



FCC PART 15C TEST REPORT No.I23Z70001-IOT04

for

Wingtech Group (Hong Kong) Limited

Flex Mirror

ODP-R133

With

FCC ID: 2APXWODPR133

Hardware Version: REV1.0

Software Version: R133.001

Issued Date: 2023-03-20

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

Report Number	Revision	Description	Issue Date
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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. China 100191

Radiated testing Location:

CTTL (BDA)

Address: No. 18A, Kangding Street, Beijing Economic-Technology
Development Area, Beijing, 100176, P.R. China

CTTL(huayuan North Road)

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

1.3. Testing Environment

Normal Temperature: 15-35°C

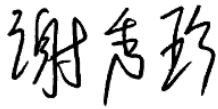
Relative Humidity: 20-75%

1.4. Project date

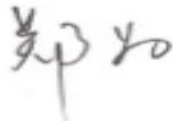
Testing Start Date: 2023-01-13

Testing End Date: 2023-03-20

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

Company Name: Wingtech Group (Hong Kong) Limited
Address: Flat/RM 1902 19/F, Podium Plaza, 5 Hanoi Road, Tsim Sha Tsui, KL,
HK
City: Hong Kong
Postal Code: /
Country: China
Telephone: +86-21-53529900
Fax: /

2.2. Manufacturer Information

Company Name: Wingtech Group (Hong Kong) Limited
Address: Flat/RM 1802 18/F, Podium Plaza, 5 Hanoi Road, TSIM SHA
TSUI, KOWLOON, HONG KONG
City: Hong Kong
Postal Code: /
Country: China
Telephone: +86-18321929116
Fax: /

3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY

EQUIPMENT(AE)

3.1. About EUT

Description	Flex Mirror
Model name	ODP-R133
FCC ID	2APXWODPR133
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
UT51a	2370001UT51a	REV1.0	R133.001
UT13a	2370001UT13a	REV1.0	R133.001

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

UT13a is used for Conduction test, UT51a is used for Radiation test.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Remark
AE1	Adapter	/
AE2	Data Cable	/
AE3	Battery	/
AE1		
Model	/	
Manufacturer	/	
Length	/	
AE2		
Model	21104	
Manufacturer	BROAD TELECOMMUNICATION CO LTD	
Length	/	
AE3		
Model	SCUD-WT-N19	
Manufacturer	SCUD (Fujian) Electronics Co., Ltd.	
Capacitance	/	
Nominal voltage	/	

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

*AE1 is not the AE of EUT, provided by client for relevant test.

3.4. General Description

Equipment Under Test (EUT) is a model of Flex Mirror 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	2021
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)	/	P
Peak Power Spectral Density	15.407 (a)	/	P
Occupied 6dB Bandwidth	15.407 (e)	/	P
Band Edges Compliance - Conducted& Radiated	15.407 (b)	/	P
Transmitter Spurious Emission - Conducted	15.407	/	P
Transmitter Spurious Emission - Radiated	15.407, 15.205, 15.209	/	P
AC Powerline Conducted Emission	15.107, 15.207	/	P

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

P	Pass, The EUT complies with the essential requirements in the standard.
NM	Not measured, The test was not measured by CTTL
NA	Not Applicable, The test was not applicable
F	Fail, The EUT does not comply with the essential requirements in the standard

6.2. Statements

CTTL has evaluated the test cases requested by the client/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	FSW67	104051	Rohde & Schwarz	1 year	2024-03-06
2	Test Receiver	ESU26	100235	R&S	1 year	2023-04-07
3	LISN	ENV216	101200	R&S	1 year	2023-06-29
4	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Manufacturer	Serial Number	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	R&S	100376	1 year	2023-09-22
2	Test Receiver	ESW44	R&S	103015	1 year	2024-01-14
3	Test Receiver	ESU26	R&S	100235	1 year	2023-03-08
4	Loop Antenna	HFH2-Z2	R&S	829324/007	1 year	2023-12-22
5	EMI Antenna	VULB9163	Schwarzbeck	01177	1 year	2023-08-03
6	EMI Antenna	3117	ETS-Lindgren	00139065	1 year	2023-09-20
8	EMI Antenna	LB-180400-25-C-KF	A-INFO	2110084000006	1 year	2024-03-02

AC Power Line Conducted Emission

No.	Equipment	Model	Manufacturer	Serial Number	Calibration Period	Calibration Due date
1	LISN	ENV216	R&S	101459	1 year	2023-03-26
2	Test Receiver	ESCI	R&S	100766	1 year	2023-03-02

Note: The test Receiver which Serial Number is 100766 was before Calibration 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	4.92
$30\text{MHz} \leq f \leq 1\text{GHz}$	5.73
$1\text{GHz} \leq f \leq 18\text{GHz}$	5.58
$18\text{GHz} \leq f \leq 40\text{GHz}$	3.37

8.6. AC Power-line Conducted Emission

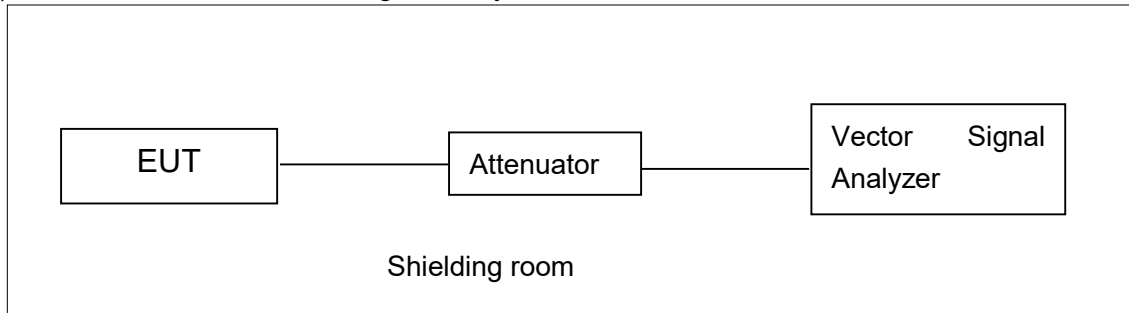
Measurement Uncertainty: 3.10dB, k=2

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

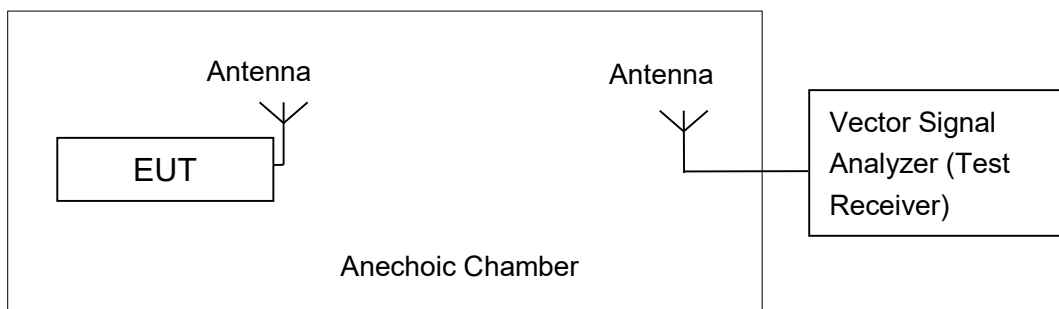


A.1.2. Radiated Emission Measurements

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 = 3MHz;



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 -2.9(ANT0)/-3.0dBi(ANT1) and the value is supplied by the applicant or manufacturer.

A.2.2. Maximum Average Output Power-Conducted

Measurement Results:

SISO-ANT0

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	14.32	17.13	13.24
	9	/	16.13	/
	12	/	16.17	/
	18	/	16.25	/
	24	/	15.20	/
	36	/	14.80	/
	48	/	13.85	/
	54	/	13.52	/

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	/	16.32	/
	MCS1	/	16.26	/
	MCS2	14.44	16.34	13.59
	MCS3	/	15.39	/
	MCS4	/	14.43	/
	MCS5	/	14.40	/
	MCS6	/	14.07	/
	MCS7	/	13.35	/

The data rate MCS2 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	/	16.37	/
	MCS1	14.42	16.40	13.84
	MCS2	/	16.21	/
	MCS3	/	15.38	/
	MCS4	/	14.45	/
	MCS5	/	14.40	/
	MCS6	/	14.01	/
	MCS7	/	13.03	/
	MCS8	/	12.49	/

The data rate MCS1 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	14.45	/
	MCS1	14.53	13.96
	MCS2	14.28	/
	MCS3	14.46	/
	MCS4	14.29	/
	MCS5	14.30	/
	MCS6	13.79	/
	MCS7	13.91	/

The data rate MCS1 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	14.46	/
	MCS1	14.55	13.78
	MCS2	14.28	/
	MCS3	14.36	/
	MCS4	14.33	/
	MCS5	14.28	/
	MCS6	13.89	/
	MCS7	13.79	/

	MCS8	12.83	/
	MCS9	11.73	/

The data rate MCS1 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	14.29
	MCS1	14.15
	MCS2	14.21
	MCS3	14.19
	MCS4	14.14
	MCS5	14.47
	MCS6	13.59
	MCS7	13.60
	MCS8	12.82
	MCS9	10.48

The data rate MCS5 is selected as worst condition, and the following cases are performed with this condition.

SISO-ANT1

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	14.65	16.35	14.15
	9	/	16.15	/
	12	/	16.24	/
	18	/	16.26	/
	24	/	15.19	/
	36	/	14.66	/
	48	/	13.70	/
	54	/	13.03	/

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	/	16.23	/
	MCS1	13.81	16.32	13.59
	MCS2	/	16.17	/
	MCS3	/	15.20	/
	MCS4	/	14.25	/
	MCS5	/	14.17	/
	MCS6	/	13.72	/
	MCS7	/	13.24	/

The data rate MCS1 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	13.79	16.28	13.45
	MCS1	/	16.22	/
	MCS2	/	16.18	/
	MCS3	/	15.21	/
	MCS4	/	14.19	/
	MCS5	/	14.19	/
	MCS6	/	13.72	/
	MCS7	/	12.57	/
	MCS8	/	12.21	/

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	13.45	/
	MCS1	13.44	/
	MCS2	13.47	/
	MCS3	13.28	/
	MCS4	13.40	/
	MCS5	13.57	13.17
	MCS6	12.73	/
	MCS7	12.81	/

The data rate MCS5 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	13.30	/
	MCS1	13.35	/
	MCS2	13.41	/
	MCS3	13.22	/
	MCS4	13.40	/
	MCS5	13.45	13.33
	MCS6	12.82	/
	MCS7	12.69	/
	MCS8	11.75	/
	MCS9	10.68	/

The data rate MCS5 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	13.33
	MCS1	13.43
	MCS2	13.20
	MCS3	13.34
	MCS4	13.47
	MCS5	13.43
	MCS6	12.72
	MCS7	12.71
	MCS8	11.86
	MCS9	10.09

The data rate MCS4 is selected as worst condition, and the following cases are performed with this condition.

MIMO-ANT0
802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	/	14.82	/
	9	14.66	14.86	14.11
	12	/	14.87	/
	18	/	14.78	/
	24	/	14.50	/
	36	/	14.47	/
	48	/	13.89	/
	54	/	12.86	/

The data rate 9Mbps 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	/	14.73	/
	MCS1	14.64	14.91	14.11
	MCS2	/	14.88	/
	MCS3	/	14.30	/
	MCS4	/	14.30	/
	MCS5	/	14.25	/
	MCS6	/	13.34	/
	MCS7	/	13.31	/

The data rate MCS1 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	/	14.59	/
	MCS1	/	14.69	/
	MCS2	14.77	14.78	14.11
	MCS3	/	14.27	/
	MCS4	/	14.25	/
	MCS5	/	14.18	/
	MCS6	/	13.31	/
	MCS7	/	12.69	/

	MCS8	/	12.25	/
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The data rate MCS2 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	14.34	/
	MCS1	14.27	/
	MCS2	14.38	13.29
	MCS3	14.23	/
	MCS4	13.75	/
	MCS5	13.84	/
	MCS6	13.20	/
	MCS7	13.36	/

The data rate MCS2 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	13.93	13.83
	MCS1	13.74	/
	MCS2	13.81	/
	MCS3	13.02	/
	MCS4	12.93	/
	MCS5	12.92	/
	MCS6	12.96	/
	MCS7	12.84	/
	MCS8	12.63	/
	MCS9	11.33	/

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	11.92
	MCS1	12.13
	MCS2	11.94
	MCS3	11.42

	MCS4	10.89
	MCS5	10.92
	MCS6	10.70
	MCS7	10.60
	MCS8	11.23
	MCS9	11.17

The data rate MCS1 is selected as worst condition, and the following cases are performed with this condition.

MIMO-ANT1

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	/	15.17	/
	9	14.84	15.16	14.25
	12	/	15.15	/
	18	/	14.93	/
	24	/	14.71	/
	36	/	14.75	/
	48	/	14.03	/
	54	/	13.05	/

The data rate 9Mbps 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	/	15.01	/
	MCS1	14.64	15.07	14.33
	MCS2	/	14.96	/
	MCS3	/	14.55	/
	MCS4	/	14.56	/
	MCS5	/	14.54	/
	MCS6	/	13.48	/
	MCS7	/	13.51	/

The data rate MCS1 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	/	14.87	/
	MCS1	/	15.01	/
	MCS2	14.75	15.03	14.29
	MCS3	/	14.56	/
	MCS4	/	14.56	/
	MCS5	/	14.53	/
	MCS6	/	13.44	/
	MCS7	/	13.12	/
	MCS8	/	12.46	/

The data rate MCS2 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	13.78	/
	MCS1	13.75	/
	MCS2	13.80	13.11
	MCS3	13.43	/
	MCS4	13.37	/
	MCS5	13.32	/
	MCS6	12.74	/
	MCS7	12.99	/

The data rate MCS2 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	13.27	13.72
	MCS1	13.23	/
	MCS2	13.24	/
	MCS3	12.66	/
	MCS4	12.72	/
	MCS5	12.67	/
	MCS6	12.62	/
	MCS7	12.58	/
	MCS8	12.04	/

	MCS9	11.17	/
--	------	-------	---

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	11.51
	MCS1	11.51
	MCS2	11.54
	MCS3	11.14
	MCS4	10.83
	MCS5	10.87
	MCS6	10.78
	MCS7	10.48
	MCS8	11.05
MCS9	11.05	

The data rate MCS1 is selected as worst condition, and the following cases are performed with this condition.

MIMO-SUM

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	/	18.01	/
	9	17.76	18.02	17.19
	12	/	18.02	/
	18	/	17.87	/
	24	/	17.62	/
	36	/	17.62	/
	48	/	16.97	/
	54	/	15.97	/

The data rate 9Mbps 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	/	17.88	/
	MCS1	17.65	18.00	17.23
	MCS2	/	17.93	/

	MCS3	/	17.44	/
	MCS4	/	17.44	/
	MCS5	/	17.41	/
	MCS6	/	16.42	/
	MCS7	/	16.42	/

The data rate MCS1 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	/	17.74	/
	MCS1	/	17.86	/
	MCS2	17.77	17.92	17.21
	MCS3	/	17.43	/
	MCS4	/	17.42	/
	MCS5	/	17.37	/
	MCS6	/	16.39	/
	MCS7	/	15.92	/
	MCS8	/	15.37	/

The data rate MCS2 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	17.08	/
	MCS1	17.03	/
	MCS2	17.11	16.21
	MCS3	16.86	/
	MCS4	16.57	/
	MCS5	16.60	/
	MCS6	15.99	/
	MCS7	16.19	/

The data rate MCS2 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	16.62	16.79
	MCS1	16.50	/
	MCS2	16.54	/
	MCS3	15.85	/
	MCS4	15.84	/
	MCS5	15.81	/
	MCS6	15.80	/
	MCS7	15.72	/
	MCS8	15.36	/
	MCS9	14.26	/

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	14.73
	MCS1	14.84
	MCS2	14.75
	MCS3	14.29
	MCS4	13.87
	MCS5	13.91
	MCS6	13.75
	MCS7	13.55
	MCS8	14.15
	MCS9	14.12

The data rate MCS1 is selected as worst condition, and the following cases are performed with this condition.

Duty Cycle

SISO
802.11a mode

Rate	6	9	12	18	24	36	48	54
Duty Cycle	93%	90%	88%	83%	78%	71%	66%	64%

802.11n-HT20 mode

Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Duty Cycle	93%	87%	82%	78%	71%	67%	64%	63%

802.11ac-HT20 mode

Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
Duty Cycle	93%	87%	82%	78%	72%	67%	64%	63%	60%

802.11n-HT40 mode

Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Duty Cycle	87%	78%	71%	66%	58%	55%	50%	50%

802.11ac-HT40 mode

Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
Duty Cycle	87%	78%	71%	66%	58%	55%	52%	50%	47%	47%

802.11ac-HT80 mode

Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
Duty Cycle	76%	66%	57%	52%	44%	44%	44%	41%	38%	38%

MIMO

802.11a mode

Rate	6	9	12	18	24	36	48	54
Duty Cycle	99%	99%	98%	97%	98%	95%	93%	93%

802.11n-HT20 mode

Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Duty Cycle	99%	98%	97%	96%	95%	93%	93%	92%

802.11ac-HT20 mode

Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
Duty Cycle	99%	98%	97%	96%	95%	93%	93%	92%	91%

802.11n-HT40 mode

Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Duty Cycle	98%	98%	96%	95%	93%	92%	91%	90%

802.11ac-HT40 mode

Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
Duty Cycle	99%	98%	96%	95%	94%	91%	90%	89%	89%	88%

802.11ac-HT80 mode

Rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
Duty Cycle	99%	98%	97%	97%	95%	94%	94%	93%	92%	91%

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:

SISO-ANT0

Mode	Channel	Power Spectral Density (dBm/500kHz)	Conclusion
802.11a	149	1.17	P
	157	3.09	P
	165	0.55	P
802.11ac HT20	149	1.22	P
	157	3.24	P
	165	0.35	P
802.11ac HT40	151	-3.19	P
	159	-3.40	P
802.11ac HT80	155	-5.26	P

MIMO

Mode	Channel	/	Power Spectral Density (dBm/500kHz)	Conclusion
802.11a	5745MHz(CH149)	Ant0	1.76	P
		Ant1	1.89	P
		SUM	4.84	P
	5785MHz(CH157)	Ant0	1.72	P
		Ant1	2.12	P
		SUM	4.93	P
	5825MHz(CH165)	Ant0	1.20	P
		Ant1	1.70	P
		SUM	4.47	P
802.11n-HT20	5745MHz(CH149)	Ant0	1.30	P
		Ant1	1.54	P
		SUM	4.43	P
	5785MHz(CH157)	Ant0	1.62	P
		Ant1	1.94	P
		SUM	4.79	P
	5825MHz(CH165)	Ant0	0.78	P
		Ant1	1.52	P

		SUM	4.18	P
802.11n-HT40	5755MHz(CH151)	Ant0	-3.17	P
		Ant1	-3.35	P
		SUM	-0.25	P
	5795MHz(CH159)	Ant0	-3.41	P
		Ant1	-3.40	P
		SUM	-0.39	P
802.11ac-HT80	5775MHz(CH155)	Ant0	-8.94	P
		Ant1	-9.41	P
		SUM	-6.16	P

Note: All Antenna are tested, only the worst-case plot have been reported.

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	16.32	P
	157	Fig.2	16.32	P
	165	Fig.3	16.32	P
802.11ac HT20	149	Fig.4	17.28	P
	157	Fig.5	17.28	P
	165	Fig.6	17.56	P
802.11ac HT40	151	Fig.7	36.40	P
	159	Fig.8	36.32	P
802.11ac HT80	155	Fig.9	76.48	P

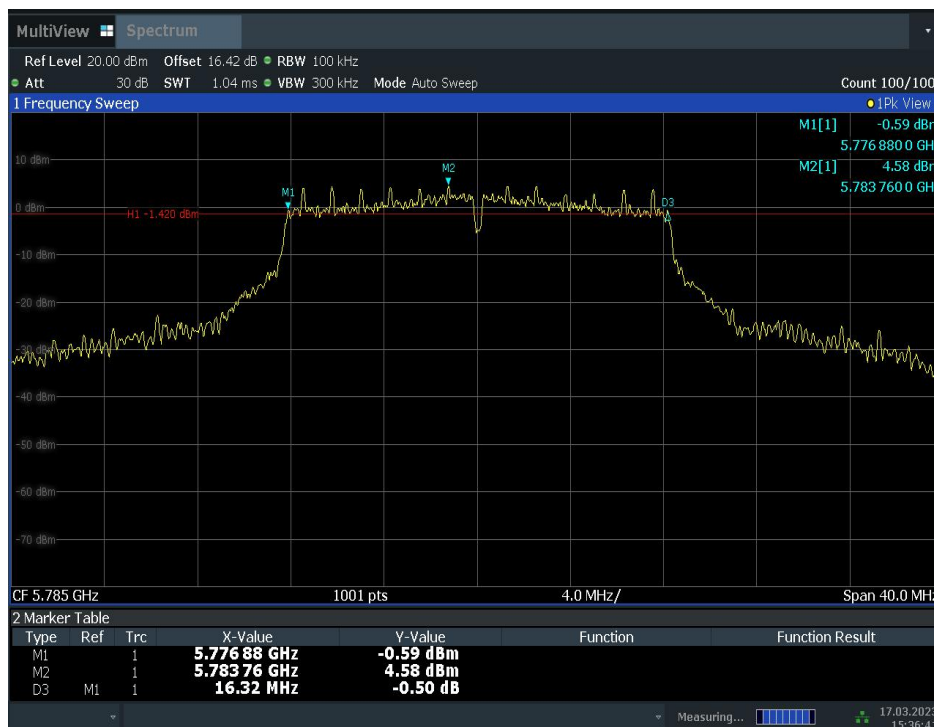
Conclusion: PASS

Test graphs as below:



15:33:48 17.03.2023

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



15:36:42 17.03.2023

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



15:37:57 17.03.2023

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



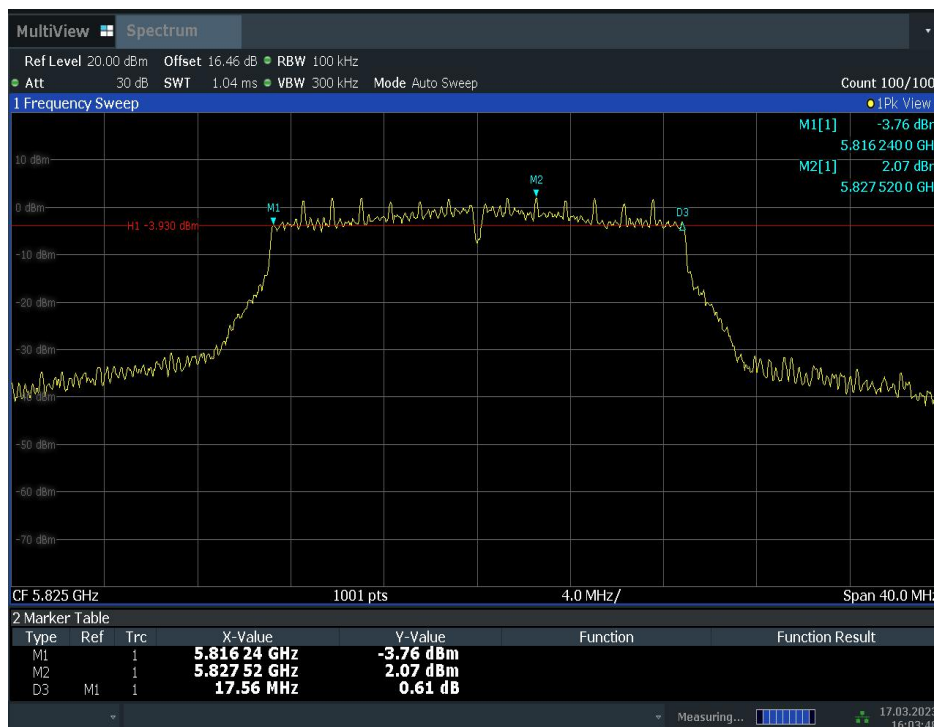
16:00:50 17.03.2023

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



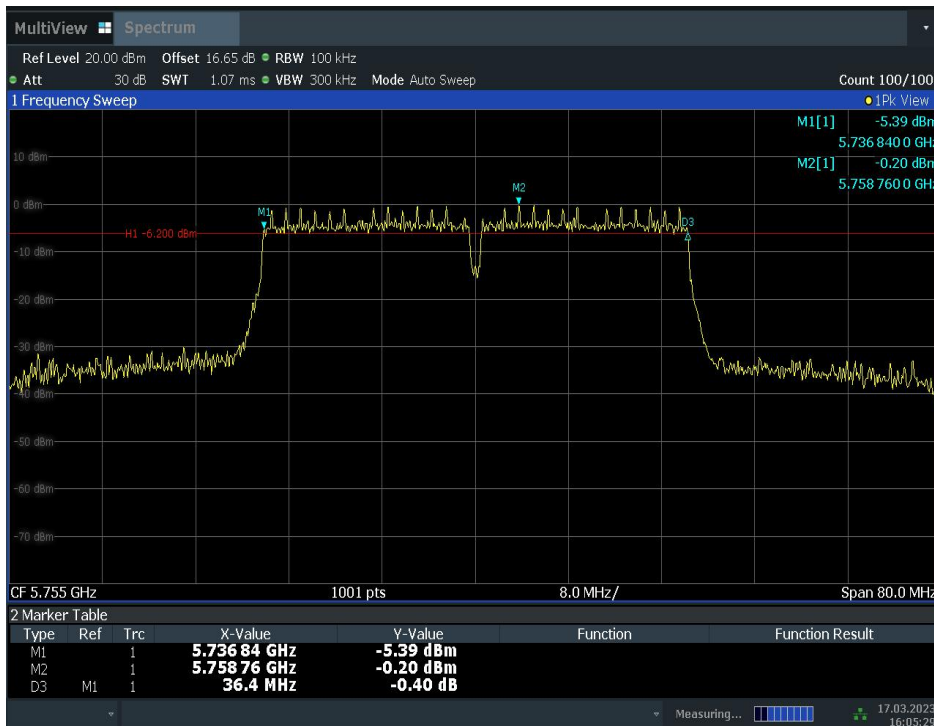
16:03:04 17.03.2023

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



16:03:49 17.03.2023

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



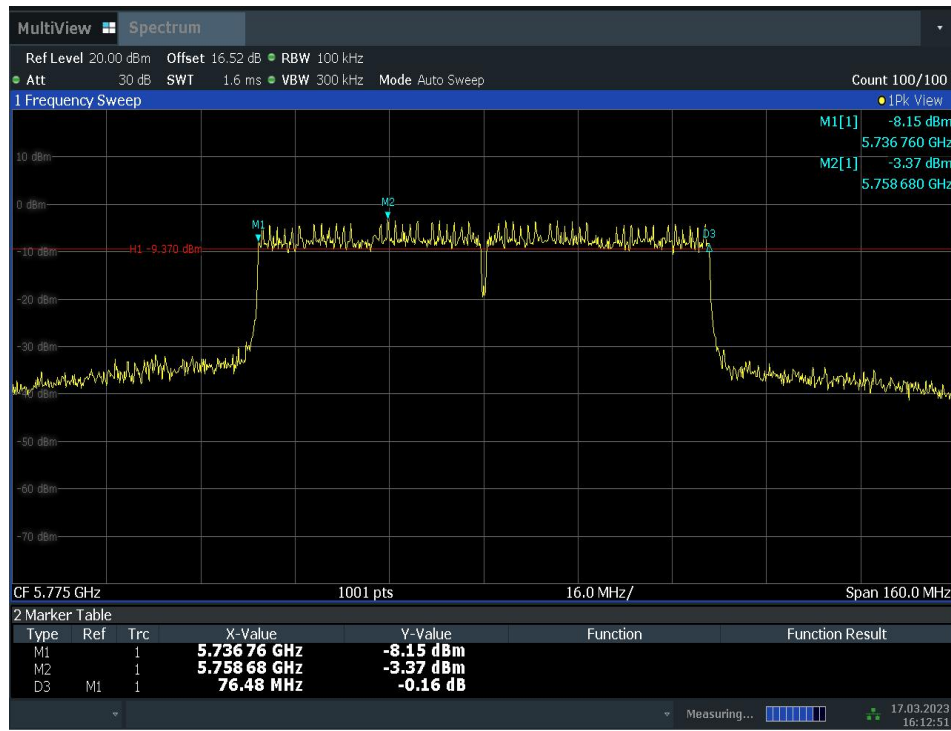
16:05:29 17.03.2023

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



16:06:39 17.03.2023

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



16:12:52 17.03.2023

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

Radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit in restricted band:

Frequency (MHz)	Field strength(μ V/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Frequency of emission (MHz)	Field strength (μ V/m)	Field strength (dBuV/m)	Measurement distance (m)
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Set up:

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m

The EUT and transmitting antenna shall be centered on the turntable.

Test Procedure

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. 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. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The receiver references:

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	100kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Sample Calculations

1. Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20 \log(D) + 104.77$$

Where:

E is the field strength in dB μ V/m

D is the measurement distance in meters

EIRP is the equivalent isotropically radiated power in dbm

2. The measurement results are obtained as described below:

$$\text{Result} = P_{\text{Mea}} + A_{\text{Rpl}} = P_{\text{Mea}} + \text{Cable Loss} + \text{Antenna Factor}$$

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.

3. The measurements were performed separately in ANT0, ANT1, and MIMO (ANT0+ANT1), and only the worst cases are shown in this section.

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	9kHz ~30 MHz	---	P
		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	9kHz ~30 MHz	---	P
		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	9kHz ~30 MHz	---	P
		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	9kHz ~30 MHz	---	P
		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	9kHz ~30 MHz	---	P
		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	9kHz ~30 MHz	---	P
		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

RESULTS ABOVE 1GHz
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)
5352.600	43.26	-23.41	34.50	32.17	54.00	10.74	V
5378.000	43.21	-23.38	34.50	32.09	54.00	10.79	V
11490.200	32.04	-32.46	38.19	26.31	54.00	21.96	V
15871.500	36.79	-26.91	40.64	23.06	54.00	17.21	V
17750.300	36.96	-26.51	41.30	22.17	54.00	17.04	V
17982.400	37.45	-25.99	41.20	22.24	54.00	16.55	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)
5352.200	43.16	-23.41	34.50	32.07	54.00	10.84	V
5376.600	43.15	-23.38	34.50	32.03	54.00	10.85	V
11570.500	32.16	-32.29	38.41	26.04	54.00	21.84	V
15877.000	36.92	-26.91	40.65	23.18	54.00	17.08	V
17761.300	37.12	-26.50	41.30	22.32	54.00	16.88	V
17978.000	37.87	-26.00	41.20	22.68	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)
5353.800	43.13	-23.41	34.50	32.04	54.00	10.87	V
5394.400	43.05	-23.34	34.50	31.88	54.00	10.95	V
11649.700	32.29	-32.25	38.60	25.94	54.00	21.71	V
15863.800	36.86	-26.93	40.63	23.17	54.00	17.14	H
17969.200	37.74	-26.01	41.20	22.56	54.00	16.26	H
17754.700	37.12	-26.51	41.30	22.33	54.00	16.88	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)
5355.200	43.21	-23.41	34.50	32.11	54.00	10.79	V
5378.200	43.06	-23.38	34.50	31.94	54.00	10.94	V
11490.200	31.88	-32.46	38.19	26.15	54.00	22.12	V
15861.600	36.92	-26.94	40.62	23.24	54.00	17.08	V
17759.100	37.07	-26.50	41.30	22.27	54.00	16.93	V
17976.900	37.70	-26.00	41.20	22.50	54.00	16.30	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)
5352.400	43.17	-23.41	34.50	32.08	54.00	10.83	V
5360.600	43.03	-23.40	34.50	31.93	54.00	10.97	V
11570.500	32.07	-32.29	38.41	25.95	54.00	21.93	V
15880.300	36.92	-26.91	40.66	23.17	54.00	17.08	V
17754.700	37.04	-26.51	41.30	22.25	54.00	16.96	V
17981.300	37.73	-25.99	41.20	22.53	54.00	16.27	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)
5358.800	43.18	-23.41	34.50	32.09	54.00	10.82	V
5365.600	43.11	-23.40	34.50	32.01	54.00	10.89	V
11649.700	32.31	-32.25	38.60	25.95	54.00	21.69	V
15874.800	36.87	-26.91	40.65	23.13	54.00	17.13	V
17755.800	37.11	-26.51	41.30	22.31	54.00	16.89	V
17979.100	37.71	-26.00	41.20	22.51	54.00	16.29	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)
5371.800	43.10	-23.39	34.50	31.99	54.00	10.90	V
5402.600	43.01	-23.33	34.49	31.85	54.00	10.99	V
11510.000	31.96	-32.41	38.23	26.14	54.00	22.04	V
15862.700	36.92	-26.94	40.63	23.23	54.00	17.08	H
17766.800	36.96	-26.50	41.30	22.16	54.00	17.04	V
17980.020	37.82	-26.00	41.20	22.61	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)
5371.000	43.03	-23.40	34.50	31.93	54.00	10.97	V
5398.400	42.99	-23.33	34.50	31.82	54.00	11.01	V
11590.300	32.29	-32.26	38.47	26.08	54.00	21.71	V
15870.400	37.03	-26.91	40.64	23.30	54.00	16.97	H
17770.100	36.88	-26.50	41.30	22.08	54.00	17.12	H
17976.900	37.62	-26.00	41.20	22.43	54.00	16.38	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)
5371.800	43.16	-23.39	34.50	32.06	54.00	10.84	V
5386.600	46.13	-23.36	34.50	34.99	54.00	7.87	V
11490.200	31.96	-32.46	38.19	26.23	54.00	22.04	V
15848.000	36.90	-26.98	40.60	23.28	54.00	17.10	H
17782.200	36.87	-26.50	41.30	22.06	54.00	17.13	V
17956.000	37.60	-26.03	41.20	22.43	54.00	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)
5356.200	43.21	-23.41	34.50	32.12	54.00	10.79	V
5369.000	43.16	-23.40	34.50	32.06	54.00	10.84	V
11570.500	32.07	-32.29	38.41	25.95	54.00	21.93	H
15849.500	36.97	-26.98	40.60	23.35	54.00	17.03	V
17732.700	37.11	-26.51	41.30	22.32	54.00	16.89	V
17983.500	37.81	-25.99	41.20	22.59	54.00	16.19	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)
5356.000	43.13	-23.41	34.50	32.04	54.00	10.87	V
5371.800	43.02	-23.39	34.50	31.92	54.00	10.98	V
11649.700	32.22	-32.25	38.60	25.87	54.00	21.78	V
15879.200	36.92	-26.91	40.66	23.18	54.00	17.08	V
17766.800	37.10	-26.50	41.30	22.30	54.00	16.90	H
17983.500	37.82	-25.99	41.20	22.61	54.00	16.18	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)
5374.400	43.03	-23.39	34.50	31.92	54.00	10.97	V
5393.200	43.00	-23.34	34.50	31.84	54.00	11.00	V
11510.000	32.01	-32.41	38.23	26.19	54.00	21.99	V
15855.000	37.05	-26.96	40.61	23.40	54.00	16.95	H
17762.400	37.08	-26.50	41.30	22.29	54.00	16.92	V
17980.200	37.93	-26.00	41.20	22.73	54.00	16.07	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)
5371.800	43.03	-23.39	34.50	31.92	54.00	10.97	V
5383.000	42.94	-23.37	34.50	31.80	54.00	11.06	V
11590.300	32.27	-32.26	38.47	26.07	54.00	21.73	H
15921.000	36.87	-26.92	40.72	23.07	54.00	17.13	V
17738.200	37.06	-26.51	41.30	22.27	54.00	16.94	V
17980.200	37.80	-26.00	41.20	22.60	54.00	16.20	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)
5375.400	43.01	-23.38	34.50	31.89	54.00	10.99	V
5381.800	42.95	-23.37	34.50	31.82	54.00	11.05	V
11549.600	31.91	-32.33	38.35	25.89	54.00	22.09	V
15879.200	36.77	-26.91	40.66	23.03	54.00	17.23	V
5454.000	43.36	-23.28	34.41	32.23	54.00	10.64	V
5459.000	43.41	-23.25	34.42	32.25	54.00	10.59	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)
5653.450	58.99	-23.02	34.71	47.30	68.47	9.48	H
5653.989	58.66	-23.02	34.71	46.97	68.30	9.64	H
11490.020	44.81	-32.46	38.19	39.08	74.00	29.19	H
17234.950	50.52	-26.27	41.26	35.52	68.30	17.78	H
17411.500	51.69	-26.22	41.20	36.71	68.30	16.61	H
17550.100	52.07	-26.44	41.20	37.32	68.30	16.23	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)
5715.000	60.20	-22.87	34.83	48.24	68.30	8.10	H
5846.200	61.35	-22.90	35.10	49.15	68.30	6.95	H
11569.950	43.63	-32.29	38.41	37.52	74.00	30.37	V
17324.850	48.80	-26.22	41.20	33.82	68.30	19.50	V
17428.550	50.09	-26.22	41.20	35.11	68.30	18.21	H
17593.550	50.82	-26.58	41.20	36.21	68.30	17.48	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)
5923.462	58.99	-22.74	35.25	46.48	68.30	9.31	H
5924.059	59.61	-22.74	35.25	47.10	68.30	8.69	H
11650.250	44.05	-32.24	38.60	37.69	74.00	29.95	H
17474.750	48.78	-26.28	41.20	33.86	68.30	19.52	H
17542.950	50.08	-26.42	41.20	35.30	68.30	18.22	H
17649.650	50.32	-26.63	41.25	35.70	68.30	17.98	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)
5650.266	58.65	-23.02	34.70	46.97	68.30	9.65	H
5650.510	58.45	-23.02	34.70	46.77	68.30	9.85	H
11490.200	44.01	-32.46	38.19	38.27	74.00	29.99	V
17234.950	49.03	-26.27	41.26	34.03	68.30	19.27	V
17373.000	50.00	-26.21	41.20	35.01	68.30	18.30	V
17637.000	50.53	-26.65	41.24	35.95	68.30	17.77	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)
5722.000	60.52	-22.90	34.84	48.57	68.30	7.78	H
5838.800	62.14	-22.90	35.10	49.94	68.30	6.16	H
11569.950	44.02	-32.29	38.41	37.91	74.00	29.98	V
17354.850	48.11	-26.21	41.20	33.11	68.30	20.19	H
17470.900	49.55	-26.27	41.20	34.62	68.30	18.75	H
17662.300	49.33	-26.61	41.26	34.68	68.30	18.97	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)
5923.233	57.68	-22.74	35.25	45.17	68.30	10.62	V
5923.742	58.26	-22.74	35.25	45.75	68.30	10.04	H
11650.250	44.09	-32.24	38.60	37.73	74.00	29.91	V
17474.750	48.24	-26.28	41.20	33.32	68.30	20.06	H
17588.050	50.58	-26.57	41.20	35.94	68.30	17.72	V
17688.700	50.73	-26.56	41.29	36.00	68.30	17.57	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)
5650.143	61.39	-23.02	34.70	49.71	68.30	6.91	H
5650.265	61.83	-23.02	34.70	50.15	68.39	6.56	V
11510.000	43.04	-32.41	38.23	37.22	74.00	30.96	V
17265.200	49.18	-26.25	41.23	34.19	68.30	19.12	V
17464.850	49.01	-26.26	41.20	34.08	68.30	19.29	V
17676.050	49.97	-26.58	41.28	35.27	68.30	18.33	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)
5924.856	57.28	-22.74	35.25	44.78	68.30	11.02	H
5924.935	56.81	-22.74	35.25	44.31	68.30	11.48	V
11589.750	43.92	-32.26	38.47	37.71	74.00	30.08	V
17385.100	49.43	-26.21	41.20	34.44	68.30	18.87	V
17475.300	49.50	-26.28	41.20	34.58	68.30	18.80	H
17638.650	49.07	-26.65	41.24	34.48	68.30	19.23	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)
5650.769	59.11	-23.02	34.70	47.43	68.30	9.19	V
5651.057	58.17	-23.02	34.70	46.49	68.30	10.13	H
11490.200	43.43	-32.46	38.19	37.69	74.00	30.57	H
17234.950	49.55	-26.27	41.26	34.55	68.30	18.75	V
17413.150	49.29	-26.22	41.20	34.31	68.30	19.01	V
17668.900	49.99	-26.59	41.27	35.31	68.30	18.31	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)
5726.600	60.89	-22.92	34.85	48.95	68.30	7.41	H
5857.400	60.08	-22.88	35.13	47.83	68.30	8.22	H
11569.950	43.50	-32.29	38.41	37.39	74.00	30.50	V
17354.850	49.85	-26.21	41.20	34.85	68.30	18.45	V
17472.550	49.02	-26.28	41.20	34.09	68.30	19.28	V
17669.450	49.78	-26.59	41.27	35.10	68.30	18.52	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)
5923.972	57.95	-22.74	35.25	45.44	68.30	10.35	V
5924.224	58.03	-22.74	35.25	45.52	68.30	10.27	V
11650.250	44.82	-32.24	38.60	38.46	74.00	29.18	V
17474.750	49.14	-26.28	41.20	34.22	68.30	19.16	H
17565.500	50.46	-26.49	41.20	35.75	68.30	17.84	H
17646.350	50.22	-26.64	41.25	35.61	68.30	18.08	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)
5650.000	60.50	-23.02	34.70	48.82	68.30	7.80	H
5650.158	60.34	-23.02	34.70	48.66	68.30	7.96	H
11510.000	44.40	-32.41	38.23	38.58	74.00	29.60	V
17265.200	49.20	-26.25	41.23	34.21	68.30	19.10	V
17395.550	50.66	-26.21	41.20	35.67	68.30	17.64	H
17681.550	50.54	-26.57	41.28	35.83	68.30	17.76	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)
5924.913	56.16	-22.74	35.25	43.65	68.30	12.14	V
5924.964	57.62	-22.74	35.25	45.11	68.30	10.68	H
11589.750	43.56	-32.26	38.47	37.36	74.00	30.44	H
17385.100	50.30	-26.21	41.20	35.31	68.30	18.00	V
17496.200	49.79	-26.32	41.20	34.91	68.30	18.51	V
17661.200	50.02	-26.61	41.26	35.37	68.30	18.28	V

802.11ac-HT80

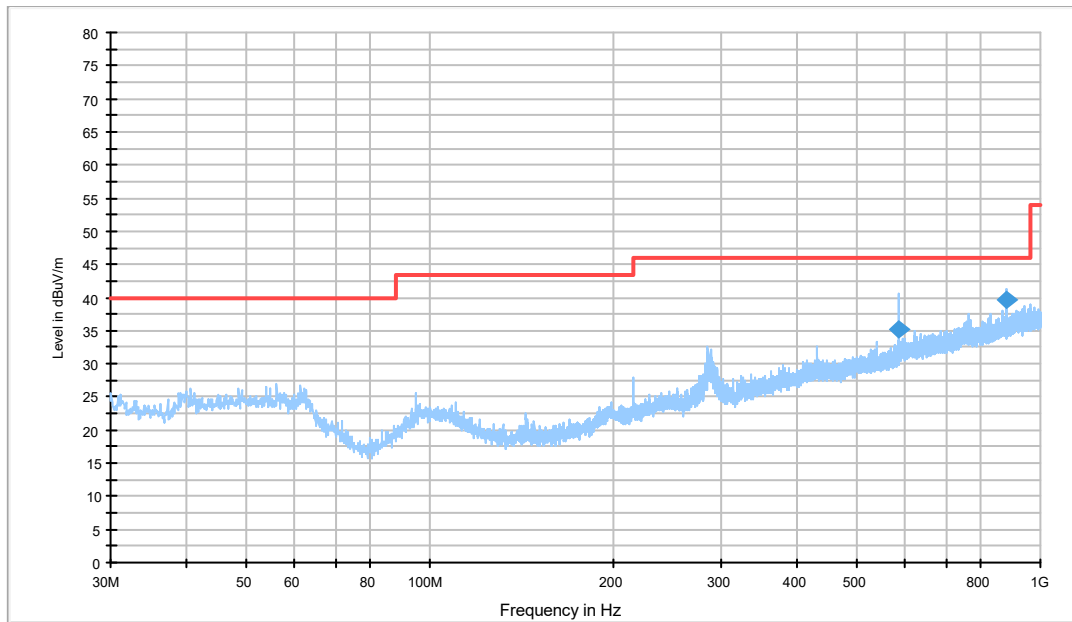
Channel 155

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)
5650.179	64.01	-23.02	34.70	52.33	68.33	4.33	V
5650.783	64.64	-23.02	34.70	52.95	68.78	4.14	V
11220.150	44.21	-32.10	37.94	38.38	74.00	29.79	V
17325.150	49.14	-26.22	41.20	34.16	68.30	19.16	V
5923.994	61.65	-22.74	35.25	49.14	68.94	7.30	V
5924.943	61.79	-22.74	35.25	49.28	68.24	6.45	V

Note:

1. The spurious emission above 18G is noise only.

WOSRT CASE BELOW 1GHz



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Polarization	Azimuth (deg)
587.9440	35.1	46.0	10.9	102.0	V	135.0
882.0480	39.7	46.0	6.3	100.0	H	-7.0

BELOW 30MHz

No emissions were found within 20dB of the limit below 30MHz.

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.	

Set up:

Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m and the table height shall be 1.5 m.

The EUT and transmitting antenna shall be centered on the turntable.

Test Procedure

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. 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. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The receiver references:

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	100kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Sample Calculations

Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20 \log(D) + 104.77 \quad \text{Where:}$$

E is the field strength in dB μ V/m

D is the measurement distance in meters

EIRP is the equivalent isotropically radiated power in dbm

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

Note: The measurements were performed separately in ANT0, ANT1, and MIMO (ANT0+ANT1), and only the worst cases are shown in this section.

Conclusion: PASS

Test graphs as below:

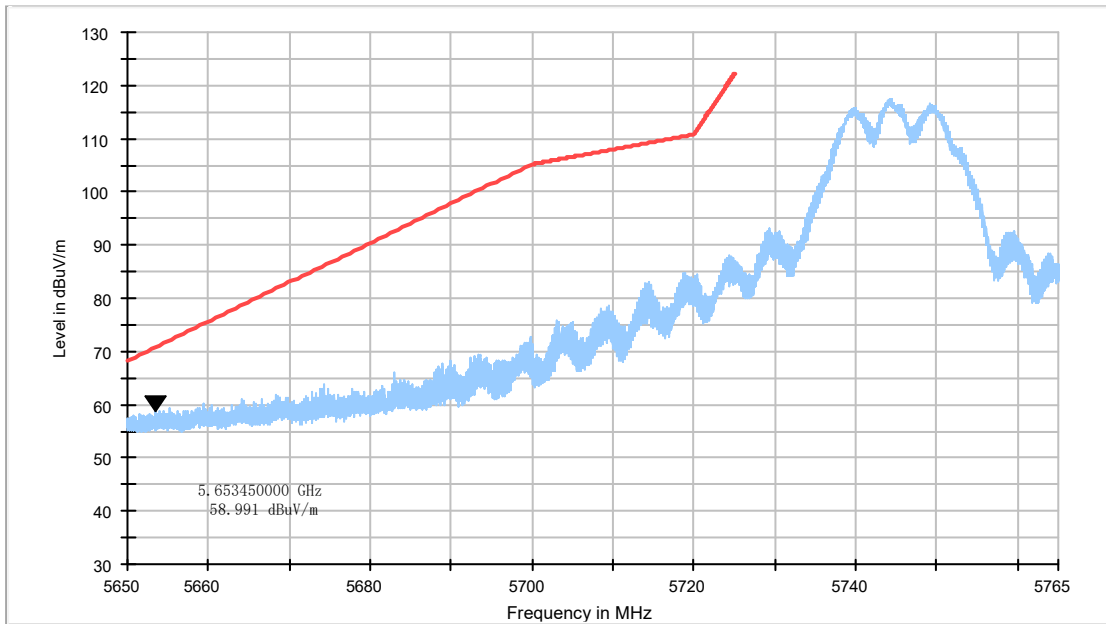


Fig. 10 Band Edges (802.11a Ch149,5745MHz)

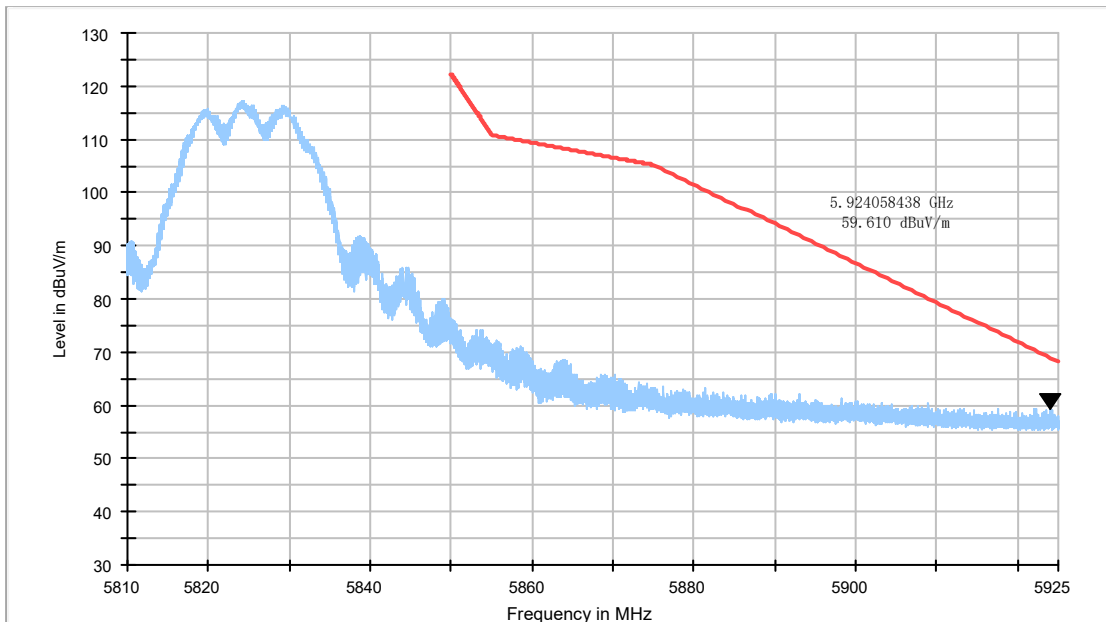


Fig. 11 Band Edges (802.11a Ch165, 5825MHz)

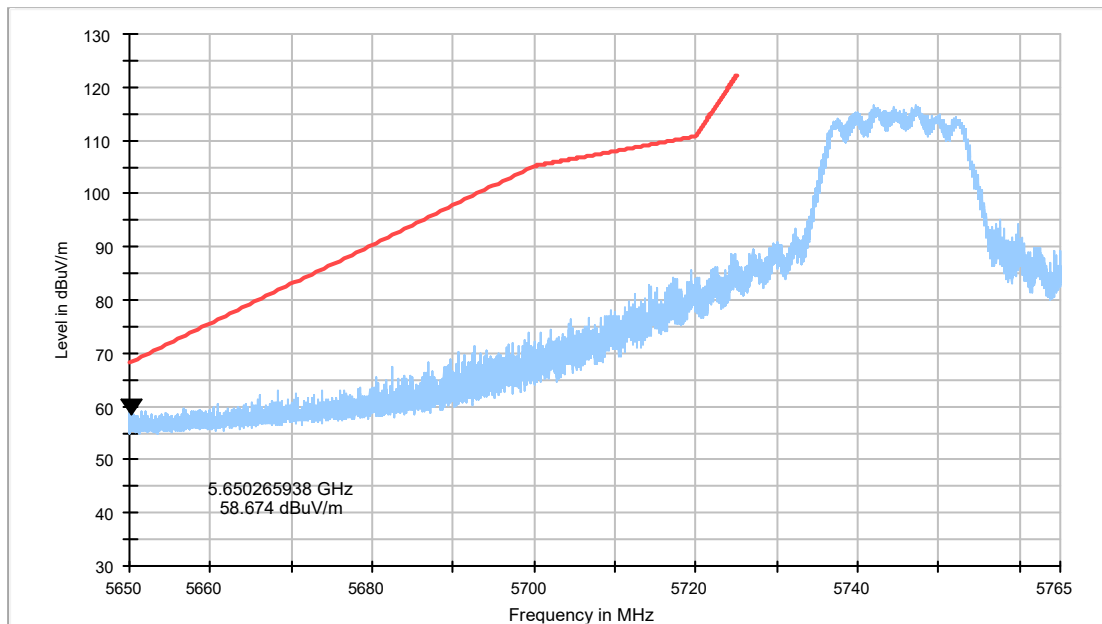


Fig. 12 Band Edges (802.11n-HT20 Ch149, 5745MHz)

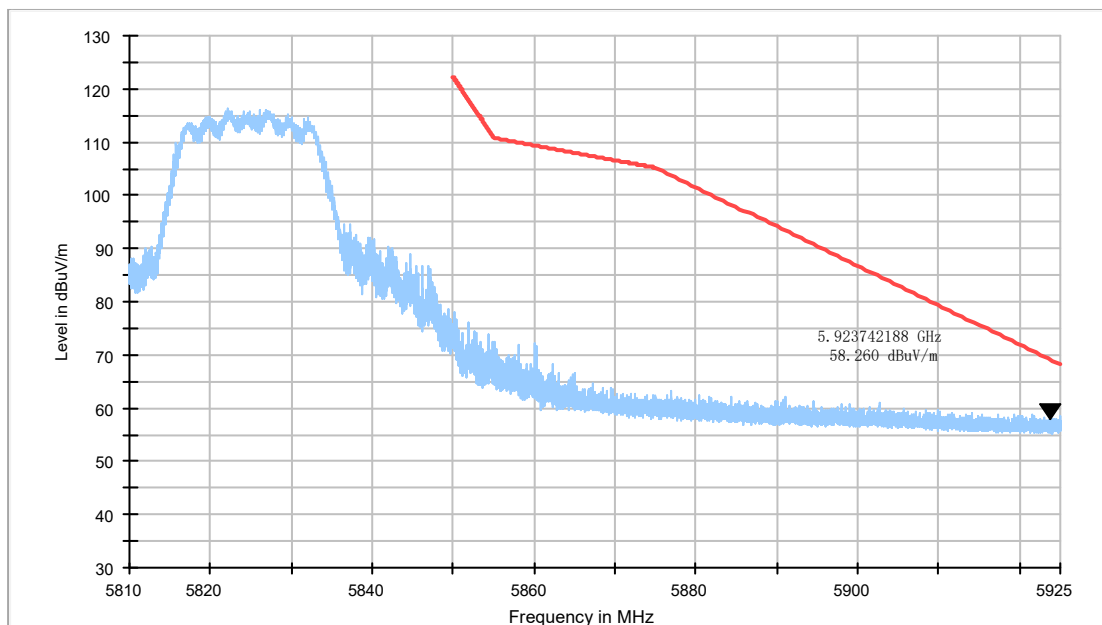


Fig. 13 Band Edges (802.11n-HT20 Ch165, 5825MHz)

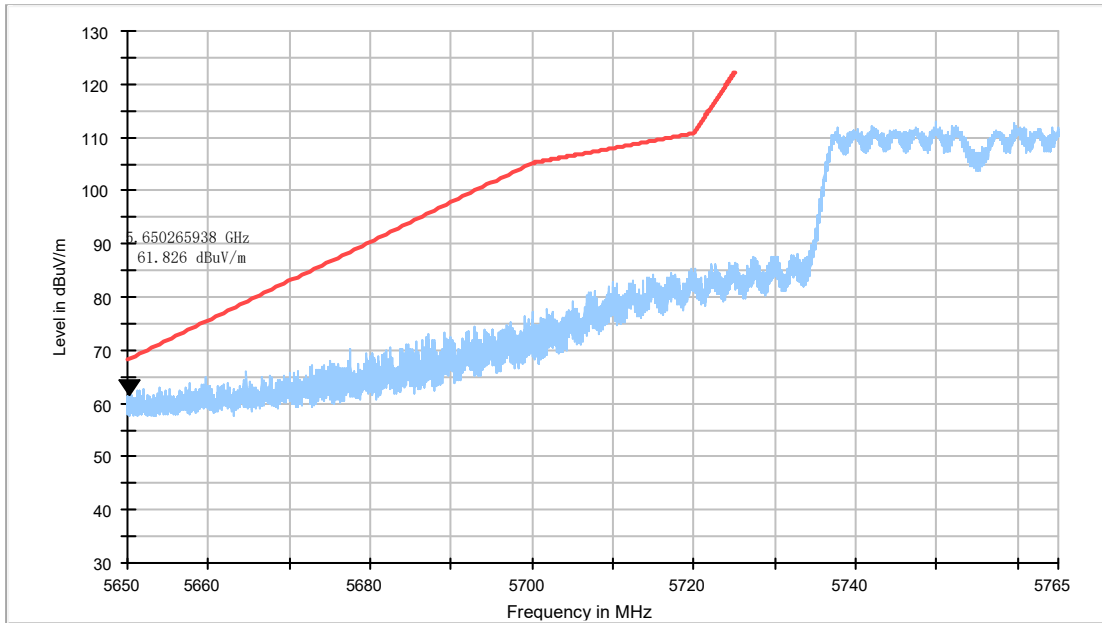


Fig. 14 Band Edges (802.11n-HT40 Ch151, 5755MHz)

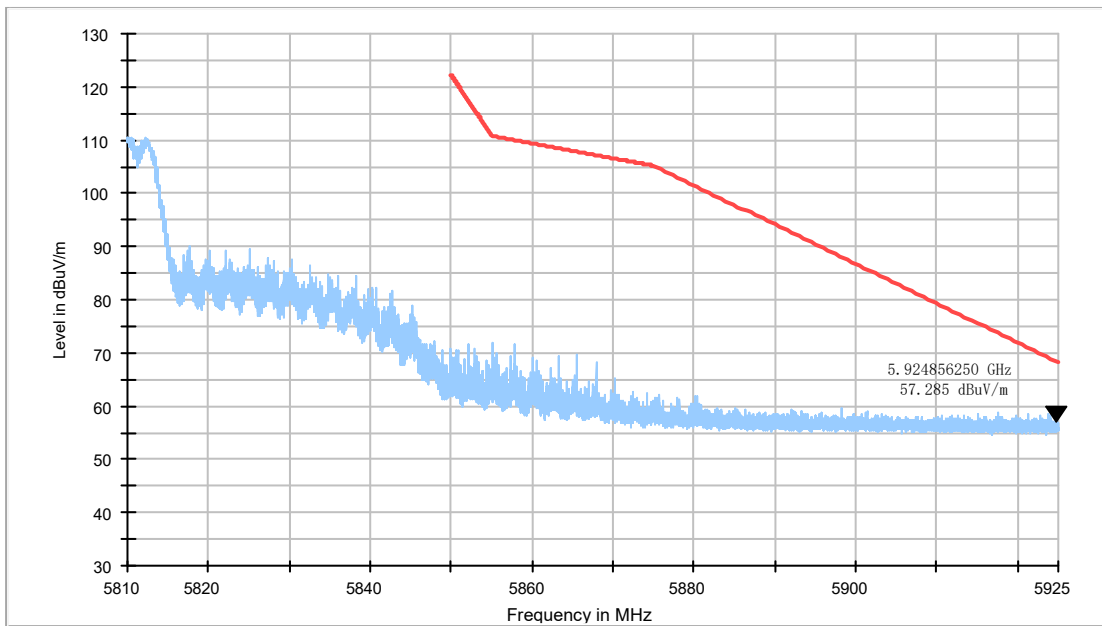


Fig. 15 Band Edges (802.11n-HT40 Ch159, 5795MHz)

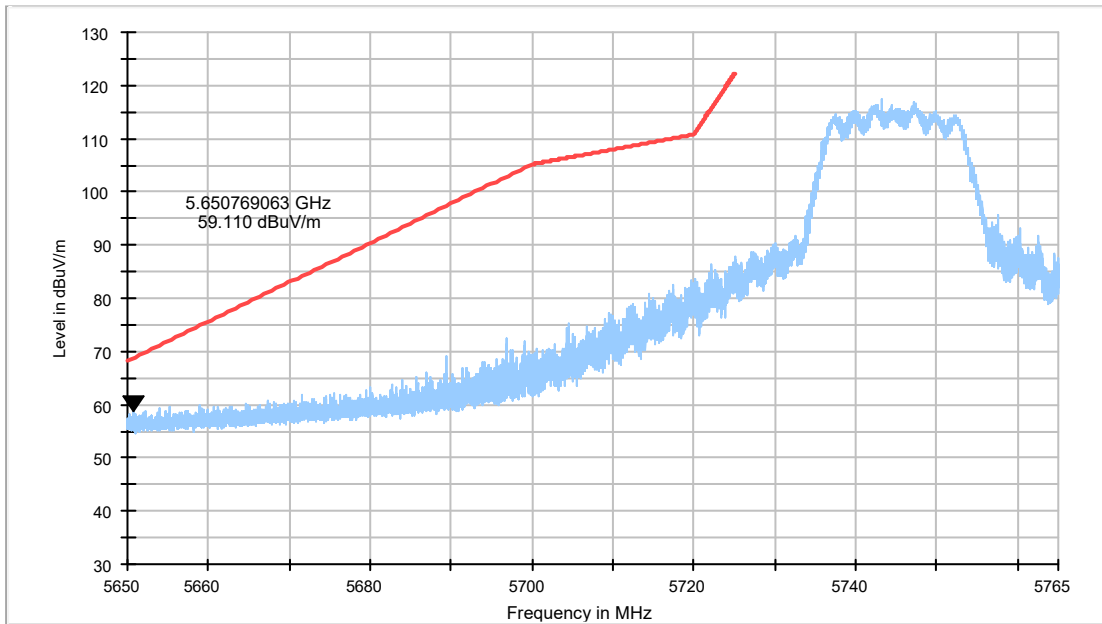


Fig. 16 Band Edges (802.11ac-HT20 Ch149, 5745MHz)

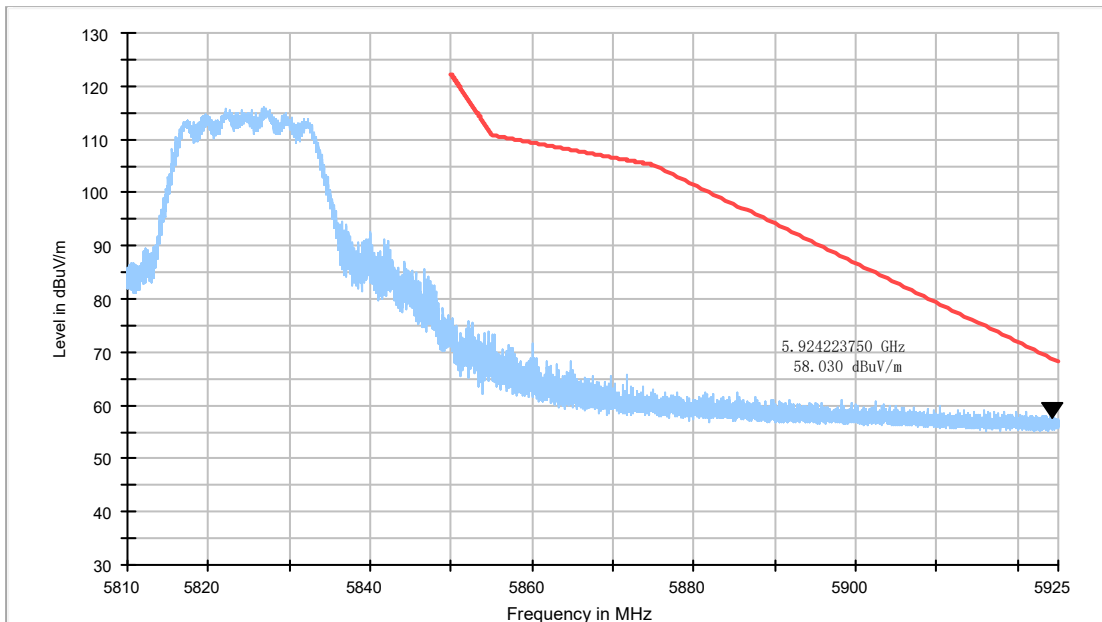


Fig. 17 Band Edges (802.11ac-HT20 Ch165, 5825MHz)

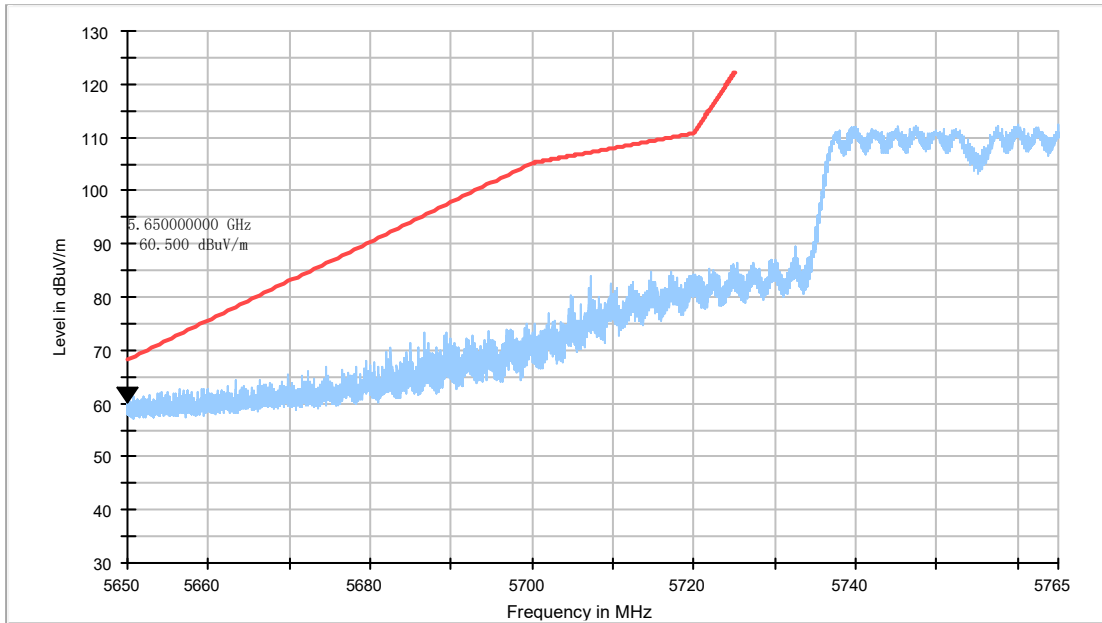


Fig. 18 Band Edges (802.11ac-HT40 Ch151, 5755MHz)

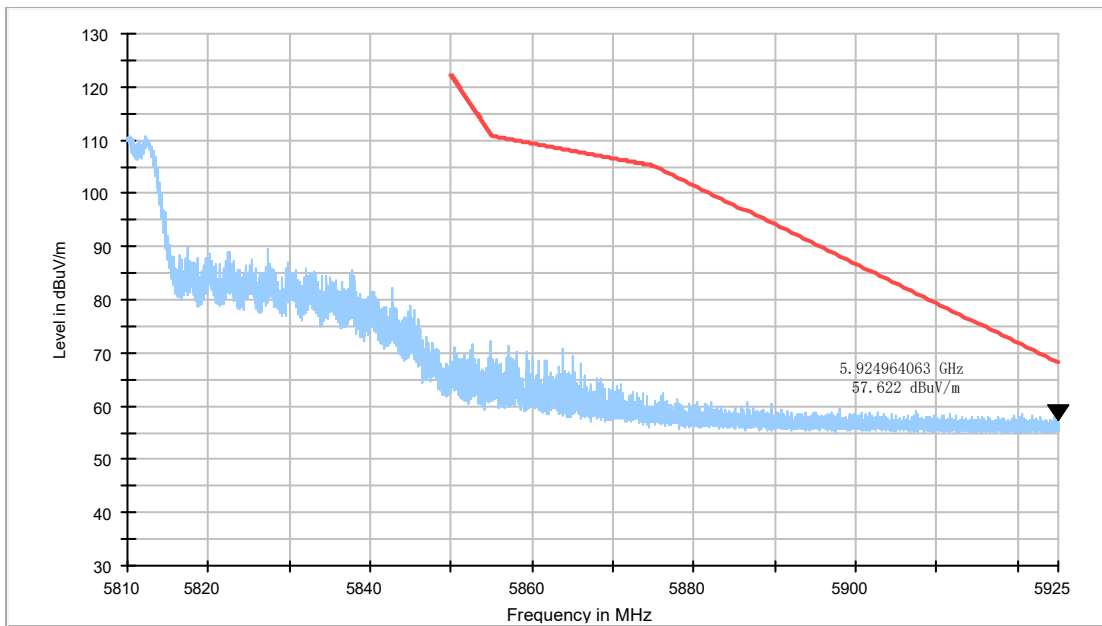


Fig. 19 Band Edges (802.11ac-HT40 Ch159, 5795MHz)

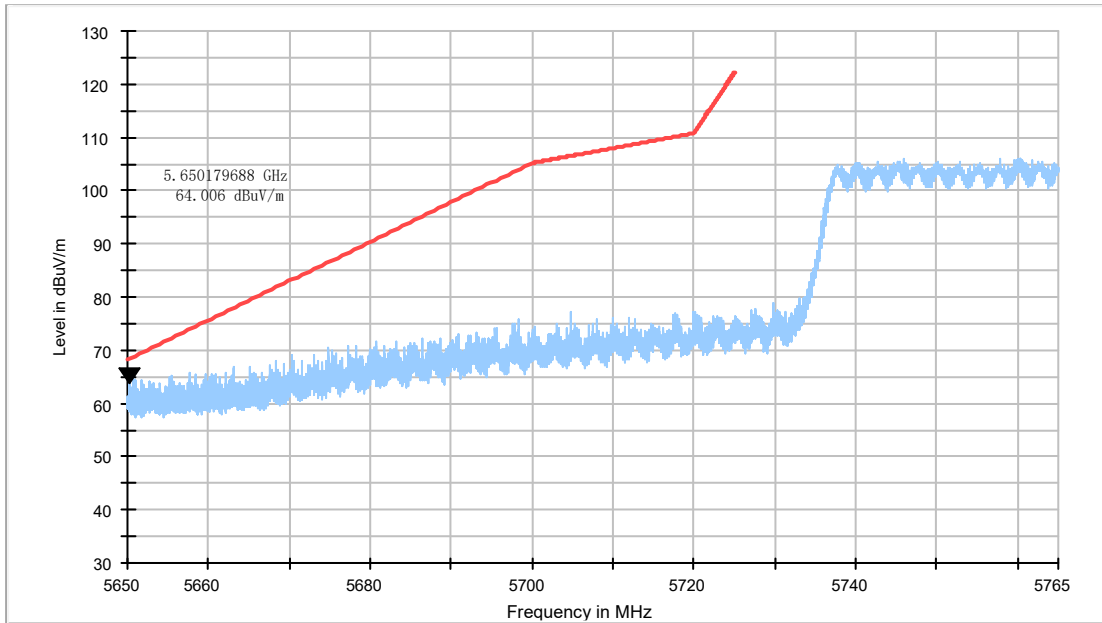


Fig. 20 Band Edges (802.11ac-HT80 Ch155, 5775MHz)

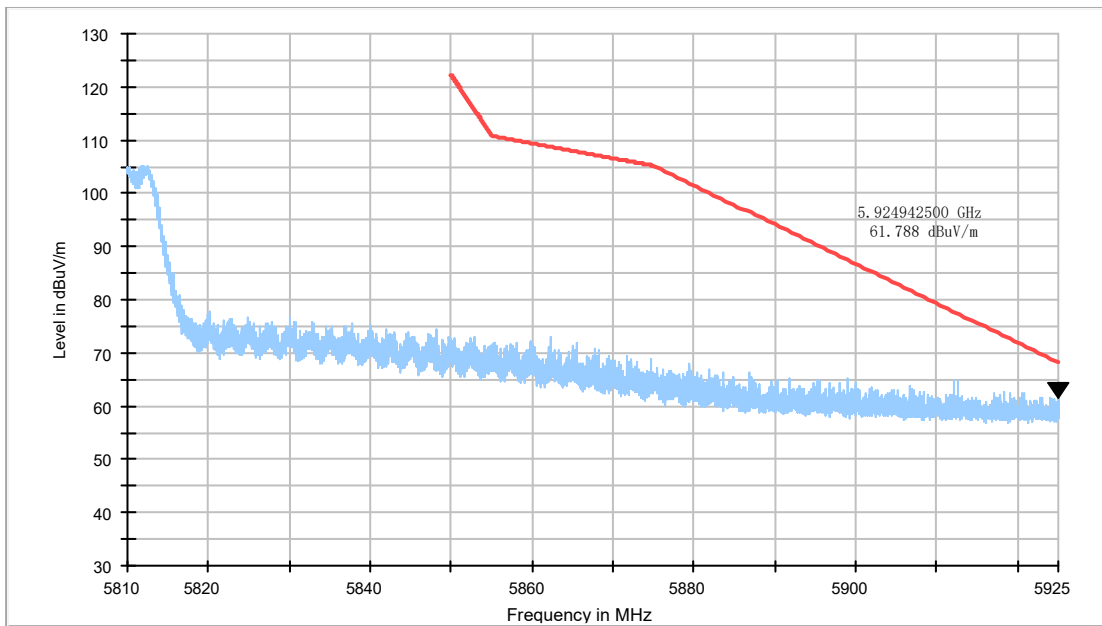


Fig. 21 Band Edges (802.11ac-HT80 Ch155, 5775MHz)

A.7. AC Powerline Conducted Emission

Method of Measurement:

See Clause 6.2 of ANSI C63.10-2013 specifically.

See Clause 4 and Clause 5 of ANSI C63.10-2013 generally.

The conducted emissions from the AC port of the EUT are measured in a shielding room. The EUT is connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection was performed. The measurements were performed with a quasi-peak detector and if required, an average detector.

The conducted emission measurements were made with the following detector of the test receiver: Quasi-Peak / Average Detector.

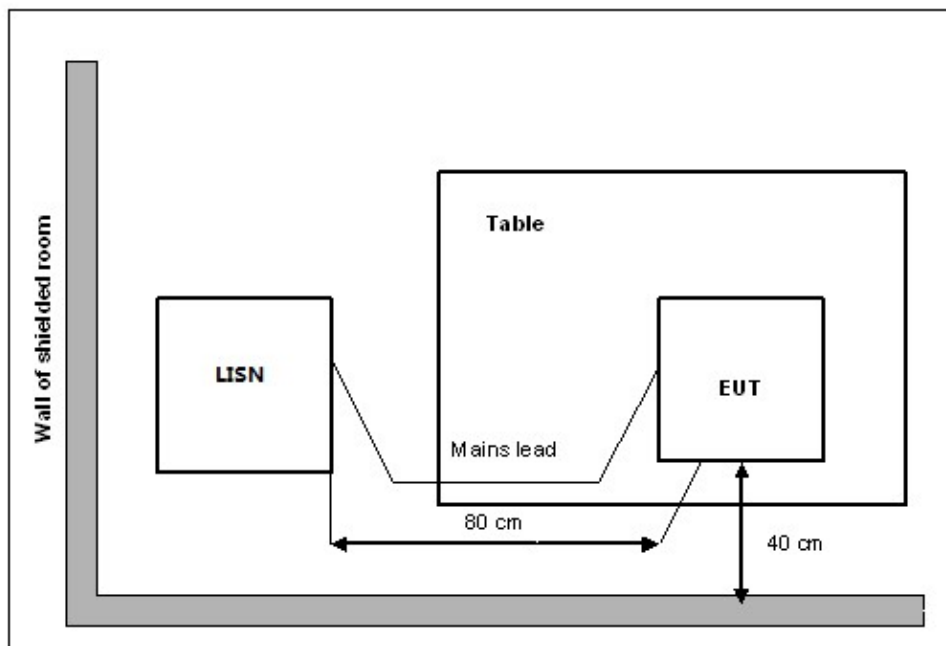
The measurement bandwidth is:

Frequency of Emission (MHz)	RBW/IF bandwidth
0.15-30	9kHz

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement Setup



Measurement Result and limit:

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ 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 μ V)	Result (dB μ 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:

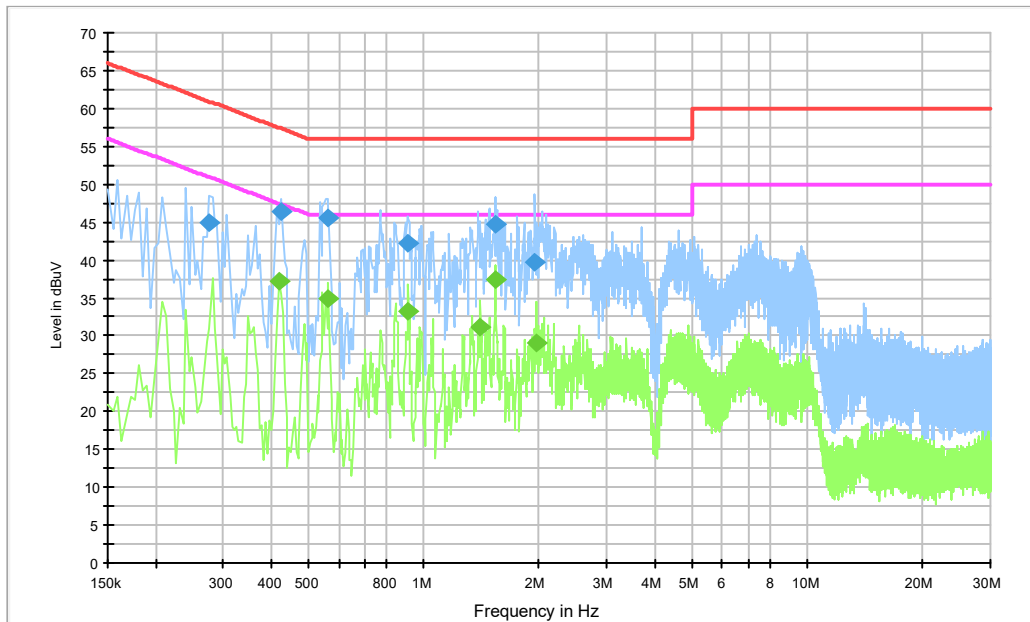


Fig. 22 AC Power line Conducted Emission-802.11a

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

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.276000	45.0	2000	9.000	On	N	19.8	15.9	60.9
0.424500	46.5	2000	9.000	On	N	19.8	10.9	57.4
0.559500	45.6	2000	9.000	On	N	19.8	10.4	56.0
0.906000	42.2	2000	9.000	On	N	19.7	13.8	56.0
1.536000	44.7	2000	9.000	On	N	19.6	11.3	56.0
1.954500	39.8	2000	9.000	On	N	19.6	16.2	56.0

Final Result 2

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.420000	37.3	2000	9.000	On	L1	19.8	10.2	47.4
0.564000	34.9	2000	9.000	On	L1	19.8	11.1	46.0
0.910500	33.3	2000	9.000	On	L1	19.7	12.7	46.0
1.405500	31.1	2000	9.000	On	L1	19.6	14.9	46.0
1.536000	37.5	2000	9.000	On	L1	19.6	8.5	46.0
1.963500	29.1	2000	9.000	On	L1	19.6	16.9	46.0

Idle:

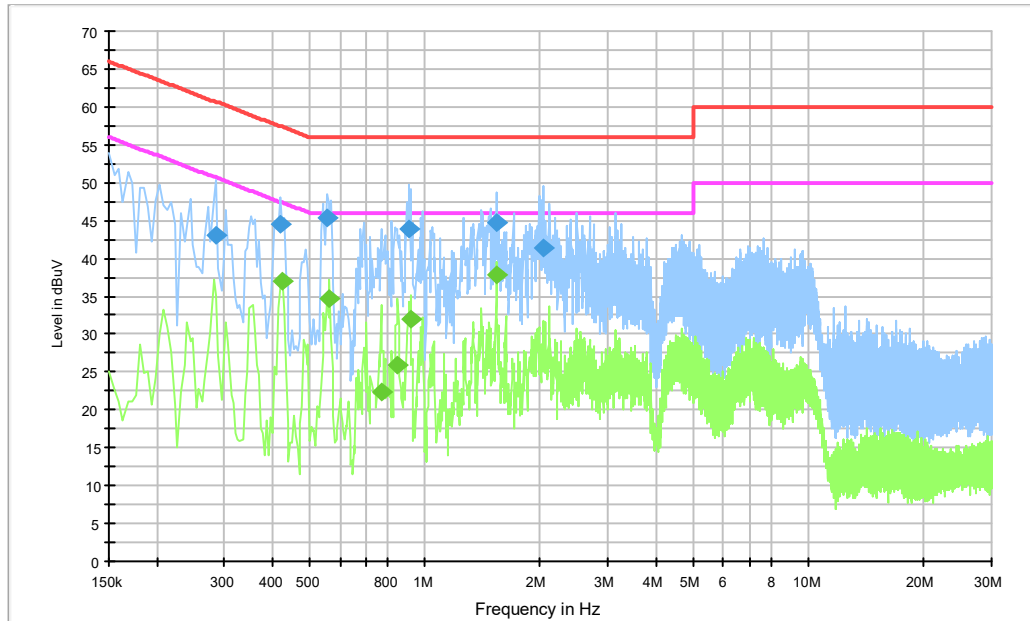


Fig. 23 AC Power line Conducted Emission-Idle

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

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.285000	43.0	2000	9.000	On	L1	19.7	17.6	60.7
0.420000	44.4	2000	9.000	On	L1	19.8	13.0	57.4
0.555000	45.3	2000	9.000	On	L1	19.8	10.7	56.0
0.910500	43.9	2000	9.000	On	L1	19.7	12.1	56.0
1.536000	44.7	2000	9.000	On	N	19.6	11.3	56.0
2.031000	41.4	2000	9.000	On	L1	19.6	14.6	56.0

Final Result 2

Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.424500	36.9	2000.0	9.000	On	L1	19.8	10.5	47.4
0.564000	34.7	2000.0	9.000	On	L1	19.8	11.3	46.0
0.771000	22.4	2000.0	9.000	On	N	19.7	23.6	46.0
0.847500	25.9	2000.0	9.000	On	N	19.7	20.1	46.0
0.919500	31.9	2000.0	9.000	On	L1	19.7	14.1	46.0
1.536000	37.8	2000.0	9.000	On	L1	19.6	8.2	46.0

ANNEX B: EUT parameters

Disclaimer: The antenna gain 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

<p>United States Department of Commerce National Institute of Standards and Technology</p>  	
<hr/> Certificate of Accreditation to ISO/IEC 17025:2017 <hr/>	
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>	
<hr/> 2022-10-01 through 2023-09-30 <i>Effective Dates</i>	 <hr/> <i>[Signature]</i> For the National Voluntary Laboratory Accreditation Program

*** END OF REPORT BODY ***