



FCC PART 15C TEST REPORT No.I21Z61482-IOT03

for

TCL Communication Ltd.

5G NR/ LTE/WCDMA/GSM Mobile Phone

T781S,T781SPP

FCC ID : 2ACCJN056

with

Hardware Version: 03

Software Version: 3D4Y

Issued Date: 2021-09-29

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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CONTENTS

CONTENTS	3
1. TEST LATORATORY.....	5
1.1. INTRODUCTION & ACCREDITATION	5
1.2. TESTING LOCATION	5
1.3. TESTING ENVIRONMENT	5
1.4. PROJECT DATE	5
1.5. SIGNATURE	5
2. CLIENT INFORMATION.....	6
2.1. APPLICANT INFORMATION	6
2.2. MANUFACTURER INFORMATION	6
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT(AE)	7
3.1. ABOUT EUT	7
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST	7
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST	7
3.4. GENERAL DESCRIPTION.....	8
4. REFERENCE DOCUMENTS	8
4.1. DOCUMENTS SUPPLIED BY APPLICANT	8
4.2. REFERENCE DOCUMENTS FOR TESTING.....	8
5. LABORATORY ENVIRONMENT.....	8
6. SUMMARY OF TEST RESULTS	9
6.1. SUMMARY OF TEST RESULTS	9
6.2. STATEMENTS.....	9
6.3. TEST CONDITIONS	9
7. TEST EQUIPMENTS UTILIZED	10
8. MEASUREMENT UNCERTAINTY	11
8.1. TRANSMITTER OUTPUT POWER	11
8.2. PEAK POWER SPECTRAL DENSITY	11
8.3. OCCUPIED 6DB BANDWIDTH.....	11
8.4. BAND EDGES COMPLIANCE	11
8.5. SPURIOUS EMISSIONS	11
8.6. AC POWER-LINE CONDUCTED EMISSION	11
ANNEX A: MEASUREMENT RESULTS.....	12
A.1. MEASUREMENT METHOD	12
A.2. MAXIMUM PEAK OUTPUT POWER	13
A.2.1. MAXIMUM AVERAGE OUTPUT POWER-CONDUCTED	13
A.3. PEAK POWER SPECTRAL DENSITY	15

A.4. OCCUPIED 6DB BANDWIDTH	17
A.5. TRANSMITTER SPURIOUS EMISSION	23
A.5.1 TRANSMITTER SPURIOUS EMISSION - RADIATED.....	23
A.6. BAND EDGES COMPLIANCE	36
A6.1 BAND EDGES - RADIATED.....	36
FIG. 10 BAND EDGES (802.11A CH149,5745MHZ).....	37
FIG. 11 BAND EDGES (802.11A CH165, 5825MHZ).....	37
FIG. 12 BAND EDGES (802.11N-HT20 CH149, 5745MHZ).....	37
FIG. 13 BAND EDGES (802.11N-HT20 CH165, 5825MHZ).....	38
FIG. 14 BAND EDGES (802.11N-HT40 CH151, 5755MHZ).....	38
FIG. 15 BAND EDGES (802.11N-HT40 CH159, 5795MHZ).....	38
FIG. 16 BAND EDGES (802.11AC-HT20 CH149, 5745MHZ).....	39
FIG. 17 BAND EDGES (802.11AC-HT20 CH165, 5825MHZ).....	39
FIG. 18 BAND EDGES (802.11AC-HT40 CH151, 5755MHZ).....	39
FIG. 19 BAND EDGES (802.11AC-HT40 CH159, 5795MHZ).....	40
FIG. 20 BAND EDGES (802.11AC-HT80 CH155, 5775MHZ).....	40
FIG. 21 BAND EDGES (802.11AC-HT80, 5775MHZ).....	40
A.7. AC POWERLINE CONDUCTED EMISSION.....	41
FIG. 22 AC POWER LINE CONDUCTED EMISSION-802.11A	42
FIG. 23 AC POWER LINE CONDUCTED EMISSION-IDLE.....	43
ANNEX B: EUT PARAMETERS.....	44
ANNEX C: ACCREDITATION CERTIFICATE	44

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(Gaolizhang Road,)

Address: Cuihu Cloud Center, No.1, Gaolizhang Road, Wenquan,
Haidian District, Beijing, China

Radiated testing Location: CTTL(huayuan North Road)

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

1.3. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.4. Project date

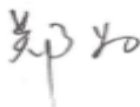
Testing Start Date: 2021-08-13

Testing End Date: 2021-09-29

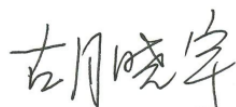
1.5. Signature



Feng Aiyu
(Prepared this test report)



Zheng Wei
(Reviewed this test report)



Hu Xiaoyu
(Approved this test report)



2. CLIENT INFORMATION

2.1. Applicant Information

Company Name: TCL Communication Ltd.
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Park, Shatin, NT, Hong Kong
City: /
Postal Code: /
Country: /
Contact: Gong Zhizhou
Telephone 0086-755-36611722
E-mail: zhizhou.gong@tcl.com

2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science
Park, Shatin, NT, Hong Kong
City: /
Postal Code: /
Country: /
Contact: Gong Zhizhou
Telephone 0086-755-36611722
E-mail: zhizhou.gong@tcl.com

3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY

EQUIPMENT(AE)

3.1. About EUT

Description	5G NR/ LTE/WCDMA/GSM Mobile Phone
Model name	T781S,T781SPP
FCC ID	2ACCJN056
WLAN Frequency Band	ISM Band: 5725MHz~5850MHz
Type of modulation	OFDM
Voltage	3.8V

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
EUT1	016048000215997	03	3D4Y
EUT2	016048000212259	03	3D4Y

*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	/	AE1
AE2	USB Cable	/	AE2
AE3	Charger	/	AE3

AE1

Model	TLp043F1
Manufacturer	BYD
Capacity	4360 mAh
Nominal Voltage	3.85V

AE2

Model	QC13US
Manufacturer	BYD
Note	/

AE3

Model	CDA0000183C1
Manufacturer	Juwei
Length of cable	/

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

3.4. General Description

Equipment Under Test (EUT) is a model of 5G NR/ LTE/WCDMA/GSM 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; 15.209 Radiated emission limits, general requirements; 15.407 General technical requirements	2018
ANSI C63.10	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2013
UNII: KDB 789033 D02	General U-NII Test Procedures New Rules v02r01	2017-12
KDB 558074 D01	Federal Communications Commission Office of Engineering and Technology Laboratory Division GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES	2019

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 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	3.8V
Humidity	44%

7. TEST EQUIPMENTS UTILIZED

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2022-05-24
2	Vector Signal Analyzer	FSW67	104051	Rohde & Schwarz	1 year	2021-12-07
3	LISN	ENV216	101200	Rohde & Schwarz	1 year	2022-05-30
4	Test Receiver	ESCI	100344	Rohde & Schwarz	1 year	2022-02-23
5	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	100235	Rohde & Schwarz	1 year	2022-02-23
2	BiLog Antenna	VULB9163	9163-1223	Schwarzbeck	1 year	2022-03-22
3	Dual-Ridge Waveguide Horn Antenna	3115	6914	ETS-Lindgren	1 year	2022-02-03
4	Bluetooth Tester	CBT	101042	Rohde & Schwarz	1 year	2022-01-03

8. Measurement Uncertainty

8.1. Transmitter Output Power

Measurement Uncertainty: 0.387dB,k=1.96

8.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dB,k=1.96

8.3. Occupied 6dB Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

8.4. Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

8.5. Spurious Emissions

Conducted (k=1.96)

Frequency Range	Uncertainty(dB)
$30\text{MHz} \leq f \leq 2\text{GHz}$	1.22
$2\text{GHz} \leq f \leq 3.6\text{GHz}$	1.22
$3.6\text{GHz} \leq f \leq 8\text{GHz}$	1.22
$8\text{GHz} \leq f \leq 12.75\text{GHz}$	1.51
$12.75\text{GHz} \leq f \leq 26\text{GHz}$	1.51
$26\text{GHz} \leq f \leq 40\text{GHz}$	1.59

Radiated (k=2)

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

8.6. AC Power-line Conducted Emission

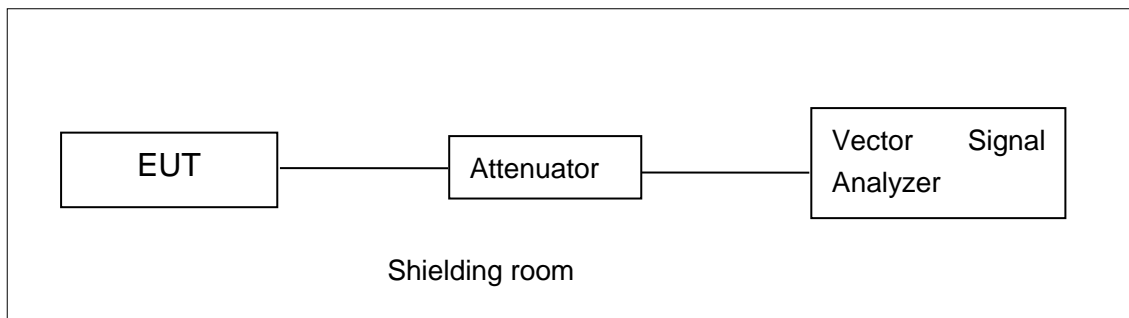
Measurement Uncertainty : 3.08dB,k=2

ANNEX A: MEASUREMENT RESULTS

A.1. Measurement Method

A.1.1. Conducted Measurements

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode.
- 3). Set the EUT to the required channel.
- 4). Set the spectrum analyzer to start measurement.
- 5). Record the values. Vector Signal Analyzer

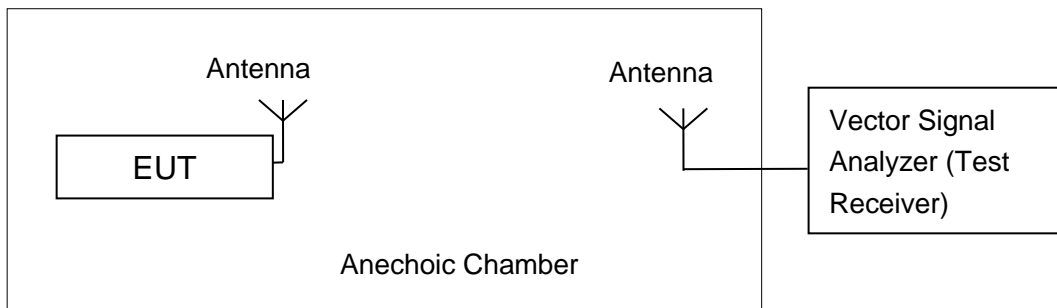


A.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,

Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;

Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 10Hz;



The measurement is made according to ANSI C63.10.

The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

A.2. Maximum Peak Output Power

Measurement Limit and Method:

Standard	Limit (dBm)
FCC CRF Part 15.407(a)	< 30

A.2.1. Maximum Average Output Power-Conducted

Measurement Results:

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	15.18	15.87	16.27

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

802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11n(20MHz)	MCS0	15.20	15.80	16.24

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

802.11ac-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ac(20MHz)	MCS0	15.19	15.79	15.84

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

802.11n-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11n(40MHz)	MCS0	14.70	15.25

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

802.11ac-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11ac(40MHz)	MCS0	15.20	15.76

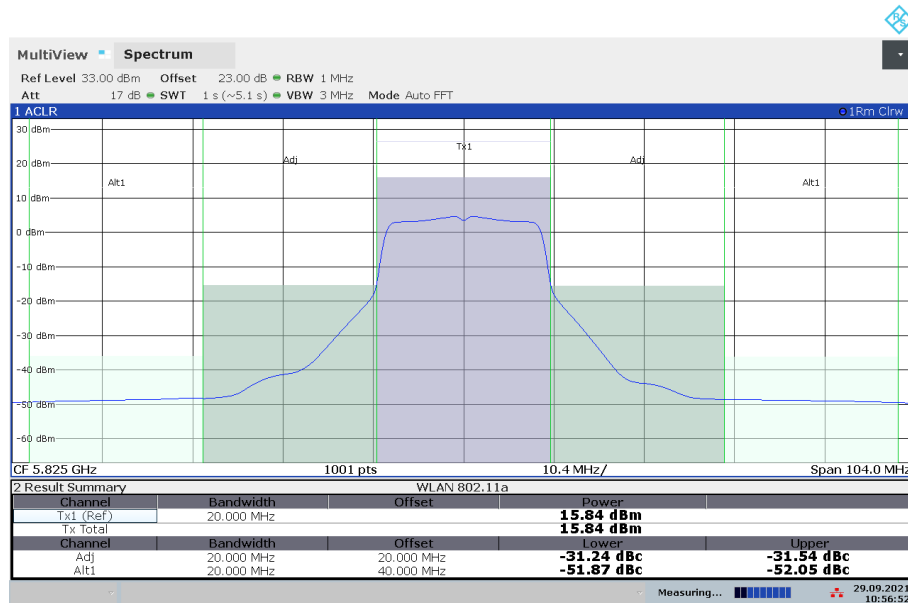
The data rate MCS0 is selected as worse condition, and the following cases are performed with this condition.

802.11ac-HT80 mode

Mode	Data Rate (Index)	Test Result (dBm)
		5775MHz (Ch155)
802.11ac (80MHz)	MCS0	14.99

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

The result of 802.11ac-HT20 ch165 MCS0 shown in this report.



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

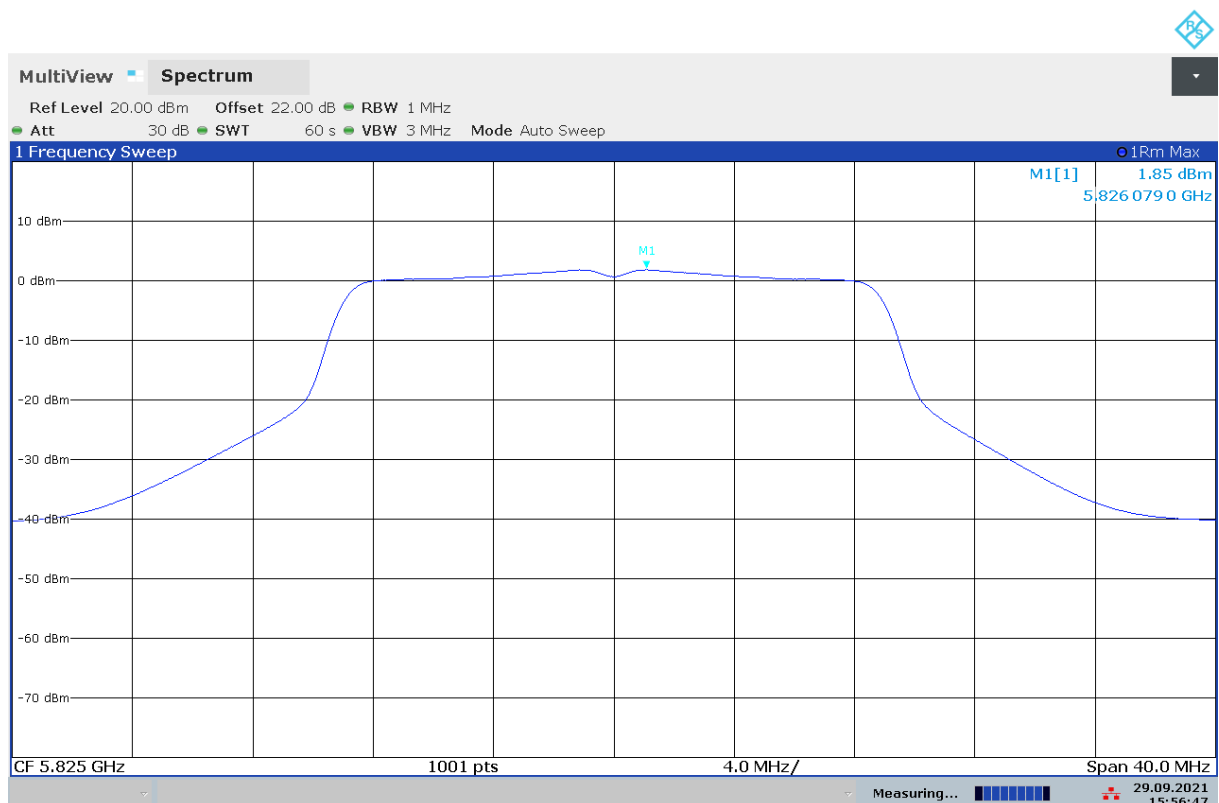
Measurement Uncertainty:

Measurement Uncertainty	0.75dB
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Measurement Results:

Mode	Channel	Power Spectral Density (dBm/500kHz)	Conclusion
802.11a	149	0.31	P
	157	0.96	P
	165	1.48	P
802.11n HT20	149	0.33	P
	157	0.98	P
	165	1.85	P
802.11ac HT40	151	-2.72	P
	159	-2.11	P
802.11ac HT80	155	-3.34	P

The result of 802.11ac-HT20 ch165 MCS0 shown in this report.





Conclusion: PASS

A.4. Occupied 6dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.407 (e)	≥ 500

The measurement is made according to KDB789033 D02 .

Measurement Uncertainty:

Measurement Uncertainty	60.80Hz
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Measurement Result:

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
		Fig.	Value	
802.11a	149	Fig.1	17.76	P
	157	Fig.2	17.72	P
	165	Fig.3	17.68	P
802.11n HT20	149	Fig.4	24.88	P
	157	Fig.5	24.76	P
	165	Fig.6	24.88	P
802.11ac HT40	151	Fig.7	41.92	P
	159	Fig.8	41.76	P
802.11ac HT80	155	Fig.9	84.16	P

Conclusion: PASS

Test graphs as below:

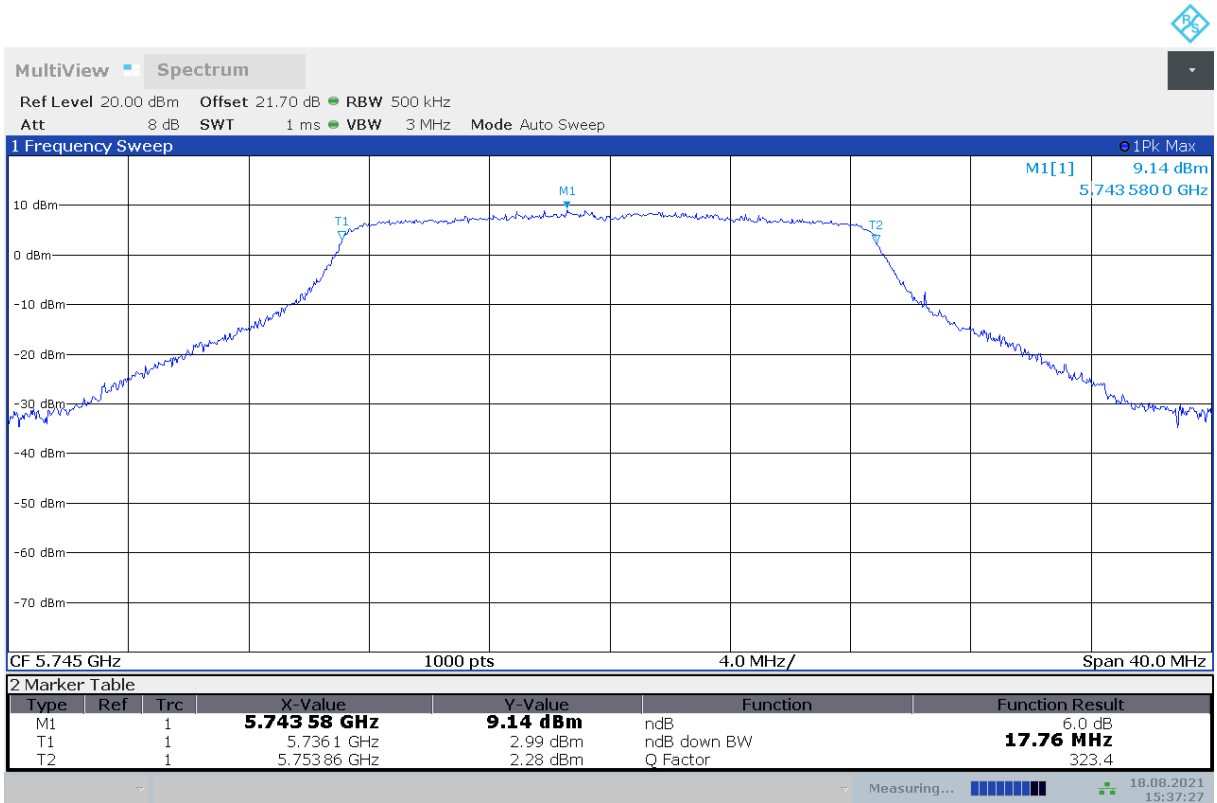


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)

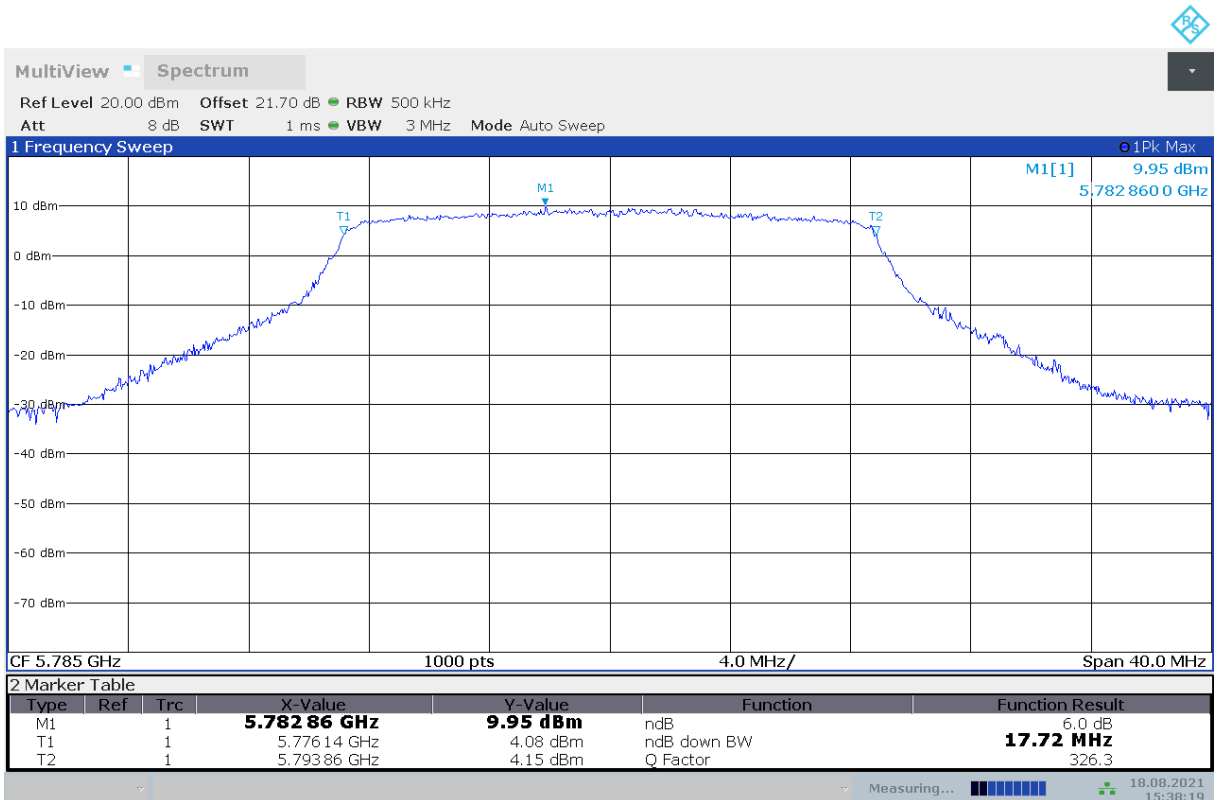


Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)

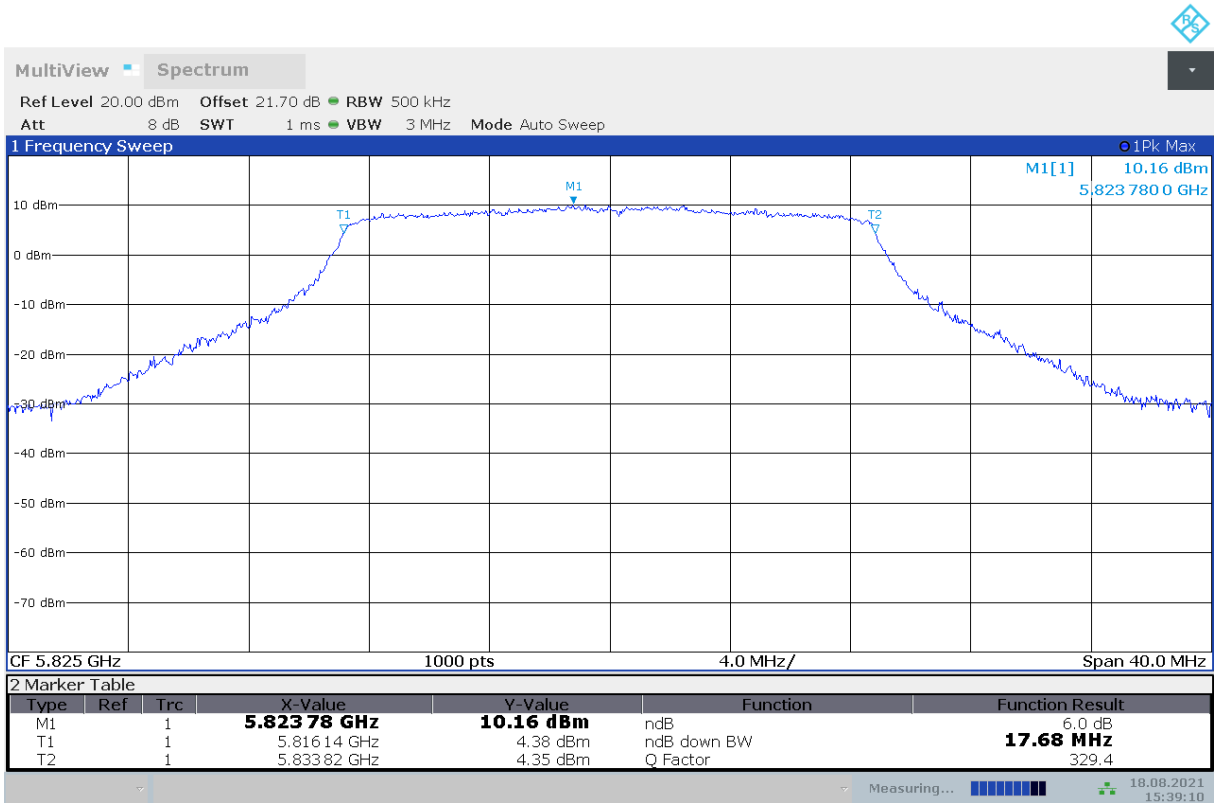


Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)

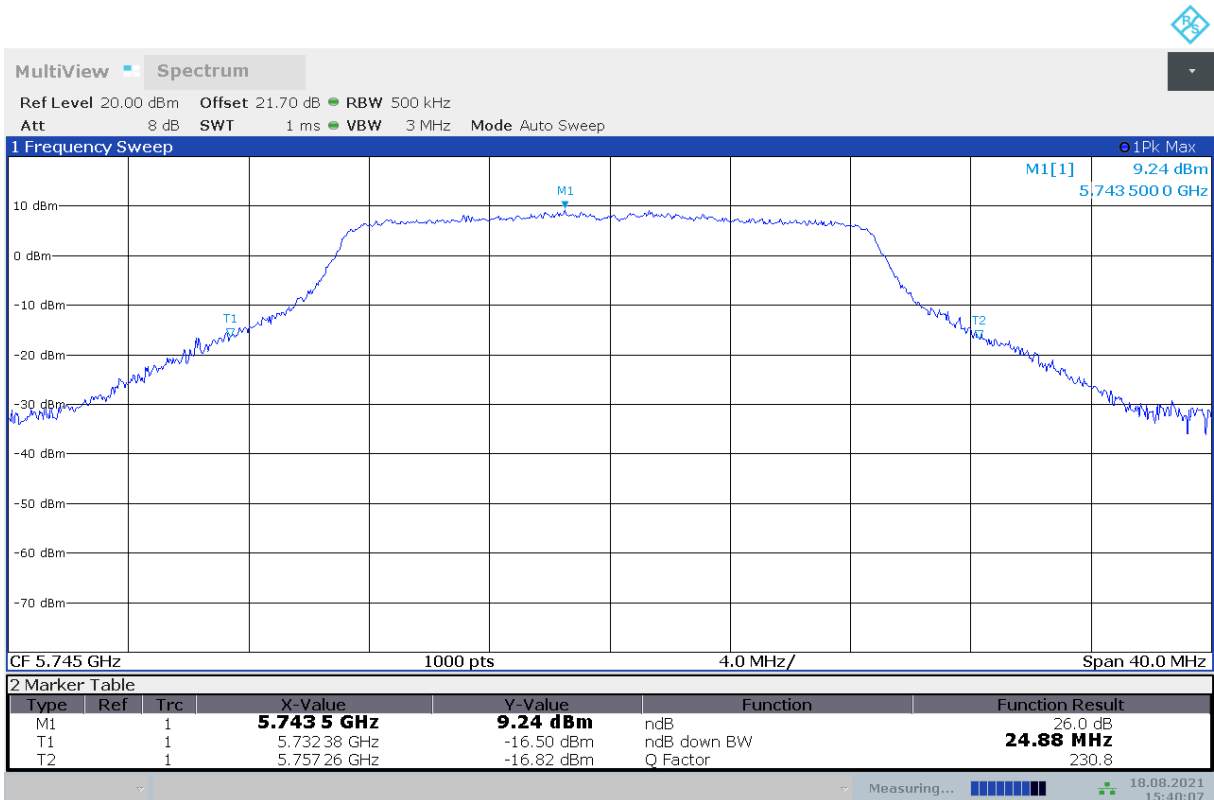


Fig. 4 Occupied 6dB Bandwidth (802.11n-HT20, Ch 149)

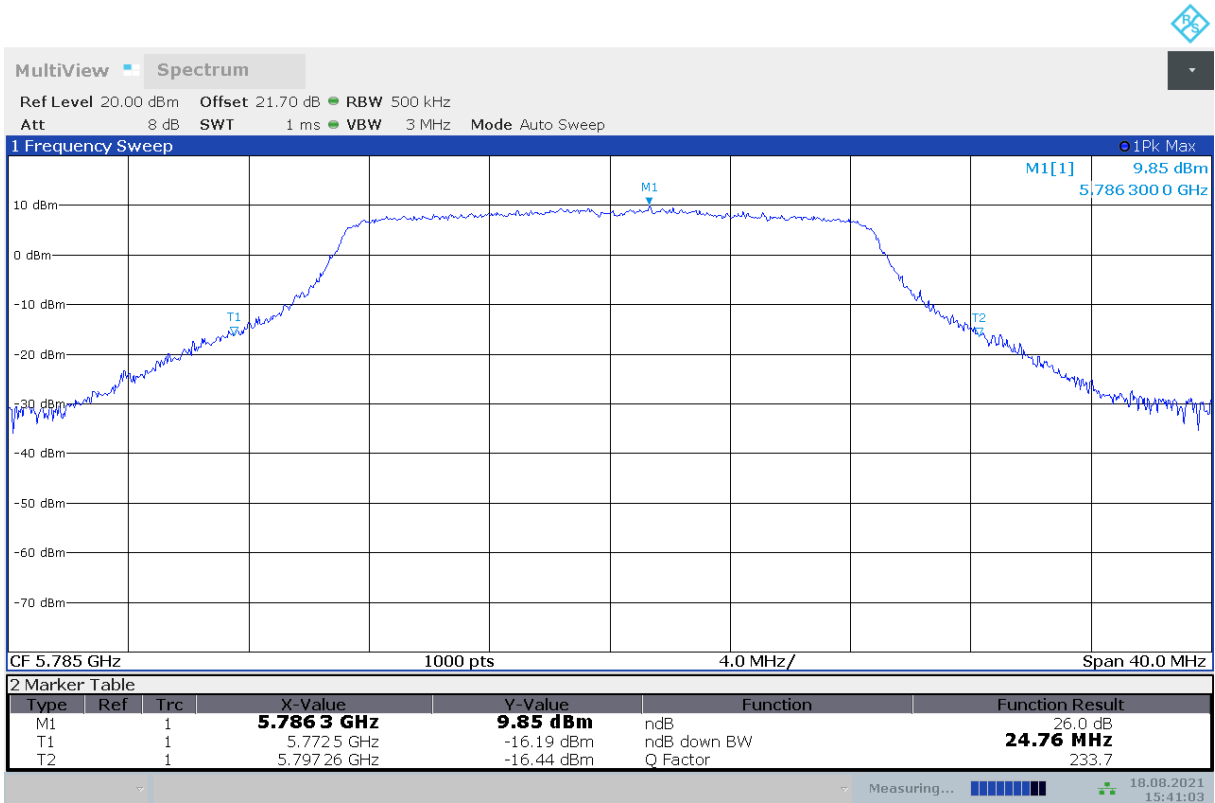


Fig. 5 Occupied 6dB Bandwidth (802.11n-HT20, Ch 157)

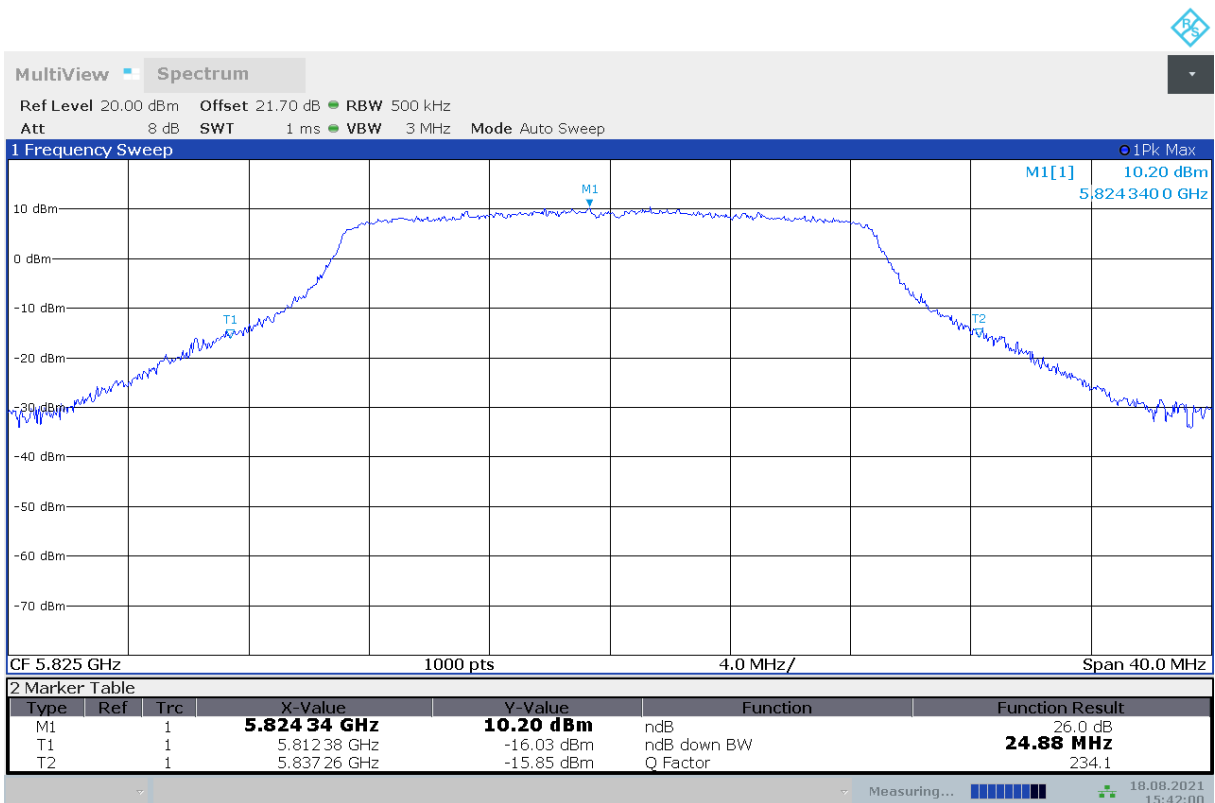


Fig. 6 Occupied 6dB Bandwidth (802.11n-HT20, Ch 165)

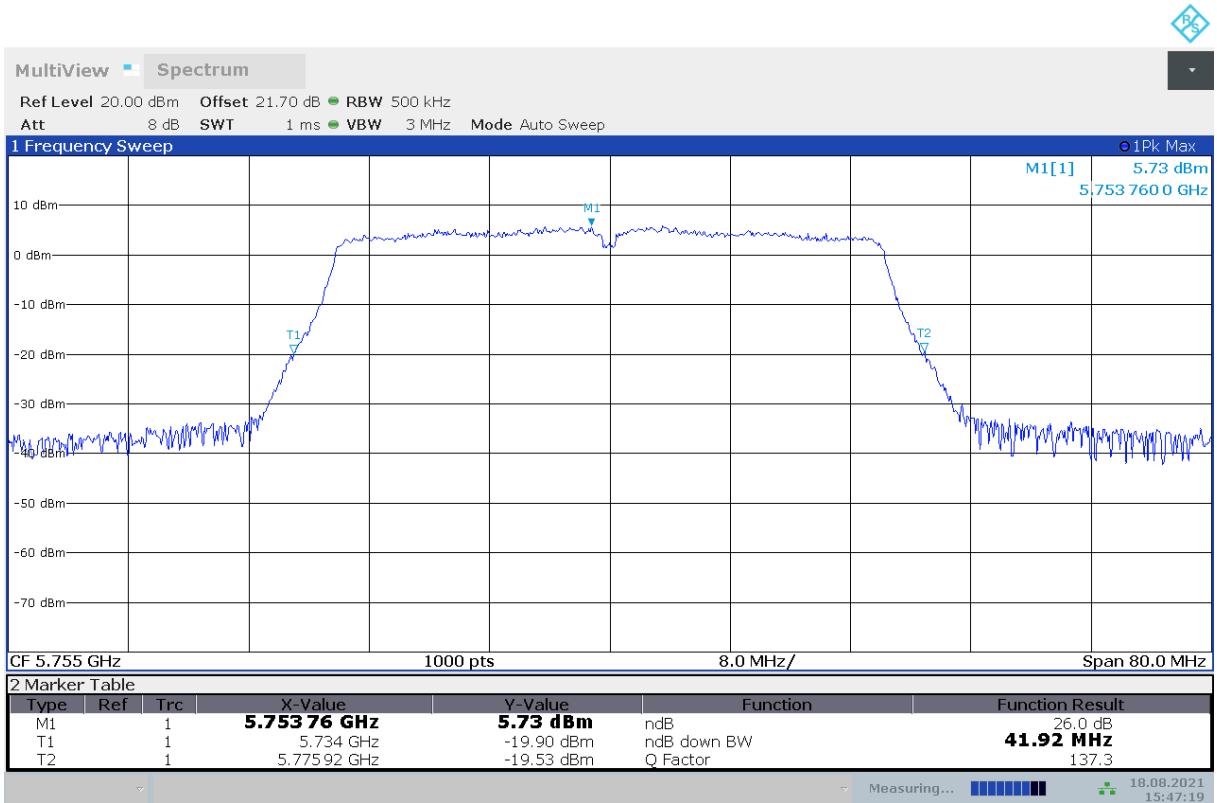


Fig. 7 Occupied 6dB Bandwidth (802.11ac-HT40, Ch 151)

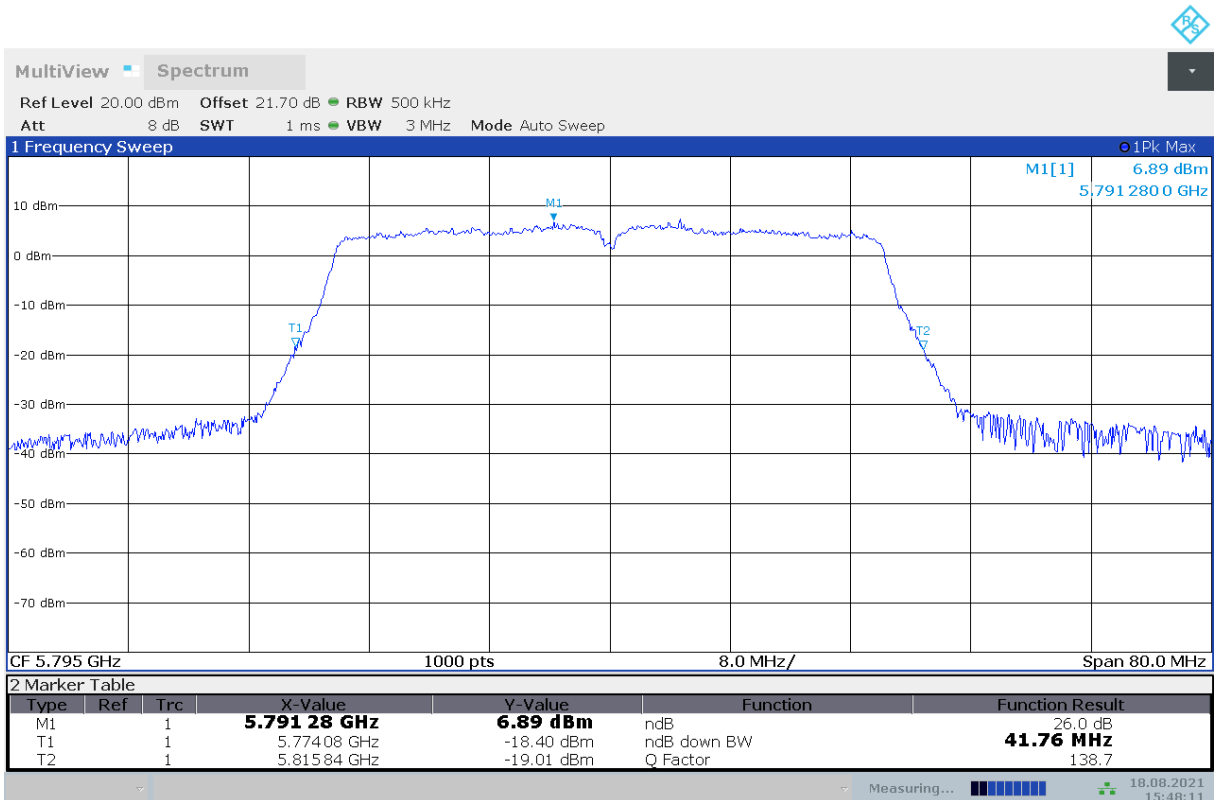


Fig. 8 Occupied 6dB Bandwidth (802.11ac-HT40, Ch 159)

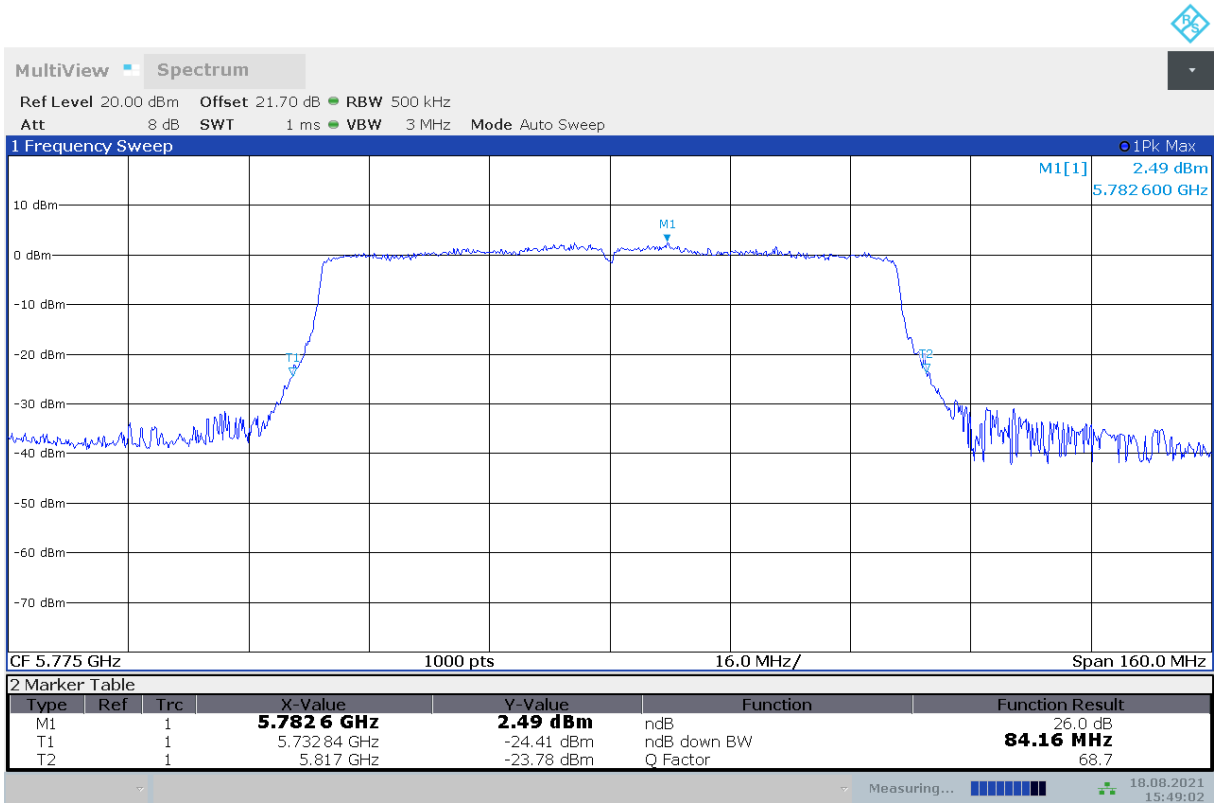


Fig. 9 Occupied 6dB Bandwidth (802.11ac-HT80, Ch 155)

A.5. Transmitter Spurious Emission

Measurement Limit:

Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC 47 CFR Part 15.407	5725MHz~5850MHz	< -27

The measurement is made according to ANSI C63.10 .

In addition, 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)).

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

Measurement Uncertainty:

Frequency Range	Uncertainty(dB)
30MHz ≤ f ≤ 2GHz	0.63
2GHz ≤ f ≤ 3.6GHz	0.82
3.6GHz ≤ f ≤ 8GHz	1.55
8GHz ≤ f ≤ 20GHz	1.86
20GHz ≤ f ≤ 22GHz	1.90
22GHz ≤ f ≤ 26GHz	2.20

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

EUT ID: EUT1

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

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

Note1:

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.

Note2: The measurement results showed here are worst cases.

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)
17980.200	46.35	-25.50	46.66	25.19	54.00	7.65	V
17981.800	46.23	-25.50	46.66	25.07	54.00	7.77	V
14493.800	39.51	-28.59	42.46	25.64	54.00	14.49	V
14496.500	39.45	-28.59	42.46	25.58	54.00	14.55	H
11822.400	35.28	-31.85	39.05	28.08	54.00	18.72	V
11820.800	35.16	-31.85	39.05	27.96	54.00	18.84	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)
17987.900	46.57	-25.50	46.66	25.41	54.00	7.43	H
17998.900	46.53	-25.50	46.66	25.37	54.00	7.47	H
14477.800	39.58	-28.59	42.46	25.71	54.00	14.42	V
14474.000	39.44	-28.59	42.46	25.57	54.00	14.56	V
11893.400	34.95	-31.85	39.05	27.75	54.00	19.05	V
11829.500	34.92	-31.85	39.05	27.72	54.00	19.08	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)
17989.500	46.29	-25.50	46.66	25.13	54.00	7.71	V
17994.500	46.26	-25.50	46.66	25.10	54.00	7.74	H
14497.000	39.53	-28.59	42.46	25.66	54.00	14.47	H
14477.200	39.41	-28.59	42.46	25.54	54.00	14.59	H
11845.500	35.10	-31.85	39.05	27.90	54.00	18.90	H
11834.500	34.96	-31.85	39.05	27.76	54.00	19.04	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)
17987.900	46.13	-25.50	46.66	24.97	54.00	7.87	H
17994.000	46.08	-25.50	46.66	24.92	54.00	7.92	H
14474.000	39.40	-28.59	42.46	25.53	54.00	14.60	H
14476.100	39.33	-28.59	42.46	25.46	54.00	14.67	H
11812.000	35.01	-31.85	39.05	27.81	54.00	18.99	H
11816.400	35.00	-31.85	39.05	27.80	54.00	19.00	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)
17985.700	46.36	-25.50	46.66	25.20	54.00	7.64	V
17996.200	46.33	-25.50	46.66	25.17	54.00	7.67	H
14490.500	39.60	-28.59	42.46	25.73	54.00	14.40	H
14472.900	39.35	-28.59	42.46	25.48	54.00	14.65	H
11836.100	35.35	-31.85	39.05	28.15	54.00	18.65	H
11859.200	34.99	-31.85	39.05	27.79	54.00	19.01	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)
17987.900	46.57	-25.50	46.66	25.41	54.00	7.43	V
17992.300	46.50	-25.50	46.66	25.34	54.00	7.50	V
14498.100	39.63	-28.59	42.46	25.76	54.00	14.37	H
14497.000	39.33	-28.59	42.46	25.46	54.00	14.67	V
11815.800	35.04	-31.85	39.05	27.84	54.00	18.96	V
11851.000	35.04	-31.85	39.05	27.84	54.00	18.96	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)
17988.500	46.35	-25.50	46.66	25.19	54.00	7.65	H
17995.600	46.29	-25.50	46.66	25.13	54.00	7.71	V
14492.600	39.41	-28.59	42.46	25.54	54.00	14.59	H
14494.900	39.37	-28.59	42.46	25.50	54.00	14.63	H
11841.600	35.16	-31.85	39.05	27.96	54.00	18.84	H
11819.100	35.01	-31.85	39.05	27.81	54.00	18.99	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)
17997.200	46.49	-25.50	46.66	25.33	54.00	7.51	H
17979.700	46.28	-25.50	46.66	25.12	54.00	7.72	V
14495.400	39.43	-28.59	42.46	25.56	54.00	14.57	V
14499.800	39.25	-28.59	42.46	25.38	54.00	14.75	H
11820.200	35.14	-31.85	39.05	27.94	54.00	18.86	V
11812.000	34.96	-31.85	39.05	27.76	54.00	19.04	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)
17981.300	46.44	-25.50	46.66	25.28	54.00	7.56	V
17983.000	46.29	-25.50	46.66	25.13	54.00	7.71	V
14496.500	39.41	-28.59	42.46	25.54	54.00	14.59	V
14487.700	39.35	-28.59	42.46	25.48	54.00	14.65	H
11831.800	34.91	-31.85	39.05	27.71	54.00	19.09	V
11815.200	34.86	-31.85	39.05	27.66	54.00	19.14	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)
17988.500	46.46	-25.50	46.66	25.30	54.00	7.54	V
17991.800	46.41	-25.50	46.66	25.25	54.00	7.59	H
14497.000	39.58	-28.59	42.46	25.71	54.00	14.42	V
14488.800	39.48	-28.59	42.46	25.61	54.00	14.52	H
11821.900	35.29	-31.85	39.05	28.09	54.00	18.71	H
11897.800	35.13	-31.85	39.05	27.93	54.00	18.87	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)
17980.800	46.69	-25.50	46.66	25.53	54.00	7.31	H
17998.300	46.69	-25.50	46.66	25.53	54.00	7.31	H
14499.800	39.41	-28.59	42.46	25.54	54.00	14.59	H
14483.900	39.39	-28.59	42.46	25.52	54.00	14.61	V
11818.000	34.98	-31.85	39.05	27.78	54.00	19.02	H
11832.300	34.98	-31.85	39.05	27.78	54.00	19.02	V

802.11ac-HT40

Channel 151

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17987.900	46.53	-25.50	46.66	25.37	54.00	7.47	H
17997.200	46.26	-25.50	46.66	25.10	54.00	7.74	V
14497.000	39.63	-28.59	42.46	25.76	54.00	14.37	V
14486.000	39.27	-28.59	42.46	25.40	54.00	14.73	V
11841.600	35.02	-31.85	39.05	27.82	54.00	18.98	H
11840.500	34.87	-31.85	39.05	27.67	54.00	19.13	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)
17987.900	46.52	-25.50	46.66	25.36	54.00	7.48	V
17998.300	46.42	-25.50	46.66	25.26	54.00	7.58	H
14493.800	39.68	-28.59	42.46	25.81	54.00	14.32	V
14494.900	39.41	-28.59	42.46	25.54	54.00	14.59	V
11840.000	35.24	-31.85	39.05	28.04	54.00	18.76	V
11917.500	34.86	-31.48	39.09	27.25	54.00	19.14	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)
17995.600	46.77	-25.50	46.66	25.61	54.00	7.23	H
17990.100	46.26	-25.50	46.66	25.10	54.00	7.74	V
14472.300	39.30	-28.59	42.46	25.43	54.00	14.70	V
14481.100	39.18	-28.59	42.46	25.31	54.00	14.82	H
11856.000	35.08	-31.85	39.05	27.88	54.00	18.92	V
11834.500	34.99	-31.85	39.05	27.79	54.00	19.01	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)
17998.900	57.77	-25.50	46.66	36.61	74.00	16.23	V
17991.800	57.69	-25.50	46.66	36.53	74.00	16.31	V
14436.000	51.36	-28.59	42.46	37.49	68.30	16.94	V
14486.000	51.36	-28.59	42.46	37.49	74.00	22.64	H
11414.300	47.10	-32.42	38.79	40.73	74.00	26.90	H
11805.900	46.95	-31.85	39.05	39.75	74.00	27.05	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)
17993.400	57.79	-25.50	46.66	36.63	74.00	16.21	V
17998.300	57.65	-25.50	46.66	36.49	74.00	16.35	H
14539.400	51.19	-27.29	41.90	36.58	68.30	17.11	V
14413.500	51.17	-28.59	42.46	37.30	68.30	17.13	V
11973.100	46.70	-31.48	39.09	39.09	74.00	27.30	V
11725.000	46.65	-31.99	38.98	39.66	74.00	27.35	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)
17998.900	57.53	-25.50	46.66	36.37	74.00	16.47	H
17991.200	57.46	-25.50	46.66	36.30	74.00	16.54	V
14395.300	51.30	-28.59	42.46	37.43	68.30	17.00	V
14439.300	51.24	-28.59	42.46	37.37	68.30	17.06	V
11936.800	47.26	-31.48	39.09	39.65	74.00	26.74	V
11595.800	47.03	-32.31	38.91	40.44	74.00	26.97	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)
17906.000	58.14	-25.50	46.66	36.98	74.00	15.86	H
17967.500	57.57	-25.50	46.66	36.41	74.00	16.43	H
14683.000	51.08	-28.32	41.35	38.06	68.30	17.22	V
14406.300	51.02	-28.59	42.46	37.15	68.30	17.28	V
11899.400	47.66	-31.85	39.05	40.46	74.00	26.34	H
11706.900	46.49	-31.99	38.98	39.50	74.00	27.51	H

Channel 157

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17941.700	57.75	-25.50	46.66	36.59	74.00	16.25	V
17963.700	57.64	-25.50	46.66	36.48	74.00	16.36	V
14700.000	51.29	-28.32	41.35	38.27	68.30	17.01	H
14685.100	51.10	-28.32	41.35	38.08	68.30	17.20	V
11841.600	47.02	-31.85	39.05	39.82	74.00	26.98	H
11908.200	46.86	-31.85	39.05	39.66	74.00	27.14	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)
17995.600	58.19	-25.50	46.66	37.03	74.00	15.81	V
17989.500	58.11	-25.50	46.66	36.95	74.00	15.89	H
14367.200	51.98	-28.42	42.34	38.06	68.30	16.32	H
14435.500	51.19	-28.59	42.46	37.32	68.30	17.11	H
11391.200	47.01	-32.42	38.79	40.64	74.00	26.99	V
11777.900	46.61	-31.99	38.98	39.62	74.00	27.39	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)
17967.500	57.58	-25.50	46.66	36.42	74.00	16.42	V
17996.700	57.42	-25.50	46.66	36.26	74.00	16.58	V
14306.200	52.04	-28.42	42.34	38.12	68.30	16.26	H
14493.800	51.47	-28.59	42.46	37.60	74.00	22.53	H
11850.500	47.54	-31.85	39.05	40.34	74.00	26.46	V
11984.600	46.88	-31.48	39.09	39.27	74.00	27.12	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)
17989.000	58.13	-25.50	46.66	36.97	74.00	15.87	V
17990.700	57.69	-25.50	46.66	36.53	74.00	16.31	H
14297.400	51.51	-28.42	42.34	37.59	68.30	16.79	V
14580.600	51.45	-27.29	41.90	36.84	68.30	16.85	V
11930.200	47.23	-31.48	39.09	39.62	74.00	26.77	H
11915.900	46.74	-31.48	39.09	39.13	74.00	27.26	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)
17975.200	58.24	-25.50	46.66	37.08	74.00	15.76	H
17970.800	57.70	-25.50	46.66	36.54	74.00	16.30	H
14457.500	51.72	-28.59	42.46	37.85	68.30	16.58	V
14520.700	51.69	-28.59	42.46	37.82	68.30	16.61	H
11838.400	46.96	-31.85	39.05	39.76	74.00	27.04	H
11817.500	46.91	-31.85	39.05	39.71	74.00	27.09	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)
17959.300	58.11	-25.50	46.66	36.95	74.00	15.89	H
17983.500	57.80	-25.50	46.66	36.64	74.00	16.20	H
14421.700	51.58	-28.59	42.46	37.71	68.30	16.72	H
14282.500	51.27	-28.42	42.34	37.35	68.30	17.03	V
11997.900	47.20	-31.48	39.09	39.59	74.00	26.80	H
11519.900	46.96	-32.26	38.84	40.39	74.00	27.04	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)
17963.700	58.49	-25.50	46.66	37.33	74.00	15.51	V
17992.800	57.77	-25.50	46.66	36.61	74.00	16.23	H
14432.700	51.81	-28.59	42.46	37.94	68.30	16.49	V
14388.100	51.62	-28.42	42.34	37.70	68.30	16.68	H
11542.500	47.48	-32.26	38.84	40.91	74.00	26.52	V
11878.500	46.62	-31.85	39.05	39.42	74.00	27.38	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)
17998.300	58.59	-25.50	46.66	37.43	74.00	15.41	H
17988.500	57.97	-25.50	46.66	36.81	74.00	16.03	V
14405.800	51.62	-28.59	42.46	37.75	68.30	16.68	H
14313.400	51.48	-28.42	42.34	37.56	68.30	16.82	V
11618.400	47.27	-32.31	38.91	40.68	74.00	26.73	V
11895.500	47.06	-31.85	39.05	39.86	74.00	26.94	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)
17969.200	58.68	-25.50	46.66	37.52	74.00	15.32	V
17987.300	57.66	-25.50	46.66	36.50	74.00	16.34	H
14370.500	51.61	-28.42	42.34	37.69	68.30	16.69	V
14685.100	51.53	-28.32	41.35	38.51	68.30	16.77	H
11999.500	46.86	-31.48	39.09	39.25	74.00	27.14	H
11854.900	46.75	-31.85	39.05	39.55	74.00	27.25	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)
17977.500	57.94	-25.50	46.66	36.78	74.00	16.06	V
17959.300	57.87	-25.50	46.66	36.71	74.00	16.13	H
14830.900	51.80	-28.59	40.79	39.60	68.30	16.50	V
14416.800	51.72	-28.59	42.46	37.85	68.30	16.58	V
11939.000	47.43	-31.48	39.09	39.82	74.00	26.57	V
11842.200	47.01	-31.85	39.05	39.81	74.00	26.99	V

A.6. Band Edges Compliance

A6.1 Band Edges - Radiated

Measurement Limit:

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

Measurement Result:

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

Conclusion: PASS

Note: The measurement results showed here are worst cases.

Test graphs as below:

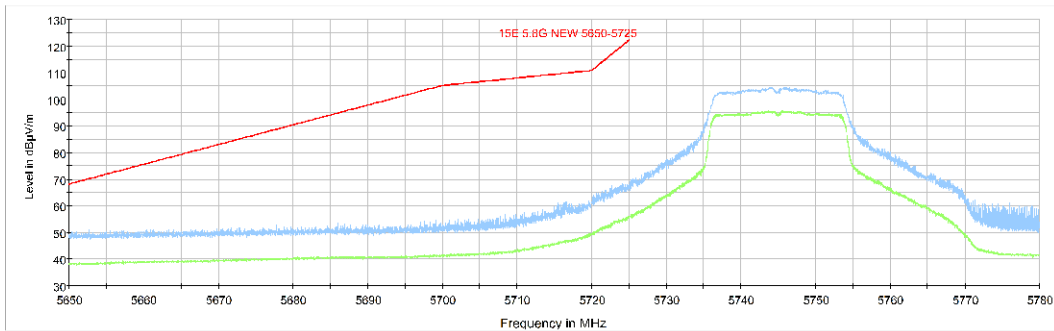


Fig. 10 Band Edges (802.11a Ch149,5745MHz)

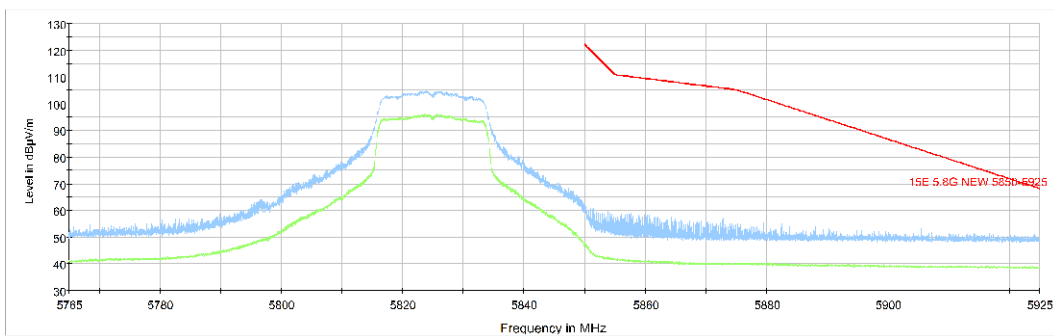


Fig. 11 Band Edges (802.11a Ch165, 5825MHz)

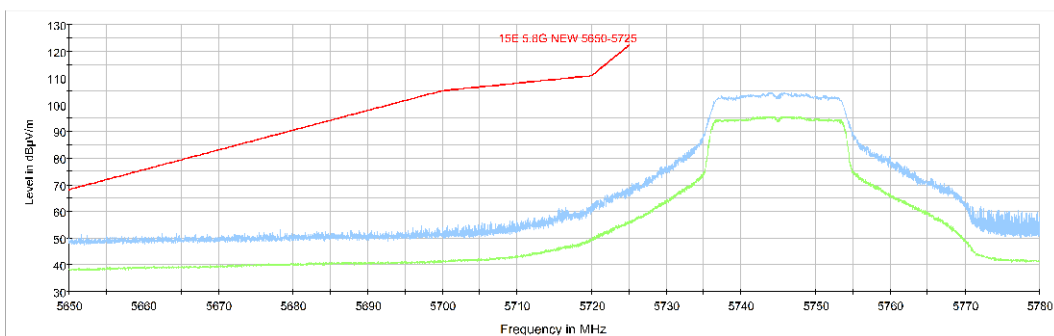


Fig. 12 Band Edges (802.11n-HT20 Ch149, 5745MHz)

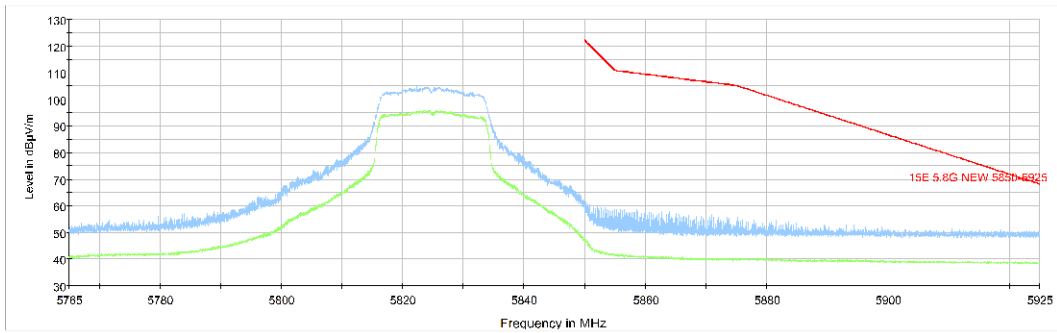


Fig. 13 Band Edges (802.11n-HT20 Ch165, 5825MHz)

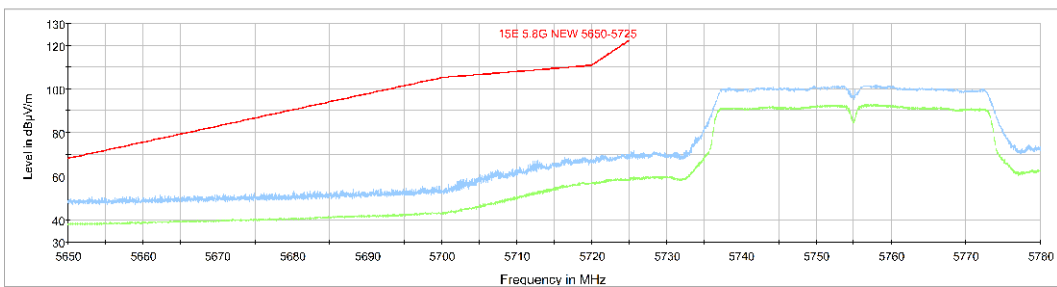


Fig. 14 Band Edges (802.11n-HT40 Ch151, 5755MHz)

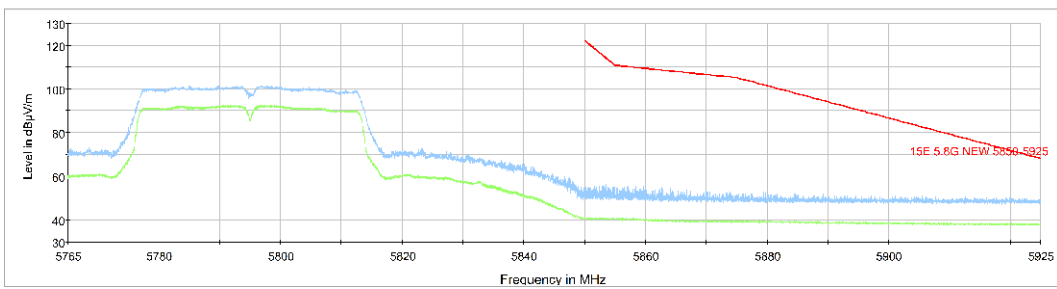


Fig. 15 Band Edges (802.11n-HT40 Ch159, 5795MHz)

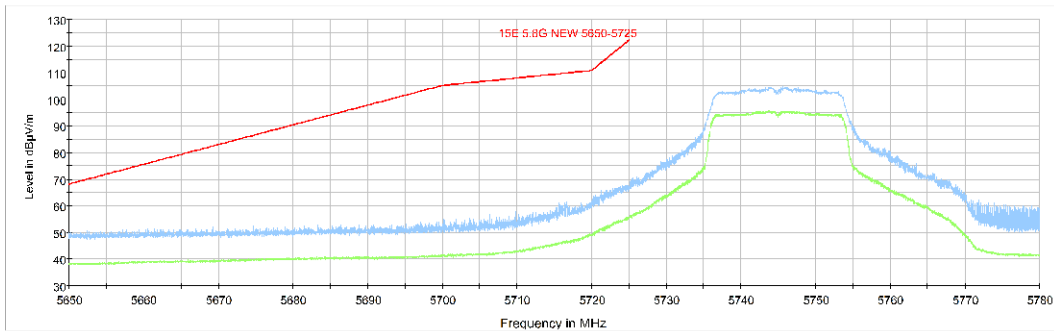


Fig. 16 Band Edges (802.11ac-HT20 Ch149, 5745MHz)

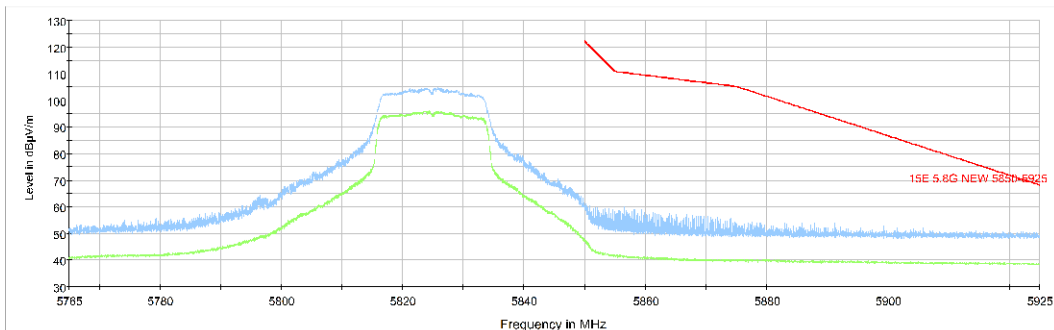


Fig. 17 Band Edges (802.11ac-HT20 Ch165, 5825MHz)

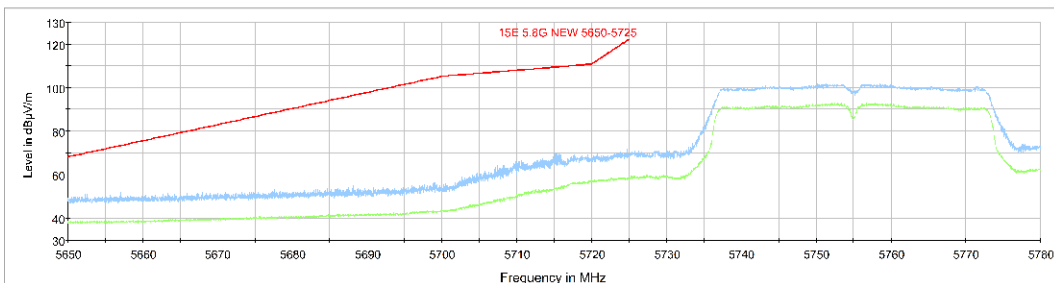


Fig. 18 Band Edges (802.11ac-HT40 Ch151, 5755MHz)

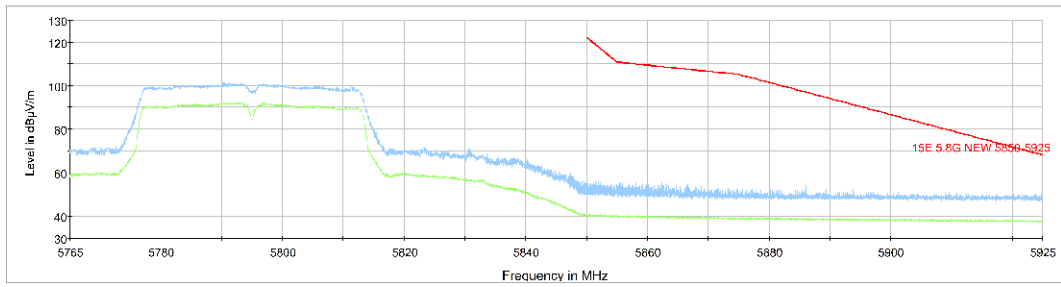


Fig. 19 Band Edges (802.11ac-HT40 Ch159, 5795MHz)

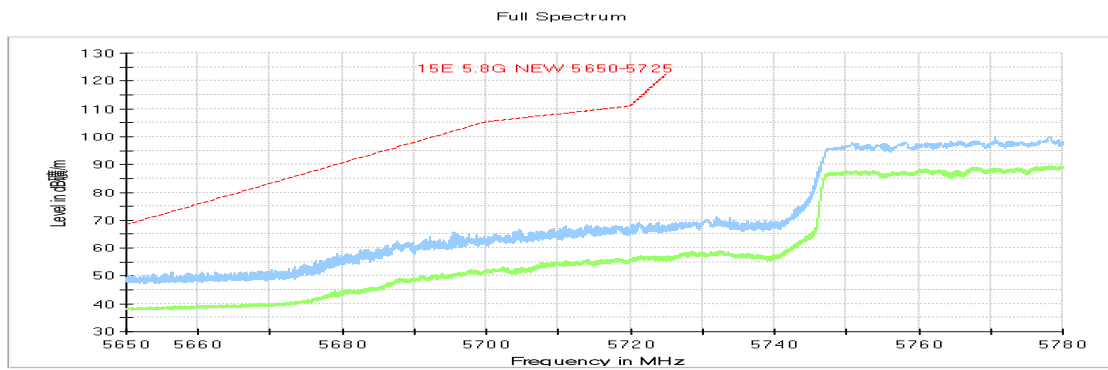


Fig. 20 Band Edges (802.11ac-HT80 Ch155, 5775MHz)

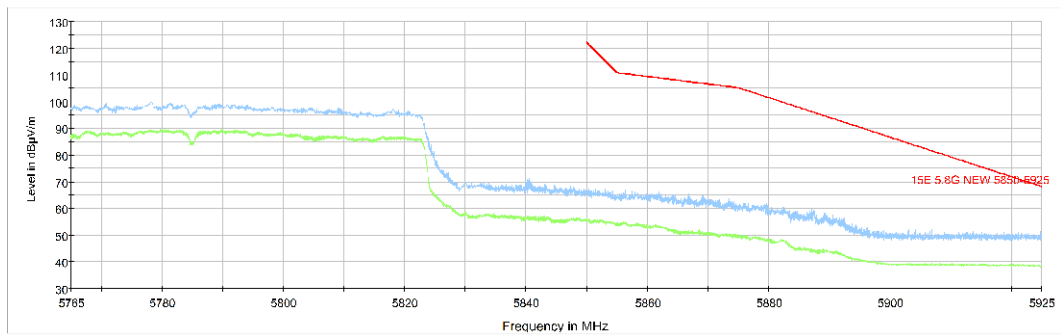


Fig. 21 Band Edges (802.11ac-HT80, 5775MHz)

A.7. AC Powerline Conducted Emission

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement uncertainty:

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

EUT ID: EUT1

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

Note: The measurement results showed here are worst cases.

Test graphs as below:

Traffic:

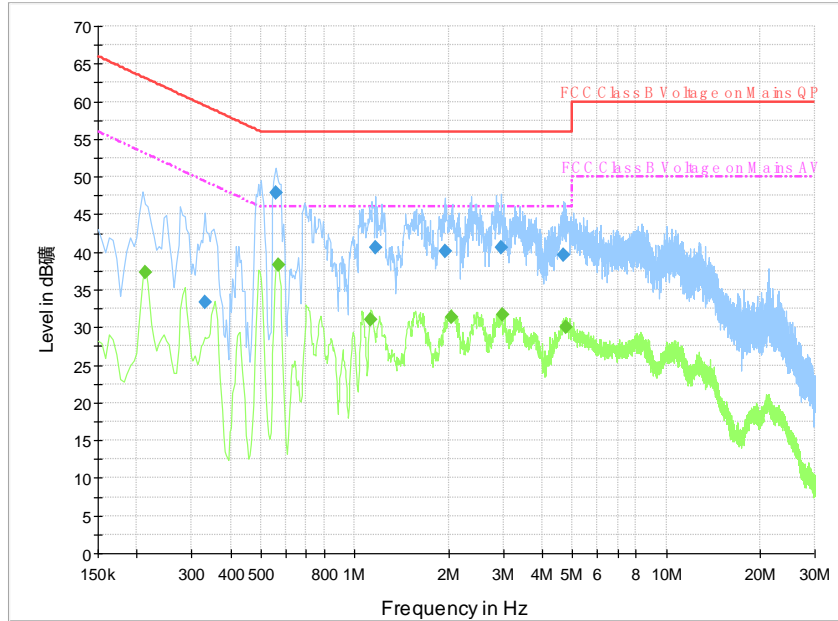


Fig. 22 AC Power line Conducted Emission-802.11a

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

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.330000	33.4	1000.0	9.000	On	L1	19.9	26.0	59.5
0.559500	47.9	1000.0	9.000	On	L1	19.9	8.1	56.0
1.167000	40.6	1000.0	9.000	On	L1	19.6	15.4	56.0
1.945500	40.1	1000.0	9.000	On	L1	19.4	15.9	56.0
2.958000	40.6	1000.0	9.000	On	L1	19.5	15.4	56.0
4.672500	39.6	1000.0	9.000	On	L1	19.6	16.4	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.213000	37.3	1000.0	9.000	On	N	19.8	15.8	53.1
0.568500	38.2	1000.0	9.000	On	N	19.9	7.8	46.0
1.126500	31.0	1000.0	9.000	On	L1	19.5	15.0	46.0
2.044500	31.4	1000.0	9.000	On	L1	19.5	14.6	46.0
2.980500	31.7	1000.0	9.000	On	L1	19.5	14.3	46.0
4.758000	30.1	1000.0	9.000	On	L1	19.6	15.9	46.0

Note2: The measurement results showed here are worst cases.

Idle:

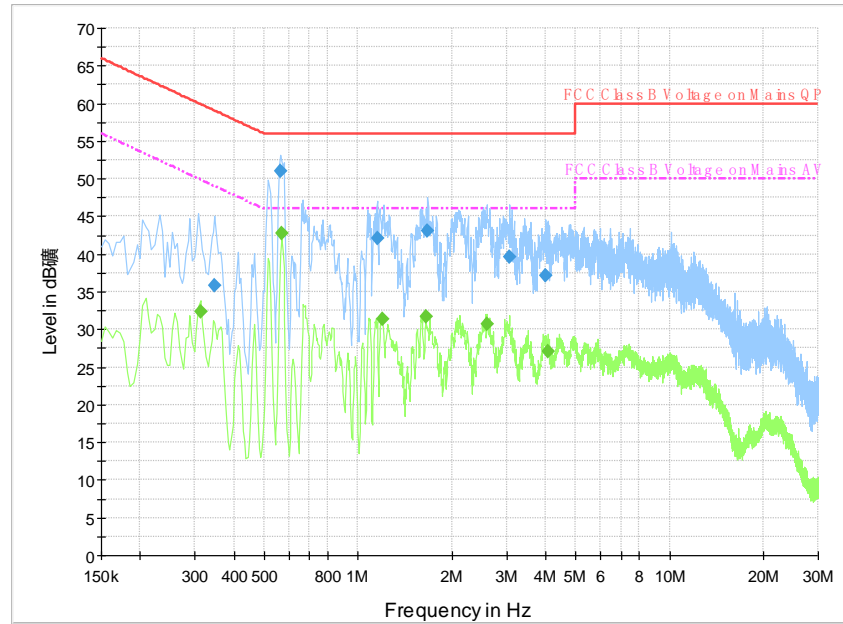


Fig. 23 AC Power line Conducted Emission-Idle

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

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.348000	35.7	1000.0	9.000	On	L1	20.0	23.3	59.0
0.564000	51.0	1000.0	9.000	On	L1	19.8	5.0	56.0
1.153500	42.0	1000.0	9.000	On	L1	19.6	14.0	56.0
1.675500	43.0	1000.0	9.000	On	L1	19.5	13.0	56.0
3.061500	39.6	1000.0	9.000	On	L1	19.5	16.4	56.0
4.011000	37.1	1000.0	9.000	On	L1	19.6	18.9	56.0

Final Result 2




Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.312000	32.4	1000.0	9.000	On	N	19.9	17.5	49.9
0.568500	42.7	1000.0	9.000	On	L1	19.8	3.3	46.0
1.194000	31.4	1000.0	9.000	On	L1	19.5	14.6	46.0
1.657500	31.7	1000.0	9.000	On	L1	19.5	14.3	46.0
2.602500	30.8	1000.0	9.000	On	L1	19.5	15.2	46.0
4.083000	27.1	1000.0	9.000	On	L1	19.6	18.9	46.0

Note2: The measurement results showed here are worst cases.

ANNEX B: EUT parameters

Disclaimer: The worse case provided by the client may affect the validity of the measurement results in this report, and the client shall bear the impact and consequences arising therefrom.

ANNEX C: Accreditation Certificate

<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>	
2020-09-29 through 2021-09-30 <i>Effective Dates</i>	 For the National Voluntary Laboratory Accreditation Program

*** END OF REPORT BODY ***