



FCC PART 15E TEST REPORT No.24T04Z101463-021

for

POINTMOBILE CO., LTD

Mobile Computer

PM452

FCC ID: V2X-PM452

with

Hardware Version: MP

Software Version: 452.00.XX

Issued Date: 2024-08-26

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

Report Number	Revision	Description	Issue Date
24T04Z101463-021	Rev.0	1st edition	2024-08-16
24T04Z101463-021	Rev.1	2 nd edition 1.Modified power supply information. 2.Added modulation types for OFDMA. 3.Added A.7 Antenna Requirement.	2024-08-26

Note: the latest revision of the test report supersedes all previous version.

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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 American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2. Testing Location

Conducted testing Location: CTTL(huayuan North Road)

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

Radiated testing Location: CTTL(BDA)

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

1.3. TestingEnvironment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.4. Project date

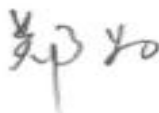
Testing Start Date: 2024-06-21

Testing End Date: 2024-08-15

1.5. Signature



Dong Jiaxuan
(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: POINTMOBILE CO., LTD
Address/Post: A-26F, Building Gasan Publik 178, Digital-ro, Geumcheon-gu
Seoul, 08513 Republic of Korea
Contact: Hanna Chae
Email: certi.manager@pointmobile.com
Tel.: +82 10 7773 8827
Fax: +82 2-3397-7872

2.2. Manufacturer Information

Company Name: POINTMOBILE CO., LTD
Address/Post: A-26F, Building Gasan Publik 178, Digital-ro, Geumcheon-gu
Seoul, 08513 Republic of Korea
Contact: Hanna Chae
Email: certi.manager@pointmobile.com
Tel.: +82 10 7773 8827
Fax: +82 2-3397-7872

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Mobile Computer
Model name	PM452
FCC ID	V2X-PM452
WLAN Frequency Band	ISM Band: 5725MHz~5850MHz
Type of modulation	OFDM/OFDMA
Nominal Voltage	3.63V

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Date of receipt
UT14a	356658610001989	MP	452.00.XX	2024-06-21
UT05a	356658610000338	MP	452.00.XX	2024-06-21

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

UT05a is used for Conduction test, UT14a is used for Radiation test.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Model	Manufacturer
AE1-1	Battery1	451-BTEC	ZhuHai Gushine Electronic Technology Co.,Ltd
AE1-2	Battery2	451-BTSC/BP19-002770	ETI CA Battery Inc.

*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 Mobile Computer with integrated antenna. It consists of normal options: Battery and Charger.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the Client.

4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

FCC Part15	FCC CFR 47, Part 15, Subpart C and E:	
	15.205 Restricted bands of operation;	2021
	15.209 Radiated emission limits, general requirements;	
	15.407 General technical requirements	
ANSI C63.10	Methods of Measurement of Radio-Noise Emissions from	
	Low-Voltage Electrical and Electronic Equipment in the	2013
	Range of 9 kHz to 40 GHz	
UNII: KDB 789033	General U-NII Test Procedures New Rules v02r01	2017-12
D02		

5. Laboratory Environment

Conducted RF performance testing is performed in shielding room.

EMC performance testing is performed in Semi-anechoic chamber.

6. Test Results

6.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15E	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
Radiated Unwanted Emission	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 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.

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	3.63V
Humidity	44%

7. Test Facilities 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	2025-07-04
2	Vector Signal Analyzer	FSW67	104051	Rohde & Schwarz	1 year	2025-04-06
3	Test Receiver	ESCI 3	100344	R&S	1 year	2025-04-01
4	LISN	ENV216	101200	R&S	1 year	2025-05-16
5	Attenuator	10dB/2W	/	Rosenberger	/	/
6	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESW44	103144	R&S	1 year	2024-11-26
2	EMI Antenna	VULB 9163	01223	SCHWARZBECK	1 year	2024-08-18
3	EMI Antenna	3115	00167250	ETS-Lindgren	1 year	2025-05-11
4	EMI Antenna	3116	2663	ETS-Lindgren	1 year	2025-03-21

Test Software

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V10.60.20	R&S
Conducted Emission	EMC32 V8.53.0	R&S

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. 6dB Emission 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

8.6. Radiated Unwanted Emission

Radiated (k=2)

Frequency Range	Uncertainty(dB)
9kHz-30MHz	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	4.72
$1\text{GHz} \leq f \leq 18\text{GHz}$	4.84
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.12

8.7. AC Power-line Conducted Emission

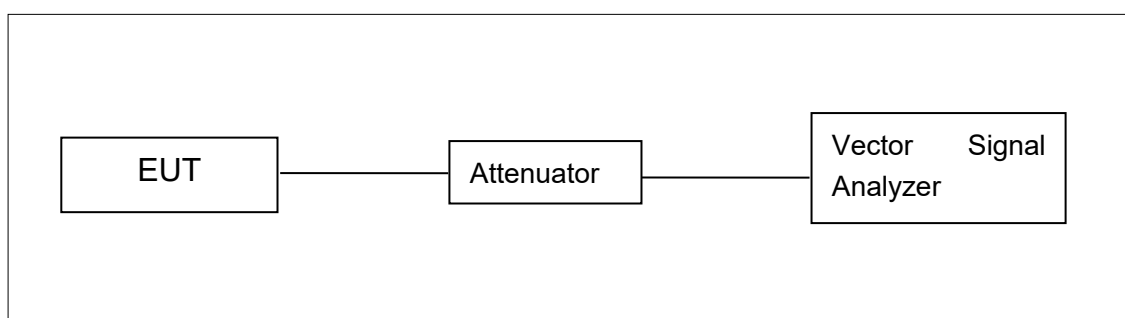
Measurement Uncertainty : 3.08dB,k=2

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

Measurement performed according to Clause 6.4, 6.5, 6.6 in ANSI C63.10-2013 and II.G.4, II.G.5, II.G.6 in KDB 789033.

The radiated emission test is performed in sei-anechoic chamber. The EUT was placed on a non-conductive table with 80cm above the ground plane for measurement below 1GHz and 1.5m above the ground plane for measurement above 1GHz. 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 from 0° to 360° and the measurement antenna is moved from 1m to 4m to get the maximization result. The maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.2. Maximum Peak Output Power

Measurement Limit and Method:

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

Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

Set RBW = 1 MHz.

Set VBW $\geq$ 3 MHz.

Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$.

Sweep time = auto.

Detector = power averaging (rms)

Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.

Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal. Add 10 log (1/x), where x is the duty cycle

A.2.1 Antenna Gain

Antenna gain is -4dBi and the value is supplied by the applicant or manufacturer.

A.2.2. Maximum Average Output Power-Conducted

EUT ID: UT05a

Measurement Results:

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	17.38	17.28	17.18

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)	MCS7	16.57	16.36	16.42

The data rate MCS7 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)	MCS8	14.61	14.13	14.30

The data rate MCS8 is selected as worst condition, and the following cases are performed with this condition.

802.11ax-HE20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ax(20MHz)	MCS0	16.98	16.86	16.78

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)	MCS7	13.11	12.84

The data rate MCS7 is selected as worst condition, and the following cases are performed with this condition.

802.11ax-HE40 mode

Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11ax(40MHz)	MCS7	13.42	13.08

The data rate MCS7 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)	MCS9	13.00	13.09

The data rate MCS9 is selected as worst condition, and the following cases are performed with this condition.

802.11ac-VHT80 mode

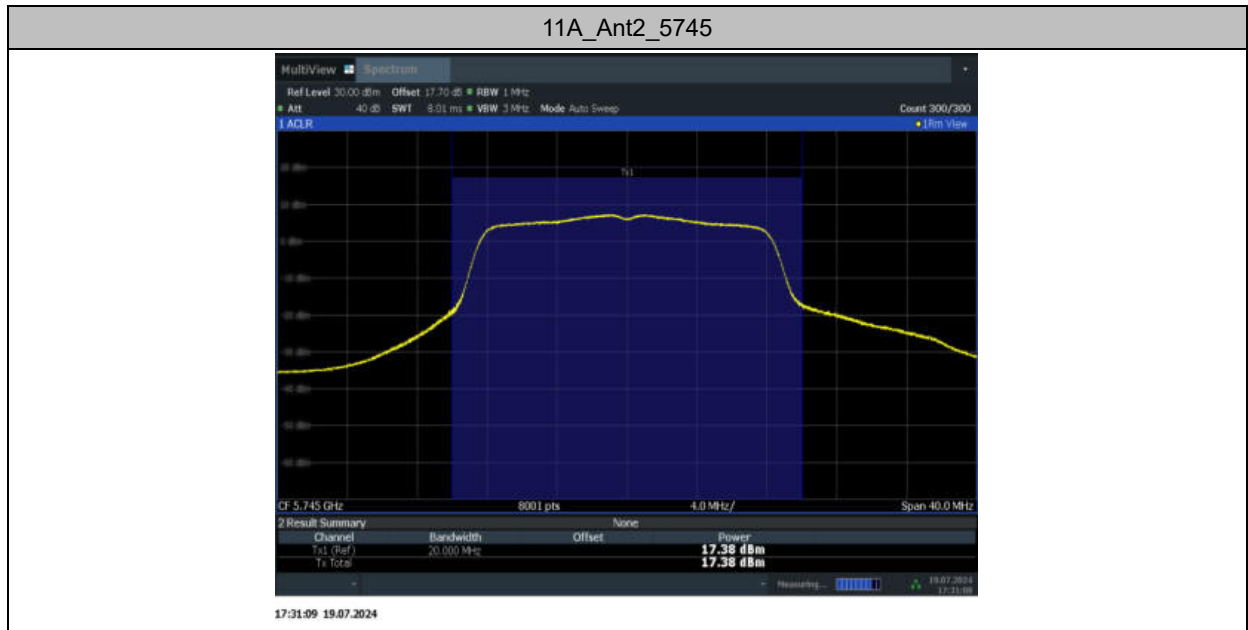
Mode	Data Rate (Index)	Test Result (dBm)
		5775MHz (Ch155)
802.11ac (80MHz)	MCS9	12.62

The data rate MCS9 is selected as worst condition, and the following cases are performed with this condition.

802.11ax-HE80 mode

Mode	Data Rate (Index)	Test Result (dBm)
		5775MHz (Ch155)
802.11ax(80MHz)	MCS9	13.22

The data rate MCS9 is selected as worst condition, and the following cases are performed with this condition.



Maximum output Power

11ax-RU

802.11ax-HE20

RU26-L mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ax(20MHz) RU26-L	MCS0	14.25	13.96	14.03

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

802.11ax-HE20

RU26-R mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ax(20MHz) RU26-R	MCS0	14.24	13.70	14.03

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

802.11ax-HE20

RU52-L mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ax(20MHz) RU52-L	MCS0	17.26	16.95	17.20

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

802.11ax-HE20

RU52-R mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ax(20MHz) RU52-R	MCS0	17.40	16.82	17.21

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

802.11ax-HE20

RU106-L mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ax(20MHz) RU106-L	MCS0	17.28	16.95	17.12

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

802.11ax-HE20
RU106-R mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ax(20MHz) RU106-R	MCS0	17.29	16.82	17.13

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

Duty cycle

Mode	11a				
Duty Cycle	79%				
Mode	11n-20	11n-40	11ac-20	11ac-40	11ac-80
Duty Cycle	30%	22%	29%	20%	15%
Mode	11ax-20	11ax-40	11ax-80	11ax-20 RU	
Duty Cycle	74%	23%	17%	83%	

Conclusion: PASS

A.3. Peak Power Spectral Density

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.407(a)	< 30 dBm/500 kHz

Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

Set RBW = 500 kHz.

Set VBW ≥ 3 MHz.

Number of points in sweep ≥ 2 × span / RBW.

Sweep time = auto.

Detector = power averaging (rms)

Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter. Use the peak search function on the instrument to find the peak of the spectrum and record its value. Add 10 log (1/x), where x is the duty cycle.

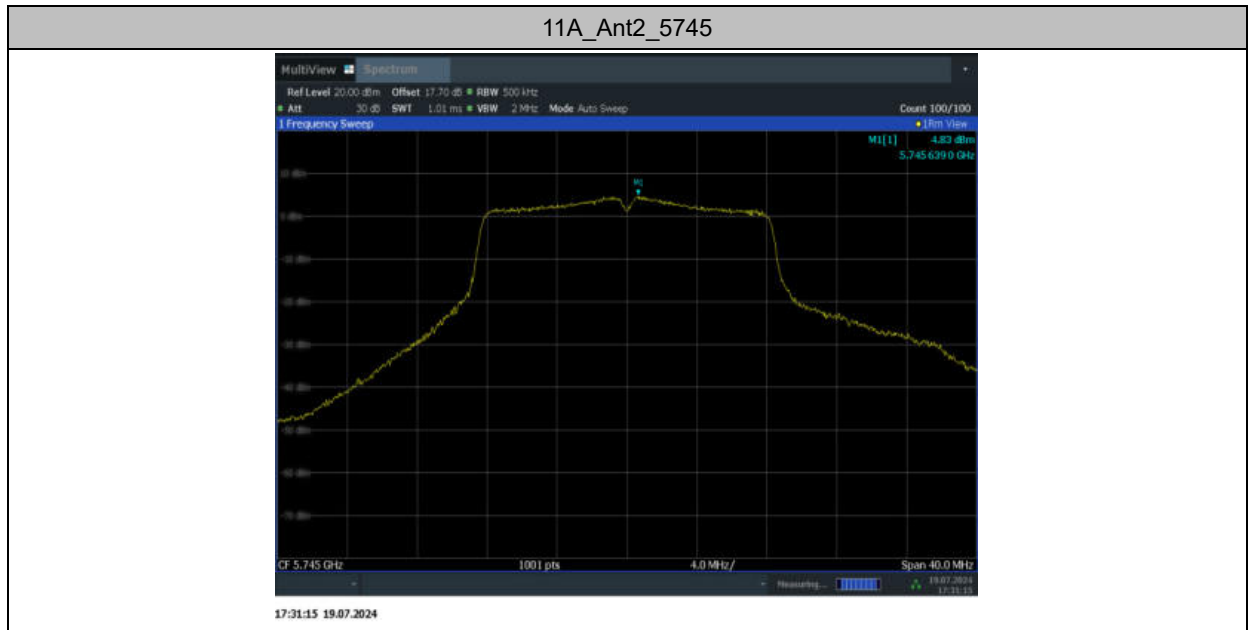
Measurement Uncertainty:

Measurement Uncertainty	0.75dB
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EUT ID: UT05a

Measurement Results:

TestMode	Antenna	Frequency[MHz]	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	Ant2	5745	4.83	≤11.00	PASS
		5785	4.51	≤30.00	PASS
		5825	4.50	≤30.00	PASS
11N40SISO	Ant2	5755	-2.39	≤11.00	PASS
		5795	-2.80	≤30.00	PASS
11AC80SISO	Ant2	5775	-5.53	≤11.00	PASS
11AX20SISO	Ant2	5745	3.89	≤11.00	PASS
		5785	3.38	≤30.00	PASS
		5825	3.75	≤30.00	PASS



Peak Power Spectral Density:

11ax-RU

Test Mode	Antenna	Frequency[MHz]	Ru Size	Ru Index	Result [dBm/MHz]	Limit [dBm/MHz]	Verdict
11AX20SISO	Ant2	5745	26Tone	RU0	9.07	≤30.00	PASS
				RU8	9.27	≤30.00	PASS
			52Tone	RU37	9.08	≤30.00	PASS
				RU40	9.16	≤30.00	PASS
			106Tone	RU53	6.25	≤30.00	PASS
				RU54	6.10	≤30.00	PASS
		5785	26Tone	RU0	8.46	≤30.00	PASS
				RU8	8.49	≤30.00	PASS
			52Tone	RU37	8.82	≤30.00	PASS
				RU40	8.61	≤30.00	PASS
			106Tone	RU53	5.76	≤30.00	PASS
				RU54	5.69	≤30.00	PASS
		5825	26Tone	RU0	8.70	≤30.00	PASS
				RU8	8.68	≤30.00	PASS
			52Tone	RU37	9.15	≤30.00	PASS
				RU40	9.02	≤30.00	PASS
			106Tone	RU53	6.15	≤30.00	PASS
				RU54	6.09	≤30.00	PASS

Conclusion: PASS

A.4. 6dB Emission Bandwidth

Measurement Limit:

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

Set RBW = 100 kHz.

Set the video bandwidth (VBW) $\geq 3 \times$ RBW.

Detector = Peak.

Trace mode = max hold.

Sweep = auto couple.

Allow the trace to stabilize.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Measurement Uncertainty:

Measurement Uncertainty	60.80Hz
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EUT ID: UT05a

TestMode	Antenna	Frequency[MHz]	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	Ant2	5745	15.16	5737.40	5752.56	0.5	PASS
		5785	15.16	5777.40	5792.56	0.5	PASS
		5825	15.16	5817.40	5832.56	0.5	PASS
11N40SISO	Ant2	5755	35.12	5737.40	5772.52	0.5	PASS
		5795	35.36	5777.40	5812.76	0.5	PASS
11AC80SISO	Ant2	5775	76.00	5736.92	5812.92	0.5	PASS
11AX20SISO	Ant2	5745	16.24	5736.48	5752.72	0.5	PASS
		5785	16.88	5776.12	5793.00	0.5	PASS
		5825	15.12	5817.44	5832.56	0.5	PASS

Test graphs as below:

11A_Ant2_5745



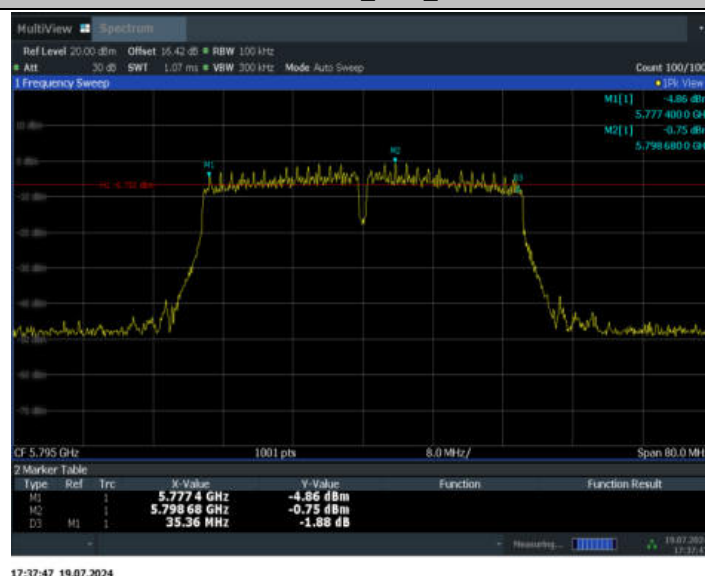
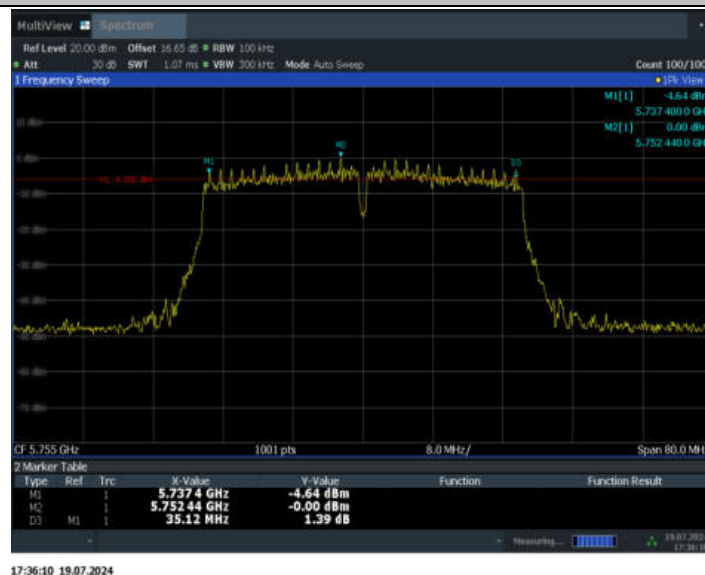
17:29:59 19.07.2024

11A_Ant2_5785



17:31:38 19.07.2024

11A_Ant2_5825



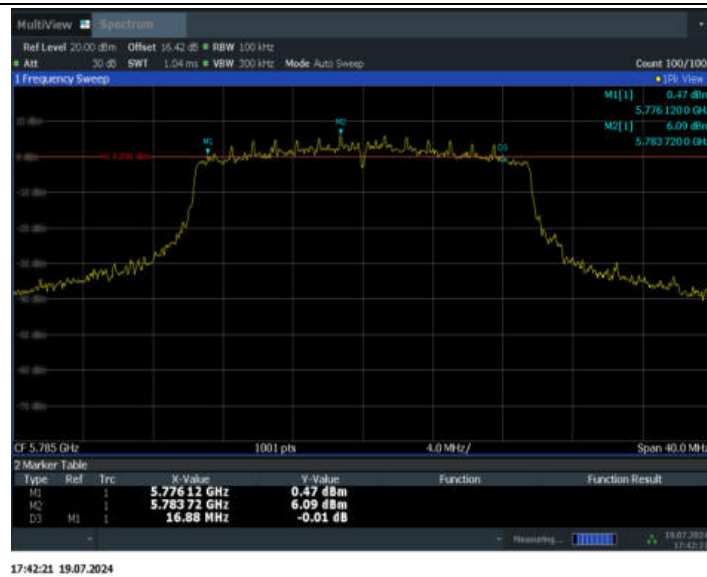
11AC80SISO_Ant2_5775



11AX20SISO_Ant2_5745



11AX20SISO_Ant2_5785



11AX20SISO_Ant2_5825



Conclusion: PASS

A.5. Radiated Unwanted Emission

A.5.1 Limits

Unwanted Emissions in the unrestricted bands shall not exceed the limits that shown in 15.407:

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.	

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 (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

Note: When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor (as defined in KDB 789033 II.G.2.d).

A.5.2 Test setup

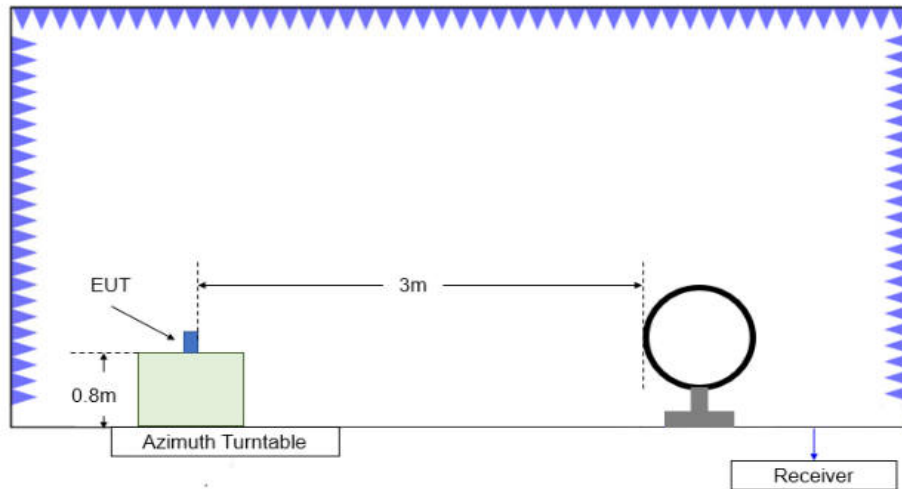


Figure A.5.1. Test Site Diagram (9kHz-30MHz)

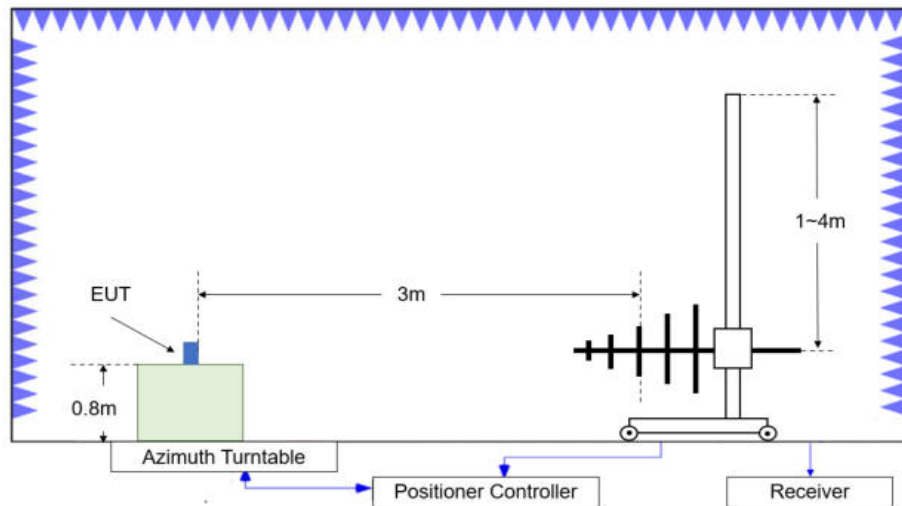


Figure A.5.2. Test Site Diagram (30MHz-1GHz)

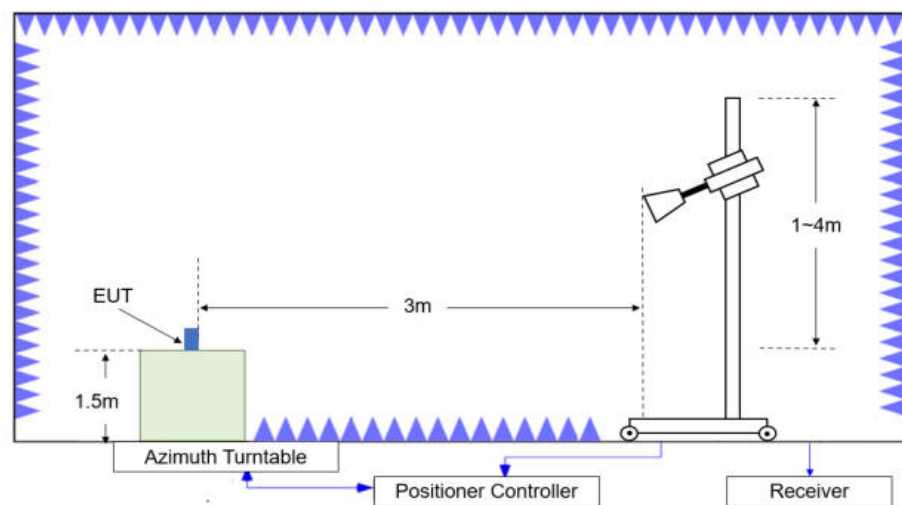


Figure A.5.3. Test Site Diagram (1GHz-40GHz)

A.5.3 Test Procedures

Radiated unwanted emissions from the EUT were measured according to ANSI C63.10 and KDB 789033 D02 v02r01.

Test setting

Frequency of emission (MHz)	RBW/VBW
30-1000	100kHz/300kHz
1000-4000	1MHz/3MHz
4000-18000	1MHz/3MHz
18000-26500	1MHz/3MHz
26500-40000	1MHz/3MHz

A.5.4 Calculation

1. The measurement results reported below is calculated by:

Measurement Results (dBμV/m) = $P_{\text{measurement}}$ (dBμV) + Cable Loss(dB) + Antenna Factor (dB/m)

Where: $P_{\text{measurement}}$ is the field strength recorded from the instrument

2. 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 dBμV/m

D is the measurement distance in meters

EIRP is the equivalent isotropically radiated power in dBm

Test note

1. The EUT is operating at its maximum duty cycle and its maximum power control level.
2. Investigation has been done on all modes and modulations/data rates. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.
3. Spurious emissions for all channels were investigated and almost the same below 1GHz. According to FCC 47 CFR §15.31, emission levels are not report much lower than the limit by over 20dB
4. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept.
5. EUT in each of three orthogonal axis emissions had been tested out only the worst case (axis data) recorded in the report.
6. Measurement frequencies were performed from 9 kHz to the 10th harmonic of highest fundamental frequency or 40GHz, whichever is lower.
7. No spurious emissions were detected within 20dB of the limit below 30MHz. OFS and semi-chamber comparison testing had been performed and the result came out very similar. (KDB 414788)
8. The low/mid/high channels of all working mode with different bandwidths were all tested, only the worst ones were reported.

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

P_{Mea} is the field strength recorded from the instrument.

Conclusion: PASS
Average Results:
802.11a
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)
17971.950	40.24	-29.59	42.40	27.43	54.00	13.76	V
17998.900	40.19	-29.59	42.40	27.38	54.00	13.81	V
14491.000	35.36	-29.56	40.00	24.92	54.00	18.64	V
14488.250	35.35	-29.56	40.00	24.91	54.00	18.65	V
11651.350	33.78	-32.62	38.90	27.50	54.00	20.22	H
11864.750	33.74	-32.73	38.85	27.62	54.00	20.26	H

802.11n-HT20
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)
17996.700	40.51	-29.59	42.40	27.70	54.00	13.49	H
17996.150	40.40	-29.59	42.40	27.59	54.00	13.60	V
14493.200	35.42	-29.56	40.00	24.98	54.00	18.58	H
14484.400	35.39	-29.56	40.00	24.95	54.00	18.61	H
11905.450	33.71	-32.53	38.80	27.44	54.00	20.29	H
11860.350	33.61	-32.73	38.85	27.49	54.00	20.39	H

802.11n-HT40
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)
17973.600	40.29	-29.59	42.40	27.48	54.00	13.71	V
17997.250	40.28	-29.59	42.40	27.47	54.00	13.72	H
14498.150	35.64	-29.56	40.00	25.20	54.00	18.36	V
14499.800	35.48	-29.56	40.00	25.04	54.00	18.52	H
11922.500	33.83	-32.53	38.80	27.56	54.00	20.17	V
11906.550	33.68	-32.53	38.80	27.41	54.00	20.32	H

802.11ac-VHT20

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)
17978.000	40.45	-29.59	42.40	27.64	54.00	13.55	H
17958.200	40.21	-29.59	42.40	27.40	54.00	13.79	V
14494.300	35.77	-29.56	40.00	25.33	54.00	18.23	V
14480.000	35.50	-29.56	40.00	25.06	54.00	18.50	V
11854.300	33.97	-32.73	38.85	27.85	54.00	20.03	H
11871.350	33.85	-32.73	38.85	27.73	54.00	20.15	V

802.11ac-VHT40

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)
17974.150	40.42	-29.59	42.40	27.61	54.00	13.58	H
17995.600	40.34	-29.59	42.40	27.53	54.00	13.66	V
14493.200	35.89	-29.56	40.00	25.45	54.00	18.11	V
14482.750	35.79	-29.56	40.00	25.35	54.00	18.21	H
11866.400	34.07	-32.73	38.85	27.95	54.00	19.93	H
11934.050	33.85	-32.42	38.75	27.52	54.00	20.15	H

802.11ac-VHT80

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)
17993.950	40.33	-29.59	42.40	27.52	54.00	13.67	V
17978.550	40.30	-29.59	42.40	27.49	54.00	13.70	V
14481.650	35.56	-29.56	40.00	25.12	54.00	18.44	V
14488.800	35.55	-29.56	40.00	25.11	54.00	18.45	V
11871.350	33.60	-32.73	38.85	27.48	54.00	20.40	V
11823.500	33.55	-32.09	38.90	26.74	54.00	20.45	H

802.11ax-HT20 full RU

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)
17998.350	40.52	-29.59	42.40	27.71	54.00	13.48	V
17977.450	40.18	-29.59	42.40	27.37	54.00	13.82	H
14492.100	35.59	-29.56	40.00	25.15	54.00	18.41	V
14495.950	35.46	-29.56	40.00	25.02	54.00	18.54	V
11839.450	33.81	-32.73	38.85	27.69	54.00	20.19	H
11851.550	33.62	-32.73	38.85	27.50	54.00	20.38	H

802.11ax-HT40 full RU

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)
17975.250	40.35	-29.59	42.40	27.54	54.00	13.65	H
17985.150	40.18	-29.59	42.40	27.37	54.00	13.82	V
14492.100	35.75	-29.56	40.00	25.31	54.00	18.25	H
14491.000	35.69	-29.56	40.00	25.25	54.00	18.31	V
11885.100	33.97	-32.53	38.80	27.70	54.00	20.03	V
11921.950	33.87	-32.53	38.80	27.60	54.00	20.13	H

802.11ax-HT80 full RU

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)
17972.500	40.36	-29.59	42.40	27.55	54.00	13.64	H
17997.800	40.35	-29.59	42.40	27.54	54.00	13.65	V
14495.400	35.60	-29.56	40.00	25.16	54.00	18.40	V
14496.500	35.60	-29.56	40.00	25.16	54.00	18.40	V
11827.350	34.12	-32.09	38.90	27.31	54.00	19.88	V
11904.350	33.97	-32.53	38.80	27.70	54.00	20.03	V

Peak Results:
802.11a

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)
17997.250	51.30	-29.59	42.40	38.49	74.00	22.70	H
17485.200	51.15	-29.07	42.15	38.07	68.20	17.05	H
14186.850	49.58	-30.42	40.40	39.60	68.20	18.62	H
13648.400	48.17	-31.29	40.65	38.81	68.20	20.03	V
11847.700	45.19	-32.73	38.85	39.07	74.00	28.81	H
11888.400	44.86	-32.53	38.80	38.59	74.00	29.14	V

802.11n-HT20

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)
17993.400	51.64	-29.59	42.40	38.83	74.00	22.36	V
17976.350	51.47	-29.59	42.40	38.66	74.00	22.53	H
14165.400	48.41	-30.42	40.40	38.43	68.20	19.79	V
14187.950	48.08	-30.42	40.40	38.10	68.20	20.12	V
11264.700	44.80	-32.99	38.85	38.94	74.00	29.20	H
11810.850	44.78	-32.09	38.90	37.97	74.00	29.22	H

802.11n-HT40

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)
17508.300	51.78	-29.07	42.15	38.70	68.20	16.42	H
17404.350	51.13	-29.44	42.10	38.47	68.20	17.07	V
13777.650	48.01	-30.98	40.90	38.09	68.20	20.19	H
14082.350	47.96	-30.20	40.50	37.66	68.20	20.24	H
11759.150	45.21	-32.71	38.90	39.02	74.00	28.79	V
10963.850	45.17	-33.13	38.65	39.65	74.00	28.83	V

802.11ac-VHT20

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)
17579.250	51.50	-29.60	42.25	38.85	68.20	16.70	V
17593.550	51.24	-29.60	42.25	38.59	68.20	16.96	H
13729.250	49.01	-31.18	40.80	39.39	68.20	19.19	V
13653.900	48.32	-31.29	40.65	38.96	68.20	19.88	H
11803.700	45.88	-32.09	38.90	39.07	74.00	28.12	H
11903.800	45.64	-32.53	38.80	39.37	74.00	28.36	V

802.11ac-VHT40

Channel 159

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17995.050	51.31	-29.59	42.40	38.50	74.00	22.69	H
17990.650	51.17	-29.59	42.40	38.36	74.00	22.83	H
13813.950	47.90	-30.20	40.90	37.20	68.20	20.30	H
13727.600	47.68	-31.18	40.80	38.06	68.20	20.52	H
11852.100	45.22	-32.73	38.85	39.10	74.00	28.78	V
11891.700	45.13	-32.53	38.80	38.86	74.00	28.87	V

802.11ac-VHT80

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)
17514.900	51.49	-29.07	42.15	38.41	68.20	16.71	V
17608.950	51.38	-29.60	42.25	38.73	68.20	16.82	V
13804.600	48.03	-30.98	40.90	38.11	68.20	20.17	V
13805.150	47.99	-30.98	40.90	38.07	68.20	20.21	V
10852.750	45.00	-33.07	38.75	39.32	74.00	29.00	H
10856.600	44.93	-33.07	38.75	39.25	74.00	29.07	V

802.11ax-HT20 full RU

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)
17925.200	51.71	-29.59	42.40	38.90	74.00	22.29	H
17559.450	51.52	-29.39	42.20	38.72	68.20	16.68	H
13713.300	48.26	-31.18	40.80	38.64	68.20	19.94	H
13656.100	47.71	-31.29	40.65	38.35	68.20	20.49	V
11819.650	45.24	-32.09	38.90	38.43	74.00	28.76	V
11899.950	44.56	-32.53	38.80	38.29	74.00	29.44	V

802.11ax-HT40 full RU

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)
17958.200	51.89	-29.59	42.40	39.08	74.00	22.11	V
17993.400	51.46	-29.59	42.40	38.65	74.00	22.54	V
13716.050	47.90	-31.18	40.80	38.28	68.20	20.30	H
13707.800	47.86	-30.98	40.70	38.14	68.20	20.34	V
10456.750	44.83	-33.87	38.65	40.05	68.20	23.37	V
11906.000	44.80	-32.53	38.80	38.53	74.00	29.20	V

802.11ax-HT80 full RU

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)
17985.150	51.67	-29.59	42.40	38.86	74.00	22.33	H
17519.850	51.59	-29.07	42.15	38.51	68.20	16.61	V
13740.250	48.52	-31.18	40.80	38.90	68.20	19.68	H
14257.250	48.35	-30.75	40.35	38.75	68.20	19.85	H
11787.200	44.80	-32.09	38.90	37.99	74.00	29.20	V
10848.900	44.79	-33.07	38.75	39.11	74.00	29.21	H

Conclusion: PASS

Band edge compliance

Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.1	P
	5825 MHz	Fig.2	P
802.11n HT20	5745 MHz	Fig.3	P
	5825 MHz	Fig.4	P
802.11n HT40	5755 MHz	Fig.5	P
	5795 MHz	Fig.6	P
802.11ac VHT20	5745 MHz	Fig.7	P
	5825 MHz	Fig.8	P
802.11ac VHT40	5755 MHz	Fig.9	P
	5795 MHz	Fig.10	P
802.11ac VHT80	5775 MHz	Fig.11	P
		Fig.12	
802.11ax HT20 full RU	5745 MHz	Fig.13	P
	5825 MHz	Fig.14	P
802.11ax HT40 full RU	5755 MHz	Fig.15	P
	5795 MHz	Fig.16	P
802.11ax HT80 full RU	5775 MHz	Fig.17	P
		Fig.18	
802.11ax HT20 partial RU	5745 MHz	Fig.19	P
	5825 MHz	Fig.20	P
802.11ax HT40 partial RU	5755 MHz	Fig.21	P
	5795 MHz	Fig.22	P
802.11ax HT80 partial RU	5775 MHz	Fig.23	P
		Fig.24	

Test graphs as below:

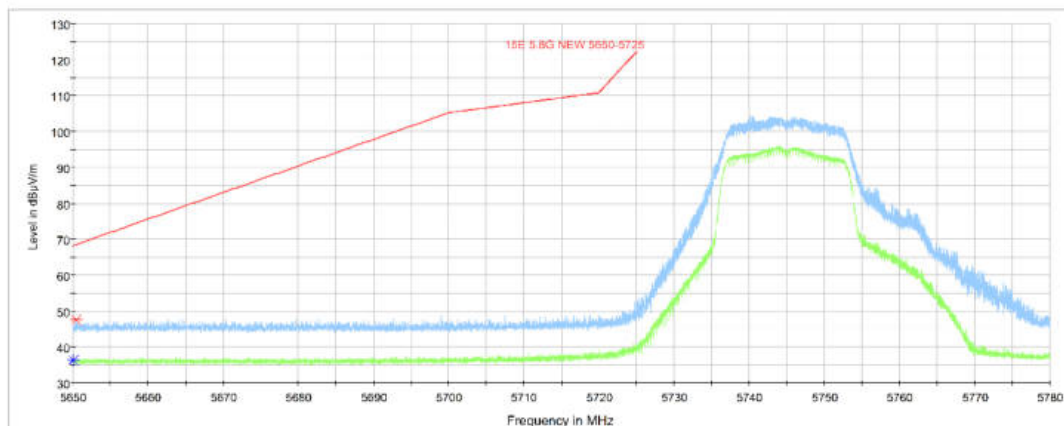


Fig. 15 Band Edges (802.11a Ch149,5745MHz)

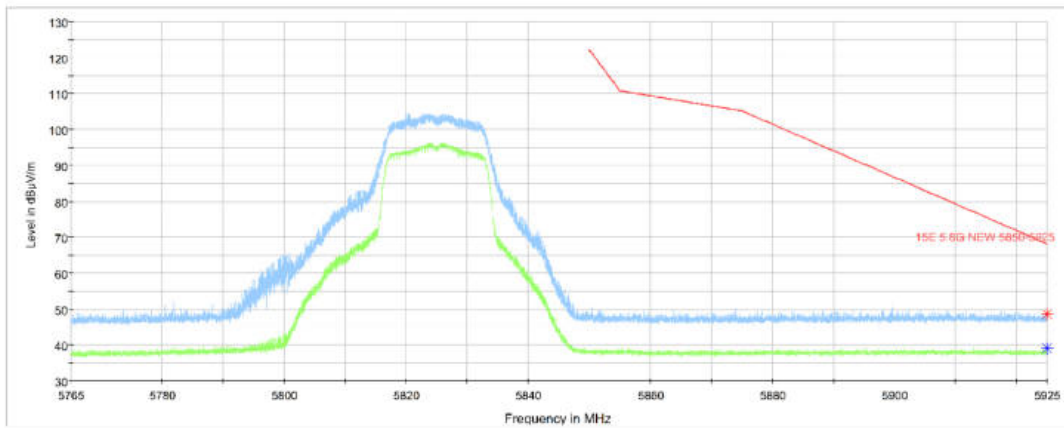


Fig. 16 Band Edges (802.11a Ch165, 5825MHz)

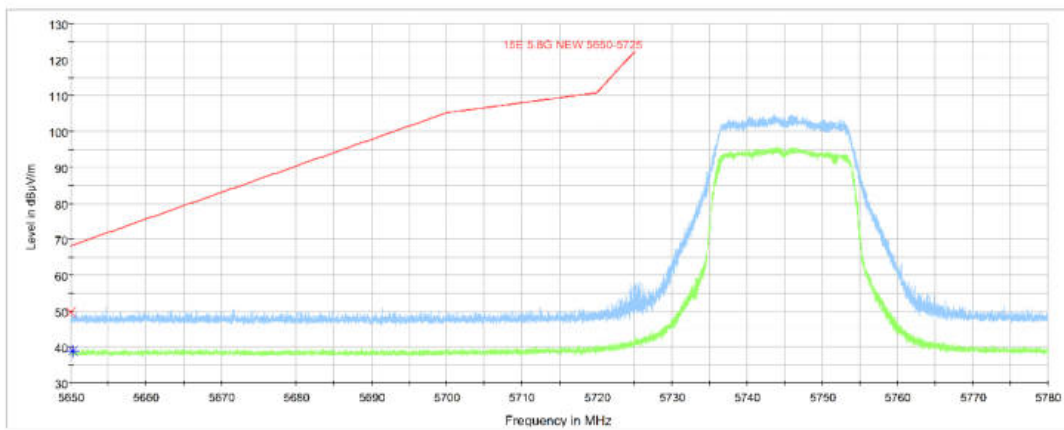


Fig. 17 Band Edges (802.11n-HT20 Ch149, 5745MHz)

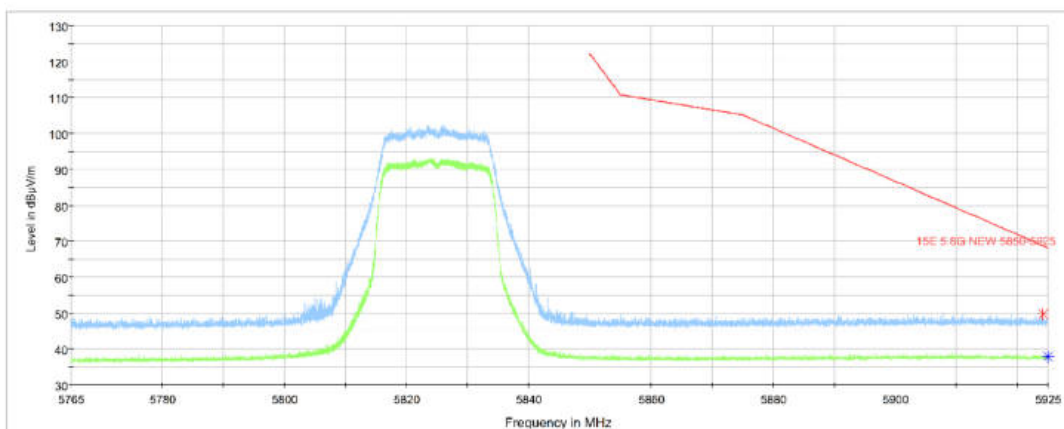


Fig. 18 Band Edges (802.11n-HT20 Ch165, 5825MHz)

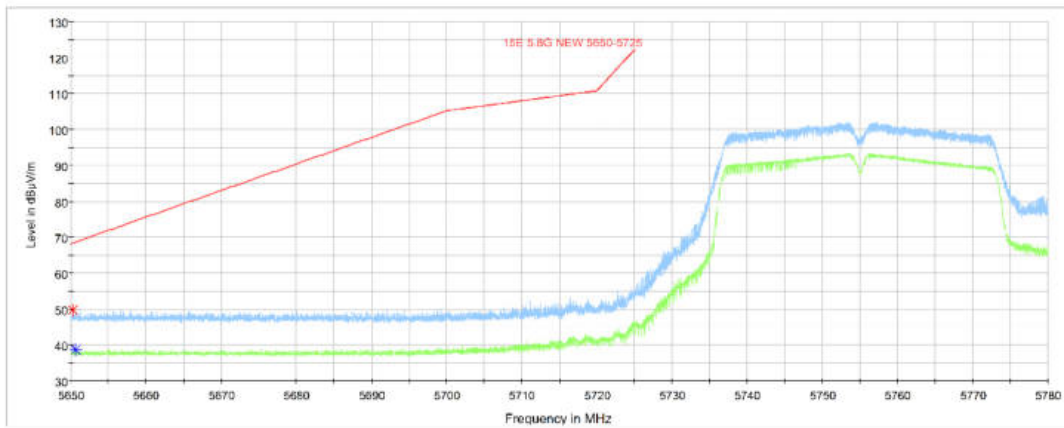


Fig. 19 Band Edges (802.11n-HT40 Ch151, 5755MHz)

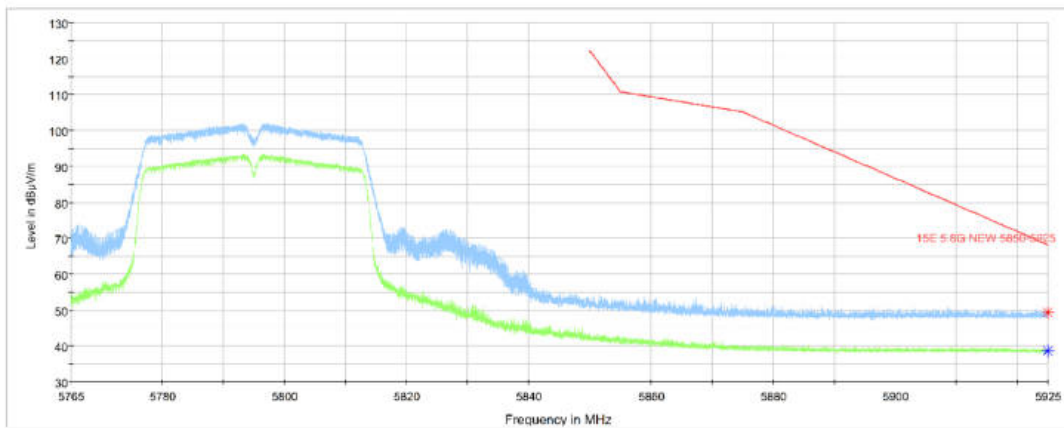


Fig. 20 Band Edges (802.11n-HT40 Ch159, 5795MHz)

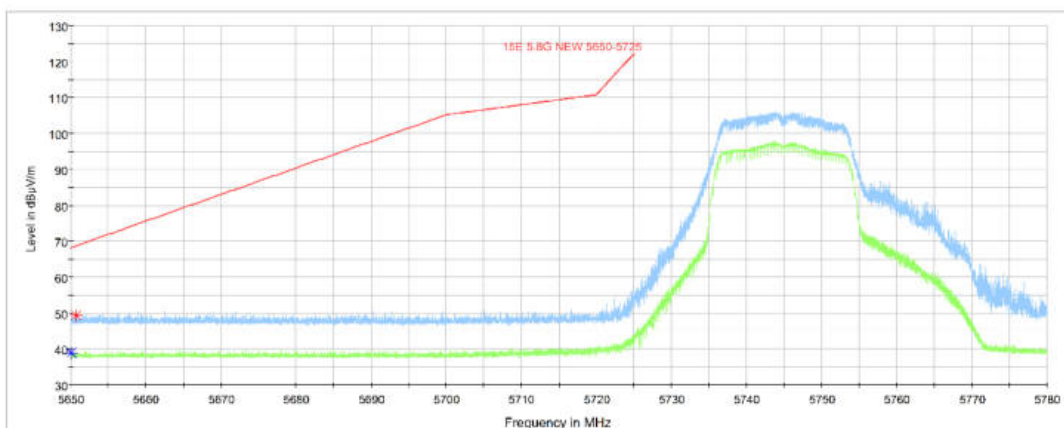


Fig. 21 Band Edges (802.11ac-HT20 Ch149, 5745MHz)

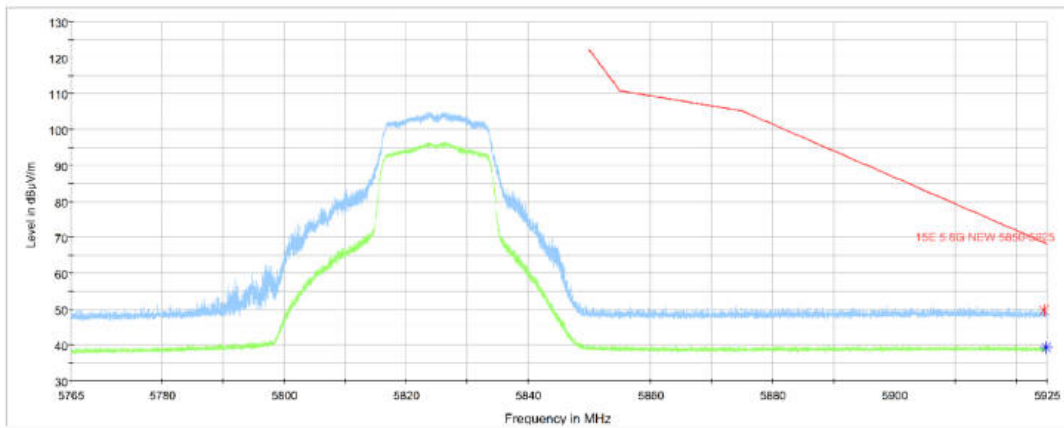


Fig. 22 Band Edges (802.11ac-HT20 Ch165, 5825MHz)

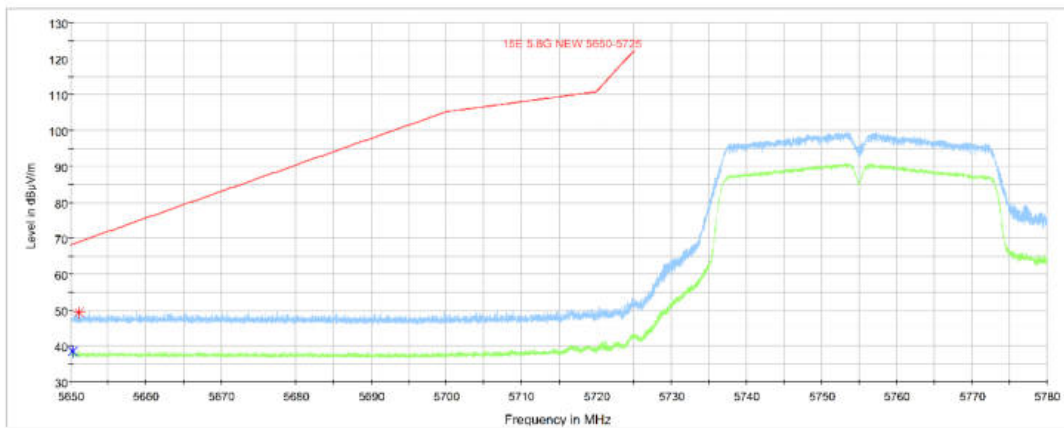


Fig. 23 Band Edges (802.11ac-HT40 Ch151, 5755MHz)

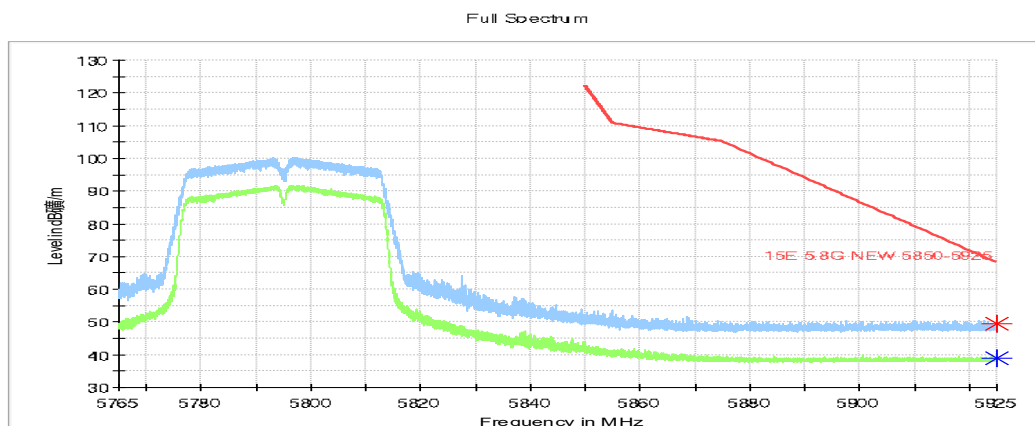


Fig. 24 Band Edges (802.11ac-HT40 Ch159, 5795MHz)

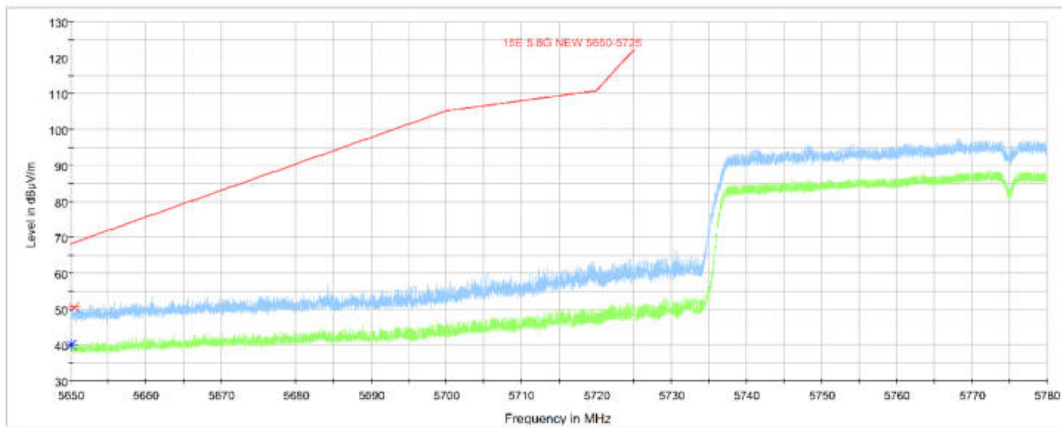


Fig. 25 Band Edges (802.11ac-HT80 Ch155-L, 5775MHz)

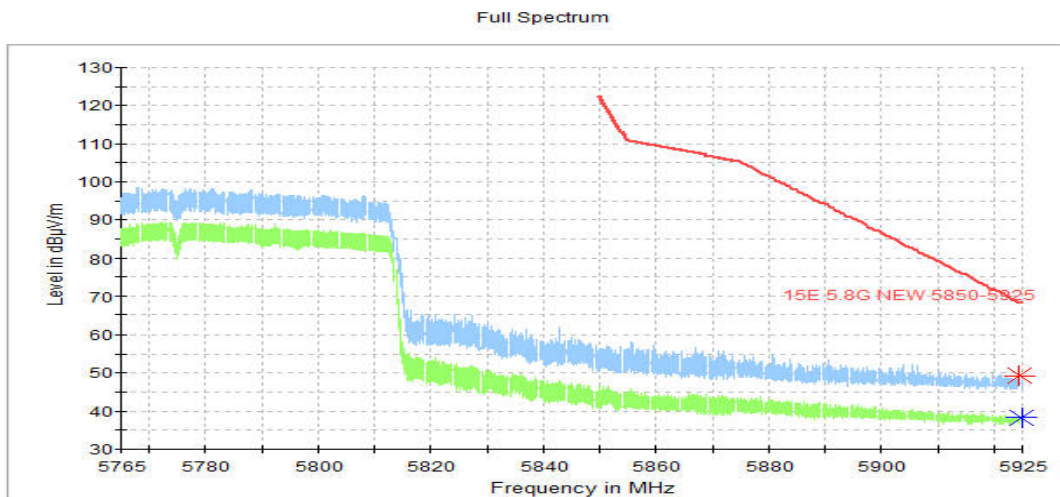


Fig. 26 Band Edges (802.11ac-HT80 Ch155-R, 5775MHz)

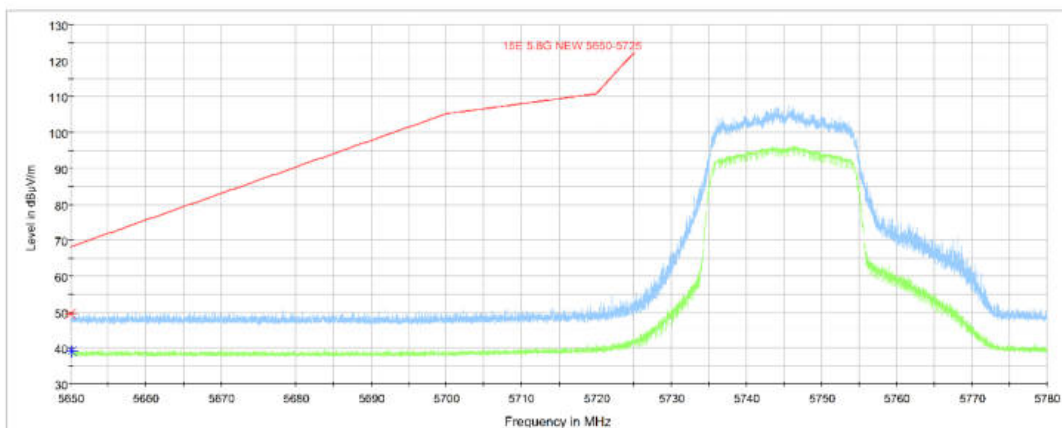


Fig. 27 Band Edges (802.11ax-HT20 Ch149 full RU, 5745MHz)

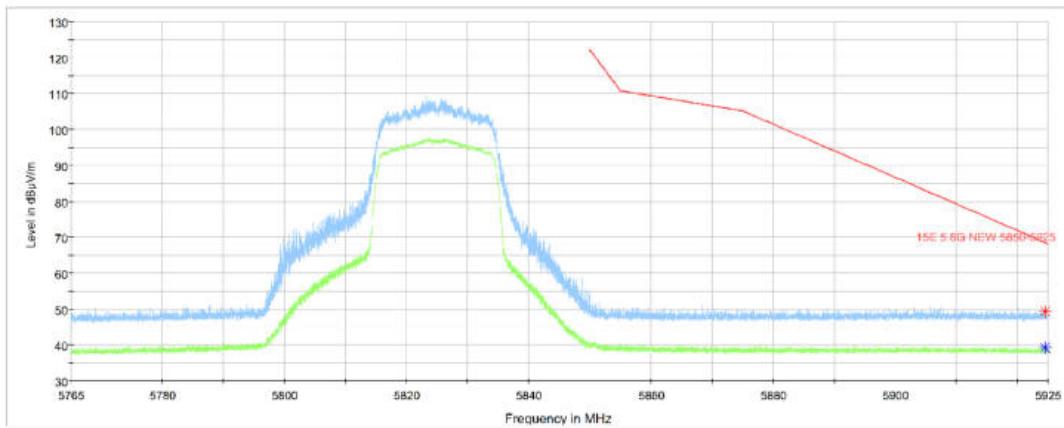


Fig. 28 Band Edges (802.11ax-HT20 Ch165 full RU, 5825MHz)

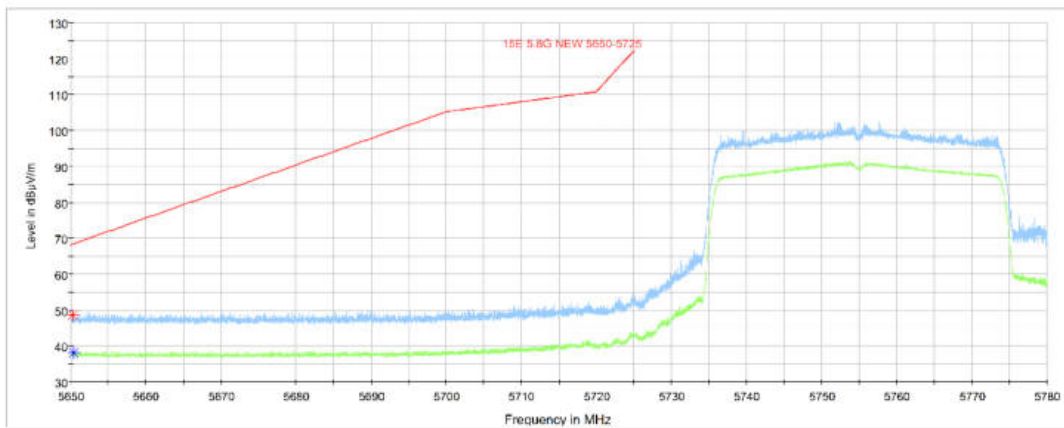


Fig. 29 Band Edges (802.11ax-HT40 Ch151 full RU, 5755MHz)

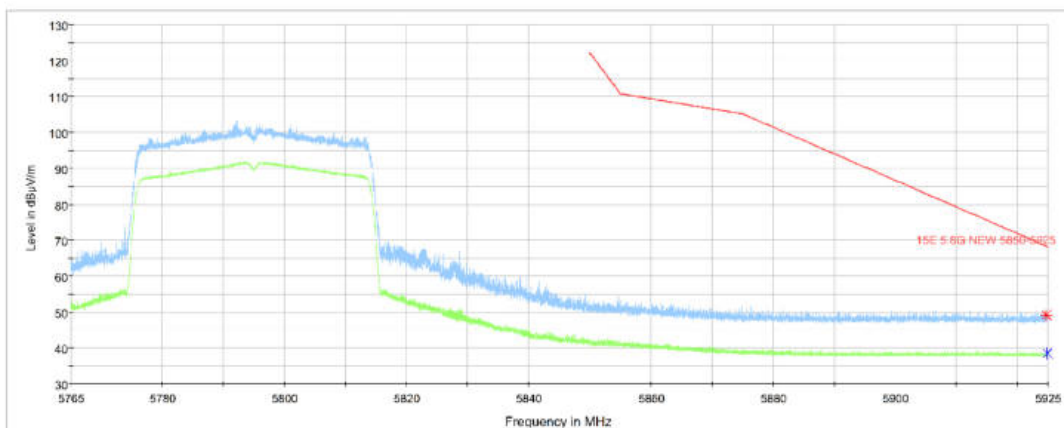


Fig. 30 Band Edges (802.11ax-HT40 Ch159 full RU, 5795MHz)

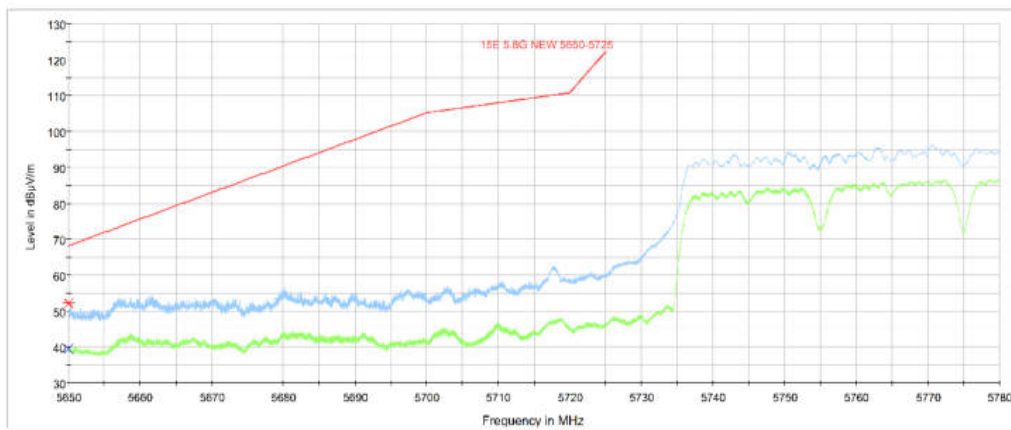


Fig. 31 Band Edges (802.11ax-HT80 Ch155-L full RU, 5775MHz)

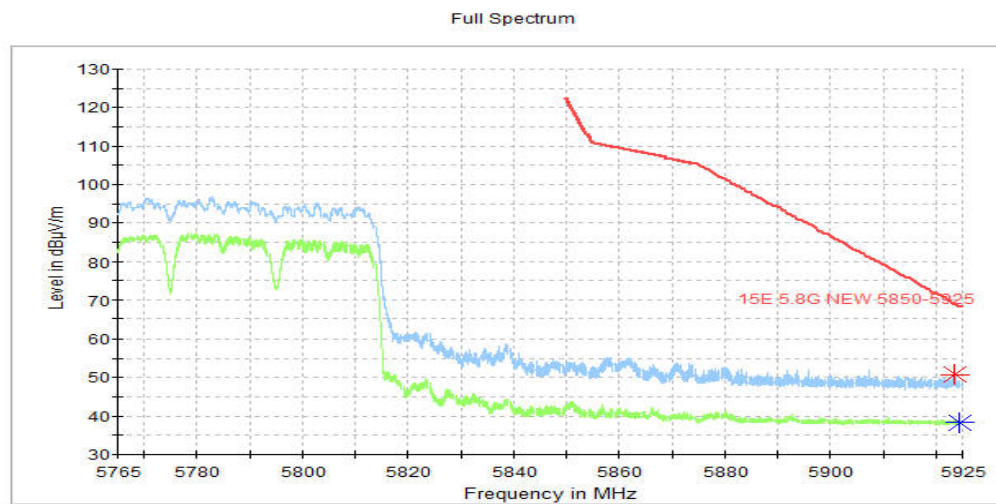


Fig. 32 Band Edges (802.11ax-HT80 Ch155-R full RU, 5775MHz)

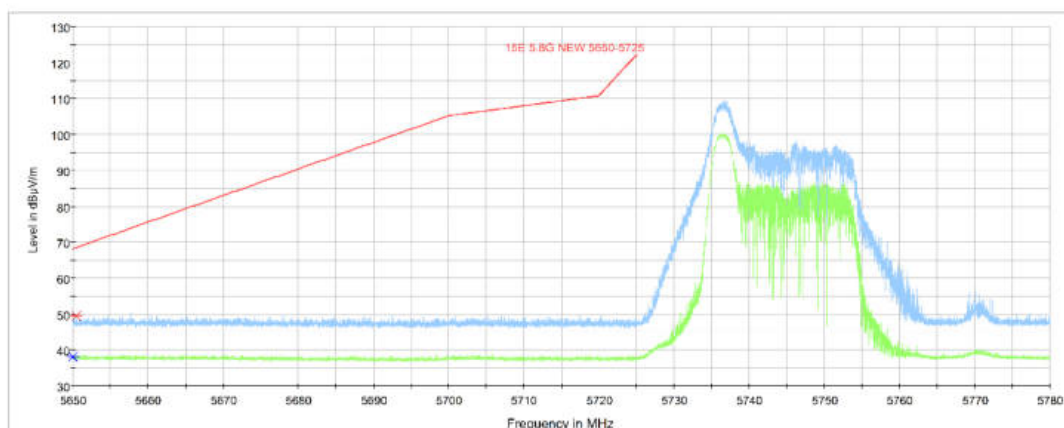


Fig. 33 Band Edges (802.11ax-HT20 Ch149 partial RU, 5745MHz)

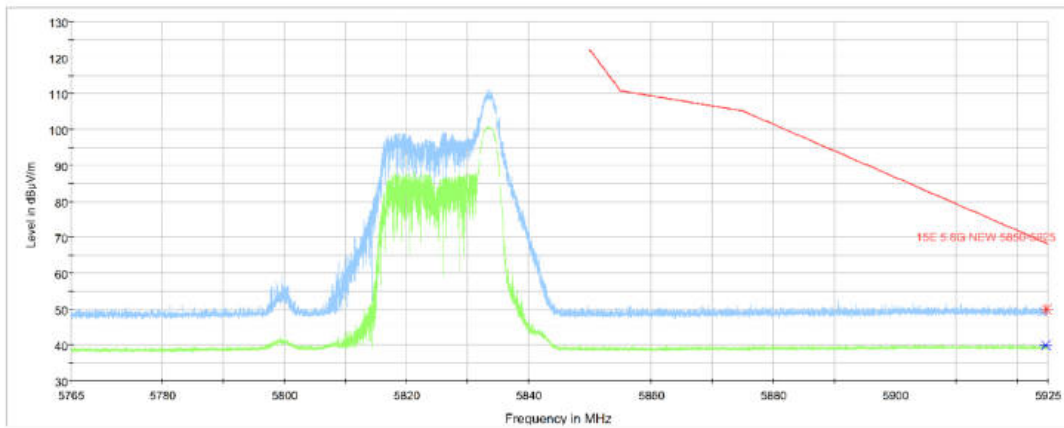


Fig. 34 Band Edges (802.11ax-HT20 Ch165 partial RU, 5825MHz)

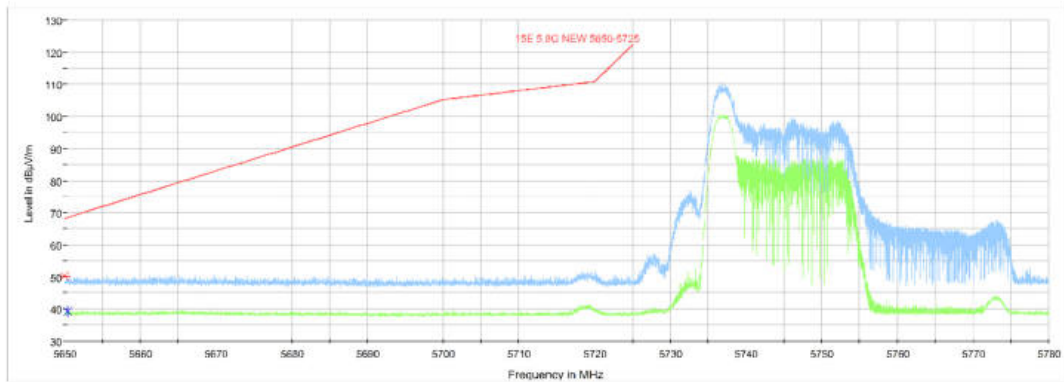


Fig. 35 Band Edges (802.11ax-HT40 Ch151 partial RU, 5755MHz)

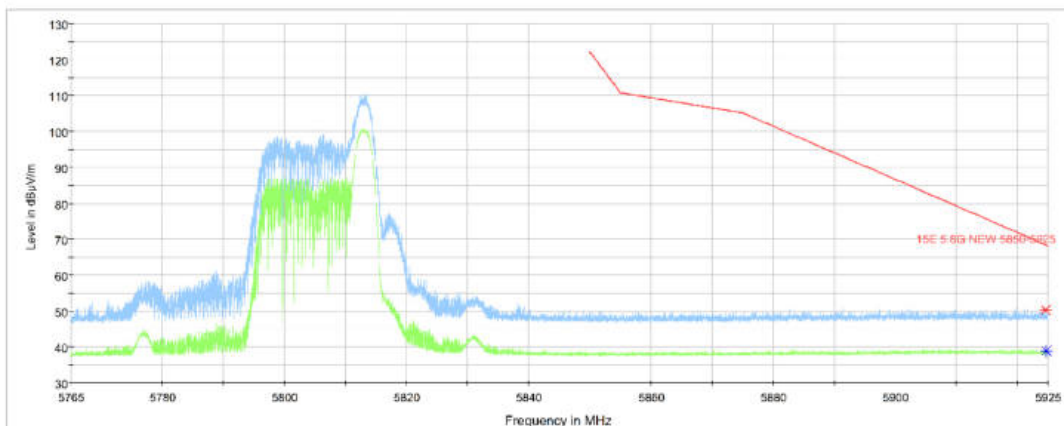


Fig. 36 Band Edges (802.11ax-HT40 Ch159 partial RU, 5795MHz)

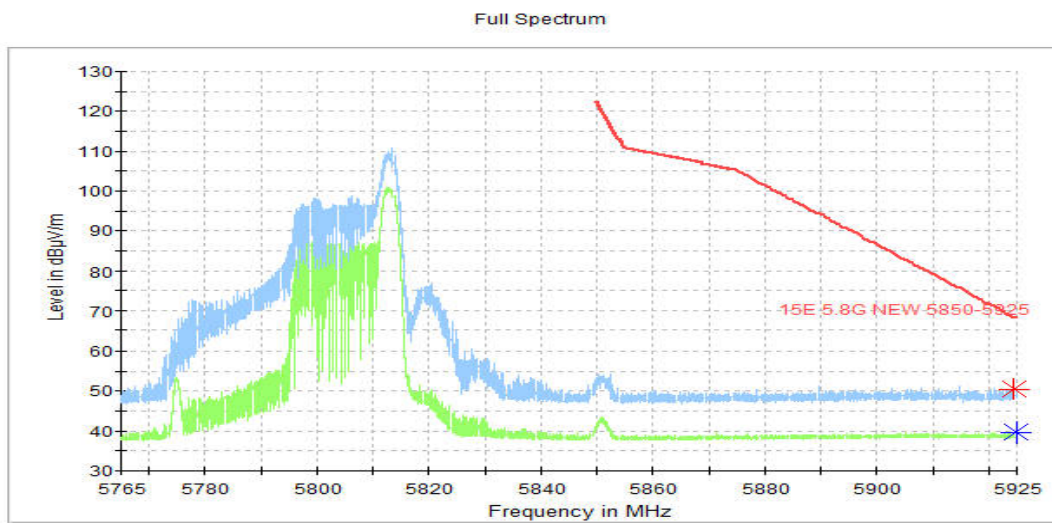


Fig. 37 Band Edges (802.11ax-HT80 Ch155-L partial RU, 5775MHz)

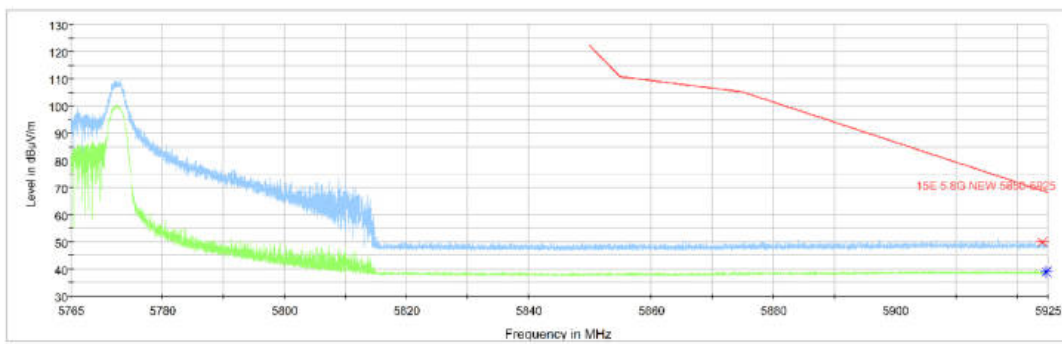


Fig. 38 Band Edges (802.11ax-HT80 Ch155-R partial RU, 5775MHz)

A.6. AC Powerline Conducted Emission

A.6.1 Summary

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section

A.6.2 Method of Measurement

See Clause 6.2 of ANSI C63.10 specifically.

See Clause 4 and Clause 5 of ANSI C63.10 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.

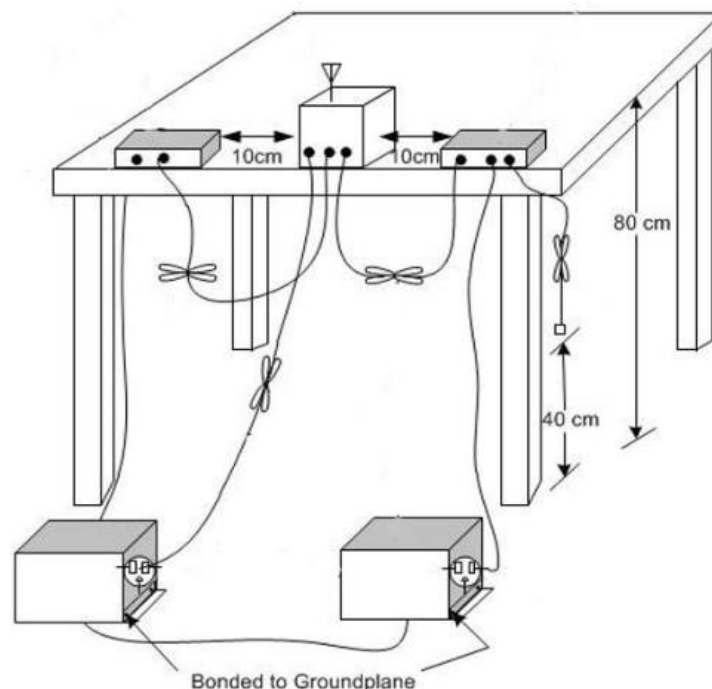
The measurement bandwidth is:

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

A.6.3 Test Condition

Voltage (V)	Frequency (Hz)
120	60

A.6.4 Test setup



A.6.5 Measurement Result and limit

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		802.11a	Idle	
0.15 to 0.5	66 to 56	Fig.39	Fig.40	P
0.5 to 5	56			
5 to 30	60			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

WLAN (Average Limit)

Frequency range (MHz)	Average Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		802.11a	Idle	
0.15 to 0.5	56 to 46	Fig.39	Fig.40	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:

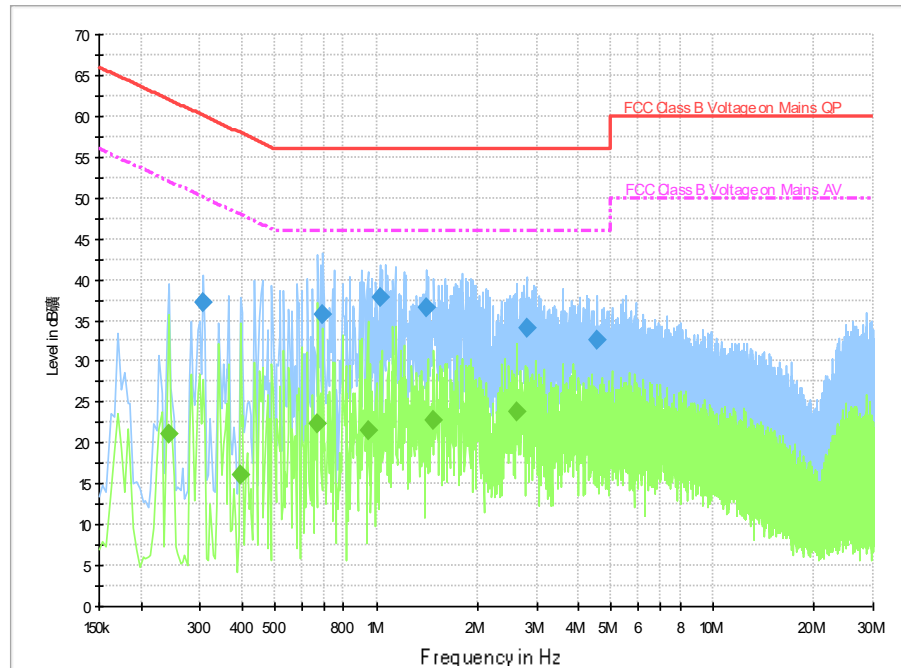


Fig. 39 AC Powerline Conducted Emission-802.11a

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.306000	37.1	2000.0	9.000	On	N	19.8	22.9	60.1	
0.694000	35.7	2000.0	9.000	On	L1	20.0	20.3	56.0	
1.026000	37.8	2000.0	9.000	On	L1	19.9	18.2	56.0	
1.406000	36.5	2000.0	9.000	On	L1	19.9	19.5	56.0	
2.794000	34.1	2000.0	9.000	On	L1	19.8	21.9	56.0	
4.514000	32.6	2000.0	9.000	On	L1	19.8	23.4	56.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.242000	21.0	2000.0	9.000	On	L1	19.9	31.0	52.0	
0.394000	16.2	2000.0	9.000	On	L1	20.0	31.8	48.0	
0.670000	22.5	2000.0	9.000	On	L1	20.0	23.5	46.0	
0.946000	21.4	2000.0	9.000	On	L1	19.9	24.6	46.0	
1.486000	22.8	2000.0	9.000	On	L1	19.9	23.2	46.0	
2.626000	23.8	2000.0	9.000	On	L1	19.8	22.2	46.0	

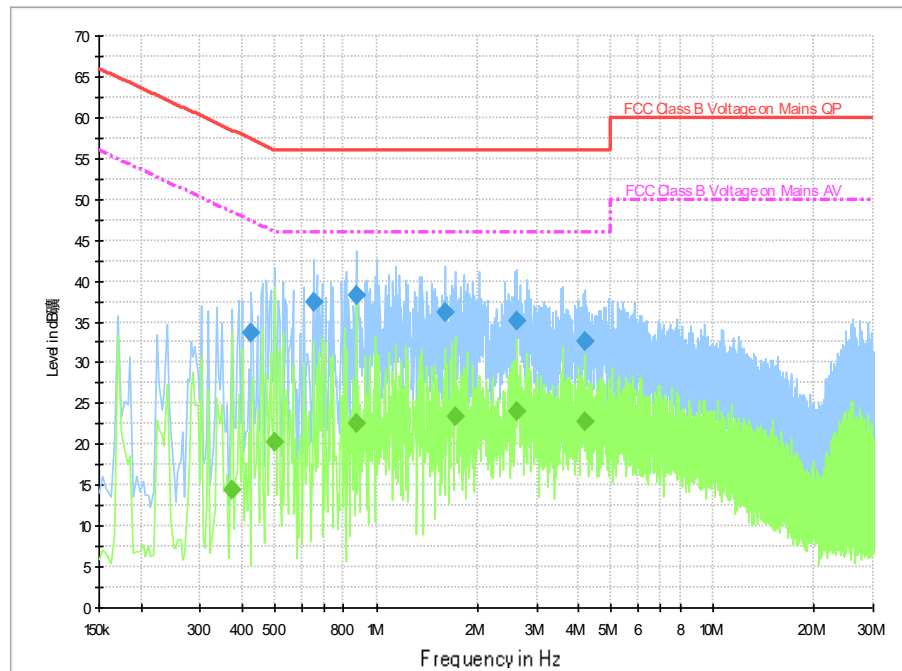


Fig. 40 AC Powerline Conducted Emission-Idle

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.426000	33.6	2000.0	9.000	On	N	19.9	23.8	57.3	
0.650000	37.3	2000.0	9.000	On	L1	20.0	18.7	56.0	
0.870000	38.3	2000.0	9.000	On	L1	19.9	17.7	56.0	
1.602000	36.1	2000.0	9.000	On	L1	19.8	19.9	56.0	
2.614000	35.2	2000.0	9.000	On	L1	19.8	20.8	56.0	
4.174000	32.6	2000.0	9.000	On	L1	19.8	23.4	56.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.426000	33.6	2000.0	9.000	On	N	19.9	23.8	57.3	
0.650000	37.3	2000.0	9.000	On	L1	20.0	18.7	56.0	
0.870000	38.3	2000.0	9.000	On	L1	19.9	17.7	56.0	
1.602000	36.1	2000.0	9.000	On	L1	19.8	19.9	56.0	
2.614000	35.2	2000.0	9.000	On	L1	19.8	20.8	56.0	
4.174000	32.6	2000.0	9.000	On	L1	19.8	23.4	56.0	

A.7. Antenna Requirement

The antenna of the device is permanently attached. There are no provisions for connection to an external antenna.

The unit complies with the requirement of FCC Part 15.203.

ANNEX B: EUT parameters

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

ANNEX C: Accreditation Certificate



*** END OF REPORT BODY ***