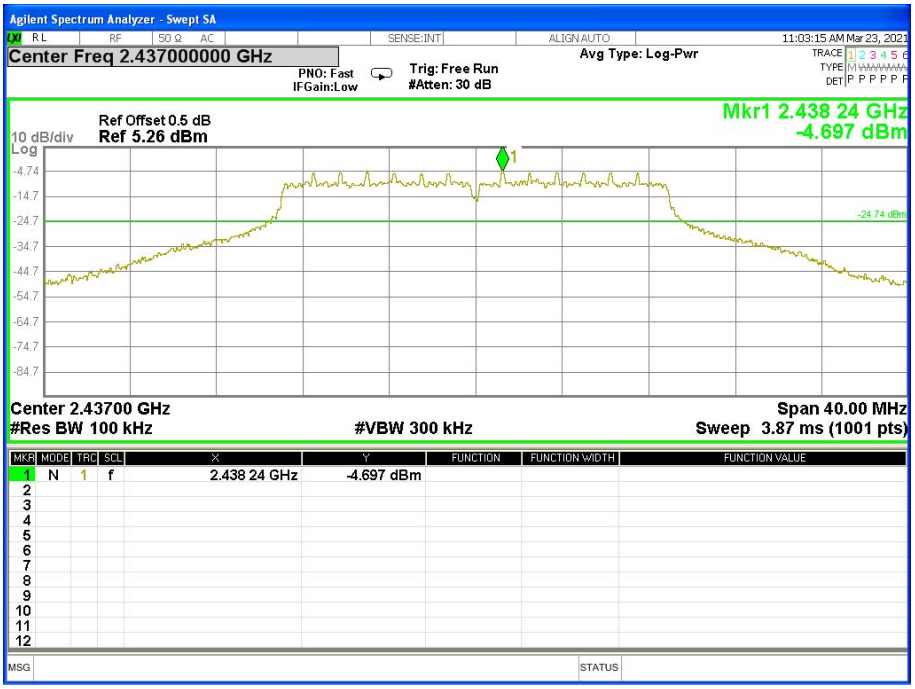
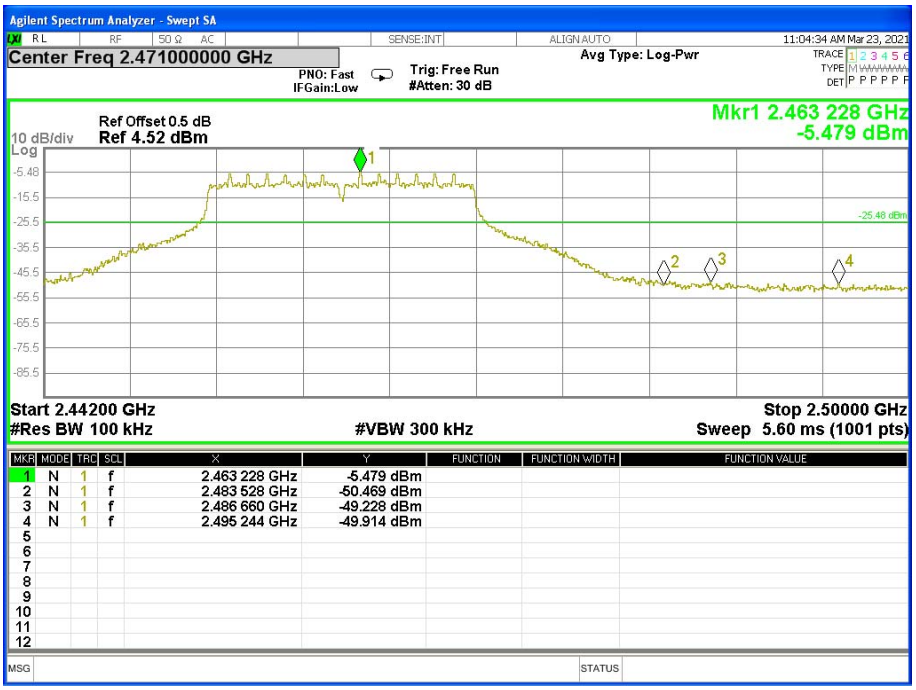
MID CH BANDEDGE



HIGH CH BANDEDGE



9. RADIATED TEST RESULTS

LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to RSS-GEN Clause 8.9 (Transmitter)

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

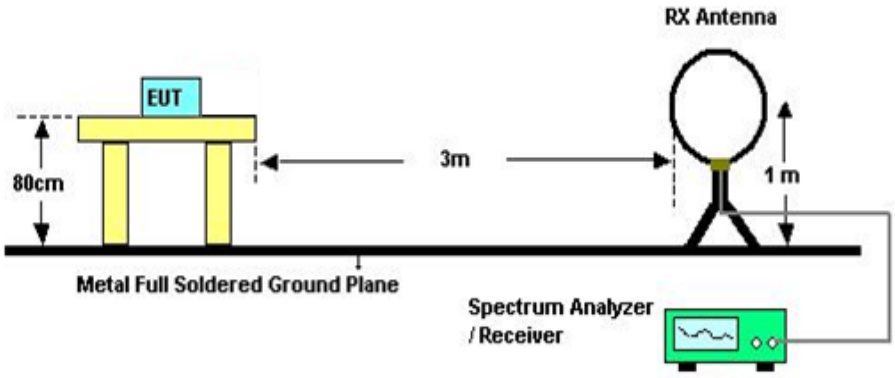
Restricted bands of operation

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

Note: [1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6c

TEST SETUP AND PROCEDURE

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 0.8 meter above ground.

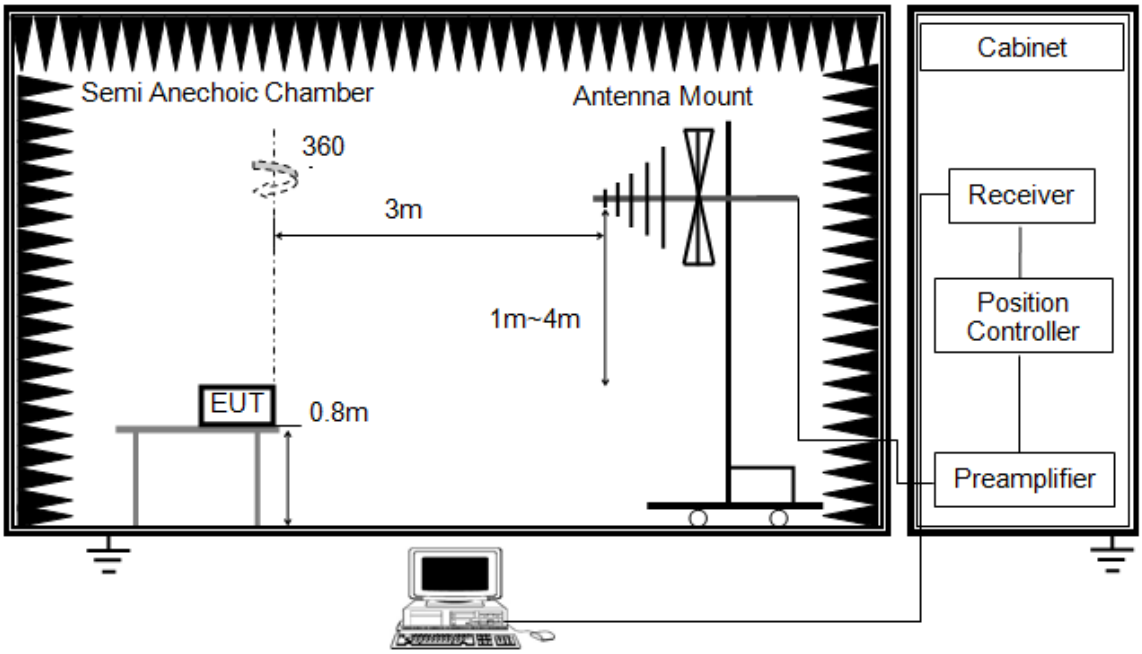
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

6. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Note: Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Below 1G



The setting of the spectrum analyser

RBW	120K
VBW	300K
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

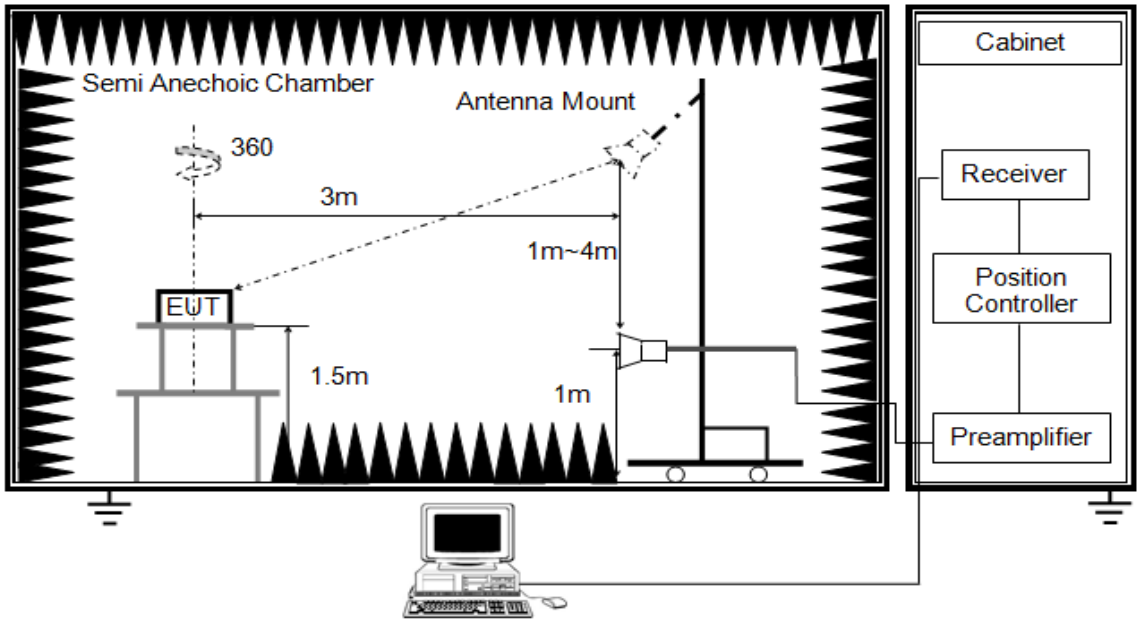
3. The EUT was placed on a turntable with 0.8 meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

6. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

ABOVE 1G



The setting of the spectrum analyser

RBW	1M
VBW	PEAK: 3M AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 1.5m above ground.

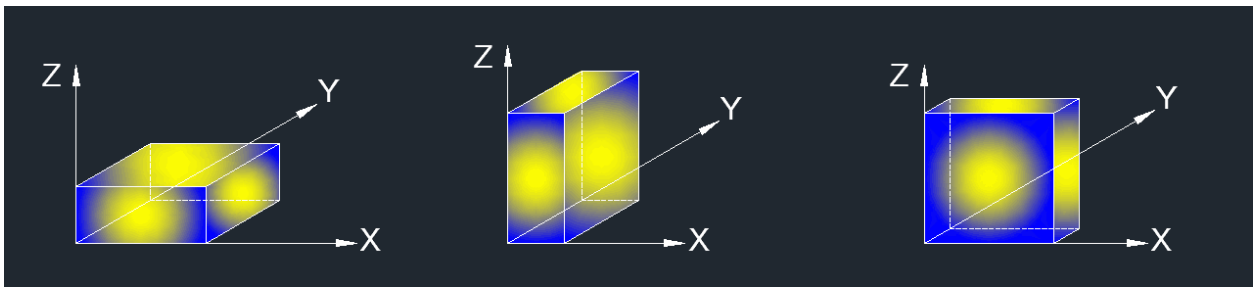
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For peak measurements, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz with peak detector; For average measurements, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 10KHz for 802.11b and 2KHz for 802.11g/n with peak detector.

7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

X axis, Y axis, Z axis positions:



8.The EUT as shown in Figure 1 is the worst mode, the report only shown the worst mode data.

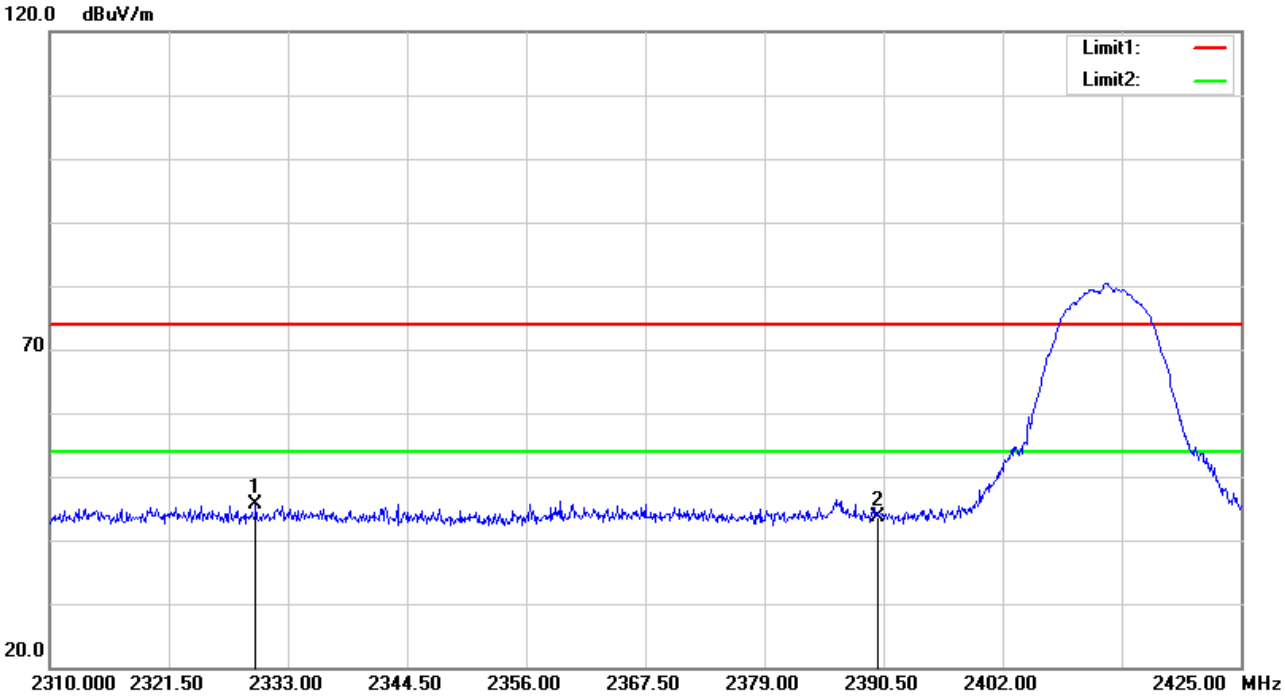
TEST ENVIRONMENT

Temperature	25°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

9.1. RESTRICTED BANDEDGE

802.11 b mode

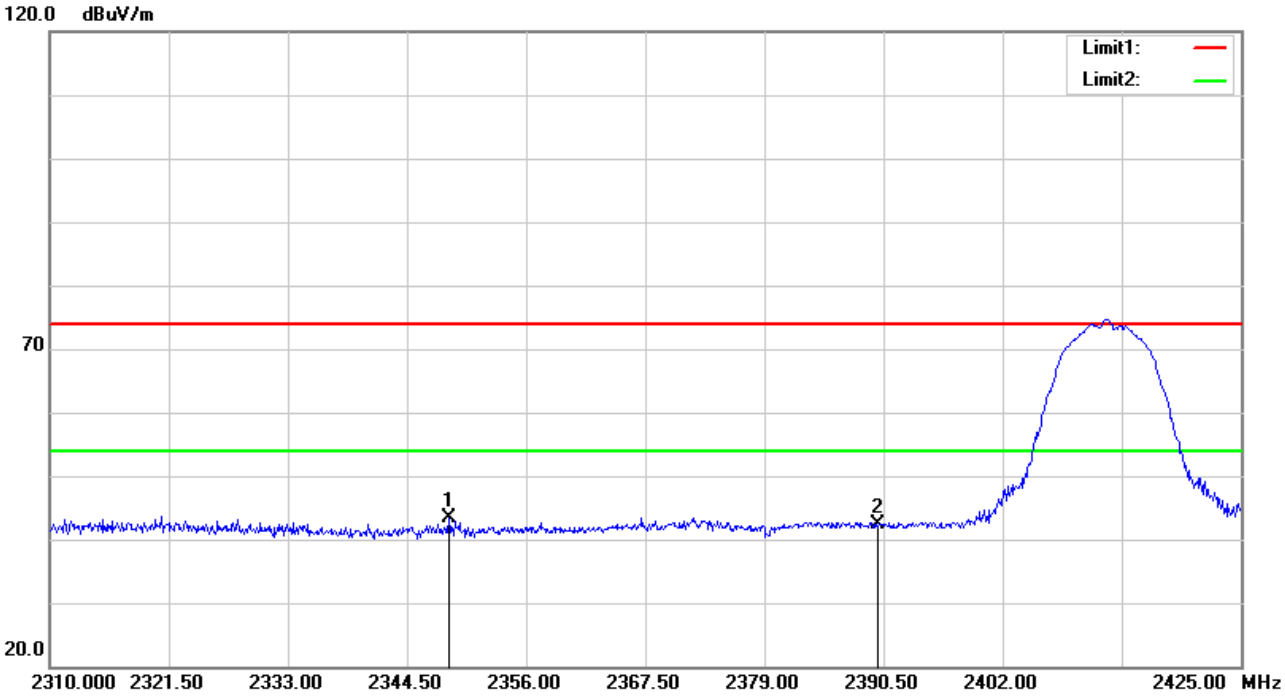
RESTRICTED BANDEDGE (01 CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2329.895	41.94	3.63	45.57	74.00	-28.43	peak
2	2390.000	39.20	4.34	43.54	74.00	-30.46	peak

Note: Measurement = Reading Level + Correct Factor.

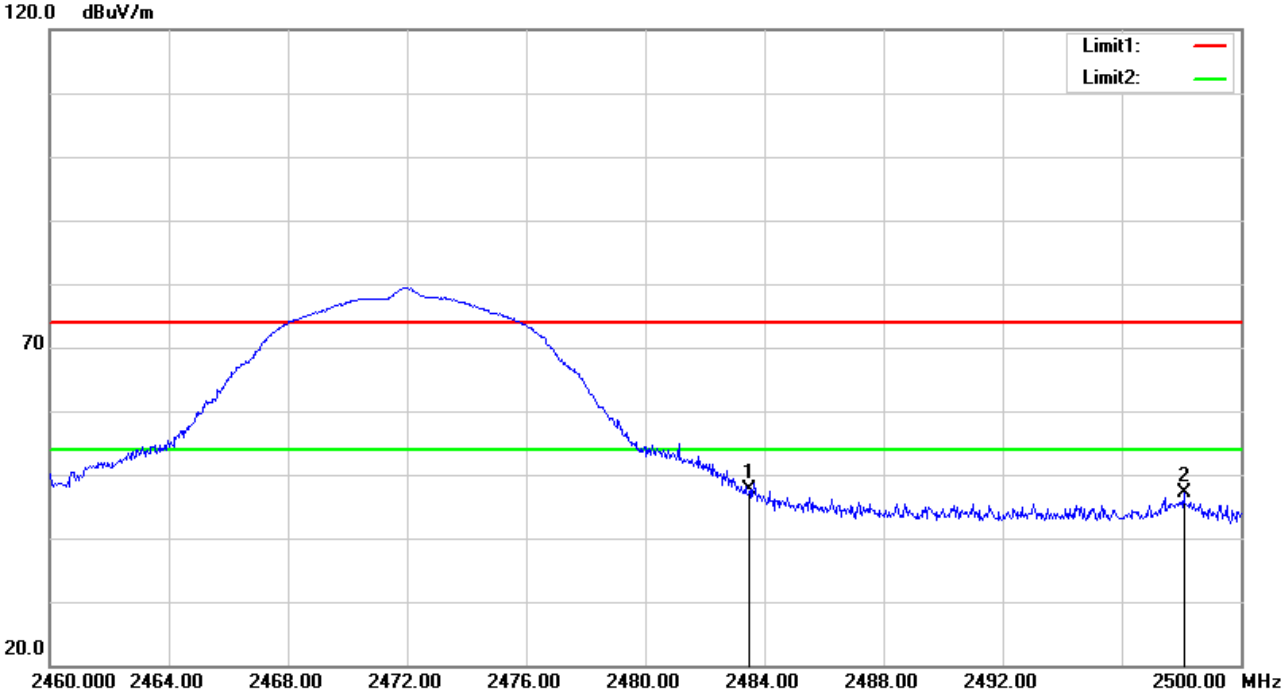
RESTRICTED BANDEDGE (01 CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2348.525	39.64	3.73	43.37	74.00	-30.63	peak
2	2390.000	38.07	4.34	42.41	74.00	-31.59	peak

Note: Measurement = Reading Level + Correct Factor.

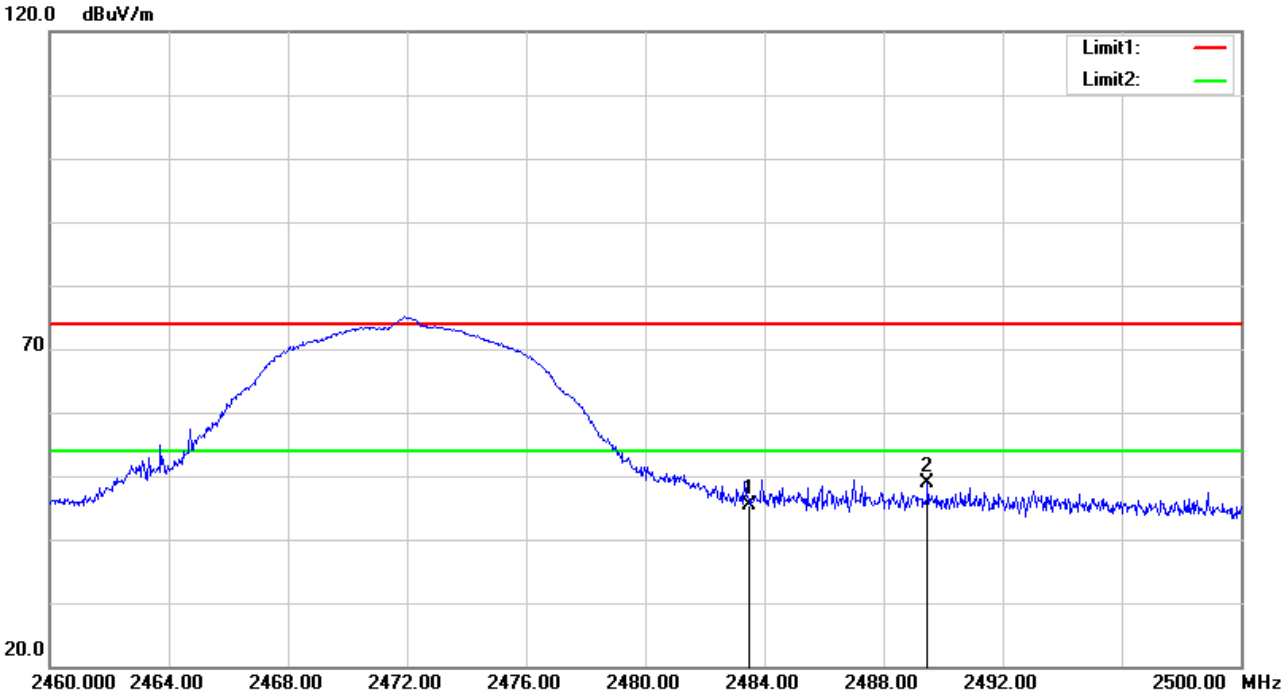
RESTRICTED BANDEDGE (11 CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	43.02	4.60	47.62	74.00	-26.38	peak
2	2498.080	42.46	4.64	47.10	74.00	-26.90	peak

Note: Measurement = Reading Level + Correct Factor.

RESTRICTED BANDEDGE (11 CHANNEL, VERTICAL)

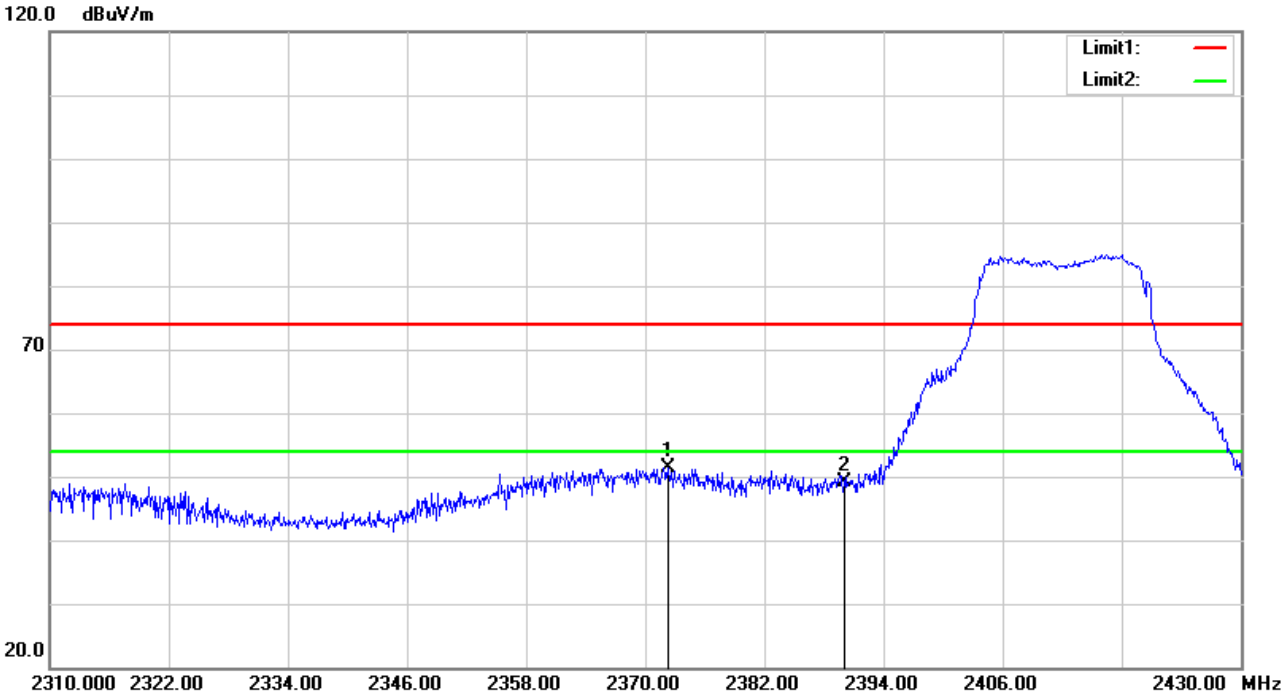


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	40.87	4.60	45.47	74.00	-28.53	peak
2	2489.480	44.16	4.62	48.78	74.00	-25.22	peak

Note: Measurement = Reading Level + Correct Factor.

802.11 g mode

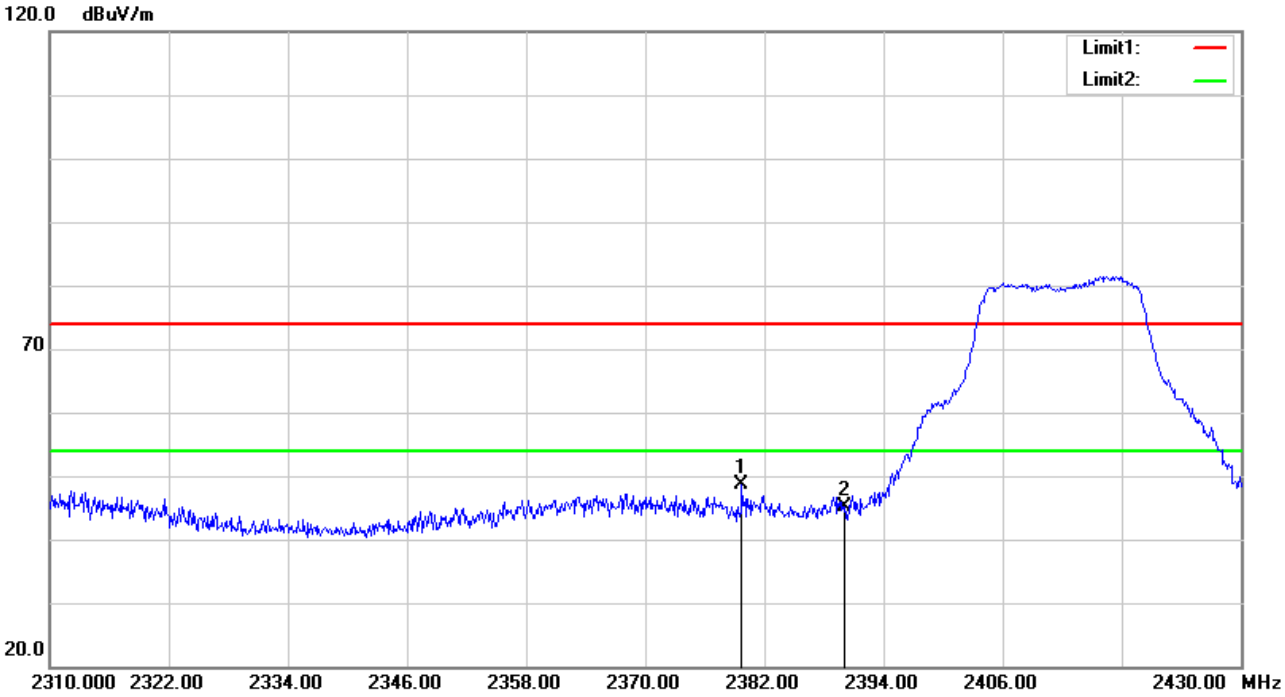
RESTRICTED BANDEDGE (01 CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2372.280	47.30	4.08	51.38	74.00	-22.62	peak
2	2390.000	44.90	4.34	49.24	74.00	-24.76	peak

Note: Measurement = Reading Level + Correct Factor.

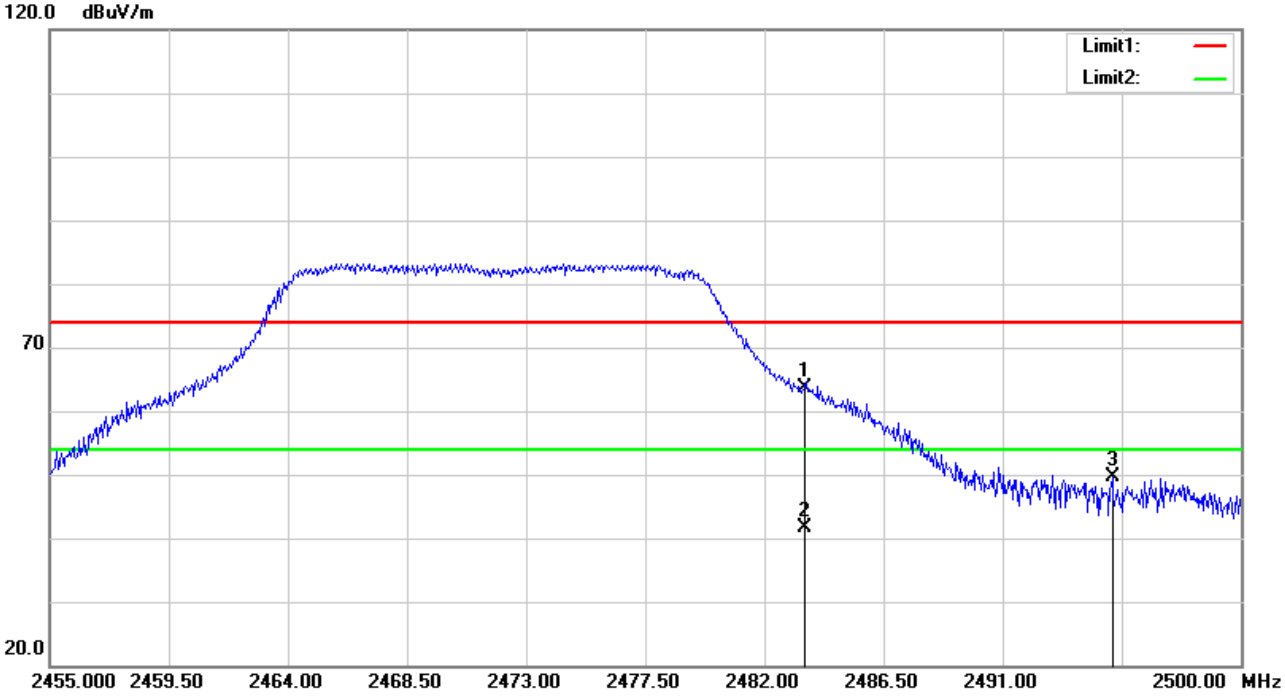
RESTRICTED BANDEDGE (01 CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2379.720	44.44	4.18	48.62	74.00	-25.38	peak
2	2390.000	40.87	4.34	45.21	74.00	-28.79	peak

Note: Measurement = Reading Level + Correct Factor.

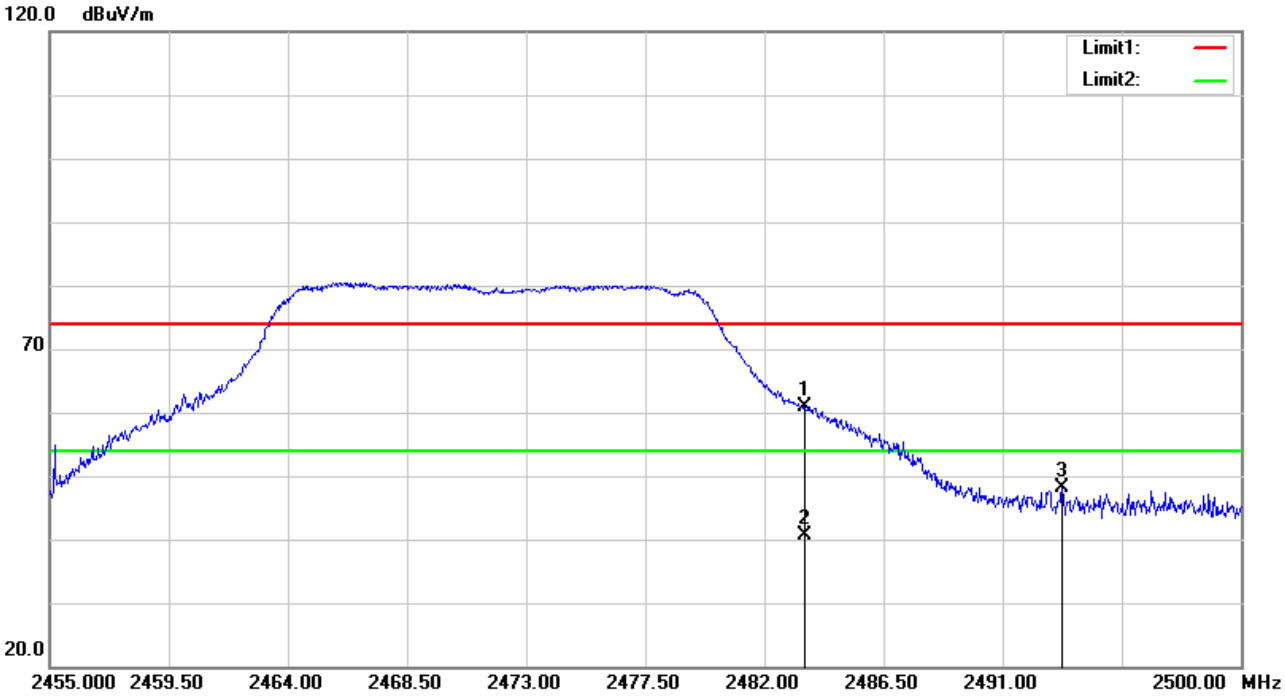
RESTRICTED BANDEDGE (11 CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	59.01	4.60	63.61	74.00	-10.39	peak
2	2483.500	36.91	4.60	41.51	54.00	-12.49	AVG
3	2495.140	44.88	4.63	49.51	74.00	-24.49	peak

Note: Measurement = Reading Level + Correct Factor.

RESTRICTED BANDEDGE (11 CHANNEL, VERTICAL)

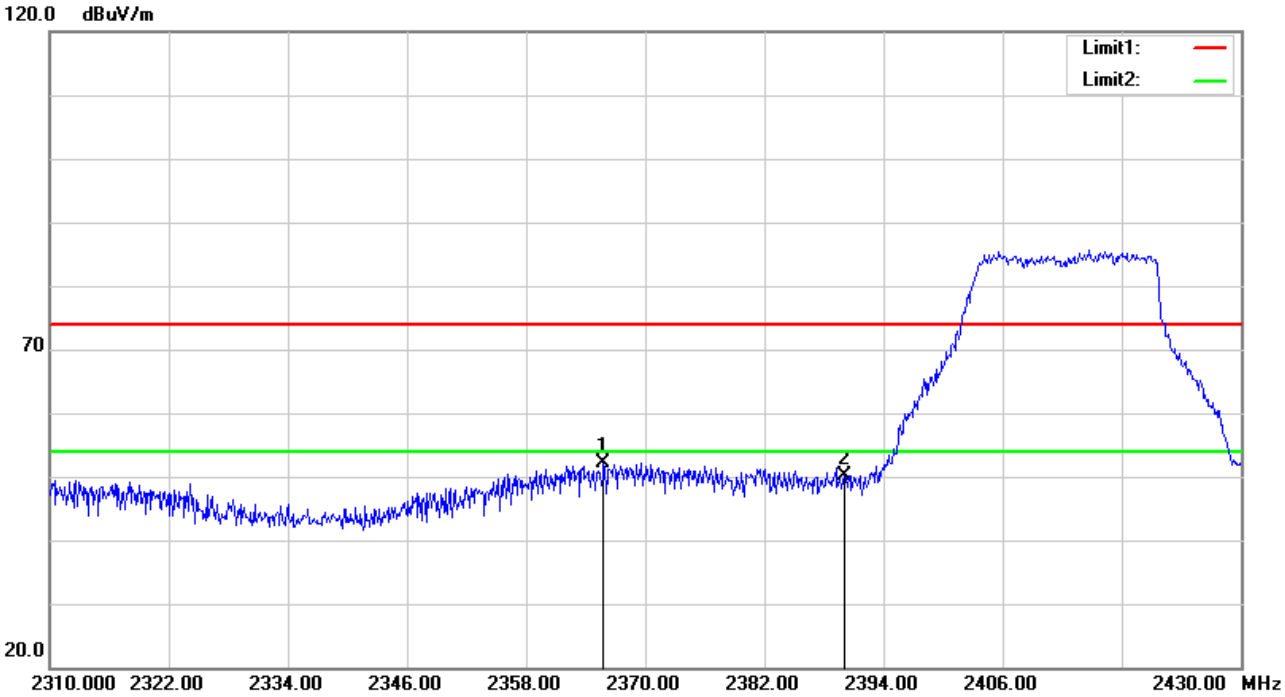


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	56.36	4.60	60.96	74.00	-13.04	peak
2	2483.500	36.01	4.60	40.61	54.00	-13.39	AVG
3	2493.250	43.40	4.64	48.04	74.00	-25.96	peak

Note: Measurement = Reading Level + Correct Factor.

802.11 n20 mode

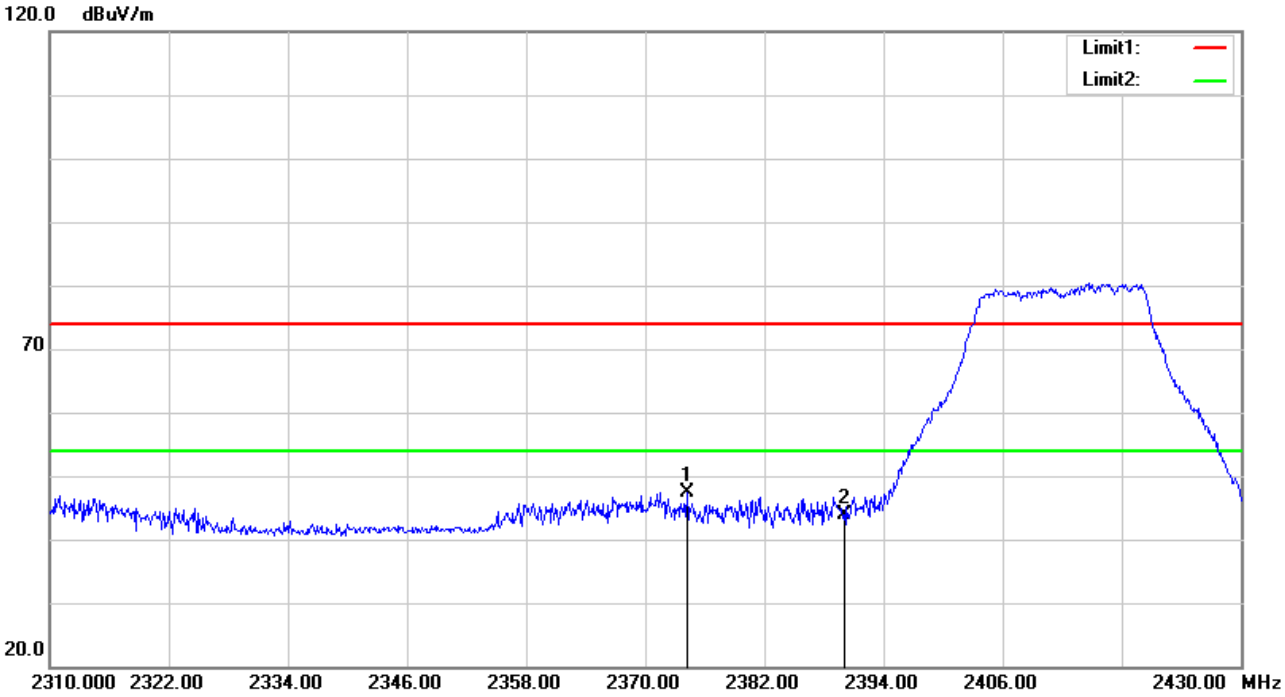
RESTRICTED BANDEDGE (01 CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2365.800	48.22	3.97	52.19	74.00	-21.81	peak
2	2390.000	45.79	4.34	50.13	74.00	-23.87	peak

Note: Measurement = Reading Level + Correct Factor.

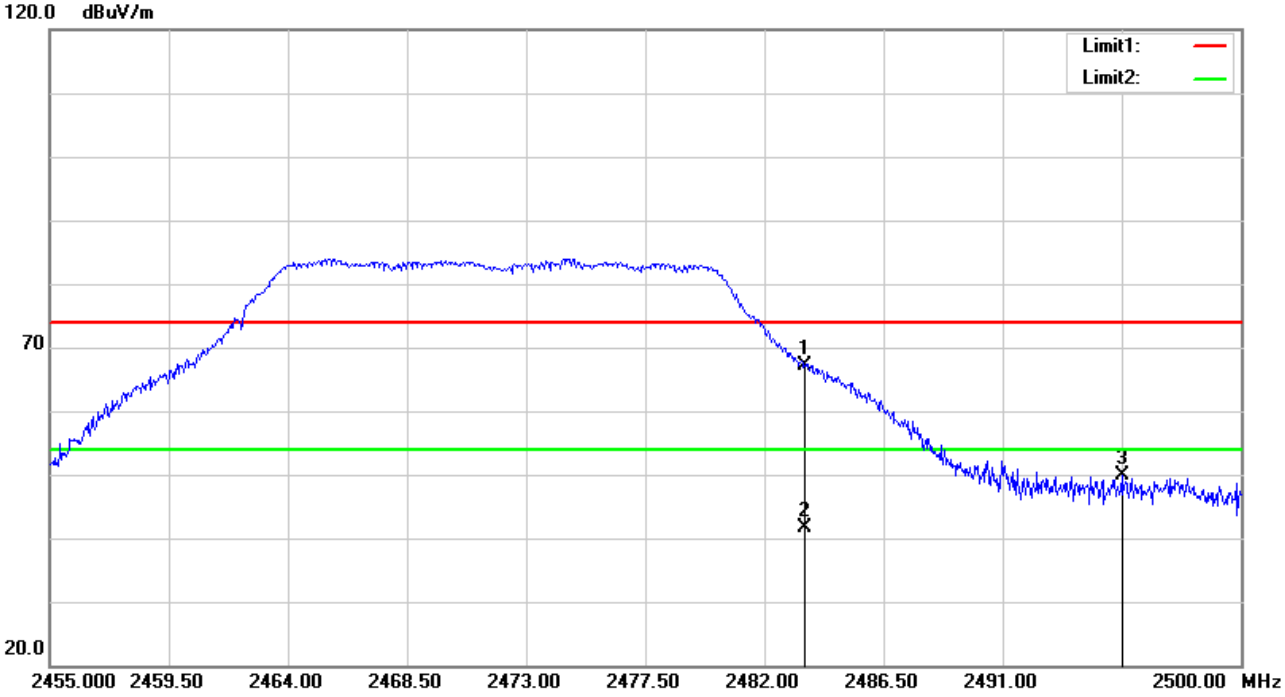
RESTRICTED BANDEDGE (01 CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2374.200	43.38	4.10	47.48	74.00	-26.52	peak
2	2390.000	39.61	4.34	43.95	74.00	-30.05	peak

Note: Measurement = Reading Level + Correct Factor.

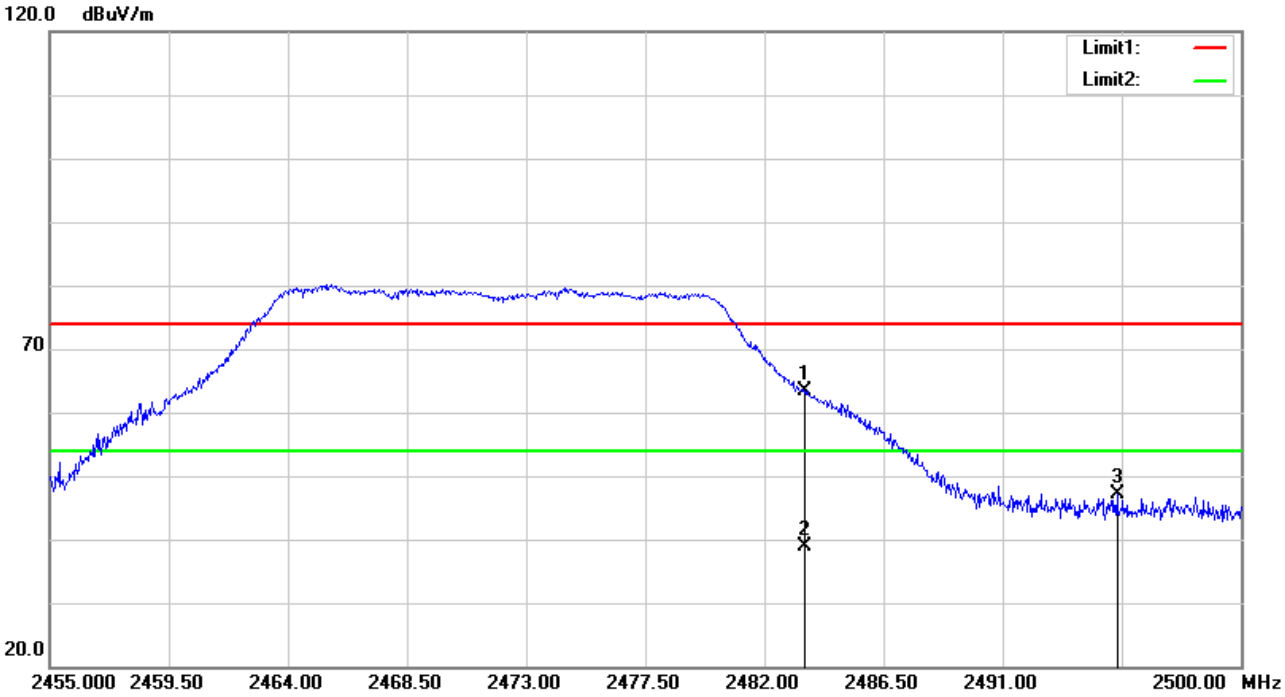
RESTRICTED BANDEDGE (11 CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	62.65	4.60	67.25	74.00	-6.75	peak
2	2483.500	37.04	4.60	41.64	54.00	-12.36	AVG
3	2495.500	45.13	4.63	49.76	74.00	-24.24	peak

Note: Measurement = Reading Level + Correct Factor.

RESTRICTED BANDEDGE (11 CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	58.70	4.60	63.30	74.00	-10.70	peak
2	2483.500	34.32	4.60	38.92	54.00	-15.08	AVG
3	2495.320	42.50	4.63	47.13	74.00	-26.87	peak

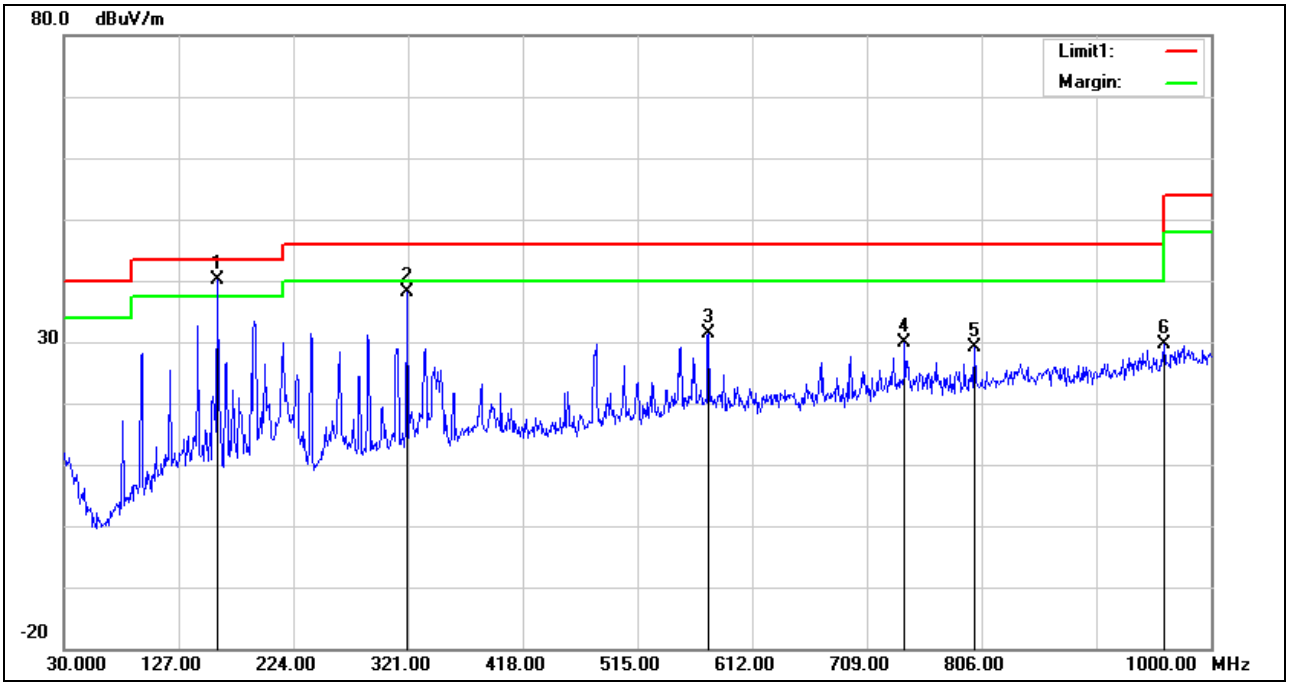
Note: Measurement = Reading Level + Correct Factor.

9.2. SPURIOUS EMISSIONS (30-1GHz)

Note: All the channels had been tested, but only the worst data recorded in the report.

802.11 b mode CH01

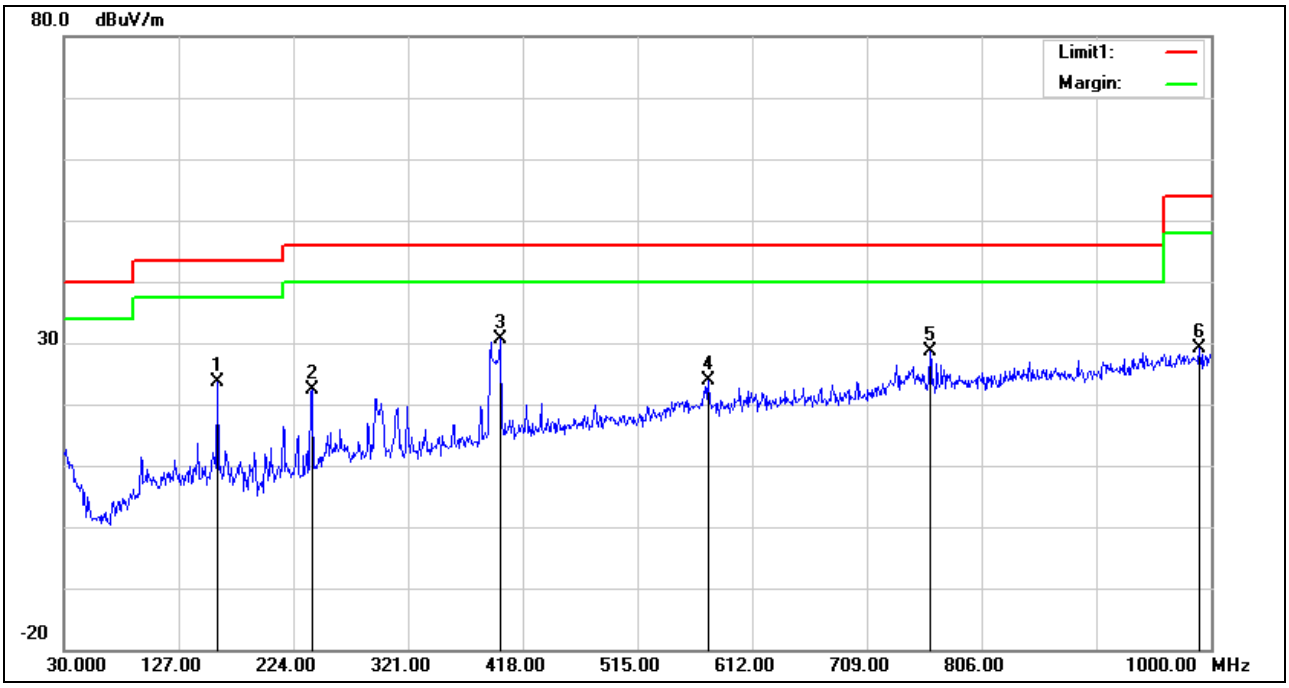
HARMONICS AND SPURIOUS EMISSIONS (HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	159.9800	58.99	-18.81	40.18	43.50	-3.32	QP
2	320.0300	52.15	-14.00	38.15	46.00	-7.85	QP
3	575.1400	37.09	-5.68	31.41	46.00	-14.59	QP
4	741.0100	31.90	-2.11	29.79	46.00	-16.21	QP
5	800.1800	31.10	-2.05	29.05	46.00	-16.95	QP
6	960.2300	27.81	1.76	29.57	54.00	-24.43	QP

Note: Measurement = Reading Level + Correct Factor.

HARMONICS AND SPURIOUS EMISSIONS (VERTICAL)

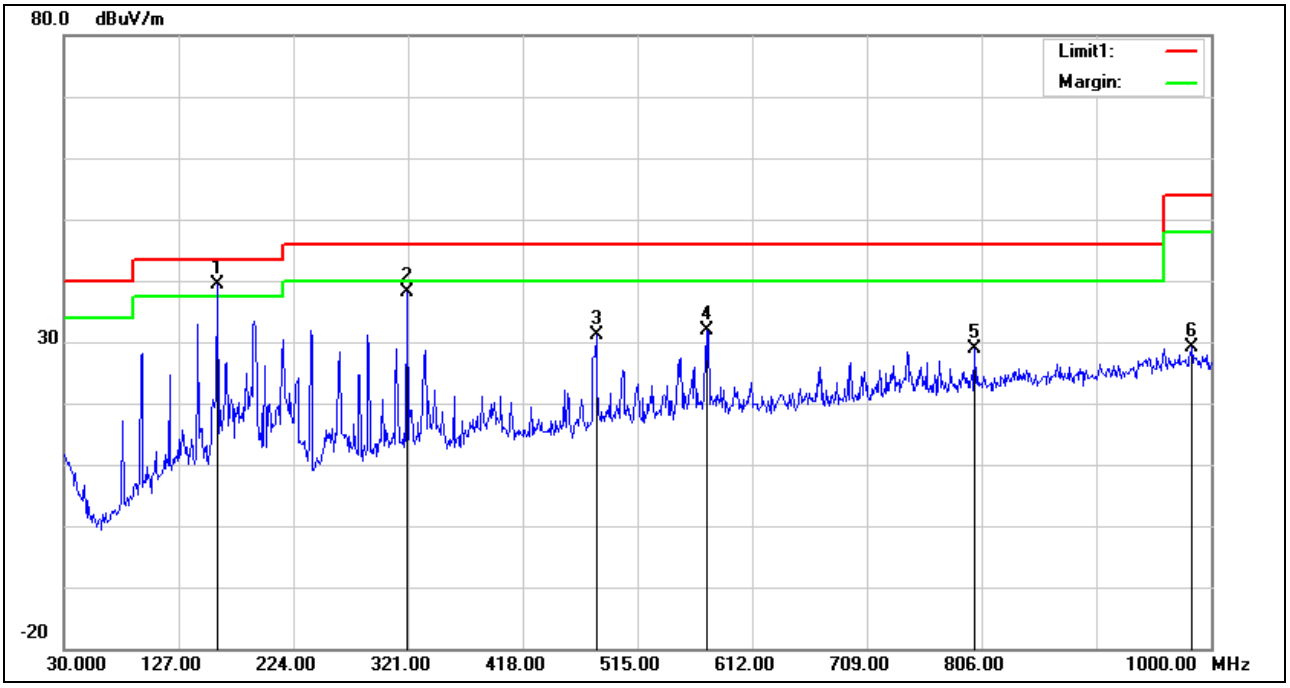


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	159.9800	42.56	-18.81	23.75	43.50	-19.75	QP
2	239.5200	40.53	-18.10	22.43	46.00	-23.57	QP
3	398.6000	41.73	-11.20	30.53	46.00	-15.47	QP
4	575.1400	29.65	-5.68	23.97	46.00	-22.03	QP
5	762.3500	30.78	-2.21	28.57	46.00	-17.43	QP
6	990.3000	27.03	2.05	29.08	54.00	-24.92	QP

Note: Measurement = Reading Level + Correct Factor.

802.11 g mode CH11

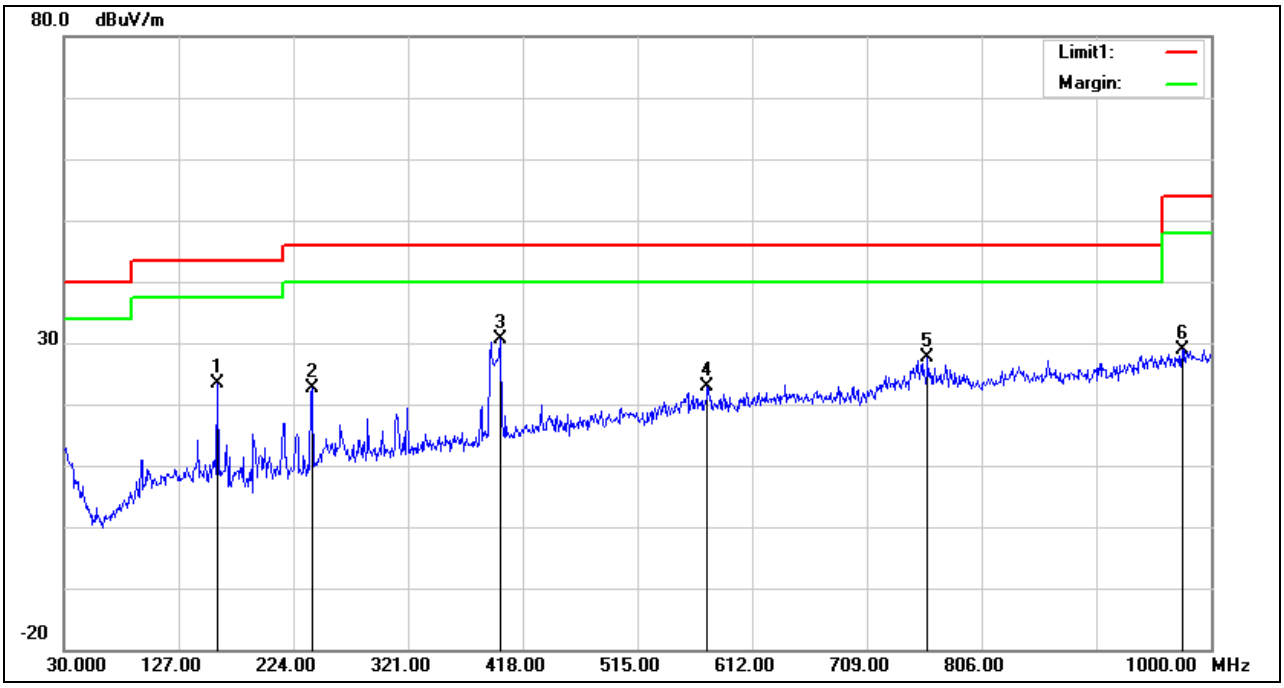
HARMONICS AND SPURIOUS EMISSIONS (HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	159.9800	58.24	-18.81	39.43	43.50	-4.07	QP
2	320.0300	52.20	-14.00	38.20	46.00	-7.80	QP
3	480.0800	39.73	-8.65	31.08	46.00	-14.92	QP
4	574.1700	37.59	-5.67	31.92	46.00	-14.08	QP
5	800.1800	30.98	-2.05	28.93	46.00	-17.07	QP
6	983.5100	26.67	2.46	29.13	54.00	-24.87	QP

Note: Measurement = Reading Level + Correct Factor.

HARMONICS AND SPURIOUS EMISSIONS (VERTICAL)

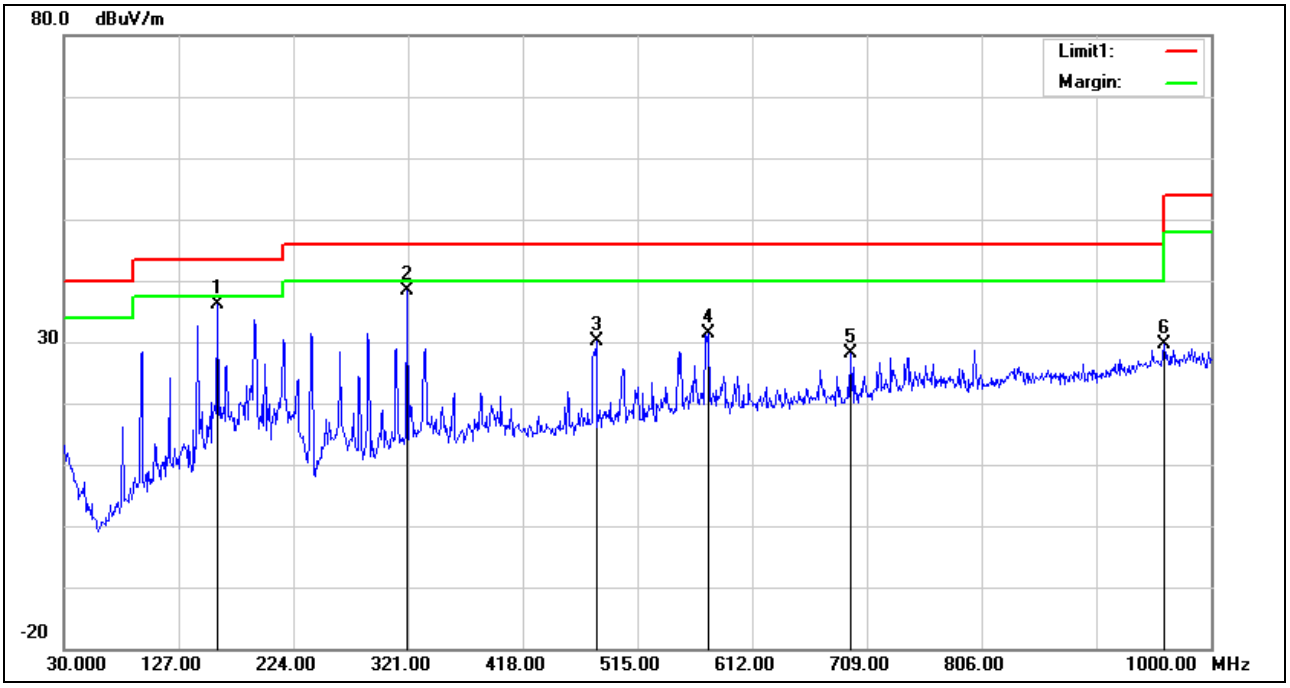


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	159.9800	42.27	-18.81	23.46	43.50	-20.04	QP
2	239.5200	40.73	-18.10	22.63	46.00	-23.37	QP
3	398.6000	41.72	-11.20	30.52	46.00	-15.48	QP
4	574.1700	28.53	-5.67	22.86	46.00	-23.14	QP
5	760.4100	29.74	-2.18	27.56	46.00	-18.44	QP
6	975.7500	26.61	2.38	28.99	54.00	-25.01	QP

Note: Measurement = Reading Level + Correct Factor.

802.11 n20 mode CH06

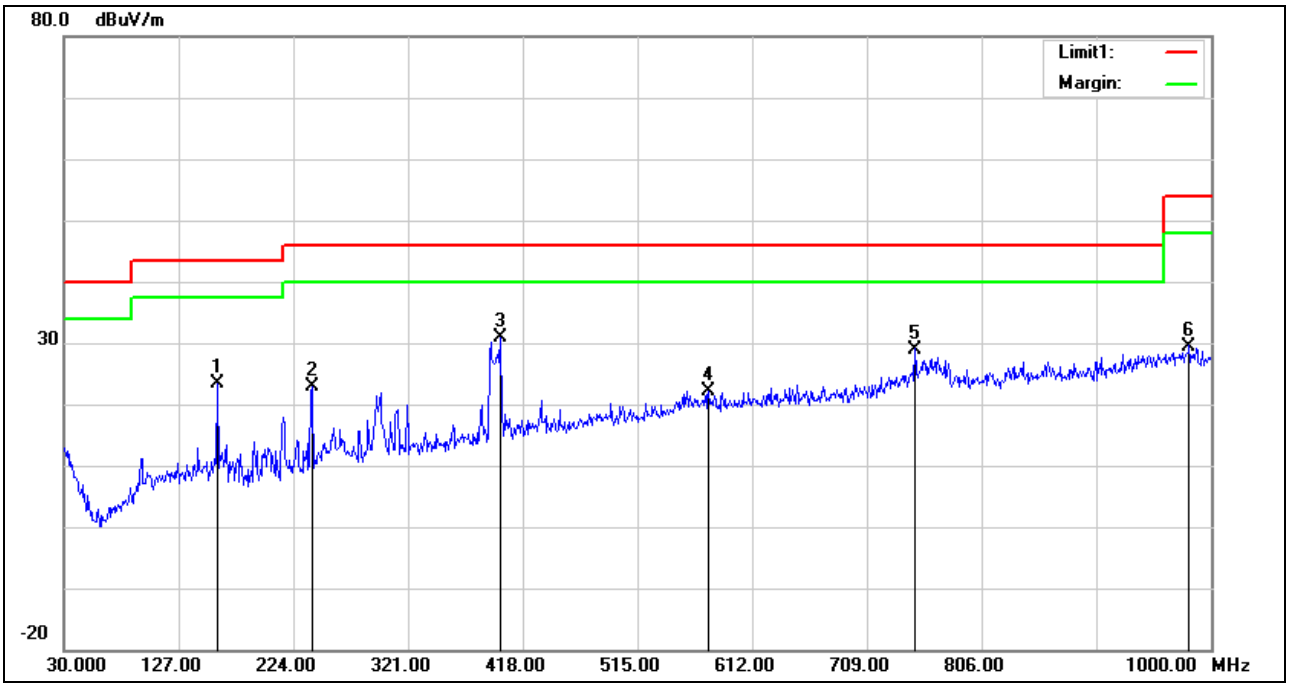
HARMONICS AND SPURIOUS EMISSIONS (HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	159.9800	55.04	-18.81	36.23	43.50	-7.27	QP
2	320.0300	52.27	-14.00	38.27	46.00	-7.73	QP
3	480.0800	38.88	-8.65	30.23	46.00	-15.77	QP
4	575.1400	36.99	-5.68	31.31	46.00	-14.69	QP
5	695.4200	32.31	-4.25	28.06	46.00	-17.94	QP
6	960.2300	27.77	1.76	29.53	54.00	-24.47	QP

Note: Measurement = Reading Level + Correct Factor.

HARMONICS AND SPURIOUS EMISSIONS (VERTICAL)



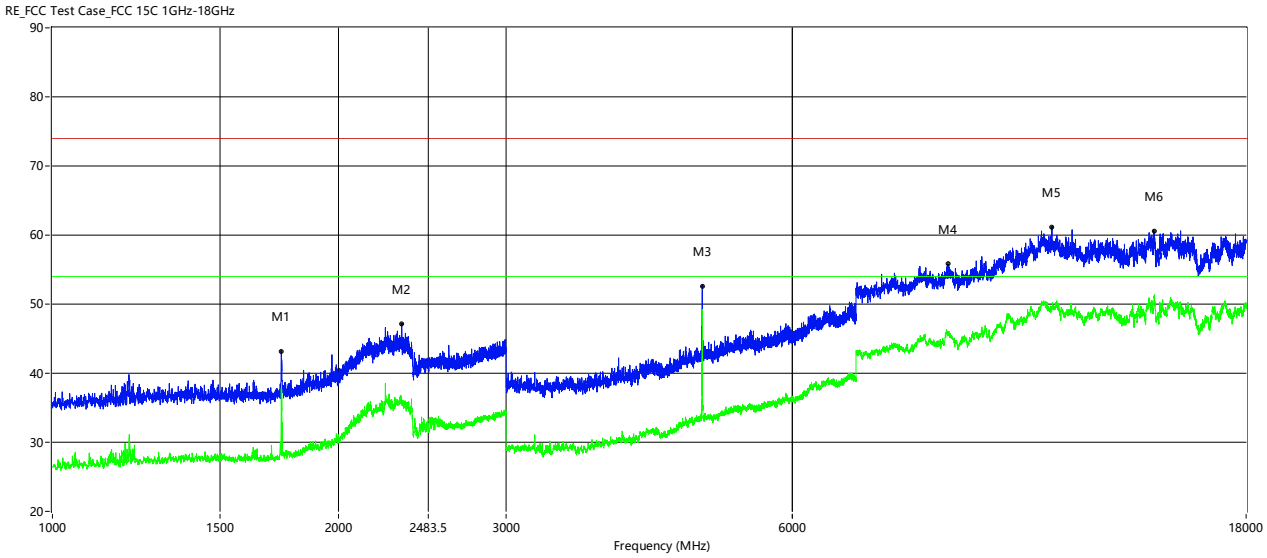
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	159.9800	42.17	-18.81	23.36	43.50	-20.14	QP
2	239.5200	41.01	-18.10	22.91	46.00	-23.09	QP
3	398.6000	41.98	-11.20	30.78	46.00	-15.22	QP
4	575.1400	27.82	-5.68	22.14	46.00	-23.86	QP
5	749.7400	31.16	-2.16	29.00	46.00	-17.00	QP
6	981.5700	26.93	2.57	29.50	54.00	-24.50	QP

Note: Measurement = Reading Level + Correct Factor.

9.3. SPURIOUS EMISSIONS (1GHz-18GHz)

802.11 b mode

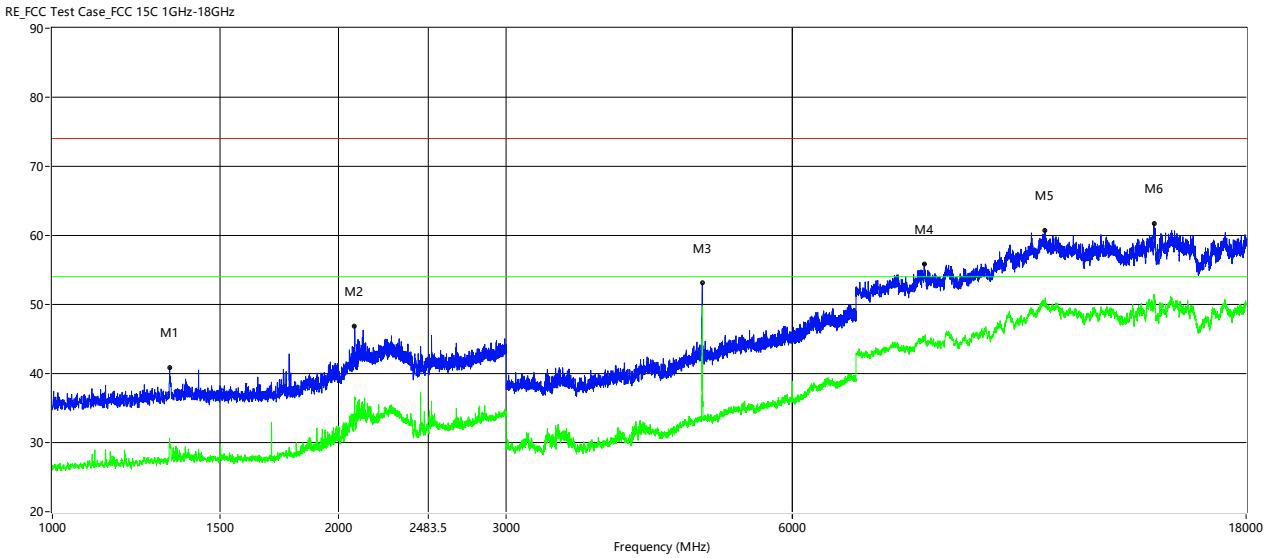
HARMONICS AND SPURIOUS EMISSIONS (01 CHANNEL, HORIZONTAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1741.000	43.20	37.73	-0.04	74.0	54.0	-16.27	Horizontal	Pass
2330.500	47.20	35.85	4.46	74.0	54.0	-18.15	Horizontal	Pass
4824.000	52.57	49.23	-6.84	74.0	54.0	-4.77	Horizontal	Pass
8749.000	55.79	45.45	5.01	74.0	54.0	-8.55	Horizontal	Pass
11248.750	61.20	49.61	9.57	74.0	54.0	-4.39	Horizontal	Pass
14403.000	60.51	51.13	11.39	74.0	54.0	-2.87	Horizontal	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

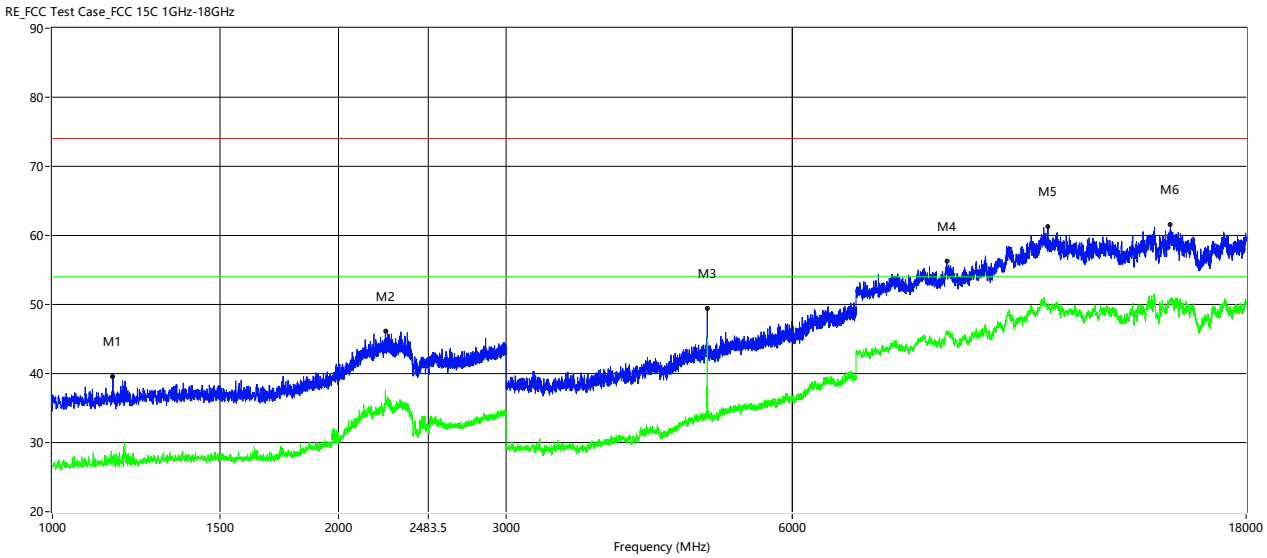
HARMONICS AND SPURIOUS EMISSIONS (01 CHANNEL, VERTICAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1328.500	40.91	30.43	-0.85	74.0	54.0	-23.57	Vertical	Pass
2079.500	46.90	36.64	3.39	74.0	54.0	-17.36	Vertical	Pass
4824.000	53.08	49.79	-6.84	74.0	54.0	-4.21	Vertical	Pass
8256.750	55.92	45.38	4.22	74.0	54.0	-8.62	Vertical	Pass
11061.750	60.78	50.47	9.89	74.0	54.0	-3.53	Vertical	Pass
14400.250	61.76	50.77	11.42	74.0	54.0	-3.23	Vertical	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

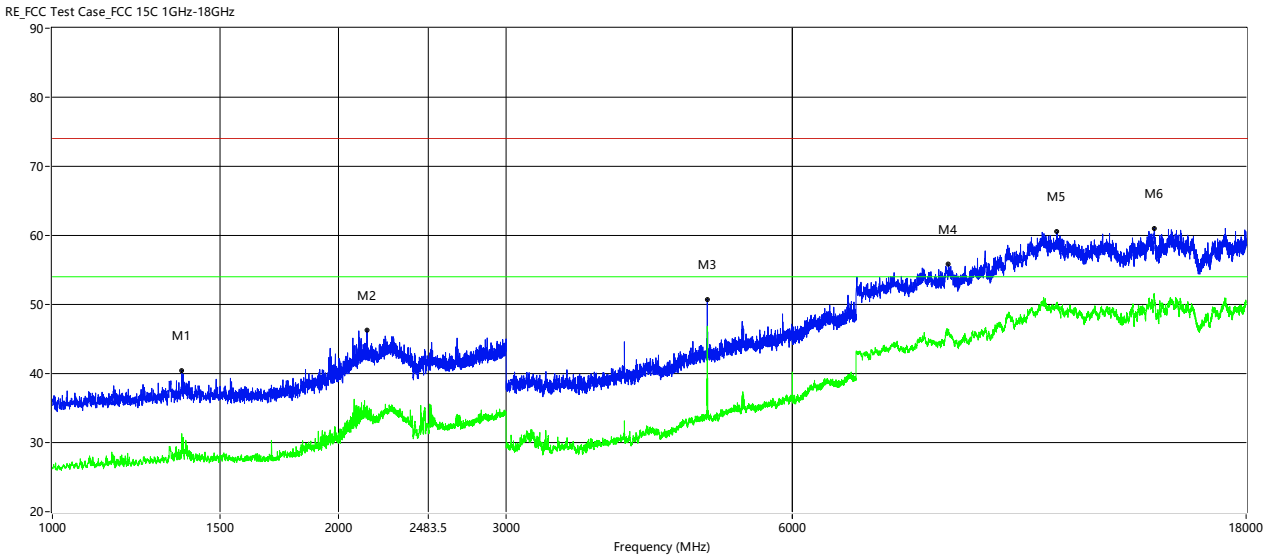
HARMONICS AND SPURIOUS EMISSIONS (06 CHANNEL, HORIZONTAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1158.000	39.64	27.74	-1.35	74.0	54.0	-26.26	Horizontal	Pass
2240.000	46.13	37.53	4.53	74.0	54.0	-16.47	Horizontal	Pass
4884.000	49.46	45.11	-6.48	74.0	54.0	-8.89	Horizontal	Pass
8721.500	56.32	45.90	5.09	74.0	54.0	-8.10	Horizontal	Pass
11138.750	61.25	49.76	9.65	74.0	54.0	-4.24	Horizontal	Pass
14988.750	61.59	50.92	10.34	74.0	54.0	-3.08	Horizontal	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

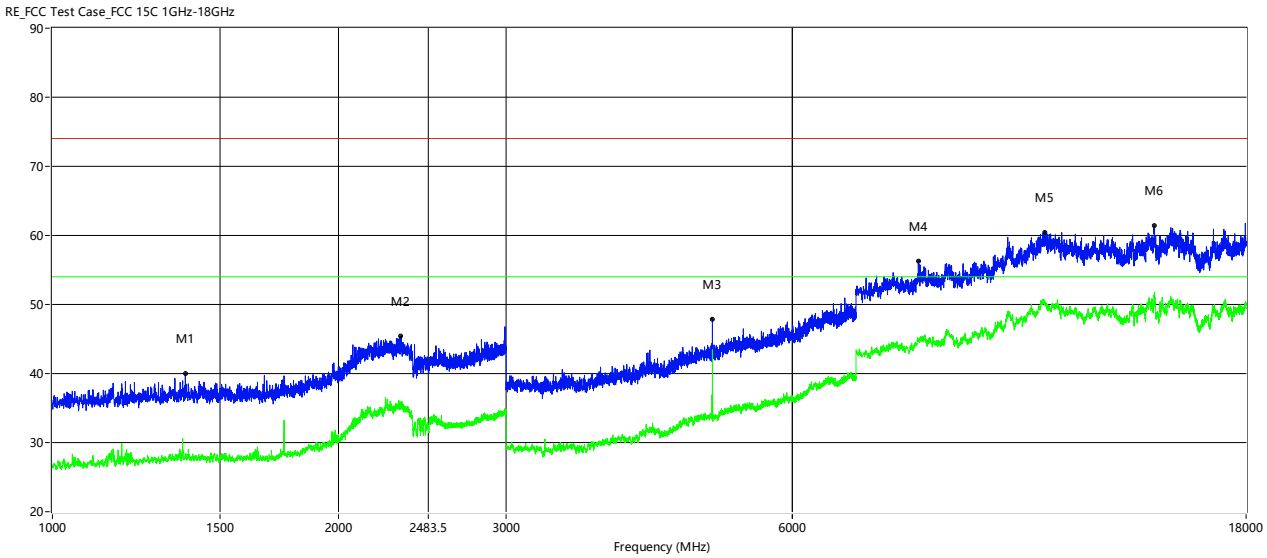
HARMONICS AND SPURIOUS EMISSIONS (06 CHANNEL, VERTICAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1368.000	40.45	31.30	-0.74	74.0	54.0	-22.70	Vertical	Pass
2142.500	46.24	35.33	4.51	74.0	54.0	-18.67	Vertical	Pass
4884.000	50.77	46.84	-6.48	74.0	54.0	-7.16	Vertical	Pass
8754.500	55.80	46.38	4.99	74.0	54.0	-7.62	Vertical	Pass
11391.750	60.51	50.34	9.73	74.0	54.0	-3.66	Vertical	Pass
14414.000	61.02	51.49	11.26	74.0	54.0	-2.51	Vertical	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

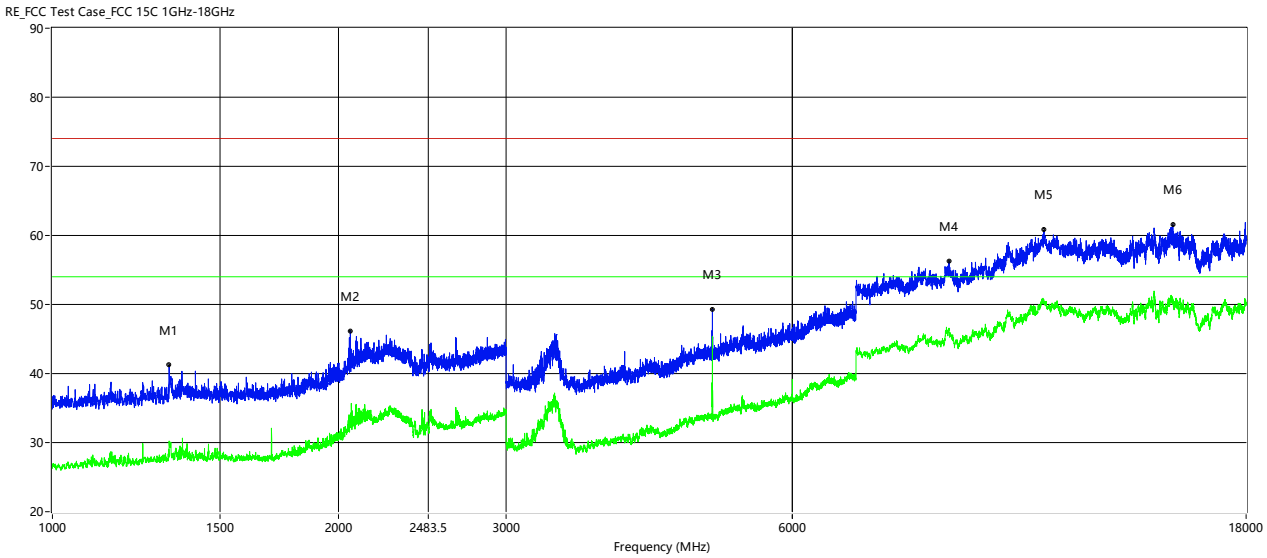
HARMONICS AND SPURIOUS EMISSIONS (11 CHANNEL, HORIZONTAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1380.000	40.00	28.42	-0.71	74.0	54.0	-25.58	Horizontal	Pass
2322.000	45.44	35.53	4.49	74.0	54.0	-18.47	Horizontal	Pass
4944.000	47.89	43.48	-6.39	74.0	54.0	-10.52	Horizontal	Pass
8141.250	56.36	44.87	4.18	74.0	54.0	-9.13	Horizontal	Pass
11064.500	60.48	50.25	9.87	74.0	54.0	-3.75	Horizontal	Pass
14422.250	61.37	51.76	11.16	74.0	54.0	-2.24	Horizontal	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

HARMONICS AND SPURIOUS EMISSIONS (11 CHANNEL, VERTICAL)

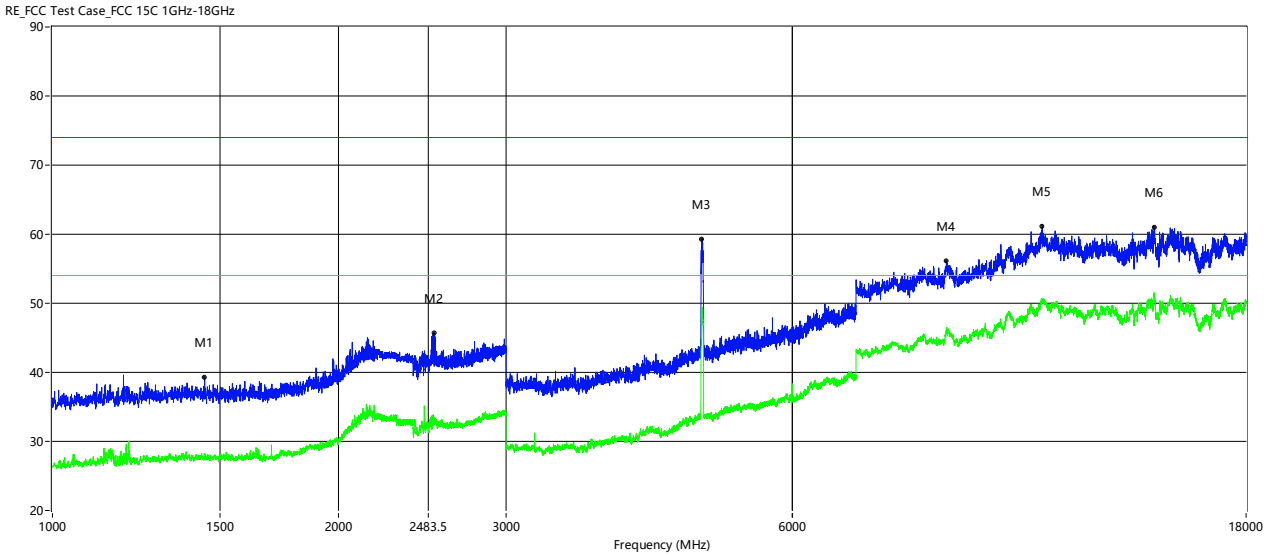


Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1327.000	41.27	30.24	-0.86	74.0	54.0	-23.76	Vertical	Pass
2058.000	46.20	32.62	2.98	74.0	54.0	-21.38	Vertical	Pass
4944.000	49.24	45.36	-6.39	74.0	54.0	-8.64	Vertical	Pass
8776.500	56.30	45.44	4.92	74.0	54.0	-8.56	Vertical	Pass
11037.000	60.79	50.14	10.02	74.0	54.0	-3.86	Vertical	Pass
15076.750	61.58	50.85	10.33	74.0	54.0	-3.15	Vertical	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

802.11 g mode

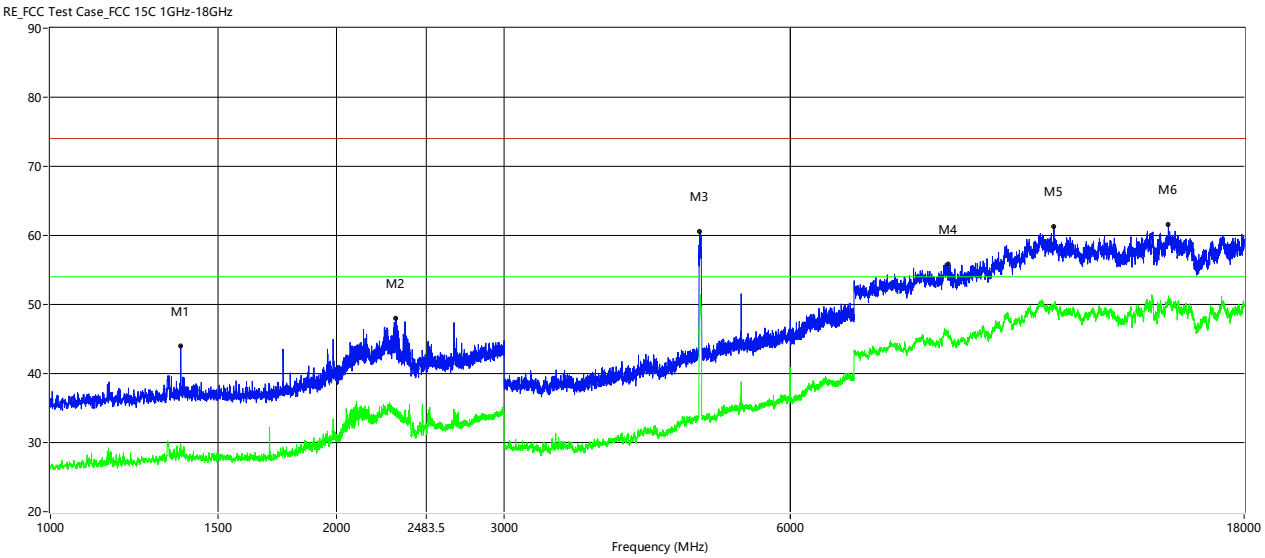
HARMONICS AND SPURIOUS EMISSIONS (01 CHANNEL, HORIZONTAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1446.000	39.26	28.24	-0.59	74.0	54.0	-25.76	Horizontal	Pass
2521.000	45.72	33.30	4.04	74.0	54.0	-20.70	Horizontal	Pass
4818.000	59.34	47.94	-6.87	74.0	54.0	-6.06	Horizontal	Pass
8716.000	56.18	46.34	5.11	74.0	54.0	-7.66	Horizontal	Pass
10984.750	61.09	50.26	10.10	74.0	54.0	-3.74	Horizontal	Pass
14414.000	61.05	51.06	11.26	74.0	54.0	-2.94	Horizontal	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

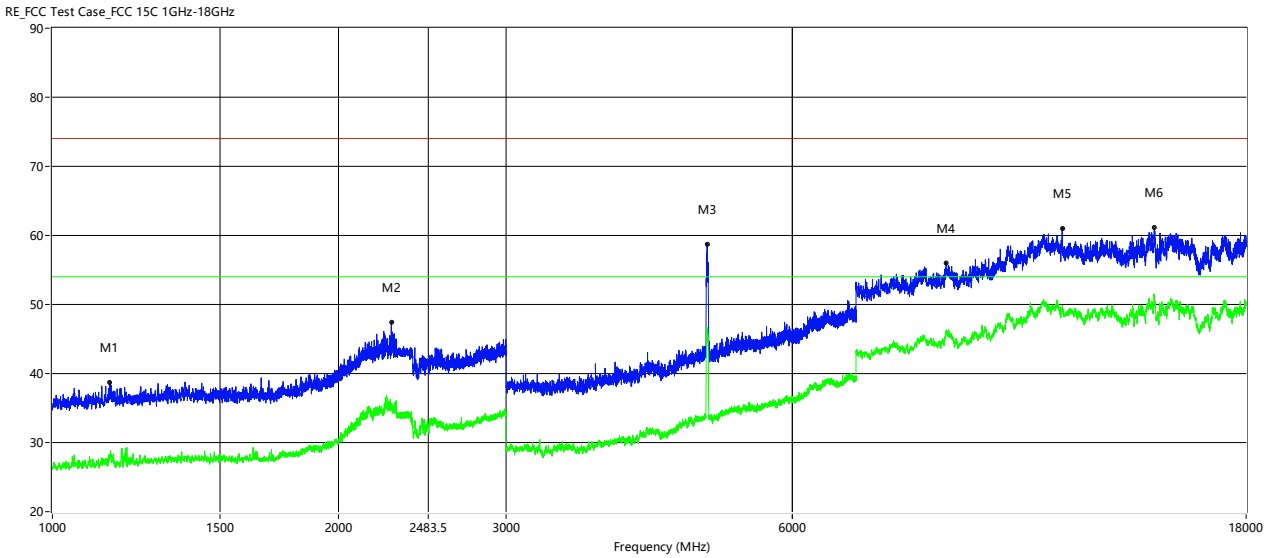
HARMONICS AND SPURIOUS EMISSIONS (01 CHANNEL, VERTICAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1371.500	44.06	29.82	-0.74	74.0	54.0	-24.18	Vertical	Pass
2308.500	47.95	34.82	4.55	74.0	54.0	-19.18	Vertical	Pass
4819.000	60.53	49.89	-6.87	74.0	54.0	-4.11	Vertical	Pass
8793.000	55.91	46.27	4.87	74.0	54.0	-7.73	Vertical	Pass
11358.750	61.35	49.89	9.66	74.0	54.0	-4.11	Vertical	Pass
14986.000	61.58	50.67	10.33	74.0	54.0	-3.33	Vertical	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

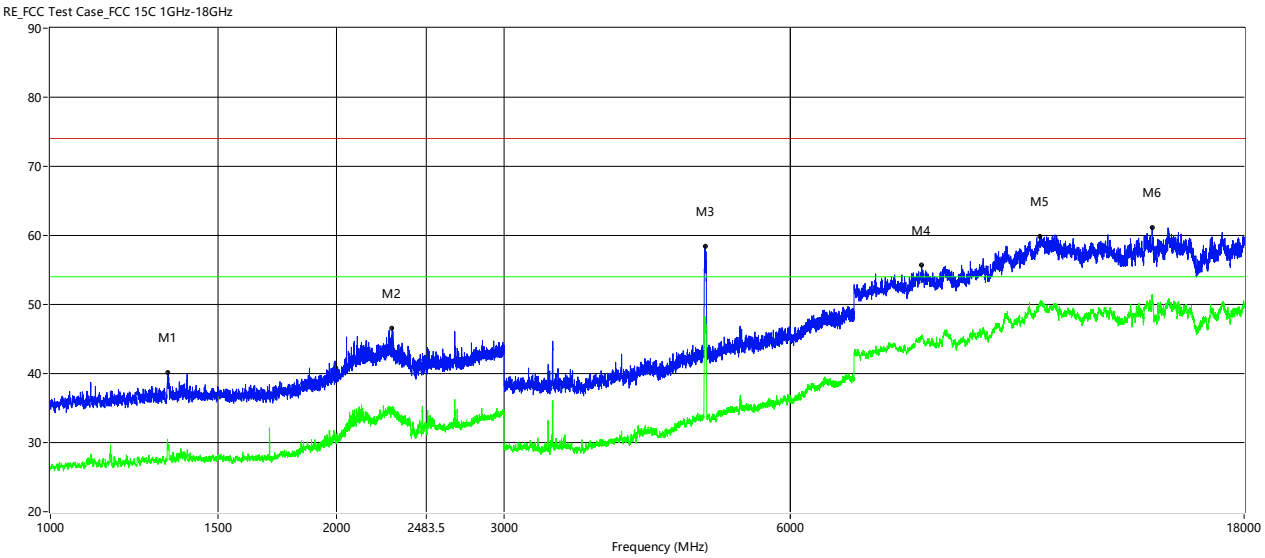
HARMONICS AND SPURIOUS EMISSIONS (06 CHANNEL, HORIZONTAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1149.500	38.67	27.82	-1.38	74.0	54.0	-26.18	Horizontal	Pass
2272.000	47.42	34.84	4.61	74.0	54.0	-19.16	Horizontal	Pass
4881.000	58.73	46.19	-6.50	74.0	54.0	-7.81	Horizontal	Pass
8707.750	55.97	45.94	5.14	74.0	54.0	-8.06	Horizontal	Pass
11532.000	61.05	49.20	9.98	74.0	54.0	-4.80	Horizontal	Pass
14414.000	61.09	50.99	11.26	74.0	54.0	-3.01	Horizontal	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

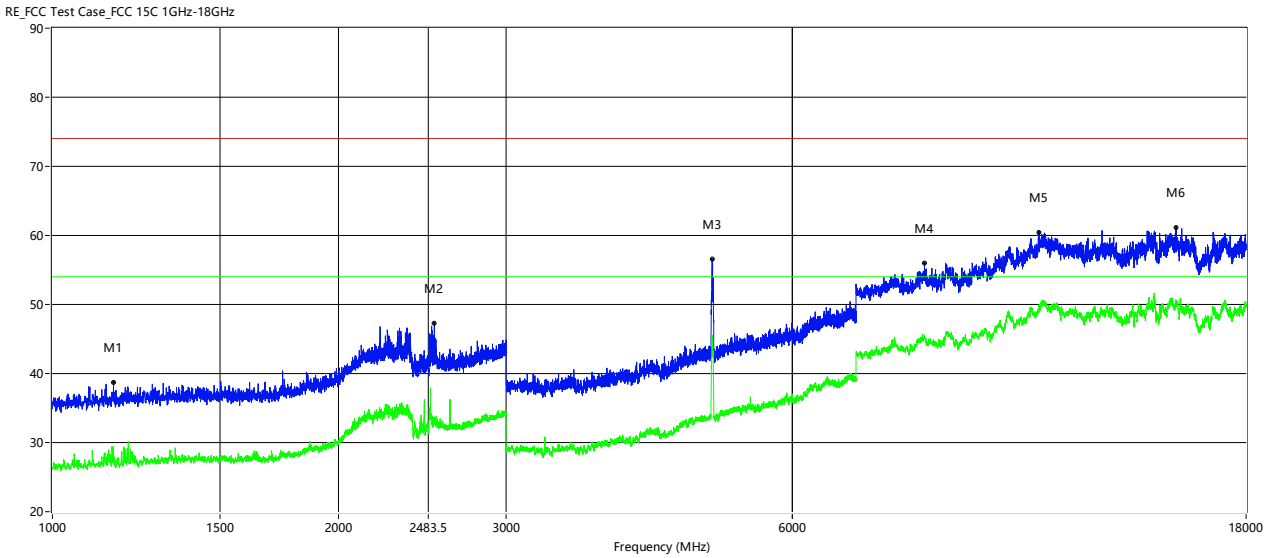
HARMONICS AND SPURIOUS EMISSIONS (06 CHANNEL, VERTICAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1330.000	40.20	29.36	-0.85	74.0	54.0	-24.64	Vertical	Pass
2288.000	46.57	34.53	4.59	74.0	54.0	-19.47	Vertical	Pass
4882.000	58.41	47.60	-6.50	74.0	54.0	-6.40	Vertical	Pass
8248.500	55.66	44.92	4.22	74.0	54.0	-9.08	Vertical	Pass
10971.000	59.90	50.06	10.00	74.0	54.0	-3.94	Vertical	Pass
14419.500	61.11	51.41	11.19	74.0	54.0	-2.59	Vertical	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

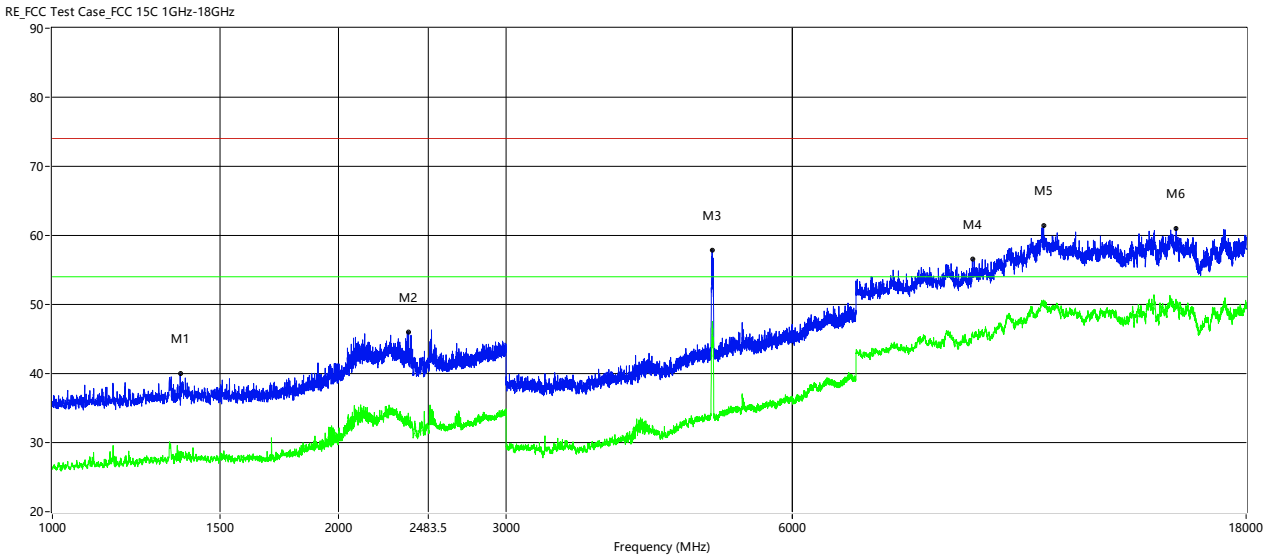
HARMONICS AND SPURIOUS EMISSIONS (11 CHANNEL, HORIZONTAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1159.500	38.73	29.50	-1.35	74.0	54.0	-24.50	Horizontal	Pass
2521.500	47.32	33.15	4.05	74.0	54.0	-20.85	Horizontal	Pass
4941.000	56.53	44.55	-6.39	74.0	54.0	-9.45	Horizontal	Pass
8262.250	55.96	45.14	4.22	74.0	54.0	-8.86	Horizontal	Pass
10896.750	60.48	49.05	9.41	74.0	54.0	-4.95	Horizontal	Pass
15197.750	61.14	50.24	11.03	74.0	54.0	-3.76	Horizontal	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

HARMONICS AND SPURIOUS EMISSIONS (11 CHANNEL, VERTICAL)

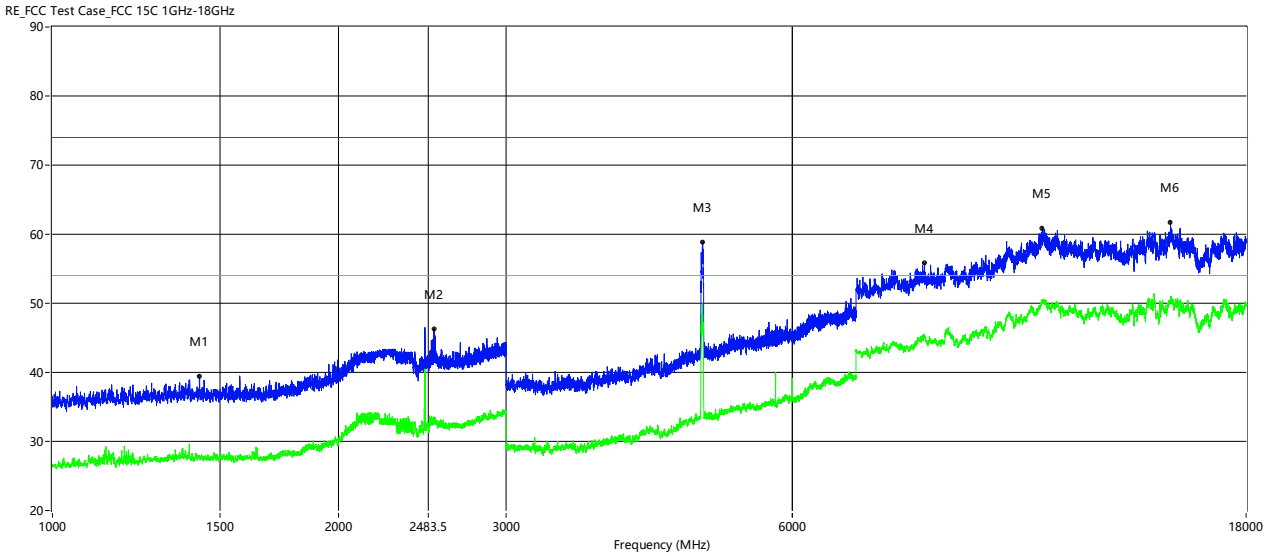


Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1363.000	40.03	28.73	-0.76	74.0	54.0	-25.27	Vertical	Pass
2369.500	46.04	32.71	4.22	74.0	54.0	-21.29	Vertical	Pass
4941.000	57.88	46.72	-6.39	74.0	54.0	-7.28	Vertical	Pass
9279.750	56.54	45.33	5.18	74.0	54.0	-8.67	Vertical	Pass
11026.000	61.37	50.66	10.08	74.0	54.0	-3.34	Vertical	Pass
15197.750	61.03	50.18	11.03	74.0	54.0	-3.82	Vertical	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

802.11 n20 mode

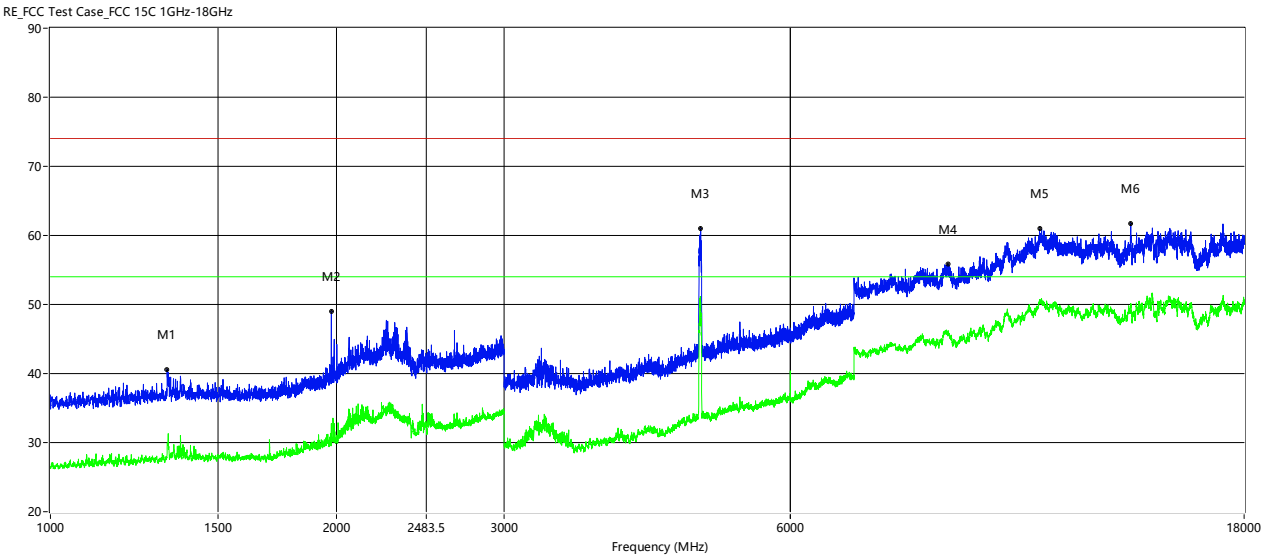
HARMONICS AND SPURIOUS EMISSIONS (01 CHANNEL, HORIZONTAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1428.000	39.37	27.92	-0.62	74.0	54.0	-26.08	Horizontal	Pass
2520.000	46.35	33.13	4.04	74.0	54.0	-20.87	Horizontal	Pass
4830.000	58.90	47.69	-6.80	74.0	54.0	-6.31	Horizontal	Pass
8262.250	55.82	44.99	4.22	74.0	54.0	-9.01	Horizontal	Pass
10990.250	60.84	49.99	10.14	74.0	54.0	-4.01	Horizontal	Pass
14988.750	61.72	50.78	10.34	74.0	54.0	-3.22	Horizontal	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

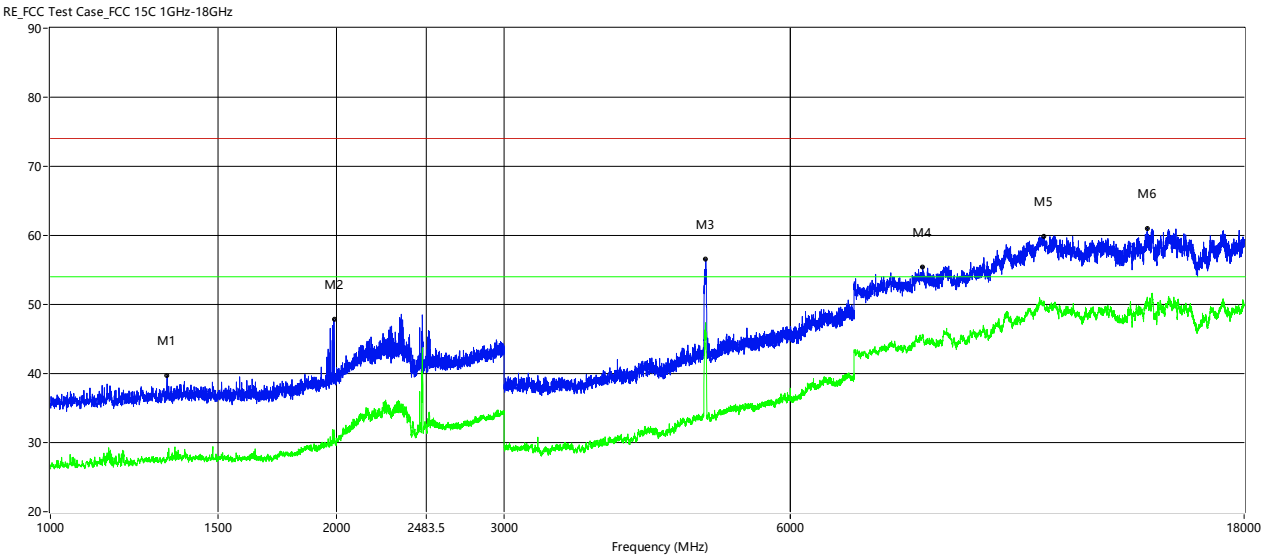
HARMONICS AND SPURIOUS EMISSIONS (01 CHANNEL, VERTICAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1327.000	40.64	29.37	-0.86	74.0	54.0	-24.63	Vertical	Pass
1974.500	48.98	32.77	1.26	74.0	54.0	-21.23	Vertical	Pass
4829.000	60.99	50.36	-6.81	74.0	54.0	-3.64	Vertical	Pass
8787.500	55.89	45.65	4.89	74.0	54.0	-8.35	Vertical	Pass
10971.000	60.93	50.69	10.00	74.0	54.0	-3.31	Vertical	Pass
13679.750	61.76	50.15	10.23	74.0	54.0	-3.85	Vertical	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

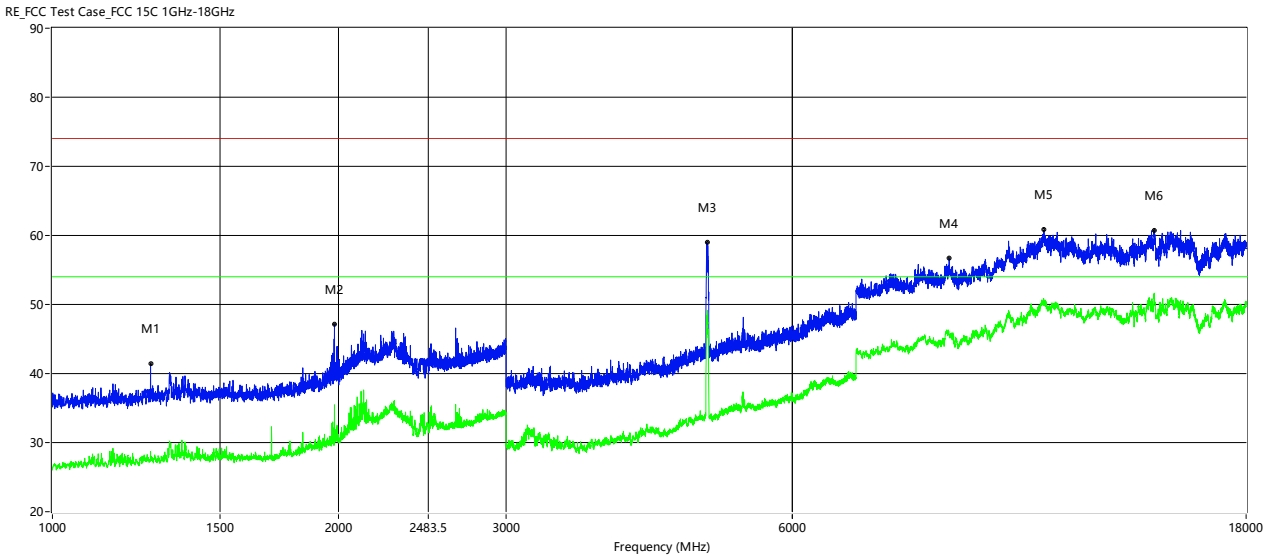
HARMONICS AND SPURIOUS EMISSIONS (06 CHANNEL, HORIZONTAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1326.500	39.68	27.87	-0.86	74.0	54.0	-26.13	Horizontal	Pass
1987.500	47.80	31.86	1.38	74.0	54.0	-22.14	Horizontal	Pass
4890.000	56.59	44.91	-6.45	74.0	54.0	-9.09	Horizontal	Pass
8267.750	55.48	45.50	4.23	74.0	54.0	-8.50	Horizontal	Pass
11094.750	59.84	50.10	9.71	74.0	54.0	-3.90	Horizontal	Pass
14246.250	60.98	50.25	11.24	74.0	54.0	-3.75	Horizontal	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

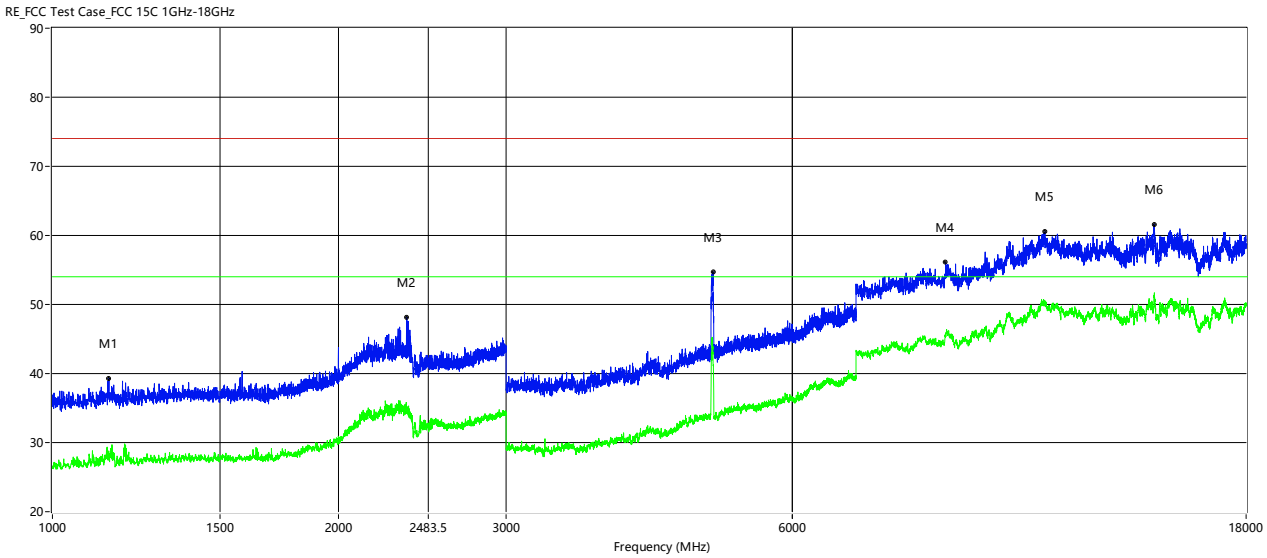
HARMONICS AND SPURIOUS EMISSIONS (06 CHANNEL, VERTICAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1268.500	41.47	28.70	-0.92	74.0	54.0	-25.30	Vertical	Pass
1980.000	47.08	35.48	1.31	74.0	54.0	-18.52	Vertical	Pass
4880.000	59.00	48.45	-6.51	74.0	54.0	-5.55	Vertical	Pass
8771.000	56.66	45.69	4.94	74.0	54.0	-8.31	Vertical	Pass
11037.000	60.79	50.09	10.02	74.0	54.0	-3.91	Vertical	Pass
14408.500	60.77	51.01	11.32	74.0	54.0	-2.99	Vertical	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

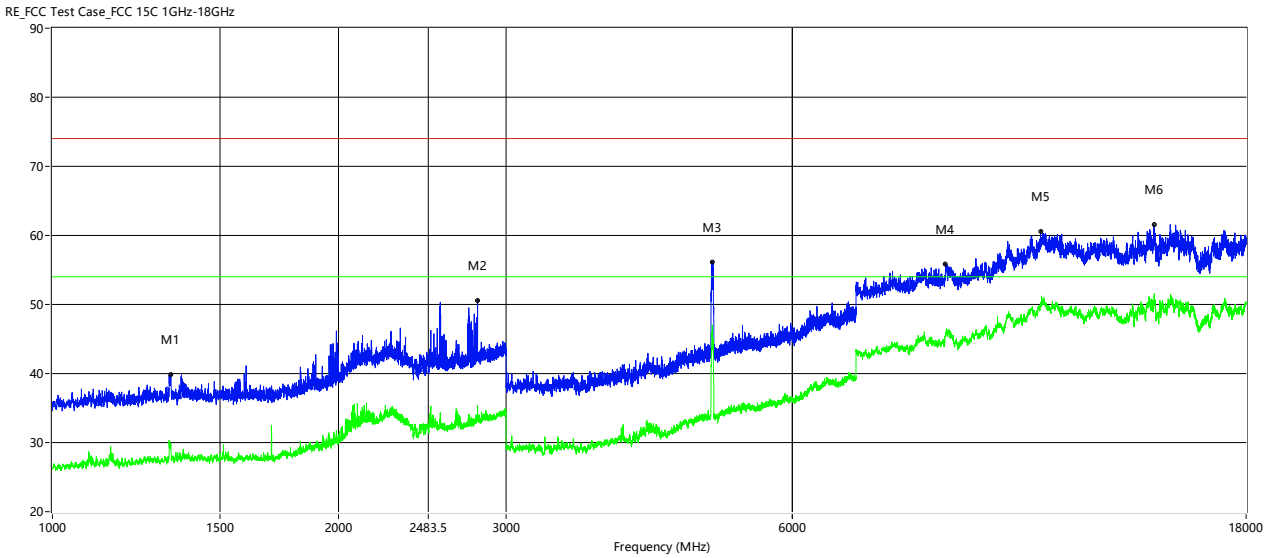
HARMONICS AND SPURIOUS EMISSIONS (11 CHANNEL, HORIZONTAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1147.000	39.31	27.85	-1.39	74.0	54.0	-26.15	Horizontal	Pass
2359.500	48.17	35.14	4.30	74.0	54.0	-18.86	Horizontal	Pass
4952.000	54.76	43.09	-6.38	74.0	54.0	-10.91	Horizontal	Pass
8696.750	56.08	45.86	5.12	74.0	54.0	-8.14	Horizontal	Pass
11059.000	60.54	50.37	9.90	74.0	54.0	-3.63	Horizontal	Pass
14414.000	61.64	51.13	11.26	74.0	54.0	-2.87	Horizontal	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

HARMONICS AND SPURIOUS EMISSIONS (11 CHANNEL, VERTICAL)



Frequency (MHz)	Peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	AV Limit (dBuV/m)	Over Limit (dB)	ANT	Verdict
1332.500	39.81	29.85	-0.84	74.0	54.0	-24.15	Vertical	Pass
2799.500	50.63	35.35	5.27	74.0	54.0	-18.65	Vertical	Pass
4944.000	56.20	46.49	-6.39	74.0	54.0	-7.51	Vertical	Pass
8694.000	55.85	45.18	5.09	74.0	54.0	-8.82	Vertical	Pass
10943.500	60.56	49.72	9.78	74.0	54.0	-4.28	Vertical	Pass
14400.250	61.53	51.01	11.42	74.0	54.0	-2.99	Vertical	Pass

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier + BRF Factor.
2. Margin = Limit - Emission Level
3. Tests were performed in three frequency range 1GHz~3GHz, 3GHz~13GHz, 13GHz~18GHz.
4. Above 18GHz emissions are mainly from the environment noise, not show in report.

9.4. SPURIOUS EMISSIONS BELOW 30M

Freq.	Reading	Limit	Margin	State	Test Result
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F	
--	--	--	--	--	PASS
--	--	--	--	--	PASS

Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits (dBuv) + distance extrapolation factor.

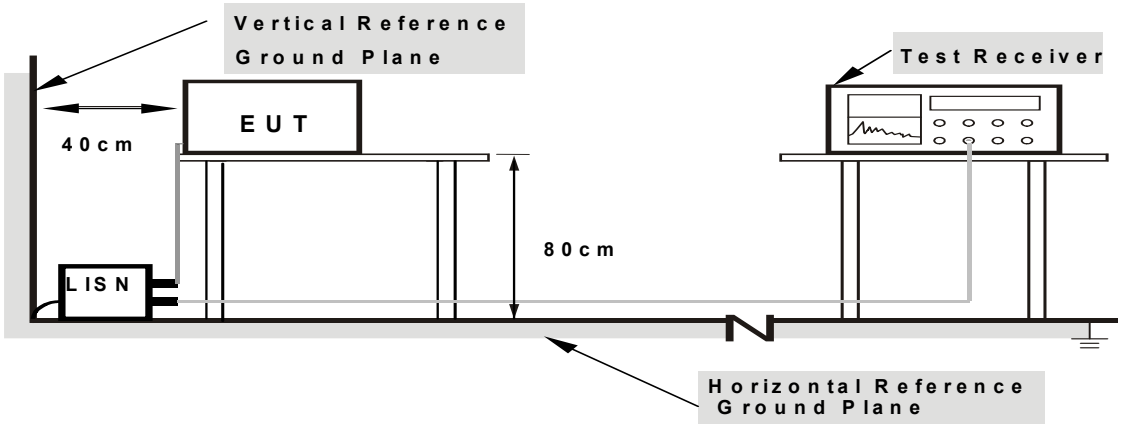
10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a) and RSS-Gen Clause 8.8

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

TEST SETUP AND PROCEDURE



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.10-2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

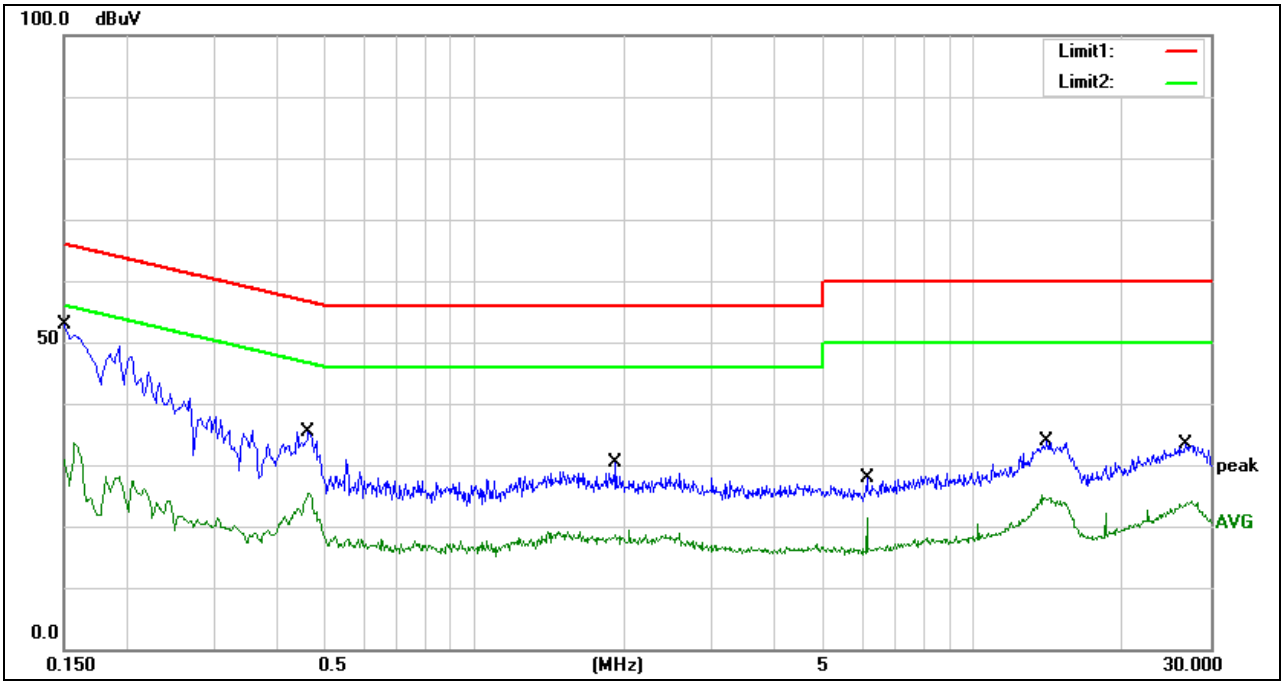
The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

TEST ENVIRONMENT

Temperature	25°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	DC 5V

RESULTS

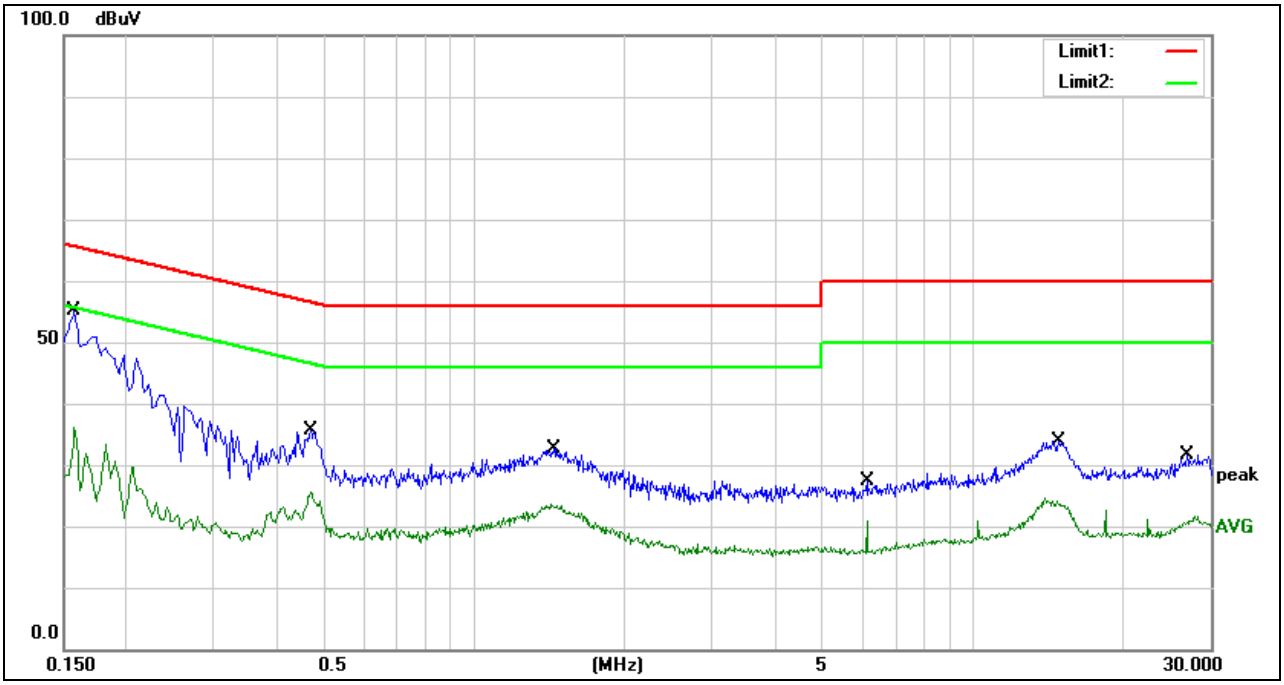
NEUTRAL N RESULTS



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1500	32.80	20.19	52.99	66.00	-13.01	QP
2	0.1500	10.80	20.19	30.99	56.00	-25.01	AVG
3	0.4660	14.92	20.46	35.38	56.58	-21.20	QP
4	0.4660	4.79	20.46	25.25	46.58	-21.33	AVG
5	1.9260	10.15	20.15	30.30	56.00	-25.70	QP
6	1.9260	-1.44	20.15	18.71	46.00	-27.29	AVG
7	6.1460	7.91	19.92	27.83	60.00	-32.17	QP
8	6.1460	1.56	19.92	21.48	50.00	-28.52	AVG
9	14.1020	13.80	20.02	33.82	60.00	-26.18	QP
10	14.1020	4.69	20.02	24.71	50.00	-25.29	AVG
11	26.7260	12.58	20.79	33.37	60.00	-26.63	QP
12	26.7260	3.05	20.79	23.84	50.00	-26.16	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

LINE L RESULTS



No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1580	34.94	20.21	55.15	65.57	-10.42	QP
2	0.1580	15.98	20.21	36.19	55.57	-19.38	AVG
3	0.4700	15.18	20.45	35.63	56.51	-20.88	QP
4	0.4700	5.12	20.45	25.57	46.51	-20.94	AVG
5	1.4460	12.49	20.15	32.64	56.00	-23.36	QP
6	1.4460	3.43	20.15	23.58	46.00	-22.42	AVG
7	6.1460	7.41	19.92	27.33	60.00	-32.67	QP
8	6.1460	0.94	19.92	20.86	50.00	-29.14	AVG
9	14.8620	13.93	20.07	34.00	60.00	-26.00	QP
10	14.8620	3.93	20.07	24.00	50.00	-26.00	AVG
11	26.8420	10.89	20.79	31.68	60.00	-28.32	QP
12	26.8420	0.19	20.79	20.98	50.00	-29.02	AVG

Note: 1. Result = Reading +Correct Factor.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

11. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

ANTENNA CONNECTOR

EUT has a PCB Antenna without antenna connector.

ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi.

Test photos

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

END OF REPORT