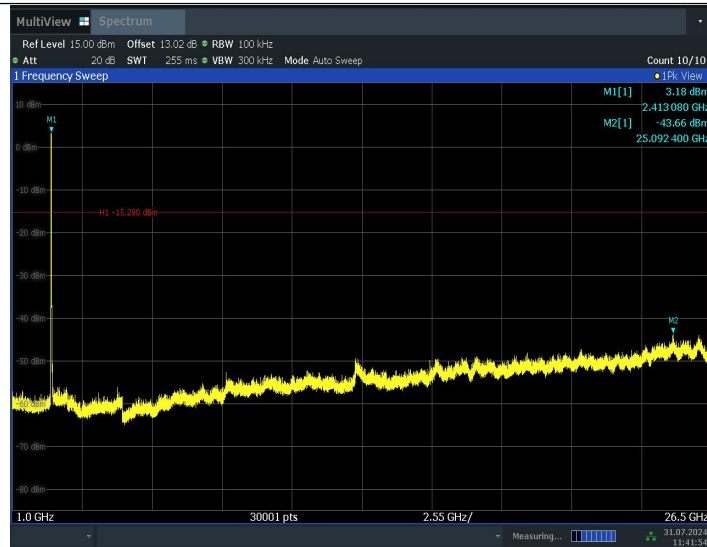
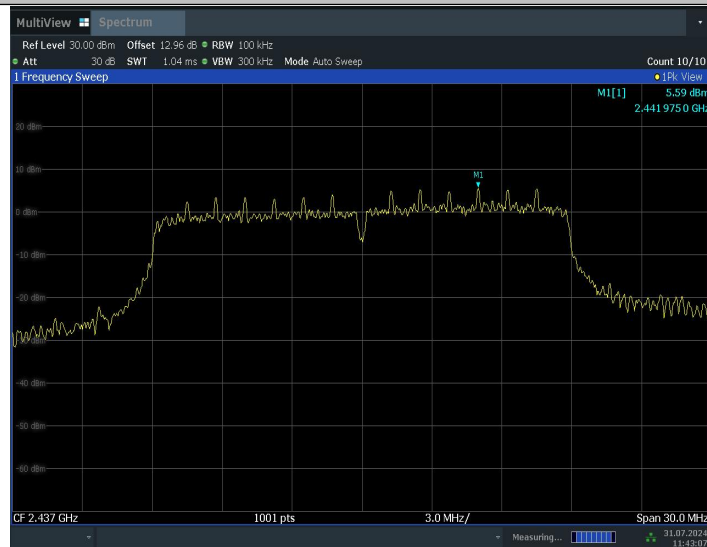




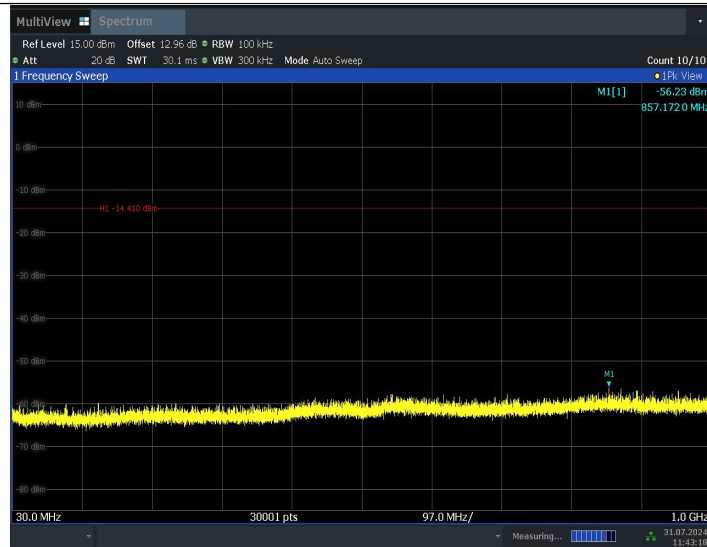
11:41:54 31.07.2024

11N20SISO_2437_0~Reference



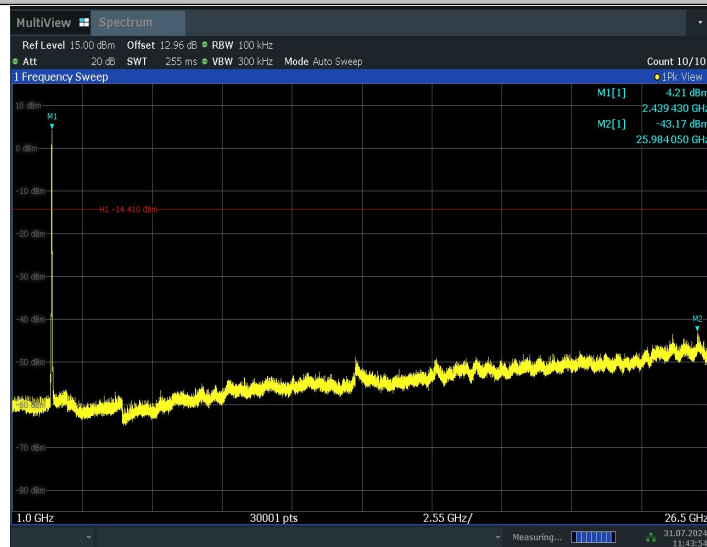
11:43:08 31.07.2024

11N20SISO_2437_30~1000



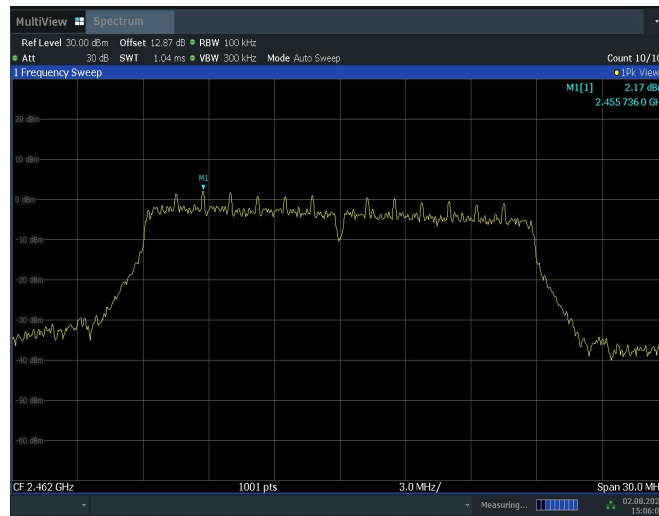
11:43:19 31.07.2024

11N20SISO_2437_1000~26500



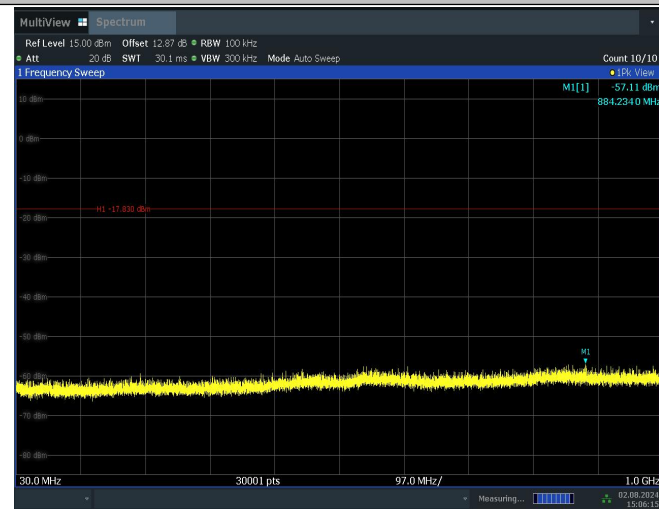
11:43:55 31.07.2024

11N20SISO_2462_0~Reference



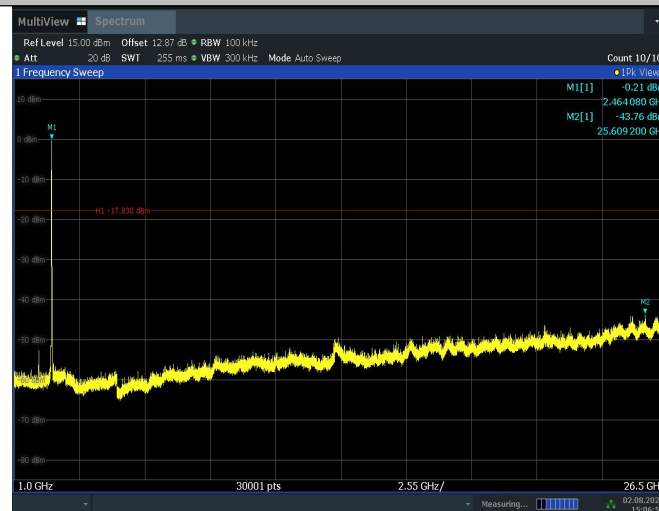
15:06:05 02.08.2024

11N20SISO_2462_30~1000



15:06:16 02.08.2024

11N20SISO_2462_1000~26500



15:06:52 02.08.2024

Conclusion: Pass

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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 (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.

Test setup

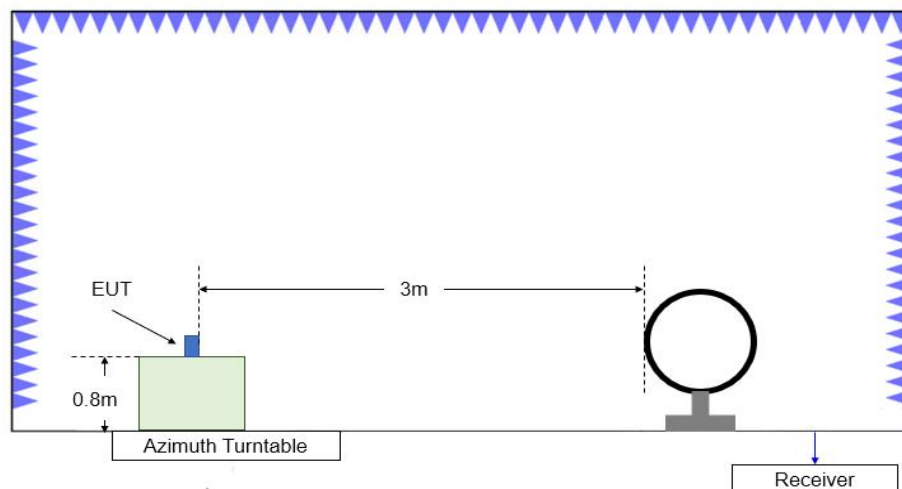


Figure A.2.1. Test Site Diagram (9kHz-30MHz)

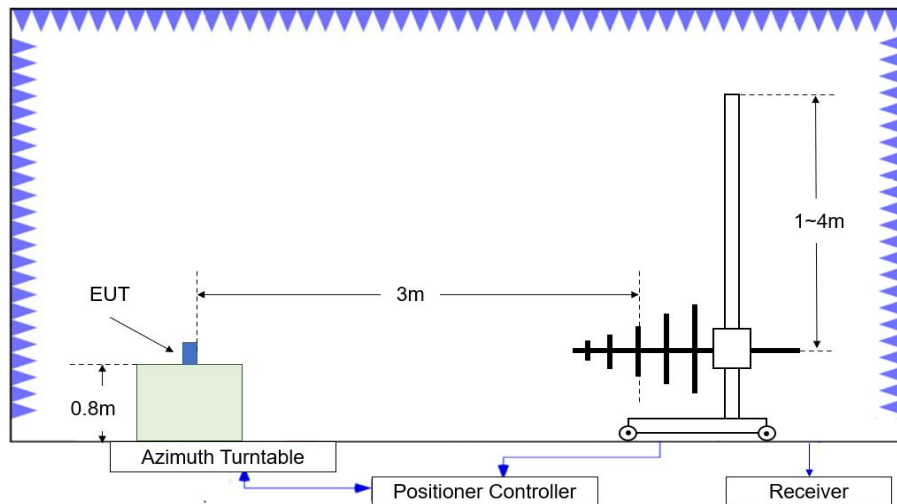


Figure A.2.2. Test Site Diagram (30MHz-1GHz)

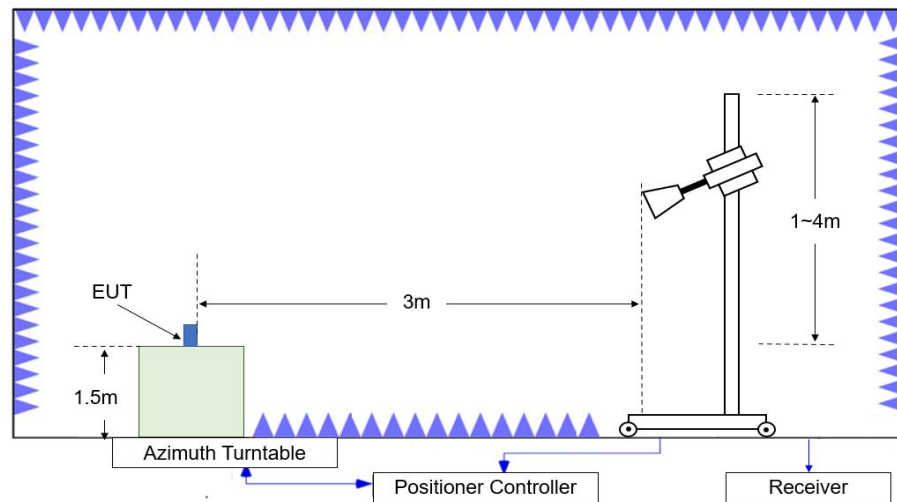


Figure A.2.3. Test Site Diagram (1GHz-40GHz)

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:

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

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)
17947.500	56.22	-25.90	46.00	36.12	74.00	17.78	H
14029.500	52.18	-28.90	41.60	39.48	74.00	21.82	V
12874.000	49.30	-30.00	40.00	39.30	74.00	24.70	V
7235.000	47.41	-34.90	36.40	45.91	74.00	26.59	V
9579.000	46.62	-33.00	37.50	42.12	74.00	27.38	V
2352.900	56.24	-19.30	28.20	47.34	74.00	17.76	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)
17893.000	55.66	-25.90	46.00	35.56	74.00	18.34	H
14093.500	51.23	-29.10	41.70	38.63	74.00	22.77	V
12867.000	49.12	-30.30	39.90	39.52	74.00	24.88	H
7309.500	47.88	-35.00	36.60	46.28	74.00	26.12	V
8519.500	46.82	-33.80	37.40	43.22	74.00	27.18	H
4776.500	42.13	-37.00	33.10	46.03	74.00	31.87	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)
17956.500	56.49	-25.90	46.00	36.39	74.00	17.51	V
14088.500	51.30	-29.10	41.70	38.70	74.00	22.70	H
12846.500	48.51	-30.30	39.90	38.91	74.00	25.49	H
7387.000	47.12	-34.40	36.60	44.92	74.00	26.88	V
9513.500	47.12	-33.10	37.60	42.62	74.00	26.88	H
2493.100	56.63	-19.00	28.20	47.43	74.00	17.37	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)
17920.000	55.55	-25.90	46.00	35.45	74.00	18.45	H
14160.500	51.82	-29.20	41.70	39.32	74.00	22.18	H
12995.000	49.12	-29.40	40.10	38.42	74.00	24.88	H
7235.500	47.36	-34.90	36.40	45.86	74.00	26.64	V
9219.500	47.26	-33.90	37.60	43.56	74.00	26.74	H
2390.000	65.62	-19.20	28.20	56.62	74.00	8.38	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)
17941.000	55.80	-25.90	46.00	35.70	74.00	18.20	H
13797.500	51.73	-29.00	41.20	39.53	74.00	22.27	V
11890.500	48.73	-31.30	39.10	40.93	74.00	25.27	H
7302.000	47.68	-35.00	36.60	46.08	74.00	26.32	V
9039.500	46.67	-33.50	37.80	42.37	74.00	27.33	H
4837.000	41.24	-36.90	33.00	45.14	74.00	32.76	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)
17912.000	55.83	-25.90	46.00	35.73	74.00	18.17	V
13810.500	51.50	-29.00	41.20	39.30	74.00	22.50	H
12961.000	49.30	-29.70	40.00	38.90	74.00	24.70	V
7391.000	48.97	-34.40	36.60	46.77	74.00	25.03	V
9822.000	46.74	-33.10	37.90	41.94	74.00	27.26	V
2485.000	65.91	-19.00	28.20	56.71	74.00	8.09	H

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)
17918.500	55.88	-25.90	46.00	35.78	74.00	18.12	V
14081.000	51.38	-29.10	41.70	38.78	74.00	22.62	V
12279.000	48.75	-30.10	39.00	39.85	74.00	25.25	H
7232.000	47.02	-34.90	36.40	45.52	74.00	26.98	V
8502.000	46.67	-33.70	37.30	43.07	74.00	27.33	V
2389.500	70.12	-19.20	28.20	61.12	74.00	3.88	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)
17897.500	55.70	-25.90	46.00	35.60	74.00	18.30	H
13777.500	51.35	-29.00	41.20	39.15	74.00	22.65	H
12403.000	49.59	-30.10	38.90	40.79	74.00	24.41	V
7307.500	47.65	-35.00	36.60	46.05	74.00	26.35	V
9985.000	47.32	-33.40	38.00	42.72	74.00	26.68	H
4722.500	41.65	-36.80	33.00	45.45	74.00	32.35	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)
17910.500	55.69	-25.90	46.00	35.59	74.00	18.31	V
13742.500	51.13	-29.10	41.10	39.13	74.00	22.87	H
12867.500	49.01	-30.30	39.90	39.41	74.00	24.99	V
9447.500	47.01	-33.50	37.90	42.61	74.00	26.99	V
7388.500	46.48	-34.40	36.60	44.28	74.00	27.52	V
2485.300	67.28	-19.00	28.20	58.08	74.00	6.72	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)
17916.500	46.50	-25.90	46.00	26.40	54.00	7.50	V
14087.500	41.62	-29.10	41.70	29.02	54.00	12.38	V
7234.000	39.92	-34.90	36.40	38.42	54.00	14.08	V
12333.500	38.92	-30.10	39.00	30.12	54.00	15.08	V
9638.000	36.90	-33.00	37.60	32.30	54.00	17.10	H
2387.900	44.58	-19.20	28.20	35.58	54.00	9.42	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)
17920.500	46.32	-25.90	46.00	26.22	54.00	7.68	V
14099.000	41.77	-29.10	41.70	29.17	54.00	12.23	H
7311.500	41.22	-35.00	36.60	39.62	54.00	12.78	V
12791.500	39.15	-30.60	39.80	29.95	54.00	14.85	H
9614.000	37.23	-33.00	37.60	32.63	54.00	16.77	V
4874.000	31.76	-36.90	33.40	35.26	54.00	22.24	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)
17942.000	46.11	-25.90	46.00	26.01	54.00	7.89	H
7387.000	41.79	-34.40	36.60	39.59	54.00	12.21	V
13743.000	41.74	-29.10	41.10	29.74	54.00	12.26	H
11760.500	38.90	-31.20	39.20	30.90	54.00	15.10	H
9584.500	37.12	-33.00	37.50	32.62	54.00	16.88	H
2490.400	45.22	-19.00	28.20	36.02	54.00	8.78	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)
17944.000	46.21	-25.90	46.00	26.11	54.00	7.79	H
13751.000	41.85	-29.10	41.10	29.85	54.00	12.15	H
12355.500	39.16	-30.10	39.00	30.36	54.00	14.84	H
7235.500	37.96	-34.90	36.40	36.46	54.00	16.04	V
9551.000	37.10	-33.10	37.60	32.60	54.00	16.90	H
2389.800	53.28	-19.20	28.20	44.28	54.00	0.72	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)
17970.500	46.08	-25.90	46.00	25.98	54.00	7.92	V
13750.500	41.66	-29.10	41.10	29.66	54.00	12.34	V
7316.500	39.23	-35.00	36.60	37.63	54.00	14.77	V
12789.000	39.03	-30.60	39.80	29.83	54.00	14.97	H
9585.000	37.38	-33.00	37.50	32.88	54.00	16.62	H
4763.000	31.78	-37.00	33.10	35.68	54.00	22.22	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)
17931.000	46.52	-25.90	46.00	26.42	54.00	7.48	V
14103.000	41.74	-29.10	41.70	29.14	54.00	12.26	H
12753.000	39.25	-30.50	39.60	30.15	54.00	14.75	H
7384.000	38.03	-34.40	36.60	35.83	54.00	15.97	V
9129.000	37.68	-33.70	37.70	33.68	54.00	16.32	V
2485.000	50.38	-19.00	28.20	41.18	54.00	3.62	H

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)
17931.000	46.20	-25.90	46.00	26.10	54.00	7.80	H
13809.500	41.52	-29.00	41.20	29.32	54.00	12.48	V
12776.500	39.26	-30.60	39.80	30.06	54.00	14.74	V
8844.000	37.12	-33.60	37.80	32.92	54.00	16.88	H
7242.500	37.08	-34.90	36.40	35.58	54.00	16.92	V
2390.000	52.97	-19.20	28.20	43.97	54.00	1.03	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)
17948.500	46.38	-25.90	46.00	26.28	54.00	7.62	H
14095.000	41.62	-29.10	41.70	29.02	54.00	12.38	H
12911.500	39.17	-30.00	40.00	29.17	54.00	14.83	V
7307.500	38.81	-35.00	36.60	37.21	54.00	15.19	V
9539.500	36.98	-33.10	37.60	32.48	54.00	17.02	H
4737.000	31.66	-36.80	33.00	35.46	54.00	22.34	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)
17899.500	46.54	-25.90	46.00	26.44	54.00	7.46	V
14184.500	41.87	-29.20	41.70	29.37	54.00	12.13	V
11873.000	39.30	-31.10	39.10	31.30	54.00	14.70	V
7389.000	38.63	-34.40	36.60	36.43	54.00	15.37	V
9116.500	37.45	-33.70	37.70	33.45	54.00	16.55	H
2485.100	49.51	-19.00	28.20	40.31	54.00	4.49	H

Band edge compliance

802.11b mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11b	1	2.31GHz~2.43GHz---L	Fig.6.2.1	P
	11	2.45GHz~2.50GHz---H	Fig.6.2.2	P

802.11g mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11g	1	2.31GHz~2.43GHz---L	Fig.6.2.3	P
	11	2.45GHz~2.50GHz---H	Fig.6.2.4	P

802.11n-HT20 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	1	2.31GHz~2.43GHz---L	Fig.6.2.5	P
	11	2.45GHz~2.50GHz---H	Fig.6.2.6	P

Test graphs as below:

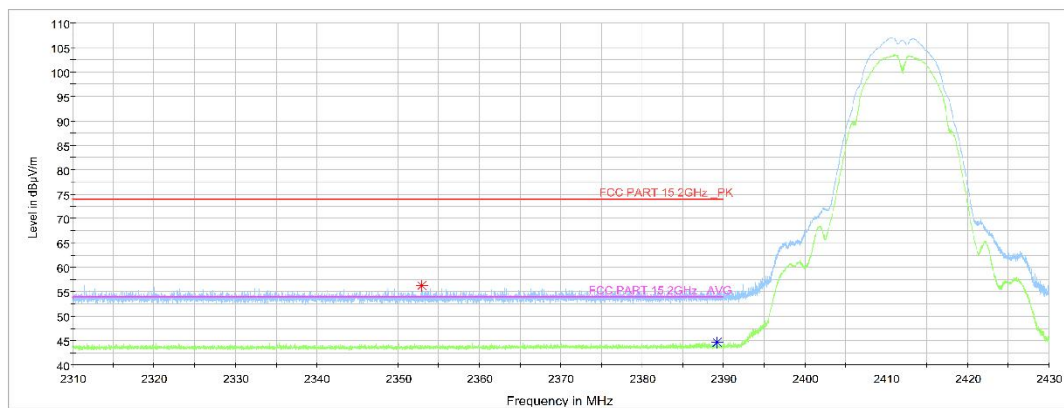


Fig.A.6.2.1 Transmitter Spurious Emission - Radiated (Power): 802.11b, ch1, 2.31 GHz – 2.43GHz

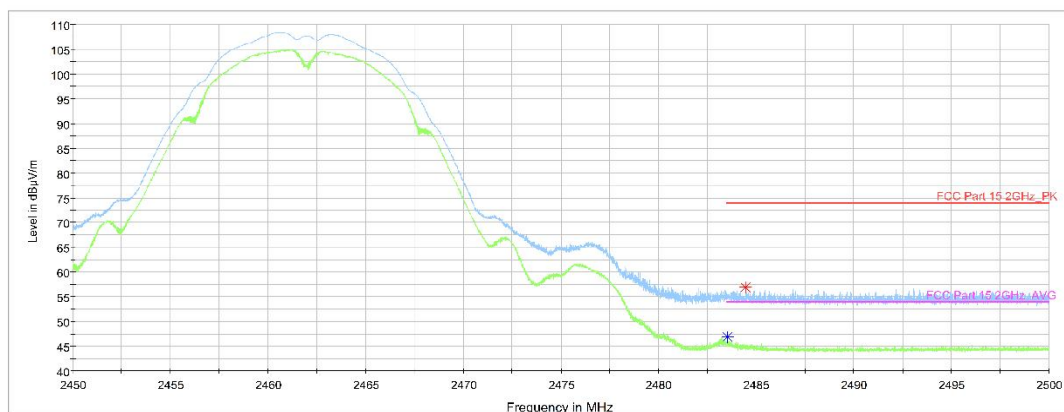


Fig.A.6.2.2 Transmitter Spurious Emission - Radiated (Power): 802.11b, ch11, 2.45 GHz - 2.50GHz

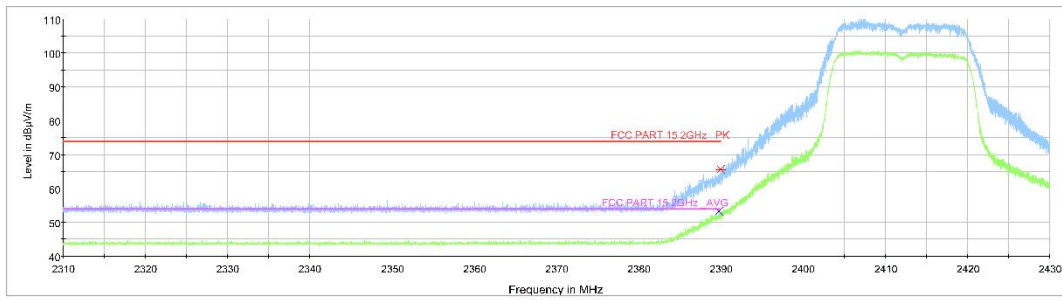


Fig.A.6.2.3 Transmitter Spurious Emission - Radiated (Power): 802.11g, ch1, 2.31 GHz - 2.43GHz

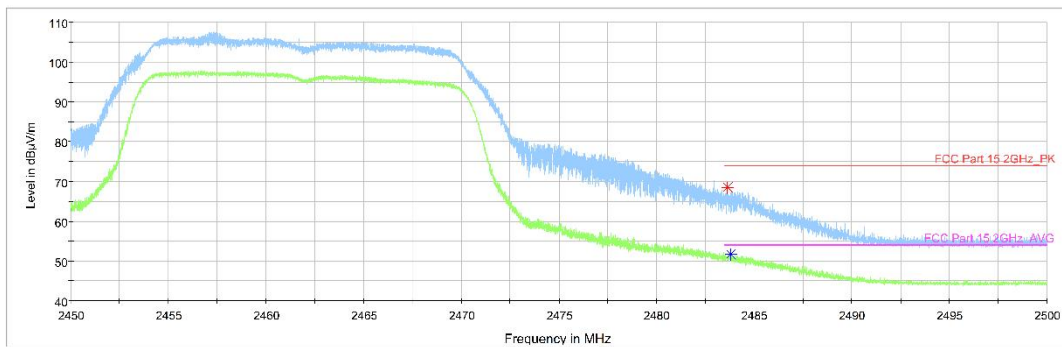


Fig.A.6.2.4 Transmitter Spurious Emission - Radiated (Power): 802.11g, ch11, 2.45 GHz - 2.50GHz

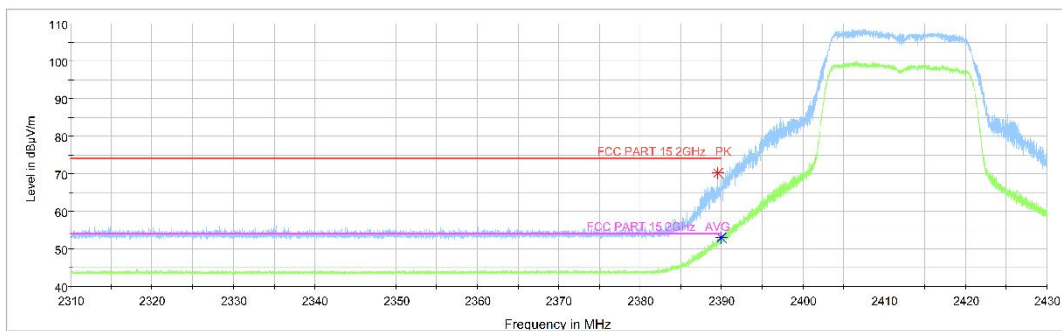


Fig.A.6.2.5 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT20, ch1, 2.31 GHz - 2.43GHz

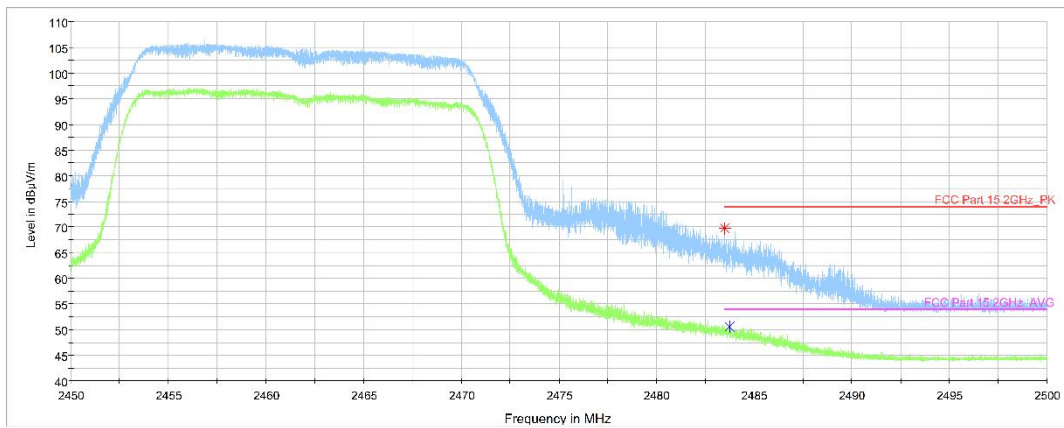


Fig.A.6.2.6 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT20, ch11, 2.45 GHz - 2.50GHz

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.

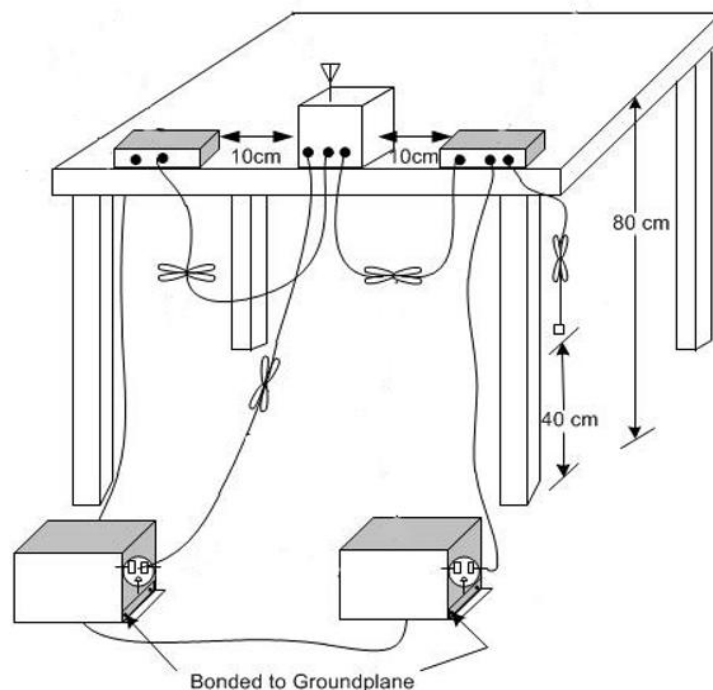
The measurement bandwidth is:

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)

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:

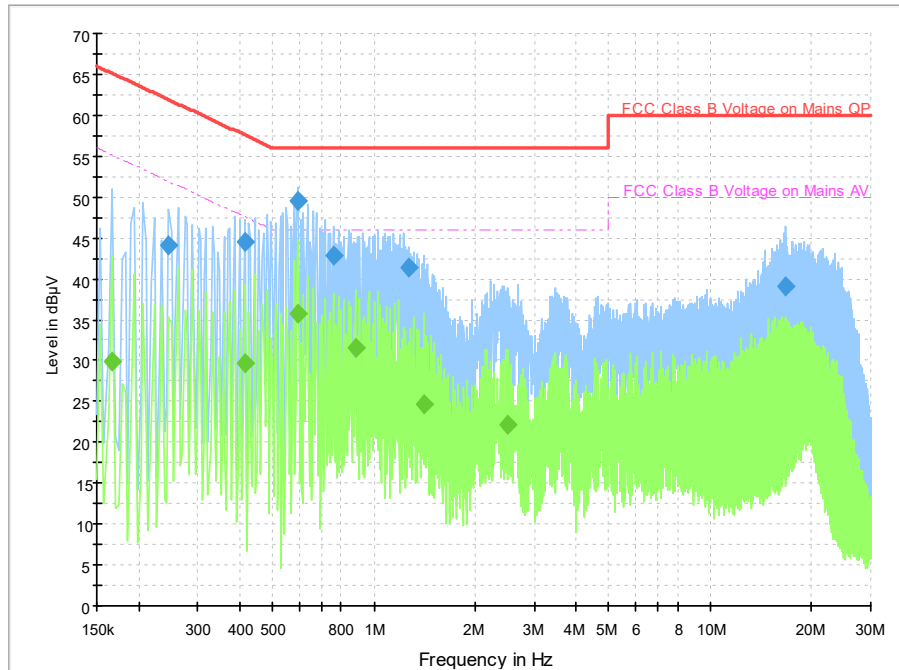


Fig.A.8.1 AC Powerline Conducted Emission-802.11b

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

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.246000	44.1	2000.0	9.000	On	L1	19.9	17.8	61.9	
0.414000	44.6	2000.0	9.000	On	L1	20.0	13.0	57.6	
0.594000	49.5	2000.0	9.000	On	L1	20.0	6.5	56.0	
0.758000	42.8	2000.0	9.000	On	L1	19.9	13.2	56.0	
1.266000	41.3	2000.0	9.000	On	N	19.7	14.7	56.0	
16.770000	39.0	2000.0	9.000	On	L1	20.0	21.0	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.166000	29.9	2000.0	9.000	On	L1	19.9	25.2	55.2	
0.414000	29.7	2000.0	9.000	On	L1	20.0	17.9	47.6	
0.594000	35.8	2000.0	9.000	On	L1	20.0	10.2	46.0	
0.882000	31.5	2000.0	9.000	On	L1	19.9	14.5	46.0	
1.410000	24.6	2000.0	9.000	On	N	19.7	21.4	46.0	
2.486000	22.0	2000.0	9.000	On	N	19.6	24.0	46.0	

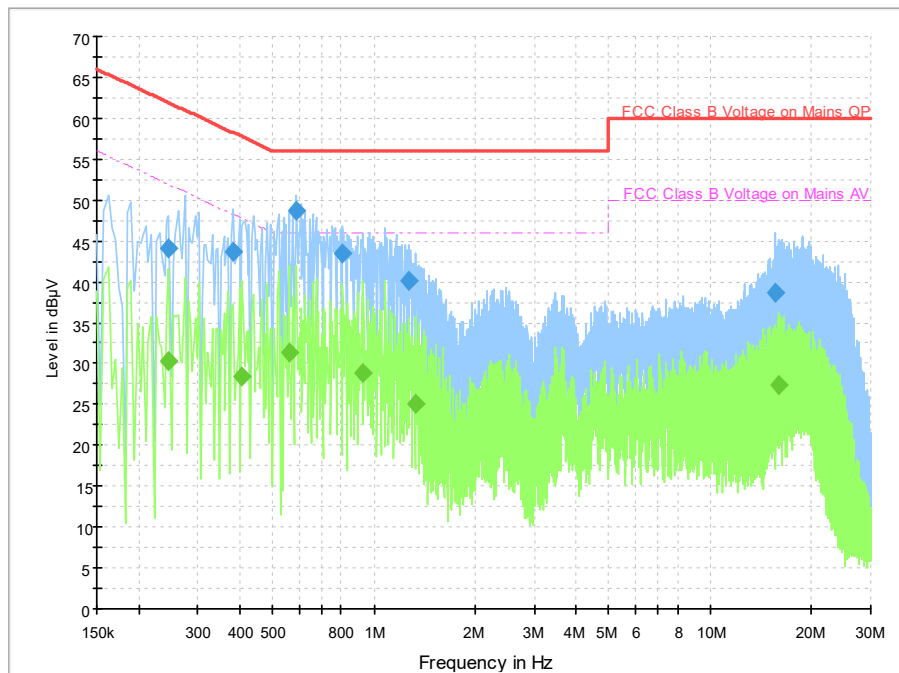


Fig.A.8.2 AC Powerline Conducted Emission-Idle

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

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.246000	44.1	2000.0	9.000	On	L1	19.9	17.8	61.9	
0.382000	43.7	2000.0	9.000	On	L1	19.9	14.5	58.2	
0.590000	48.7	2000.0	9.000	On	L1	20.0	7.3	56.0	
0.806000	43.5	2000.0	9.000	On	N	19.8	12.5	56.0	
1.274000	40.2	2000.0	9.000	On	N	19.7	15.8	56.0	
15.650000	38.7	2000.0	9.000	On	L1	20.0	21.3	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.246000	30.3	2000.0	9.000	On	L1	19.9	21.6	51.9	
0.406000	28.4	2000.0	9.000	On	N	19.9	19.3	47.7	
0.558000	31.3	2000.0	9.000	On	N	19.9	14.7	46.0	
0.930000	28.8	2000.0	9.000	On	N	19.7	17.2	46.0	
1.330000	25.1	2000.0	9.000	On	N	19.7	20.9	46.0	
15.918000	27.5	2000.0	9.000	On	L1	20.0	22.5	50.0	

A.8. 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*****