

4.5 Radiated Band Edges and Spurious Emission Measurement

4.5.1 Limit of Radiated Band Edges and Spurious Emission

FCC §15.247 (d)

IC RSS-247 5.5

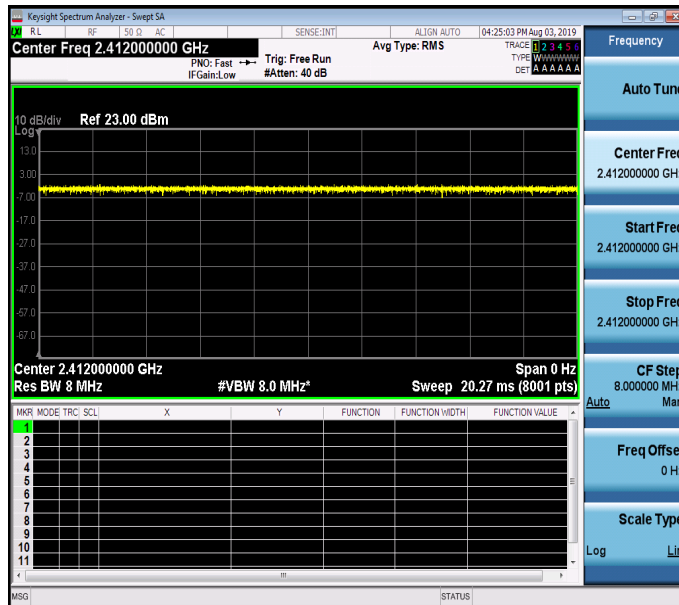
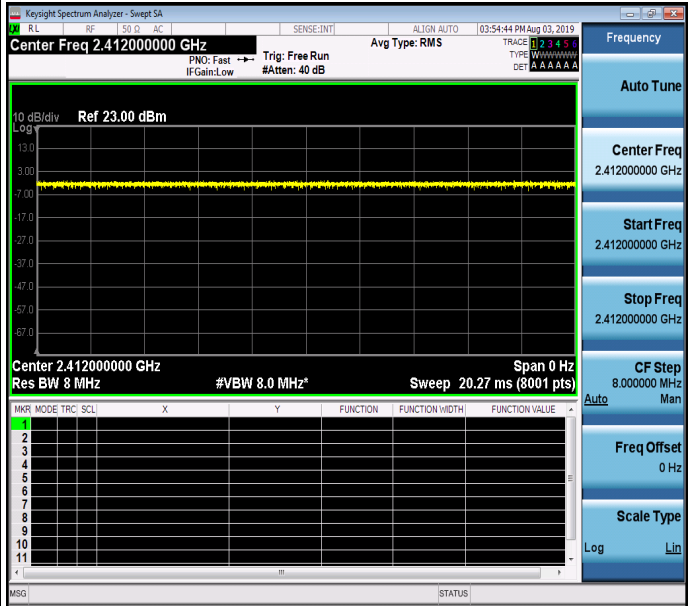
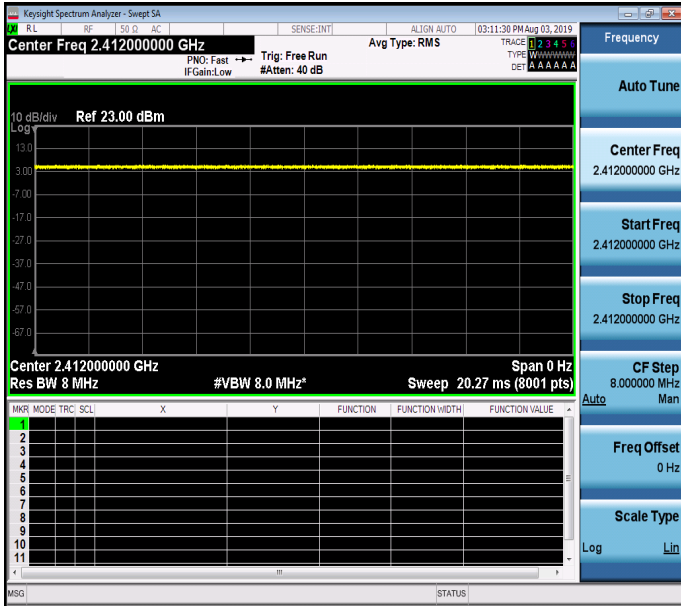
In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

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
Above 960	500	3

4.5.2 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The measurement distance is 3 meter.
3. For each suspected emission, 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 to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=120 kHz for $f < 1$ GHz, RBW=1MHz for $f > 1$ GHz ; VBW = RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
 - (3) For average measurement:
VBW = 10 Hz, when duty cycle is no less than 98 percent.
VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	VBW Setting
802.11b	100%	10Hz
802.11g	100%	10Hz
2.4GHz 802.11n HT20	100%	10Hz



6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

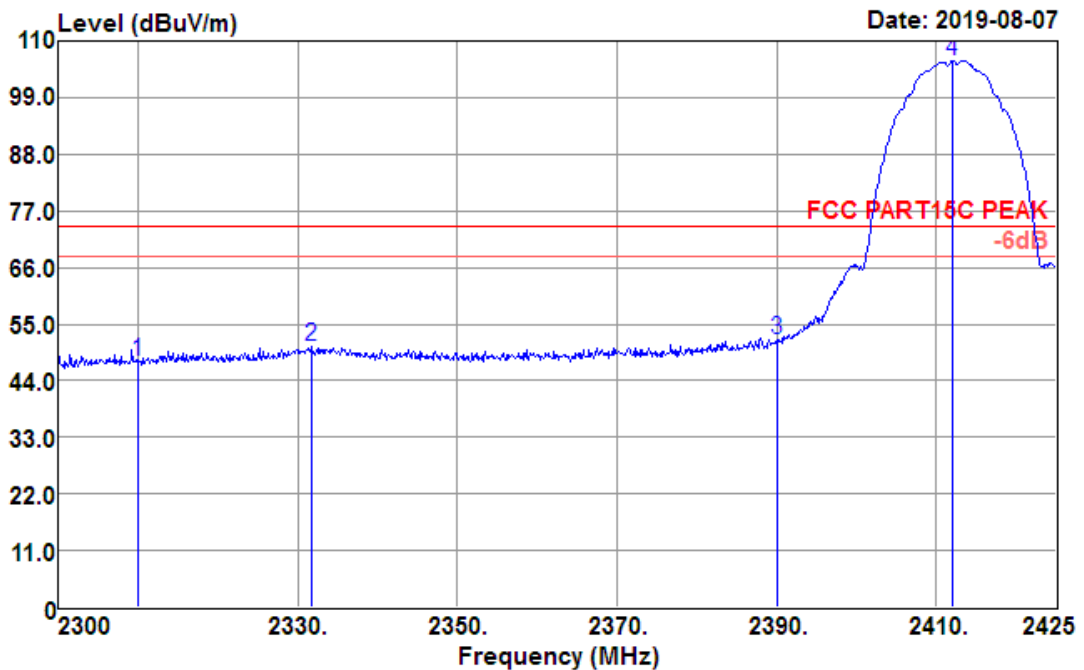
4.5.3 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

4.5.4 Test Result of Radiated Spurious at Band Edges

Test Mode :	802.11b CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Horizontal

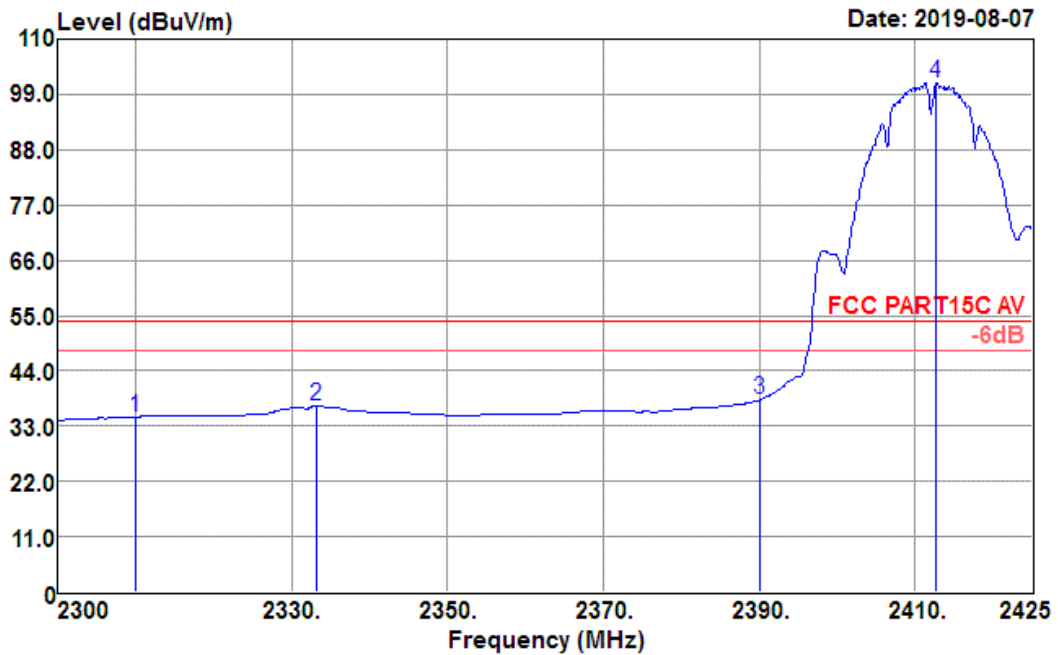
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Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2310.000	578.52	-500.00	4.67	35.43	47.76	74.00	-26.24	Peak
2331.750	581.29	-500.00	4.70	35.46	50.53	74.00	-23.47	Peak
2390.000	582.89	-500.00	4.75	35.55	52.09	74.00	-21.91	Peak
2412.125	637.05	-500.00	4.78	35.58	106.25	74.00	32.25	Peak

Test Mode :	802.11b CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Horizontal

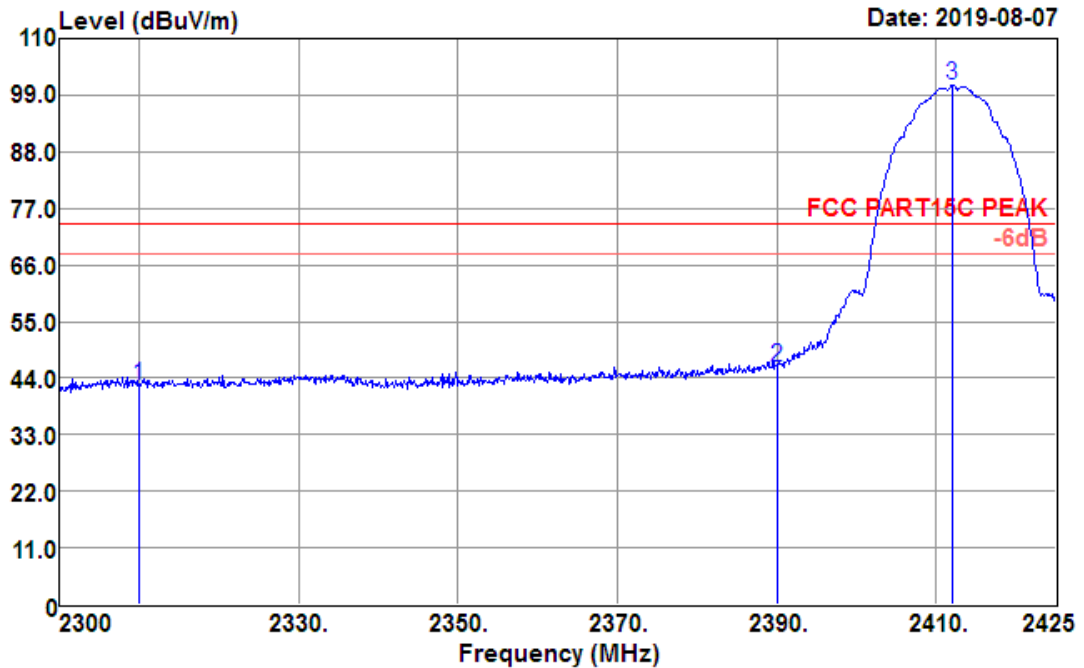
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Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2310.000	38.66	26.91	4.67	35.43	34.81	54.00	-19.19	Average
2333.125	40.79	26.97	4.70	35.47	36.99	54.00	-17.01	Average
2390.000	41.91	27.11	4.75	35.55	38.22	54.00	-15.78	Average
2412.750	104.86	27.17	4.78	35.58	101.23	54.00	47.23	Average

Test Mode :	802.11b CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Vertical

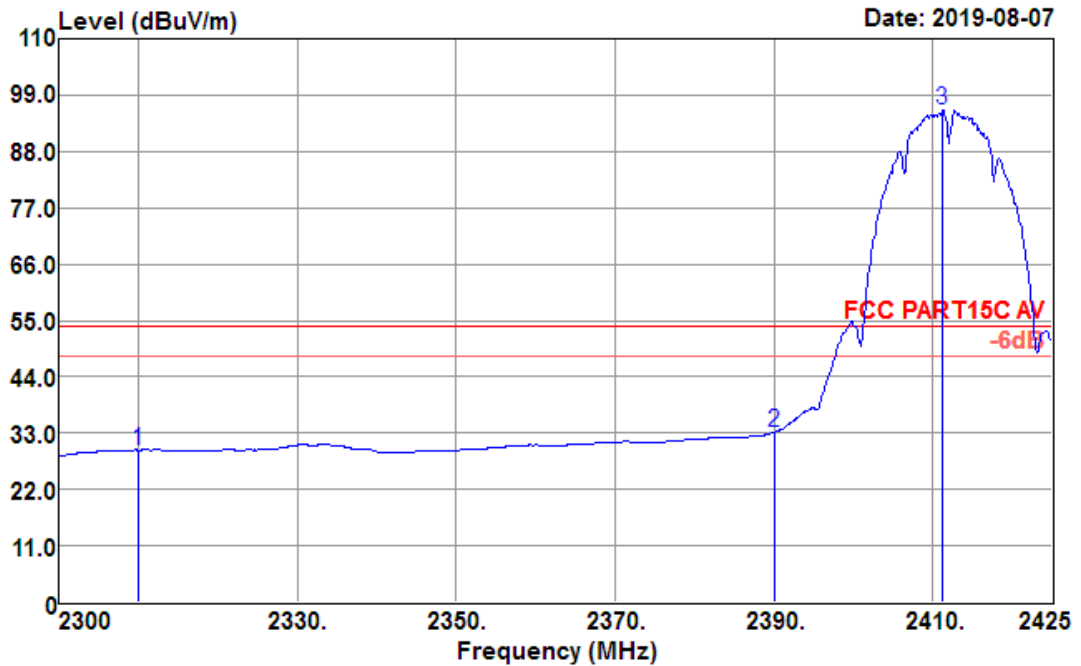
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Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2310.000	46.23	26.91	4.67	35.43	42.38	74.00	-31.62	Peak
2390.000	49.89	27.11	4.75	35.55	46.20	74.00	-27.80	Peak
2412.125	104.57	27.17	4.78	35.58	100.94	74.00	26.94	Peak

Test Mode :	802.11b CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Vertical

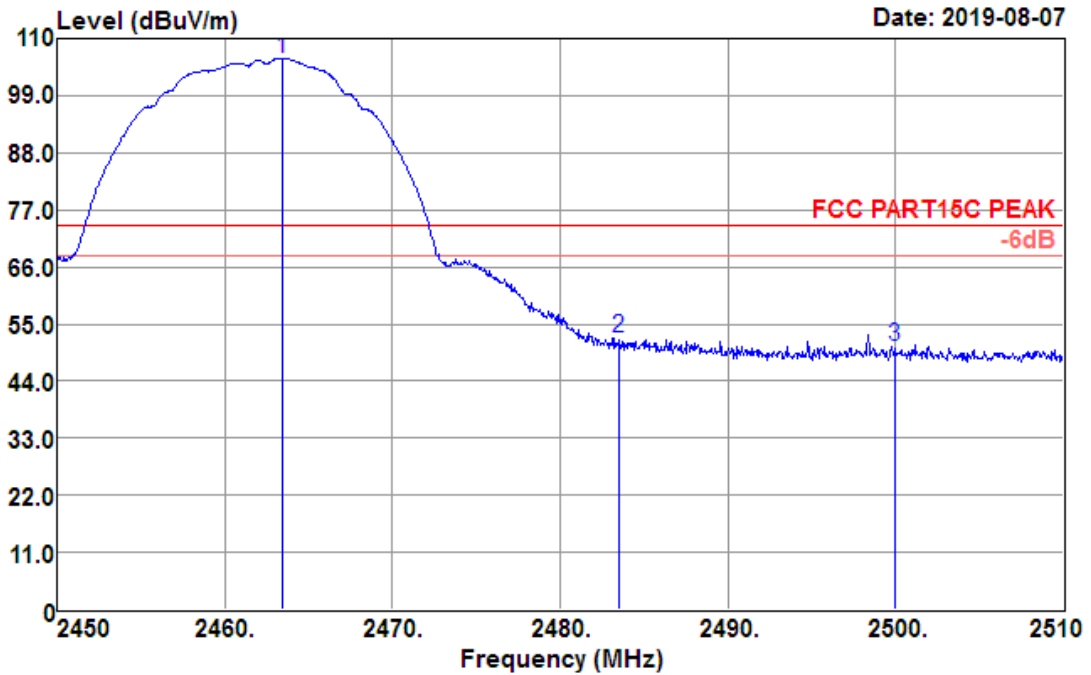
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	33.54	26.91	4.67	35.43	29.69	54.00	-24.31	Average
2390.000	36.88	27.11	4.75	35.55	33.19	54.00	-20.81	Average
2411.250	99.64	27.17	4.78	35.58	96.01	54.00	42.01	Average

Test Mode :	802.11b CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Horizontal

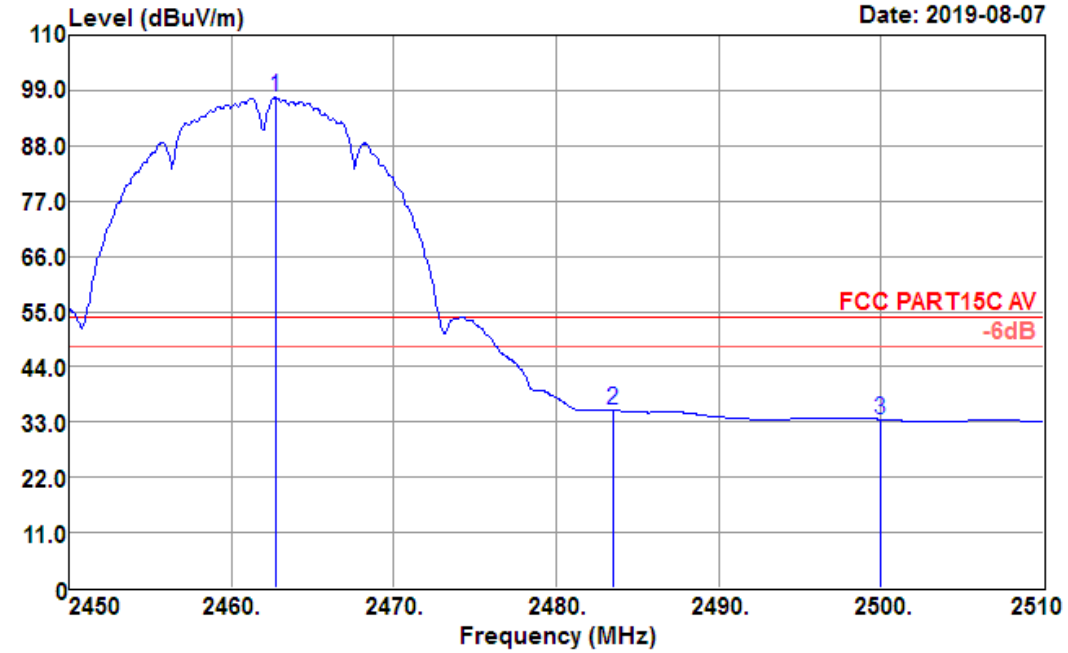
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Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2463.440	111.01	27.30	3.58	35.65	106.24	74.00	32.24	Peak
2483.500	56.84	27.36	3.59	35.68	52.11	74.00	-21.89	Peak
2500.000	55.24	27.40	3.60	35.70	50.54	74.00	-23.46	Peak

Test Mode :	802.11b CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Horizontal

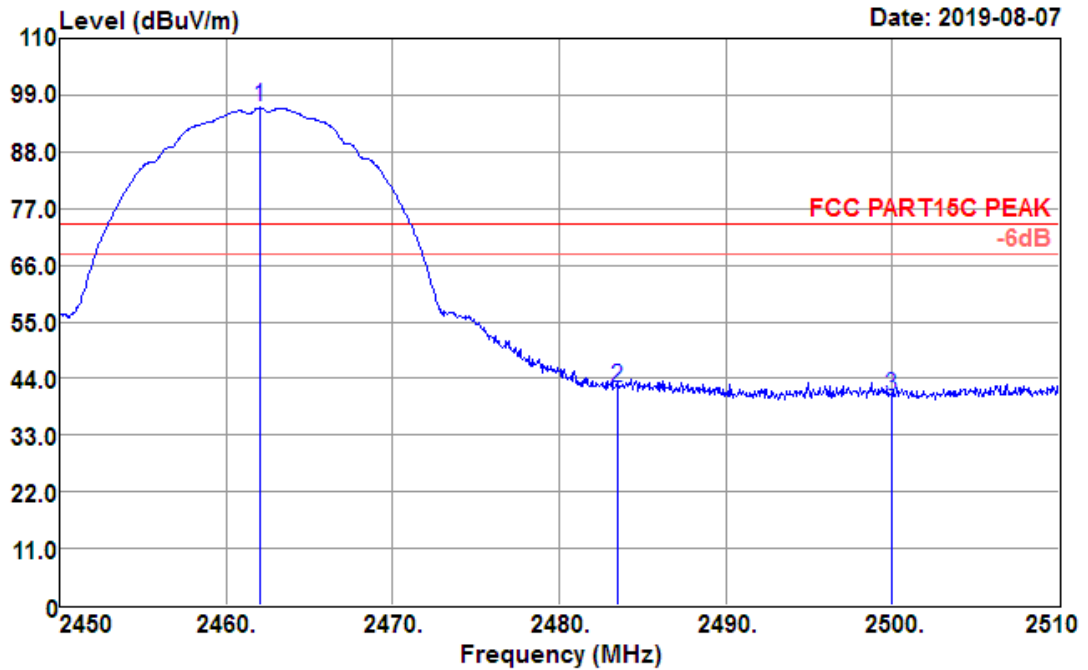
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2462.720	102.40	27.30	3.58	35.65	97.63	54.00	43.63	Average
2483.500	40.08	27.36	3.59	35.68	35.35	54.00	-18.65	Average
2500.000	38.29	27.40	3.60	35.70	33.59	54.00	-20.41	Average

Test Mode :	802.11b CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Vertical

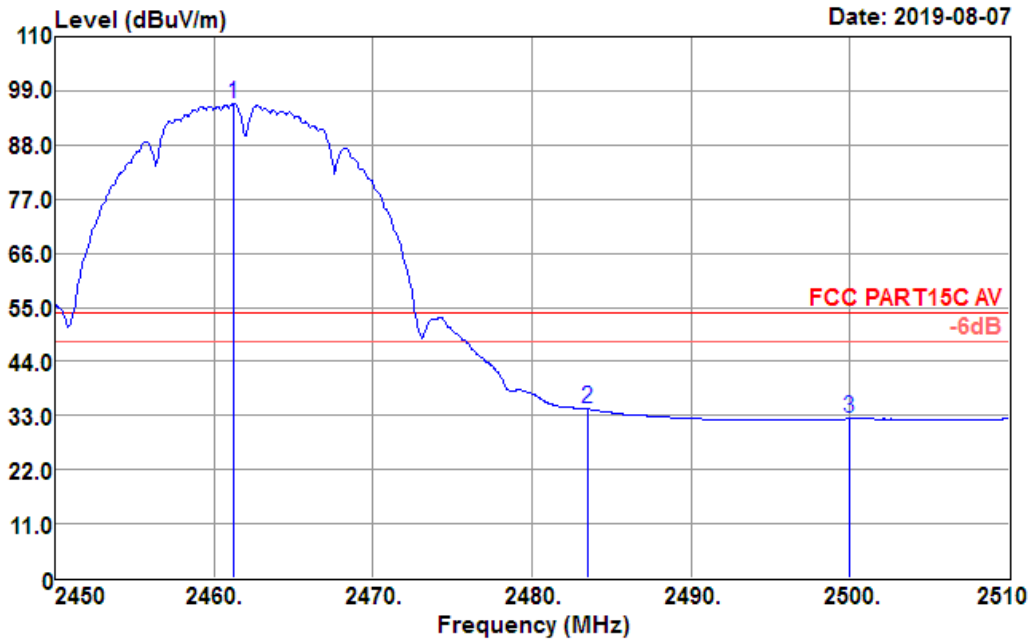
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2462.000	101.34	27.30	3.58	35.65	96.57	74.00	22.57	Peak
2483.500	46.77	27.36	3.59	35.68	42.04	74.00	-31.96	Peak
2500.000	45.42	27.40	3.60	35.70	40.72	74.00	-33.28	Peak

Test Mode :	802.11b CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Vertical

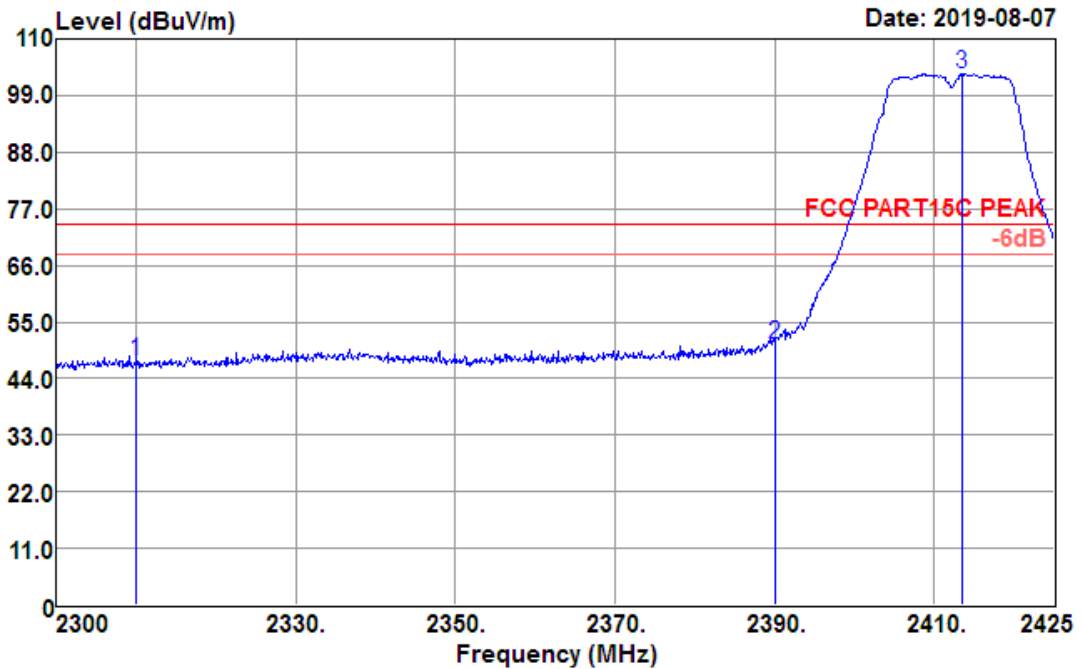
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2461.220	99.92	27.30	4.84	35.65	96.41	54.00	42.41	Average
2483.500	37.79	27.36	4.87	35.68	34.34	54.00	-19.66	Average
2499.980	35.74	27.40	4.89	35.70	32.33	54.00	-21.67	Average

Test Mode :	802.11g CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Horizontal

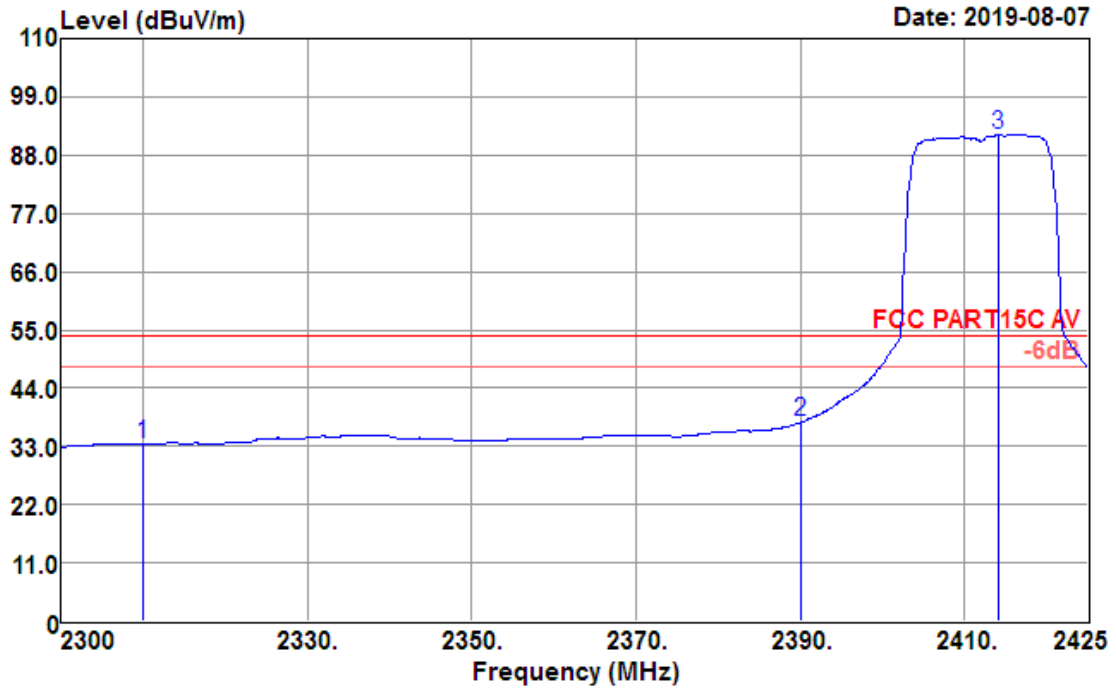
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	51.22	26.91	4.67	35.43	47.37	74.00	-26.63	Peak
2390.000	54.38	27.11	4.75	35.55	50.69	74.00	-23.31	Peak
2413.500	106.78	27.18	4.78	35.58	103.16	74.00	29.16	Peak

Test Mode :	802.11g CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Horizontal

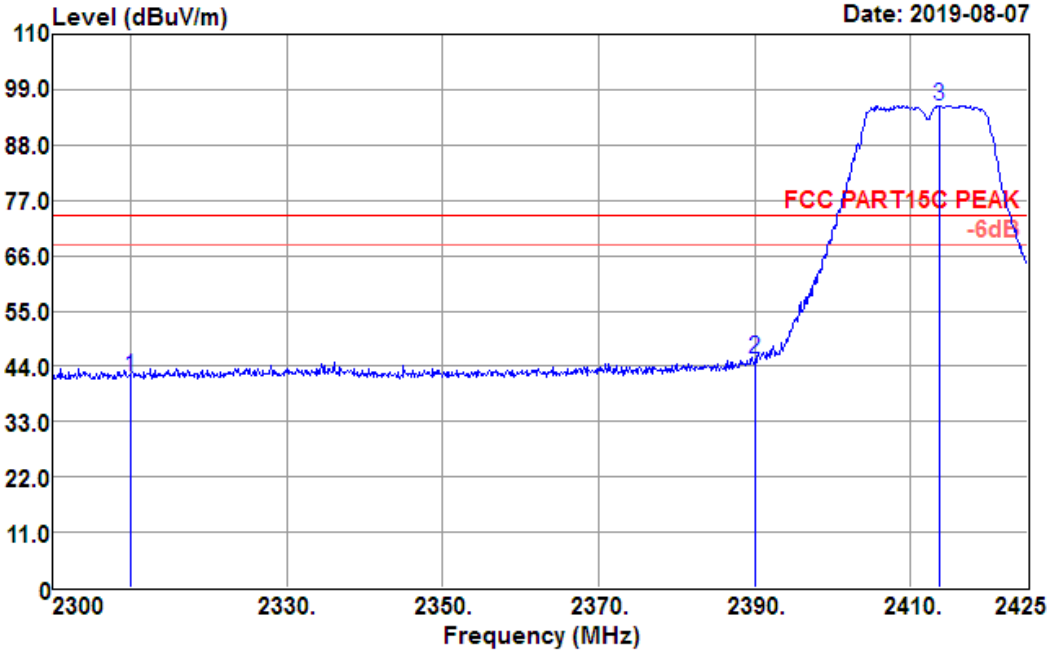
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	37.41	26.91	4.67	35.43	33.56	54.00	-20.44	Average
2390.000	41.24	27.11	4.75	35.55	37.55	54.00	-16.45	Average
2414.125	95.61	27.18	4.78	35.58	91.99	54.00	37.99	Average

Test Mode :	802.11g CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Vertical

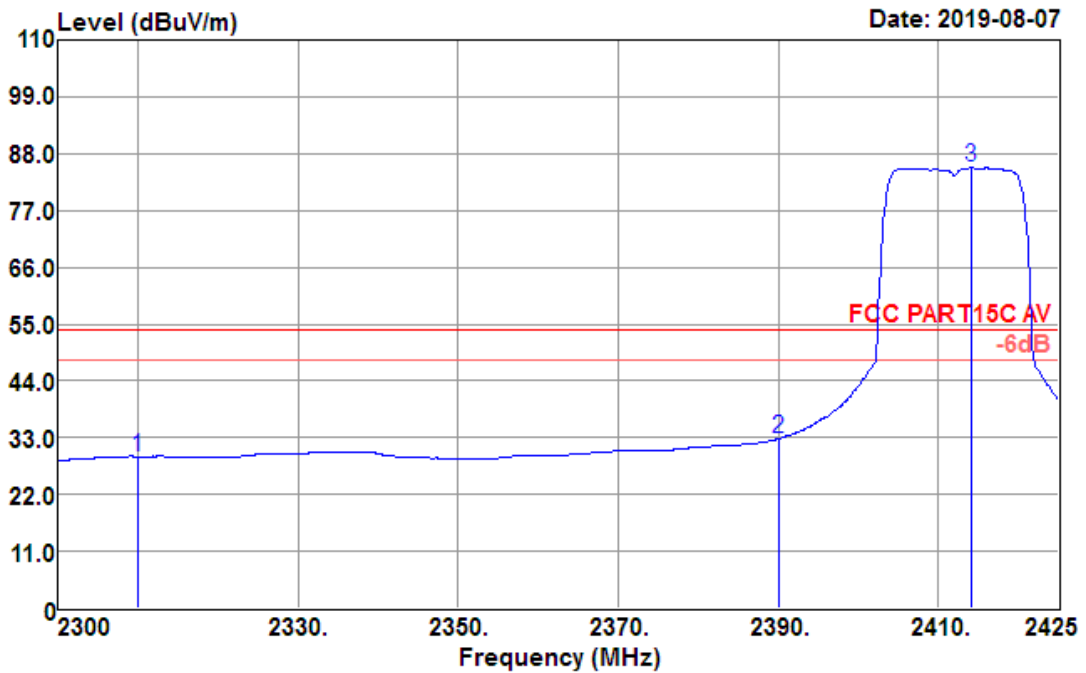
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Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2310.000	45.83	26.91	4.67	35.43	41.98	74.00	-32.02	Peak
2390.000	49.12	27.11	4.75	35.55	45.43	74.00	-28.57	Peak
2413.625	99.49	27.18	4.78	35.58	95.87	74.00	21.87	Peak

Test Mode :	802.11g CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Vertical

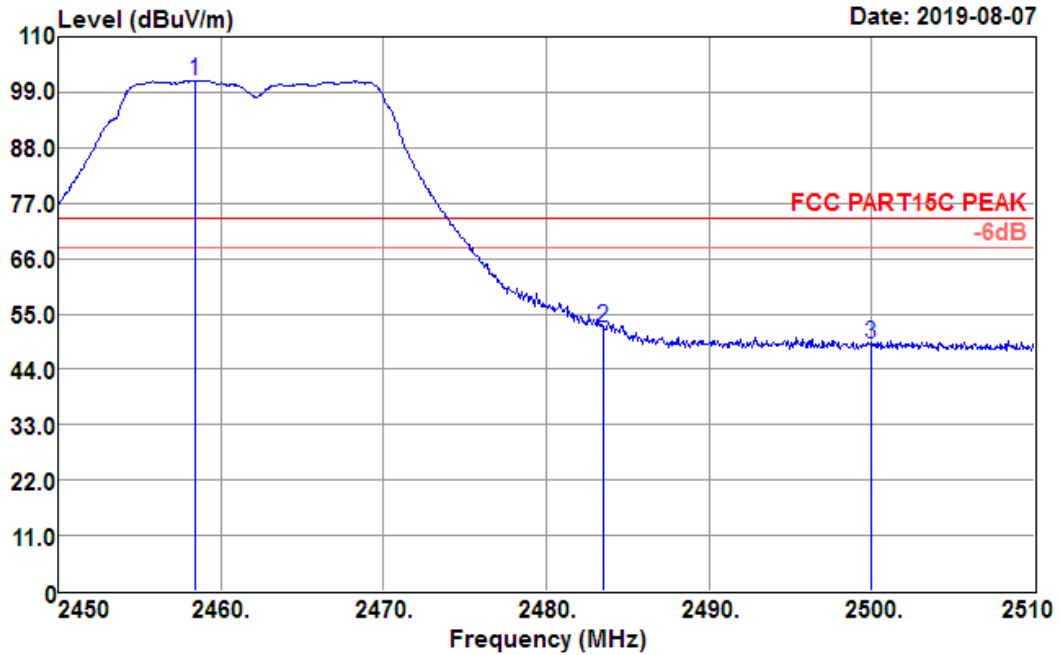
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	33.23	26.91	4.67	35.43	29.38	54.00	-24.62	Average
2390.000	36.44	27.11	4.75	35.55	32.75	54.00	-21.25	Average
2414.125	88.94	27.18	4.78	35.58	85.32	54.00	31.32	Average

Test Mode :	802.11g CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Horizontal

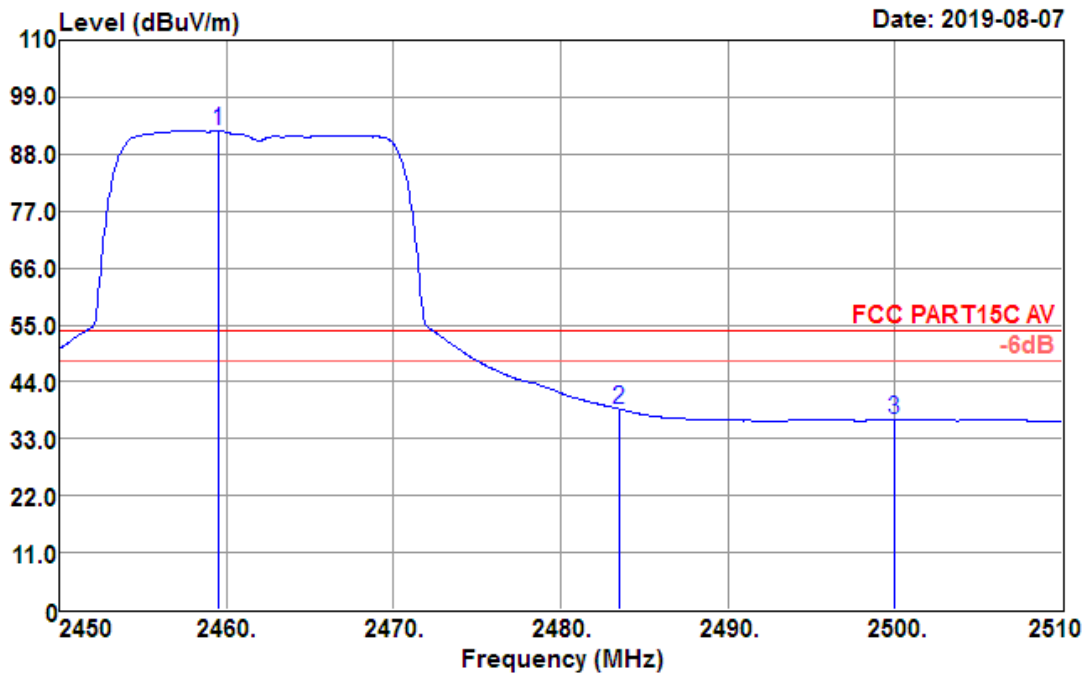
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2458.400	104.91	27.29	4.84	35.64	101.40	74.00	27.40	Peak
2483.500	55.70	27.36	4.87	35.68	52.25	74.00	-21.75	Peak
2500.000	52.29	27.40	4.90	35.70	48.89	74.00	-25.11	Peak

Test Mode :	802.11g CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Horizontal

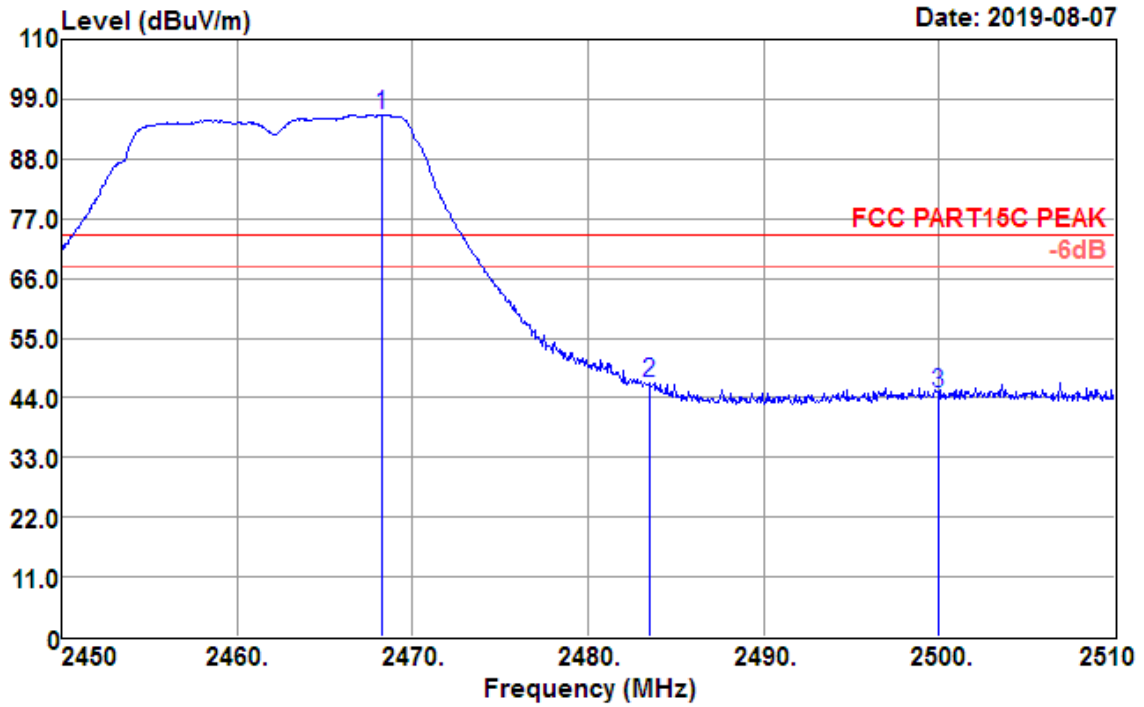
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Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2459.480	96.06	27.29	4.84	35.64	92.55	54.00	38.55	Average
2483.500	42.20	27.36	4.87	35.68	38.75	54.00	-15.25	Average
2500.000	40.04	27.40	4.90	35.70	36.64	54.00	-17.36	Average

Test Mode :	802.11g CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Vertical

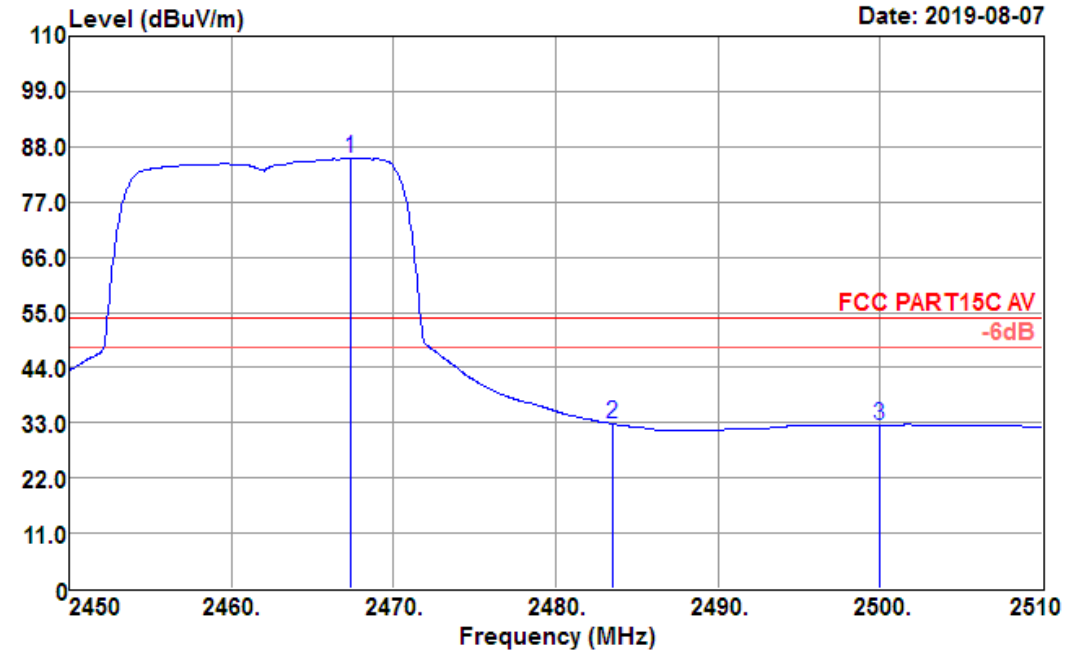
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Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2468.300	99.62	27.32	4.85	35.66	96.13	74.00	22.13	Peak
2483.480	50.26	27.36	4.87	35.68	46.81	74.00	-27.19	Peak
2500.000	48.08	27.40	4.90	35.70	44.68	74.00	-29.32	Peak

Test Mode :	802.11g CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Vertical

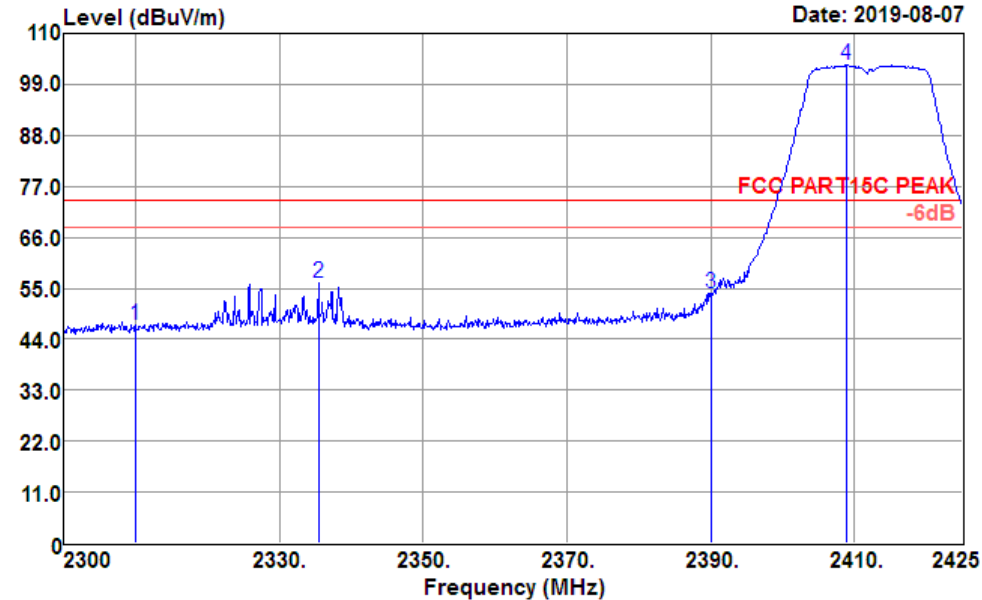
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2467.400	89.13	27.32	4.85	35.65	85.65	54.00	31.65	Average
2483.480	36.25	27.36	4.87	35.68	32.80	54.00	-21.20	Average
2500.000	35.95	27.40	4.90	35.70	32.55	54.00	-21.45	Average

Test Mode :	802.11n HT20 CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Horizontal

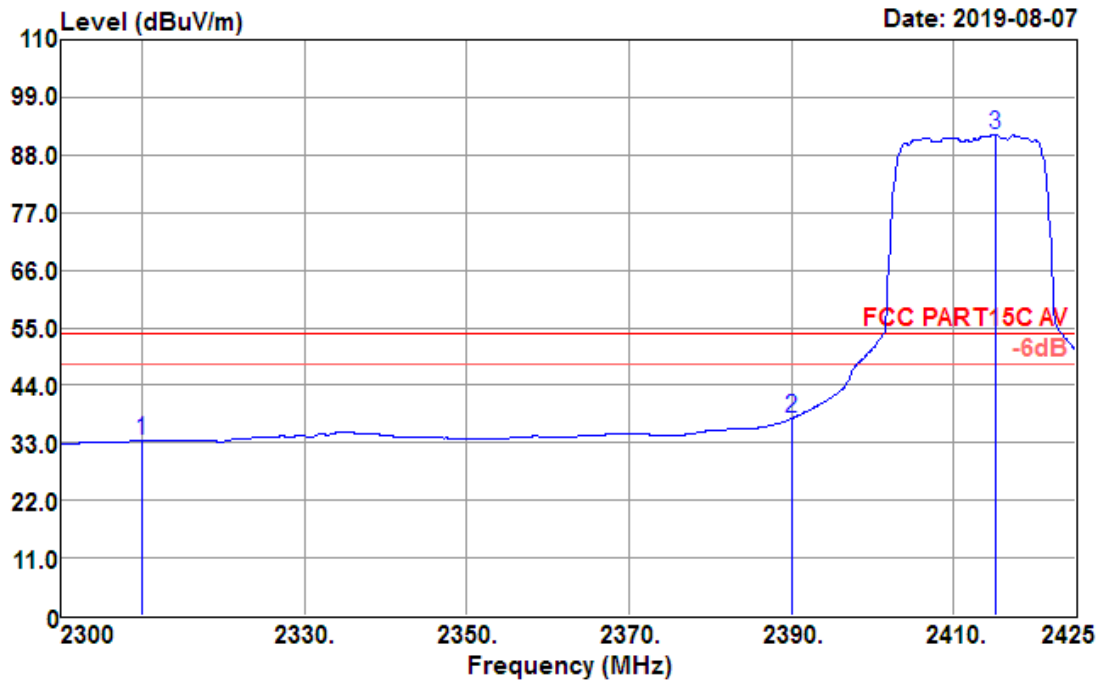
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	50.76	26.91	4.67	35.43	46.91	74.00	-27.09	Peak
2335.500	59.94	26.97	4.70	35.47	56.14	74.00	-17.86	Peak
2390.000	57.45	27.11	4.75	35.55	53.76	74.00	-20.24	Peak
2409.000	106.89	27.16	4.77	35.57	103.25	74.00	29.25	Peak

Test Mode :	802.11n HT20 CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Horizontal

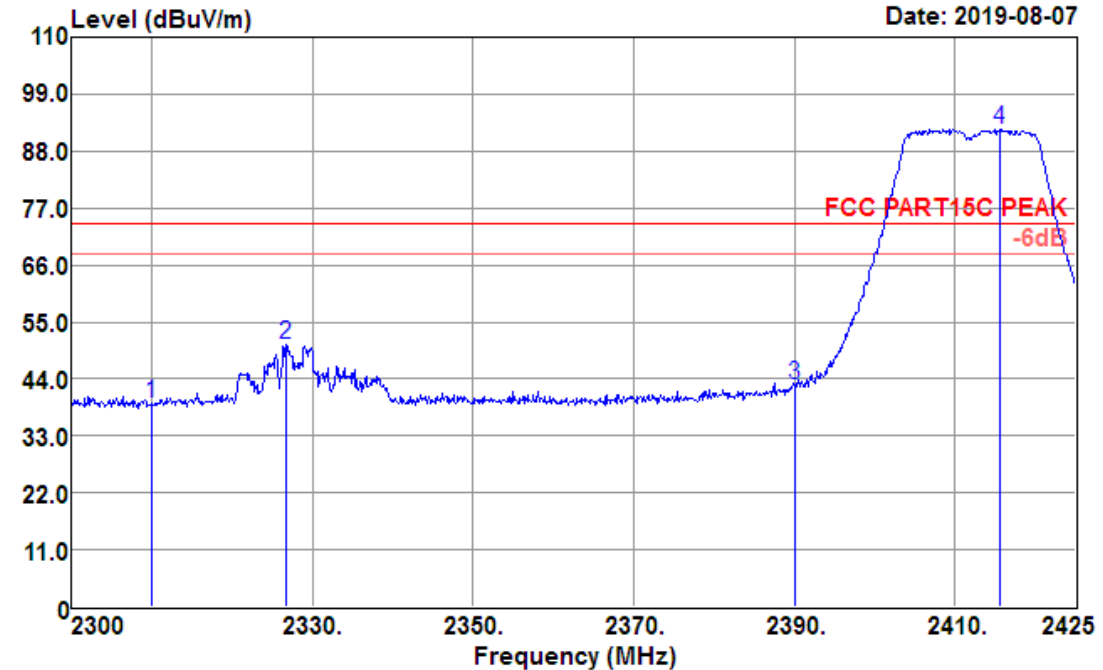
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	37.21	26.91	4.67	35.43	33.36	54.00	-20.64	Average
2390.000	41.31	27.11	4.75	35.55	37.62	54.00	-16.38	Average
2415.125	95.57	27.18	4.78	35.58	91.95	54.00	37.95	Average

Test Mode :	802.11n HT20 CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Vertical

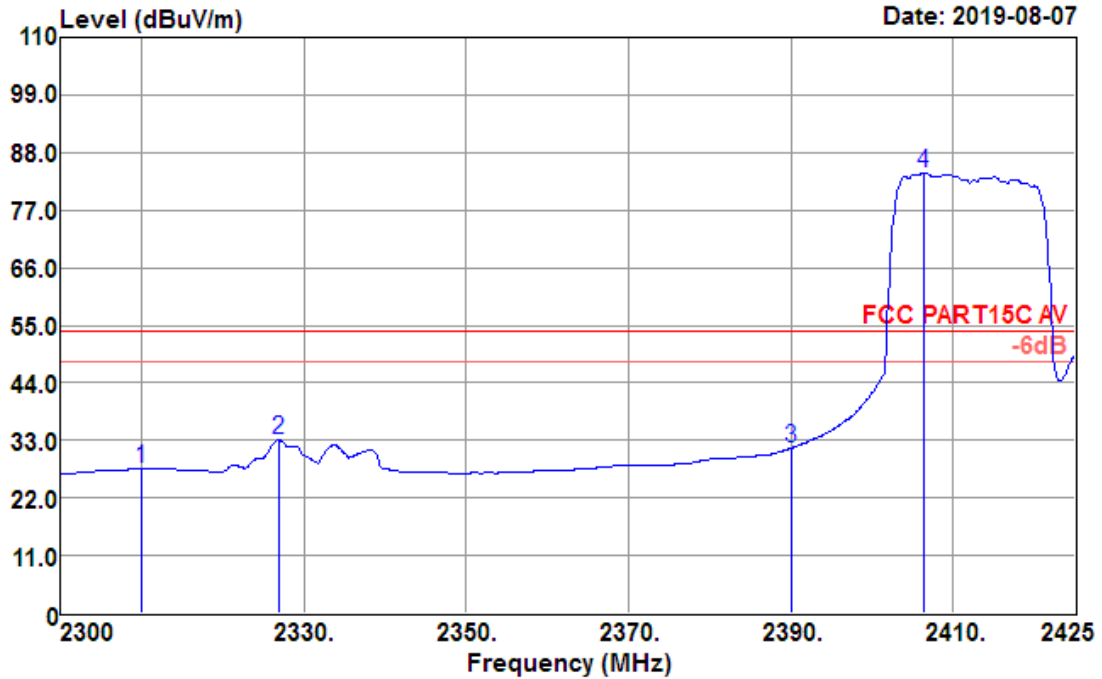
Data: 73



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	Limit level dBuV/m	Over limit dB	Remark
2310.000	43.01	26.91	4.67	35.43	74.00	-34.84	Peak
2326.750	54.31	26.95	4.69	35.46	74.00	-23.51	Peak
2390.000	46.61	27.11	4.75	35.55	74.00	-31.08	Peak
2415.500	95.78	27.18	4.78	35.58	74.00	18.16	Peak

Test Mode :	802.11n HT20 CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.3GHz~2.425GHz	Polarization :	Vertical

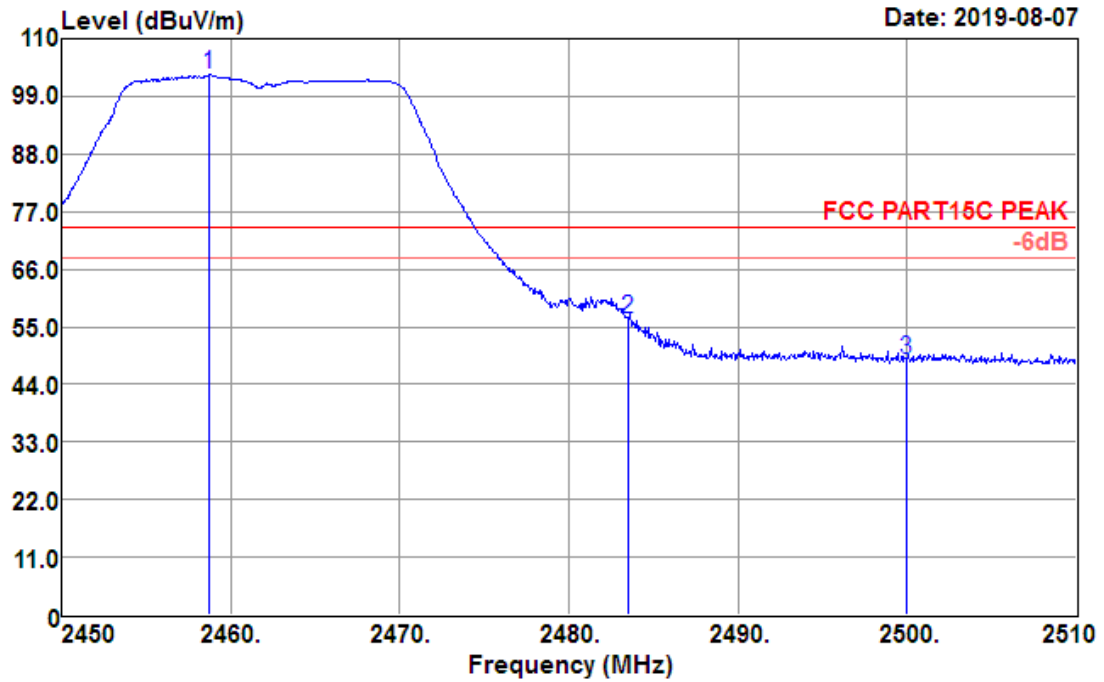
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2310.000	31.33	26.91	4.67	35.43	27.48	54.00	-26.52	Average
2326.875	36.87	26.95	4.69	35.46	33.05	54.00	-20.95	Average
2390.000	35.15	27.11	4.75	35.55	31.46	54.00	-22.54	Average
2406.375	87.71	27.16	4.77	35.57	84.07	54.00	30.07	Average

Test Mode :	802.11n HT20 CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Horizontal

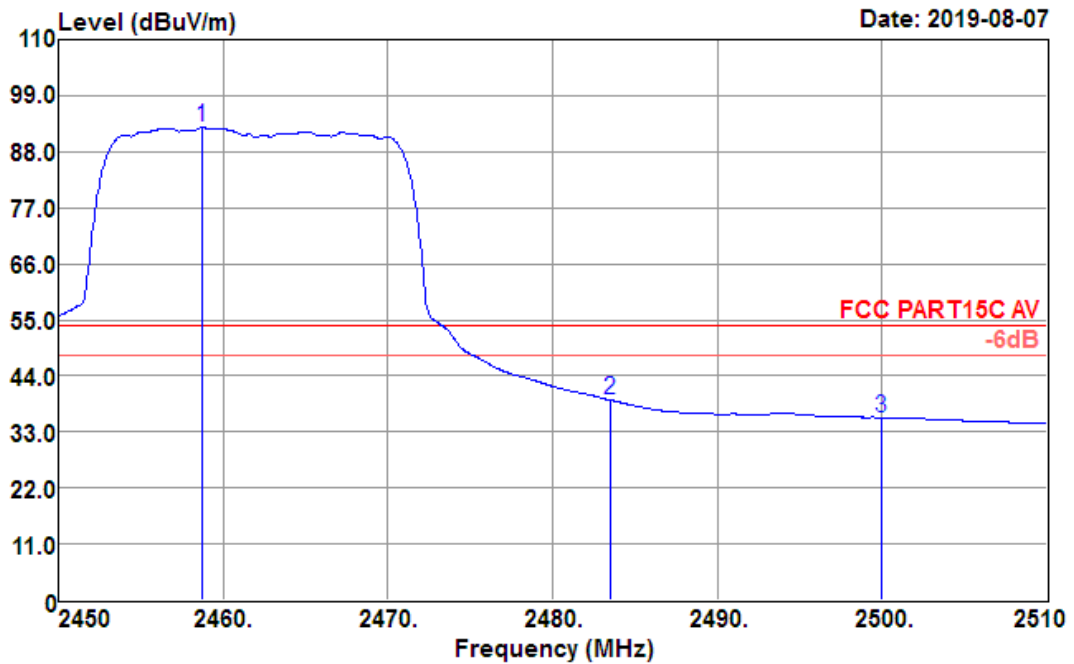
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2458.760	106.70	27.29	4.84	35.64	103.19	74.00	29.19	Peak
2483.480	60.07	27.36	4.87	35.68	56.62	74.00	-17.38	Peak
2500.000	52.05	27.40	4.90	35.70	48.65	74.00	-25.35	Peak

Test Mode :	802.11n HT20 CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Horizontal

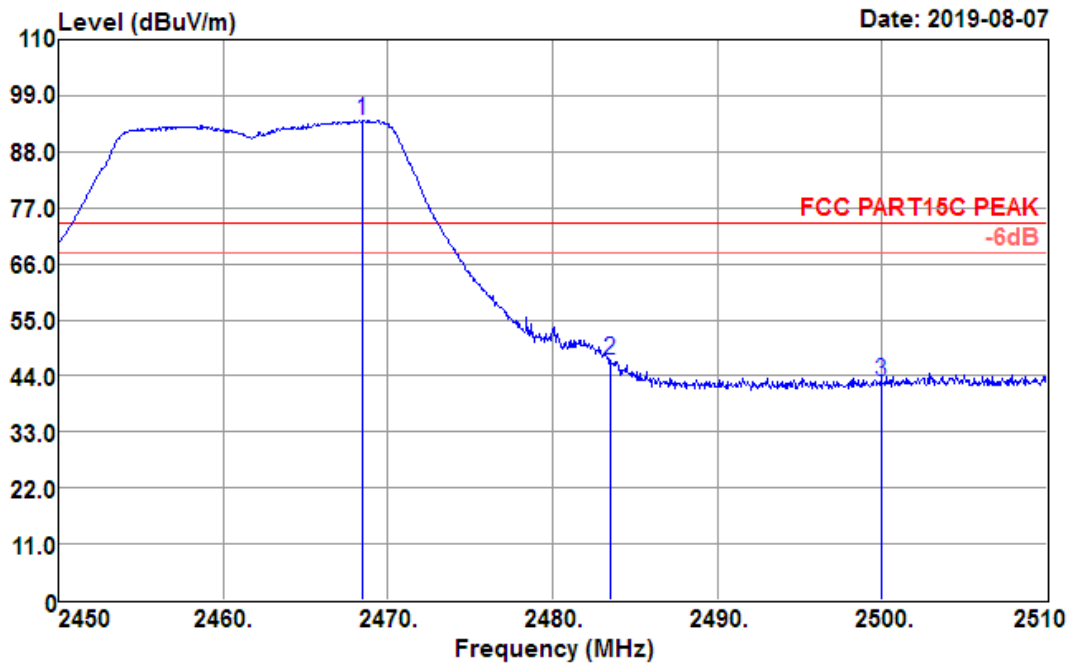
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2458.760	96.27	27.29	4.84	35.64	92.76	54.00	38.76	Average
2483.480	42.71	27.36	4.87	35.68	39.26	54.00	-14.74	Average
2500.000	39.18	27.40	4.90	35.70	35.78	54.00	-18.22	Average

Test Mode :	802.11n HT20 CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Vertical

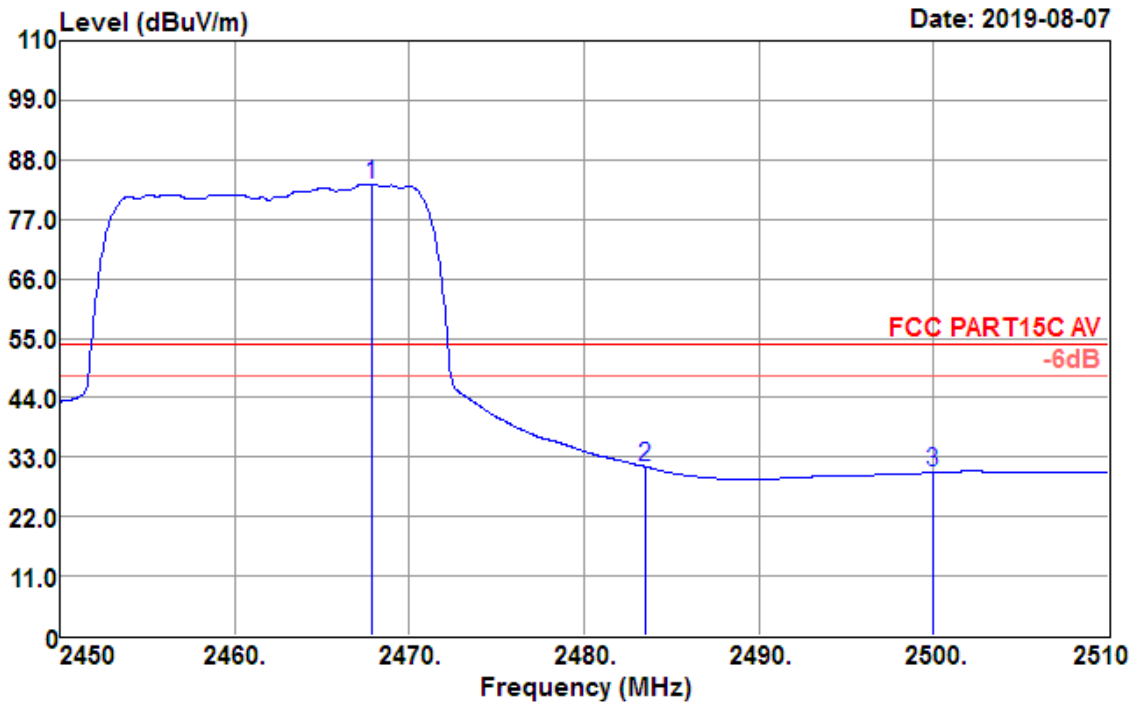
Data: 79



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2468.420	97.54	27.32	4.85	35.66	94.05	74.00	20.05	Peak
2483.480	50.58	27.36	4.87	35.68	47.13	74.00	-26.87	Peak
2500.000	46.31	27.40	4.90	35.70	42.91	74.00	-31.09	Peak

Test Mode :	802.11n HT20 CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	2.45GHz~2.51GHz	Polarization :	Vertical

Data: 80

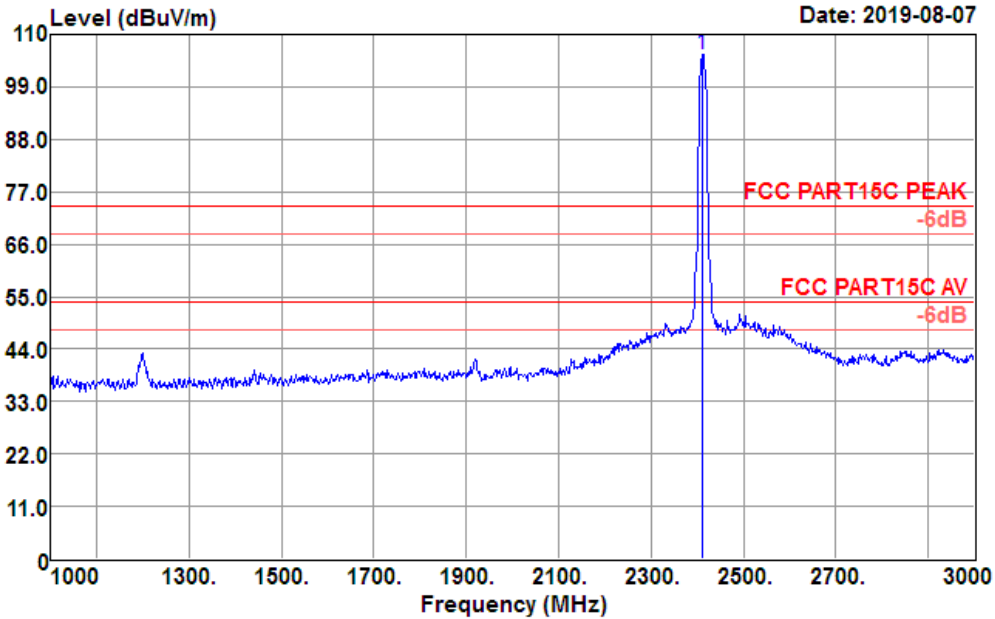


Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2467.820	86.89	27.32	4.85	35.65	83.41	54.00	29.41	Average
2483.480	34.71	27.36	4.87	35.68	31.26	54.00	-22.74	Average
2500.000	33.53	27.40	4.90	35.70	30.13	54.00	-23.87	Average

4.5.5 Test Result of Radiated Spurious Emission (1GHz ~ 10th Harmonic)

Test Mode :	802.11b CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Horizontal

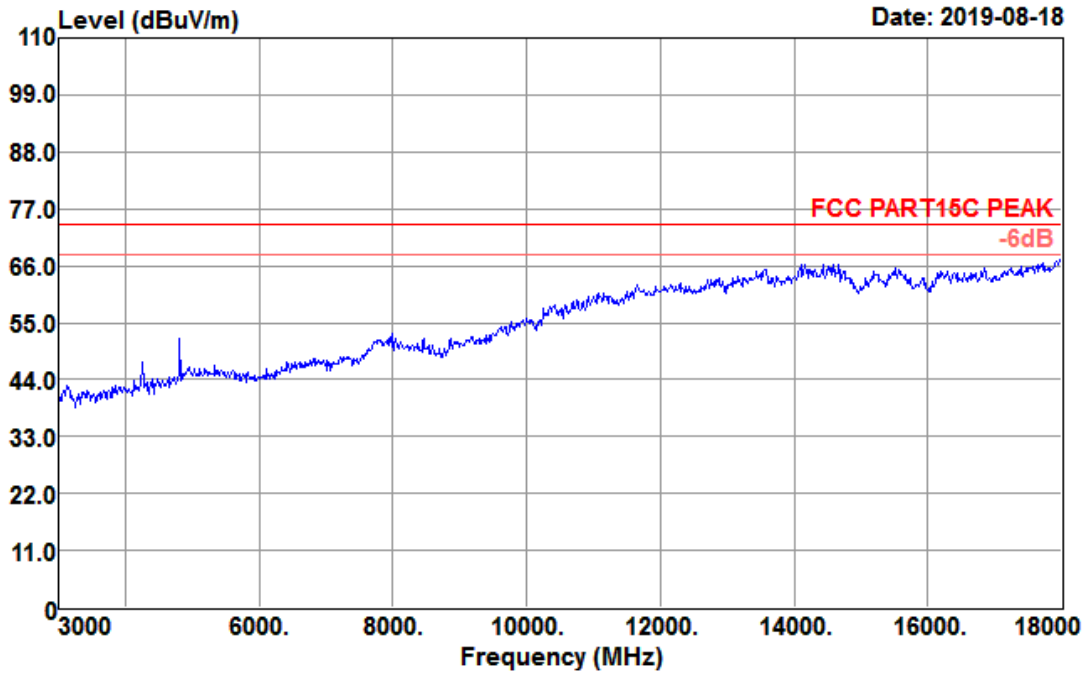
Data: 24

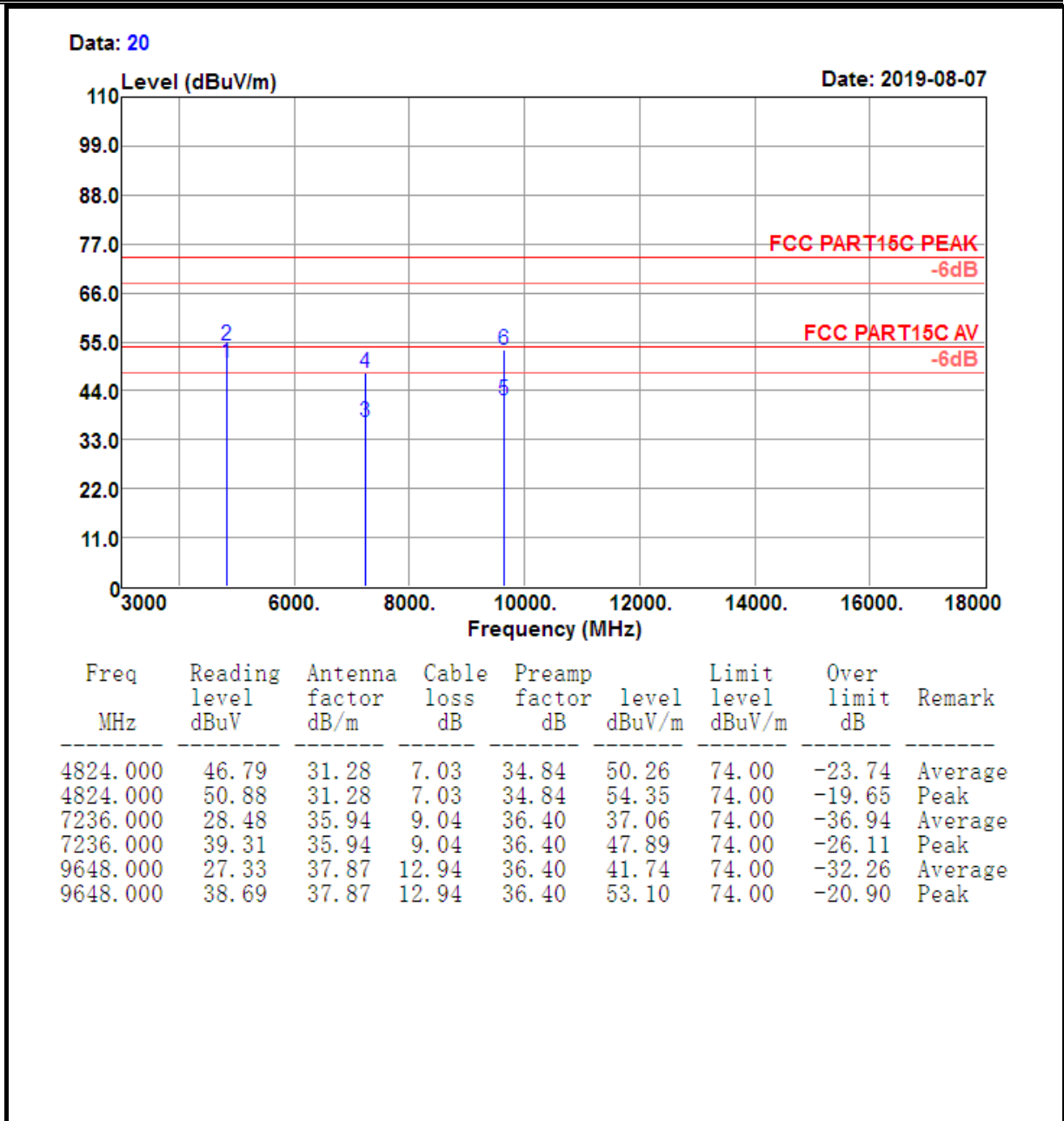


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2412.000	109.41	27.17	4.78	35.58	105.78	74.00	31.78	Peak

Test Mode :	802.11b CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Horizontal

Data: 19

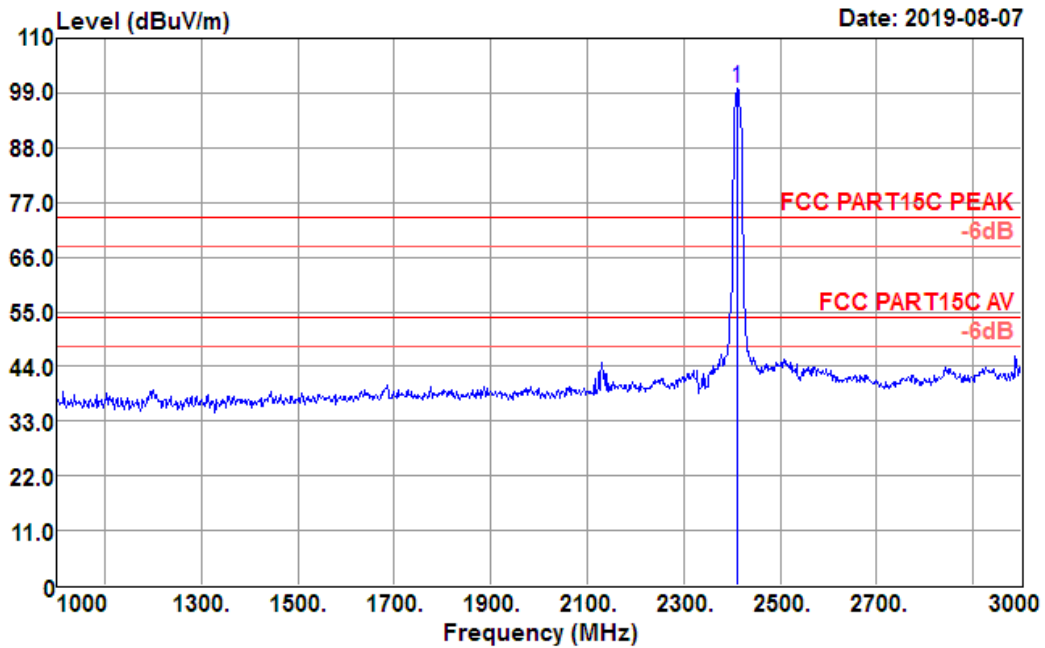




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

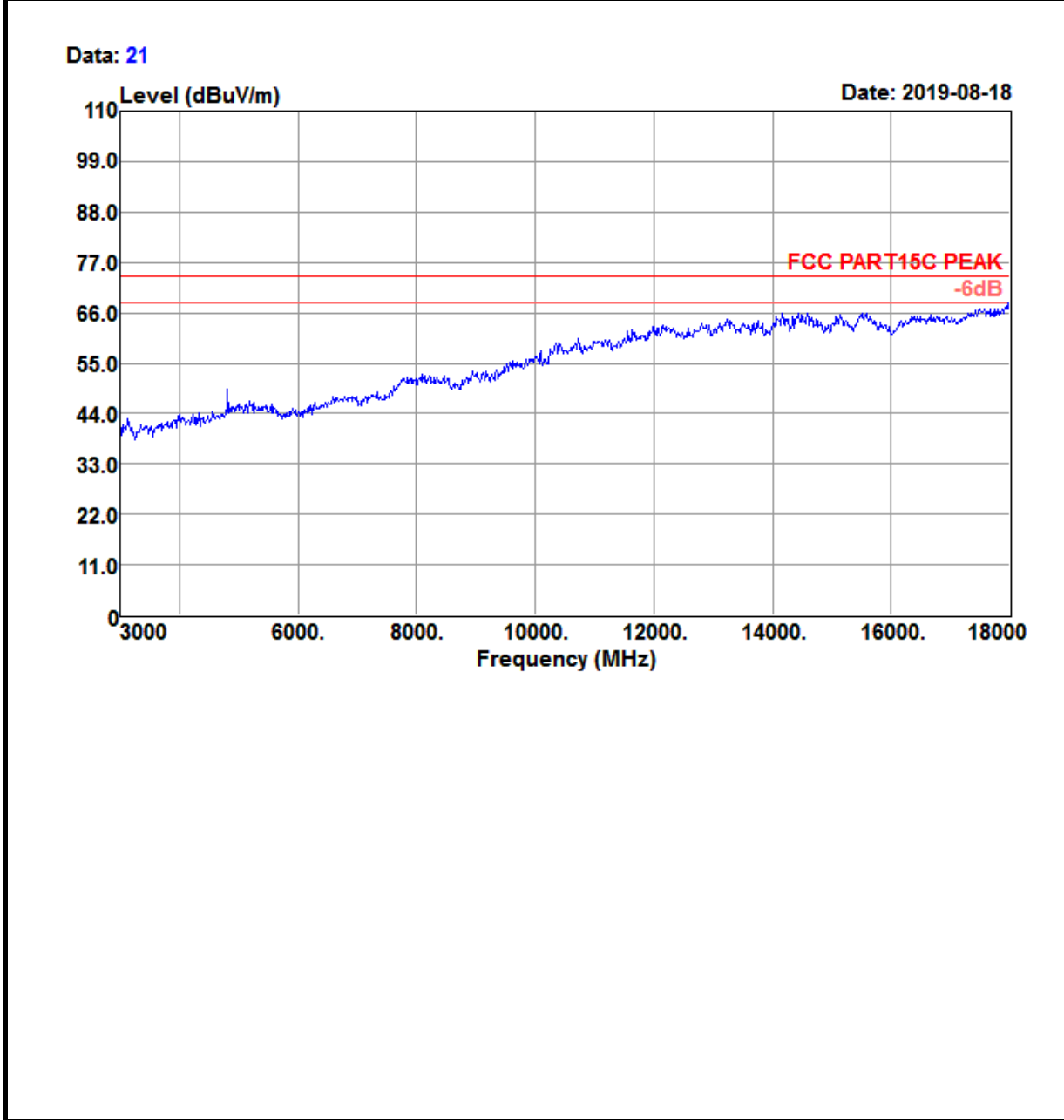
Test Mode :	802.11b CH01 (2412 MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Vertical

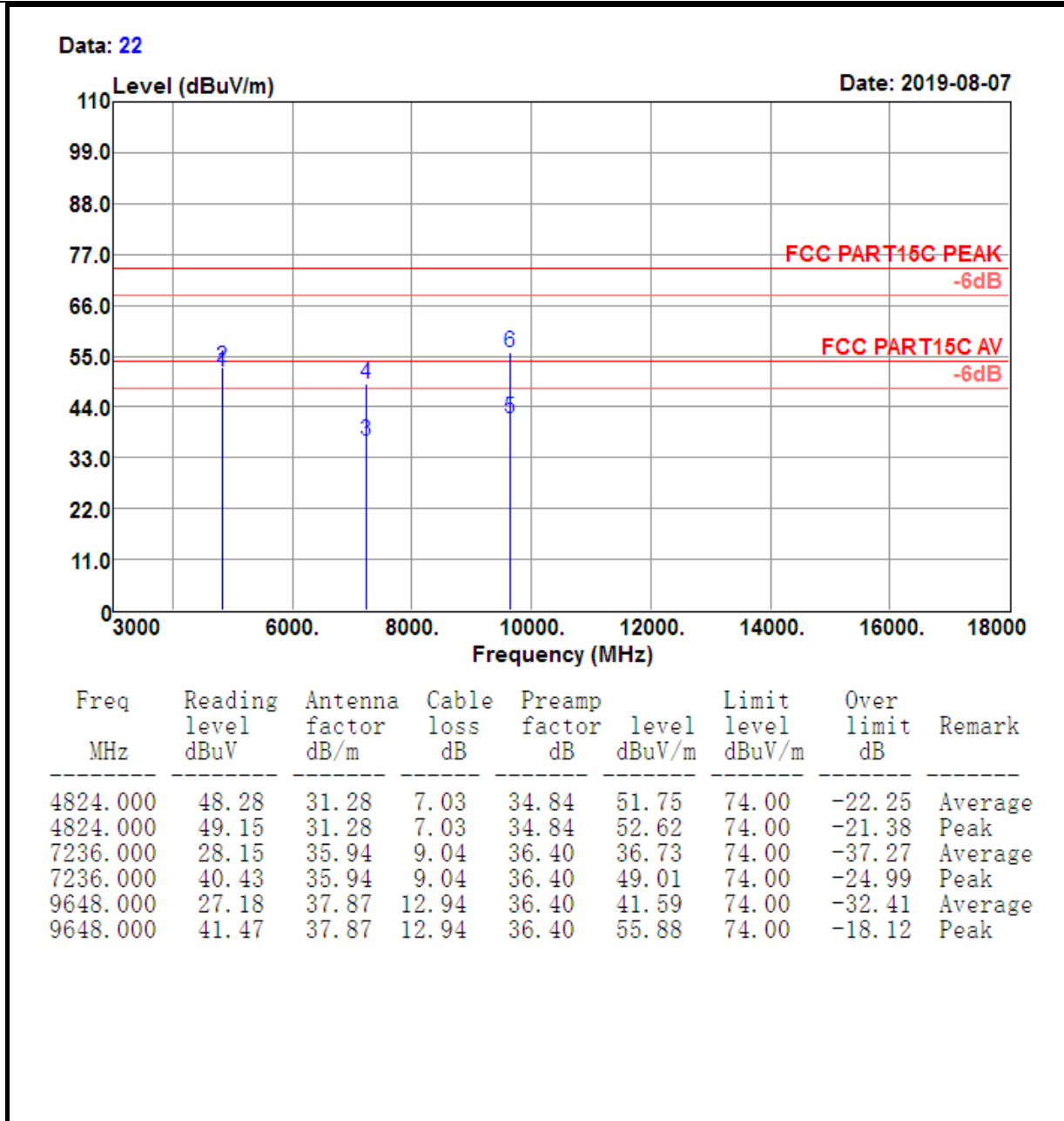
Data: 23



Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2412.000	103.47	27.17	4.78	35.58	99.84	74.00	25.84	Peak

Test Mode :	802.11b CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Vertical

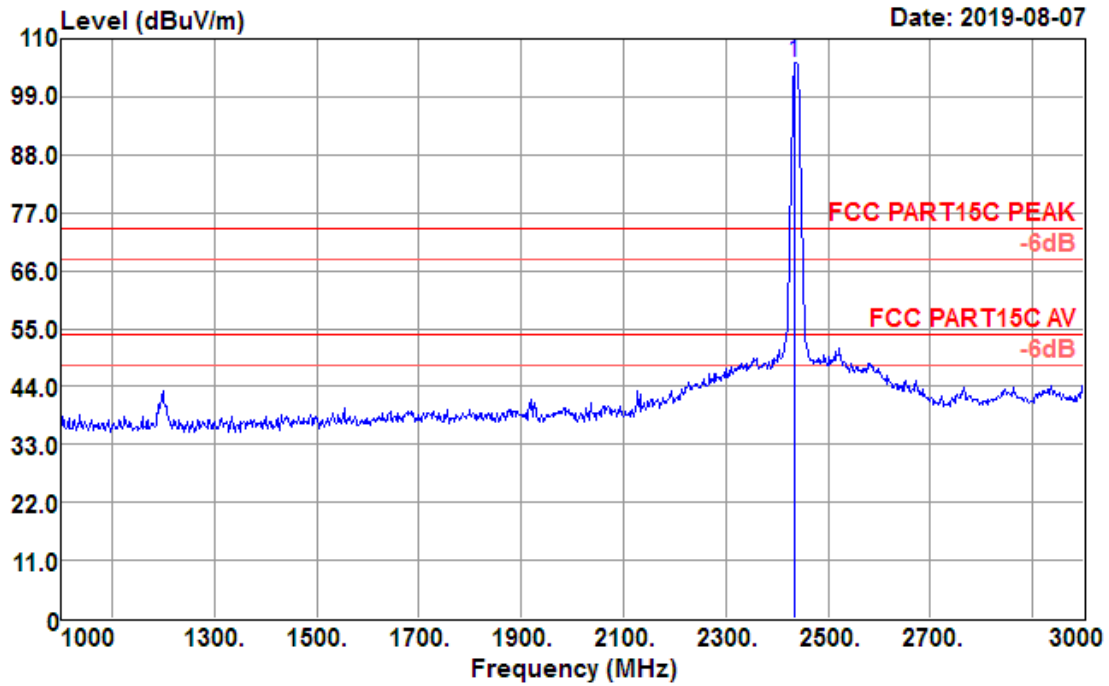




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

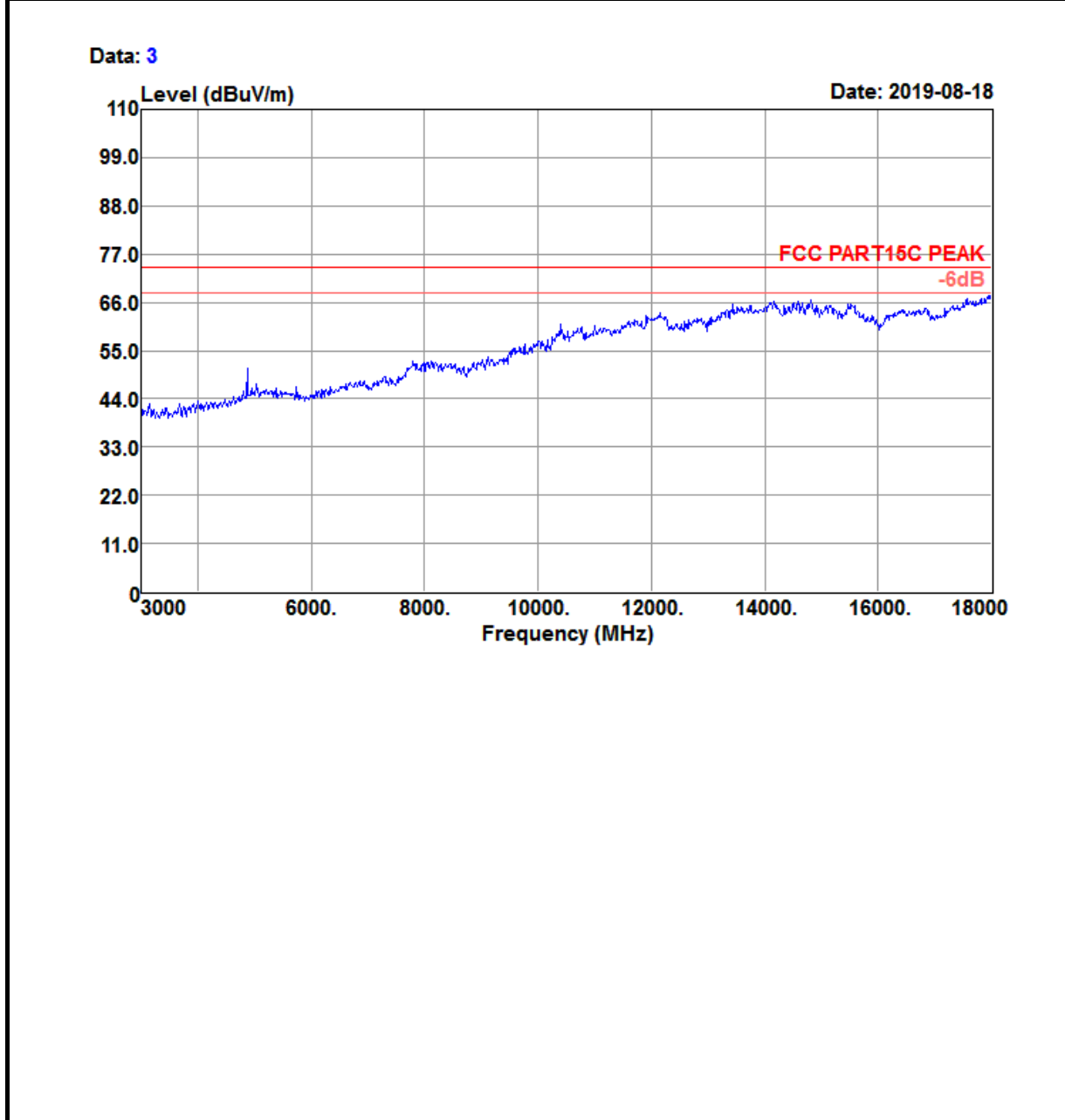
Test Mode :	802.11b CH06 (2437MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Horizontal

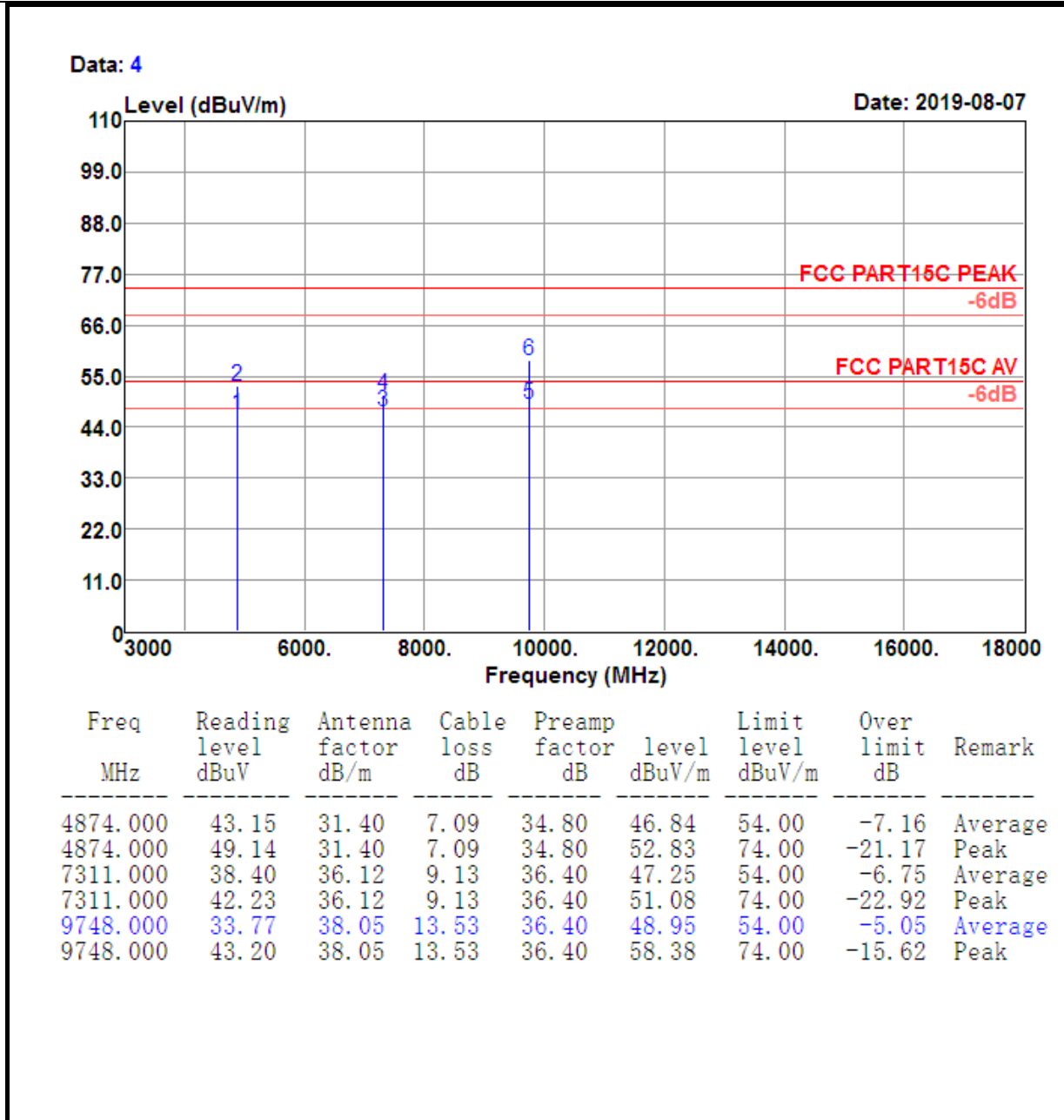
Data: 7



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2436.000	108.96	27.23	4.81	35.61	105.39	74.00	31.39	Peak

Test Mode :	802.11b CH06 (2437MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Horizontal

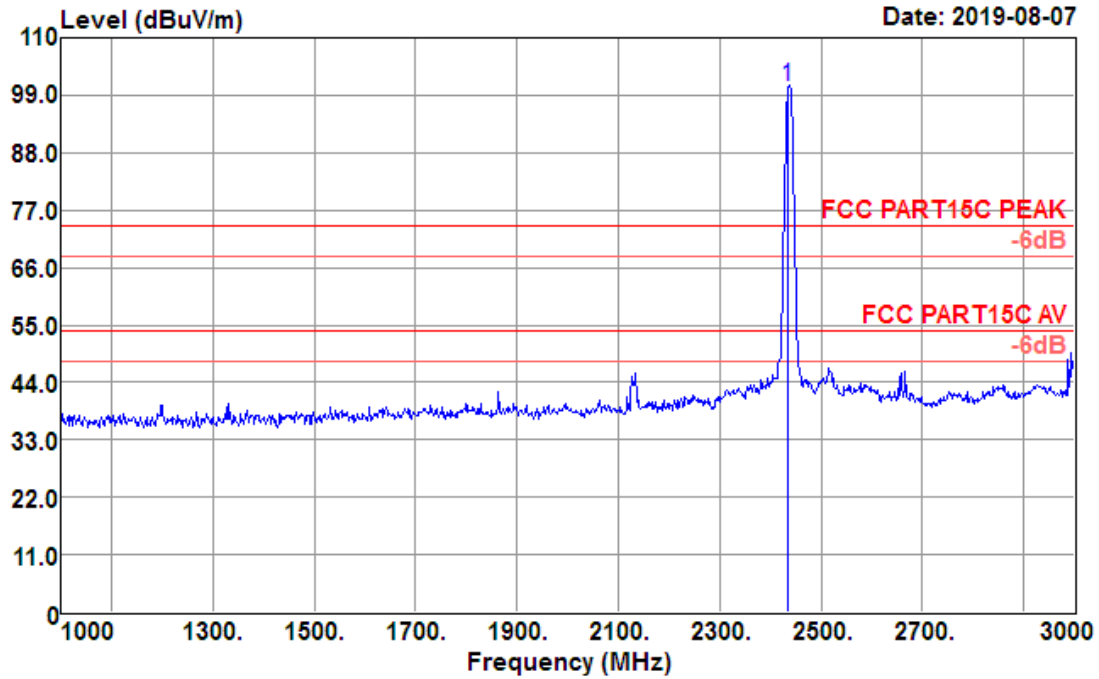




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11b CH06 (2437MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Vertical

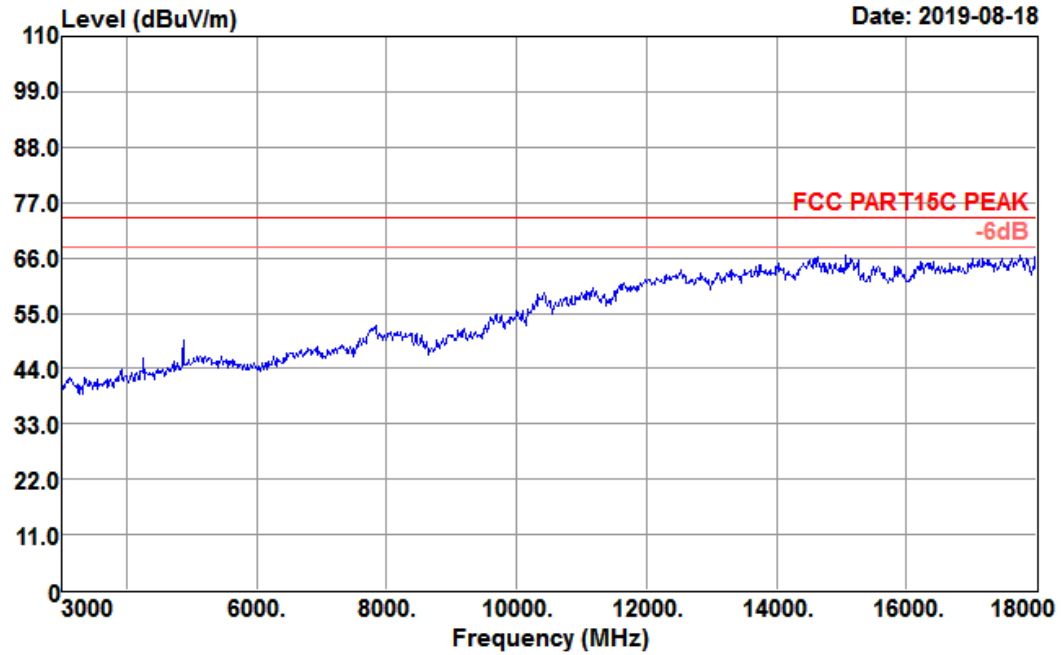
Data: 8

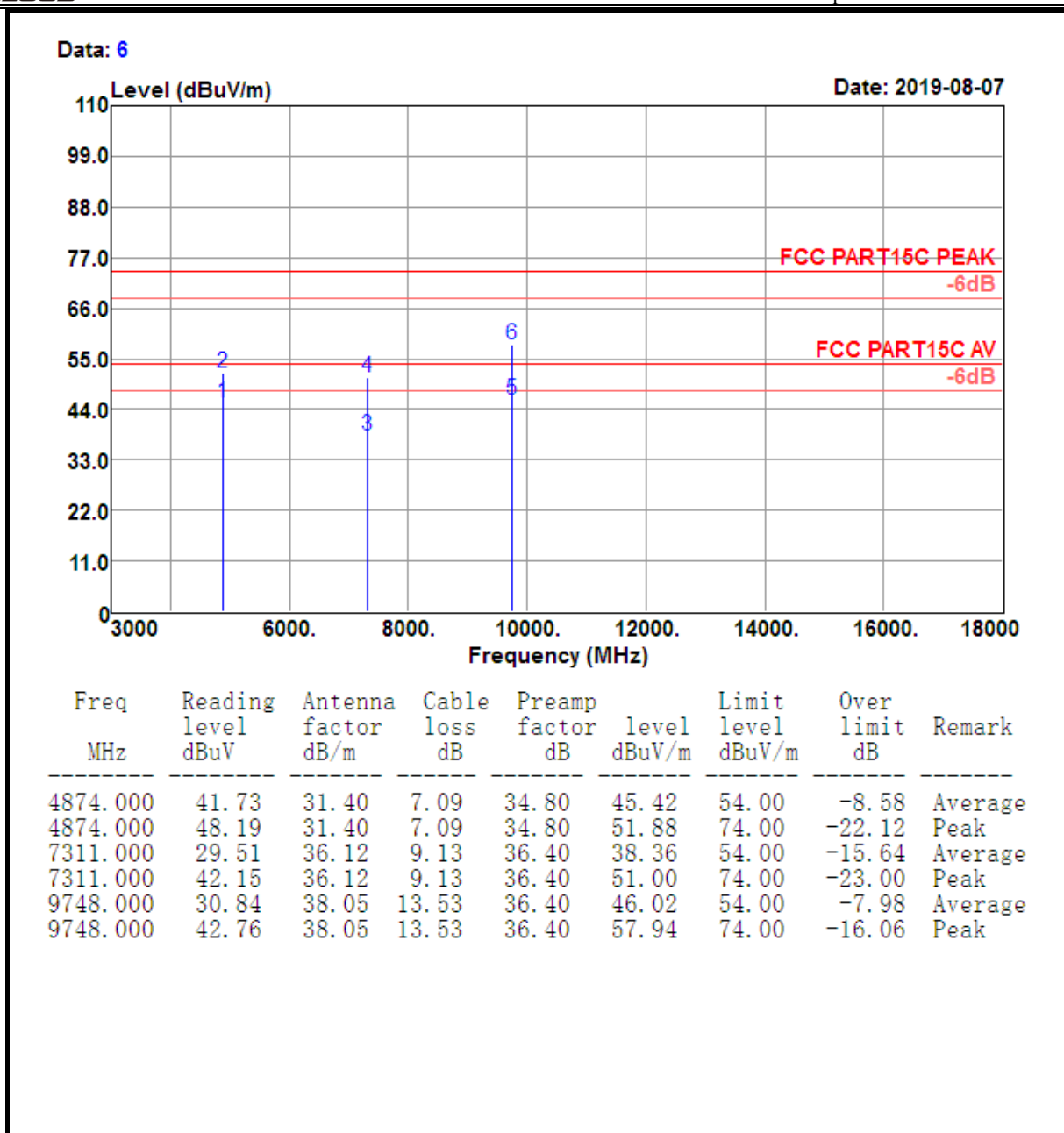


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2436.000	104.10	27.23	4.81	35.61	100.53	74.00	26.53	Peak

Test Mode :	802.11b CH06 (2437MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Vertical

Data: 5

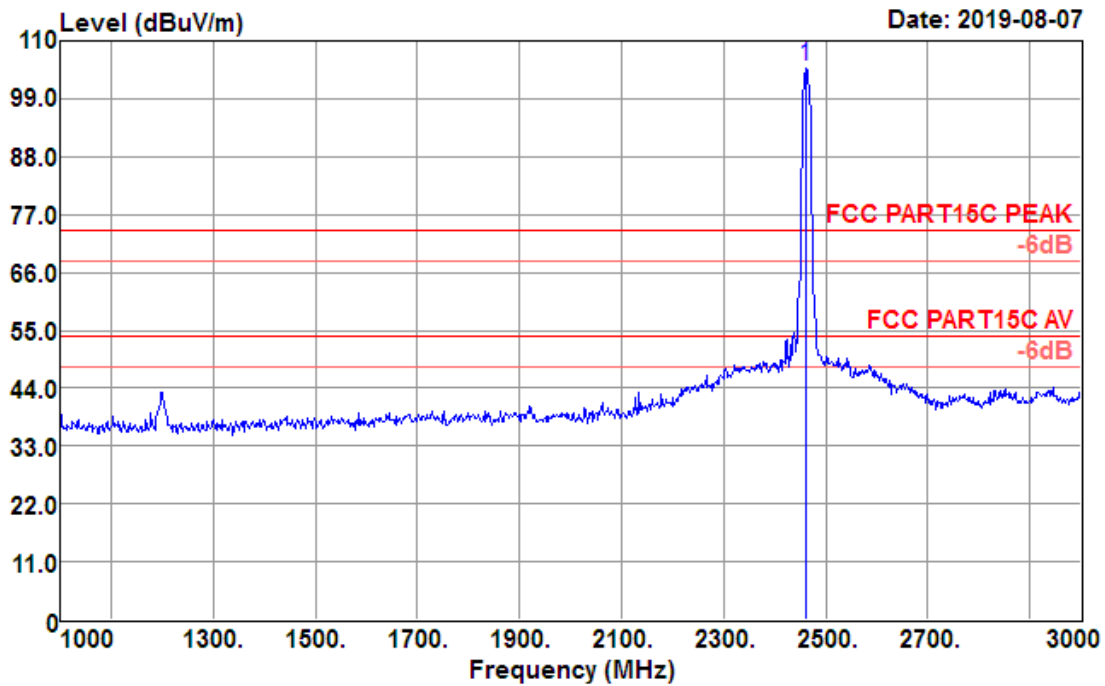




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

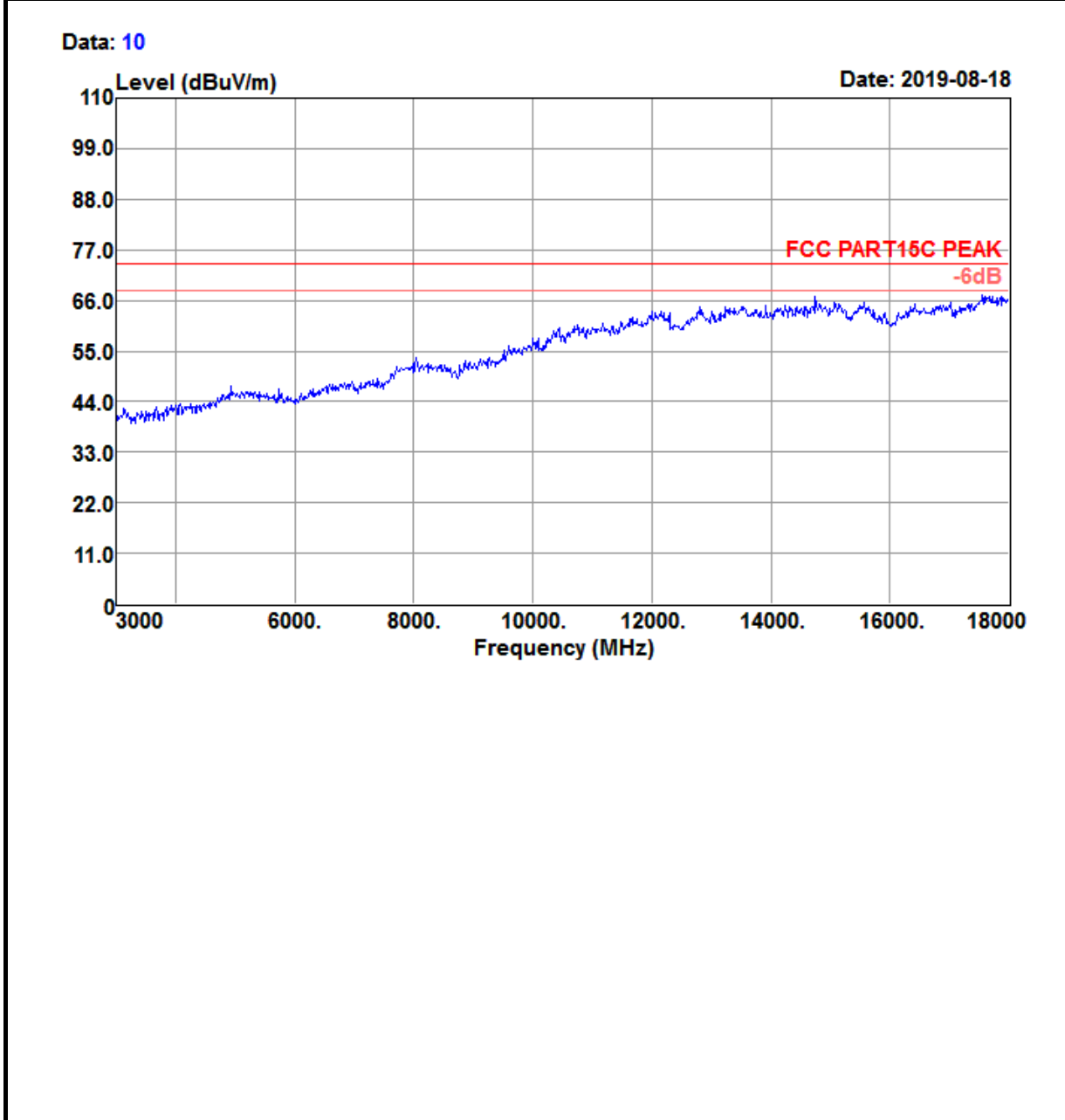
Test Mode :	802.11b CH11 (2462MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Horizontal

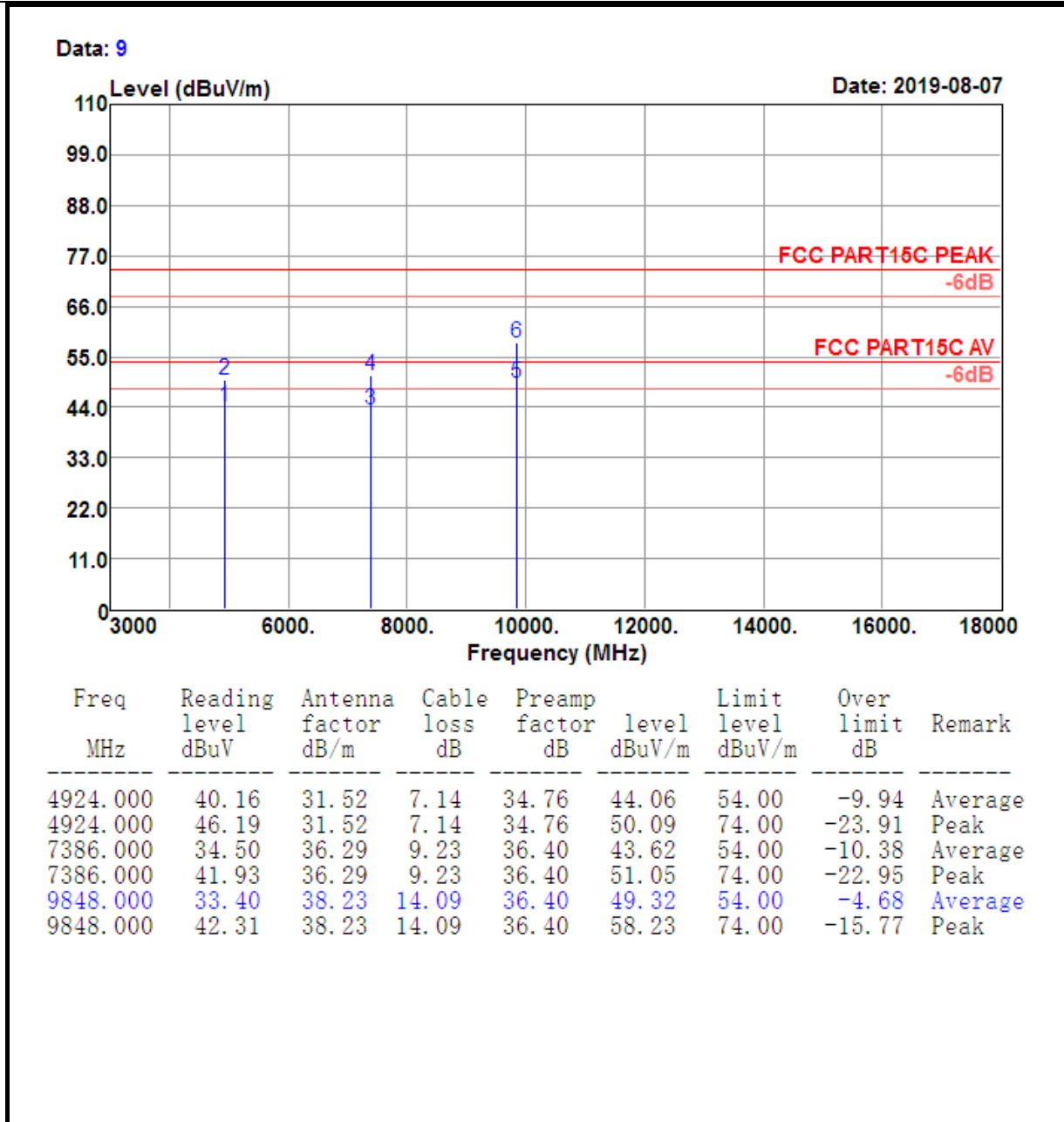
Data: 14



Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2462.000	108.47	27.30	4.84	35.65	104.96	74.00	30.96	Peak

Test Mode :	802.11b CH11 (2462MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Horizontal

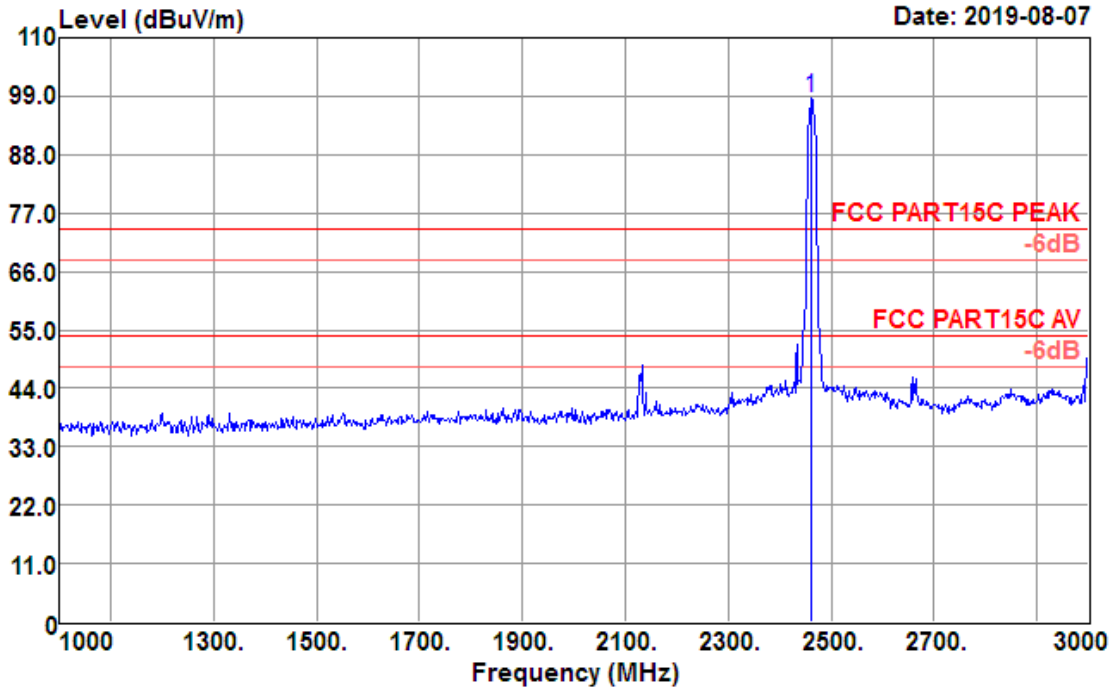




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11b CH11 (2462MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Vertical

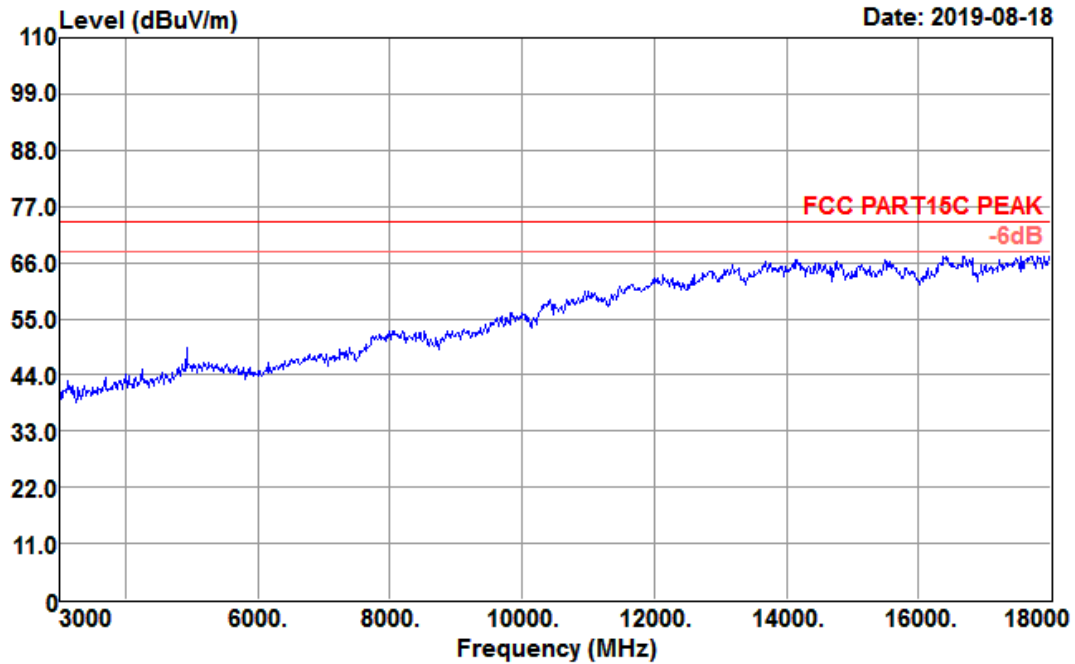
Data: 15

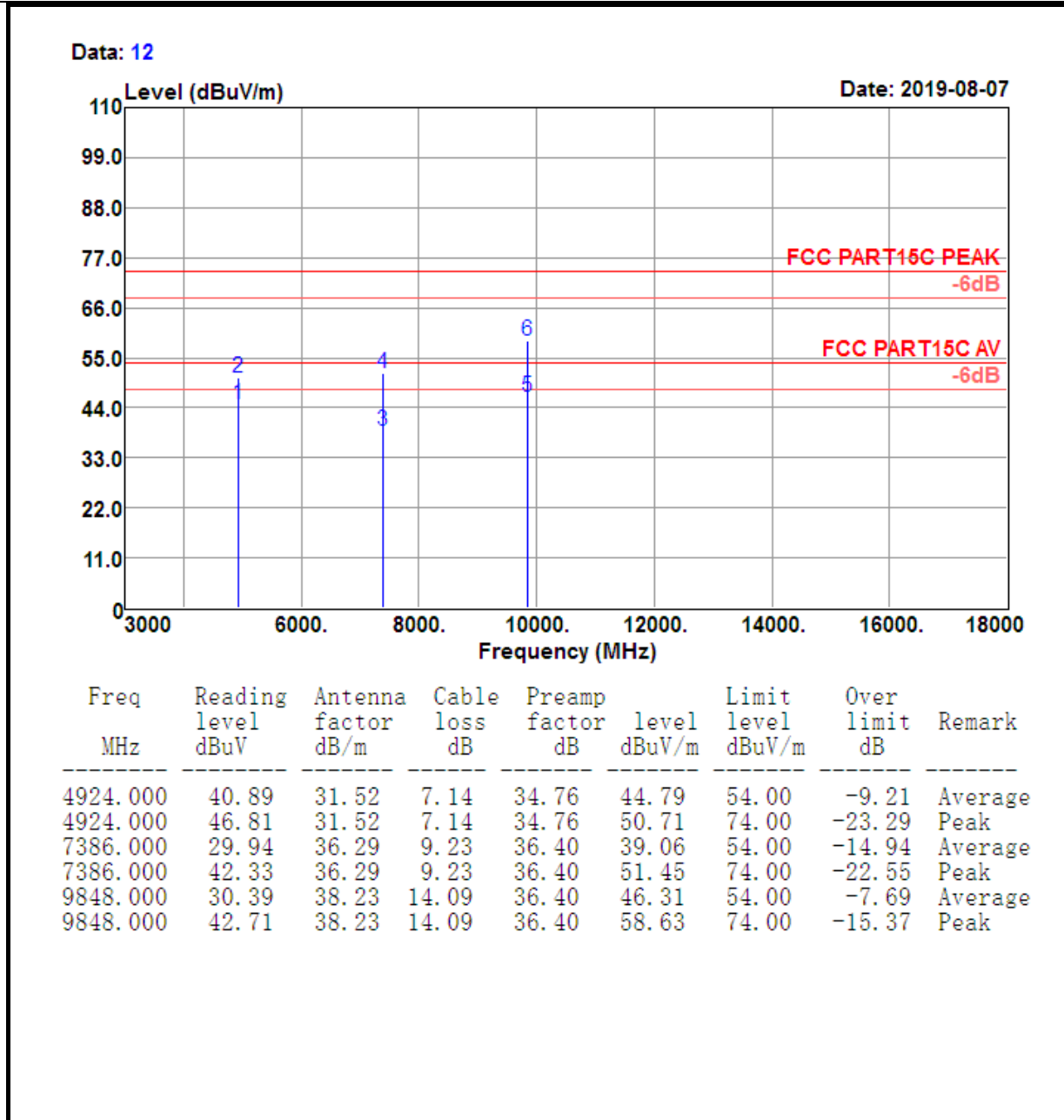


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2462.000	102.07	27.30	4.84	35.65	98.56	74.00	24.56	Peak

Test Mode :	802.11b CH11 (2462MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Vertical

Data: 11

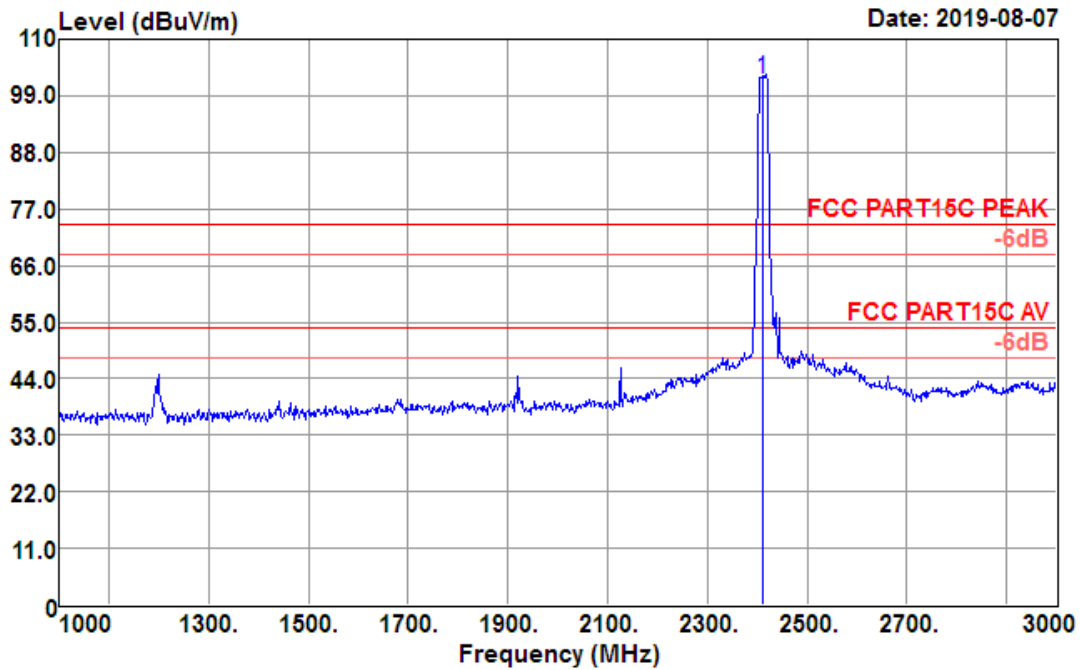




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

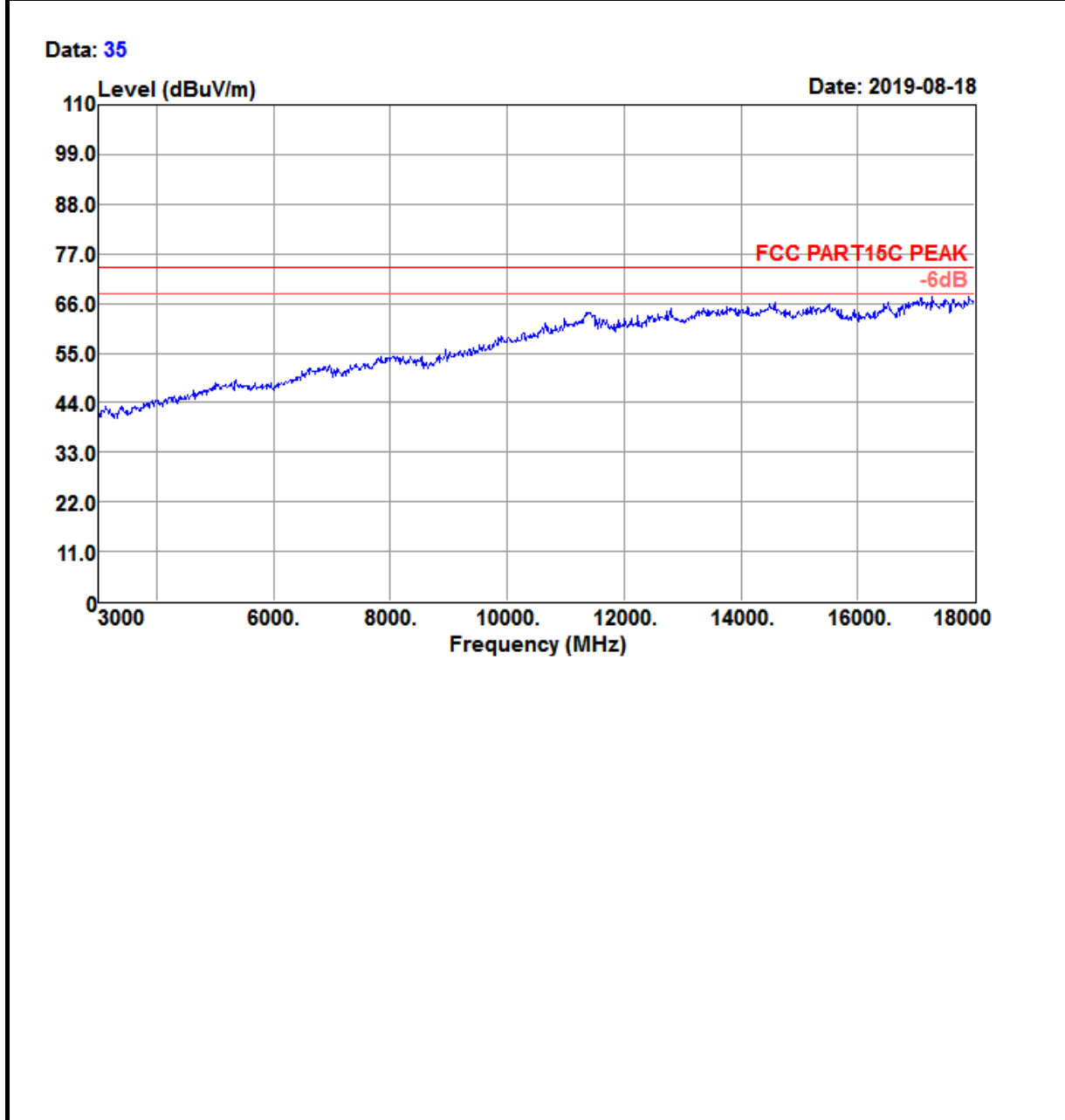
Test Mode :	802.11g CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Horizontal

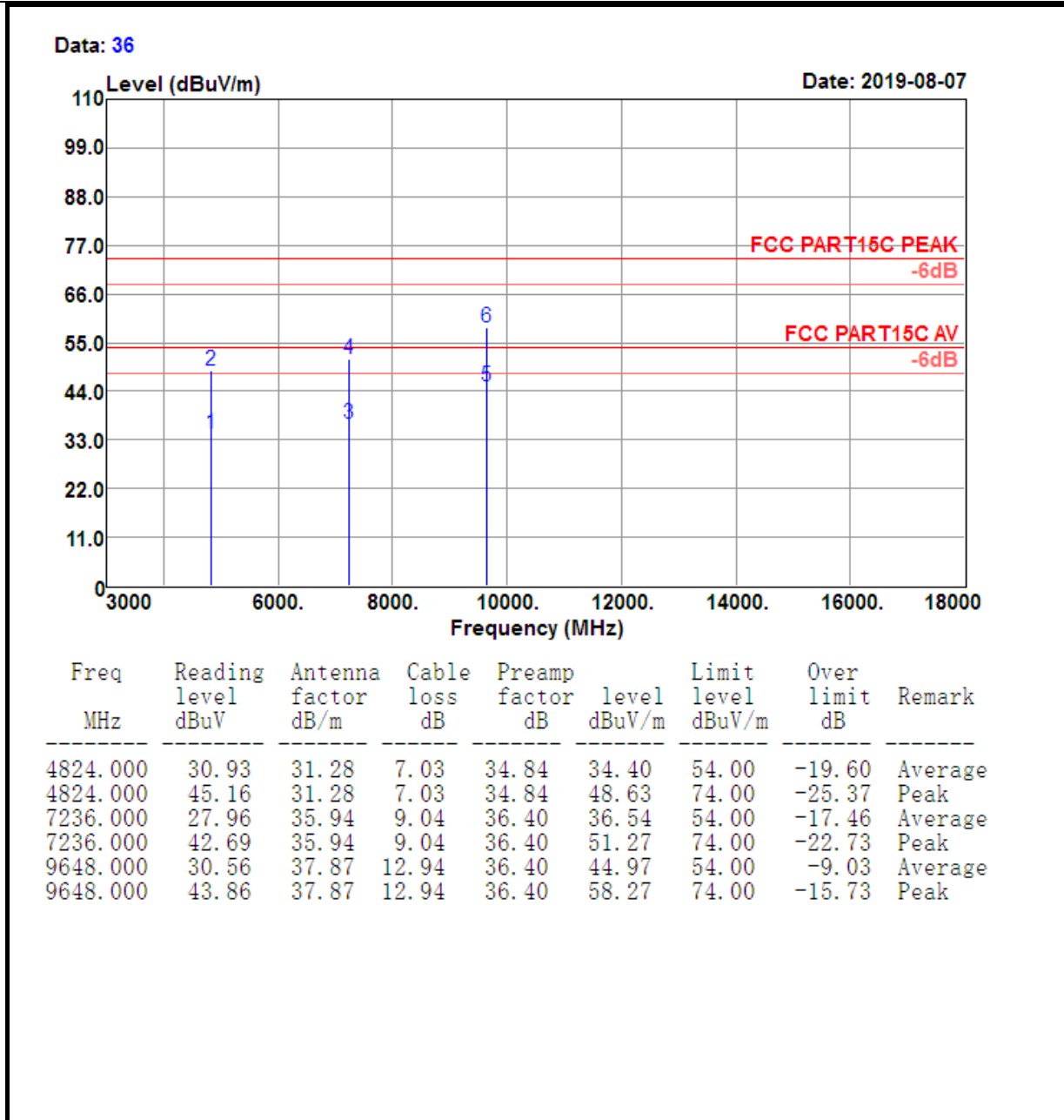
Data: 30



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2412.000	105.72	27.17	4.78	35.58	102.09	74.00	28.09	Peak

Test Mode :	802.11g CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Horizontal

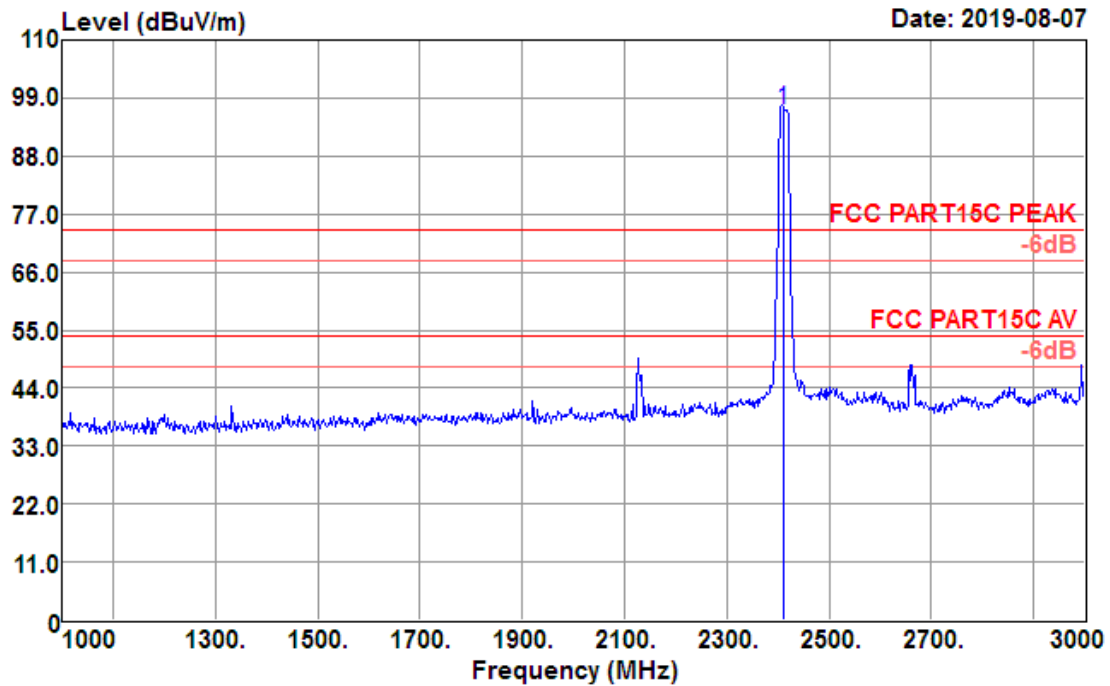




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11g CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Vertical

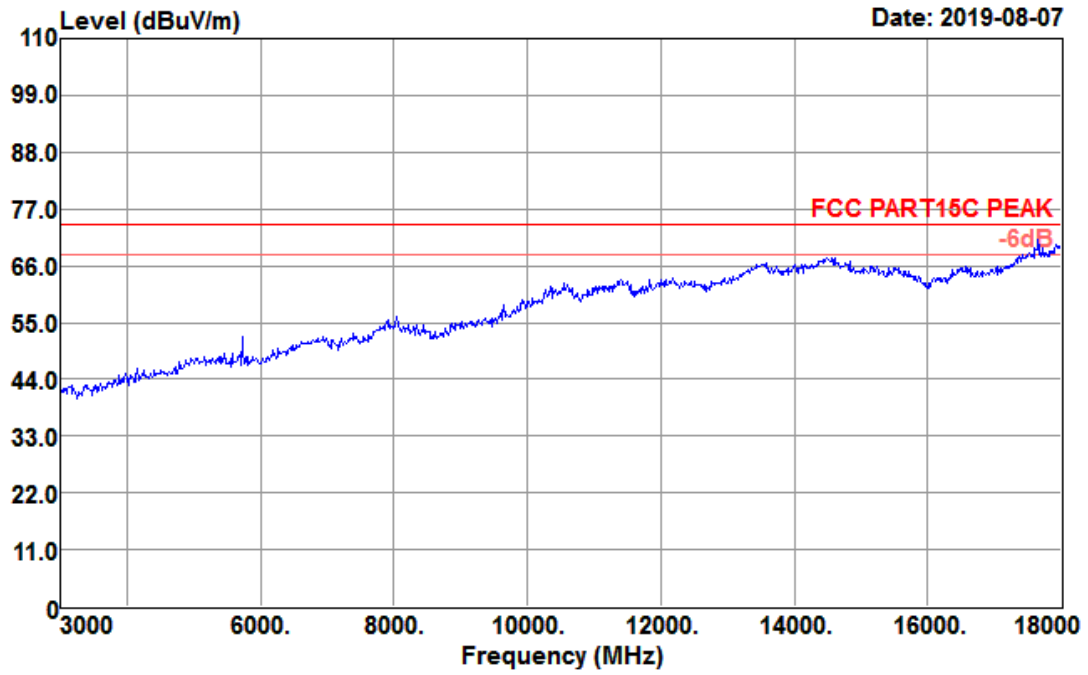
Data: 29

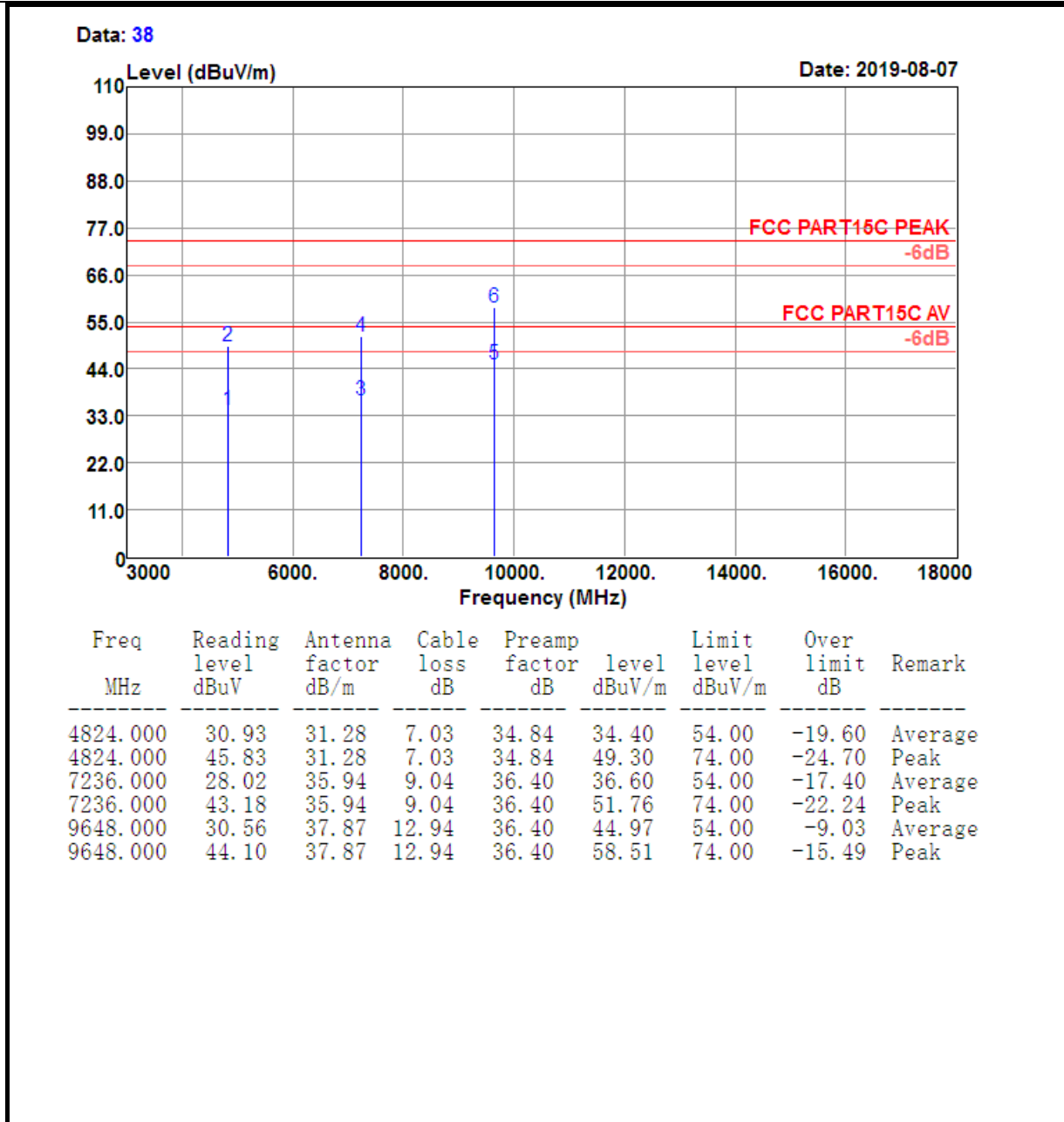


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2412.000	100.36	27.17	4.78	35.58	96.73	74.00	22.73	Peak

Test Mode :	802.11g CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Vertical

Data: 37

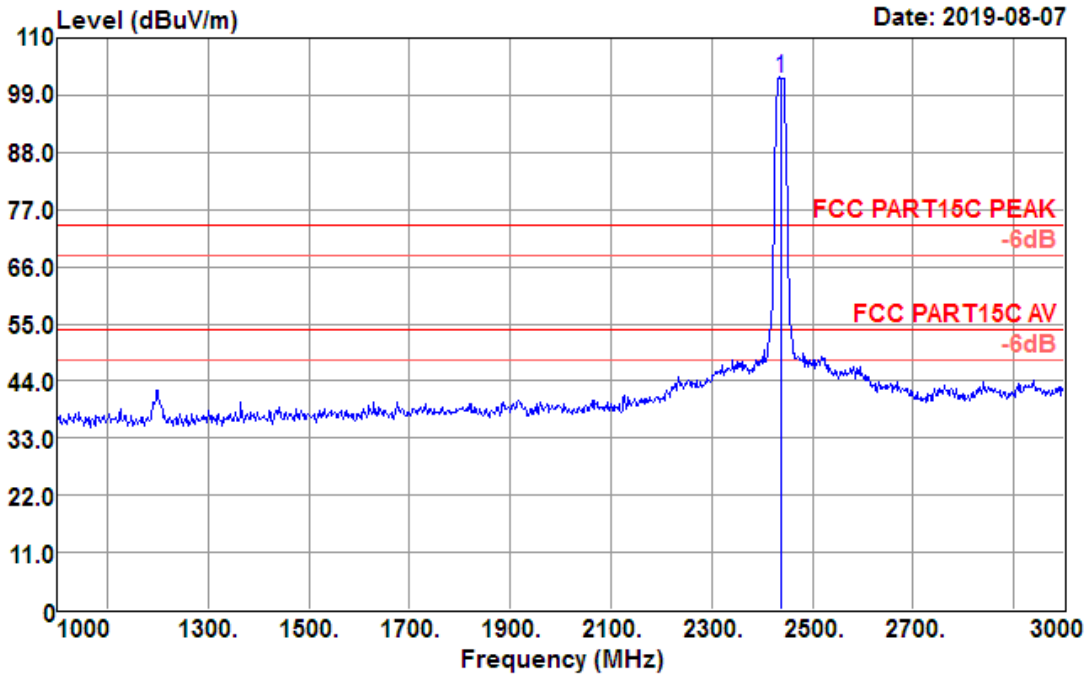




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11g CH06 (2437MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Horizontal

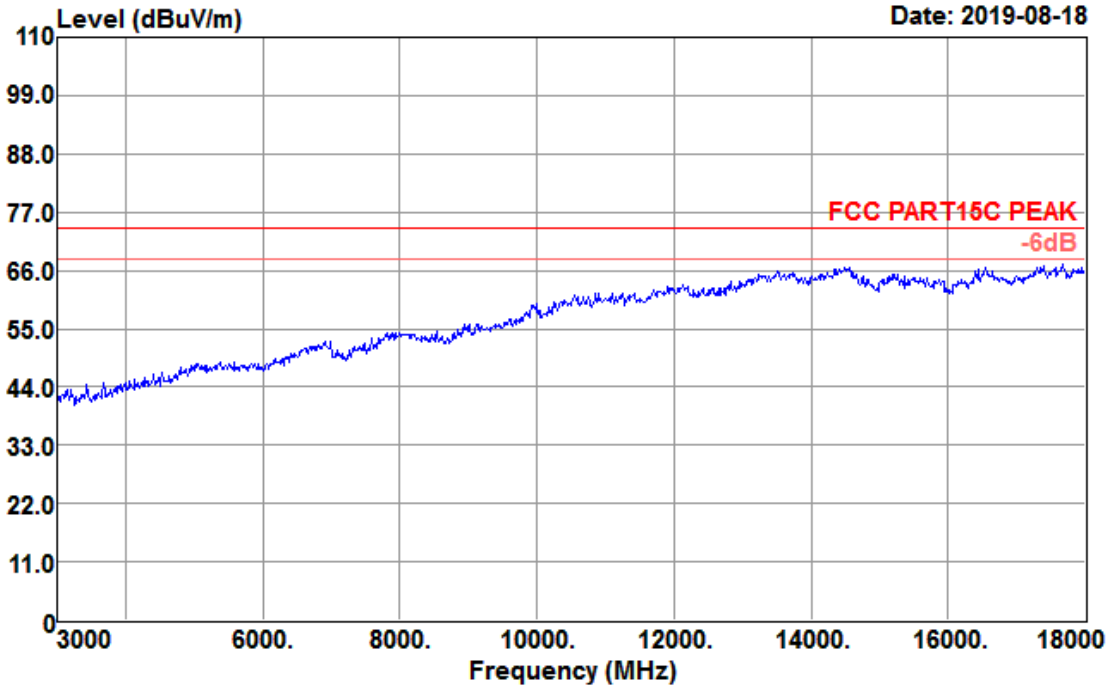
Data: 31

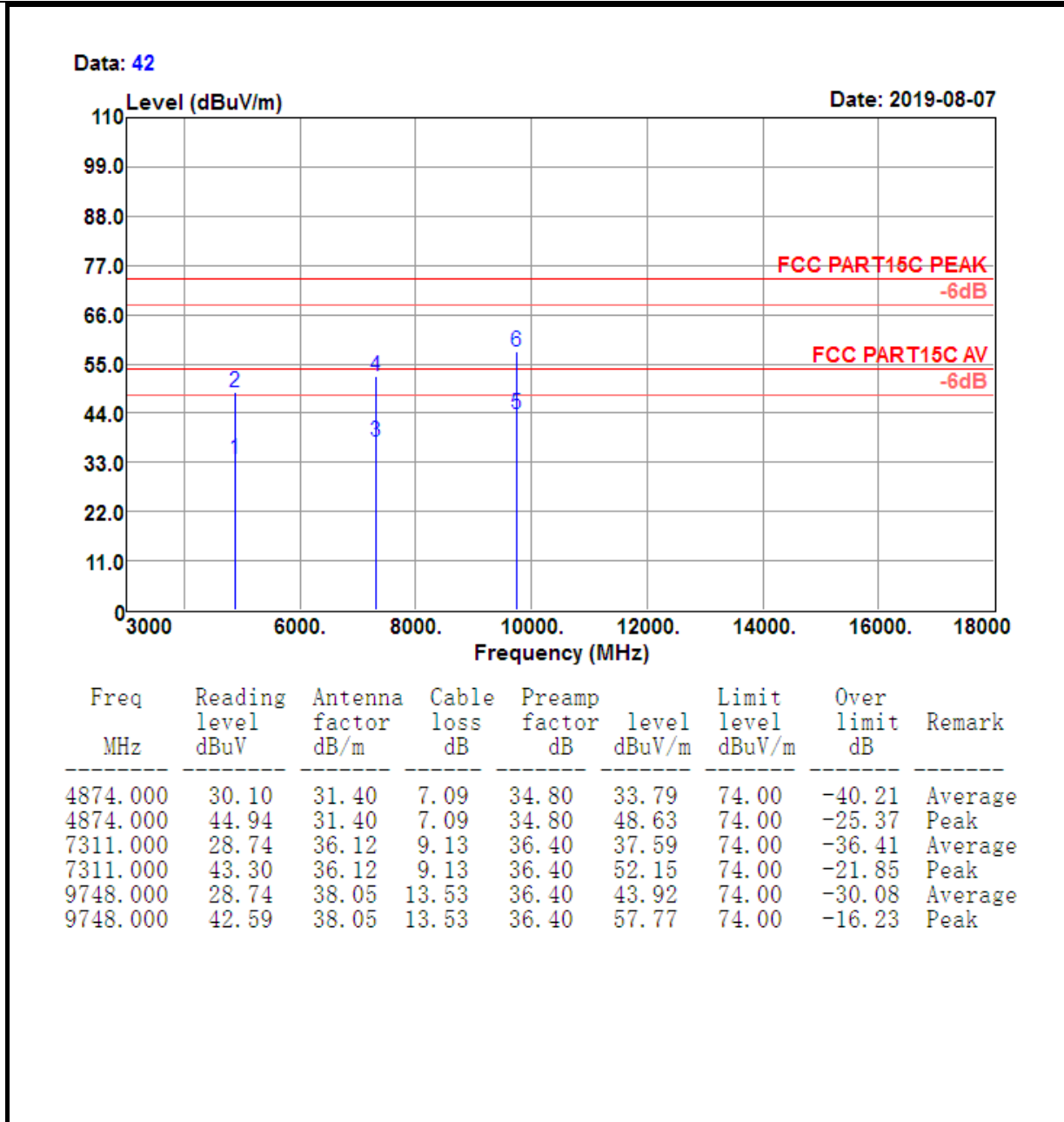


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2437.000	105.65	27.24	4.81	35.61	102.09	74.00	28.09	Peak

Test Mode :	802.11g CH06 (2437MHz)	Temperature :	24~26℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Horizontal

Data: 41

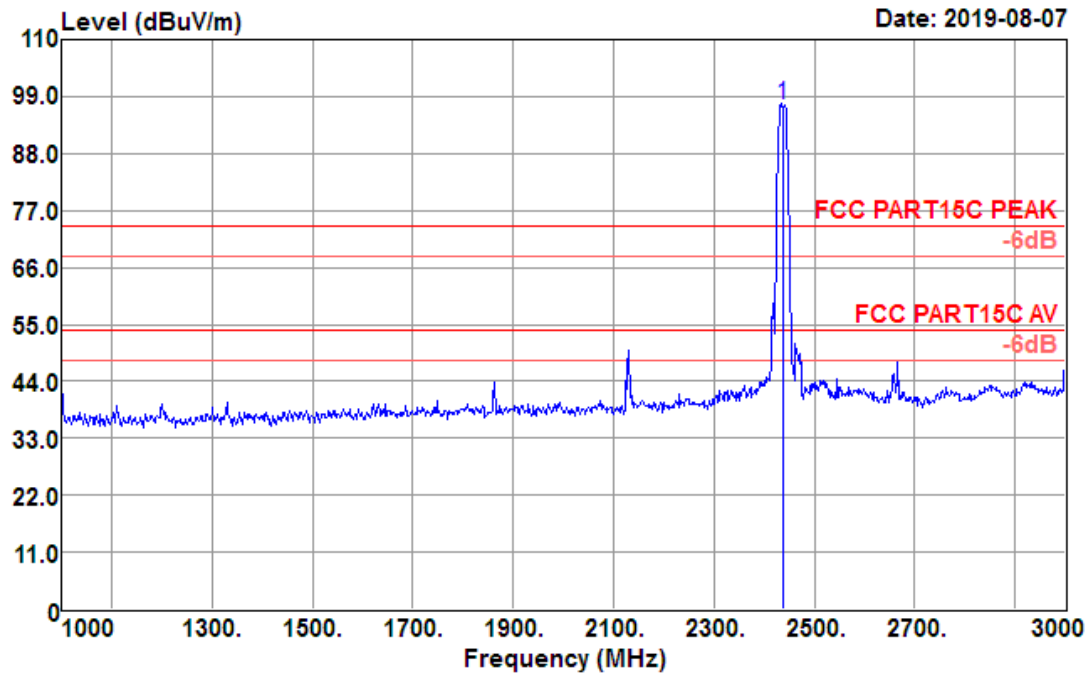




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11g CH06 (2437MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Vertical

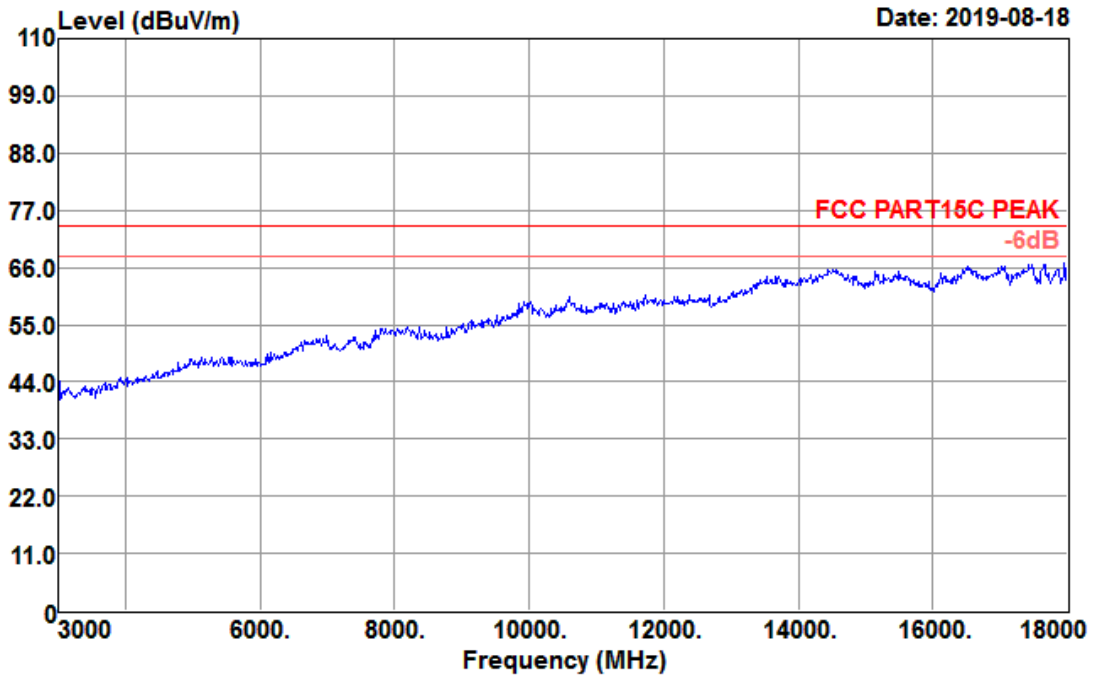
Data: 32

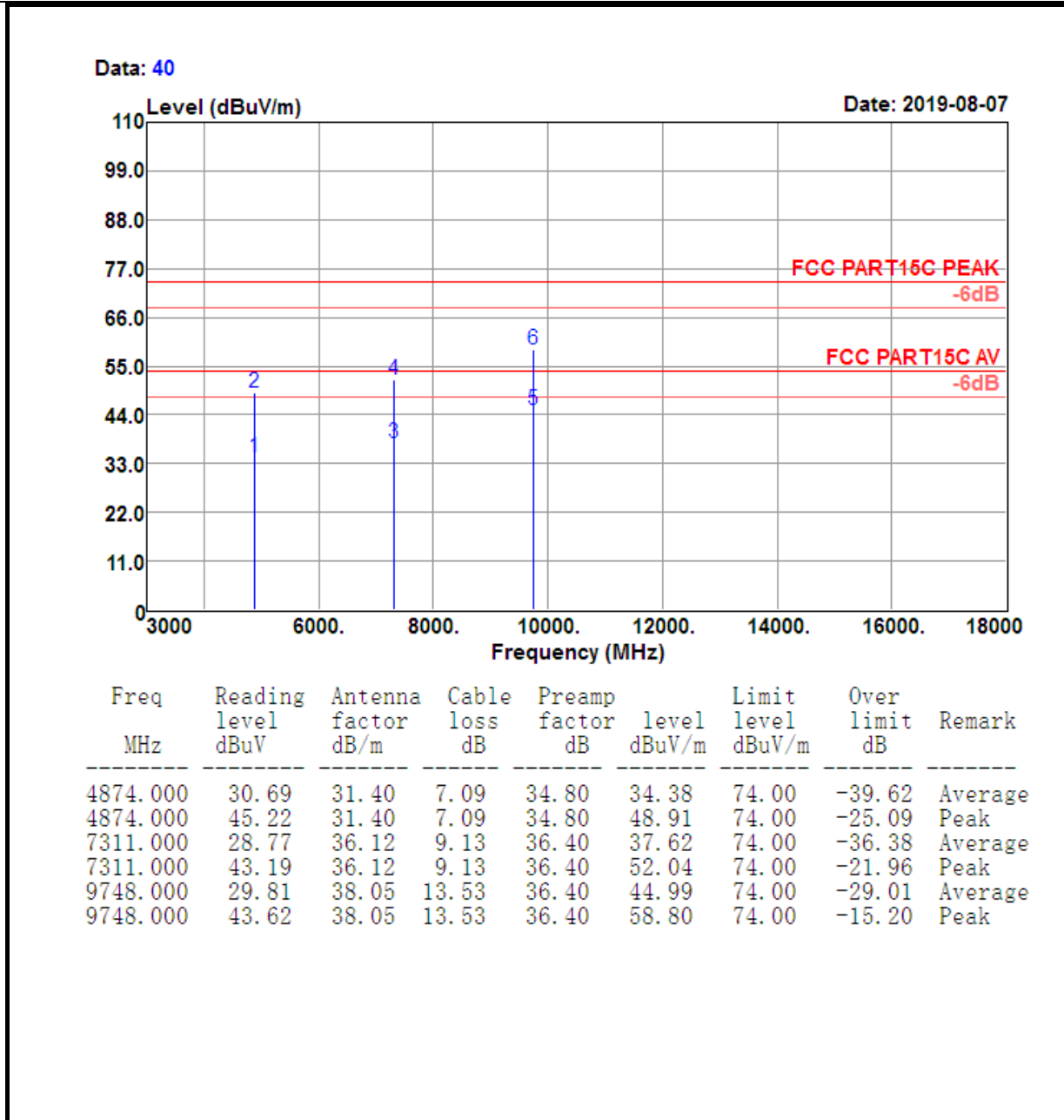


Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2437.000	100.98	27.24	4.81	35.61	97.42	74.00	23.42	Peak

Test Mode :	802.11g CH06 (2437MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Vertical

Data: 39

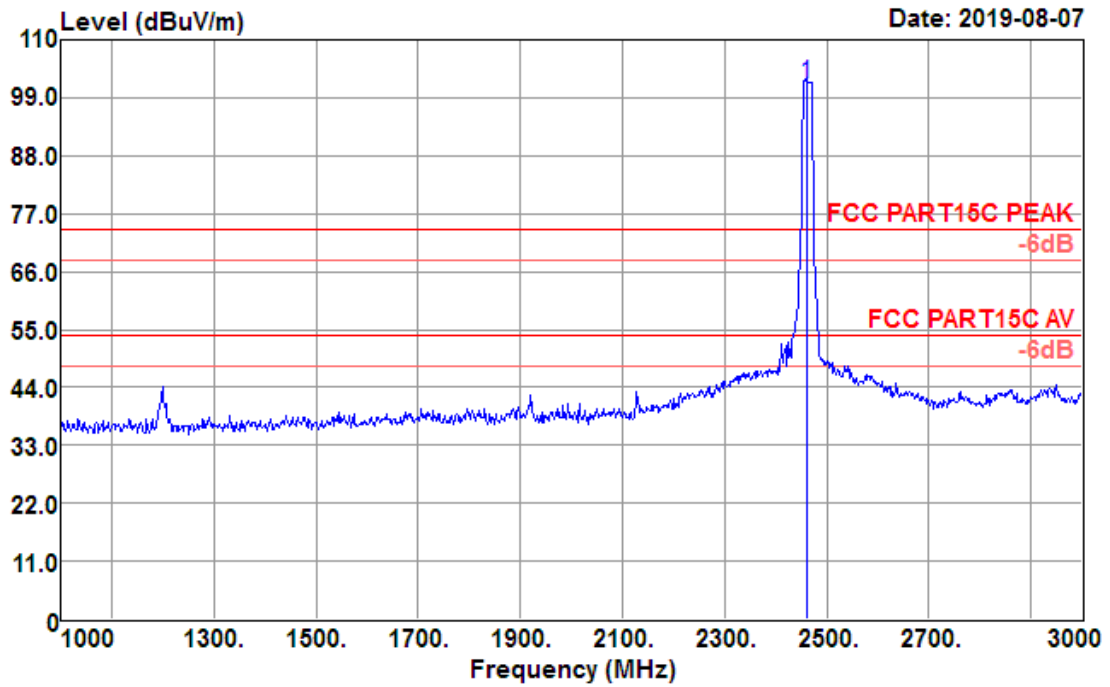




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11g CH11 (2462MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Horizontal

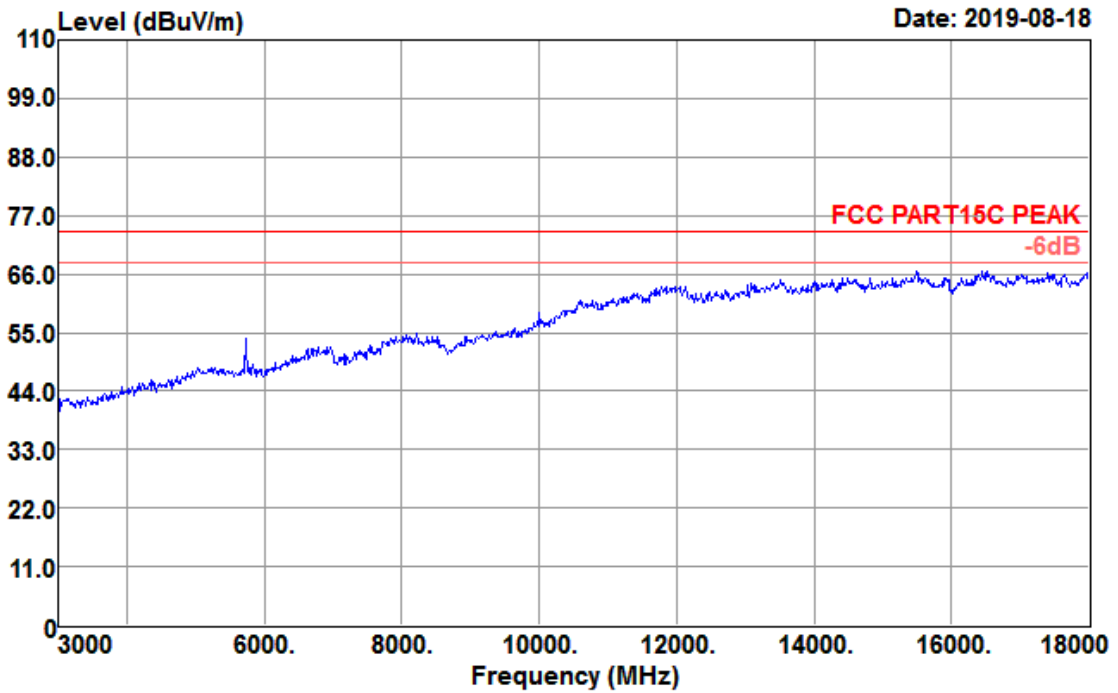
Data: 34

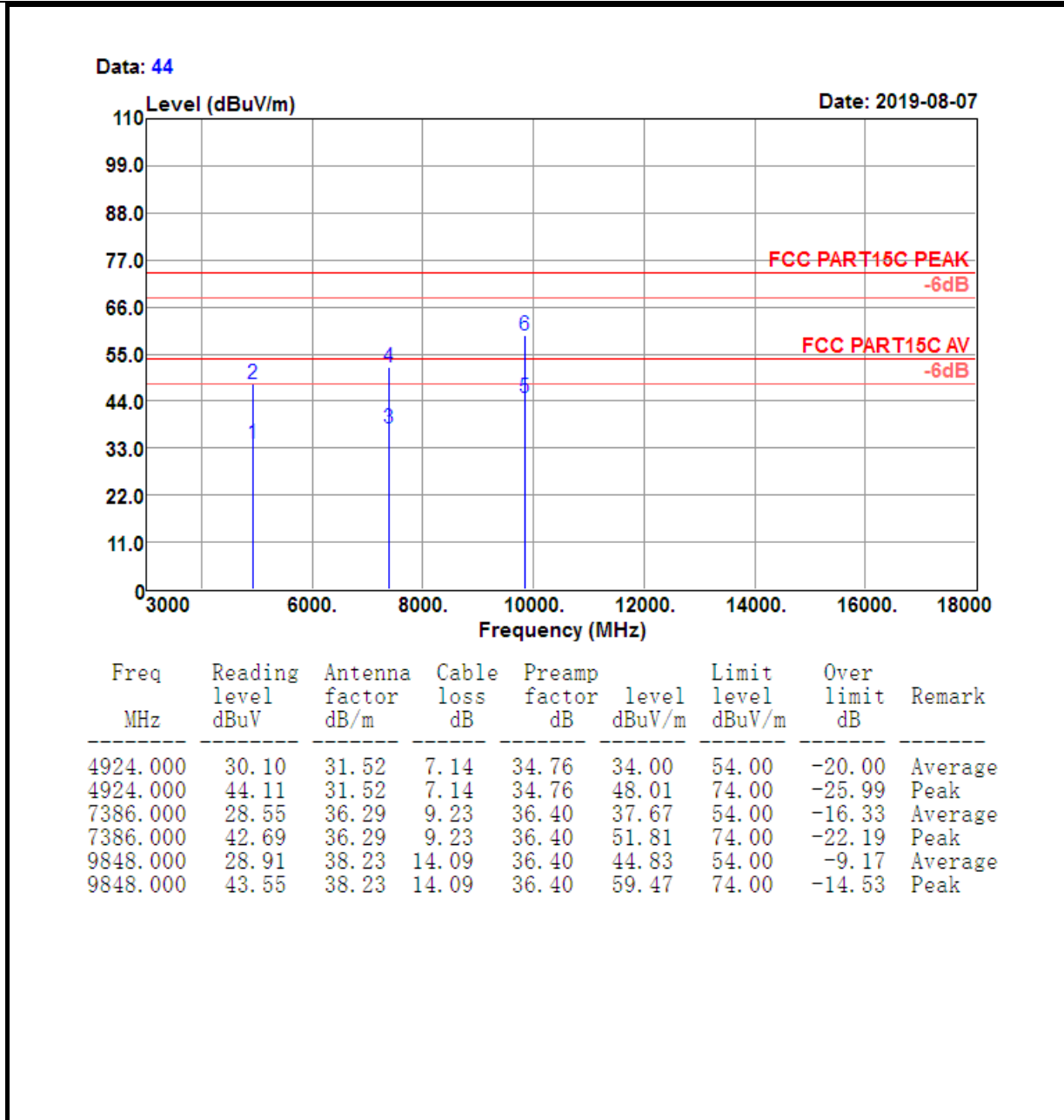


Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2462.000	105.02	27.30	4.84	35.65	101.51	74.00	27.51	Peak

Test Mode :	802.11g CH11 (2462MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Horizontal

Data: 43

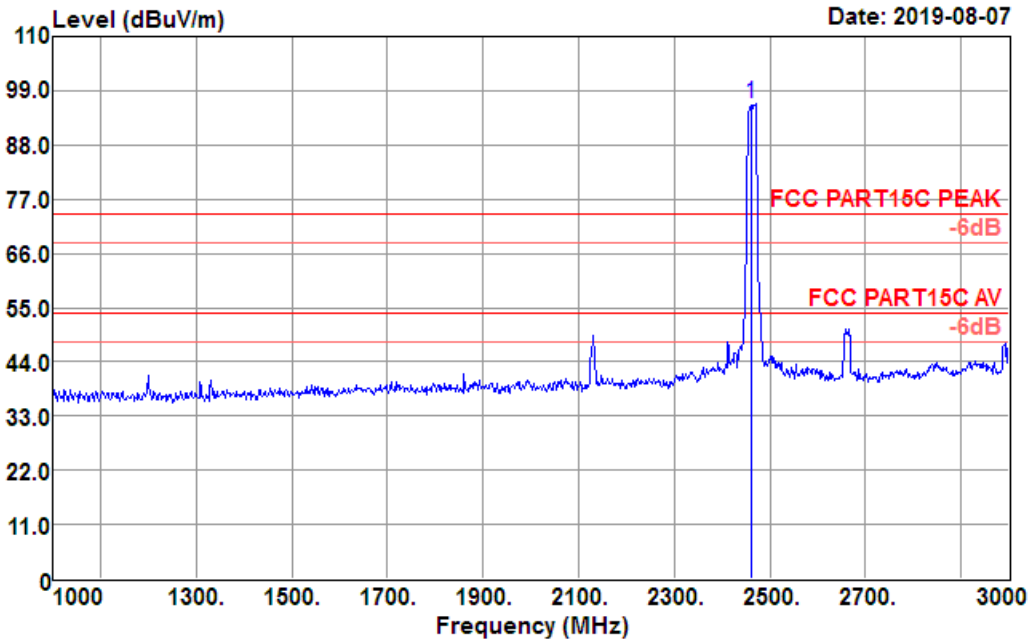




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11g CH11 (2462MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Vertical

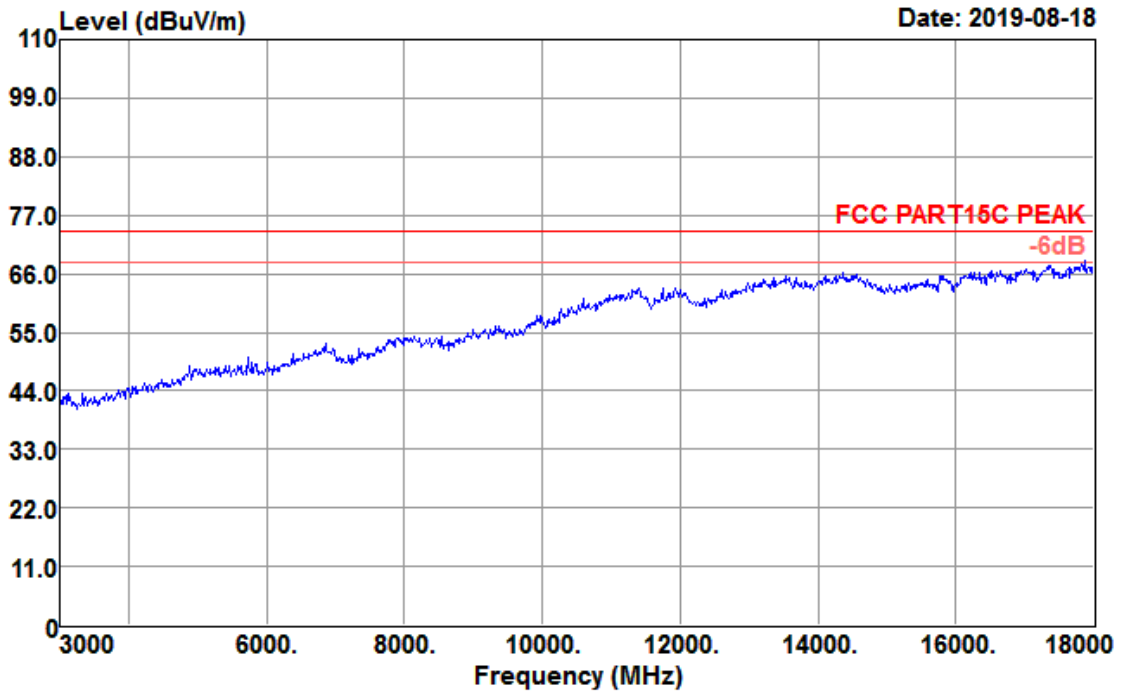
Data: 33

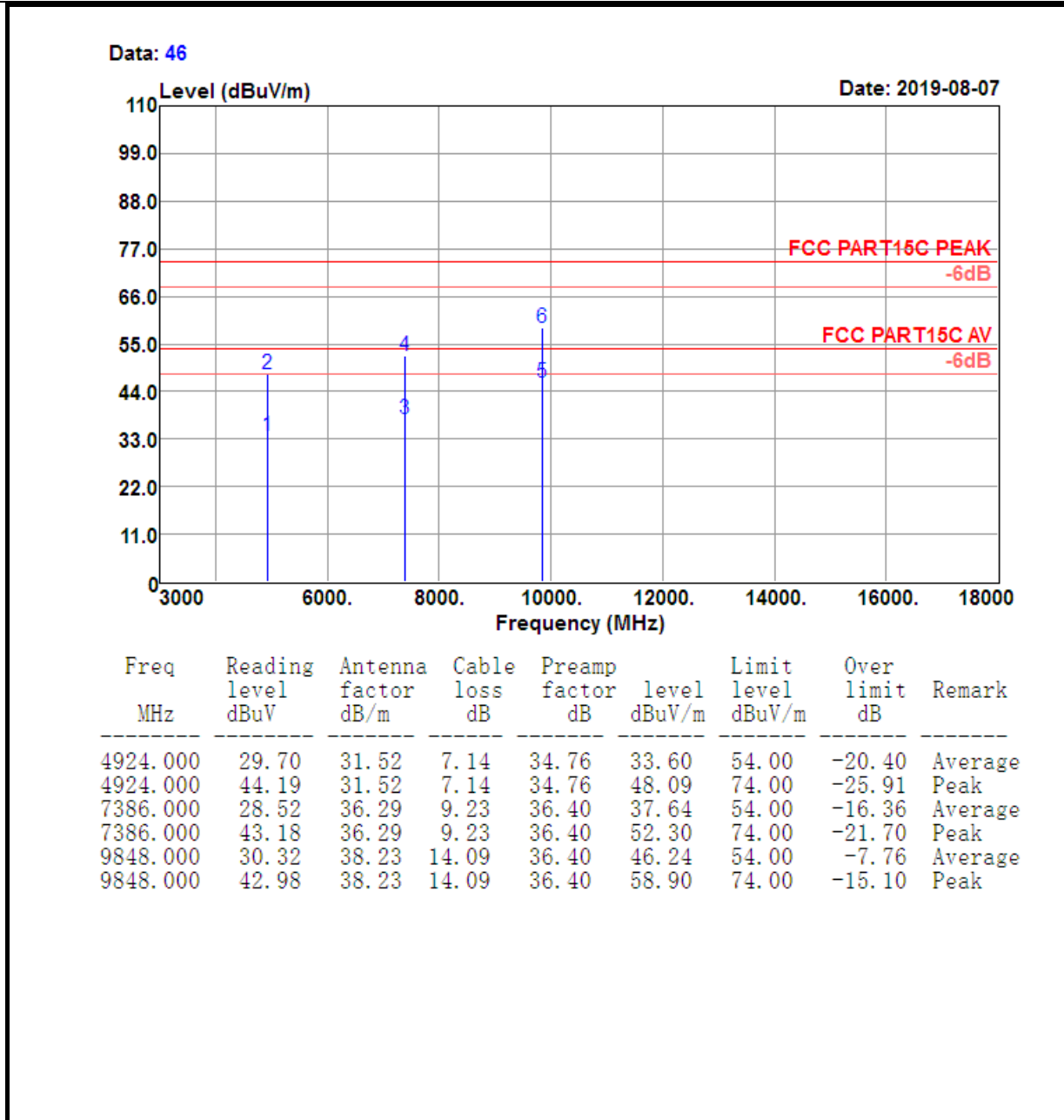


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2462.000	99.83	27.30	4.84	35.65	96.32	74.00	22.32	Peak

Test Mode :	802.11g CH11 (2462MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Vertical

Data: 45

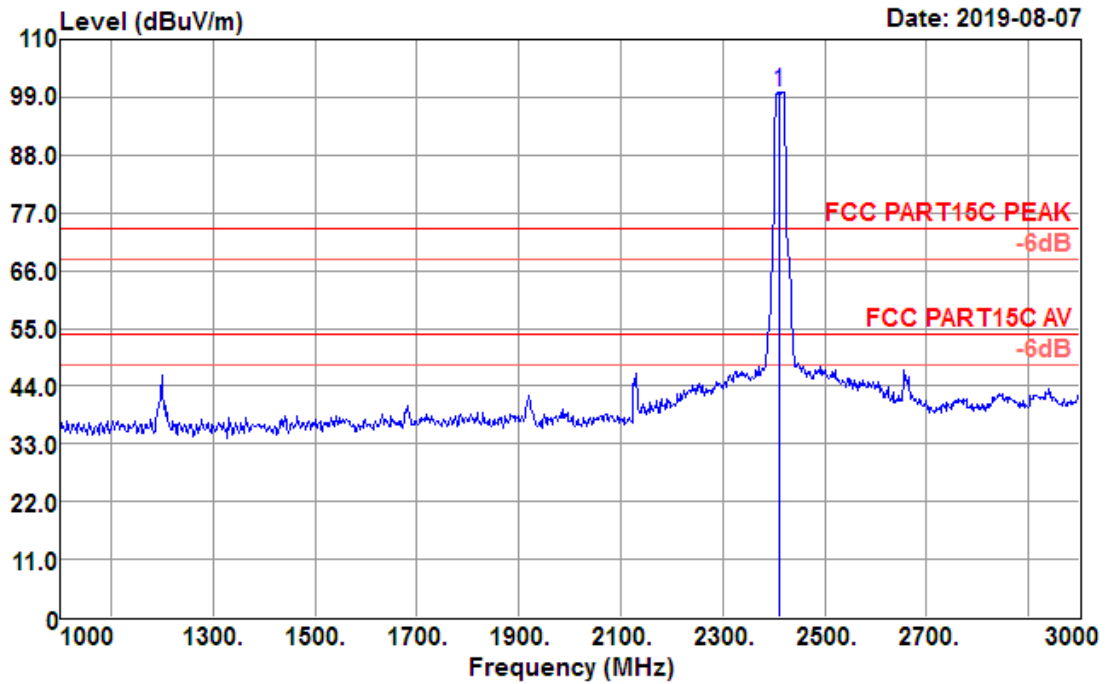




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11n HT20 CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Horizontal

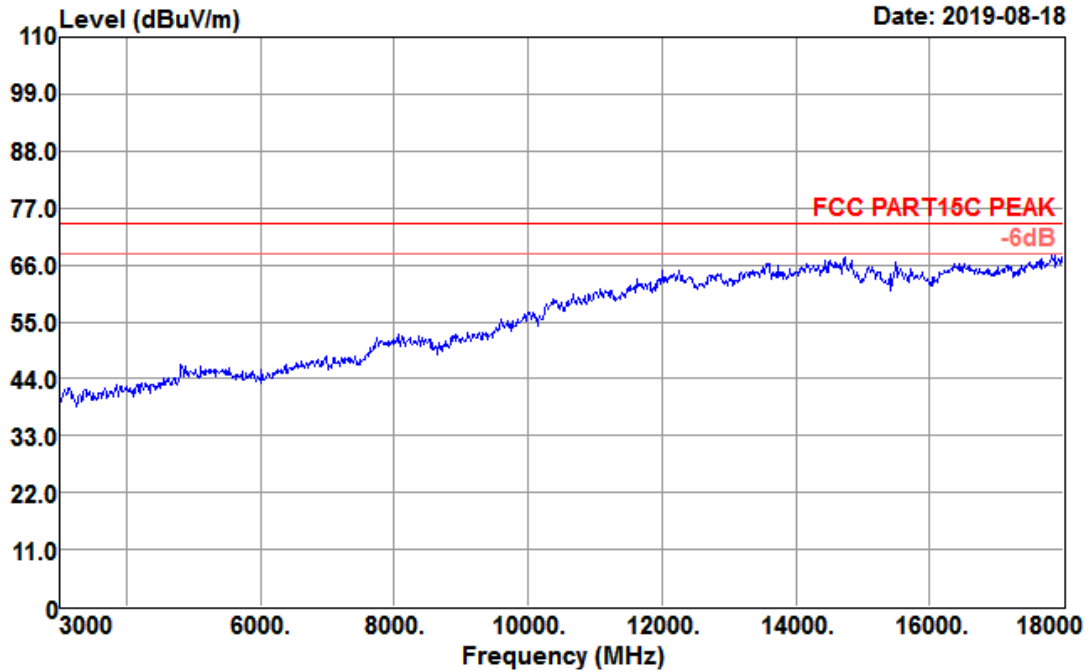
Data: 56

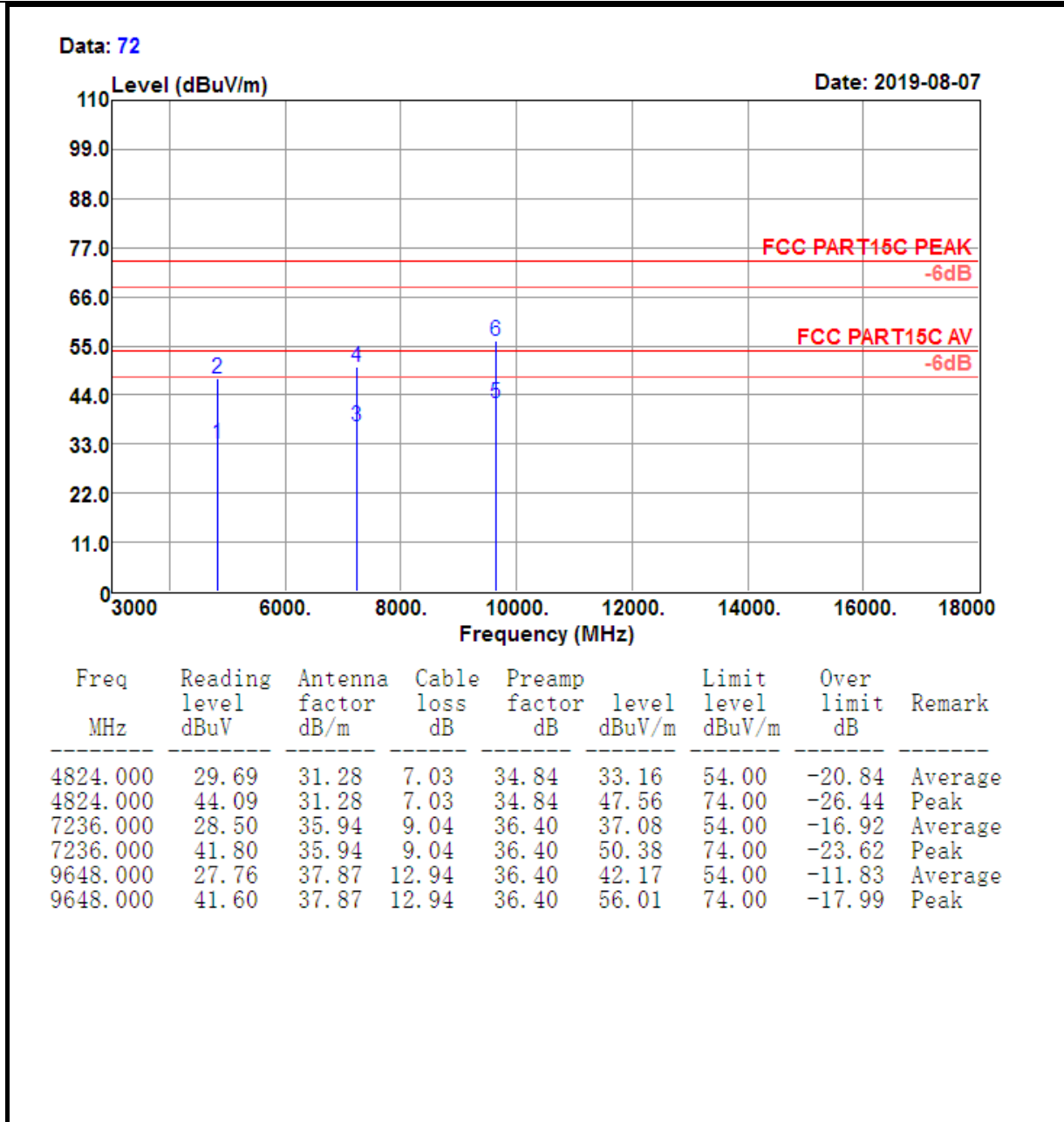


Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2412.000	103.46	27.17	4.78	35.58	99.83	74.00	25.83	Peak

Test Mode :	802.11n HT20 CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Horizontal

Data: 71

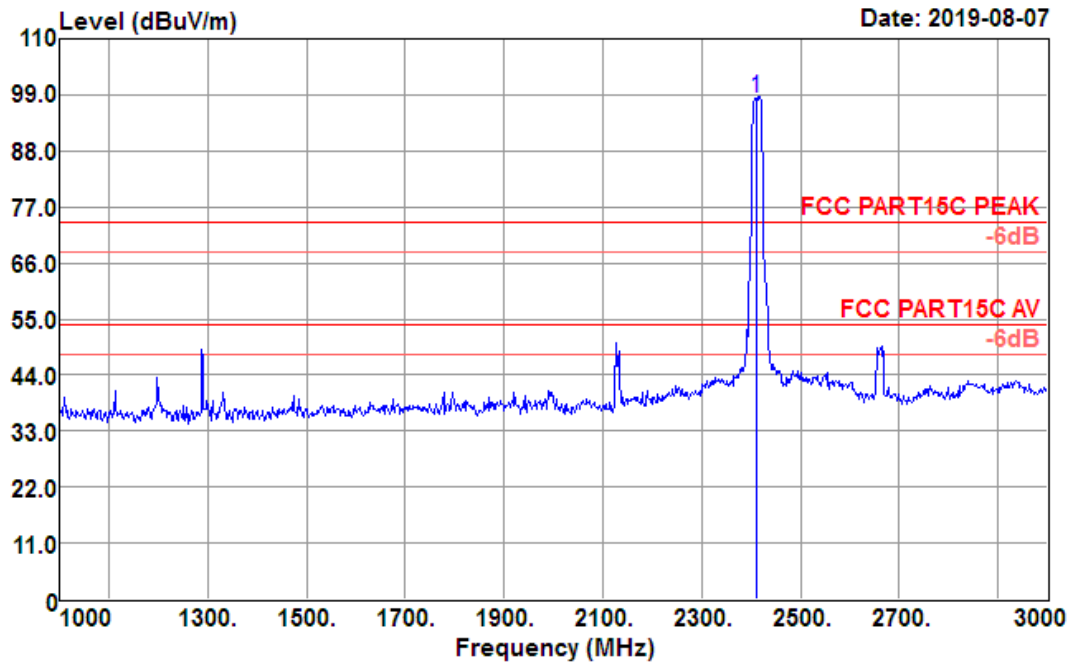




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

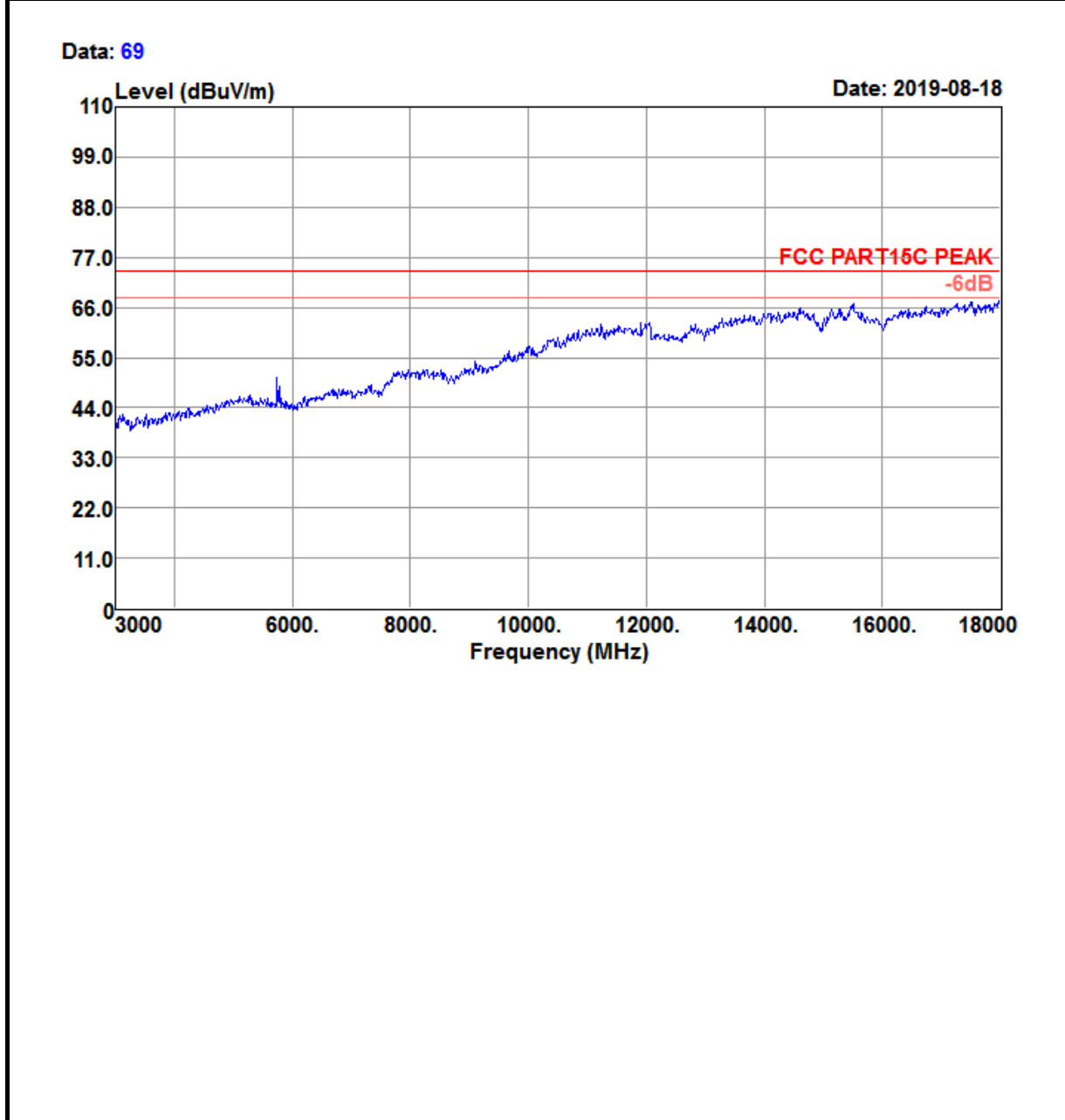
Test Mode :	802.11n HT20 CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Vertical

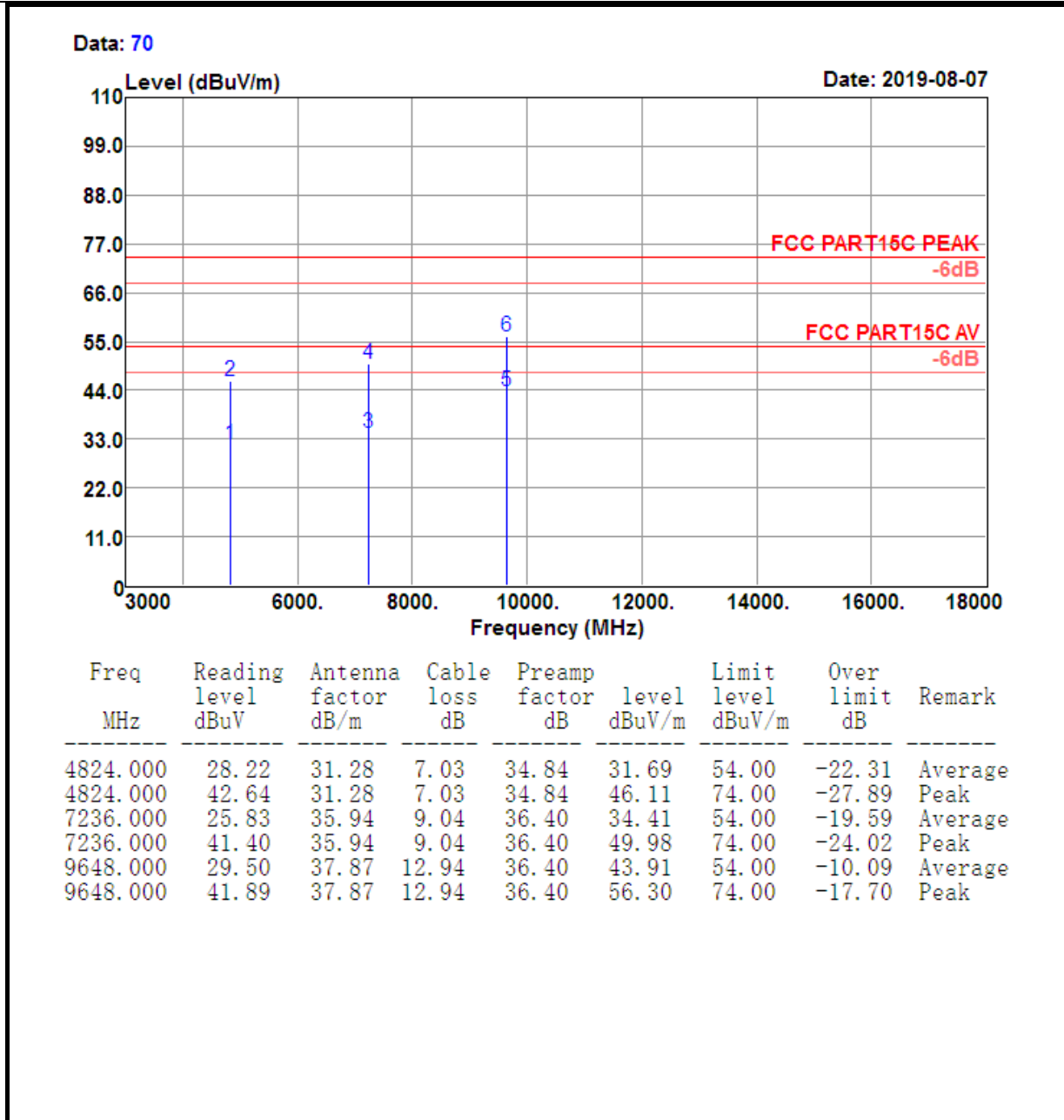
Data: 55



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2412.000	101.90	27.17	4.78	35.58	98.27	74.00	24.27	Peak

Test Mode :	802.11n HT20 CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Vertical

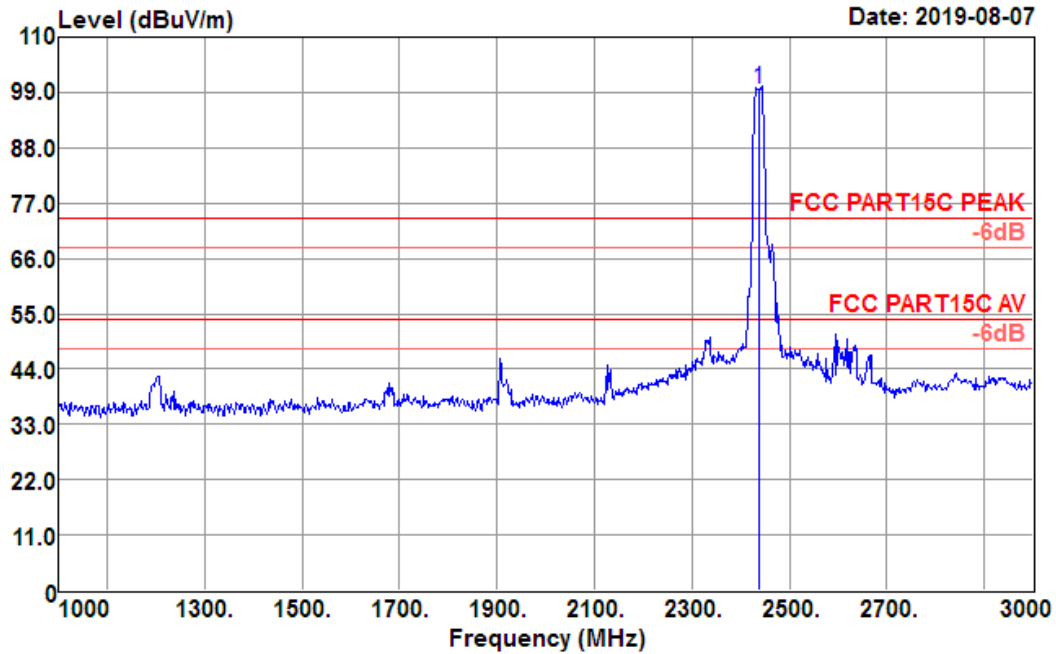




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11n HT20 CH06 (2437MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Horizontal

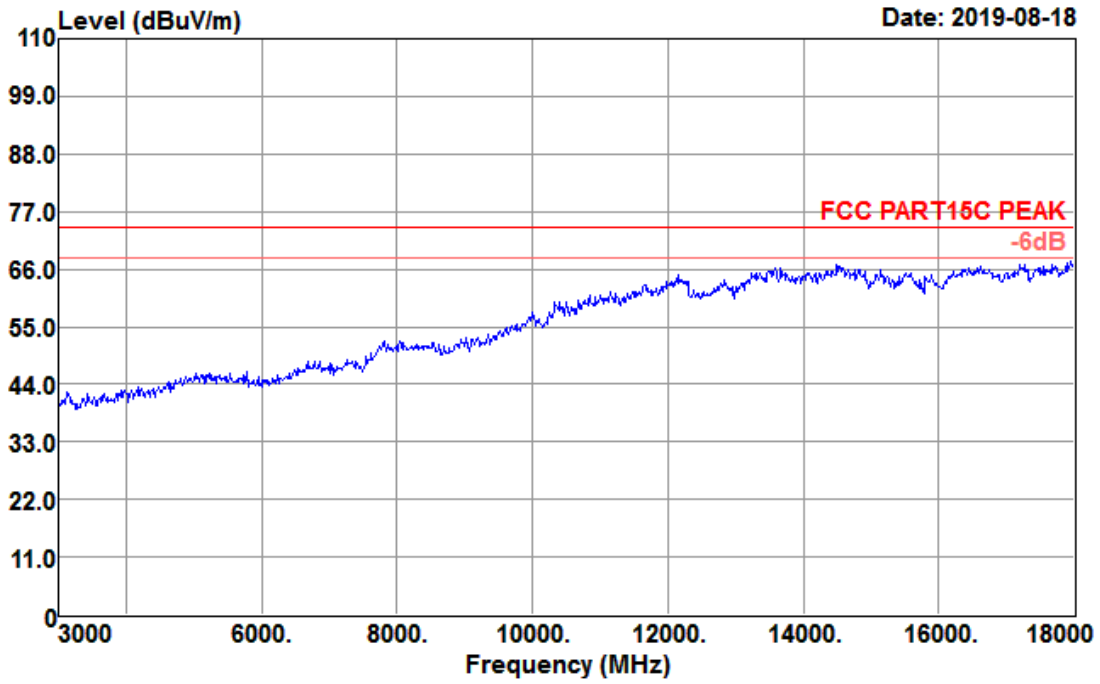
Data: 59



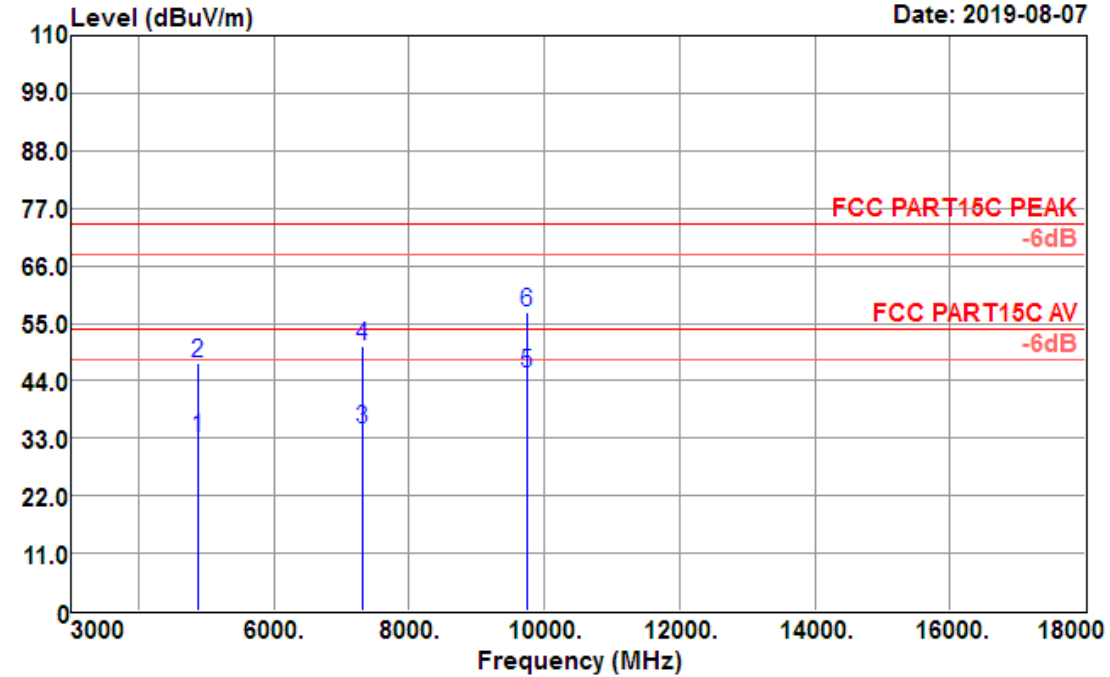
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2437.000	103.17	27.24	4.81	35.61	99.61	74.00	25.61	Peak

Test Mode :	802.11n HT20 CH06 (2437MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Horizontal

Data: 65



Data: 66

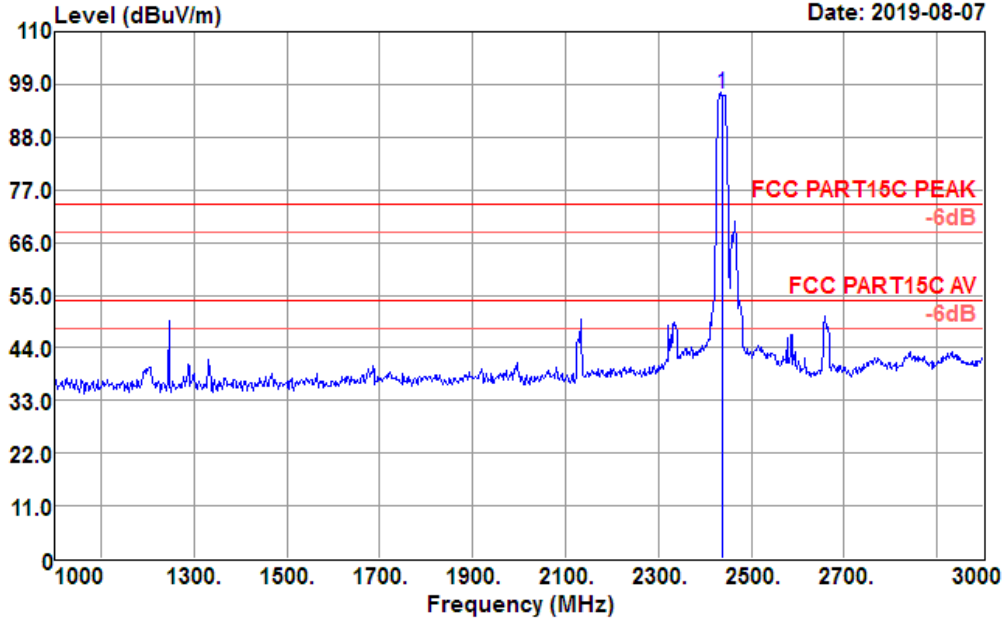


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
4874.000	29.41	31.40	7.09	34.80	33.10	54.00	-20.90	Average
4874.000	43.77	31.40	7.09	34.80	47.46	74.00	-26.54	Peak
7311.000	25.94	36.12	9.13	36.40	34.79	54.00	-19.21	Average
7311.000	41.70	36.12	9.13	36.40	50.55	74.00	-23.45	Peak
9748.000	30.41	38.05	13.53	36.40	45.59	54.00	-8.41	Average
9748.000	41.88	38.05	13.53	36.40	57.06	74.00	-16.94	Peak

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

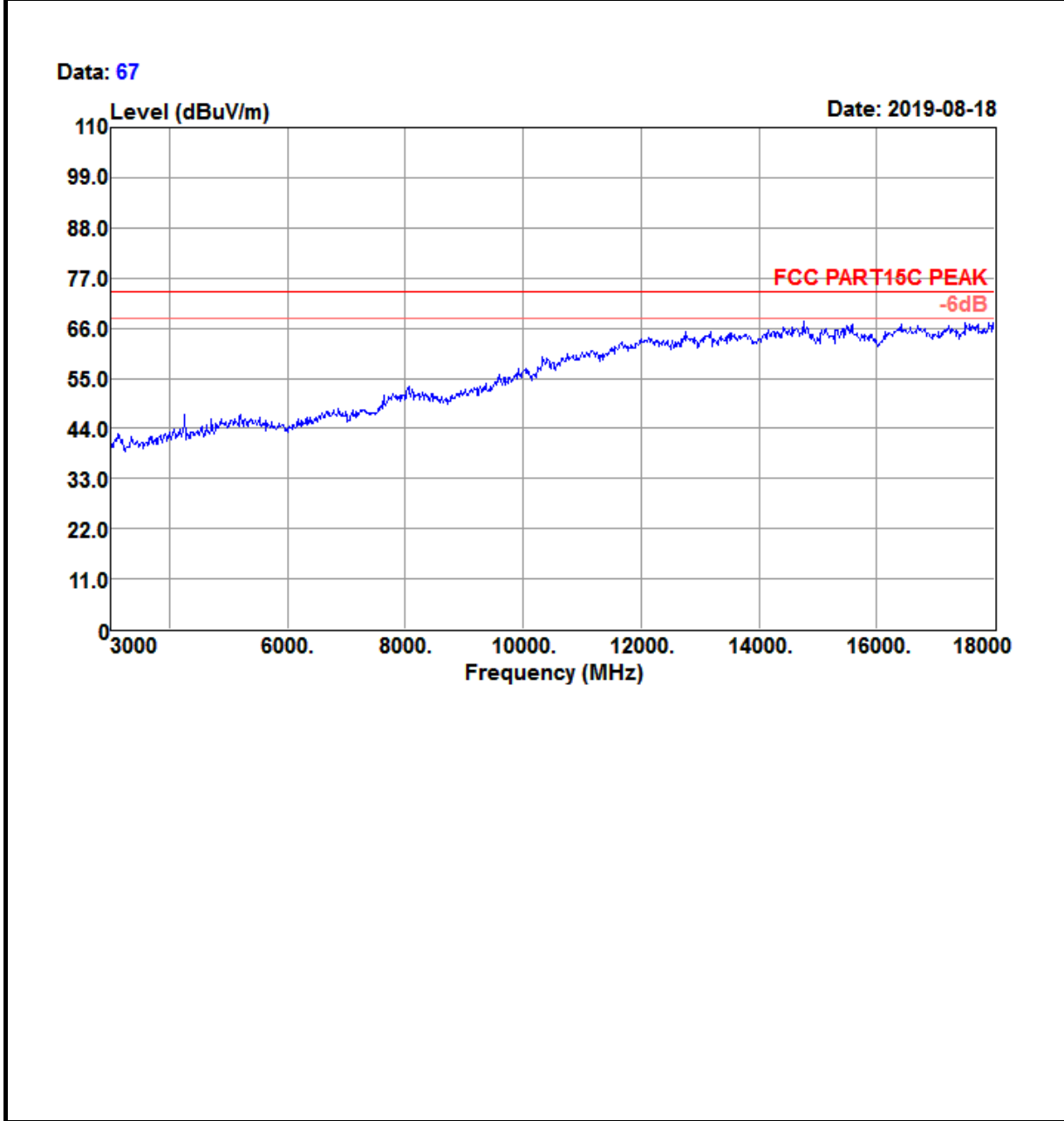
Test Mode :	802.11n HT20 CH06 (2437MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Vertical

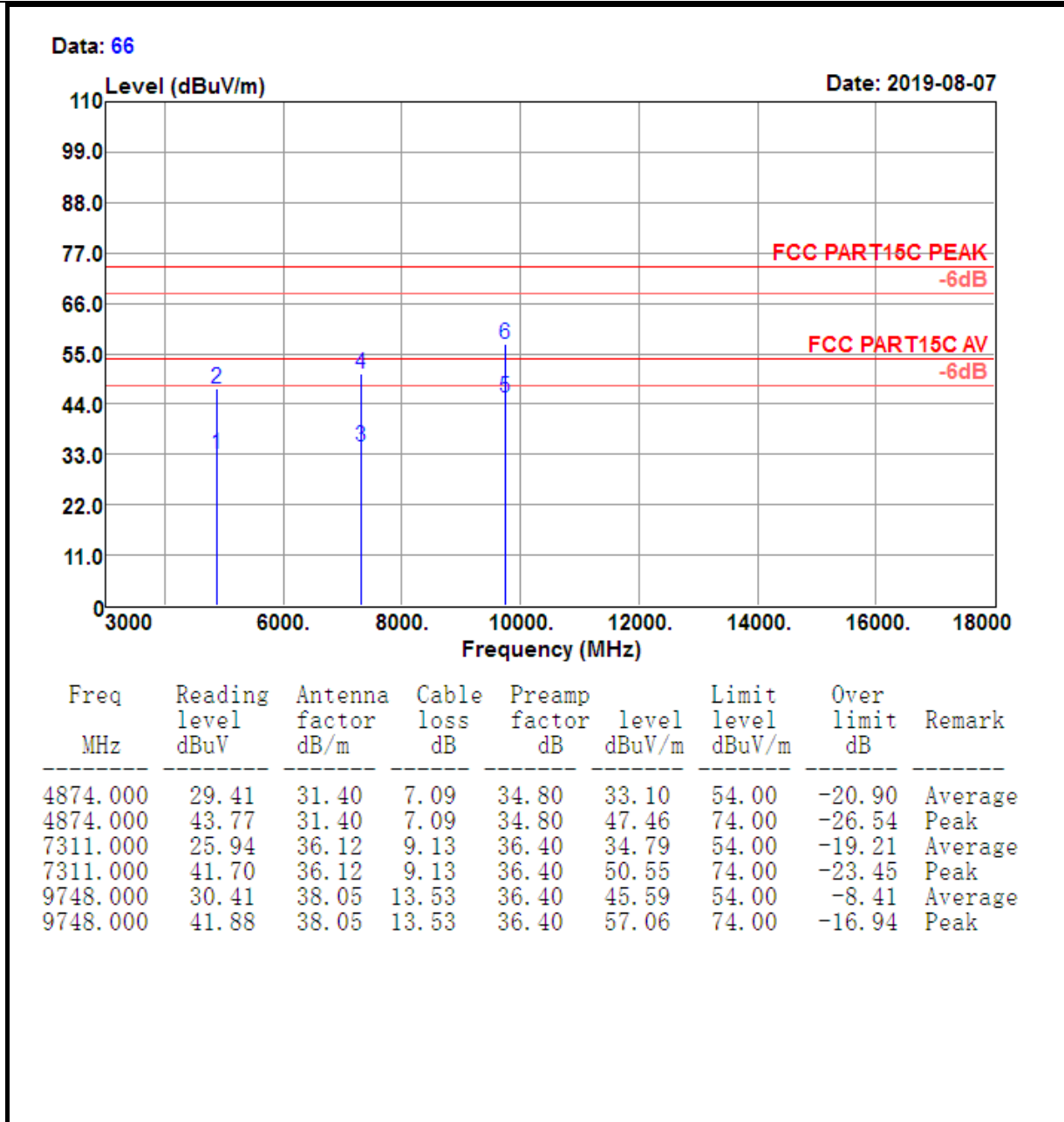
Data: 60



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamplifier factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2437.000	100.45	27.24	4.81	35.61	96.89	74.00	22.89	Peak

Test Mode :	802.11n HT20 CH06 (2437MHz)	Temperature :	21~23℃
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Vertical

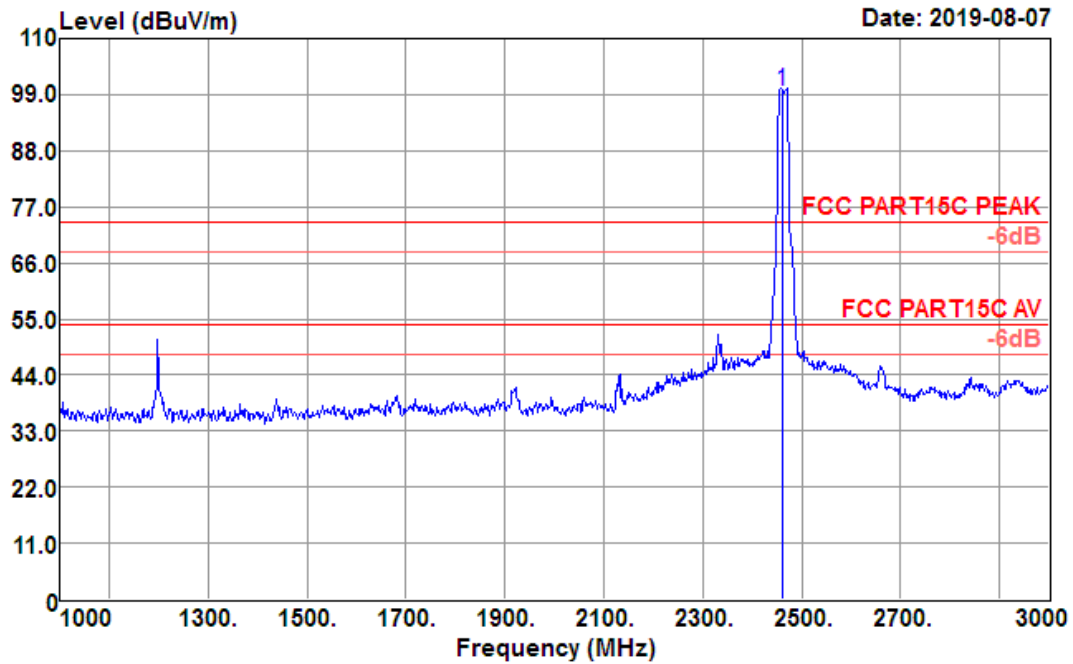




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11n HT20 CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Horizontal

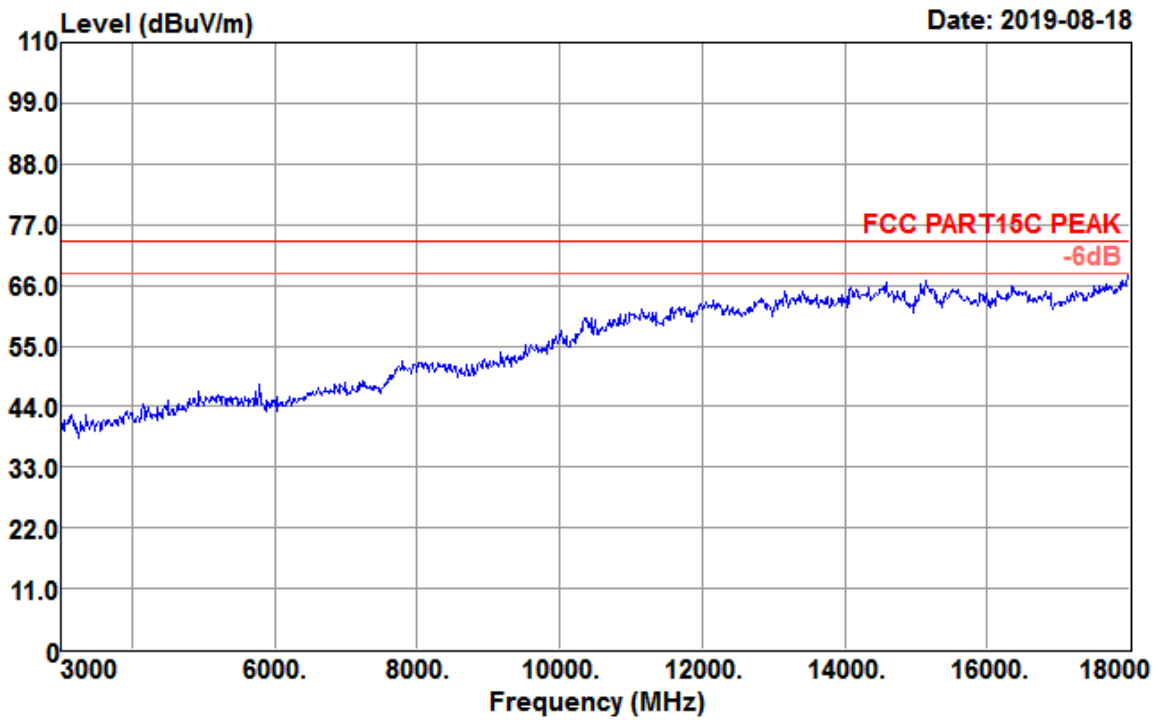
Data: 57

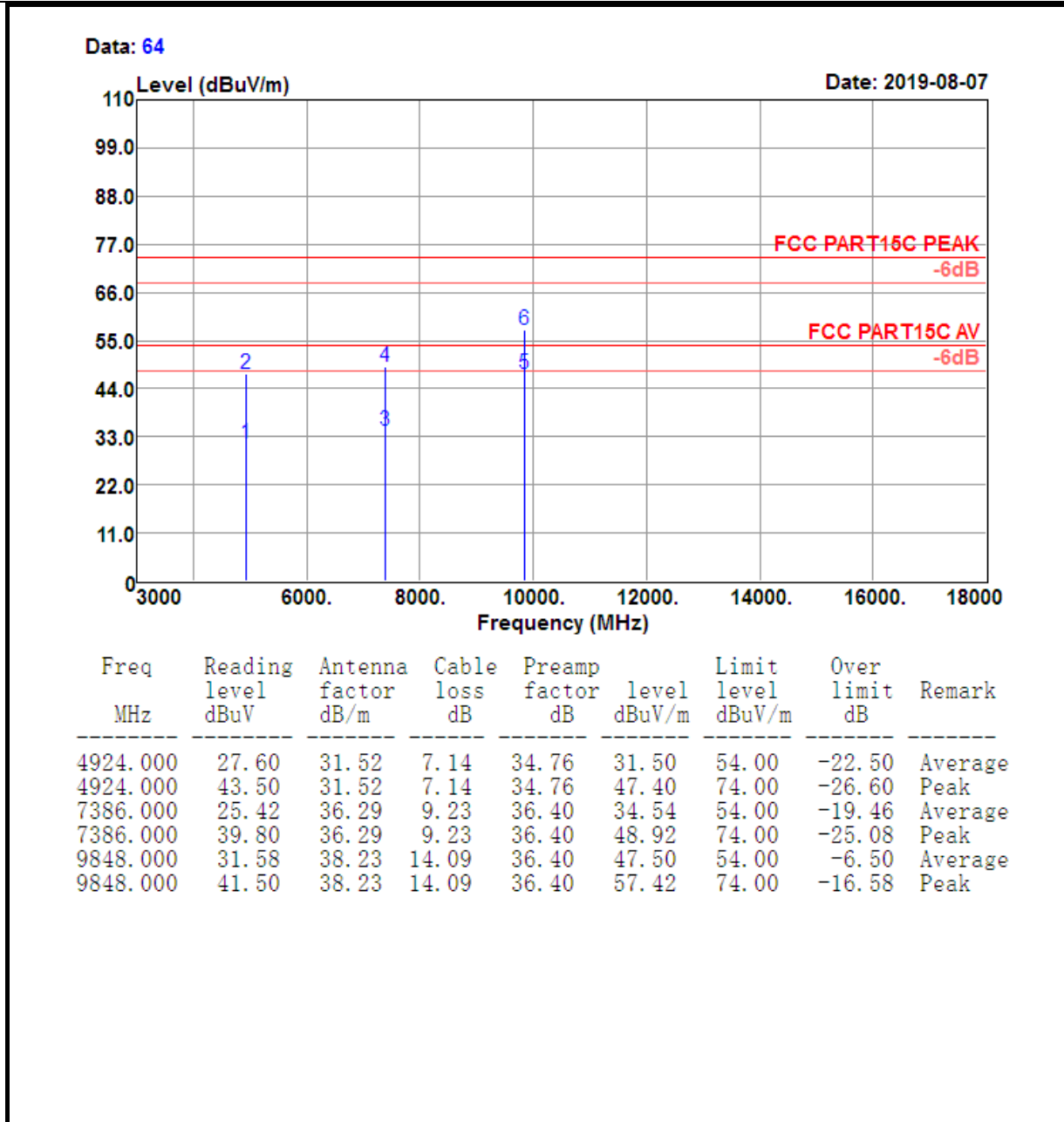


Freq MHz	Reading level dBUV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBUV/m	Limit level dBUV/m	Over limit dB	Remark
2462.000	103.19	27.30	4.84	35.65	99.68	74.00	25.68	Peak

Test Mode :	802.11n HT20 CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Horizontal

Data: 63

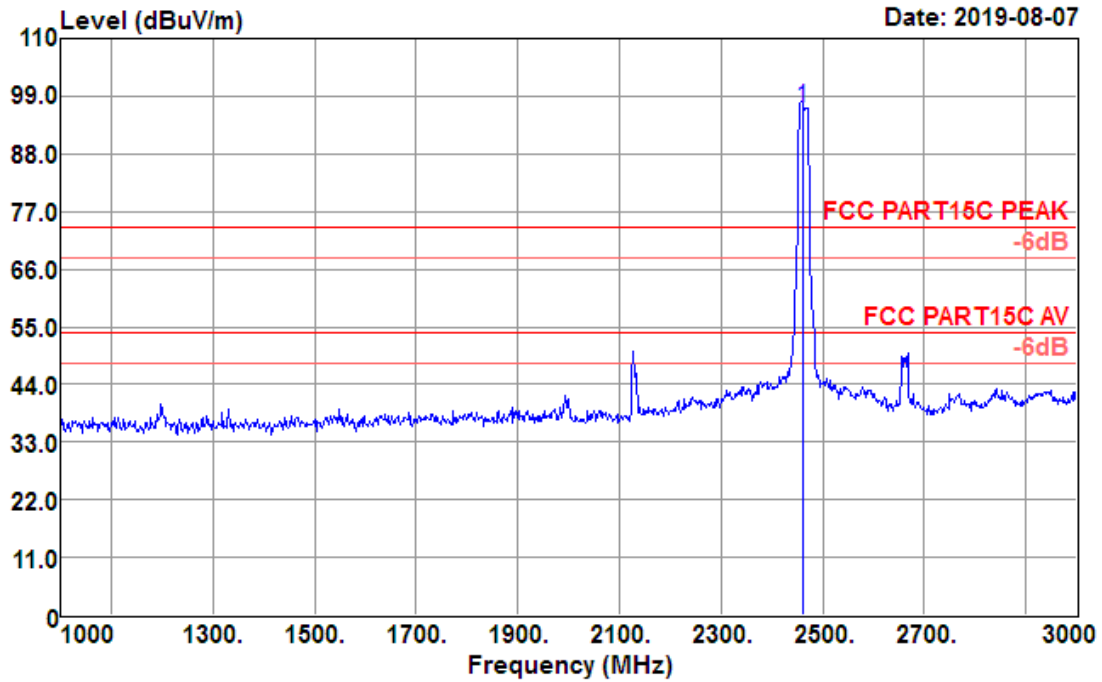




Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Test Mode :	802.11n HT20 CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	1GHz~3GHz	Polarization :	Vertical

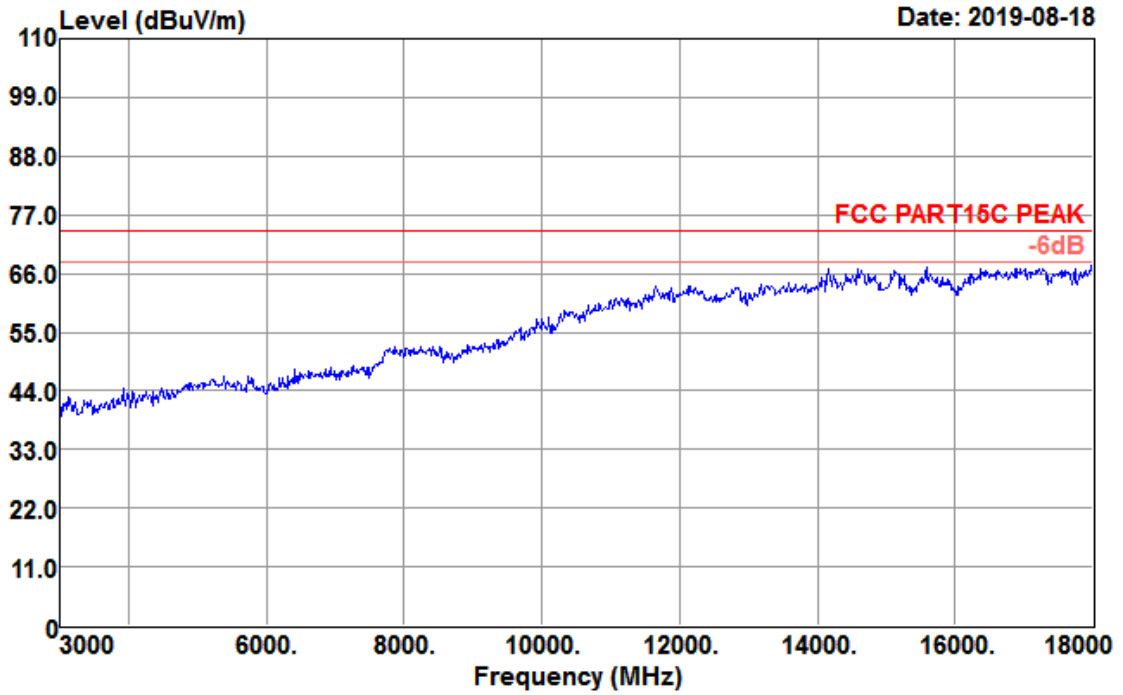
Data: 58

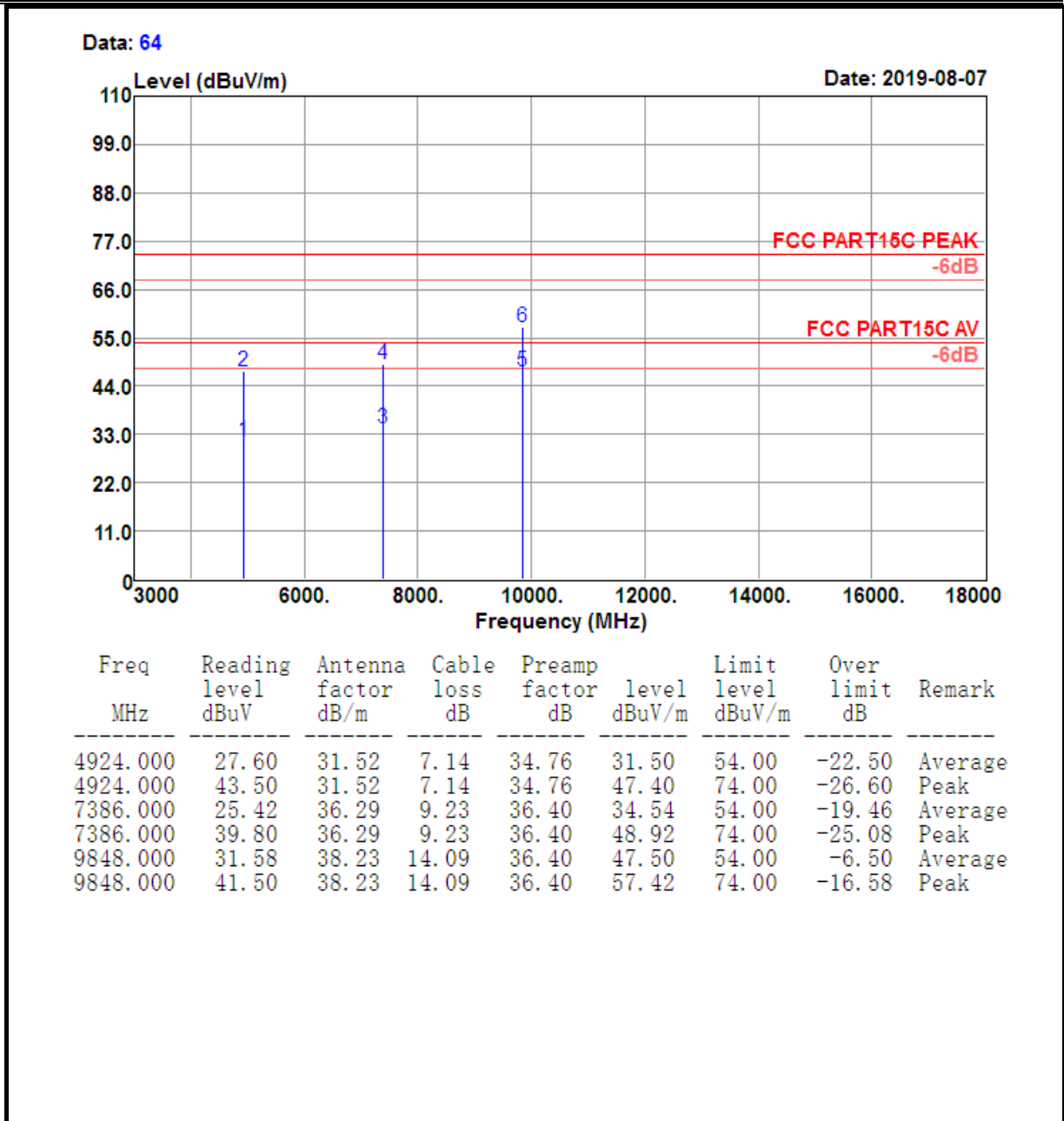


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
2462.000	100.23	27.30	4.84	35.65	96.72	74.00	22.72	Peak

Test Mode :	802.11n HT20 CH11 (2462 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	3GHz~18GHz	Polarization :	Vertical

Data: 61



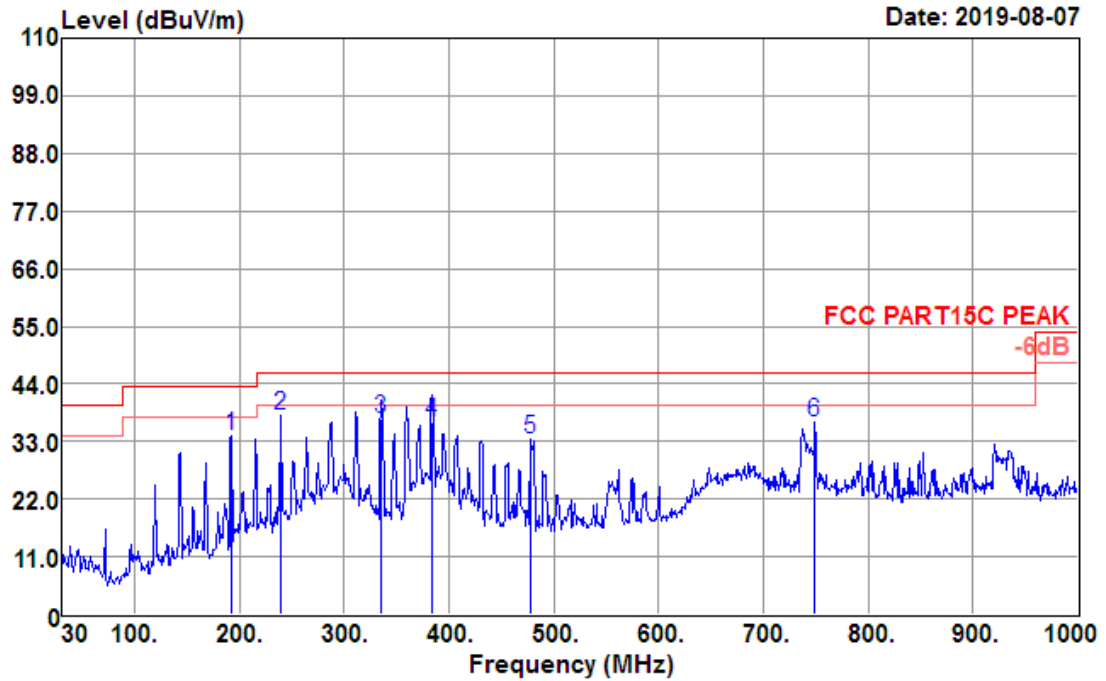


Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

4.5.6 Test Result of Radiated Spurious Emission (30MHz ~ 1GHz)

Test Mode :	802.11b CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	30MHz~1GHz	Polarization :	Horizontal

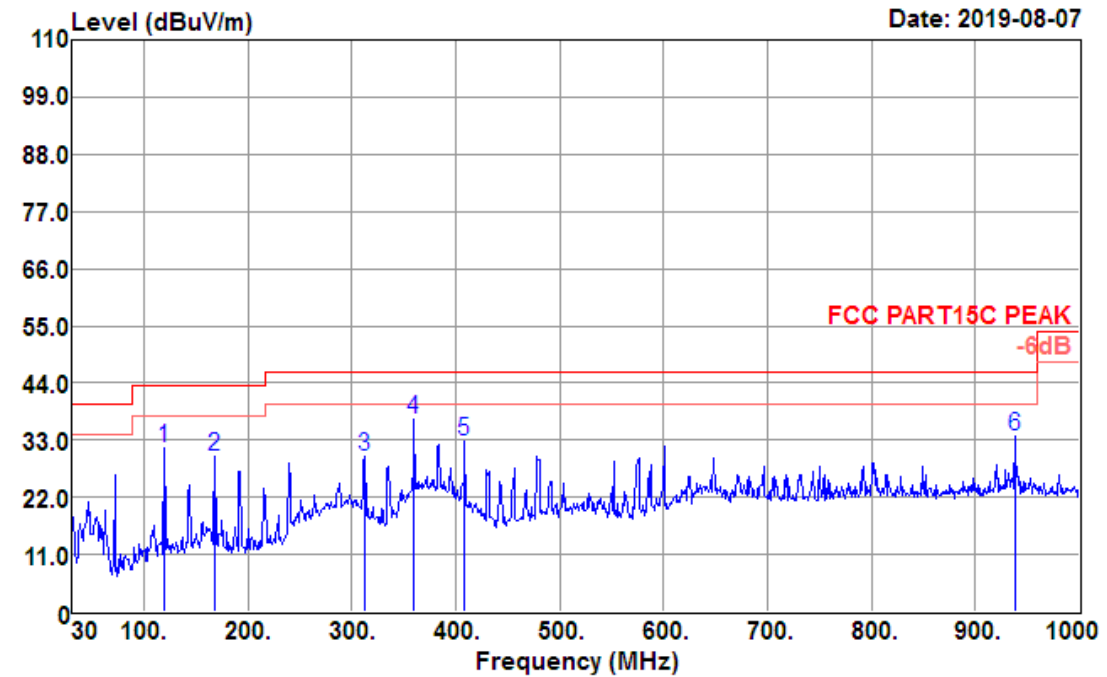
Data: 2



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
191.990	53.46	10.38	2.78	32.65	33.97	43.50	-9.53	QP
239.520	56.52	11.09	3.08	32.67	38.02	46.00	-7.98	QP
335.550	52.90	13.58	3.69	32.74	37.43	46.00	-8.57	QP
384.050	51.09	14.50	3.93	32.78	36.74	46.00	-9.26	QP
477.170	45.84	16.11	4.50	32.88	33.57	46.00	-12.43	QP
748.770	42.99	20.24	5.58	32.15	36.66	46.00	-9.34	QP

Test Mode :	802.11b CH01 (2412 MHz)	Temperature :	21~23°C
Test Engineer :	Julie Deng	Relative Humidity :	63~65%
Frequency Range	30MHz~1GHz	Polarization :	Vertical

Data: 1



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
119.240	49.97	12.12	2.11	32.61	31.59	43.50	-11.91	QP
167.740	46.69	13.43	2.53	32.63	30.02	43.50	-13.48	QP
312.270	45.77	13.13	3.52	32.71	29.71	46.00	-16.29	QP
359.800	51.74	14.04	3.86	32.76	36.88	46.00	-9.12	QP
408.300	46.68	14.94	4.04	32.81	32.85	46.00	-13.15	QP
937.920	37.28	21.93	6.43	31.79	33.85	46.00	-12.15	QP

4.6 AC Conducted Emission Measurement

4.6.1 Limit of AC Conducted Emission

FCC §15.207

IC RSS-GEN 8.8

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

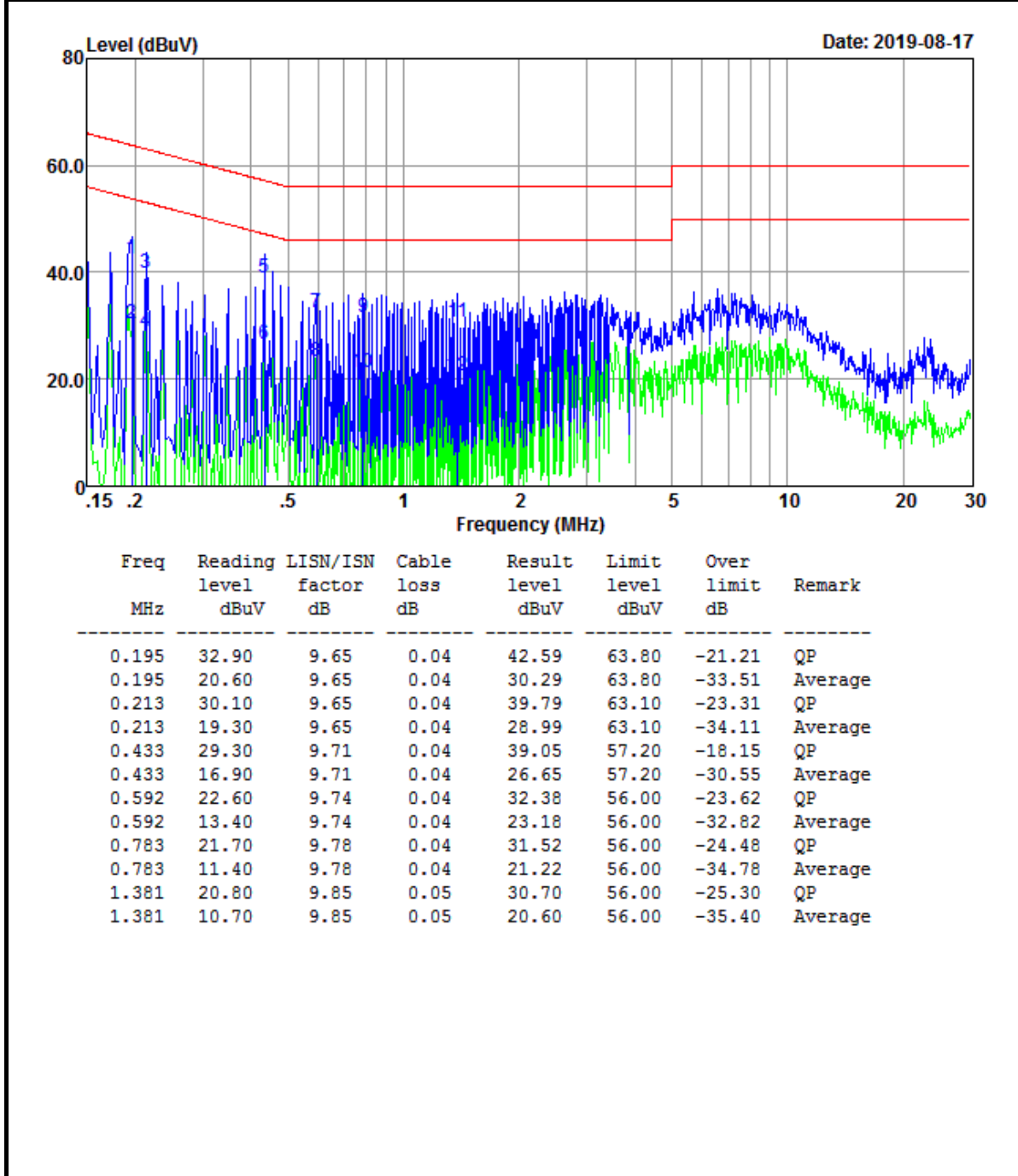
*Decreases with the logarithm of the frequency.

4.6.2 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

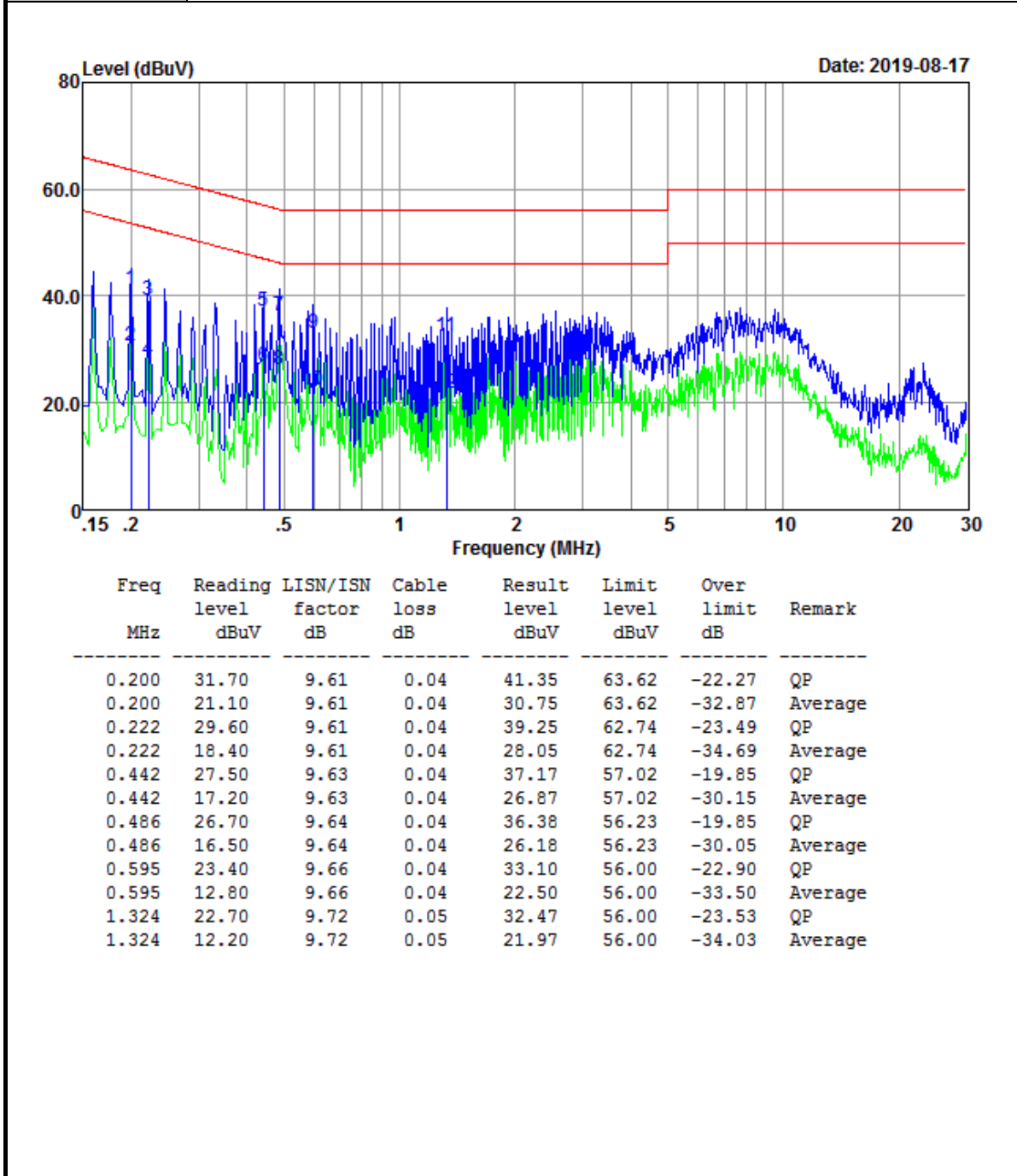
4.6.3 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20°C
Test Engineer :	Damon Zhang	Relative Humidity :	64%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Link + Power Supply		



Result Level= Reading Level + LISN Factor + Cable Loss

Test Mode :	Mode 1	Temperature :	20°C
Test Engineer :	Damon Zhang	Relative Humidity :	64%
Test Voltage :	120Vac / 60Hz	Phase :	NEUTRAL
Function Type :	WLAN Link + Power Supply		



Result Level= Reading Level + LISN Factor + Cable Loss

4.7 Antenna Requirements

4.7.1 Standard Applicable

According to antenna requirement of §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 re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded..

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

4.7.2 Antenna Connected Construction

An embedded-in antenna design is used.

4.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	Keysight	N9010A	MY56070788	2019-01-23	2020-01-22	Conducted
Power Sensor	Keysight	U2021XA	MY56510025	2019-01-23	2020-01-22	Conducted
Power Sensor	Keysight	U2021XA	MY57030005	2019-01-23	2020-01-22	Conducted
Power Sensor	Keysight	U2021XA	MY56510018	2019-01-23	2020-01-22	Conducted
Power Sensor	Keysight	U2021XA	MY56480002	2019-01-23	2020-01-22	Conducted
Thermal Chamber	Sanmtest	SMC-408-CD	2435	2019-05-09	2020-05-08	Conducted
Base Station	R&S	CMW 270	101231	2019-01-23	2020-01-22	Conducted
Signal Generator (Interferer)	Keysight	N5182B	MY56200384	2019-05-19	2020-05-18	Conducted
Signal Generator (Blocker)	Keysight	N5171B	MY56200661	2019-01-23	2020-01-22	Conducted

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV 40	101433	2019-02-18	2020-02-17	Radiation
Amplifier	Sonoma	310	363917	2019-01-22	2020-01-21	Radiation
Amplifier	Schwarzbeck	BBV 9718	327	2019-01-22	2020-01-21	Radiation
Amplifier	Narda	TTA1840-35-HG	2034380	2019/05/15	2020/05/14	Radiation
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-051	2017/3/3	2020/3/2	Radiation
Broadband Antenna	Schwarzbeck	VULB 9168	9168-757	2017-03-03	2020-03-02	Radiation
Horn Antenna	Schwarzbeck	BBHA 9120 D	1677	2017-03-03	2020-03-02	Radiation
Horn Antenna	COM-POWER	AH-1840	101117	2018-06-20	2021-06-19	Radiation
Test Software	Auidx	E3	6.111221a	N/A	N/A	Radiation
Filter	Micro-Tronics	BRM 50702	G266	N/A	N/A	Radiation

N/A: No Calibration Required

6 Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.67dB
Radiated emissions	30MHz ~ 1GMHz	5.05dB
	1GHz ~ 18GHz	5.06 dB
	18GHz ~ 40GHz	3.65dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.