



FCC PART 15E TEST REPORT No.24T04Z102302-004

for

TCL Communication Ltd.

GSM/UMTS/LTE mobile phone

T509A

FCC ID:2ACCJB228

with

Hardware Version: 05

Software Version: BLC4

Issued Date: 2024-10-31

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
24T04Z102302-004	Rev.0	1st edition	2024-10-31

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(huayuan North Road)

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

1.3. TestingEnvironment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.4. Project date

Testing Start Date: 2024-10-15

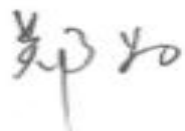
Testing End Date: 2024-10-31

1.5. Signature



Yao Xingyu

(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: TCL Communication Ltd.
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City: Hong Kong
Postal Code: /
Country: China
Contact Person: Ting Wang
Contact Email: ting.wang.hz@tcl.com
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Fax: 0086-755-36612000-81722

2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address/Post: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science
Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
Contact Person: Ting Wang
Contact Email: ting.wang.hz@tcl.com
Telephone: +86 752 2639091
Fax: 0086-755-36612000-81722

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

3.1. About EUT

Description	GSM/UMTS/LTE mobile phone
Model name	T509A
FCC ID	2ACCJB228
WLAN Frequency Band	ISM Band: 5725MHz~5850MHz
Type of modulation	OFDM
Nominal Voltage	3.87V
Extreme High Voltage	4.45V
Extreme Low Voltage	3.6V

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Date of receipt
UT08a	359735331410231/ 359735331410249	05	BLC4	2024-10-18
UT10a	359735331410314/ 359735331410322	05	BLC4	2024-10-15

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

UT08a is used for Conduction test, UT10a is used for Radiation test.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Model	Manufacture
AE1	Battery	TLp049B8	HuiZhou GanFeng LiEnergy Battery Technology Co., Ltd.
AE2	Charger1	UT-681A-5200MY	Shenzhen Baijunda Electronic Co.,Ltd.
AE3	USB Cable1	JWUB1686-M01R	Huizhou Juwei Electronics Co.,Ltd
AE4	USB Cable2	FKY-23-367	Qiyang Fukangyuan Electronic Technology Co., Ltd.

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

3.4. General Description

Equipment Under Test (EUT) is a model of GSM/UMTS/LTE mobile phone with integrated antenna.

It consists of normal options: Battery and Charger.

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

Samples undergoing test were selected by the Client.

4. Reference Documents

4.1. Documents supplied by applicant

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

4.2. Reference Documents for testing

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

FCC Part15	FCC CFR 47, Part 15, Subpart C and E:	
	15.205 Restricted bands of operation;	2021
	15.209 Radiated emission limits, general requirements;	
	15.407 General technical requirements	
ANSI C63.10	Methods of Measurement of Radio-Noise Emissions from	
	Low-Voltage Electrical and Electronic Equipment in the	2013
	Range of 9 kHz to 40 GHz	
UNII: KDB 789033	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
6dB Emission 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	3.87V
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	2025-08-12
2	Vector Signal Analyzer	FSW67	104051	Rohde & Schwarz	1 year	2025-04-01
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	103023	Rohde & Schwarz	1 year	2025-07-06
2	EMI Antenna	VULB9163	01222	Schwarzbeck	1 year	2025-08-30
3	EMI Antenna	3115	00167250	ETS-Lindgren	1 year	2025-05-11
4	EMI Antenna	3116	2663	ETS-Lindgren	1 year	2025-03-21

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

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

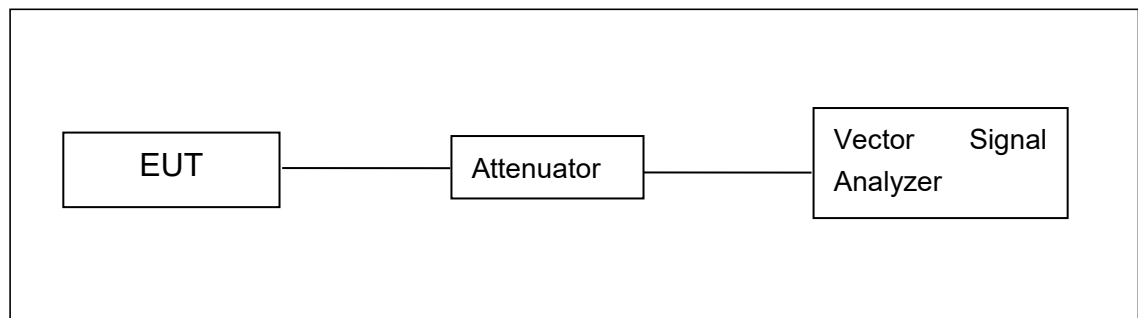
Measurement Uncertainty : 3.08dB,k=2

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

A.2.2. Maximum Average Output Power-Conducted

EUT ID: UT08a

Measurement Results:

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	15.47	15.58	15.52

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	15.26	15.58	15.52

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

this condition.

802.11ac-VHT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11ac (20MHz)	MCS0	15.24	15.55	15.52

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	15.01	15.19

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

802.11ac-VHT40 mode

Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11ac (40MHz)	MCS0	14.94	15.42

The data rate MCS0 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)	MCS0	14.92

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

The duty cycle of all mode are 100%



Maximum output Power: 11a CH157

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.

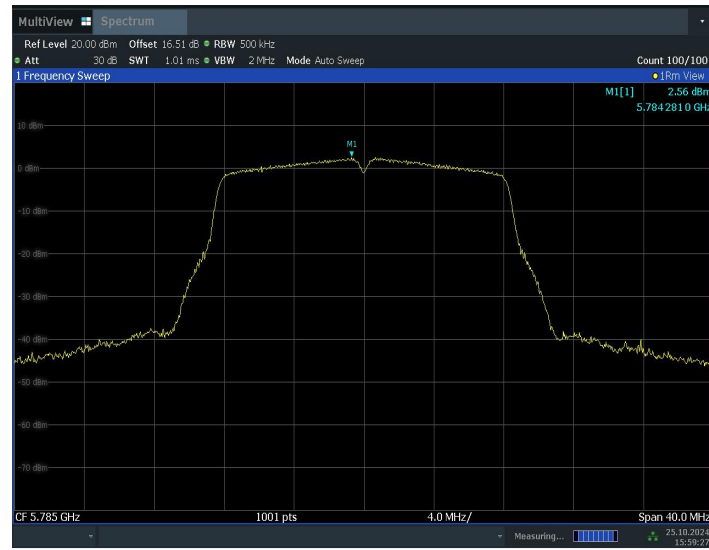
Measurement Uncertainty:

Measurement Uncertainty	0.75dB
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EUT ID: UT08a

Measurement Results:

TestMode	Frequency[MHz]	Result [dBm/MHz]	Limit[dBm/MHz]	Verdict
11A	5745	2.47	≤30.00	PASS
	5785	2.56	≤30.00	PASS
	5825	2.01	≤30.00	PASS
11N20SISO	5745	1.87	≤30.00	PASS
	5785	1.55	≤30.00	PASS
	5825	1.66	≤30.00	PASS
11AC40SISO	5755	-1.01	≤30.00	PASS
	5795	-1.12	≤30.00	PASS
11AC80SISO	5775	-4.43	≤30.00	PASS



15:59:28 25.10.2024

Peak Power Spectral Density:11a CH157

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:

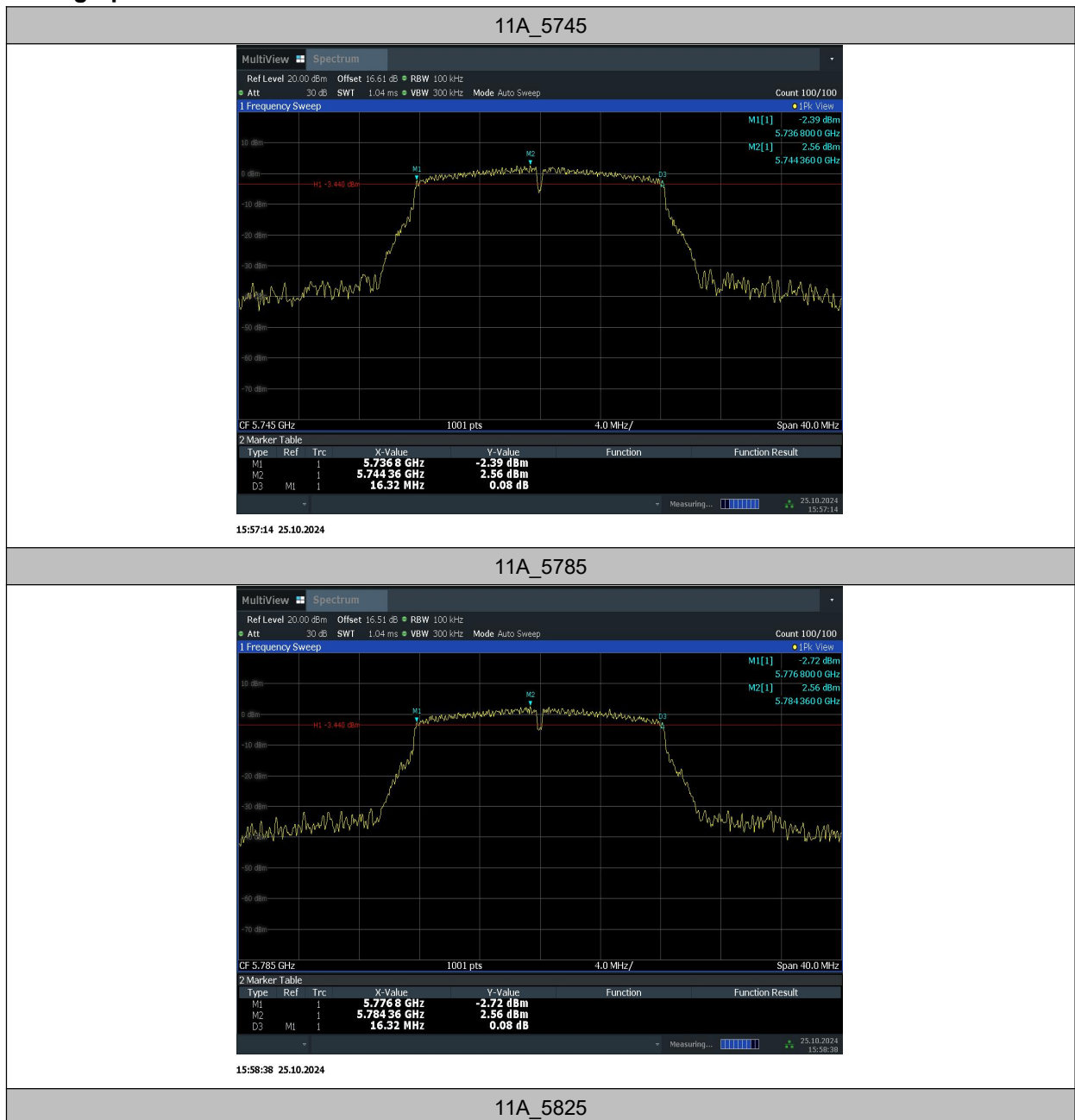
Measurement Uncertainty	60.80Hz
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EUT ID: UT08a

Measurement Result:

TestMode	Frequency[MHz]	6db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	5745	16.32	5736.80	5753.12	0.5	PASS
	5785	16.32	5776.80	5793.12	0.5	PASS
	5825	16.32	5816.80	5833.12	0.5	PASS
11N20SISO	5745	17.60	5736.16	5753.76	0.5	PASS
	5785	17.60	5776.16	5793.76	0.5	PASS
	5825	17.60	5816.16	5833.76	0.5	PASS
11AC40SISO	5755	36.00	5736.84	5772.84	0.5	PASS
	5795	36.32	5776.76	5813.08	0.5	PASS
11AC80SISO	5775	76.32	5736.76	5813.08	0.5	PASS

Test graphs as below:





15:59:56 25.10.2024

11N20SISO_5745



16:55:39 25.10.2024

11N20SISO_5785



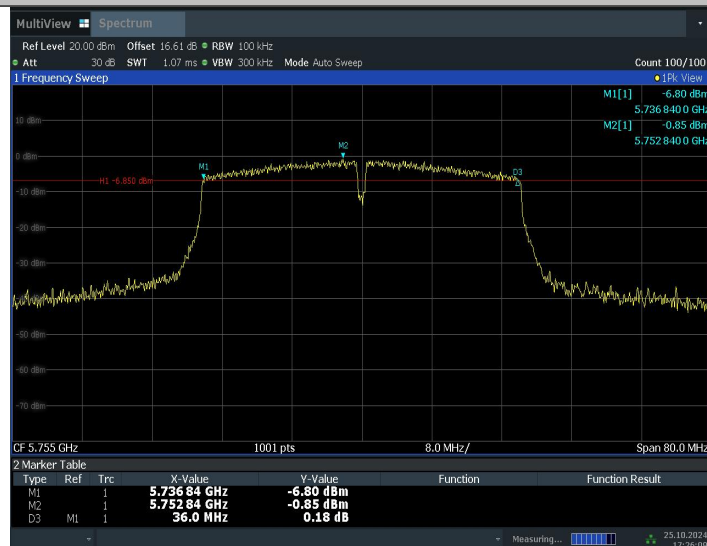
16:57:01 25.10.2024

11N20SISO_5825



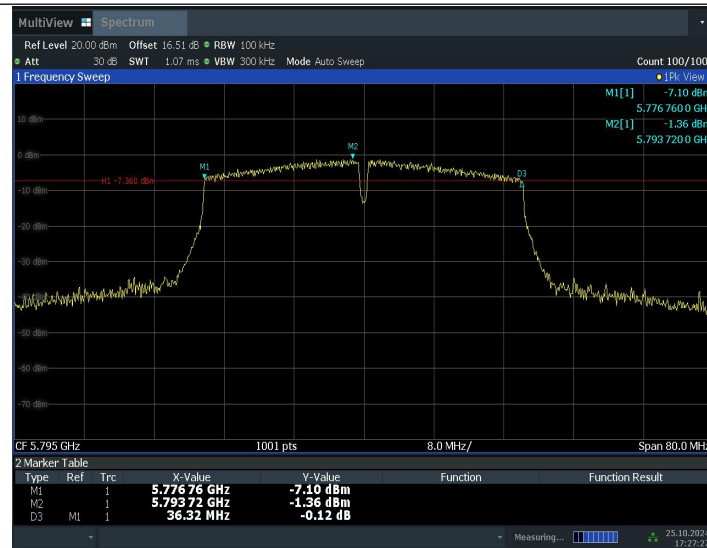
16:58:31 25.10.2024

11AC40SISO_5755



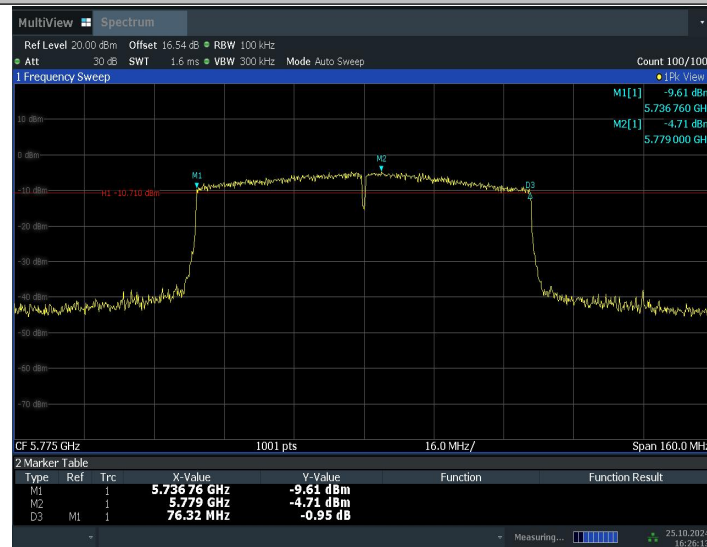
17:26:09 25.10.2024

11AC40SISO_5795



17:27:27 25.10.2024

11AC80SISO_5775



16:26:13 25.10.2024

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

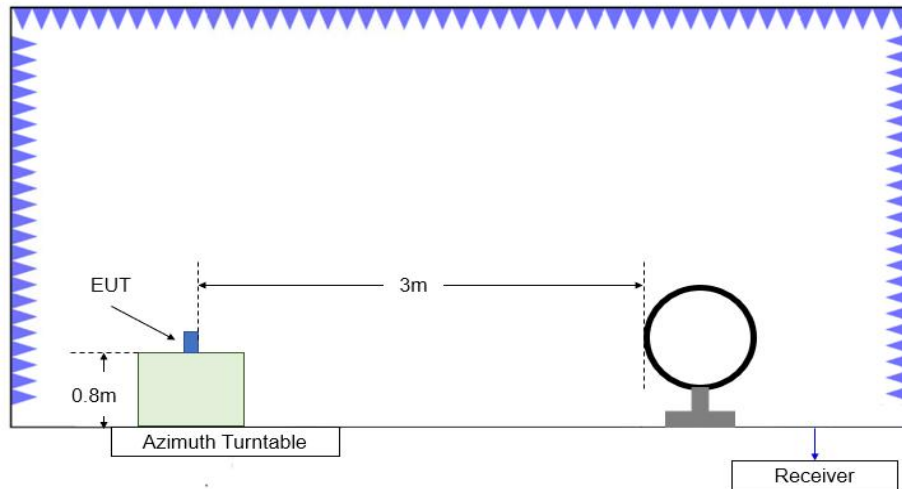


Figure A.5.1. Test Site Diagram (9kHz-30MHz)

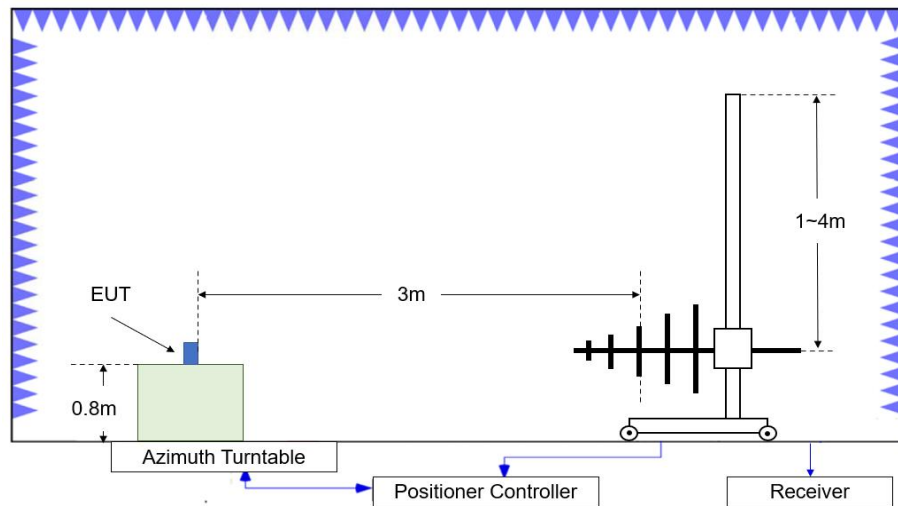


Figure A.5.2. Test Site Diagram (30MHz-1GHz)

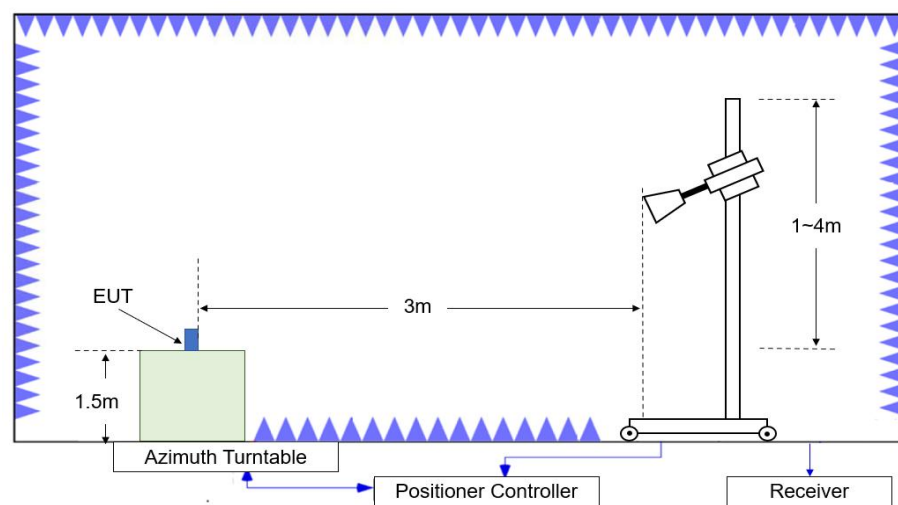


Figure A.5.3. Test Site Diagram (1GHz-40GHz)

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 (dB μ V/m) = $P_{\text{measurement}}$ (dB μ V) + 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 dB μ V/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)
17910.300	45.28	-26.18	45.95	25.51	54.00	8.72	H
17930.200	45.10	-26.18	45.95	25.33	54.00	8.90	V
11649.100	40.10	-31.81	39.20	32.71	54.00	13.90	V
11650.200	39.88	-31.81	39.20	32.49	54.00	14.12	V
13290.900	38.69	-30.02	40.60	28.11	54.00	15.31	V
15973.800	38.68	-27.99	38.30	28.37	54.00	15.32	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)
17943.900	45.17	-26.18	45.95	25.40	54.00	8.83	V
17925.800	45.08	-26.18	45.95	25.31	54.00	8.92	H
11646.400	40.19	-31.81	39.20	32.80	54.00	13.81	V
11649.700	40.12	-31.81	39.20	32.73	54.00	13.88	V
16101.400	38.88	-27.86	38.15	28.59	54.00	15.12	H
14498.100	38.80	-28.77	41.90	25.67	54.00	15.20	V

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)
17928.000	45.17	-26.18	45.95	25.40	54.00	8.83	H
17913.700	45.13	-26.18	45.95	25.36	54.00	8.87	H
14495.400	38.90	-28.77	41.90	25.77	54.00	15.10	V
16187.800	38.88	-27.86	38.20	28.54	54.00	15.12	V
11595.800	37.72	-31.78	39.20	30.30	54.00	16.28	V
11584.800	37.67	-31.78	39.20	30.25	54.00	16.33	V

802.11ac-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)
17925.800	45.12	-26.18	45.95	25.35	54.00	8.88	H
17914.800	45.07	-26.18	45.95	25.30	54.00	8.93	H
14498.700	38.97	-28.77	41.90	25.84	54.00	15.03	V
14498.100	38.92	-28.77	41.90	25.79	54.00	15.08	V
11653.000	37.70	-31.81	39.20	30.31	54.00	16.30	V
11651.900	37.64	-31.81	39.20	30.25	54.00	16.36	V

802.11ac-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)
17916.400	45.10	-26.18	45.95	25.33	54.00	8.90	H
17926.800	44.94	-26.18	45.95	25.17	54.00	9.06	V
14496.000	38.96	-28.77	41.90	25.83	54.00	15.04	V
14489.900	38.90	-28.77	41.90	25.77	54.00	15.10	H
11589.800	37.34	-31.78	39.20	29.92	54.00	16.66	V
11792.700	36.92	-31.76	39.20	29.48	54.00	17.08	H

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)
17919.700	45.08	-26.18	45.95	25.31	54.00	8.92	H
17937.800	45.05	-26.18	45.95	25.28	54.00	8.95	V
16189.400	39.10	-27.86	38.30	28.66	54.00	14.90	H
14497.600	39.08	-28.77	41.90	25.95	54.00	14.92	V
11459.400	36.71	-32.13	39.05	29.79	54.00	17.29	H
11009.500	36.63	-32.25	38.60	30.28	54.00	17.37	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)
17951.600	56.24	-26.18	45.95	36.47	74.00	17.76	H
17929.000	56.05	-26.18	45.95	36.28	74.00	17.95	H
13602.800	52.37	-29.86	40.80	41.43	68.30	15.93	H
16493.500	51.99	-27.72	39.00	40.71	68.30	16.31	V
11652.500	51.76	-31.81	39.20	44.37	74.00	22.24	V
11651.400	50.09	-31.81	39.20	42.70	74.00	23.91	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)
17895.000	56.41	-26.18	45.95	36.64	74.00	17.59	V
17919.700	56.18	-26.18	45.95	36.41	74.00	17.82	H
16989.100	53.02	-27.38	40.85	39.55	68.30	15.28	V
16987.500	52.58	-27.38	40.85	39.11	68.30	15.72	H
11648.000	50.93	-31.81	39.20	43.54	74.00	23.07	V
11644.800	50.00	-31.81	39.20	42.61	74.00	24.00	V

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)
17988.500	56.18	-26.18	45.95	36.41	74.00	17.82	V
17931.200	55.78	-26.18	45.95	36.01	74.00	18.22	H
16928.600	52.23	-27.30	40.30	39.23	68.30	16.07	V
16787.200	52.15	-27.52	39.85	39.82	68.30	16.15	H
11591.400	49.29	-31.78	39.20	41.87	74.00	24.71	V
11588.100	48.94	-31.78	39.20	41.52	74.00	25.06	V

802.11ac-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)
17937.800	56.31	-26.18	45.95	36.54	74.00	17.69	V
17927.400	56.22	-26.18	45.95	36.45	74.00	17.78	H
13820.500	51.93	-29.34	41.25	40.02	68.30	16.37	H
16699.200	51.91	-27.70	39.65	39.96	68.30	16.39	V
11648.000	48.36	-31.81	39.20	40.97	74.00	25.64	V
11829.000	48.18	-31.76	39.20	40.74	74.00	25.82	H

802.11ac-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)
17925.800	56.32	-26.18	45.95	36.55	74.00	17.68	V
17921.900	56.09	-26.18	45.95	36.32	74.00	17.91	H
16397.800	52.21	-27.84	38.70	41.35	68.30	16.09	V
16801.500	52.20	-27.52	39.85	39.87	68.30	16.10	H
11815.800	48.57	-31.76	39.20	41.13	74.00	25.43	H
8983.300	48.24	-33.53	37.70	44.07	68.30	20.06	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)
17917.500	56.15	-26.18	45.95	36.38	74.00	17.85	V
17901.500	55.84	-26.18	45.95	36.07	74.00	18.16	H
16733.300	52.40	-27.64	39.70	40.34	68.30	15.90	H
16952.200	52.40	-27.34	40.60	39.14	68.30	15.90	V
11286.700	47.63	-32.11	38.65	41.09	74.00	26.37	V
11815.800	47.62	-31.76	39.20	40.18	74.00	26.38	V

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 HT20	5745 MHz	Fig.7	P
	5825 MHz	Fig.8	P
802.11ac HT40	5755 MHz	Fig.9	P
	5795 MHz	Fig.10	P
802.11ac HT80	5775 MHz	Fig.11 Fig.12	P

Conclusion: PASS

Test graphs as below:

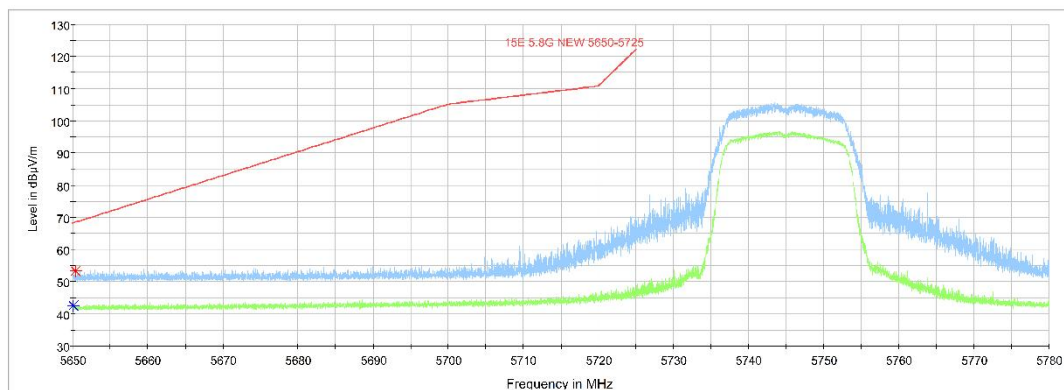


Fig. 1 Band Edges (802.11a Ch149,5745MHz)

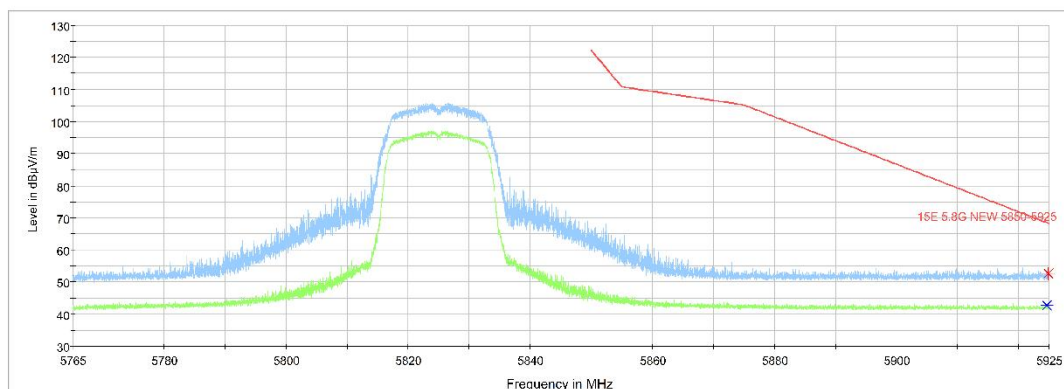


Fig. 2 Band Edges (802.11a Ch165, 5825MHz)

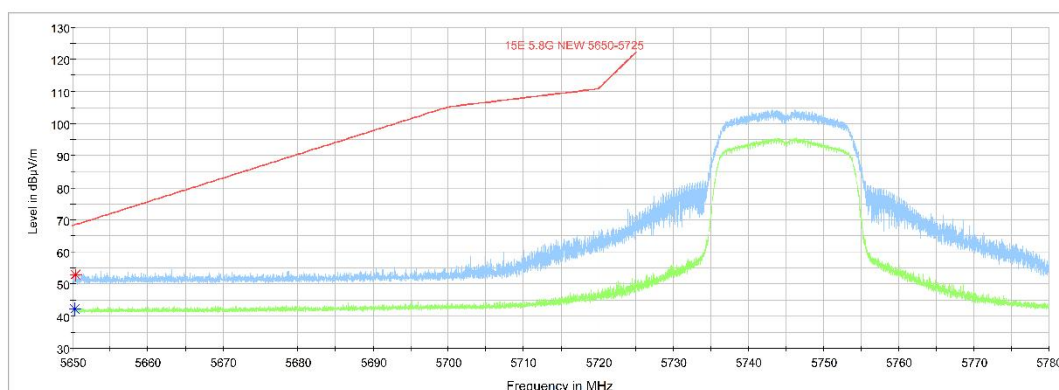


Fig. 3 Band Edges (802.11n-HT20 Ch149, 5745MHz)

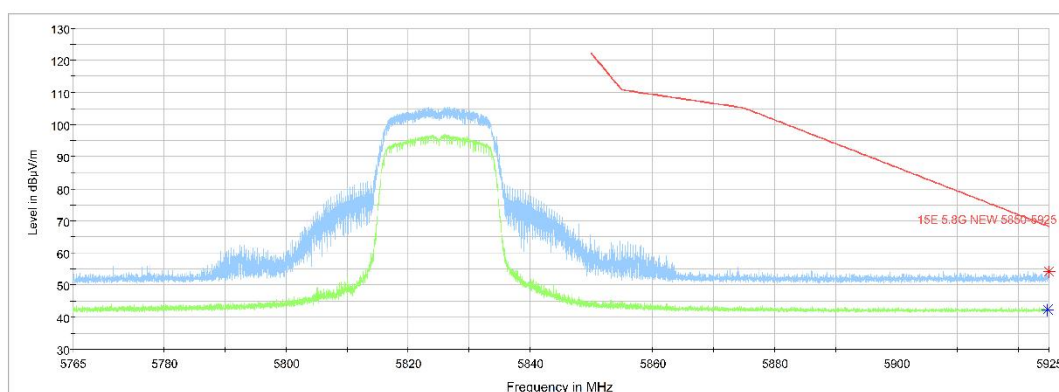


Fig. 4 Band Edges (802.11n-HT20 Ch165, 5825MHz)

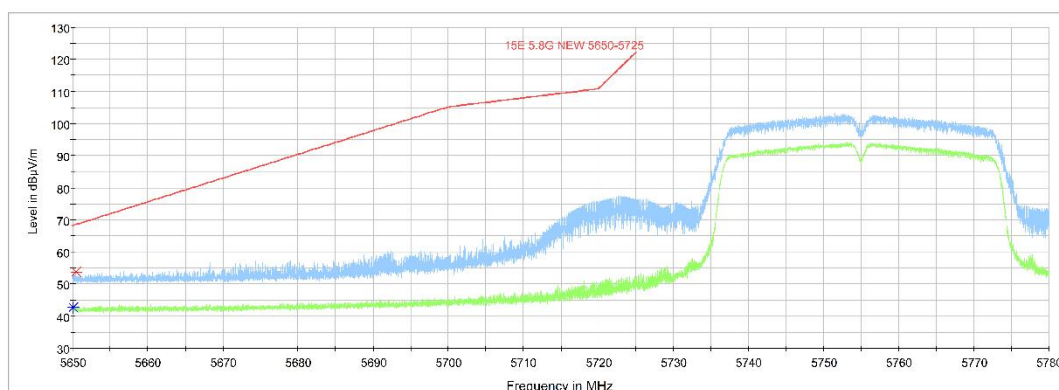


Fig. 5 Band Edges (802.11n-HT40 Ch151, 5755MHz)

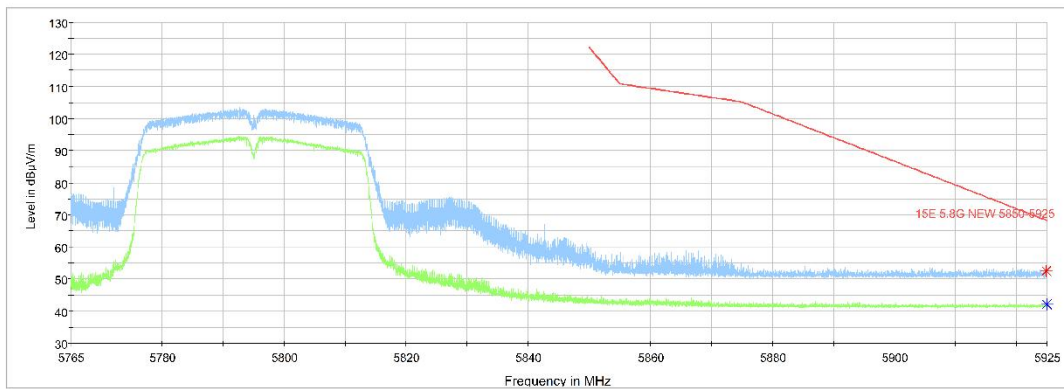


Fig. 6 Band Edges (802.11n-HT40 Ch159, 5795MHz)

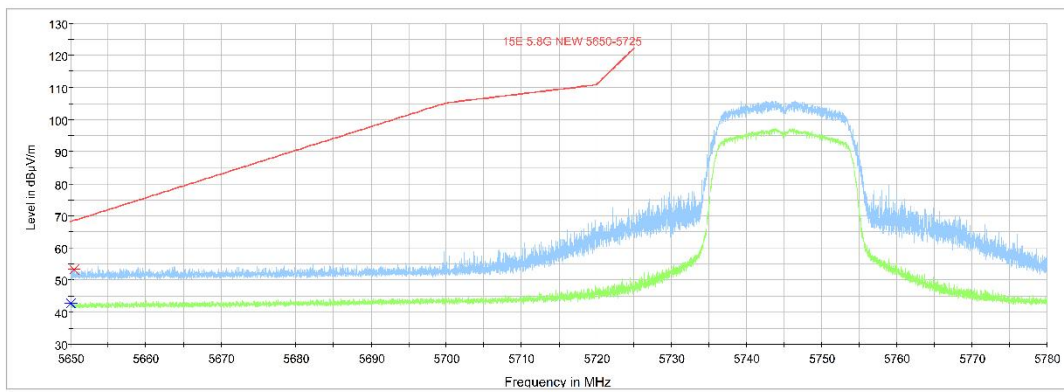


Fig. 7 Band Edges (802.11ac-HT20 Ch149, 5745MHz)

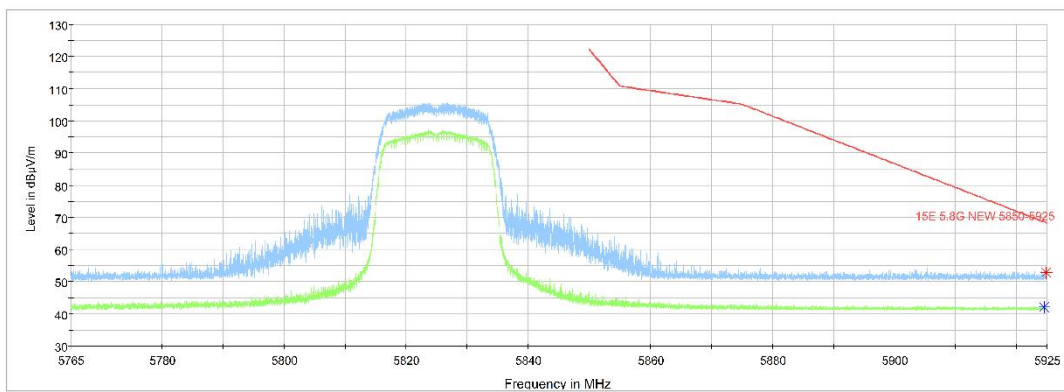


Fig. 8 Band Edges (802.11ac-HT20 Ch165, 5825MHz)

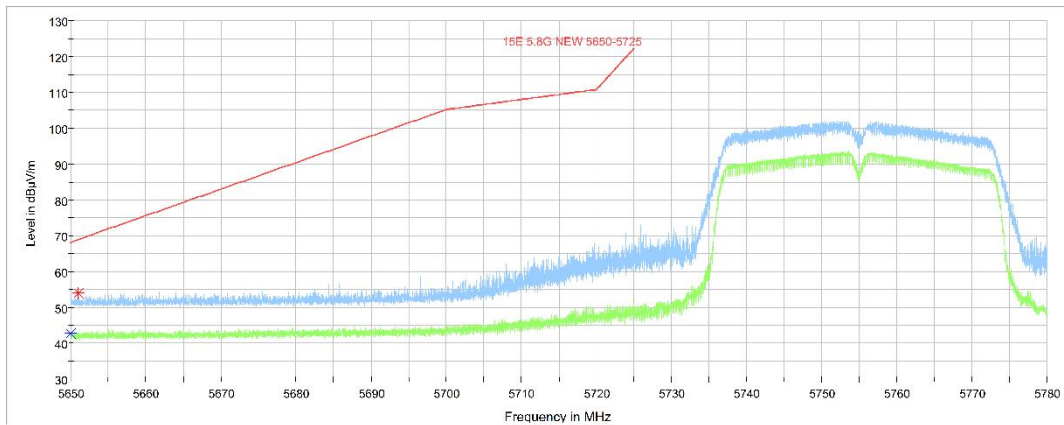


Fig. 9 Band Edges (802.11ac-HT40 Ch151, 5755MHz)

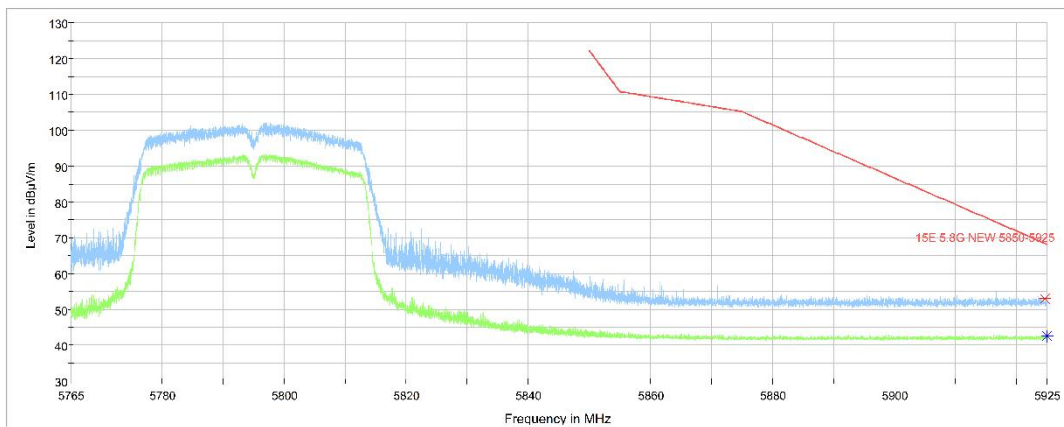


Fig. 10 Band Edges (802.11ac-HT40 Ch159, 5795MHz)

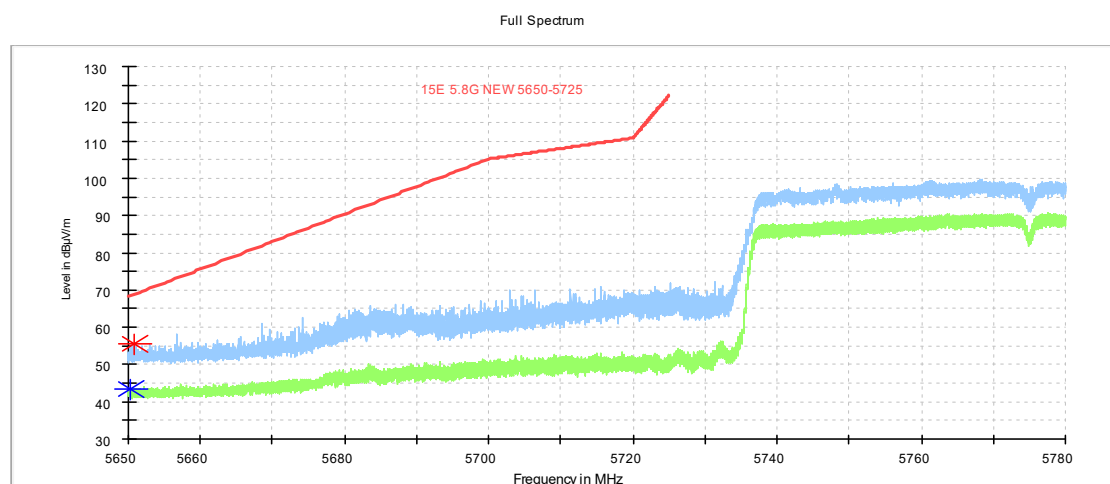


Fig. 11 Band Edges (802.11ac-HT80 Ch155, 5775MHz)

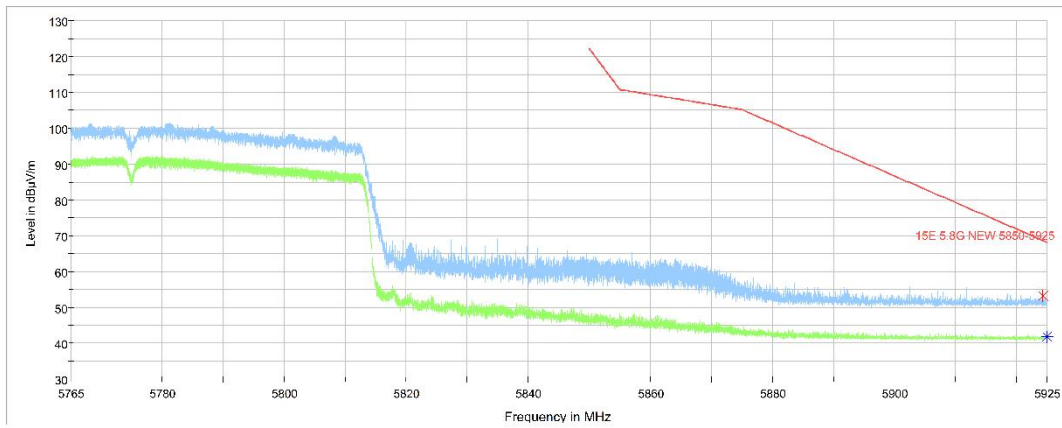


Fig. 12 Band Edges (802.11ac-HT80, 5775MHz)

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.

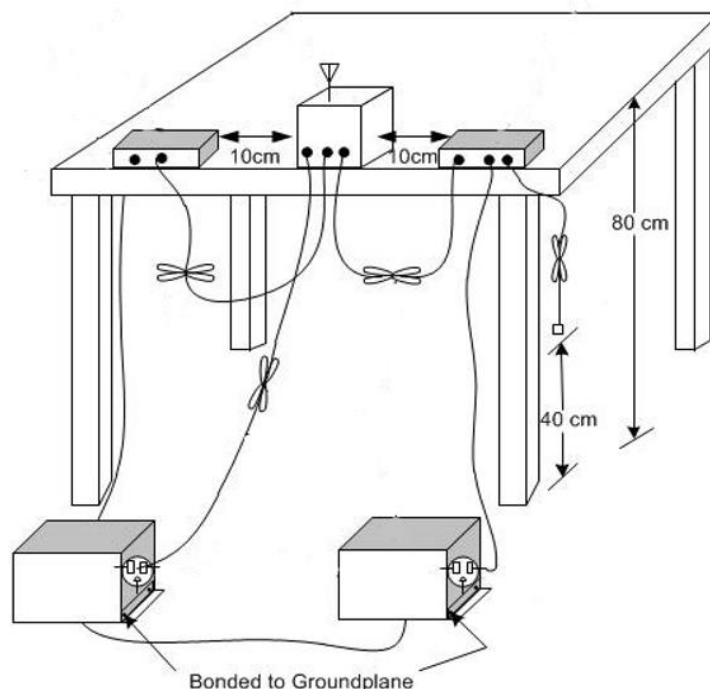
The measurement bandwidth is:

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

Wi-Fi (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		Wi-Fi	Idle	
0.15 to 0.5	66 to 56	Fig.A.6.1	Fig. A.6.2	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.

Wi-Fi (Average Limit)

Frequency range (MHz)	Average Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		Wi-Fi	Idle	
0.15 to 0.5	56 to 46	Fig.A.6.1	Fig. A.6.2	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.

Conclusion: Pass

Test graphs as below:

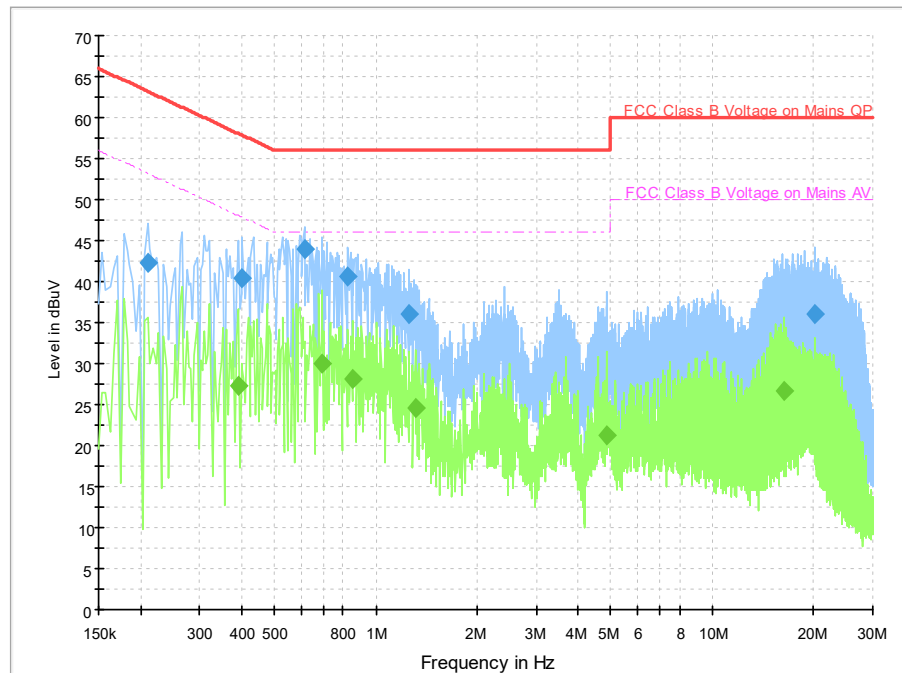


Fig.A.6.1. AC Powerline Conducted Emission-Idle

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.210000	42.4	2000.0	9.000	On	L1	19.8	20.8	63.2	
0.402000	40.3	2000.0	9.000	On	L1	20.0	17.5	57.8	
0.614000	44.0	2000.0	9.000	On	L1	20.0	12.0	56.0	
0.826000	40.6	2000.0	9.000	On	N	19.8	15.4	56.0	
1.254000	36.1	2000.0	9.000	On	N	19.7	19.9	56.0	
20.194000	36.0	2000.0	9.000	On	L1	20.0	24.0	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.390000	27.3	2000.0	9.000	On	L1	19.9	20.7	48.1	
0.694000	30.0	2000.0	9.000	On	L1	20.0	16.0	46.0	
0.854000	28.1	2000.0	9.000	On	N	19.8	17.9	46.0	
1.310000	24.6	2000.0	9.000	On	N	19.7	21.4	46.0	
4.858000	21.3	2000.0	9.000	On	L1	19.8	24.7	46.0	
16.318000	26.6	2000.0	9.000	On	L1	20.0	23.4	50.0	

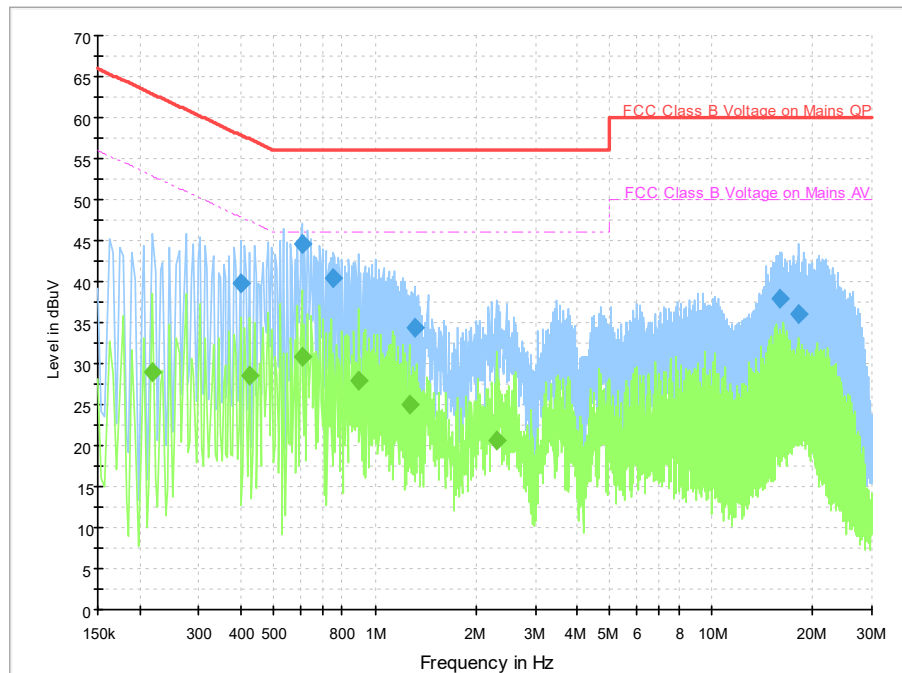


Fig.A.6.2. AC Powerline Conducted Emission-Idle

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.398000	39.9	2000.0	9.000	On	L1	20.0	18.0	57.9	
0.606000	44.6	2000.0	9.000	On	L1	20.0	11.4	56.0	
0.754000	40.4	2000.0	9.000	On	N	19.8	15.6	56.0	
1.318000	34.3	2000.0	9.000	On	L1	19.9	21.7	56.0	
15.970000	38.0	2000.0	9.000	On	L1	20.0	22.0	60.0	
18.130000	36.1	2000.0	9.000	On	L1	20.0	23.9	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.218000	29.0	2000.0	9.000	On	L1	19.8	23.9	52.9	
0.426000	28.6	2000.0	9.000	On	L1	20.0	18.7	47.3	
0.606000	30.9	2000.0	9.000	On	L1	20.0	15.1	46.0	
0.894000	27.9	2000.0	9.000	On	N	19.8	18.1	46.0	
1.266000	25.0	2000.0	9.000	On	N	19.7	21.0	46.0	
2.314000	20.6	2000.0	9.000	On	L1	19.8	25.4	46.0	

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 ***