



FCC PART 15C TEST REPORT No.I23Z60023-IOT03

for

TCL Communication Ltd.

GSM/UMTS/LTE mobile phone

T610P

With

FCC ID: 2ACCJB198

Hardware Version: PIO

Software Version: 7GSA

Issued Date: 2023-02-02

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.

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REPORT HISTORY

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1. TEST LATORATORY

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISSED 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

Radiated testing Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
100191, P. R. China

1.3. TestingEnvironment

Normal Temperature: 15-35°C

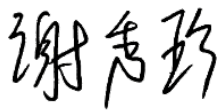
Relative Humidity: 20-75%

1.4. Project date

Testing Start Date: 2023-01-04

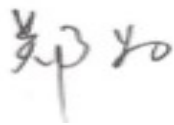
Testing End Date: 2023-01-31

1.5. Signature



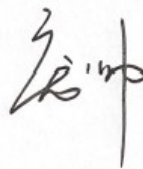
Xie Xiuzhen

(Prepared this test report)



Zheng Wei

(Reviewed this test report)



Pang Shuai

(Approved this test report)

2. CLIENT INFORMATION

2.1. Applicant Information

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2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
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Park, Shatin, NT, Hong Kong
Contact: Annie Jiang
Email: nianxiang.jiang@tcl.com
Telephone: +86 755 3661 1621
Fax: /

3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY

EQUIPMENT(AE)

3.1. About EUT

Description	GSM/UMTS/LTE mobile phone
Model name	T610P
FCC ID	2ACCJB193
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
UT04a(T610E) /		05	7GS9
UT18a(T610E) /		05	7GS9
UT14a(T610P)	352422290200211/ 352422290200229	PIO	7GSA

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	Type	SN
AE1	Battery	/	/
AE2	Charger	/	/
AE3	USB Cable	/	/

AE1

Model	TLp049C8
Manufacturer	Dongguan Ganfeng Electronics Co., LTD
Capacity	4900mAh
Nominal Voltage	3.87V

AE2

Model	YJC018R-US
Manufacturer	Dongguan YingJu Power Co., Ltd.

AE3

Model	JWUB1520-M01R
Manufacturer	Huizhou Juwei Electronics Co., Ltd.

*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 Part15	FCC CFR 47, Part 15, Subpart C and E:	
	15.205 Restricted bands of operation;	2021
	15.209 Radiated emission limits, general requirements;	
	15.407 General technical requirements	
ANSI C63.10	Methods of Measurement of Radio-Noise Emissions from	
	Low-Voltage Electrical and Electronic Equipment in the	2013
	Range of 9 kHz to 40 GHz	
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)	/	P
Peak Power Spectral Density	15.407 (a)	/	BR
Occupied 6dB Bandwidth	15.407 (e)	/	BR
Band Edges Compliance - Conducted& Radiated	15.407 (b)	/	BR
Transmitter Spurious Emission - Conducted	15.407	/	BR
Transmitter Spurious Emission - Radiated	15.407, 15.205, 15.209	/	BR
AC Powerline Conducted Emission	15.107, 15.207	/	BR

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
BR	BR Re-use test data from basic model report.

6.2. Statements

CTTL has evaluated the test cases requested by the client/manufacturer as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.1.

This report only deals with the WLAN function among the features described in section 3.

The Equipment Under Test (EUT) model T610P (FCC ID: 2ACCJB198) is a variant product of T610E (FCC ID: 2ACCJB193), according to the declaration of changes provided by the applicant and FCC KDB publication 484596 D01, except power, other results are derived from test report I22Z62079-IOT01.

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	2023-05-15
2	Test Receiver	ESCI	100344	R&S	1 year	2023-03-21
3	LISN	ENV216	101200	R&S	1 year	2023-06-29
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	2024-01-11
2	EMI Antenna	VULB 9163	01223	SCHWARZBECK	1 year	2023-07-25
3	EMI Antenna	3115	00167250	ETS-Lindgren	1 year	2023-06-20

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	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.15
$1\text{GHz} \leq f \leq 18\text{GHz}$	5.54
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.26

8.6. AC Power-line Conducted Emission

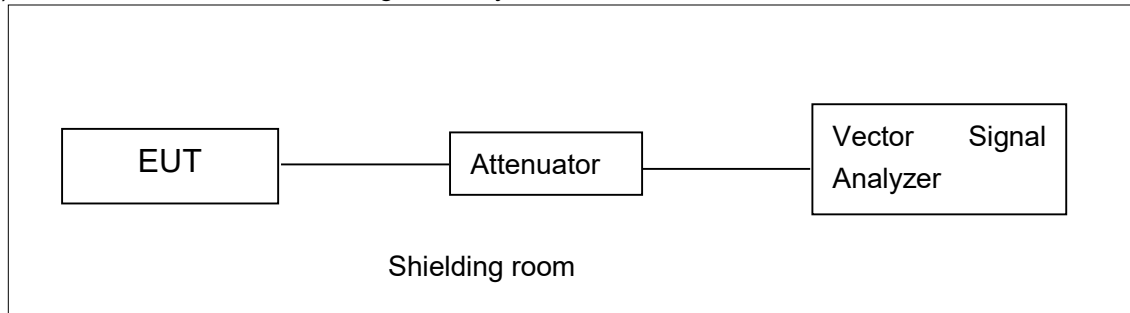
Measurement Uncertainty : 3.08dB,k=2

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

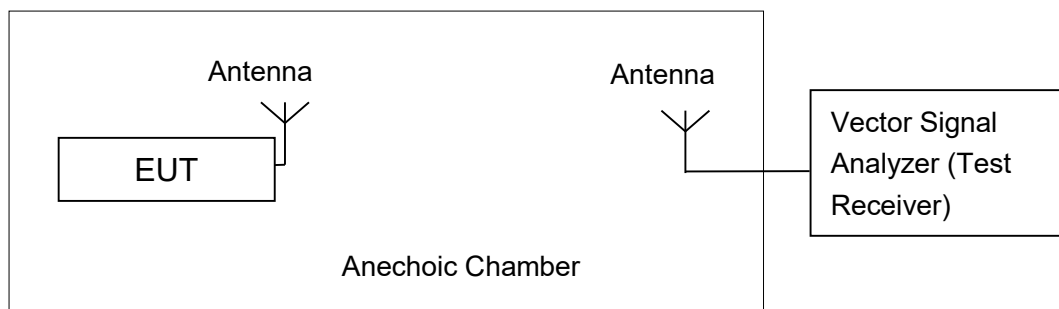


A.1.2. Radiated Emission Measurements

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 1.5dBi and the value is supplied by the applicant or manufacturer.

A.2.2. Maximum Average Output Power-Conducted

Measurement Results(T610E):

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	14.21	14.36	14.78

The data rate 6Mbps is selected as worst 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	13.70	14.34	13.97

The data rate MCS0 is selected as worst 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	14.31	14.37	14.28

The data rate MCS0 is selected as worst 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	13.96	14.24

The data rate MCS0 is selected as worst 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	13.67	14.27

The data rate MCS0 is selected as worst 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	14.00

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

Measurement results for variant model:

EUT ID:UT14a(T610P)

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	13.60	13.09	13.91

The data rate 6Mbps is selected as worst 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	14.49	14.17	14.08

The data rate MCS0 is selected as worst 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	13.57	14.12	14.06

The data rate MCS0 is selected as worst 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	14.44	14.00

The data rate MCS0 is selected as worst 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	14.26	14.03

The data rate MCS0 is selected as worst 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	14.18

The data rate MCS0 is selected as worst 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	-0.63	P
	157	0.06	P
	165	0.16	P
802.11ac HT20	149	-0.47	P
	157	0.01	P
	165	-0.21	P
802.11ac HT40	151	-3.40	P
	159	-3.22	P
802.11ac HT80	155	-6.68	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	16.35	P
802.11ac HT20	149	Fig.4	17.55	P
	157	Fig.5	17.60	P
	165	Fig.6	17.55	P
802.11ac HT40	151	Fig.7	36.32	P
	159	Fig.8	36.08	P
802.11ac HT80	155	Fig.9	76.48	P

Conclusion: PASS

Test graphs as below:

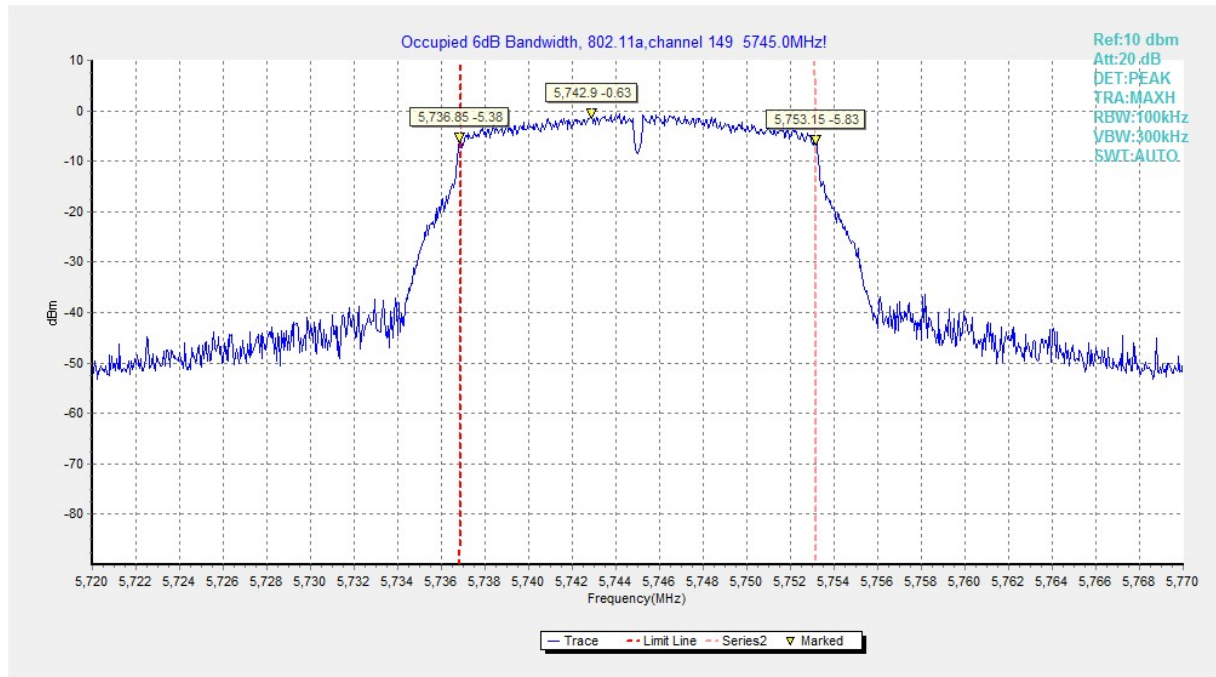


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)

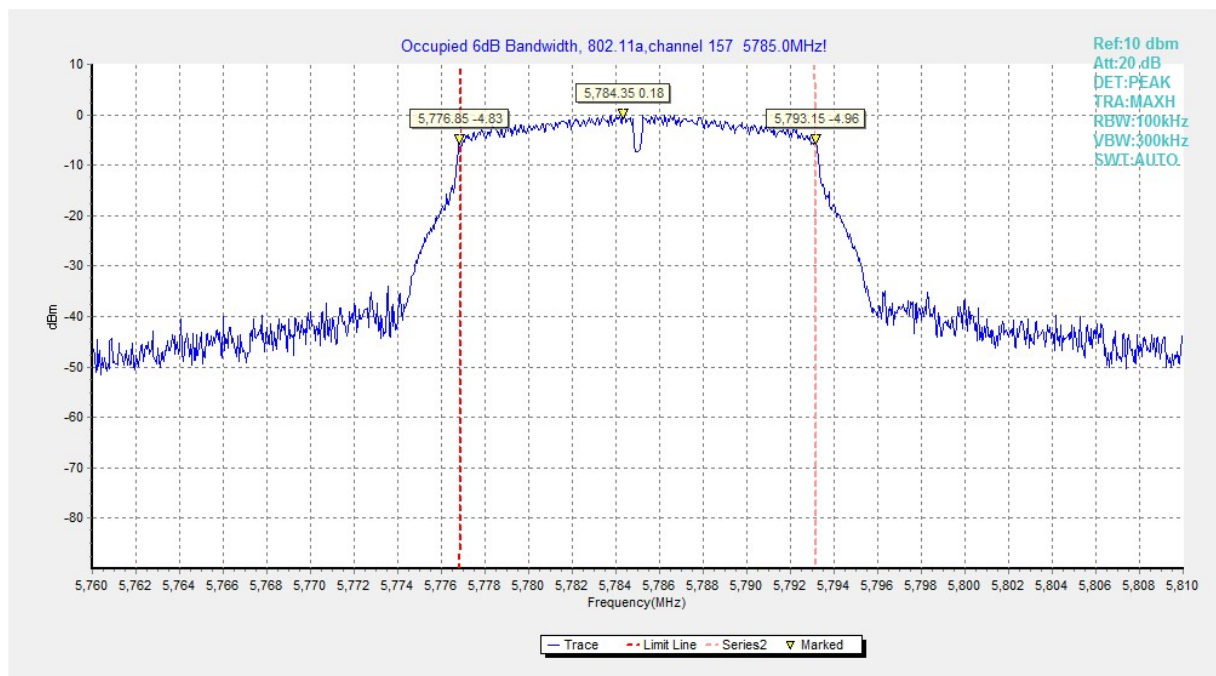


Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)

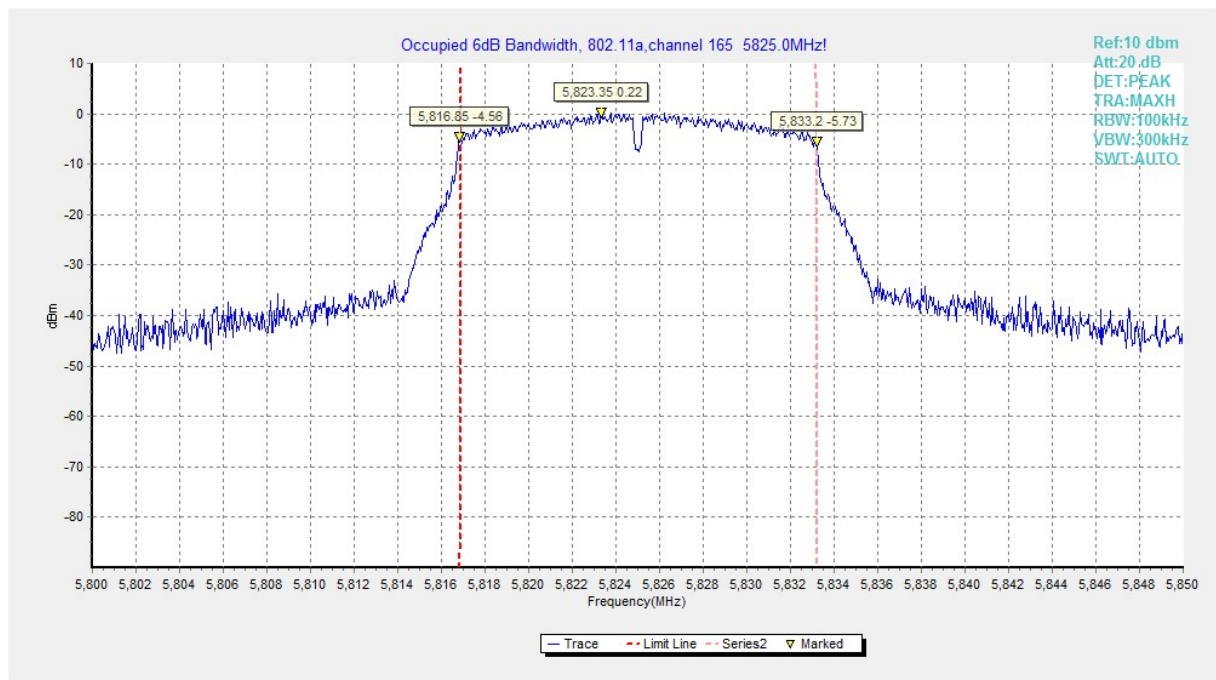


Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)

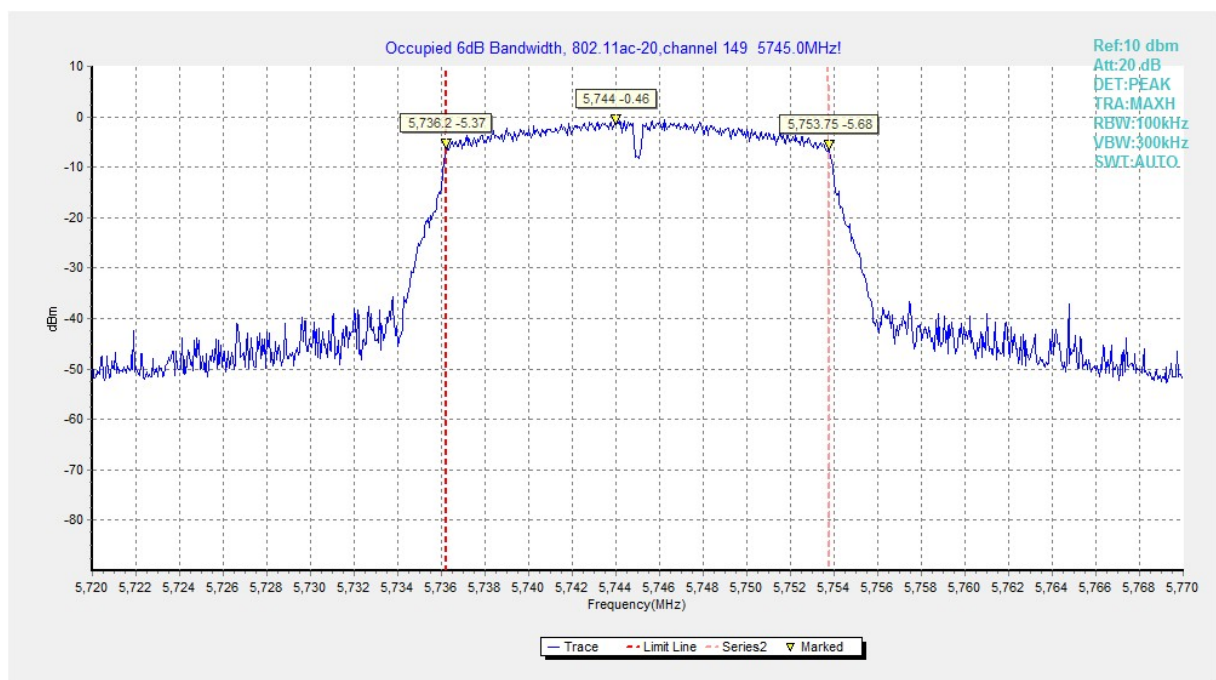


Fig. 4 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 149)

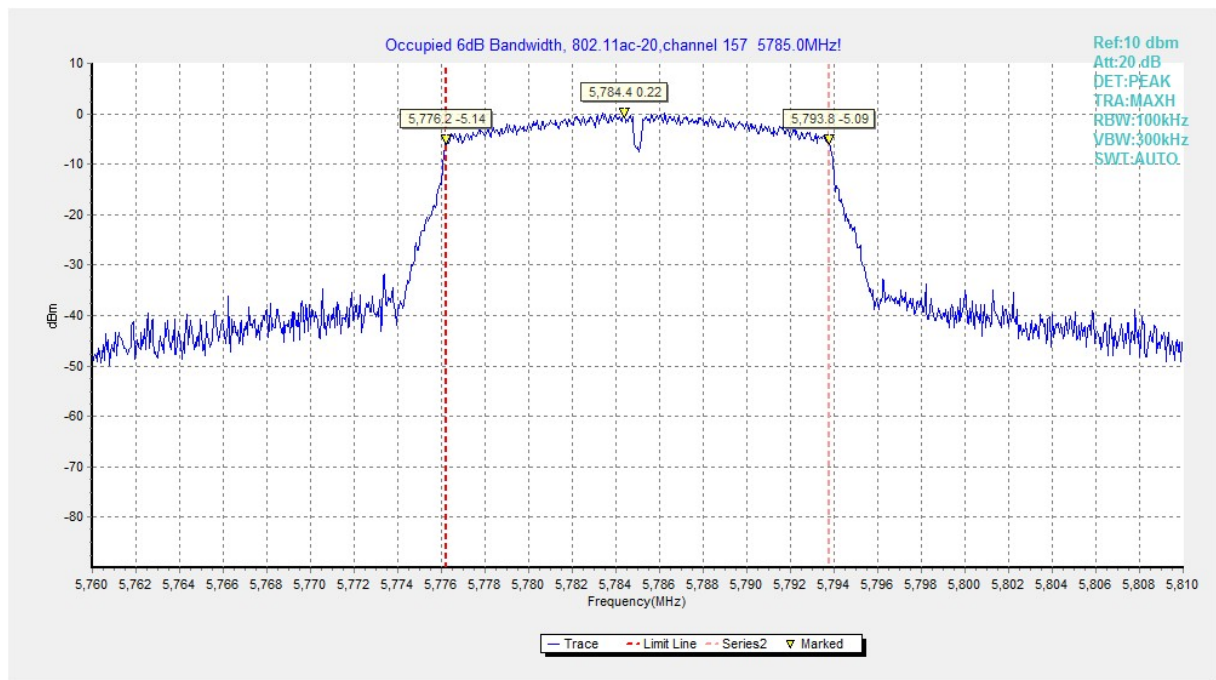


Fig. 5 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 157)

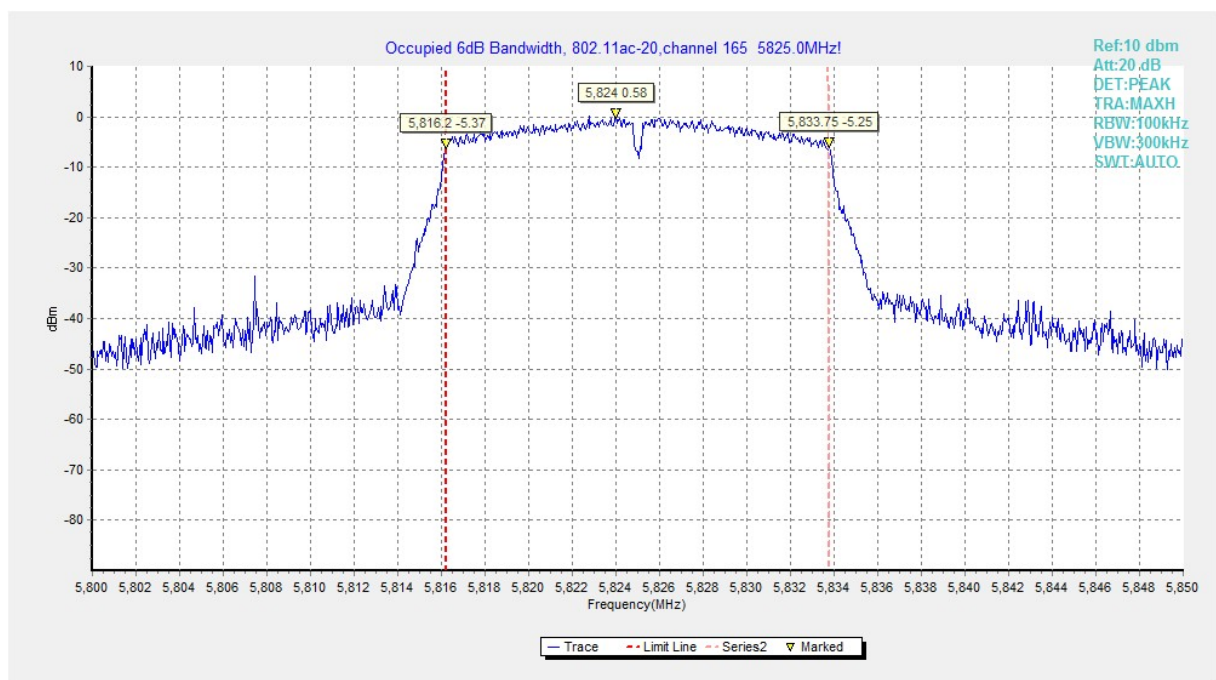


Fig. 6 Occupied 6dB Bandwidth (802.11ac-HT20, Ch 165)

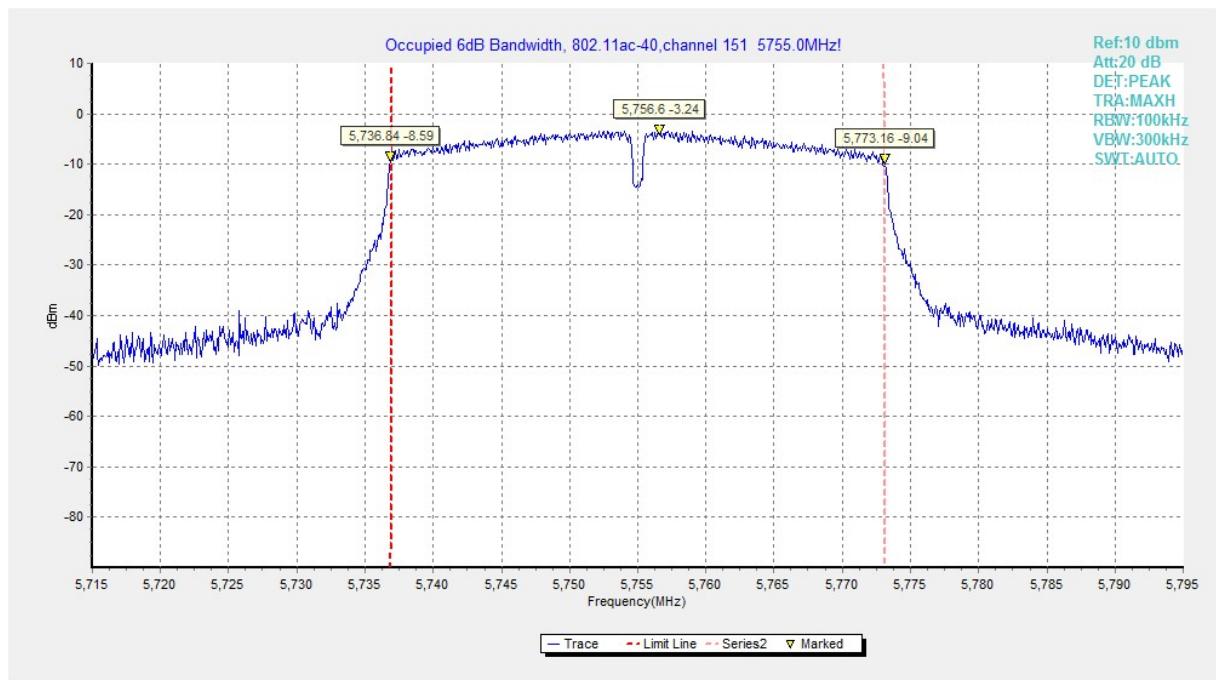


Fig. 7 Occupied 6dB Bandwidth (802.11ac-HT40, Ch 151)

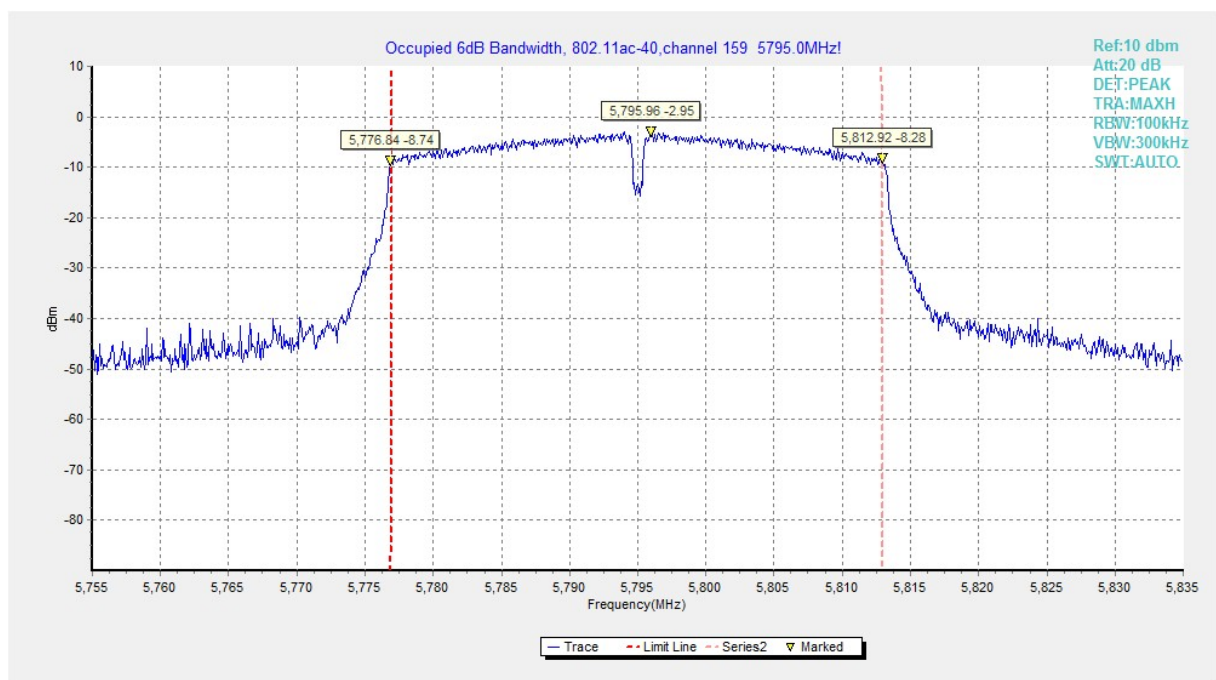


Fig. 8 Occupied 6dB Bandwidth (802.11ac-HT40, Ch 159)

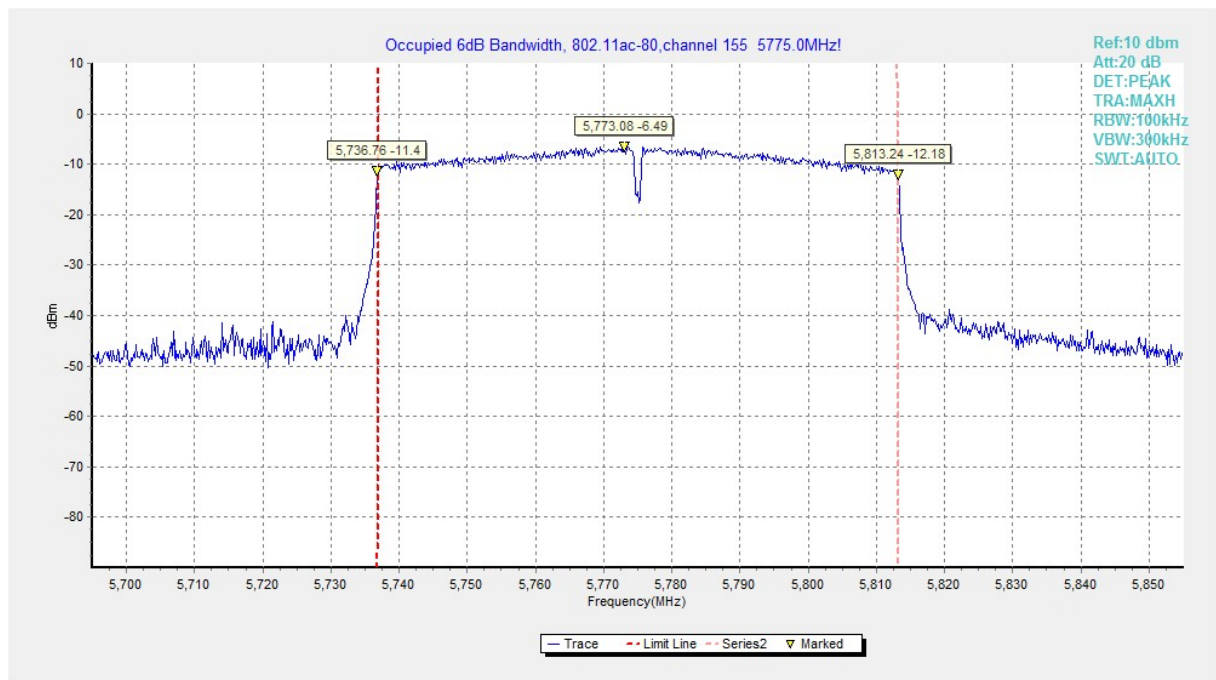


Fig. 9 Occupied 6dB Bandwidth (802.11ac-HT80, Ch 155)

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
		26.5 GHz~ 40 GHz	---	P

	165	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
		26.5 GHz~ 40 GHz	---	P
	165	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
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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)
17974.333	40.88	-25.50	46.66	19.72	54.00	13.12	H
17873.500	40.79	-25.50	46.66	19.63	54.00	13.21	H
16035.400	39.68	-27.35	38.54	28.49	54.00	14.32	V
15962.067	39.44	-27.35	38.54	28.25	54.00	14.56	H
11764.100	37.41	-31.99	38.98	30.42	54.00	16.59	V
11756.767	36.33	-31.99	38.98	29.34	54.00	17.67	V

Channel 157

Frequency (MHz)	Measurement Result	Cable Loss	Antenna Factor	Receiver Reading	Limit (dBuV/m)	Margin (dB)	Antenna Pol.
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	(dBuV/m)	(dB)	(dB/m)	(dBuV)			(H/V)
17957.833	41.19	-25.50	46.66	20.03	54.00	12.81	V
17934.733	41.12	-25.50	46.66	19.96	54.00	12.88	V
15359.267	39.58	-27.53	39.06	28.05	54.00	14.42	V
15983.700	39.44	-27.35	38.54	28.25	54.00	14.56	V
11969.800	36.59	-31.48	39.09	28.98	54.00	17.41	V
11732.200	36.55	-31.99	38.98	29.56	54.00	17.45	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)
17931.433	41.07	-25.50	46.66	19.91	54.00	12.93	H
17953.067	40.65	-25.50	46.66	19.49	54.00	13.35	V
16008.633	39.36	-27.35	38.54	28.17	54.00	14.64	H
16003.867	39.35	-27.35	38.54	28.16	54.00	14.65	V
11737.700	36.48	-31.99	38.98	29.49	54.00	17.52	V
11972.733	36.25	-31.48	39.09	28.64	54.00	17.75	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)
17841.600	40.84	-25.50	46.66	19.68	54.00	13.16	V
17935.467	40.76	-25.50	46.66	19.60	54.00	13.24	H
16055.200	39.22	-27.35	38.54	28.03	54.00	14.78	V
15987.000	39.12	-27.35	38.54	27.93	54.00	14.88	V
11730.733	36.35	-31.99	38.98	29.36	54.00	17.65	H
11871.167	36.06	-31.85	39.05	28.86	54.00	17.94	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)
17976.533	40.76	-25.50	46.66	19.60	54.00	13.24	V
17866.533	40.63	-25.50	46.66	19.47	54.00	13.37	V
15985.900	39.34	-27.35	38.54	28.15	54.00	14.66	V
15955.467	39.25	-27.35	38.54	28.06	54.00	14.75	H
11940.467	36.56	-31.48	39.09	28.95	54.00	17.44	V
11760.433	36.32	-31.99	38.98	29.33	54.00	17.68	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)
17885.600	40.86	-25.50	46.66	19.70	54.00	13.14	H
17939.500	40.66	-25.50	46.66	19.50	54.00	13.34	V
16058.133	39.65	-26.77	38.93	27.49	54.00	14.35	V
15885.433	39.25	-26.97	38.48	27.74	54.00	14.75	H
11760.800	36.55	-31.99	38.98	29.56	54.00	17.45	H
11760.067	36.31	-31.99	38.98	29.32	54.00	17.69	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)
17907.600	41.12	-25.50	46.66	19.96	54.00	12.88	H
17953.800	40.82	-25.50	46.66	19.66	54.00	13.18	V
16027.333	39.97	-27.35	38.54	28.78	54.00	14.03	H
16028.800	39.41	-27.35	38.54	28.22	54.00	14.59	H
11984.467	36.25	-31.48	39.09	28.64	54.00	17.75	V
11354.900	36.19	-32.42	38.79	29.82	54.00	17.81	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)
17822.900	41.36	-25.50	46.66	20.20	54.00	12.64	H
17971.033	41.29	-25.50	46.66	20.13	54.00	12.71	V
15889.100	39.24	-26.97	38.48	27.73	54.00	14.76	V
16007.533	39.23	-27.35	38.54	28.04	54.00	14.77	V
11767.033	37.03	-31.99	38.98	30.04	54.00	16.97	V
11769.600	36.90	-31.99	38.98	29.91	54.00	17.10	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)
17973.600	40.74	-25.50	46.66	19.58	54.00	13.26	H
17970.300	40.51	-25.50	46.66	19.35	54.00	13.49	V
15962.433	39.32	-27.35	38.54	28.13	54.00	14.68	H
16018.900	39.29	-27.35	38.54	28.10	54.00	14.71	V
11768.500	36.69	-31.99	38.98	29.70	54.00	17.31	H
11829.367	36.31	-31.85	39.05	29.11	54.00	17.69	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)
17958.567	40.81	-25.50	46.66	19.65	54.00	13.19	H
17984.600	40.73	-25.50	46.66	19.57	54.00	13.27	V
15958.767	39.91	-27.35	38.54	28.72	54.00	14.09	V
16016.333	39.57	-27.35	38.54	28.38	54.00	14.43	V
11761.900	36.56	-31.99	38.98	29.57	54.00	17.44	H
11738.433	36.28	-31.99	38.98	29.29	54.00	17.72	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)
17934.733	40.91	-25.50	46.66	19.75	54.00	13.09	H
17886.700	40.68	-25.50	46.66	19.52	54.00	13.32	V
15952.167	39.39	-27.35	38.54	28.20	54.00	14.61	H
16151.633	39.30	-26.77	38.93	27.14	54.00	14.70	V
11764.467	36.82	-31.99	38.98	29.83	54.00	17.18	V
11840.733	36.38	-31.85	39.05	29.18	54.00	17.62	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)
17868.000	40.73	-25.50	46.66	19.57	54.00	13.27	V
17957.833	40.60	-25.50	46.66	19.44	54.00	13.40	V
15995.067	39.58	-27.35	38.54	28.39	54.00	14.42	V
16004.600	39.57	-27.35	38.54	28.38	54.00	14.43	H
11660.700	36.49	-32.31	38.91	29.90	54.00	17.51	H
11732.933	36.46	-31.99	38.98	29.47	54.00	17.54	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)
17979.100	41.28	-25.50	46.66	20.12	54.00	12.72	V
17868.000	41.08	-25.50	46.66	19.92	54.00	12.92	H
15962.067	39.49	-27.35	38.54	28.30	54.00	14.51	H
15990.667	39.24	-27.35	38.54	28.05	54.00	14.76	V
11760.433	36.34	-31.99	38.98	29.35	54.00	17.66	H
11628.433	36.31	-32.31	38.91	29.72	54.00	17.69	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)
17940.600	41.15	-25.50	46.66	19.99	54.00	12.85	V
17933.633	40.88	-25.50	46.66	19.72	54.00	13.12	H
15957.667	39.39	-27.35	38.54	28.20	54.00	14.61	H
16156.400	39.23	-26.77	38.93	27.07	54.00	14.77	H
11739.900	36.44	-31.99	38.98	29.45	54.00	17.56	V
11731.833	36.36	-31.99	38.98	29.37	54.00	17.64	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)
17233.300	59.38	-25.95	44.35	40.97	68.20	8.82	V
17237.700	59.26	-25.95	44.35	40.85	68.20	8.94	V
16489.700	48.87	-26.96	39.82	36.01	68.20	19.33	H
16991.300	48.70	-26.32	42.36	32.65	68.20	19.50	V
11801.867	45.82	-31.85	39.05	38.62	74.00	28.18	V
11767.400	45.29	-31.99	38.98	38.30	74.00	28.71	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)
17354.667	58.62	-25.95	44.35	40.21	68.20	9.58	V
17355.400	57.97	-25.95	44.35	39.56	68.20	10.23	V
16824.833	49.25	-26.62	41.49	34.38	68.20	18.95	H
16956.100	48.93	-26.32	42.36	32.88	68.20	19.27	V
11938.267	45.44	-31.48	39.09	37.83	74.00	28.56	H
11969.800	44.96	-31.48	39.09	37.35	74.00	29.04	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)
17473.833	55.25	-26.85	45.25	36.85	68.20	12.95	V
17483.367	55.25	-26.85	45.25	36.85	68.20	12.95	V
16867.733	48.89	-26.62	41.49	34.02	68.20	19.31	V
16501.800	48.59	-26.96	39.82	35.73	68.20	19.61	V
11734.400	45.50	-31.99	38.98	38.51	74.00	28.50	V
11654.833	44.78	-32.31	38.91	38.19	74.00	29.22	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)
17235.867	59.24	-25.95	44.35	40.83	68.20	8.96	H
17230.367	57.45	-25.95	44.35	39.04	68.20	10.75	V
16580.633	48.78	-26.87	40.65	35.00	68.20	19.42	H
15845.833	48.75	-26.97	38.48	37.24	74.00	25.25	V
11734.033	45.05	-31.99	38.98	38.06	74.00	28.95	H
11762.633	44.84	-31.99	38.98	37.85	74.00	29.16	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)
17359.433	59.68	-25.95	44.35	41.27	68.20	8.52	H
17349.167	59.47	-25.95	44.35	41.06	68.20	8.73	H
16842.433	49.10	-26.62	41.49	34.23	68.20	19.10	V
15923.200	48.95	-27.35	38.54	37.76	74.00	25.05	H
11999.133	45.78	-31.48	39.09	38.17	74.00	28.22	H
11758.967	45.08	-31.99	38.98	38.09	74.00	28.92	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)
17471.633	54.90	-26.85	45.25	36.50	68.20	13.30	V
17477.867	54.41	-26.85	45.25	36.01	68.20	13.79	V
16164.467	49.05	-26.77	38.93	36.89	74.00	24.95	V
16995.333	48.98	-26.32	42.36	32.93	68.20	19.22	V
11596.167	45.56	-32.31	38.91	38.97	74.00	28.44	H
11944.133	45.07	-31.48	39.09	37.46	74.00	28.93	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)
17274.000	55.63	-25.95	44.35	37.22	68.20	12.57	V
17272.167	53.45	-25.95	44.35	35.04	68.20	14.75	H
16990.200	48.84	-26.32	42.36	32.79	68.20	19.36	H
16699.800	48.82	-26.87	40.65	35.04	68.20	19.38	H
11390.833	44.72	-32.42	38.79	38.35	74.00	29.28	H
11966.133	44.66	-31.48	39.09	37.05	74.00	29.34	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)
17368.233	55.28	-25.95	44.35	36.87	68.20	12.92	V
17373.733	55.28	-25.95	44.35	36.87	68.20	12.92	V
16866.267	49.73	-26.62	41.49	34.86	68.20	18.47	V
16634.900	49.15	-26.87	40.65	35.37	68.20	19.05	V
11749.433	45.15	-31.99	38.98	38.16	74.00	28.85	V
11992.167	44.98	-31.48	39.09	37.37	74.00	29.02	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)
17242.467	56.75	-25.95	44.35	38.34	68.20	11.45	H
17231.467	55.93	-25.95	44.35	37.52	68.20	12.27	H
16953.167	49.06	-26.32	42.36	33.01	68.20	19.14	V
16855.633	48.97	-26.62	41.49	34.10	68.20	19.23	V
11728.167	45.01	-31.99	38.98	38.02	74.00	28.99	H
11764.467	44.87	-31.99	38.98	37.88	74.00	29.13	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)
17357.600	55.87	-25.95	44.35	37.46	68.20	12.33	V
17352.467	55.45	-25.95	44.35	37.04	68.20	12.75	V
16928.967	49.09	-26.32	42.36	33.04	68.20	19.11	H
16855.633	48.67	-26.62	41.49	33.80	68.20	19.53	H
10811.867	45.38	-32.33	38.59	39.12	74.00	28.62	H
11994.733	44.96	-31.48	39.09	37.35	74.00	29.04	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)
17478.600	53.69	-26.85	45.25	35.29	68.20	14.51	H
17475.667	53.68	-26.85	45.25	35.28	68.20	14.52	H
16853.067	49.51	-26.62	41.49	34.64	68.20	18.69	V
16813.467	49.27	-26.62	41.49	34.40	68.20	18.93	V
11698.100	45.39	-31.99	38.98	38.40	74.00	28.61	H
11728.900	44.89	-31.99	38.98	37.90	74.00	29.11	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)
17273.267	52.04	-25.95	44.35	33.63	68.20	16.16	H
17250.533	51.52	-25.95	44.35	33.11	68.20	16.68	H
16970.400	49.25	-26.32	42.36	33.20	68.20	18.95	H
15967.933	48.71	-27.35	38.54	37.52	74.00	25.29	H
11754.567	44.80	-31.99	38.98	37.81	74.00	29.20	H
11770.700	44.63	-31.99	38.98	37.64	74.00	29.37	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)
17388.033	54.55	-26.85	45.25	36.15	68.20	13.65	H
17379.967	54.30	-25.95	44.35	35.89	68.20	13.90	H
16836.567	48.74	-26.62	41.49	33.87	68.20	19.46	V
16905.500	48.60	-26.32	42.36	32.55	68.20	19.60	V
11701.033	45.55	-31.99	38.98	38.56	74.00	28.45	V
11767.767	44.82	-31.99	38.98	37.83	74.00	29.18	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)
17359.067	55.11	-25.95	44.35	36.70	68.20	13.09	V
17335.967	54.19	-25.95	44.35	35.78	68.20	14.01	H
16970.400	49.70	-26.32	42.36	33.65	68.20	18.50	V
16833.267	49.13	-26.62	41.49	34.26	68.20	19.07	V
11941.567	46.01	-31.48	39.09	38.40	74.00	27.99	H
11219.233	45.27	-32.60	38.75	39.13	74.00	28.73	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:

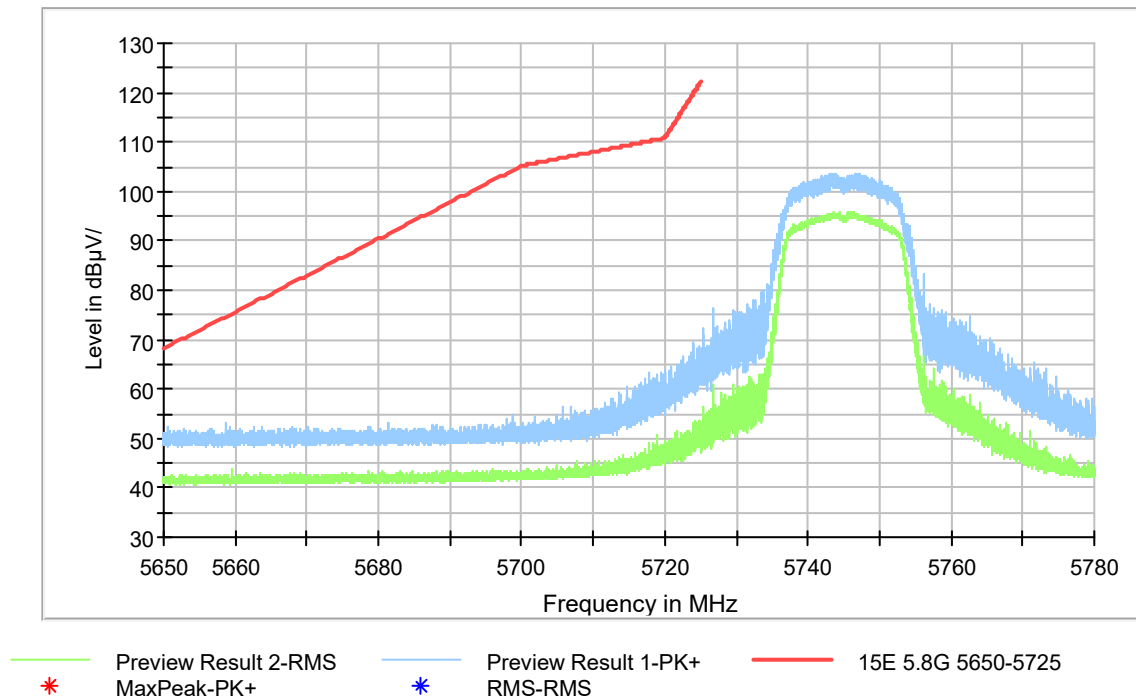


Fig. 10 Band Edges (802.11a Ch149,5745MHz)

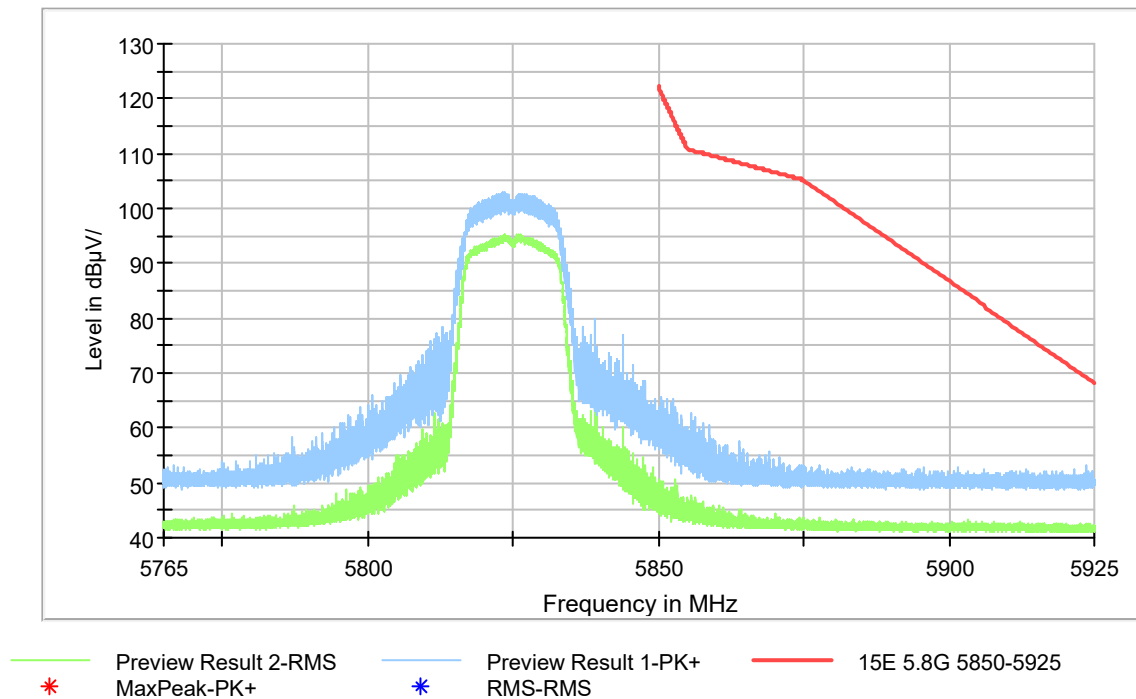


Fig. 11 Band Edges (802.11a Ch165, 5825MHz)

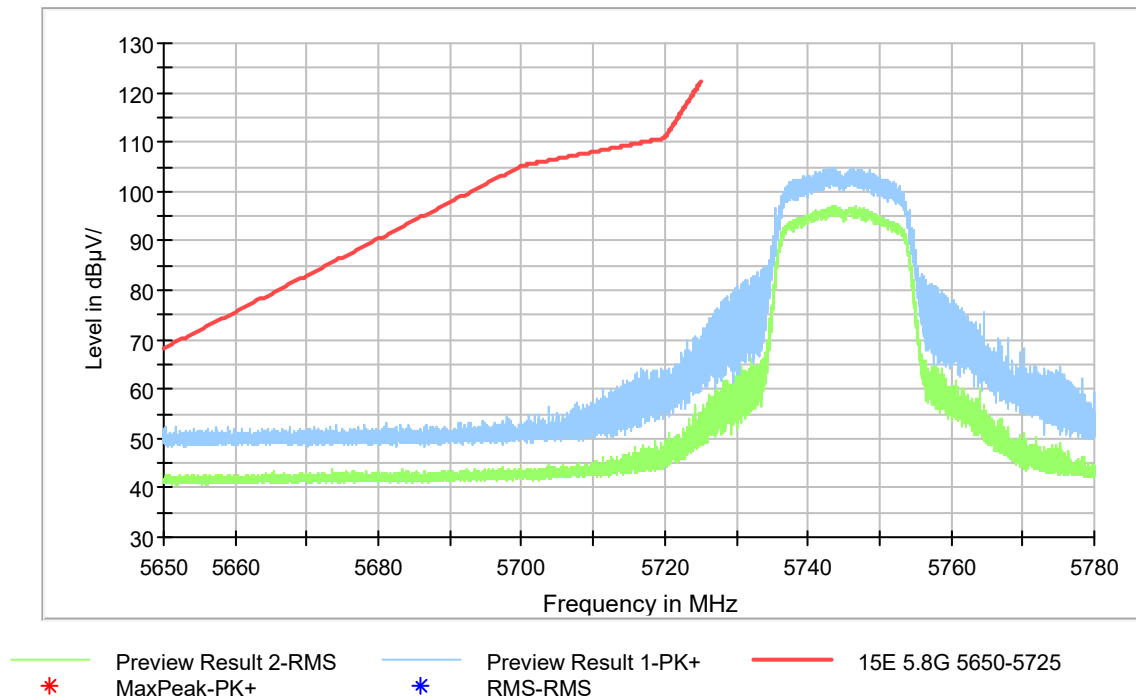


Fig. 12 Band Edges (802.11n-HT20 Ch149, 5745MHz)

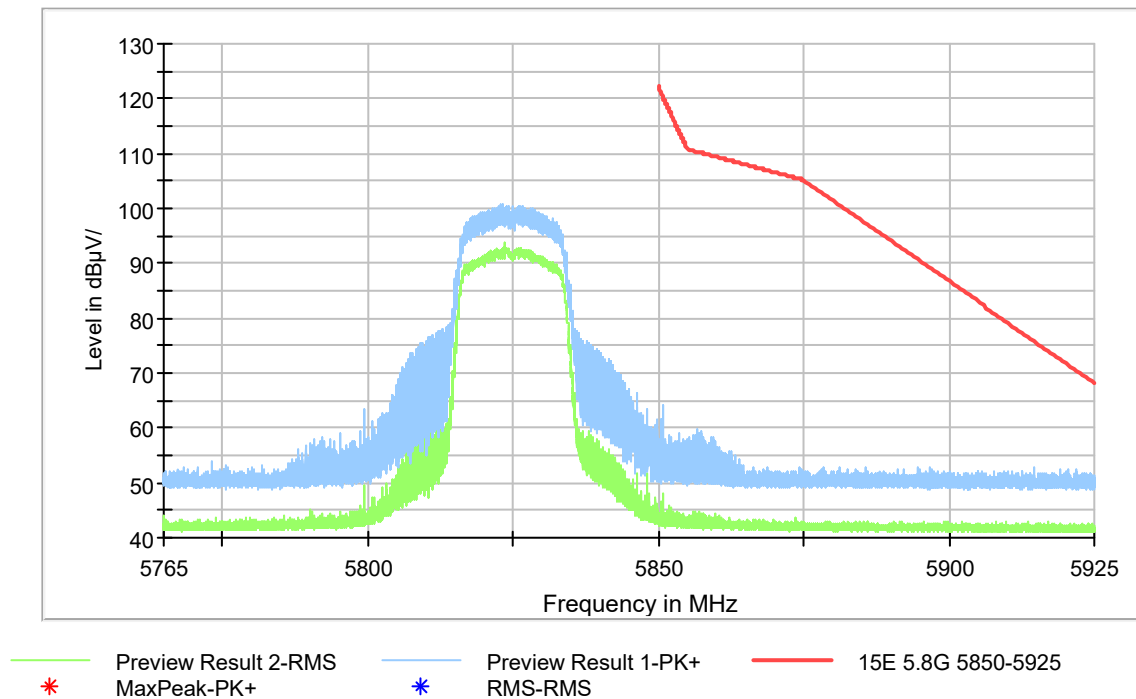


Fig. 13 Band Edges (802.11n-HT20 Ch165, 5825MHz)

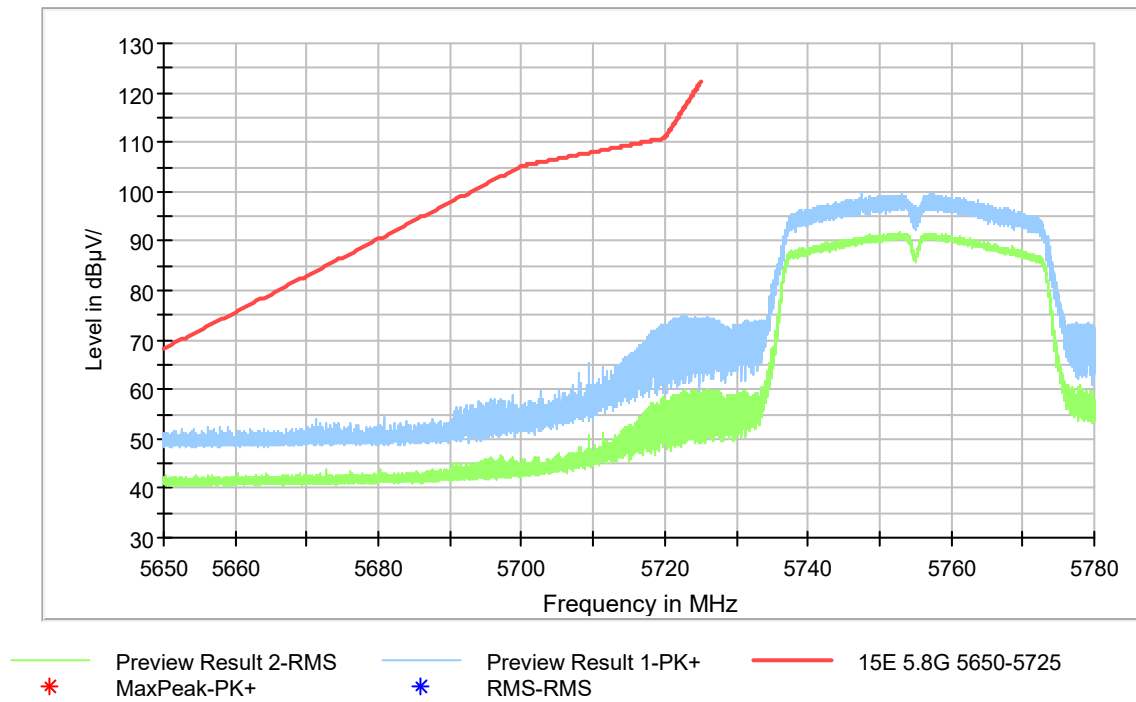


Fig. 14 Band Edges (802.11n-HT40 Ch151, 5755MHz)

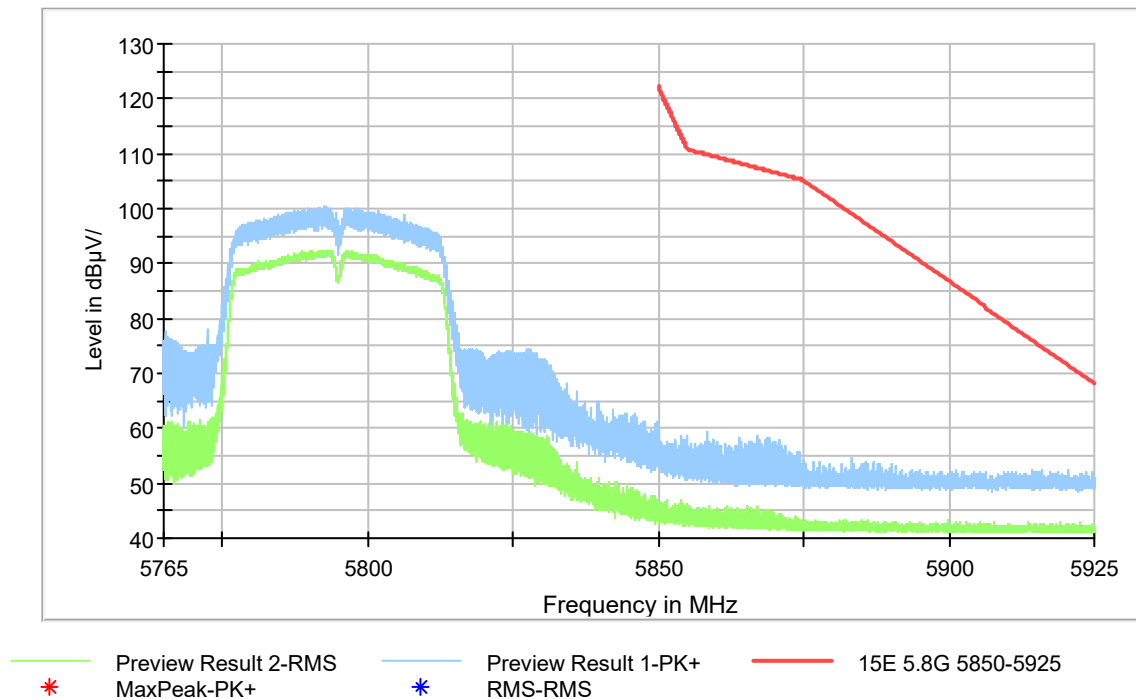


Fig. 15 Band Edges (802.11n-HT40 Ch159, 5795MHz)

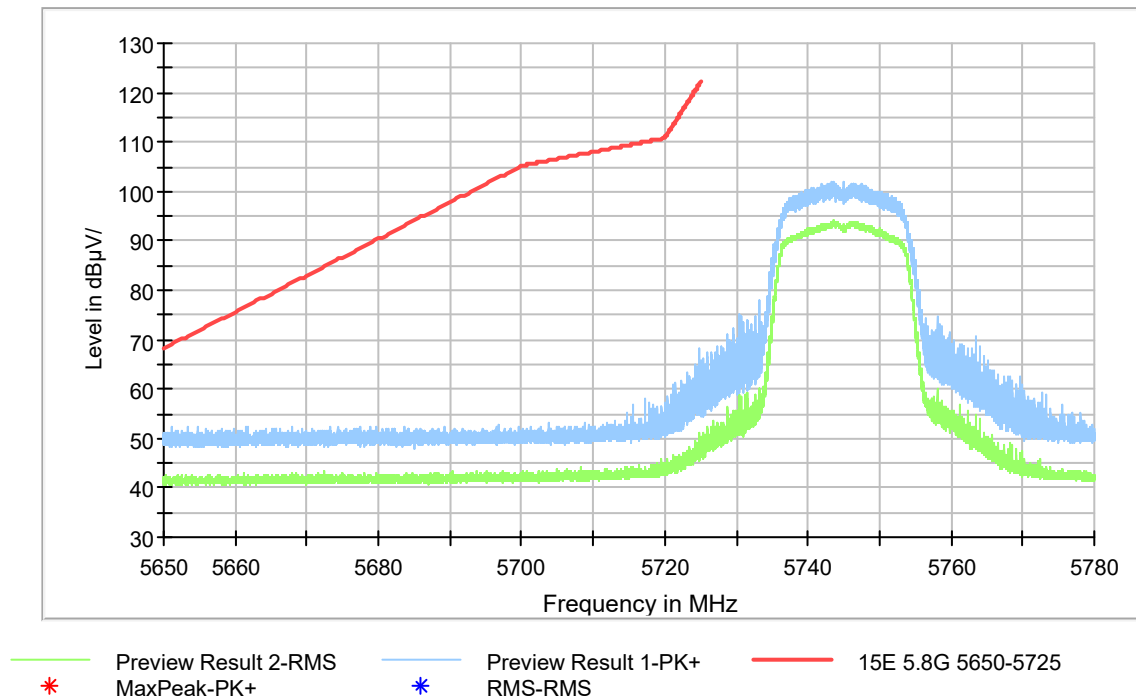


Fig. 16 Band Edges (802.11ac-HT20 Ch149, 5745MHz)

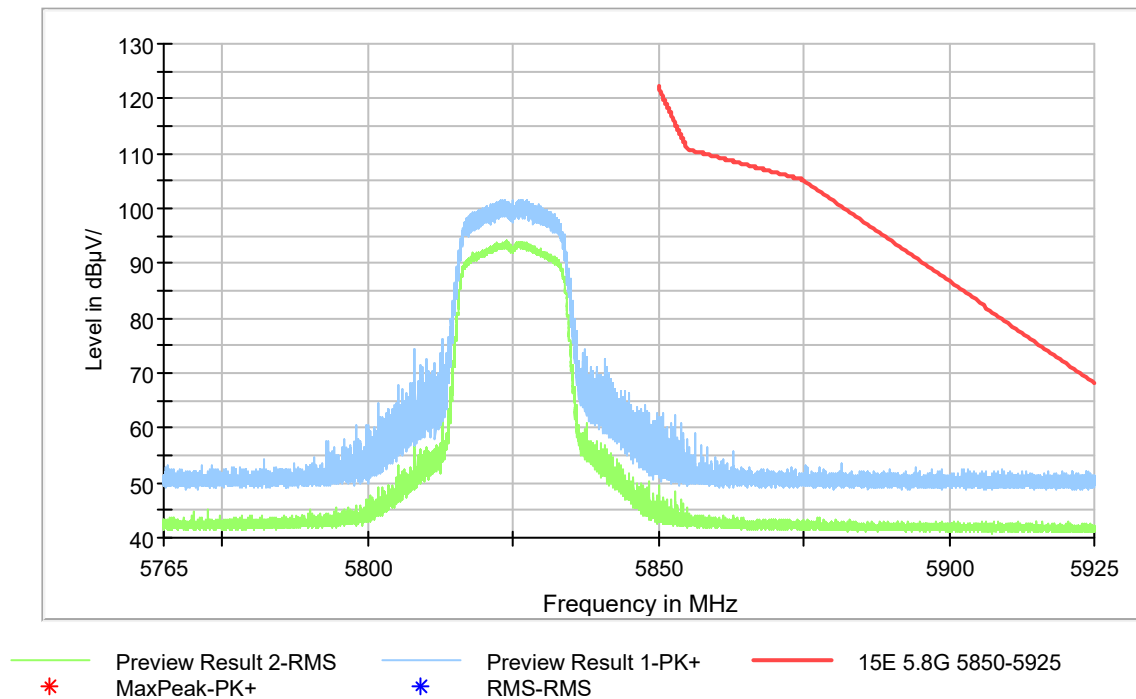


Fig. 17 Band Edges (802.11ac-HT20 Ch165, 5825MHz)

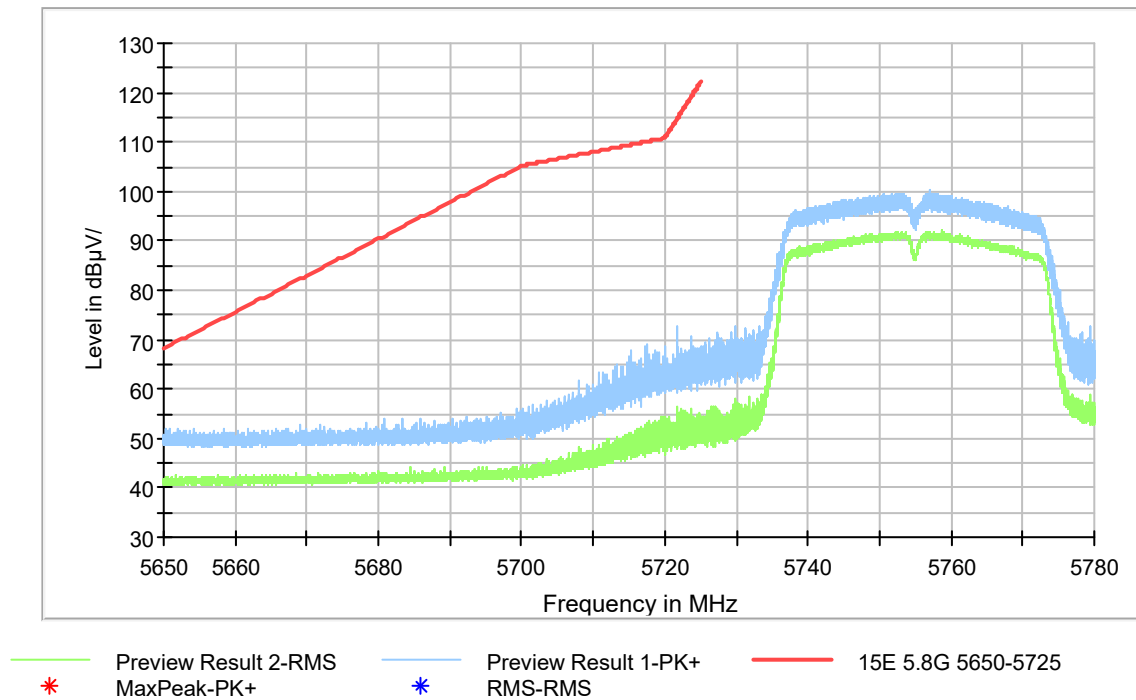


Fig. 18 Band Edges (802.11ac-HT40 Ch151, 5755MHz)

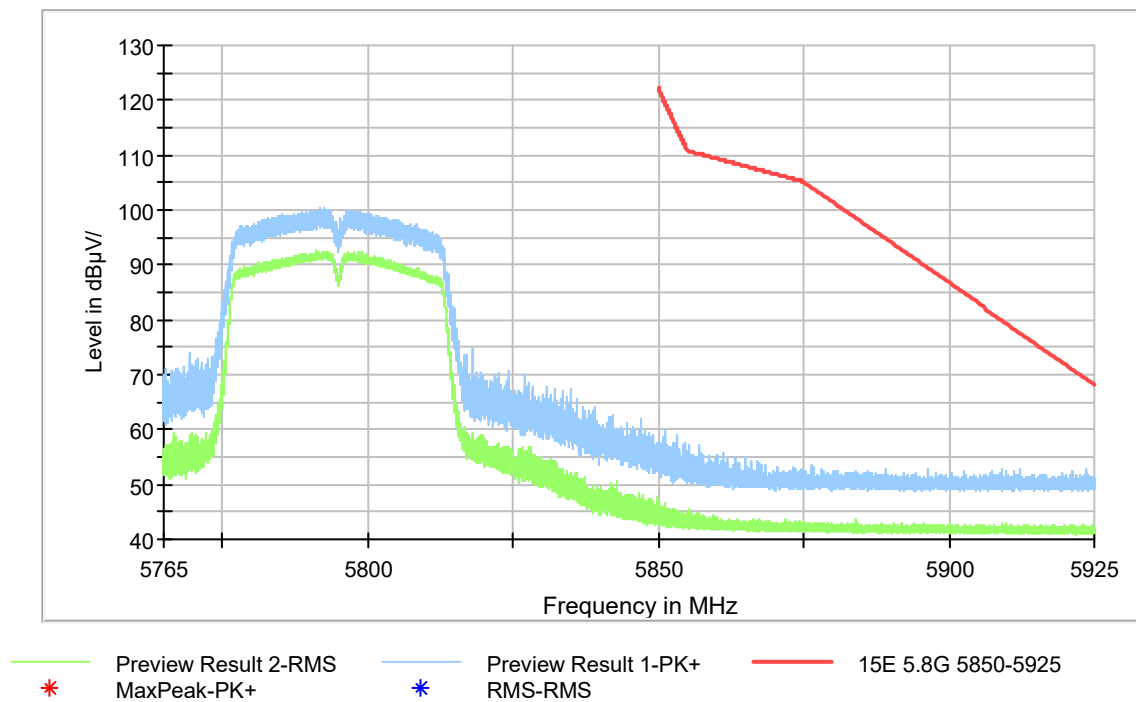


Fig. 19 Band Edges (802.11ac-HT40 Ch159, 5795MHz)

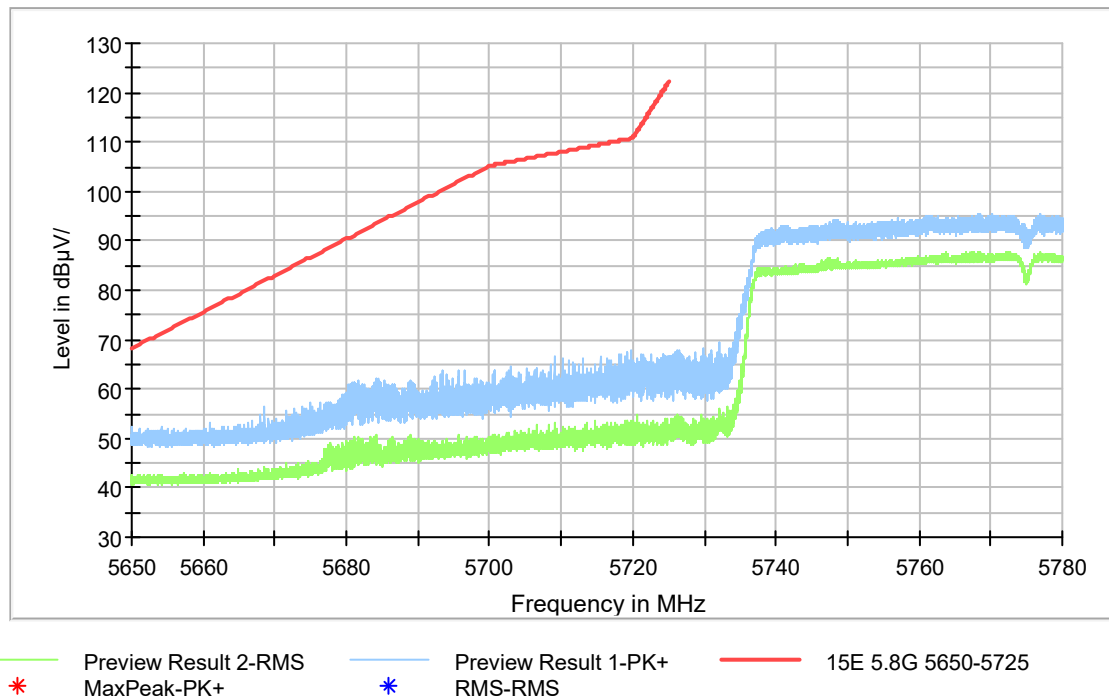


Fig. 20 Band Edges (802.11ac-HT80 Ch155, 5775MHz)

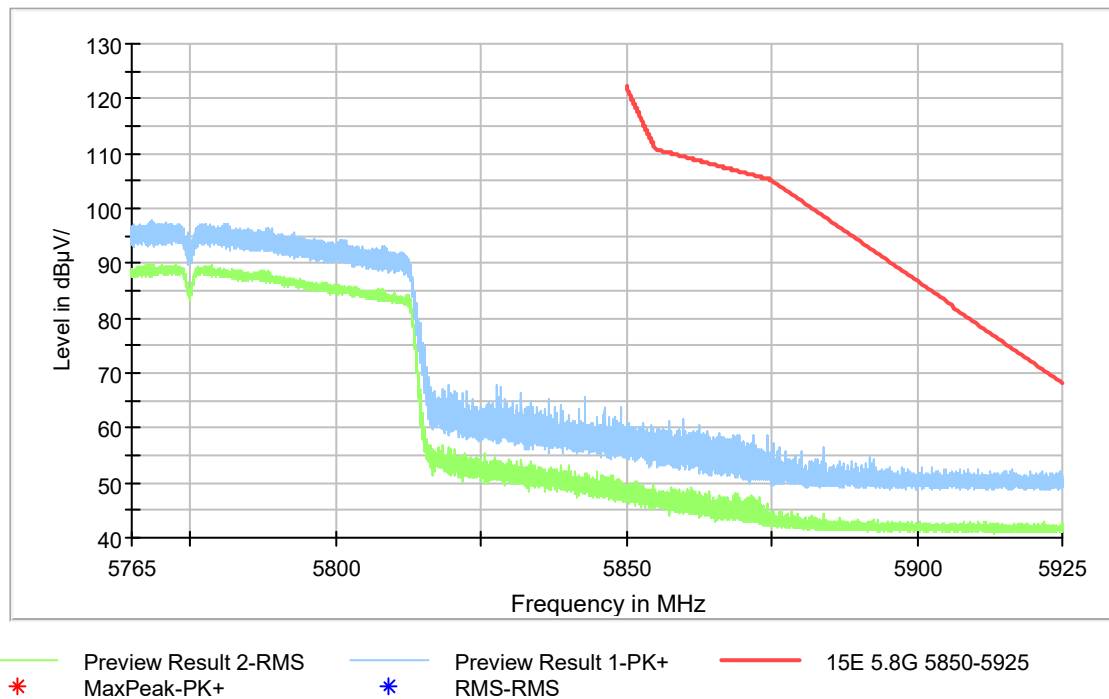


Fig. 21 Band Edges (802.11ac-HT80, 5775MHz)

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 (dBμV)	Result (dBμV)		Conclusion
		With charger		
		802.11a	Idle	
0.15 to 0.5	66 to 56	Fig.22	Fig.23	P
0.5 to 5	56			
5 to 30	60			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

WLAN (Average Limit)

Frequency range (MHz)	Average Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		802.11a	Idle	
0.15 to 0.5	56 to 46	Fig.22	Fig.23	P
0.5 to 5	46			
5 to 30	50			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

The measurement is made according to ANSI C63.10 .

Conclusion: PASS

Test graphs as below:

Traffic:

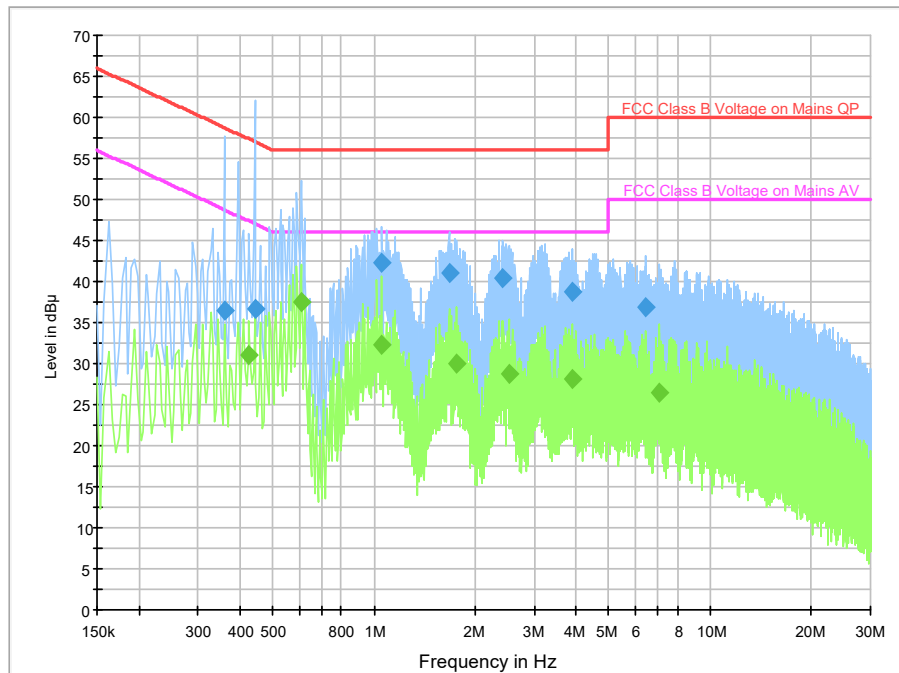


Fig. 22 AC Power line Conducted Emission-802.11a

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)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.358000	36.4	9.000	On	N	19.7	22.4	58.8	
0.442000	36.7	9.000	On	N	19.7	20.3	57.0	
1.054000	42.3	9.000	On	L1	19.7	13.7	56.0	
1.670000	41.0	9.000	On	L1	19.6	15.0	56.0	
2.426000	40.4	9.000	On	L1	19.6	15.6	56.0	
3.878000	38.7	9.000	On	L1	19.6	17.3	56.0	

Final Result 2

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.426000	30.9	9.000	On	L1	19.7	16.4	47.3	
0.606000	37.5	9.000	On	L1	19.7	8.5	46.0	
1.054000	32.3	9.000	On	L1	19.7	13.7	46.0	
1.766000	30.1	9.000	On	L1	19.6	15.9	46.0	
2.514000	28.7	9.000	On	L1	19.6	17.3	46.0	
3.878000	28.1	9.000	On	L1	19.6	17.9	46.0	

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

Idle:

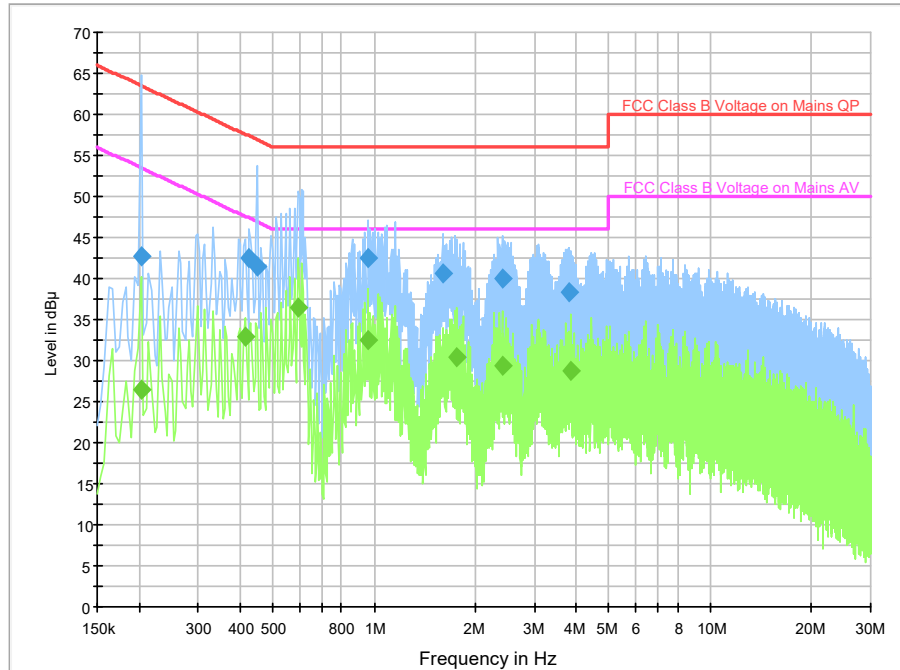


Fig. 23 AC Power line Conducted Emission-Idle

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)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.202000	42.7	9.000	On	L1	19.7	20.8	63.5	
0.426000	42.5	9.000	On	L1	19.7	14.8	57.3	
0.450000	41.5	9.000	On	L1	19.7	15.4	56.9	
0.958000	42.6	9.000	On	L1	19.6	13.4	56.0	
1.606000	40.7	9.000	On	L1	19.6	15.3	56.0	
2.398000	40.0	9.000	On	L1	19.6	16.0	56.0	

Final Result 2

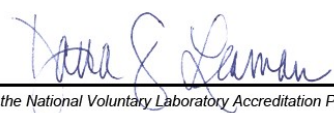
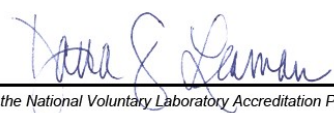
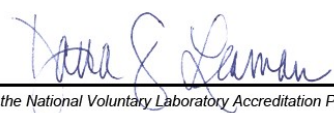
Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.202000	26.5	9.000	On	L1	19.7	27.0	53.5	
0.414000	32.9	9.000	On	L1	19.7	14.7	47.6	
0.594000	36.4	9.000	On	L1	19.7	9.6	46.0	
0.958000	32.5	9.000	On	L1	19.6	13.5	46.0	
1.770000	30.5	9.000	On	L1	19.6	15.5	46.0	
2.398000	29.3	9.000	On	L1	19.6	16.7	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, worse case and cable loss 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

United States Department of Commerce National Institute of Standards and Technology   Certificate of Accreditation to ISO/IEC 17025:2017 NVLAP LAB CODE: 600118-0 Telecommunication Technology Labs, CAICT Beijing China <i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i> Electromagnetic Compatibility & Telecommunications <i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).</i> <table><tr><td> 2022-10-01 through 2023-09-30 <i>Effective Dates</i> </td><td></td><td>  <i>For the National Voluntary Laboratory Accreditation Program</i> </td></tr></table>		2022-10-01 through 2023-09-30 <i>Effective Dates</i>		 <i>For the National Voluntary Laboratory Accreditation Program</i>
2022-10-01 through 2023-09-30 <i>Effective Dates</i>		 <i>For the National Voluntary Laboratory Accreditation Program</i>		

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