FCC PART 15
TEST REPORT
No.I19Z61444-IOT04

for

Client name: Micromax Informatics Ltd

Product name: LTE Mobile Phone

Model name: T5542

With

FCC ID: 2AU5XT5542

Hardware Version: MMX_T5542_V3.0

Software Version: MMX_T5542_SW_V03_20191106

Issued Date: 2019-11-14

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S.Government.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: cttl_terminals@caict.ac.cn, website: www.caict.ac.cn

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I19Z61444-IOT04	Rev.0	1st edition	2019-11-14

CONTENTS

1. TEST LATORATORY

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

Location 2: CTTL(BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing, P. R. China 100176

1.3. Testing Environment

Normal Temperature: 15-35℃

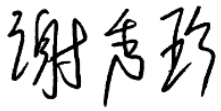
Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2019-09-19

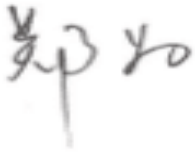
Testing End Date: 2019-11-07

1.5. Signature



Xie Xiuzhen

(Prepared this test report)



Zheng Wei

(Reviewed this test report)

Hu Xiaoyu

(Approved this test report)

2. CLIENT INFORMATION

2.1 Applicant Information

Company Name:	Micromax Informatics Ltd
Address:	288A Udyog Vihar Phase 4 Gurgaon 122015
City:	/
Postal Code:	/
Country:	/
Telephone:	+91 8447446444
Fax:	/

2.2 Manufacturer Information

Company Name:	Micromax Informatics Ltd
Address:	288A Udyog Vihar Phase 4 Gurgaon 122015
City:	/
Postal Code:	/
Country:	/
Telephone:	+91 8447446444
Fax:	/

3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARYEQUIPMENT(AE)

3.1. About EUT

Description	LTE Mobile Phone
Model name	T5542
FCC ID	2AU5XT5542
WLAN Frequency Range	ISM Bands: -5150MHz~5250MHz -5250MHz~5350MHz
Type of modulation	OFDM
Antenna	Integral Antenna
Voltage	3.8V

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT3	358849109008639	MMX_T5542_V3.0	MMX_T5542_SW_V03_20191106
EUT2	358849109008654	MMX_T5542_V3.0	MMX_T5542_SW_V03_20191106

*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	SN
AE1	Battery	/	Inbuilt
AE2	Charger	/	CH002
AE3	USB Cable	/	DC004

AE1

Model	Li-Polymer
Manufacturer	NINGBO VEKEN BATTERY CO., LTD.
Capacitance	4000mAh
Nominal voltage	3.85V

AE2

Model	HA-19050200UU
Manufacturer	ShenZhen HongGuangDe Technology CO.,LTD.
Length of cable	/

AE3

Model	YXT-537-TYPE-1.2M(Type-C)
Manufacturer	THIN STRIP OF SKY,SHENZHEN ELECTRONICS CO.,LTD.
Length of cable	/

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

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.12	EUT3+ AE1+ AE2+ AE3	WIFI

3.5. General Description

The Equipment under Test (EUT) is a model of LTE Mobile Phone with integrated antenna and inbuilt battery.

It has Bluetooth (EDR)function.

It consists of normal options: travel charger, USB cable.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

3.6. Interpretation of the Test Environment

For the test methods, the test environment uncertainty figures correspond to an expansion factor k=2.

Measurement Uncertainty

Parameter	Uncertainty
temperature	0.48°C
humidity	2 %
DC voltages	0.003V

4. REFERENCE DOCUMENTS

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant 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.

FCC Part15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices	2018
ANSI C63.10	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 D02	General U-NII Test Procedures New Rules v02r01	2017-12

5. LABORATORY ENVIRONMENT

Conducted RF performance testing is performed in shielding room.

EMC performance testing is performed in Semi-anechoic chamber.

6. SUMMARY OF TEST RESULTS

6.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15E	Sub-clause of IC	Verdict
Maximum Output Power	15.407	/	**P**
Power Spectral Density	15.407	/	**P**
Occupied 26dB Bandwidth	15.403	/	**P**
Band edge compliance	15.209	/	**P**
Transmitter spurious emissions radiated	15.407	/	**P**
Spurious emissions radiated < 30 MHz	15.407	/	**P**
Spurious emissions conducted < 30 MHz	15.407	/	**P**
Frequency Stability	15.407	/	**P**
Transmit Power Control	15.407	/	**NA**

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

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

6.2. Statements

CTTL has evaluated the test cases requested by the client/manufacturer as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.1.

This report only deals with the WLAN function among the features described in section 3.

6.3. Test Conditions

For this report, all the test cases are tested under normal temperature and normal voltage, and also under norm humidity, the specific condition is shown as follows:

Temperature	26℃
Voltage	3.8V
Humidity	44%

7. TEST EQUIPMENTS UTILIZED

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2020-05-15
2	Test Receiver	ESCI	100344	Rohde & Schwarz	1 year	2020-03-14
3	LISN	ENV216	101200	Rohde & Schwarz	1 year	2020-02-14
4	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	100235	Rohde & Schwarz	1 year	2020-03-01
2	BiLog Antenna	VULB9163	9163-1222	Schwarzbeck	1 year	2020-03-14
3	Dual-Ridge Waveguide Horn Antenna	3115	6914	ETS-Lindgren	1year	2020-01-03
4	EMI Antenna	3116	2661	ETS-Lindgren	1 Year	2020-10-14
5	Vector Signal Analyzer	FSV40	101047	Rohde & Schwarz	1 year	2020-05-16

8. Measurement Uncertainty

8.1 Transmitter Output Power

Measurement Uncertainty: 0.387dB,k=1.96

8.2 Peak Power Spectral Density

Measurement Uncertainty: 0.705dB,k=1.96

8.3 Occupied Channel Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

8.4 Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

8.5 Spurious Emissions

Conducted (k=1.96)

Frequency Range	Uncertainty(dB)
30MHz ≤ f ≤ 2GHz	1.22
2GHz ≤ f ≤3.6GHz	1.22
3.6GHz ≤ f ≤8GHz	1.22
8GHz ≤ f ≤12.75GHz	1.51
12.75GHz ≤ f ≤26GHz	1.51
26GHz ≤ f ≤40GHz	1.59

Radiated (k=2)

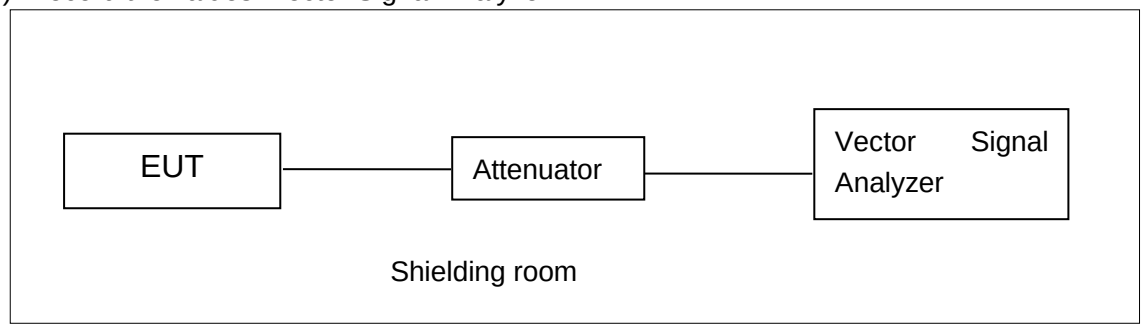
Frequency Range	Uncertainty(dB)
9kHz-30MHz	/
30MHz ≤ f ≤ 1GHz	4.86
1GHz ≤ f ≤18GHz	5.26
18GHz ≤ f ≤40GHz	5.28

ANNEX A: MEASUREMENT RESULTS

A.1. Measurement Method

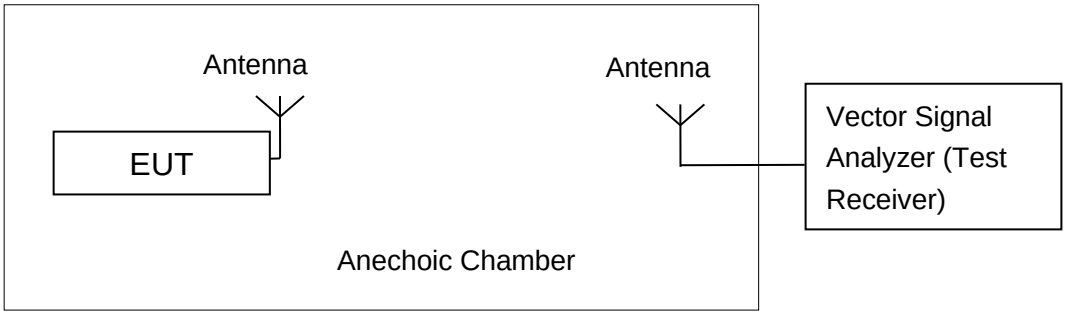
A.1.1. Conducted Measurements

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.

A.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

Limit use the less value, and B is the 26dB bandwidth.

The measurementmethod SA-1 is made according to KDB 789033

Measurement Results:

802.11a mode

Mode	Frequency	Test Result (dBm)							
		Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
802.11a	5180MHz	13.51	13.50	13.50	13.48	13.43	13.47	13.45	13.47
	5200MHz	13.58	/	/	/	/	/	/	/
	5240MHz	13.50	/	/	/	/	/	/	/
	5260MHz	13.50	/	/	/	/	/	/	/
	5280MHz	13.39	/	/	/	/	/	/	/
	5320MHz	13.27	/	/	/	/	/	/	/

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

802.11n-HT20 mode

Mode	Frequency	Test Result (dBm)							
		Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n (HT20)	5180MHz	14.02	14.00	13.99	13.97	13.92	13.95	13.94	13.97
	5200MHz	14.01	/	/	/	/	/	/	/
	5240MHz	13.89	/	/	/	/	/	/	/
	5260MHz	13.98	/	/	/	/	/	/	/
	5280MHz	14.02	/	/	/	/	/	/	/
	5320MHz	14.28	/	/	/	/	/	/	/

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

802.11n-HT40 mode

Mode	Frequency	Test Result (dBm)							
		Data Rate							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n (HT40)	5190MHz	14.10	14.23	14.27	14.23	14.35	14.48	14.53	14.57
	5230MHz	/	/	/	/	/	/	/	14.35
	5270MHz	/	/	/	/	/	/	/	14.38
	5310MHz	/	/	/	/	/	/	/	14.15

The data rate MCS7 is selected as worse condition, and the following cases are performed with this condition.

A.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

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	4.77	P
	5200 MHz	4.65	P
	5240 MHz	4.89	P
	5260 MHz	4.83	P
	5280 MHz	4.54	P
	5320 MHz	4.33	P
802.11n HT20	5180 MHz	4.53	P
	5200 MHz	4.36	P
	5240 MHz	4.83	P
	5260 MHz	4.39	P
	5280 MHz	4.24	P
	5320 MHz	4.33	P
802.11n HT40	5190 MHz	3.13	P
	5230 MHz	3.58	P
	5270 MHz	2.91	P
	5310 MHz	3.06	P

Conclusion: PASS

A.4. Occupied 26dB Bandwidth(conducted)

Measurement Limit:

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

The measurement is made according to KDB 789033

Measurement Uncertainty:

Measurement Uncertainty	60.80Hz

Measurement Result:

Mode	Frequency	Occupied 26dB Bandwidth (MHz)		conclusion
802.11a	5180 MHz	Fig.1	24.15	P
	5200 MHz	Fig.2	22.95	P
	5240 MHz	Fig.3	23.20	P
	5260 MHz	Fig.4	23.00	P
	5280 MHz	Fig.5	22.90	P
	5320 MHz	Fig.6	23.10	P
802.11n HT20	5180 MHz	Fig.7	24.25	P
	5200 MHz	Fig.8	23.50	P
	5240 MHz	Fig.9	24.25	P
	5260 MHz	Fig.10	23.10	P
	5280 MHz	Fig.11	23.45	P
	5320 MHz	Fig.12	23.45	P
802.11n HT40	5190 MHz	Fig.13	42.80	P
	5230 MHz	Fig.14	42.80	P
	5270 MHz	Fig.15	42.64	P
	5310 MHz	Fig.16	43.68	P

Conclusion: PASS

Test graphs as below:

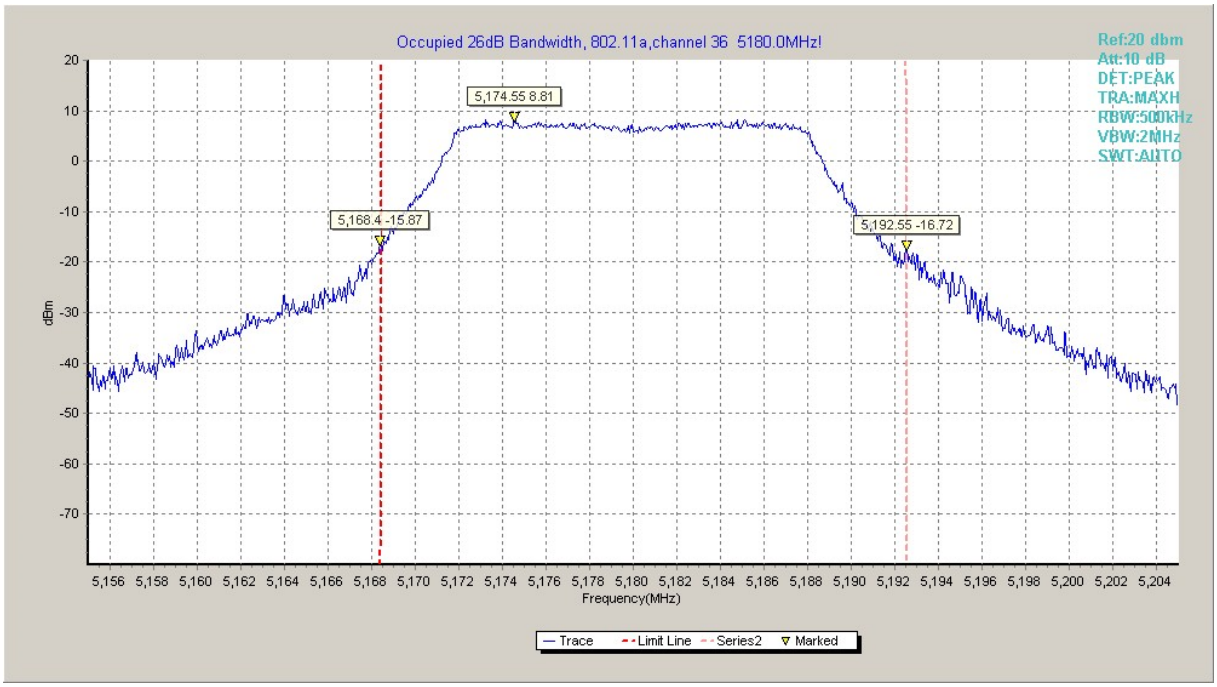


Fig.1 Occupied 26dB Bandwidth (802.11a, 5180MHz)

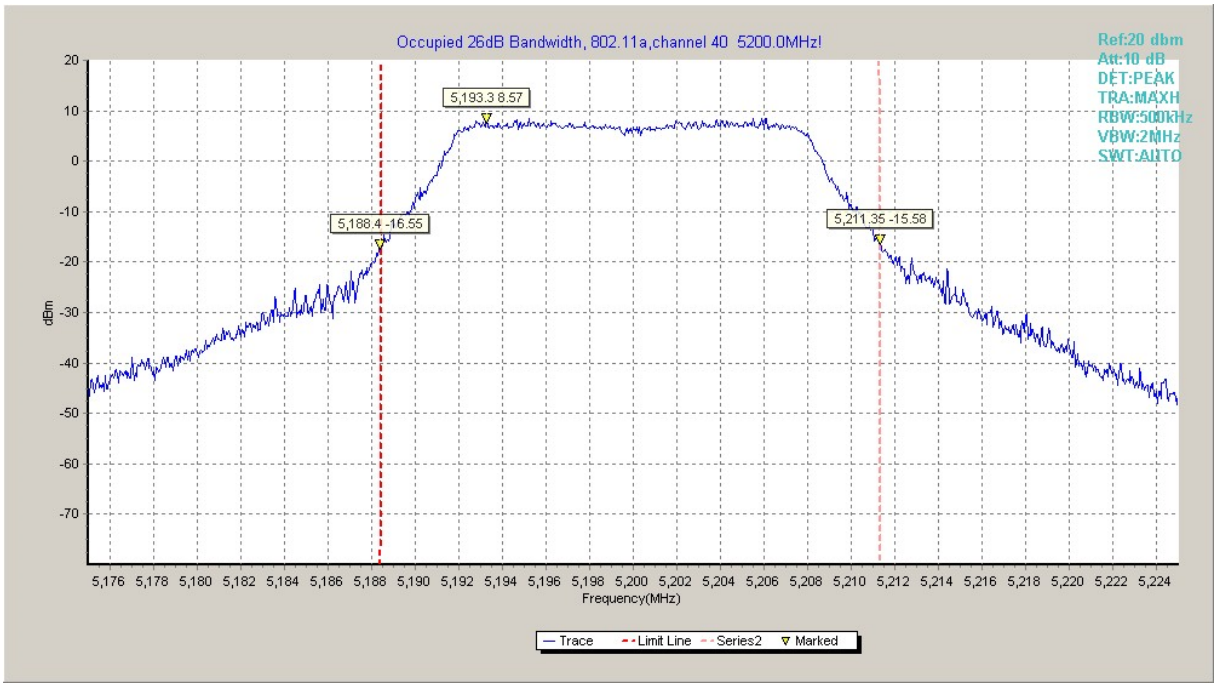


Fig.2 Occupied 26dB Bandwidth (802.11a, 5200MHz)

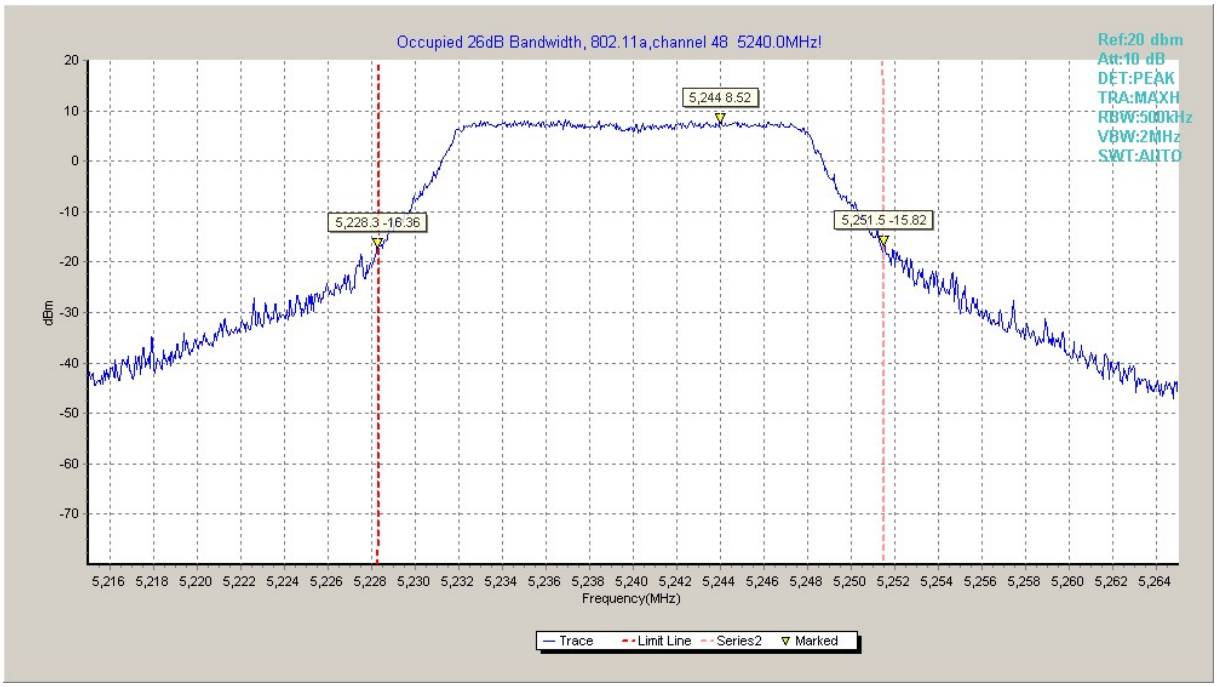


Fig.3 Occupied 26dB Bandwidth (802.11a, 5240MHz)

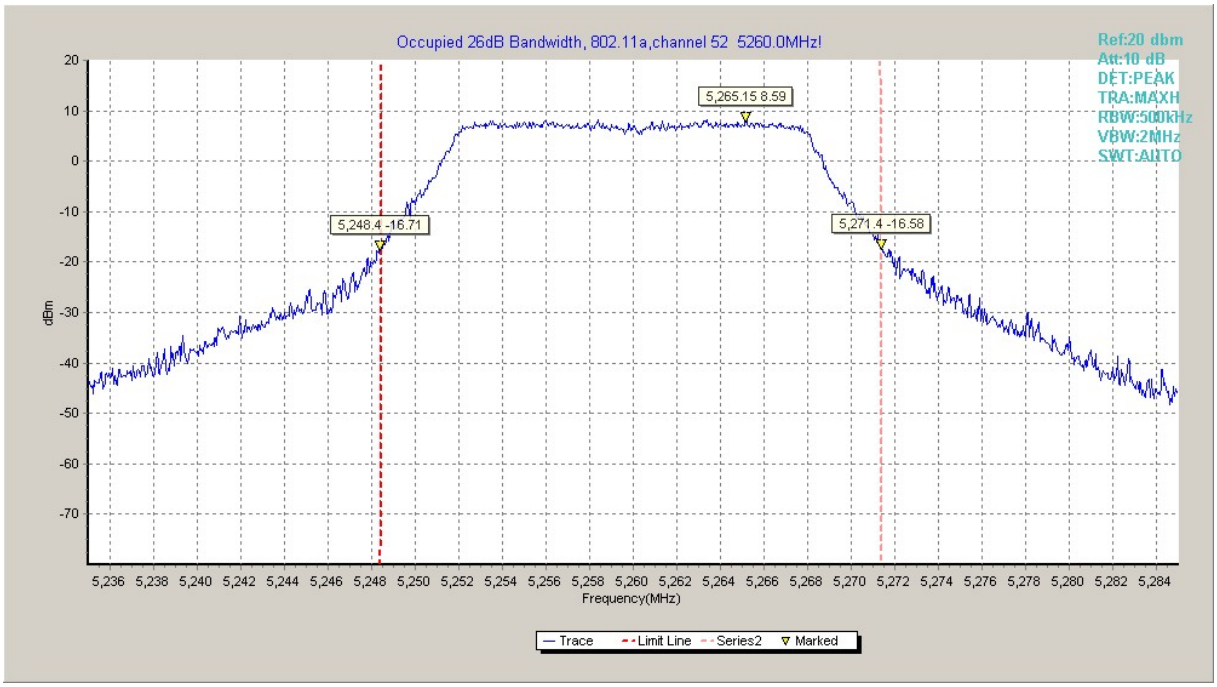


Fig.4 Occupied 26dB Bandwidth (802.11a, 5260MHz)

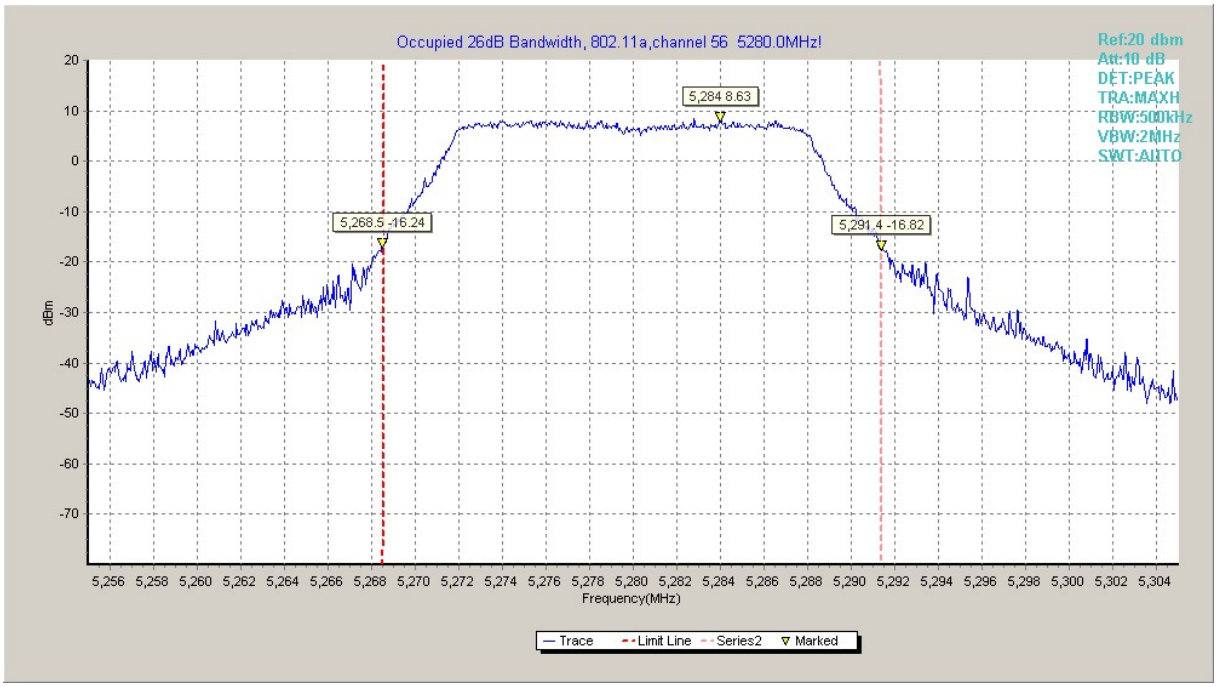


Fig.5 Occupied 26dB Bandwidth (802.11a, 5280MHz)

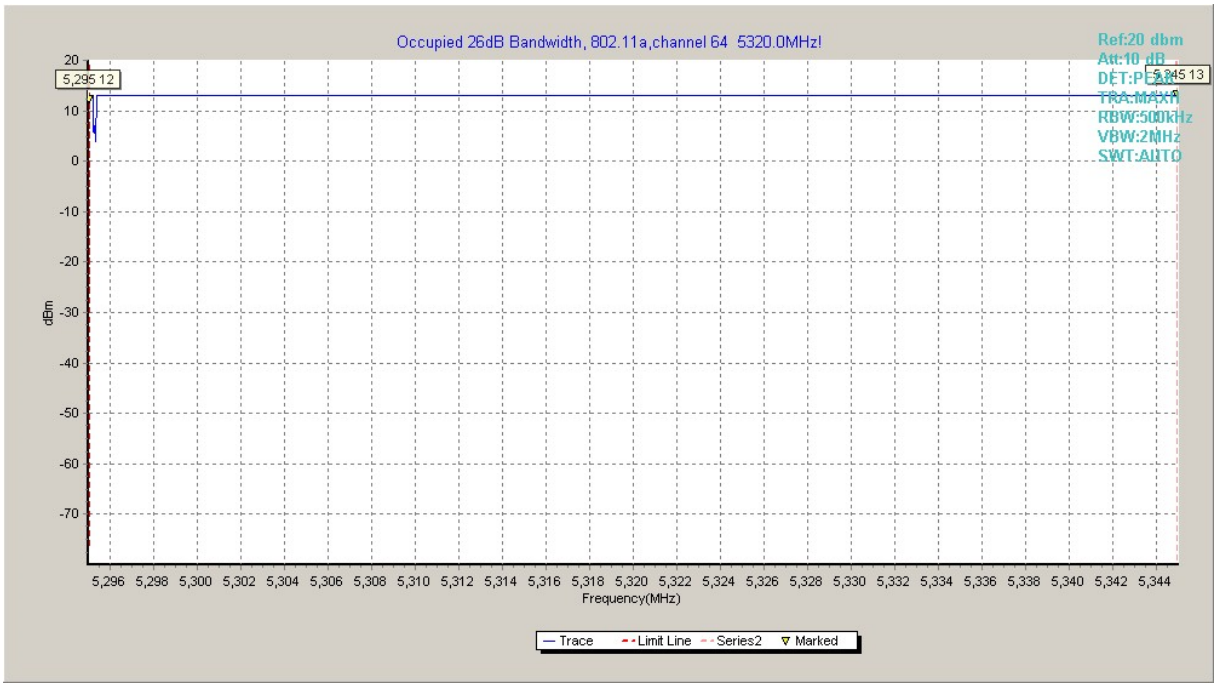


Fig.6 Occupied 26dB Bandwidth (802.11a, 5320MHz)

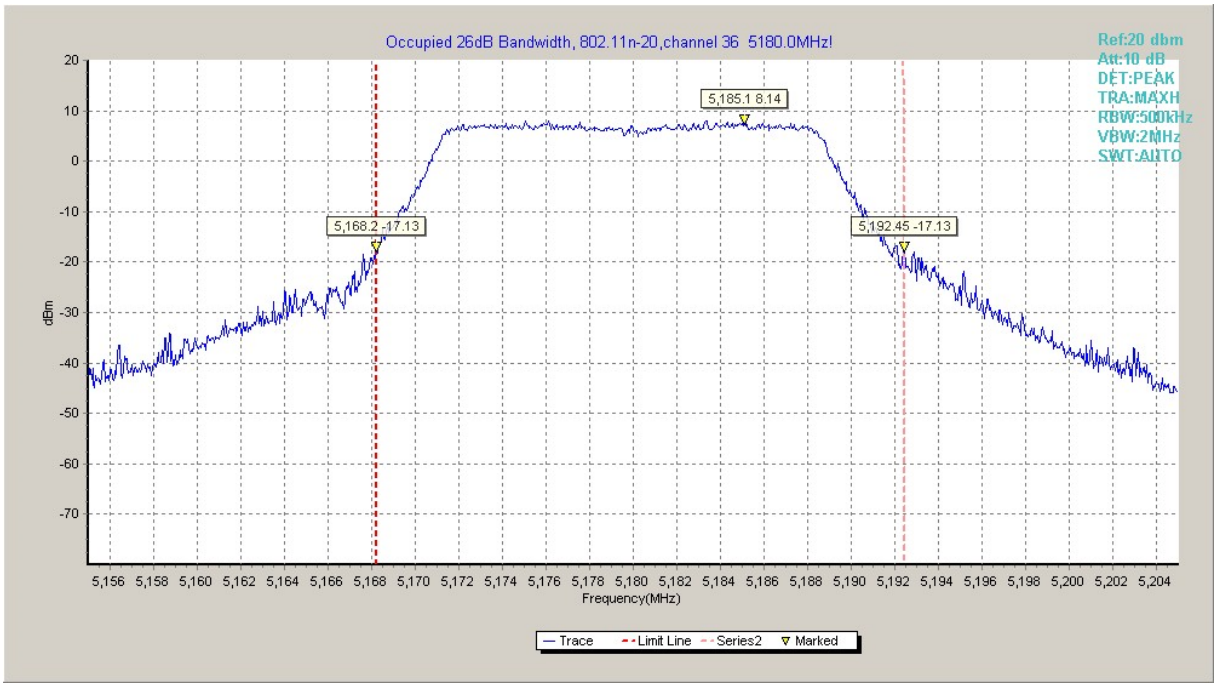


Fig.7 Occupied 26dB Bandwidth (802.11n-HT20, 5180MHz)

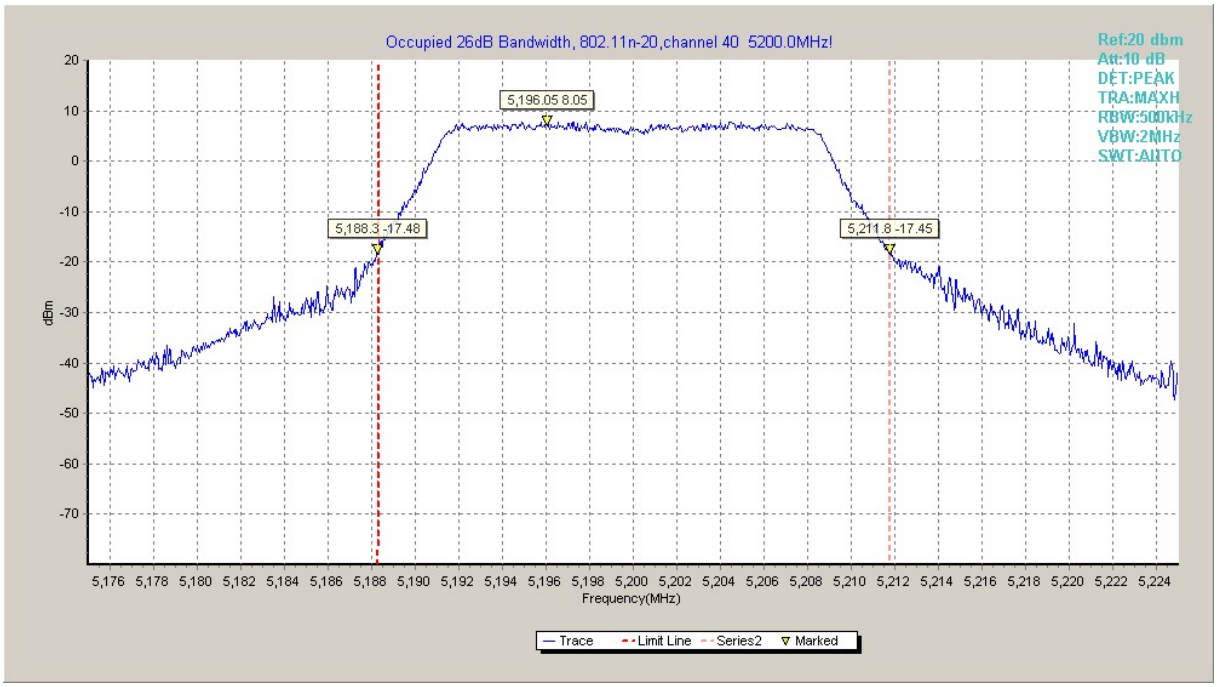


Fig.8 Occupied 26dB Bandwidth (802.11n-HT20, 5200MHz)

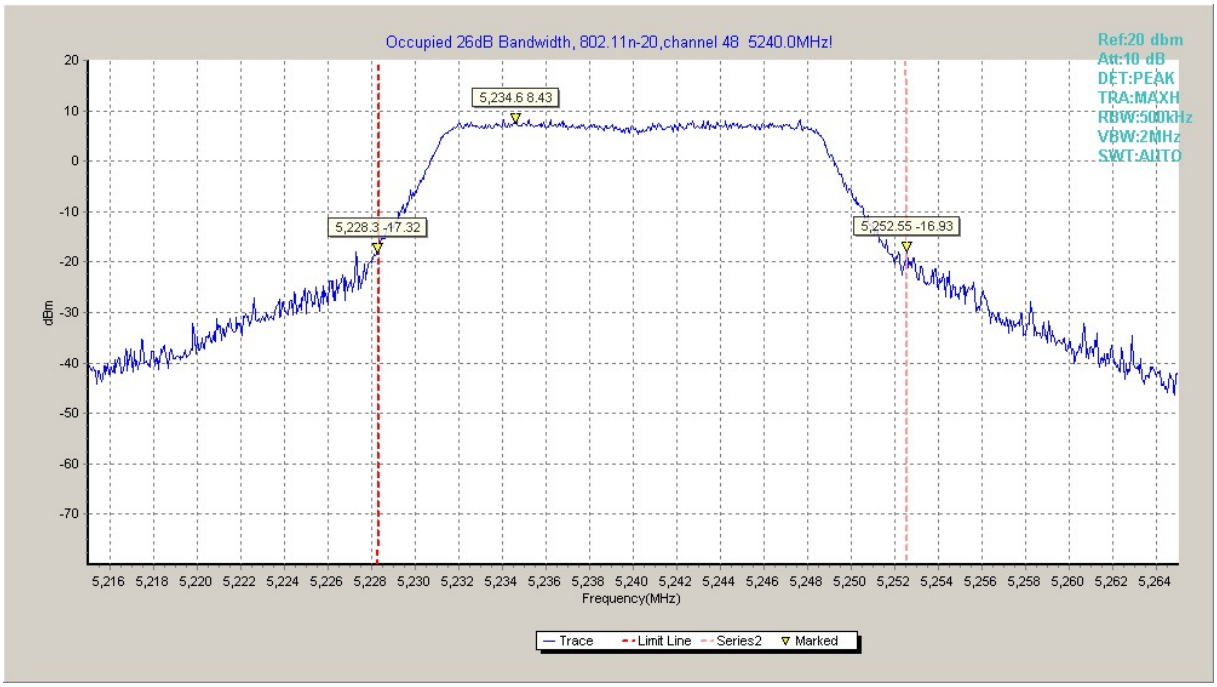


Fig.9 Occupied 26dB Bandwidth (802.11n-HT20, 5240MHz)

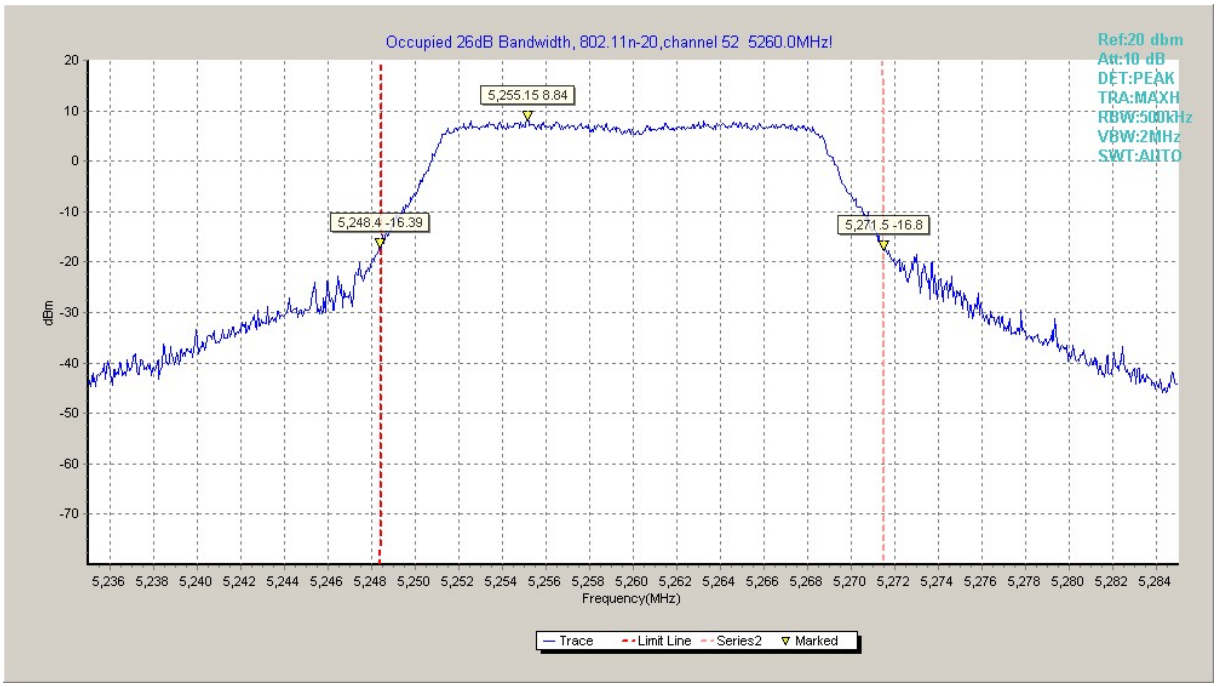


Fig.10 Occupied 26dB Bandwidth (802.11n-HT20, 5260MHz)

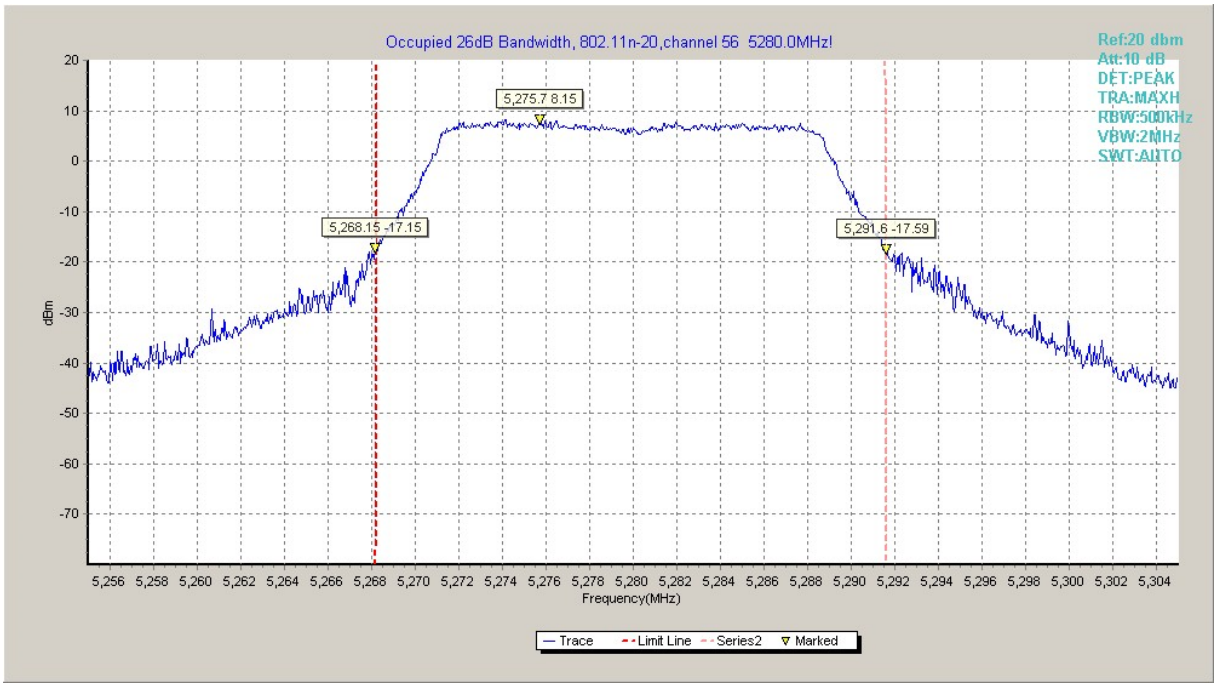


Fig.11 Occupied 26dB Bandwidth (802.11n-HT20, 5280MHz)

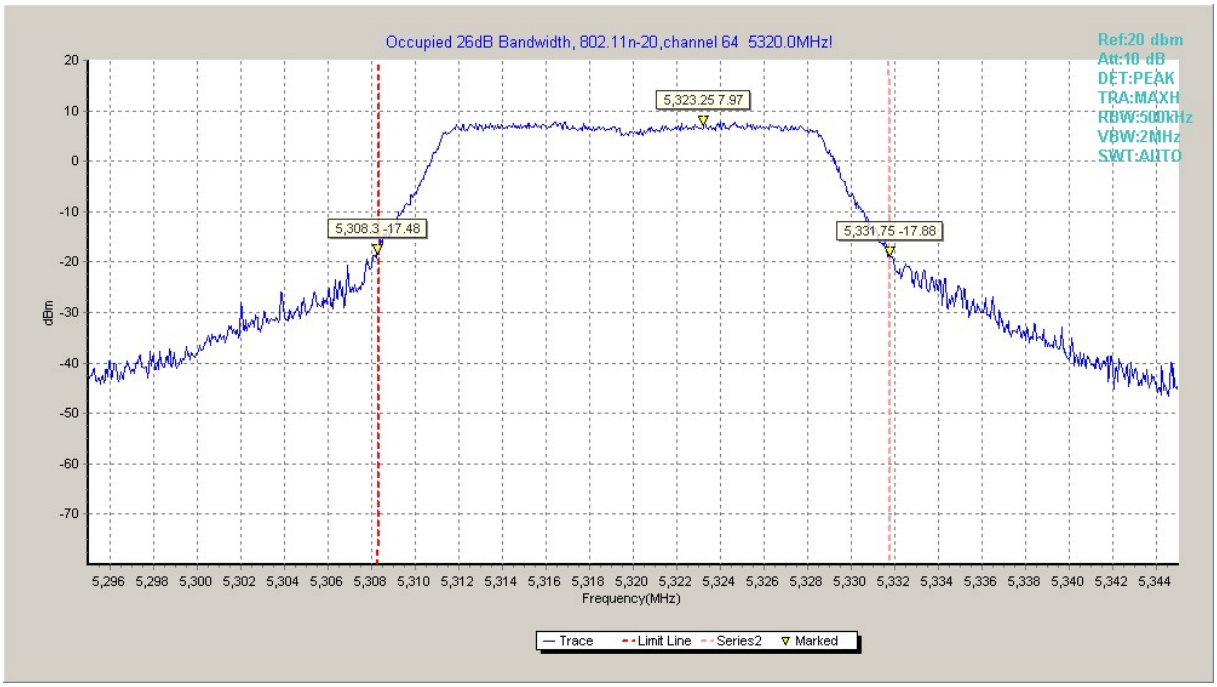


Fig.12 Occupied 26dB Bandwidth (802.11n-HT20, 5320MHz)

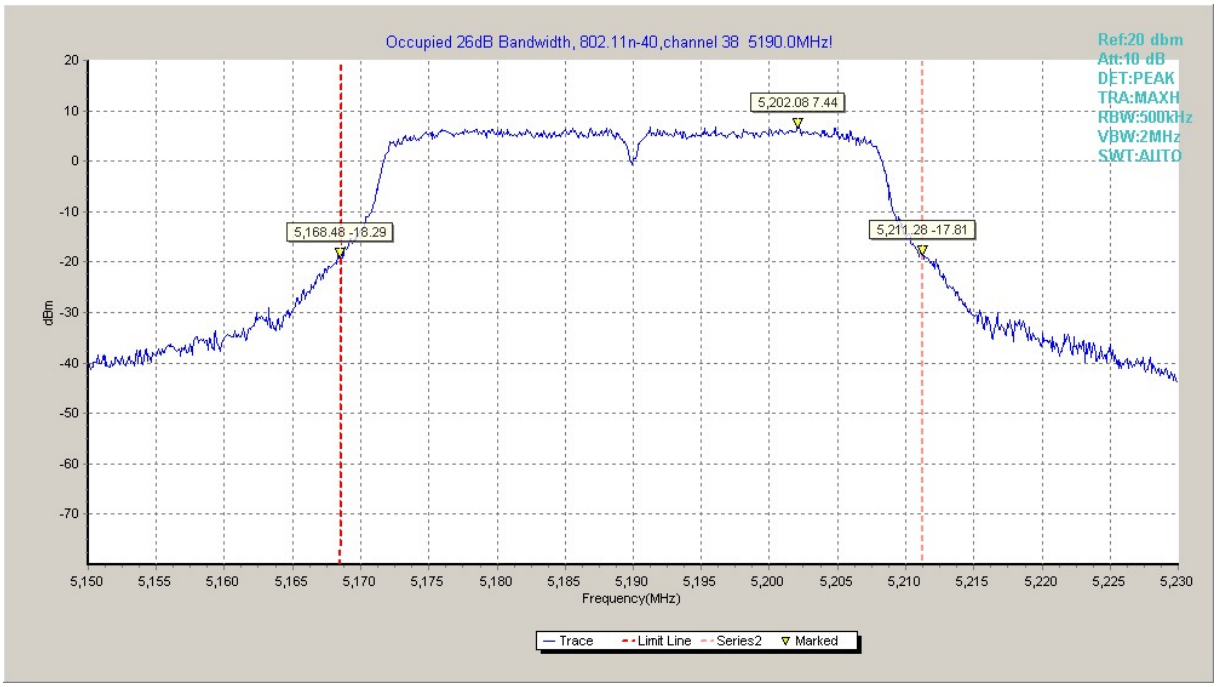


Fig.13 Occupied 26dB Bandwidth (802.11n-HT40, 5190MHz)

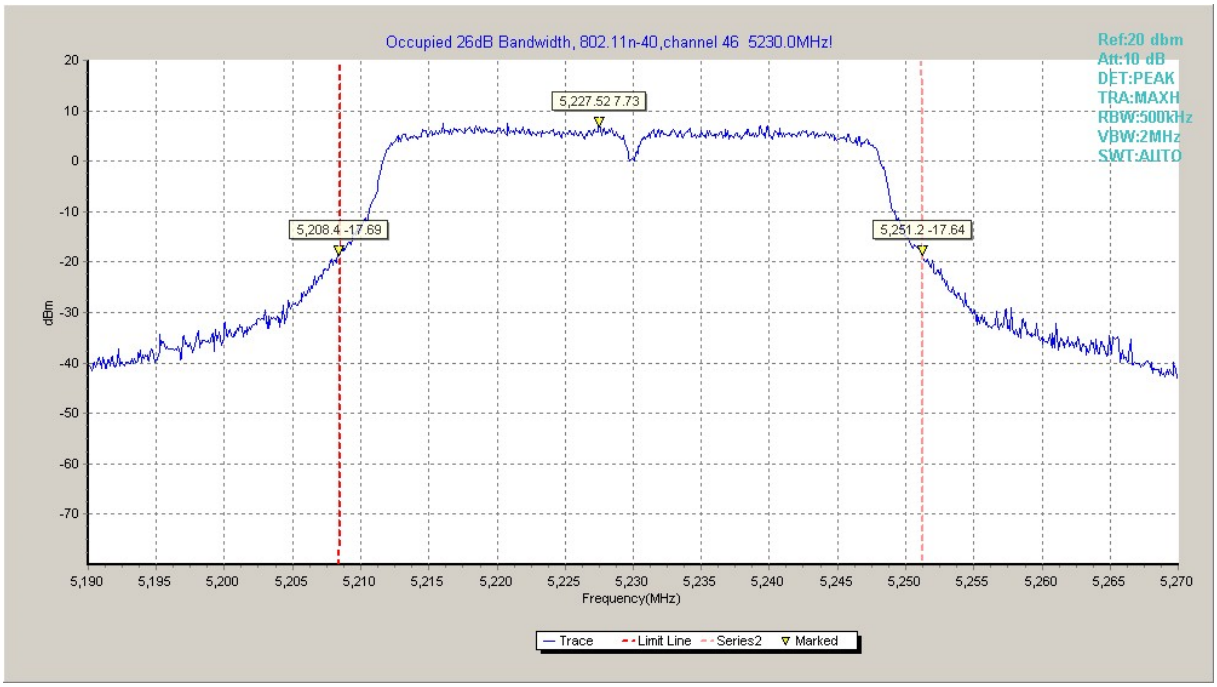


Fig.14 Occupied 26dB Bandwidth (802.11n-HT40, 5230MHz)

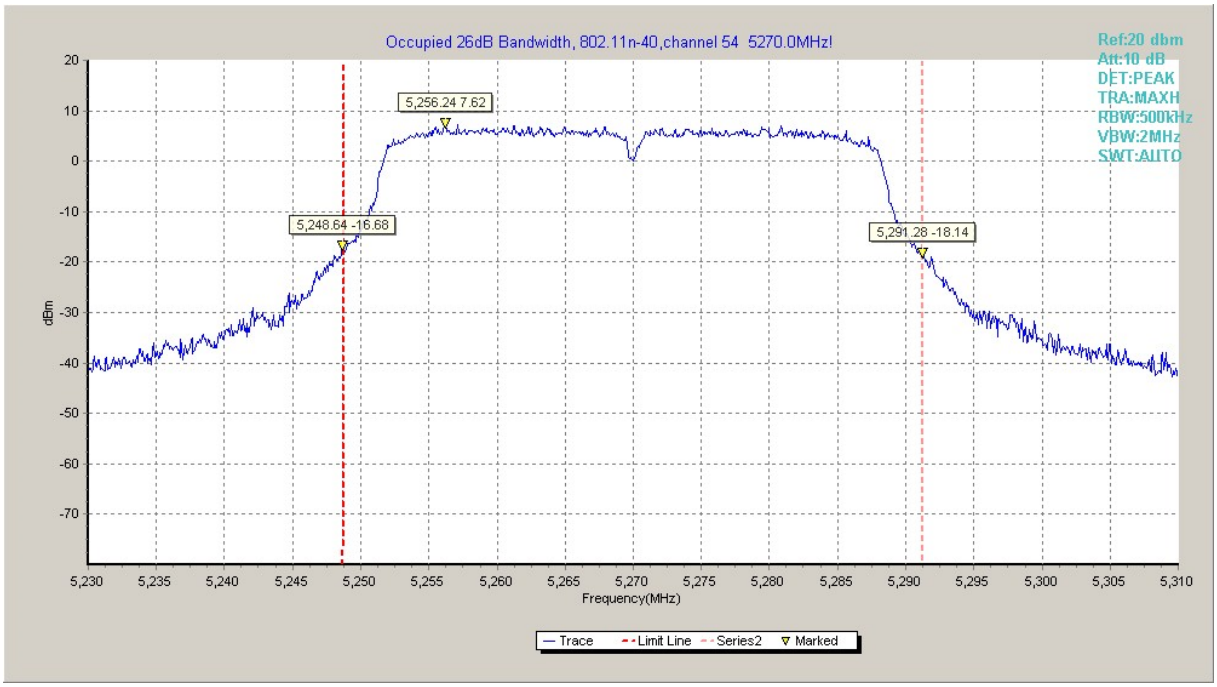


Fig.15 Occupied 26dB Bandwidth (802.11n-HT40, 5270MHz)

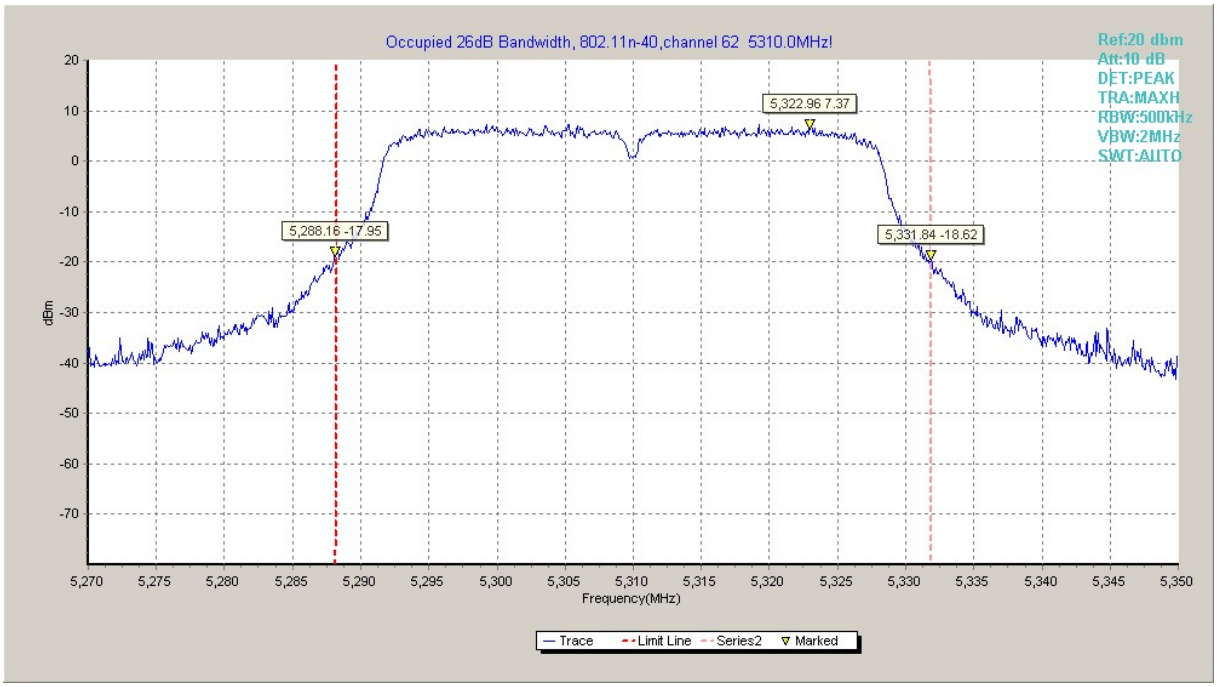


Fig.16 Occupied 26dB Bandwidth (802.11n-HT40, 5310MHz)

A.5. Band Edges Compliance

A5.1 Band Edges - Radiated

Measurement Limit:

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

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 Uncertainty:

Measurement Uncertainty	5.40dB

Measurement Result:

Mode	Channel	Test Results	Conclusion
802.11a	5180 MHz	Fig.17	P
	5320 MHz	Fig.18	P
802.11n HT20	5180 MHz	Fig.19	P
	5320 MHz	Fig.20	P
802.11n HT40	5190 MHz	Fig.21	P
	5310 MHz	Fig.22	P

Conclusion: PASS

Test graphs as below:

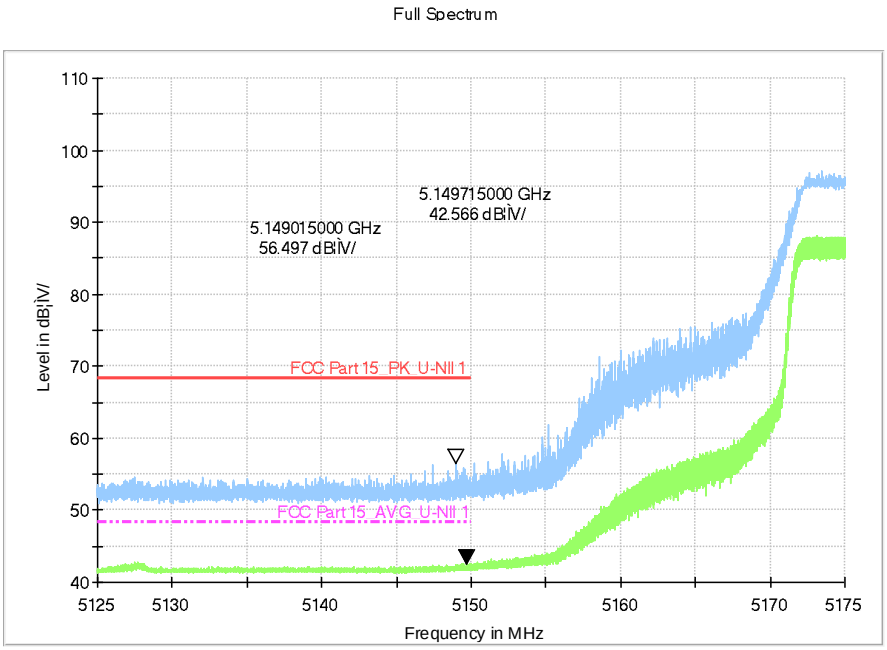


Fig. 17 Band Edges (802.11a, 5180MHz)

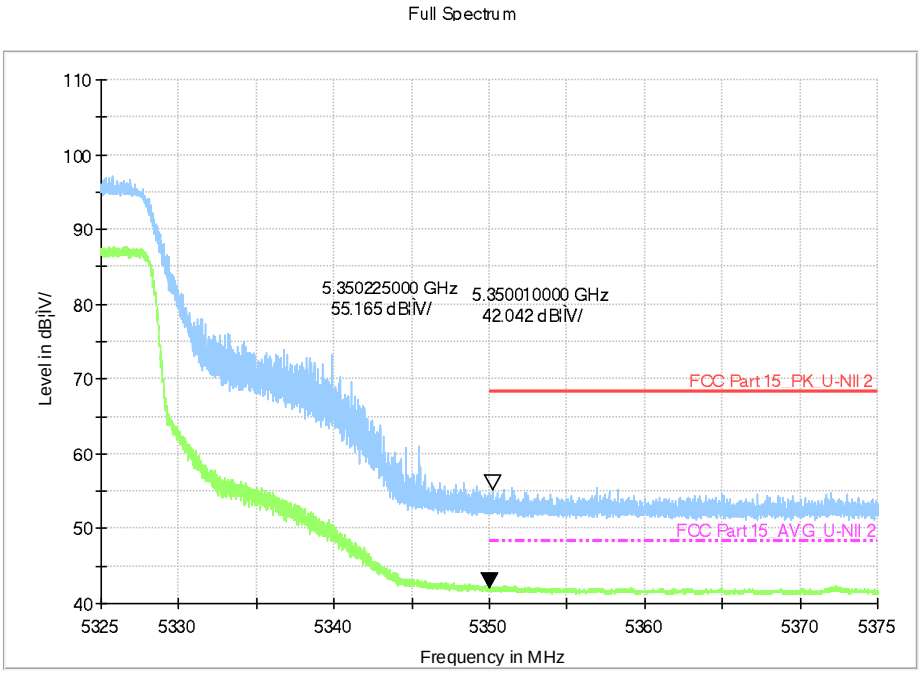


Fig. 18 Band Edges (802.11a, 5320MHz)

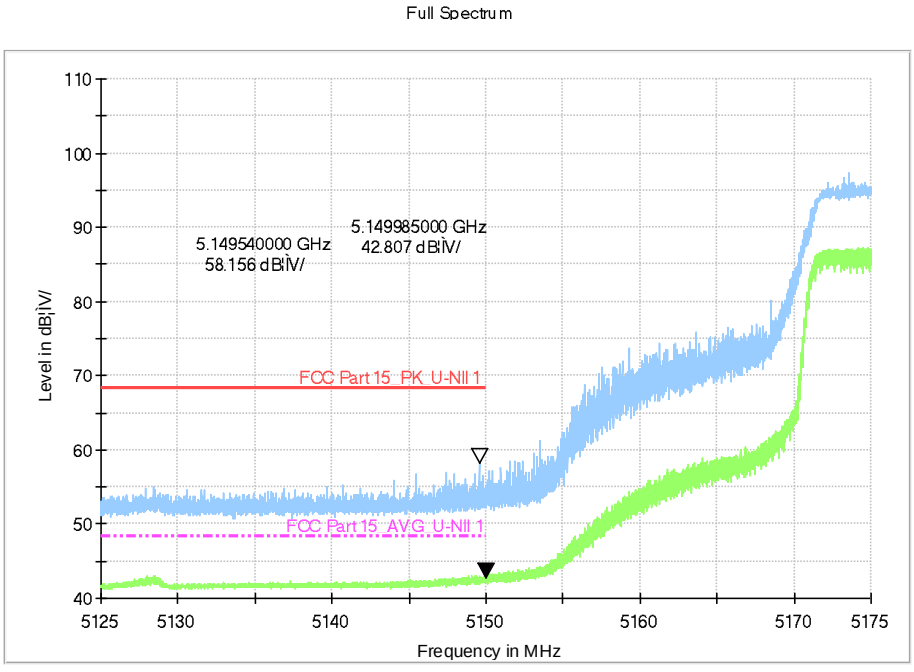


Fig. 19 Band Edges (802.11n-HT20, 5180MHz)

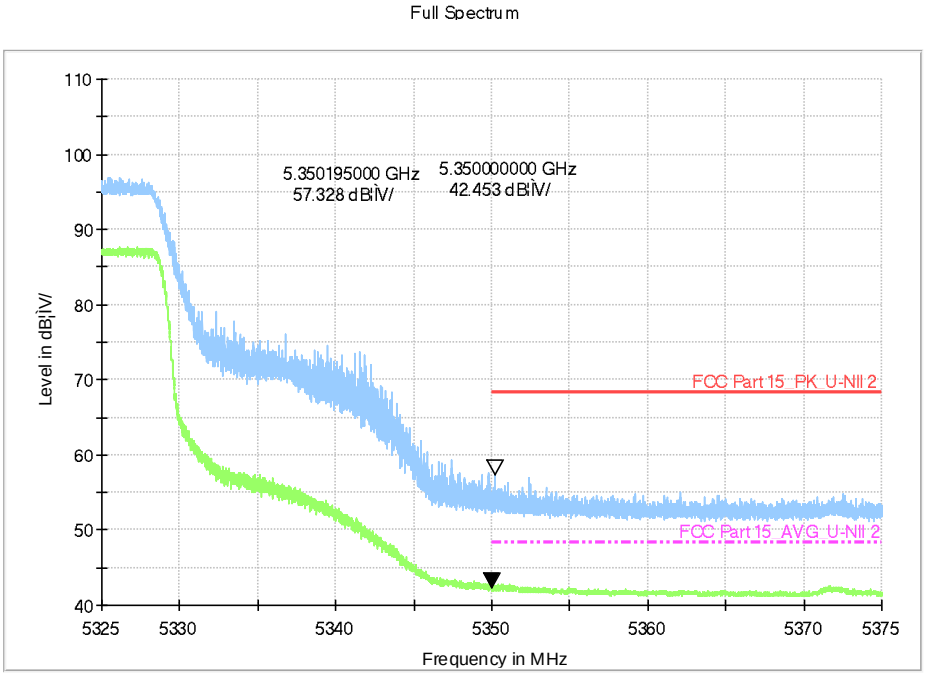


Fig. 20 Band Edges (802.11n-HT20, 5320MHz)

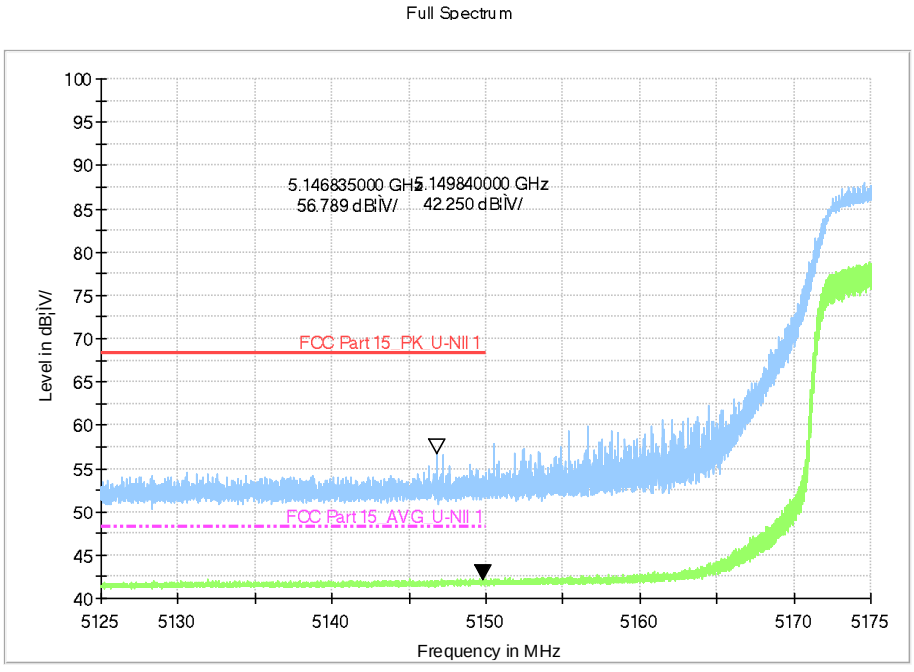


Fig. 21 Band Edges (802.11n-HT40, 5190MHz)

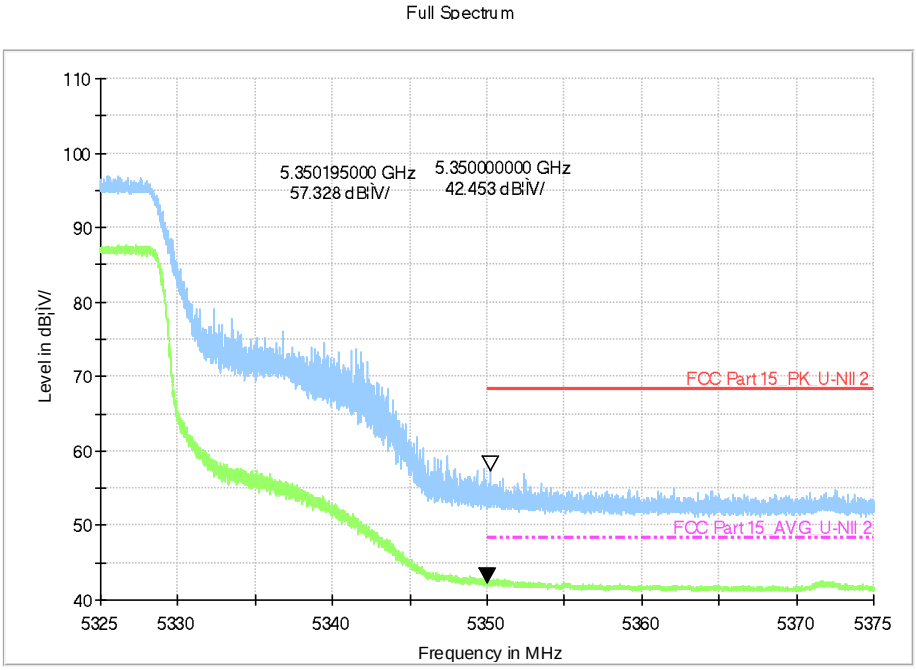


Fig. 22 Band Edges (802.11n-HT40, 5310MHz)

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)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength(dBμV/m)	Measurement distance(m)
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

Measurement uncertainty:

Expanded measurement uncertainty for this test item is U =3.9dB, k=2.

Measurement Results:

Conclusion: PASS

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”, and including the cable loss(the gain of the preamplifier), the gain of receive antenna.

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

Average

802.11a

Channel 36

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17963.7	35.3	-25.5	43.4	17.4	V
17984.6	35.3	-25.5	43.4	17.4	V
17888.9	35.2	-25.5	43.4	17.3	V
17986.8	35.2	-25.5	43.4	17.3	V
17970.3	35.1	-25.5	43.4	17.2	V
5127.5	42.8	-17.0	33.4	26.4	H

Channel 40

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17970.3	35.3	-25.5	43.4	17.4	H
17972.5	35.3	-25.5	43.4	17.4	H
17978.0	35.3	-25.5	43.4	17.4	V
17976.9	35.2	-25.5	43.4	17.3	V
17981.3	35.2	-25.5	43.4	17.3	V
17985.7	35.2	-25.5	43.4	17.3	V

Channel 48

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17990.1	35.5	-25.5	43.4	17.6	V
17979.1	35.4	-25.5	43.4	17.5	V
17992.3	35.4	-25.5	43.4	17.5	V
17970.3	35.3	-25.5	43.4	17.4	H
17973.6	35.3	-25.5	43.4	17.4	V
17978.0	35.3	-25.5	43.4	17.4	V

Channel 52

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17987.9	35.6	-25.5	43.4	17.7	V
17963.7	35.5	-25.5	43.4	17.6	V
17990.1	35.5	-25.5	43.4	17.6	V
17995.6	35.5	-25.5	43.4	17.6	V
17997.8	35.5	-25.5	43.4	17.6	V
17983.5	35.4	-25.5	43.4	17.5	H

Channel 56

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17943.9	35.6	-25.5	43.4	17.7	V
17970.3	35.5	-25.5	43.4	17.6	V
17964.8	35.4	-25.5	43.4	17.5	V
17864.7	35.3	-25.5	43.4	17.4	V
17960.4	35.3	-25.5	43.4	17.4	V
17987.9	35.3	-25.5	43.4	17.4	H

Channel 64

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17982.4	35.7	-25.5	43.4	17.8	V
17964.8	35.6	-25.5	43.4	17.7	V
17979.1	35.6	-25.5	43.4	17.7	V
17989.0	35.6	-25.5	43.4	17.7	V
17962.6	35.5	-25.5	43.4	17.6	V
5351.0	42.3	-16.9	33.4	25.8	V

802.11n-HT20

Channel 36

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17958.2	35.4	-25.5	43.4	17.5	V
17976.9	35.4	-25.5	43.4	17.5	V
17971.4	35.3	-25.5	43.4	17.4	V
17979.1	35.3	-25.5	43.4	17.4	V
17991.2	35.3	-25.5	43.4	17.4	V
5149.9	43.2	-17.0	33.4	26.8	H

Channel 40

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17979.1	35.5	-25.5	43.4	17.6	V
17960.4	35.3	-25.5	43.4	17.4	V
17971.4	35.3	-25.5	43.4	17.4	V
17824.0	35.1	-25.5	43.4	17.2	V
17964.8	35.1	-25.5	43.4	17.2	V
17967.0	35.1	-25.5	43.4	17.2	V

Channel 48

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17994.5	35.5	-25.5	43.4	17.6	V
17997.8	35.4	-25.5	43.4	17.5	V
17974.7	35.3	-25.5	43.4	17.4	V
17975.8	35.3	-25.5	43.4	17.4	V
17982.4	35.3	-25.5	43.4	17.4	V
17973.6	35.2	-25.5	43.4	17.3	V

Channel 52

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17996.7	35.6	-25.5	43.4	17.7	V
17997.8	35.6	-25.5	43.4	17.7	V
17972.5	35.5	-25.5	43.4	17.6	V
17987.9	35.4	-25.5	43.4	17.5	V
17916.4	35.3	-25.5	43.4	17.4	V
17961.5	35.3	-25.5	43.4	17.4	H

Channel 56

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17996.7	35.7	-25.5	43.4	17.8	V
17990.1	35.6	-25.5	43.4	17.7	V
17970.3	35.5	-25.5	43.4	17.6	V
17981.3	35.5	-25.5	43.4	17.6	V
17995.6	35.5	-25.5	43.4	17.6	V
17978.0	35.4	-25.5	43.4	17.5	V

Channel 64

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17990.1	35.7	-25.5	43.4	17.8	V
17984.6	35.6	-25.5	43.4	17.7	V
17993.4	35.6	-25.5	43.4	17.7	V
17994.5	35.6	-25.5	43.4	17.7	V
17970.3	35.5	-25.5	43.4	17.6	V
5350.7	42.8	-16.9	33.4	26.3	V

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Channel 38

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17931.8	35.4	-25.5	43.4	17.5	H
17974.7	35.4	-25.5	43.4	17.5	V
17989.0	35.4	-25.5	43.4	17.5	V
17993.4	35.3	-25.5	43.4	17.4	V
17956.0	35.2	-25.5	43.4	17.3	H
5149.6	42.3	-17.0	33.4	25.9	V

Channel 46

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17981.3	35.5	-25.5	43.4	17.6	V
17994.5	35.4	-25.5	43.4	17.5	V
17964.8	35.3	-25.5	43.4	17.4	V
17969.2	35.3	-25.5	43.4	17.4	V
17975.8	35.3	-25.5	43.4	17.4	V
17996.7	35.3	-25.5	43.4	17.4	H

Channel 54

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17980.2	35.7	-25.5	43.4	17.8	H
17985.7	35.7	-25.5	43.4	17.8	H
17928.5	35.5	-25.5	43.4	17.6	V
17978.0	35.5	-25.5	43.4	17.6	V
17982.4	35.5	-25.5	43.4	17.6	V
17996.7	35.5	-25.5	43.4	17.6	V

Channel 62

Frequency (MHz)	Measurement Result (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBµV)	Antenna Pol. (H/V)
17991.2	35.6	-25.5	43.4	17.7	V
17932.9	35.5	-25.5	43.4	17.6	V
17972.5	35.5	-25.5	43.4	17.6	V
17992.3	35.5	-25.5	43.4	17.6	V
17950.5	35.4	-25.5	43.4	17.5	V
5350.0	50.9	-16.9	33.4	34.4	V

Peak

802.11a

Channel 36

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17969.2	47.1	-25.5	43.4	29.2	H
17547.9	46.7	-26.9	43.4	30.2	V
17837.2	46.7	-25.5	43.4	28.8	V
17960.4	46.7	-25.5	43.4	28.8	V
17863.6	46.5	-25.5	43.4	28.6	V
5149.0	56.5	-17.0	33.4	40.1	H

Channel 40

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17890.0	47.2	-25.5	43.4	29.3	V
17329.0	47.0	-25.9	40.1	32.8	V
17656.8	47.0	-25.7	43.4	29.3	V
17954.9	47.0	-25.5	43.4	29.1	H
17995.6	46.9	-25.5	43.4	29.0	H
17776.7	46.7	-25.5	43.4	28.8	V

Channel 48

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17961.5	47.8	-25.5	43.4	29.9	H
17979.1	47.6	-25.5	43.4	29.7	V
17708.5	47.5	-25.7	43.4	29.8	V
17963.7	47.4	-25.5	43.4	29.5	V
17397.2	47.3	-26.9	43.4	30.8	V
17599.6	47.2	-25.7	43.4	29.5	V

Channel 52

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17984.6	47.6	-25.5	43.4	29.7	V
17452.2	47.5	-26.9	43.4	31.0	V
17473.1	47.3	-26.9	43.4	30.8	V
17932.9	47.3	-25.5	43.4	29.4	H
17463.2	47.2	-26.9	43.4	30.7	V
17888.9	47.2	-25.5	43.4	29.3	V

Channel 56

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17949.4	47.4	-25.5	43.4	29.5	H
17826.2	47.2	-25.5	43.4	29.3	H
17903.2	47.1	-25.5	43.4	29.2	H
17945.0	47.1	-25.5	43.4	29.2	H
17957.1	47.0	-25.5	43.4	29.1	H
17937.3	46.9	-25.5	43.4	29.0	H

Channel 64

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17946.1	48.1	-25.5	43.4	30.2	H
17985.7	47.7	-25.5	43.4	29.8	V
17453.3	47.5	-26.9	43.4	31.0	H
17942.8	47.4	-25.5	43.4	29.5	H
17876.8	47.3	-25.5	43.4	29.4	V
5356.9	55.5	-16.9	33.4	39.0	V

802.11n-HT20

Channel 36

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17954.9	47.5	-25.5	43.4	29.6	H
17973.6	47.2	-25.5	43.4	29.3	H
17391.7	47.1	-26.9	43.4	30.6	H
17783.3	47.0	-25.5	43.4	29.1	V
17945.0	47.0	-25.5	43.4	29.1	H
5149.5	58.2	-17.0	33.4	41.8	H

Channel 40

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17898.8	47.5	-25.5	43.4	29.6	V
17855.9	47.4	-25.5	43.4	29.5	H
17980.2	47.1	-25.5	43.4	29.2	H
17609.5	46.9	-25.7	43.4	29.2	V
17650.2	46.9	-25.7	43.4	29.2	V
17749.2	46.9	-25.5	43.4	29.0	V

Channel 48

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17745.9	47.5	-25.5	43.4	29.6	V
17496.2	47.4	-26.9	43.4	30.9	V
17976.9	47.4	-25.5	43.4	29.5	V
17943.9	47.1	-25.5	43.4	29.2	V
17946.1	46.8	-25.5	43.4	28.9	H
17974.7	46.8	-25.5	43.4	28.9	V

Channel 52

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17941.7	47.5	-25.5	43.4	29.6	V
17948.3	47.5	-25.5	43.4	29.6	H
17992.3	47.4	-25.5	43.4	29.5	H
17495.1	47.2	-26.9	43.4	30.7	H
17881.2	47.2	-25.5	43.4	29.3	H
17938.4	47.1	-25.5	43.4	29.2	V

Channel 56

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17792.1	47.3	-25.5	43.4	29.4	H
17820.7	47.3	-25.5	43.4	29.4	V
17841.6	47.2	-25.5	43.4	29.3	V
17930.7	46.9	-25.5	43.4	29.0	V
17997.8	46.9	-25.5	43.4	29.0	V
17776.7	46.8	-25.5	43.4	28.9	H

Channel 64

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17825.1	47.4	-25.5	43.4	29.5	V
17859.2	47.3	-25.5	43.4	29.4	V
17979.1	47.2	-25.5	43.4	29.3	H
17710.7	47.0	-25.7	43.4	29.3	V
17990.1	47.0	-25.5	43.4	29.1	V
5350.2	57.3	-16.9	33.4	40.8	V

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Channel 38

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17810.8	47.6	-25.5	43.4	29.7	H
17871.3	47.2	-25.5	43.4	29.3	H
17962.6	47.2	-25.5	43.4	29.3	V
17997.8	47.2	-25.5	43.4	29.3	V
17893.3	47.1	-25.5	43.4	29.2	V
5146.8	56.8	-17.0	33.4	40.4	H

Channel 46

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17817.4	47.3	-25.5	43.4	29.4	V
17318.0	47.2	-25.9	40.1	33.0	V
17874.6	47.0	-25.5	43.4	29.1	V
17551.2	46.9	-26.9	43.4	30.4	V
17816.3	46.9	-25.5	43.4	29.0	V
17147.5	46.8	-26.6	40.1	33.3	H

Channel 54

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17877.9	47.5	-25.5	43.4	29.6	V
17962.6	47.5	-25.5	43.4	29.6	H
17836.1	47.2	-25.5	43.4	29.3	H
17997.8	47.2	-25.5	43.4	29.3	V
17822.9	46.9	-25.5	43.4	29.0	V
17838.3	46.9	-25.5	43.4	29.0	V

Channel 62

Frequency (MHz)	Measurement Result (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBµV)	Antenna Pol. (H/V)
17994.5	48.1	-25.5	43.4	30.2	V
17667.8	47.7	-25.7	43.4	30.0	H
17974.7	47.7	-25.5	43.4	29.8	V
17866.9	47.5	-25.5	43.4	29.6	H
17921.9	47.3	-25.5	43.4	29.4	V
5351.5	70.3	-16.9	33.4	53.8	V

Sample calculation: 802.11n 40MHz CH62–Peak, 5351.5MHz

Peak ERP(dBm) = P_{Mea}(53.8dBuV/m) + Cable Loss(-16.3) + Antenna Factor(33.4) = 70.3dBuV/m

A.7. AC Powerline Conducted Emission (150kHz- 30MHz)

Test Condition:

Voltage（V）	Frequency（Hz）
120	60

Measurement uncertainty:

Expanded measurement uncertainty for this test item is U =3.38dB, k=2.

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.23	Fig.24	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.23	Fig.24	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:

Result for Traffic:

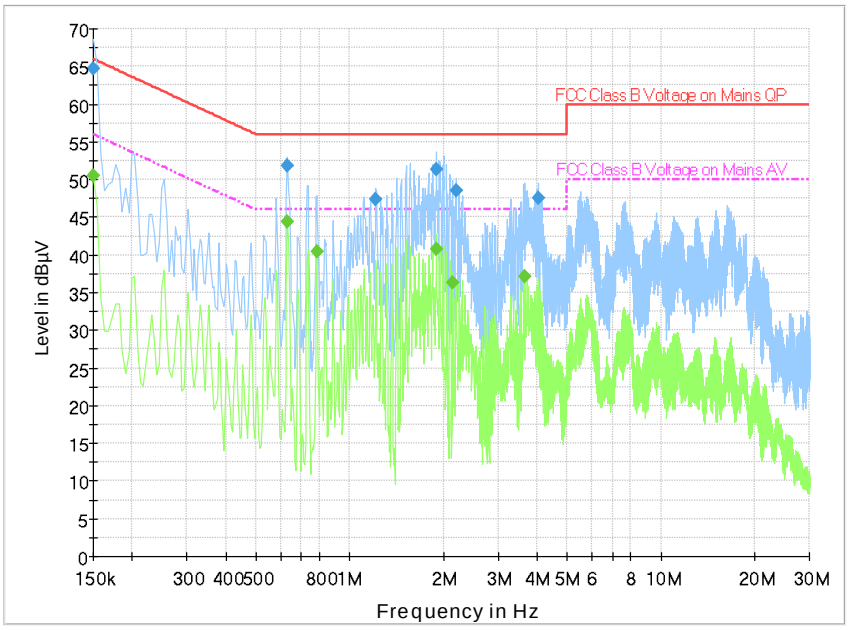

Fig. 23 Conducted Emission(802.11a, Ch40, TX)

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	64.8	2000.0	9.000	On	N	30.6	1.2	66.0	
0.631500	51.8	2000.0	9.000	On	L1	19.8	4.2	56.0	
1.212000	47.3	2000.0	9.000	On	L1	19.6	8.7	56.0	
1.896000	51.3	2000.0	9.000	On	L1	19.6	4.7	56.0	
2.193000	48.5	2000.0	9.000	On	L1	19.6	7.5	56.0	
4.042500	47.6	2000.0	9.000	On	L1	19.6	8.5	56.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	50.6	2000.0	9.000	On	L1	30.7	5.4	56.0	
0.631500	44.4	2000.0	9.000	On	L1	19.8	1.6	46.0	
0.784500	40.5	2000.0	9.000	On	L1	19.8	5.5	46.0	
1.896000	40.8	2000.0	9.000	On	L1	19.6	5.2	46.0	
2.143500	36.2	2000.0	9.000	On	L1	19.6	9.8	46.0	
3.660000	37.2	2000.0	9.000	On	L1	19.6	8.8	46.0	

Result for Idle:

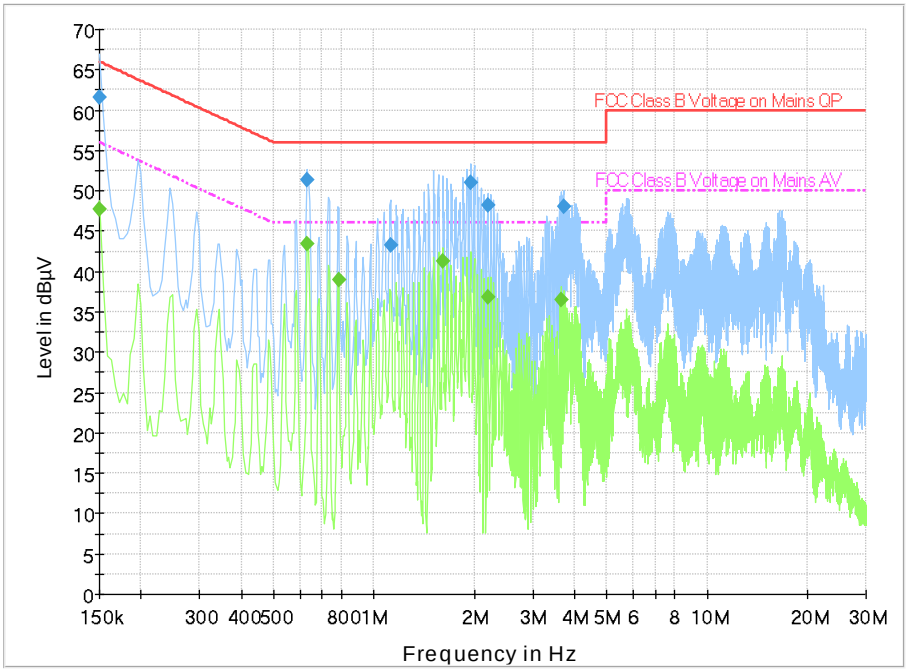

Fig. 24 Conducted Emission(802.11a, IDLE)

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	61.6	2000.0	9.000	On	L1	30.7	4.4	66.0	
0.631500	51.3	2000.0	9.000	On	L1	19.8	4.7	56.0	
1.122000	43.2	2000.0	9.000	On	L1	19.7	12.8	56.0	
1.950000	51.0	2000.0	9.000	On	L1	19.6	5.0	56.0	
2.193000	48.2	2000.0	9.000	On	L1	19.6	7.8	56.0	
3.709500	48.0	2000.0	9.000	On	L1	19.6	8.0	56.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	47.7	2000.0	9.000	On	L1	30.7	8.3	56.0	
0.631500	43.4	2000.0	9.000	On	L1	19.8	2.6	46.0	
0.784500	38.9	2000.0	9.000	On	L1	19.8	7.1	46.0	
1.612500	41.3	2000.0	9.000	On	L1	19.6	4.7	46.0	
2.193000	36.8	2000.0	9.000	On	L1	19.6	9.2	46.0	
3.655500	36.5	2000.0	9.000	On	L1	19.6	9.5	46.0	

A.8. 99% Occupied bandwidth

Method of Measurement: See ANSI C63.10-2013-clause 12.4.2.

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Step a) through step c) might require iteration to adjust within the specified range.

e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% ofthe total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Measurement Uncertainty:

Measurement Uncertainty	60.80Hz

Measurement Result:

Mode	Frequency	99% Occupied bandwidth (MHz)		conclusion
802.11a	5180 MHz	Fig.25	17.96	P
	5200 MHz	Fig.26	17.91	P
	5240 MHz	Fig.27	17.99	P
802.11n HT20	5180 MHz	Fig.28	18.75	P
	5200 MHz	Fig.29	18.72	P
	5240 MHz	Fig.30	18.71	P
802.11n HT40	5190 MHz	Fig.31	36.23	P
	5230 MHz	Fig.32	36.22	P

Conclusion: PASS

Test graphs as below:

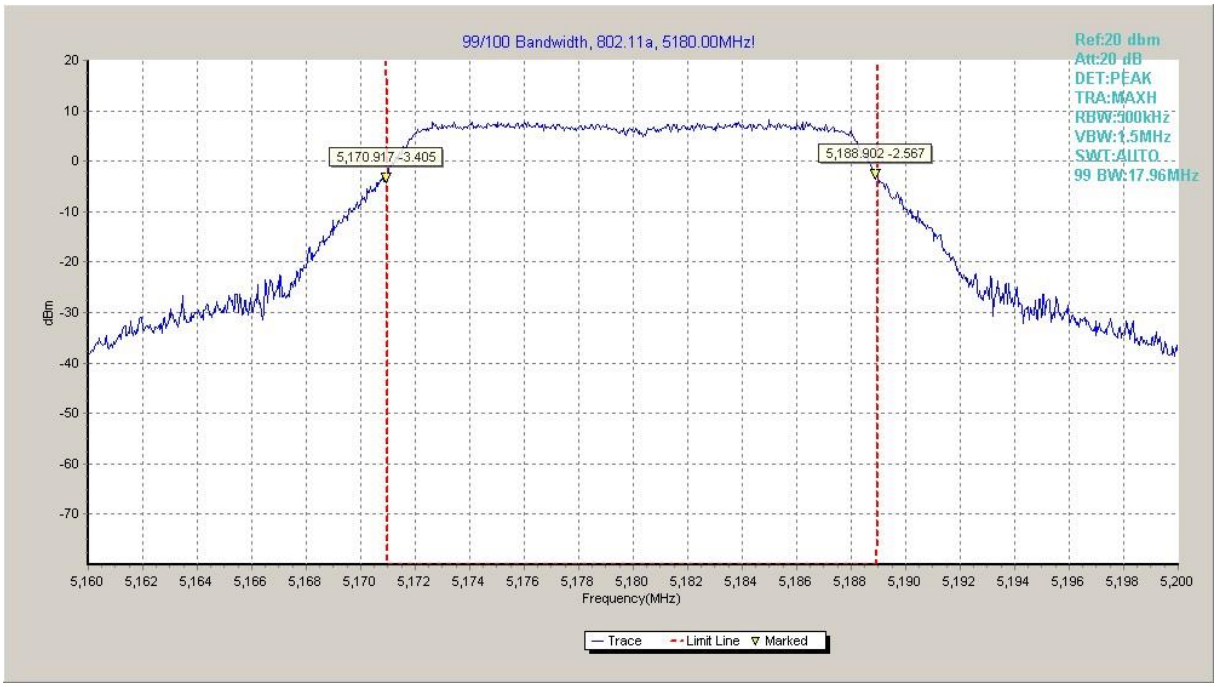

Fig. 25 99% Occupied bandwidth (802.11a, 5180MHz)

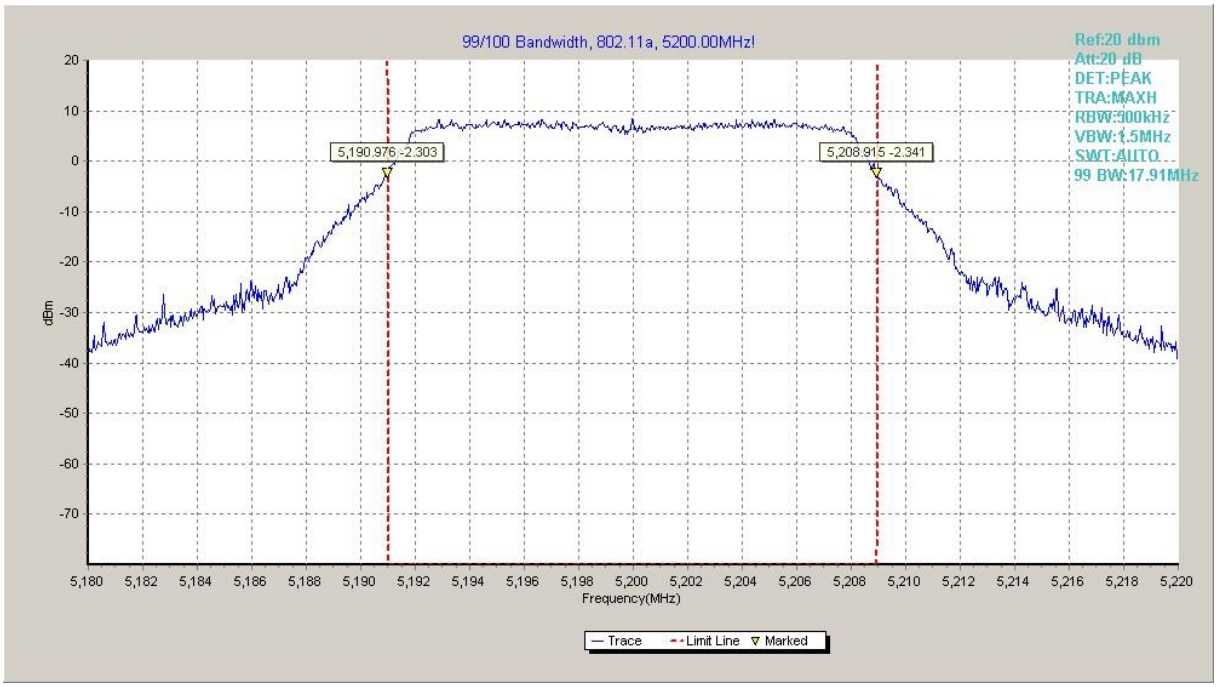

Fig. 26 99% Occupied bandwidth (802.11a, 5200MHz)

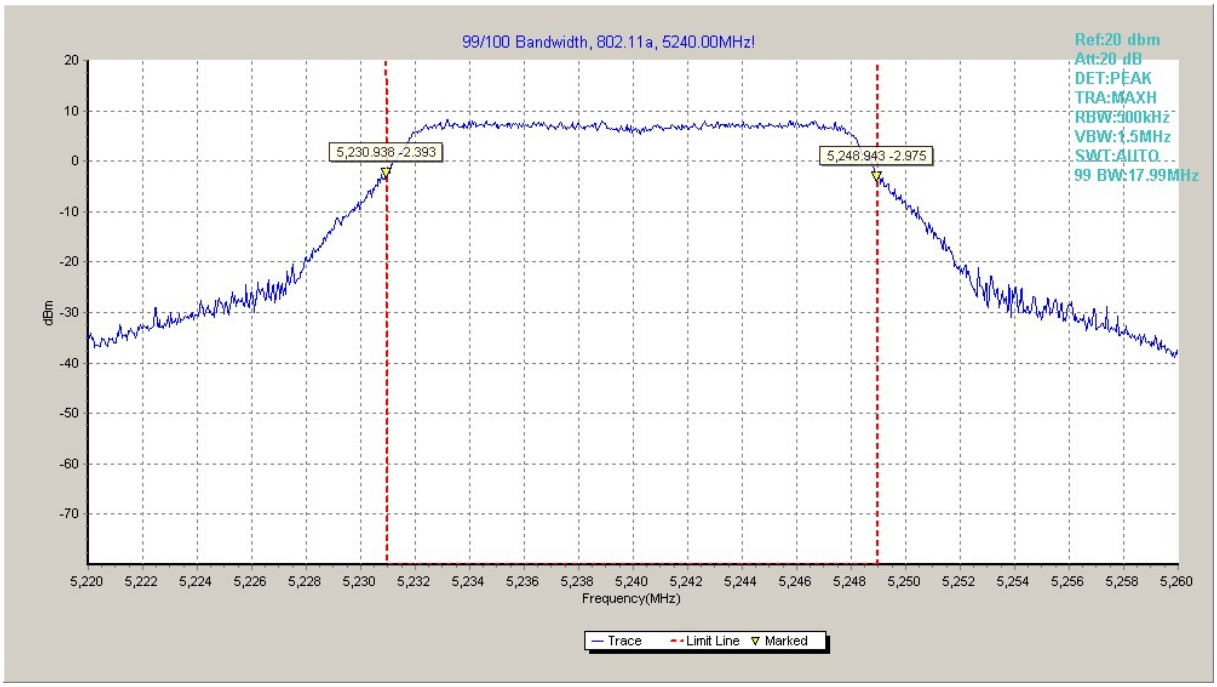

Fig. 27 99% Occupied bandwidth (802.11a, 5240MHz)

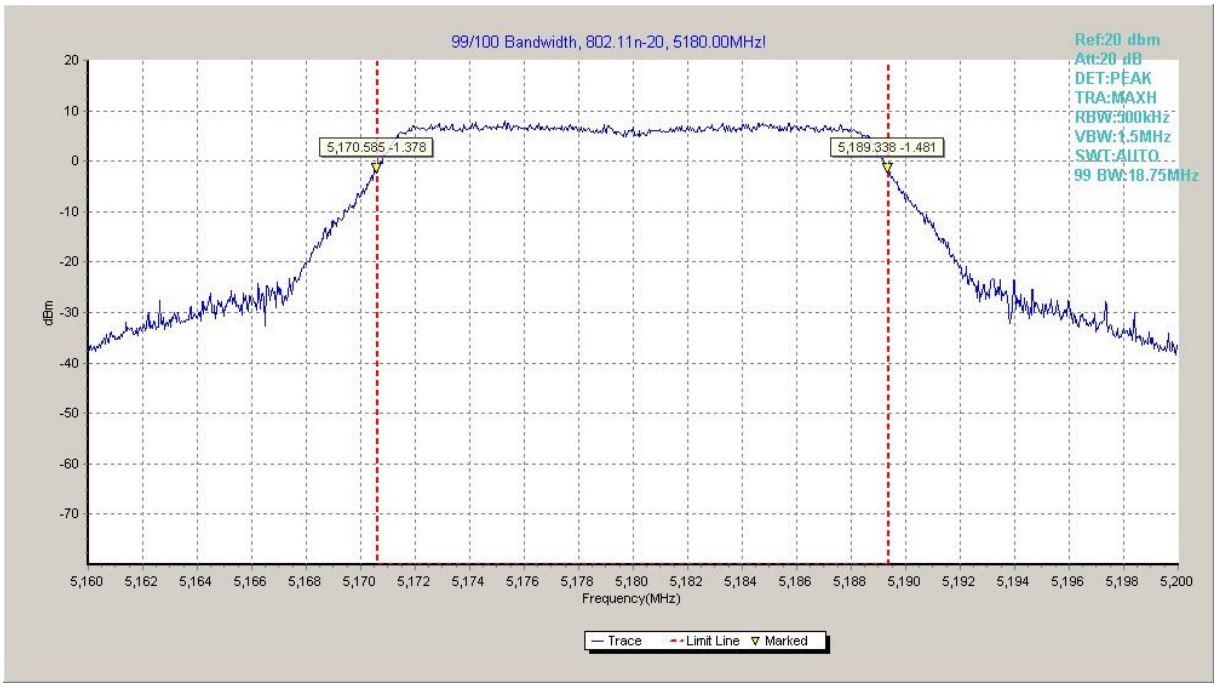

Fig. 28 99% Occupied bandwidth (802.11n-HT20, 5180MHz)

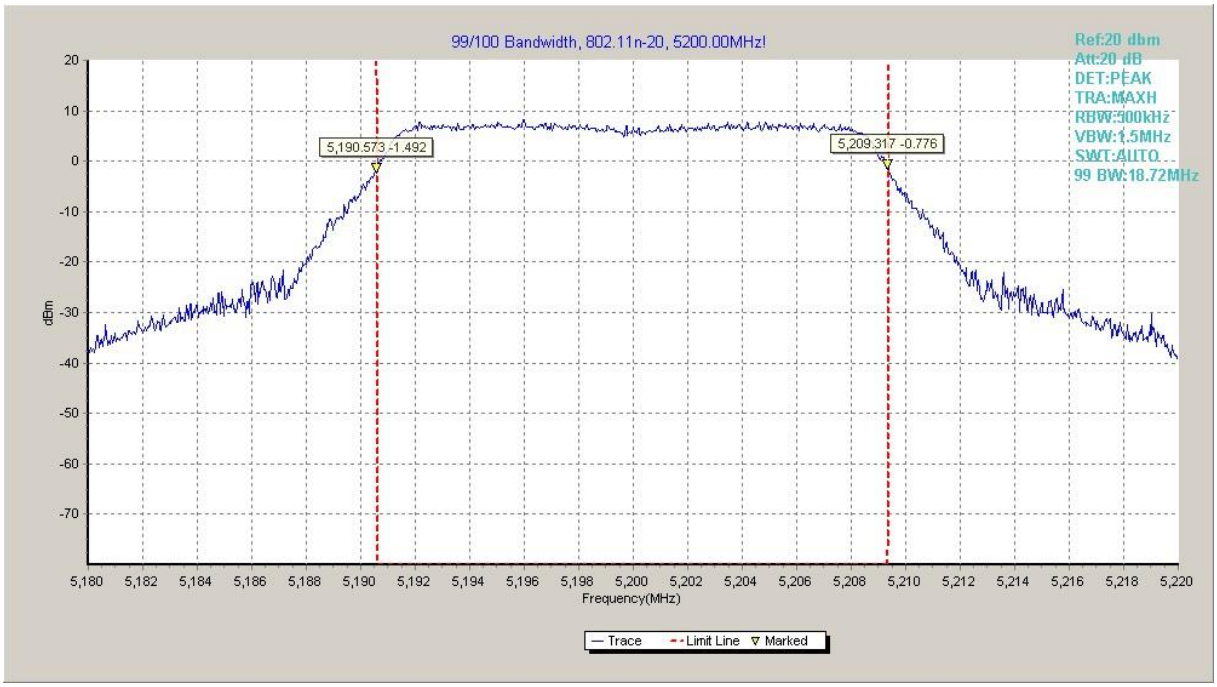

Fig. 29 99% Occupied bandwidth (802.11n-HT20, 5200MHz)

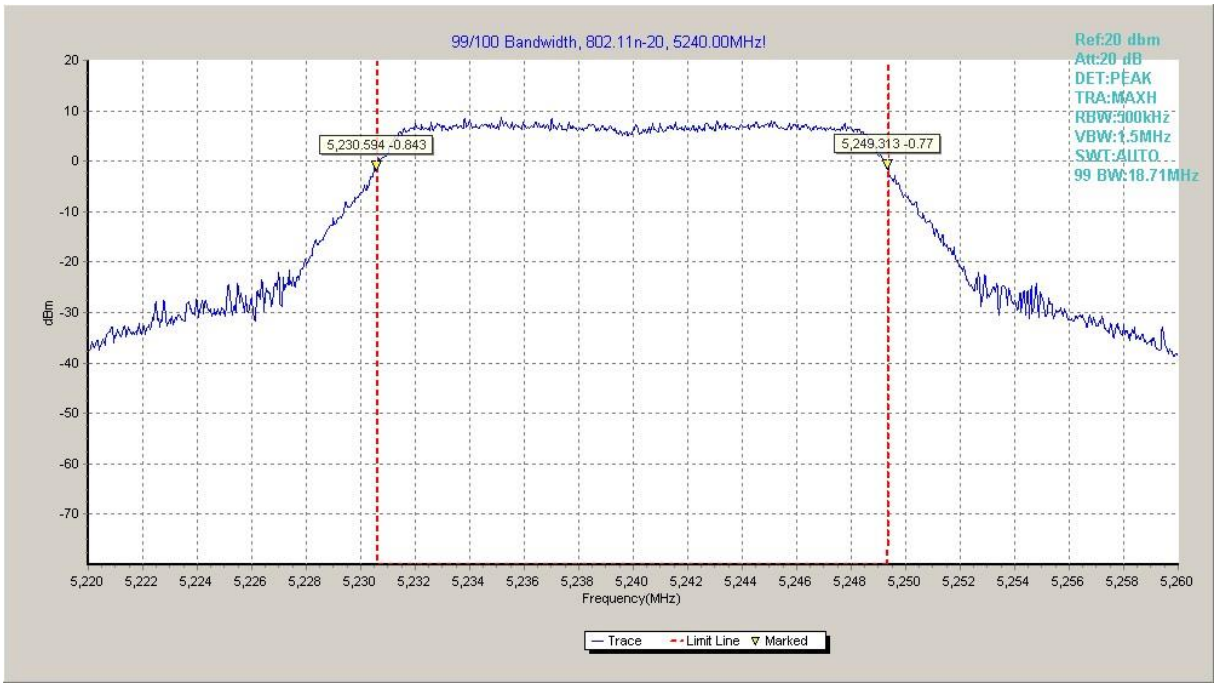

Fig. 30 99% Occupied bandwidth (802.11n-HT20, 5240MHz)

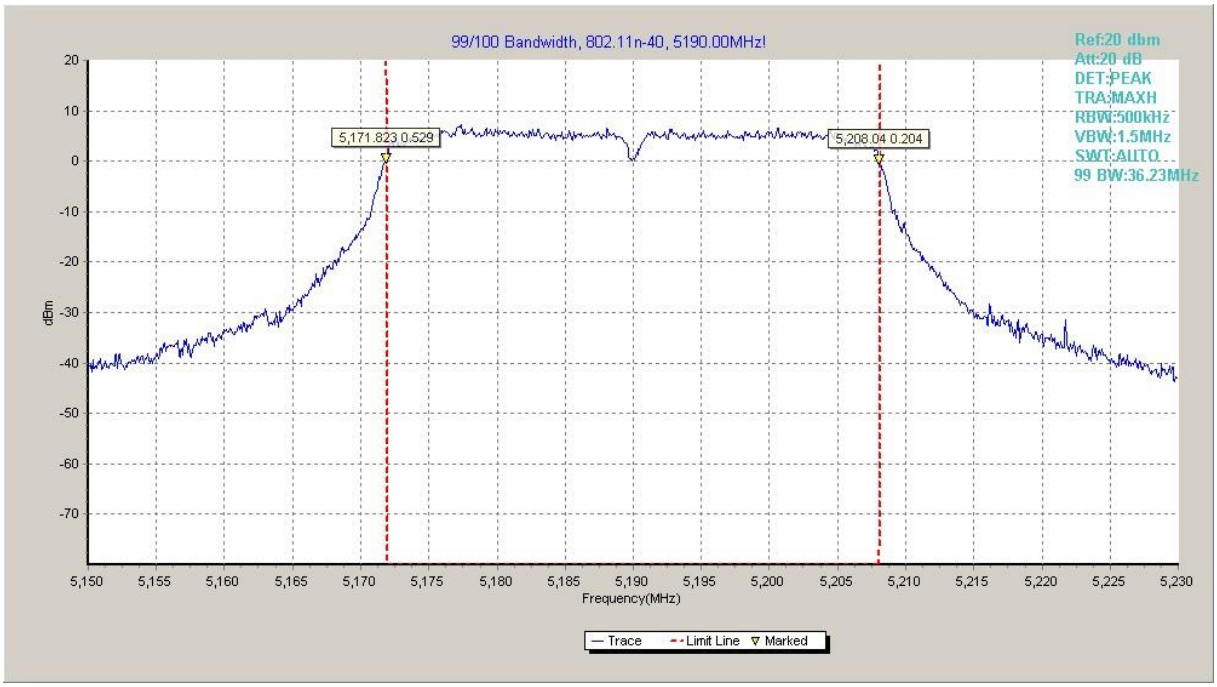

Fig. 31 99% Occupied bandwidth (802.11n-HT40, 5190MHz)

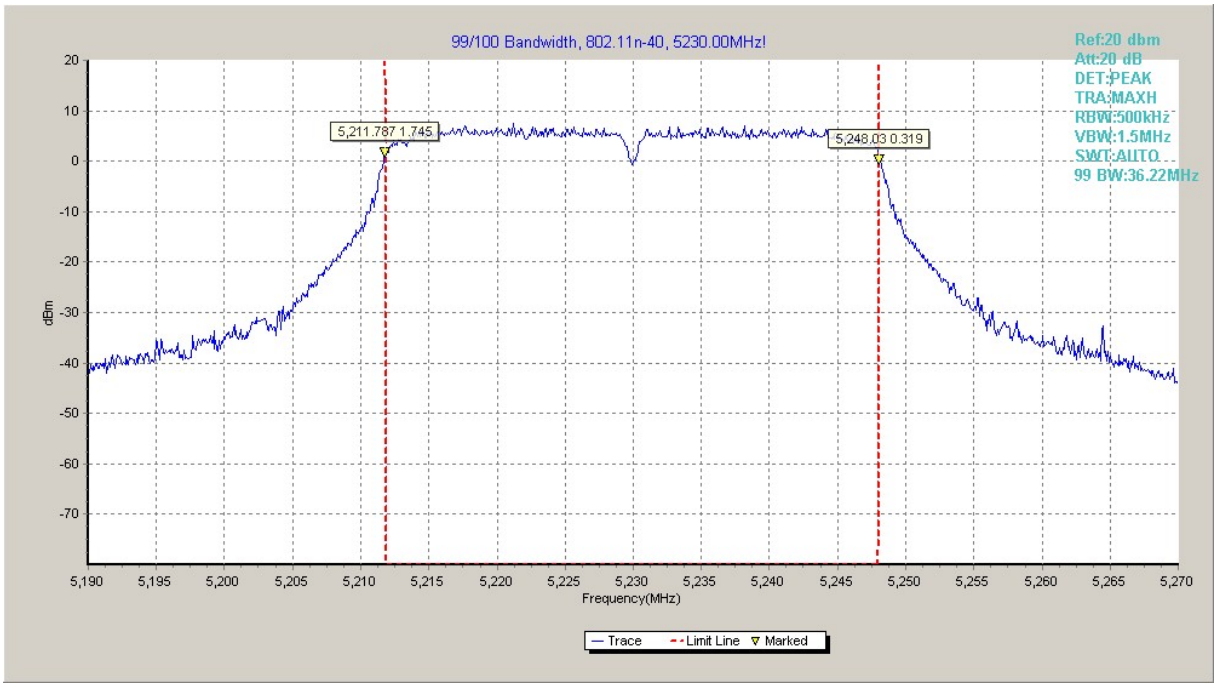

Fig. 32 99% Occupied bandwidth (802.11n-HT40, 5230MHz)

A.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.

Measurement Result:

Mode	Frequency	Test Condition		Result(MHz)
802.11n-HT20	5180MHz	Tnom	Vnom	0.04
		Tmax	Vnom	
		Tmin	Vnom	
		Vmax	Tnom	
		Vmin	Tnom	
802.11a	5280MHz	Tnom	Vnom	0.04
		Tmax	Vnom	
		Tmin	Vnom	
		Vmax	Tnom	
		Vmin	Tnom	
		Tmax	Vnom	
		Tmin	Vnom	
		Vmax	Tnom	
		Vmin	Tnom	

A.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).

ANNEX B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

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

2019-09-26 through 2020-09-30
Effective Dates

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

For the National Voluntary Laboratory Accreditation Program

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