



# FCC PART 15C TEST REPORT No.I22Z60248-IOT17

for

**Shenzhen Tinno Mobile Technology Corp.**

**Smart phone**

**U616AT**

**With**

**FCC ID: XD6U616AT**

**Hardware Version: V1.0**

**Software Version: U616ATV01.01.10**

**Issued Date: 2022-04-27**

**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.

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## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I22Z60248-IOT17	Rev.0	1st edition	2022-04-27

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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

Conducted 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

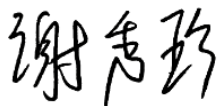
Relative Humidity: 20-75%

### 1.4. Project date

Testing Start Date: 2022-03-14

Testing End Date: 2022-04-27

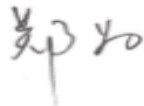
### 1.5. Signature



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Xie Xiuzhen

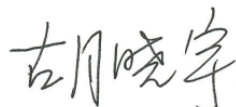
( Prepared this test report )



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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: Shenzhen Tinno Mobile Technology Corp.  
Address: TINNO Building, No.33, Xiandong Rd, Xili, Nanshan District,  
Shenzhen, Guangdong Province,PRC  
City: Shenzhen  
Postal Code: /  
Country: China  
Telephone: 0755-86095550  
Fax: 0755-86095551

### **2.2. Manufacturer Information**

Company Name: Shenzhen Tinno Mobile Technology Corp.  
Address: TINNO Building, No.33, Xiandong Rd, Xili, Nanshan District,  
Shenzhen, Guangdong Province,PRC  
City: Shenzhen  
Postal Code: /  
Country: China  
Telephone: 0755-86095550  
Fax: 0755-86095551

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

#### EQUIPMENT(AE)

##### 3.1. About EUT

Description	Smart phone
Model name	U616AT
FCC ID	XD6U616AT
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
UT40a	860325060016169	V1.0	U616ATV01.01.10
UT33a	860325060006251	V1.0	U616ATV01.01.10

\*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	SN
AE1	Battery	/
AE2	Charger	/
AE3	USB Cable	/
AE4	USB Cable	/

###### AE1

Model	PT34H406082J
Manufacturer	Ningbo Veken Battery Co., Ltd.
Capacity	3310mAh
Nominal Voltage	3.85V

###### AE2

Model	TN-050200U3
Manufacturer	Dong Guan City GangQi Electronic Co.,Ltd
Length of cable	/

###### AE3

Model	336275
Manufacturer	SUNTOPS ELECTRONICS CO.,LTD
Length of cable	/

###### AE4

Model	T365-011B-1
Manufacturer	Shenzhen Yihuaxing Electronics 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 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	3.85V
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	2022-05-24
2	Test Receiver	ESCI	100766	R&S	1 year	2022-04-09
3	LISN	ENV216	101200	R&S	1 year	2022-05-30
4	Shielding Room	S81	/	ETS-Lindgren	/	/

### Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESW44	103015	R&S	1 year	2022-09-03
2	EMI Antenna	VULB 9163	483	SCHWARZBECK	1 year	2022-08-24
3	EMI Antenna	3117	00058889	ETS-Lindgren	1 year	2022-11-19

※The Test Receiver with series number of 100766 did not exceed CAL.DUE.DATE when used.

## 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

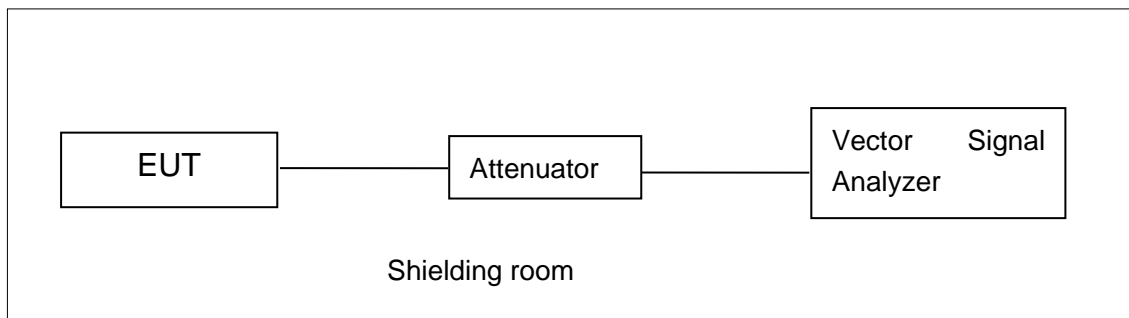
Measurement Uncertainty : 3.08dB,k=2

## 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

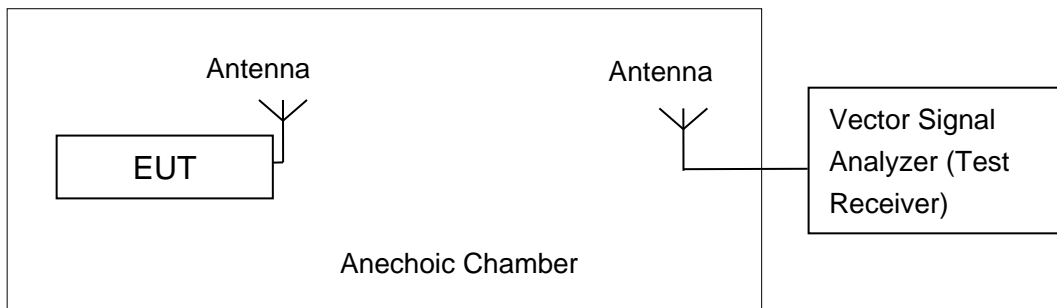


#### A.1.2. Radiated Emission Measurements

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 -0.53dBi and the value is supplied by the applicant or manufacturer.

### A.2.2. Maximum Average Output Power-Conducted

#### Measurement Results:

#### 802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	17.97	18.32	18.55

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

#### 802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11n(20MHz)	MCS0	17.77	17.66	17.91

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

#### 802.11ac-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ac(20MHz)	MCS0	15.52	15.76	15.89

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

#### 802.11n-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11n(40MHz)	MCS0	18.50	18.41

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

**802.11ac-HT40 mode**

Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11ac(40MHz)	MCS0	15.56	15.78

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

**802.11ac-HT80 mode**

Mode	Data Rate (Index)	Test Result (dBm)
		5775MHz (Ch155)
802.11ac(80MHz)	MCS0	14.50

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 100%.

**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	6.02	P
	157	5.48	P
	165	5.39	P
802.11n HT20	149	5.72	P
	157	5.26	P
	165	5.10	P
802.11n HT40	151	2.69	P
	159	2.23	P
802.11ac HT80	155	-4.27	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
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	17.55	P
	165	Fig.6	17.55	P
802.11n HT40	151	Fig.7	36.32	P
	159	Fig.8	36.08	P
802.11ac HT80	155	Fig.9	76.32	P

#### Conclusion: PASS

#### Test graphs as below:

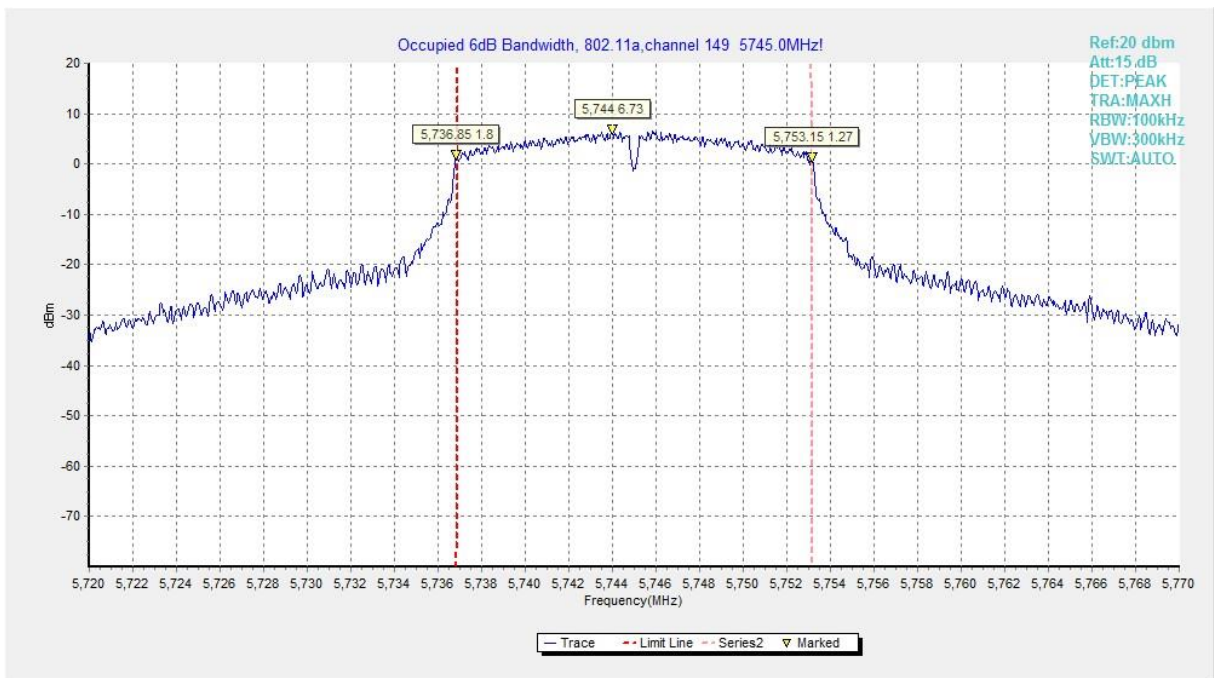
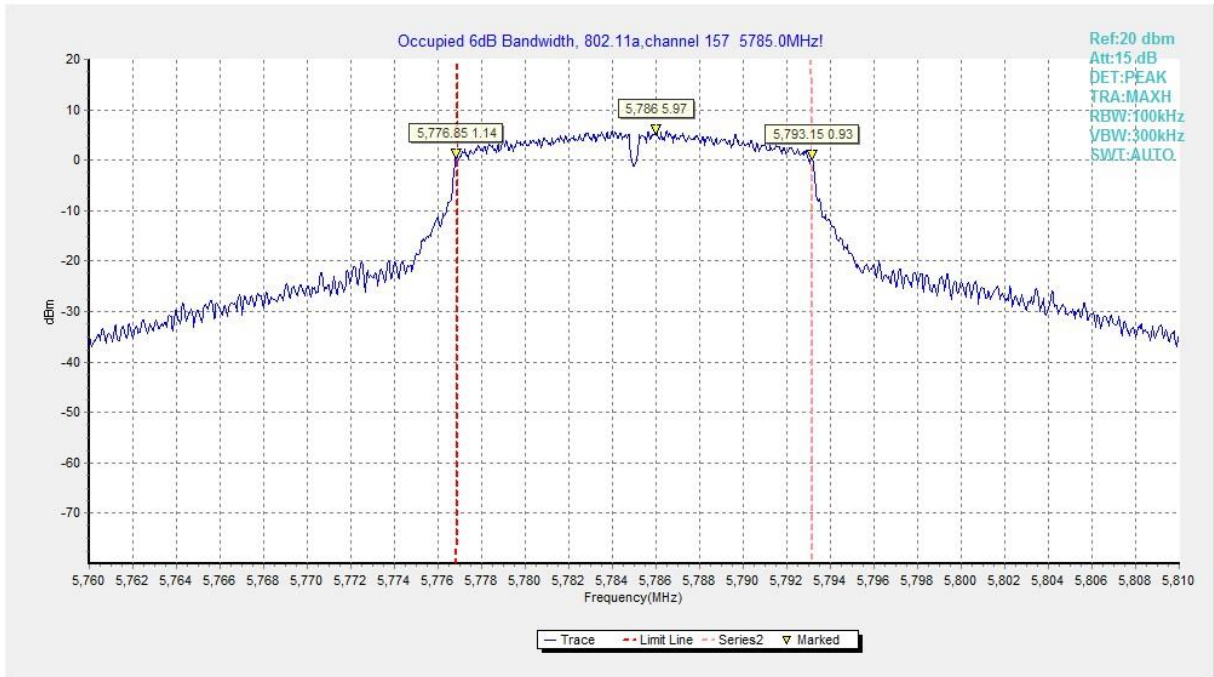
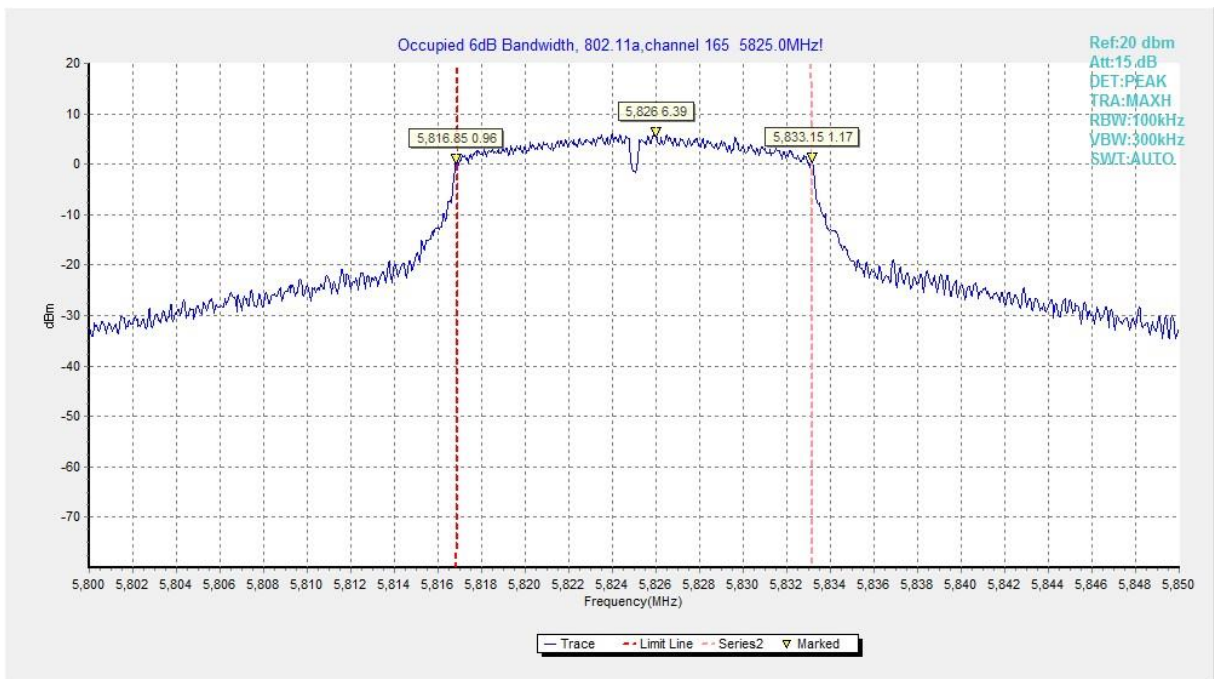


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)

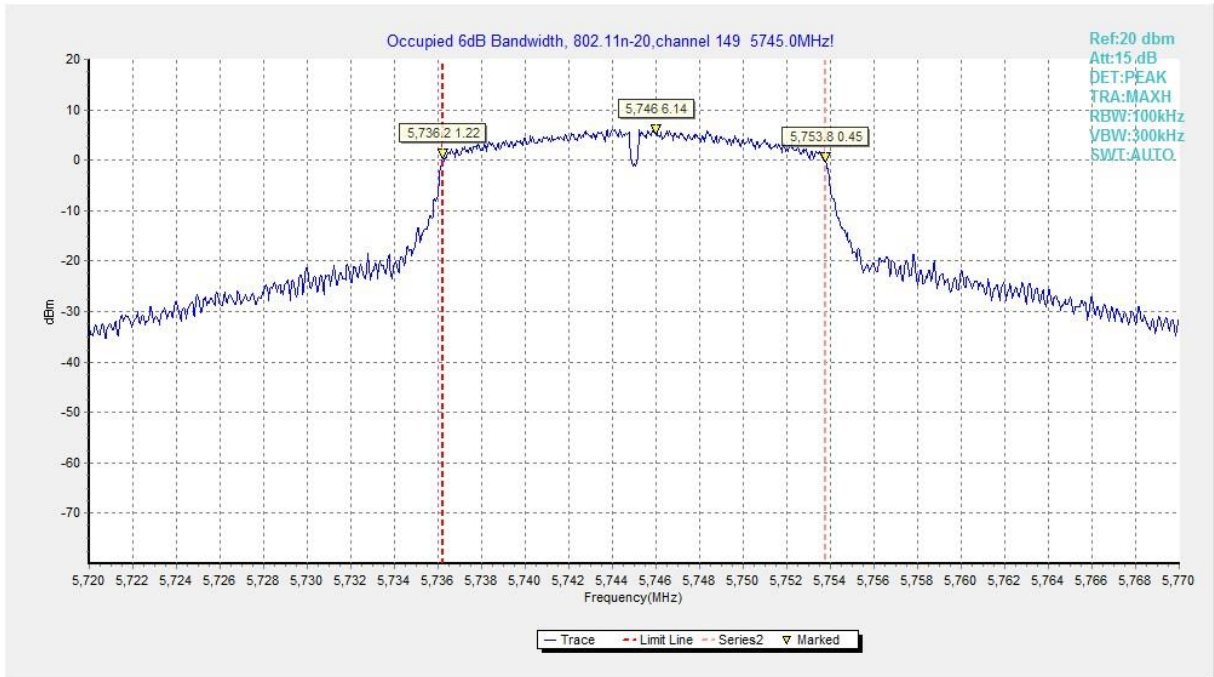




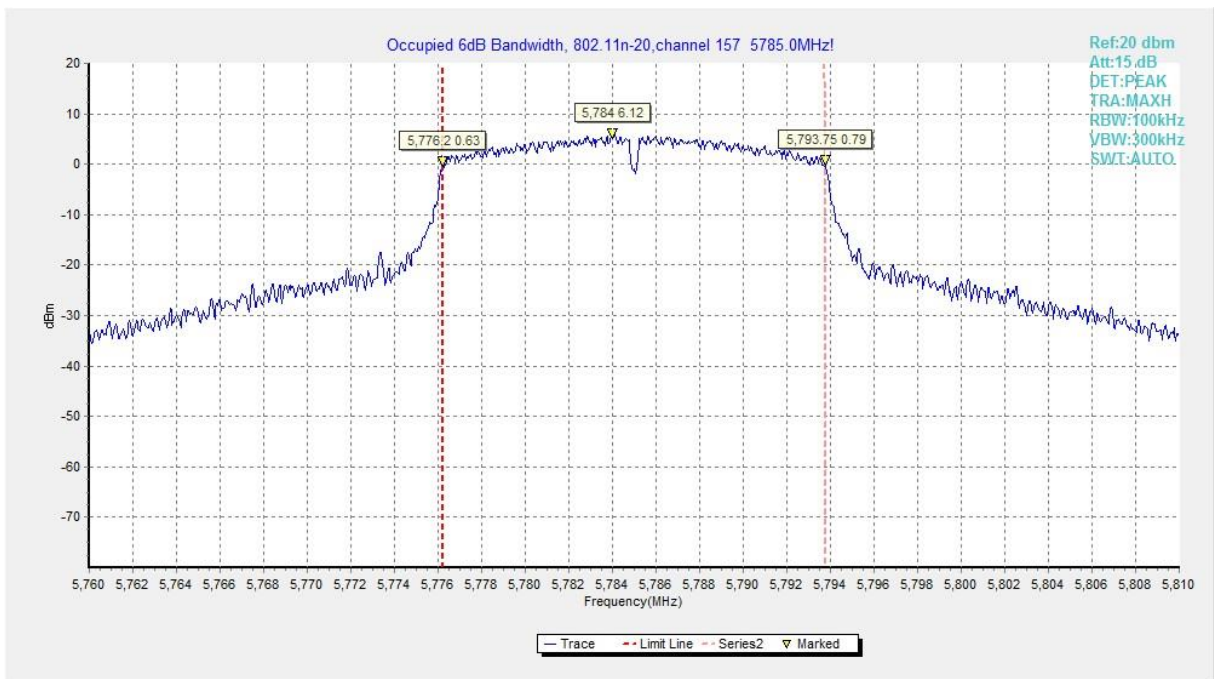
**Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)**



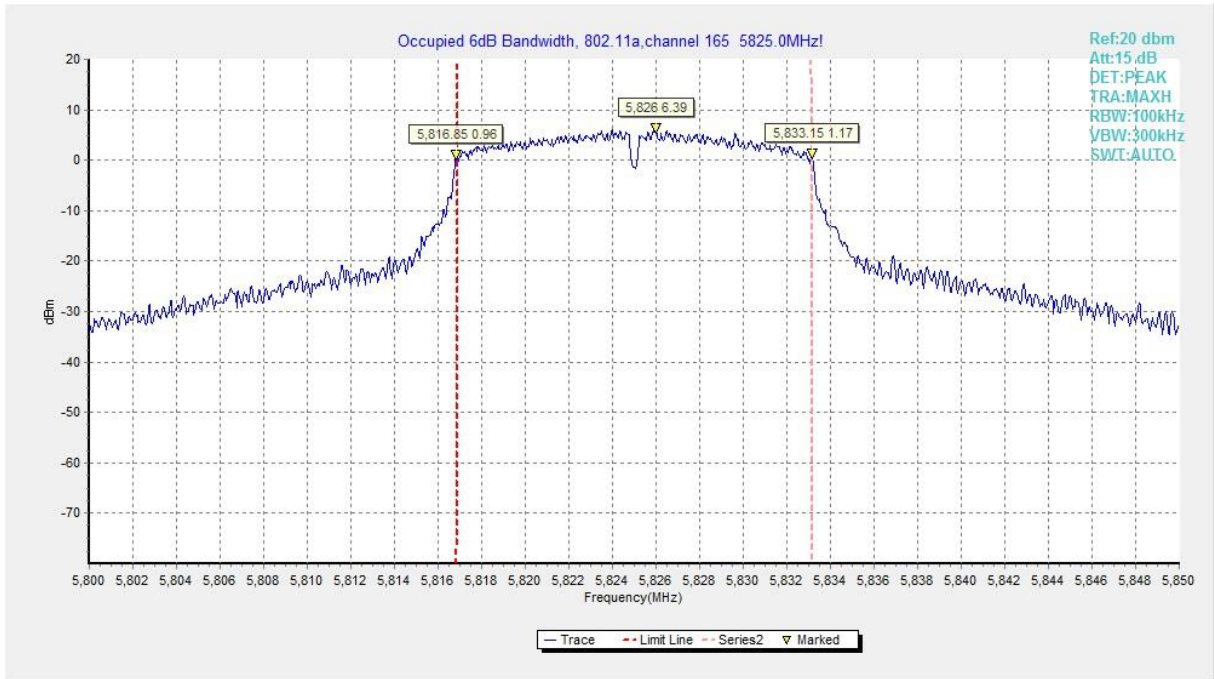
**Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)**



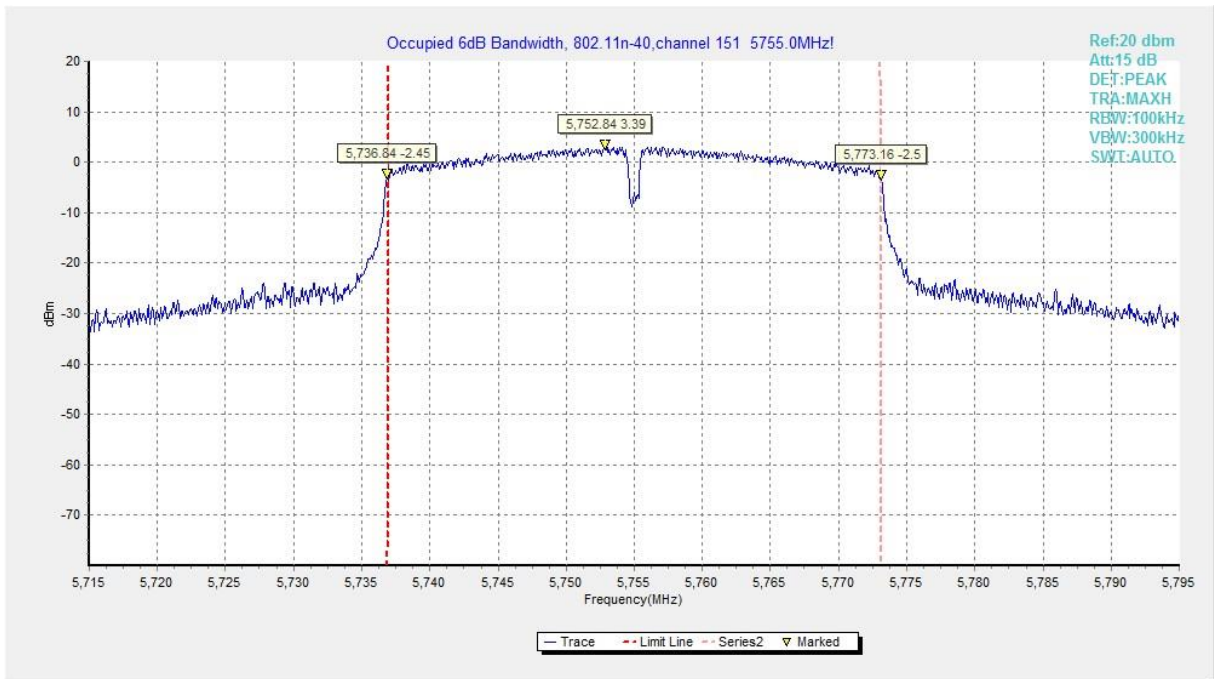
**Fig. 4 Occupied 6dB Bandwidth (802.11n-HT20, Ch 149)**



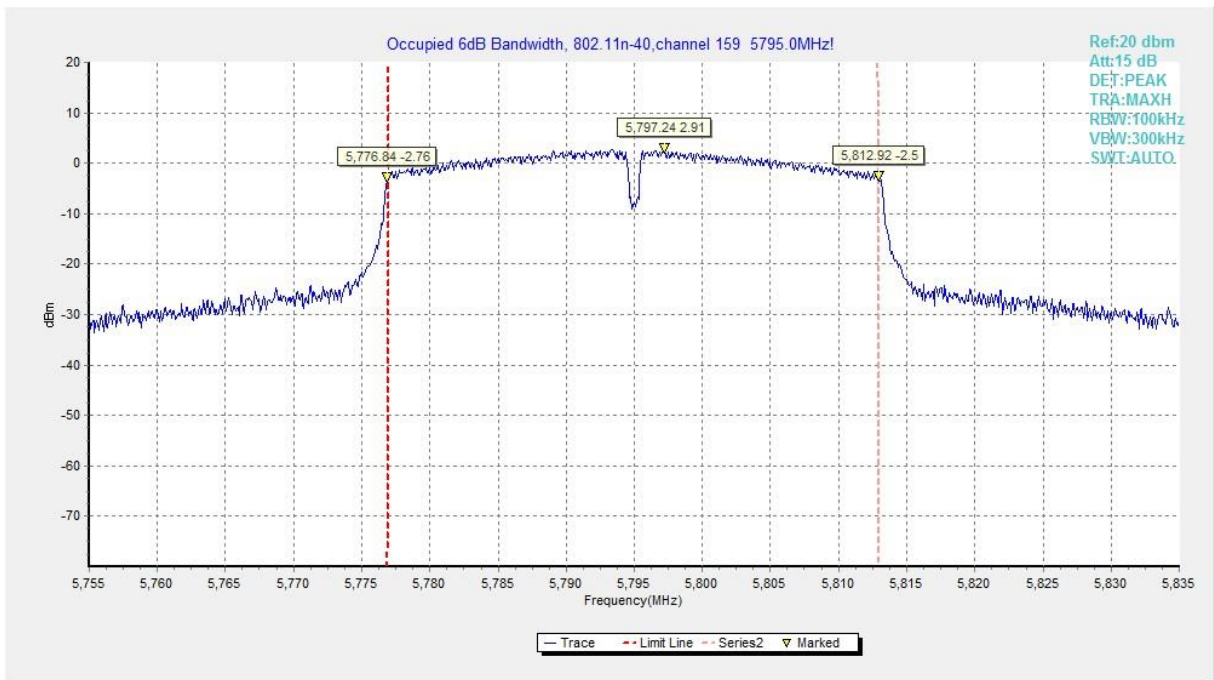
**Fig. 5 Occupied 6dB Bandwidth (802.11n-HT20, Ch 157)**



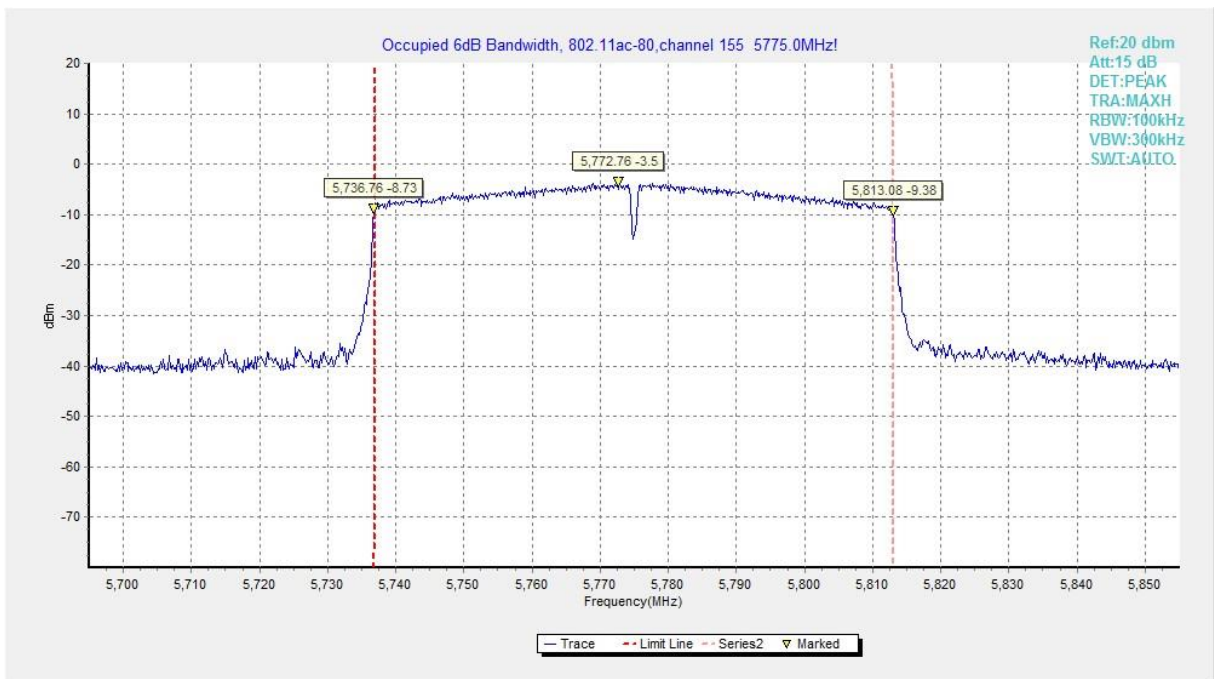
**Fig. 6 Occupied 6dB Bandwidth (802.11n-HT20, Ch 165)**



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



**Fig. 8 Occupied 6dB Bandwidth (802.11n-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
		26.5 GHz~ 40 GHz	---	P
	165	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)
17993.400	42.21	-25.50	46.66	21.05	54.00	11.79	V
17862.000	42.11	-25.50	46.66	20.95	54.00	11.89	H
11490.800	41.66	-32.26	38.84	35.09	54.00	12.34	V
11489.600	41.43	-32.26	38.84	34.86	54.00	12.57	V
16048.000	38.72	-27.35	38.54	27.53	54.00	15.28	V
16069.500	38.44	-26.77	38.93	26.28	54.00	15.56	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)
17998.300	42.05	-25.50	46.66	20.89	54.00	11.95	H
17991.800	41.98	-25.50	46.66	20.82	54.00	12.02	V
11568.900	41.63	-32.31	38.91	35.04	54.00	12.37	V
11569.400	41.38	-32.31	38.91	34.79	54.00	12.62	H
15968.300	38.48	-27.35	38.54	27.29	54.00	15.52	V
16138.800	38.46	-26.77	38.93	26.30	54.00	15.54	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)
17989.500	42.11	-25.50	46.66	20.95	54.00	11.89	H
17974.200	42.09	-25.50	46.66	20.93	54.00	11.91	V
11646.400	41.20	-32.31	38.91	34.61	54.00	12.80	V
11647.500	40.89	-32.31	38.91	34.30	54.00	13.11	V
16071.100	38.49	-26.77	38.93	26.33	54.00	15.51	H
16076.600	38.45	-26.77	38.93	26.29	54.00	15.55	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	42.54	-25.50	46.66	21.38	54.00	11.46	H
17960.400	42.09	-25.50	46.66	20.93	54.00	11.91	V
11488.500	41.34	-32.26	38.84	34.77	54.00	12.66	V
11485.200	41.19	-32.26	38.84	34.62	54.00	12.81	V
16062.900	38.59	-26.77	38.93	26.43	54.00	15.41	V
16061.800	38.52	-26.77	38.93	26.36	54.00	15.48	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)
17990.100	42.19	-25.50	46.66	21.03	54.00	11.81	V
17998.900	42.08	-25.50	46.66	20.92	54.00	11.92	V
11568.300	40.87	-32.31	38.91	34.28	54.00	13.13	V
11573.200	40.71	-32.31	38.91	34.12	54.00	13.29	V
16052.500	38.77	-27.35	38.54	27.58	54.00	15.23	H
16144.900	38.54	-26.77	38.93	26.38	54.00	15.46	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)
17982.400	42.07	-25.50	46.66	20.91	54.00	11.93	H
17998.300	41.81	-25.50	46.66	20.65	54.00	12.19	H
11652.500	41.20	-32.31	38.91	34.61	54.00	12.80	V
11647.000	40.82	-32.31	38.91	34.23	54.00	13.18	V
16125.600	38.55	-26.77	38.93	26.39	54.00	15.45	V
16062.900	38.50	-26.77	38.93	26.34	54.00	15.50	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)
17998.300	42.12	-25.50	46.66	20.96	54.00	11.88	V
17989.500	42.04	-25.50	46.66	20.88	54.00	11.96	V
11508.900	39.51	-32.26	38.84	32.94	54.00	14.49	V
11506.700	39.27	-32.26	38.84	32.70	54.00	14.73	V
16061.800	38.63	-26.77	38.93	26.47	54.00	15.37	H
16066.200	38.54	-26.77	38.93	26.38	54.00	15.46	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)
17989.000	42.06	-25.50	46.66	20.90	54.00	11.94	V
17783.300	42.05	-25.50	46.66	20.89	54.00	11.95	V
16056.300	38.83	-27.35	38.54	27.64	54.00	15.17	H
16138.800	38.56	-26.77	38.93	26.40	54.00	15.44	H
11589.800	38.51	-32.31	38.91	31.92	54.00	15.49	V
11591.400	38.40	-32.31	38.91	31.81	54.00	15.60	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)
17995.000	42.16	-25.50	46.66	21.00	54.00	11.84	V
17734.300	42.00	-25.74	45.95	21.79	54.00	12.00	V
11490.800	40.62	-32.26	38.84	34.05	54.00	13.38	V
11494.000	40.26	-32.26	38.84	33.69	54.00	13.74	V
16142.100	38.69	-26.77	38.93	26.53	54.00	15.31	H
15976.000	38.55	-27.35	38.54	27.36	54.00	15.45	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)
17998.300	41.99	-25.50	46.66	20.83	54.00	12.01	H
17997.800	41.97	-25.50	46.66	20.81	54.00	12.03	V
11568.300	40.06	-32.31	38.91	33.47	54.00	13.94	V
11569.400	39.93	-32.31	38.91	33.34	54.00	14.07	V
16053.000	38.66	-27.35	38.54	27.47	54.00	15.34	H
15956.200	38.47	-27.35	38.54	27.28	54.00	15.53	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)
17968.700	42.06	-25.50	46.66	20.90	54.00	11.94	H
17976.900	41.93	-25.50	46.66	20.77	54.00	12.07	H
11650.200	41.07	-32.31	38.91	34.48	54.00	12.93	V
11653.500	40.02	-32.31	38.91	33.43	54.00	13.98	V
16059.000	38.68	-26.77	38.93	26.52	54.00	15.32	V
16049.700	38.50	-27.35	38.54	27.31	54.00	15.50	V

**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)
17964.800	42.11	-25.50	46.66	20.95	54.00	11.89	H
17988.500	41.96	-25.50	46.66	20.80	54.00	12.04	V
16147.600	38.48	-26.77	38.93	26.32	54.00	15.52	H
16137.700	38.44	-26.77	38.93	26.28	54.00	15.56	H
11502.300	38.41	-32.26	38.84	31.84	54.00	15.59	V
11513.300	38.32	-32.26	38.84	31.75	54.00	15.68	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)
17995.600	41.99	-25.50	46.66	20.83	54.00	12.01	V
17991.200	41.94	-25.50	46.66	20.78	54.00	12.06	H
16053.500	38.50	-27.35	38.54	27.31	54.00	15.50	V
16055.200	38.50	-27.35	38.54	27.31	54.00	15.50	H
11599.100	38.02	-32.31	38.91	31.43	54.00	15.98	V
11597.500	37.99	-32.31	38.91	31.40	54.00	16.01	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)
17998.300	42.21	-25.50	46.66	21.05	54.00	11.79	H
17939.500	42.05	-25.50	46.66	20.89	54.00	11.95	H
16159.100	38.48	-26.77	38.93	26.32	54.00	15.52	H
16138.800	38.43	-26.77	38.93	26.27	54.00	15.57	H
11537.000	37.60	-32.26	38.84	31.03	54.00	16.40	V
11550.700	37.56	-32.26	38.84	30.99	54.00	16.44	V

**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)
17997.800	53.31	-25.50	46.66	32.15	74.00	20.69	H
17450.000	53.20	-26.85	45.25	34.80	68.30	15.10	H
16575.500	51.41	-26.87	40.65	37.63	68.30	16.89	V
11487.500	51.10	-32.26	38.84	44.53	74.00	22.90	V
16594.800	50.80	-26.87	40.65	37.02	68.30	17.50	V
11489.600	50.03	-32.26	38.84	43.46	74.00	23.97	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)
17447.200	52.76	-26.85	45.25	34.36	68.30	15.54	H
17822.900	52.74	-25.50	46.66	31.58	74.00	21.26	V
16873.000	51.49	-26.62	41.49	36.62	68.30	16.81	V
16584.800	51.09	-26.87	40.65	37.31	68.30	17.21	V
11569.400	50.92	-32.31	38.91	44.33	74.00	23.08	H
11567.200	50.87	-32.31	38.91	44.28	74.00	23.13	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)
17476.400	55.66	-26.85	45.25	37.26	68.30	12.64	V
17474.200	55.52	-26.85	45.25	37.12	68.30	12.78	V
16841.200	51.69	-26.62	41.49	36.82	68.30	16.61	H
13598.400	51.15	-29.50	40.43	40.22	68.30	17.15	V
11652.500	51.08	-32.31	38.91	44.49	74.00	22.92	V
11651.400	51.05	-32.31	38.91	44.46	74.00	22.95	V

**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)
17596.300	52.60	-25.74	45.95	32.39	68.30	15.70	V
17860.800	52.48	-25.50	46.66	31.32	74.00	21.52	V
11485.800	51.04	-32.26	38.84	44.47	74.00	22.96	V
16576.000	51.00	-26.87	40.65	37.22	68.30	17.30	H
11489.600	50.89	-32.26	38.84	44.32	74.00	23.11	V
16515.000	50.84	-26.96	39.82	37.98	68.30	17.46	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)
17351.000	52.99	-25.95	44.35	34.58	68.30	15.31	V
17865.800	52.80	-25.50	46.66	31.64	74.00	21.20	V
16567.200	51.67	-26.87	40.65	37.89	68.30	16.63	V
16573.800	51.50	-26.87	40.65	37.72	68.30	16.80	V
11570.500	50.65	-32.31	38.91	44.06	74.00	23.35	V
11569.400	50.46	-32.31	38.91	43.87	74.00	23.54	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)
17473.700	57.18	-26.85	45.25	38.78	68.30	11.12	V
17479.200	56.69	-26.85	45.25	38.29	68.30	11.61	V
16553.000	51.57	-26.87	40.65	37.79	68.30	16.73	H
16598.000	51.26	-26.87	40.65	37.48	68.30	17.04	H
11658.000	50.74	-32.31	38.91	44.15	74.00	23.26	V
11651.400	50.23	-32.31	38.91	43.64	74.00	23.77	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)
17300.400	53.13	-25.95	44.35	34.72	68.30	15.17	V
17937.800	52.52	-25.50	46.66	31.36	74.00	21.48	H
16587.600	51.10	-26.87	40.65	37.32	68.30	17.20	H
16988.500	50.89	-26.32	42.36	34.84	68.30	17.41	V
11517.100	49.21	-32.26	38.84	42.64	74.00	24.79	V
11521.000	49.01	-32.26	38.84	42.44	74.00	24.99	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)
17609.000	52.86	-25.74	45.95	32.65	68.30	15.44	V
17972.000	52.67	-25.50	46.66	31.51	74.00	21.33	H
16713.000	51.20	-26.62	41.49	36.33	68.30	17.10	H
16538.100	51.03	-26.96	39.82	38.17	68.30	17.27	H
11590.900	47.94	-32.31	38.91	41.35	74.00	26.06	V
11587.500	47.90	-32.31	38.91	41.31	74.00	26.10	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)
17228.300	52.53	-25.95	44.35	34.12	68.30	15.77	H
17936.800	52.32	-25.50	46.66	31.16	74.00	21.68	H
16593.700	51.57	-26.87	40.65	37.79	68.30	16.73	V
16377.000	51.52	-27.10	39.31	39.31	68.30	16.78	H
11487.500	50.68	-32.26	38.84	44.11	74.00	23.32	V
11488.500	49.81	-32.26	38.84	43.24	74.00	24.19	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)
17888.300	53.12	-25.50	46.66	31.96	74.00	20.88	H
17359.800	53.02	-25.95	44.35	34.61	68.30	15.28	H
13568.600	51.16	-29.50	40.43	40.23	68.30	17.14	V
16589.800	51.15	-26.87	40.65	37.37	68.30	17.15	V
11567.800	49.81	-32.31	38.91	43.22	74.00	24.19	V
11568.900	49.60	-32.31	38.91	43.01	74.00	24.40	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)
17473.700	54.65	-26.85	45.25	36.25	68.30	13.65	V
17480.800	54.08	-26.85	45.25	35.68	68.30	14.22	V
16568.900	51.13	-26.87	40.65	37.35	68.30	17.17	V
16797.200	50.85	-26.62	41.49	35.98	68.30	17.45	V
11648.000	49.58	-32.31	38.91	42.99	74.00	24.42	H
11650.200	49.57	-32.31	38.91	42.98	74.00	24.43	V

**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)
17986.200	53.56	-25.50	46.66	32.40	74.00	20.44	H
17889.500	52.44	-25.50	46.66	31.28	74.00	21.56	V
16467.700	51.09	-26.96	39.82	38.23	68.30	17.21	V
16849.400	51.04	-26.62	41.49	36.17	68.30	17.26	H
11508.400	48.40	-32.26	38.84	41.83	74.00	25.60	V
11524.900	48.03	-32.26	38.84	41.46	74.00	25.97	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)
17712.300	52.86	-25.74	45.95	32.65	74.00	21.14	V
17796.500	52.63	-25.50	46.66	31.47	74.00	21.37	H
16590.900	50.95	-26.87	40.65	37.17	68.30	17.35	V
16583.800	50.85	-26.87	40.65	37.07	68.30	17.45	H
11947.800	47.70	-31.48	39.09	40.09	74.00	26.30	V
11594.700	47.64	-32.31	38.91	41.05	74.00	26.36	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)
17602.300	52.87	-25.74	45.95	32.66	68.30	15.43	H
17880.100	52.60	-25.50	46.66	31.44	74.00	21.40	V
16566.700	51.62	-26.87	40.65	37.84	68.30	16.68	H
16944.500	51.02	-26.32	42.36	34.97	68.30	17.28	H
11546.300	47.60	-32.26	38.84	41.03	74.00	26.40	V
11555.100	46.96	-32.26	38.84	40.39	74.00	27.04	V



## A.6. Band Edges Compliance

### A6.1 Band Edges - Radiated

#### Measurement Limit:

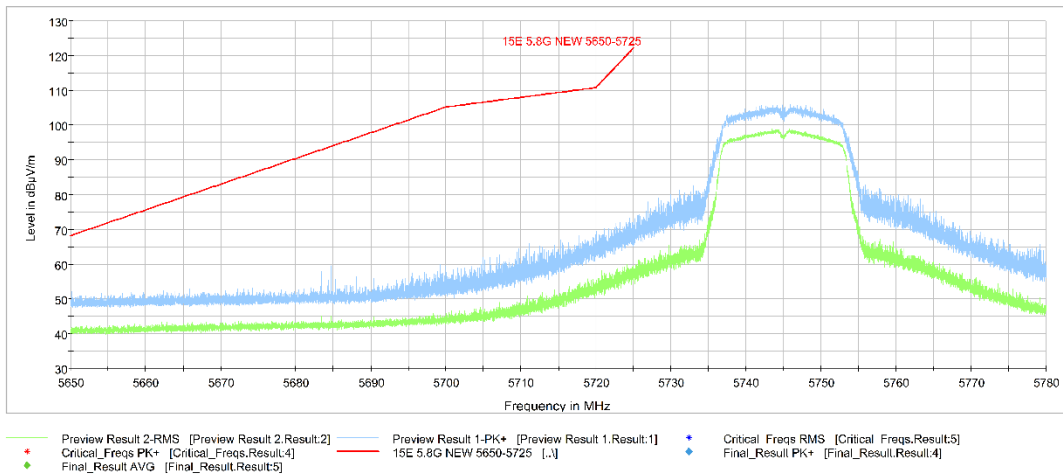
Standard	Limit (dBm/MHz)	
FCC 47 CFR Part 15.407	at the band edge	27
	at 5 MHz above or below the band edge	15.6
	at 25 MHz above or below the band edge	10
	at 75 MHz or more above or below the band edge	-27
	Note: increasing linearly from point to point.	

#### Measurement Result:

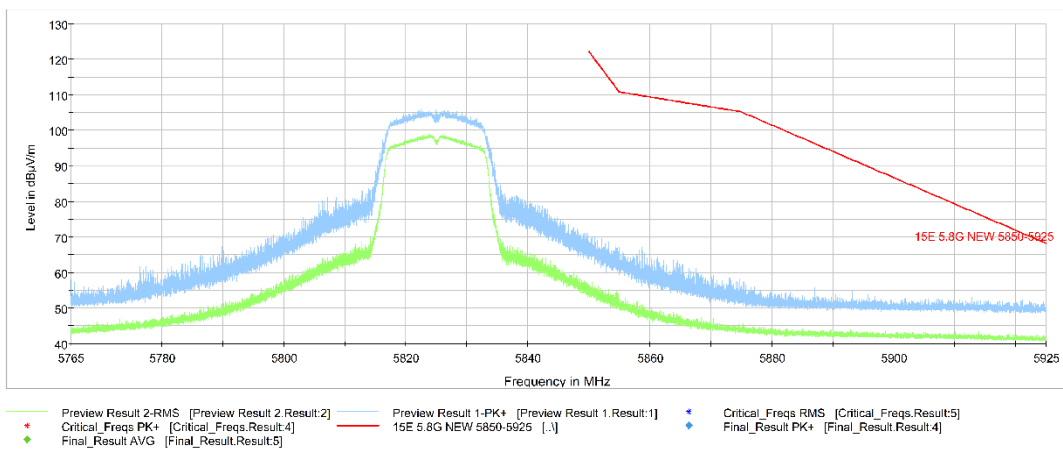
Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.10	P
	5825 MHz	Fig.11	P
802.11n HT20	5745 MHz	Fig.12	P
	5825 MHz	Fig.13	P
802.11n HT40	5755 MHz	Fig.14	P
	5795 MHz	Fig.15	P
802.11ac HT20	5745 MHz	Fig.16	P
	5825 MHz	Fig.17	P
802.11ac HT40	5755 MHz	Fig.18	P
	5795 MHz	Fig.19	P
802.11ac HT80	5775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

**Conclusion: PASS**

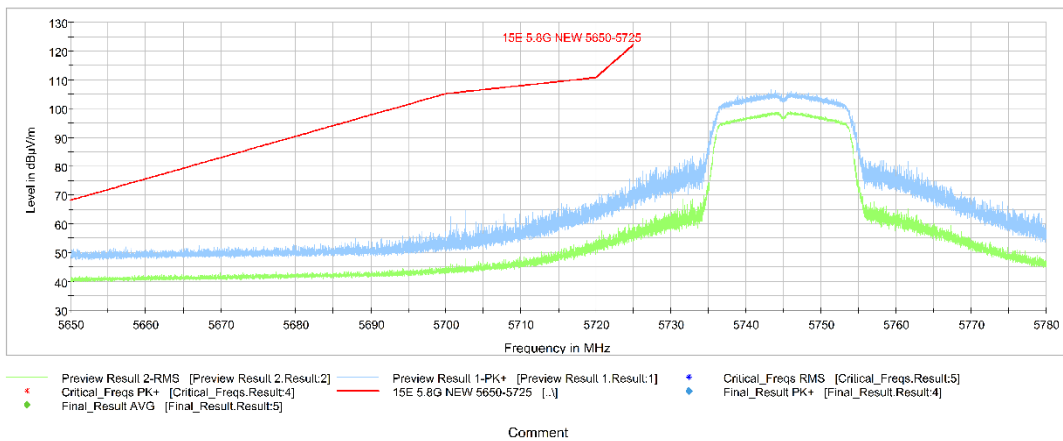
**Test graphs as below:**



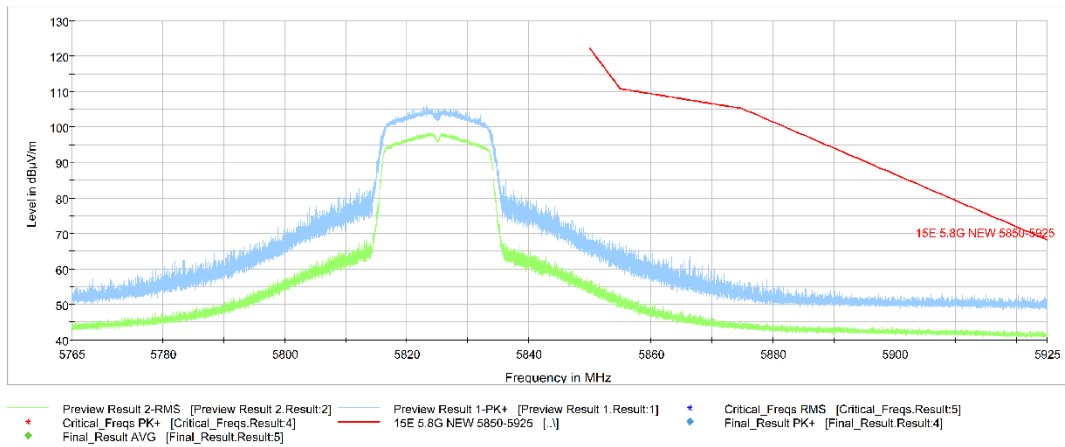
**Fig. 10 Band Edges (802.11a Ch149,5745MHz)**



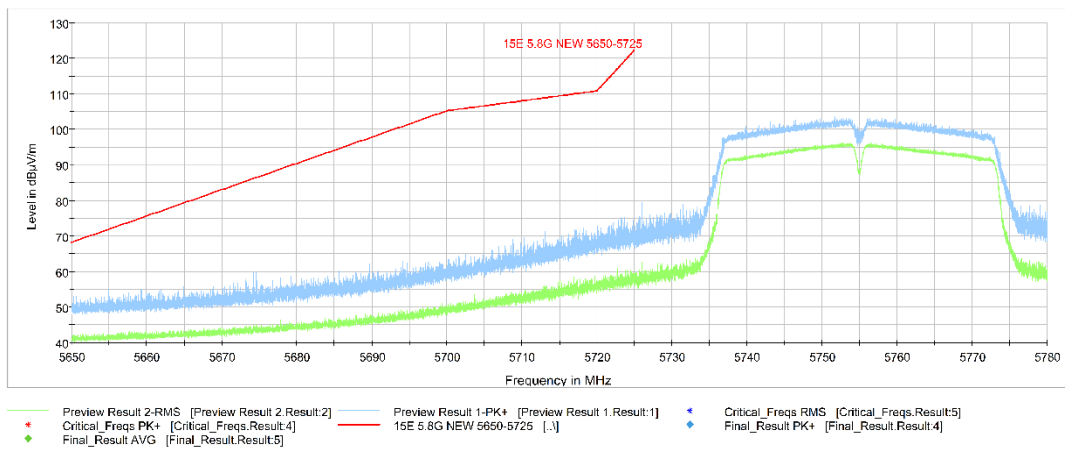
**Fig. 11 Band Edges (802.11a Ch165, 5825MHz)**



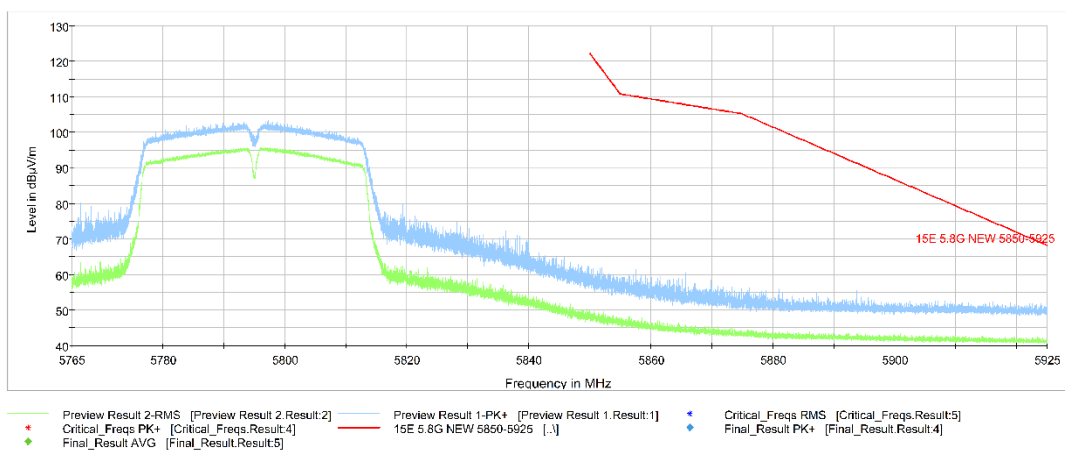
**Fig. 12 Band Edges (802.11n-HT20 Ch149, 5745MHz)**



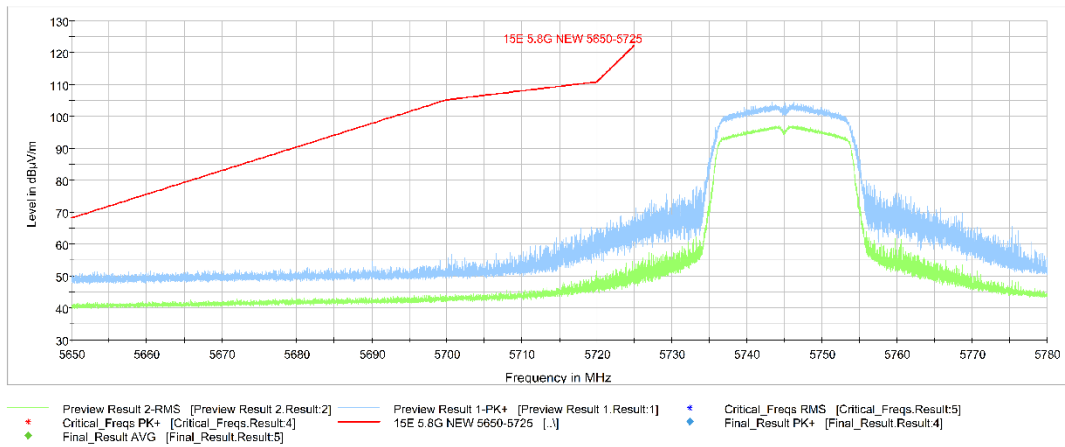
**Fig. 13 Band Edges (802.11n-HT20 Ch165, 5825MHz)**



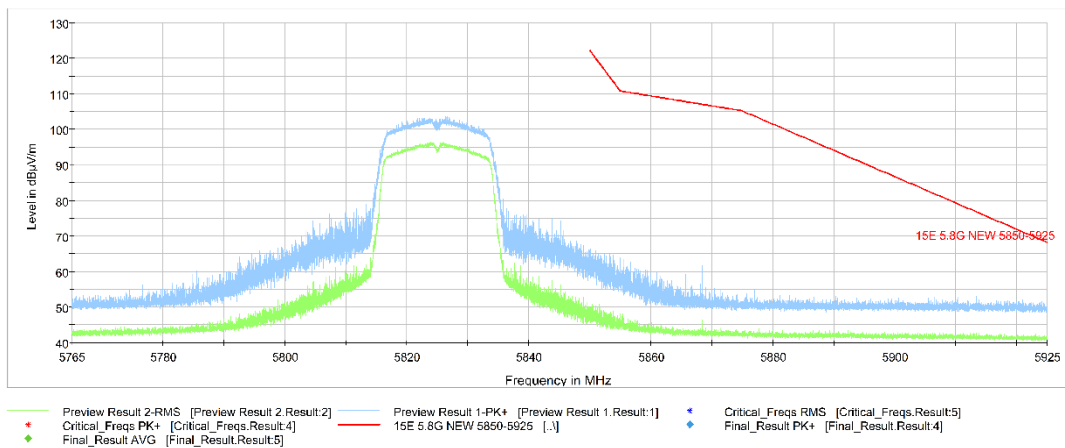
**Fig. 14 Band Edges (802.11n-HT40 Ch151, 5755MHz)**



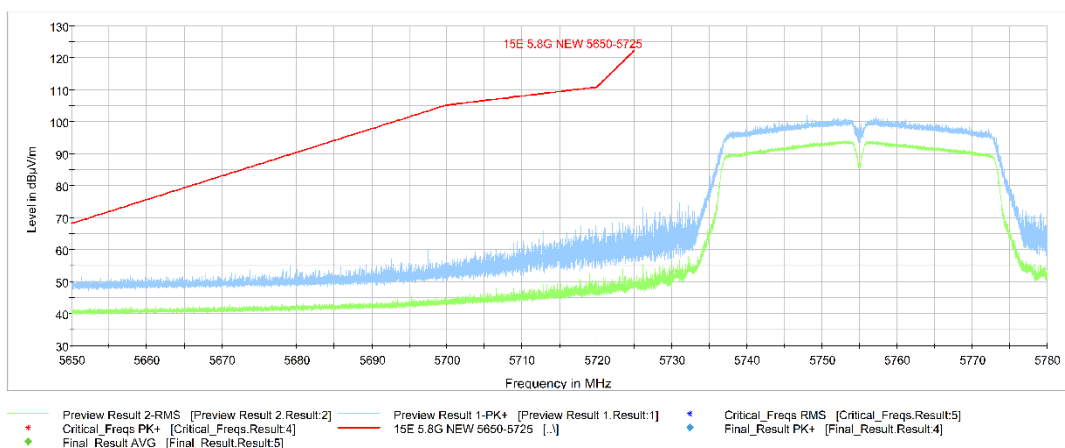
**Fig. 15 Band Edges (802.11n-HT40 Ch159, 5795MHz)**



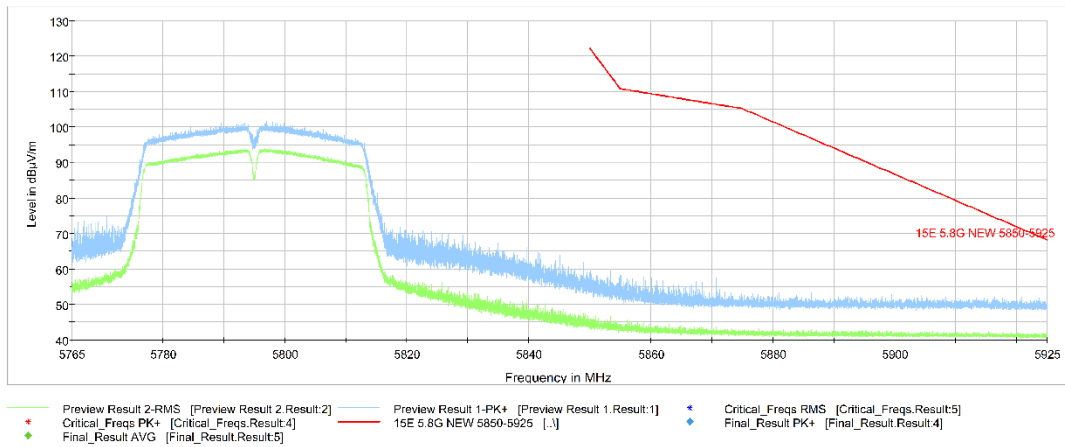
**Fig. 16 Band Edges (802.11ac-HT20 Ch149, 5745MHz)**



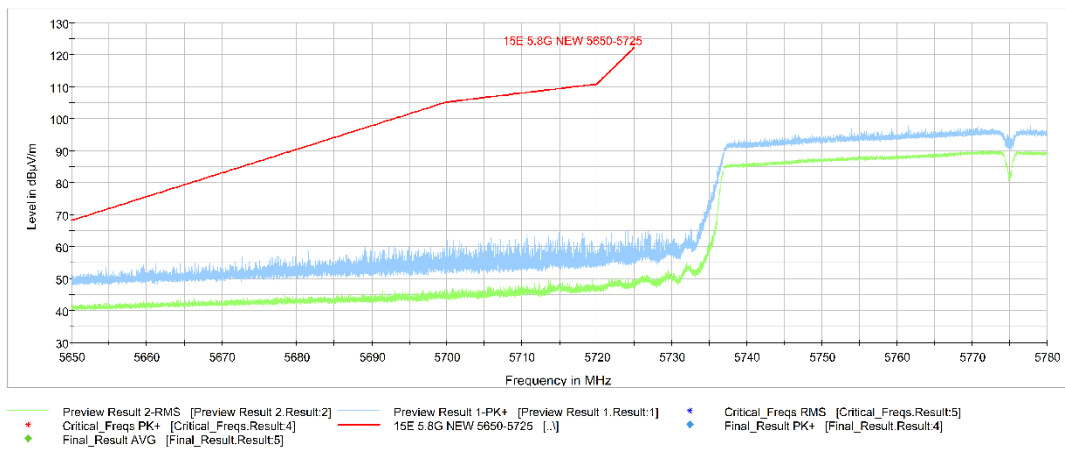
**Fig. 17 Band Edges (802.11ac-HT20 Ch165, 5825MHz)**



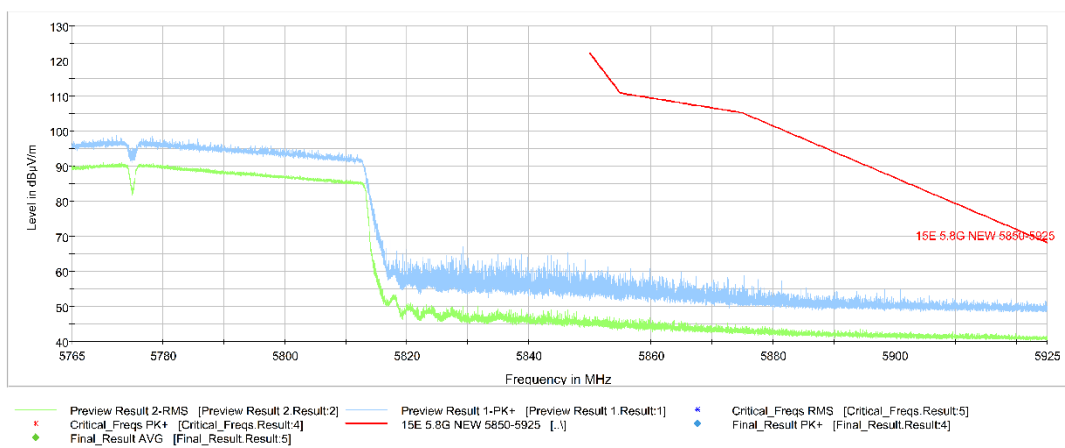
**Fig. 18 Band Edges (802.11ac-HT40 Ch151, 5755MHz)**



**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		
		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 (dB $\mu$ V)	Result (dB $\mu$ V)		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			

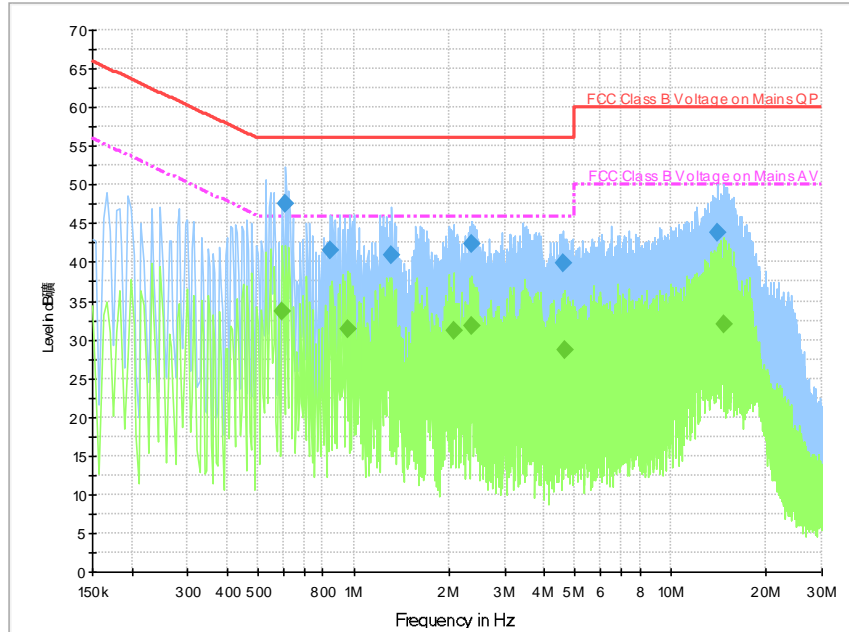
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

The measurement is made according to ANSI C63.10 .

**Conclusion: PASS**

**Test graphs as below:**

**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**

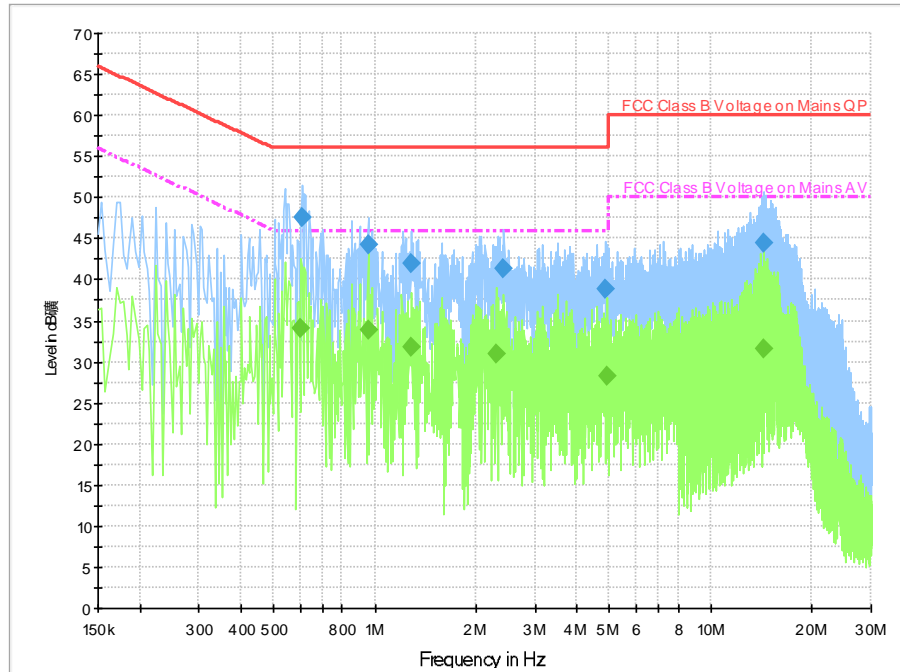
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.610000	47.5	5000.	9.000	On	L1	19.7	8.5	56.0	
0.842000	41.6	5000.	9.000	On	L1	19.6	14.4	56.0	
1.322000	41.0	5000.	9.000	On	L1	19.5	15.0	56.0	
2.362000	42.4	5000.	9.000	On	L1	19.5	13.6	56.0	
4.602000	39.9	5000.	9.000	On	L1	19.6	16.1	56.0	
14.062000	43.9	5000.	9.000	On	L1	19.8	16.1	60.0	

**Final Result 2**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.594000	33.7	5000.	9.000	On	L1	19.8	12.3	46.0	
0.958000	31.4	5000.	9.000	On	L1	19.5	14.6	46.0	
2.070000	31.1	5000.	9.000	On	L1	19.5	14.9	46.0	
2.362000	31.7	5000.	9.000	On	L1	19.5	14.3	46.0	
4.630000	28.6	5000.	9.000	On	L1	19.6	17.4	46.0	
14.806000	32.0	5000.	9.000	On	L1	19.8	18.0	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)	Comment
0.610000	47.5	5000.	9.000	On	L1	19.7	8.5	56.0	
0.954000	44.2	5000.	9.000	On	L1	19.6	11.8	56.0	
1.286000	42.0	5000.	9.000	On	L1	19.5	14.0	56.0	
2.426000	41.2	5000.	9.000	On	L1	19.5	14.8	56.0	
4.866000	38.8	5000.	9.000	On	L1	19.6	17.2	56.0	
14.390000	44.5	5000.	9.000	On	L1	19.8	15.5	60.0	

**Final Result 2**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.602000	34.0	5000.0	9.000	On	N	19.9	12.0	46.0	
0.954000	33.8	5000.0	9.000	On	L1	19.6	12.2	46.0	
1.286000	31.7	5000.0	9.000	On	L1	19.5	14.3	46.0	
2.310000	31.0	5000.0	9.000	On	L1	19.5	15.0	46.0	
4.926000	28.3	5000.0	9.000	On	L1	19.6	17.7	46.0	
14.390000	31.7	5000.0	9.000	On	L1	19.8	18.3	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 \*\*\*