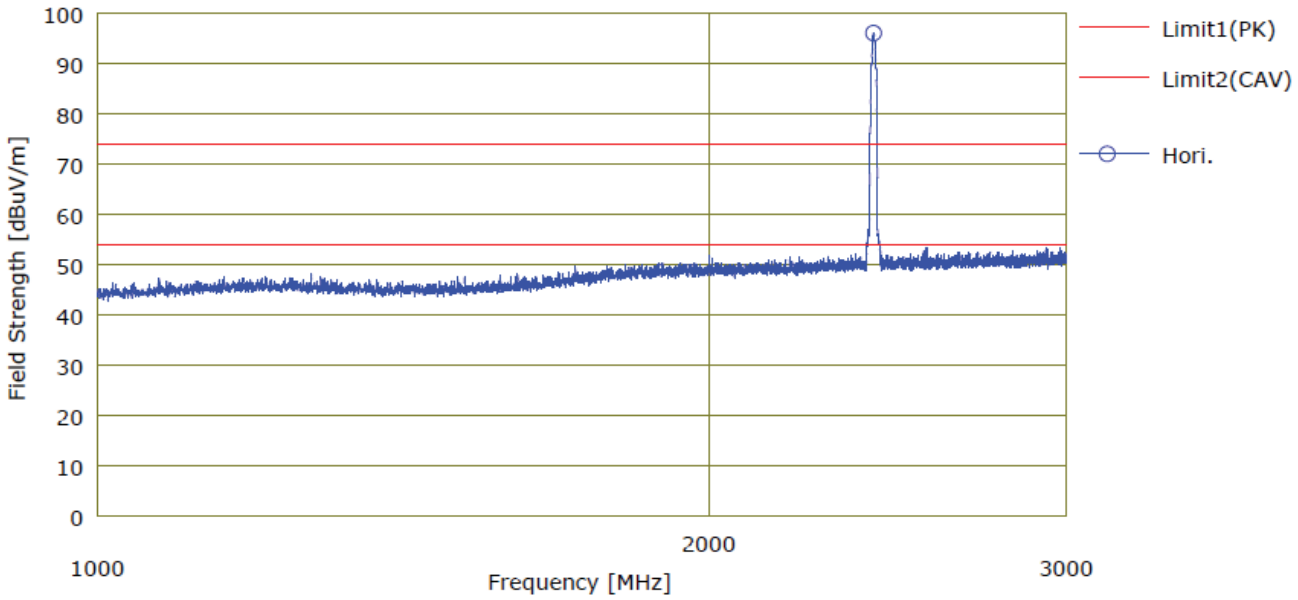
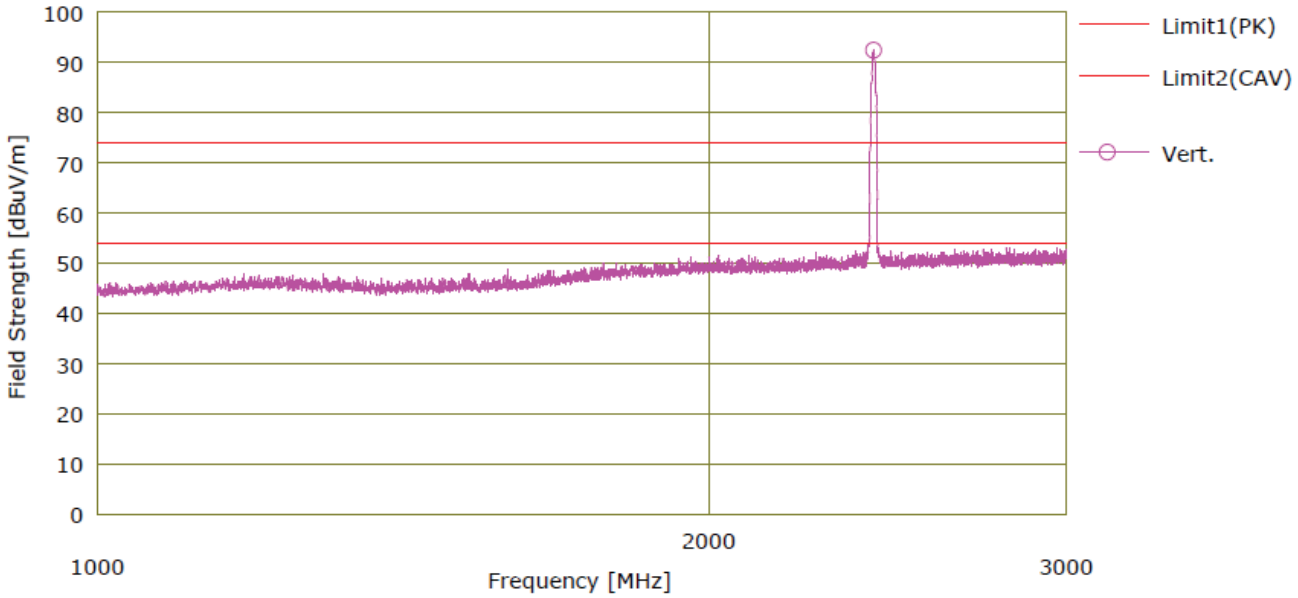
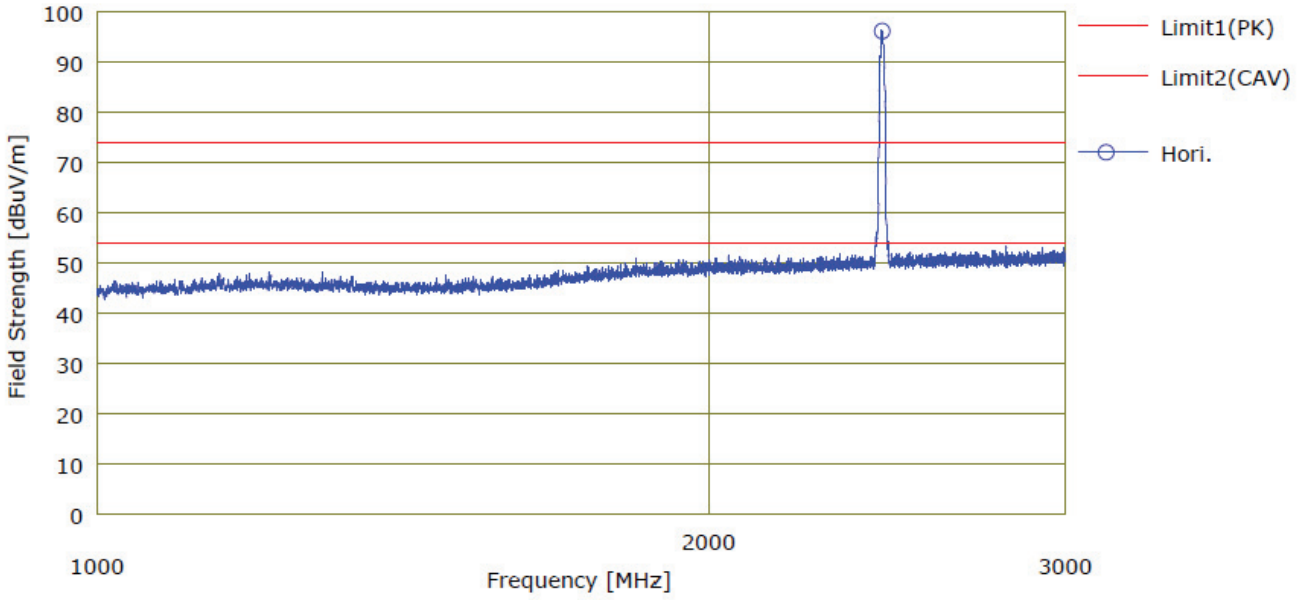
Figure 7. Plot of radiated spurious emissions (from 1 GHz to 3 GHz)

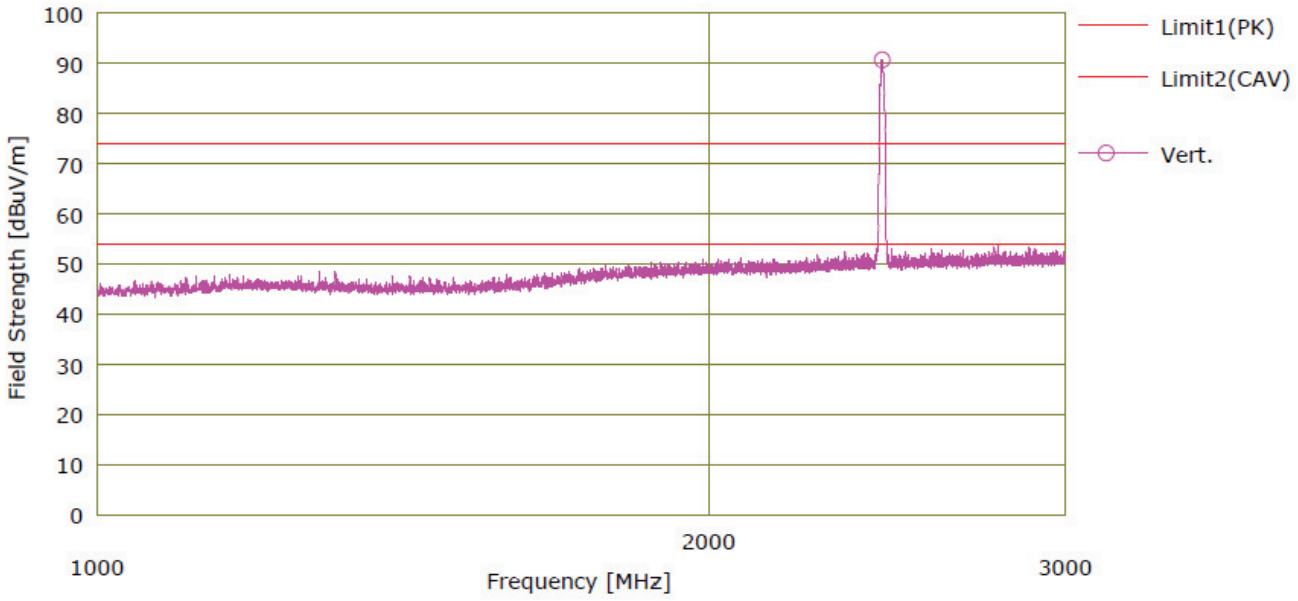
(802.11b, 1 Mbps) transmitting at f_{LOW}



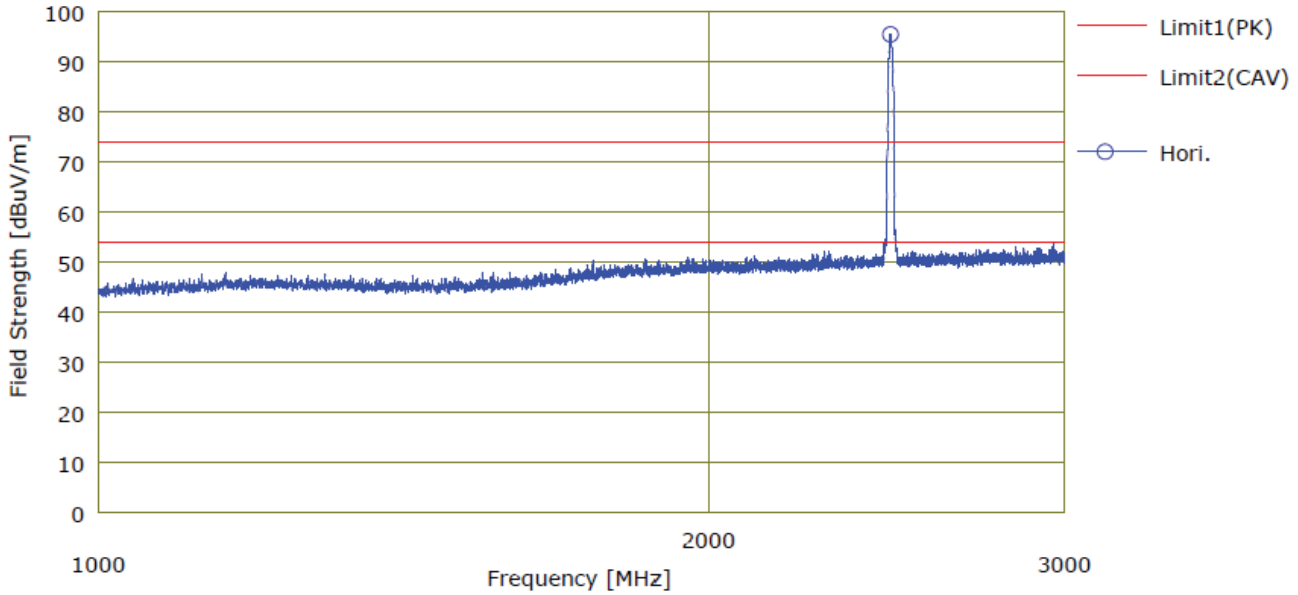


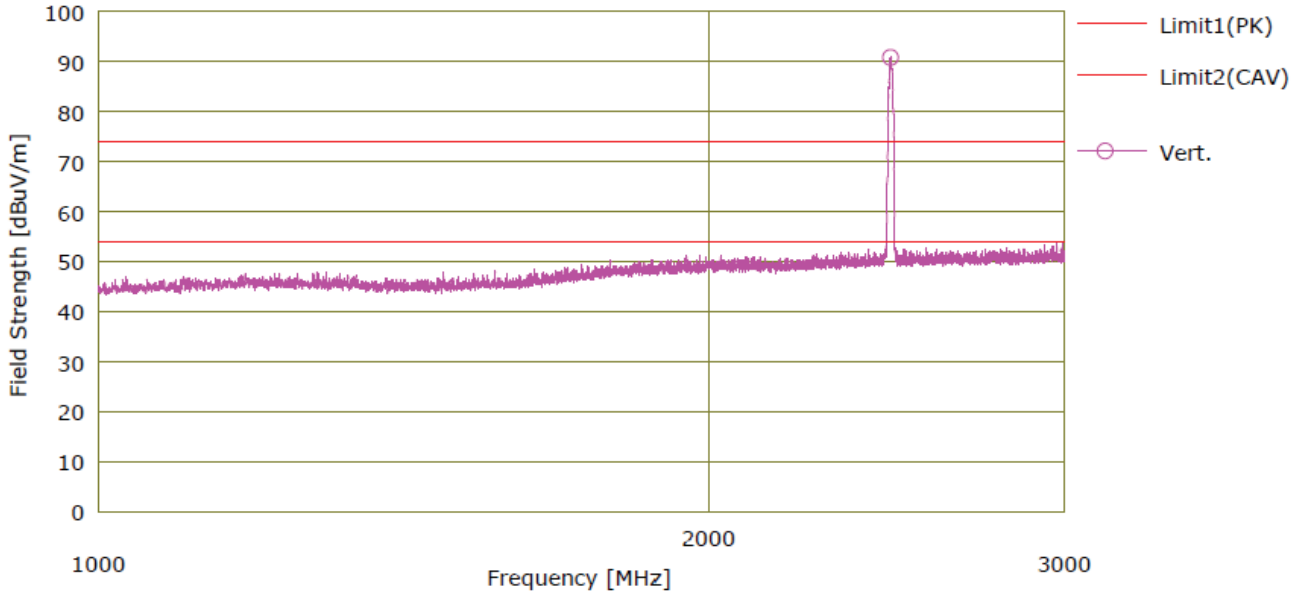
(802.11b, 1 Mbps) transmitting at f_{MID}



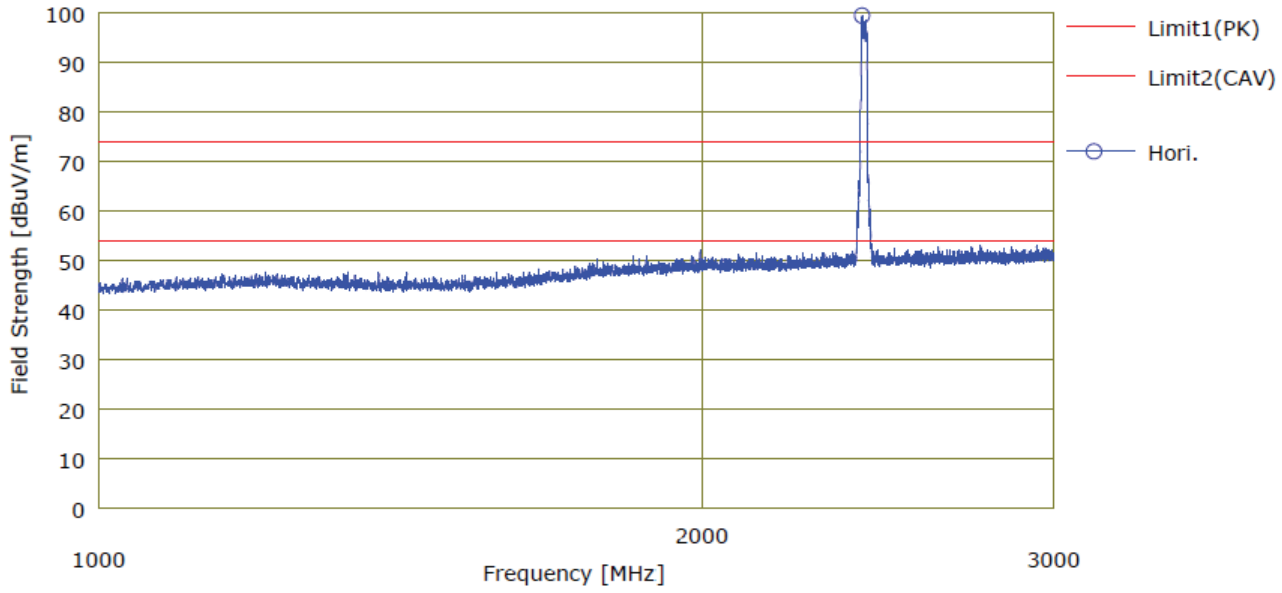


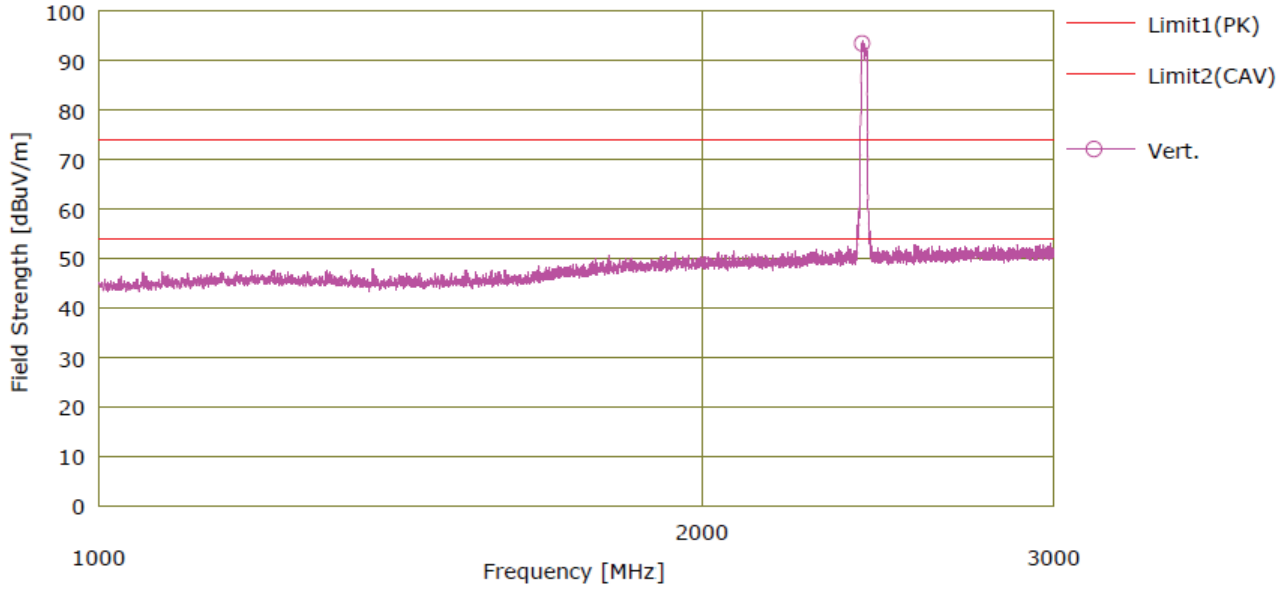
(802.11b, 1 Mbps) transmitting at f_{HIGH}



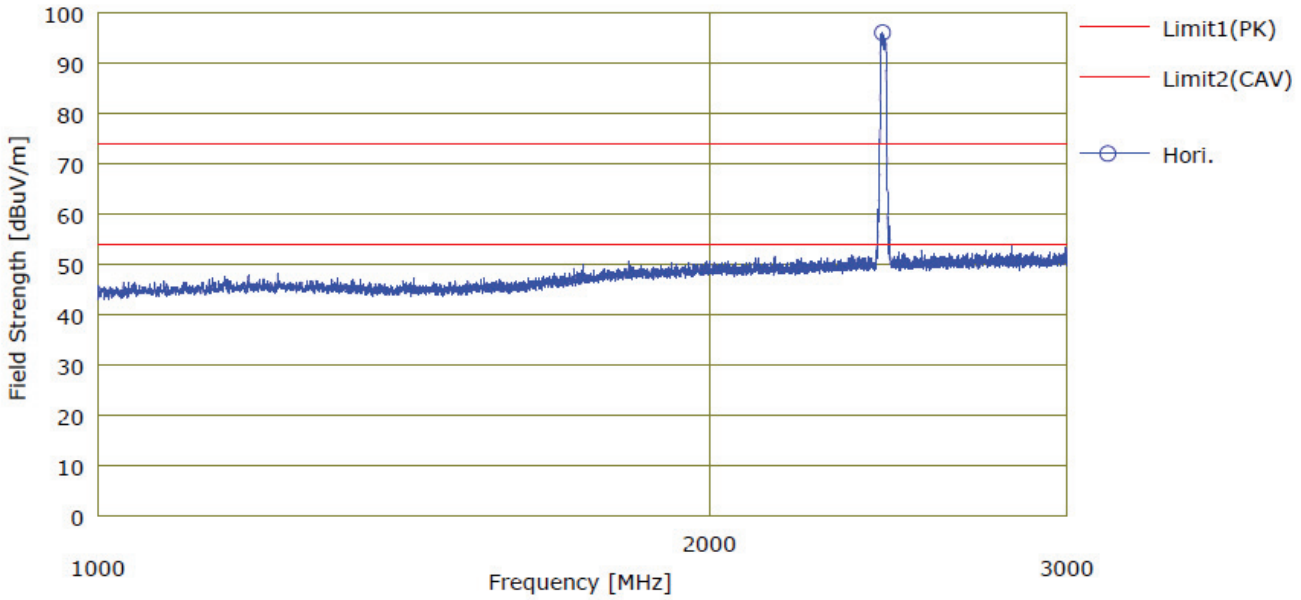


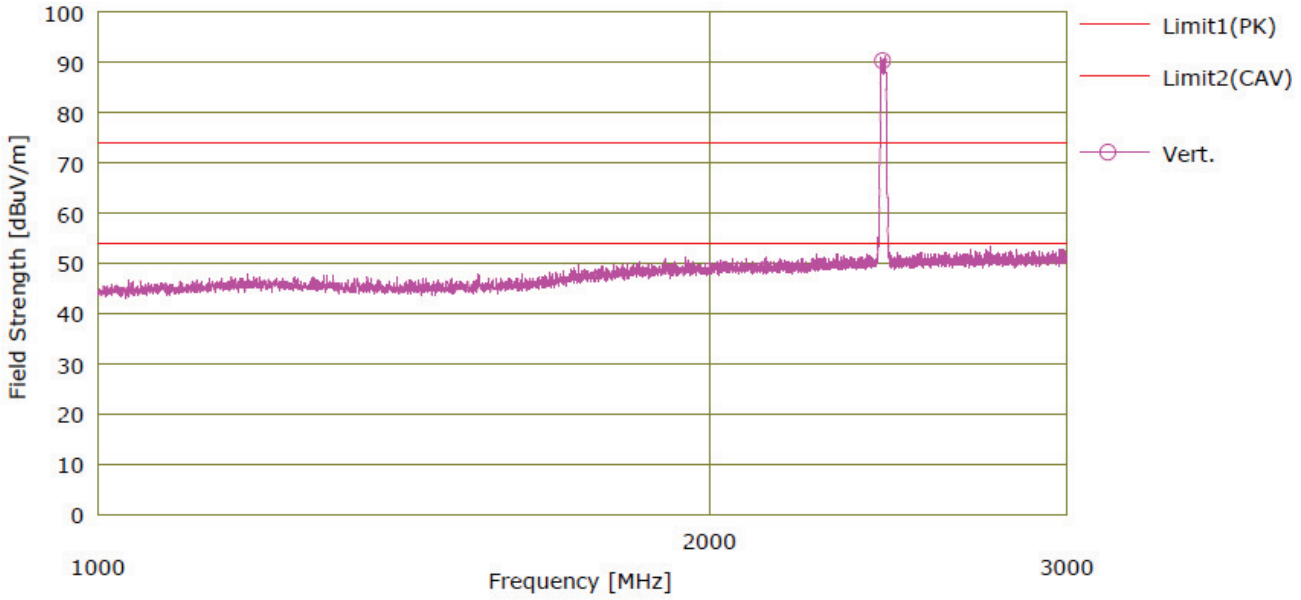
(802.11g, 6 Mbps) transmitting at f_{LOW}



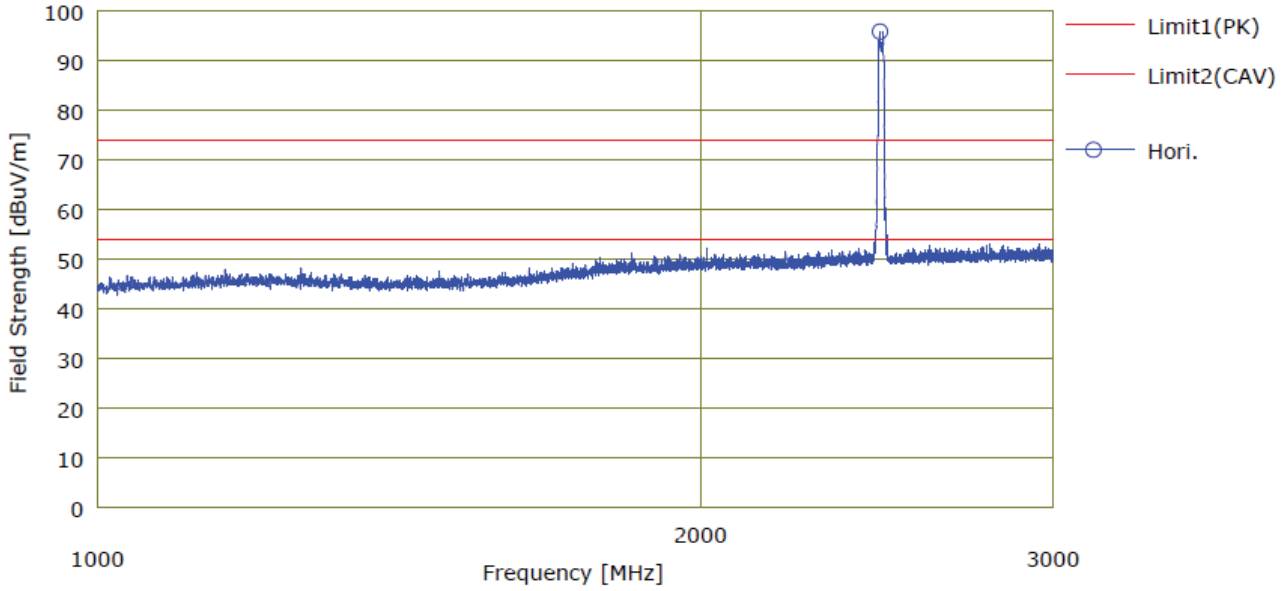


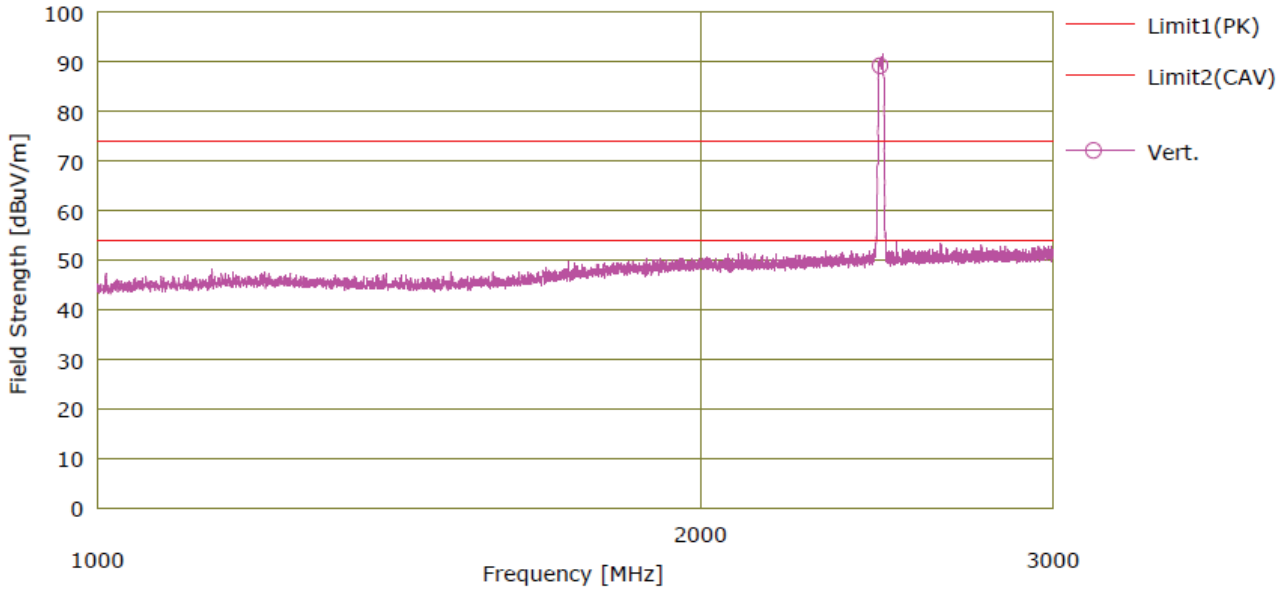
(802.11g, 6 Mbps) transmitting at f_{MID}



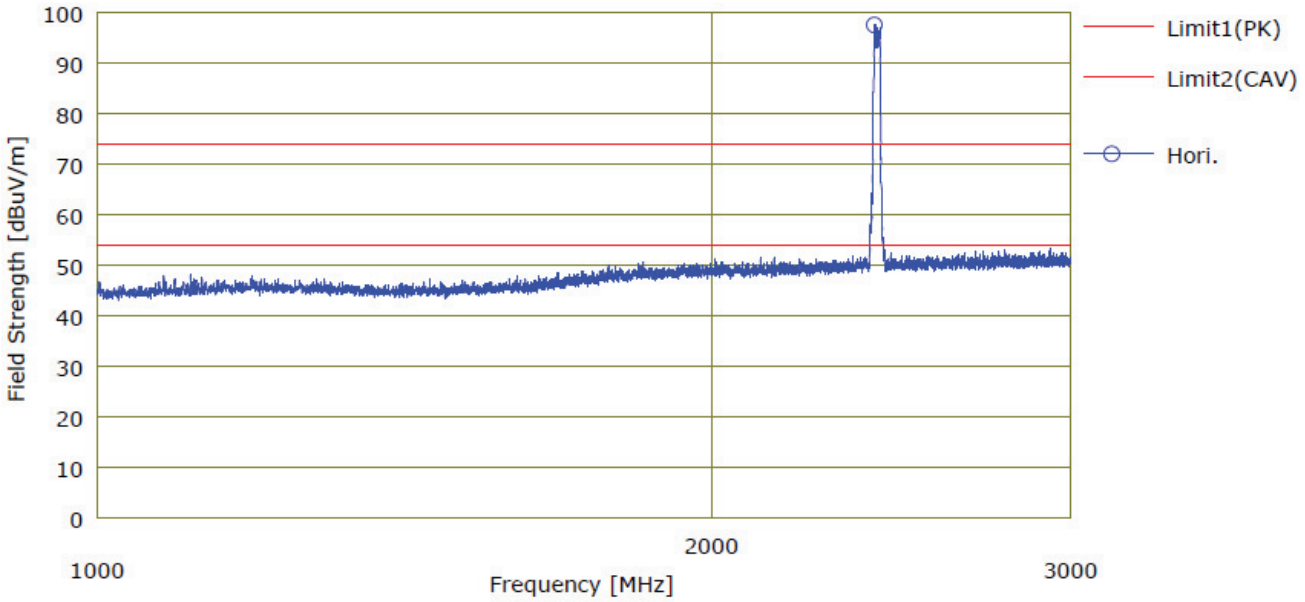


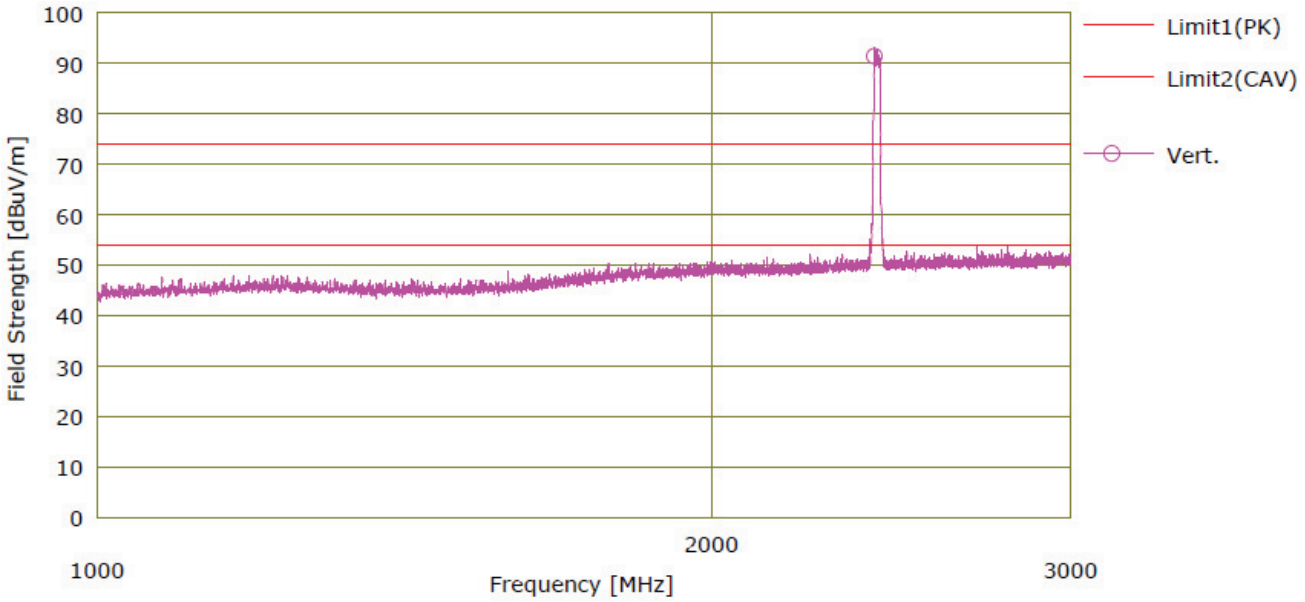
(802.11g, 6 Mbps) transmitting at f_{HIGH}



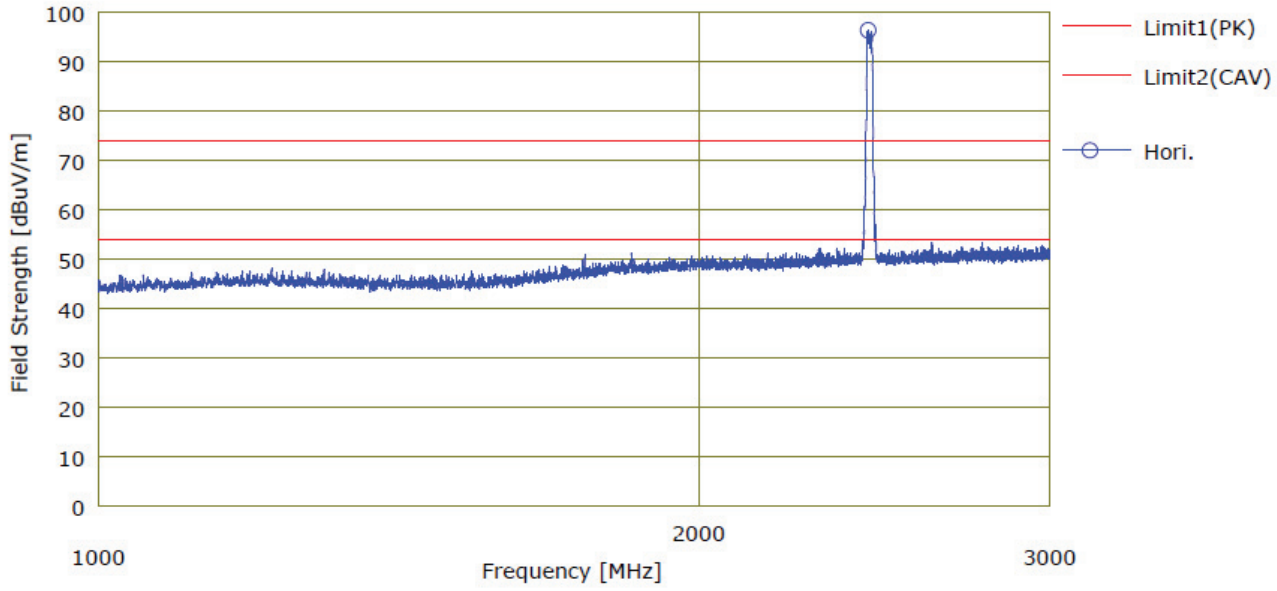


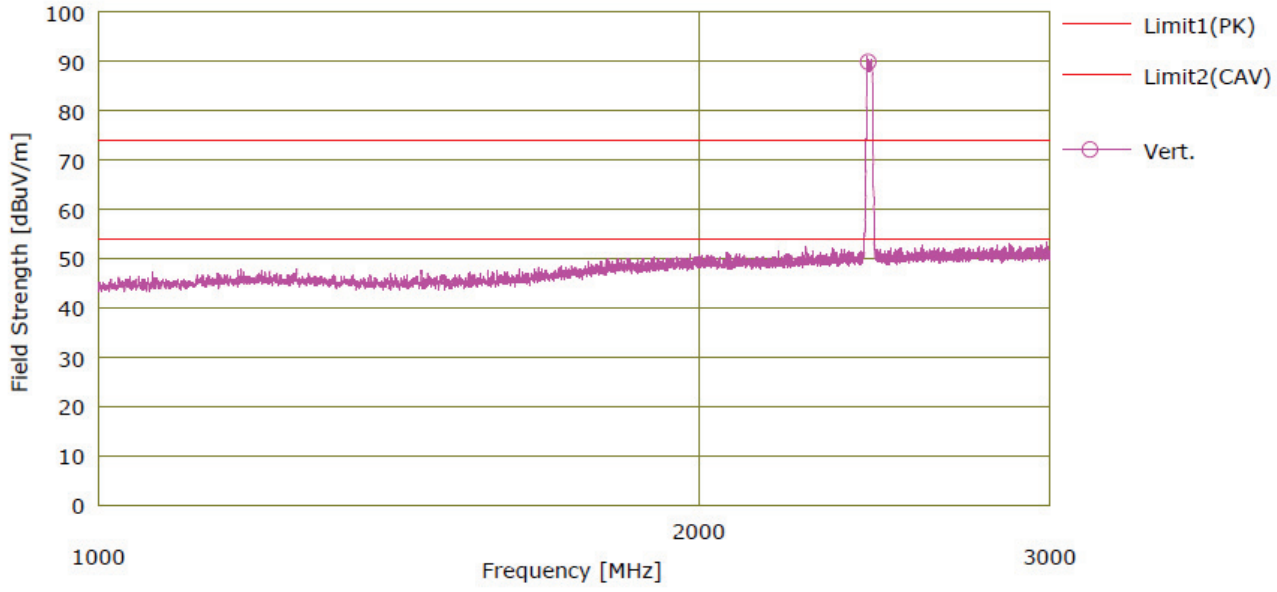
(802.11n(HT20), MCS0) transmitting at f_{LOW}



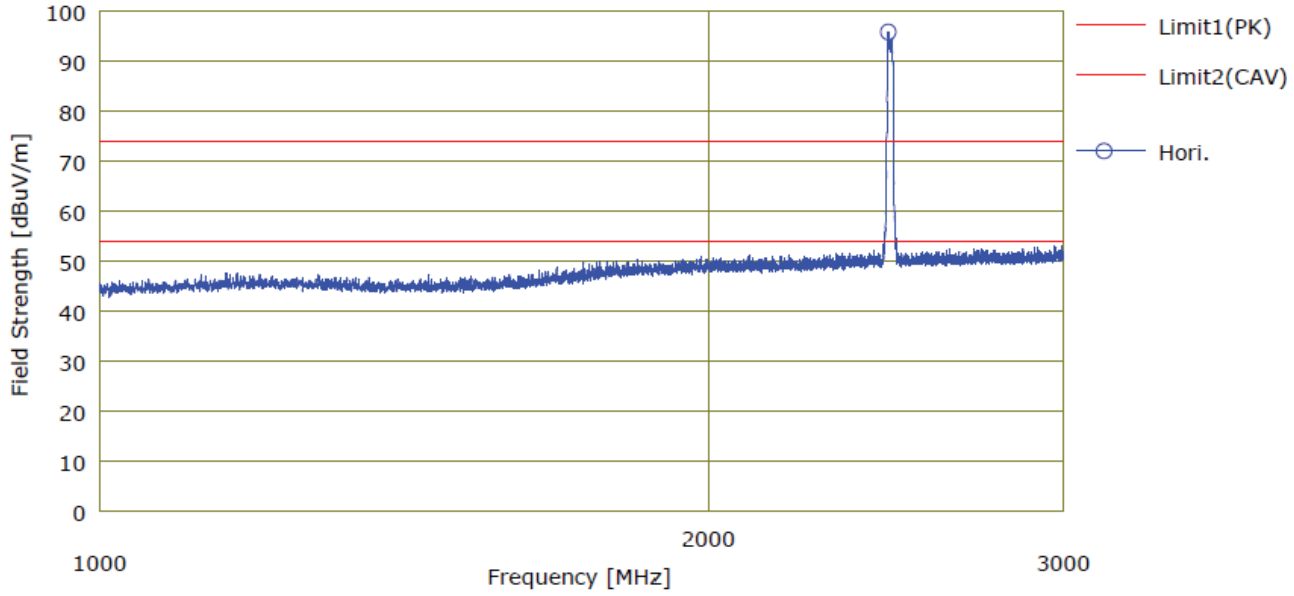


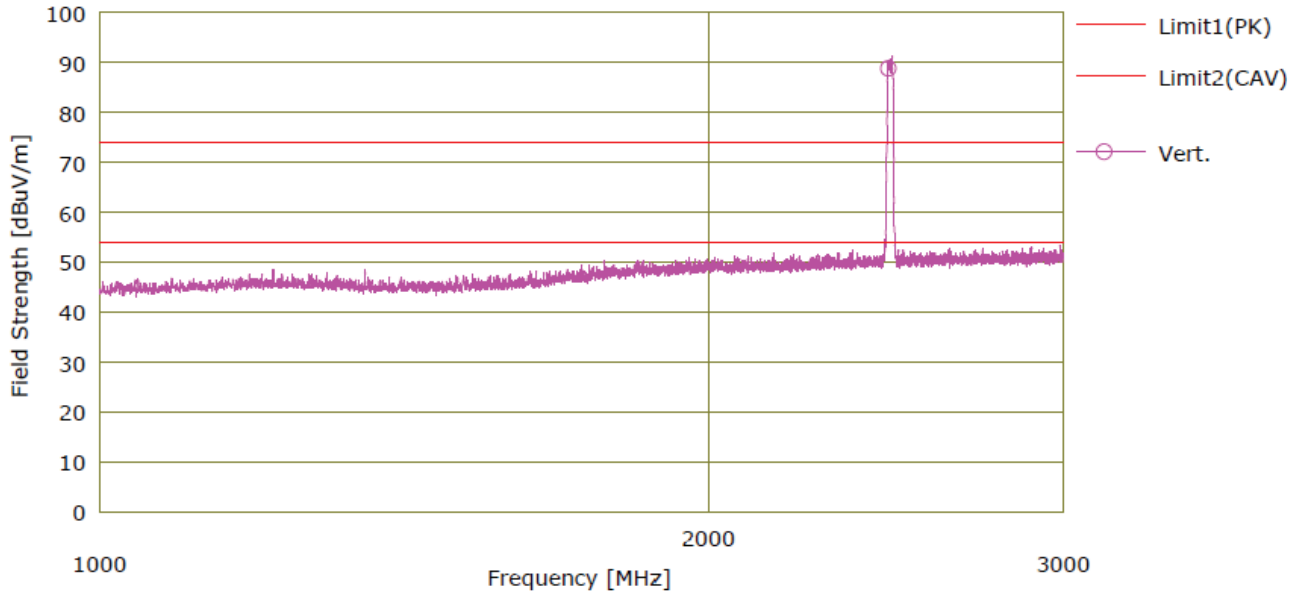
(802.11n(HT20), MCS0) transmitting at f_{MID}





(802.11n(HT20), MCS0) transmitting at f_{HIGH}

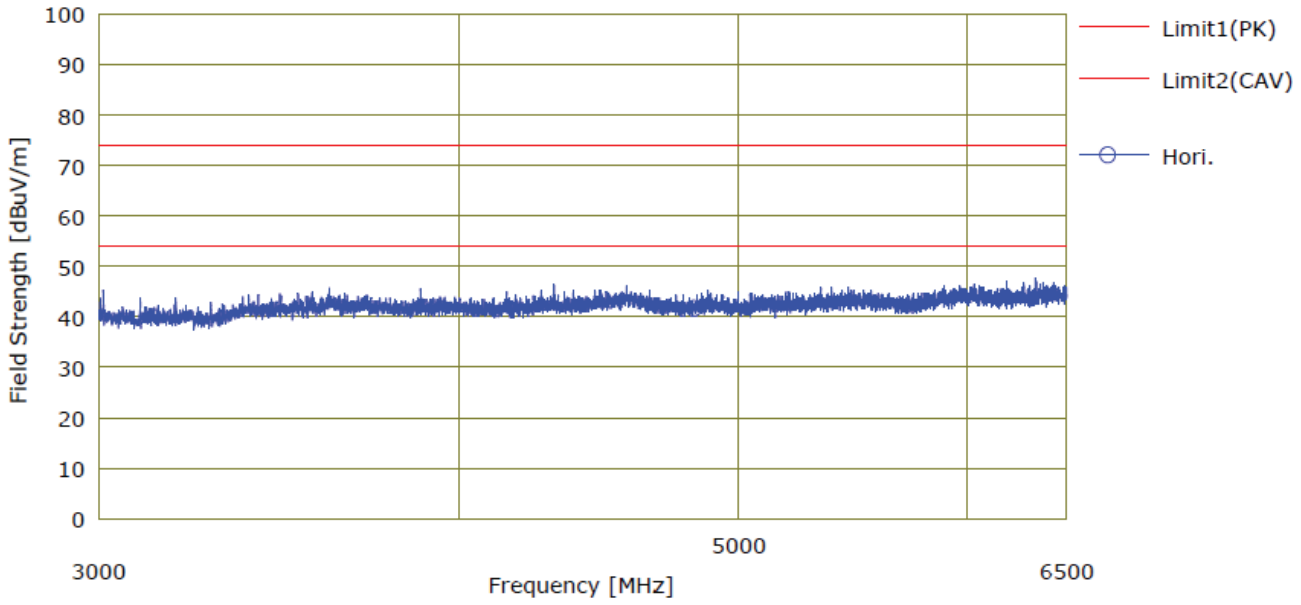


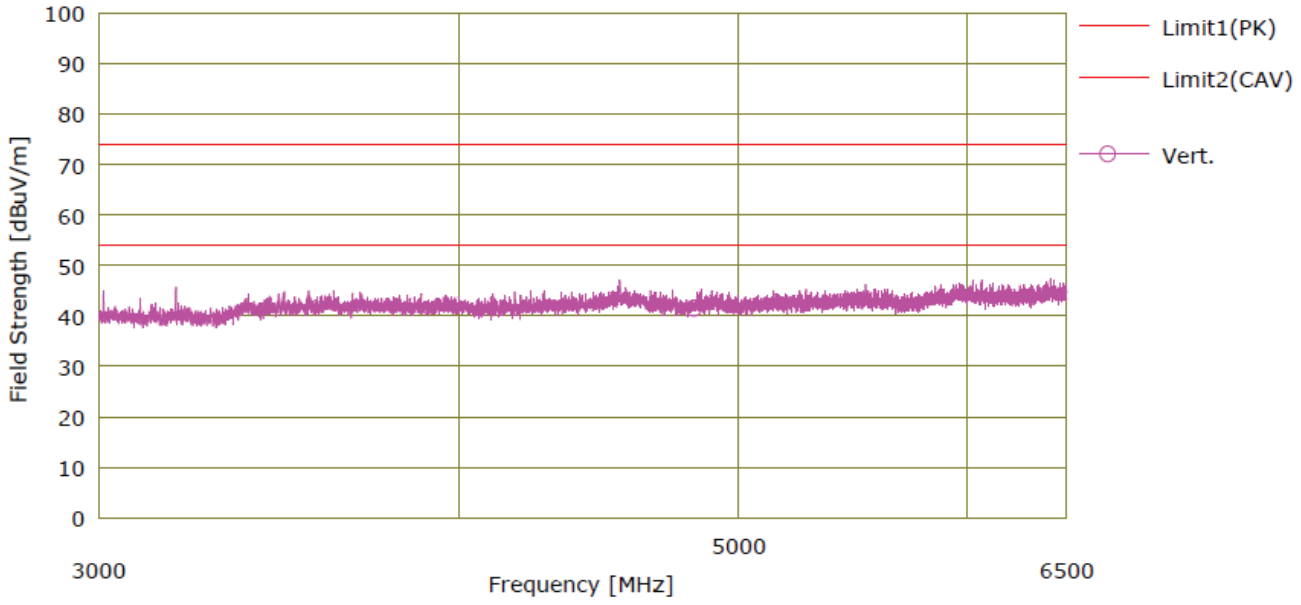


Remark: The plot(s) in the figure 7 were obtained from the preliminary measurements (peak data) by using the Peak detector with RBW 1 MHz.

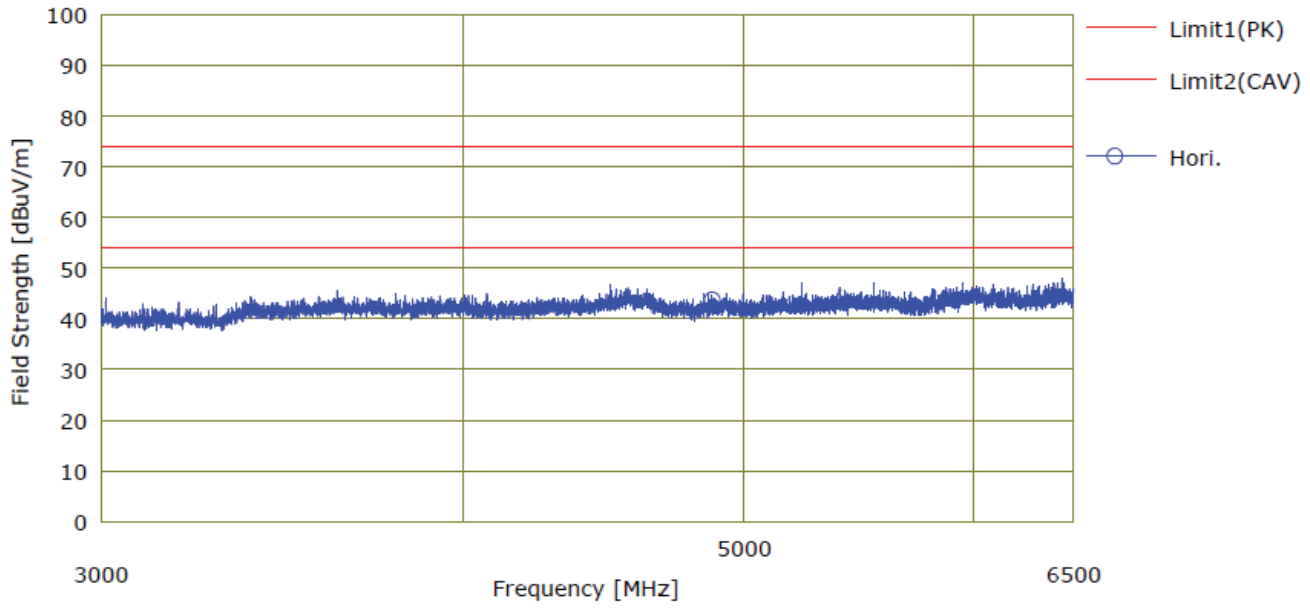
Figure 8. Plot of radiated spurious emissions (from 3 GHz to 6.5 GHz)

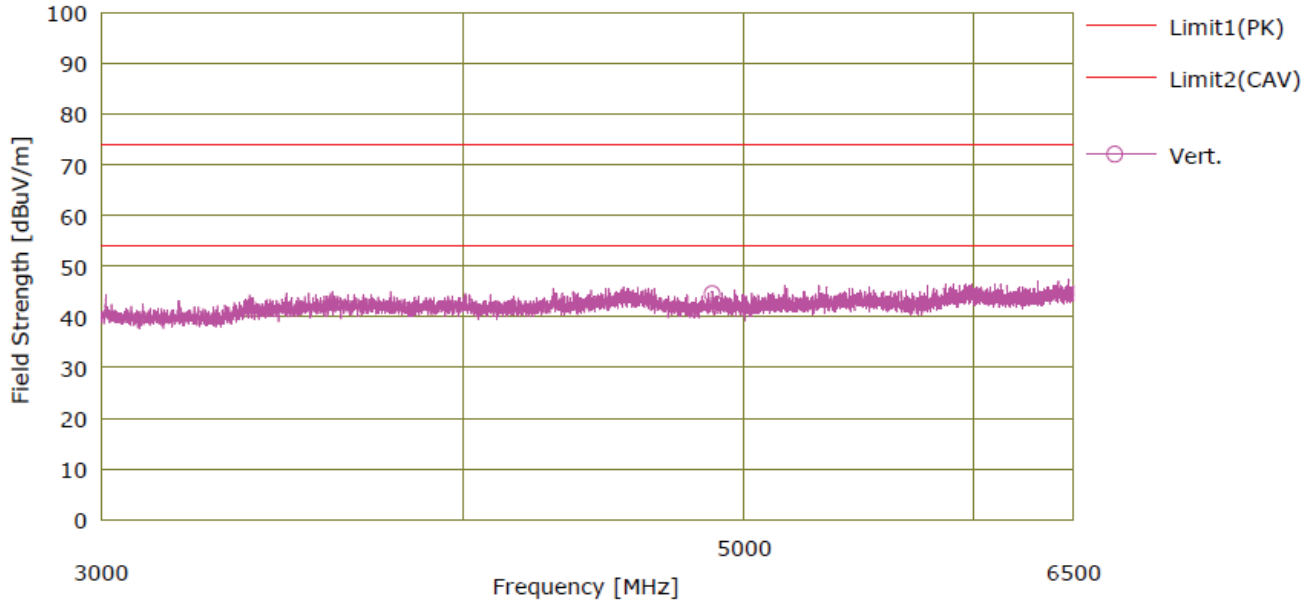
(802.11b, 1 Mbps) transmitting at f_{LOW}



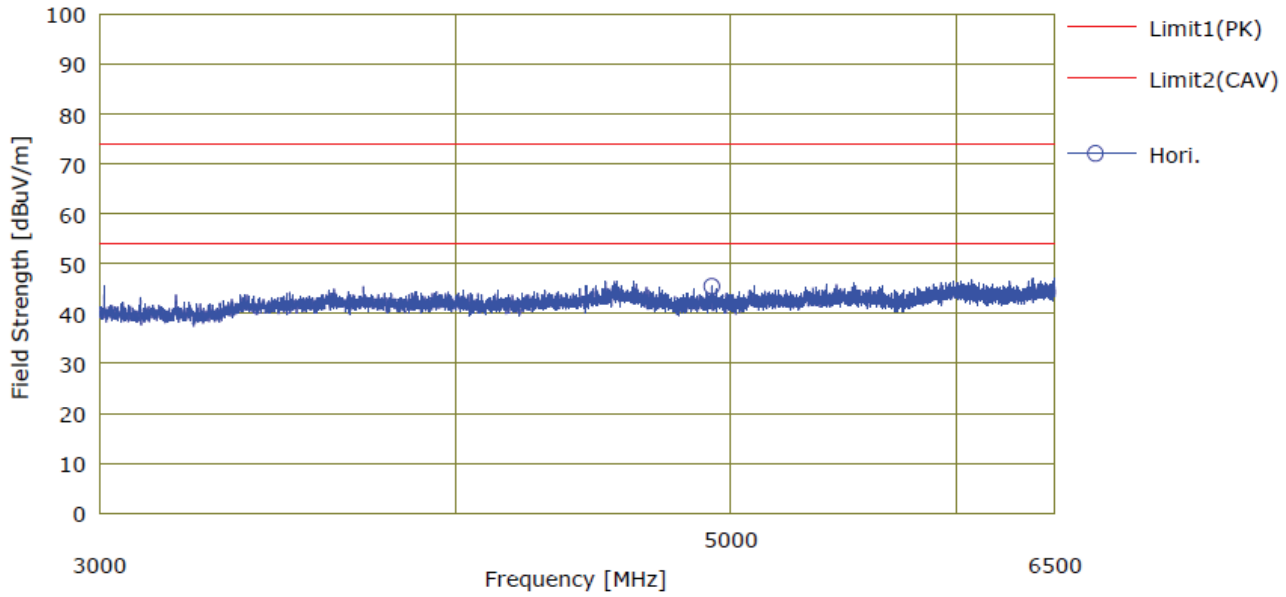


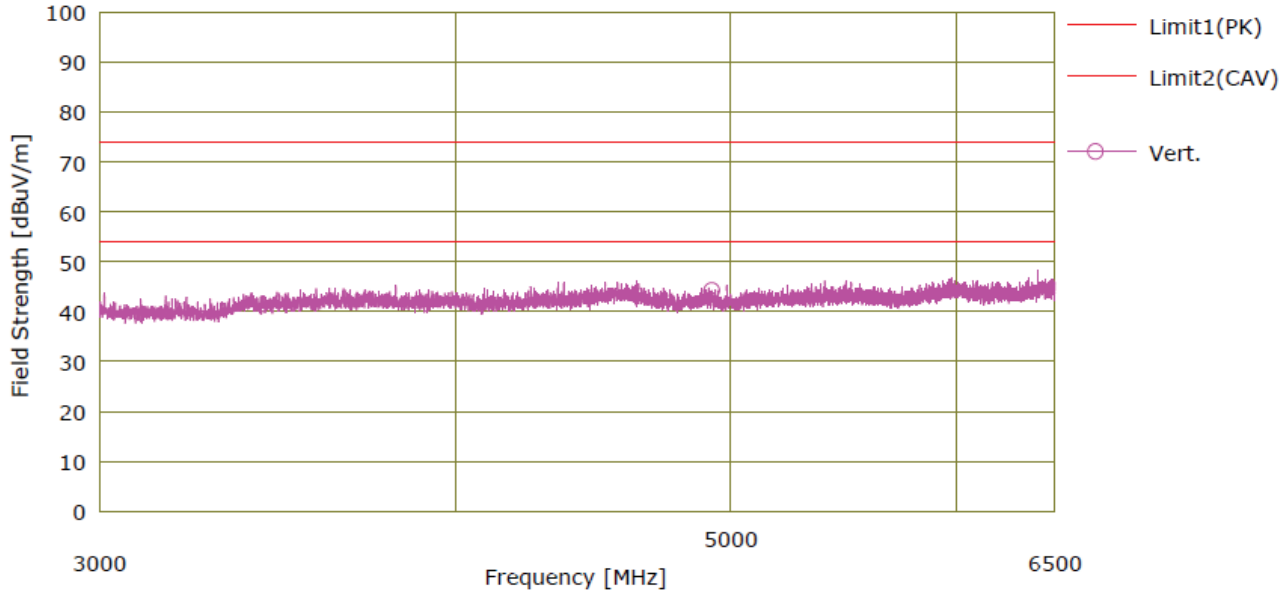
(802.11b, 1 Mbps) transmitting at f_{MID}



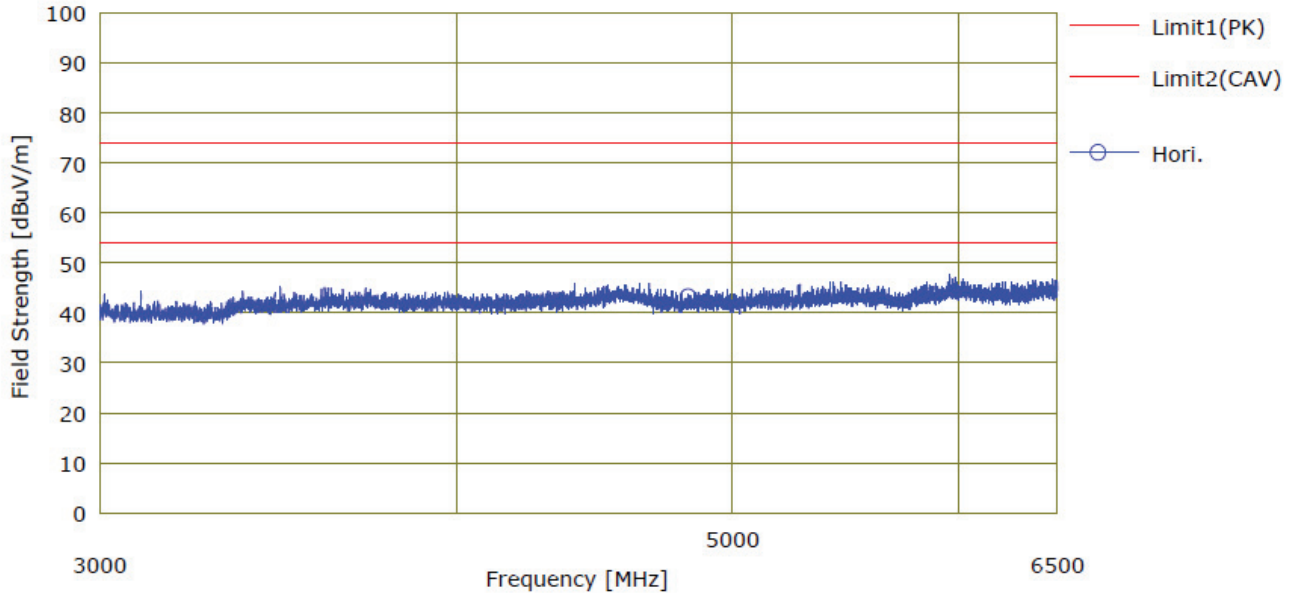


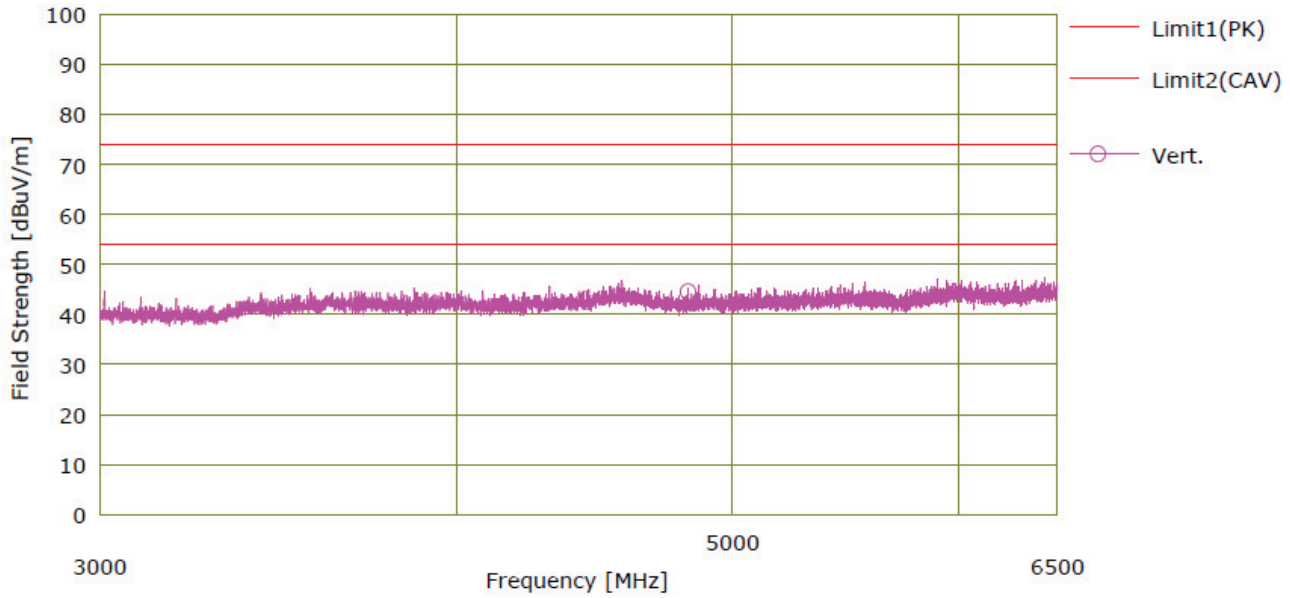
(802.11b, 1 Mbps) transmitting at f_{HIGH}



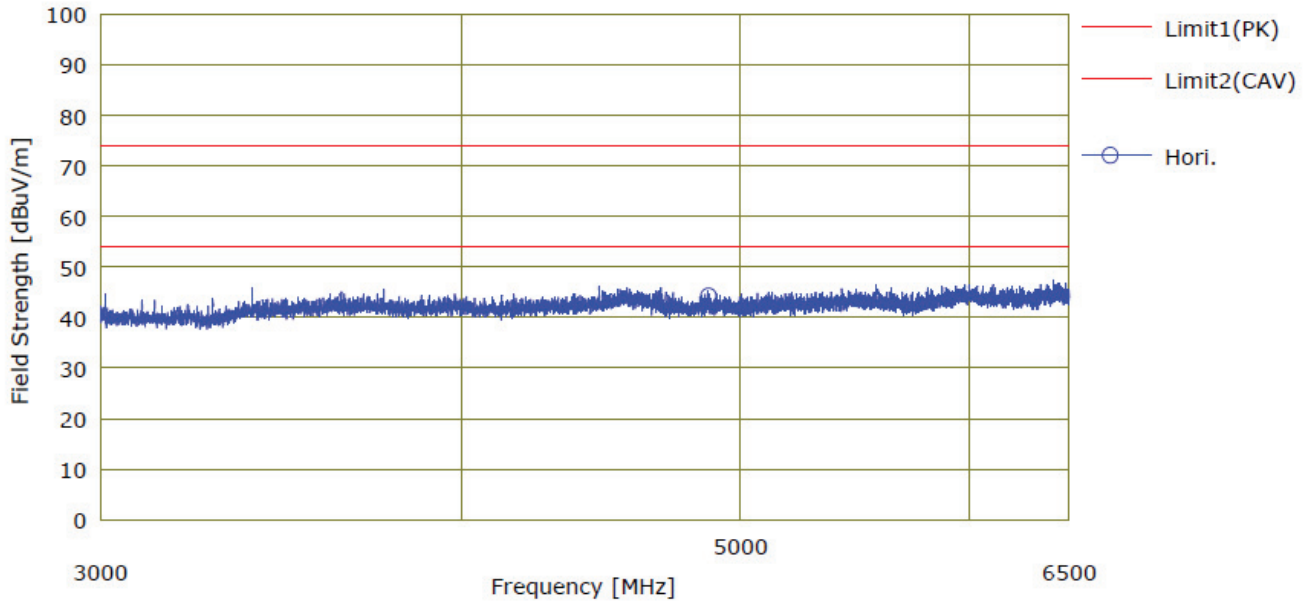


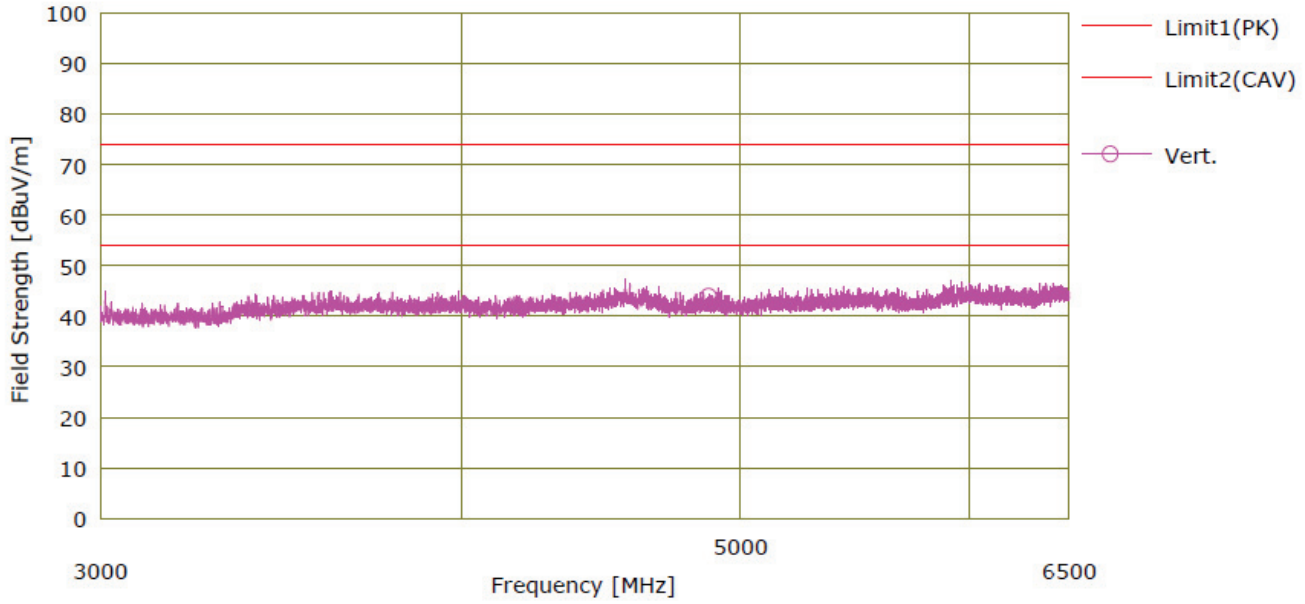
(802.11g, 6 Mbps) transmitting at f_{LOW}



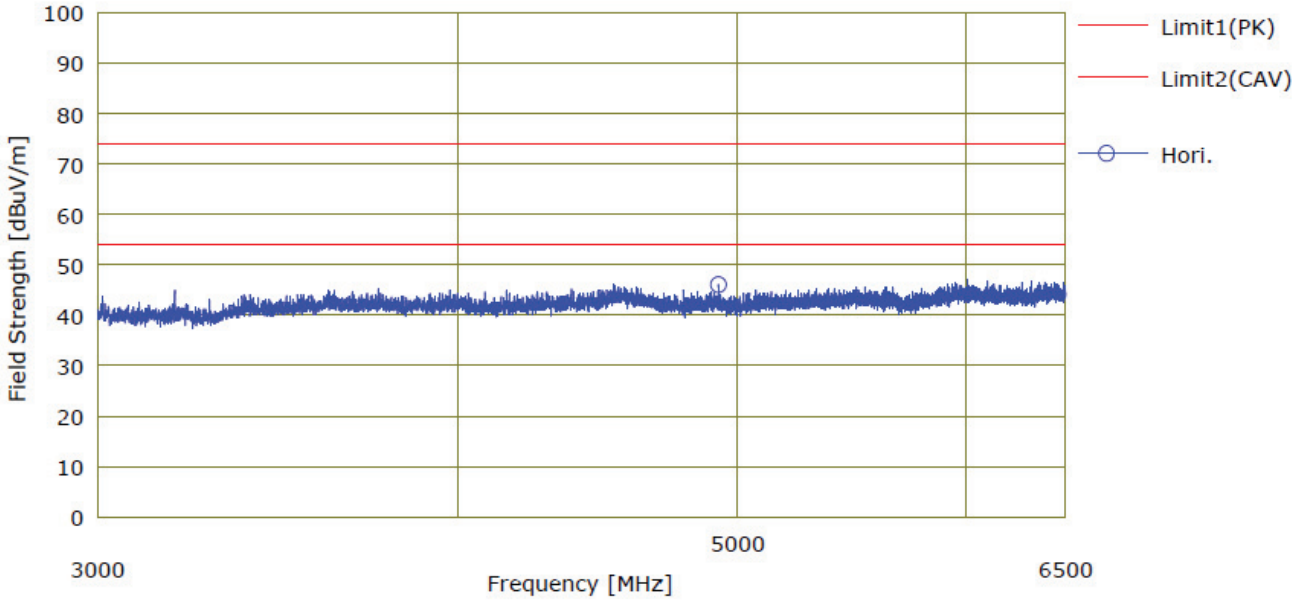


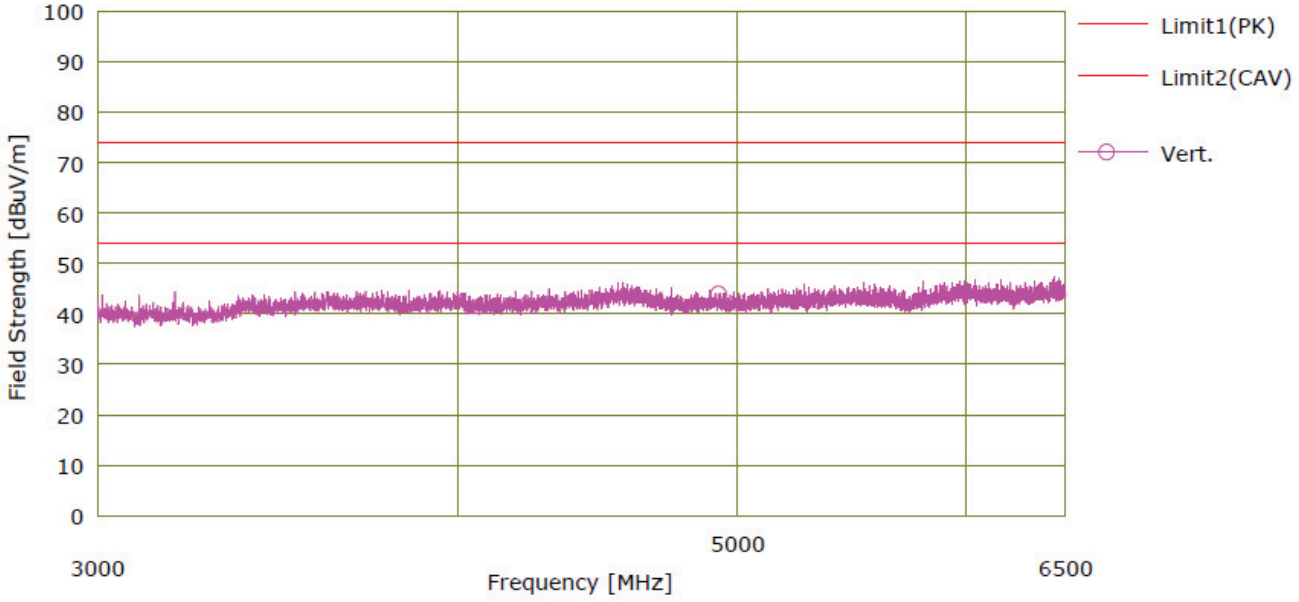
(802.11g, 6 Mbps) transmitting at f_{MID}



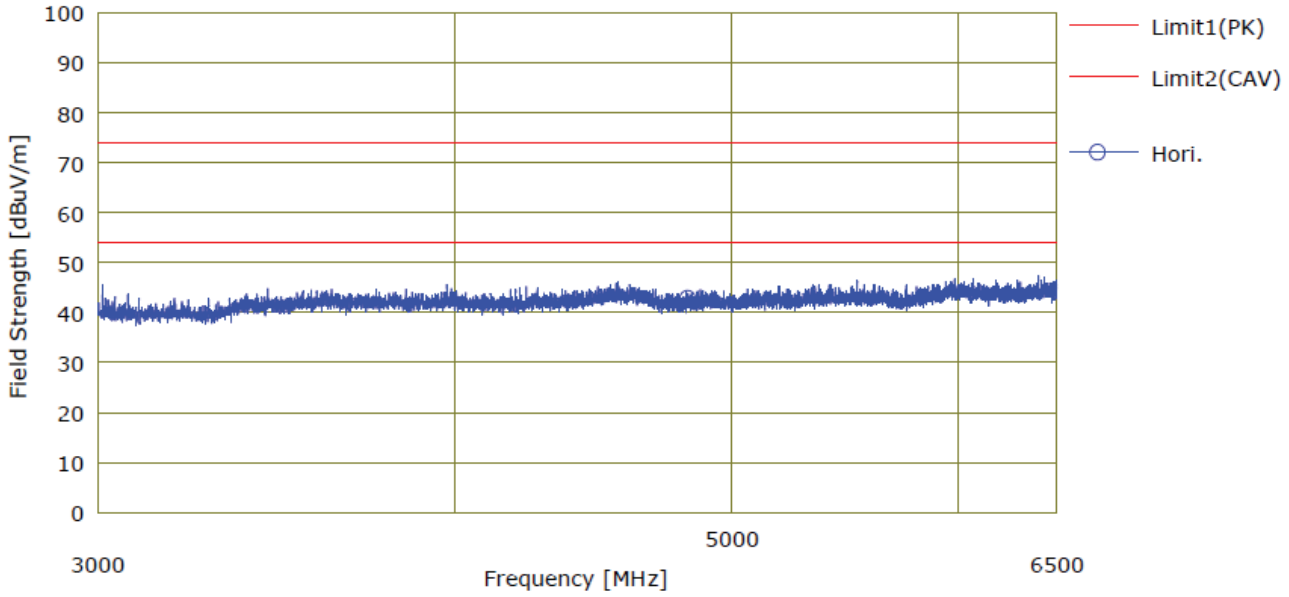


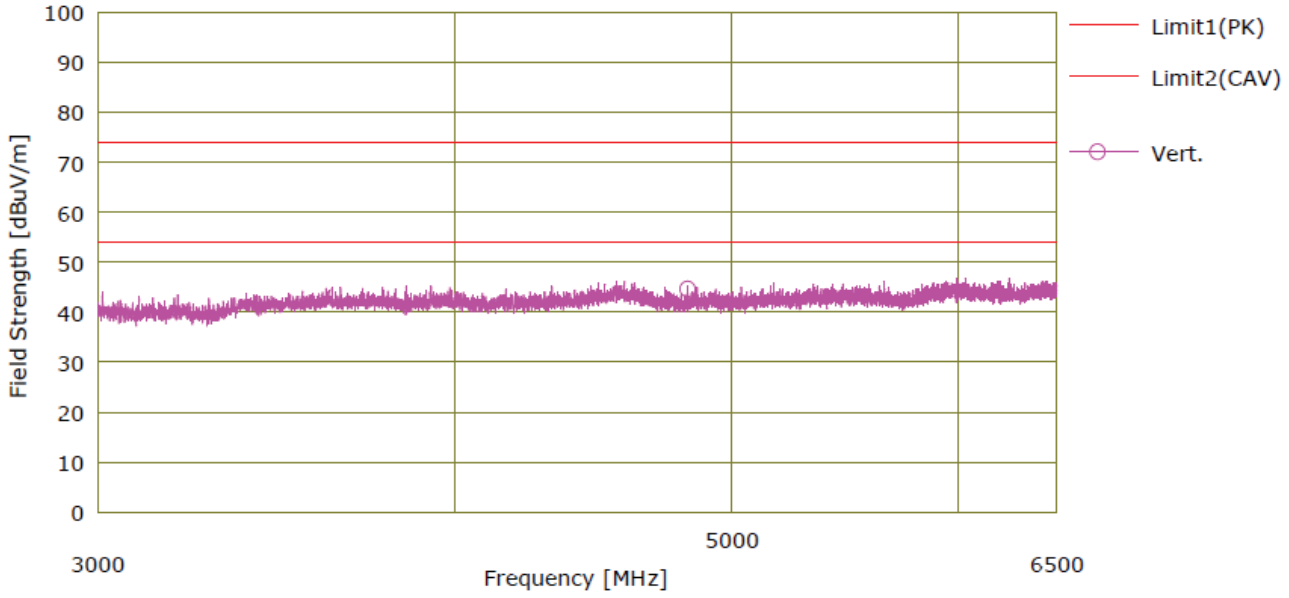
(802.11g, 6 Mbps) transmitting at f_{HIGH}



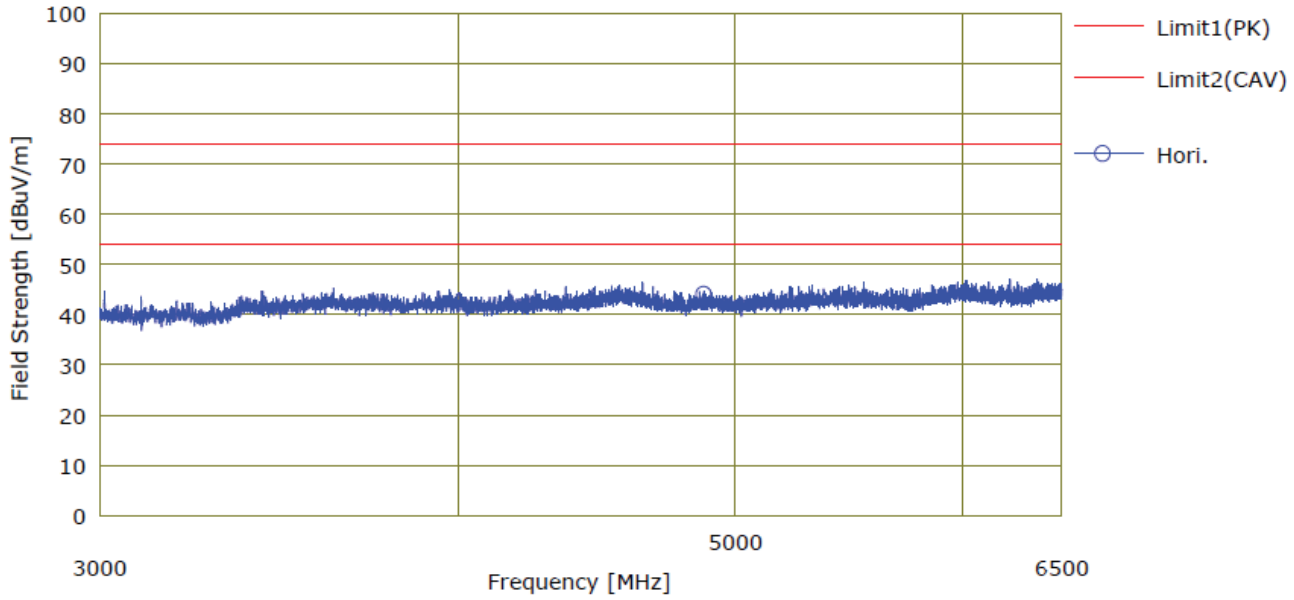


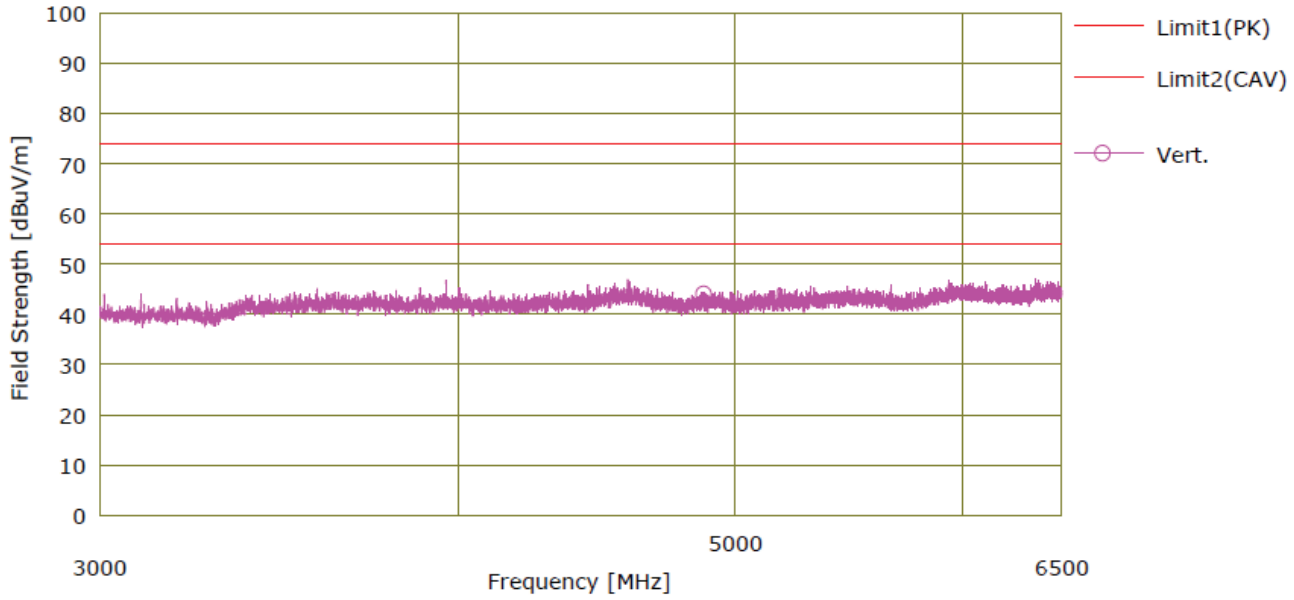
(802.11n(HT20), MCS0) transmitting at f_{LOW}



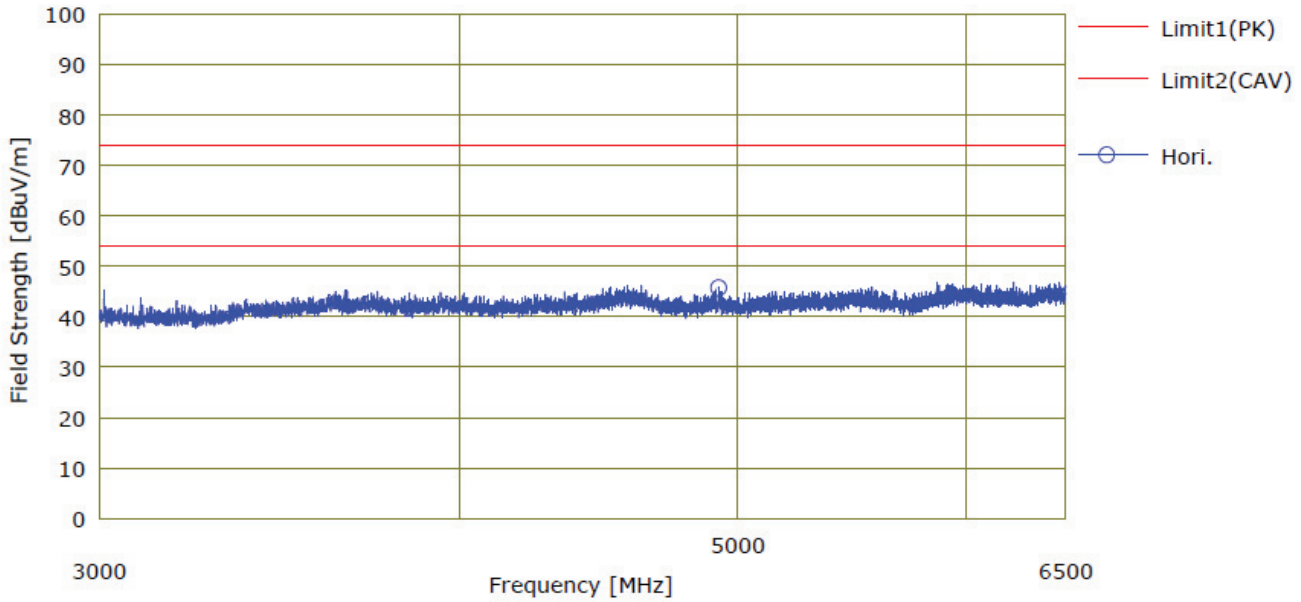


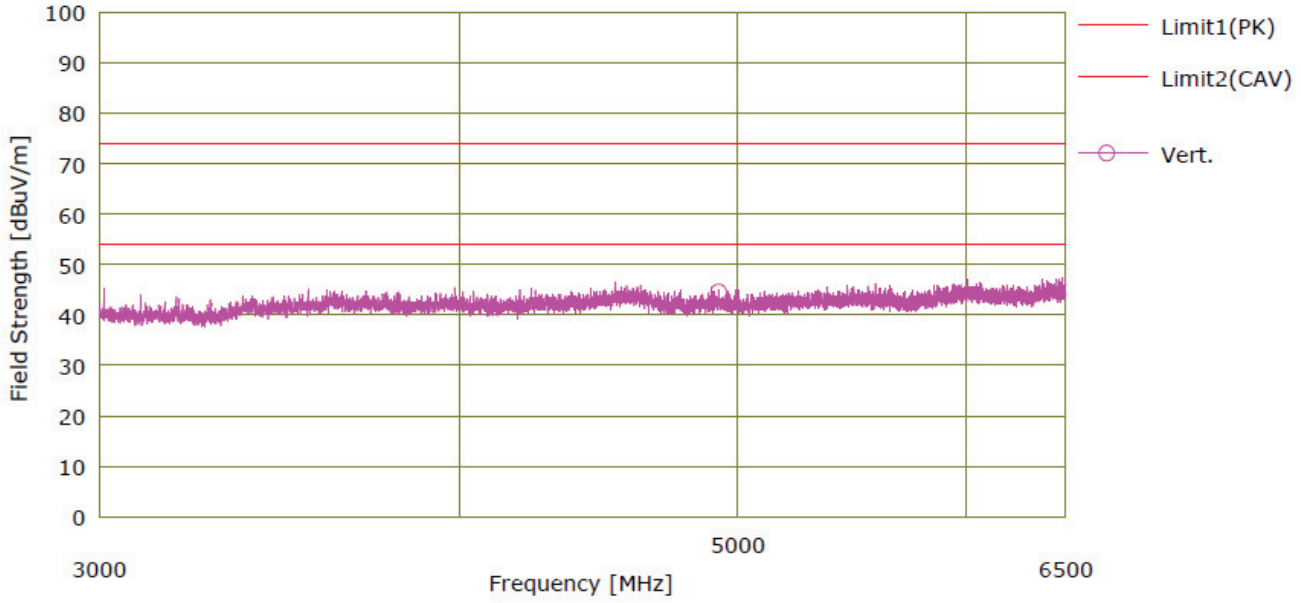
(802.11n(HT20), MCS0) transmitting at f_{MID}





(802.11n(HT20), MCS0) transmitting at f_{HIGH}

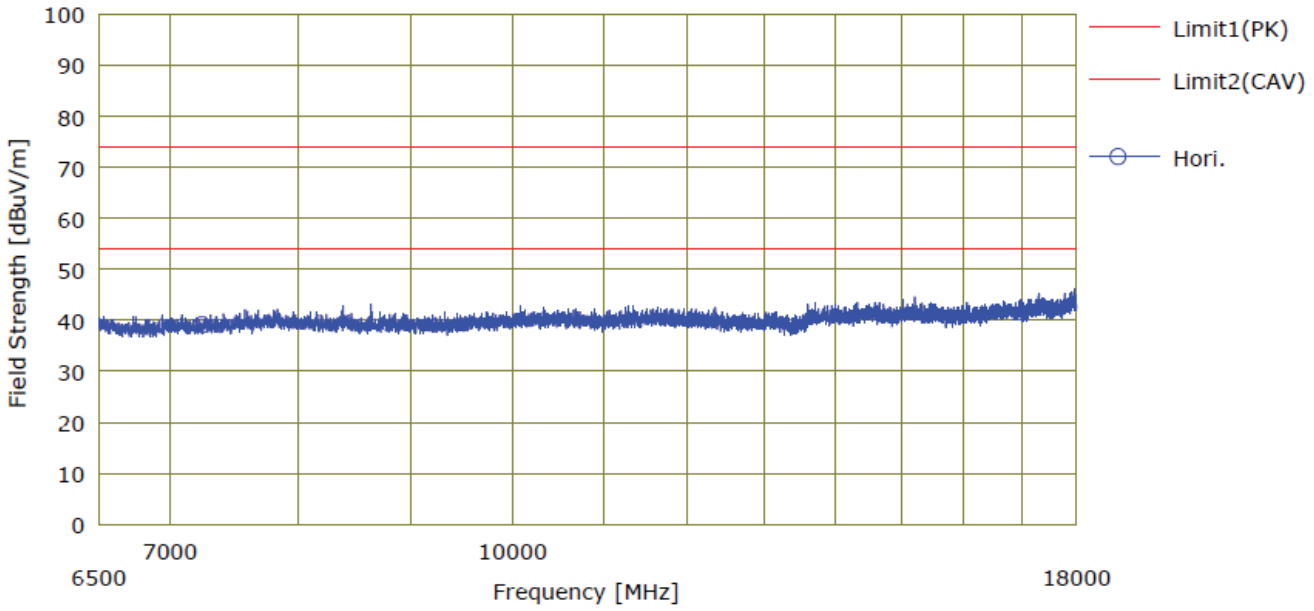


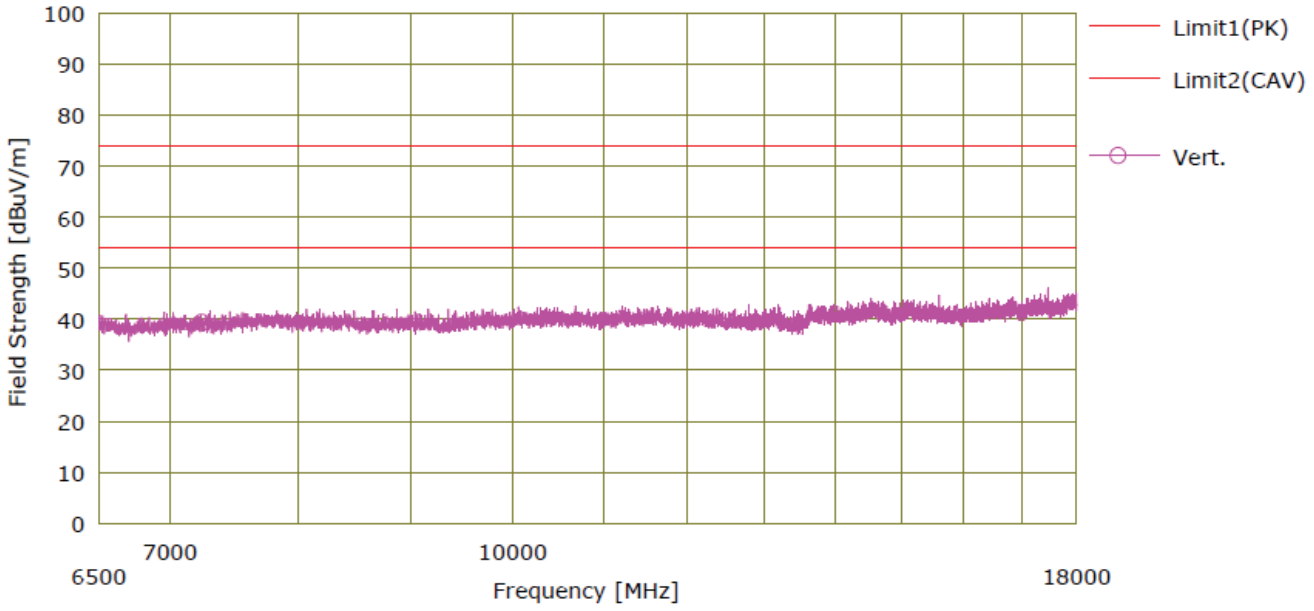


Remark: The plot(s) in the figure 8 were obtained from the preliminary measurements (peak data) by using the Peak detector with RBW 1 MHz.

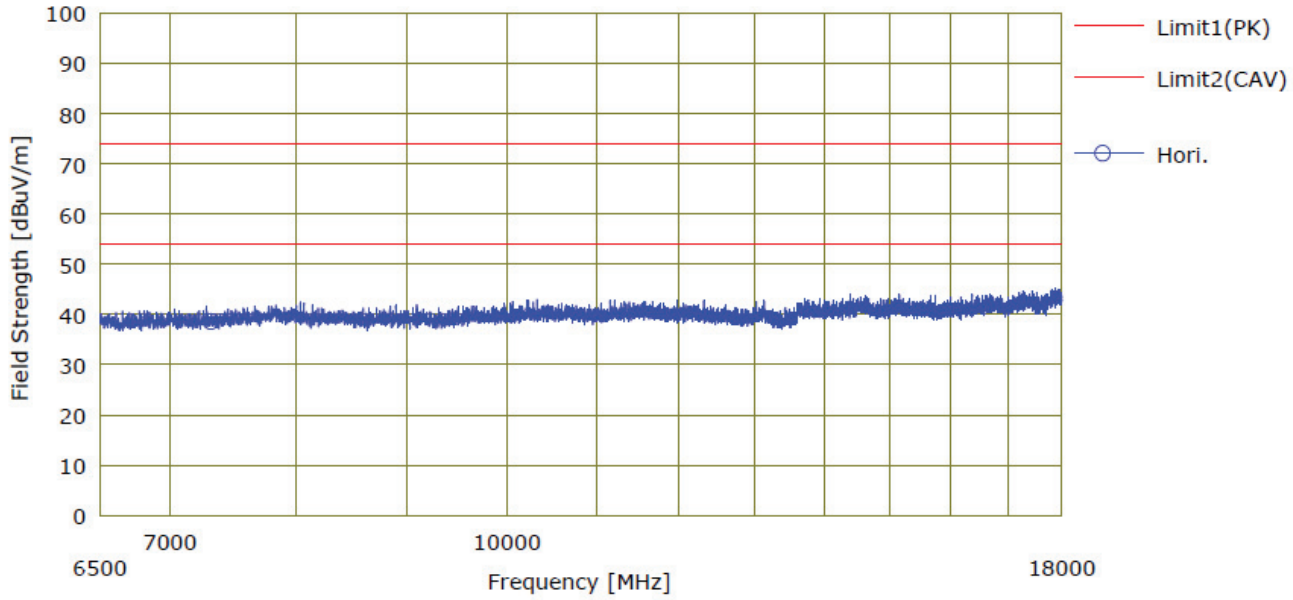
Figure 9. Plot of radiated spurious emissions (from 6.5 GHz to 18 GHz)

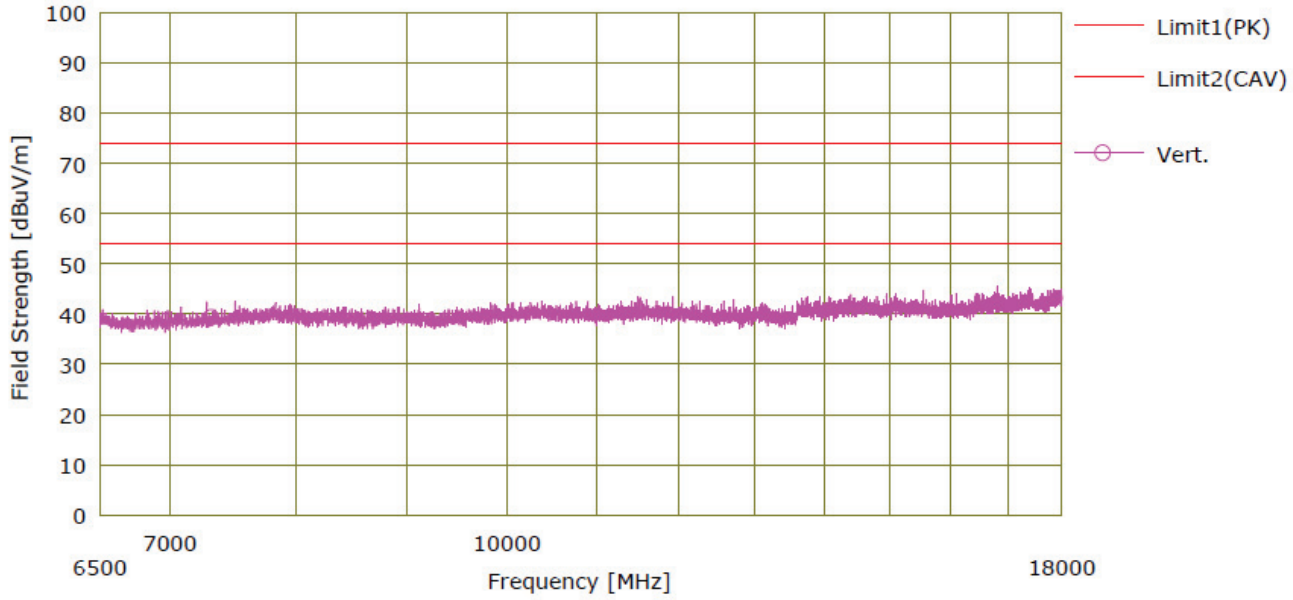
(802.11b, 1 Mbps) transmitting at f_{LOW}



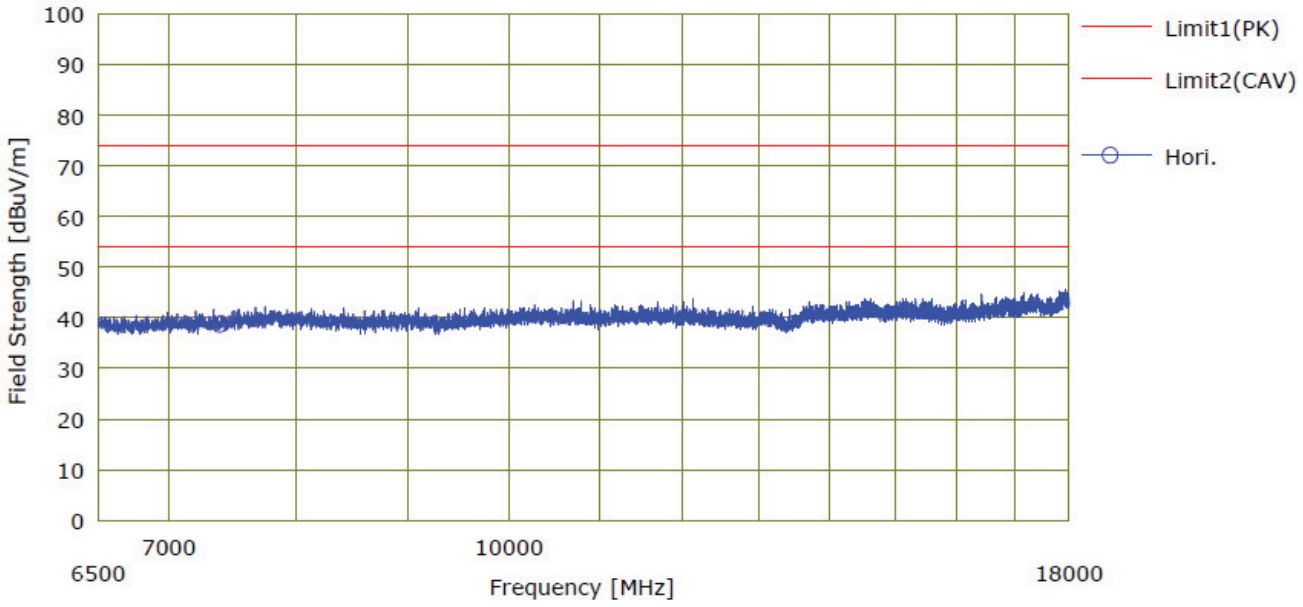


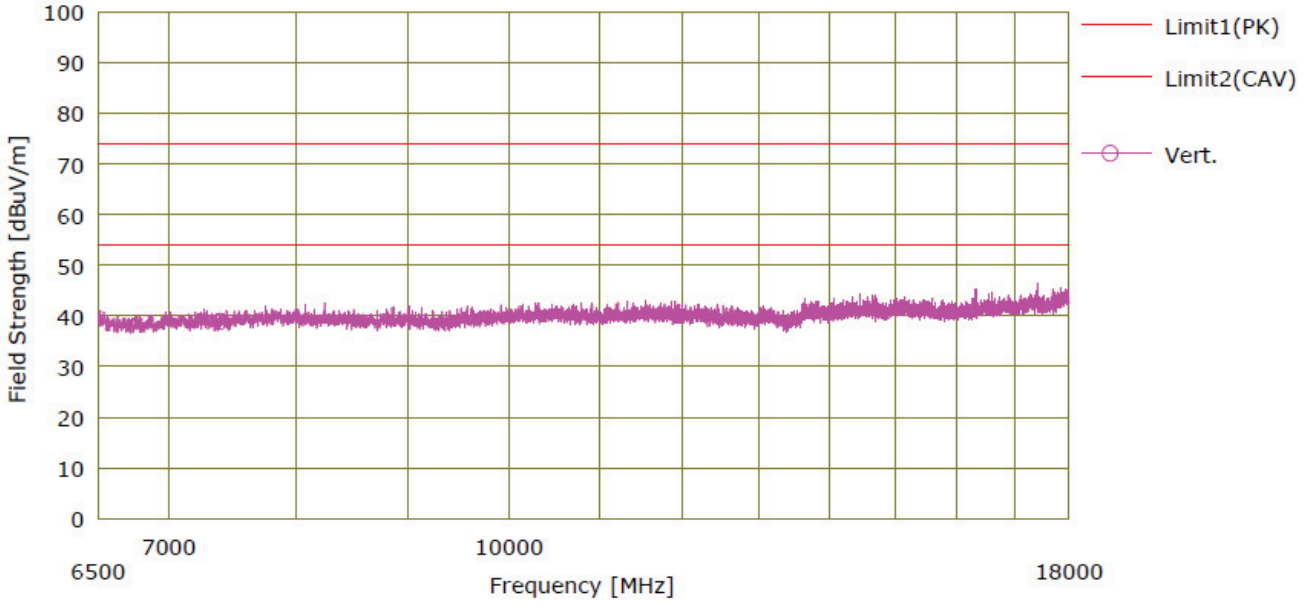
(802.11b, 1 Mbps) transmitting at f_{MID}



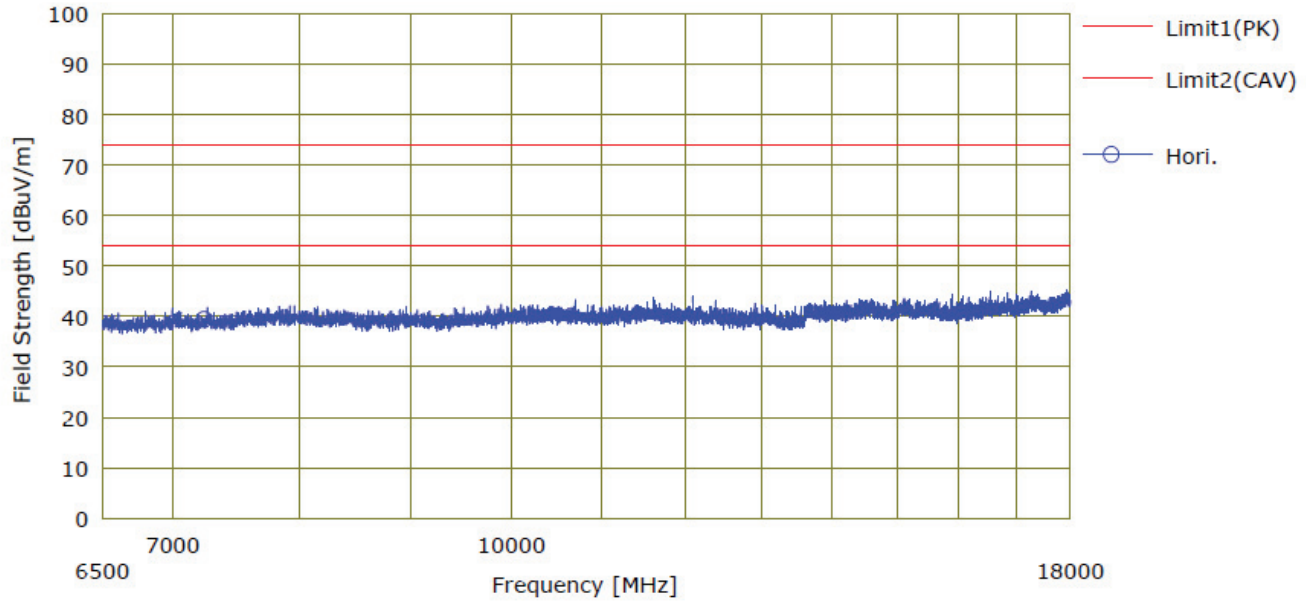


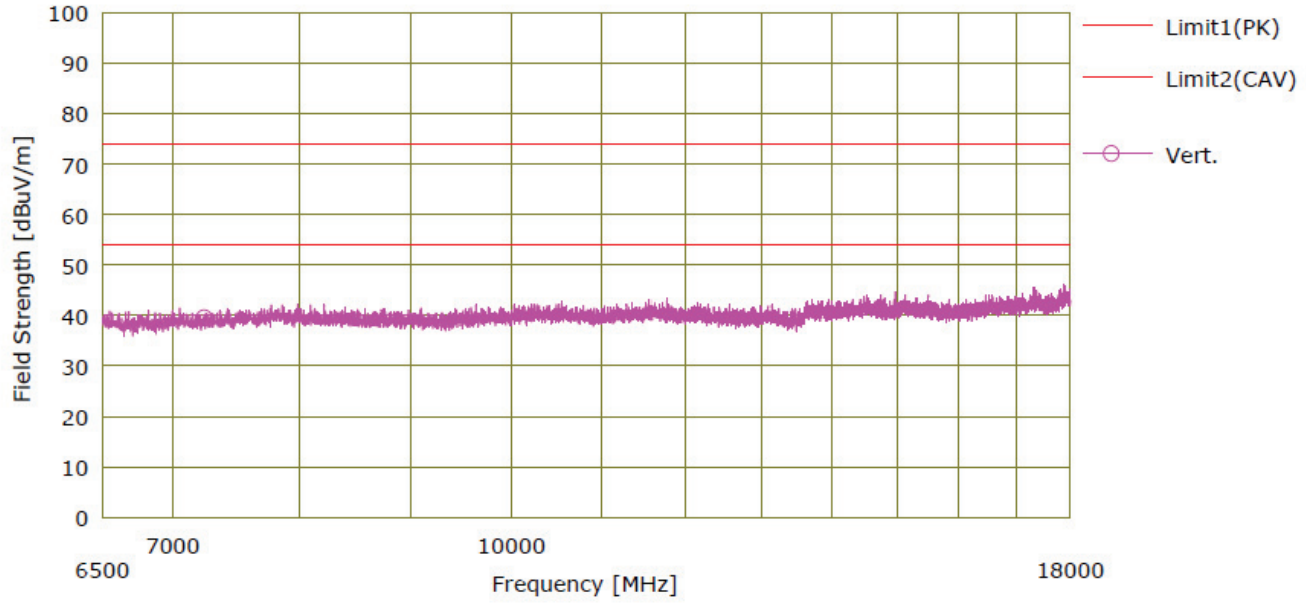
(802.11b, 1 Mbps) transmitting at f_{HIGH}



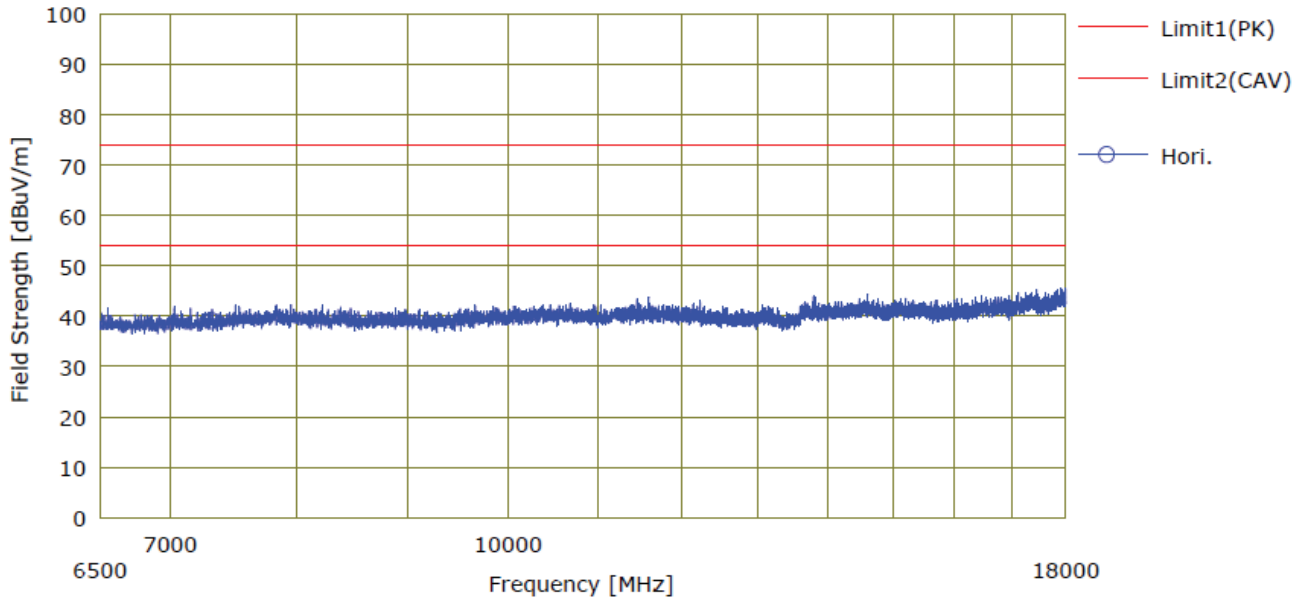


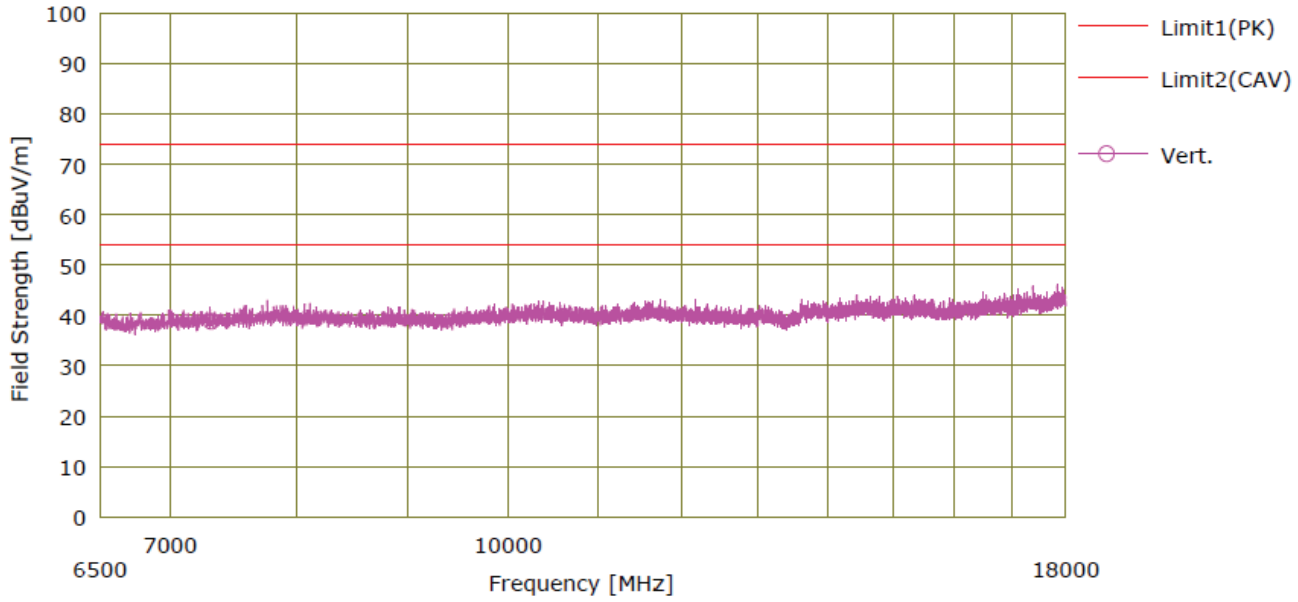
(802.11g, 6 Mbps) transmitting at f_{LOW}



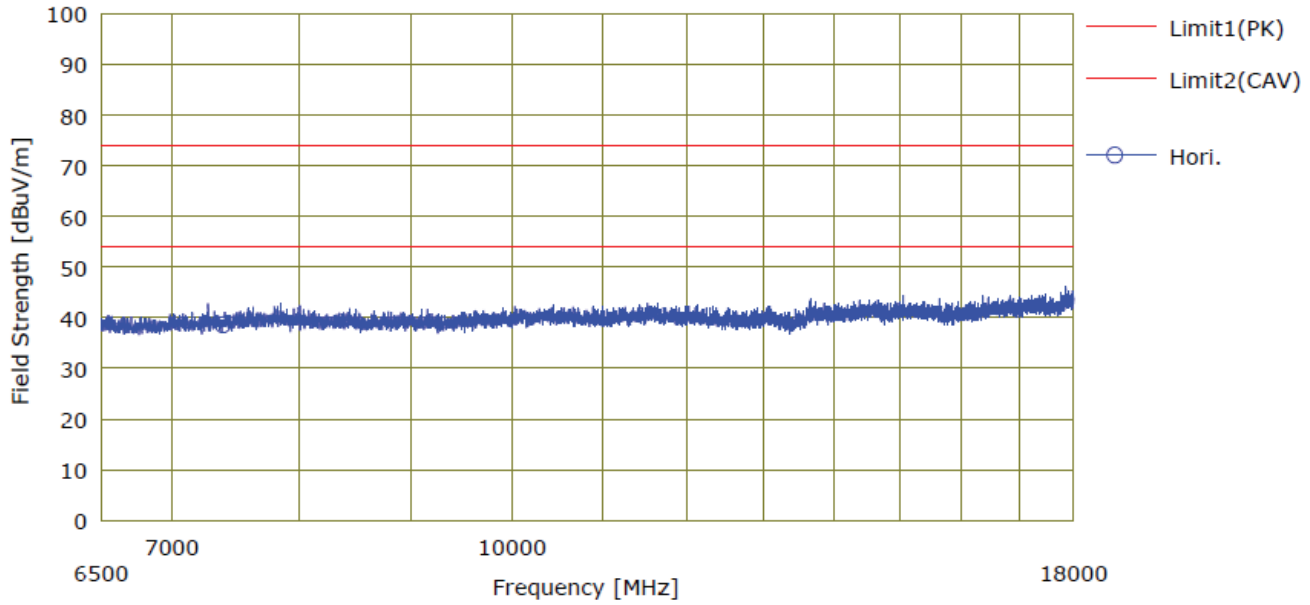


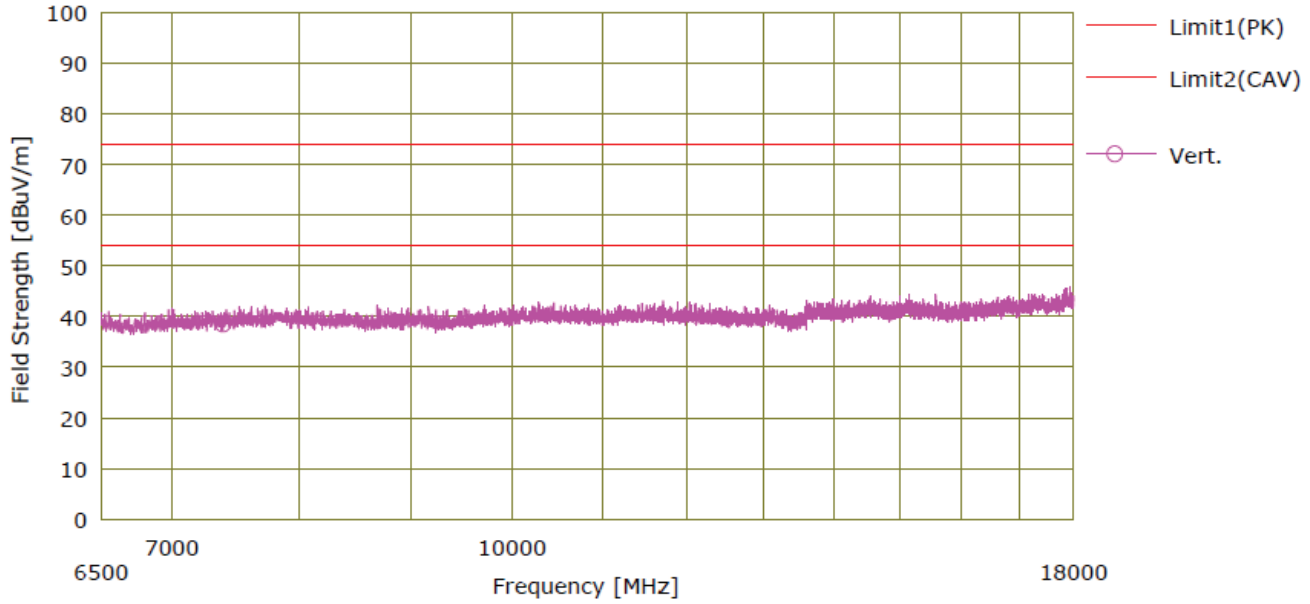
(802.11g, 6 Mbps) transmitting at f_{MID}



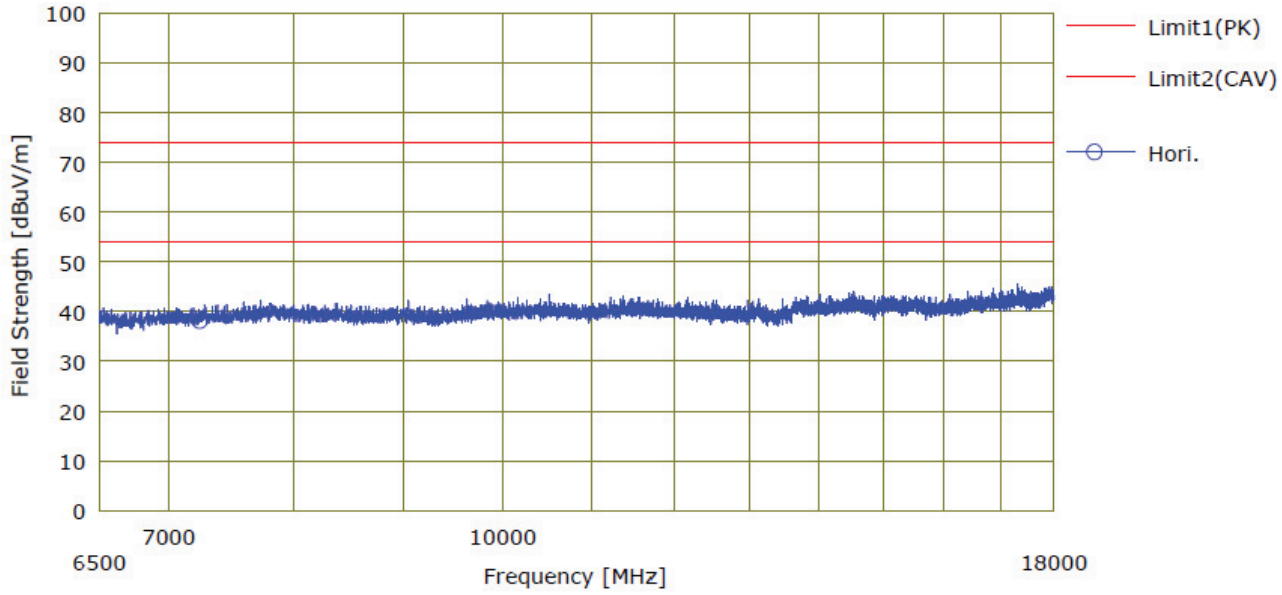


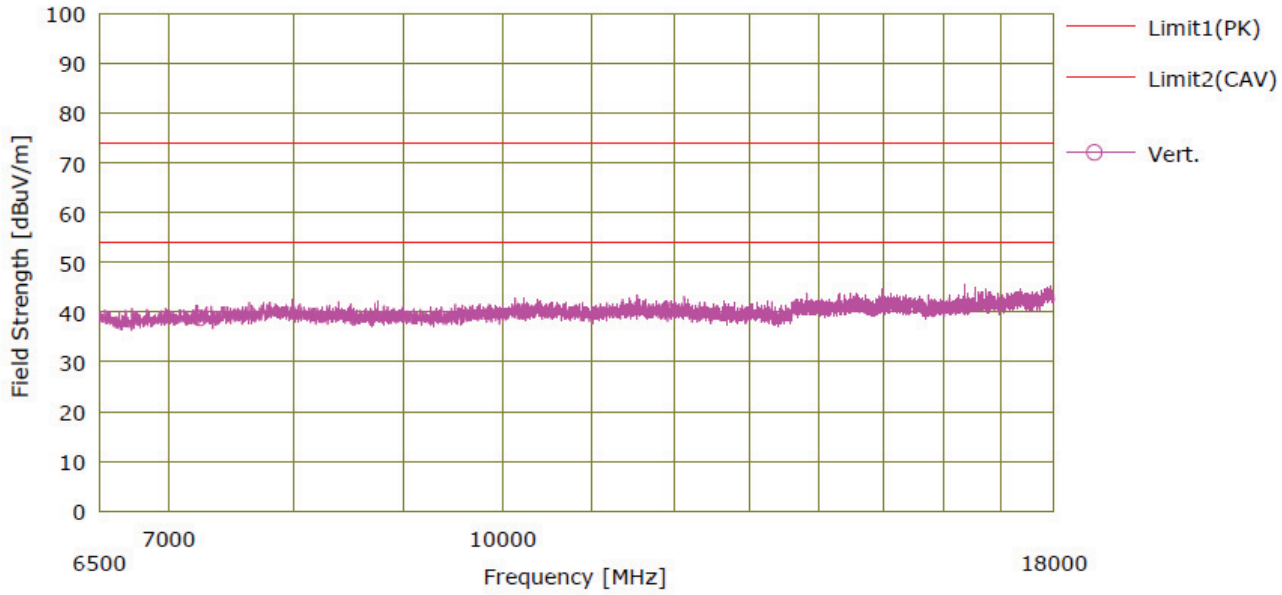
(802.11g, 6 Mbps) transmitting at f_{HIGH}



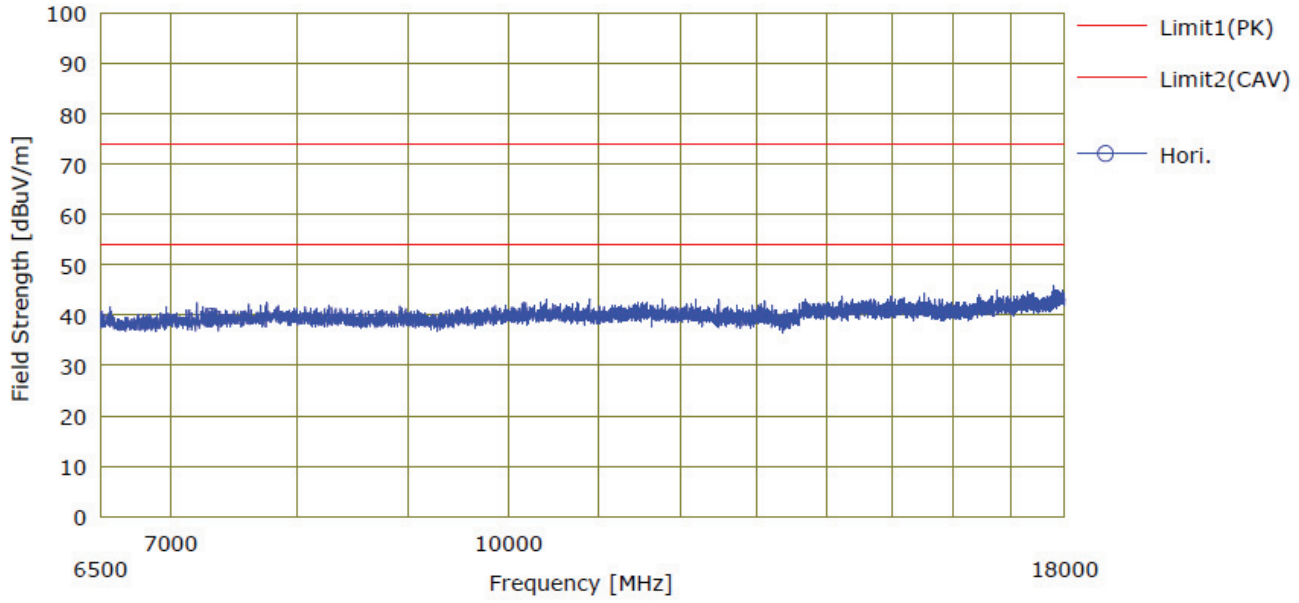


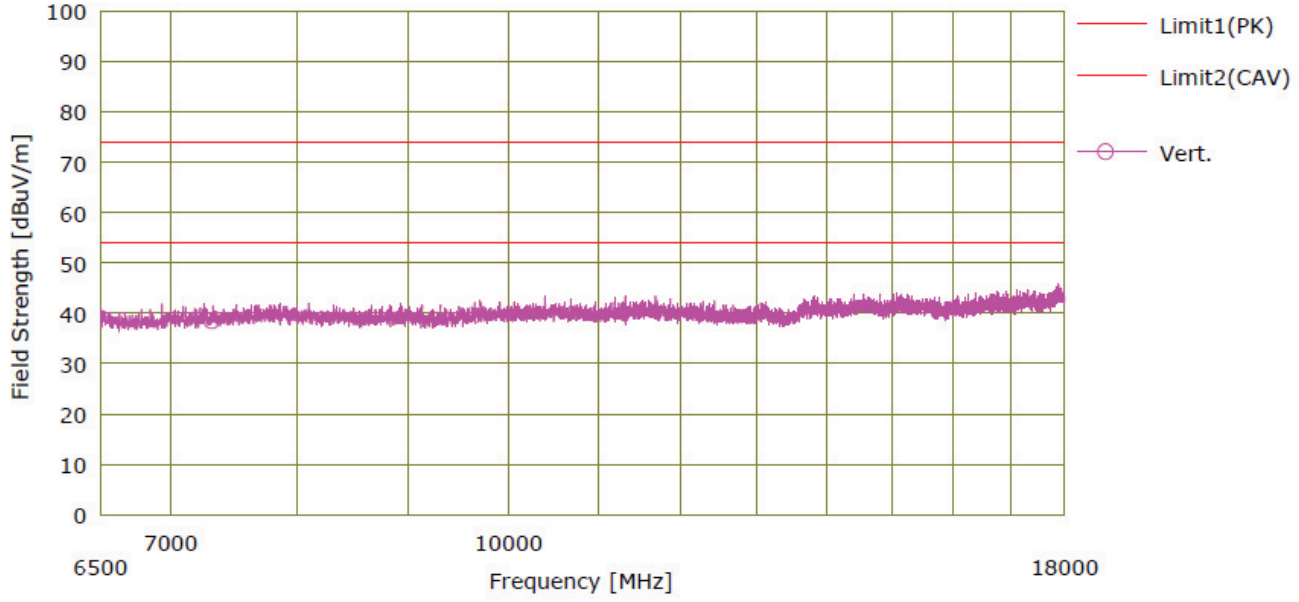
(802.11n(HT20), MCS0) transmitting at f_{LOW}



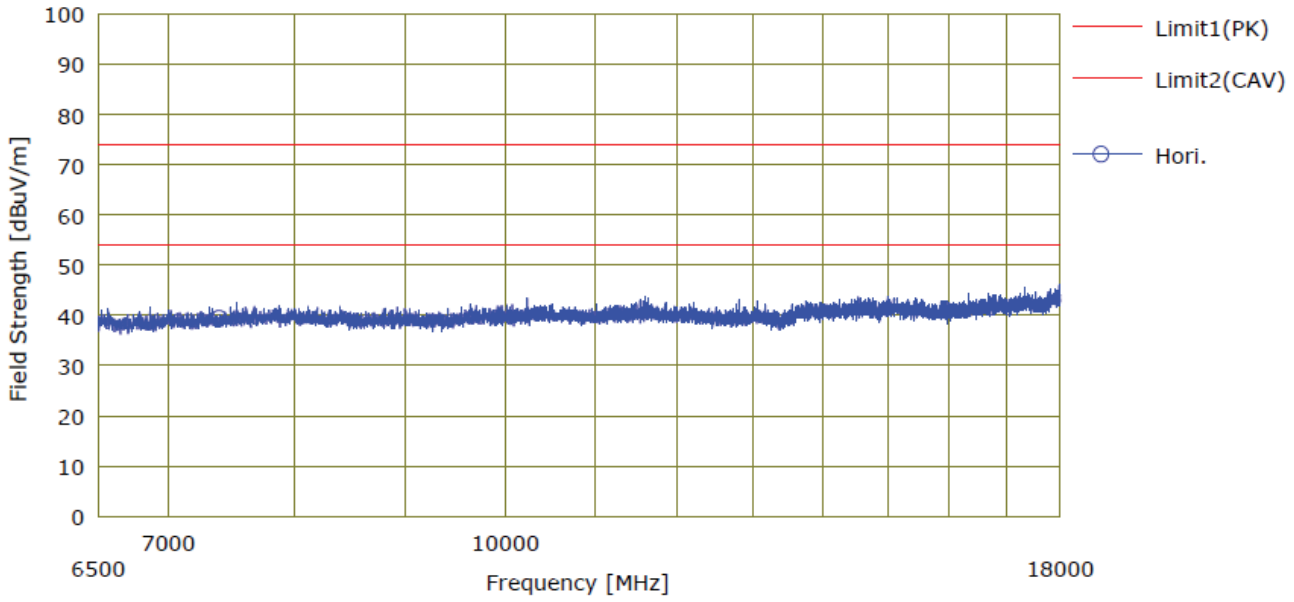


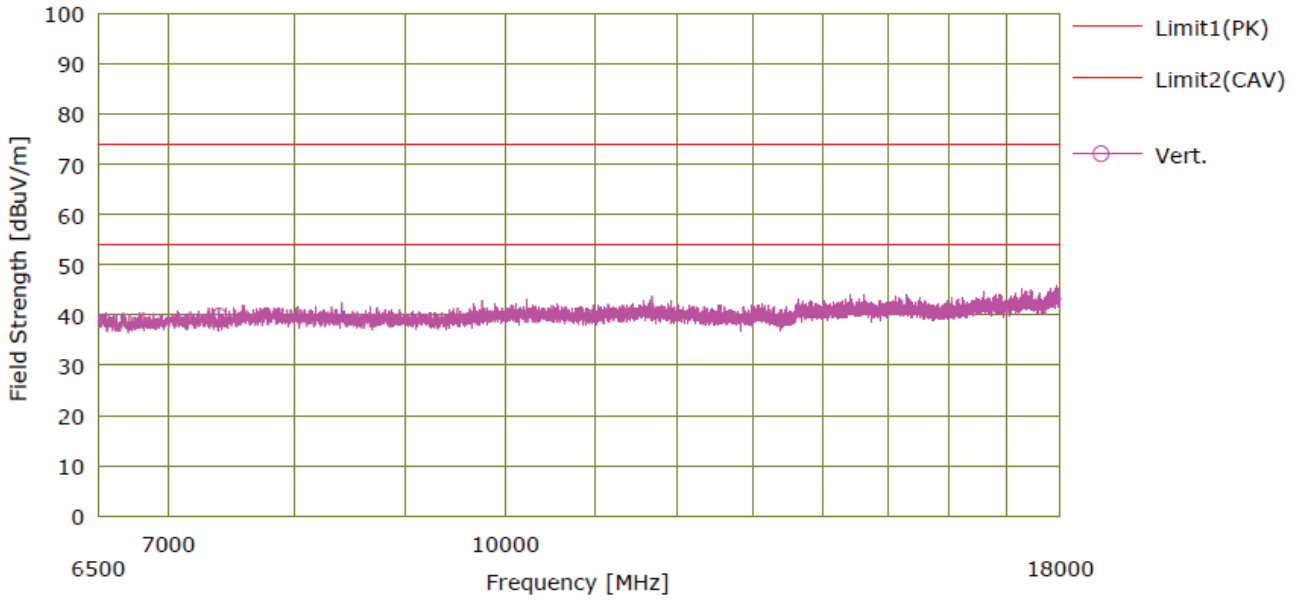
(802.11n(HT20), MCS0) transmitting at f_{MID}





(802.11n(HT20), MCS0) transmitting at f_{HIGH}

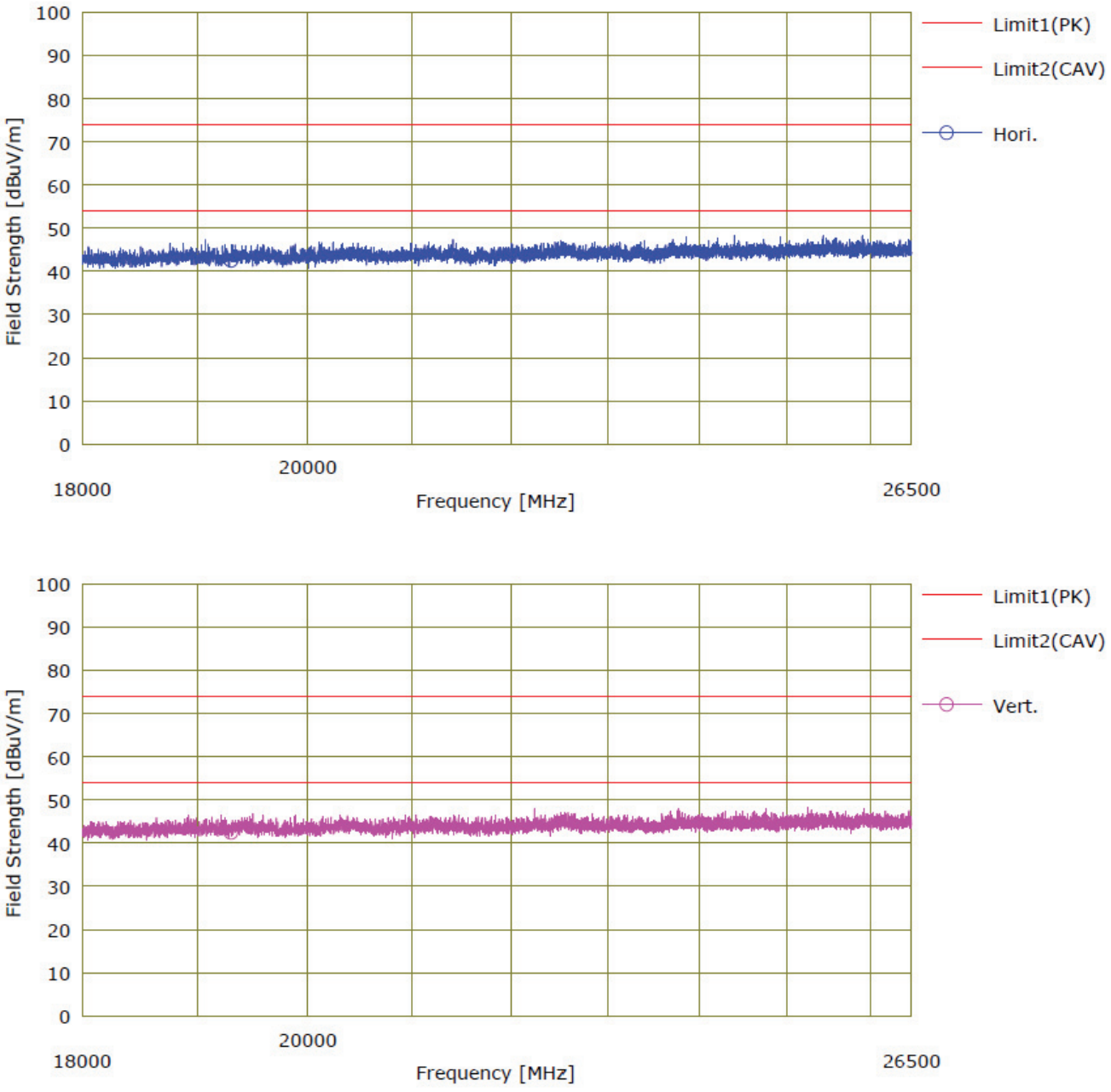




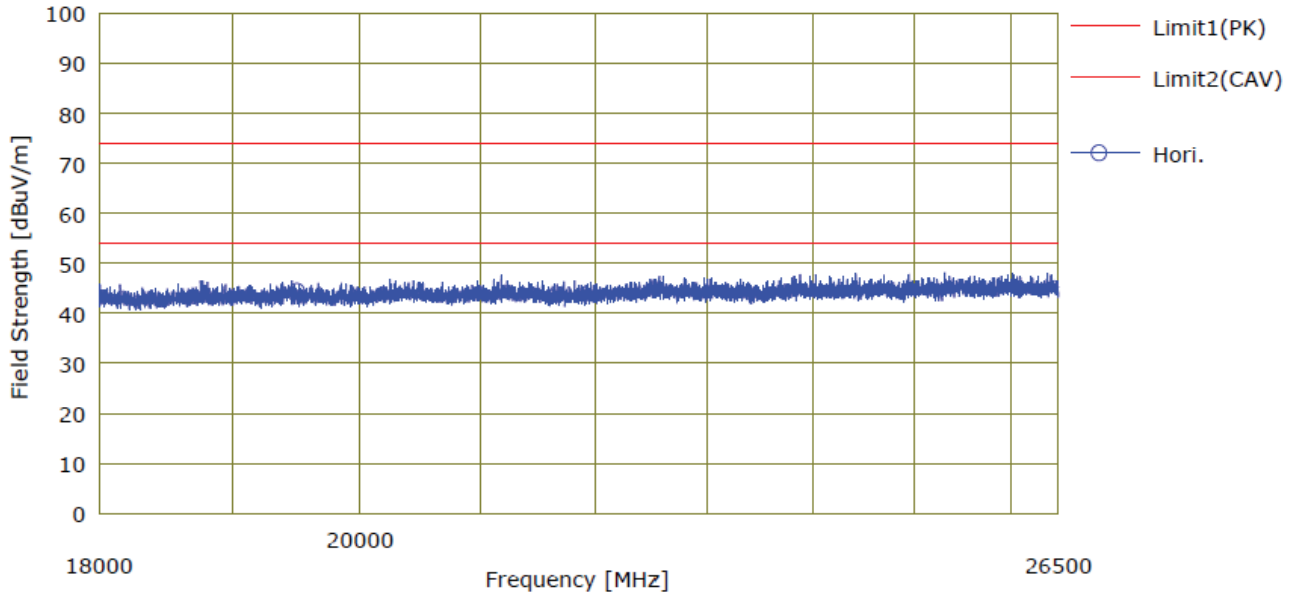
Remark: The plot(s) in the figure 9 were obtained from the preliminary measurements (peak data) by using the Peak detector with RBW 1 MHz.

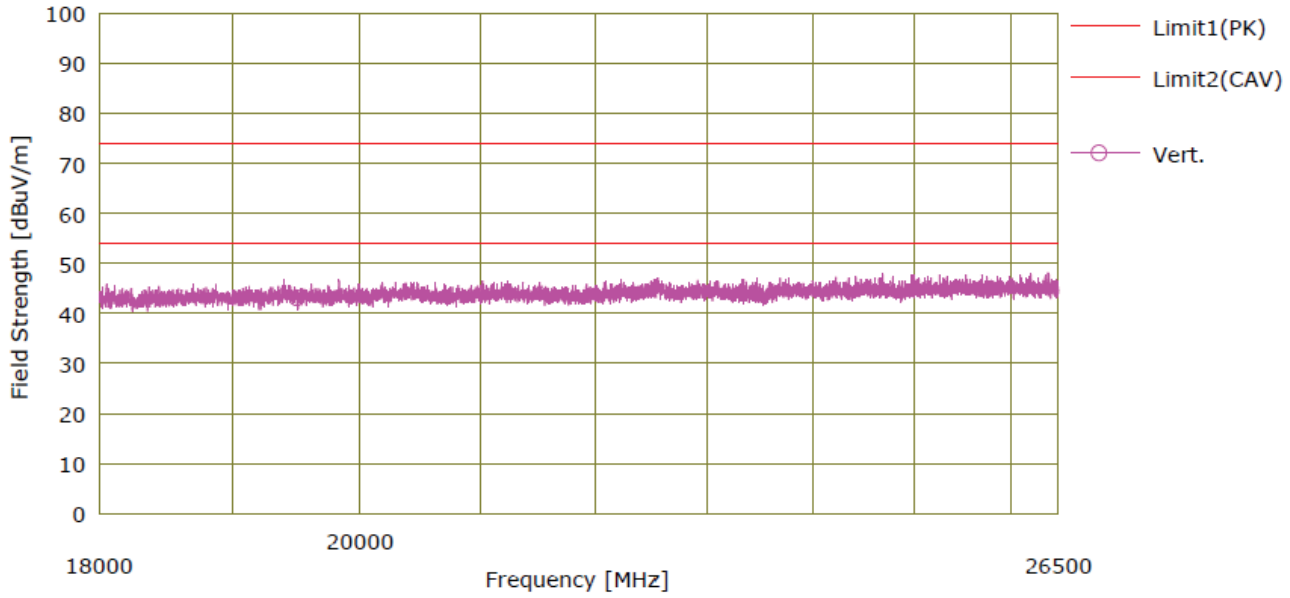
Figure 10. Plot of radiated spurious emissions (from 18 GHz to 26.5 GHz)

(802.11b, 1 Mbps) transmitting at f_{LOW}

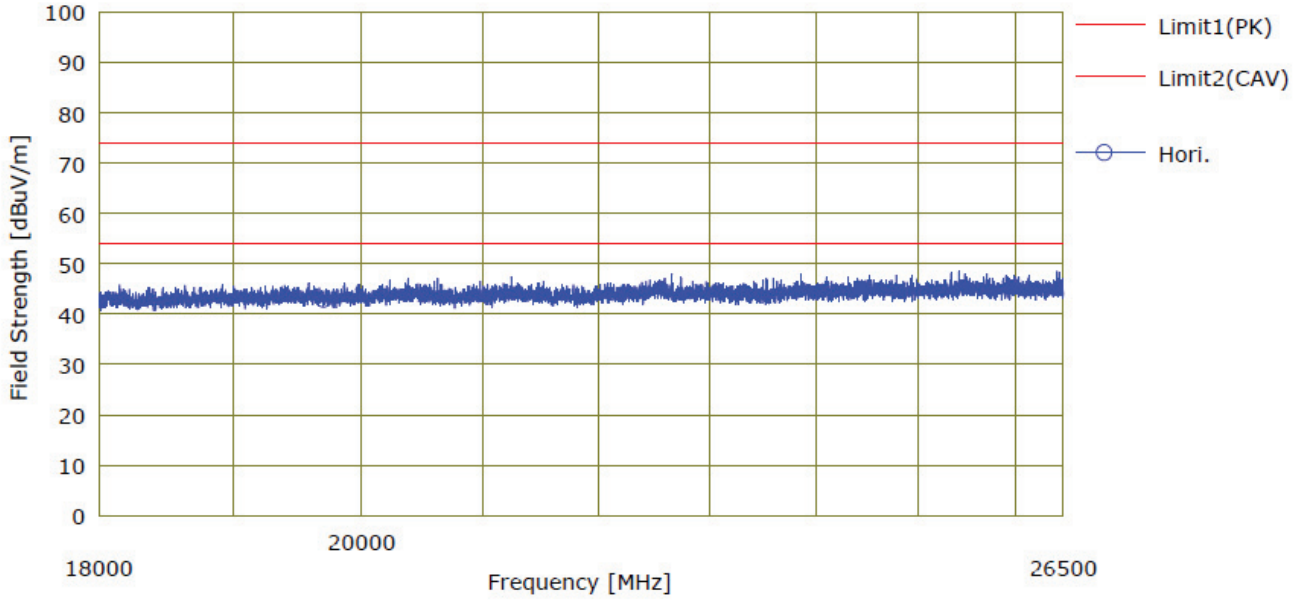


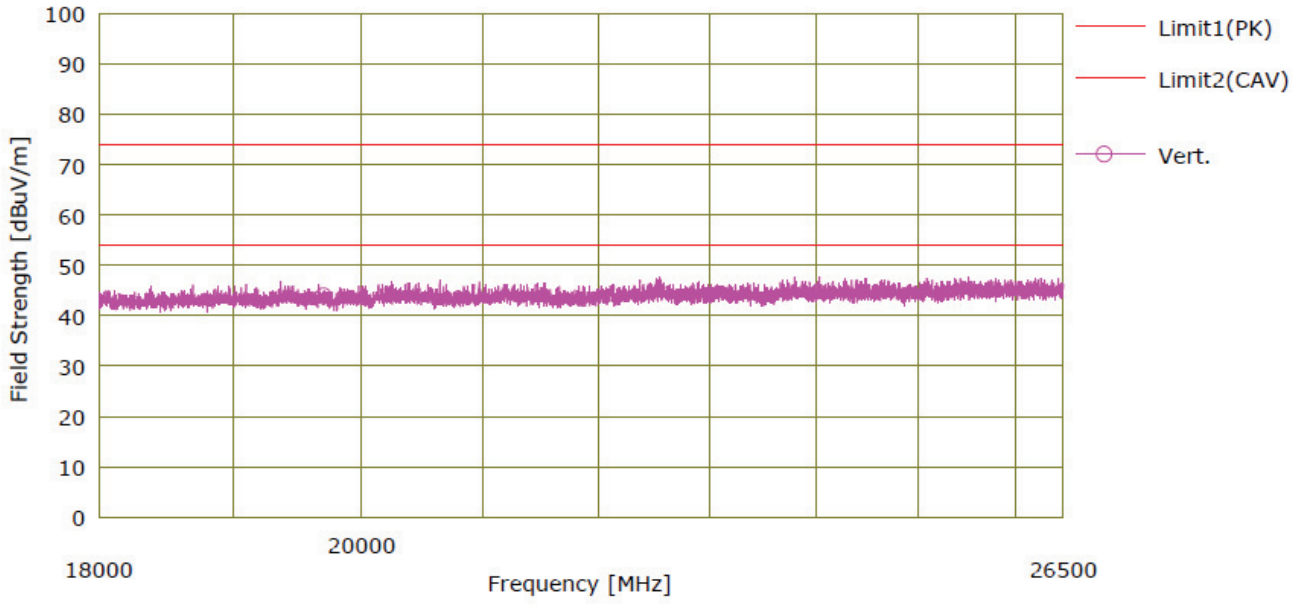
(802.11b, 1 Mbps) transmitting at f_{MID}



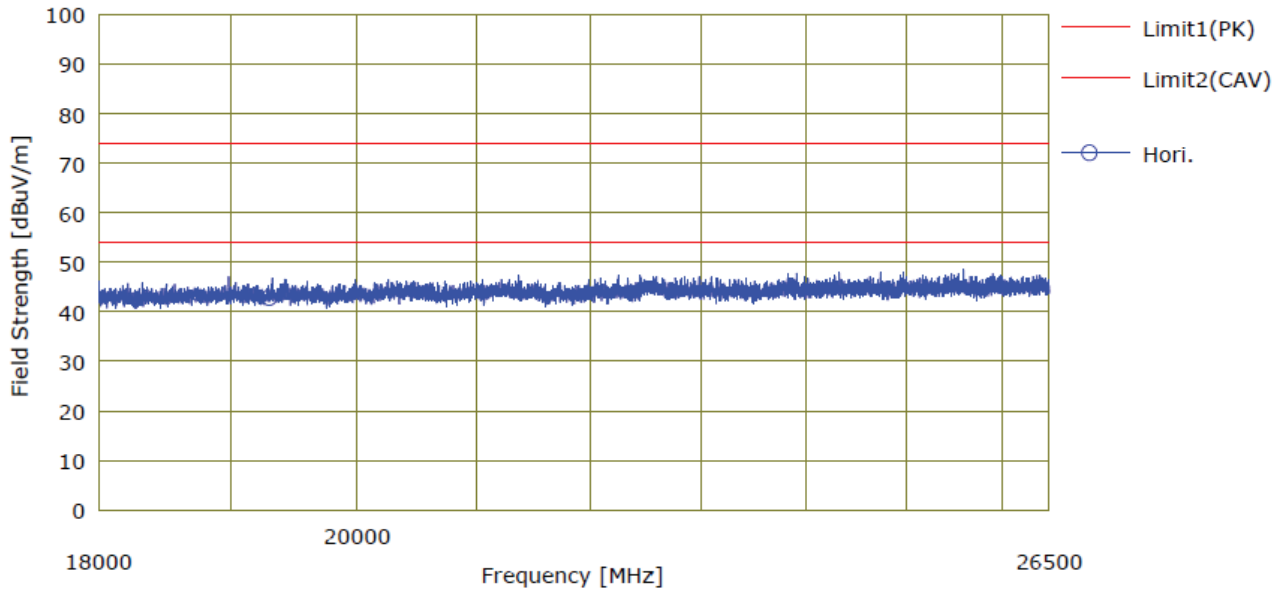


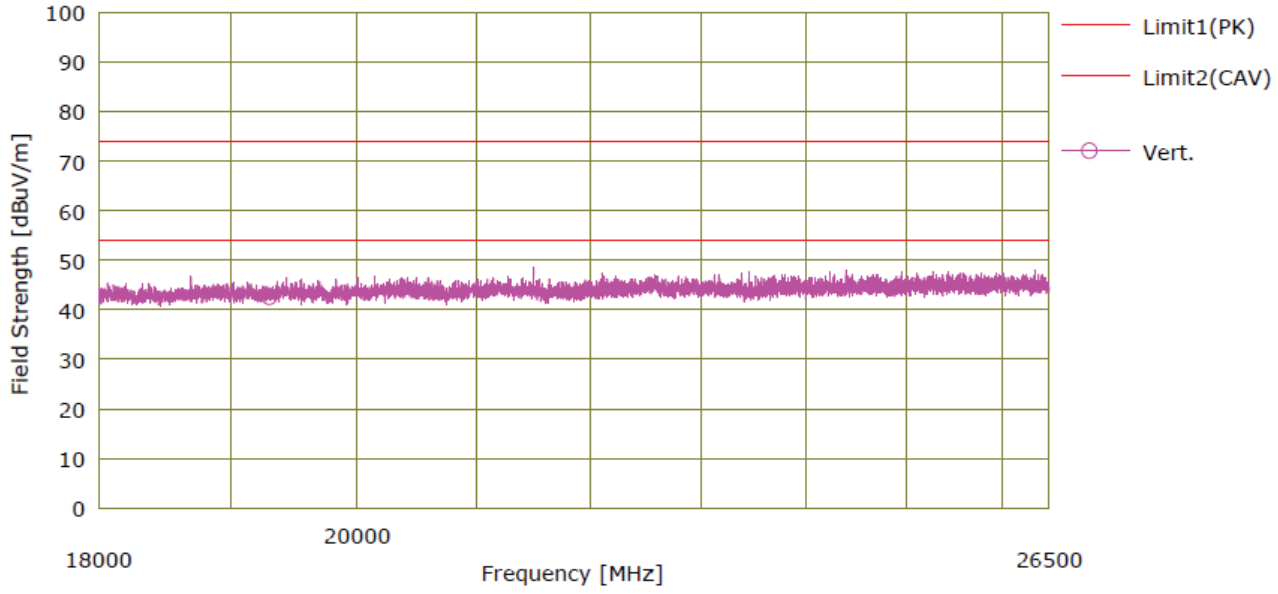
(802.11b, 1 Mbps) transmitting at f_{HIGH}



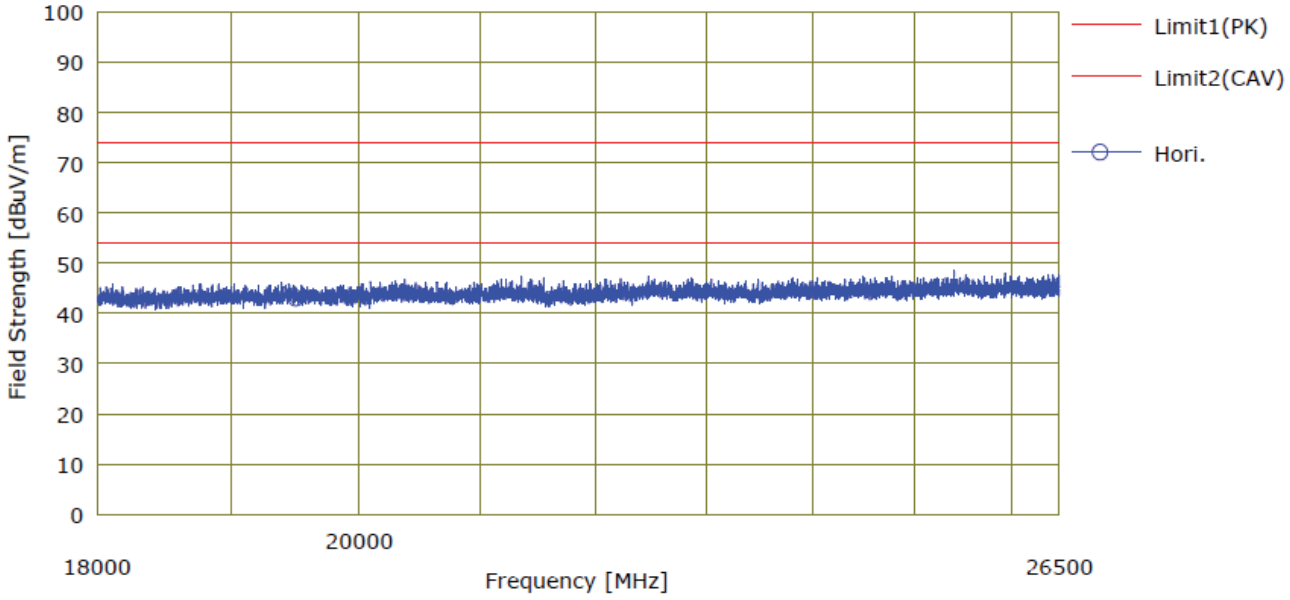


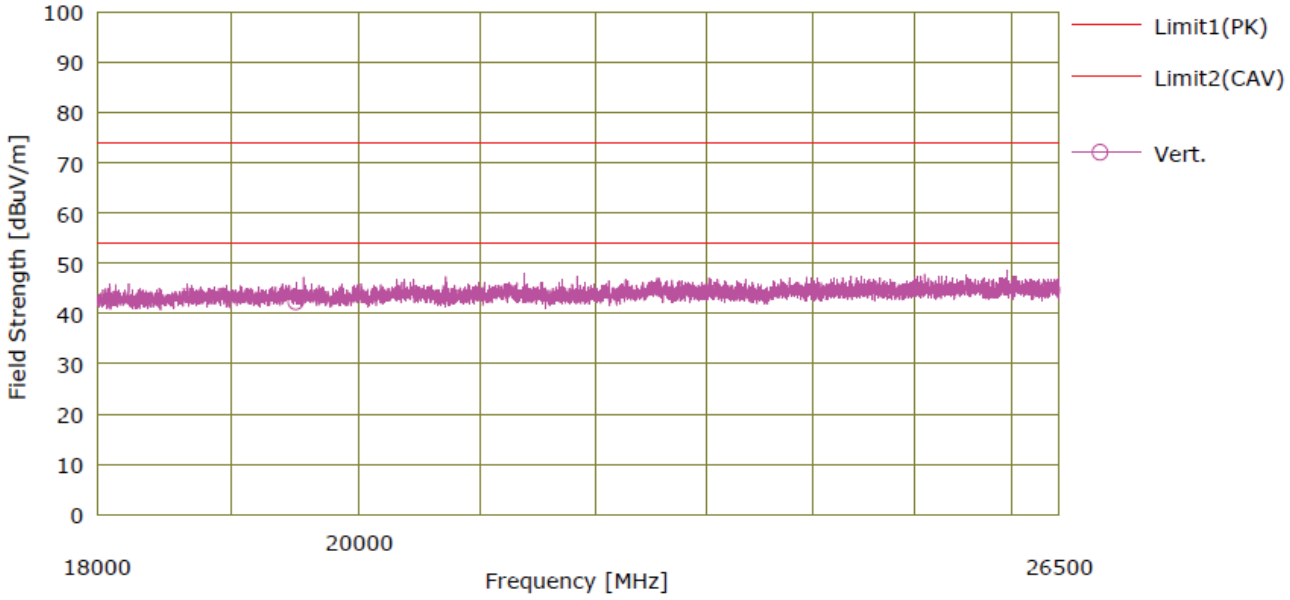
(802.11g, 6 Mbps) transmitting at f_{LOW}



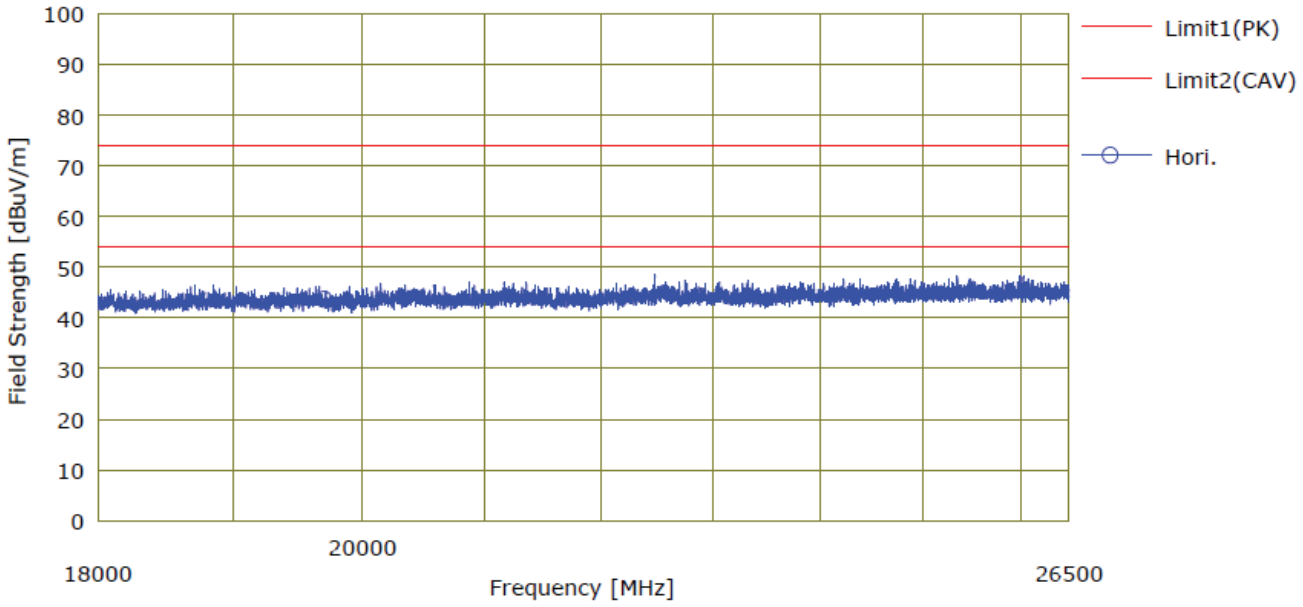


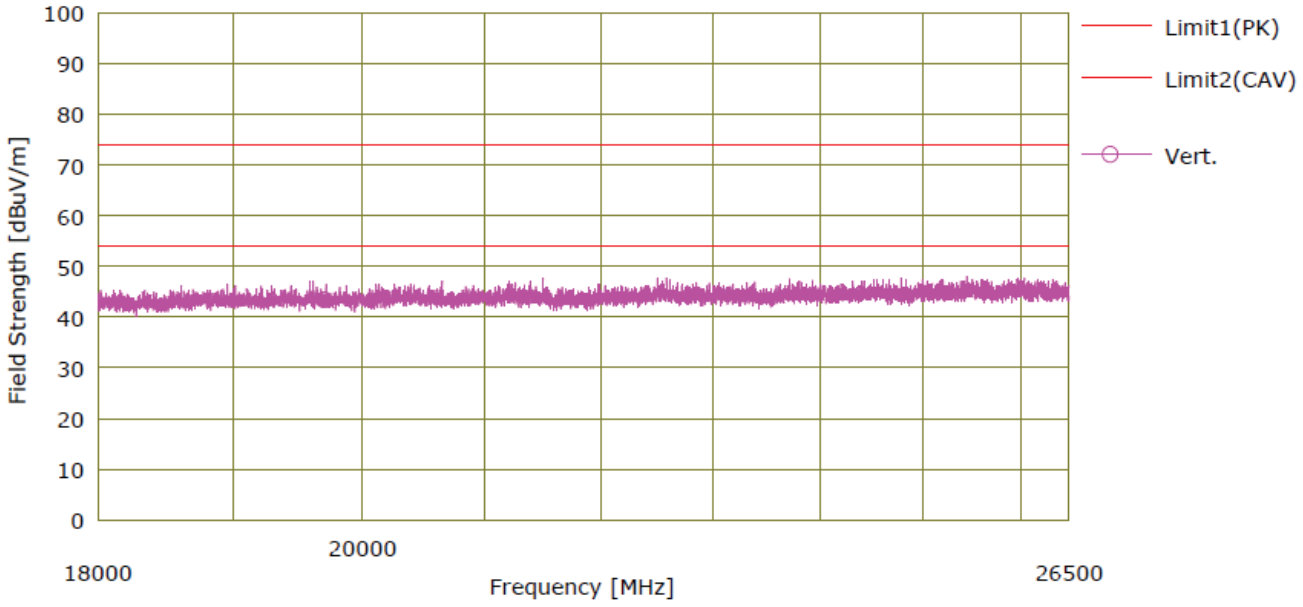
(802.11g, 6 Mbps) transmitting at f_{MID}



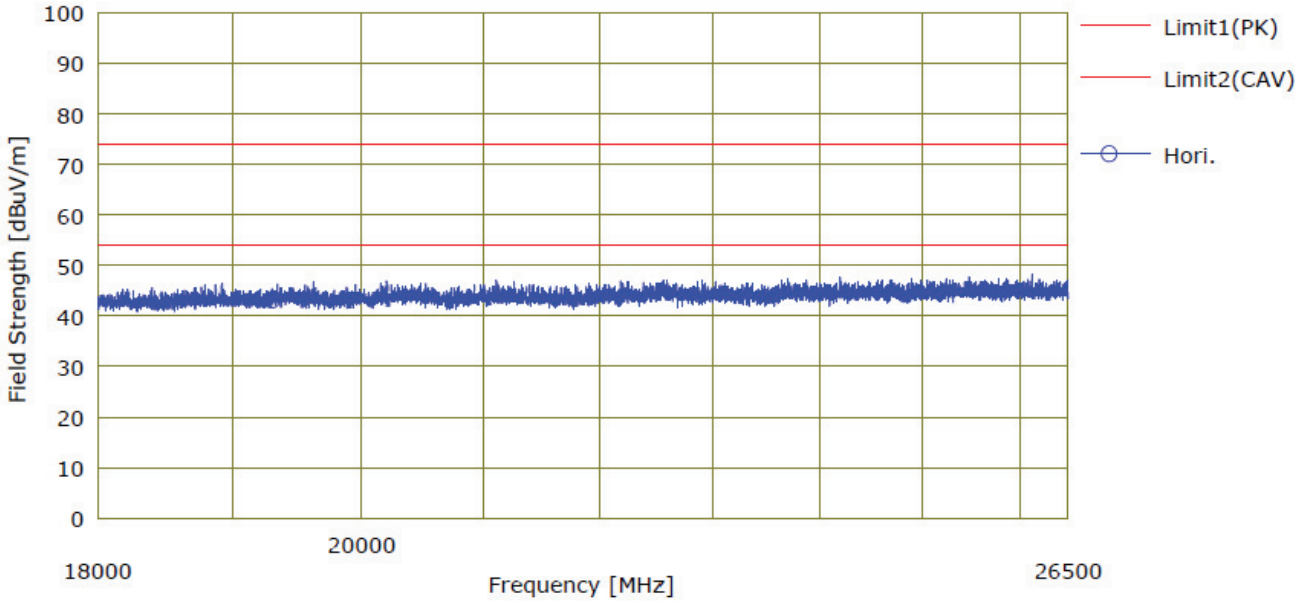


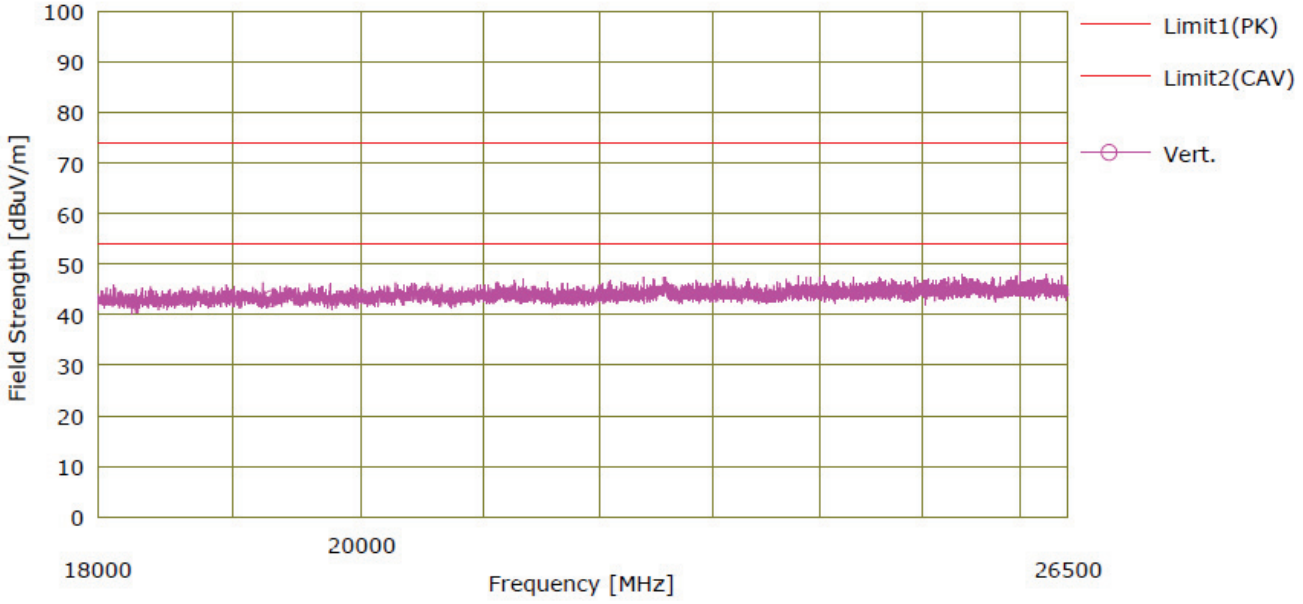
(802.11g, 6 Mbps) transmitting at f_{HIGH}



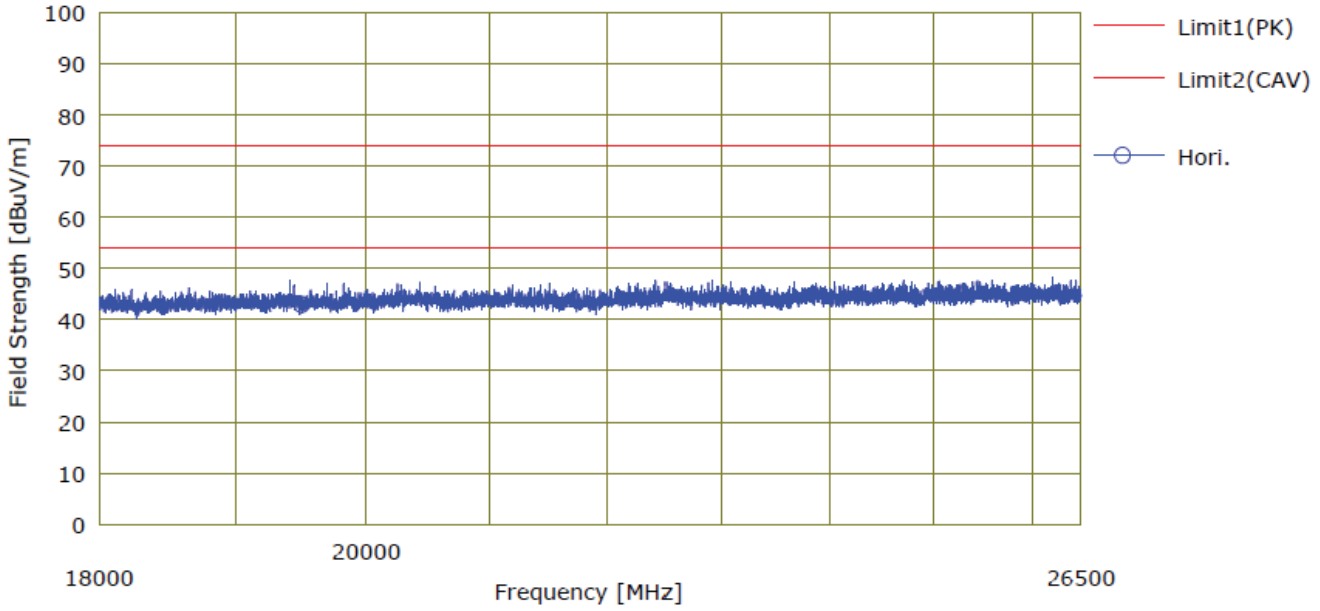


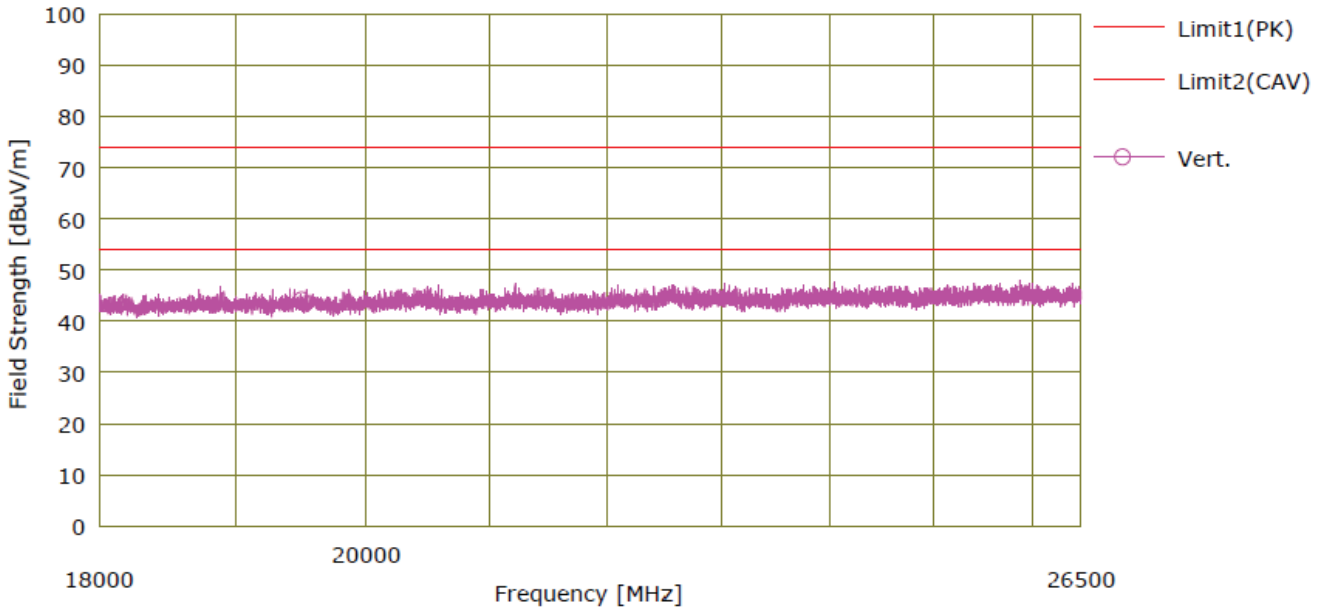
(802.11n(HT20), MCS0) transmitting at f_{LOW}



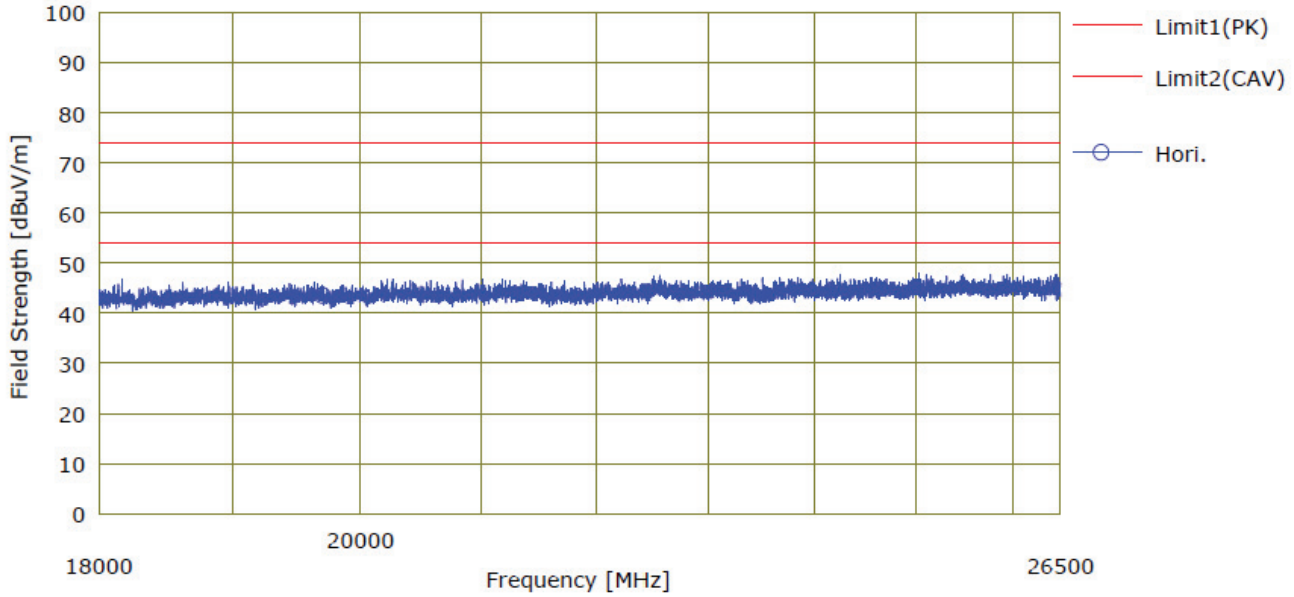


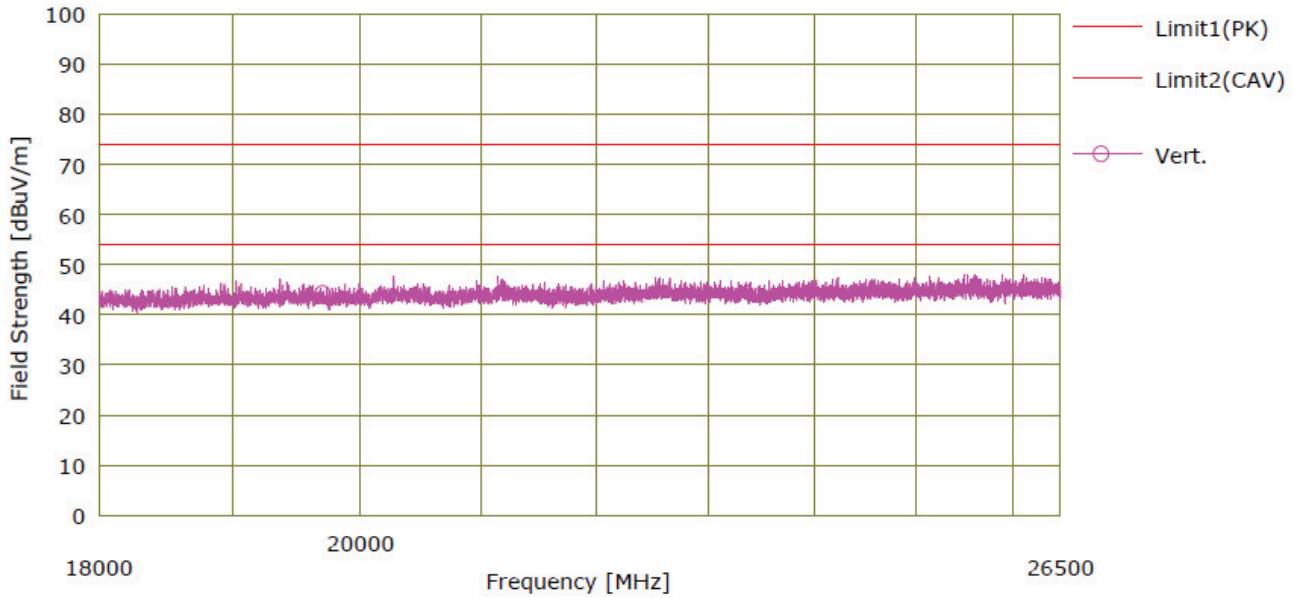
(802.11n(HT20), MCS0) transmitting at f_{MID}





(802.11n(HT20), MCS0) transmitting at f_{HIGH}





Remark: The plot(s) in the figure 10 were obtained from the preliminary measurements (peak data) by using the Peak detector with RBW 300 kHz.

5.5. Peak power spectral density

5.5.1 Regulation

According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

5.5.2 Test Procedure

The Peak power spectral density were measured with the following setting according to Subclause 11.10.2 of ANSI C63.10-2020.

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 x DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.5.3 Result: PASS

Table 6: Peak Power Spectral Density

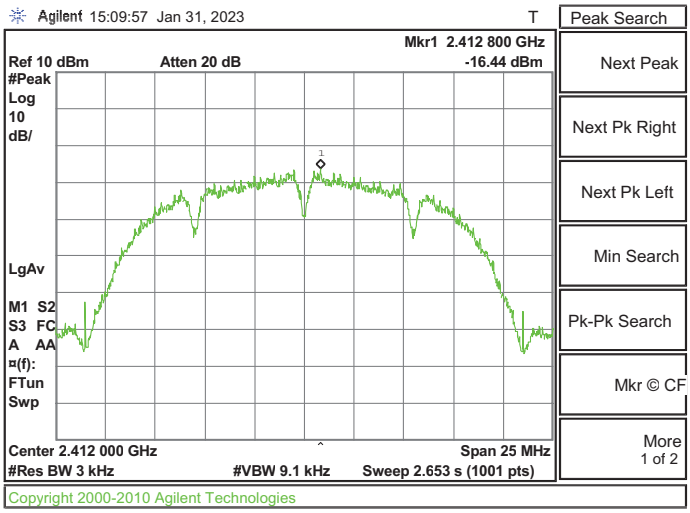
Mode	Rate	Transmitting frequency (MHz)	Reading (dBm)	LIMIT (dBm)	Margin (dB)
802.11b	1 Mbps	2412	**-16.44**	8.00	24.44
		2437	-16.69	8.00	24.69
		2462	-17.41	8.00	25.41
802.11g	6 Mbps	2412	-19.40	8.00	27.40
		2437	**-18.64**	8.00	26.64
		2462	-19.38	8.00	27.38
802.11n	MCS0	2412	-19.53	8.00	27.53
		2437	-19.73	8.00	27.73
		2462	**-18.96**	8.00	26.96

Note: *1) Reading: Measured Peak Power Spectral Density(PSD/3 kHz)*
2) Margin (dB) = LIMIT (dBm) - Reading (dBm)

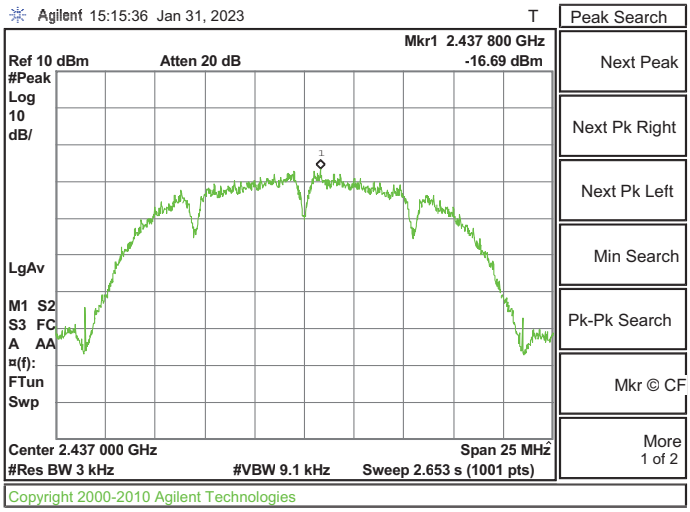
Figure 11. Plot of Peak Power Spectral Density

During the measurements, the insertion loss of the cable loss and the external attenuator (10 dB) was corrected in the spectrum analyzer.

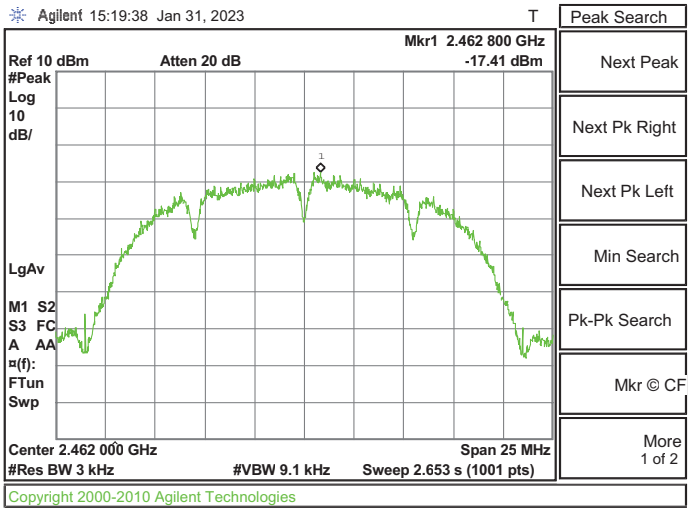
(802.11b, 1 Mbps) transmitting at f_{LOW}



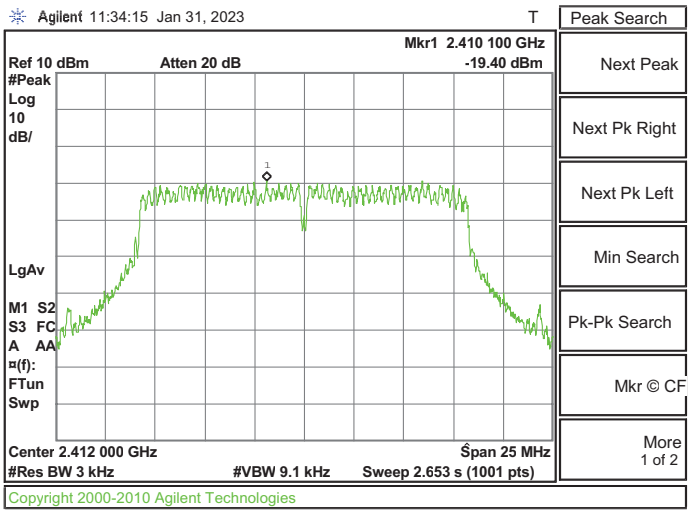
(802.11b, 1 Mbps) transmitting at f_{MID}



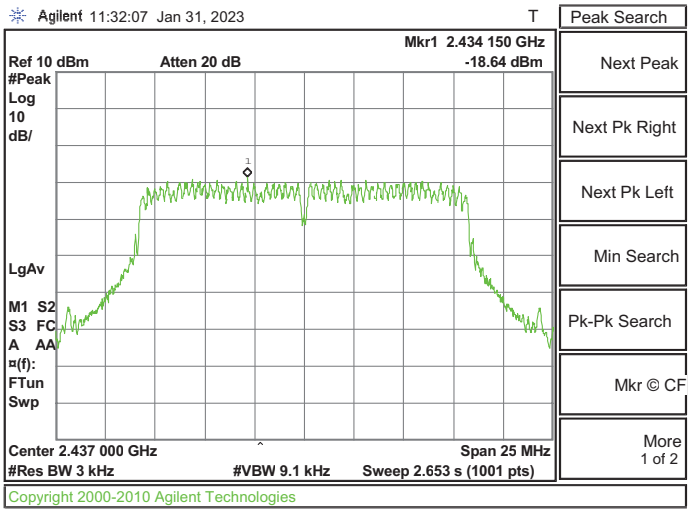
(802.11b, 1 Mbps) transmitting at f_{HIGH}



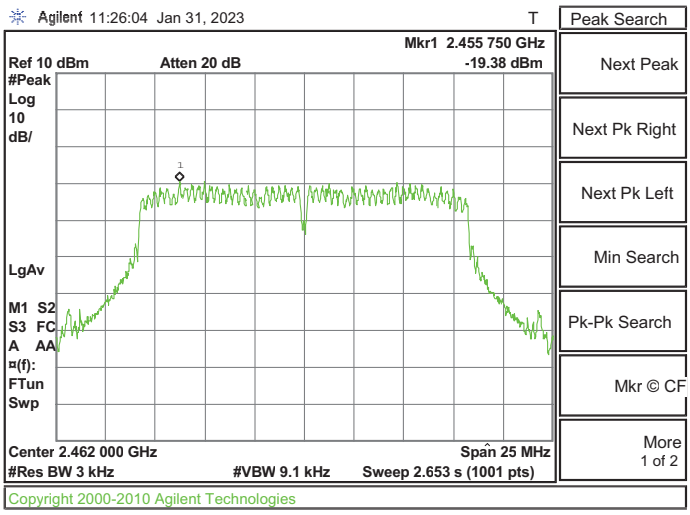
(802.11g, 6 Mbps) transmitting at f_{LOW}



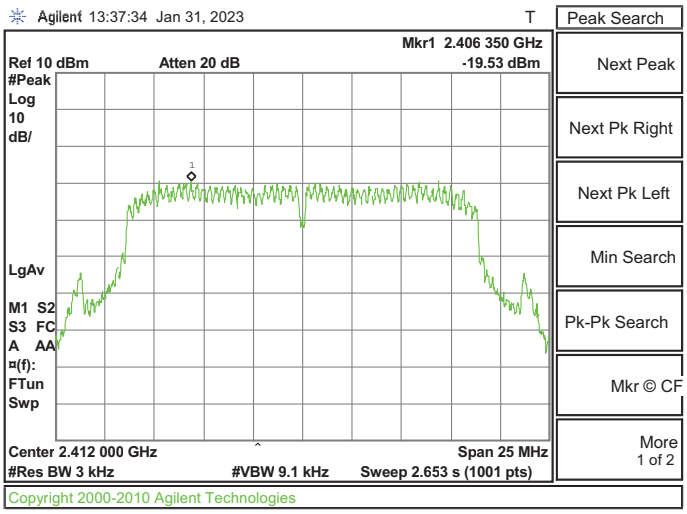
(802.11g, 6 Mbps) transmitting at f_{MID}



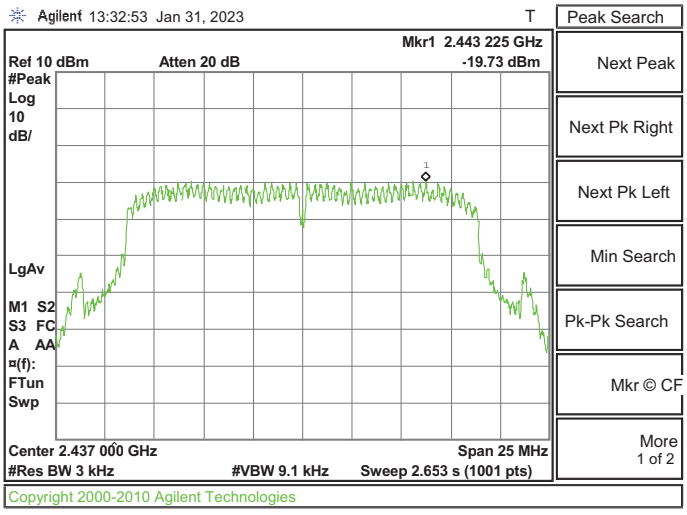
(802.11g, 6 Mbps) transmitting at f_{HIGH}



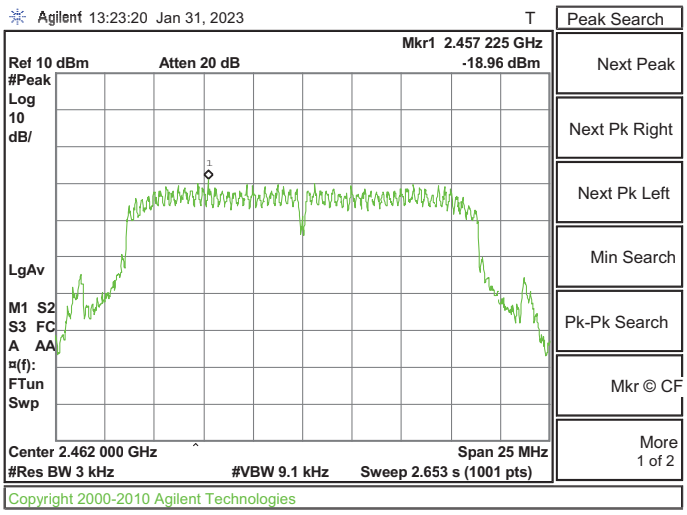
(802.11n, MCS0) transmitting at f_{LOW}



(802.11n, MCS0) transmitting at f_{MID}



(802.11n, MCS0) transmitting at f_{HIGH}



5.6. AC power line Conducted emissions

5.6.1 Regulation

According to §15.207(a), for an intentional radiator 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, as measured using a 50μH/50Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Qausi-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.

5.6.2 Test Procedure

1. The EUT and supporting equipment including all I/O cables were set up as per the test configuration to simulate typical usage. If the EUT is a table top system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane. If the EUT is a floor standing equipment, it is placed on the ground plane, which has about 10 mm non-conductive covering to insulate the EUT from the ground plane.
2. Each current-carrying conductor of the EUT power cord(s), except the ground (safety) conductor(s) was individually connected through a 50 Ω/50 μH line impedance stabilization network (LISN) to the input power mains. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to peak mode, quasi-peak mode and average mode within a bandwidth of 9 kHz.

5.6.3 Result: **PASS**

Table 7: Conducted Emissions – (802.11b, 1 Mbps, 2437 MHz)

Frequency (MHz)	Line (L/N)	CF (dB)	CL (dB)	Actual (dBµV)		Limit (dBµV)		Margin (dB)	
				QP	AV	QP	AV	QP	AV
0.152 0	L	9.57	9.92	53.59	37.66	65.89	55.89	12.30	18.23
0.154 1	L	9.57	9.92	53.54	37.21	65.78	55.78	12.24	18.57
0.432 2	N	9.57	9.93	39.46	30.74	57.21	47.21	17.75	16.47
0.483 3	L	9.58	9.93	37.99	29.53	56.28	46.28	18.29	16.75
0.489 5	N	9.57	9.93	39.57	31.34	56.18	46.18	16.61	14.84
17.168 5	L	9.68	10.27	45.14	33.51	60.00	50.00	14.86	16.49
17.350 5	N	9.66	10.27	46.85	33.66	60.00	50.00	13.15	16.34

Table 8: Conducted Emissions – (802.11g, 6 Mbps, 2437 MHz)

Frequency (MHz)	Line (L/N)	CF (dB)	CL (dB)	Actual (dBµV)		Limit (dBµV)		Margin (dB)	
				QP	AV	QP	AV	QP	AV
0.152 0	L	9.57	9.92	48.81	33.82	65.89	55.89	17.08	22.07
0.156 1	L	9.57	9.92	49.84	34.35	65.67	55.67	15.83	21.32
0.438 3	N	9.57	9.93	39.42	32.02	57.09	47.09	17.67	15.07
0.493 6	N	9.57	9.93	39.48	33.01	56.11	46.11	16.63	13.10
6.608 1	N	9.63	10.10	37.85	30.24	60.00	50.00	22.15	19.76
17.094 9	N	9.66	10.27	48.08	35.23	60.00	50.00	11.92	14.77
17.135 8	L	9.68	10.27	47.50	35.01	60.00	50.00	12.50	14.99

Table 9: Conducted Emissions – (802.11n(HT20), MCS0, 2437 MHz))

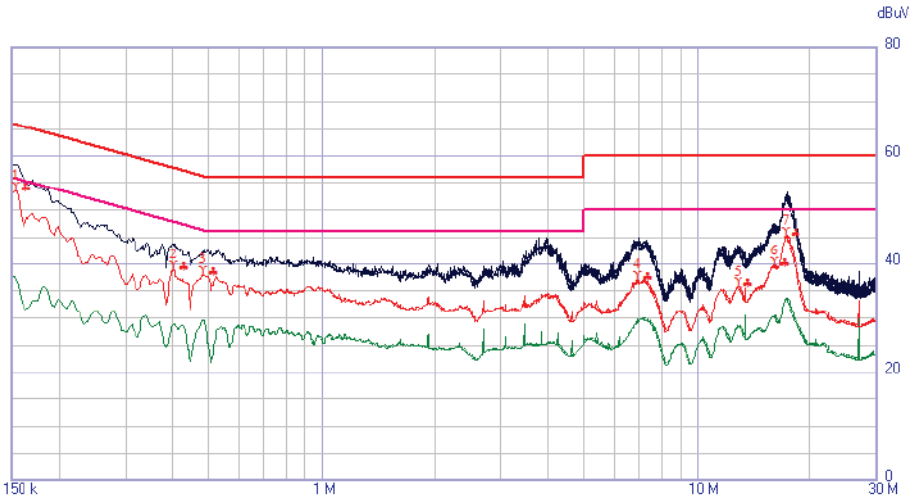
Frequency (MHz)	Line (L/N)	CF (dB)	CL (dB)	Actual (dBμV)		Limit (dBμV)		Margin (dB)	
				QP	AV	QP	AV	QP	AV
0.1520	N	9.56	9.92	48.49	36.36	65.89	55.89	17.40	19.53
0.1541	N	9.56	9.92	48.00	36.24	65.78	55.78	17.78	19.54
0.3974	L	9.58	9.93	36.37	30.07	57.91	47.91	21.54	17.84
0.4486	N	9.57	9.93	38.50	31.73	56.90	46.90	18.40	15.17
0.5038	N	9.57	9.93	38.47	31.40	56.00	46.00	17.53	14.60
0.5549	N	9.58	9.93	38.12	30.31	56.00	46.00	17.88	15.69
16.7963	N	9.66	10.26	46.70	34.00	60.00	50.00	13.30	16.00
16.9701	L	9.68	10.27	46.97	34.63	60.00	50.00	13.03	15.37

Note: *1) L/N: Line / Neutral*
2) CF and CL: correction factor (LISN) and cable loss including the insertion loss of Pulse Limiter
3) Actual = Final measured values after containing CF and CL
4) Margin = Limit - Actual

Figure 12. Plot of Conducted Emissions

(802.11b, 1 Mbps) transmitting at f_{MID}

Line – PE



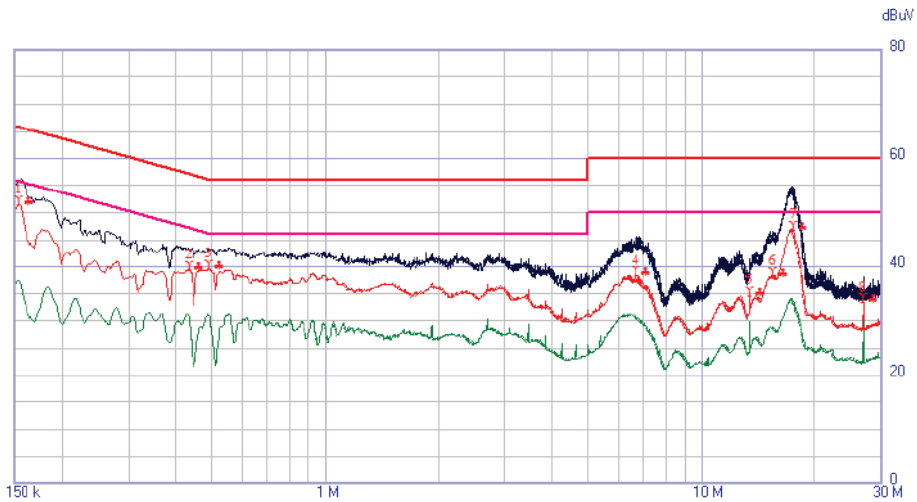
	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C 32_QP_B 32_CAV_B	1500 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = 3
Limits:
32_QP_B
32_CAV_B

Factors:
ENV 216_L_2023.01.03
CL_Pule Limiter_2023.01.03

Peak
QPeak
C-Avg

Neutral – PE



	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C 32_QP_B 32_CAV_B	1500 ms	9 kHz	10	OFF	ON	...	...

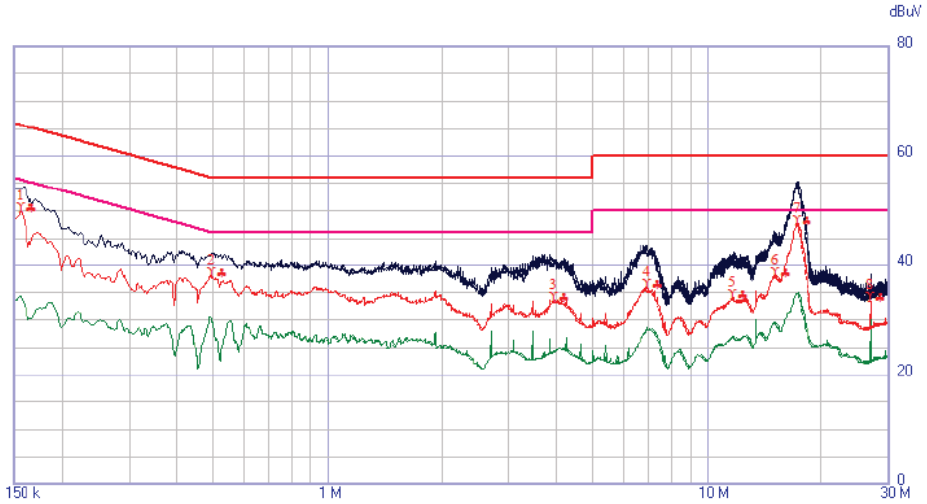
Ancillary = General
Nr. of Worst = 3
Limits:
32_QP_B
32_CAV_B

Factors:
ENV 216_N_2023.01.03
CL_Pule Limiter_2023.01.03

Peak
QPeak
C-Avg

(802.11g, 6 Mbps) transmitting at f_{MID}

Line – PE



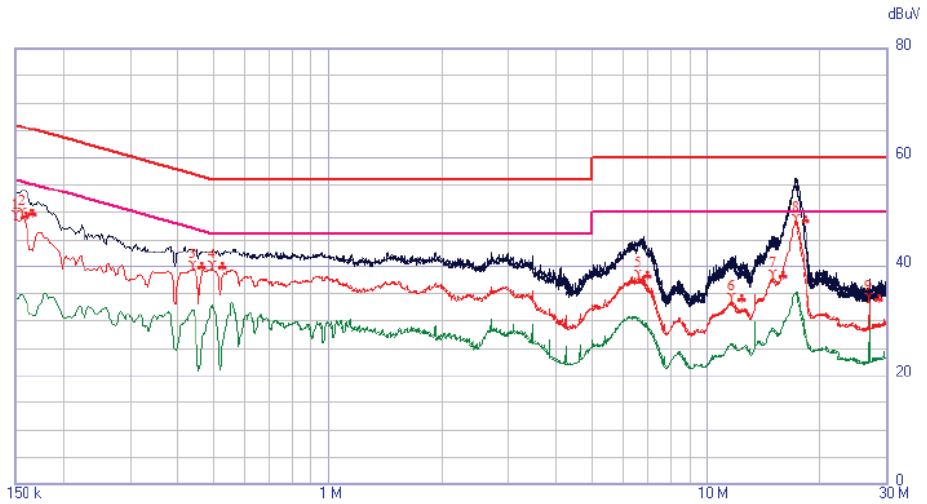
	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C 32_QP_B 32_CAV_B	1500 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = 3
Limits:
32_QP_B
32_CAV_B

Factors:
ENV 216_L_2023.01.03
CL_Pule Limiter_2023.01.03

Peak
QPeak
CAvg

Neutral – PE



	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C 32_QP_B 32_CAV_B	1500 ms	9 kHz	10	OFF	ON	...	...

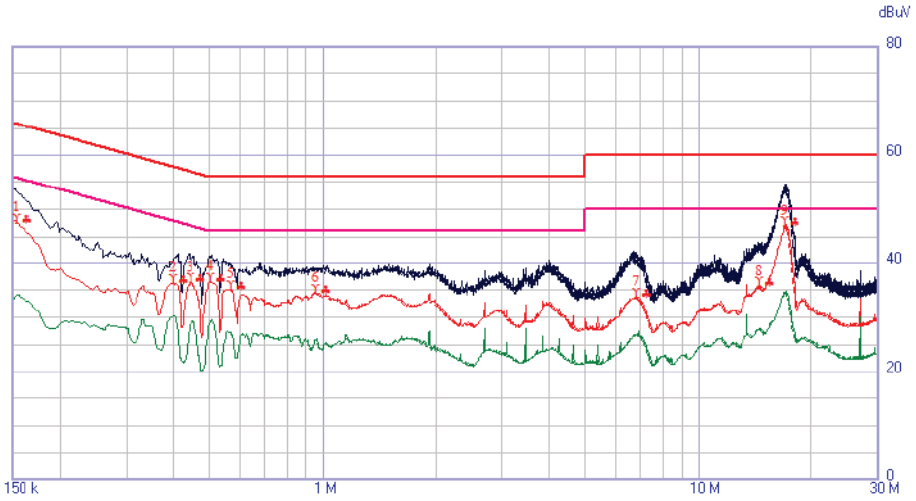
Ancillary = General
Nr. of Worst = 3
Limits:
32_QP_B
32_CAV_B

Factors:
ENV 216_N_2023.01.03
CL_Pule Limiter_2023.01.03

Peak
QPeak
CAvg

(802.11n, MCS0) transmitting at f_{MID}

Line – PE



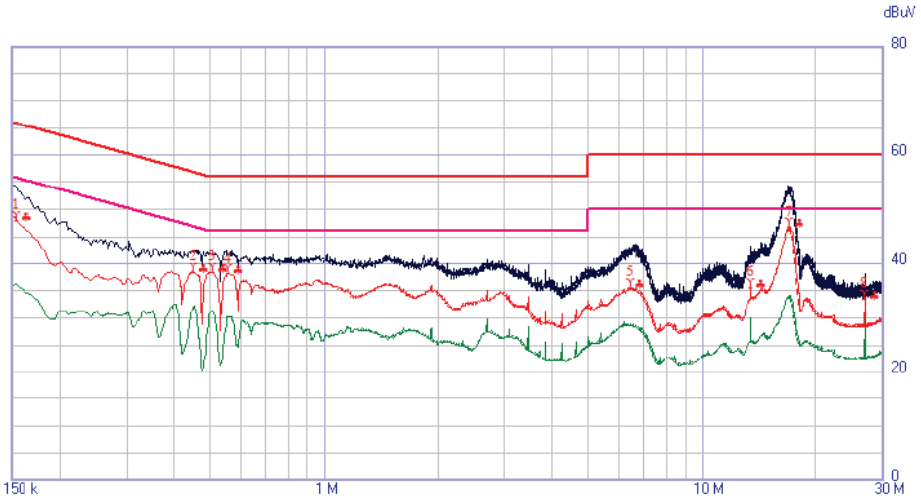
	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C 32_QP_B 32_CAV_B	1500 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = 3
Limits:
32_QP_B
32_CAV_B

Factors:
ENV 216_L_2023.01.03
CL_Pule Limiter_2023.01.03

Peak
QPeak
C-Avg

Neutral – PE



	Start [MHz]	Stop [MHz]	Step	Detector	Hold Time	RBW	Min Att	Pre Amp	Pre Sel	Prompt start	Ancillary
1	0.15	30	AUTO (2.045 kHz)	P Q C 32_QP_B 32_CAV_B	1500 ms	9 kHz	10	OFF	ON	...	...

Ancillary = General
Nr. of Worst = 3
Limits:
32_QP_B
32_CAV_B

Factors:
ENV 216_N_2023.01.03
CL_Pule Limiter_2023.01.03

Peak
QPeak
C-Avg