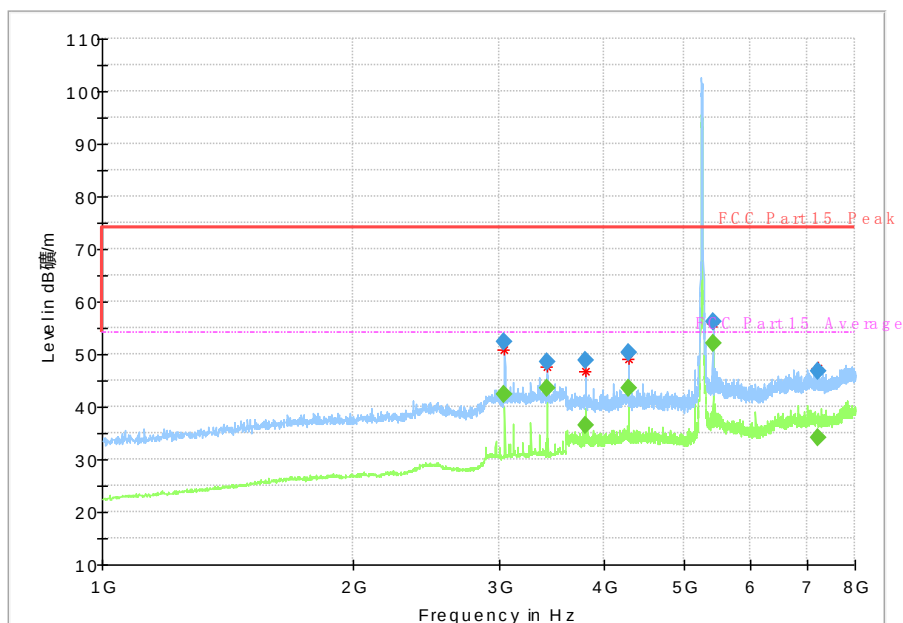


Fig. 71 Radiated Spurious Emission (802.11n-HT20, ch36, 1 GHz-8 GHz)

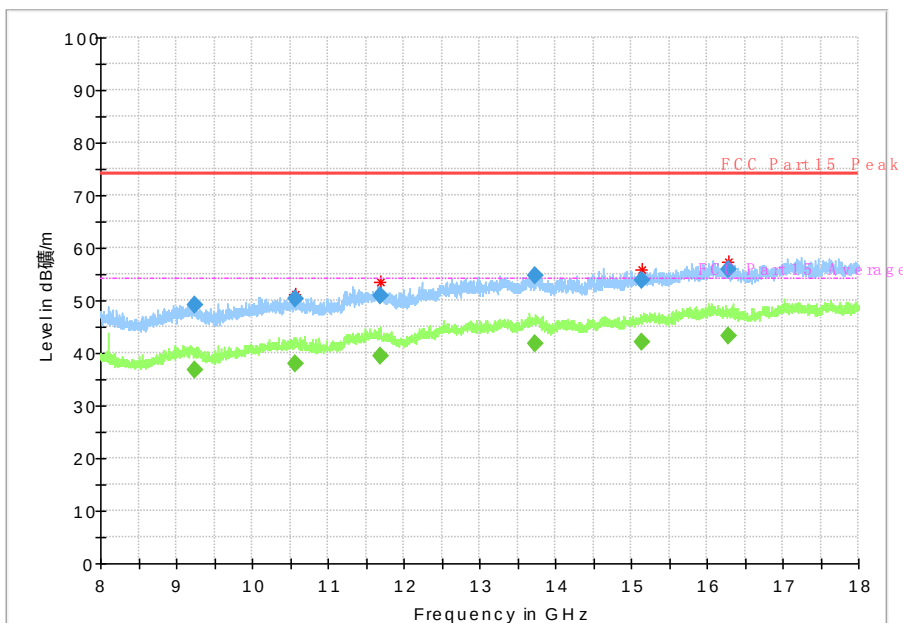


Fig. 72 Radiated Spurious Emission (802.11n-HT20, ch36, 8 GHz-18 GHz)

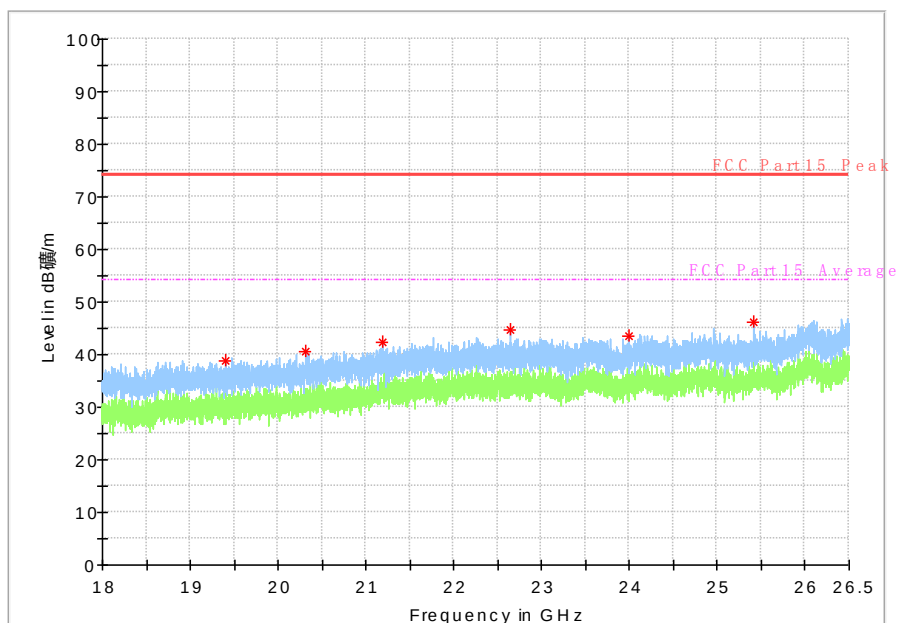


Fig. 73 Radiated Spurious Emission (802.11n-HT20, ch36, 18 GHz-26.5 GHz)

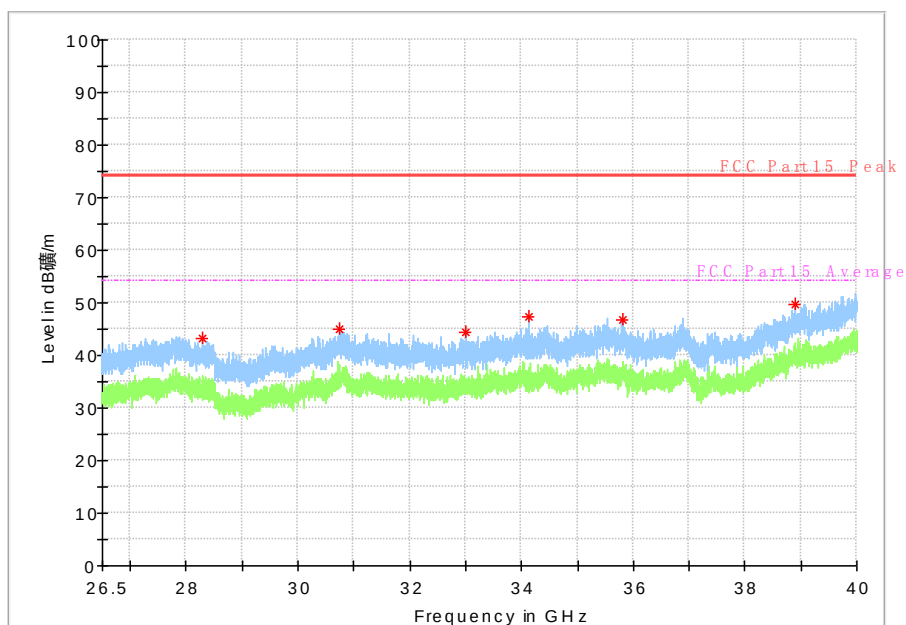


Fig. 74 Radiated Spurious Emission (802.11n-HT20, ch36, 26.5 GHz-40 GHz)

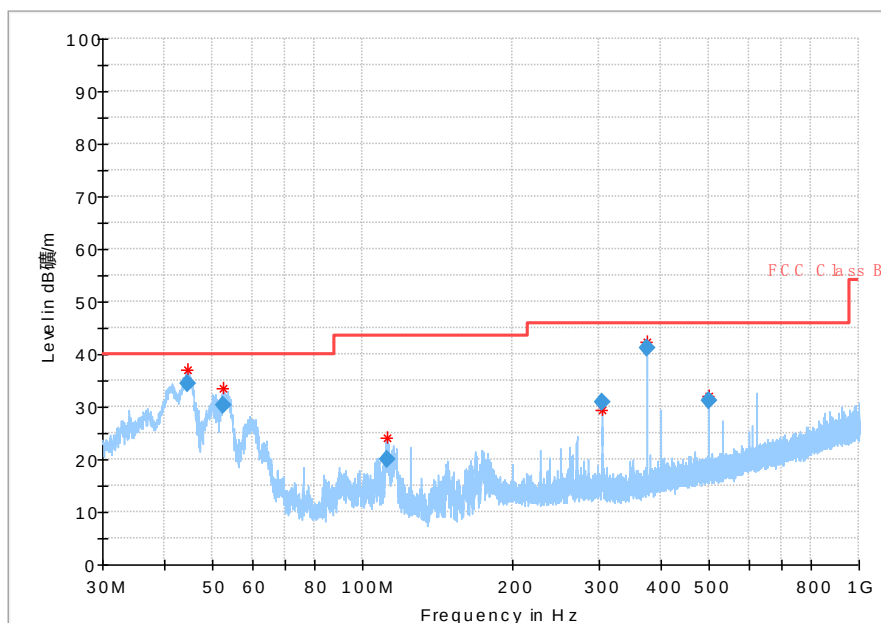


Fig. 75 Radiated Spurious Emission (802.11n-HT40, ch38, 30 MHz-1 GHz)

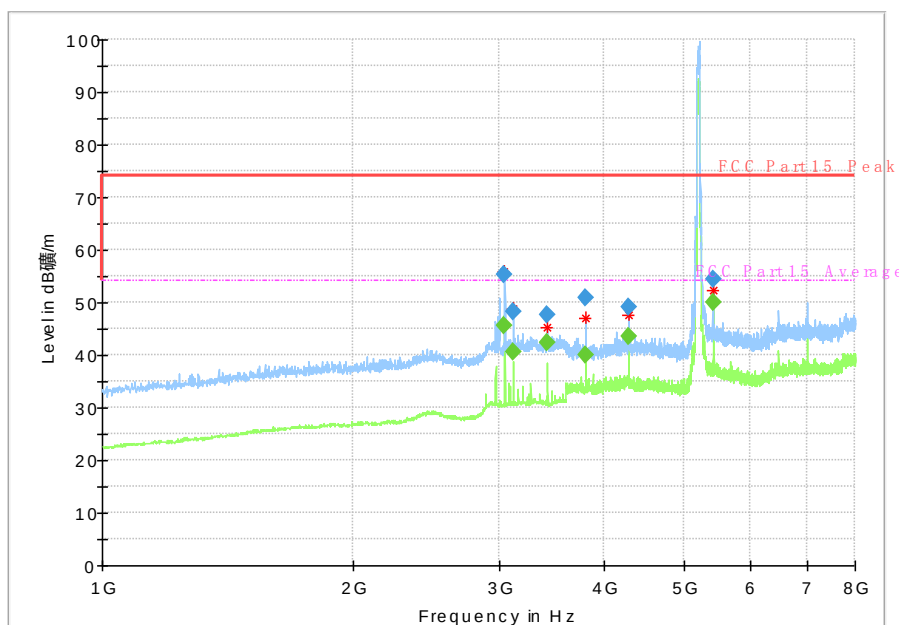


Fig. 76 Radiated Spurious Emission (802.11n-HT40, ch38, 1 GHz-8 GHz)

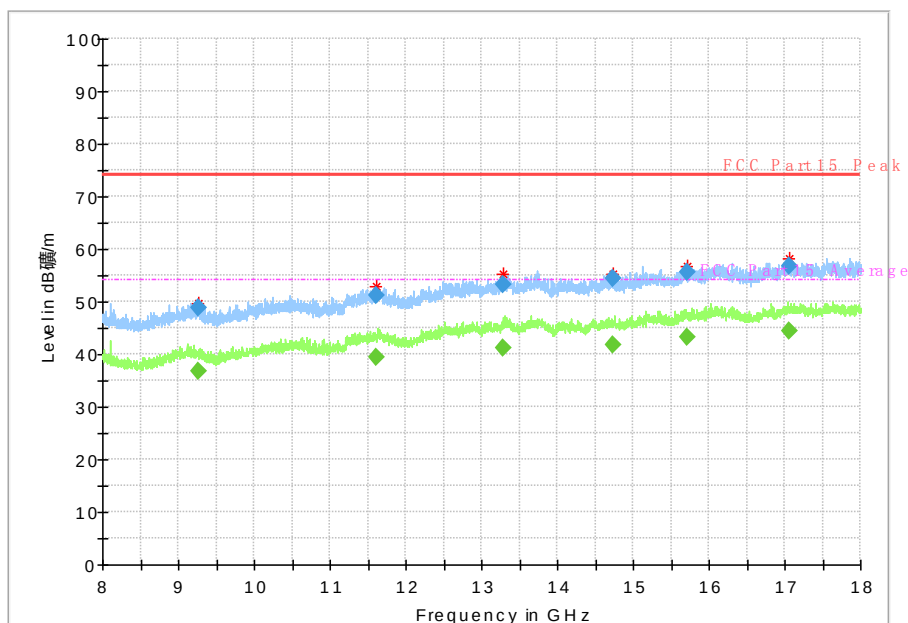


Fig. 77 Radiated Spurious Emission (802.11n-HT40, ch38, 8 GHz-18 GHz)

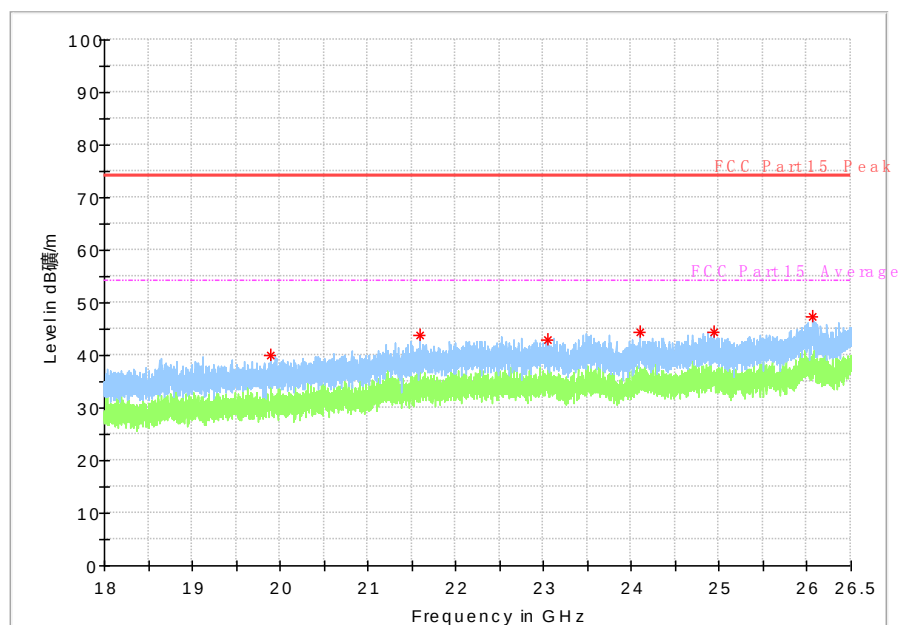


Fig. 78 Radiated Spurious Emission (802.11n-HT40, ch38, 18 GHz-26.5 GHz)

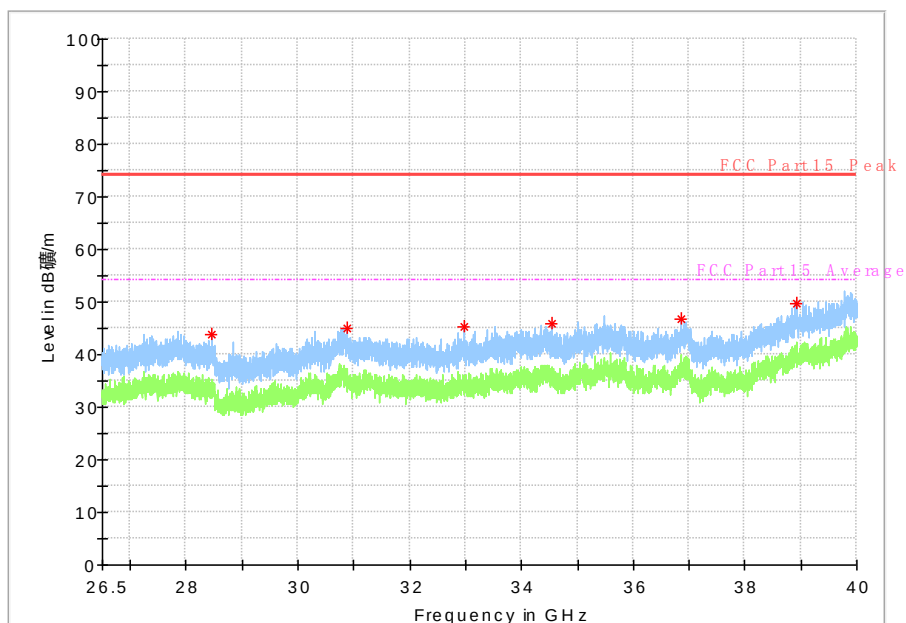


Fig. 79 Radiated Spurious Emission (802.11n-HT40, ch38, 26.5 GHz-40 GHz)

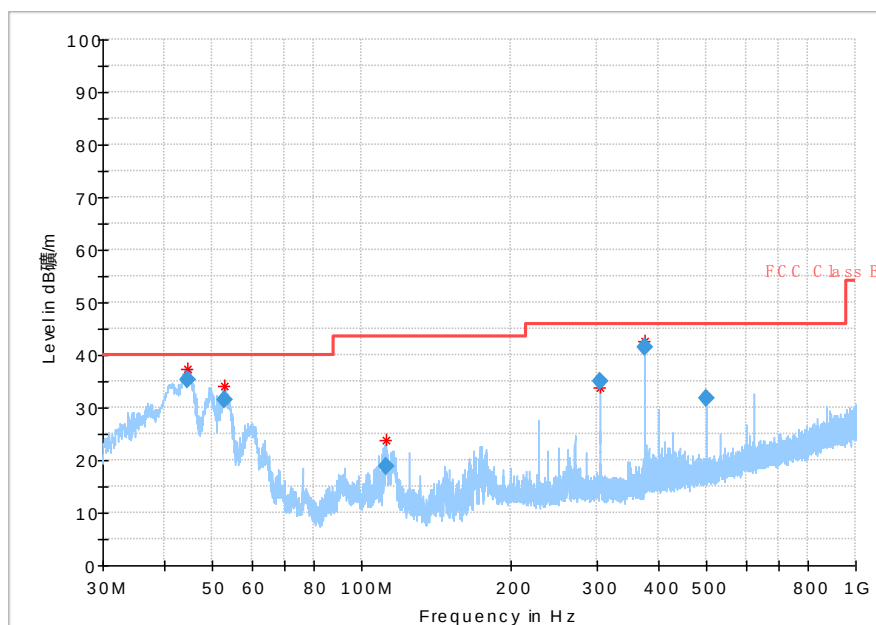


Fig. 80 Radiated Spurious Emission (802.11ac-HT20, Ch36, 30 MHz-1 GHz)

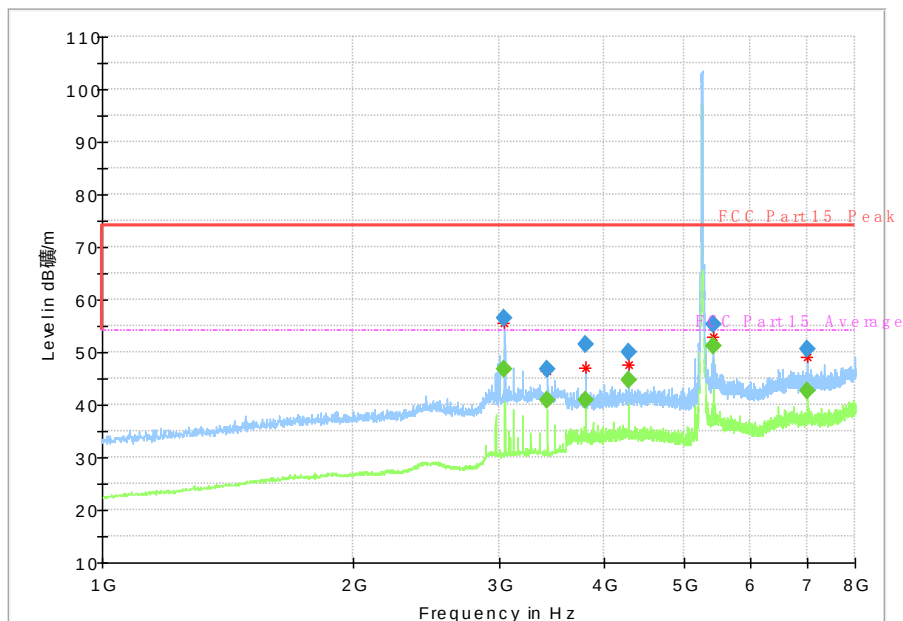


Fig. 81 Radiated Spurious Emission (802.11ac-HT20, Ch36, 1 GHz-8 GHz)

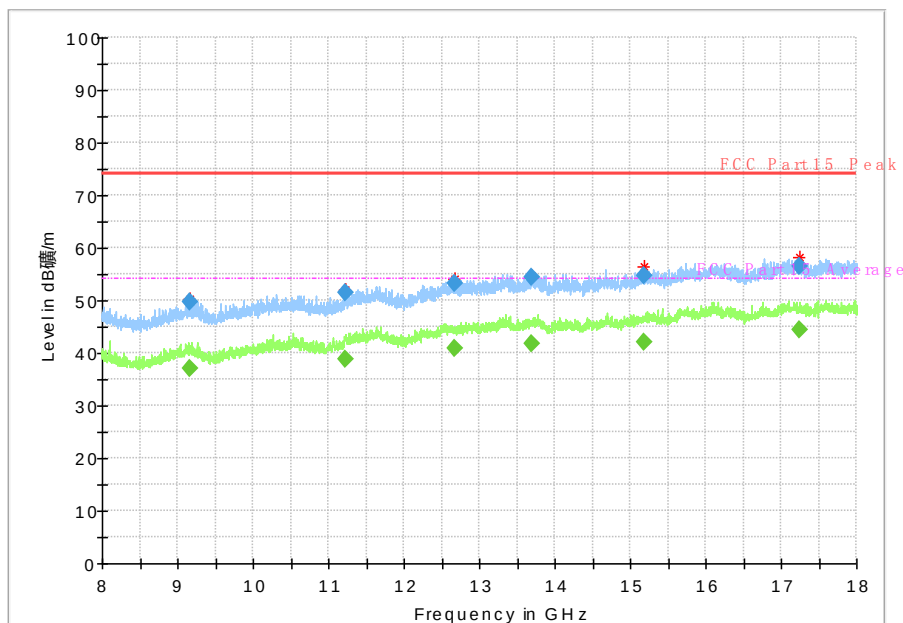


Fig. 82 Radiated Spurious Emission (802.11ac-HT20, Ch36, 8 GHz-18 GHz)

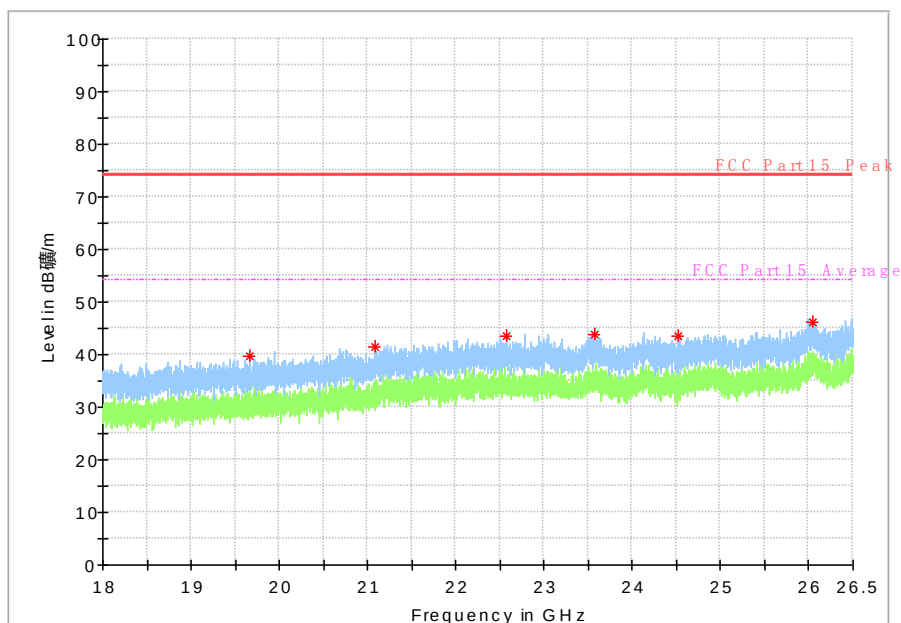


Fig. 83 Radiated Spurious Emission (802.11ac-HT20, Ch36, 18 GHz-26.5 GHz)

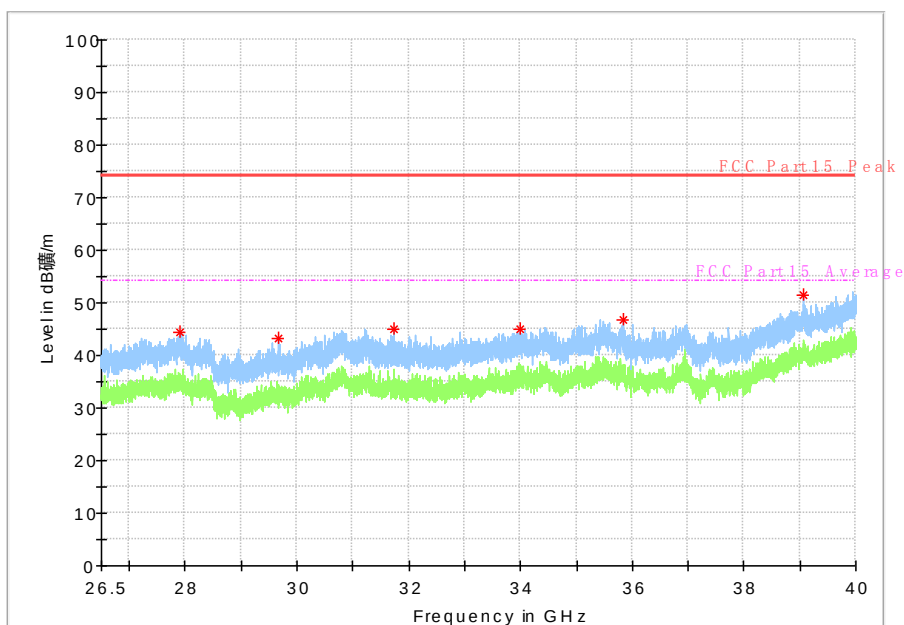


Fig. 84 Radiated emission: 802.11n, (802.11ac-HT20, Ch36, 26.5 GHz - 40 GHz)

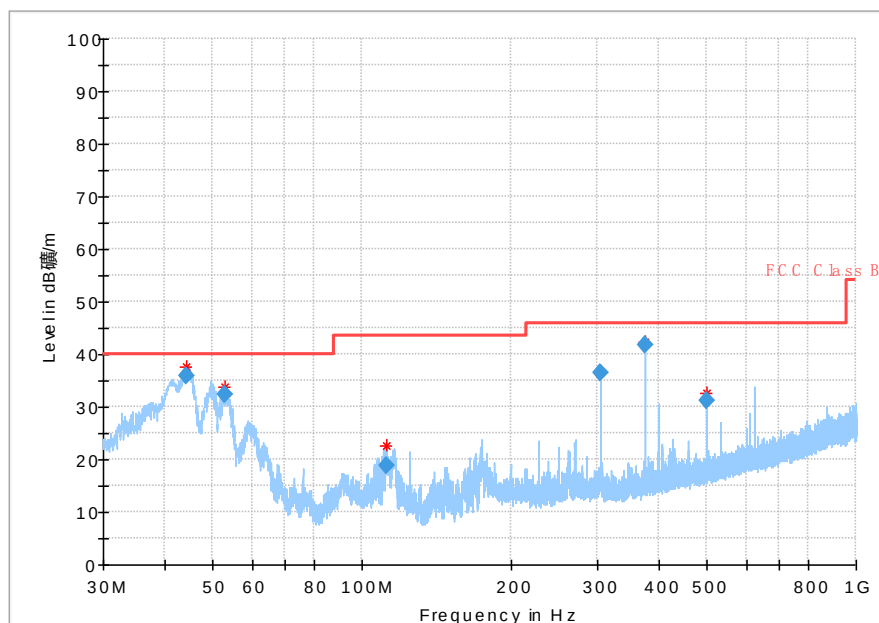


Fig. 85 Radiated Spurious Emission (802.11ac-HT40, Ch38, 30 MHz-1 GHz)

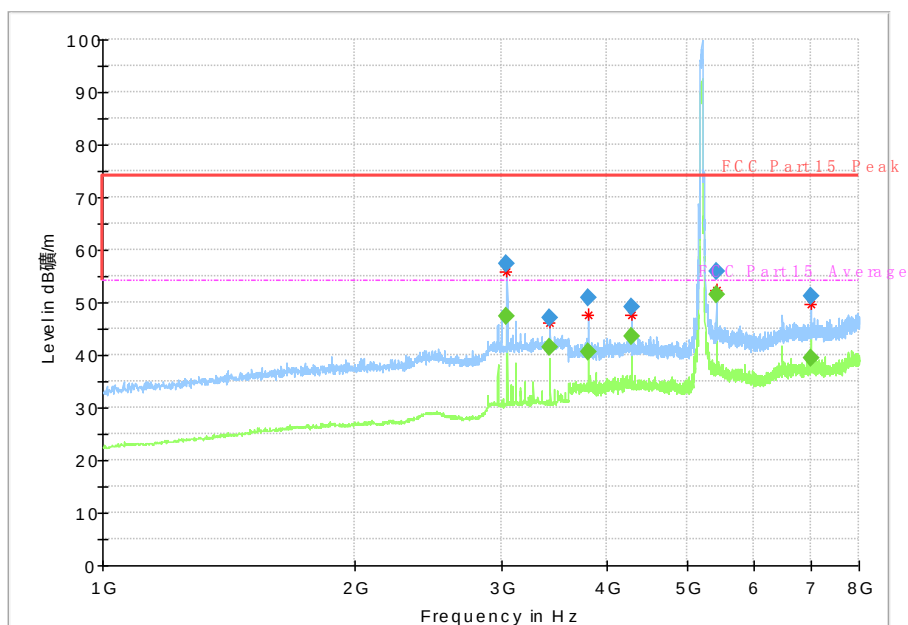


Fig. 86 Radiated Spurious Emission (802.11ac-HT40, Ch38, 1 GHz-8 GHz)

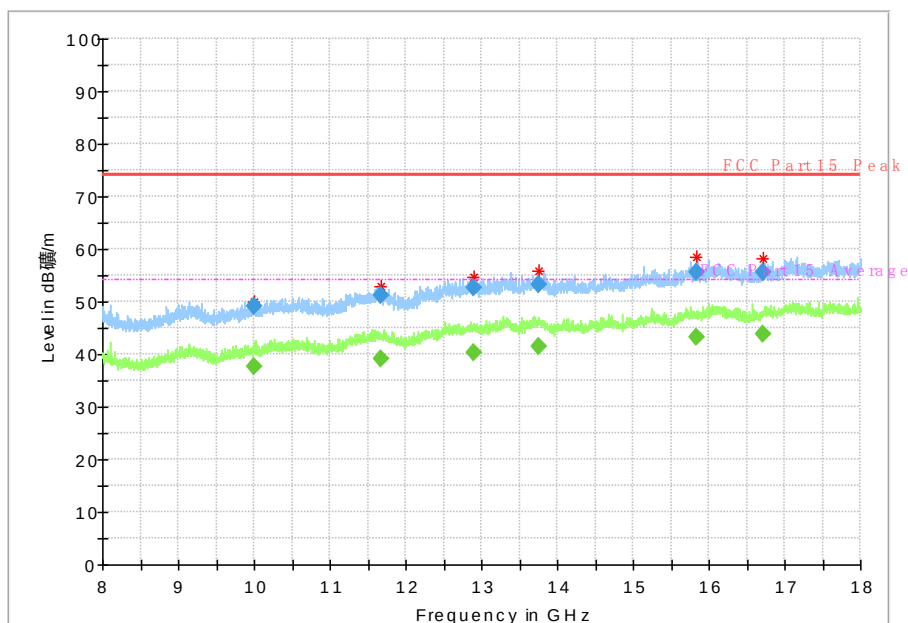


Fig. 87 Radiated Spurious Emission (802.11ac-HT40, Ch38, 8 GHz-18 GHz)

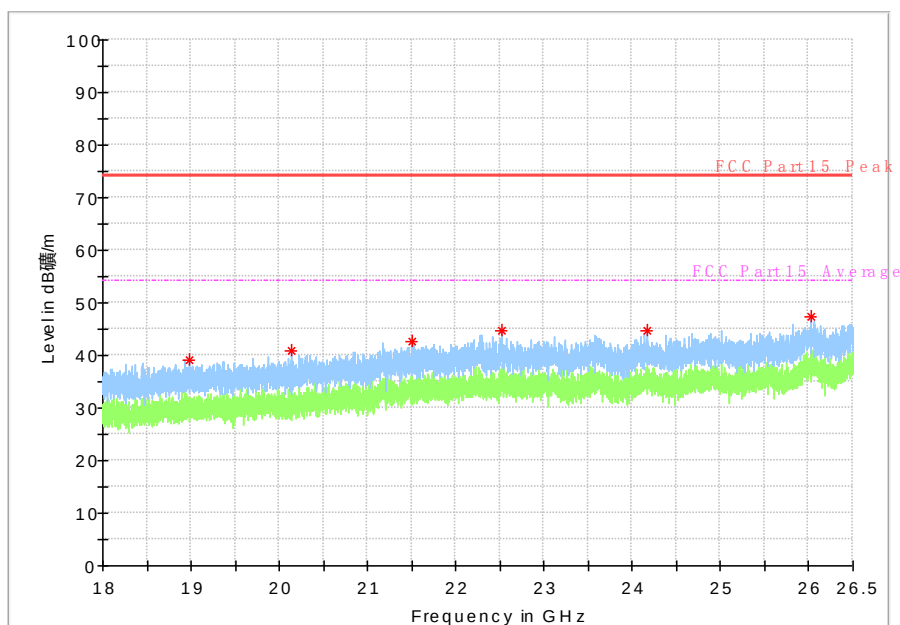


Fig. 88 Radiated Spurious Emission (802.11ac-HT40, Ch38, 18 GHz-26.5 GHz)

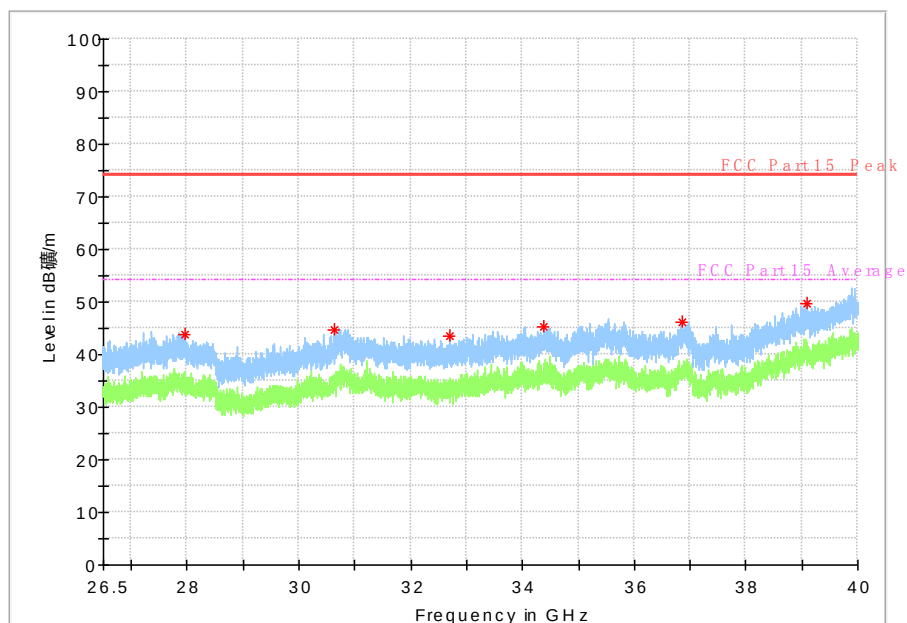


Fig. 89 Radiated emission: 802.11n, (802.11ac-HT40, Ch38, 26.5 GHz - 40 GHz)

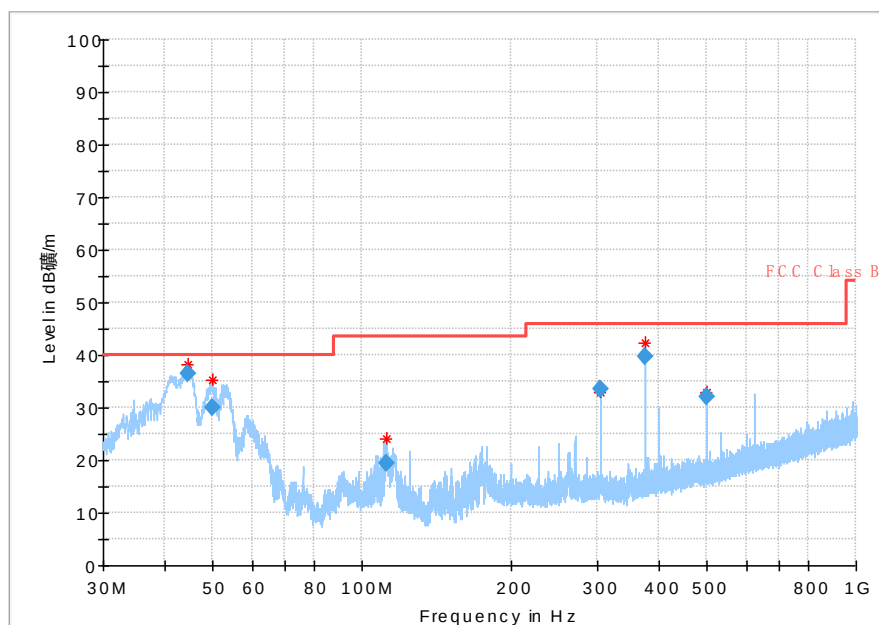


Fig. 90 Radiated Spurious Emission (802.11ac-HT80, Ch42, 30 MHz-1 GHz)

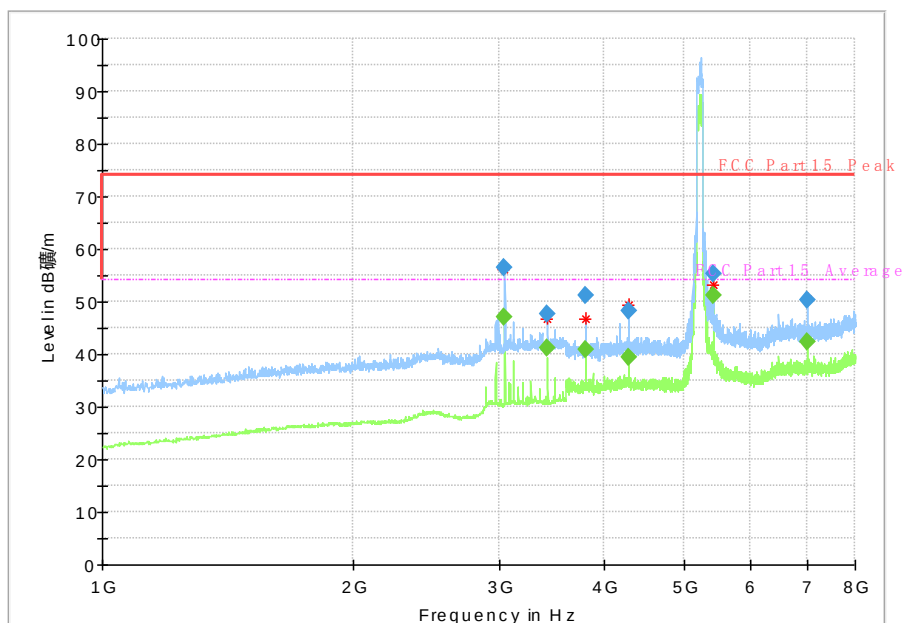


Fig. 91 Radiated Spurious Emission (802.11ac-HT80, Ch42, 1 GHz-8 GHz)

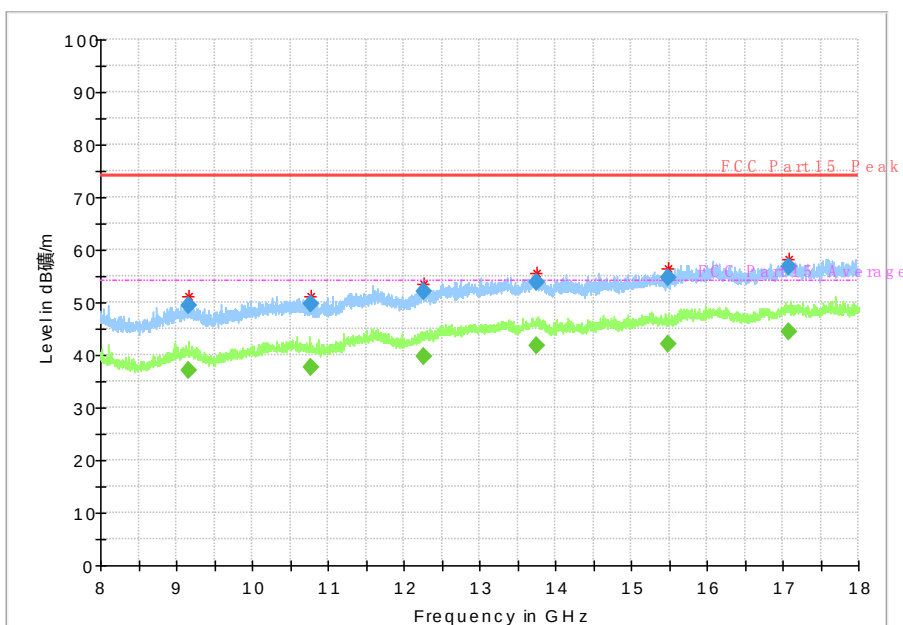


Fig. 92 Radiated Spurious Emission (802.11ac-HT80, Ch42, 8 GHz-18 GHz)

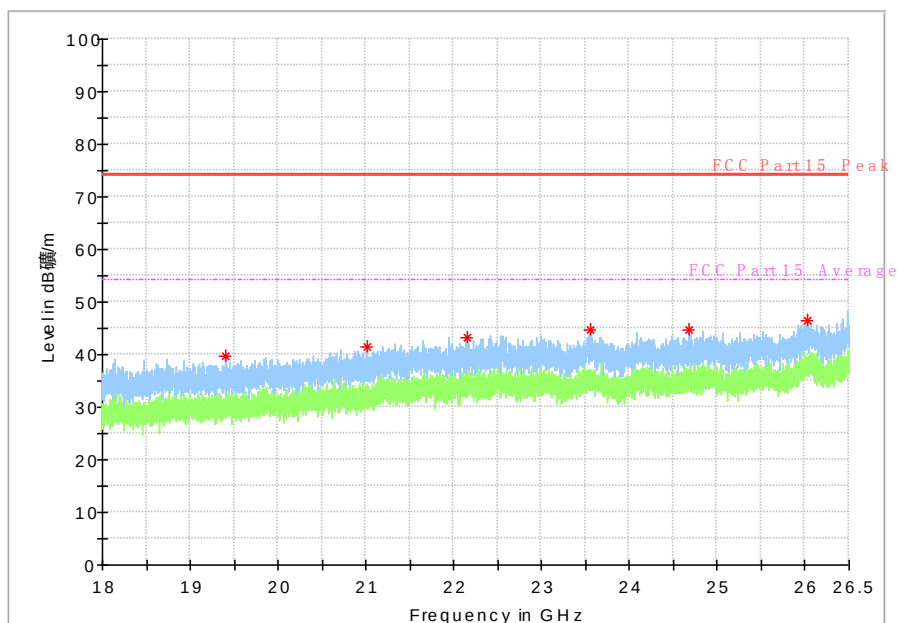


Fig. 93 Radiated Spurious Emission (802.11ac-HT80, Ch42, 18 GHz-26.5 GHz)

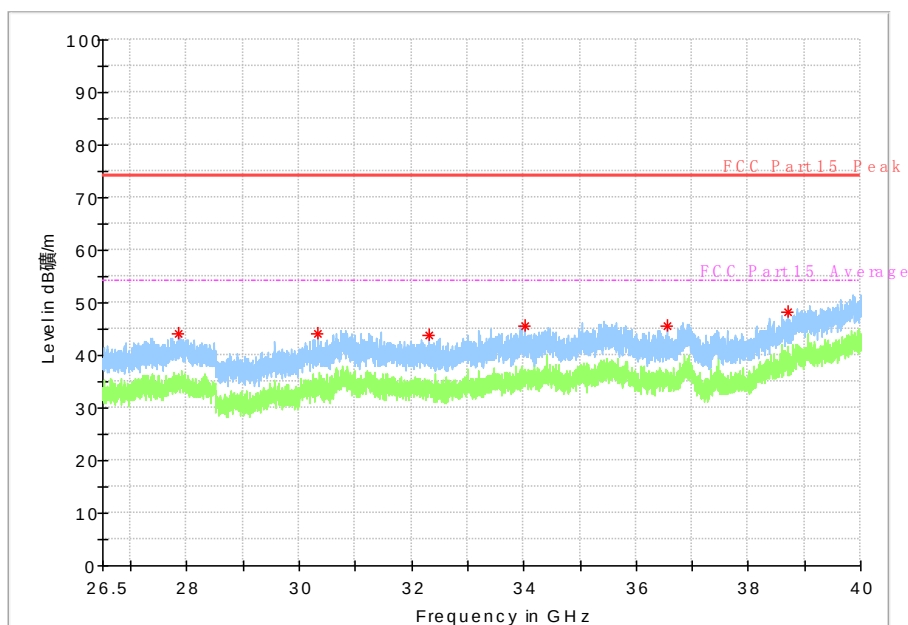


Fig. 94 Radiated emission: 802.11n, (802.11ac-HT80, Ch42, 26.5 GHz - 40 GHz)

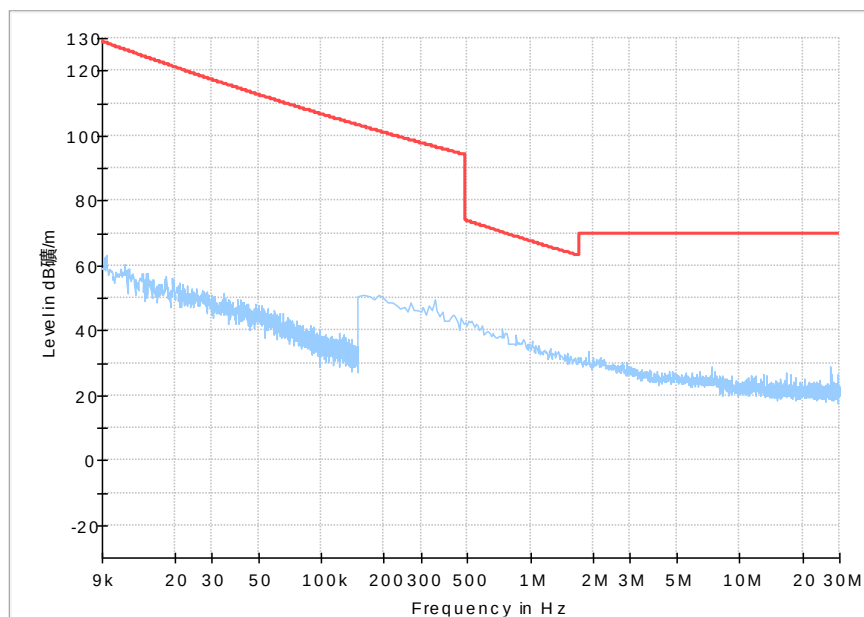


Fig. 95 Radiated Spurious Emission (9kHz-30MHz)

ANNEX A.7. 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.96		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.96		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:

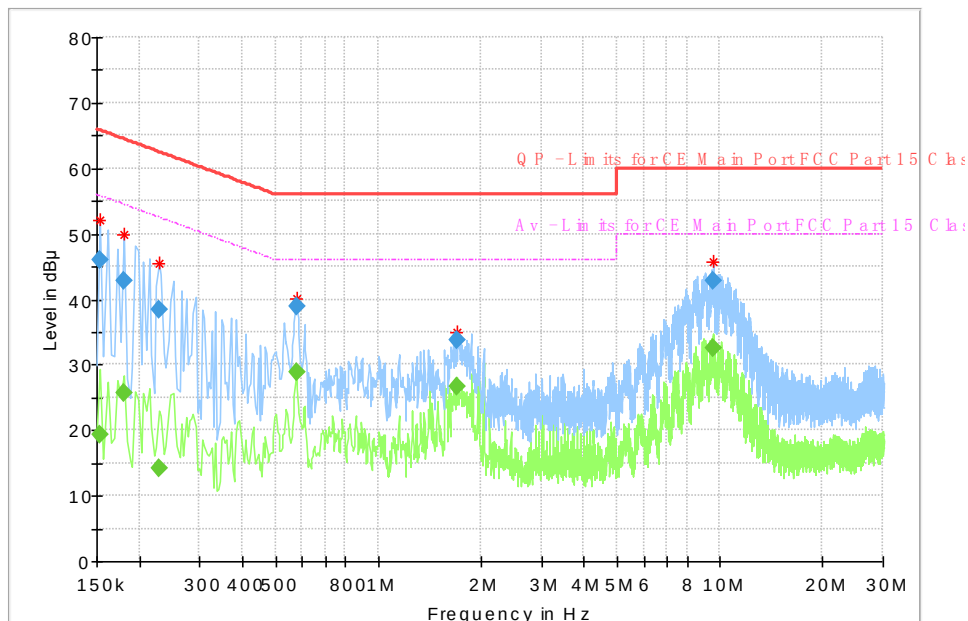


Fig. 96 Conducted Emission(802.11a, TX)

Measurement Result:

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.153731	46.06	---	65.80	19.73	15000.0	9.000	N	ON	9.8
0.153731	---	19.32	55.80	36.47	15000	9.000	N	ON	9.8
0.179850	---	25.74	54.49	28.76	15000	9.000	L1	ON	9.8
0.179850	42.78	---	64.49	21.72	15000.0	9.000	L1	ON	9.8
0.228356	---	14.20	52.51	38.31	15000	9.000	N	ON	9.8
0.228356	38.42	---	62.51	24.09	15000.0	9.000	N	ON	9.8
0.575363	---	28.76	46.00	17.24	15000	9.000	L1	ON	9.8
0.575363	38.94	---	56.00	17.06	15000	9.000	L1	ON	9.8
1.694738	33.68	---	56.00	22.32	15000	9.000	N	ON	9.9
1.694738	---	26.55	46.00	19.45	15000	9.000	N	ON	9.9
9.608719	---	32.46	50.00	17.54	15000	9.000	L1	ON	11.2
9.608719	42.76	---	60.00	17.24	15000	9.000	L1	ON	11.2

ANNEX B. Accreditation Certificate



*****End of the Report*****