TESTING
NVLAP LAB CODE 600118-0

FCC PART 15C
TEST REPORT
No.I21Z60214-IOT03

for

Shenzhen Tinno Mobile Technology Corp.

4G MIFI

UM200AA

With

FCC ID: XD6UM200AA

Hardware Version: V1.0

Software Version: UM200AAV01.56.11

Issued Date: 2021-03-10

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

©Copyright. All rights reserved by CTTL.

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I21Z60214-IOT03	Rev.0	1st edition	2021-03-02
I21Z60214-IOT03	Rev.1	2nd edition. Add test instructions on P21.	2021-03-10

. ©Copyright. All rights reserved by CTTL.

CONTENTS

. ©Copyright. All rights reserved by CTTL.

. ©Copyright. All rights reserved by CTTL.

1. TEST LATORATORY

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 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 (ISED#: 24849). 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(huayuan North Road)

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

1.3. TestingEnvironment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.4. Project date

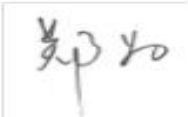
Testing Start Date: 2021-01-26

Testing End Date: 2021-03-02

1.5. Signature

Jiang Xue

(Prepared this test report)



Zheng Wei

(Reviewed this test report)

Hu Xiaoyu

(Approved this test report)

. ©Copyright. All rights reserved by CTTL.

2. CLIENT INFORMATION

2.1. Applicant Information

Company Name:	Shenzhen Tinno Mobile Technology Corp.
Address:	4/F, H-3 Building,OCT Eastern Industrial Park. NO.1 XiangShan East Road, Nan Shan District,Shenzhen, P.R.China
City:	Shenzhen
Postal Code:	/
Country:	China
Telephone:	0755-86095550
Fax:	/

2.2. Manufacturer Information

Company Name:	Shenzhen Tinno Mobile Technology Corp.
Address:	4/F, H-3 Building,OCT Eastern Industrial Park. NO.1 XiangShan East Road, Nan Shan District,Shenzhen, P.R.China
City:	Shenzhen
Postal Code:	/
Country:	China
Telephone:	0755-86095550
Fax:	/

. ©Copyright. All rights reserved by CTTL.

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

3.1. About EUT

Description	4G MIFI
Model name	UM200AA
FCC ID	XD6UM200AA
WLAN Frequency Band	ISM Band: 5725MHz~5850MHz
Type of modulation	OFDM
Voltage	3.85V

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
EUT1	865770050001215	V1.0	UM200AAV01.56.11
EUT2	865770050001892	V1.0	UM200AAV01.55.10

*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	/	/
AE2	Charger	/	/

AE1

Model	LT25H436270J
Manufacturer	Ningbo Veken Battery Co., Ltd.
Capacitance	2500mAh
Nominal voltage	3.85V

AE2

Model	TN-050120U8
Manufacturer	Chongqing Lianmao Electronic Co., Ltd.
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 4G MIFI 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.

. ©Copyright. All rights reserved by CTTL.

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.

. ©Copyright. All rights reserved by CTTL.

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%

. ©Copyright. All rights reserved by CTTL.

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	2021-05-19
3	Test Receiver	ESCI 3	100344	Rohde & Schwarz	1 year	2021-02-26
4	Shielding Room	S81	WL-SB-1005054	Beijing Lingkun Electromagnetic Technology Co. LTD	/	/
5	Attenuator	10dB/2W	/	Rosenberger	/	/

Note: The Test Receiver which series number is 100344 was before the CAL. DUE DATE when used.

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	100235	Rohde & Schwarz	1 year	2021-03-18
2	BiLog Antenna	VULB9163	9163-483	Schwarzbeck	1 years	2021-08-27
3	EMI Antenna	3115	00167250	ETS-Lindgren	1 Years	2021-05-14
4	Dual-Ridge Waveguide Horn Antenna	3116	2661	ETS-Lindgren	1 year	2021-10-06
5	Vector Signal Analyzer	FSV40	101047	Rohde & Schwarz	1 year	2021-06-15

. ©Copyright. All rights reserved by CTTL.

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	4.86
1GHz ≤ f ≤18GHz	5.26
18GHz ≤ f ≤40GHz	5.28

8.6. AC Power-line Conducted Emission

Measurement Uncertainty : 3.38dB, k=2.

ANNEX A: EUT parameters

Disclaimer: the Antenna gain and power worse case provided by the client may affect the validity of the measurement results in this report, and the client shall bear the impact and consequences arising therefrom.

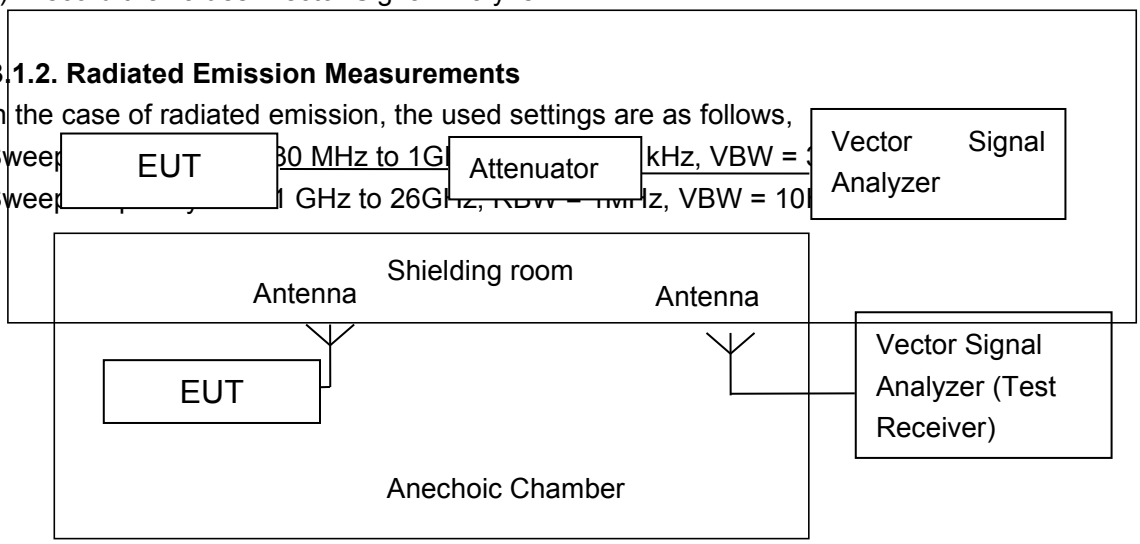
. ©Copyright. All rights reserved by CTTL.

ANNEX B: MEASUREMENT RESULTS

B.1. Measurement Method

B.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



B.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,

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.

B.2. Maximum Peak Output Power

Measurement Limit and Method:

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

B.2.1 Antenna Gain

Antenna gain is -4.5dBi and the value is supplied by the applicant or manufacturer.

. ©Copyright. All rights reserved by CTTL.

he following data rates are selected as the worst condition; as the maximum power is got with these data rate. The following cases are performed with this condition.

802.11a mode	802.11n-HT20 mode	802.11n-HT40 mode	802.11ac-HT20 mode	802.11ac-HT40 mode	802.11ac-HT80 mode
6Mbps	MCS0	MCS0	MCS0	MCS0	MCS0

Duty Cycle

Mode	802.11a	802.11n-HT20	802.11ac-HT20	802.11n-HT40	802.11ac-HT40	802.11ac-HT80
Duty Cycle	98%	98%	98%	98%	98%	94%

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	12.41	12.55	11.92

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

802.11n-HT20 mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz(Ch165)
802.11n(20MHz)	9.87	9.83	9.81

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

802.11ac-HT20 mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz(Ch165)
802.11ac(20MHz)	9.47	9.43	9.31

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

802.11n-HT40 mode

Mode	Test Result (dBm)	
	5755MHz (Ch151)	5795MHz(Ch159)
802.11n(40MHz)	9.89	9.98

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

. ©Copyright. All rights reserved by CTTL.

802.11ac-HT40 mode

Mode	Test Result (dBm)	
	5755MHz (Ch151)	5795MHz(Ch159)
802.11ac(40MHz)	9.64	9.57

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

802.11ac-HT80 mode

Mode	Test Result (dBm)
	5775MHz (Ch155)
802.11ac(80MHz)	9.59

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

Conclusion: PASS

B.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:

. ©Copyright. All rights reserved by CTTL.

Measurement Uncertainty	0.75dB

Measurement Results:

Mode	Channel	Power Spectral Density (dBm/500kHz)	Conclusion
802.11a	149	-3.59	P
	157	-4.09	P
	165	-4.37	P
802.11n HT20	149	-4.52	P
	157	-4.99	P
	165	-5.22	P
802.11n HT40	151	-7.51	P
	159	-8.07	P
802.11ac HT80	155	-11.39	P

Conclusion: PASS

B.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

. ©Copyright. All rights reserved by CTTL.

Measurement Result:

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
802.11a	149	Fig.1	15.10	P
	157	Fig.2	14.45	P
	165	Fig.3	15.10	P
802.11n HT20	149	Fig.4	15.15	P
	157	Fig.5	15.15	P
	165	Fig.6	15.15	P
802.11n HT40	151	Fig.7	35.12	P
	159	Fig.8	35.12	P
802.11ac HT80	155	Fig.9	75.20	P

Conclusion: PASS

Test graphs as below:

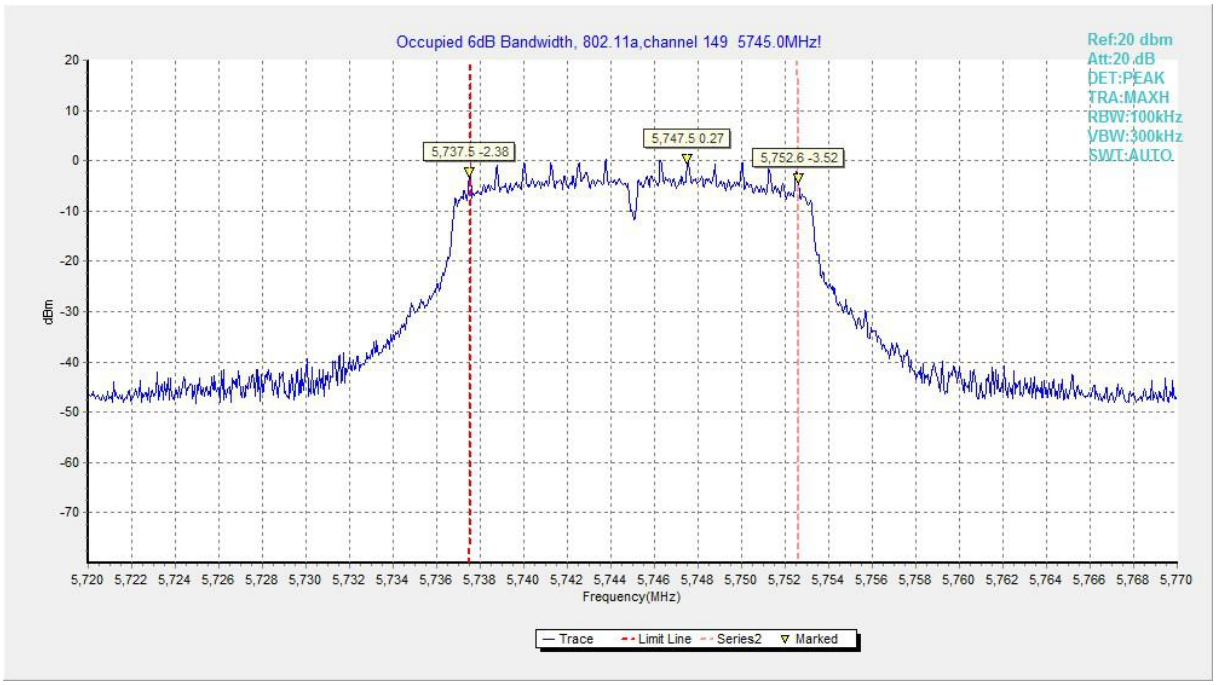


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)

. ©Copyright. All rights reserved by CTTL.

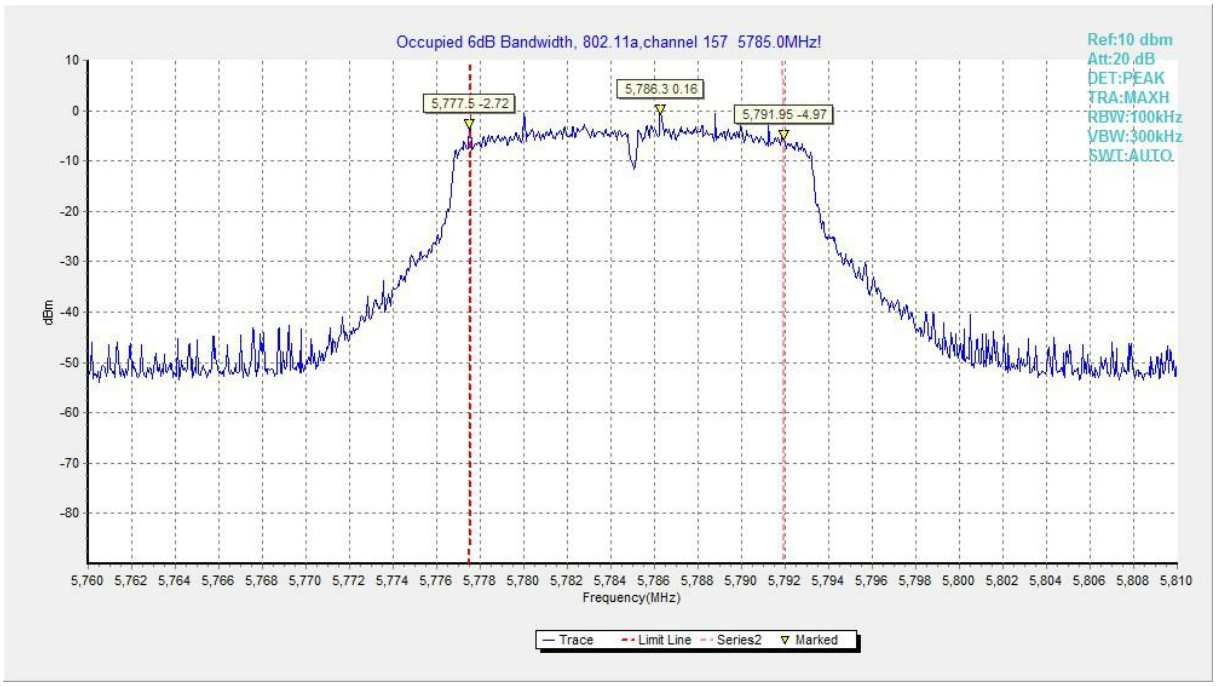


Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)

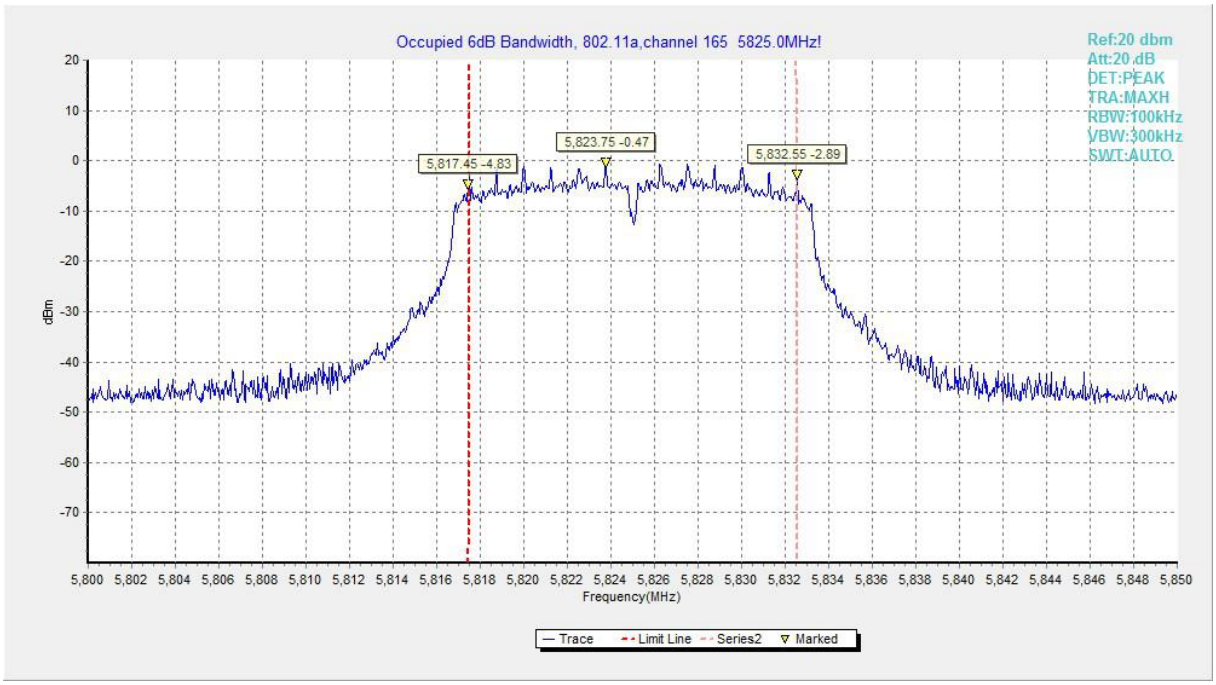


Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)

. ©Copyright. All rights reserved by CTTL.

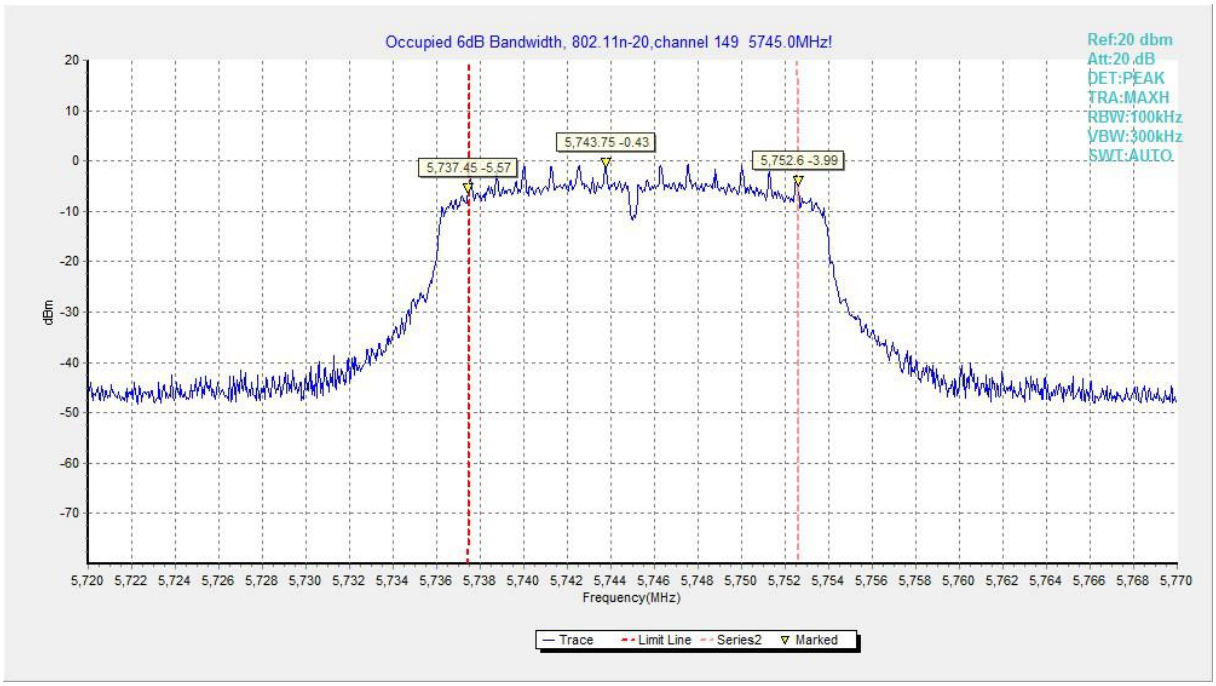


Fig. 4 Occupied 6dB Bandwidth (802.11n-HT20, Ch 149)

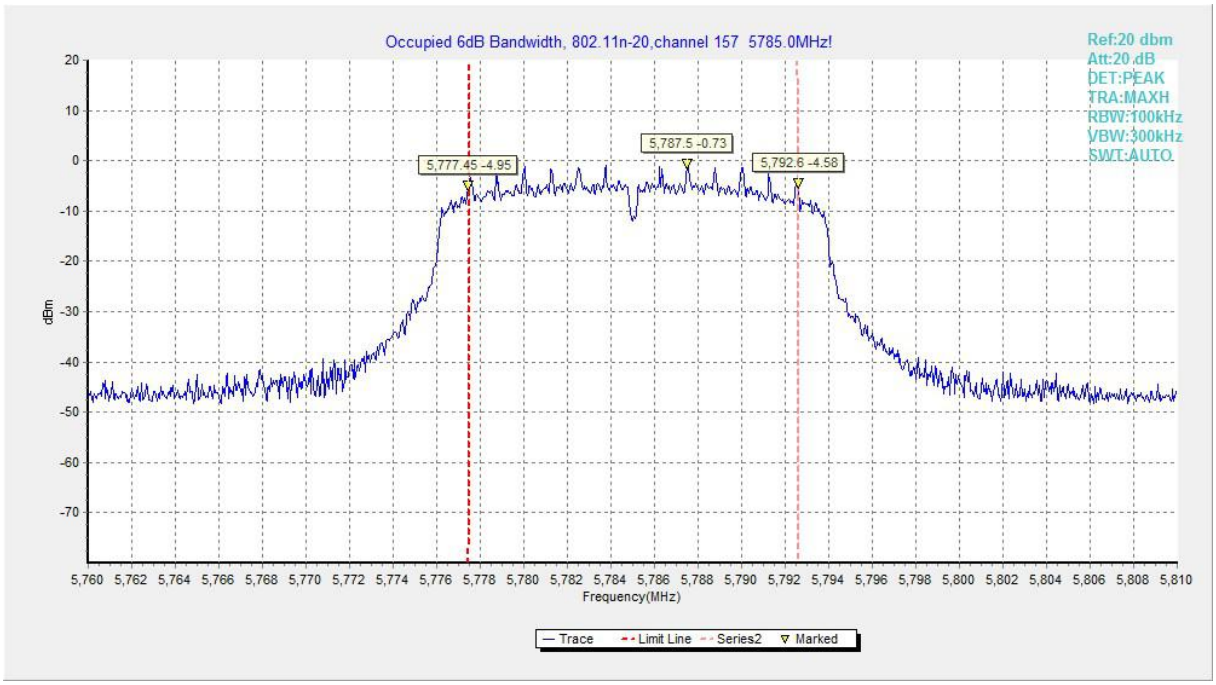


Fig. 5 Occupied 6dB Bandwidth (802.11n-HT20, Ch 157)

. ©Copyright. All rights reserved by CTTL.

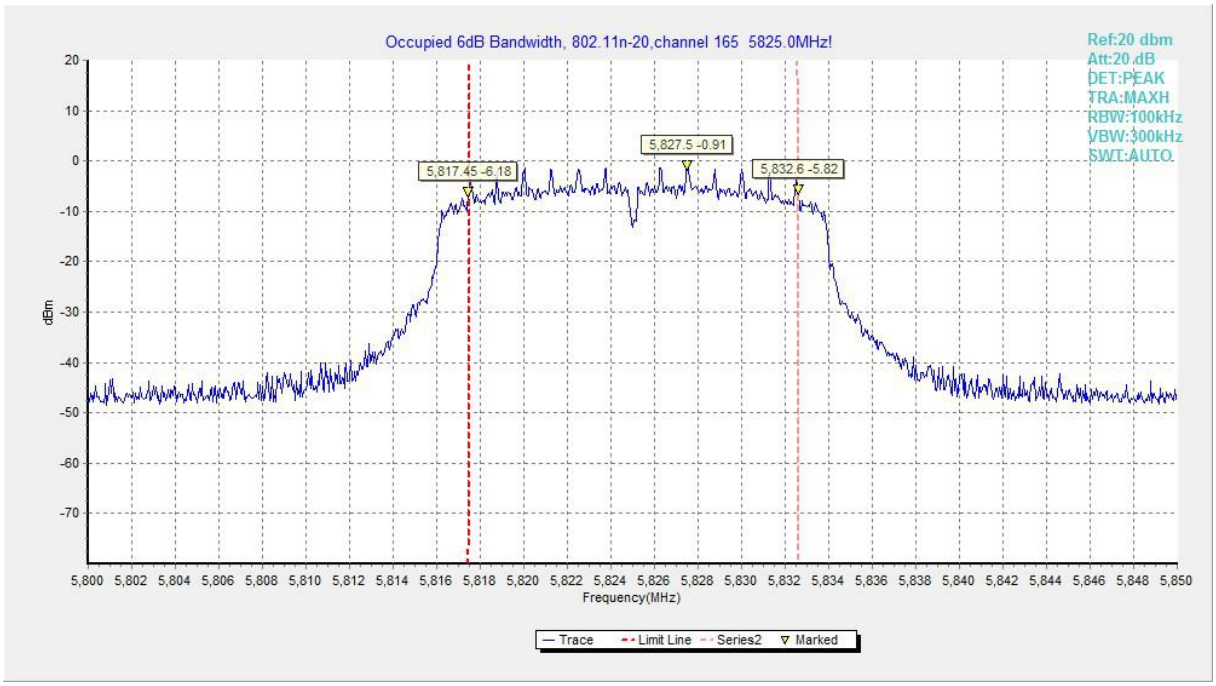


Fig. 6 Occupied 6dB Bandwidth (802.11n-HT20, Ch 165)

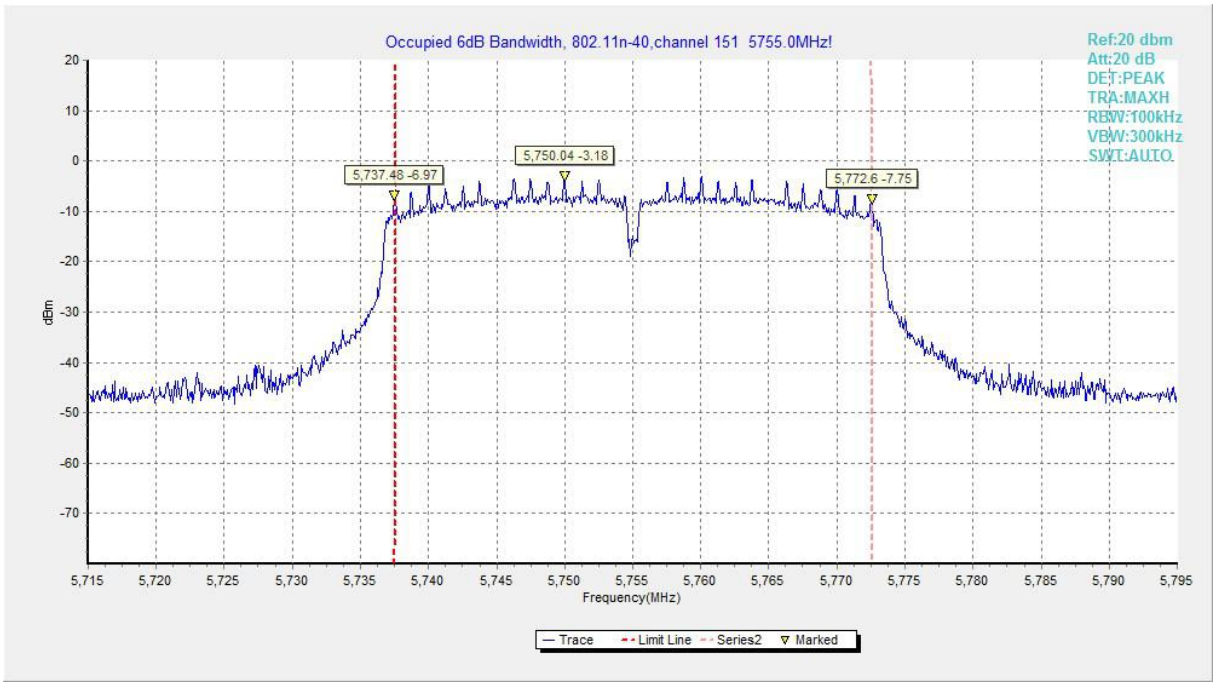


Fig. 7 Occupied 6dB Bandwidth (802.11n-HT40, Ch 151)

. ©Copyright. All rights reserved by CTTL.

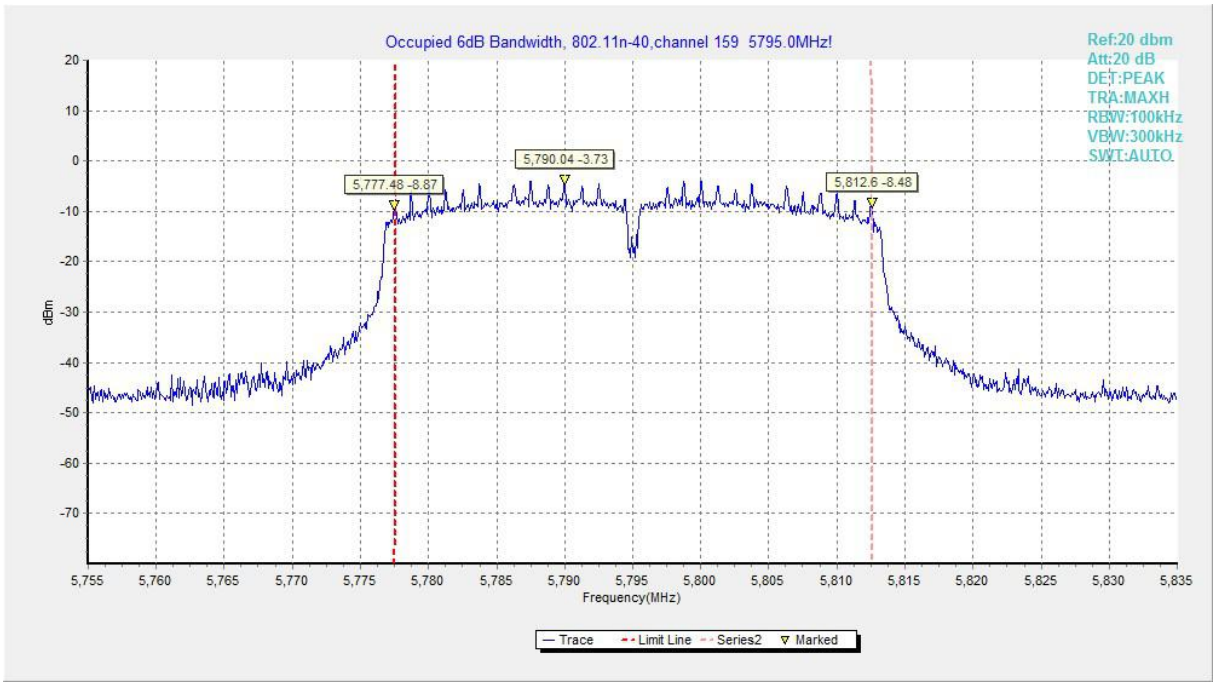


Fig. 8 Occupied 6dB Bandwidth (802.11n-HT40, Ch 159)

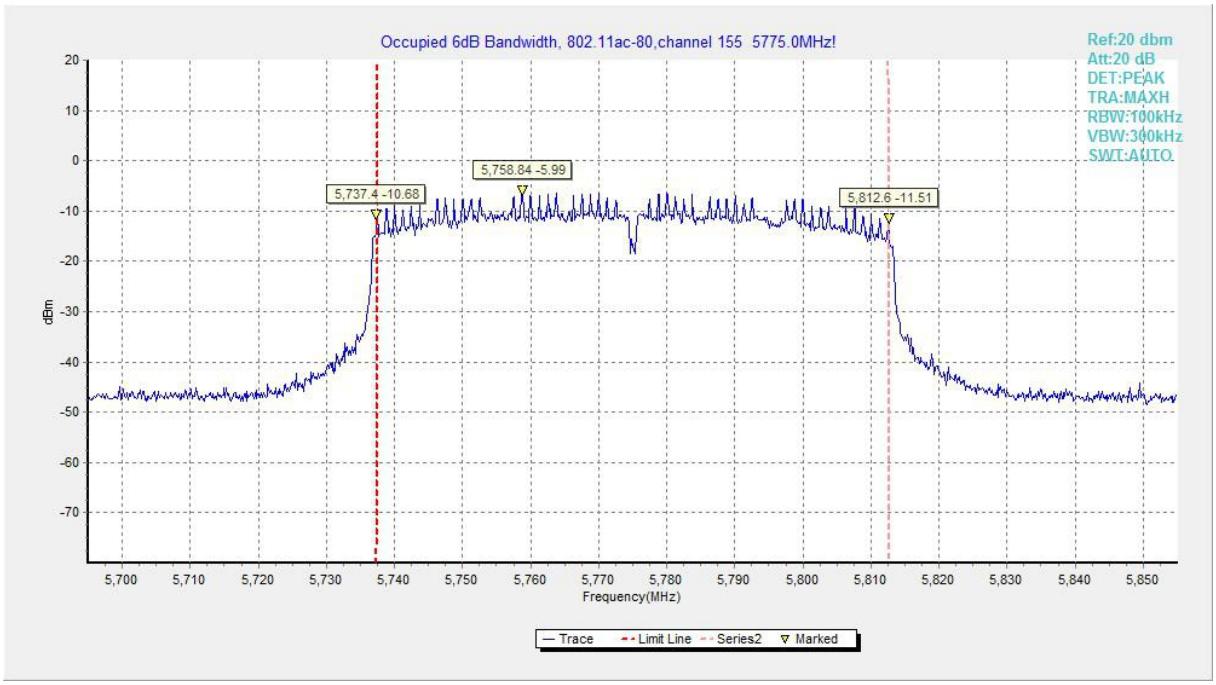


Fig. 9 Occupied 6dB Bandwidth (802.11ac-HT80, Ch 155)

. ©Copyright. All rights reserved by CTTL.

B.5. Transmitter Spurious Emission

Measurement Limit:

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

The measurement is made according to ANSI C63.10 .

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

Frequency of emission (MHz)	Field strength (uV/m)	Field strength (dBμV/m)	Measurement distance(m)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Test Condition

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

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.

. ©Copyright. All rights reserved by CTTL.

Peak Results：

802.11a

Ch149

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17947.2	54.3	-25.5	46.7	33.1	V	74	19.7
17997.2	54.2	-25.5	46.7	33	V	74	19.8
17971.4	54	-25.5	46.7	32.8	H	74	20
17977.5	54	-25.5	46.7	32.8	V	74	20
17750.8	53.6	-25.5	46.7	32.4	V	74	20.4
17927.4	53.6	-25.5	46.7	32.4	V	74	20.4

Ch157

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17985.2	54.9	-25.5	46.7	33.7	H	74	19.1
17998.3	54	-25.5	46.7	32.8	H	74	20
17990.1	53.7	-25.5	46.7	32.5	V	74	20.3
17967.5	53.6	-25.5	46.7	32.4	H	74	20.4
17978	53.6	-25.5	46.7	32.4	H	74	20.4
17882.8	53.5	-25.5	46.7	32.3	V	74	20.5

Ch165

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17967.5	54.6	-25.5	46.7	33.4	V	74	19.4
17757.5	53.9	-25.5	46.7	32.7	V	74	20.1
17879	53.6	-25.5	46.7	32.4	V	74	20.4
17978.5	53.6	-25.5	46.7	32.4	H	74	20.4
17984.6	53.5	-25.5	46.7	32.3	V	74	20.5
17897.7	53.4	-25.5	46.7	32.2	V	74	20.6

. ©Copyright. All rights reserved by CTTL.

802.11n-HT20

Ch149

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17983.5	54.1	-25.5	46.7	32.9	V	74	19.9
17873.5	53.9	-25.5	46.7	32.7	V	74	20.1
17878.5	53.9	-25.5	46.7	32.7	V	74	20.1
17949.4	53.8	-25.5	46.7	32.6	V	74	20.2
17889.5	53.7	-25.5	46.7	32.5	V	74	20.3
17734.9	53.6	-25.7	46	33.4	V	74	20.4

Ch157

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17972	53.9	-25.5	46.7	32.7	V	74	20.1
17395	53.7	-26.9	45.2	35.3	V	74	20.3
17984	53.7	-25.5	46.7	32.5	V	74	20.3
17914.2	53.6	-25.5	46.7	32.4	V	74	20.4
17890.5	53.4	-25.5	46.7	32.2	V	74	20.6
17979.7	53.3	-25.5	46.7	32.1	H	74	20.7

Ch165

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17879	54.2	-25.5	46.7	33	H	74	19.8
17992.8	54.2	-25.5	46.7	33	H	74	19.8
17974.7	53.8	-25.5	46.7	32.6	H	74	20.2
17884.5	53.6	-25.5	46.7	32.4	H	74	20.4
17921.3	53.6	-25.5	46.7	32.4	H	74	20.4
17979.7	53.4	-25.5	46.7	32.2	H	74	20.6

. ©Copyright. All rights reserved by CTTL.

802.11n-HT40

Ch151

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17994.5	54.4	-25.5	46.7	33.2	H	74	19.6
17950.5	54.2	-25.5	46.7	33	H	74	19.8
17956	54	-25.5	46.7	32.8	H	74	20
17898.8	53.8	-25.5	46.7	32.6	H	74	20.2
17939	53.8	-25.5	46.7	32.6	H	74	20.2
17987.3	53.8	-25.5	46.7	32.6	H	74	20.2

Ch159

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17851.5	54.3	-25.5	46.7	33.1	V	74	19.7
17862	54.2	-25.5	46.7	33	V	74	19.8
17969.2	54	-25.5	46.7	32.8	V	74	20
17950.5	53.8	-25.5	46.7	32.6	V	74	20.2
17957.1	53.8	-25.5	46.7	32.6	H	74	20.2
17884	53.6	-25.5	46.7	32.4	V	74	20.4

. ©Copyright. All rights reserved by CTTL.

802.11ac-HT20

Ch149

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17885.6	53.9	-25.5	46.7	32.7	V	74	20.1
17973	53.9	-25.5	46.7	32.7	V	74	20.1
17878.5	53.6	-25.5	46.7	32.4	H	74	20.4
17879	53.6	-25.5	46.7	32.4	H	74	20.4
17936.8	53.6	-25.5	46.7	32.4	V	74	20.4
17970.3	53.6	-25.5	46.7	32.4	V	74	20.4

Ch157

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17970.3	55	-25.5	46.7	33.8	V	74	19
17875.2	54.3	-25.5	46.7	33.1	H	74	19.7
17983	54.2	-25.5	46.7	33	V	74	19.8
17987.3	53.7	-25.5	46.7	32.5	H	74	20.3
17969.8	53.6	-25.5	46.7	32.4	H	74	20.4
17978	53.6	-25.5	46.7	32.4	H	74	20.4

Ch165

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17972.5	54.4	-25.5	46.7	33.2	V	74	19.6
17891.1	54.1	-25.5	46.7	32.9	V	74	19.9
17973.6	54.1	-25.5	46.7	32.9	H	74	19.9
17978.5	54	-25.5	46.7	32.8	H	74	20
17889.5	53.7	-25.5	46.7	32.5	H	74	20.3
17894.4	53.6	-25.5	46.7	32.4	H	74	20.4

. ©Copyright. All rights reserved by CTTL.

802.11ac-HT40

Ch151

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17984	54.3	-25.5	46.7	33.1	V	74	19.7
17997.2	54.3	-25.5	46.7	33.1	H	74	19.7
17977.5	54.2	-25.5	46.7	33	V	74	19.8
17993.4	54.2	-25.5	46.7	33	V	74	19.8
17881.2	54	-25.5	46.7	32.8	V	74	20
17995.6	54	-25.5	46.7	32.8	H	74	20

Ch159

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17936.8	54.2	-25.5	46.7	33	V	74	19.8
17979.7	54.2	-25.5	46.7	33	H	74	19.8
17983	54	-25.5	46.7	32.8	V	74	20
17866.9	53.9	-25.5	46.7	32.7	V	74	20.1
17996.2	53.8	-25.5	46.7	32.6	V	74	20.2
17968.7	53.6	-25.5	46.7	32.4	H	74	20.4

802.11ac-HT80

Ch155

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17995.6	54.4	-25.5	46.7	33.2	V	74	19.6
17862.5	54	-25.5	46.7	32.8	H	74	20
17980.2	53.9	-25.5	46.7	32.7	H	74	20.1
17880.7	53.8	-25.5	46.7	32.6	H	74	20.2
17976.3	53.7	-25.5	46.7	32.5	H	74	20.3
17980.8	53.7	-25.5	46.7	32.5	V	74	20.3

. ©Copyright. All rights reserved by CTTL.

Average Results：

802.11a

Ch149

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17987.9	42.8	-25.5	46.7	21.6	V	54	11.2
17982.4	42.7	-25.5	46.7	21.5	H	54	11.3
17973.6	42.6	-25.5	46.7	21.4	V	54	11.4
17995	42.6	-25.5	46.7	21.4	V	54	11.4
17996.2	42.6	-25.5	46.7	21.4	H	54	11.4
17962	42.5	-25.5	46.7	21.3	V	54	11.5

Ch157

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17981.8	42.7	-25.5	46.7	21.5	H	54	11.3
17991.2	42.7	-25.5	46.7	21.5	H	54	11.3
17967	42.6	-25.5	46.7	21.4	H	54	11.4
17982.4	42.6	-25.5	46.7	21.4	V	54	11.4
17962	42.5	-25.5	46.7	21.3	H	54	11.5
17965.9	42.5	-25.5	46.7	21.3	V	54	11.5

Ch165

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17985.2	43.1	-25.5	46.7	21.9	V	54	10.9
17975.8	42.8	-25.5	46.7	21.6	V	54	11.2
17965.9	42.7	-25.5	46.7	21.5	V	54	11.3
17987.3	42.7	-25.5	46.7	21.5	V	54	11.3
17998.3	42.7	-25.5	46.7	21.5	H	54	11.3
17973.6	42.6	-25.5	46.7	21.4	H	54	11.4

. ©Copyright. All rights reserved by CTTL.

802.11n-HT20

Ch149

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17974.2	42.8	-25.5	46.7	21.6	V	54	11.2
17981.8	42.7	-25.5	46.7	21.5	H	54	11.3
17983	42.7	-25.5	46.7	21.5	H	54	11.3
17984.6	42.7	-25.5	46.7	21.5	V	54	11.3
17994.5	42.7	-25.5	46.7	21.5	V	54	11.3
17992.3	42.6	-25.5	46.7	21.4	H	54	11.4

Ch157

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17981.8	42.9	-25.5	46.7	21.7	H	54	11.1
17970.3	42.6	-25.5	46.7	21.4	V	54	11.4
17984	42.6	-25.5	46.7	21.4	V	54	11.4
17989	42.6	-25.5	46.7	21.4	H	54	11.4
17974.7	42.5	-25.5	46.7	21.3	H	54	11.5
17996.7	42.5	-25.5	46.7	21.3	H	54	11.5

Ch165

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17950	42.5	-25.5	46.7	21.3	V	54	11.5
17963.2	42.5	-25.5	46.7	21.3	H	54	11.5
17969.8	42.5	-25.5	46.7	21.3	H	54	11.5
17972	42.5	-25.5	46.7	21.3	V	54	11.5
17974.7	42.5	-25.5	46.7	21.3	H	54	11.5
17984	42.5	-25.5	46.7	21.3	H	54	11.5

. ©Copyright. All rights reserved by CTTL.

802.11n-HT40

Ch151

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17983	42.8	-25.5	46.7	21.6	V	54	11.2
17979.7	42.5	-25.5	46.7	21.3	V	54	11.5
17992.3	42.5	-25.5	46.7	21.3	H	54	11.5
17958.8	42.4	-25.5	46.7	21.2	V	54	11.6
17967	42.4	-25.5	46.7	21.2	H	54	11.6
17975.2	42.4	-25.5	46.7	21.2	V	54	11.6

Ch159

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17966.5	42.9	-25.5	46.7	21.7	V	54	11.1
17972.5	42.7	-25.5	46.7	21.5	V	54	11.3
17973.6	42.7	-25.5	46.7	21.5	V	54	11.3
17978	42.6	-25.5	46.7	21.4	V	54	11.4
17972	42.5	-25.5	46.7	21.3	V	54	11.5
17976.9	42.5	-25.5	46.7	21.3	H	54	11.5

. ©Copyright. All rights reserved by CTTL.

802.11ac-HT20

Ch149

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17987.9	42.7	-25.5	46.7	21.5	H	54	11.3
17974.2	42.6	-25.5	46.7	21.4	V	54	11.4
17976.3	42.6	-25.5	46.7	21.4	H	54	11.4
17950	42.5	-25.5	46.7	21.3	V	54	11.5
17975.8	42.5	-25.5	46.7	21.3	V	54	11.5
17976.9	42.5	-25.5	46.7	21.3	H	54	11.5

Ch157

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17979.7	42.8	-25.5	46.7	21.6	H	54	11.2
17987.9	42.7	-25.5	46.7	21.5	V	54	11.3
17996.7	42.7	-25.5	46.7	21.5	V	54	11.3
17981.8	42.6	-25.5	46.7	21.4	V	54	11.4
17983	42.6	-25.5	46.7	21.4	V	54	11.4
17963.2	42.5	-25.5	46.7	21.3	H	54	11.5

Ch165

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17969.8	43	-25.5	46.7	21.8	V	54	11
17975.8	42.8	-25.5	46.7	21.6	V	54	11.2
17966.5	42.7	-25.5	46.7	21.5	V	54	11.3
17976.9	42.7	-25.5	46.7	21.5	V	54	11.3
17995.6	42.7	-25.5	46.7	21.5	V	54	11.3
17998.3	42.6	-25.5	46.7	21.4	V	54	11.4

. ©Copyright. All rights reserved by CTTL.

802.11ac-HT40

Ch151

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17975.8	43	-25.5	46.7	21.8	H	54	11
17965.3	42.8	-25.5	46.7	21.6	V	54	11.2
17975.2	42.8	-25.5	46.7	21.6	V	54	11.2
17984	42.7	-25.5	46.7	21.5	V	54	11.3
17979.1	42.6	-25.5	46.7	21.4	H	54	11.4
17995.6	42.6	-25.5	46.7	21.4	H	54	11.4

Ch159

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17975.8	42.6	-25.5	46.7	21.4	V	54	11.4
17974.2	42.5	-25.5	46.7	21.3	V	54	11.5
17978.5	42.5	-25.5	46.7	21.3	H	54	11.5
17891.1	42.4	-25.5	46.7	21.2	V	54	11.6
17962.6	42.4	-25.5	46.7	21.2	H	54	11.6
17964.2	42.4	-25.5	46.7	21.2	H	54	11.6

802.11ac-HT80

Ch155

Frequency (MHz)	Result (dBuV/m)	Cable Loss (dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization	Limit (dBuV/m)	Magin (dBuV/m)
17992.3	42.6	-25.5	46.7	21.4	V	54	11.4
17996.7	42.6	-25.5	46.7	21.4	H	54	11.4
17994	42.5	-25.5	46.7	21.3	H	54	11.5
17947.2	42.4	-25.5	46.7	21.2	H	54	11.6
17966.5	42.4	-25.5	46.7	21.2	H	54	11.6
17978	42.4	-25.5	46.7	21.2	V	54	11.6

. ©Copyright. All rights reserved by CTTL.

B.6. Band Edges Compliance

B.6.1 Band Edges - 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)).

Measurement Uncertainty:

Measurement Uncertainty	0.75dB

Measurement Result:

Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.10	P
	5825 MHz	Fig.11	P
802.11n HT20	5745 MHz	Fig.12	P
	5825 MHz	Fig.13	P
802.11n HT40	5755 MHz	Fig.14	P
	5795 MHz	Fig.15	P
802.11ac HT20	5745 MHz	Fig.16	P
	5825 MHz	Fig.17	P
802.11ac HT40	5755 MHz	Fig.18	P
	5795 MHz	Fig.19	P
802.11ac HT80	5775 MHz	Fig.20 Fig.21	P

Conclusion: PASS

Test graphs as below:

. ©Copyright. All rights reserved by CTTL.

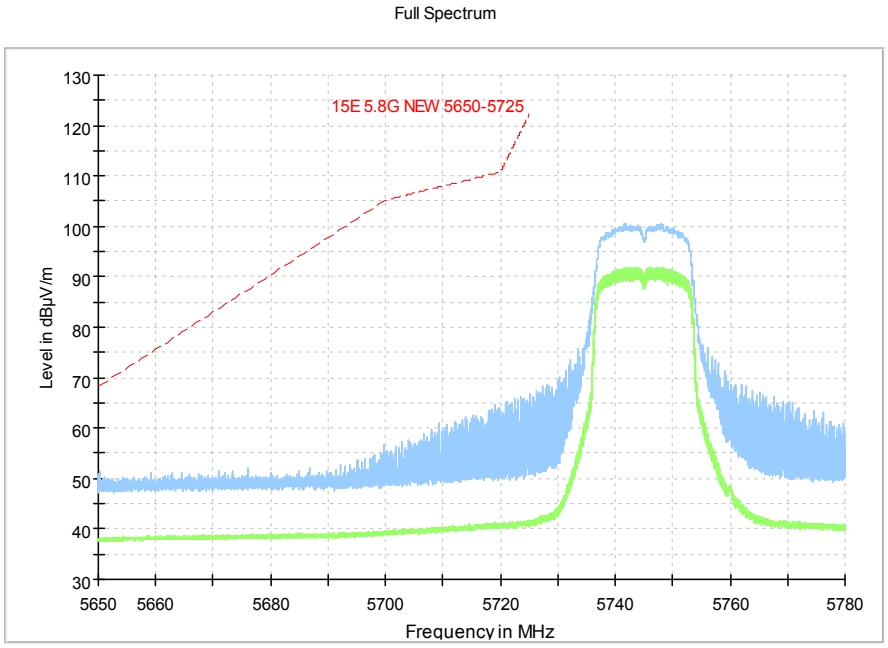


Fig. 10 Band Edges (802.11a, 5745MHz)

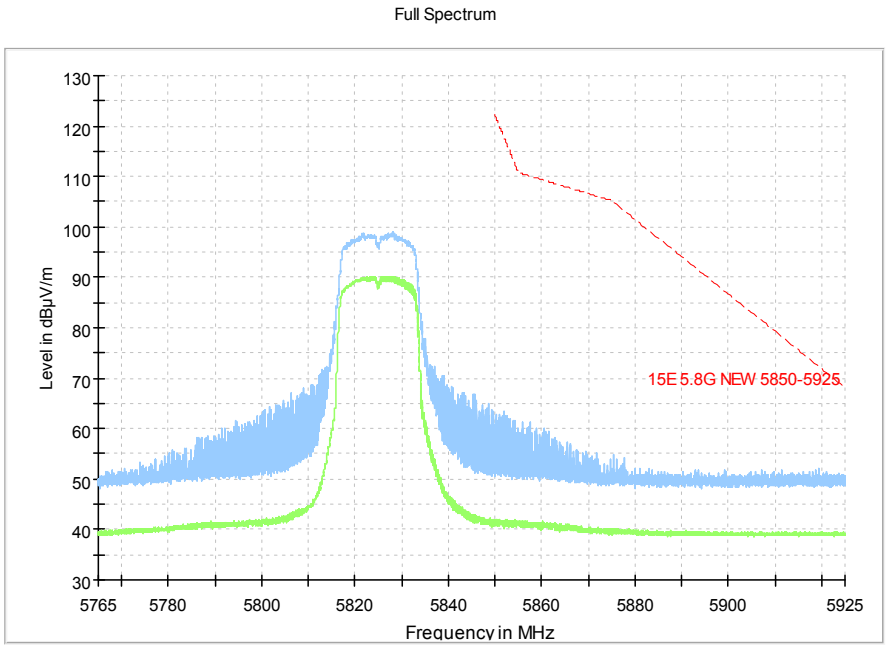


Fig. 11 Band Edges (802.11a, 5825MHz)

. ©Copyright. All rights reserved by CTTL.

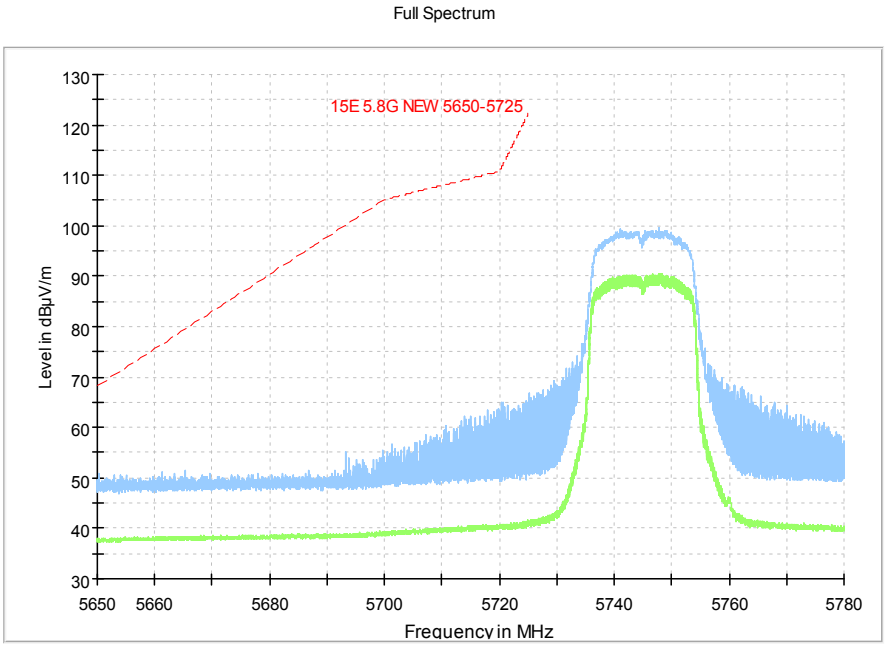


Fig. 12 Band Edges (802.11n-HT20, 5745MHz)

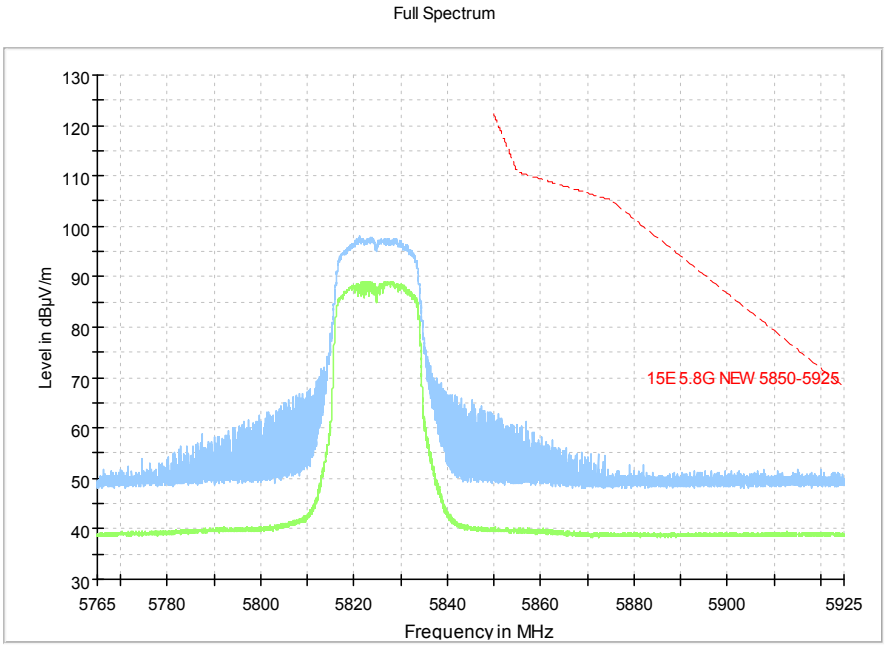


Fig. 13 Band Edges (802.11n-HT20, 5825MHz)

. ©Copyright. All rights reserved by CTTL.

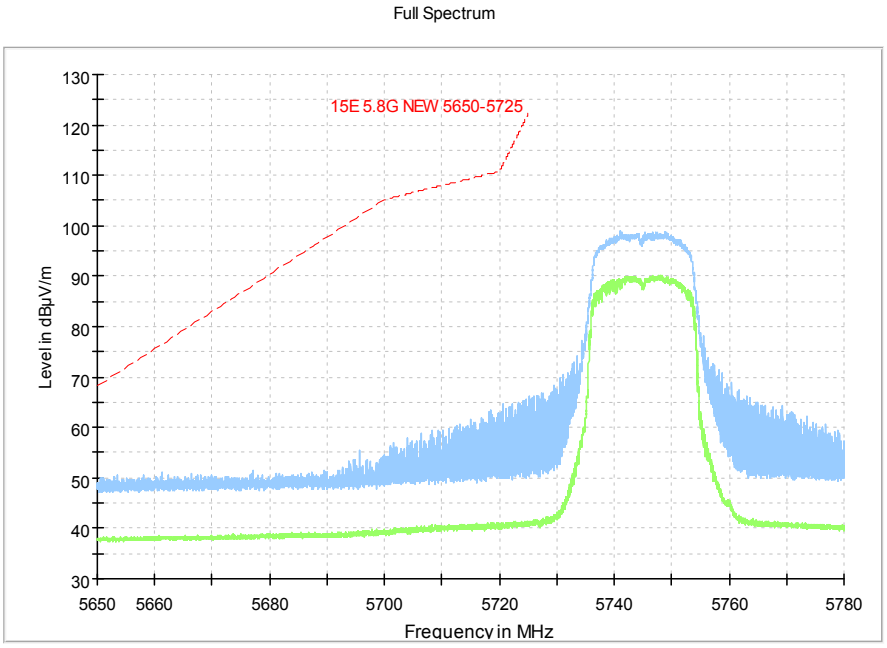


Fig. 14 Band Edges (802.11ac-HT20, 5745MHz)

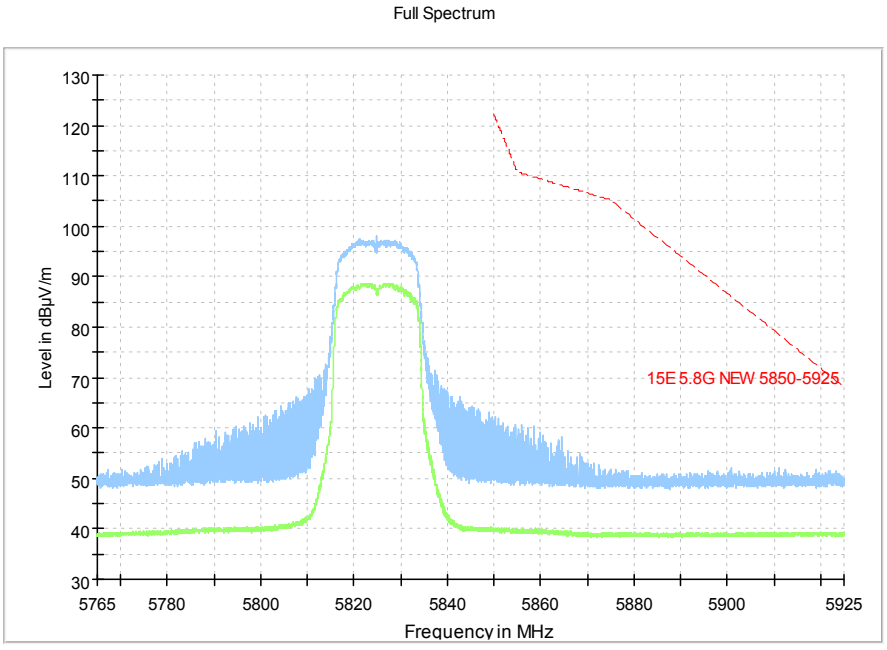


Fig. 15 Band Edges (802.11ac-HT20, 5825MHz)

. ©Copyright. All rights reserved by CTTL.

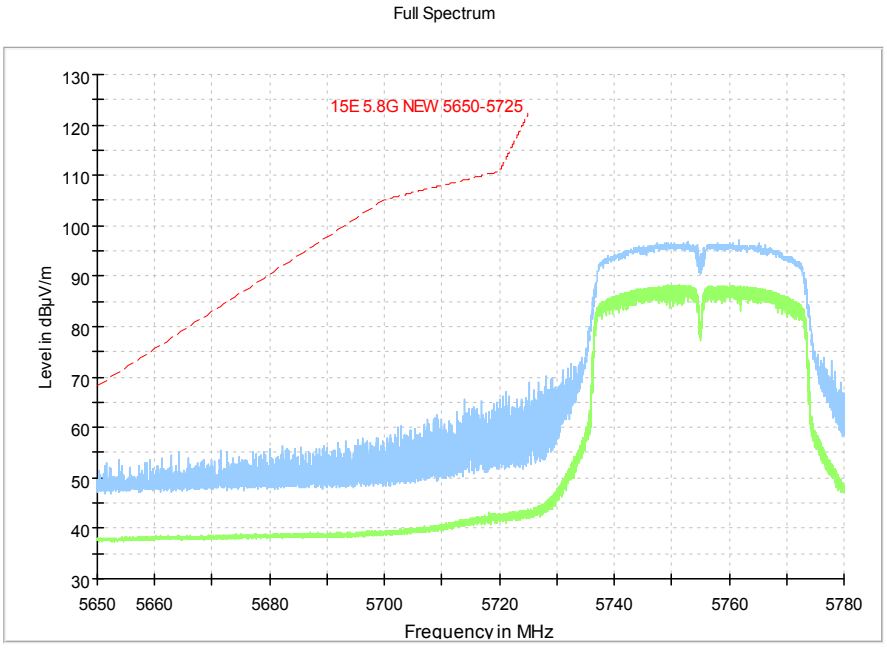


Fig. 16 Band Edges (802.11n-HT40, 5755MHz)

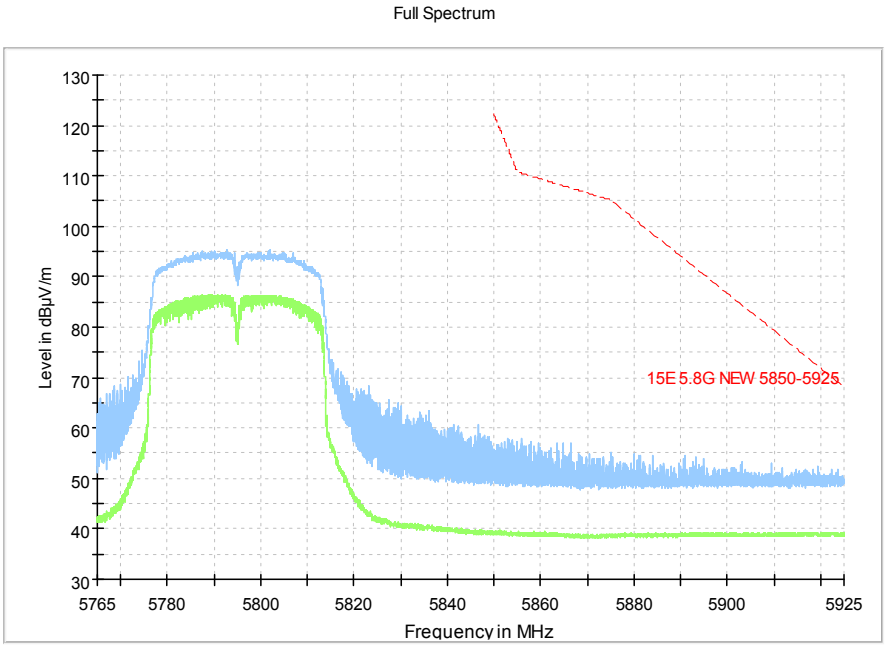


Fig. 17 Band Edges (802.11n-HT40, 5795MHz)

. ©Copyright. All rights reserved by CTTL.

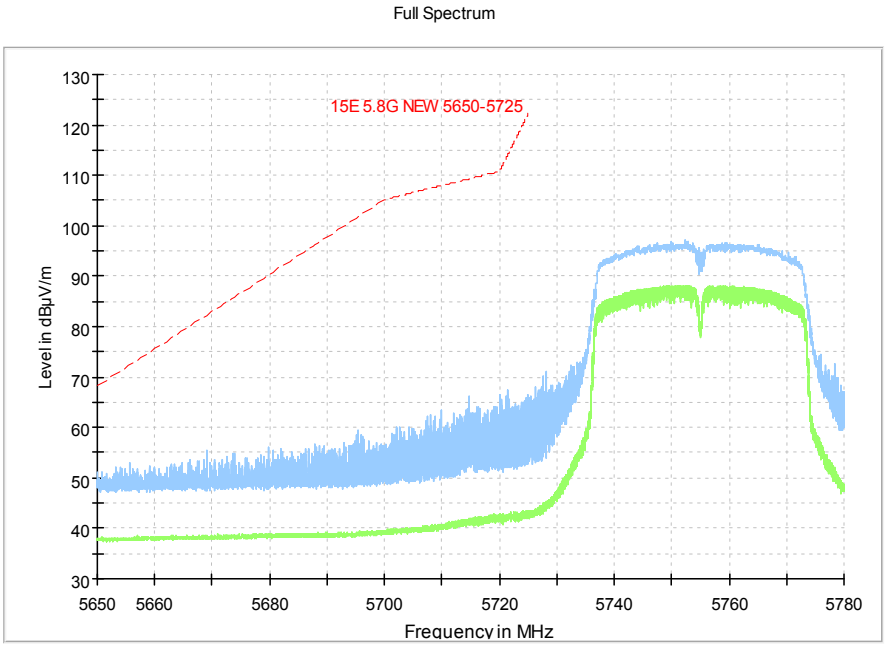


Fig. 18 Band Edges (802.11ac-HT40, 5755MHz)

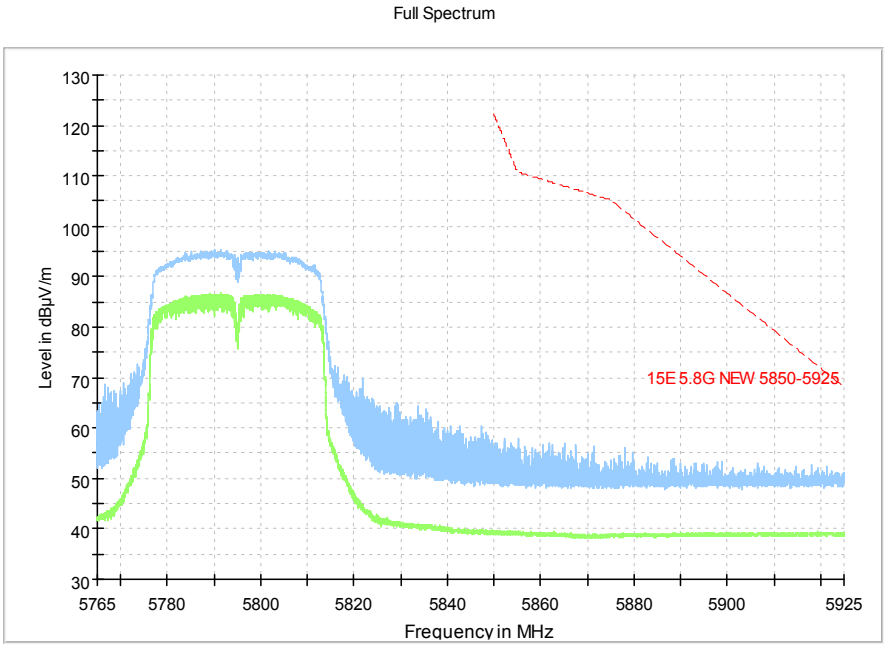


Fig. 19 Band Edges (802.11ac-HT40, 5795MHz)

. ©Copyright. All rights reserved by CTTL.

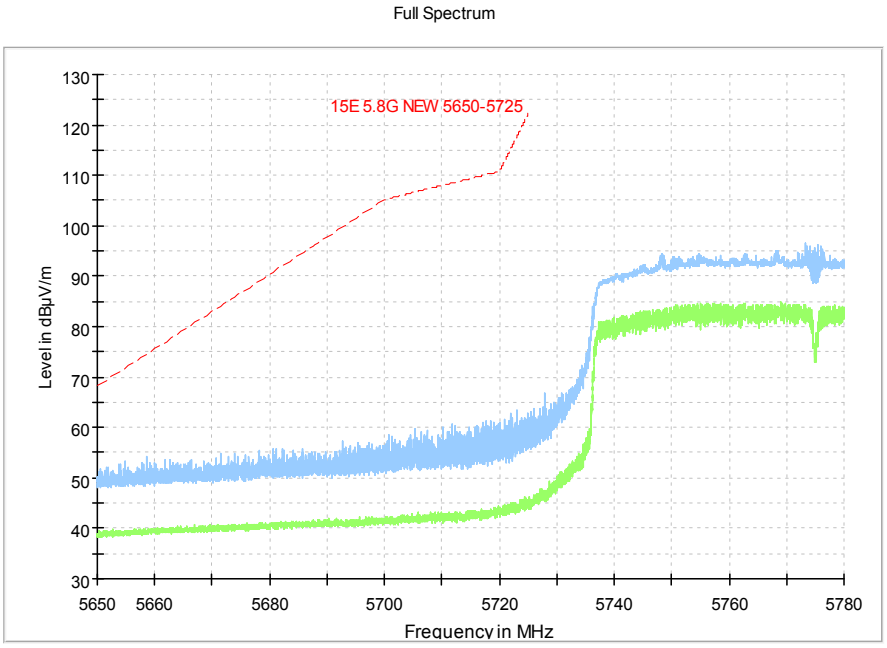


Fig. 20 Band Edges (802.11ac-HT80, 5775MHz)

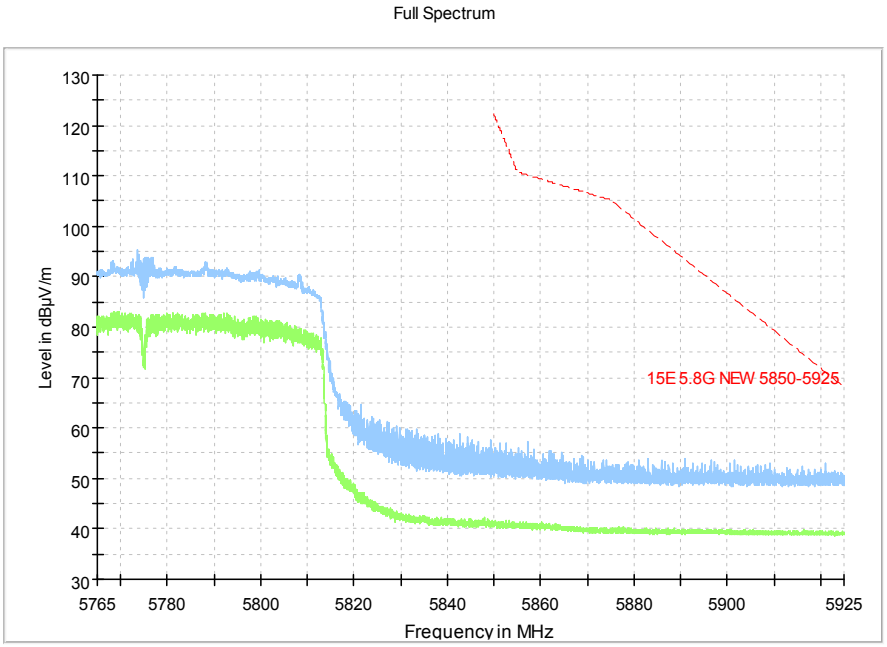


Fig. 21 Band Edges (802.11ac-HT80, 5775MHz)

. ©Copyright. All rights reserved by CTTL.

B.7. AC Powerline Conducted Emission

Test Condition:

Voltage（V）	Frequency（Hz）
120	60

Measurement uncertainty:

Expanded measurement uncertainty for this test item is U =3.10dB, k=2.

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.22	Fig.23	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.22	Fig.23	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:

. ©Copyright. All rights reserved by CTTL.

Traffic:

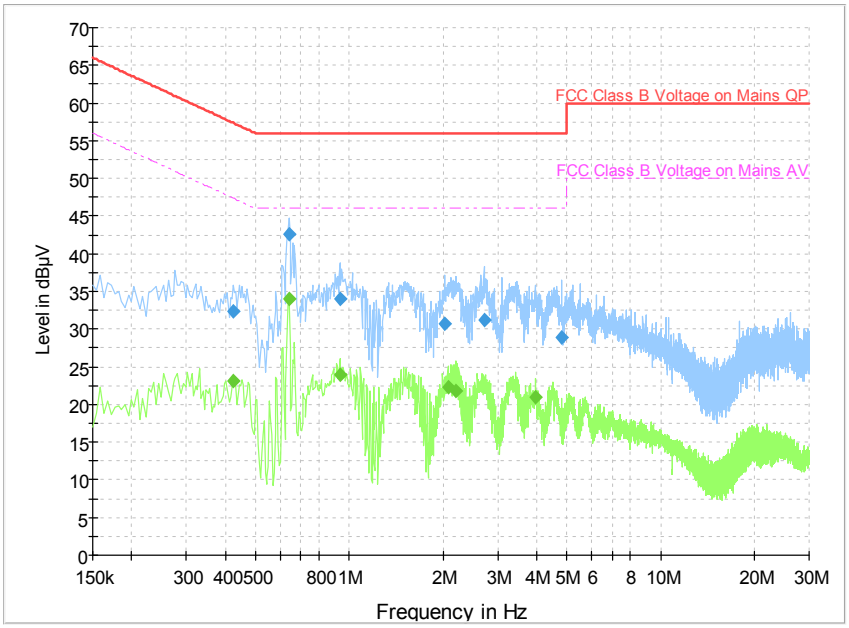


Fig. 22 AC Power line Conducted Emission-802.11a

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.424500	32.4	L1	19.6	24.9	57.4
0.640500	42.6	L1	19.6	13.4	56.0
0.933000	34.0	L1	19.6	22.0	56.0
2.026500	30.8	L1	19.5	25.2	56.0
2.710500	31.1	L1	19.6	24.9	56.0
4.803000	28.9	L1	19.8	27.1	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.424500	23.1	L1	19.6	24.3	47.4
0.640500	34.0	L1	19.6	12.0	46.0
0.933000	23.9	L1	19.6	22.1	46.0
2.076000	22.3	L1	19.5	23.7	46.0
2.202000	21.7	L1	19.6	24.3	46.0
3.957000	20.9	L1	19.7	25.1	46.0

. ©Copyright. All rights reserved by CTTL.

Idle:

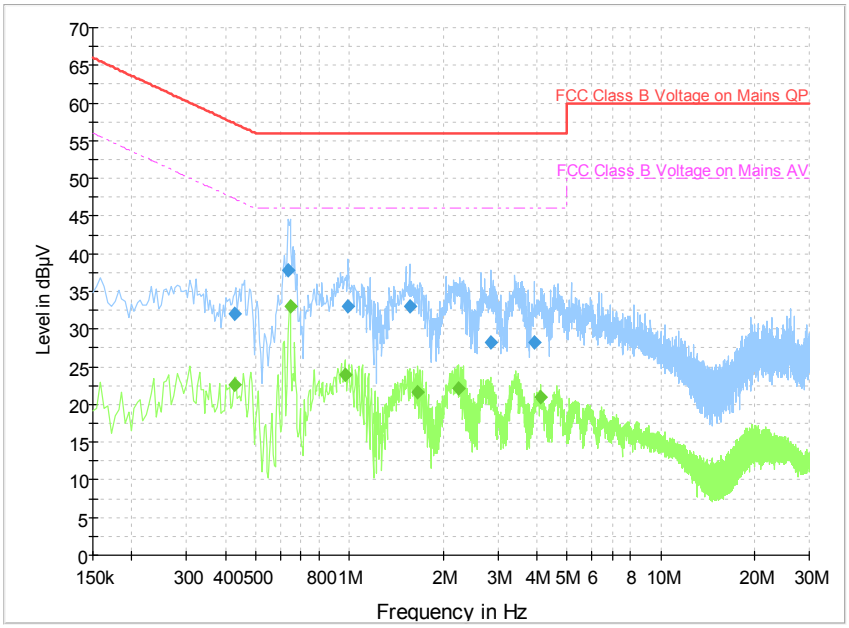


Fig. 23 AC Power line Conducted Emission-Idle

Note1: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Final Result 1

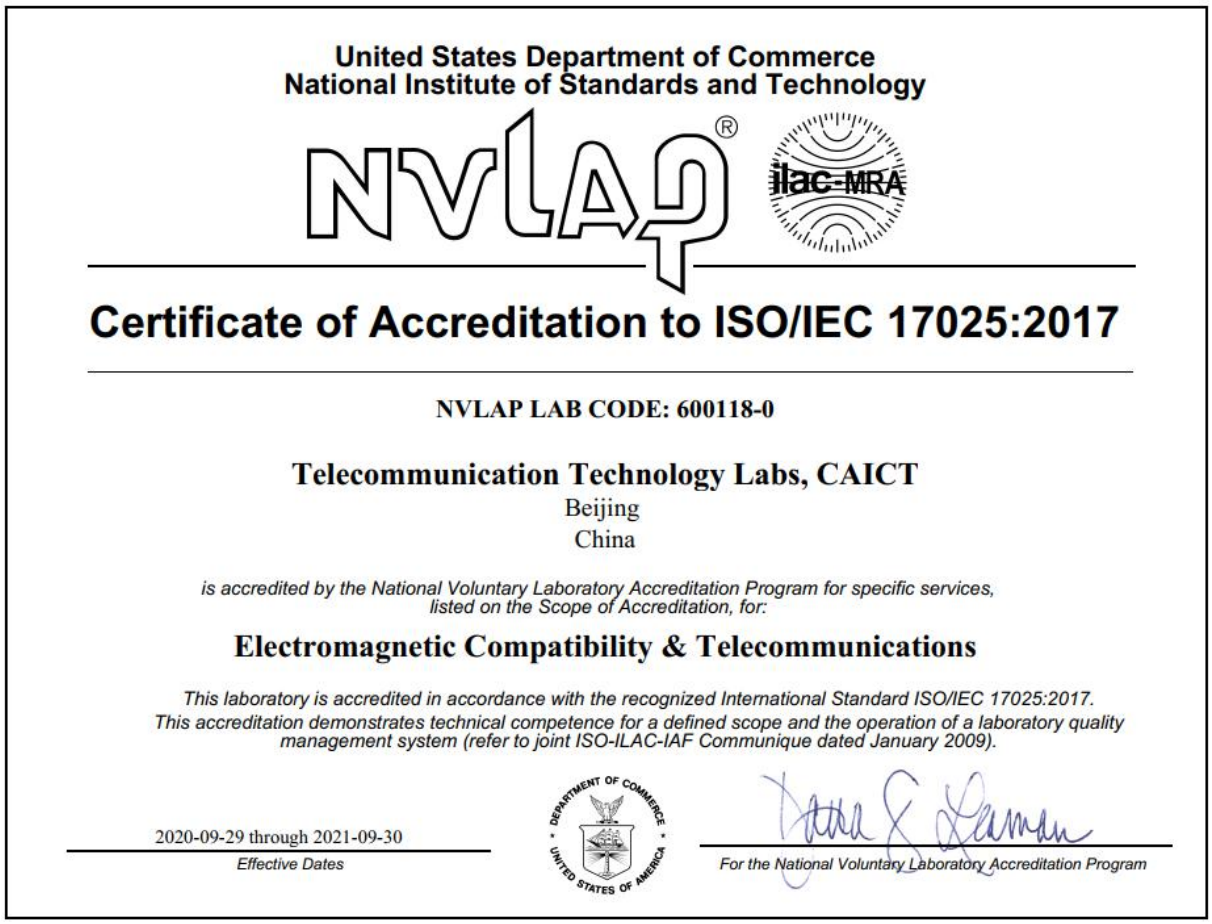
Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.429000	32.1	L1	19.6	25.2	57.3
0.636000	37.8	L1	19.6	18.2	56.0
0.991500	33.0	L1	19.6	23.0	56.0
1.563000	32.9	L1	19.6	23.1	56.0
2.850000	28.2	N	19.6	27.8	56.0
3.916500	28.2	L1	19.7	27.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.429000	22.6	L1	19.6	24.7	47.3
0.645000	33.1	L1	19.6	12.9	46.0
0.969000	23.9	L1	19.6	22.1	46.0
1.662000	21.7	L1	19.6	24.3	46.0
2.251500	22.2	L1	19.6	23.8	46.0
4.123500	20.9	L1	19.7	25.1	46.0

. ©Copyright. All rights reserved by CTTL.

ANNEX C: Accreditation Certificate



United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

ilac-MRA

Certificate of Accreditation to ISO/IEC 17025:2017

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 17025:2017. 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).

2020-09-29 through 2021-09-30
Effective Dates

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

For the National Voluntary Laboratory Accreditation Program

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

. ©Copyright. All rights reserved by CTTL.