



FCC PART 15C TEST REPORT No.23T04Z80961-09

for

Wingtech Group (Hong Kong) Limited

5G Mobile Phone

TMRV075G

FCC ID:2APXW-TMRV075G

with

Hardware Version: V1.0

Software Version: TMRV075G_0.03.03

Issued Date: 2024-03-04

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.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
23T04Z80961-09	Rev.0	1st edition	2024-03-04

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

Location 1:CTTL(Huayuan North Road)

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

Location 2:CTTL(huayuan North Road)

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

1.3. Testing Environment

Normal Temperature: 15-35°C
Relative Humidity: 20-75%

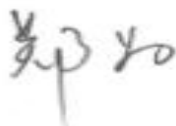
1.4. Project date

Testing Start Date: 2023-12-27
Testing End Date: 2024-03-04

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: Wingtech Group (Hong Kong) Limited
Address: Flat/RM 1903 19/F, Podium Plaza, 5 Hanoi Road, Tsim Sha Tsui, KL,
HK
City: Hong Kong
Postal Code: /
Country: China
Telephone: +86-21-53529900
Fax: /

2.2. Manufacturer Information

Company Name: Wingtech Group (Hong Kong) Limited
Address: Flat/RM 1903 19/F, Podium Plaza, 5 Hanoi Road, Tsim Sha Tsui, KL,
HK
City: Hong Kong
Postal Code: /
Country: China
Telephone: +86-21-53529900
Fax: /

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

3.1. About EUT

Description	5G Mobile Phone
Model name	TMRV075G
FCC ID	2APXW-TMRV075G
With WLAN Function	Yes
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	DSSS/CCK/OFDM
Number of Channels	11
Antenna	Integral Antenna
MAX Conducted Power	26.64dBm
Nominal Voltage	3.87V
Extreme High Voltage	4.45V
Extreme Low Voltage	3.6V

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
UT30a	862503070011333/ 862503070011325	V1.0	TMRV075G_0.03.03	2023-12-29
UT88a	862503070027362/ 862503070027370	V1.0	TMRV075G_0.03.03	2024-01-22

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

UT30a is used for Conduction test, UT88a is used for Radiation test.

3.3. Internal Identification of AE

AE ID*	Description	Model	Manufacture
AE1	Battery1	TM002	SCUD (FUJIAN) Electronics Co., Ltd.
AE2	USB Cable1	USB AM TO TYPE-C2.0	Huizhou Washin Electronics Co., LTD
AE3	PC	/	/

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

3.4. General Description

The Equipment under Test (EUT) is a model of 5G Mobile Phone with integrated antenna and inbuilt battery.

It consists of normal options: travel charger, USB cable.

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

Samples undergoing test were selected by the client.

3.5. Interpretation of the Test Environment

For the test methods, the test environment uncertainty figures correspond to an expansion factor $k=2$.

Measurement Uncertainty

Parameter	Uncertainty
temperature	0.48°C
humidity	2 %
DC voltages	0.003V

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.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15, Subpart C:	2021
	15.205 Restricted bands of operation;	
	15.209 Radiated emission limits, general requirements;	
ANSI C63.10	15.247 Operation within the bands 902-928MHz, 2400-2483.5 MHz, and 5725-5850 MHz.	2013
	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	
	Federal Communications Commission Office of Engineering and Technology Laboratory Division	
KDB 558074 D01	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. 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	15.247 (b)	/	P
Peak Power Spectral Density	15.247 (e)	/	P
Occupied 6dB Bandwidth	15.247 (a)	/	P
Band Edges Compliance	15.247 (d)	/	P
Transmitter Spurious Emission - Conducted	15.247 (d)	/	P
Radiated Unwanted Emission	15.247, 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.
NP	Not Perform, The test was not performed 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	2024-07-04
2	Vector Signal Analyzer	FSW67	104051	Rohde & Schwarz	1 year	2024-03-06
3	Test Receiver	ESCI	100344	R&S	1 year	2024-03-20
4	LISN	ENV216	101200	R&S	1 year	2024-07-04
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	R&S	1 year	2024-07-08
2	EMI Antenna	VULB 9163	01222	SCHWARZBECK	1 year	2024-02-28
3	EMI Antenna	3115	6914	ETS-Lindgren	1 year	2024-04-25
4	EMI Antenna	3116	2661	ETS-Lindgren	1 year	2024-03-28

※ Note: The EMI Antenna with series number of 01222 and 2661 did not exceed the CAL.DUE.DATE when used.

8. Measurement Uncertainty

8.1. Maximum Output Power

Measurement Uncertainty: 0.387dB,k=1.96

8.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dB,k=1.96

8.3. DTS 6-dB Signal Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

8.4. Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

8.5. Transmitter Spurious Emission

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) k=2
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: Detailed Test Results

A.1. Measurement Method

A.1.1. Conducted Measurements

Connect the EUT to the test system as Fig.A.1.1.1 shows.

Set the EUT to the required work mode.

Set the EUT to the required channel.

Set the Vector Signal Analyzer and start measurement.

Record the values. Vector Signal Analyzer

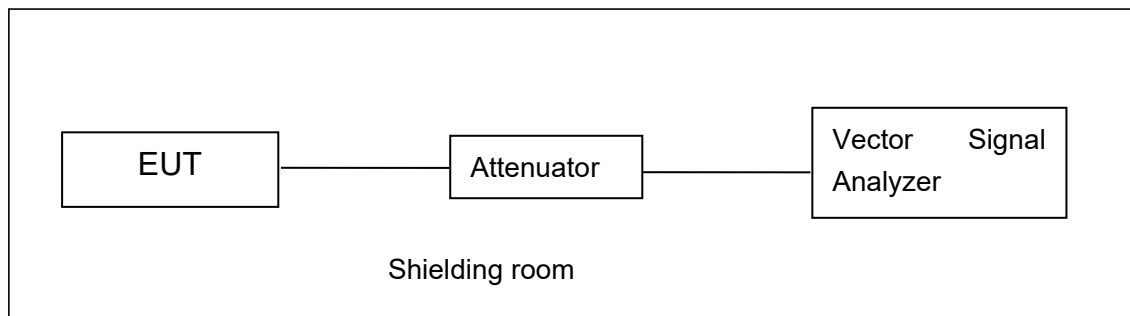


Fig.A.1.1.1: Test Setup Diagram for Conducted Measurements

A.1.2. Radiated Emission Measurements

The measurement is made according to ANSI C63.10

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 Output Power

Method of Measurement: See ANSI C63.10-2013-clause 11.9.1.3

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

Measurement Limit:

Standard	Limit (dBm)
FCC CRF Part 15.247(b)	< 30

A.2.1 Antenna Gain

Antenna gain is -1.9dBi and the value is supplied by the applicant or manufacturer.

A.2.2. Peak Output Power-conducted

EUT ID: UT30a

Measurement Results:

802.11b/g mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11b	1	24.17	24.28	24.09
802.11g	6	26.57	26.64	26.22

The data rate 1Mbps and 6Mbps are selected as worst condition, and the following cases are performed with this condition.

802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		2412MHz (Ch1)	2437MHz (Ch6)	2462 MHz (Ch11)
802.11n (20MHz)	MCS0	26.50	26.54	26.28

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

Duty Cycle

Mode	802.11b	802.11g	802.11n20
Duty Cycle	98%	98%	98%

Conclusion: Pass

A.3. Peak Power Spectral Density

Method of Measurement: See ANSI C63.10-2013-clause 11.10.2

- a) Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set the RBW to RBW = 3 kHz.
- d) Set the VBW = 10 kHz.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level within the RBW.

Measurement Limit:

Standard	Limit
FCC CRF Part 15.247(e)	< 8 dBm/3 kHz

EUT ID: UT30a

Measurement Results:

802.11b/g mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11b	1	Fig.A.3.1	-1.26	P
	6	Fig.A.3.2	-1.77	P
	11	Fig.A.3.3	-1.49	P
802.11g	1	Fig.A.3.4	-6.60	P
	6	Fig.A.3.5	-6.76	P
	11	Fig.A.3.6	-6.38	P

802.11n-HT20 mode

Mode	Channel	Power Spectral Density (dBm/3 kHz)		Conclusion
802.11n (HT20)	1	Fig.A.3.7	-6.78	P
	6	Fig.A.3.8	-6.78	P
	11	Fig.A.3.9	-6.61	P

Test graphs as below:



Fig.A.3.1 Power Spectral Density(802.11b,Ch1)



Fig.A.3.2 Power Spectral Density (802.11b, Ch 6)



Fig.A.3.3 Power Spectral Density (802.11b, Ch 11)

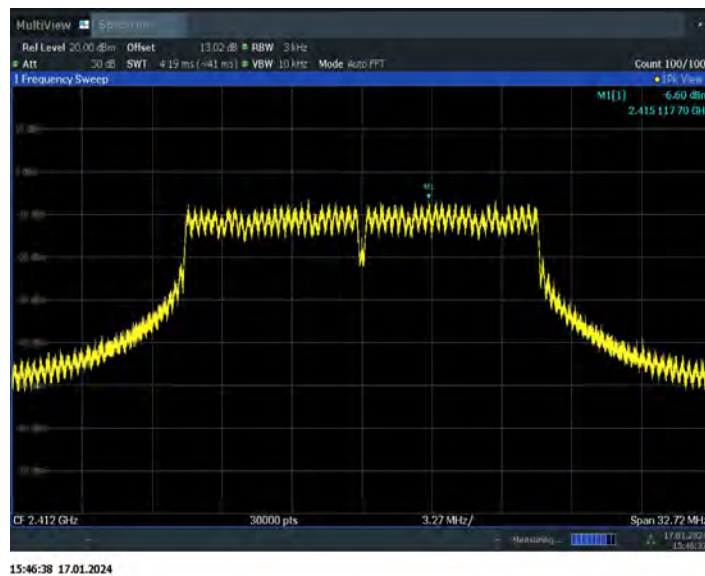


Fig.A.3.4 Power Spectral Density (802.11g, Ch 1)



Fig.A.3.5 Power Spectral Density (802.11g, Ch 6)

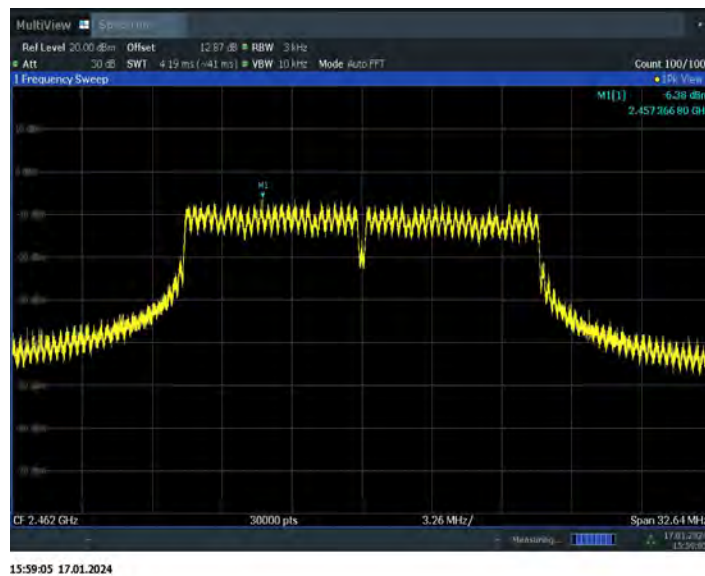


Fig.A.3.6 Power Spectral Density (802.11g, Ch 11)



Fig.A.3.7 Power Spectral Density (802.11n-HT20, Ch 1)



Fig.A.3.8 Power Spectral Density (802.11n-HT20, Ch 6)



Fig.A.3.9 Power Spectral Density (802.11n-HT20, Ch 11)

Conclusion: Pass

A.4. DTS 6-dB Signal Bandwidth

Method of Measurement: See ANSI C63.10-2013 section 11.8.1.

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) = 300 kHz.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) 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 Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247 (a)	≥ 500

EUT ID: UT30a

Measurement Result:

802.11b/g mode

Mode	Channel	DTS Bandwidth (MHz)		conclusion
802.11b	1	Fig.A.4.1	8.56	P
	6	Fig.A.4.2	9.04	P
	11	Fig.A.4.3	9.52	P
802.11g	1	Fig.A.4.4	16.36	P
	6	Fig.A.4.5	16.36	P
	11	Fig.A.4.6	16.32	P

802.11n-HT20 mode

Mode	Channel	DTS Bandwidth (MHz)		conclusion
802.11n (HT20)	1	Fig.A.4.7	17.60	P
	6	Fig.A.4.8	17.56	P
	11	Fig.A.4.9	16.92	P

Test graphs as below:



Fig.A.4.1 DTS Bandwidth(802.11b,Ch 1)



Fig.A.4.2 DTS Bandwidth (802.11b, Ch 6)



Fig.A.4.3 DTS Bandwidth (802.11b, Ch 11)



Fig.A.4.4 DTS Bandwidth (802.11g, Ch 1)



15:48:07 17.01.2024

Fig.A.4.5 DTS Bandwidth (802.11g, Ch 6)



15:50:00 17.01.2024

Fig.A.4.6 DTS Bandwidth (802.11g, Ch 11)



Fig.A.4.7 DTS Bandwidth (802.11n-20MHz, Ch 1)



Fig.A.4.8 DTS Bandwidth (802.11n-HT20, Ch 6)



Fig.A.4.9 DTS Bandwidth (802.11n-HT20, Ch 11)

Conclusion: Pass

A.5. Band Edges Compliance

Method of Measurement: See ANSI C63.10-2013-clause 6.10.4

Connect the spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described below.

- a) Set Span = 100MHz
- b) Sweep Time: coupled
- c) Set the RBW= 100 kHz
- c) Set the VBW= 300 kHz
- d) Detector: Peak
- e) Trace: Max hold

Measurement Limit:

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	> 20

EUT ID: UT30a

Measurement Result:

802.11b/g mode

Mode	Channel	Test Results	Conclusion
802.11b	1	Fig.A.5.1	P
	11	Fig.A.5.2	P
802.11g	1	Fig.A.5.3	P
	11	Fig.A.5.4	P

802.11n-HT20 mode

Mode	Channel	Test Results	Conclusion
802.11n (HT20)	1	Fig.A.5.5	P
	11	Fig.A.5.6	P

Test graphs as below:



Fig.A.5.1 Band Edges (802.11b, Ch 1)



Fig.A.5.2 Band Edges (802.11b, Ch 11)



Fig.A.5.3 Band Edges (802.11g, Ch 1)



Fig.A.5.4 Band Edges (802.11g, Ch 11)



Fig.A.5.5 Band Edges (802.11n-HT20, Ch 1)



Fig.A.5.6 Band Edges (802.11n-HT20, Ch 11)

Conclusion: Pass

A.6. Transmitter Spurious Emission

Method of Measurement: See ANSI C63.10-2013-clause 11.11

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency
- b) Set the span to ≥ 1.5 times the DTS bandwidth
- c) Set the RBW= 100 kHz
- d) Set the VBW= 300 kHz
- e) Detector = Peak
- f) Sweep time = auto couple
- g) Trace mode = max hold
- h) Allow trace to fully stabilize
- i) Use the peak marker function to determine the maximum PSD level

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Establish an emission level by using the following procedure:

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW = 300 kHz.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (d)	20dB below peak output power in 100 kHz bandwidth

EUT ID: UT30a

Measurement Results:

TestMode	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	2412	Reference	12.62	12.62	---	PASS
		30~1000	12.62	-56.27	≤ -7.38	PASS
		1000~26500	12.62	-44.14	≤ -7.38	PASS
	2437	Reference	12.41	12.41	---	PASS
		30~1000	12.41	-56.5	≤ -7.59	PASS
		1000~26500	12.41	-43.5	≤ -7.59	PASS
	2462	Reference	12.76	12.76	---	PASS
		30~1000	12.76	-56.21	≤ -7.24	PASS
		1000~26500	12.76	-43.74	≤ -7.24	PASS
11G	2412	Reference	7.65	7.65	---	PASS
		30~1000	7.65	-56.32	≤ -12.35	PASS
		1000~26500	7.65	-43.65	≤ -12.35	PASS
	2437	Reference	7.67	7.67	---	PASS
		30~1000	7.67	-57.08	≤ -12.33	PASS
		1000~26500	7.67	-43.63	≤ -12.33	PASS
	2462	Reference	8.11	8.11	---	PASS
		30~1000	8.11	-56.88	≤ -11.89	PASS
		1000~26500	8.11	-42.89	≤ -11.89	PASS
11N20SISO	2412	Reference	7.73	7.73	---	PASS
		30~1000	7.73	-55.16	≤ -12.27	PASS
		1000~26500	7.73	-44.06	≤ -12.27	PASS
	2437	Reference	7.61	7.61	---	PASS
		30~1000	7.61	-56.56	≤ -12.39	PASS
		1000~26500	7.61	-44.23	≤ -12.39	PASS
	2462	Reference	8.10	8.10	---	PASS
		30~1000	8.10	-56.53	≤ -11.9	PASS
		1000~26500	8.10	-43.54	≤ -11.9	PASS

Test graphs as below:

11B_2412_0~Reference



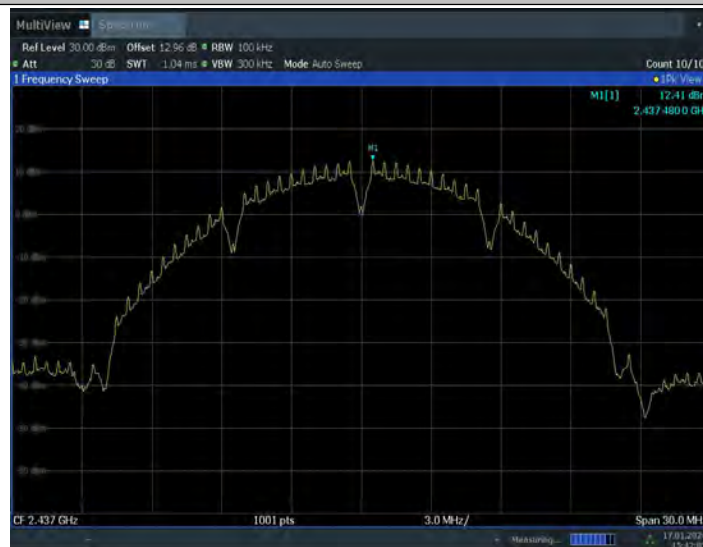
11B_2412_30~1000



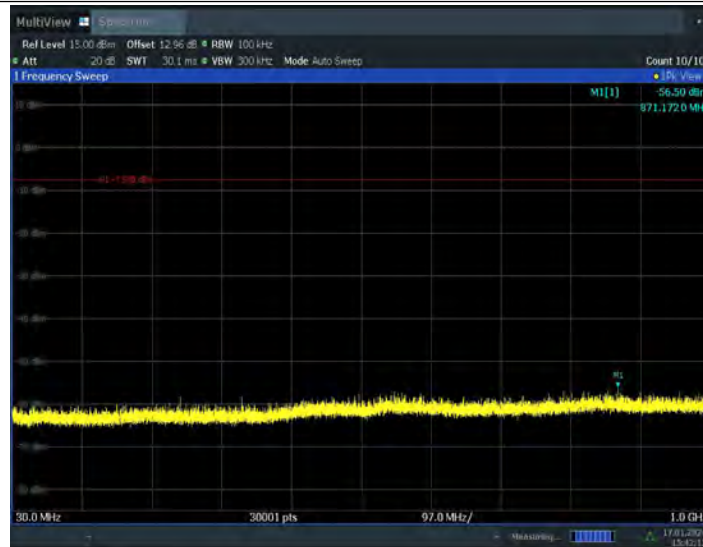
11B_2412_1000~26500



11B_2437_0~Reference



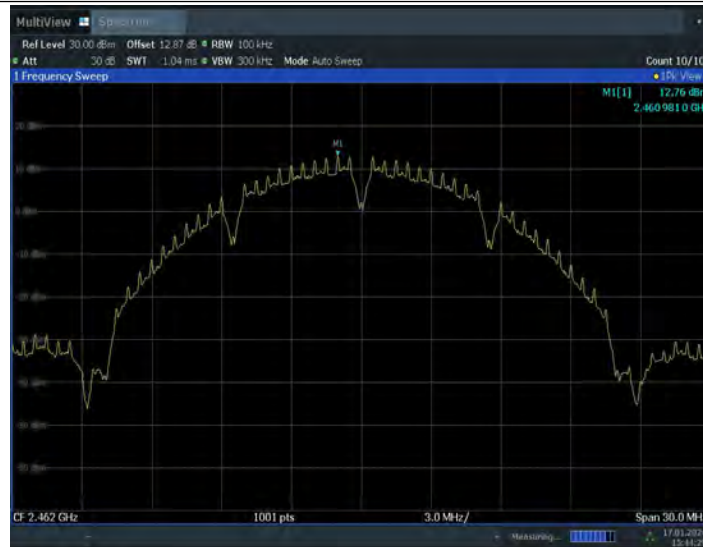
11B_2437_30~1000



11B_2437_1000~26500



11B_2462_0~Reference



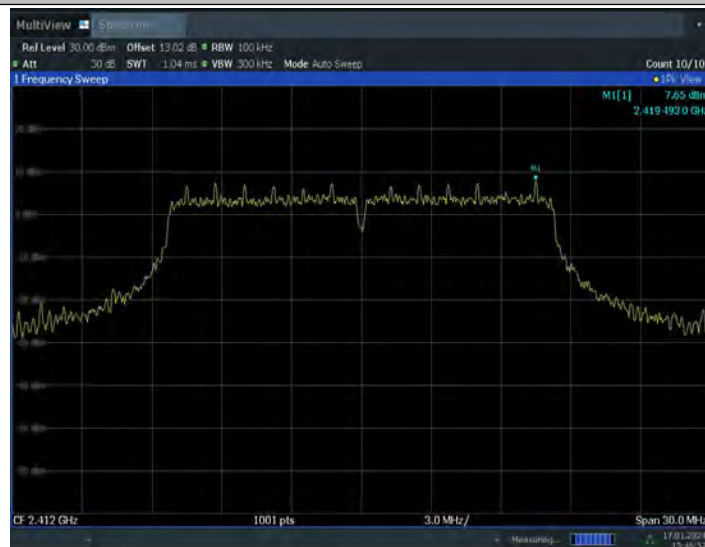
11B_2462_30~1000



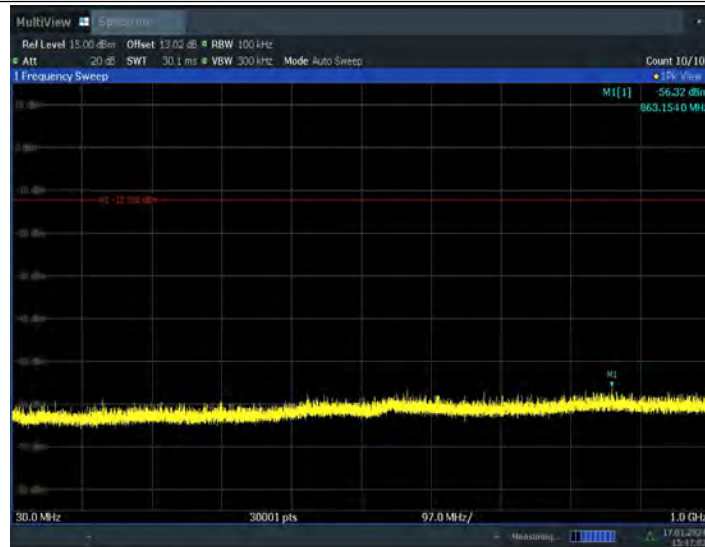
11B_2462_1000~26500



11G_2412_0~Reference



11G_2412_30~1000



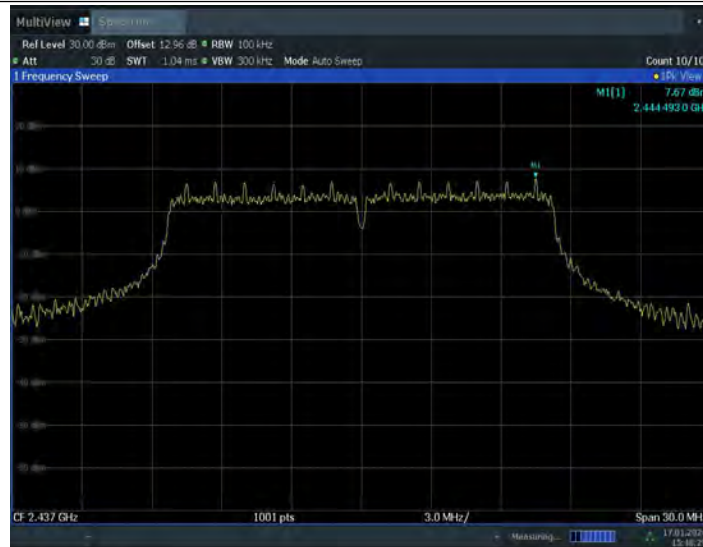
15:47:04 17.01.2024

11G_2412_1000~26500

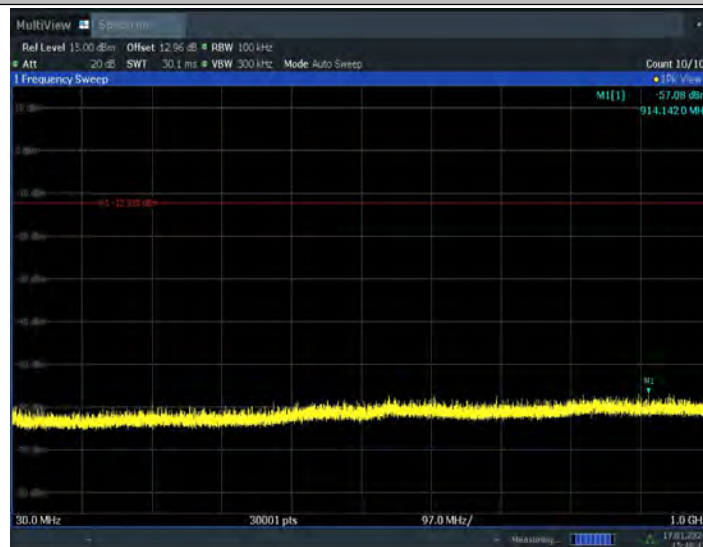


15:47:40 17.01.2024

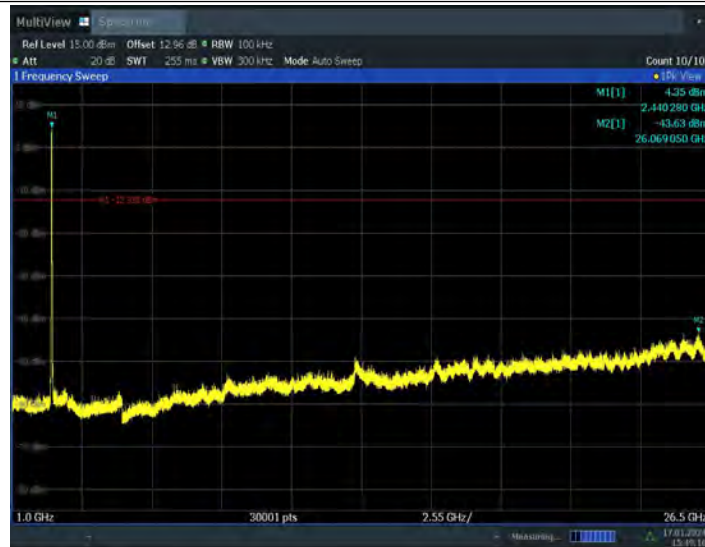
11G_2437_0~Reference



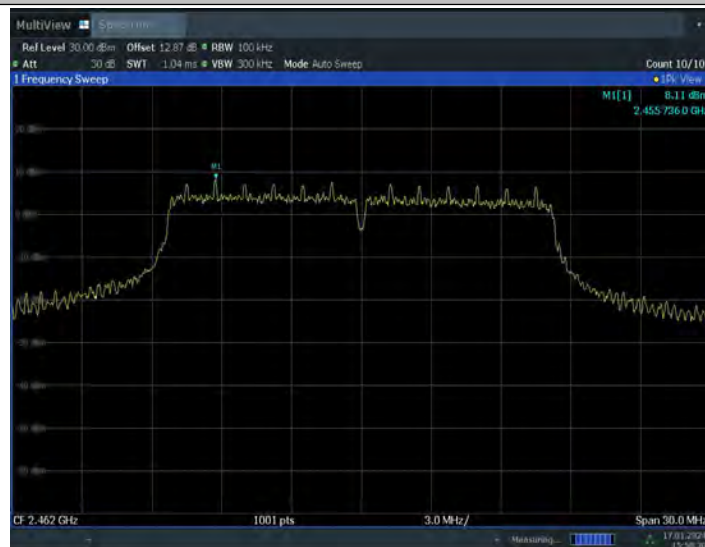
11G_2437_30~1000



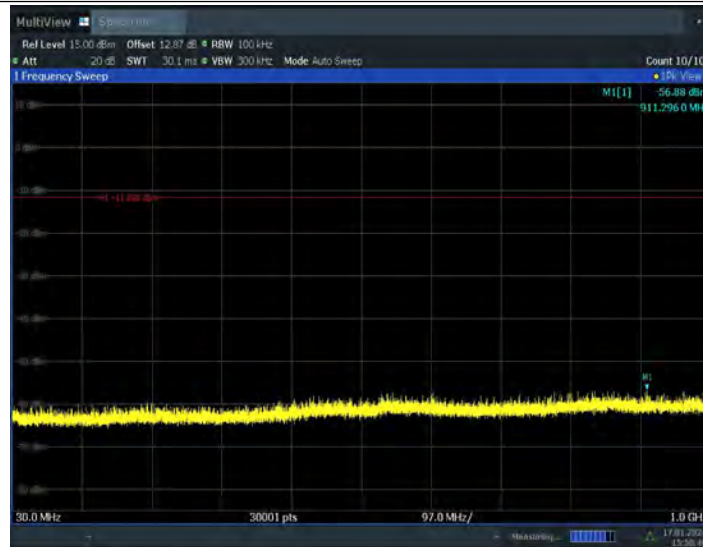
11G_2437_1000~26500



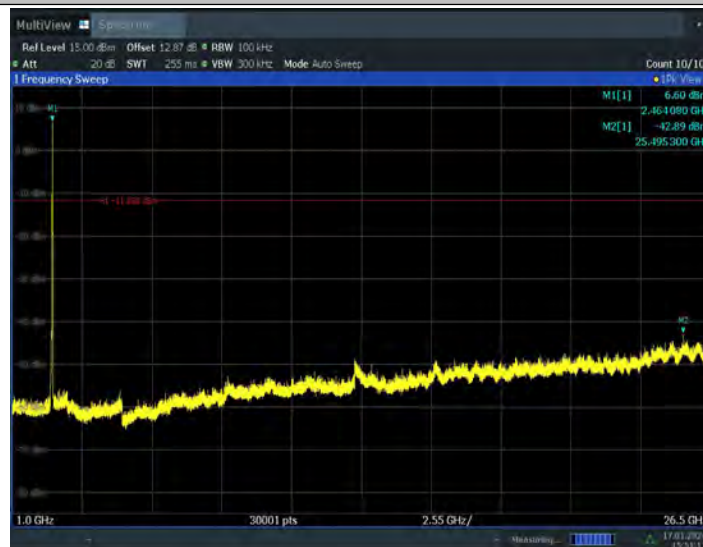
11G_2462_0~Reference



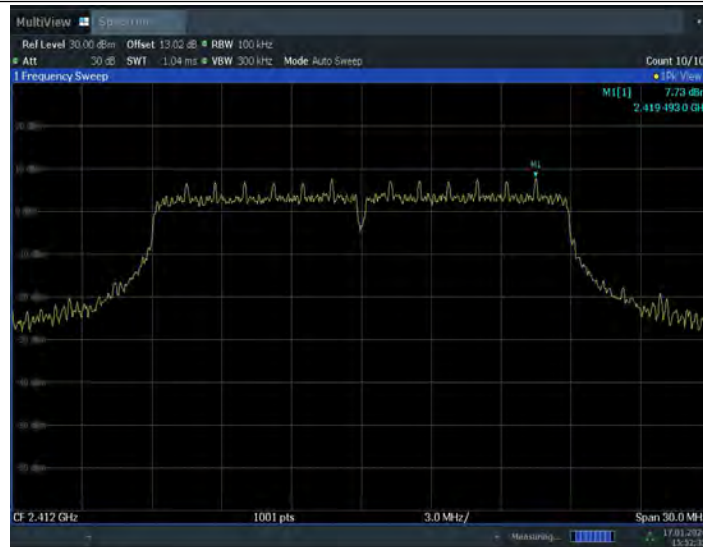
11G_2462_30~1000



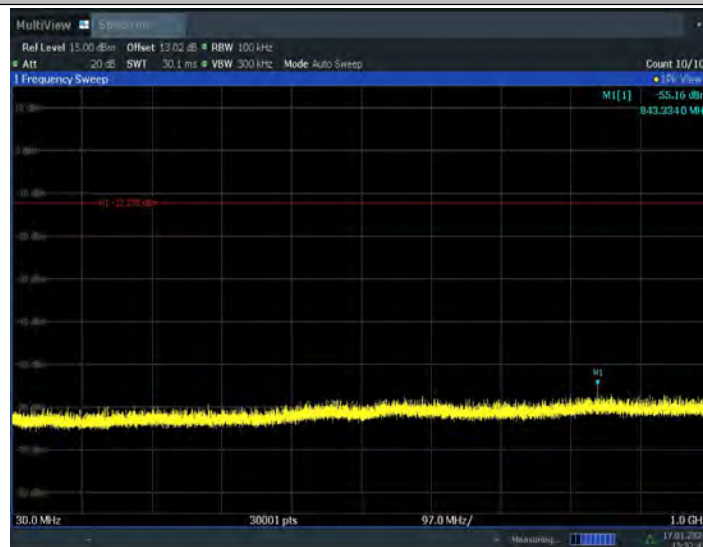
11G_2462_1000~26500



11N20SISO_2412_0~Reference



11N20SISO_2412_30~1000

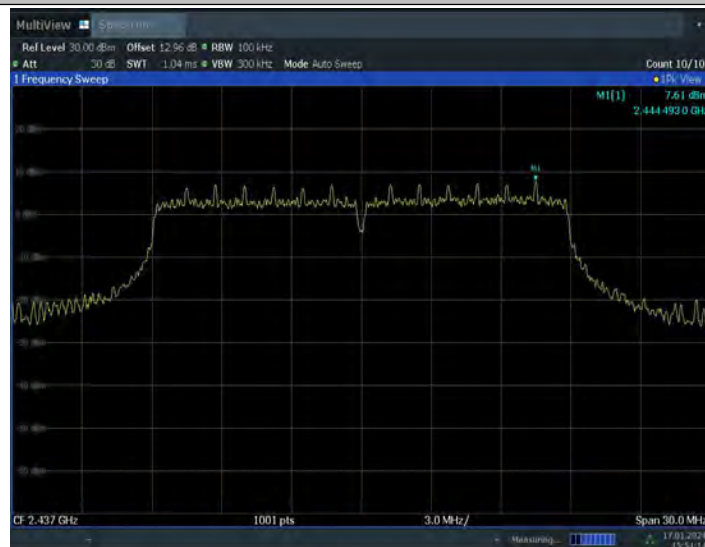


11N20SISO_2412_1000~26500



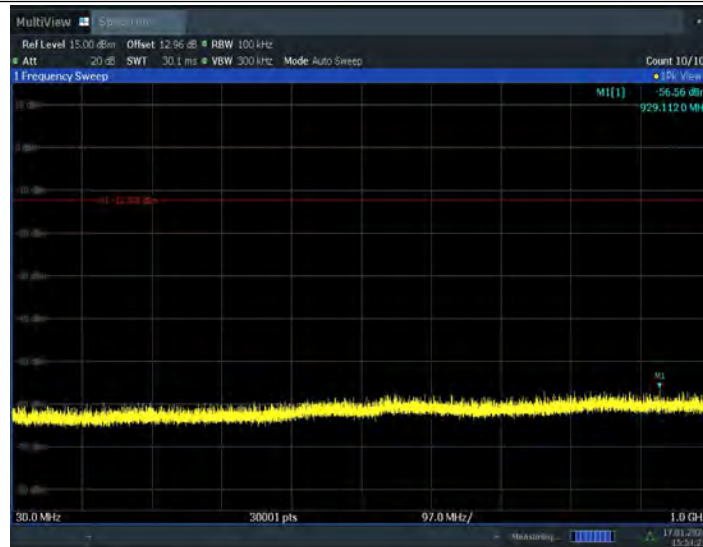
15:53:22 17.01.2024

11N20SISO_2437_0~Reference

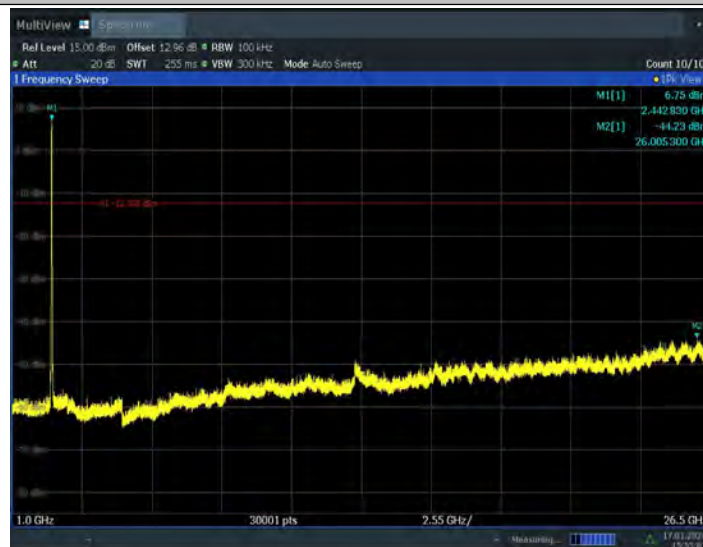


15:54:15 17.01.2024

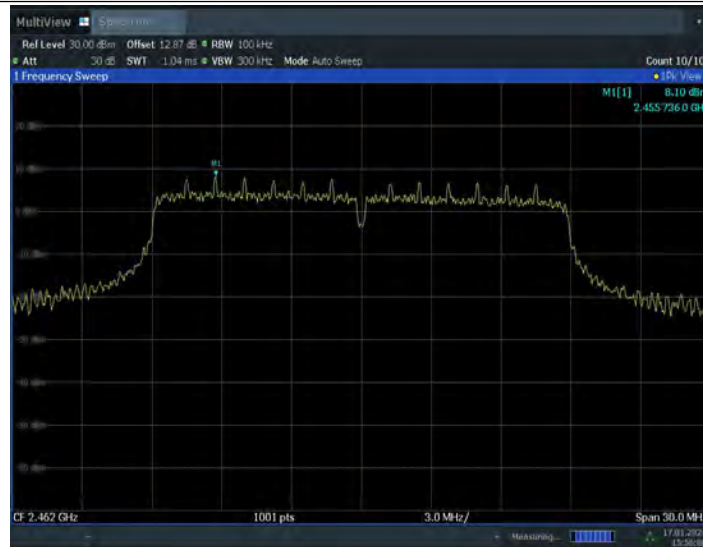
11N20SISO_2437_30~1000



11N20SISO_2437_1000~26500



11N20SISO_2462_0~Reference



15:56:01 17.01.2024

11N20SISO_2462_30~1000



15:56:12 17.01.2024

11N20SISO_2462_1000~26500



Conclusion: Pass

A.7. Radiated Unwanted Emission

Limits

Measurement Limit

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output power

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)).

Limit in restricted band

Frequency (MHz)	Field strength($\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.490	$2400/F(\text{kHz})$	300
0.490 - 1.705	$24000/F(\text{kHz})$	30
1.705 – 30.0	30	30

Frequency of emission (MHz)	Field strength ($\mu\text{V/m}$)	Field strength (dB $\mu\text{V/m}$)	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.

Test setup

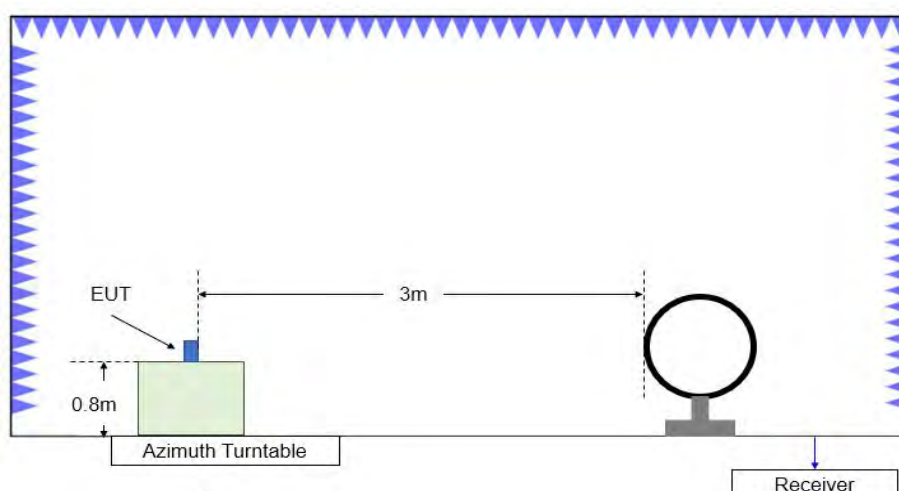


Figure A.7.1. Test Site Diagram (9kHz-30MHz)

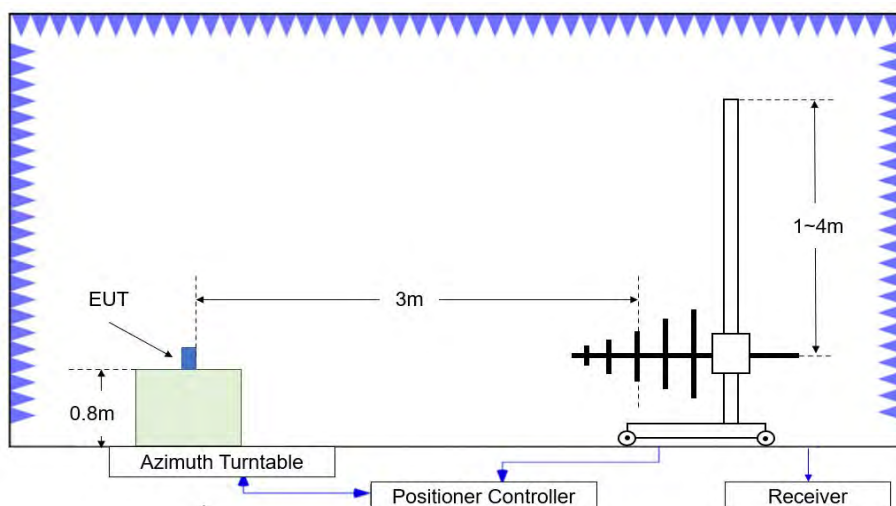


Figure A.7.2. Test Site Diagram (30MHz-1GHz)

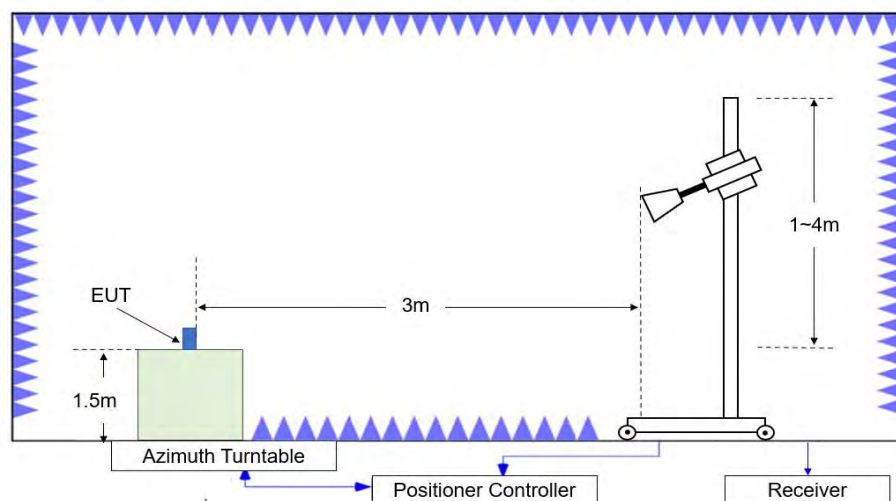


Figure A.7.3. Test Site Diagram (1GHz-40GHz)

Test Procedures

Radiated unwanted emissions from the EUT were measured according to ANSI C63.10.

Test setting

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	100kHz/300kHz	5
1000-3000	1MHz/3MHz	15
3000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Sample Calculation

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.

The measurement results are obtained as described below:

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

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. Measurement frequencies were performed from 9 kHz to the 10th harmonic of highest fundamental frequency or 40GHz, whichever is lower.

Test Result

Peak

802.11b

Ch1

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)
17946.500	51.94	-29.40	46.00	35.34	74.00	22.06	H
7235.000	50.71	-35.60	36.40	49.91	74.00	23.29	V
14996.000	48.80	-30.00	40.60	38.20	74.00	25.20	H
12564.000	47.29	-31.20	39.20	39.29	74.00	26.71	H
9742.000	43.13	-34.50	37.80	39.83	74.00	30.87	H
2387.300	58.98	-19.80	28.20	50.58	74.00	15.02	V

Ch6

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)
7312.000	57.64	-35.40	36.60	56.44	74.00	16.36	V
16960.500	50.63	-29.70	40.60	39.73	74.00	23.37	V
14818.000	48.61	-30.00	41.00	37.61	74.00	25.39	H
12588.500	47.71	-32.20	39.30	40.61	74.00	26.29	V
8517.000	43.11	-34.30	37.40	40.01	74.00	30.89	V
4956.500	39.44	-37.40	33.60	43.24	74.00	34.56	H

Ch11

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)
17950.000	50.15	-29.40	46.00	33.55	74.00	23.85	V
12063.000	48.25	-32.20	39.00	41.55	74.00	25.75	V
13250.500	47.83	-32.00	40.50	39.33	74.00	26.17	V
7385.000	45.95	-35.10	36.60	44.45	74.00	28.05	V
8574.500	42.72	-35.00	37.50	40.22	74.00	31.28	V
2486.200	58.79	-19.70	28.20	50.29	74.00	15.21	H

802.11g

Ch1

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)
17937.000	50.45	-29.40	46.00	33.85	74.00	23.55	H
12389.000	47.37	-31.90	38.90	40.37	74.00	26.63	V
13184.000	46.99	-31.00	40.40	37.59	74.00	27.01	H
9160.500	42.84	-34.70	37.70	39.84	74.00	31.16	V
7234.500	41.84	-35.60	36.40	41.04	74.00	32.16	H
2387.900	60.56	-19.80	28.20	52.16	74.00	13.44	V

Ch6

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)
17939.500	50.06	-29.40	46.00	33.46	74.00	23.94	V
14922.000	47.41	-30.30	40.80	37.01	74.00	26.59	V
12815.500	47.11	-31.50	39.80	38.81	74.00	26.89	V
8334.500	42.65	-35.00	37.20	40.45	74.00	31.35	V
7310.500	42.33	-35.40	36.60	41.13	74.00	31.67	V
4889.500	38.32	-37.50	33.40	42.42	74.00	35.68	H

Ch11

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)
17942.500	50.08	-29.40	46.00	33.48	74.00	23.92	H
12548.500	47.76	-31.20	39.20	39.76	74.00	26.24	H
14811.500	46.79	-30.00	41.00	35.79	74.00	27.21	V
8501.500	42.51	-34.60	37.30	39.81	74.00	31.49	H
7384.500	42.22	-35.10	36.60	40.72	74.00	31.78	H
2486.200	57.05	-19.70	28.20	48.55	74.00	16.95	V

802.11n-HT20
Ch1

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)
17960.000	50.48	-29.40	46.00	33.88	74.00	23.52	V
7248.000	48.13	-35.60	36.40	47.33	74.00	25.87	H
14672.000	47.63	-30.00	41.50	36.13	74.00	26.37	H
12569.000	46.90	-31.20	39.20	38.90	74.00	27.10	H
9632.500	42.91	-34.30	37.60	39.61	74.00	31.09	V
2389.800	60.15	-19.80	28.20	51.75	74.00	13.85	H

Ch6

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)
17905.500	50.60	-29.40	46.00	34.00	74.00	23.40	H
7301.000	48.15	-35.40	36.60	46.95	74.00	25.85	H
14527.000	47.18	-30.60	41.90	35.88	74.00	26.82	H
12795.500	46.80	-31.50	39.80	38.50	74.00	27.20	H
9721.000	42.54	-34.50	37.80	39.24	74.00	31.46	V
4519.500	38.76	-37.70	32.60	43.86	74.00	35.24	H

Ch11

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)
17975.000	50.03	-29.40	46.00	33.43	74.00	23.97	V
14869.000	47.24	-30.10	40.90	36.44	74.00	26.76	H
7393.000	47.15	-35.10	36.60	45.65	74.00	26.85	H
12583.500	46.83	-32.20	39.30	39.73	74.00	27.17	V
8501.000	42.49	-34.60	37.30	39.79	74.00	31.51	H
2485.700	57.07	-19.70	28.20	48.57	74.00	16.93	H

Average
802.11b
Ch1

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)
7237.000	46.07	-35.60	36.40	45.27	54.00	7.93	V
17071.000	42.02	-29.40	41.10	30.32	54.00	11.98	V
14863.000	38.58	-30.10	40.90	27.78	54.00	15.42	H
12561.000	38.14	-31.20	39.20	30.14	54.00	15.86	H
8587.000	33.27	-35.00	37.50	30.77	54.00	20.73	H
2389.400	46.81	-19.80	28.20	38.41	54.00	7.19	V

Ch6

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)
7310.000	53.89	-35.40	36.60	52.69	54.00	0.11	V
17950.000	41.27	-29.40	46.00	24.67	54.00	12.73	V
14788.500	38.06	-30.40	41.20	27.26	54.00	15.94	V
12063.000	37.94	-32.20	39.00	31.24	54.00	16.06	V
8611.500	33.25	-35.00	37.50	30.75	54.00	20.75	H
3375.000	29.80	-38.00	30.90	36.90	54.00	24.20	H

Ch11

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)
17941.500	41.34	-29.40	46.00	24.74	54.00	12.66	V
7387.000	40.71	-35.10	36.60	39.21	54.00	13.29	V
12562.000	38.08	-31.20	39.20	30.08	54.00	15.92	H
14779.500	38.01	-30.40	41.20	27.21	54.00	15.99	H
8514.500	33.29	-34.60	37.30	30.59	54.00	20.71	H
2485.600	47.29	-19.70	28.20	38.79	54.00	6.71	H

802.11g

Ch1

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)
17946.500	41.23	-29.40	46.00	24.63	54.00	12.77	H
14781.500	37.91	-30.40	41.20	27.11	54.00	16.09	V
12817.000	37.59	-31.50	39.80	29.29	54.00	16.41	H
7234.500	33.88	-35.60	36.40	33.08	54.00	20.12	H
8603.500	33.21	-35.00	37.50	30.71	54.00	20.79	H
2388.800	47.12	-19.80	28.20	38.72	54.00	6.88	V

Ch6

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)
17910.500	41.37	-29.40	46.00	24.77	54.00	12.63	V
14719.000	37.80	-30.20	41.40	26.70	54.00	16.20	V
12538.500	37.47	-31.20	39.20	29.47	54.00	16.53	V
7309.500	35.10	-35.40	36.60	33.90	54.00	18.90	V
8501.000	33.40	-34.60	37.30	30.70	54.00	20.60	H
4755.000	28.67	-37.50	33.10	33.07	54.00	25.33	V

Ch11

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)
17950.000	41.01	-29.40	46.00	24.41	54.00	12.99	H
12563.500	37.54	-31.20	39.20	29.54	54.00	16.46	V
14824.000	37.54	-30.00	41.00	26.54	54.00	16.46	H
7385.000	35.52	-35.10	36.60	34.02	54.00	18.48	V
8508.000	33.04	-34.60	37.30	30.34	54.00	20.96	H
2485.800	47.46	-19.70	28.20	38.96	54.00	6.54	V

802.11n-HT20

Ch1

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17979.500	41.14	-29.40	46.00	24.54	54.00	12.86	V
12791.500	37.47	-31.50	39.80	29.17	54.00	16.53	H
14806.000	37.43	-30.00	41.00	26.43	54.00	16.57	V
7231.500	34.76	-35.60	36.40	33.96	54.00	19.24	V
8511.500	33.19	-34.60	37.30	30.49	54.00	20.81	H
2389.700	47.13	-19.80	28.20	38.73	54.00	6.87	H

Ch6

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)
17951.500	41.08	-29.40	46.00	24.48	54.00	12.92	V
12790.000	37.46	-31.50	39.80	29.16	54.00	16.54	V
14743.000	37.34	-30.20	41.40	26.24	54.00	16.66	H
7312.000	35.66	-35.40	36.60	34.46	54.00	18.34	H
8538.500	33.23	-34.30	37.40	30.13	54.00	20.77	V
4559.500	28.68	-37.50	32.50	33.68	54.00	25.32	V

Ch11

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)
17945.500	40.90	-29.40	46.00	24.30	54.00	13.10	V
14804.500	37.32	-30.00	41.00	26.32	54.00	16.68	H
12311.500	37.25	-32.10	39.00	30.35	54.00	16.75	V
7383.500	35.03	-35.10	36.60	33.53	54.00	18.97	V
8499.500	33.06	-34.60	37.30	30.36	54.00	20.94	V
2485.300	47.19	-19.70	28.20	38.69	54.00	6.81	H

Band edge compliance

802.11b mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11b	1	2.31GHz~2.43GHz---L	Fig.7.4	P
	11	2.45GHz~2.50GHz---H	Fig.7.5	P

802.11g mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11g	1	2.31GHz~2.43GHz---L	Fig.7.6	P
	11	2.45GHz~2.50GHz---H	Fig.7.7	P

802.11n-HT20 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	1	2.31GHz~2.43GHz---L	Fig.7.8	P
	11	2.45GHz~2.50GHz---H	Fig.7.9	P

Test graphs as below:

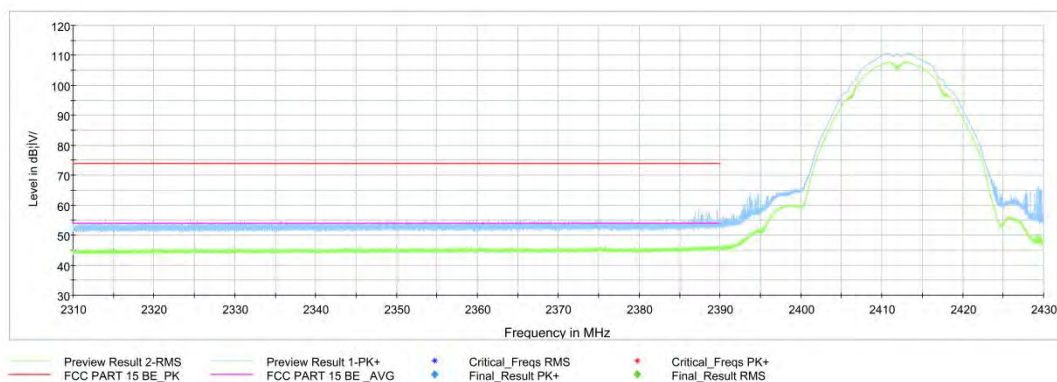


Fig.A.7.4 Transmitter Spurious Emission - Radiated (Power): 802.11b, ch1, 2.31 GHz – 2.43GHz

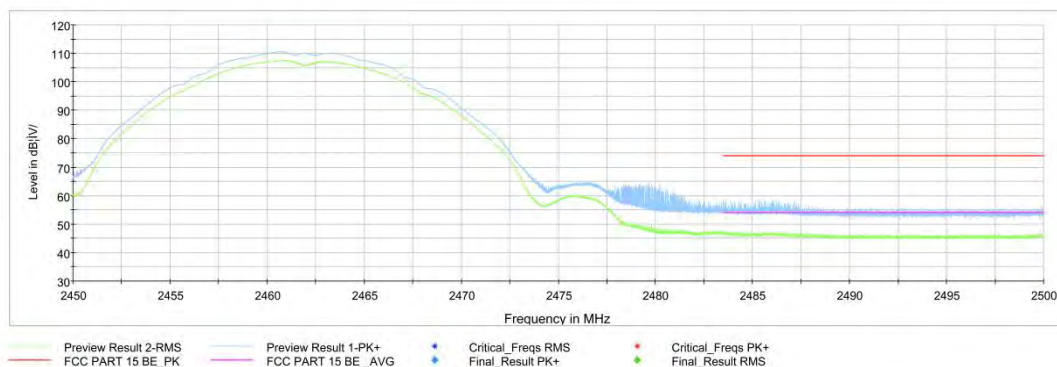


Fig.A.7.5 Transmitter Spurious Emission - Radiated (Power): 802.11b, ch11, 2.45 GHz - 2.50GHz

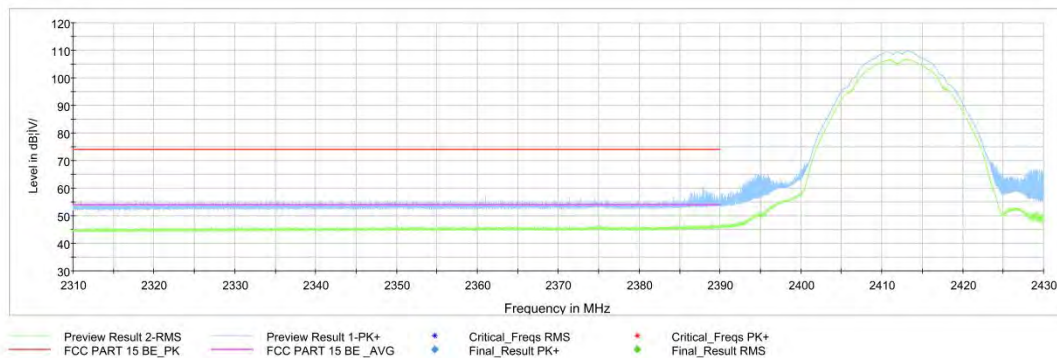


Fig.A.7.6 Transmitter Spurious Emission - Radiated (Power): 802.11g, ch1, 2.31 GHz - 2.43GHz

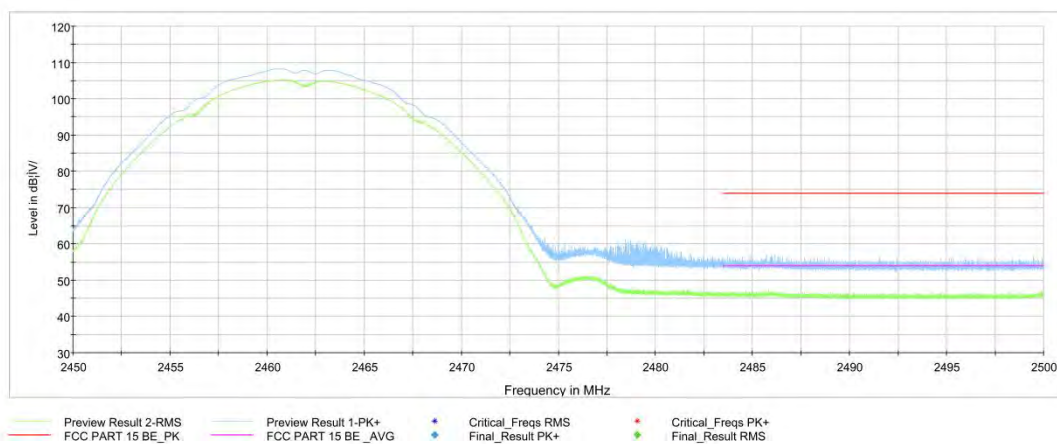


Fig.A.7.7 Transmitter Spurious Emission - Radiated (Power): 802.11g, ch11, 2.45 GHz - 2.50GHz

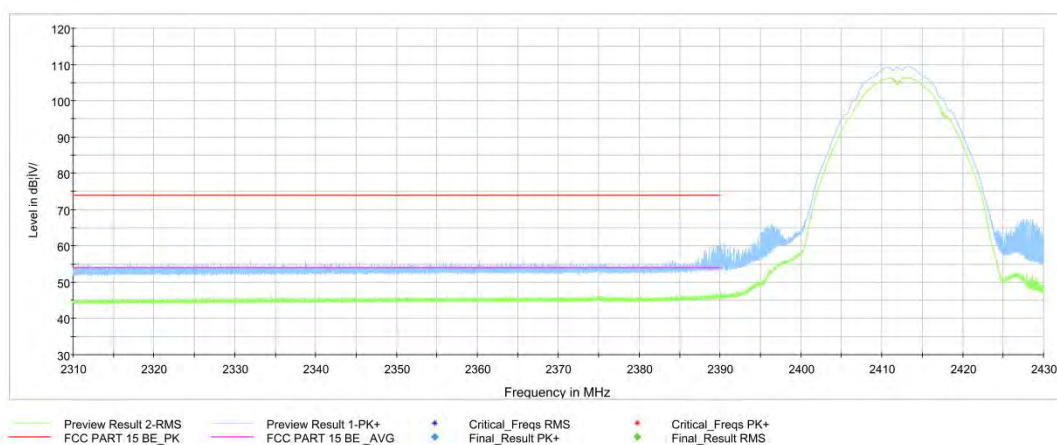


Fig.A.7.8 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT20, ch1, 2.31 GHz - 2.43GHz

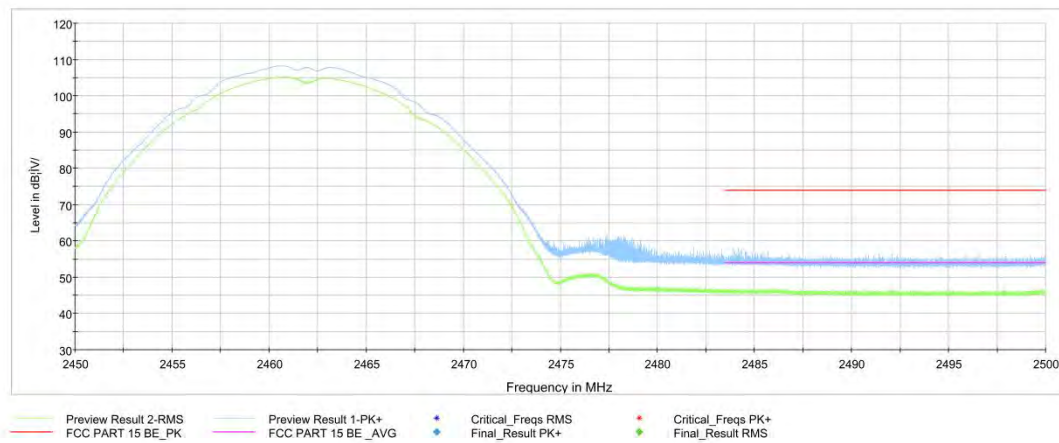


Fig.A.7.9 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT20, ch11, 2.45 GHz - 2.50GHz

A.8. AC Power-line Conducted Emission

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

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.

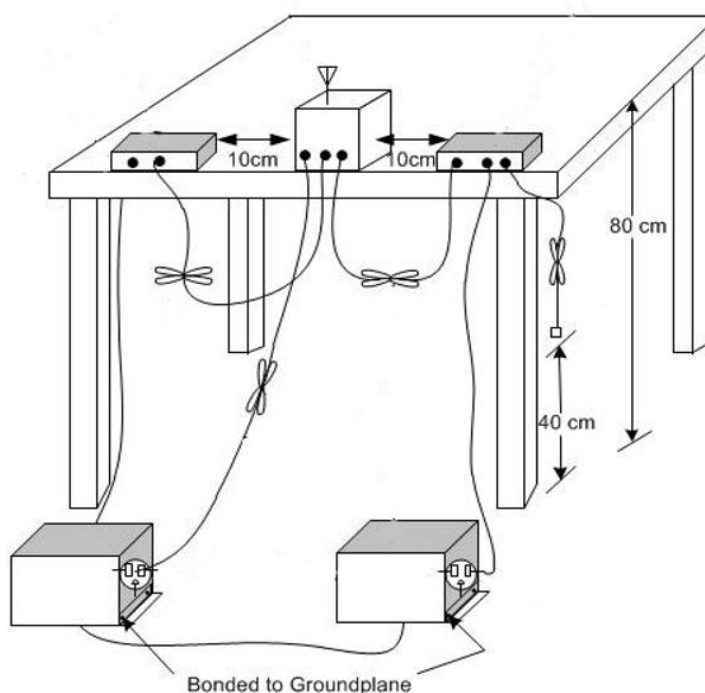
The measurement bandwidth is:

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

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Test setup



Measurement Result and limit:
WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		802.11b	Idle	
0.15 to 0.5	66 to 56	Fig.A.8.1	Fig.A.8.2	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.				

WLAN (Average Limit)

2.4.1 (Average Limit)				
Frequency range (MHz)	Average Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		802.11b	Idle	
0.15 to 0.5	56 to 46	Fig.A.8.1	Fig.A.8.2	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:

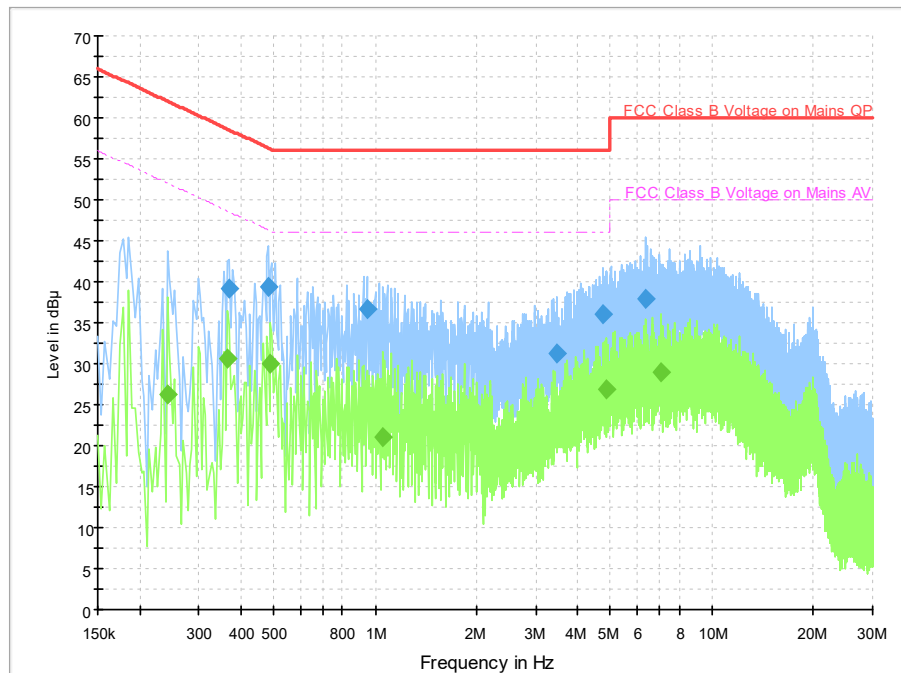


Fig.A.8.1 AC Powerline Conducted Emission-802.11b

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

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.370000	39.2	2000.0	9.000	On	L1	19.7	19.3	58.5	
0.482000	39.3	2000.0	9.000	On	L1	19.7	17.0	56.3	
0.946000	36.8	2000.0	9.000	On	L1	19.7	19.2	56.0	
3.450000	31.3	2000.0	9.000	On	L1	19.6	24.7	56.0	
4.758000	36.1	2000.0	9.000	On	L1	19.6	19.9	56.0	
6.338000	37.9	2000.0	9.000	On	L1	19.7	22.1	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.242000	26.2	2000.0	9.000	On	N	19.7	25.8	52.0	
0.366000	30.5	2000.0	9.000	On	N	19.7	18.1	48.6	
0.490000	30.0	2000.0	9.000	On	N	19.7	16.1	46.2	
1.058000	21.1	2000.0	9.000	On	L1	19.7	24.9	46.0	
4.854000	26.9	2000.0	9.000	On	L1	19.6	19.1	46.0	
7.086000	28.9	2000.0	9.000	On	L1	19.7	21.1	50.0	

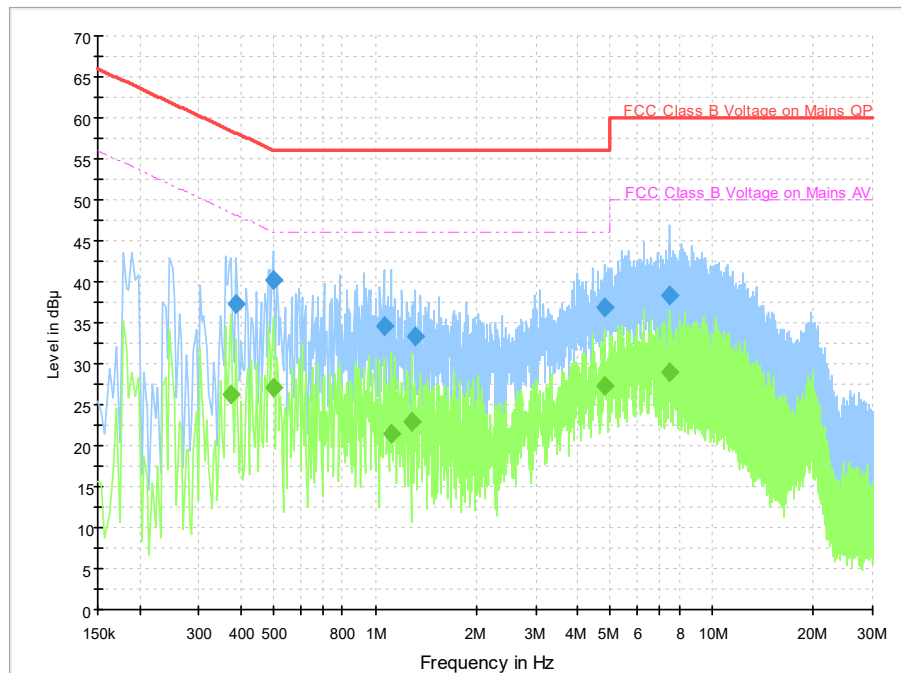


Fig.A.8.2 AC Powerline Conducted Emission-Idle

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

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.386000	37.2	2000.0	9.000	On	N	19.7	20.9	58.1	
0.498000	40.2	2000.0	9.000	On	L1	19.7	15.9	56.0	
1.062000	34.6	2000.0	9.000	On	L1	19.7	21.4	56.0	
1.310000	33.2	2000.0	9.000	On	L1	19.6	22.8	56.0	
4.790000	36.9	2000.0	9.000	On	L1	19.6	19.1	56.0	
7.482000	38.4	2000.0	9.000	On	L1	19.7	21.6	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.374000	26.2	2000.0	9.000	On	L1	19.7	22.2	48.4	
0.498000	27.0	2000.0	9.000	On	L1	19.7	19.0	46.0	
1.118000	21.4	2000.0	9.000	On	L1	19.7	24.6	46.0	
1.282000	22.9	2000.0	9.000	On	N	19.6	23.1	46.0	
4.790000	27.3	2000.0	9.000	On	L1	19.6	18.7	46.0	
7.482000	28.9	2000.0	9.000	On	L1	19.7	21.1	50.0	

ANNEX B: EUT parameters

Disclaimer: The antenna gain 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*****