FCC PART 15C

TEST REPORT

No.I20Z60720-IOT06

for

Client name: TCL Communication Ltd.

Product name: GSM/UMTS/LTE Mobile phone

Model name: 5007W,5007Z

With

FCC ID: 2ACCJH128

Hardware Version: 04

Software Version: 7HS05000

Issued Date: 2020-06-20

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
I20Z60720-IOT06	Rev.0	1st edition	2020-06-20

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

Conducted testing Location: CTTL(huayuan North Road)

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

Radiated testing Location: CTTL(BDA)

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

TestingEnvironment

Normal Temperature:	15-35℃
Extreme Temperature:	-20/+55℃
Relative Humidity:	20-75%

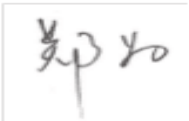
1.3. Project date

Testing Start Date:	2020-05-15
Testing End Date:	2020-06-20

1.4. Signature

Feng Aiyu

(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:	TCL Communication Ltd
Address:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City:	/
Postal Code:	/
Country:	/
Telephone:	0086-755-36611722
Fax:	0086-755-36612000-81722

2.2 Manufacturer Information

Company Name:	TCL Communication Ltd
Address:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
City:	/
Postal Code:	/
Country:	/
Telephone:	0086-755-36611722
Fax:	0086-755-36612000-81722

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

3.1. About EUT

Description	GSM/UMTS/LTE Mobile phone
Model name	5007W,5007Z
FCC ID	2ACCJH128
WLAN Frequency Band	ISM Bands: -5150MHz~5250MHz -5250MHz~5350MHz -5470MHz~5725MHz
Type of modulation	OFDM
Antenna	Integral Antenna
Voltage	3.85V

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
EUT1	015735000206007	04	7HS05000
EUT6	015735000206643	04	7HS05000

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE10	Battery	/
AE11	charger	/
AE14	USB	/
AE15	USB	

AE10

Model	TLp034F1 CAC3400011C1
Manufacturer	BYD
Capacity	3500mAh
Nominal Voltage	3.85V

AE11

Model	UC13US CBA0059BGMC5
Manufacturer	PUAN
Length of cable	/

AE14

Model	CDA0000150C2
Manufacturer	/
Length of cable	/

AE15

Model	CDA0000150C1
Manufacturer	/
Length of cable	/

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

3.4. General Description

Equipment Under Test (EUT) is a model of Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN with integrated antenna. It consists of normal options: Battery and Charger.
Manual and specifications of the EUT were provided to fulfil the test.
Samples undergoing test were selected by the Client.

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	FCC CFR 47, Part 15, Subpart C and E: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.407 General technical requirements	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
KDB 558074 D01	Federal Communications Commission Office of Engineering and Technology Laboratory Division GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES	2019

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 Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.407 (a)	/	P
Peak Power Spectral Density	15.407 (a)	/	P
Occupied 6dB Bandwidth	15.407 (e)	/	P
Band Edges Compliance - Conducted& Radiated	15.407 (b)	/	P
Transmitter Spurious Emission - Conducted	15.407	/	P
Transmitter Spurious Emission - Radiated	15.407, 15.205, 15.209	/	P
AC Powerline Conducted Emission	15.107, 15.207	/	P

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	3.85V
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	2021-05-06
2	LISN	ENV216	101200	Rohde & Schwarz	1 year	2021-05-17
3	Test Receiver	ESCI	100344	Rohde & Schwarz	1 year	2021-02-26
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	2021-03-05
2	BiLog Antenna	VULB9163	483	Schwarzbeck	1 year	2020-09-17
3	Dual-Ridge Waveguide Horn Antenna	3115	6914	ETS-Lindgren	1 year	2021-01-14
4	EMI Antenna	3117	00139065	ETS-Lindgren	1 year	2020-11-15
5	Spectrum Analyzer	FSV40	101047	Rohde & Schwarz	1 year	2021-05-18

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 6dB 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	5.40
1GHz ≤ f ≤18GHz	4.32
18GHz ≤ f ≤40GHz	5.26

8.6. AC Power-line Conducted Emission

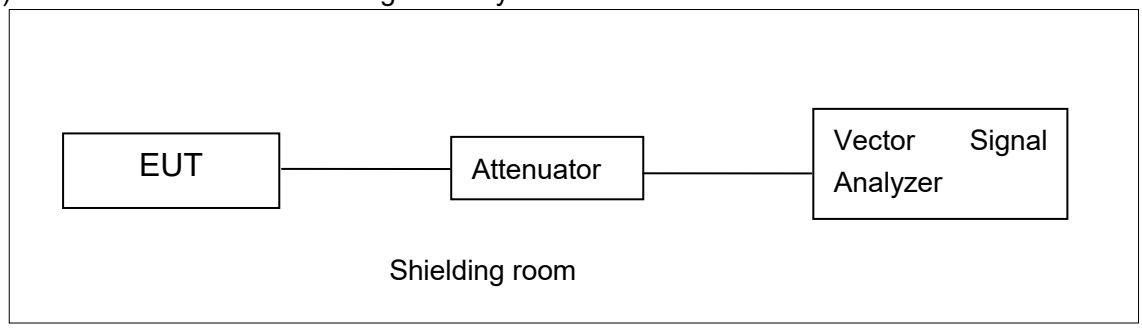
Measurement Uncertainty : 3.38dB,k=2

ANNEX A: MEASUREMENT RESULTS

A.1. Measurement Method

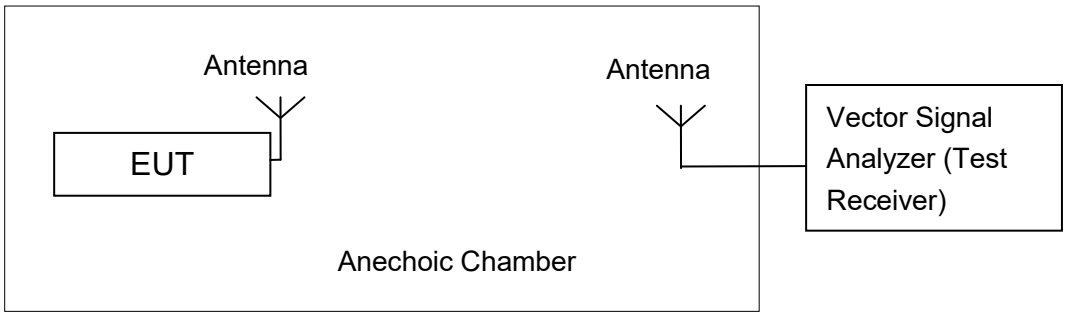
A.1.1. Conducted Measurements

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

A.2. Maximum Peak Output Power

Measurement Limit and Method:

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

A.2.1 Antenna Gain

Antenna gain is -0.76dBi and the value is supplied by the applicant or manufacturer.

A.2.2. Maximum Average Output Power-Conducted

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

802.11a mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	18.92	19.17	19.11

802.11n-HT20 mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz(Ch165)
802.11n(20MHz)	18.95	18.85	18.87

802.11ac-HT20 mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz(Ch165)
802.11ac(20MHz)	18.26	18.25	18.21

802.11n-HT40 mode

Mode	Test Result (dBm)	
	5755MHz (Ch151)	5795MHz(Ch159)
802.11n(40MHz)	14.65	14.41

802.11ac-HT40 mode

Mode	Test Result (dBm)	
	5755MHz (Ch151)	5795MHz(Ch159)
802.11ac(40MHz)	13.86	13.67

802.11ac-HT80 mode

Mode	Test Result (dBm)
	5775MHz (Ch155)
802.11ac(80MHz)	13.83

Conclusion: PASS

A.3. Peak Power Spectral Density

Measurement Limit:

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

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

Measurement Uncertainty:

Measurement Uncertainty	0.75dB

Measurement Results:

Mode	Channel	Power Spectral Density (dBm/500kHz)	Conclusion
802.11a	149	3.87	P
	157	4.58	P
	165	4.32	P
802.11n HT20	149	4.05	P
	157	3.73	P
	165	3.48	P
802.11ac HT20	149	3.84	P
	157	3.62	P
	165	3.39	P
802.11n HT40	151	-2.68	P
	159	-3.04	P
802.11ac HT40	151	-3.72	P
	159	-4.08	P
802.11ac HT80	155	-7.01	P

Conclusion: PASS

A.4. Occupied 6dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.407 (e)	≥ 500

The measurement is made according to KDB789033 D02 .

Measurement Uncertainty:

Measurement Uncertainty	60.80Hz

Measurement Result:

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
802.11a	149	Fig.1	16.30	P
	157	Fig.2	16.30	P
	165	Fig.3	16.30	P
802.11n HT20	149	Fig.4	17.60	P
	157	Fig.5	17.60	P
	165	Fig.6	17.55	P
802.11ac HT20	149	Fig.7	17.60	P
	157	Fig.8	17.35	P
	165	Fig.9	17.60	P
802.11n HT40	151	Fig.10	36.32	P
	159	Fig.11	35.32	P
802.11ac HT40	151	Fig.12	35.08	P
	159	Fig.13	36.32	P
802.11ac HT80	155	Fig.14	76.16	P

Conclusion: PASS

Test graphs as below:

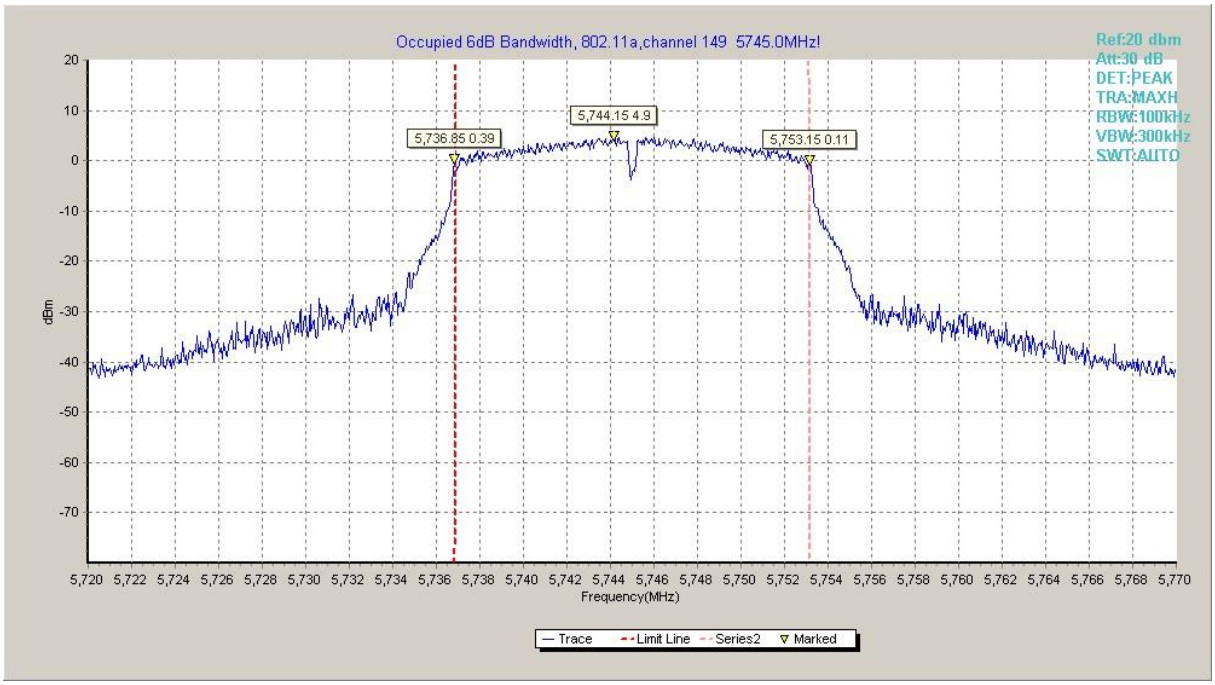


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)

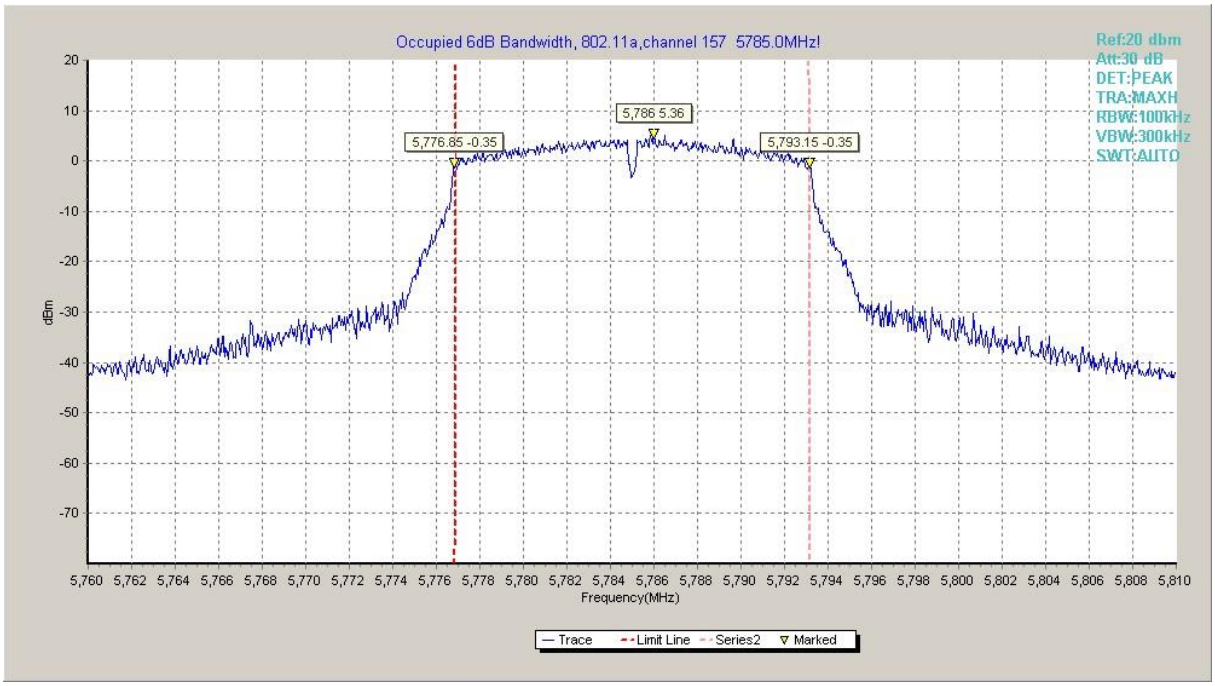


Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)

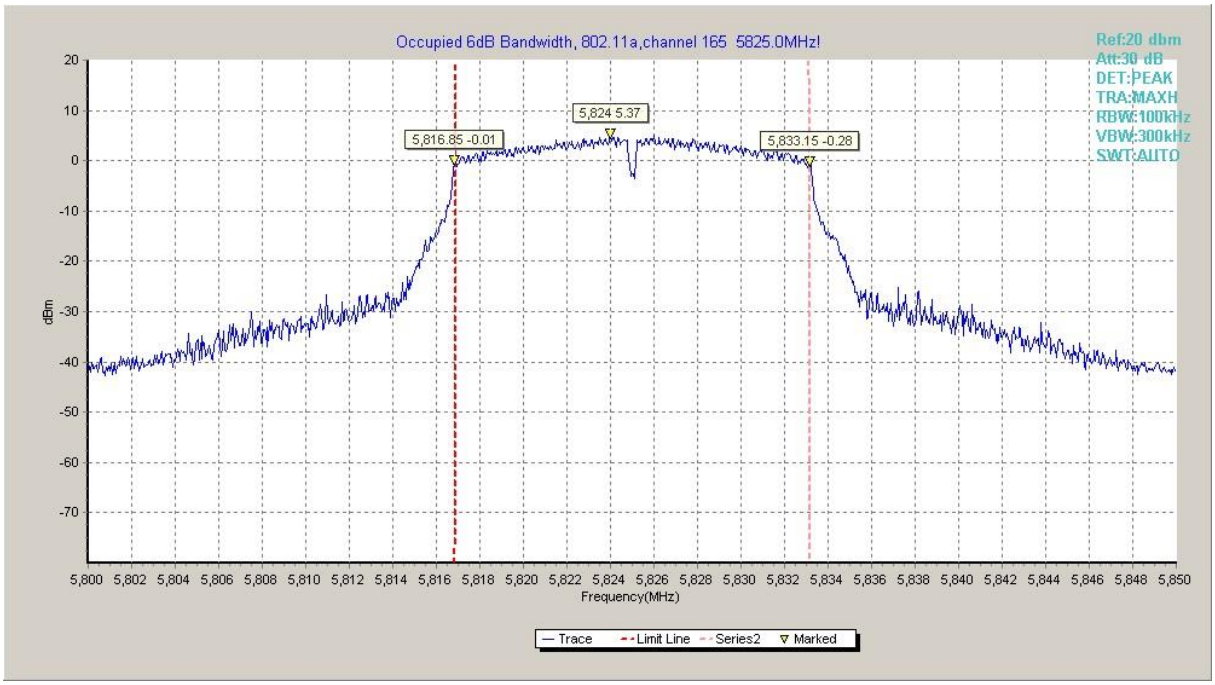


Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)

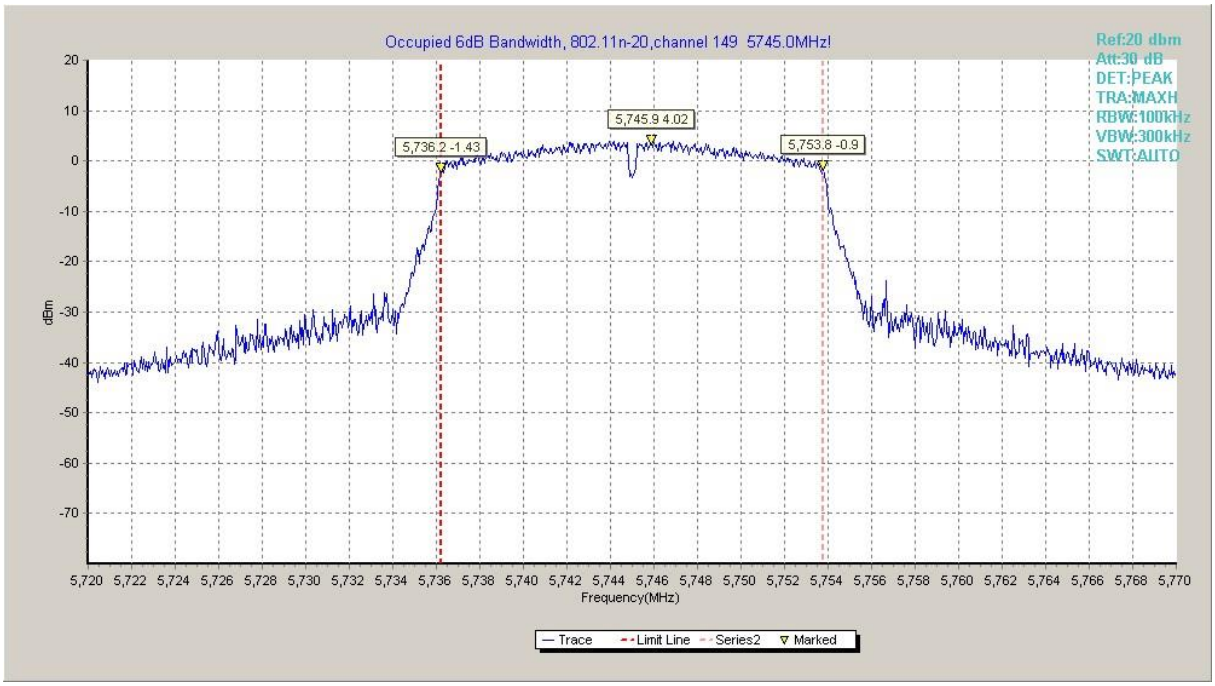


Fig. 4 Occupied 6dB Bandwidth (802.11n20, Ch 149)

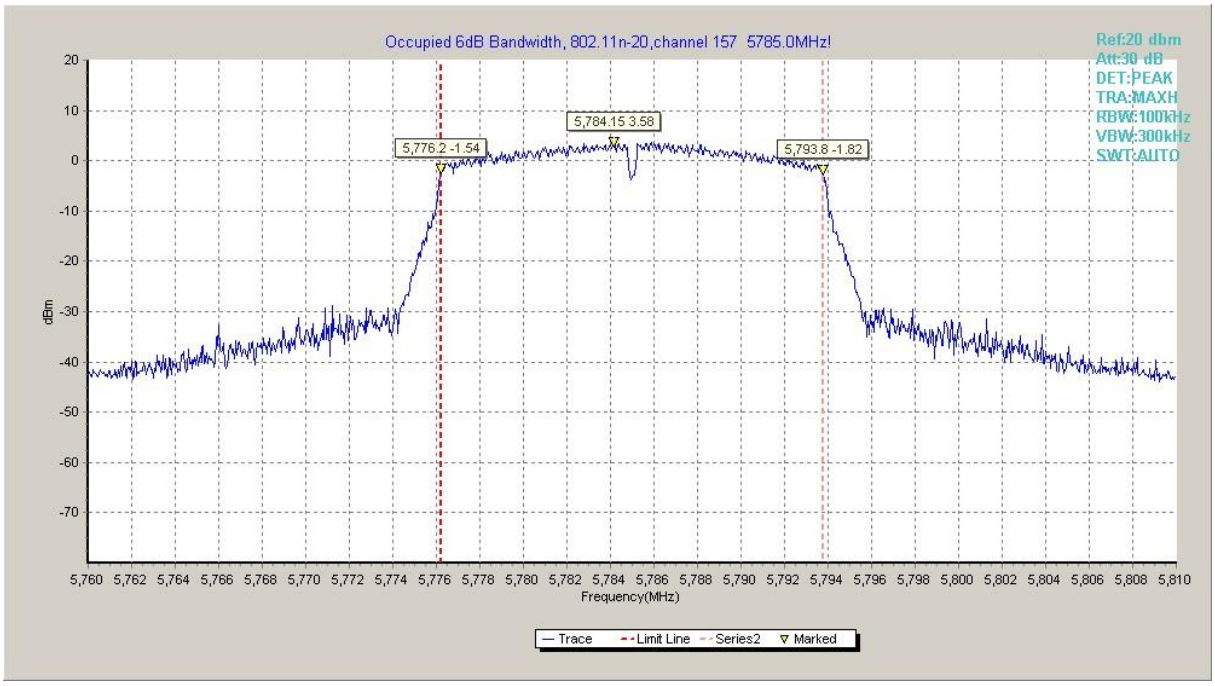


Fig. 5 Occupied 6dB Bandwidth (802.11n20, Ch 157)

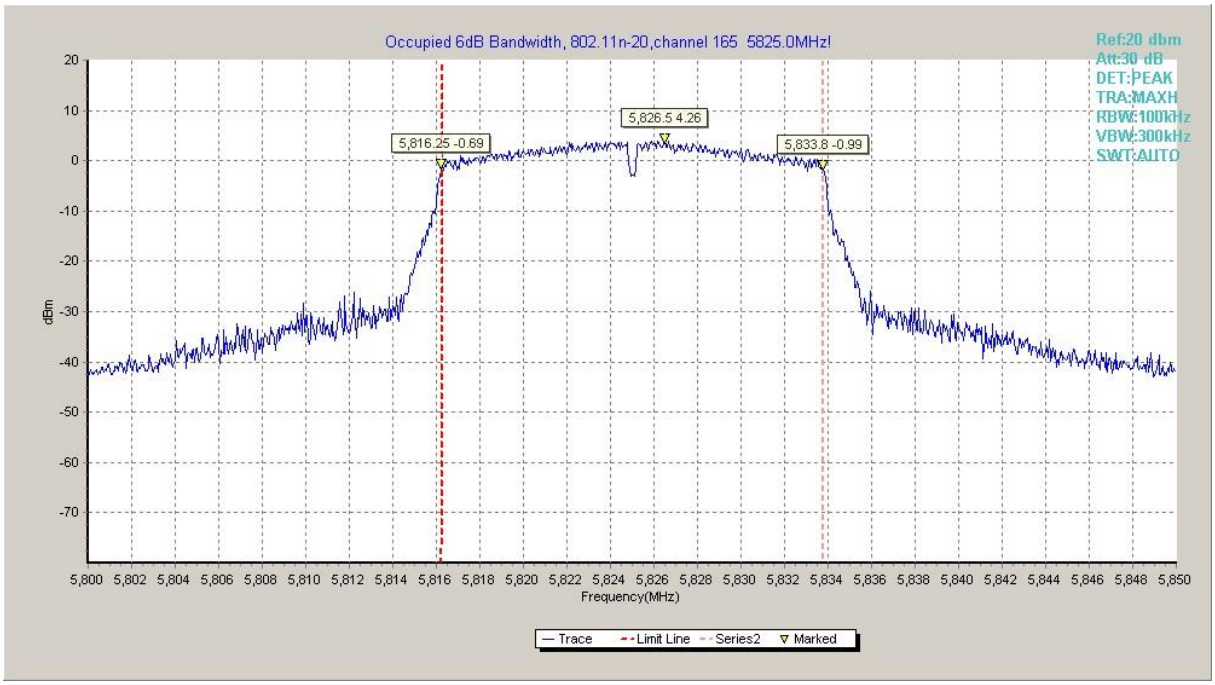


Fig. 6 Occupied 6dB Bandwidth (802.11n20, Ch 165)

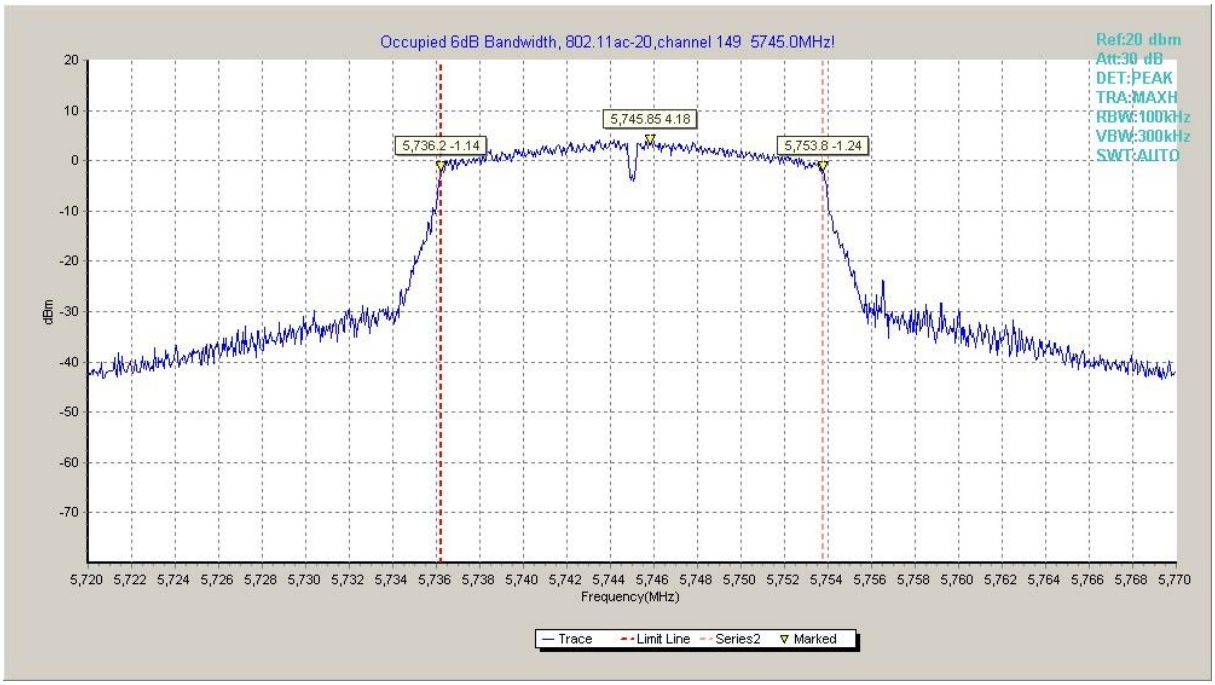


Fig. 7 Occupied 6dB Bandwidth (802.11ac20, Ch 149)

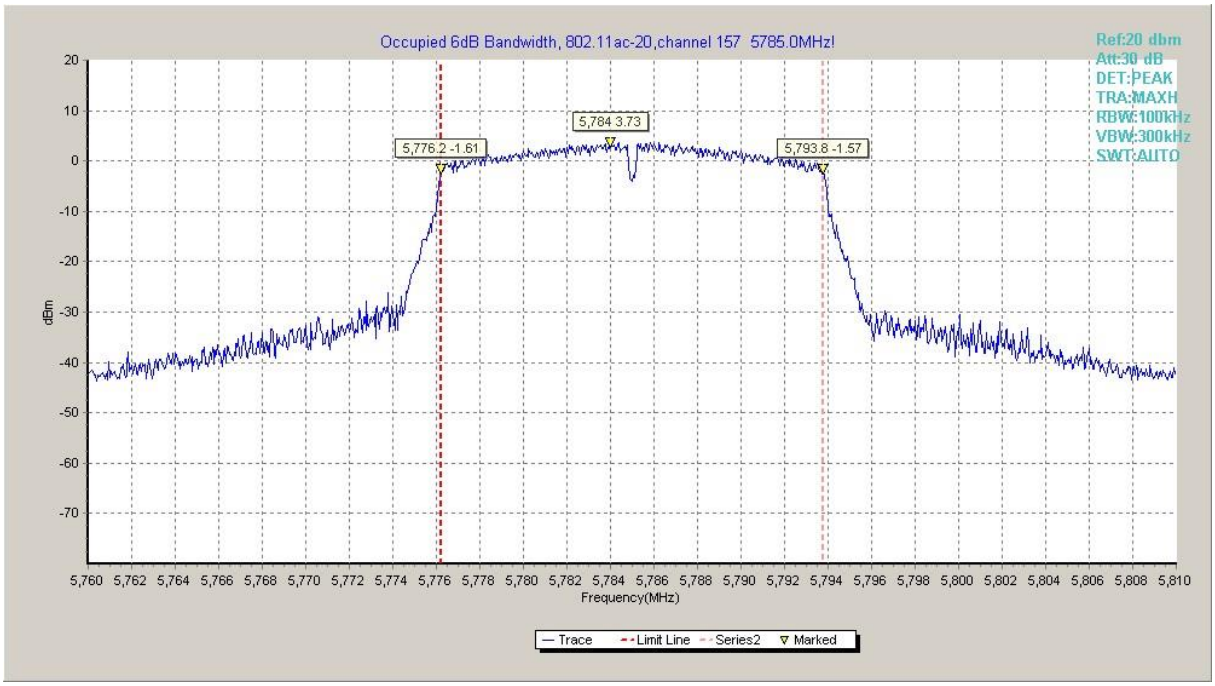


Fig. 8 Occupied 6dB Bandwidth (802.11ac20, Ch 157)

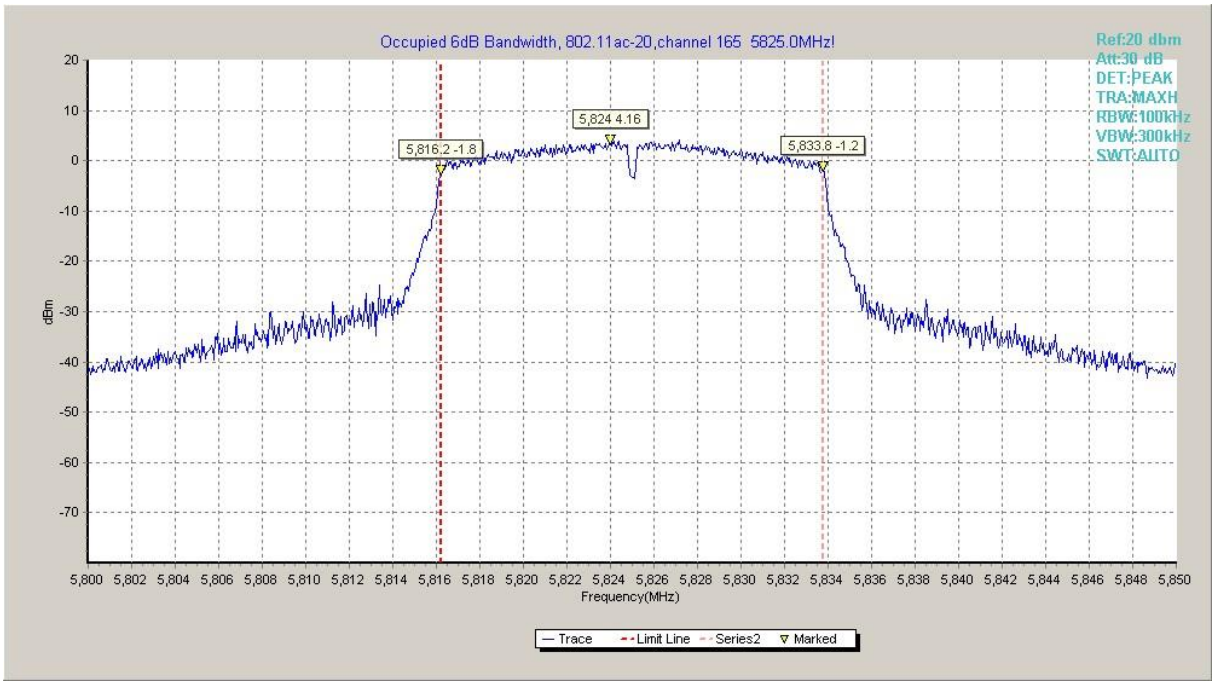


Fig. 9 Occupied 6dB Bandwidth (802.11ac20, Ch 165)

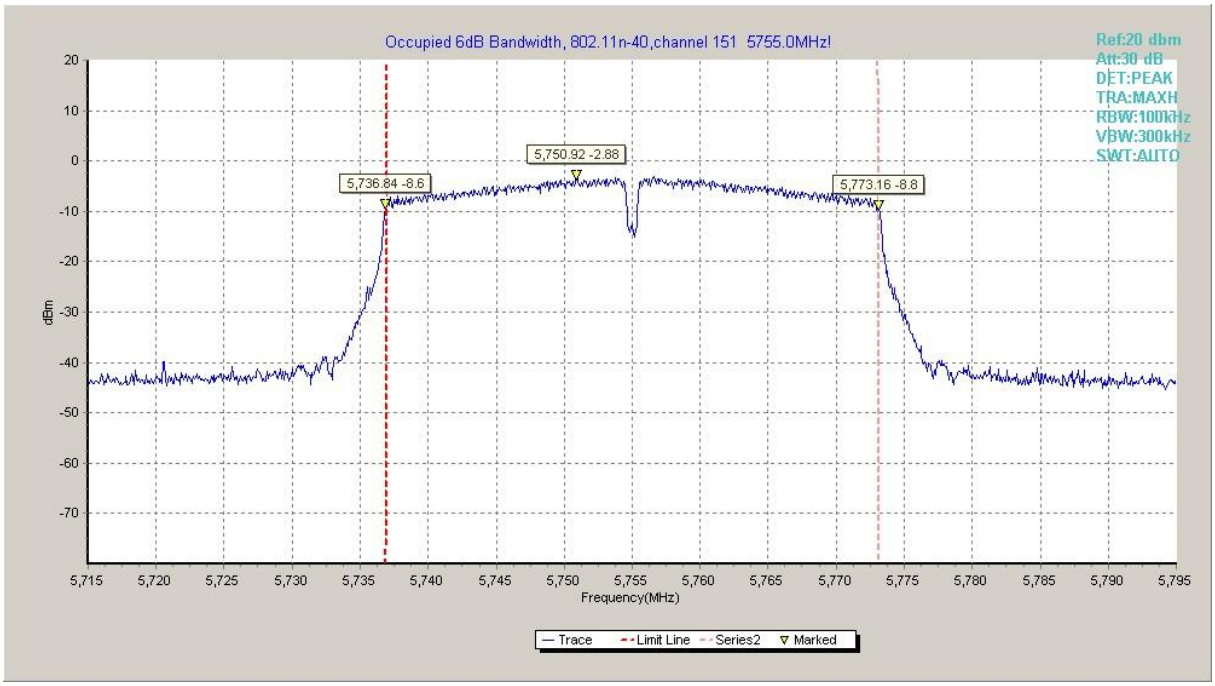


Fig. 10 Occupied 6dB Bandwidth (802.11n40, Ch 151)

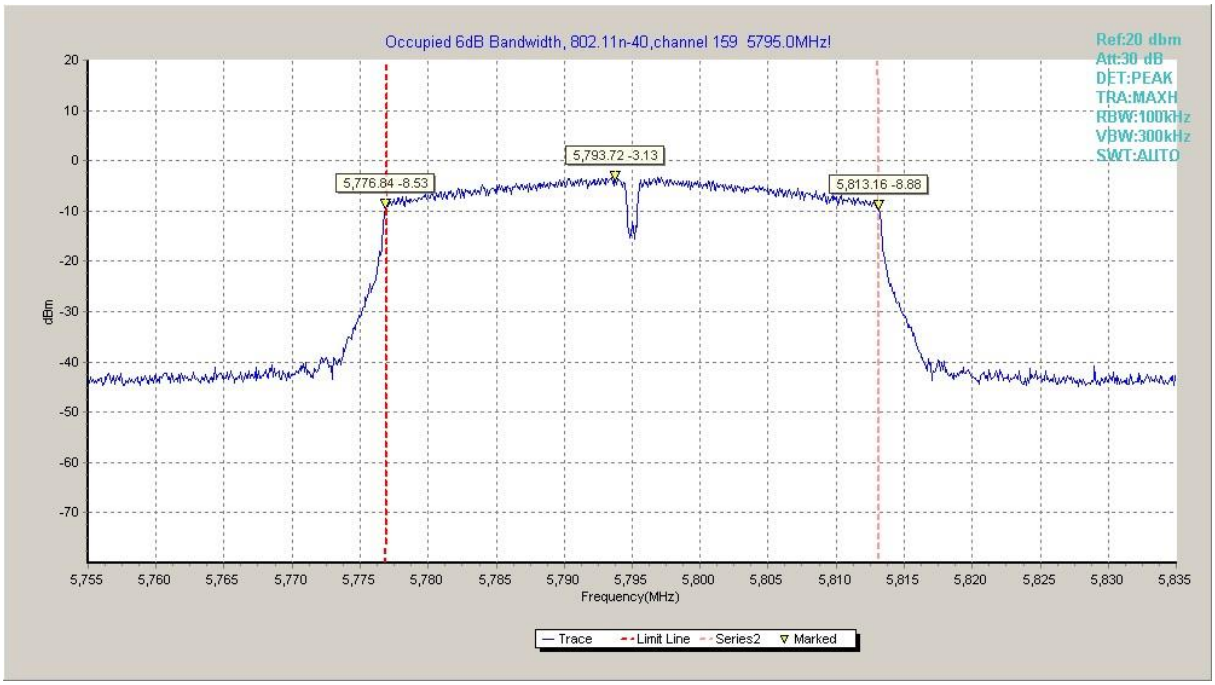


Fig. 11 Occupied 6dB Bandwidth (802.11n40, Ch 159)

Fig. 12 Occupied 6dB Bandwidth (802.11ac40, Ch 151)

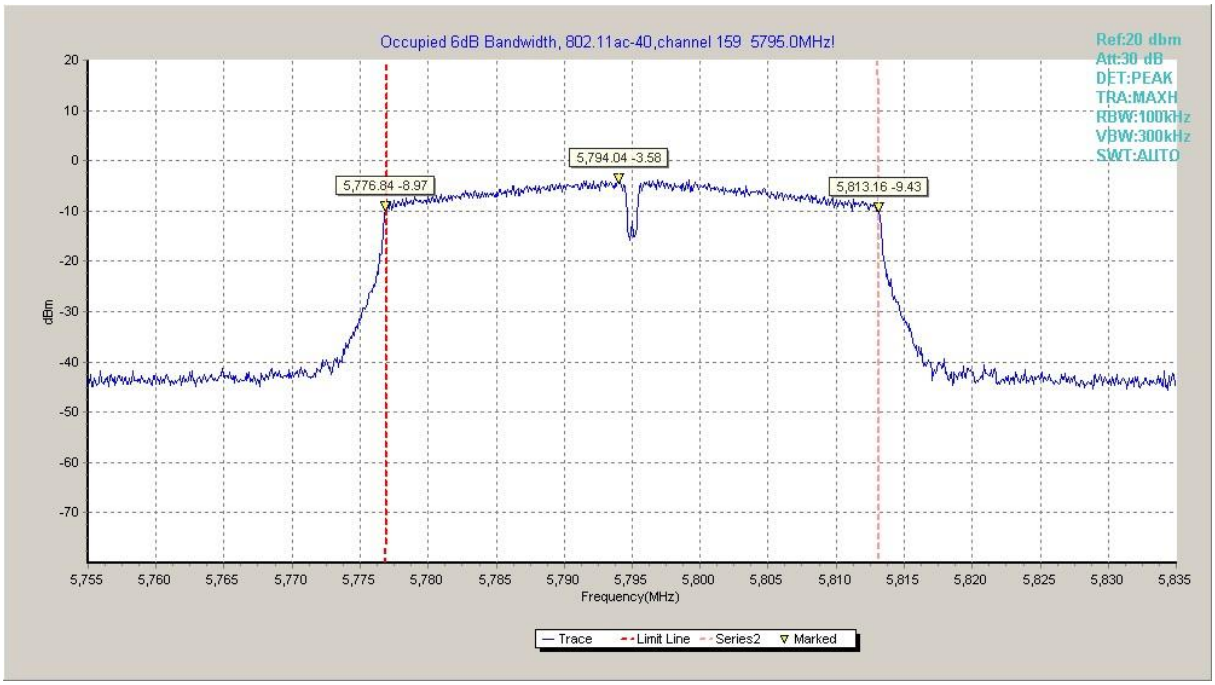


Fig. 13 Occupied 6dB Bandwidth (802.11ac40, Ch 159)

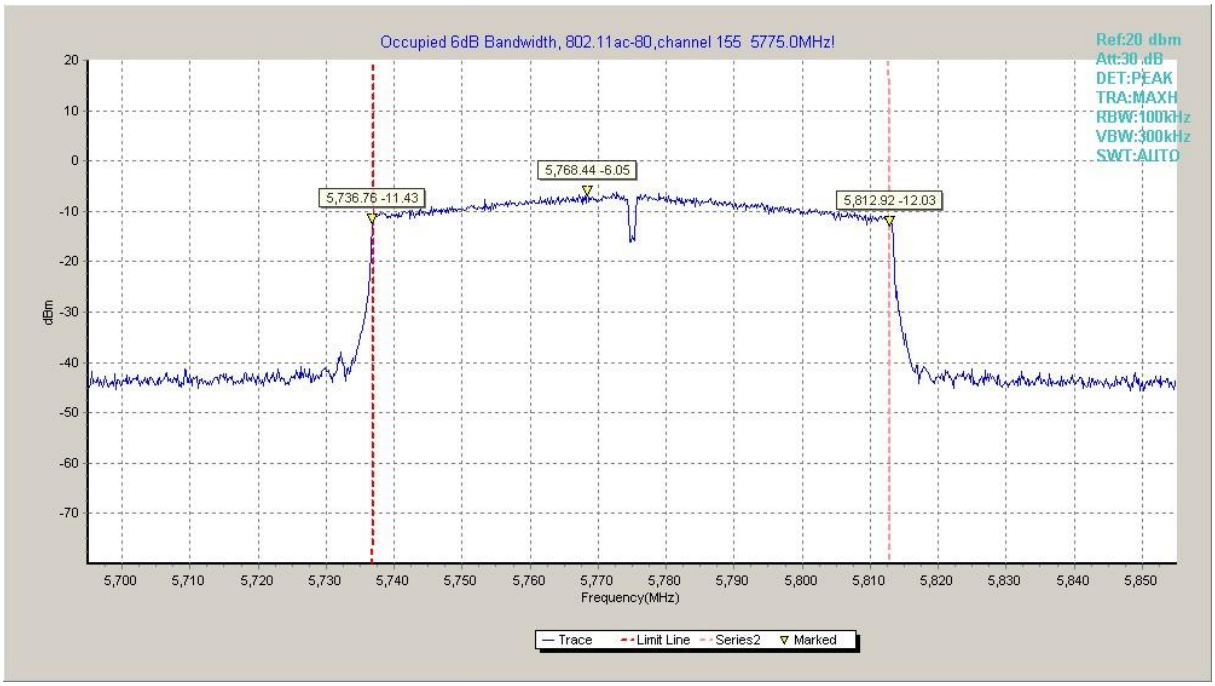


Fig. 14 Occupied 6dB Bandwidth (802.11ac80, Ch 155)

A.5 Transmitter Spurious Emission - Radiated

Measurement Limit:

Standard	Limit (dBm/MHz)	
FCC 47 CFR Part 15.407	at the band edge	27
	at 5 MHz above or below the band edge	15.6
	at 25 MHz above or below the band edge	10
	at 75 MHz or more above or below the band edge	-27
	Note：increasing linearly from point to point.	

The measurement is made according to KDB 789033

Frequency Range	Uncertainty(dB)
30MHz ≤ f ≤ 1GHz	5.40
1GHz ≤ f ≤18GHz	4.32
18GHz ≤ f ≤40GHz	5.26

Measurement Results:

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.

Average Results：

802.11a

Ch149

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17997.800	46.2	-25.5	46.7	25.0	54.0	7.8	V
17992.300	46.1	-25.5	46.7	24.9	54.0	7.9	H
17995.600	46.1	-25.5	46.7	24.9	54.0	7.9	V
17991.200	46.0	-25.5	46.7	24.8	54.0	8.0	V
17994.500	46.0	-25.5	46.7	24.8	54.0	8.0	V
17989.000	45.9	-25.5	43.4	28.0	54.0	8.1	H

Ch157

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17982.400	45.6	-25.5	46.7	24.4	54.0	8.4	V
17983.500	45.6	-25.5	46.7	24.4	54.0	8.4	V
17986.800	45.5	-25.5	46.7	24.3	54.0	8.5	H
17989.000	45.5	-25.5	46.7	24.3	54.0	8.5	H
17991.200	45.5	-25.5	46.7	24.3	54.0	8.5	V
17992.300	45.5	-25.5	46.7	24.3	54.0	8.5	V

Ch165

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17983.500	45.7	-25.5	46.7	24.5	54.0	8.3	V
17986.800	45.7	-25.5	46.7	24.5	54.0	8.3	V
17991.200	45.7	-25.5	46.7	24.5	54.0	8.3	H
17997.800	45.7	-25.5	46.7	24.5	54.0	8.3	H
17993.400	45.6	-25.5	46.7	24.4	54.0	8.4	V
17994.500	45.6	-25.5	43.4	27.7	54.0	8.4	H

802.11n-HT20

Ch149

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17986.800	46.1	-25.5	46.7	24.9	54.0	7.9	V
17989.000	45.9	-25.5	46.7	24.7	54.0	8.1	V
17987.900	45.7	-25.5	46.7	24.5	54.0	8.3	V
17990.100	45.7	-25.5	46.7	24.5	54.0	8.3	V
17992.300	45.7	-25.5	46.7	24.5	54.0	8.3	H
17990.100	45.7	-25.5	43.4	27.8	54.0	8.3	H

Ch157

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17987.900	45.8	-25.5	46.7	24.6	54.0	8.2	H
17985.700	45.7	-25.5	46.7	24.5	54.0	8.3	H
17994.500	45.7	-25.5	46.7	24.5	54.0	8.3	H
17983.500	45.6	-25.5	46.7	24.4	54.0	8.4	H
17991.200	45.6	-25.5	46.7	24.4	54.0	8.4	H
17995.600	45.6	-25.5	46.7	24.4	54.0	8.4	V

Ch165

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17995.600	45.8	-25.5	46.7	24.6	54.0	8.2	V
17991.200	45.7	-25.5	46.7	24.5	54.0	8.3	V
17994.500	45.7	-25.5	46.7	24.5	54.0	8.3	V
17996.700	45.7	-25.5	46.7	24.5	54.0	8.3	H
17987.900	45.6	-25.5	46.7	24.4	54.0	8.4	H
17987.900	45.6	-25.5	43.4	27.7	54.0	8.4	H

802.11n-HT40

Ch151

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17987.900	45.9	-25.5	46.7	24.7	54.0	8.1	V
17994.500	45.9	-25.5	46.7	24.7	54.0	8.1	V
17993.400	45.6	-25.5	46.7	24.4	54.0	8.4	H
17983.500	45.5	-25.5	46.7	24.3	54.0	8.5	H
17990.100	45.5	-25.5	46.7	24.3	54.0	8.5	V
17995.600	45.5	-25.5	43.4	27.6	54.0	8.5	H

Ch159

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17985.700	45.8	-25.5	46.7	24.6	54.0	8.2	V
17994.500	45.8	-25.5	46.7	24.6	54.0	8.2	V
17986.800	45.6	-25.5	46.7	24.4	54.0	8.4	H
17992.300	45.6	-25.5	46.7	24.4	54.0	8.4	V
17996.700	45.6	-25.5	46.7	24.4	54.0	8.4	V
17984.600	45.5	-25.5	43.4	27.6	54.0	8.5	H

802.11ac-HT20

Ch149

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17990.100	46.0	-25.5	46.7	24.8	54.0	8.0	V
17991.200	45.7	-25.5	46.7	24.5	54.0	8.3	H
17984.600	45.6	-25.5	46.7	24.4	54.0	8.4	H
17985.700	45.6	-25.5	46.7	24.4	54.0	8.4	H
17986.800	45.6	-25.5	46.7	24.4	54.0	8.4	V
18000.000	45.6	-26.5	46.4	25.7	54.0	8.4	H

Ch157

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17994.500	45.8	-25.5	46.7	24.6	54.0	8.2	H
17997.800	45.8	-25.5	46.7	24.6	54.0	8.2	V
17981.300	45.6	-25.5	46.7	24.4	54.0	8.4	H
17991.200	45.6	-25.5	46.7	24.4	54.0	8.4	V
17995.600	45.6	-25.5	46.7	24.4	54.0	8.4	H
17996.700	45.6	-25.5	46.7	24.4	54.0	8.4	H

Ch165

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17994.500	46.0	-25.5	46.7	24.8	54.0	8.0	V
17989.000	45.6	-25.5	46.7	24.4	54.0	8.4	V
17992.300	45.6	-25.5	46.7	24.4	54.0	8.4	H
17982.400	45.5	-25.5	46.7	24.3	54.0	8.5	V
17990.100	45.5	-25.5	46.7	24.3	54.0	8.5	V
18000.000	45.5	-26.5	46.4	25.6	54.0	8.5	H

802.11ac-HT40

Ch151

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17993.400	45.8	-25.5	46.7	24.6	54.0	8.2	V
17979.100	45.6	-25.5	46.7	24.4	54.0	8.4	H
17992.300	45.6	-25.5	46.7	24.4	54.0	8.4	V
17987.900	45.5	-25.5	46.7	24.3	54.0	8.5	V
17989.000	45.5	-25.5	46.7	24.3	54.0	8.5	H
17989.000	45.5	-25.5	43.4	27.6	54.0	8.5	H

Ch159

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17997.800	45.7	-25.5	46.7	24.5	54.0	8.3	H
17991.200	45.6	-25.5	46.7	24.4	54.0	8.4	V
17992.300	45.6	-25.5	46.7	24.4	54.0	8.4	V
17993.400	45.6	-25.5	46.7	24.4	54.0	8.4	V
17989.000	45.5	-25.5	46.7	24.3	54.0	8.5	H
17983.500	45.4	-25.5	43.4	27.5	54.0	8.6	H

802.11ac-HT80

Ch155

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17997.800	45.5	-25.5	43.4	27.6	54.0	8.5	H
17995.600	45.8	-25.5	43.4	27.9	54.0	8.2	H
17994.500	45.7	-25.5	43.4	27.8	54.0	8.3	V
17984.600	45.6	-25.5	43.4	27.7	54.0	8.4	H
17991.200	45.6	-25.5	43.4	27.7	54.0	8.4	H
18000.000	45.5	-26.5	46.4	25.6	54.0	8.5	H

Peak Results：

802.11a

Ch149

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17992.300	58.0	-25.5	46.7	36.8	68.3	10.3	H
17989.000	57.5	-25.5	46.7	36.3	68.3	10.8	H
17968.100	56.9	-25.5	46.7	35.7	68.3	11.4	V
17971.400	56.7	-25.5	46.7	35.5	68.3	11.6	H
17982.400	56.6	-25.5	46.7	35.4	68.3	11.7	V
5724.400	72.2	-16.3	34.3	54.2	111.0	38.8	H

Ch157

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17997.800	57.8	-25.5	46.7	36.6	68.3	10.5	V
17995.600	57.3	-25.5	46.7	36.1	68.3	11.0	V
17981.300	57.0	-25.5	46.7	35.8	68.3	11.3	V
17987.900	57.0	-25.5	46.7	35.8	68.3	11.3	V
17973.600	56.9	-25.5	46.7	35.7	68.3	11.4	V
17979.100	56.9	-25.5	46.7	35.7	68.3	11.4	H

Ch165

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17974.700	57.2	-25.5	46.7	36.0	68.3	11.1	H
17904.300	57.0	-25.5	46.7	35.8	68.3	11.3	H
17924.100	56.9	-25.5	46.7	35.7	68.3	11.4	H
17968.100	56.9	-25.5	46.7	35.7	68.3	11.4	H
17946.100	56.8	-25.5	46.7	35.6	68.3	11.5	V
5852.100	63.8	-16.2	34.4	45.7	118.0	54.2	H

802.11n-HT20

Ch149

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17903.200	57.3	-25.5	46.7	36.1	68.3	11.0	V
17989.000	57.3	-25.5	46.7	36.1	68.3	11.0	V
17993.400	57.1	-25.5	46.7	35.9	68.3	11.2	V
17952.700	57.0	-25.5	46.7	35.8	68.3	11.3	V
17959.300	56.9	-25.5	46.7	35.7	68.3	11.4	V
5724.800	76.5	-16.3	34.3	58.5	114.0	37.5	H

Ch157

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17987.900	57.8	-25.5	46.7	36.6	68.3	10.5	H
17996.700	57.4	-25.5	46.7	36.2	68.3	10.9	V
17963.700	56.9	-25.5	46.7	35.7	68.3	11.4	V
17982.400	56.7	-25.5	46.7	35.5	68.3	11.6	V
17984.600	56.7	-25.5	46.7	35.5	68.3	11.6	V
17990.100	56.7	-25.5	46.7	35.5	68.3	11.6	H

Ch165

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17981.300	56.9	-25.5	46.7	35.7	68.3	11.4	H
17974.700	56.8	-25.5	46.7	35.6	68.3	11.5	V
17995.600	56.7	-25.5	46.7	35.5	68.3	11.6	V
17992.300	56.6	-25.5	46.7	35.4	68.3	11.7	V
17994.500	56.6	-25.5	46.7	35.4	68.3	11.7	V
5850.100	62.2	-16.2	34.4	44.1	119.0	56.8	H

802.11n-HT40

Ch151

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17981.300	57.1	-25.5	46.7	35.9	68.3	11.2	V
17985.700	57.0	-25.5	46.7	35.8	68.3	11.3	V
17991.200	57.0	-25.5	46.7	35.8	68.3	11.3	H
17975.800	56.9	-25.5	46.7	35.7	68.3	11.4	H
17997.800	56.7	-25.5	46.7	35.5	68.3	11.6	V
5723.500	64.7	-16.3	34.3	46.7	115.0	50.3	H

Ch159

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17973.600	57.4	-25.5	46.7	36.2	68.3	10.9	V
17989.000	57.2	-25.5	46.7	36.0	68.3	11.1	V
17952.700	57.0	-25.5	46.7	35.8	68.3	11.3	V
17986.800	56.9	-25.5	46.7	35.7	68.3	11.4	H
17987.900	56.9	-25.5	46.7	35.7	68.3	11.4	H
5855.400	60.5	-16.2	34.4	42.4	110.0	49.5	H

802.11ac-HT20

Ch149

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17997.800	58.0	-25.5	46.7	36.8	68.3	10.3	V
17992.300	57.7	-25.5	46.7	36.5	68.3	10.6	V
17994.500	57.3	-25.5	46.7	36.1	68.3	11.0	V
17967.000	57.1	-25.5	46.7	35.9	68.3	11.2	V
17976.900	57.1	-25.5	46.7	35.9	68.3	11.2	H
5724.600	80.5	-16.3	34.3	62.5	112.0	31.5	H

Ch157

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17992.300	57.2	-25.5	46.7	36.0	68.3	11.1	H
17991.200	57.1	-25.5	46.7	35.9	68.3	11.2	V
17989.000	56.8	-25.5	46.7	35.6	68.3	11.5	H
17985.700	56.7	-25.5	46.7	35.5	68.3	11.6	H
17883.400	56.6	-25.5	46.7	35.4	68.3	11.7	V
17962.600	56.6	-25.5	46.7	35.4	68.3	11.7	H

Ch165

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17982.400	56.8	-25.5	46.7	35.6	68.3	11.5	V
17983.500	56.6	-25.5	46.7	35.4	68.3	11.7	V
17996.700	56.6	-25.5	46.7	35.4	68.3	11.7	V
17980.200	56.5	-25.5	46.7	35.3	68.3	11.8	H
17989.000	56.5	-25.5	46.7	35.3	68.3	11.8	V
5850.300	68.4	-16.2	34.4	50.3	120.0	51.6	H

802.11ac-HT40

Ch151

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17989.000	57.3	-25.5	46.7	36.1	68.3	11.0	H
17990.100	57.1	-25.5	46.7	35.9	68.3	11.2	H
17986.800	57.0	-25.5	46.7	35.8	68.3	11.3	V
17992.300	57.0	-25.5	46.7	35.8	68.3	11.3	V
17982.400	56.9	-25.5	46.7	35.7	68.3	11.4	H
5724.700	61.0	-16.3	34.3	43.0	113.0	52.0	H

Ch159

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
17986.800	57.1	-25.5	46.7	35.9	68.3	11.2	H
17993.400	56.8	-25.5	46.7	35.6	68.3	11.5	V
17987.900	56.7	-25.5	46.7	35.5	68.3	11.6	H
17965.900	56.6	-25.5	46.7	35.4	68.3	11.7	H
17981.300	56.6	-25.5	46.7	35.4	68.3	11.7	V
5857.000	53.6	-16.2	34.4	35.5	110.0	56.4	H

802.11ac-HT80

Ch155

Frequency (MHz)	Meas. Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Limit (dBμV/m)	Margin (dB)	Antenna Pol. (H/V)
5716.000	64.1	-36.5	34.2	66.4	110.0	45.9	H
17984.600	56.9	-25.5	43.4	39.0	68.3	11.4	H
17986.800	56.9	-25.5	43.4	39.0	68.3	11.4	V
17998.900	56.7	-25.5	43.4	38.8	68.3	11.6	H
17990.100	56.7	-25.5	43.4	38.8	68.3	11.6	H
17976.900	56.6	-25.5	43.4	38.7	68.3	11.7	H

Sample calculation:

Peak Result= P_{Mea}(38.7dBuV/m) + Cable Loss(-25.5) + Antenna Factor(43.4) =56.6 dBuV/m

Conclusion: PASS

A.6 Band Edges Compliance – Radiated

Measurement Limit:

Standard	Limit (dBm/MHz)	
FCC 47 CFR Part 15.407	at the band edge	27
	at 5 MHz above or below the band edge	15.6
	at 25 MHz above or below the band edge	10
	at 75 MHz or more above or below the band edge	-27
	Note：increasing linearly from point to point.	

The measurement is made according to KDB 789033 D02

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 (MHz)	Field strength(μV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Set up:

Figure 4 shows the typical arrangement of an unlicensed wireless device on a tabletop on a test site. Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m and the table height shall be 1.5 m.

The EUT and transmitting antenna shall be centered on the turntable.

Test Condition

The EUT shall be tested 1 near top, 1 near middle, and 1 near bottom. Set the unlicensed wireless device to operate in continuous transmit mode. For unlicensed wireless devices unable to be configured for 100% duty cycle even in test mode, configure the system for the maximum duty cycle supported.

When required for unlicensed wireless devices, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Exploratory radiated emissions measurements

Exploratory radiated measurements shall be performed at the measurement distance or at a

closer distance than that specified for compliance to determine the emission characteristics of the EUT and, if applicable, the EUT configuration that produces the maximum level of emissions. The frequencies of maximum emission may be determined by manually positioning the antenna close to the EUT, and then moving the antenna over all sides of the EUT while observing a spectral display. It is advantageous to have prior knowledge of the frequencies of emissions, although this may be determined from such a near-field scan. The near-field scan shall only be used to determine the frequency but not the amplitude of the emissions. Where exploratory measurements are not adequate to determine the worst-case operating modes and are used only to identify the frequencies of the highest emissions, additional preliminary tests can be required.
For emissions from the EUT, the maximum level shall be determined by rotating the EUT and its antenna through 0° to 360°. For each mode of operation required to be tested, the frequency spectrum (based on findings from exploratory measurements) shall be monitored.
Broadband antennas and a spectrum analyzer or a radio-noise meter with a panoramic display are often useful in this type of test. If either antenna height or EUT azimuth are not fully measured during exploratory testing, then complete testing can be required at the OATS or semi-anechoic chamber when the final full spectrum testing is performed.

Final radiated emissions measurements

The final measurements are using the orientation and equipment arrangement of the EUT based on the measurement results found during the preliminary (exploratory) measurements, the EUT arrangement, appropriate modulation, and modes of operation that produce the emissions that have the highest amplitude relative to the limit shall be selected for the final measurement.
For emissions from the EUT, the maximum level shall be determined by rotating the EUT and its antenna through 0° to 360°. Final measurements for the EUT require a measurement antenna height scan of 1 m to 4 m and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. For each mode of operation required to be tested, the frequency spectrum (based on findings from exploratory measurements) shall be monitored.
For each mode selected, record the frequency and amplitude of the highest fundamental emission (if applicable), as well as the frequency and amplitude of the six highest spurious emissions relative to the limit. Emissions more than 20 dB below the limit do not need to be reported.
This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The receiver references:

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	100KHz/300KHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-40000	1MHz/3MHz	20

Measurement Result:

Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.15	P
	5825 MHz	Fig.16	P
802.11n HT20	5745 MHz	Fig.17	P
	5825 MHz	Fig.18	P
802.11ac HT20	5745 MHz	Fig.19	P
	5825 MHz	Fig.20	P
802.11n HT40	5755 MHz	Fig.21	P
	5795 MHz	Fig.22	P
802.11ac HT40	5755 MHz	Fig.23	P
	5795 MHz	Fig.24	P
802.11ac HT80	5775 MHz	Fig.25	P
	5775 MHz	Fig.26	P

Conclusion: PASS

Test graphs as below:

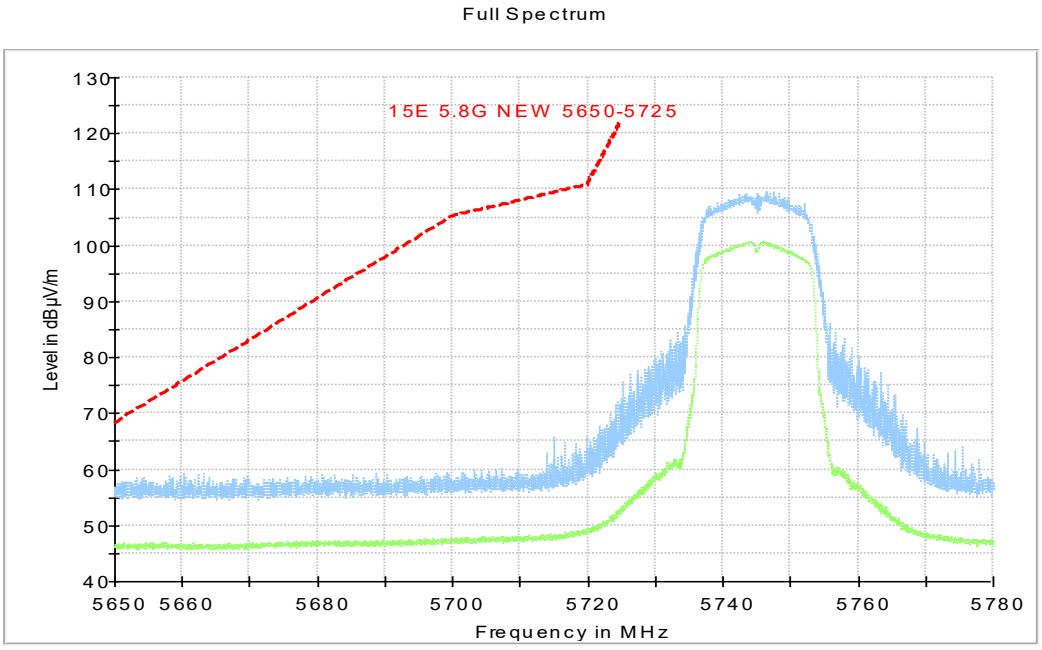


Fig. 15 Band Edges (802.11a, 5745MHz)

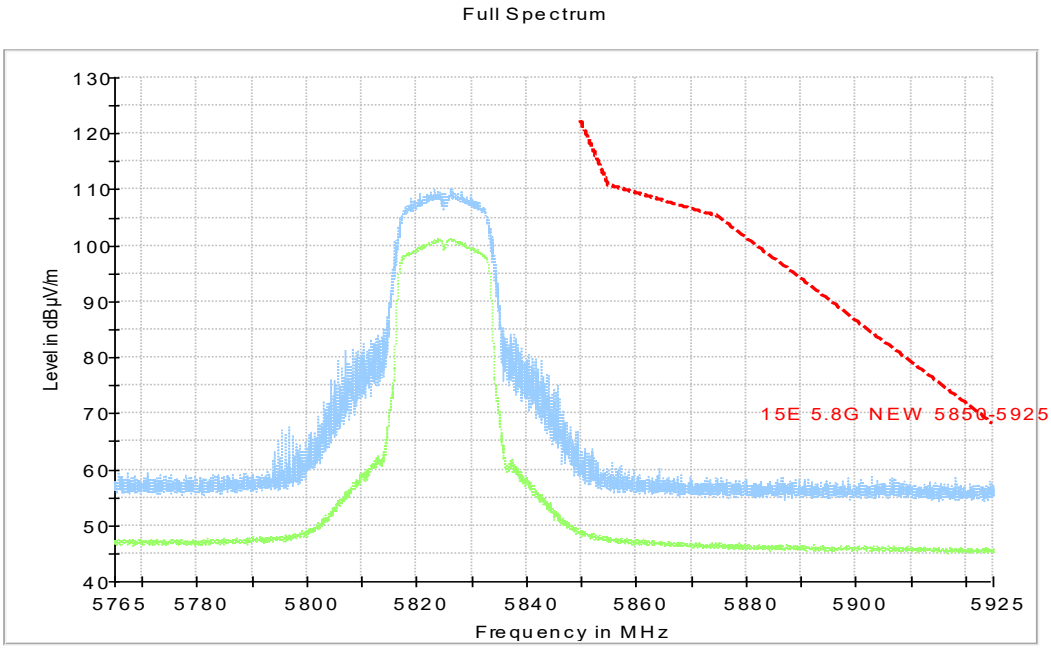


Fig. 16 Band Edges (802.11a, 5825MHz)

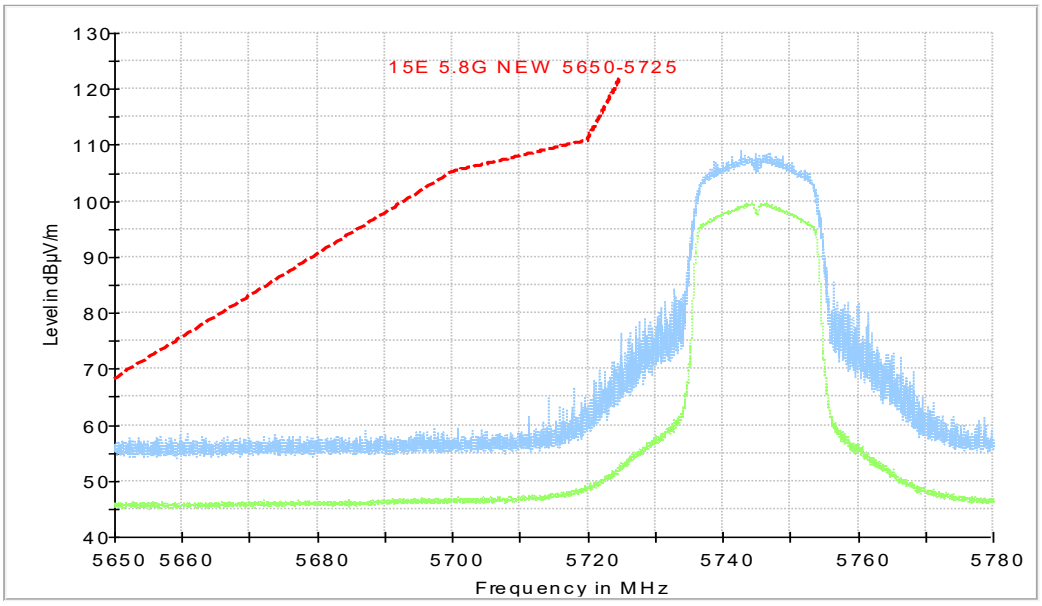


Fig. 17 Band Edges (802.11n-HT20, 5745MHz)

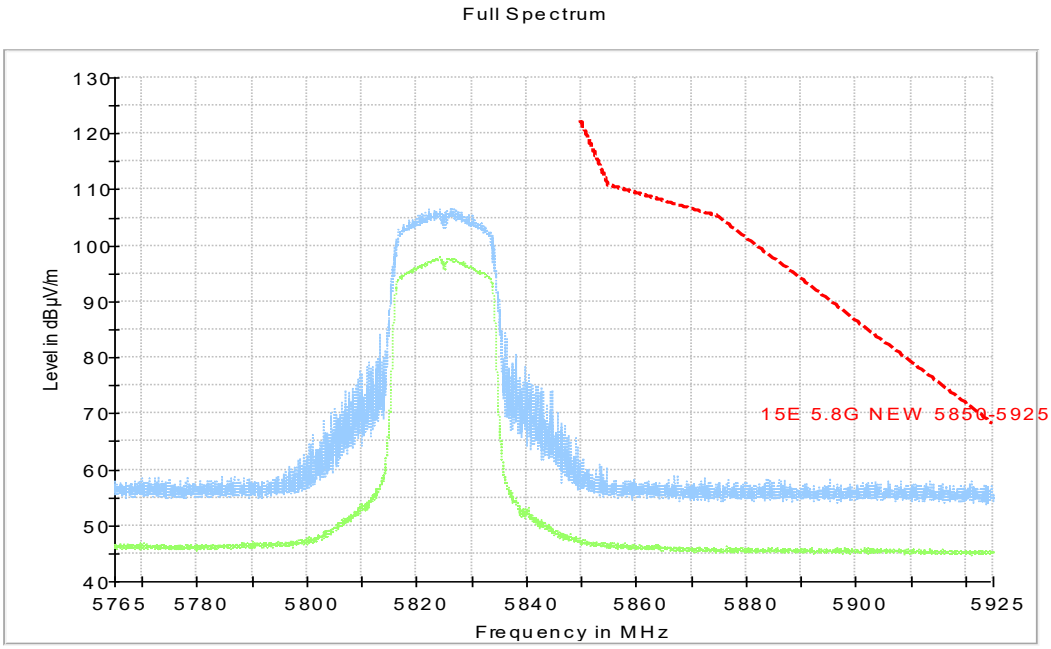


Fig. 18 Band Edges (802.11n-HT20, 5825MHz)

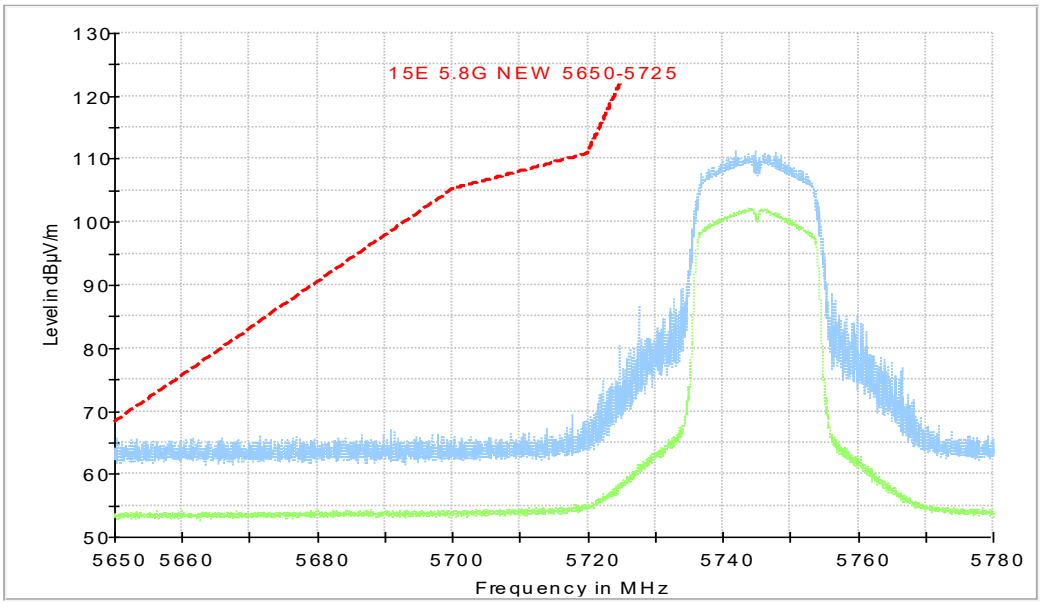


Fig. 19 Band Edges (802.11ac-HT20, 5745MHz)

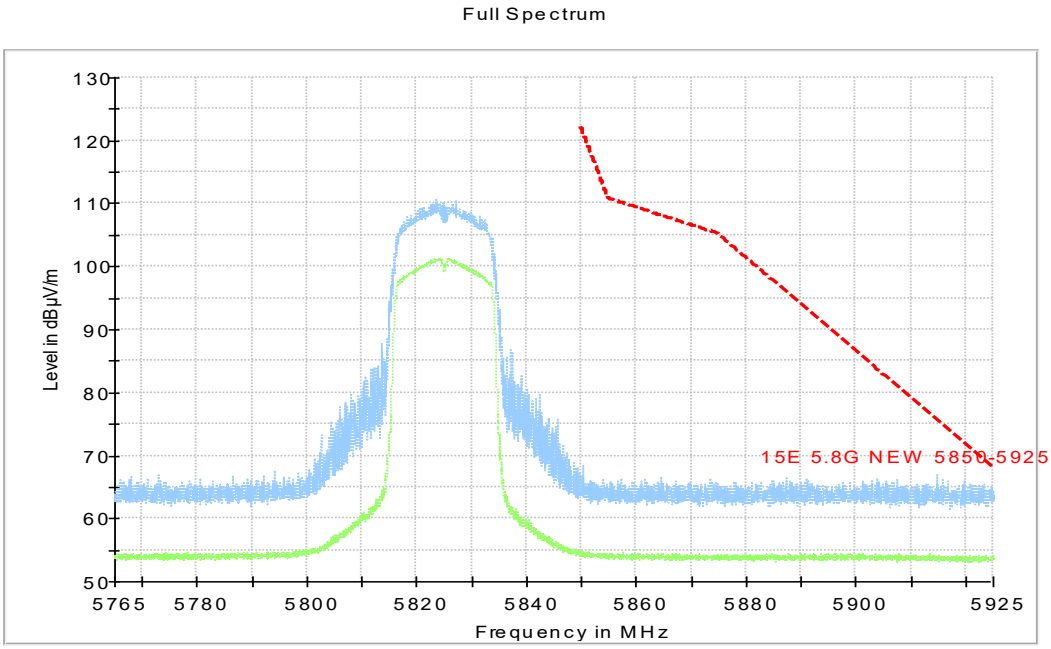


Fig. 20 Band Edges (802.11ac-HT20, 5825MHz)

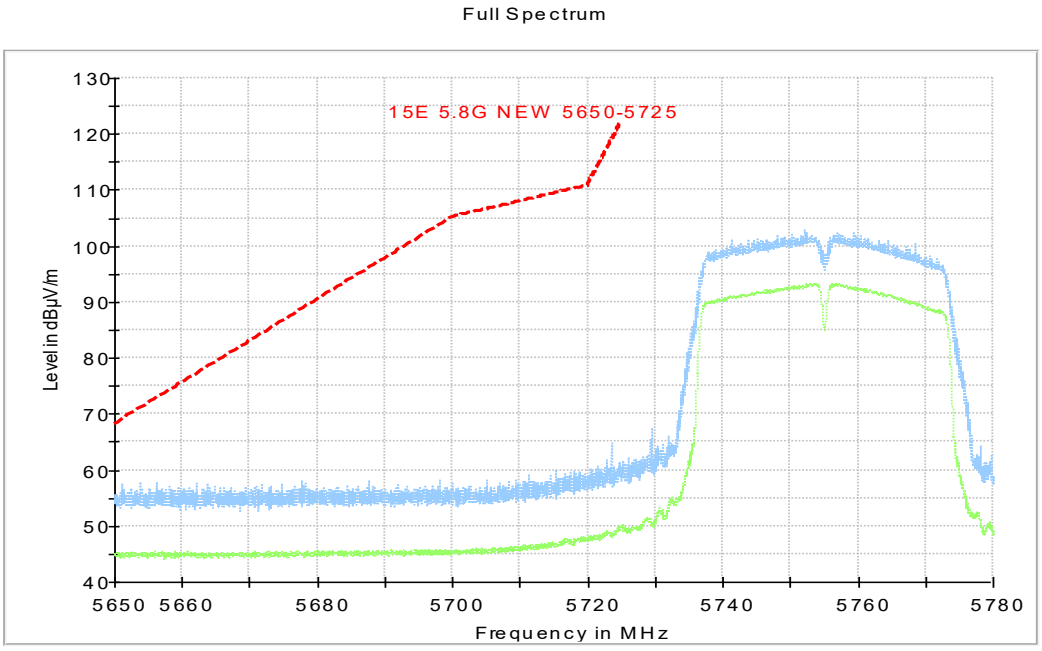


Fig. 21 Band Edges (802.11n-HT40, 5755MHz)

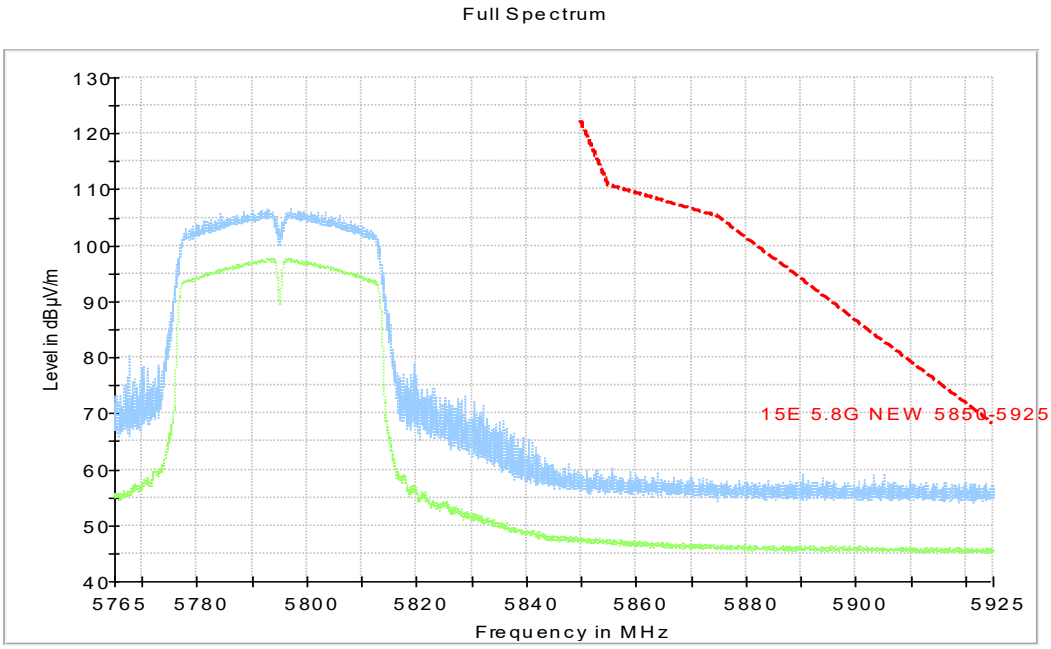


Fig. 22 Band Edges (802.11n-HT40, 5795MHz)

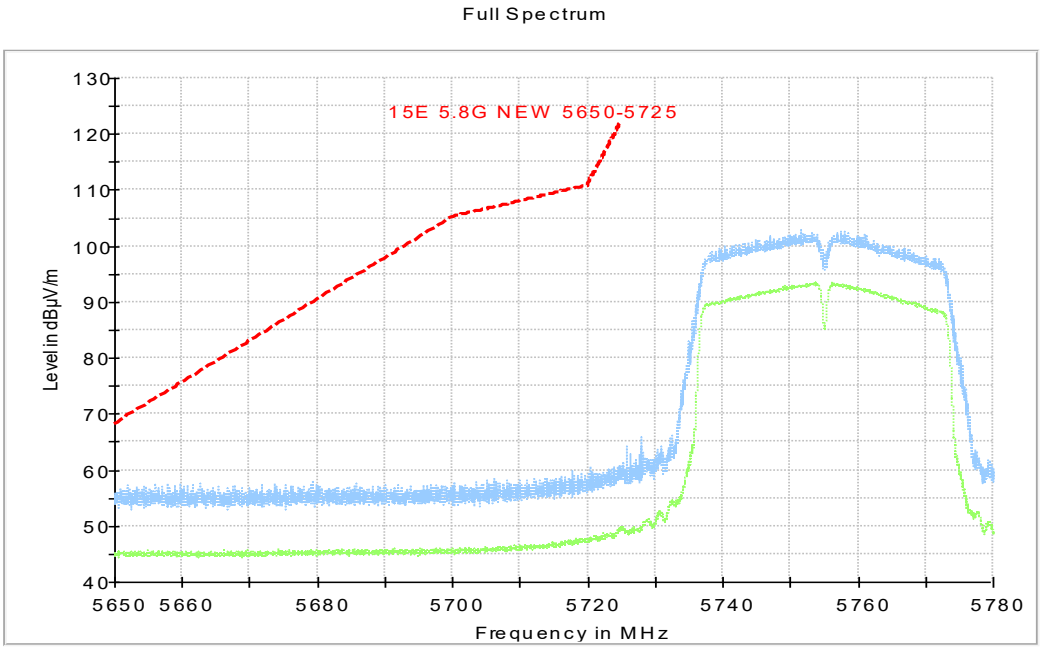


Fig. 23 Band Edges (802.11ac-HT40, 5755MHz)

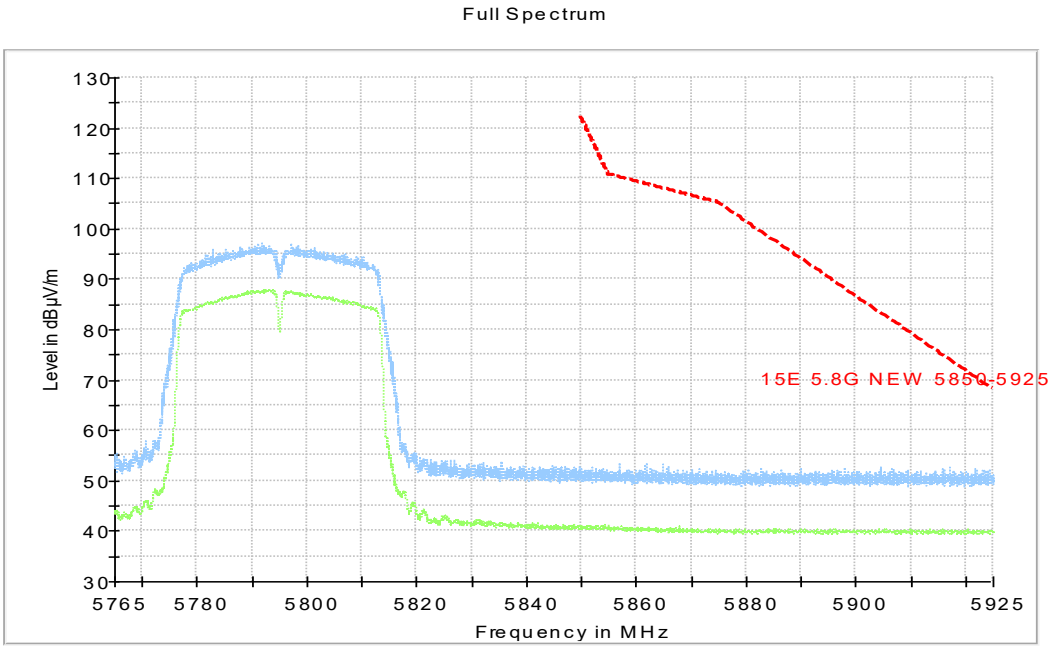


Fig. 24 Band Edges (802.11ac-HT40, 5795MHz)

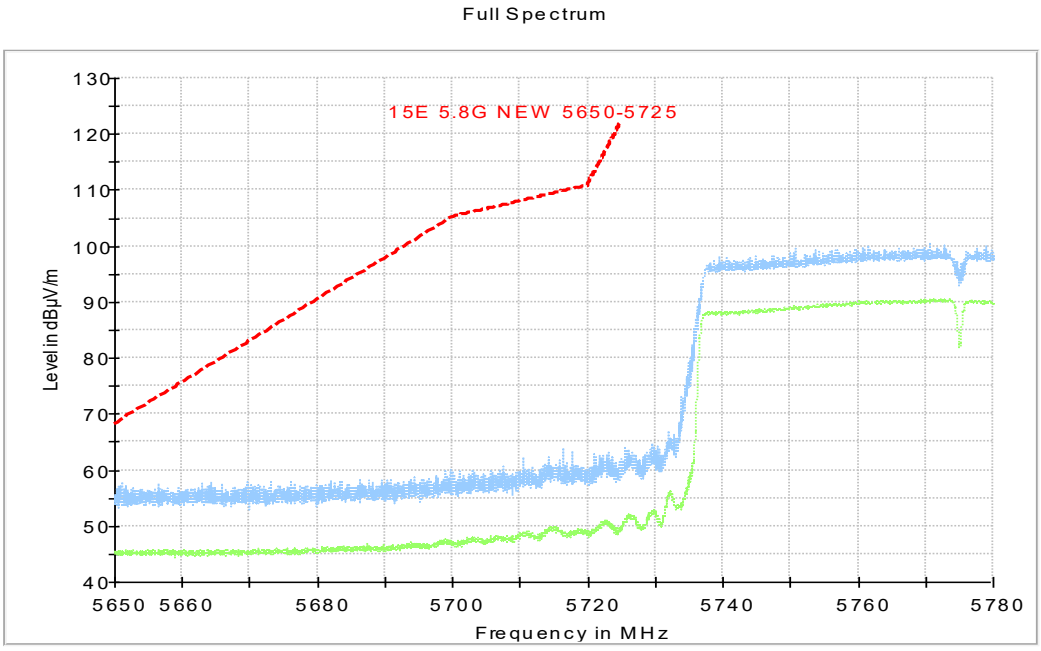


Fig. 25 Band Edges (802.11ac-HT80, 5775MHz)

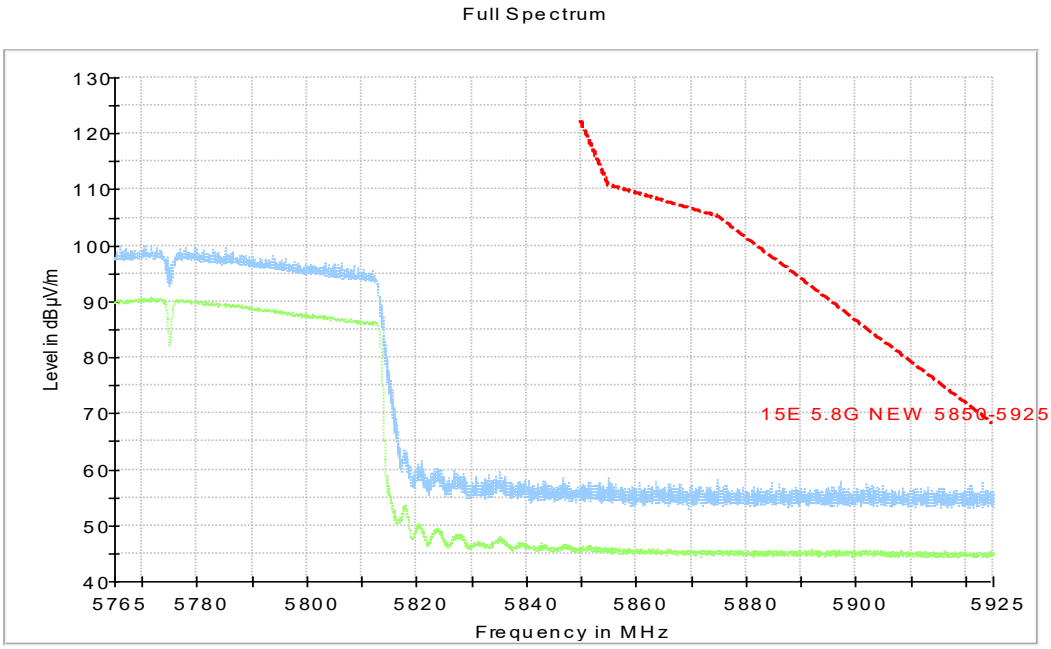


Fig. 26 Band Edges (802.11ac-HT80, 5775MHz)

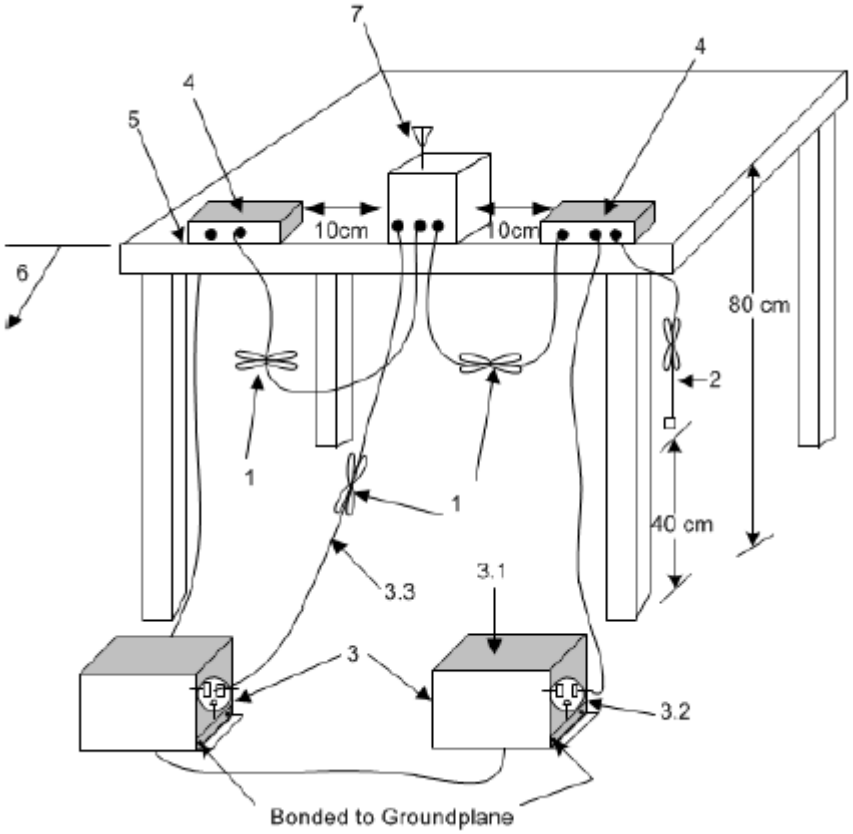
A.7. AC Powerline Conducted Emission

Method of Measurement: See ANSI C63.10-clause 6.2

Setup:

A stand-alone EUT shall be placed in the center along the back edge of the tabletop. For multiunit tabletop systems, the EUT shall be centered laterally (left to right facing the tabletop) on the tabletop and its rear shall be flush with the rear of the table.

Accessories that are part of an EUT system tested on a tabletop shall be placed in a test arrangement on one or both sides of the host with a 10 cm separation between the nearest points of the cabinets. The rear of the host and accessories shall be flush with the back of the supporting tabletop unless that would not be typical of normal use. If more than two accessories are present, then an equipment test arrangement shall be chosen that maintains 10 cm spacing between cabinets unless the equipment is normally located closer together.



Exploratory ac power-line conducted emission measurements

Exploratory measurements shall be used to identify the frequency of the emission that has the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable positions, and with a typical system equipment configuration and arrangement. For each mode of operation and for each ac power current-carrying conductor, cable manipulation shall be performed within the range of likely configurations. For this measurement or series of measurements, the frequency spectrum of interest shall be monitored looking for the emission that has the highest amplitude relative to the limit. Once that emission is found for each current-carrying conductor of each power cord associated with the EUT (but not the cords associated with non-EUT equipment in the overall system), the one configuration and arrangement and mode of operation that produces the emission closest to the limit over all of the

measured conductors shall be recorded.

Final ac power-line conducted emission measurements

Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is selected for the final measurement, while applying the appropriate modulating signal to the EUT. If the EUT is relocated from an exploratory test site to a final test site, the highest emissions shall be remaximized at the final test location before final ac power-line conducted emission measurements are performed. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) is then performed for the full frequency range for which the EUT is being tested for compliance without further variation of the EUT arrangement, cable positions, or EUT mode of operation. If the EUT is composed of equipment units that have their own separate ac power connections (e.g., floor-standing equipment with independent power cords for each shelf that are able to connect directly to the ac power network), then each current-carrying conductor of one unit is measured while the other units are connected to a second (or more) LISN(s). All units shall be measured separately. If a power strip is provided by the manufacturer, to supply all of the units making up the EUT, only the conductors in the power cord of the power strip shall be measured.

Test Condition:

Voltage（V）	Frequency（Hz）
110	60

Measurement Result and limit:

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		802.11a	Idle	
0.15 to 0.5	66 to 56	Fig. 27	Fig. 28	P
0.5 to 5	56			
5 to 30	60			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

WLAN (Average Limit)

Frequency range (MHz)	Average Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		802.11a	Idle	
0.15 to 0.5	56 to 46	Fig.27	Fig.28	P
0.5 to 5	46			
5 to 30	50			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

The measurement is made according to ANSI C63.10 .

Conclusion: PASS

Test graphs as below:

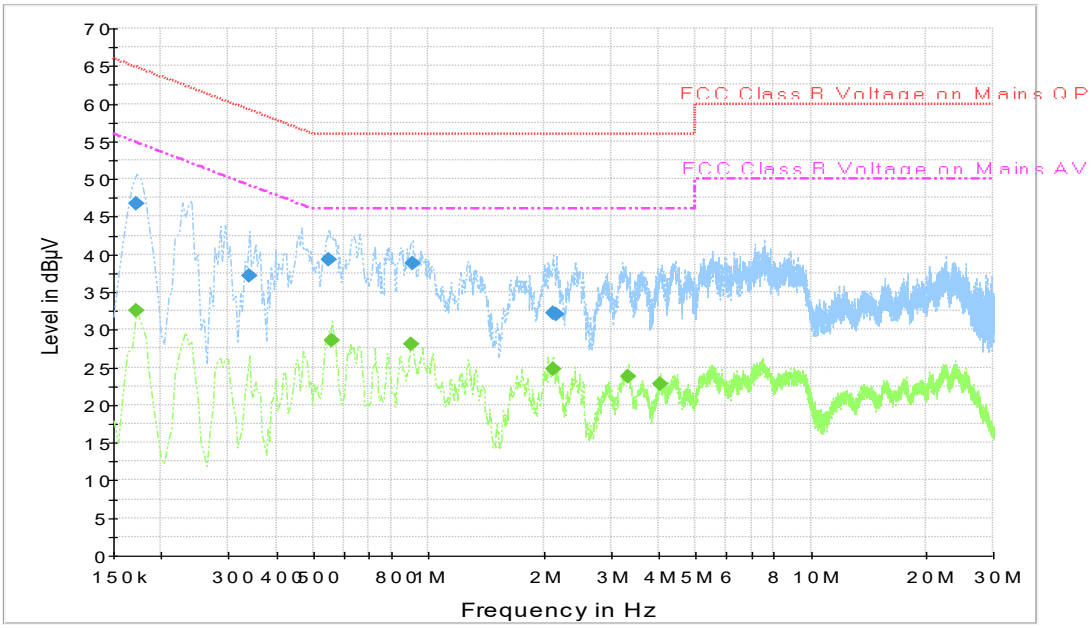


Fig. 27 AC Powerline Conducted Emission-802.11a

Measurement Result 1:

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.172500	46.7	N	19.9	18.2	64.8
0.339000	37.1	L1	20.1	22.1	59.2
0.550500	39.3	L1	20.1	16.7	56.0
0.906000	38.7	L1	19.9	17.3	56.0
2.116500	32.2	N	19.9	23.8	56.0
2.161500	32.1	L1	20.1	23.9	56.0

Measurement Result 2:

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.172500	32.5	L1	20.1	22.3	54.8
0.559500	28.6	L1	20.1	17.4	46.0
0.901500	28.0	N	20.0	18.0	46.0
2.116500	24.7	L1	20.1	21.3	46.0
3.322500	23.8	L1	20.4	22.2	46.0
4.056000	22.7	L1	20.6	23.3	46.0

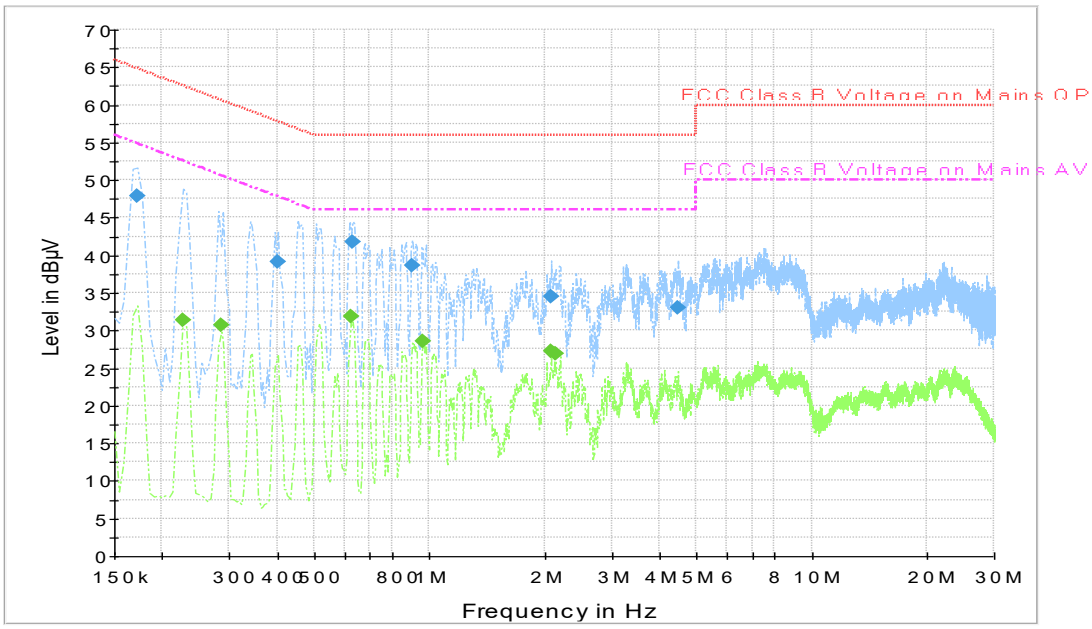


Fig. 28 AC Powerline Conducted Emission-Idle

Measurement Result 1:

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.172500	47.9	L1	20.1	17.0	64.8
0.402000	39.2	N	19.9	18.6	57.8
0.631500	41.7	L1	20.1	14.3	56.0
0.901500	38.6	N	20.0	17.4	56.0
2.080500	34.6	L1	20.1	21.4	56.0
4.465500	33.0	L1	20.7	23.0	56.0

Measurement Result 2:

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.226500	31.4	N	19.8	21.2	52.6
0.285000	30.7	N	19.8	20.0	50.7
0.622500	31.9	N	20.0	14.1	46.0
0.960000	28.6	N	19.9	17.4	46.0
2.080500	27.3	N	19.9	18.7	46.0
2.139000	26.9	N	19.9	19.1	46.0

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

For the National Voluntary Laboratory Accreditation Program

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