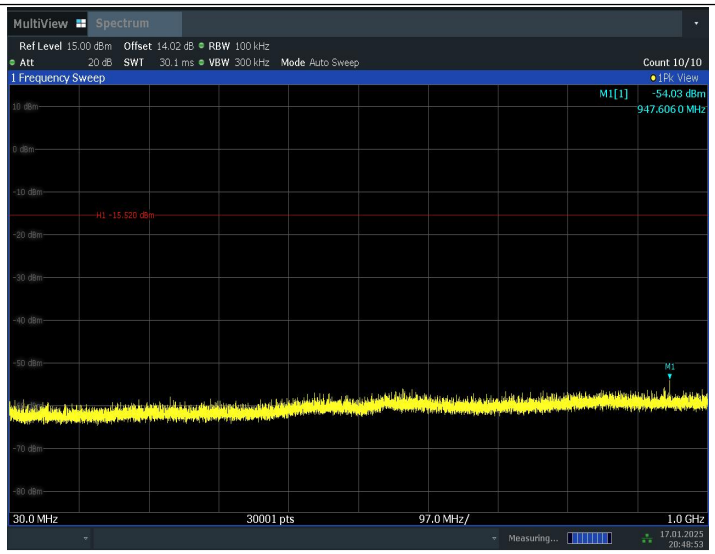

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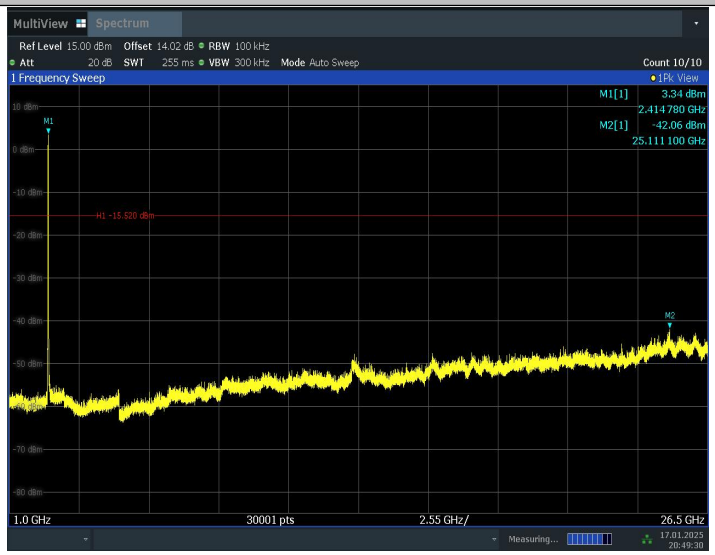
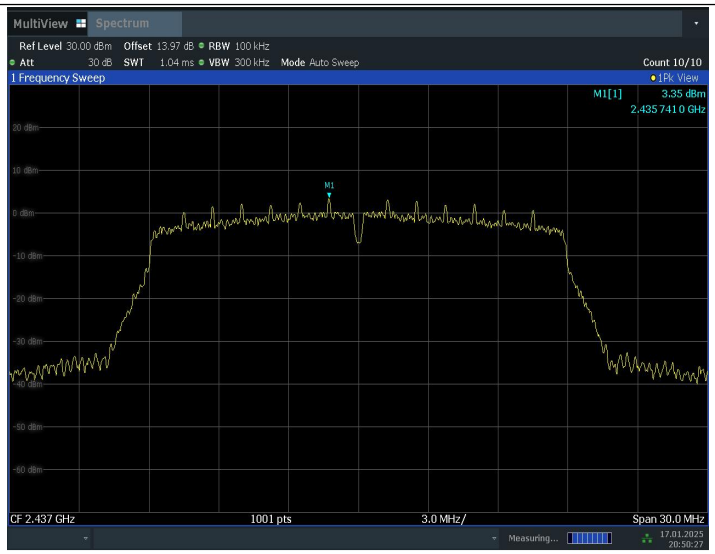
11N20SISO_2412_1000~26500



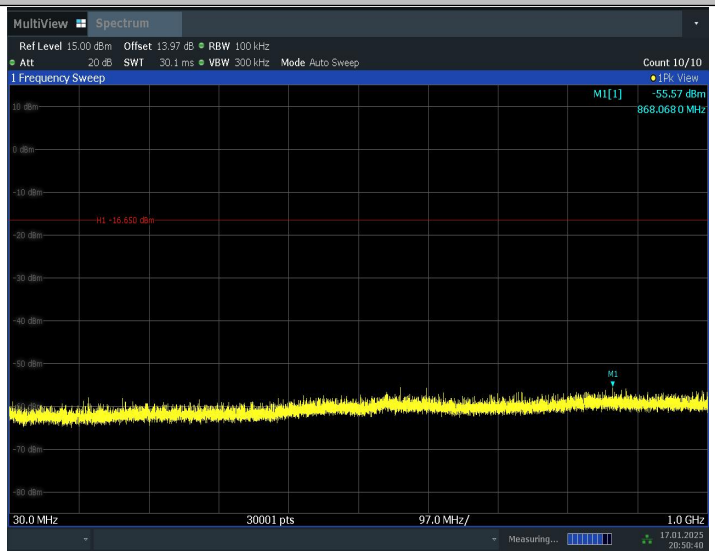
20:49:31 17.01.2025

11N20SISO_2437_0~Reference



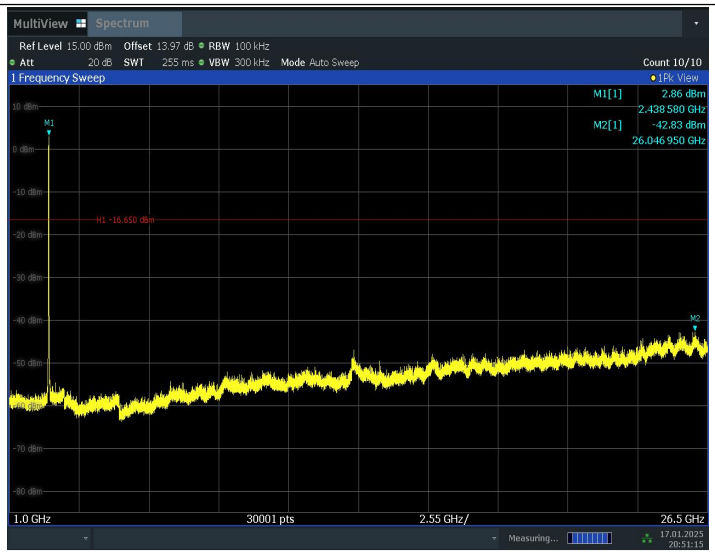
20:50:27 17.01.2025

11N20SISO_2437_30~1000



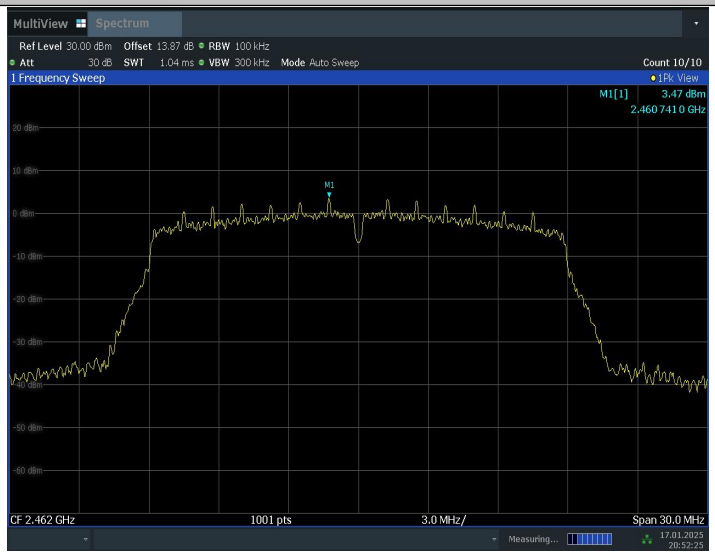
20:50:40 17.01.2025

11N20SISO_2437_1000~26500



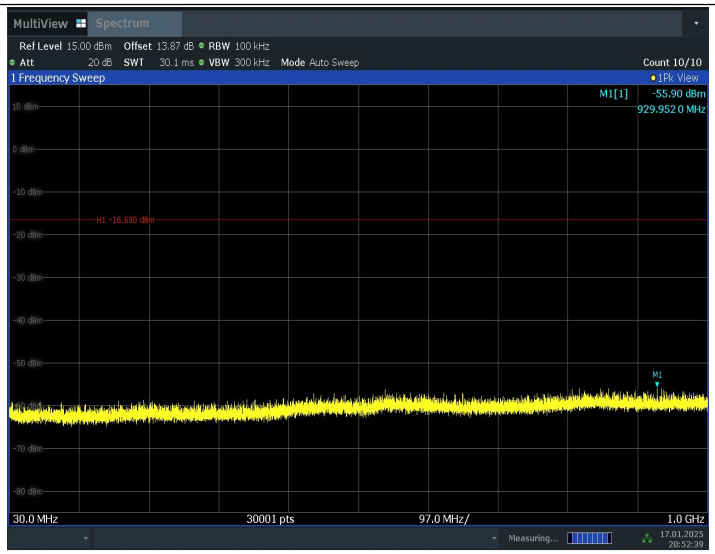
20:51:16 17.01.2025

11N20SISO_2462_0~Reference



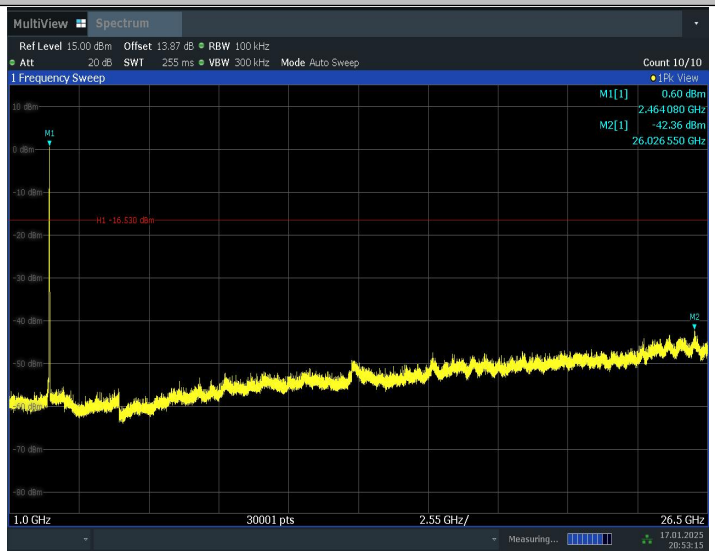
20:52:26 17.01.2025

11N20SISO_2462_30~1000



20:52:39 17.01.2025

11N20SISO_2462_1000~26500



20:53:16 17.01.2025

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(μV/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 (uV/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

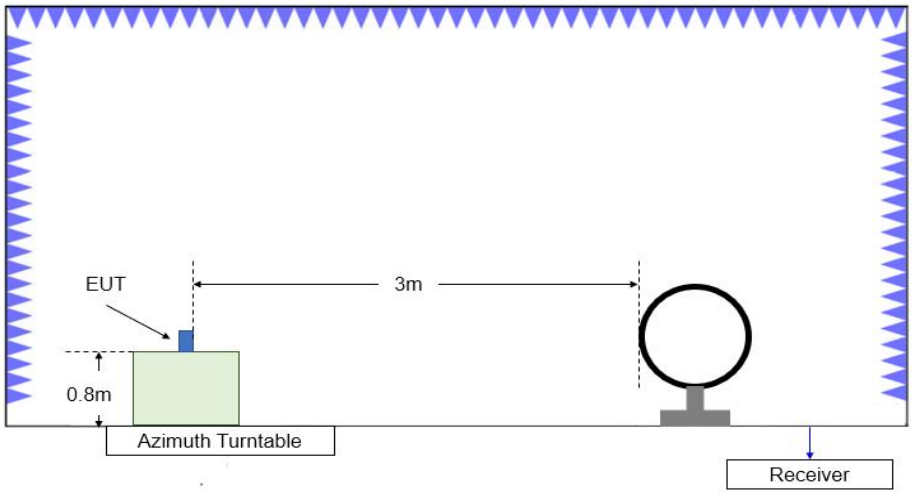


Figure A.2.1. Test Site Diagram (9kHz-30MHz)

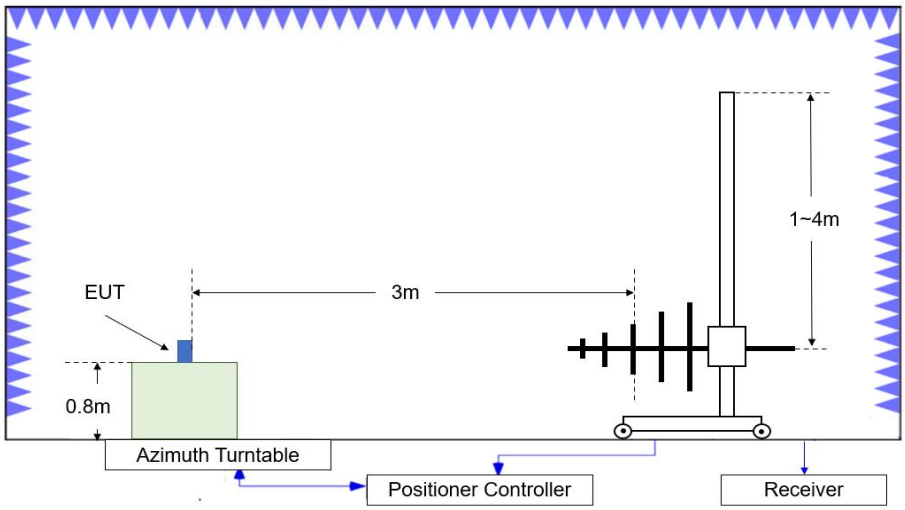


Figure A.2.2. Test Site Diagram (30MHz-1GHz)

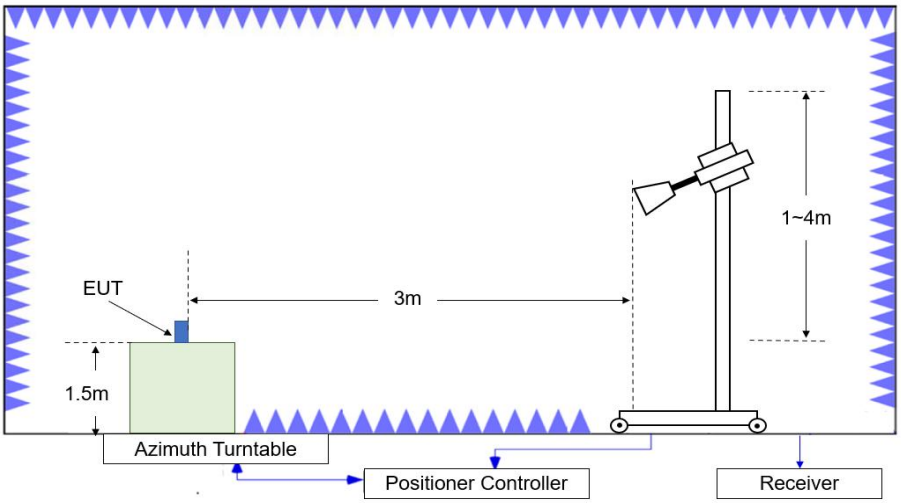


Figure A.2.3. Test Site Diagram (1GHz-40GHz)

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:

Result=P_{Mea}+$A_{Rpl=}$ P_{Mea}+Cable Loss+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 10^{th} harmonic of highest fundamental frequency.

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)
2386.450	52.47	-27.4	31.9	47.97	74.0	21.5	H
2388.900	52.50	-27.4	32.0	47.96	74.0	21.5	V
4824.000	45.93	-33.1	34.3	44.71	74.0	28.1	V
7236.000	43.78	-30.8	35.6	38.99	74.0	30.2	V
9648.000	45.85	-30.3	36.8	39.33	74.0	28.1	V
12060.000	46.39	-29.7	38.7	37.36	74.0	27.6	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)
2400.400	53.28	-27.4	32.0	48.69	74.0	20.7	H
2470.000	52.84	-27.4	32.2	48.07	74.0	21.2	V
4874.000	43.09	-33.3	34.3	42.14	74.0	30.9	H
7311.000	44.25	-30.0	35.8	38.43	74.0	29.8	V
9748.000	45.67	-29.5	37.1	38.09	74.0	28.3	V
12185.000	46.83	-28.8	38.7	36.95	74.0	27.2	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)
2483.550	53.56	-27.2	32.2	48.52	74.0	20.4	H
2484.150	53.20	-27.1	32.2	48.15	74.0	20.8	H
4924.000	46.15	-33.0	34.2	45.02	74.0	27.8	H
7387.500	43.79	-30.6	35.6	38.81	74.0	30.2	H
9848.000	46.13	-28.9	37.1	37.92	74.0	27.9	H
12310.000	46.43	-28.5	38.8	36.09	74.0	27.6	V

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)
2388.350	64.87	-27.4	32.0	60.34	74.0	9.1	V
2388.550	65.46	-27.4	32.0	60.93	74.0	8.5	V
4823.000	43.25	-33.1	34.3	42.04	74.0	30.7	V
7236.000	44.30	-30.8	35.6	39.51	74.0	29.7	H
9648.500	46.06	-30.3	36.8	39.56	74.0	27.9	V
12060.500	46.57	-29.6	38.7	37.46	74.0	27.4	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)
2395.600	54.64	-27.4	32.0	50.06	74.0	19.4	V
2478.000	53.66	-27.3	32.2	48.75	74.0	20.3	V
4874.000	41.73	-33.3	34.3	40.79	74.0	32.3	V
7311.000	44.29	-30.0	35.8	38.47	74.0	29.7	V
9748.000	46.16	-29.5	37.1	38.58	74.0	27.8	V
12185.000	46.85	-28.8	38.7	36.97	74.0	27.1	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)
2483.650	67.29	-27.2	32.2	62.25	74.0	6.7	V
2483.950	67.39	-27.2	32.2	62.34	74.0	6.6	V
4924.000	42.07	-33.0	34.2	40.94	74.0	31.9	H
7389.000	44.26	-30.7	35.6	39.32	74.0	29.7	H
9849.500	47.35	-28.8	37.1	39.05	74.0	26.7	V
12310.000	46.89	-28.5	38.8	36.55	74.0	27.1	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)
2387.650	65.04	-27.4	32.0	60.53	74.0	9.0	H
2389.550	65.14	-27.4	32.0	60.59	74.0	8.9	H
4824.000	42.99	-33.1	34.3	41.77	74.0	31.0	H
7236.000	43.81	-30.8	35.6	39.01	74.0	30.2	H
9648.000	45.49	-30.3	36.8	38.97	74.0	28.5	V
12060.000	46.05	-29.7	38.7	37.01	74.0	28.0	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)
2389.200	52.74	-27.4	32.0	48.20	74.0	21.3	V
2478.400	53.02	-27.3	32.2	48.11	74.0	21.0	H
4874.000	42.21	-33.3	34.3	41.26	74.0	31.8	V
7311.000	46.24	-30.0	35.8	40.42	74.0	27.8	H
9748.000	47.39	-29.5	37.1	39.81	74.0	26.6	V
12185.000	46.17	-28.8	38.7	36.29	74.0	27.8	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)
2483.850	70.24	-27.2	32.2	65.19	74.0	3.8	H
2484.000	68.77	-27.2	32.2	63.72	74.0	5.2	H
4924.000	41.91	-33.0	34.2	40.78	74.0	32.1	V
7387.500	45.44	-30.6	35.6	40.46	74.0	28.6	V
9847.000	46.62	-28.9	37.1	38.46	74.0	27.4	V
12310.000	47.32	-28.5	38.8	36.98	74.0	26.7	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)
2386.100	41.81	-27.5	31.9	37.32	54.0	12.2	V
2386.950	42.06	-27.4	31.9	37.55	54.0	11.9	V
4824.000	40.19	-33.1	34.3	38.97	54.0	13.8	H
7236.000	33.79	-30.8	35.6	28.99	54.0	20.2	V
9650.000	36.00	-30.4	36.8	29.60	54.0	18.0	V
12069.500	37.83	-28.3	38.7	27.38	54.0	16.2	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)
2411.450	44.26	-27.6	32.0	39.77	54.0	9.7	V
2461.150	44.22	-27.6	32.2	39.57	54.0	9.8	V
4874.000	38.06	-33.3	34.3	37.11	54.0	15.9	H
7304.500	34.98	-30.1	35.8	29.29	54.0	19.0	V
9750.500	36.48	-29.6	37.1	28.94	54.0	17.5	V
12185.500	36.91	-28.8	38.7	27.05	54.0	17.1	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)
2486.850	43.25	-27.1	32.2	38.12	54.0	10.7	V
2487.150	43.77	-27.1	32.2	38.63	54.0	10.2	V
4924.000	43.19	-33.0	34.2	42.06	54.0	10.8	H
7384.000	33.35	-30.5	35.6	28.26	54.0	20.7	V
9850.000	36.03	-28.8	37.1	27.70	54.0	18.0	V
12311.000	36.56	-28.5	38.8	26.30	54.0	17.4	V

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)
2388.350	46.01	-27.4	32.0	41.48	54.0	8.0	V
2388.900	46.81	-27.4	32.0	42.27	54.0	7.2	V
4824.000	32.72	-33.1	34.3	31.50	54.0	21.3	V
7234.500	33.70	-30.9	35.6	28.99	54.0	20.3	H
9648.000	35.85	-30.3	36.8	29.32	54.0	18.2	H
12056.500	36.45	-29.6	38.7	27.32	54.0	17.6	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)
2404.800	41.27	-27.5	32.0	36.73	54.0	12.7	V
2462.950	42.65	-27.5	32.2	37.98	54.0	11.3	V
4874.000	31.53	-33.3	34.3	30.58	54.0	22.5	V
7311.000	34.06	-30.0	35.8	28.24	54.0	19.9	V
9748.000	35.81	-29.5	37.1	28.23	54.0	18.2	H
12188.000	36.67	-28.9	38.7	26.87	54.0	17.3	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)
2483.900	48.30	-27.2	32.2	43.25	54.0	5.7	V
2485.150	47.88	-27.1	32.2	42.80	54.0	6.1	V
4924.000	32.50	-33.0	34.2	31.37	54.0	21.5	V
7395.500	34.37	-30.5	35.6	29.23	54.0	19.6	H
9854.500	35.56	-29.1	37.1	27.55	54.0	18.4	H
12312.000	36.10	-28.6	38.8	25.92	54.0	17.9	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)
2389.300	47.63	-27.4	32.0	43.09	54.0	6.4	V
2389.800	48.83	-27.4	32.0	44.28	54.0	5.2	V
4824.000	33.63	-33.1	34.3	32.42	54.0	20.4	V
7236.000	33.67	-30.8	35.6	28.88	54.0	20.3	H
9648.000	35.66	-30.3	36.8	29.13	54.0	18.3	H
12057.500	36.46	-29.6	38.7	27.36	54.0	17.5	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)
2403.150	44.33	-27.5	32.0	39.77	54.0	9.7	V
2470.150	44.44	-27.4	32.2	39.67	54.0	9.6	V
4874.000	32.36	-33.3	34.3	31.41	54.0	21.6	V
7311.000	34.77	-30.0	35.8	28.95	54.0	19.2	V
9748.000	36.75	-29.5	37.1	29.17	54.0	17.2	V
1218.500	37.22	-29.1	28.0	38.35	54.0	16.8	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)
2484.700	48.41	-27.1	32.2	43.34	54.0	5.6	V
2485.400	48.17	-27.1	32.2	43.08	54.0	5.8	V
4924.500	31.82	-33.0	34.2	30.65	54.0	22.2	H
7386.000	33.72	-30.6	35.6	28.69	54.0	20.3	H
9855.000	36.38	-29.1	37.1	28.40	54.0	17.6	V
12310.500	37.71	-28.5	38.8	27.41	54.0	16.3	V

Conclusion: Pass

Note: the spurious emission above 18G is noise only and did not show on the report.

Band edge compliance

802.11b mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11b	1	2.31GHz~2.43GHz---L	Fig.1	**P**
	11	2.45GHz~2.50GHz---H	Fig.2	**P**

802.11g mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11g	1	2.31GHz~2.43GHz---L	Fig.3	**P**
	11	2.45GHz~2.50GHz---H	Fig.4	**P**

802.11n-HT20 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	1	2.31GHz~2.43GHz---L	Fig.5	**P**
	11	2.45GHz~2.50GHz---H	Fig.6	**P**

Test graphs as below:

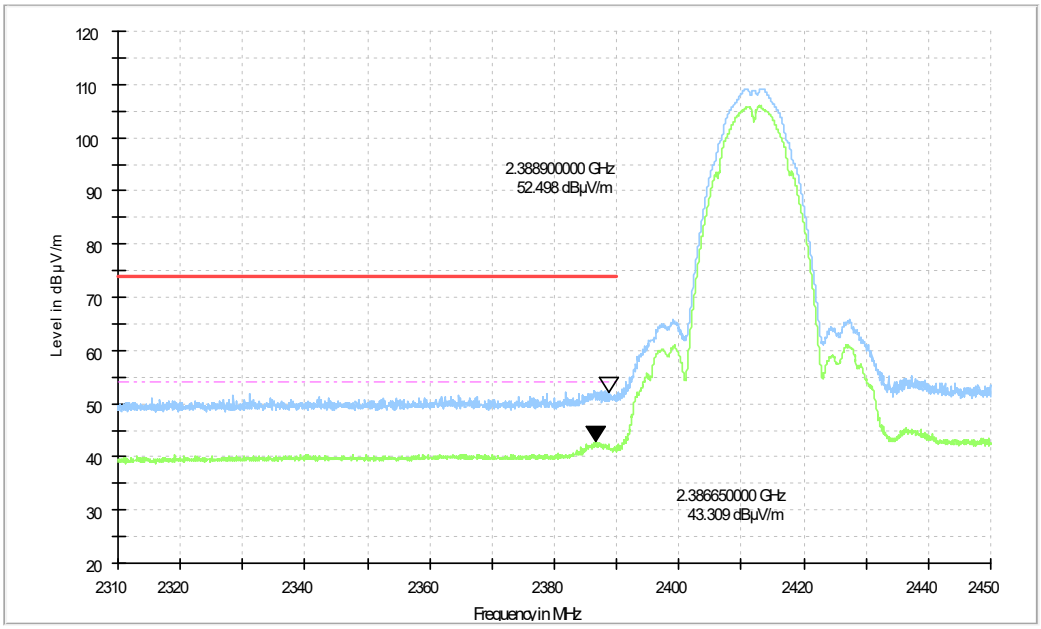


Fig.1 Transmitter Spurious Emission - Radiated (Power): 802.11b, ch1, 2.31 GHz – 2.43GHz

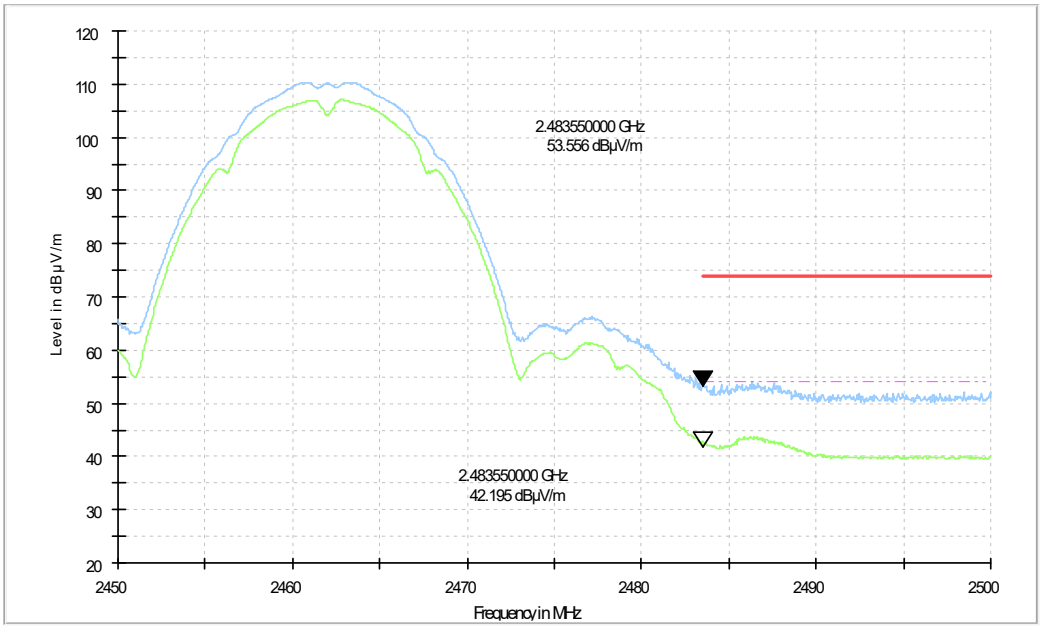


Fig.2 Transmitter Spurious Emission - Radiated (Power): 802.11b, ch11, 2.45 GHz - 2.50GHz

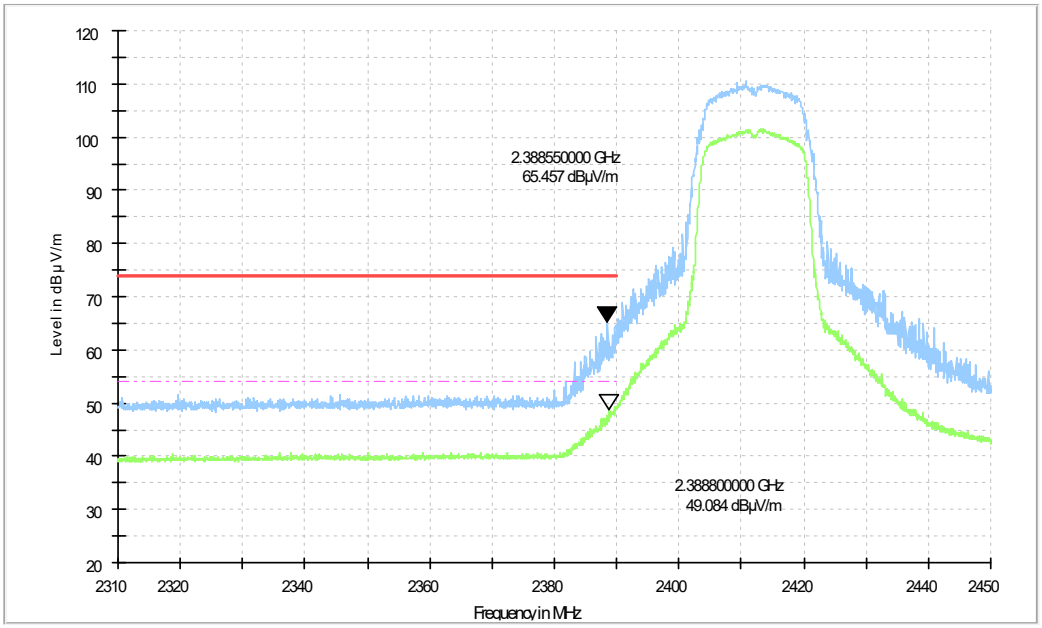


Fig.3 Transmitter Spurious Emission - Radiated (Power): 802.11g, ch1, 2.31 GHz - 2.43GHz

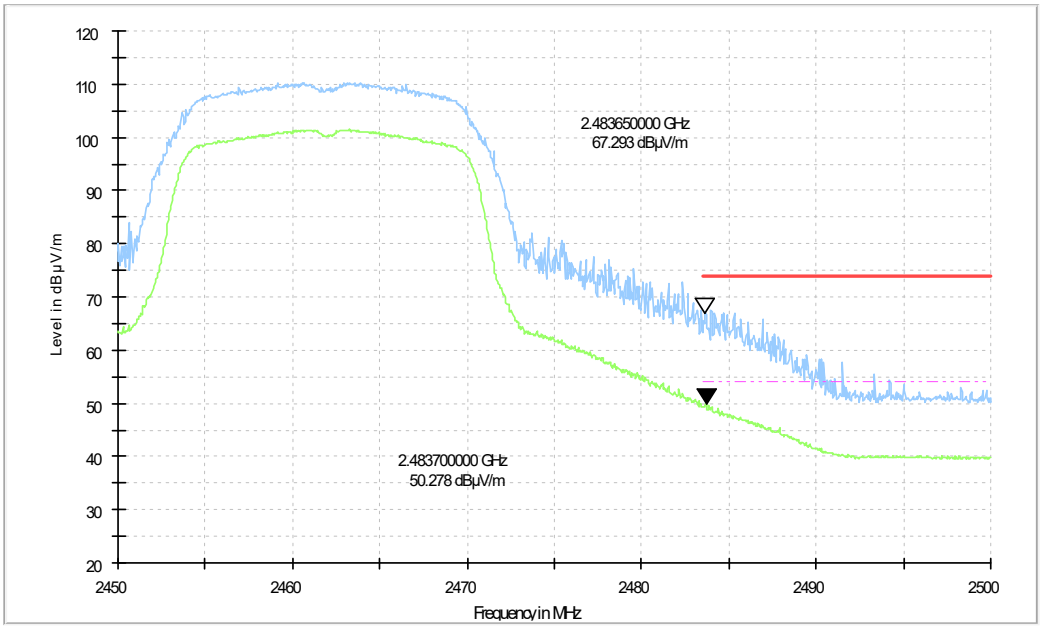


Fig.4 Transmitter Spurious Emission - Radiated (Power): 802.11g, ch11, 2.45 GHz - 2.50GHz

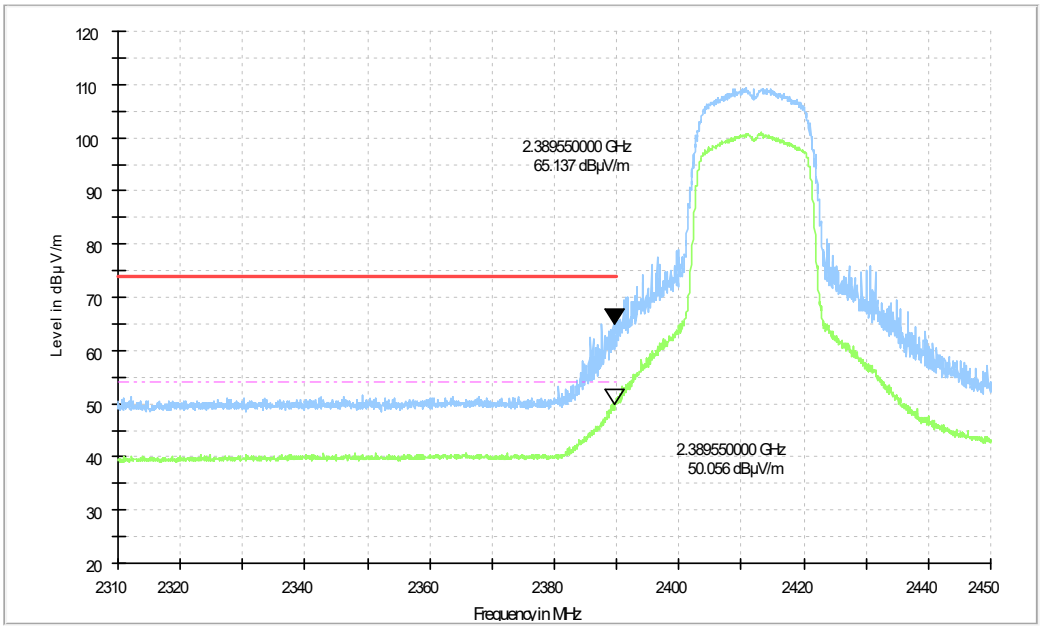


Fig.5 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT20, ch1, 2.31 GHz - 2.43GHz

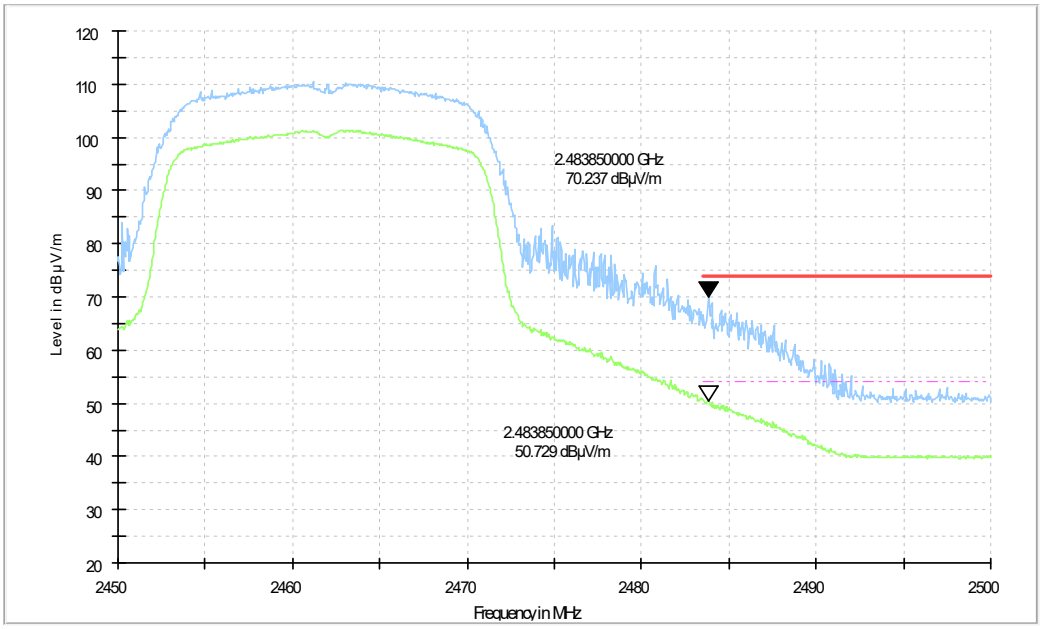


Fig.6 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT20, ch11, 2.45 GHz - 2.50GHz

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.

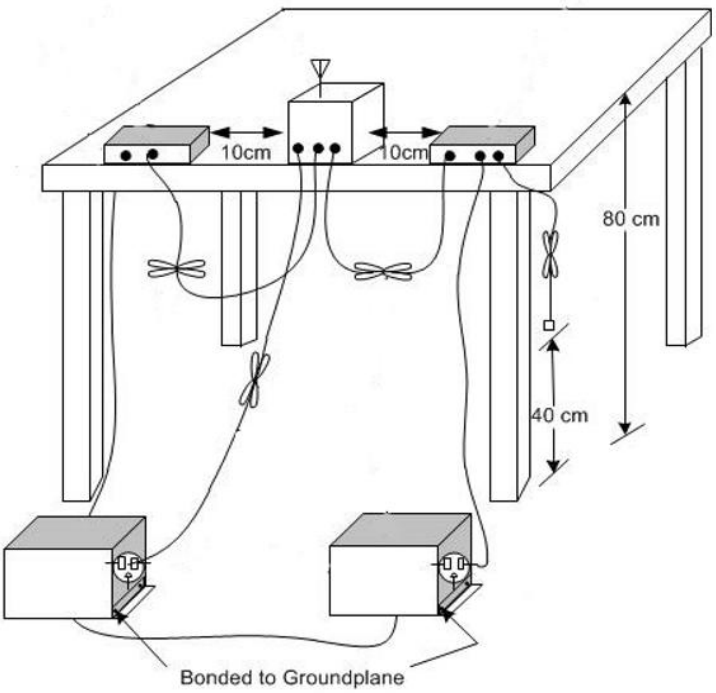
The measurement bandwidth is:

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:

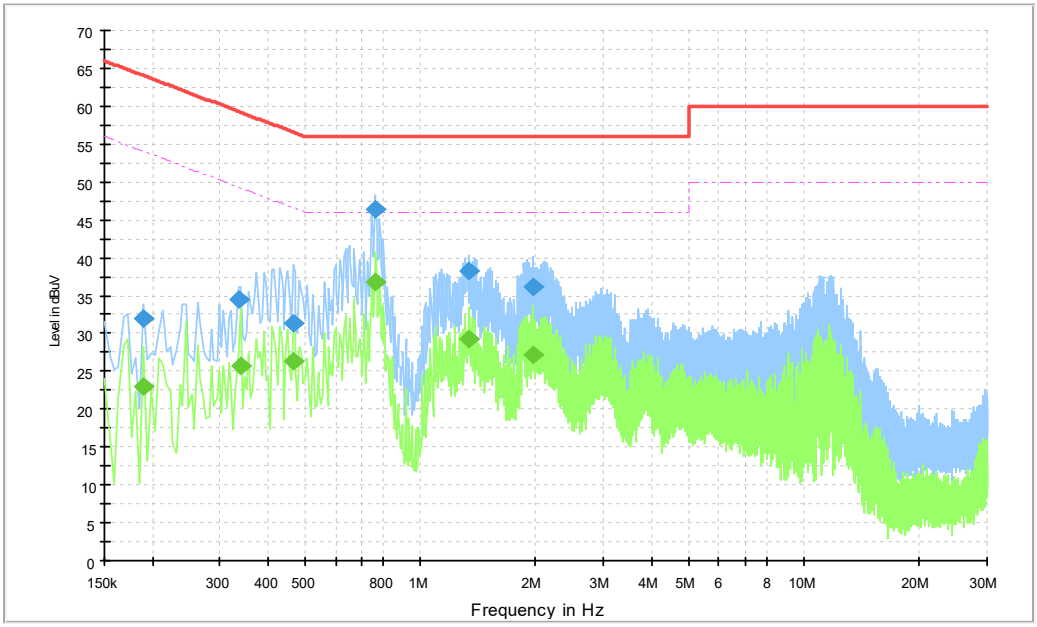


Fig.A.8.1 AC Powerline Conducted Emission-802.11b

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 (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190500	31.9	2000.0	9.000	L1	20.0	32.1	64.0
0.334500	34.5	2000.0	9.000	L1	20.0	24.8	59.3
0.465000	31.4	2000.0	9.000	N	20.2	25.2	56.6
0.762000	46.3	2000.0	9.000	L1	20.0	9.7	56.0
1.342500	38.3	2000.0	9.000	L1	19.9	17.7	56.0
1.972500	36.1	2000.0	9.000	L1	19.8	19.9	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190500	23.0	2000.0	9.000	L1	20.0	31.0	54.0
0.339000	25.7	2000.0	9.000	L1	20.0	23.5	49.2
0.465000	26.2	2000.0	9.000	L1	20.1	20.4	46.6
0.766500	36.8	2000.0	9.000	L1	20.0	9.2	46.0
1.342500	29.2	2000.0	9.000	L1	19.9	16.8	46.0
1.972500	27.1	2000.0	9.000	L1	19.8	18.9	46.0

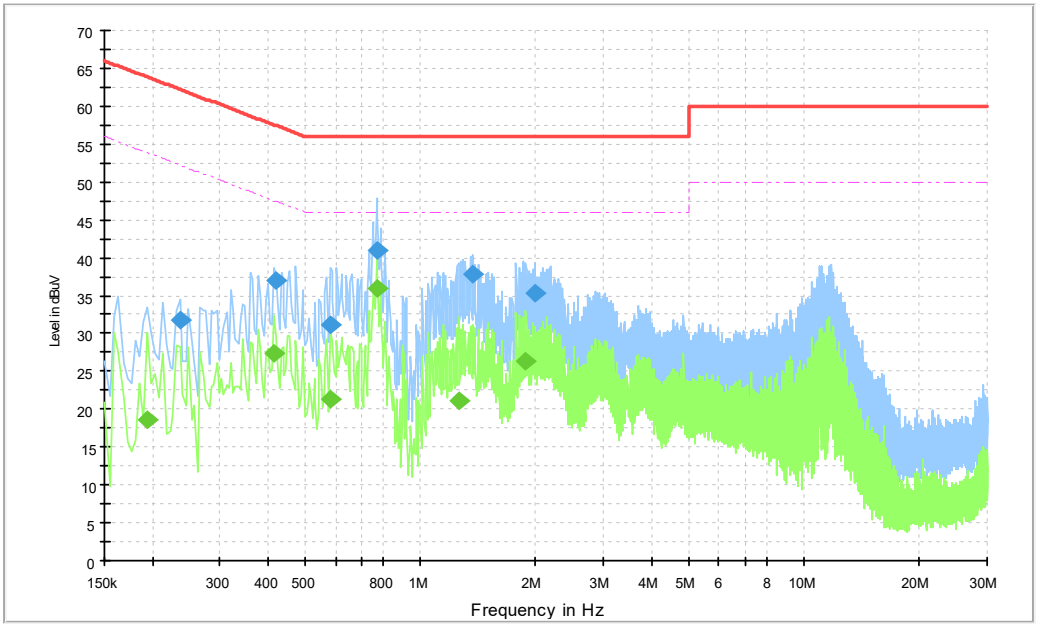


Fig.A.8.2 AC Powerline Conducted Emission-Idle

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 (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.235500	31.8	2000.0	9.000	L1	20.0	30.5	62.3
0.420000	37.0	2000.0	9.000	L1	20.1	20.5	57.4
0.582000	31.2	2000.0	9.000	N	20.1	24.8	56.0
0.771000	40.9	2000.0	9.000	N	20.1	15.1	56.0
1.365000	37.9	2000.0	9.000	L1	19.9	18.1	56.0
1.995000	35.2	2000.0	9.000	L1	19.8	20.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.195000	18.5	2000.0	9.000	N	20.0	35.3	53.8
0.415500	27.3	2000.0	9.000	L1	20.1	20.2	47.5
0.582000	21.2	2000.0	9.000	N	20.1	24.8	46.0
0.771000	35.9	2000.0	9.000	L1	20.0	10.1	46.0
1.257000	21.1	2000.0	9.000	N	20.0	24.9	46.0
1.887000	26.4	2000.0	9.000	L1	19.8	19.6	46.0

A.9. 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 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

Accredited Laboratory

A2LA has accredited

TELECOMMUNICATION TECHNOLOGY LABS, CAICT

Beijing, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 23rd day of July 2024.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 7049.01
Valid to July 31, 2026

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

*****END OF REPORT*****