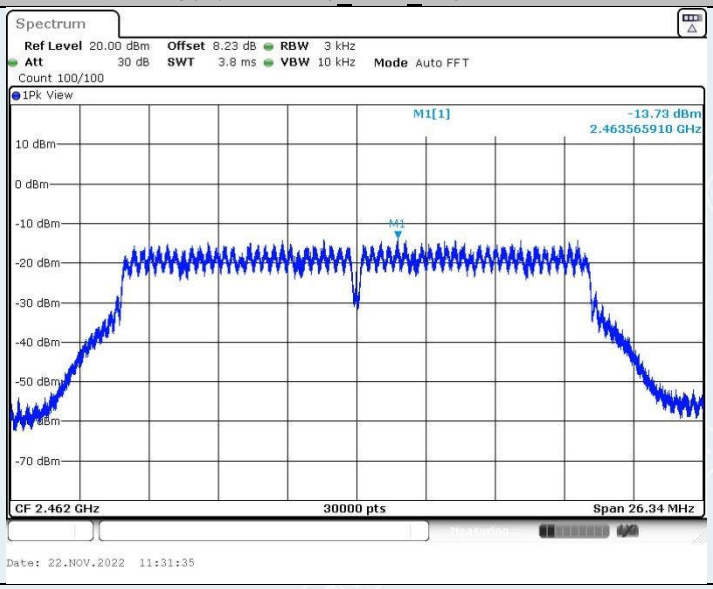
802.11n HT20_Ant1_2462MHz



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9. CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS

9.1 LIMITS

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

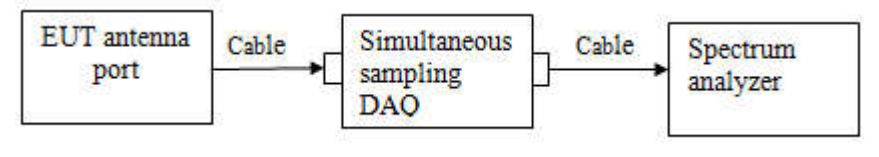
9.2 TEST PROCEDURES

Test procedures follow KDB 558074 D01 DTS Measurement Guidance.

Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.

1) Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.
2) Set the spectrum analyzer: RBW =100kHz; VBW =300kHz, Frequency range = 30MHz to 26.5GHz; Sweep = auto; Detector Function = Peak; Trace = Max hold.
3) Measure and record the results in the test report.
4) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

9.3 TEST SETUP



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9.4 TEST RESULTS

Environment: 24.2℃/49%RH/101.0kPa Voltage:DC 12V
Tested By:Yang Zhaoyun Date: 2022-11-22

Band edge

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
802.11b	Ant1	Low	2412	5.53	-36.82	≤-14.47	PASS
		High	2462	5.76	-47.67	≤-14.24	PASS
802.11g	Ant1	Low	2412	1.20	-32.26	≤-18.8	PASS
		High	2462	1.43	-36.93	≤-18.57	PASS
802.11n HT20	Ant1	Low	2412	-0.51	-38.50	≤-20.51	PASS
		High	2462	-0.23	-40.50	≤-20.23	PASS

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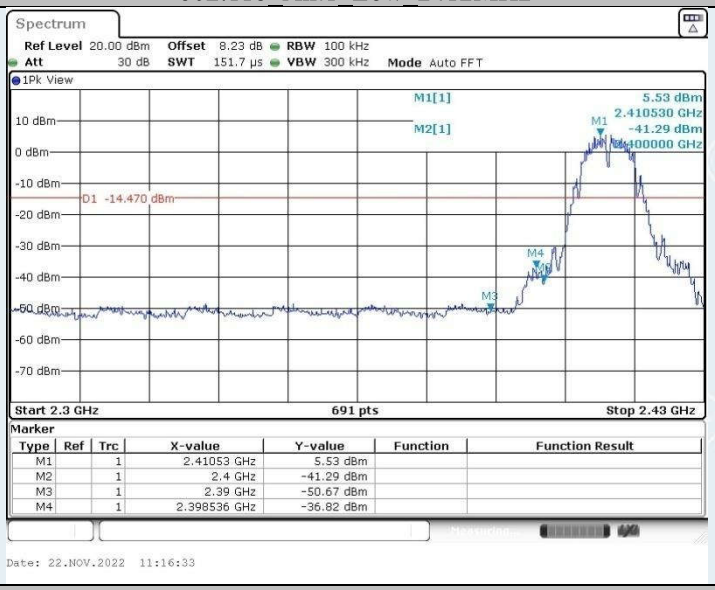
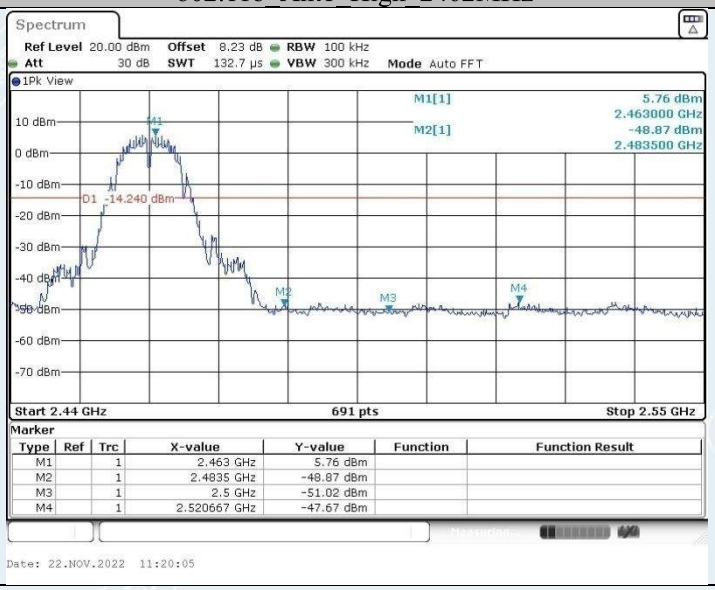
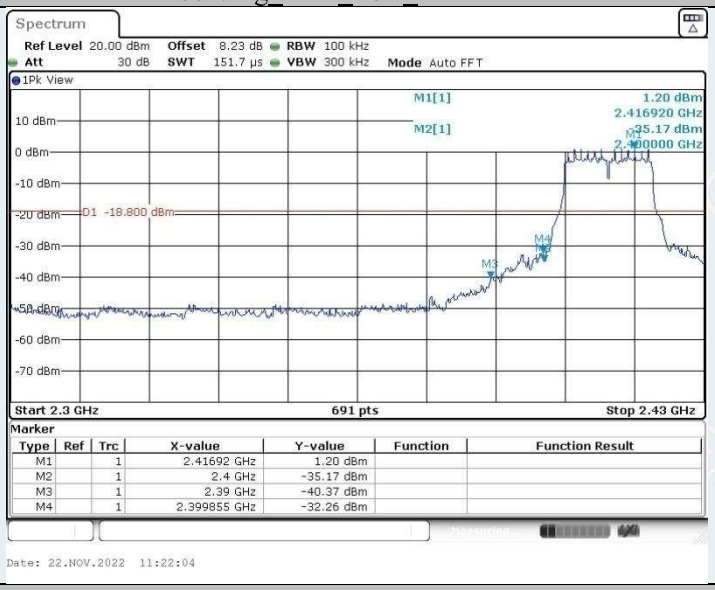
802.11b_Ant1_Low_2412MHz



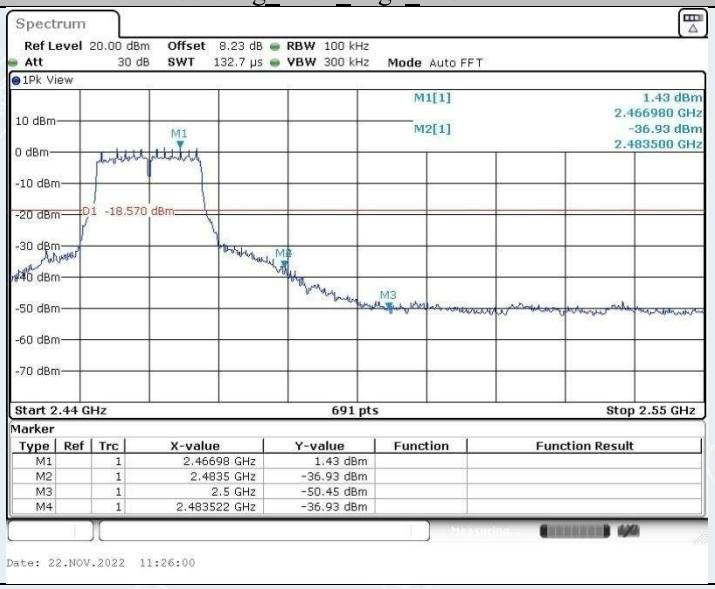
802.11b_Ant1_High_2462MHz



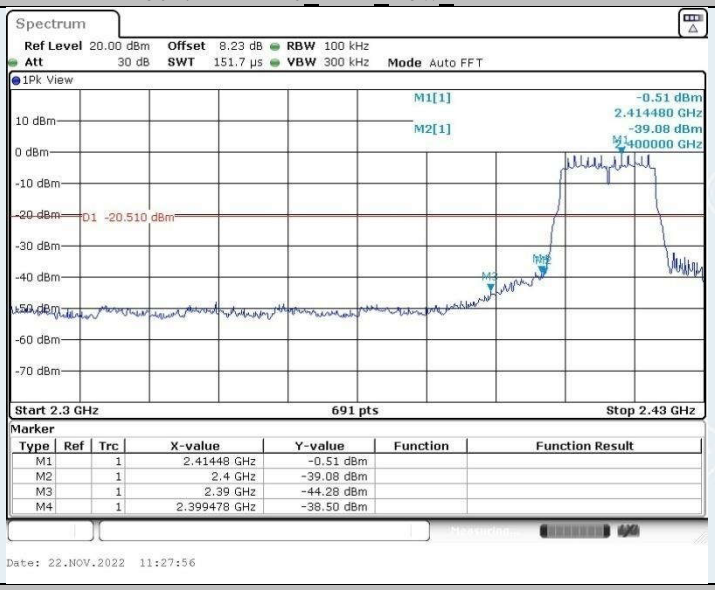
802.11g_Ant1_Low_2412MHz



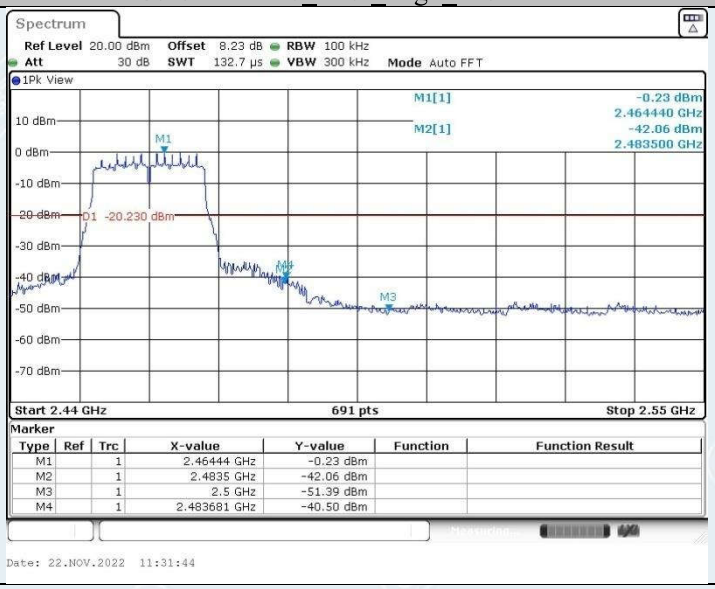
802.11g_Ant1_High_2462MHz



802.11n HT20_Ant1_Low_2412MHz



802.11n HT20_Ant1_High_2462MHz



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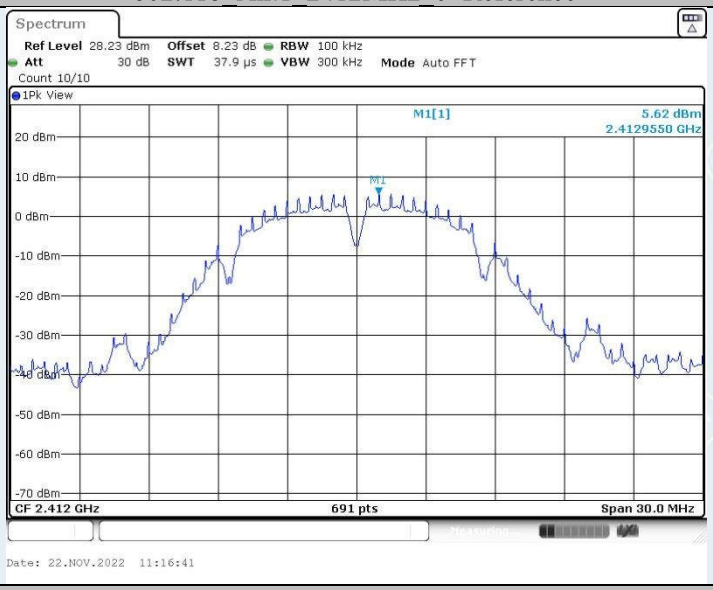
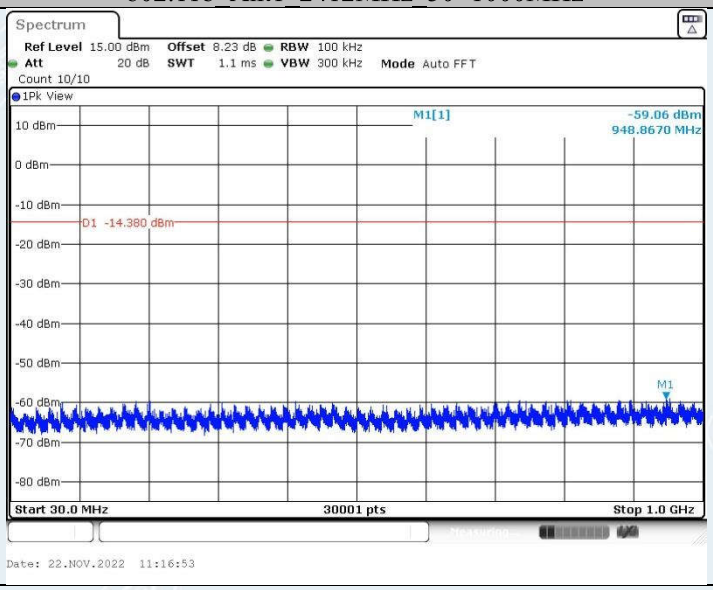
Conducted Spurious Emission:
Test Result
Environment: 24.2℃/49%RH/101.0kPa Voltage:DC 12V
Tested By:Yang Zhaoyun Date: 2022-11-22

Test Mode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
802.11b	Ant1	2412	Reference	5.62	5.62	---	PASS
			30~1000	5.62	-59.06	≤-14.38	PASS
			1000~26500	5.62	-54.89	≤-14.38	PASS
		2437	Reference	6.16	6.16	---	PASS
			30~1000	6.16	-58.64	≤-13.84	PASS
			1000~26500	6.16	-52.35	≤-13.84	PASS
		2462	Reference	5.90	5.90	---	PASS
			30~1000	5.90	-58.44	≤-14.1	PASS
			1000~26500	5.90	-51.67	≤-14.1	PASS
802.11g	Ant1	2412	Reference	1.35	1.35	---	PASS
			30~1000	1.35	-58.6	≤-18.65	PASS
			1000~26500	1.35	-55.37	≤-18.65	PASS
		2437	Reference	1.91	1.91	---	PASS
			30~1000	1.91	-58.17	≤-18.09	PASS
			1000~26500	1.91	-54.73	≤-18.09	PASS
		2462	Reference	1.76	1.76	---	PASS
			30~1000	1.76	-58.73	≤-18.24	PASS
			1000~26500	1.76	-55.35	≤-18.24	PASS
802.11n HT20	Ant1	2412	Reference	-0.74	-0.74	---	PASS
			30~1000	-0.74	-58.99	≤-20.74	PASS
			1000~26500	-0.74	-55.16	≤-20.74	PASS
		2437	Reference	-0.14	-0.14	---	PASS
			30~1000	-0.14	-58.41	≤-20.14	PASS
			1000~26500	-0.14	-55.01	≤-20.14	PASS
		2462	Reference	-0.22	-0.22	---	PASS
			30~1000	-0.22	-58.57	≤-20.22	PASS
			1000~26500	-0.22	-54.54	≤-20.22	PASS

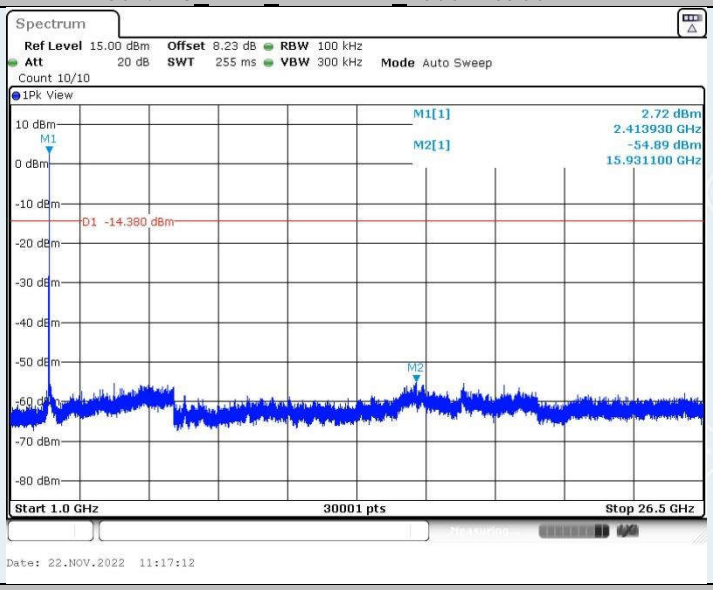
802.11b_Ant1_2412MHz_0~Reference



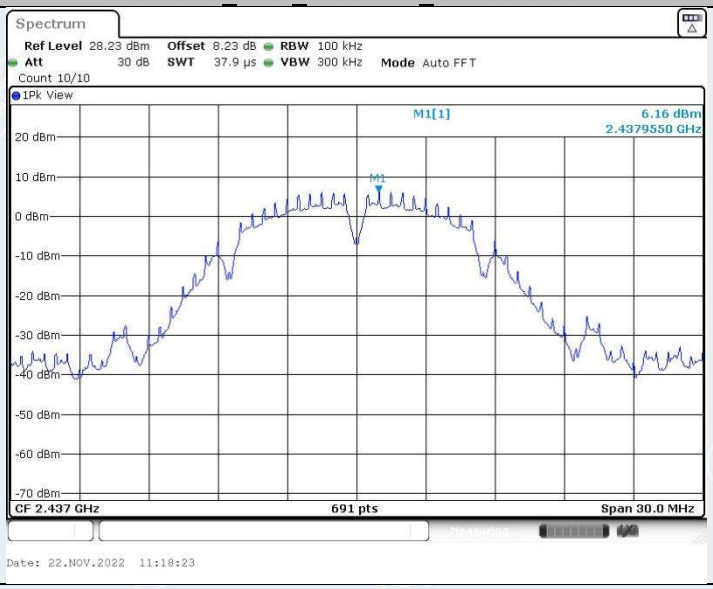
802.11b_Ant1_2412MHz_30~1000MHz



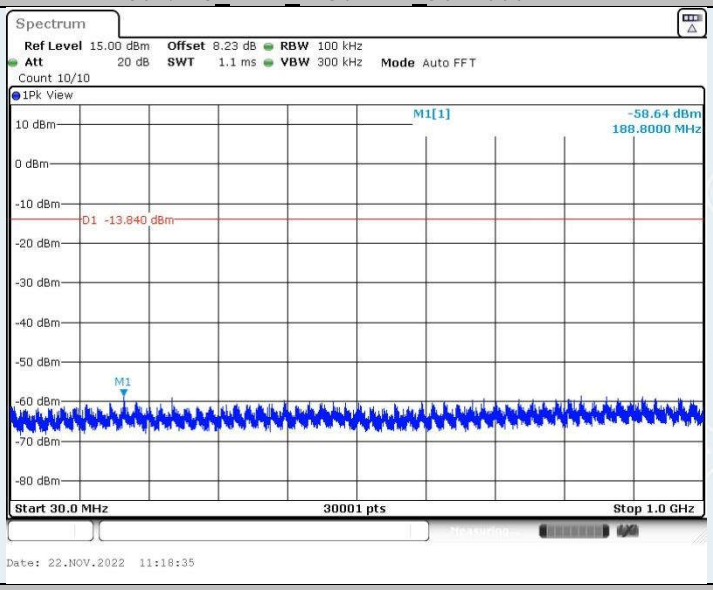
802.11b_Ant1_2412MHz_1000~26500MHz



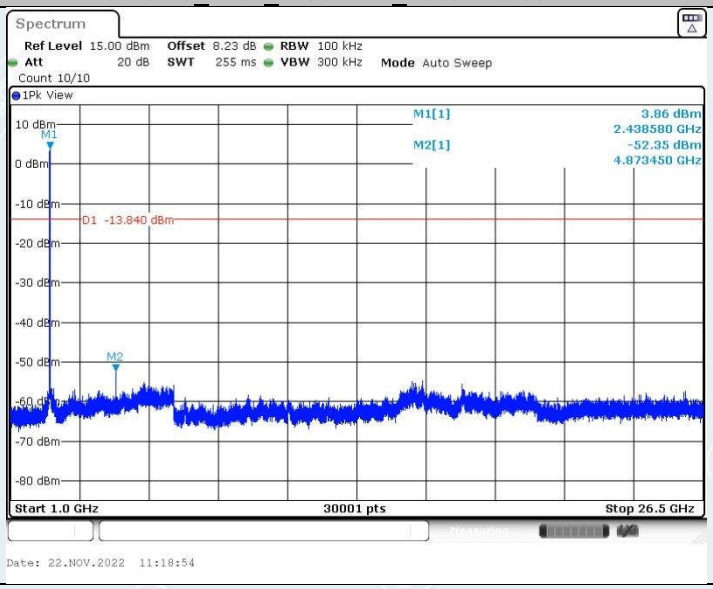
802.11b_Ant1_2437MHz_0~Reference



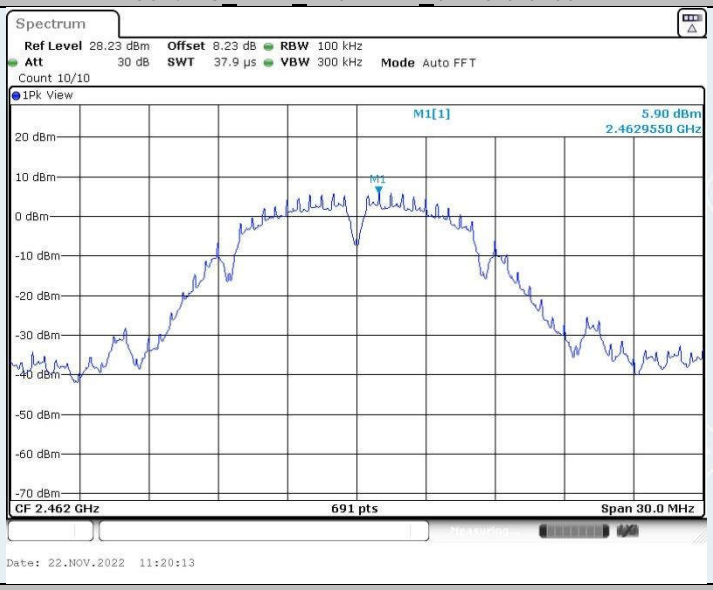
802.11b_Ant1_2437MHz_30~1000MHz



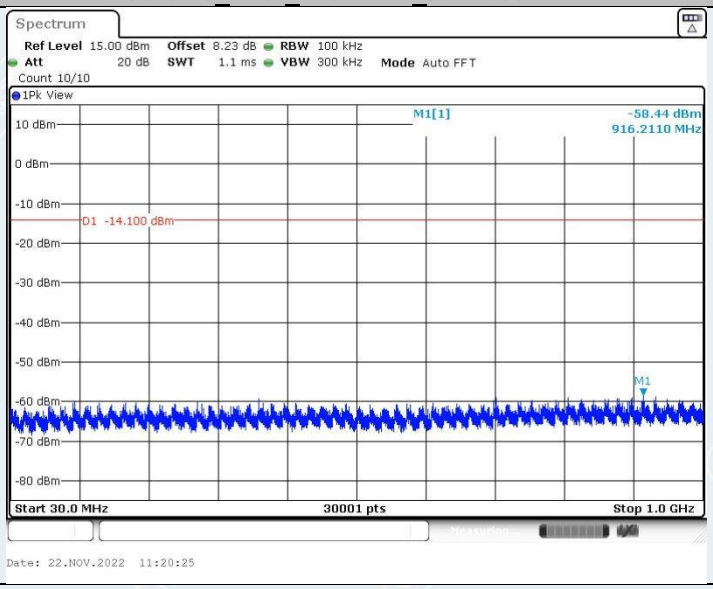
802.11b_Ant1_2437MHz_1000~26500MHz



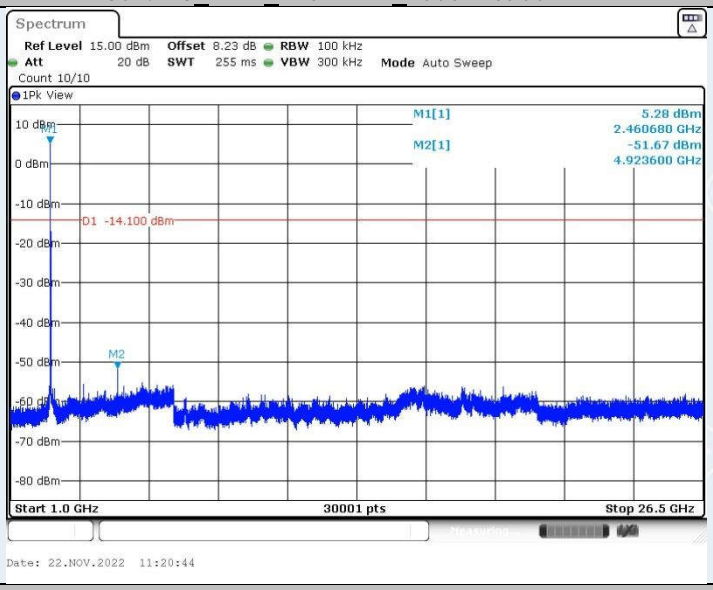
802.11b_Ant1_2462MHz_0~Reference



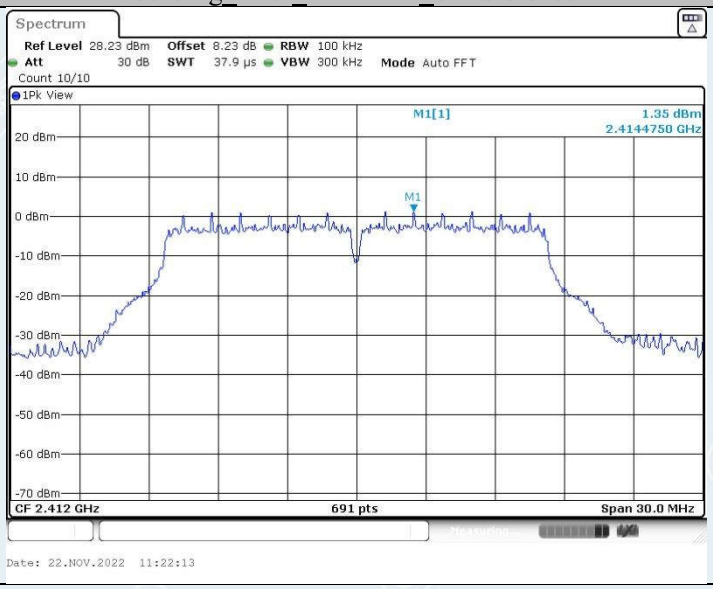
802.11b_Ant1_2462MHz_30~1000MHz



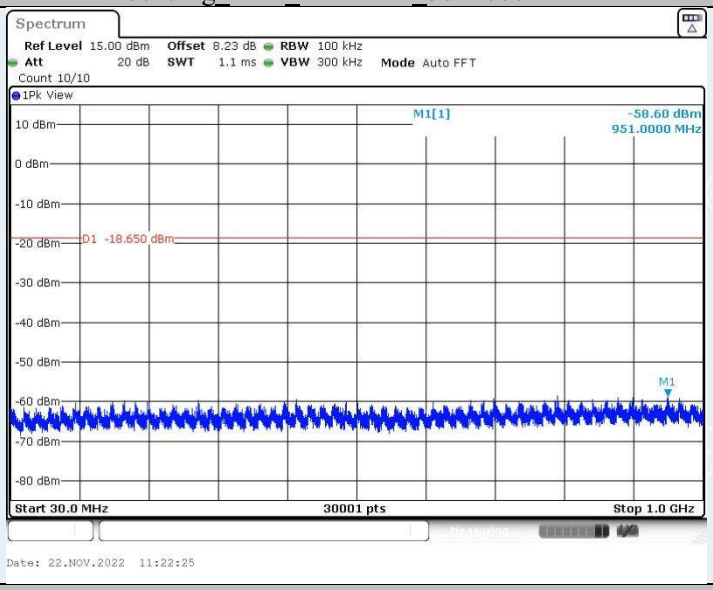
802.11b_Ant1_2462MHz_1000~26500MHz



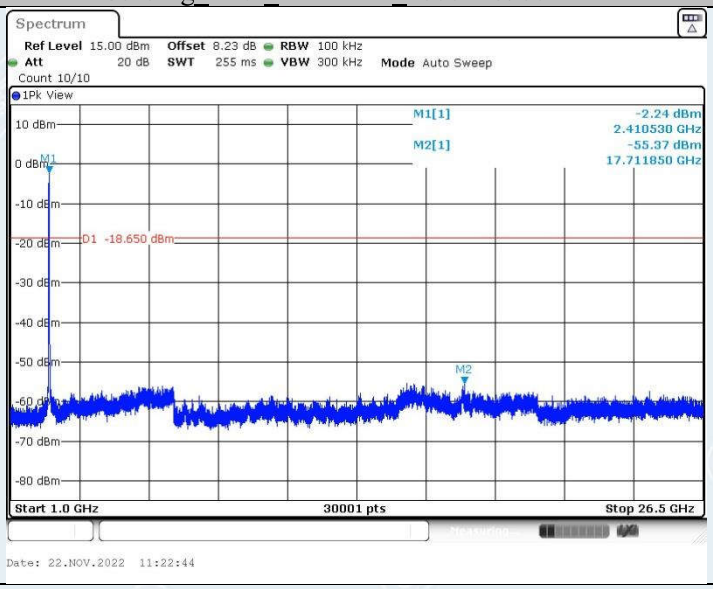
802.11g_Ant1_2412MHz_0~Reference



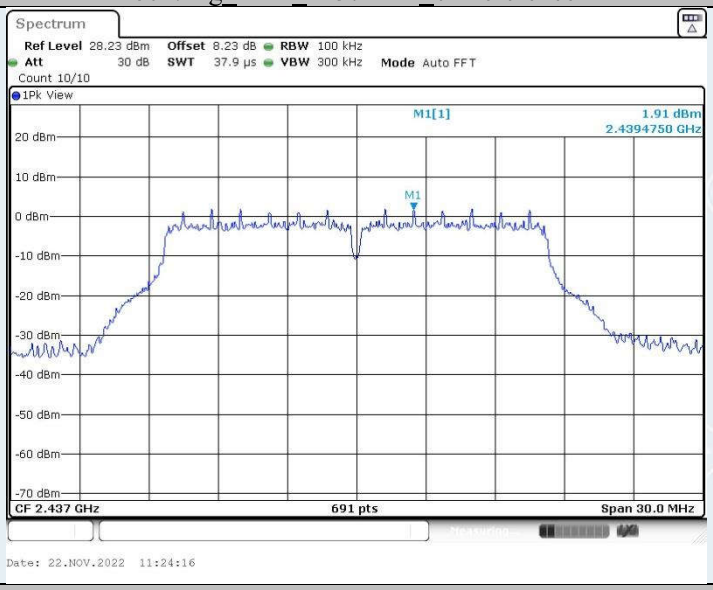
802.11g_Ant1_2412MHz_30~1000MHz



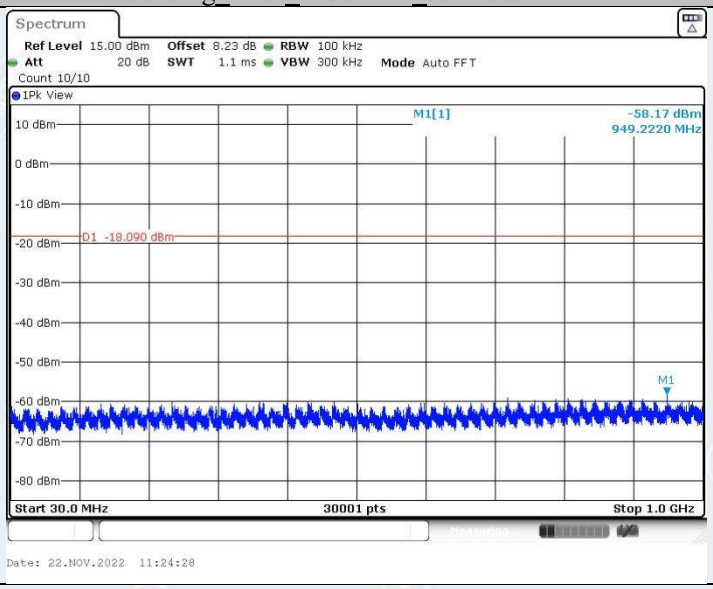
802.11g_Ant1_2412MHz_1000~26500MHz



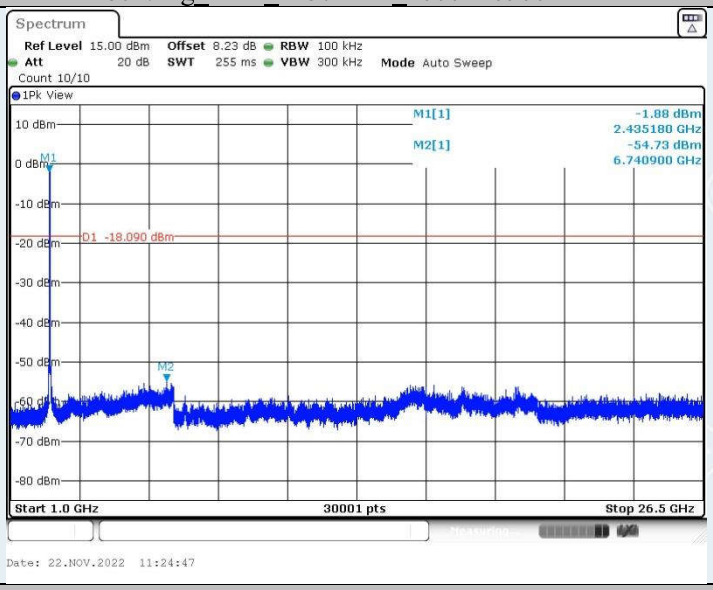
802.11g_Ant1_2437MHz_0~Reference



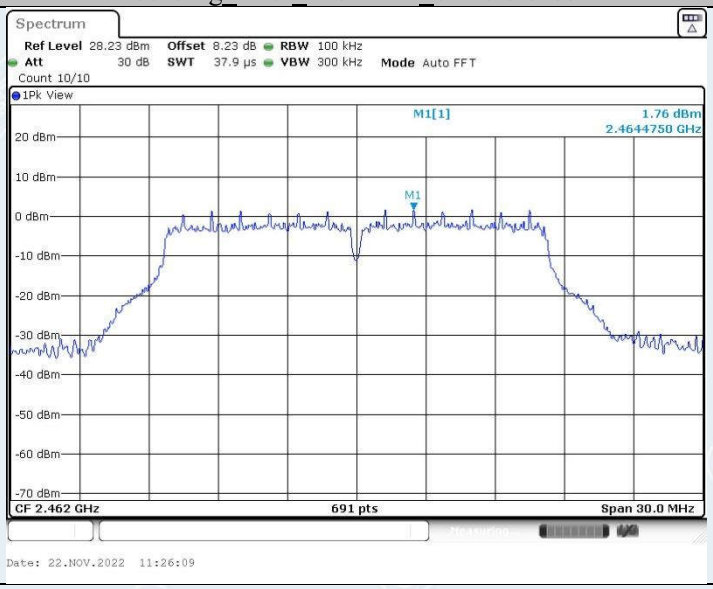
802.11g_Ant1_2437MHz_30~1000MHz



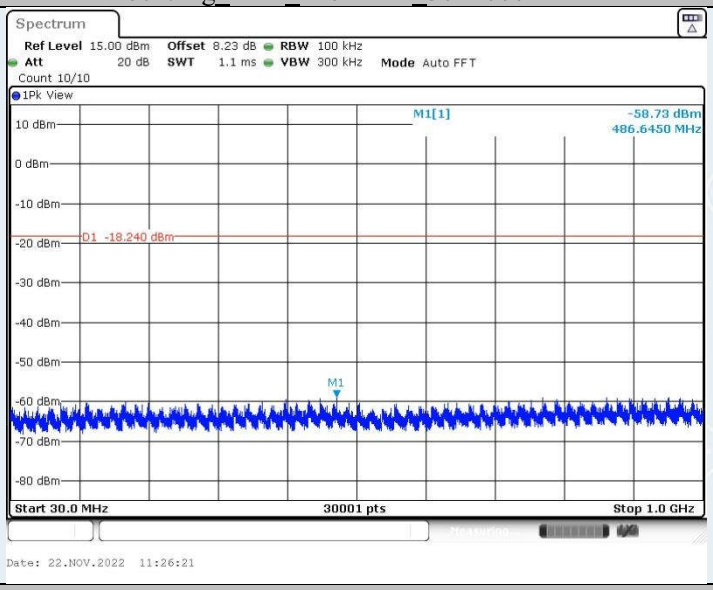
802.11g_Ant1_2437MHz_1000~26500MHz



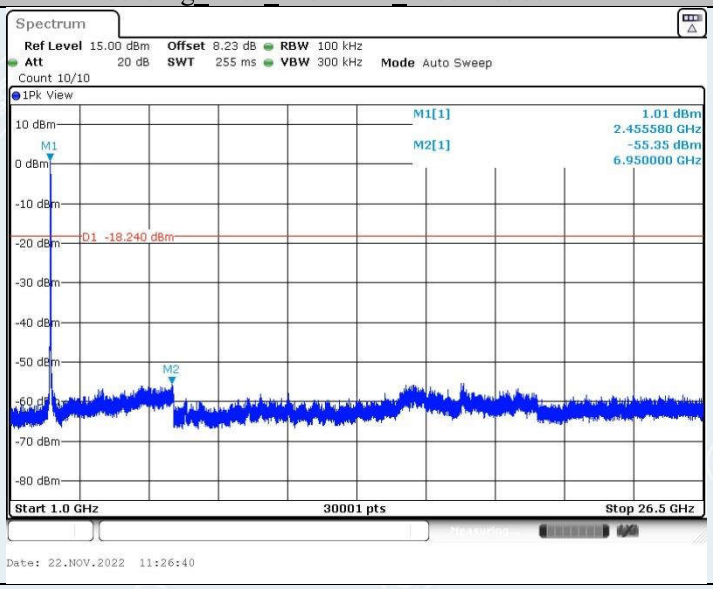
802.11g_Ant1_2462MHz_0~Reference



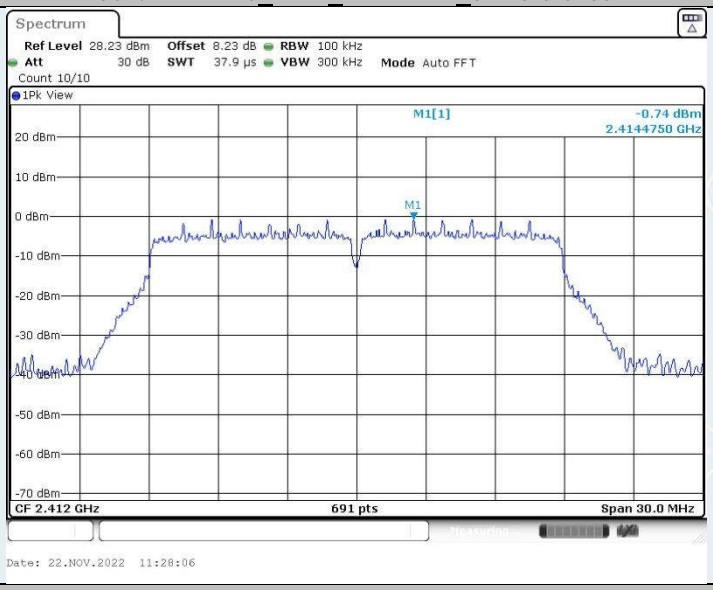
802.11g_Ant1_2462MHz_30~1000MHz



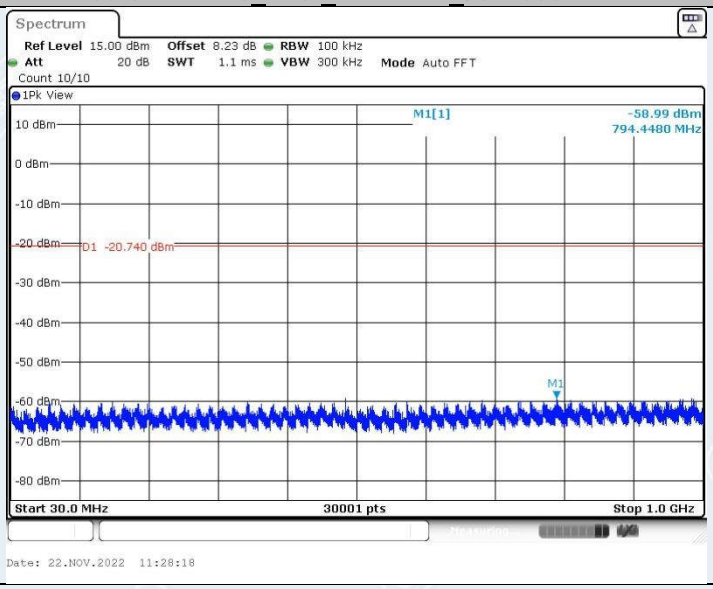
802.11g_Ant1_2462MHz_1000~26500MHz



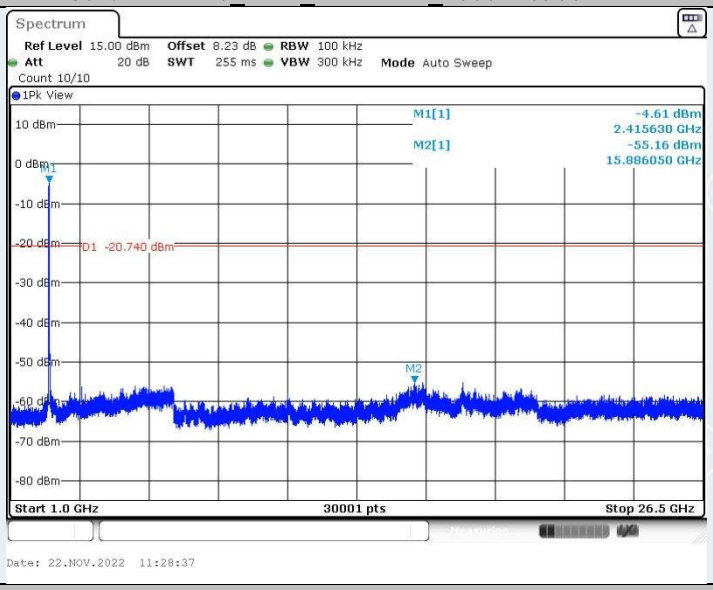
802.11n HT20_Ant1_2412MHz_0~Reference



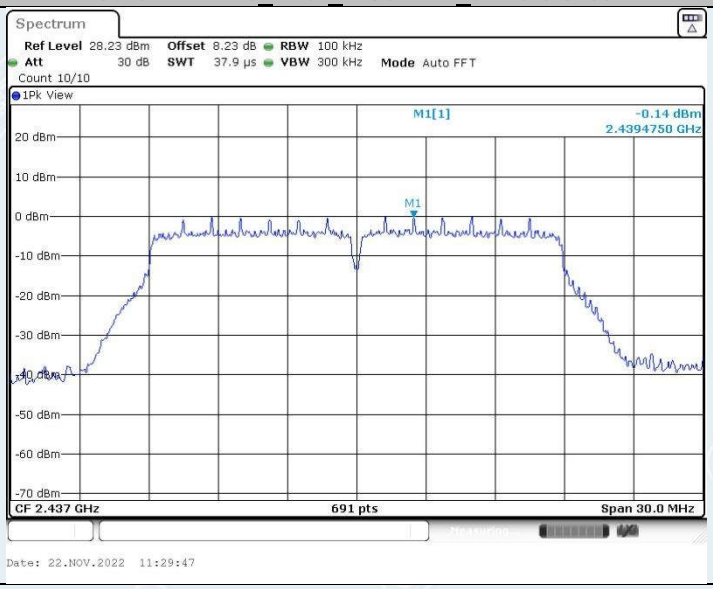
802.11n HT20_Ant1_2412MHz_30~1000MHz



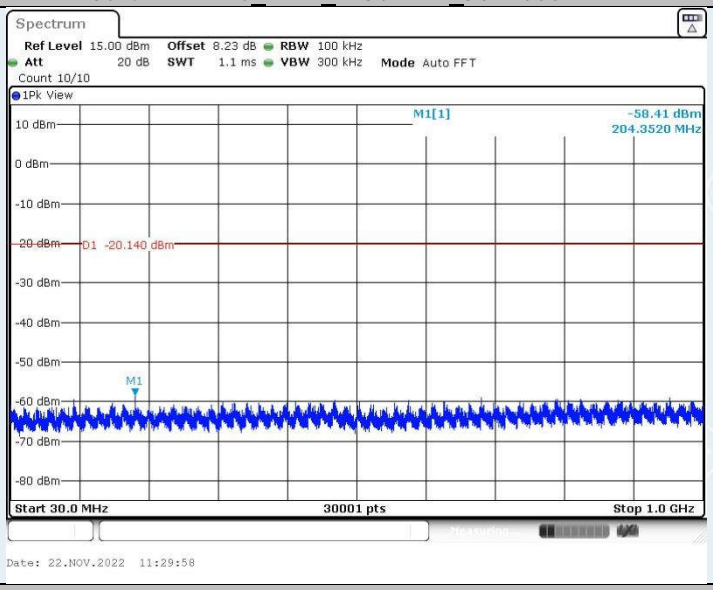
802.11n HT20_Ant1_2412MHz_1000~26500MHz



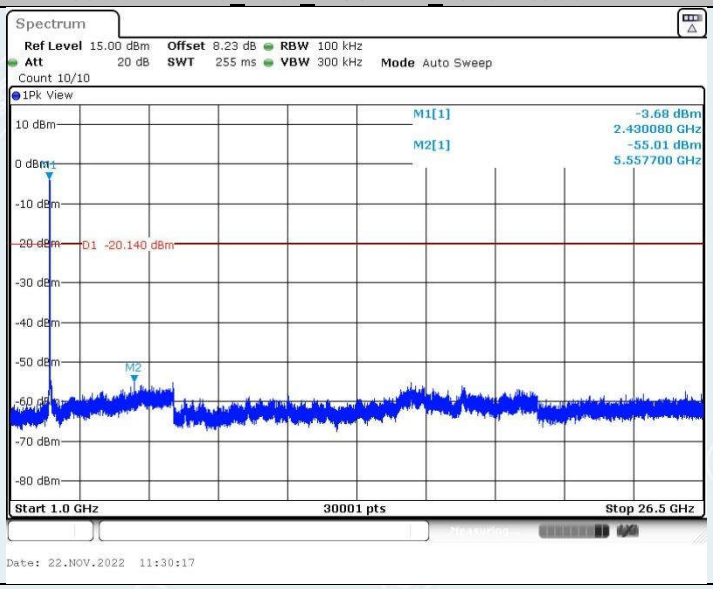
802.11n HT20_Ant1_2437MHz_0~Reference



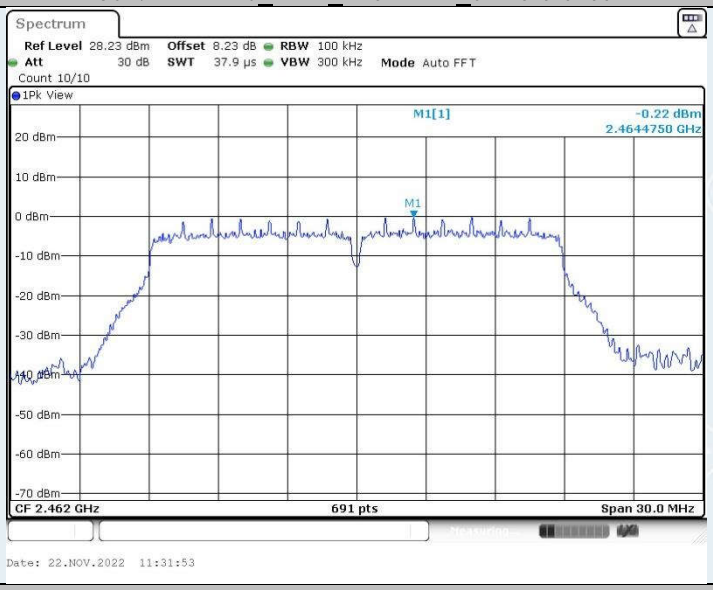
802.11n HT20_Ant1_2437MHz_30~1000MHz



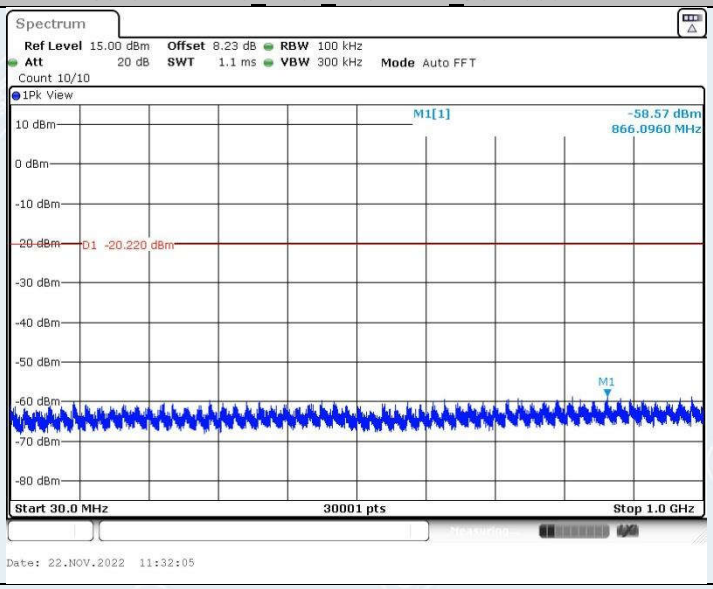
802.11n HT20_Ant1_2437MHz_1000~26500MHz



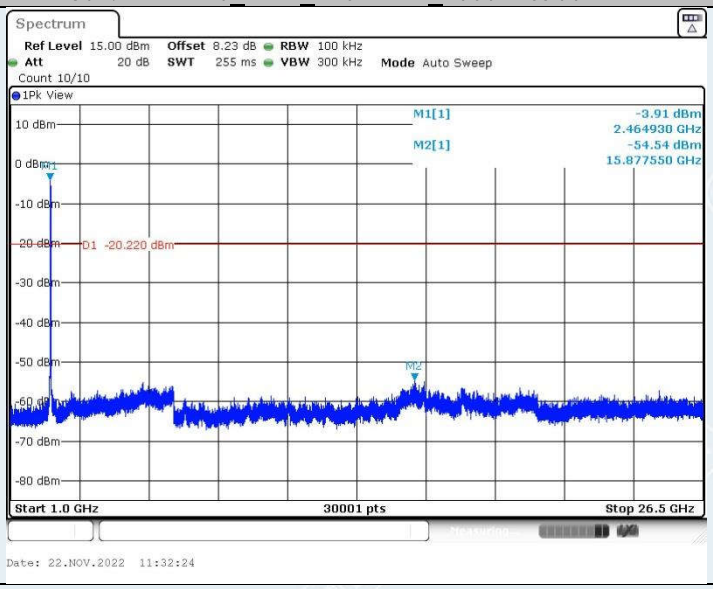
802.11n HT20_Ant1_2462MHz_0~Reference



802.11n HT20_Ant1_2462MHz_30~1000MHz



802.11n HT20_Ant1_2462MHz_1000~26500MHz



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10. RESTRICTED BANDSOF OPERATION

10.1 LIMITS

Section 15.247(d) In addition, Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency(MHz)	Frequency(MHz)	Frequency(MHz)	Frequency(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	2655 - 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	
13.36 - 13.41			

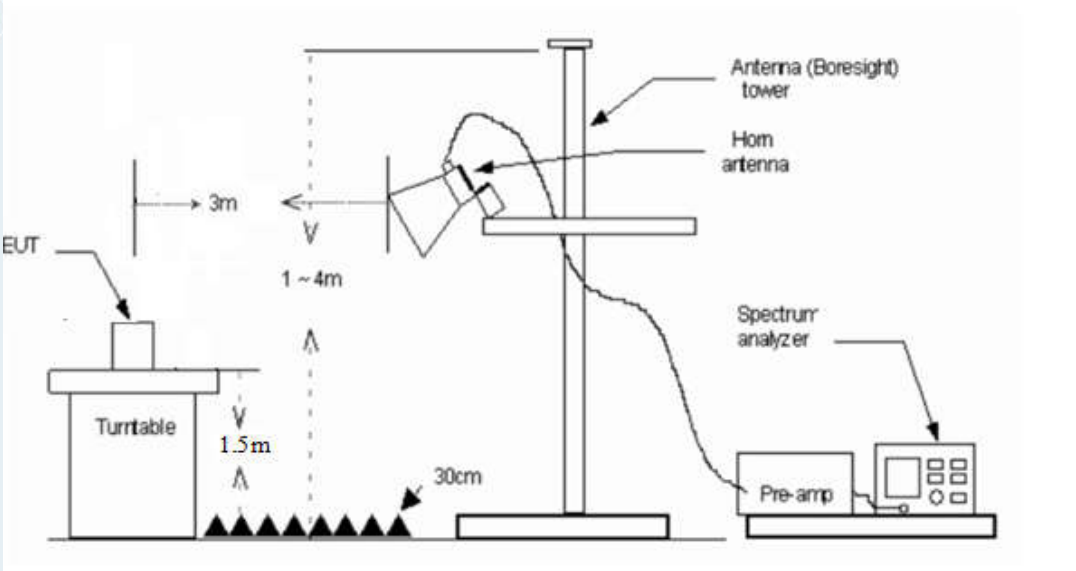
Frequency (MHz)	Quasi-peak(μV/m)	Measurement distance(m)	Quasi-peak(dBμV/m)@distance 3m
0.009-0.490	2400/F(kHz)	300	128.5~93.8
0.490-1.705	24000/F(kHz)	30	73.8~63
1.705-30.0	30	30	69.5
30~88	100	3	40
88~216	150	3	43.5
216~960	200	3	46
Above 960	500	3	54

10.2 TEST PROCEDURES

Test procedures follow KDB 558074 D01 DTS Measurement Guidance.

1) The EUT is placed on a turntable, which is 1.5m above the ground plane.
2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4) Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
   a) PEAK: RBW=1MHz / VBW=1MHz / Sweep=AUTO.
   b) AVERAGE: RBW=1MHz / VBW=1/T / Sweep=AUTO.
   If the EUT is configured to transmit with duty cycle ≥98%，set VBW≤RBW/100 (i.e.,10kHz) but not less than 10 Hz.If the EUT duty cycle is ＜98%， set VBW≥1/T, Where T is defined in section 2.9.
5) Repeat the procedures until all the PEAK and AVERAGE versus polarization are measured.

10.3 TEST SETUP



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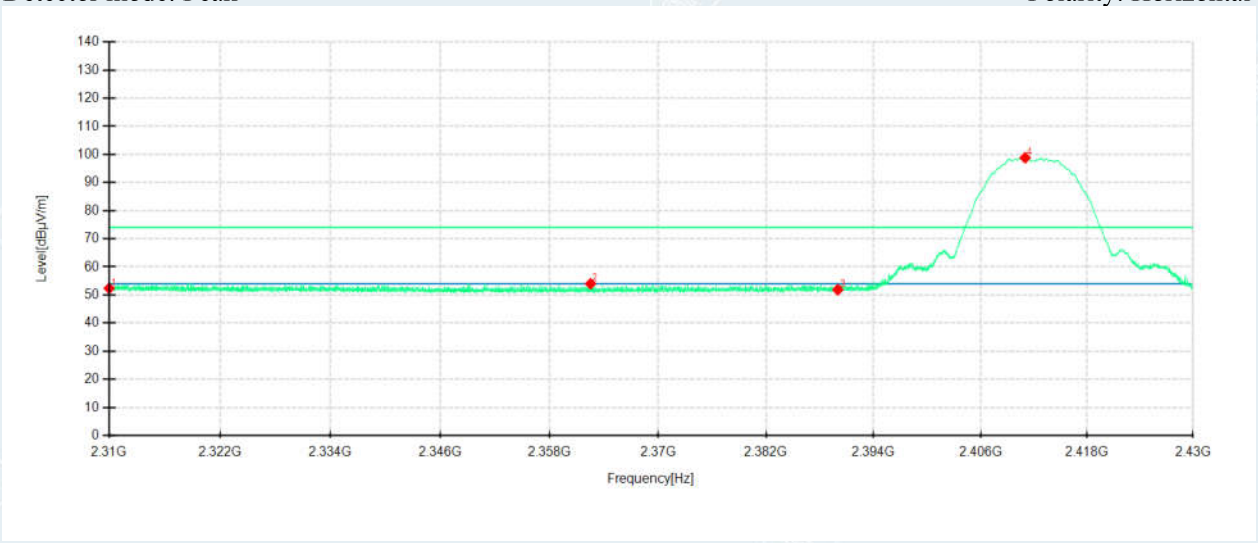
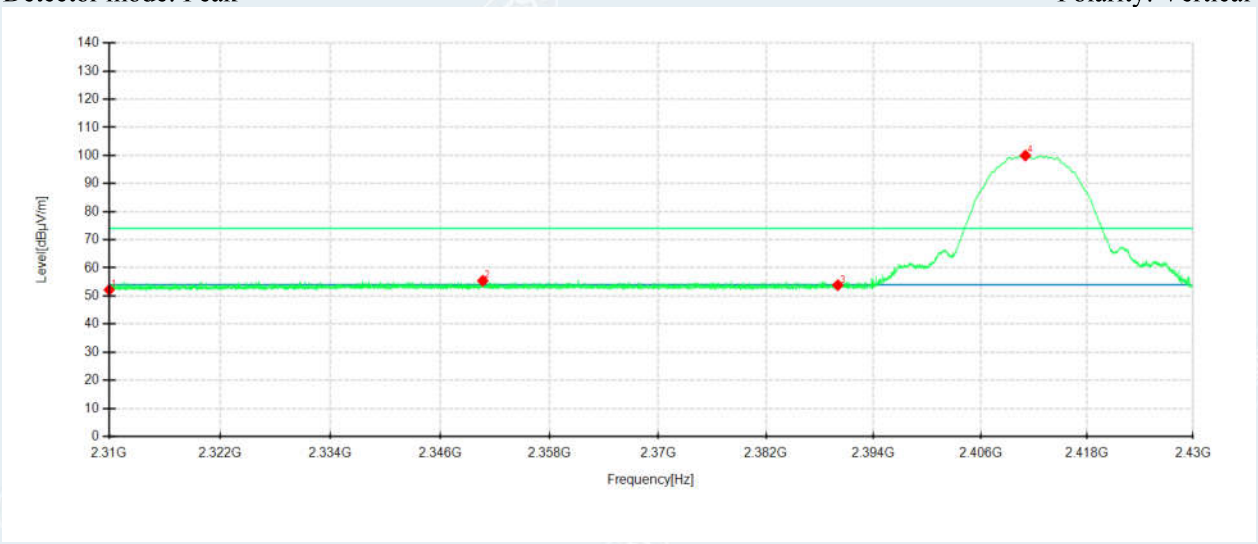
10.4 TEST RESULTS

802.11b mode
Lowest Channel
Frequency 2412MHz
Environment: 23.6℃/52%RH/101.0kPa Voltage: DC 12V
Tested By: Chen xiaocong Date: 2022-12-19
Detector mode: Peak Polarity: Horizontal



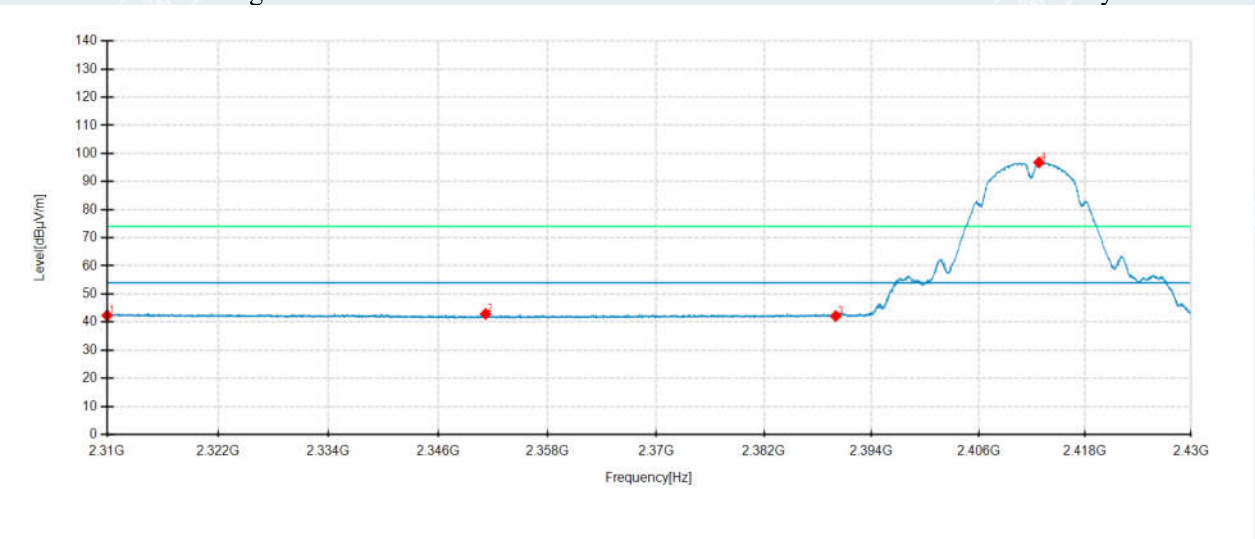
Detector mode: Peak Polarity: Vertical



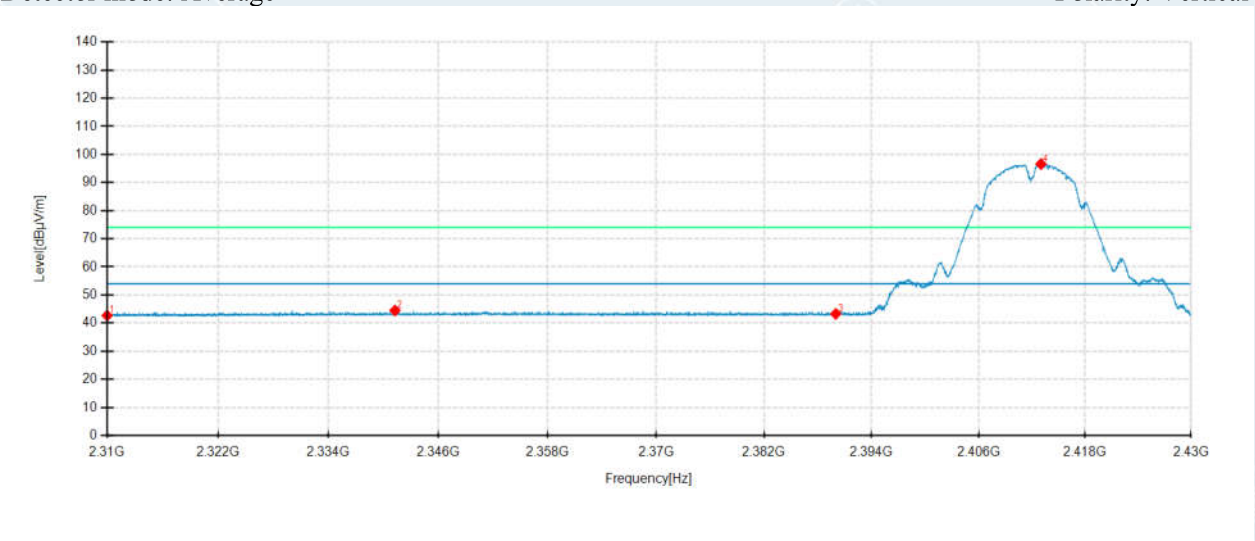
No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2310	43.01	52.36	9.35	74.00	21.64	200	206	Horizontal	/
2	2362.545	45.31	53.96	8.65	74.00	20.04	100	66	Horizontal	/
3	2390	42.93	51.86	8.93	74.00	22.14	100	17	Horizontal	/
4	2411.01	89.75	98.83	9.08	74.00	-24.83	100	337	Horizontal	No limit
1	2310	42.23	52.16	9.93	74.00	21.84	200	360	Vertical	/
2	2350.68	45.20	55.41	10.21	74.00	18.59	200	360	Vertical	/
3	2390	43.78	53.85	10.07	74.00	20.15	100	235	Vertical	/
4	2411.04	90.13	99.97	9.84	74.00	-25.97	100	294	Vertical	No limit

———— The following blanks ————

802.11b mode
Lowest Channel
Frequency 2412MHz
Environment: 23.6℃/52%RH/101.0kPa Voltage: DC 12V
Tested By: Chen xiaocong Date: 2022-12-19
Detector mode: Average Polarity: Horizontal

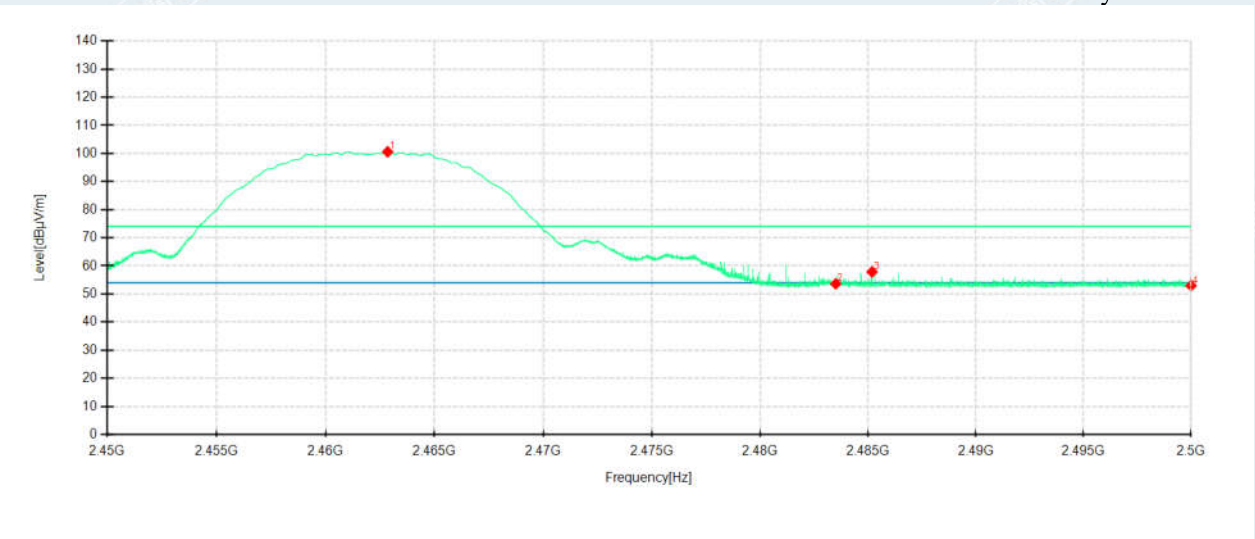


Detector mode: Average Polarity: Vertical

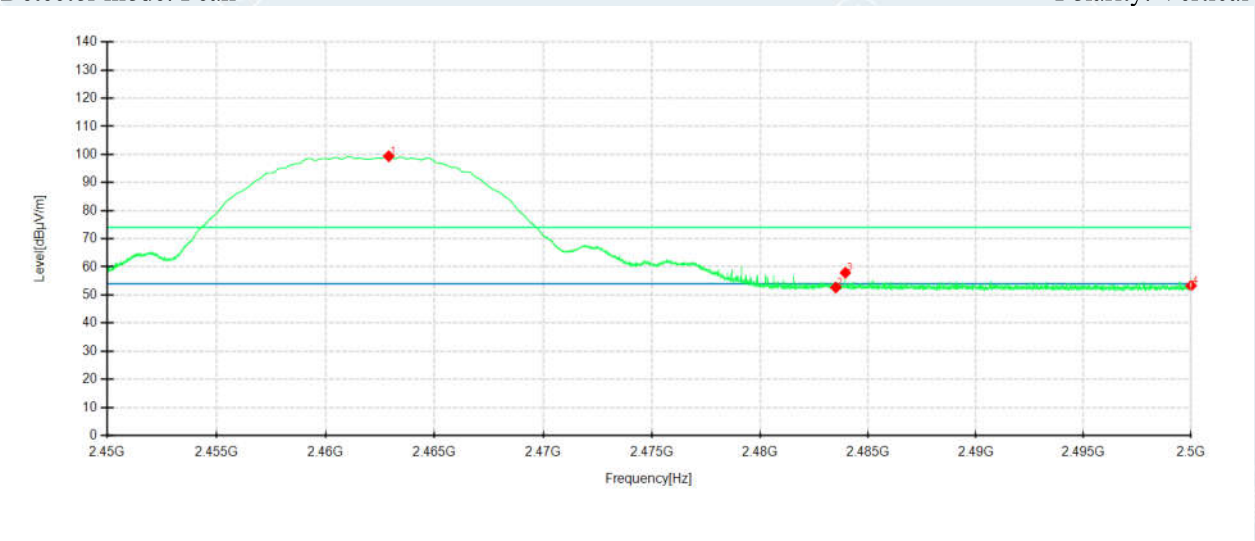


No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2310	32.99	42.34	9.35	54.00	11.66	200	266	Horizontal	/
2	2351.205	34.35	42.88	8.53	54.00	11.12	200	246	Horizontal	/
3	2390	33.19	42.12	8.93	54.00	11.88	100	0	Horizontal	/
4	2412.795	87.71	96.79	9.08	54.00	-42.79	100	164	Horizontal	No limit
1	2310	32.73	42.66	9.93	54.00	11.34	100	179	Vertical	/
2	2341.275	34.30	44.46	10.16	54.00	9.54	100	129	Vertical	/
3	2390	33.20	43.27	10.07	54.00	10.73	100	118	Vertical	/
4	2413.02	86.78	96.58	9.80	54.00	-42.58	100	118	Vertical	No limit

802.11b mode
Highest Channel
Frequency 2462MHz
Environment: 23.6℃/52%RH/101.0kPa Voltage: DC 12V
Tested By: Chen xiaocong Date: 2022-12-19
Detector mode: Peak Polarity: Horizontal

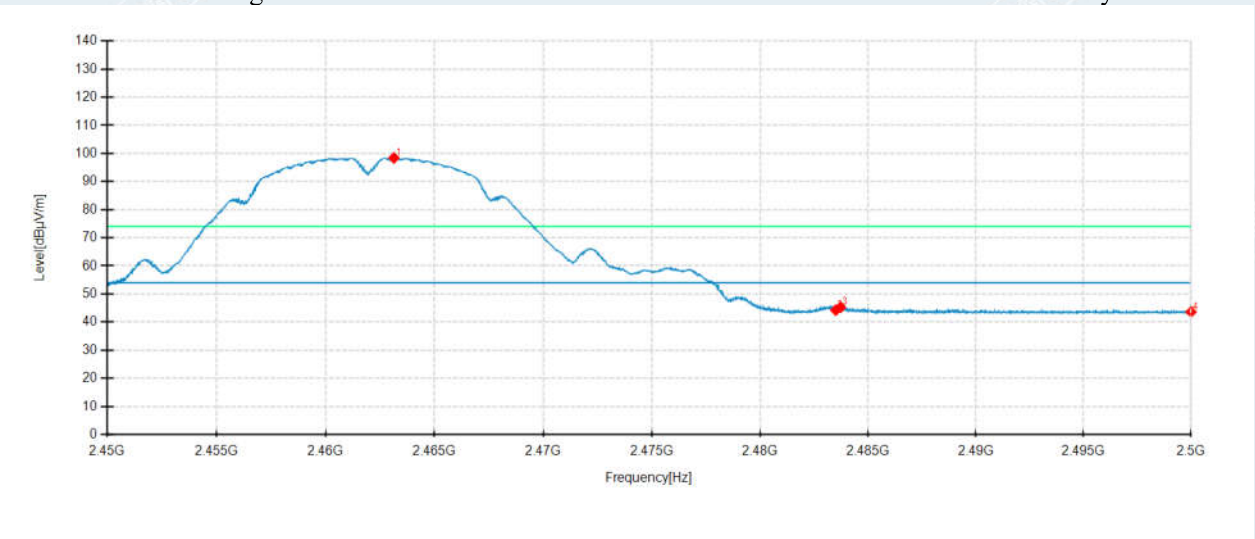


Detector mode: Peak Polarity: Vertical

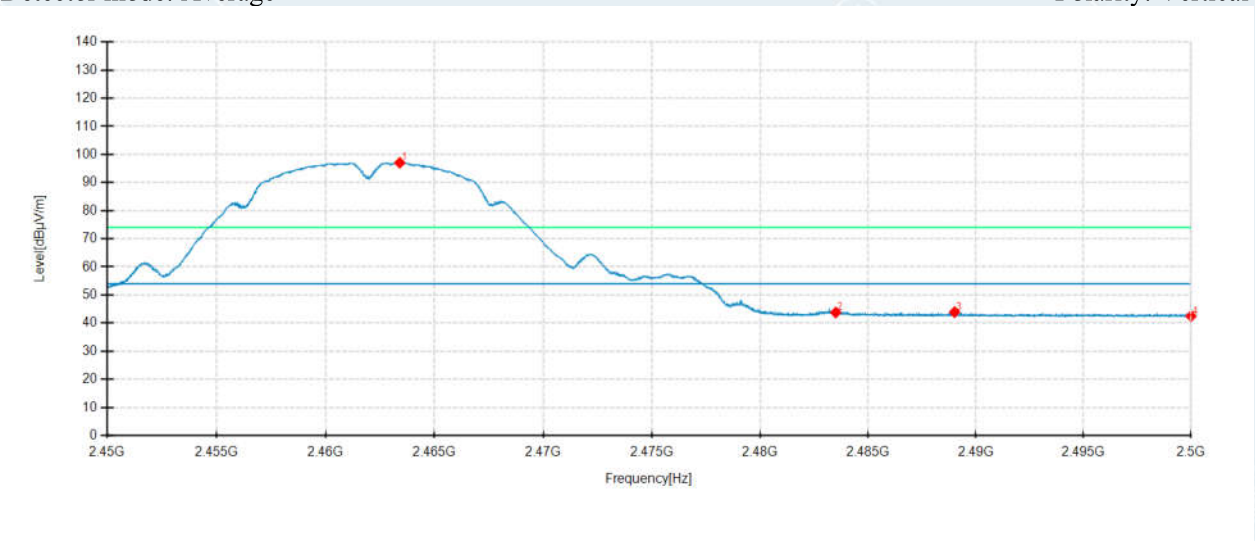


No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2462.8438	91.07	100.57	9.50	74.00	-26.57	200	127	Horizontal	No limit
2	2483.5	43.67	53.59	9.92	74.00	20.41	200	35	Horizontal	/
3	2485.1812	47.91	57.86	9.95	74.00	16.14	200	115	Horizontal	/
4	2500	42.68	52.93	10.25	74.00	21.07	100	23	Horizontal	/
1	2462.8938	90.17	99.36	9.19	74.00	-25.36	200	245	Vertical	No limit
2	2483.5	43.37	52.65	9.28	74.00	21.35	200	65	Vertical	/
3	2483.9438	48.61	57.89	9.28	74.00	16.11	200	254	Vertical	/
4	2500	43.92	53.27	9.35	74.00	20.73	200	264	Vertical	/

802.11b mode
Highest Channel
Frequency 2462MHz
Environment: 23.6℃/52%RH/101.0kPa Voltage: DC 12V
Tested By: Chen xiaocong Date: 2022-12-19
Detector mode: Average Polarity: Horizontal

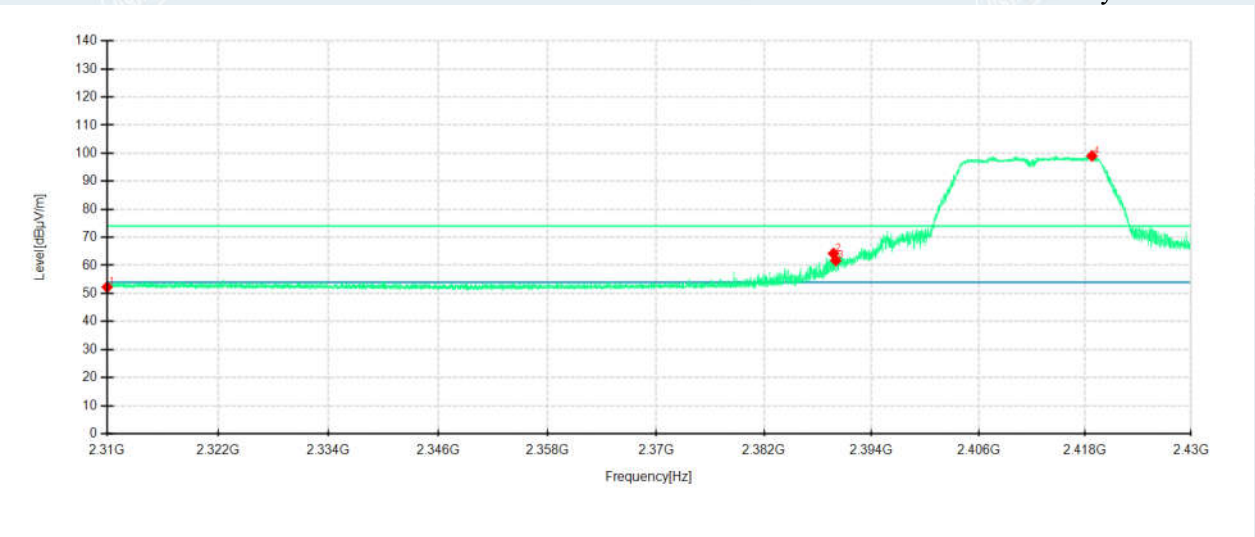


Detector mode: Average Polarity: Vertical

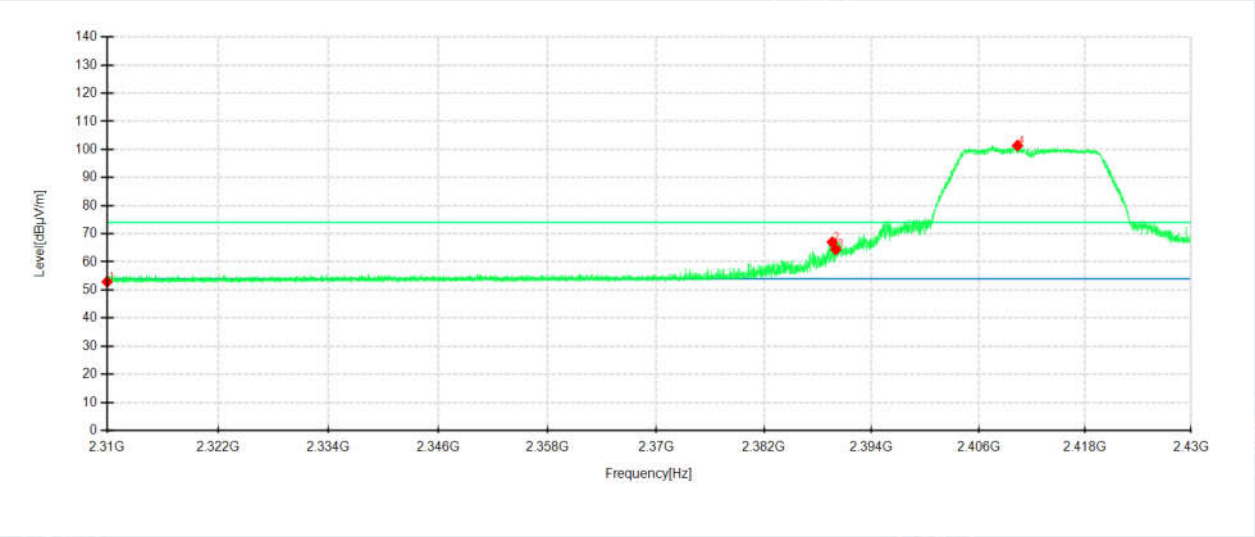


No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2463.1312	88.87	98.38	9.51	54.00	-44.38	200	125	Horizontal	No limit
2	2483.5	34.32	44.24	9.92	54.00	9.76	100	127	Horizontal	/
3	2483.7188	35.32	45.24	9.92	54.00	8.76	100	117	Horizontal	/
4	2500	33.35	43.60	10.25	54.00	10.40	100	117	Horizontal	/
1	2463.4	87.84	97.04	9.20	54.00	-43.04	200	244	Vertical	No limit
2	2483.5	34.46	43.74	9.28	54.00	10.26	200	145	Vertical	/
3	2489.0062	34.59	43.89	9.30	54.00	10.11	100	155	Vertical	/
4	2500	33.13	42.48	9.35	54.00	11.52	100	297	Vertical	/

802.11g mode
Lowest Channel
Frequency 2412MHz
Environment: 23.6℃/52%RH/101.0kPa Voltage: DC 12V
Tested By: Chen xiaocong Date: 2022-12-15
Detector mode: Peak Polarity: Horizontal



Detector mode: Peak Polarity: Vertical



No.	Frequency MHz	Reading dBμV/m	Level dBμV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2310	42.91	52.26	9.35	74.00	21.74	100	93	Horizontal	/
2	2389.74	55.30	64.23	8.93	74.00	9.77	100	162	Horizontal	/
3	2390	52.80	61.73	8.93	74.00	12.27	100	210	Horizontal	/
4	2418.78	89.90	99.01	9.11	74.00	-25.01	200	108	Horizontal	No limit
1	2310	42.96	52.89	9.93	74.00	21.11	200	220	Vertical	/
2	2389.605	56.93	67.00	10.07	74.00	7.00	200	278	Vertical	/
3	2390	54.34	64.41	10.07	74.00	9.59	200	270	Vertical	/
4	2410.38	91.52	101.36	9.84	74.00	-27.36	100	334	Vertical	No limit

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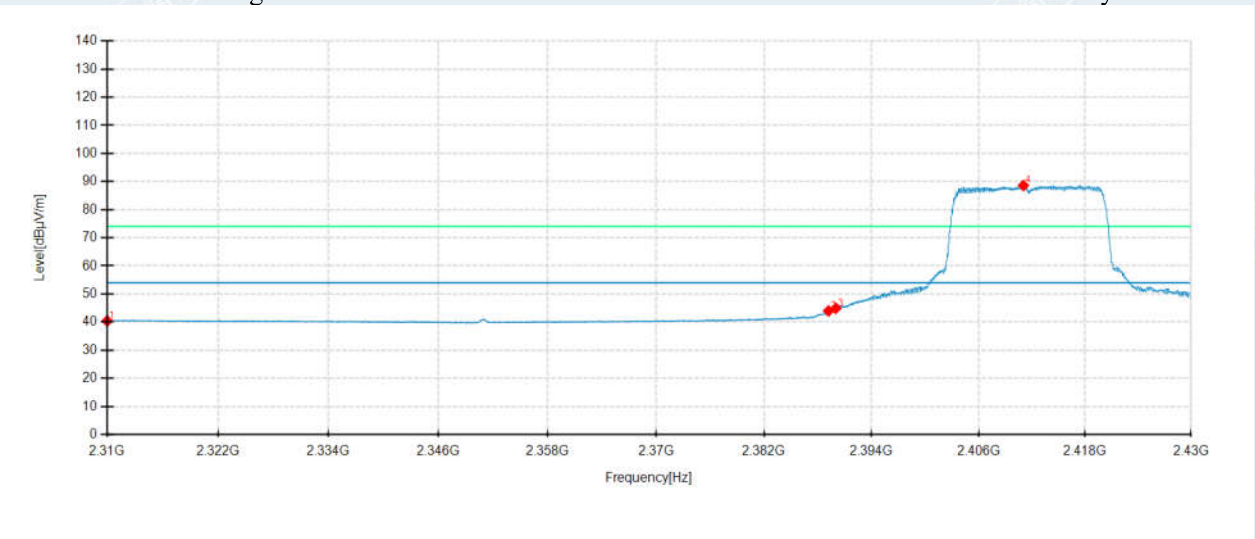
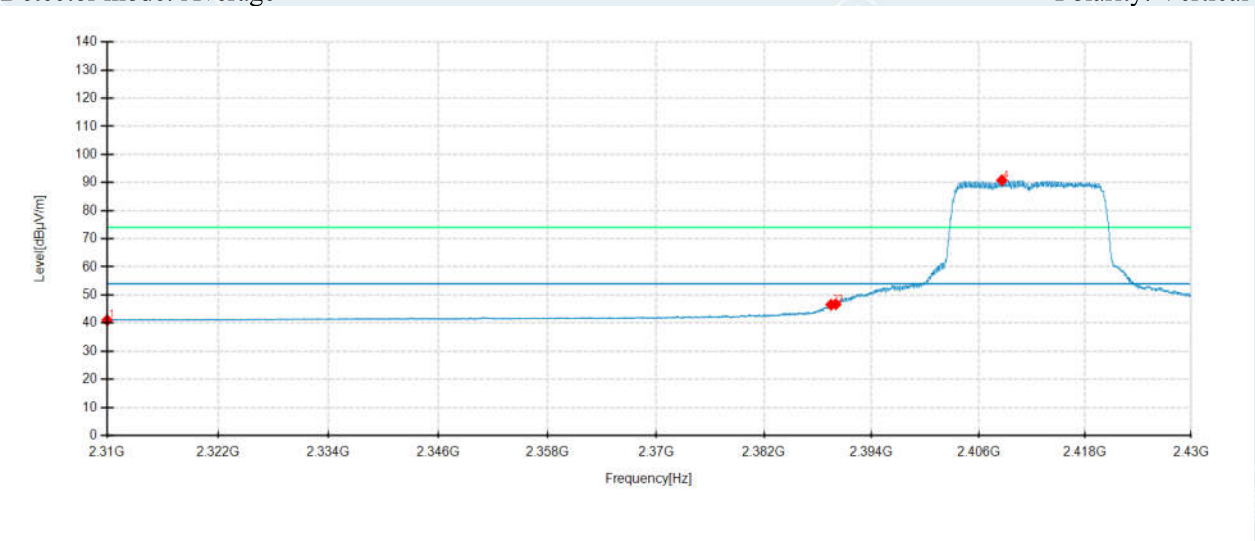
802.11g mode
Lowest Channel
Frequency 2412MHz
Environment: 23.6℃/52%RH/101.0kPa Voltage: DC 12V
Tested By: Chen xiaocong Date: 2022-12-15
Detector mode: Average Polarity: Horizontal



Detector mode: Average Polarity: Vertical



No.	Frequency MHz	Reading dBµV/m	Level dBµV/m	Factor dB	Limit dBuV/m	Margin dB	Height cm	Angle °	Pole	Comment
1	2310	31.05	40.40	9.35	54.00	13.60	200	81	Horizontal	/
2	2389.185	35.02	43.94	8.92	54.00	10.06	100	152	Horizontal	/
3	2390	35.95	44.88	8.93	54.00	9.12	100	152	Horizontal	/
4	2411.04	79.52	88.60	9.08	54.00	-34.60	200	100	Horizontal	No limit
1	2310	31.11	41.04	9.93	54.00	12.96	200	54	Vertical	/
2	2389.47	36.46	46.53	10.07	54.00	7.47	200	95	Vertical	/
3	2390	36.61	46.68	10.07	54.00	7.32	200	95	Vertical	/
4	2408.625	80.94	90.82	9.88	54.00	-36.82	100	336	Vertical	No limit