



# FCC PART 15C TEST REPORT No.I21Z62312-IOT06

for

**OnePlus Technology (Shenzhen) Co., Ltd.**

**Smart Phone**

**GN2200**

**With**

**FCC ID: 2ABZ2-AA455**

**Hardware Version: 11**

**Software Version: GN2200\_11\_A.02**

**Issued Date: 2022-01-29**

**Note:**

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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:**

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## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I21Z62312-IOT06	Rev.0	1st edition	2022-01-12
I21Z62312-IOT06	Rev.1	Update the reference Documents .	2022-01-29

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## 1. TEST LABORATORY

### 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

Testing Location: CTTL(huayuan North Road)

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

### 1.3. Testing Environment

Normal Temperature: 15-35°C

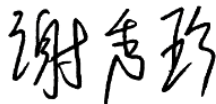
Relative Humidity: 20-75%

### 1.4. Project date

Testing Start Date: 2021-11-26

Testing End Date: 2022-01-12

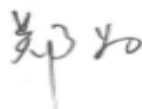
### 1.5. Signature



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Xie Xiuzhen

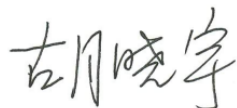
( Prepared this test report )



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Zheng Wei

(Reviewed this test report)



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Hu Xiaoyu

(Approved this test report)



## **2. CLIENT INFORMATION**

### **2.1. Applicant Information**

Company Name: OnePlus Technology (Shenzhen) Co., Ltd.  
Address: 18C02, 18C03, 18C04 and 18C05, Shum Yip Terra Building,  
Binhe Avenue North, Futian District, Shenzhen  
City: Shenzhen  
Postal Code: /  
Country: China  
Telephone: 86 755 61898696-7023  
Fax: /

### **2.2. Manufacturer Information**

Company Name: OnePlus Technology (Shenzhen) Co., Ltd.  
Address: "18C02, 18C03, 18C04 and 18C05, Shum Yip Terra Building, Binhe  
Avenue North, Futian District, Shenzhen"  
City: Shenzhen  
Postal Code: /  
Country: China  
Telephone: 86 755 61898696-7023  
Fax: /

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

#### EQUIPMENT(AE)

##### 3.1. About EUT

Description	Smart Phone
Model name	GN2200
FCC ID	2ABZ2-AA455
WLAN Frequency Band	ISM Band: 5725MHz~5850MHz
Type of modulation	OFDM
Voltage	3.87V

##### 3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
EUT1	866966050025092	11	GN2200_11_A.02
EUT2	866966050029490	11	GN2200_11_A.02

\*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	Charger1	H121415BA1500104	CH001
AE2	Charger2	J21401GA1000034	CH012
AE3	Charger3	C621404AA1000041	CH020

###### AE1

Model	VCB3HDUH
Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO LTD
Length of cable	1 meter

###### AE2

Model	VCB3HDUH
Manufacturer	HUIZHOU GOLDEN LAKE INDUSTRIAL CO., LTD
Length of cable	1 meter

###### AE3

Model	VCB3HDUH
Manufacturer	Dongguan YOHO Electronic Technology Co., LTD.
Length of cable	1 meter

\*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 Smart Phone 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

## 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)	/	<b>P</b>
Peak Power Spectral Density	15.407 (a)	/	<b>P</b>
Occupied 6dB Bandwidth	15.407 (e)	/	<b>P</b>
Band Edges Compliance - Conducted& Radiated	15.407 (b)	/	<b>P</b>
Transmitter Spurious Emission - Conducted	15.407	/	<b>P</b>
Transmitter Spurious Emission - Radiated	15.407, 15.205, 15.209	/	<b>P</b>
AC Powerline Conducted Emission	15.107, 15.207	/	<b>P</b>

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/matrix 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°C
Voltage	3.87V
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	2022-05-24
2	LISN	ENV216	101200	R&S	1 year	2022-05-30
3	Test Receiver	ESCI	100344	R&S	1 year	2022-02-23
4	Shielding Room	S81	/	ETS-Lindgren	/	/

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	FSW67	103290	R&S	1 year	2022-01-20
2	BiLog Antenna	VULB9163	9163-1223	Schwarzbeck	1 year	2022-03-22
3	EMI Antenna	3115	0016725	ETS-Lindgren	1 year	2022-07-01

## 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)
$30\text{MHz} \leq f \leq 2\text{GHz}$	1.22
$2\text{GHz} \leq f \leq 3.6\text{GHz}$	1.22
$3.6\text{GHz} \leq f \leq 8\text{GHz}$	1.22
$8\text{GHz} \leq f \leq 12.75\text{GHz}$	1.51
$12.75\text{GHz} \leq f \leq 26\text{GHz}$	1.51
$26\text{GHz} \leq f \leq 40\text{GHz}$	1.59

#### Radiated (k=2)

Frequency Range	Uncertainty(dB)
9kHz-30MHz	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.16
$1\text{GHz} \leq f \leq 18\text{GHz}$	5.44
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.28

### 8.6. AC Power-line Conducted Emission

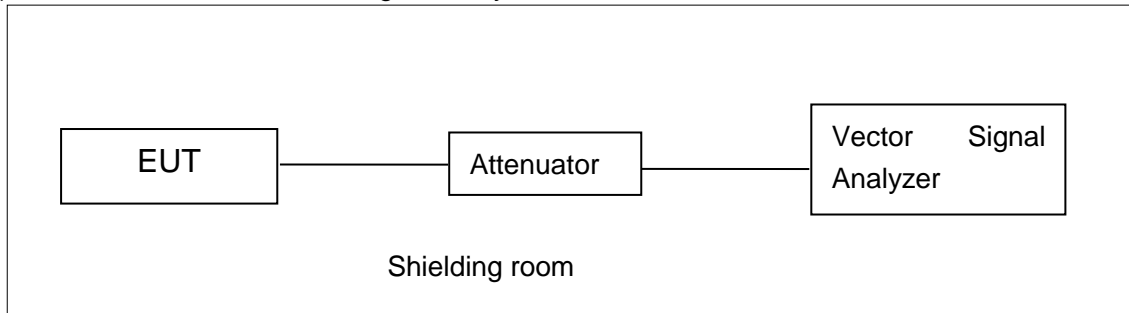
Measurement Uncertainty : 3.08dB,k=2

## 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

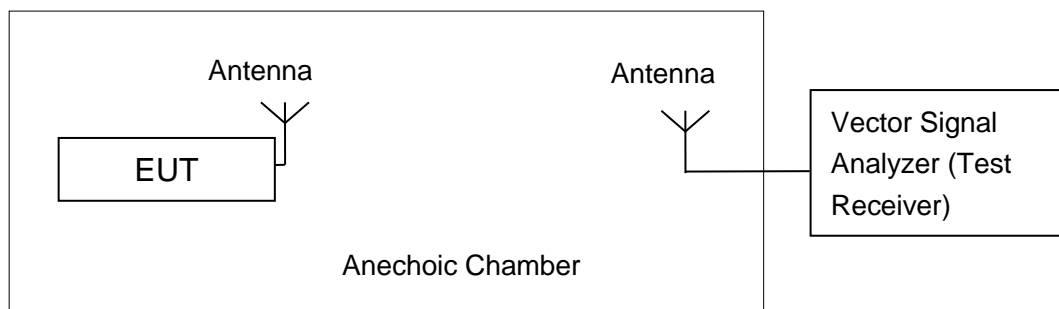


#### A.1.2. Radiated Emission Measurements

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 -4dBi and the value is supplied by the applicant or manufacturer.

### A.2.2. Maximum Peak Output Power-conducted

#### Measurement Results:

#### 802.11a mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	19.87	19.86	20.01

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)	19.61	19.68	19.86

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)	19.60	19.65	19.84

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)	19.22	19.43

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

**802.11ac-HT40 mode**

Mode	Test Result (dBm)	
	5755MHz (Ch151)	5795MHz(Ch159)
802.11ac(40MHz)	19.18	19.42

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)	19.65

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

The duty cycle of all mode are meet the 98% requirement.

**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
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#### Measurement Results:

Mode	Channel	Power Spectral Density ( dBm/500kHz )	Conclusion
802.11a	149	5.57	P
	157	5.41	P
	165	5.75	P
802.11ac HT20	149	5.11	P
	157	5.02	P
	165	5.29	P
802.11ac HT40	151	2.03	P
	159	2.16	P
802.11ac HT80	155	-1.55	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
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#### Measurement Result:

Mode	Channel	Occupied 6dB Bandwidth ( MHz)		conclusion
		Fig.	Value	
802.11a	149	Fig.1	15.35	P
	157	Fig.2	15.30	P
	165	Fig.3	15.55	P
802.11ac HT20	149	Fig.4	15.45	P
	157	Fig.5	15.15	P
	165	Fig.6	16.80	P
802.11ac HT40	151	Fig.7	35.68	P
	159	Fig.8	35.12	P
802.11ac HT80	155	Fig.9	75.52	P

#### Conclusion: PASS

#### Test graphs as below:

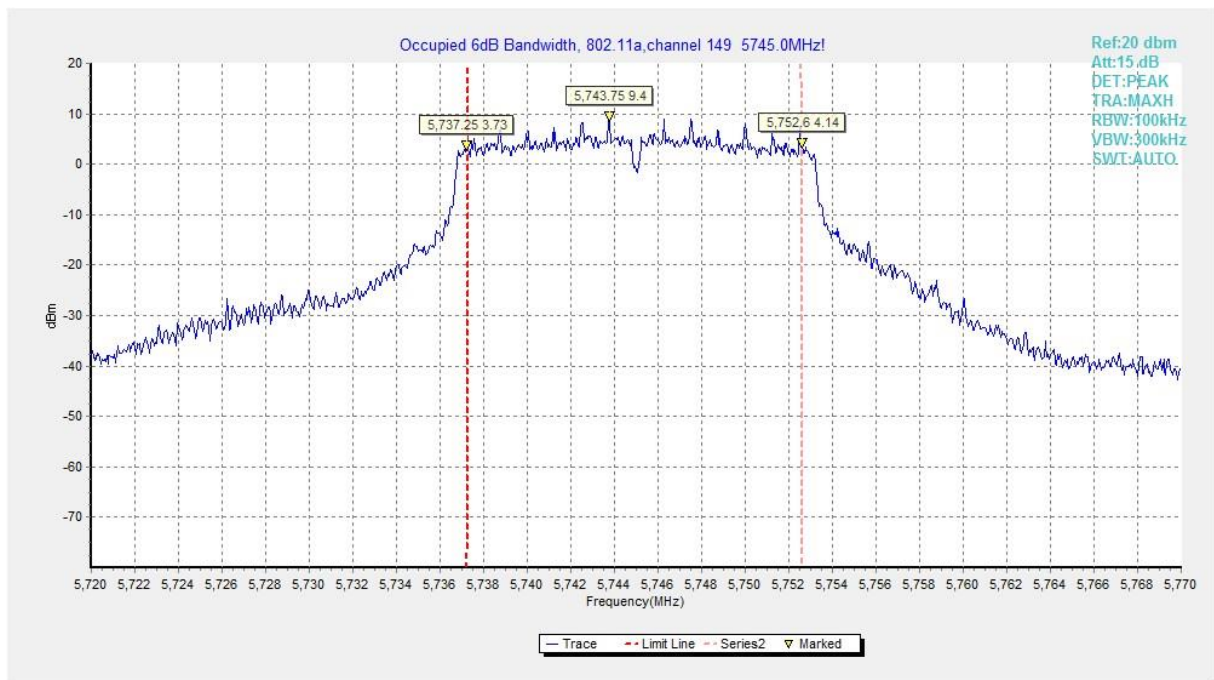
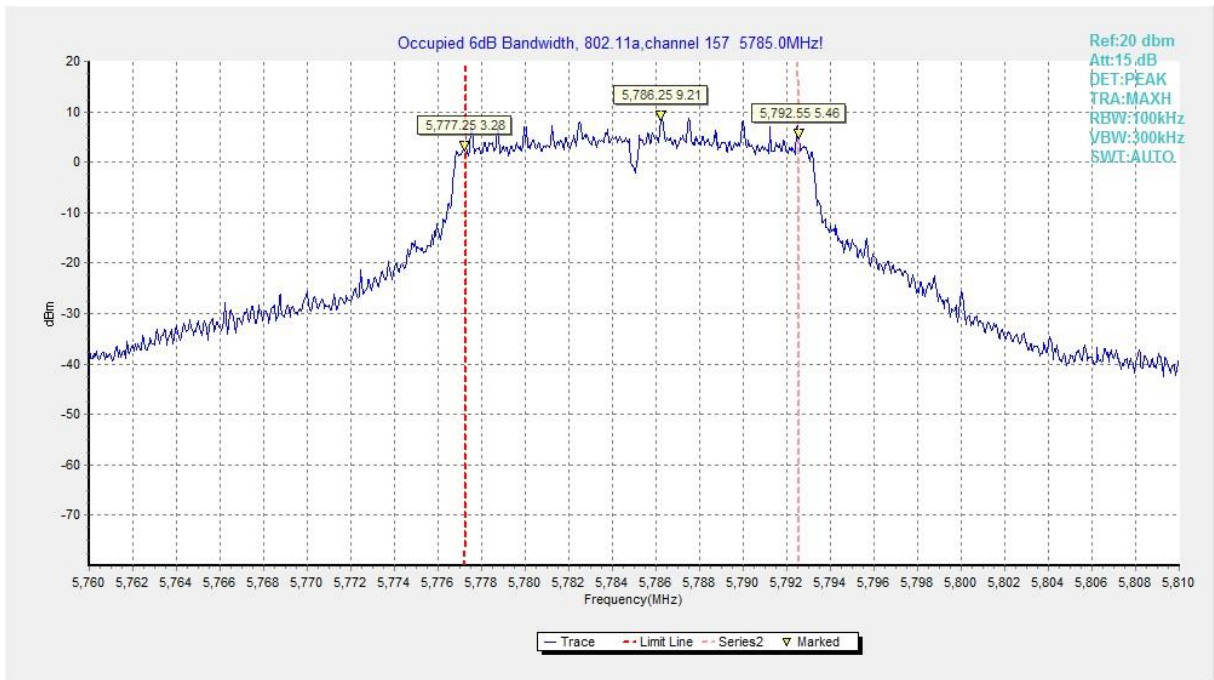
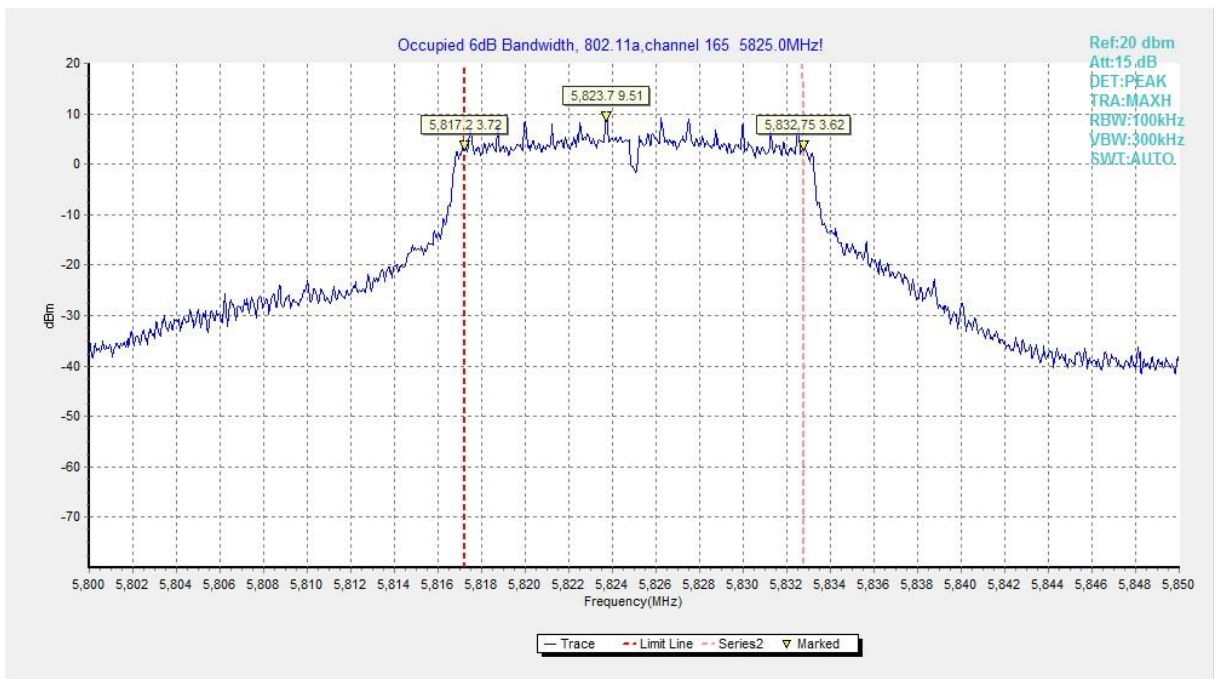


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)

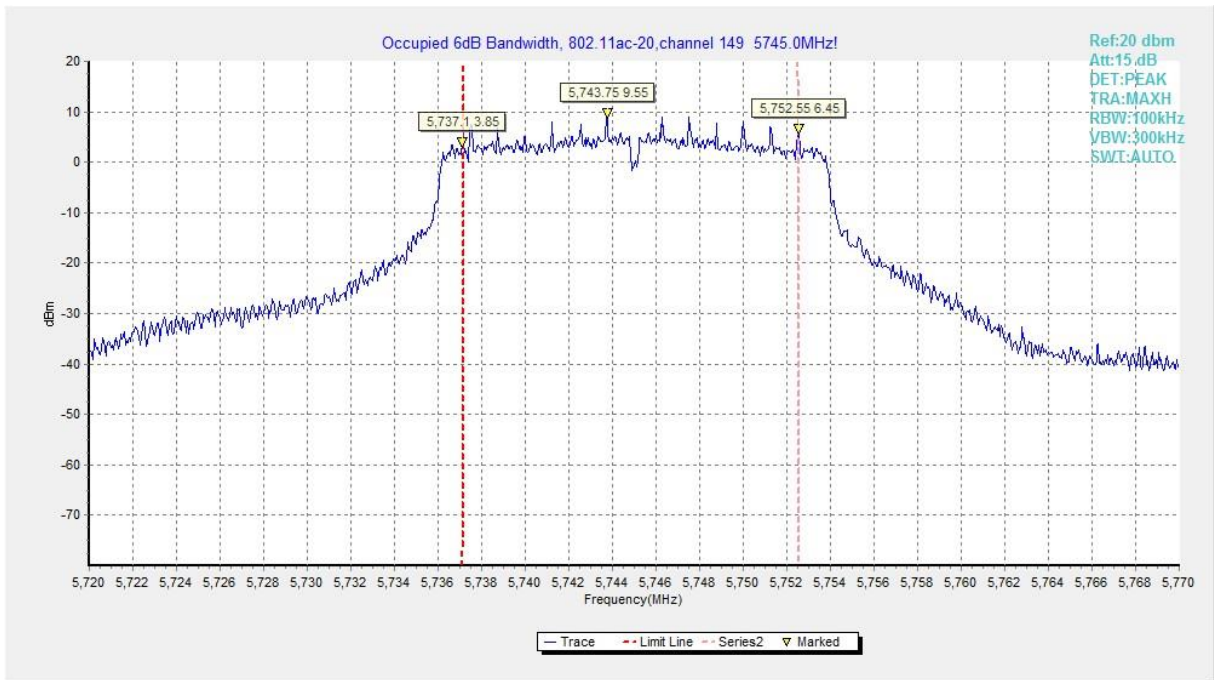




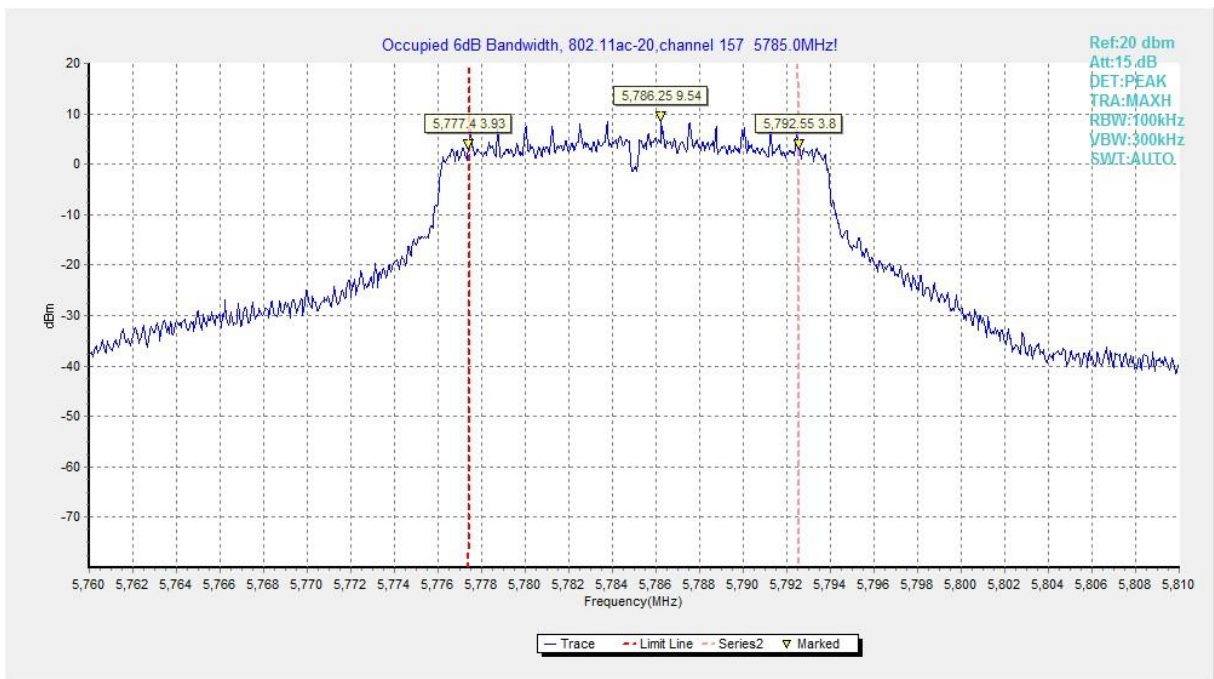
**Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)**



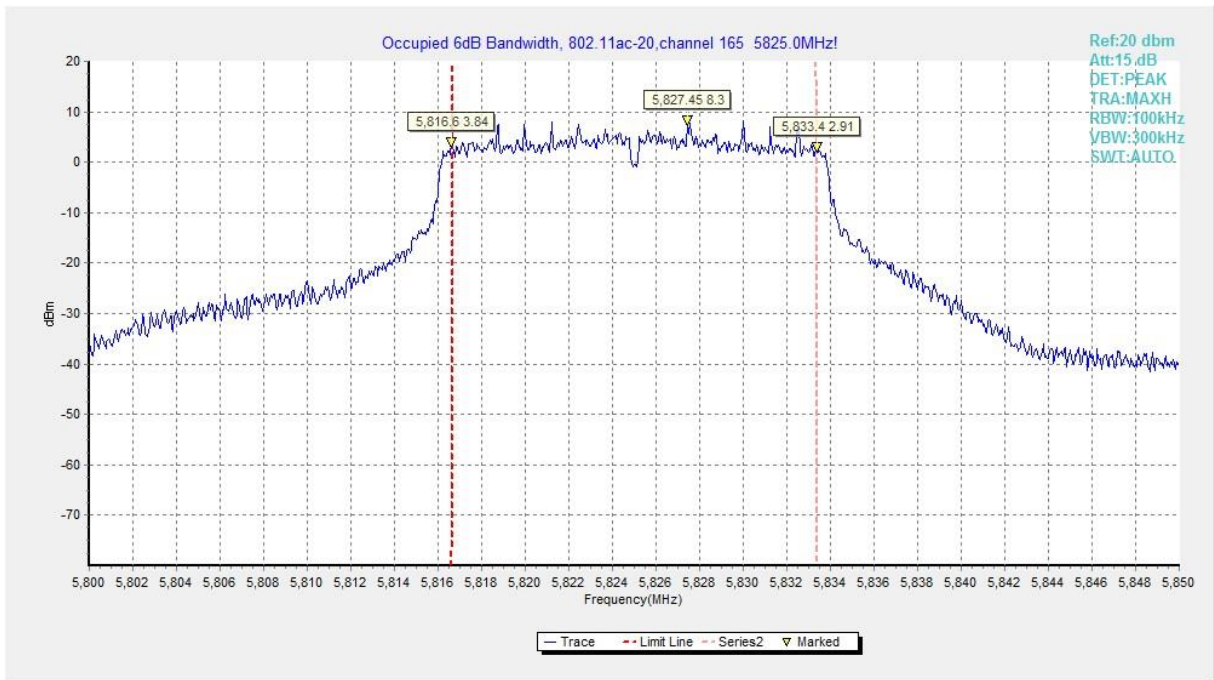
**Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)**



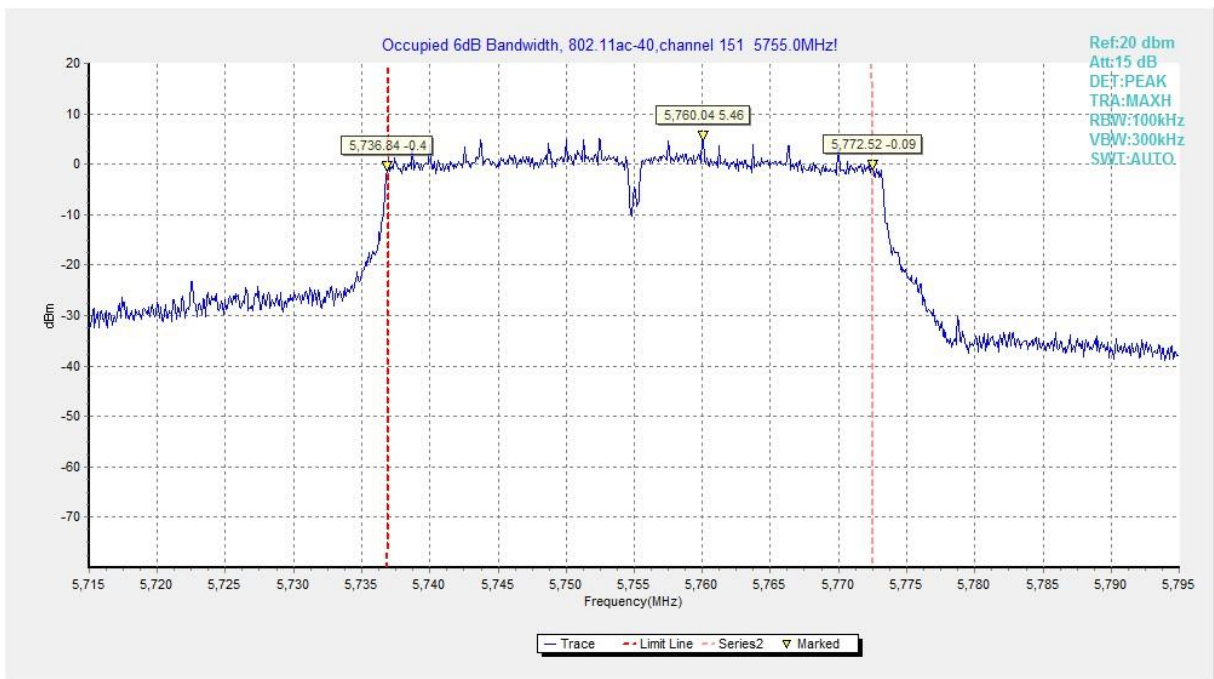
**Fig. 4 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 149)**



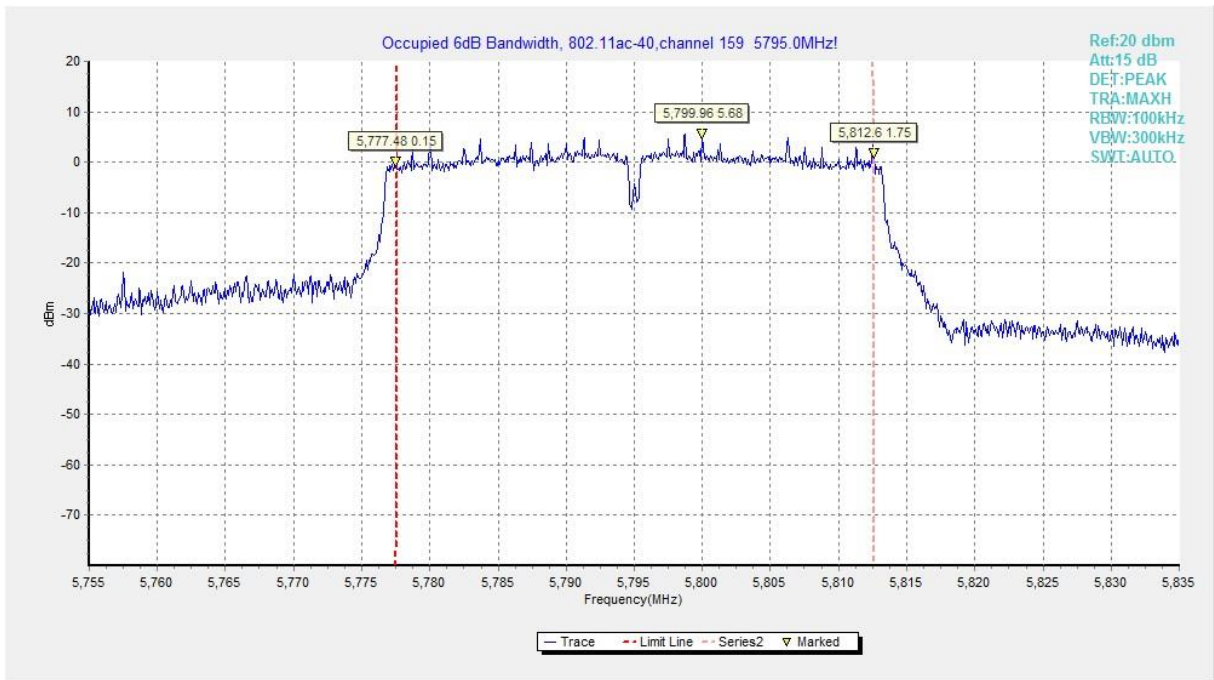
**Fig. 5 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 157)**



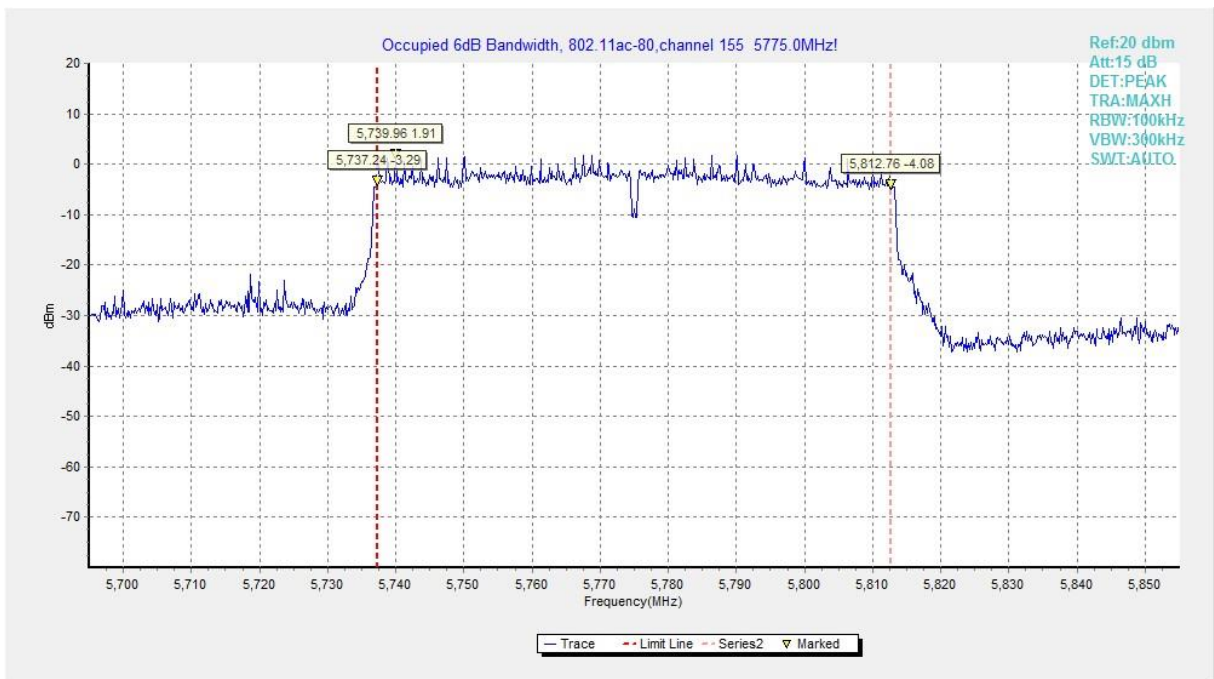
**Fig. 6 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 165)**



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



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



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

## A.5. Transmitter Spurious Emission

### A.5.1 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

#### Measurement Results:

##### 802.11a mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11a	149	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
	157	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
	165	26.5 GHz~ 40 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P

**802.11n-HT20 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	149	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
	157	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
	165	26.5 GHz~ 40 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P

**802.11n-HT40 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT40)	151	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
		26.5 GHz~ 40 GHz	---	P
	159	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P

**802.11ac-HT20 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11ac (HT20)	149	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
	157	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
	165	26.5 GHz~ 40 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P

**802.11ac-HT40 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11ac (HT40)	151	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
		26.5 GHz~ 40 GHz	---	P
	159	1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P

**802.11ac-HT80 mode**

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11ac (HT80)	155	30 MHz ~1 GHz	---	P
		1 GHz ~ 3 GHz	---	P
		3 GHz ~ 7 GHz	---	P
		7 GHz ~ 18 GHz	---	P
		18 GHz ~ 26.5 GHz	---	P
		26.5 GHz~ 40 GHz	---	P

**Conclusion: PASS**

**Note:**

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

$P_{Mea}$  is the field strength recorded from the instrument.

**Average Results:**
**802.11a**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17986.200	42.11	-25.50	46.66	20.95	54.00	11.89	V
17997.800	42.08	-25.50	46.66	20.92	54.00	11.92	V
16133.300	37.67	-26.77	38.93	25.51	54.00	16.33	H
13321.700	37.59	-29.49	39.71	27.37	54.00	16.41	H
11799.300	36.19	-31.85	39.05	28.99	54.00	17.81	H
11874.700	36.19	-31.85	39.05	28.99	54.00	17.81	V

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17991.800	42.18	-25.50	46.66	21.02	54.00	11.82	V
17992.800	42.12	-25.50	46.66	20.96	54.00	11.88	H
13325.500	37.65	-29.49	39.71	27.43	54.00	16.35	H
13259.500	37.61	-29.67	39.55	27.73	54.00	16.39	V
11873.600	36.18	-31.85	39.05	28.98	54.00	17.82	H
11802.600	36.10	-31.85	39.05	28.90	54.00	17.90	V

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17988.500	42.22	-25.50	46.66	21.06	54.00	11.78	H
17997.200	42.07	-25.50	46.66	20.91	54.00	11.93	V
16049.700	37.66	-27.35	38.54	26.47	54.00	16.34	V
13312.400	37.62	-29.49	39.71	27.40	54.00	16.38	H
11871.400	36.16	-31.85	39.05	28.96	54.00	17.84	V
11802.600	36.14	-31.85	39.05	28.94	54.00	17.86	H



**802.11n-HT20**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17992.800	42.43	-25.50	46.66	21.27	54.00	11.57	V
17993.400	42.43	-25.50	46.66	21.27	54.00	11.57	V
13260.100	37.71	-29.67	39.55	27.83	54.00	16.29	V
13304.100	37.67	-29.49	39.71	27.45	54.00	16.33	V
11801.000	36.47	-31.85	39.05	29.27	54.00	17.53	H
11803.200	36.39	-31.85	39.05	29.19	54.00	17.61	H

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17963.700	42.50	-25.50	46.66	21.34	54.00	11.50	V
17974.200	42.41	-25.50	46.66	21.25	54.00	11.59	H
13318.400	37.82	-29.49	39.71	27.60	54.00	16.18	V
13332.100	37.80	-29.49	39.71	27.58	54.00	16.20	V
11810.900	36.73	-31.85	39.05	29.53	54.00	17.27	H
11904.900	36.44	-31.85	39.05	29.24	54.00	17.56	H

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17970.800	42.37	-25.50	46.66	21.21	54.00	11.63	V
17976.300	42.37	-25.50	46.66	21.21	54.00	11.63	V
13339.900	37.92	-29.49	39.71	27.70	54.00	16.08	V
13281.000	37.74	-29.67	39.55	27.86	54.00	16.26	H
11805.900	36.48	-31.85	39.05	29.28	54.00	17.52	V
11830.700	36.34	-31.85	39.05	29.14	54.00	17.66	H

**802.11n-HT40**

## Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17978.000	42.24	-25.50	46.66	21.08	54.00	11.76	H
17995.000	42.24	-25.50	46.66	21.08	54.00	11.76	H
13352.000	37.71	-29.49	39.71	27.49	54.00	16.29	V
13285.400	37.69	-29.67	39.55	27.81	54.00	16.31	V
11791.600	36.28	-31.99	38.98	29.29	54.00	17.72	H
11782.300	36.23	-31.99	38.98	29.24	54.00	17.77	V

## Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17998.300	42.42	-25.50	46.66	21.26	54.00	11.58	H
17997.200	42.38	-25.50	46.66	21.22	54.00	11.62	V
13294.200	37.82	-29.49	39.71	27.60	54.00	16.18	H
13316.800	37.77	-29.49	39.71	27.55	54.00	16.23	V
11834.000	36.29	-31.85	39.05	29.09	54.00	17.71	H
11809.200	36.18	-31.85	39.05	28.98	54.00	17.82	V

**802.11ac-HT20**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17992.300	42.28	-25.50	46.66	21.12	54.00	11.72	H
17989.500	42.22	-25.50	46.66	21.06	54.00	11.78	H
13323.400	37.62	-29.49	39.71	27.40	54.00	16.38	V
13320.000	37.54	-29.49	39.71	27.32	54.00	16.46	H
11807.000	36.27	-31.85	39.05	29.07	54.00	17.73	H
11815.300	36.18	-31.85	39.05	28.98	54.00	17.82	H

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17991.200	42.12	-25.50	46.66	20.96	54.00	11.88	V
17989.000	42.10	-25.50	46.66	20.94	54.00	11.90	V
13328.300	37.51	-29.49	39.71	27.29	54.00	16.49	H
13260.600	37.49	-29.67	39.55	27.61	54.00	16.51	V
11895.600	36.04	-31.85	39.05	28.84	54.00	17.96	H
11914.300	36.04	-31.48	39.09	28.43	54.00	17.96	V

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17990.100	42.32	-25.50	46.66	21.16	54.00	11.68	H
17985.700	42.28	-25.50	46.66	21.12	54.00	11.72	V
13328.300	37.92	-29.49	39.71	27.70	54.00	16.08	V
13283.200	37.88	-29.67	39.55	28.00	54.00	16.12	V
11845.000	36.36	-31.85	39.05	29.16	54.00	17.64	H
11834.500	36.30	-31.85	39.05	29.10	54.00	17.70	H

**802.11ac-HT40**

## Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17995.600	42.33	-25.50	46.66	21.17	54.00	11.67	V
17958.800	42.28	-25.50	46.66	21.12	54.00	11.72	V
13272.800	37.76	-29.67	39.55	27.88	54.00	16.24	V
13312.400	37.73	-29.49	39.71	27.51	54.00	16.27	H
11855.400	36.33	-31.85	39.05	29.13	54.00	17.67	H
11906.600	36.28	-31.85	39.05	29.08	54.00	17.72	H

## Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17950.500	42.39	-25.50	46.66	21.23	54.00	11.61	H
17998.300	42.37	-25.50	46.66	21.21	54.00	11.63	V
13330.000	37.76	-29.49	39.71	27.54	54.00	16.24	V
13343.700	37.73	-29.49	39.71	27.51	54.00	16.27	V
11816.900	36.48	-31.85	39.05	29.28	54.00	17.52	V
11787.200	36.37	-31.99	38.98	29.38	54.00	17.63	H

**802.11ac-HT80**

## Channel 155

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17987.900	42.34	-25.50	46.66	21.18	54.00	11.66	V
17973.000	42.28	-25.50	46.66	21.12	54.00	11.72	V
13295.300	37.85	-29.49	39.71	27.63	54.00	16.15	H
13250.200	37.68	-29.67	39.55	27.80	54.00	16.32	H
11845.000	36.45	-31.85	39.05	29.25	54.00	17.55	H
11864.200	36.40	-31.85	39.05	29.20	54.00	17.60	H

**Peak Results:**
**802.11a**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17584.200	55.19	-25.74	45.95	34.98	68.30	13.11	V
17991.200	54.98	-25.50	46.66	33.82	74.00	19.02	H
16563.400	52.40	-26.87	40.65	38.62	68.30	15.90	H
16637.700	52.17	-26.87	40.65	38.39	68.30	16.13	H
11850.500	49.15	-31.85	39.05	41.95	74.00	24.85	V
11834.500	49.04	-31.85	39.05	41.84	74.00	24.96	V

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17915.800	54.92	-25.50	46.66	33.76	74.00	19.08	H
17998.300	54.77	-25.50	46.66	33.61	74.00	19.23	V
16993.000	52.60	-26.32	42.36	36.55	68.30	15.70	V
16452.300	52.53	-26.96	39.82	39.67	68.30	15.77	H
11877.400	49.13	-31.85	39.05	41.93	74.00	24.87	V
11778.400	48.92	-31.99	38.98	41.93	74.00	25.08	H

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17992.800	54.75	-25.50	46.66	33.59	74.00	19.25	V
17917.500	54.59	-25.50	46.66	33.43	74.00	19.41	H
16481.500	52.69	-26.96	39.82	39.83	68.30	15.61	H
16517.200	52.21	-26.96	39.82	39.35	68.30	16.09	V
11810.900	49.45	-31.85	39.05	42.25	74.00	24.55	H
8977.300	49.04	-33.28	38.19	44.13	68.30	19.26	H

**802.11n-HT20**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17393.900	54.43	-26.85	45.25	36.03	68.30	13.87	H
17975.200	54.38	-25.50	46.66	33.22	74.00	19.62	V
16847.200	51.74	-26.62	41.49	36.87	68.30	16.56	H
16538.100	51.60	-26.96	39.82	38.74	68.30	16.70	H
11862.000	48.55	-31.85	39.05	41.35	74.00	25.45	V
11889.500	48.38	-31.85	39.05	41.18	74.00	25.62	H

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17941.200	54.47	-25.50	46.66	33.31	74.00	19.53	H
17582.000	54.33	-25.74	45.95	34.12	68.30	13.97	V
16740.000	52.57	-26.62	41.49	37.70	68.30	15.73	V
16531.000	51.78	-26.96	39.82	38.92	68.30	16.52	V
11814.200	49.50	-31.85	39.05	42.30	74.00	24.50	H
11780.600	48.50	-31.99	38.98	41.51	74.00	25.50	V

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17992.800	54.46	-25.50	46.66	33.30	74.00	19.54	H
17972.000	54.11	-25.50	46.66	32.95	74.00	19.89	H
16543.000	52.61	-26.96	39.82	39.75	68.30	15.69	V
16523.800	52.04	-26.96	39.82	39.18	68.30	16.26	V
11841.700	49.19	-31.85	39.05	41.99	74.00	24.81	H
11923.100	48.90	-31.48	39.09	41.29	74.00	25.10	V

**802.11n-HT40**

## Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17958.800	54.39	-25.50	46.66	33.23	74.00	19.61	H
17912.500	54.32	-25.50	46.66	33.16	74.00	19.68	V
16572.800	51.66	-26.87	40.65	37.88	68.30	16.64	V
16597.500	51.65	-26.87	40.65	37.87	68.30	16.65	V
10839.000	49.31	-32.33	38.59	43.05	74.00	24.69	H
11880.200	48.61	-31.85	39.05	41.41	74.00	25.39	V

## Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17955.500	54.39	-25.50	46.66	33.23	74.00	19.61	V
17940.600	54.35	-25.50	46.66	33.19	74.00	19.65	V
13698.500	52.38	-29.10	40.86	40.61	68.30	15.92	V
16452.300	51.90	-26.96	39.82	39.04	68.30	16.40	V
11841.100	48.76	-31.85	39.05	41.56	74.00	25.24	V
11806.500	48.39	-31.85	39.05	41.19	74.00	25.61	H

**802.11ac-HT20**

## Channel 149

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17959.300	54.62	-25.50	46.66	33.46	74.00	19.38	H
17584.800	54.57	-25.74	45.95	34.36	68.30	13.73	V
16589.800	52.42	-26.87	40.65	38.64	68.30	15.88	V
16658.500	52.38	-26.87	40.65	38.60	68.30	15.92	H
11346.100	48.85	-32.42	38.79	42.48	74.00	25.15	H
11346.700	48.81	-32.42	38.79	42.44	74.00	25.19	H

## Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17978.000	54.66	-25.50	46.66	33.50	74.00	19.34	V
17925.800	54.42	-25.50	46.66	33.26	74.00	19.58	H
16443.000	52.55	-26.96	39.82	39.69	68.30	15.75	H
16620.000	52.18	-26.87	40.65	38.40	68.30	16.12	V
11788.900	48.90	-31.99	38.98	41.91	74.00	25.10	V
11856.000	48.78	-31.85	39.05	41.58	74.00	25.22	V

## Channel 165

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17937.300	54.42	-25.50	46.66	33.26	74.00	19.58	V
17947.200	54.33	-25.50	46.66	33.17	74.00	19.67	H
16545.200	52.19	-26.87	40.65	38.41	68.30	16.11	H
16581.000	52.07	-26.87	40.65	38.29	68.30	16.23	H
11873.000	48.34	-31.85	39.05	41.14	74.00	25.66	H
11897.800	48.30	-31.85	39.05	41.10	74.00	25.70	H



**802.11ac-HT40**

## Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17952.200	54.06	-25.50	46.66	32.90	74.00	19.94	H
17915.800	53.90	-25.50	46.66	32.74	74.00	20.10	V
16525.500	51.84	-26.96	39.82	38.98	68.30	16.46	H
16449.000	51.66	-26.96	39.82	38.80	68.30	16.64	V
11799.300	48.52	-31.85	39.05	41.32	74.00	25.48	H
11409.400	48.42	-32.42	38.79	42.05	74.00	25.58	V

## Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17397.800	54.61	-26.85	45.25	36.21	68.30	13.69	V
17964.200	54.59	-25.50	46.66	33.43	74.00	19.41	H
16595.300	52.04	-26.87	40.65	38.26	68.30	16.26	V
16988.500	51.78	-26.32	42.36	35.73	68.30	16.52	H
11876.900	48.59	-31.85	39.05	41.39	74.00	25.41	H
11451.200	48.40	-32.26	38.84	41.83	74.00	25.60	V

**802.11ac-HT80**

## Channel 155

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17971.400	54.15	-25.50	46.66	32.99	74.00	19.85	H
17936.200	54.11	-25.50	46.66	32.95	74.00	19.89	V
16839.000	52.04	-26.62	41.49	37.17	68.30	16.26	V
16538.700	51.57	-26.96	39.82	38.71	68.30	16.73	V
11392.900	48.87	-32.42	38.79	42.50	74.00	25.13	H
11830.100	48.72	-31.85	39.05	41.52	74.00	25.28	H

## A.6. Band Edges Compliance

### A6.1 Band Edges - Radiated

#### Measurement Limit:

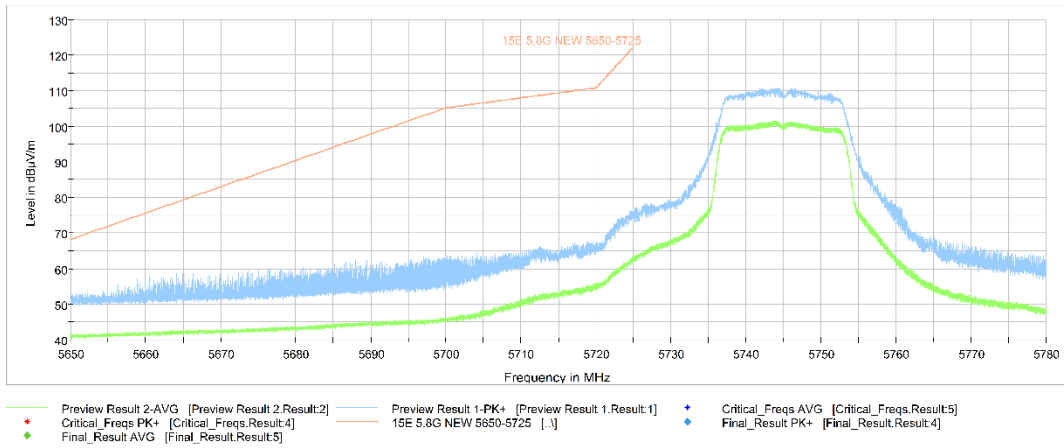
Standard	Limit (dBm/MHz)	
FCC 47 CFR Part 15.407	at the band edge	27
	at 5 MHz above or below the band edge	15.6
	at 25 MHz above or below the band edge	10
	at 75 MHz or more above or below the band edge	-27
	Note: increasing linearly from point to point.	

#### Measurement Result:

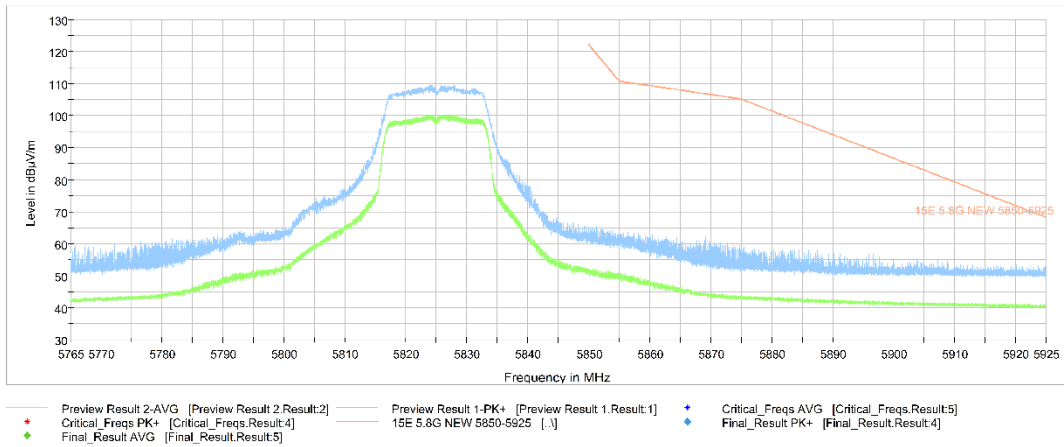
Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.10	P
	5825 MHz	Fig.11	P
802.11n HT20	5745 MHz	Fig.12	P
	5825 MHz	Fig.13	P
802.11n HT40	5755 MHz	Fig.14	P
	5795 MHz	Fig.15	P
802.11ac HT20	5745 MHz	Fig.16	P
	5825 MHz	Fig.17	P
802.11ac HT40	5755 MHz	Fig.18	P
	5795 MHz	Fig.19	P
802.11ac HT80	5775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

**Conclusion: PASS**

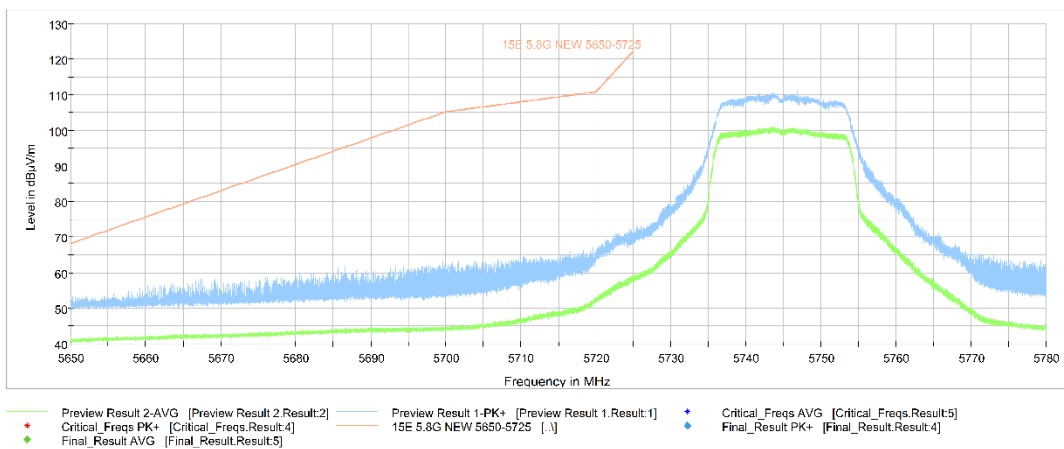
**Test graphs as below:**



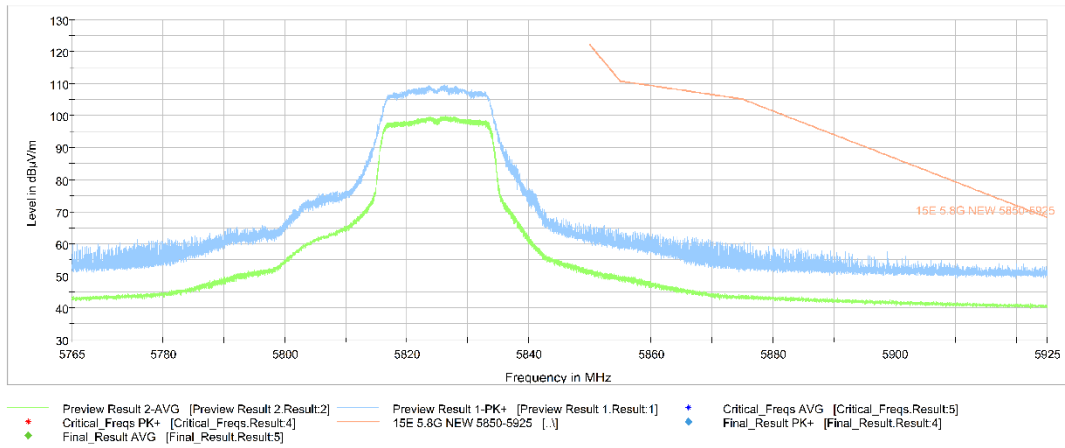
**Fig. 10 Band Edges (802.11a Ch149,5745MHz)**



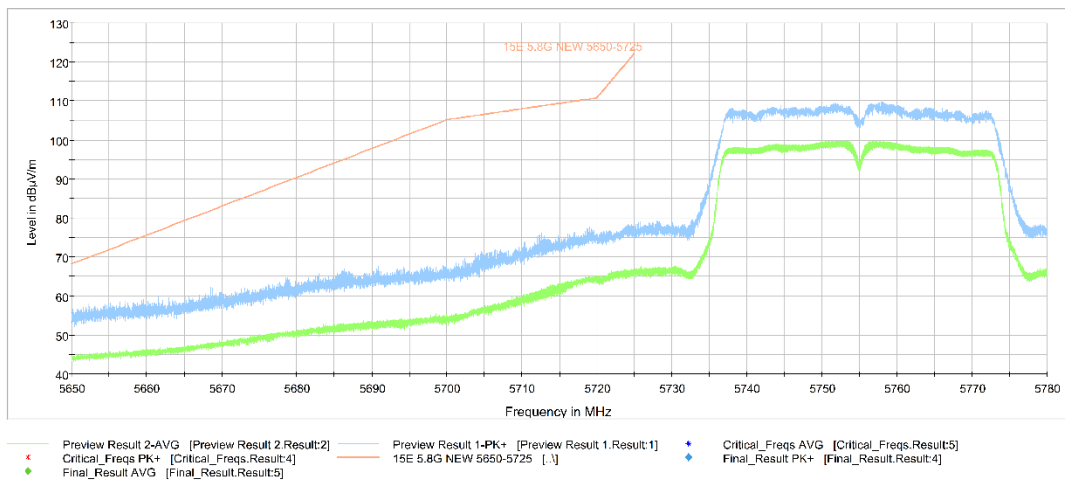
**Fig. 11 Band Edges (802.11a Ch165, 5825MHz)**



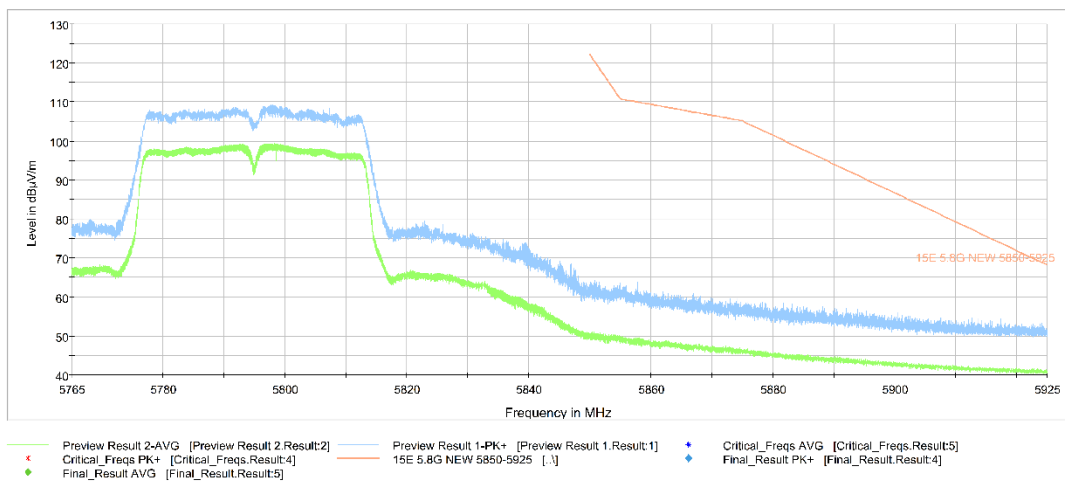
**Fig. 12 Band Edges (802.11n-HT20 Ch149, 5745MHz)**



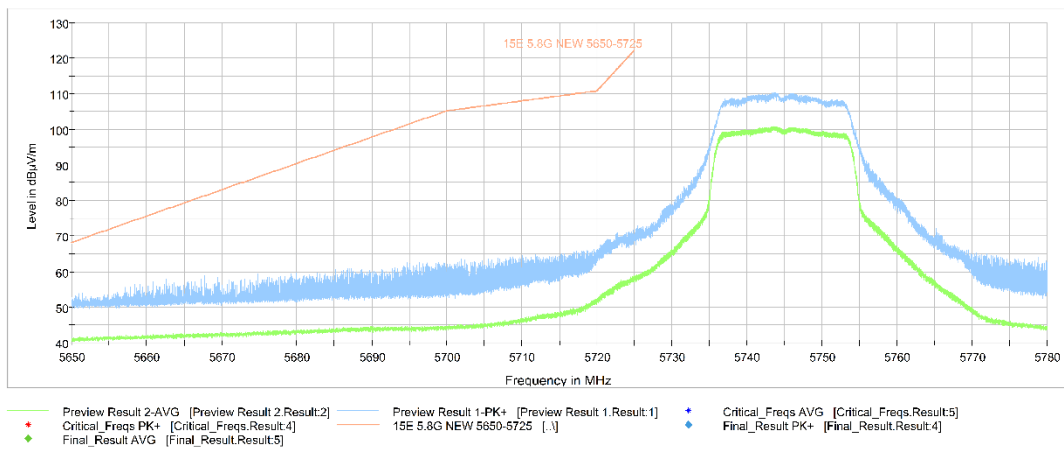
**Fig. 13 Band Edges (802.11n-HT20 Ch165, 5825MHz)**



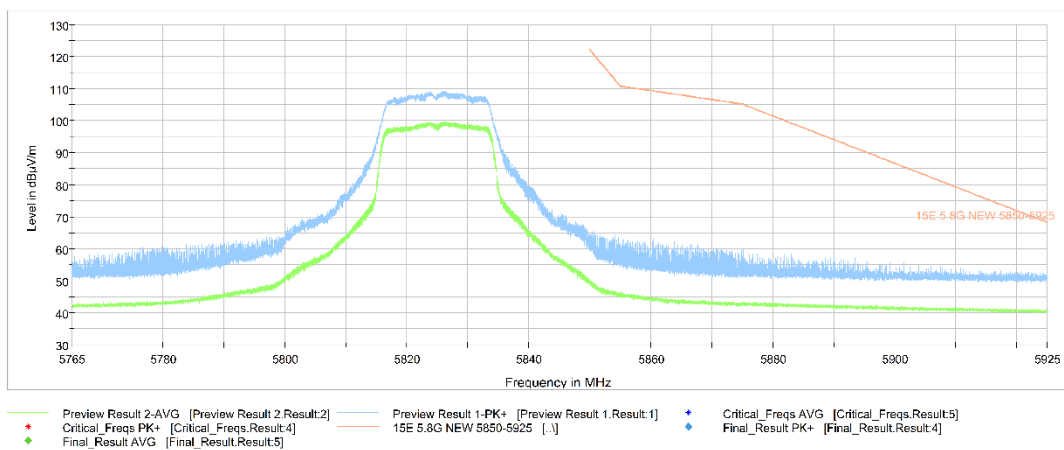
**Fig. 14 Band Edges (802.11n-HT40 Ch151, 5755MHz)**



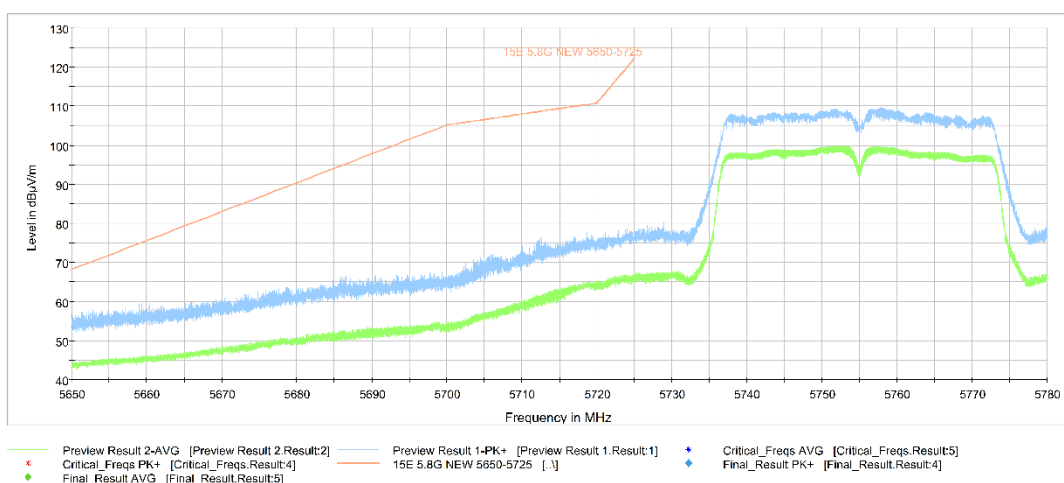
**Fig. 15 Band Edges (802.11n-HT40 Ch159, 5795MHz)**



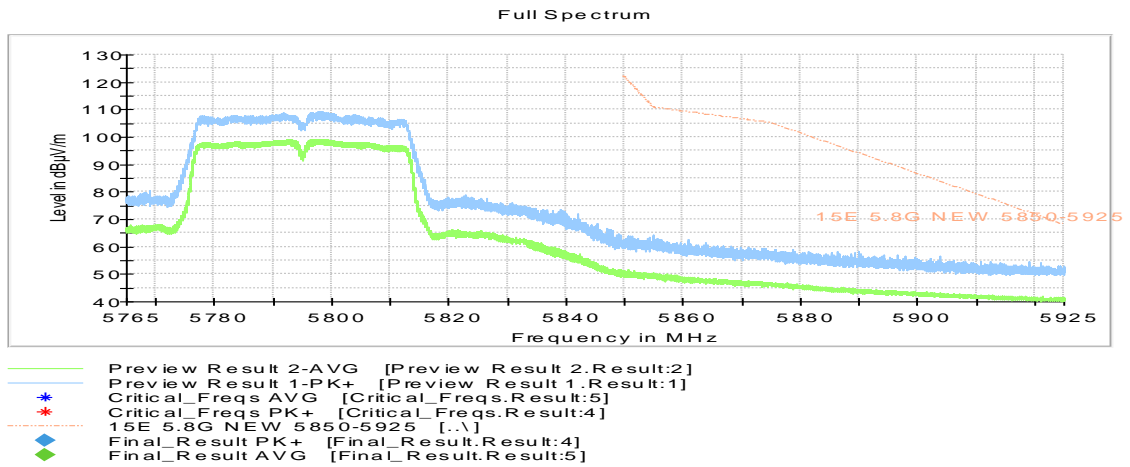
**Fig. 16 Band Edges (802.11ac-HT20 Ch149, 5745MHz)**



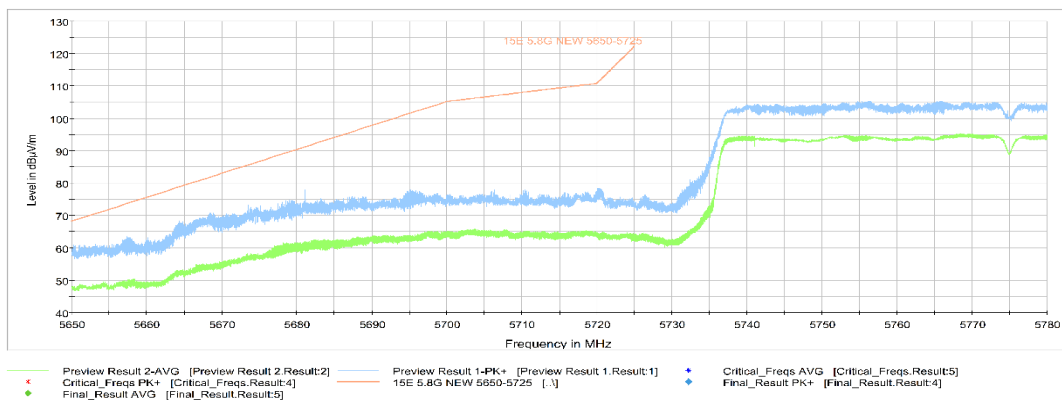
**Fig. 17 Band Edges (802.11ac-HT20 Ch165, 5825MHz)**



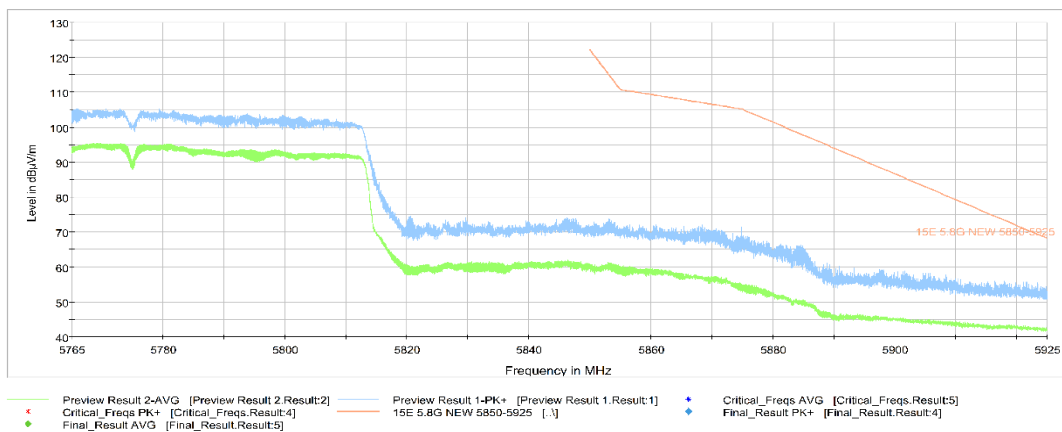
**Fig. 18 Band Edges (802.11ac-HT40 Ch151, 5755MHz)**



**Fig. 19 Band Edges (802.11ac-HT40 Ch159, 5795MHz)**



**Fig. 20 Band Edges (802.11ac-HT80 Ch155, 5775MHz)**



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

## A.7. AC Powerline Conducted Emission

### Test Condition:

Voltage (V)	Frequency (Hz)
120	60

### Measurement uncertainty:

Expanded measurement uncertainty for this test item is  $U = 3.08\text{dB}$ ,  $k=2$ .

### Measurement Result and limit:

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		With charger AE1		
		802.11a	Idle	
0.15 to 0.5	66 to 56	Fig.22	Fig.23	<b>P</b>
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 (dB $\mu$ V)	Result (dB $\mu$ V)		Conclusion
		With charger AE1		
		802.11a	Idle	
0.15 to 0.5	56 to 46	Fig.22	Fig.23	<b>P</b>
0.5 to 5	46			
5 to 30	50			

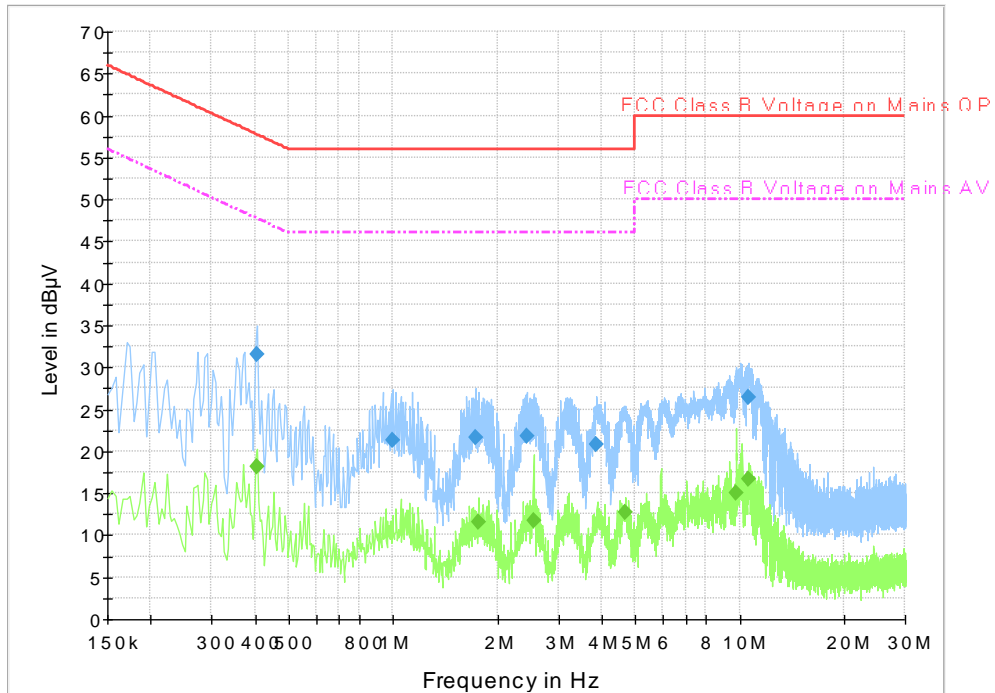
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

The measurement is made according to ANSI C63.10 .

**Conclusion: PASS**

Test graphs as below:

**Traffic:**



**Fig. 22 AC Power line Conducted Emission-802.11a**

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)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.406000	31.5	2000.0	9.000	On	N	19.9	26.3	57.7
1.002000	21.3	2000.0	9.000	On	N	19.8	34.7	56.0
1.726000	21.6	2000.0	9.000	On	N	19.7	34.4	56.0
2.426000	21.9	2000.0	9.000	On	N	19.7	34.1	56.0
3.874000	20.8	2000.0	9.000	On	N	19.7	35.2	56.0
10.654000	26.4	2000.0	9.000	On	L1	19.7	33.6	60.0

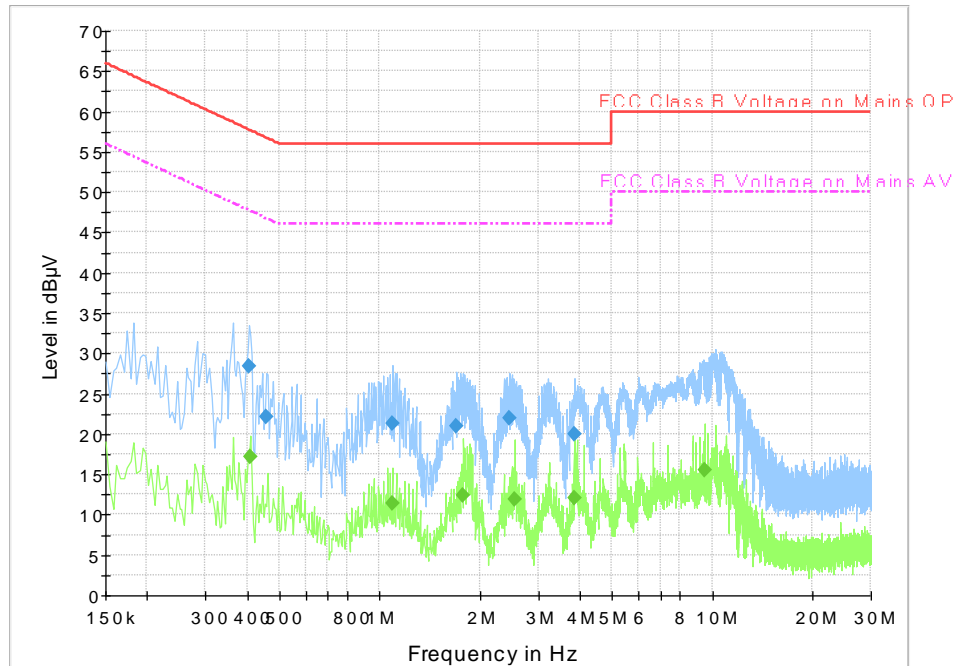
**Final Result 2**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.406000	18.2	2000.0	9.000	On	N	19.9	29.5	47.7
1.758000	11.5	2000.0	9.000	On	N	19.7	34.5	46.0
2.542000	11.7	2000.0	9.000	On	N	19.7	34.3	46.0
4.670000	12.6	2000.0	9.000	On	L1	19.6	33.4	46.0
9.774000	15.1	2000.0	9.000	On	L1	19.7	34.9	50.0
10.654000	16.7	2000.0	9.000	On	L1	19.7	33.3	50.0

Note2: The measurement results showed here are worst cases of the combinations of different cables and chargers



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)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.406000	28.4	2000.0	9.000	On	L1	19.9	29.4	57.7
0.458000	22.2	2000.0	9.000	On	N	20.0	34.5	56.7
1.090000	21.4	2000.0	9.000	On	N	19.8	34.6	56.0
1.706000	20.9	2000.0	9.000	On	N	19.7	35.1	56.0
2.466000	21.9	2000.0	9.000	On	N	19.7	34.1	56.0
3.858000	20.0	2000.0	9.000	On	L1	19.5	36.0	56.0

### Final Result 2

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.410000	17.1	2000.0	9.000	On	N	19.9	30.5	47.6
1.090000	11.4	2000.0	9.000	On	N	19.8	34.6	46.0
1.786000	12.4	2000.0	9.000	On	N	19.8	33.6	46.0
2.550000	11.8	2000.0	9.000	On	N	19.7	34.2	46.0
3.858000	12.0	2000.0	9.000	On	L1	19.5	34.0	46.0
9.510000	15.6	2000.0	9.000	On	L1	19.6	34.4	50.0

Note2: The measurement results showed here are worst cases of the combinations of different cables and chargers

## ANNEX B: EUT parameters

Disclaimer: The antenna gain and 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.

## ANNEX C: Accreditation Certificate



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