



# FCC PART 15C TEST REPORT No.I21Z62393-IOT05

for

**TCL Communication Ltd.**

**GSM/UMTS/LTE Mobile phone**

**T603DL**

With

**FCC ID: 2ACCJH143**

**Hardware Version: PIO**

**Software Version: vR4G**

**Issued Date: 2022-01-19**

**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.

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## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I21Z62393-IOT05	Rev.0	1st edition	2022-01-11
I21Z62393-IOT05	Rev.1	Update the reference documents on page 8.	2022-01-19

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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

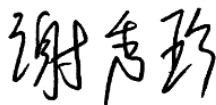
Relative Humidity: 20-75%

### 1.4. Project date

Testing Start Date: 2021-12-06

Testing End Date: 2022-01-11

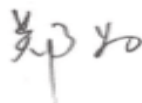
### 1.5. Signature



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

### **2.2. Manufacturer Information**

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

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

#### **EQUIPMENT(AE)**

##### **3.1. About EUT**

Description	GSM/UMTS/LTE Mobile phone
Model name	T603DL
FCC ID	2ACCJH143
WLAN Frequency Band	ISM Band: 5725MHz~5850MHz
Type of modulation	OFDM
Voltage	3.85V

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

<b>EUT ID*</b>	<b>IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
EUT1	016050000214919	PIO	vR4G
EUT2	016052000213853	PIO	vR4G

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

##### **3.3. Internal Identification of AE used during the test**

<b>AE ID*</b>	<b>Description</b>	<b>Type</b>	<b>SN</b>
AE1	Battery	/	
AE2	Charger1	/	
AE3	Data Cable	/	

###### **AE1**

Model	CAC3860025C7 (TLp038D7)
Manufacturer	VEKEN
Capacity	3860mAh
Nominal Voltage	/

###### **AE2**

Model	CBA0059BGTC5
Manufacturer	PUAN
Length of cable	/

###### **AE3**

Model	CDA0000172C1
Manufacturer	JUWEI
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 GSM/UMTS/LTE Mobile 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 CFR 47, Part 15, Subpart C and E:	
FCC Part15	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 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	100344	R&S	1 year	2022-02-23
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	ESU 26	100235	R&S	1 year	2022-02-23
2	EMI Antenna	VULB 9163	01223	SCHWARZBECK	1 year	2022-03-22
3	EMI Antenna	3115	6914	ETS-Lindgren	1 year	2022-02-23

## 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

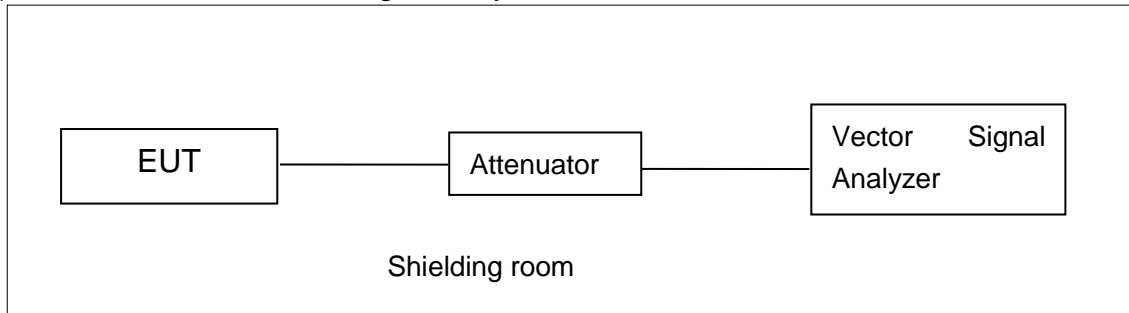
Measurement Uncertainty : 3.08dB,k=2

## 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

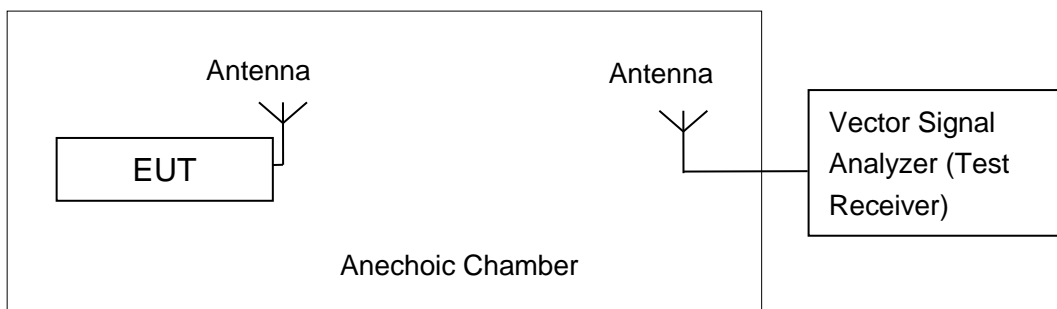


#### A.1.2. Radiated Emission Measurements

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 -5dBi and the value is supplied by the applicant or manufacturer.

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

#### 802.11a mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	16.53	17.41	18.43

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)	17.39	17.46	18.34

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)	17.44	17.42	18.42

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)	17.28	16.98

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)	17.47	17.51

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)	18.86

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	3.07	P
	157	3.53	P
	165	4.48	P
802.11ac HT20	149	2.11	P
	157	2.73	P
	165	4.18	P
802.11ac HT40	151	-0.50	P
	159	0.13	P
802.11ac HT80	155	-2.85	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	16.35	P
	157	Fig.2	16.35	P
	165	Fig.3	16.35	P
802.11ac HT20	149	Fig.4	17.55	P
	157	Fig.5	17.55	P
	165	Fig.6	17.55	P
802.11ac HT40	151	Fig.7	36.32	P
	159	Fig.8	36.32	P
802.11ac HT80	155	Fig.9	76.32	P

### Conclusion: PASS

#### Test graphs as below:

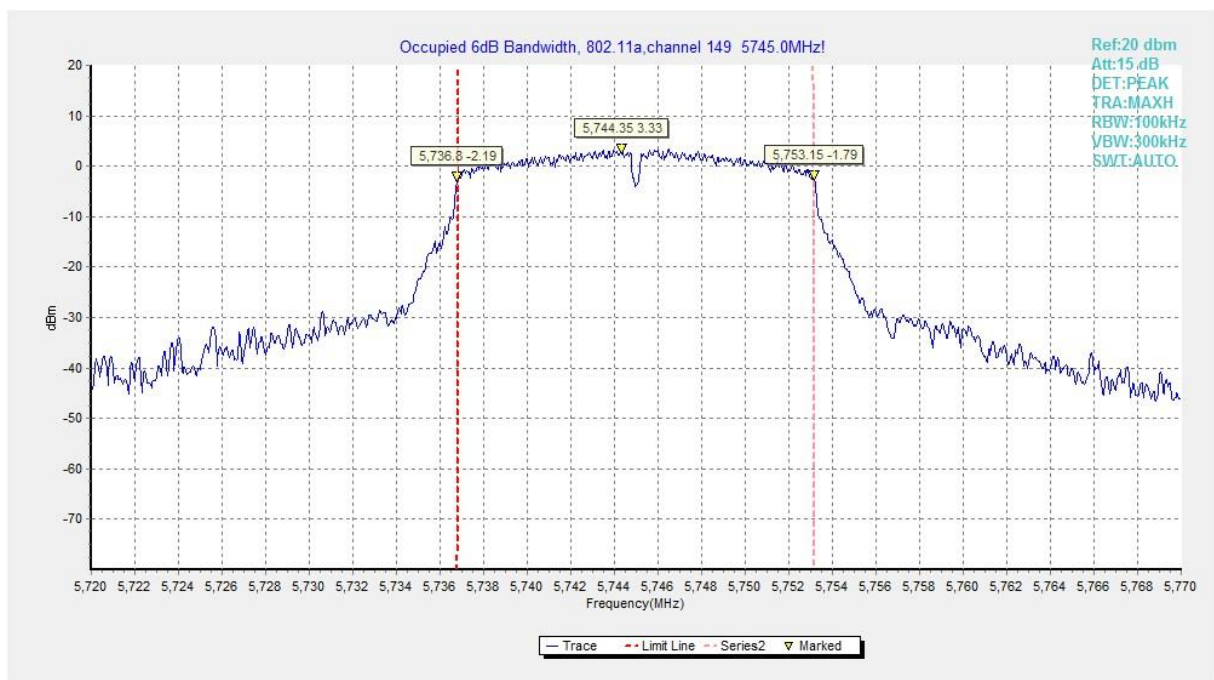
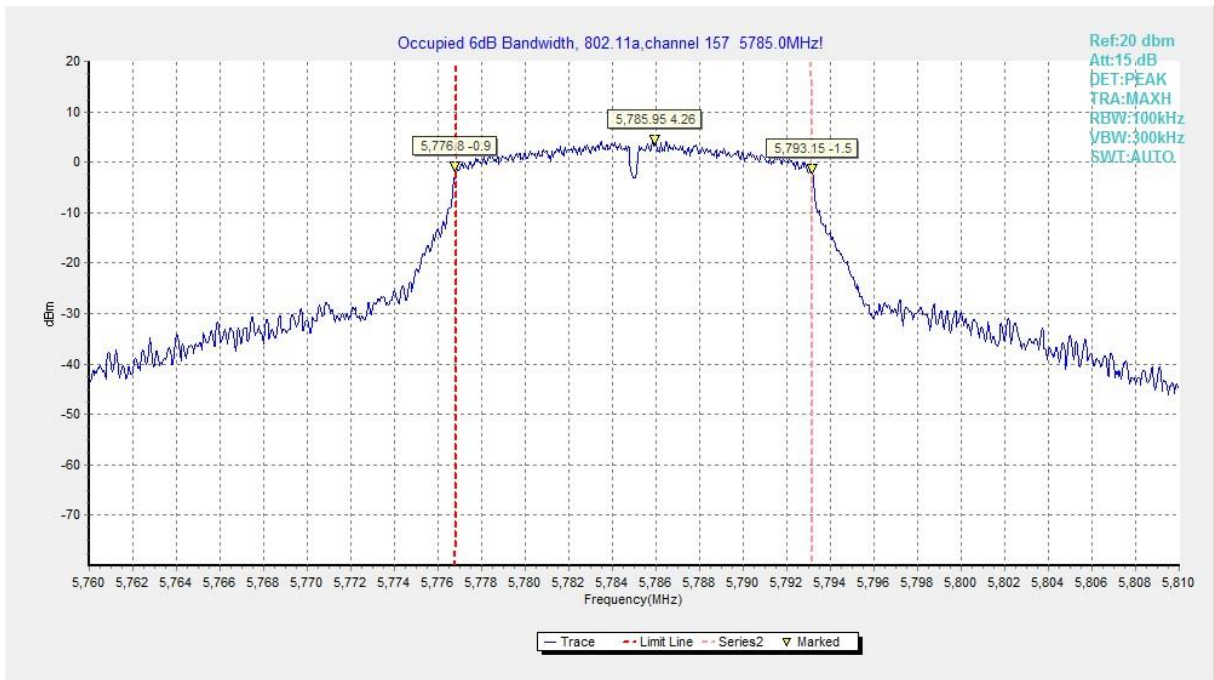
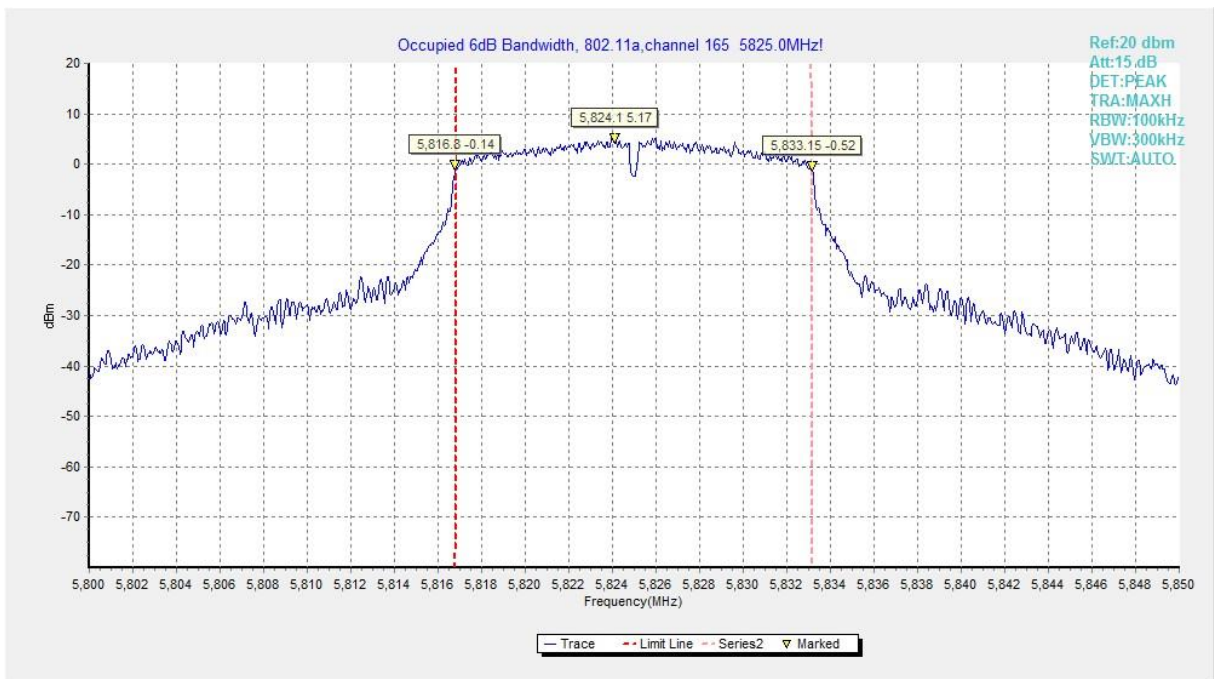


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)

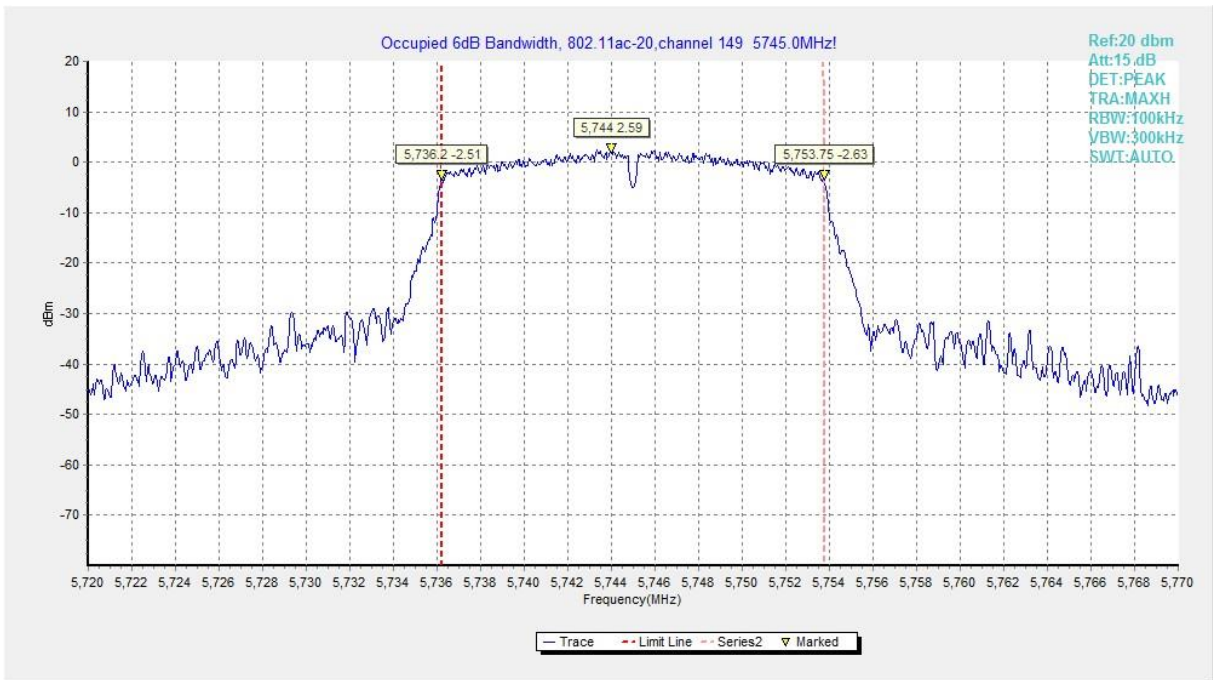




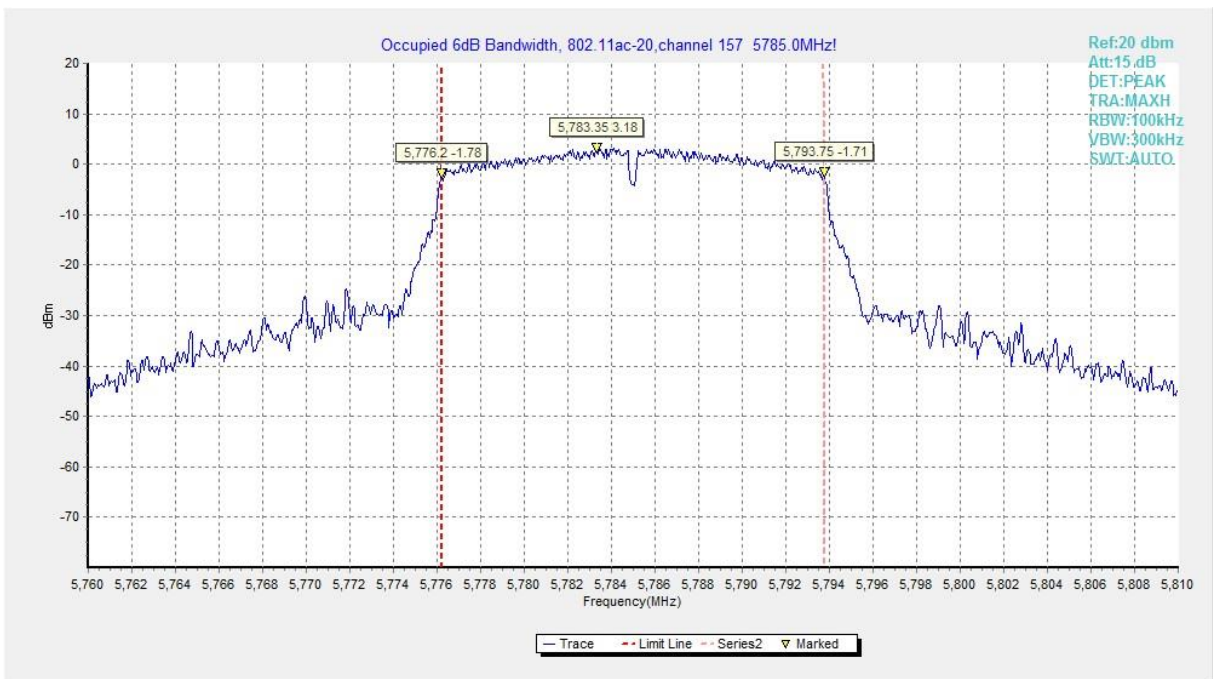
**Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)**



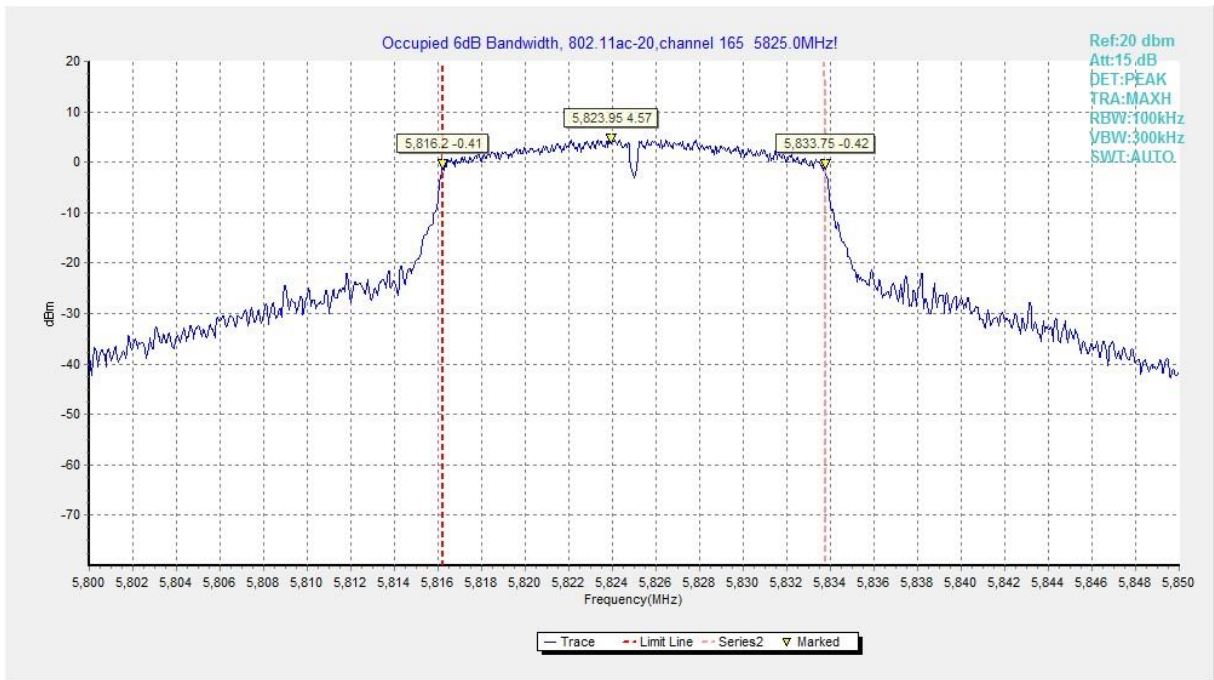
**Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)**



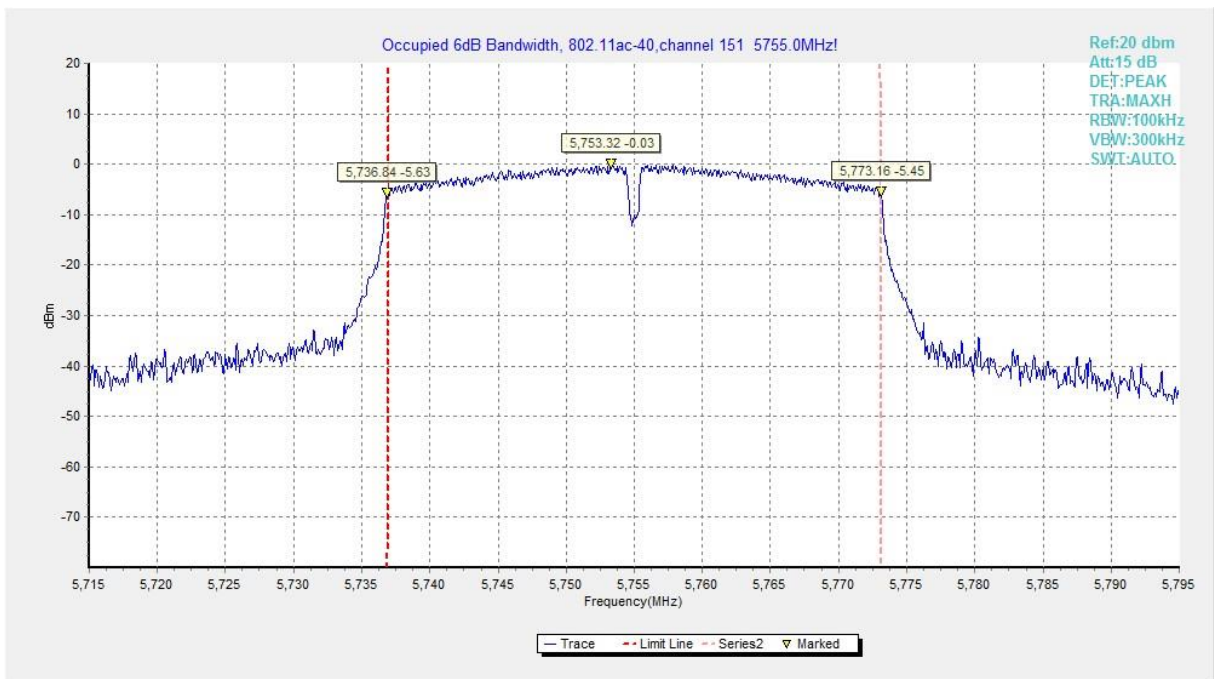
**Fig. 4 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 149)**



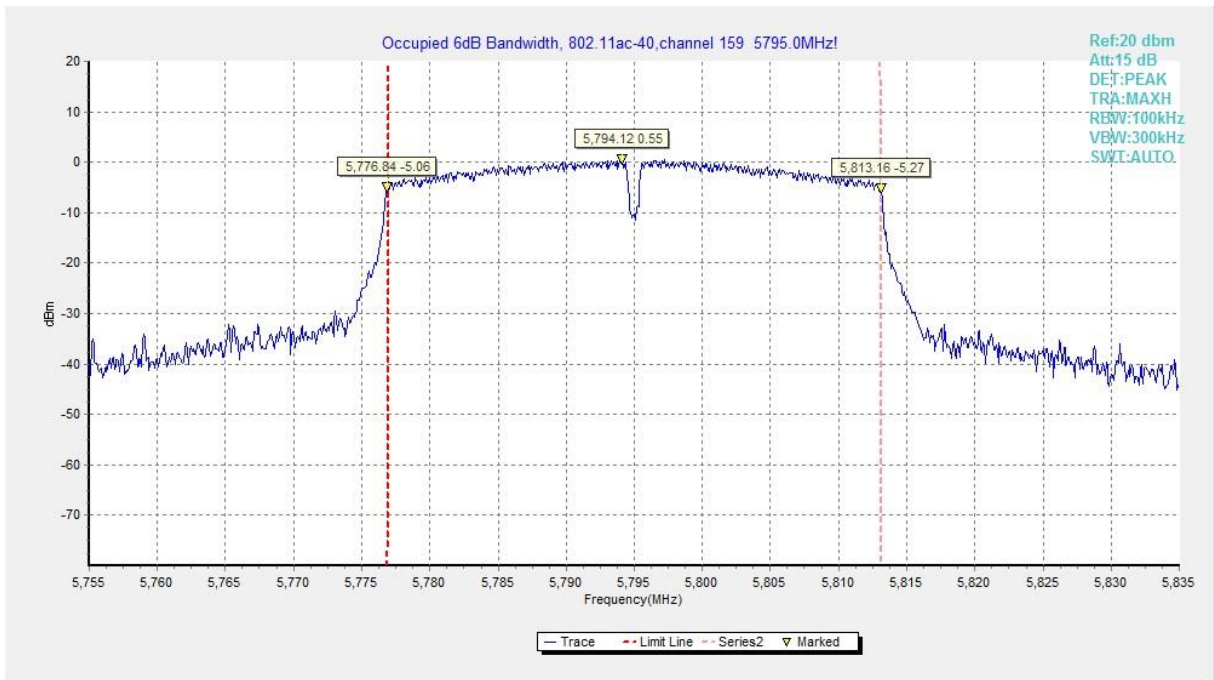
**Fig. 5 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 157)**



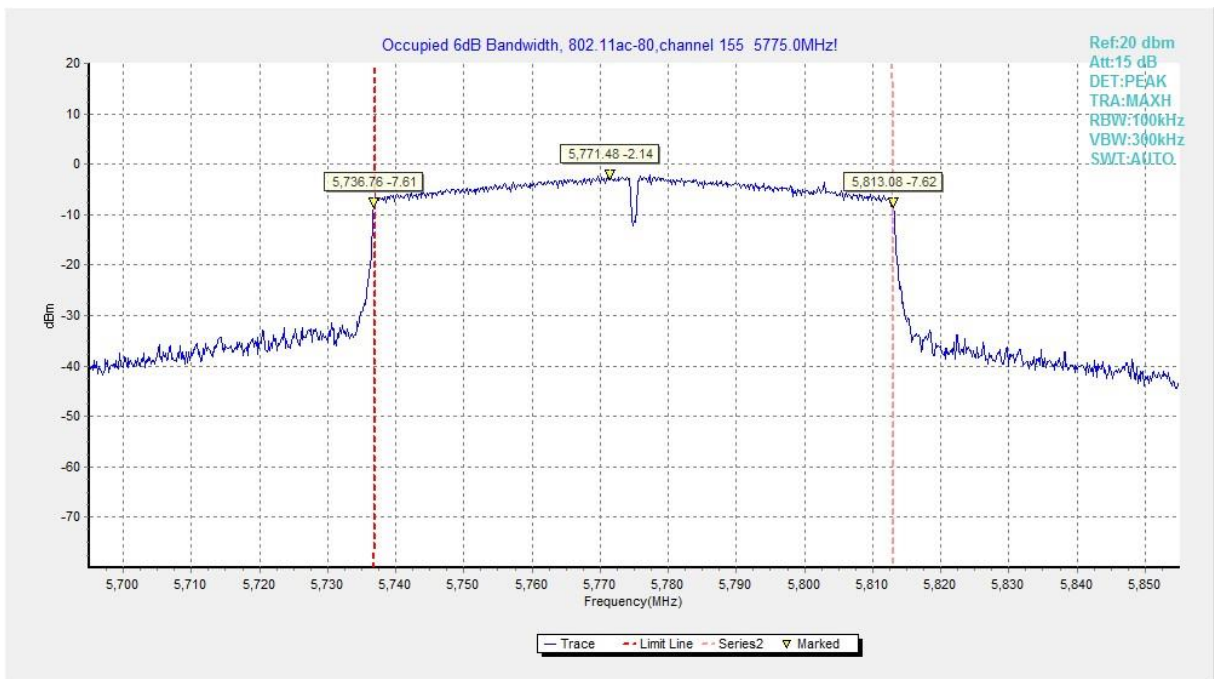
**Fig. 6 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 165)**



**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
		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)
11488.000	45.74	-32.26	38.84	39.17	54.00	8.26	H
11491.300	45.56	-32.26	38.84	38.99	54.00	8.44	H
17997.200	41.94	-25.50	46.66	20.78	54.00	12.06	V
17992.800	41.93	-25.50	46.66	20.77	54.00	12.07	V
13259.500	37.37	-29.67	39.55	27.49	54.00	16.63	V
13256.800	37.35	-29.67	39.55	27.47	54.00	16.65	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)
11567.200	44.74	-32.31	38.91	38.15	54.00	9.26	H
11571.600	44.67	-32.31	38.91	38.08	54.00	9.33	H
17990.100	42.09	-25.50	46.66	20.93	54.00	11.91	V
17997.200	42.02	-25.50	46.66	20.86	54.00	11.98	H
13323.400	37.26	-29.49	39.71	27.04	54.00	16.74	H
13372.300	37.25	-29.49	39.71	27.03	54.00	16.75	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)
11648.600	46.64	-32.31	38.91	40.05	54.00	7.36	H
11653.000	46.48	-32.31	38.91	39.89	54.00	7.52	H
17996.200	41.99	-25.50	46.66	20.83	54.00	12.01	V
17984.000	41.95	-25.50	46.66	20.79	54.00	12.05	H
13256.800	37.34	-29.67	39.55	27.46	54.00	16.66	H
13320.600	37.33	-29.49	39.71	27.11	54.00	16.67	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)
11491.900	44.63	-32.26	38.84	38.06	54.00	9.37	H
11489.100	44.58	-32.26	38.84	38.01	54.00	9.42	H
17973.000	41.98	-25.50	46.66	20.82	54.00	12.02	H
17998.900	41.96	-25.50	46.66	20.80	54.00	12.04	H
13294.200	37.33	-29.49	39.71	27.11	54.00	16.67	V
13257.900	37.26	-29.67	39.55	27.38	54.00	16.74	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)
11569.400	44.03	-32.31	38.91	37.44	54.00	9.97	H
11568.300	43.77	-32.31	38.91	37.18	54.00	10.23	H
17970.300	41.95	-25.50	46.66	20.79	54.00	12.05	H
17997.800	41.95	-25.50	46.66	20.79	54.00	12.05	H
15652.600	37.28	-27.23	38.61	25.90	54.00	16.72	V
13280.500	37.22	-29.67	39.55	27.34	54.00	16.78	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)
11649.700	46.09	-32.31	38.91	39.50	54.00	7.91	V
11648.600	45.86	-32.31	38.91	39.27	54.00	8.14	V
17982.400	41.94	-25.50	46.66	20.78	54.00	12.06	V
17966.500	41.90	-25.50	46.66	20.74	54.00	12.10	V
13259.500	37.24	-29.67	39.55	27.36	54.00	16.76	V
13353.600	37.22	-29.49	39.71	27.00	54.00	16.78	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)
17972.500	42.09	-25.50	46.66	20.93	54.00	11.91	H
17989.500	42.03	-25.50	46.66	20.87	54.00	11.97	V
11513.300	41.39	-32.26	38.84	34.82	54.00	12.61	H
11507.800	41.32	-32.26	38.84	34.75	54.00	12.68	H
16150.900	37.91	-26.77	38.93	25.75	54.00	16.09	V
16043.600	37.82	-27.35	38.54	26.63	54.00	16.18	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)
17988.500	42.12	-25.50	46.66	20.96	54.00	11.88	V
17998.900	42.03	-25.50	46.66	20.87	54.00	11.97	V
11589.800	38.70	-32.31	38.91	32.11	54.00	15.30	H
11592.000	38.56	-32.31	38.91	31.97	54.00	15.44	H
16150.900	37.86	-26.77	38.93	25.70	54.00	16.14	V
16051.400	37.81	-27.35	38.54	26.62	54.00	16.19	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)
17996.700	42.04	-25.50	46.66	20.88	54.00	11.96	H
17998.300	42.02	-25.50	46.66	20.86	54.00	11.98	V
11488.600	40.31	-32.26	38.84	33.74	54.00	13.69	H
11491.300	40.17	-32.26	38.84	33.60	54.00	13.83	H
16147.600	37.94	-26.77	38.93	25.78	54.00	16.06	H
16049.100	37.89	-27.35	38.54	26.70	54.00	16.11	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)
17992.300	42.13	-25.50	46.66	20.97	54.00	11.87	V
17991.800	42.04	-25.50	46.66	20.88	54.00	11.96	V
11571.600	40.87	-32.31	38.91	34.28	54.00	13.13	H
11571.100	40.85	-32.31	38.91	34.26	54.00	13.15	H
16130.000	37.92	-26.77	38.93	25.76	54.00	16.08	V
16050.200	37.87	-27.35	38.54	26.68	54.00	16.13	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)
11649.200	43.59	-32.31	38.91	37.00	54.00	10.41	H
11649.700	43.46	-32.31	38.91	36.87	54.00	10.54	H
17988.500	42.13	-25.50	46.66	20.97	54.00	11.87	V
17987.300	42.07	-25.50	46.66	20.91	54.00	11.93	H
16135.500	38.00	-26.77	38.93	25.84	54.00	16.00	V
16137.700	37.94	-26.77	38.93	25.78	54.00	16.06	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)
17997.800	42.15	-25.50	46.66	20.99	54.00	11.85	H
17978.000	42.08	-25.50	46.66	20.92	54.00	11.92	H
11510.000	38.96	-32.26	38.84	32.39	54.00	15.04	H
11512.200	38.83	-32.26	38.84	32.26	54.00	15.17	H
16138.200	37.90	-26.77	38.93	25.74	54.00	16.10	V
16141.500	37.85	-26.77	38.93	25.69	54.00	16.15	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)
17996.700	42.03	-25.50	46.66	20.87	54.00	11.97	H
17974.700	42.00	-25.50	46.66	20.84	54.00	12.00	V
11592.000	39.50	-32.31	38.91	32.91	54.00	14.50	H
11585.400	39.45	-32.31	38.91	32.86	54.00	14.55	H
16148.700	37.83	-26.77	38.93	25.67	54.00	16.17	V
16135.000	37.82	-26.77	38.93	25.66	54.00	16.18	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)
17976.900	42.07	-25.50	46.66	20.91	54.00	11.93	H
17998.900	42.04	-25.50	46.66	20.88	54.00	11.96	H
16137.700	37.92	-26.77	38.93	25.76	54.00	16.08	V
16138.200	37.82	-26.77	38.93	25.66	54.00	16.18	V
11540.300	37.59	-32.26	38.84	31.02	54.00	16.41	H
11539.700	37.56	-32.26	38.84	30.99	54.00	16.44	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)
11486.900	61.51	-32.26	38.84	54.94	74.00	12.49	H
11493.000	60.91	-32.26	38.84	54.34	74.00	13.09	H
17996.200	54.81	-25.50	46.66	33.65	74.00	19.19	V
17995.000	54.38	-25.50	46.66	33.22	74.00	19.62	V
16579.900	52.03	-26.87	40.65	38.25	68.30	16.27	H
16599.200	51.90	-26.87	40.65	38.12	68.30	16.40	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)
11563.400	59.39	-32.31	38.91	52.80	74.00	14.61	H
11572.200	59.17	-32.31	38.91	52.58	74.00	14.83	H
17947.200	54.45	-25.50	46.66	33.29	74.00	19.55	V
17991.800	54.41	-25.50	46.66	33.25	74.00	19.59	H
16844.500	51.62	-26.62	41.49	36.75	68.30	16.68	V
16701.500	51.55	-26.87	40.65	37.77	68.30	16.75	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)
11648.600	61.44	-32.31	38.91	54.85	74.00	12.56	H
11650.300	61.03	-32.31	38.91	54.44	74.00	12.97	H
17942.800	54.85	-25.50	46.66	33.69	74.00	19.15	H
17604.000	54.39	-25.74	45.95	34.18	68.30	13.91	V
16557.300	52.41	-26.87	40.65	38.63	68.30	15.89	H
16442.400	52.03	-26.96	39.82	39.17	68.30	16.27	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)
11488.000	59.10	-32.26	38.84	52.53	74.00	14.90	H
11487.500	58.89	-32.26	38.84	52.32	74.00	15.11	H
17967.000	54.53	-25.50	46.66	33.37	74.00	19.47	V
17976.300	54.45	-25.50	46.66	33.29	74.00	19.55	V
16590.900	51.98	-26.87	40.65	38.20	68.30	16.32	V
16523.200	51.91	-26.96	39.82	39.05	68.30	16.39	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)
11568.900	59.00	-32.31	38.91	52.41	74.00	15.00	H
11568.300	58.39	-32.31	38.91	51.80	74.00	15.61	H
17995.000	54.72	-25.50	46.66	33.56	74.00	19.28	V
17926.800	54.31	-25.50	46.66	33.15	74.00	19.69	V
16523.800	53.38	-26.96	39.82	40.52	68.30	14.92	V
16522.200	51.67	-26.96	39.82	38.81	68.30	16.63	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)
11650.300	60.67	-32.31	38.91	54.08	74.00	13.33	H
11648.100	60.18	-32.31	38.91	53.59	74.00	13.82	V
17956.500	54.80	-25.50	46.66	33.64	74.00	19.20	V
17961.500	54.21	-25.50	46.66	33.05	74.00	19.79	V
16456.700	51.83	-26.96	39.82	38.97	68.30	16.47	V
14217.100	51.67	-28.99	42.00	38.65	68.30	16.63	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)
11510.600	56.52	-32.26	38.84	49.95	74.00	17.48	H
11502.900	54.82	-32.26	38.84	48.25	74.00	19.18	H
17996.700	54.60	-25.50	46.66	33.44	74.00	19.40	V
17810.800	54.39	-25.50	46.66	33.23	74.00	19.61	H
16741.000	52.41	-26.62	41.49	37.54	68.30	15.89	H
16469.900	52.34	-26.96	39.82	39.48	68.30	15.96	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)
17592.500	55.05	-25.74	45.95	34.84	68.30	13.25	V
17940.600	54.61	-25.50	46.66	33.45	74.00	19.39	H
13806.800	52.75	-29.10	40.86	40.98	68.30	15.55	V
11592.000	52.67	-32.31	38.91	46.08	74.00	21.33	H
11589.800	52.62	-32.31	38.91	46.03	74.00	21.38	H
16691.000	52.62	-26.87	40.65	38.84	68.30	15.68	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)
11493.500	56.39	-32.26	38.84	49.82	74.00	17.61	H
11497.400	56.37	-32.26	38.84	49.80	74.00	17.63	H
17910.900	55.14	-25.50	46.66	33.98	74.00	18.86	V
17874.600	54.58	-25.50	46.66	33.42	74.00	19.42	V
16691.500	52.40	-26.87	40.65	38.62	68.30	15.90	V
16536.500	52.19	-26.96	39.82	39.33	68.30	16.11	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)
11571.100	57.78	-32.31	38.91	51.19	74.00	16.22	H
11572.700	57.31	-32.31	38.91	50.72	74.00	16.69	H
17958.800	54.60	-25.50	46.66	33.44	74.00	19.40	V
17912.500	54.55	-25.50	46.66	33.39	74.00	19.45	V
16549.100	52.91	-26.87	40.65	39.13	68.30	15.39	V
16587.600	52.32	-26.87	40.65	38.54	68.30	15.98	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)
11650.800	59.29	-32.31	38.91	52.70	74.00	14.71	H
11645.300	59.17	-32.31	38.91	52.58	74.00	14.83	H
17956.000	55.09	-25.50	46.66	33.93	74.00	18.91	H
17315.800	54.58	-25.95	44.35	36.17	68.30	13.72	V
16634.300	52.93	-26.87	40.65	39.15	68.30	15.37	H
16654.700	52.76	-26.87	40.65	38.98	68.30	15.54	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)
17954.900	54.58	-25.50	46.66	33.42	74.00	19.42	V
17578.200	54.41	-25.74	45.95	34.20	68.30	13.89	H
16673.400	53.08	-26.87	40.65	39.30	68.30	15.22	H
11507.800	52.75	-32.26	38.84	46.18	74.00	21.25	H
16587.000	52.46	-26.87	40.65	38.68	68.30	15.84	V
11509.500	52.32	-32.26	38.84	45.75	74.00	21.68	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)
17943.300	54.64	-25.50	46.66	33.48	74.00	19.36	H
17402.200	54.60	-26.85	45.25	36.20	68.30	13.70	H
16625.000	53.24	-26.87	40.65	39.46	68.30	15.06	H
11593.600	53.15	-32.31	38.91	46.56	74.00	20.85	H
11581.000	52.65	-32.31	38.91	46.06	74.00	21.35	H
16648.700	52.60	-26.87	40.65	38.82	68.30	15.70	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)
17945.500	54.60	-25.50	46.66	33.44	74.00	19.40	V
17305.900	54.55	-25.95	44.35	36.14	68.30	13.75	H
16963.800	52.69	-26.32	42.36	36.64	68.30	15.61	H
16827.400	52.51	-26.62	41.49	37.64	68.30	15.79	H
11550.700	50.97	-32.26	38.84	44.40	74.00	23.03	H
11540.800	50.96	-32.26	38.84	44.39	74.00	23.04	H

## A.6. Band Edges Compliance

### A6.1 Band Edges - Radiated

#### Measurement Limit:

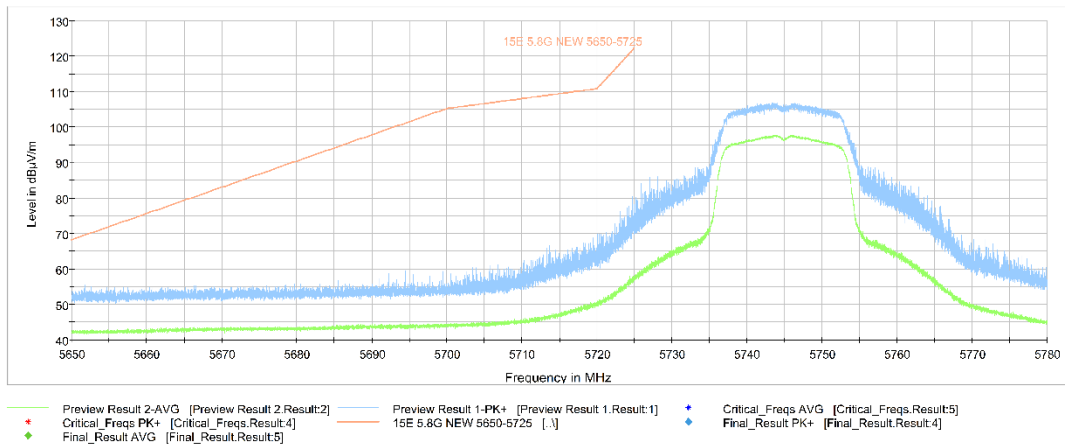
Standard	Limit (dBm/MHz)	
FCC 47 CFR Part 15.407	at the band edge	27
	at 5 MHz above or below the band edge	15.6
	at 25 MHz above or below the band edge	10
	at 75 MHz or more above or below the band edge	-27
	Note: increasing linearly from point to point.	

#### Measurement Result:

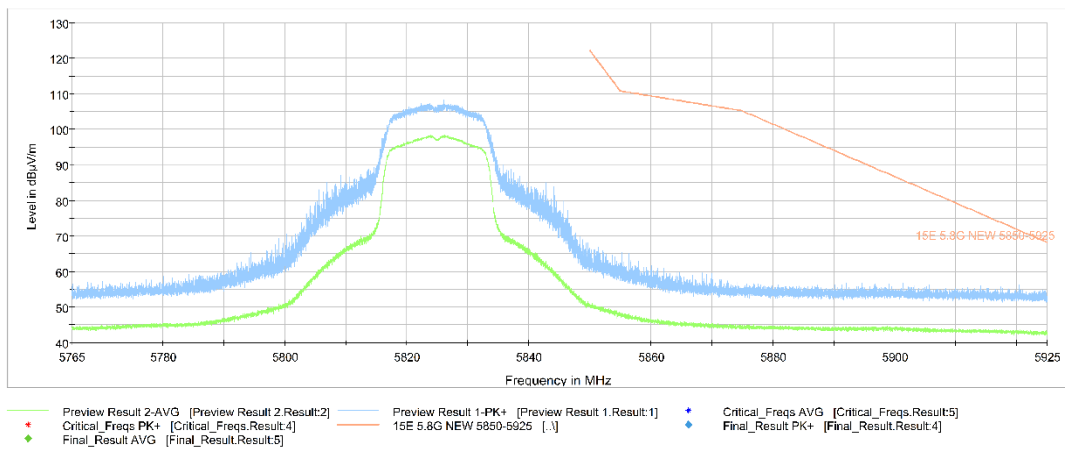
Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.10	P
	5825 MHz	Fig.11	P
802.11n HT20	5745 MHz	Fig.12	P
	5825 MHz	Fig.13	P
802.11n HT40	5755 MHz	Fig.14	P
	5795 MHz	Fig.15	P
802.11ac HT20	5745 MHz	Fig.16	P
	5825 MHz	Fig.17	P
802.11ac HT40	5755 MHz	Fig.18	P
	5795 MHz	Fig.19	P
802.11ac HT80	5775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

**Conclusion: PASS**

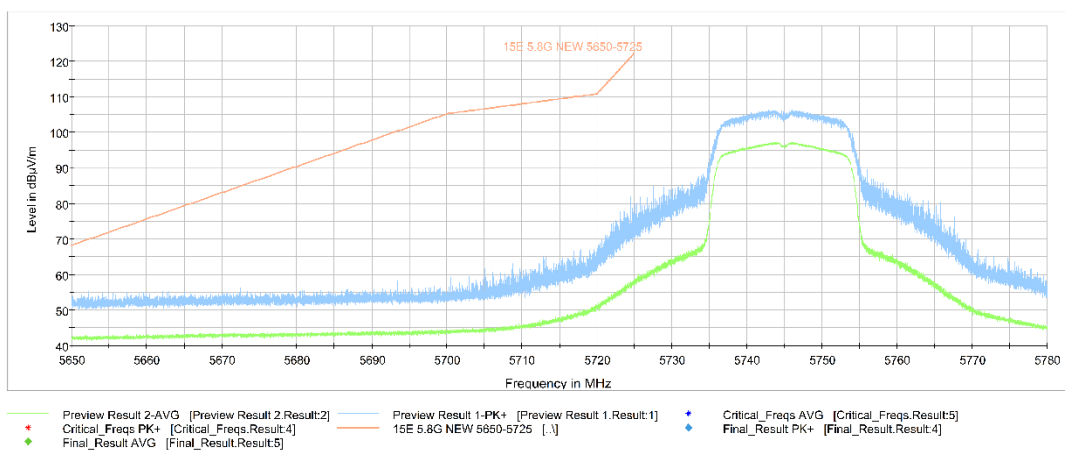
**Test graphs as below:**



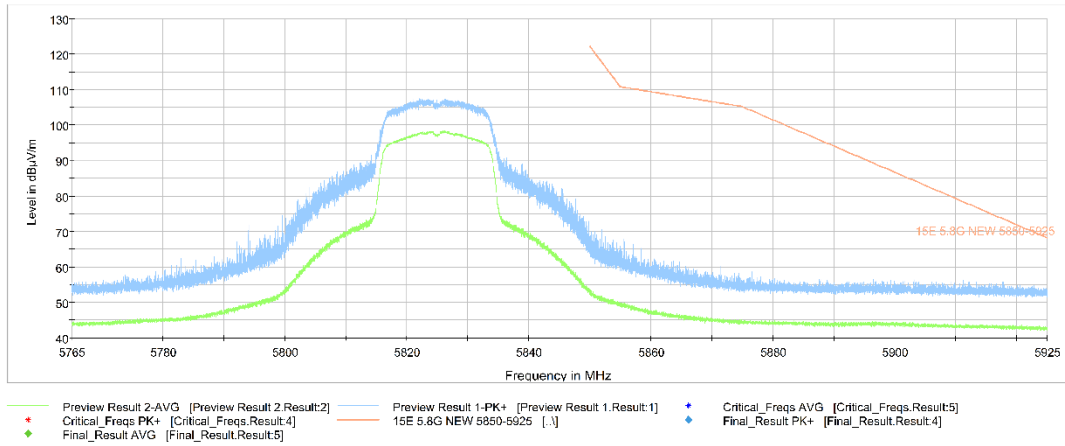
**Fig. 10 Band Edges (802.11a Ch149,5745MHz)**



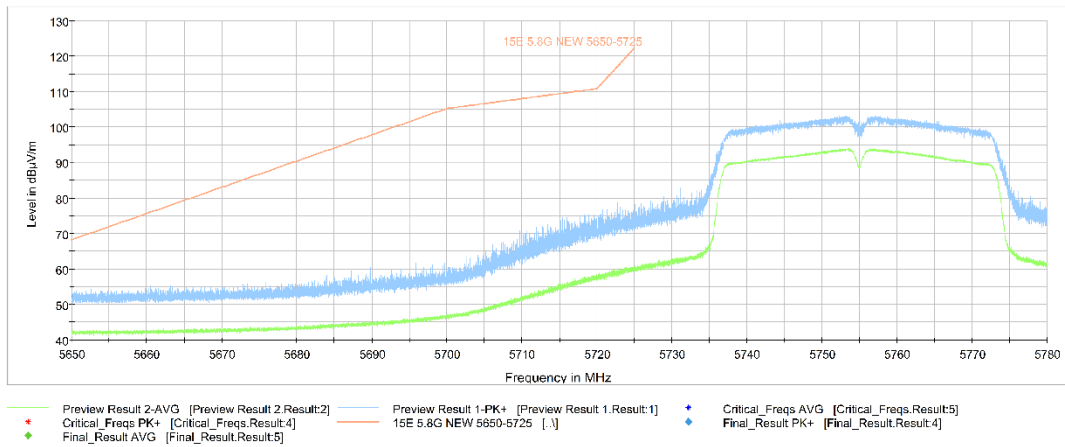
**Fig. 11 Band Edges (802.11a Ch165, 5825MHz)**



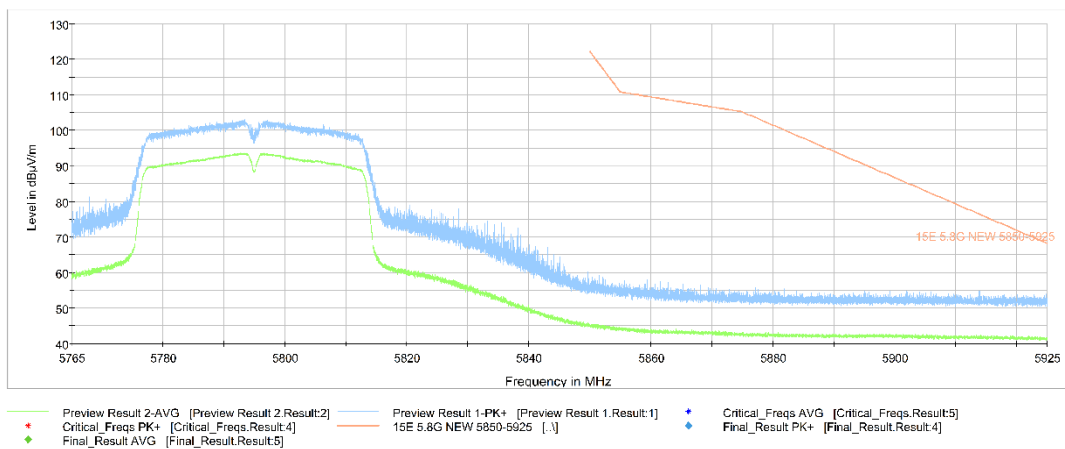
**Fig. 12 Band Edges (802.11n-HT20 Ch149, 5745MHz)**



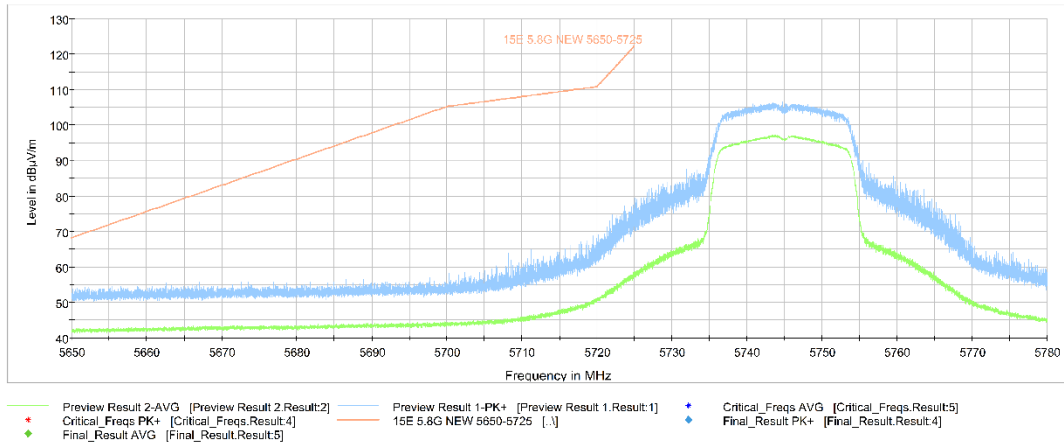
**Fig. 13 Band Edges (802.11n-HT20 Ch165, 5825MHz)**



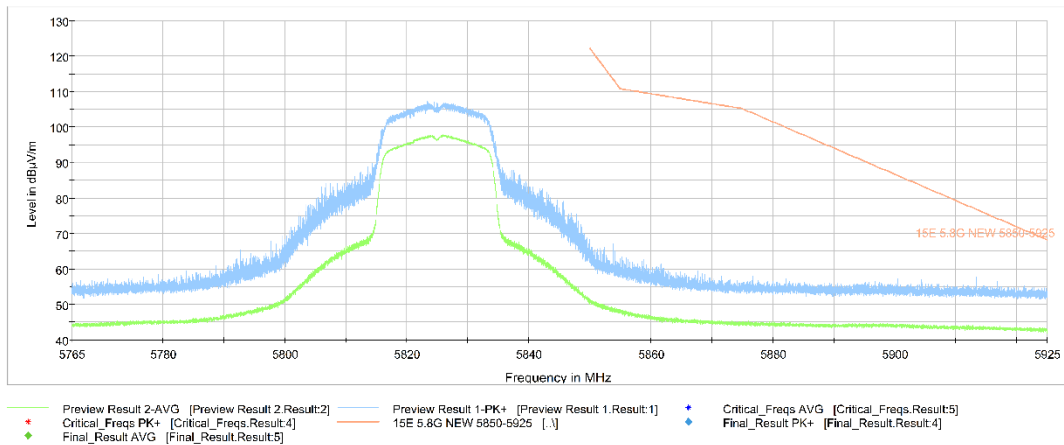
**Fig. 14 Band Edges (802.11n-HT40 Ch151, 5755MHz)**



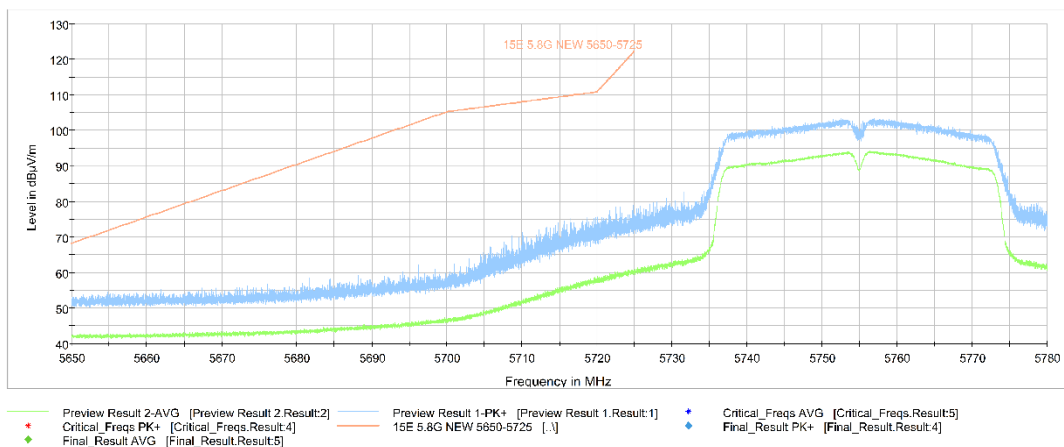
**Fig. 15 Band Edges (802.11n-HT40 Ch159, 5795MHz)**



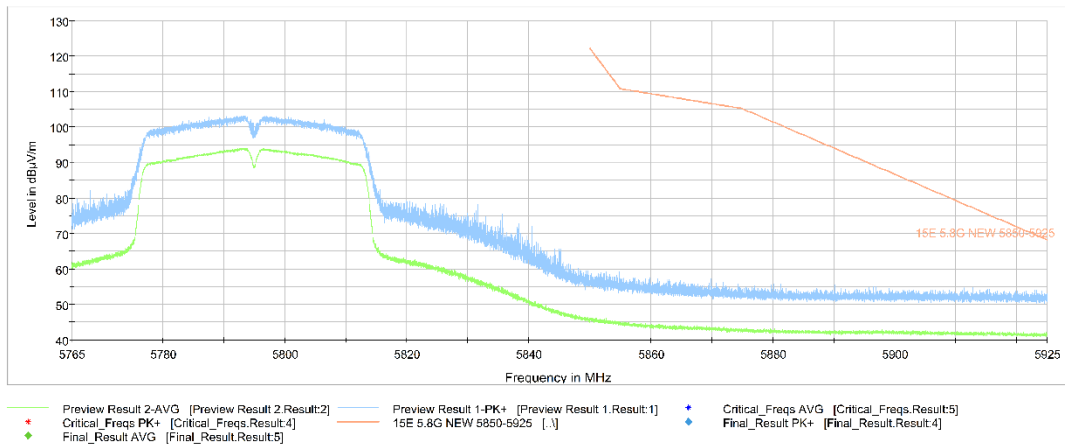
**Fig. 16 Band Edges (802.11ac-HT20 Ch149, 5745MHz)**



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

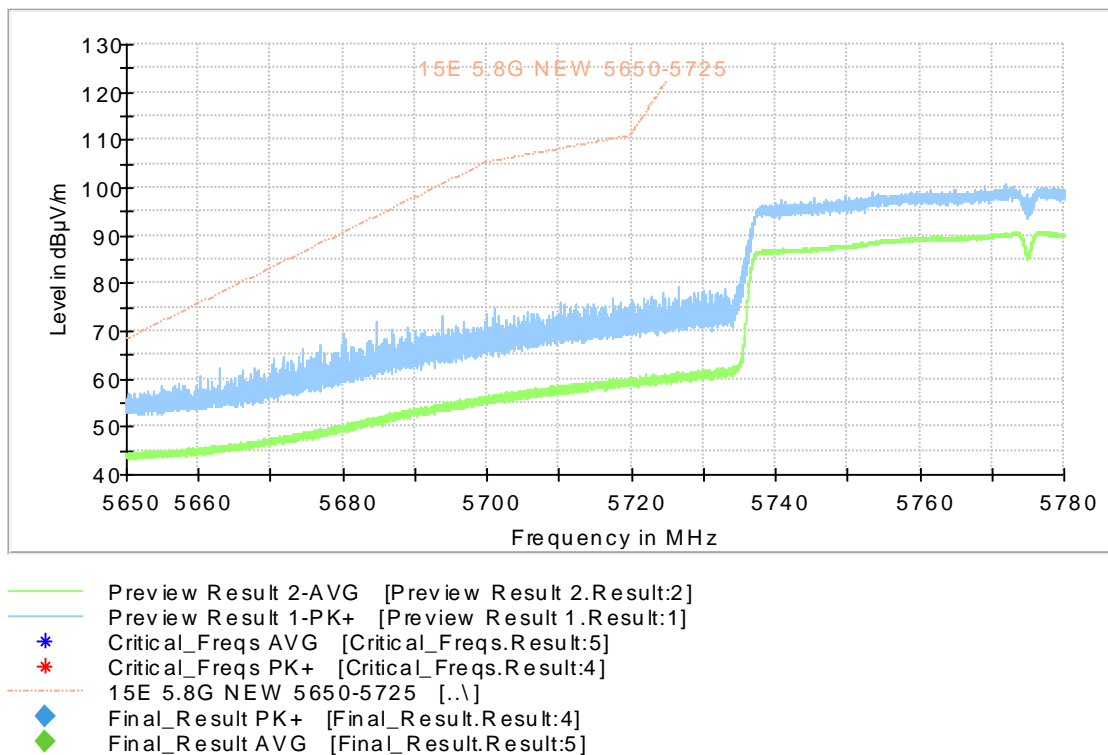


**Fig. 18 Band Edges (802.11ac-HT40 Ch151, 5755MHz)**

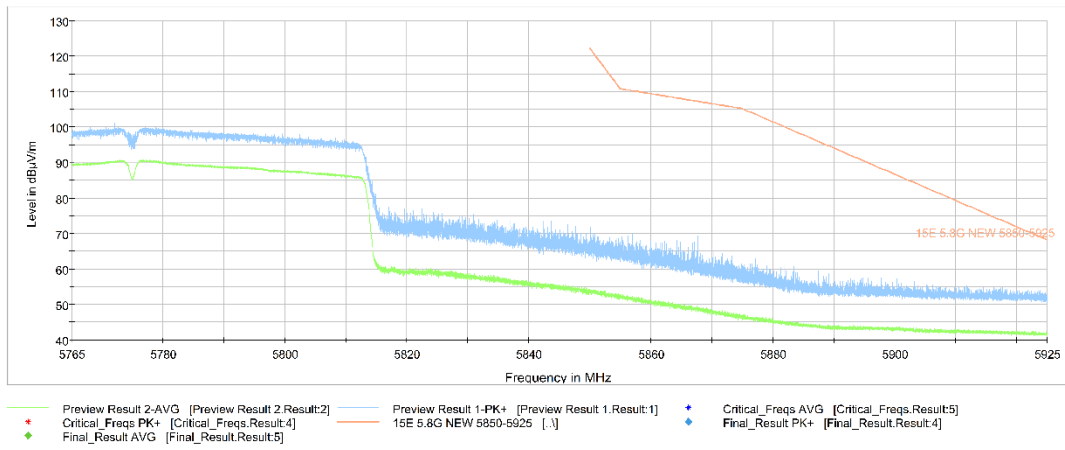


**Fig. 19 Band Edges (802.11ac-HT40 Ch159, 5795MHz)**

Full Spectrum



**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	<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		
		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.

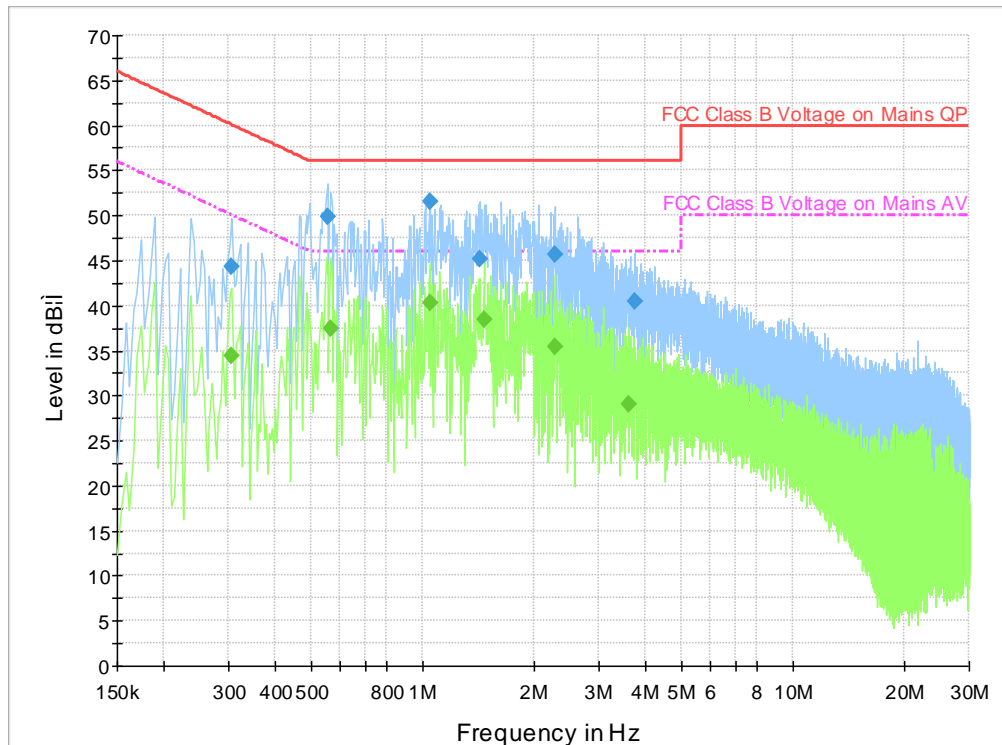
The measurement is made according to ANSI C63.10 .

**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**

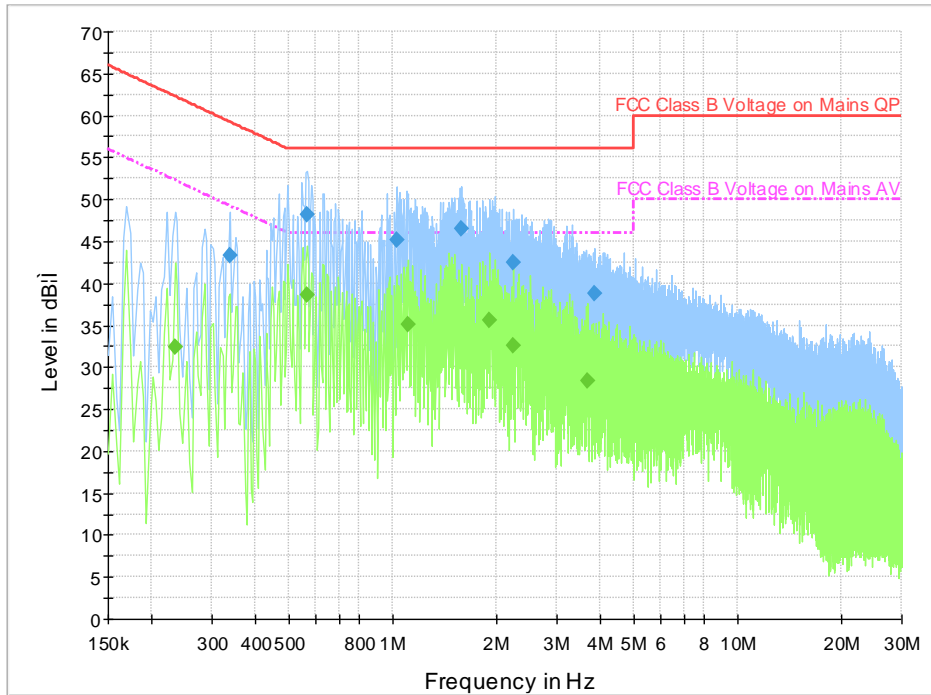
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.306000	44.3	2000.0	9.000	On	L1	20.0	15.8	60.1	
0.554000	49.9	2000.0	9.000	On	L1	19.9	6.1	56.0	
1.050000	51.5	2000.0	9.000	On	L1	19.6	4.5	56.0	
1.434000	45.2	2000.0	9.000	On	L1	19.5	10.8	56.0	
2.278000	45.6	2000.0	9.000	On	L1	19.5	10.4	56.0	
3.750000	40.5	2000.0	9.000	On	N	19.7	15.5	56.0	

**Final Result 2**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.306000	34.4	2000.0	9.000	On	L1	20.0	15.7	50.1	
0.566000	37.5	2000.0	9.000	On	L1	19.8	8.5	46.0	
1.050000	40.3	2000.0	9.000	On	L1	19.6	5.7	46.0	
1.466000	38.4	2000.0	9.000	On	L1	19.5	7.6	46.0	
2.278000	35.3	2000.0	9.000	On	L1	19.5	10.7	46.0	
3.626000	29.1	2000.0	9.000	On	L1	19.5	16.9	46.0	

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
0.338000	43.3	2000.0	9.000	On	L1	20.0	16.0	59.3	
0.566000	48.2	2000.0	9.000	On	L1	19.8	7.8	56.0	
1.030000	45.2	2000.0	9.000	On	L1	19.6	10.8	56.0	
1.590000	46.5	2000.0	9.000	On	L1	19.5	9.5	56.0	
2.246000	42.4	2000.0	9.000	On	L1	19.5	13.6	56.0	
3.870000	38.8	2000.0	9.000	On	N	19.7	17.2	56.0	

**Final Result 2**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.234000	32.4	2000.0	9.000	On	L1	20.0	19.9	52.3	
0.566000	38.7	2000.0	9.000	On	L1	19.8	7.3	46.0	
1.110000	35.1	2000.0	9.000	On	L1	19.5	10.9	46.0	
1.918000	35.6	2000.0	9.000	On	L1	19.4	10.4	46.0	
2.246000	32.5	2000.0	9.000	On	L1	19.5	13.5	46.0	
3.682000	28.4	2000.0	9.000	On	L1	19.5	17.6	46.0	

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 \*\*\*