

Note.

1. $f < 30$ MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40 \log(D_m/D_s)$
 $f \geq 30$ MHz, extrapolation factor of 20 dB/decade of distance. $F_d = 20 \log(D_m/D_s)$
 Where:
 F_d = Distance factor in dB
 D_m = Measurement distance in meters
 D_s = Specification distance in meters
2. Field strength(dB μ V/m) = Level(dB μ V) + CF (dB) + or DCF(dB)
3. Margin(dB) = Limit(dB μ V/m) - Field strength(dB μ V/m)
4. Emissions below 18 GHz were measured at a 3 meter test distance while emissions above 18 GHz were measured at a 1 meter test distance with the application of a distance correction factor.
5. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z, it was determined that **X orientation** was worst-case orientation; therefore, all final radiated testing was performed with the EUT in **X orientation**.
6. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
7. According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

Frequency (MHz)	Distance (Meters)	Radiated (μ V/m)
0.009 ~ 0.490	300	2400/F(kHz)
0.490 ~ 1.705	30	24000/F(kHz)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88 ~ 216	3	150**
216 ~ 960	3	200**
Above 960	3	500

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 ~ 72 MHz, 76 ~ 88 MHz, 174 ~ 216 MHz or 470 ~ 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

Duty cycle

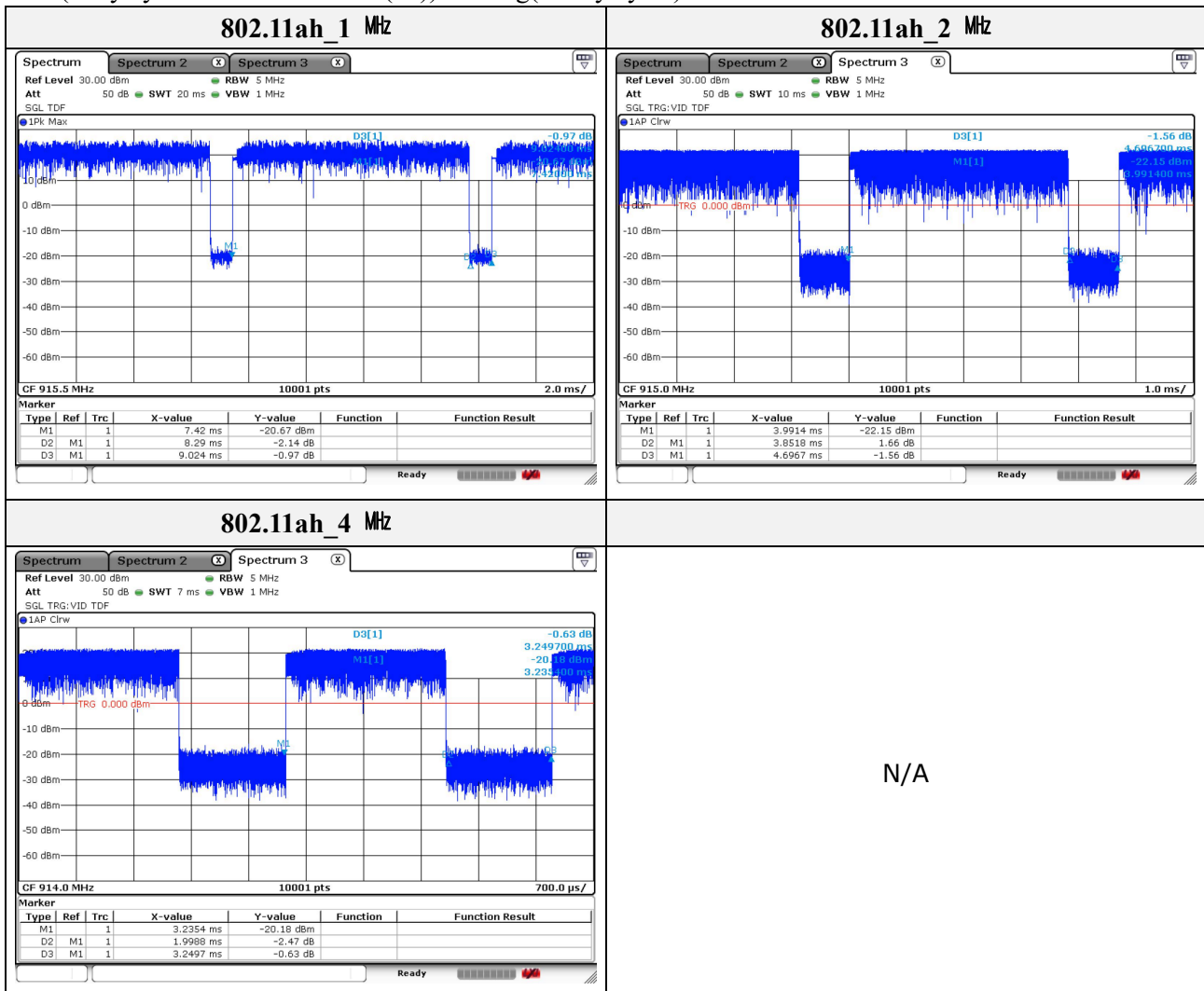
Regarding to KDB 558074 D01_v05 r02, 6. Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

- A diode detector and an oscilloscope that together have sufficiently short response time to permit accurate measurements of the on- and off-times of the transmitted signal.
- The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on- and off-times of the transmitted signal.

Mode	T _{on} time (ms)	Period (ms)	Duty cycle (Linear)	Duty cycle (%)	Duty cycle correction factor (dB)
802.11ah_1 MHz	8.290 0	9.024 0	0.919	91.866	0.37
802.11ah_2 MHz	3.851 8	4.696 7	0.820	82.011	0.86
802.11ah_4 MHz	1.998 8	3.249 7	0.615	61.507	2.11

Duty cycle (Linear) = T_{on} time/Period

DCF(Duty cycle correction factor (dB)) = 10log(1/duty cycle)



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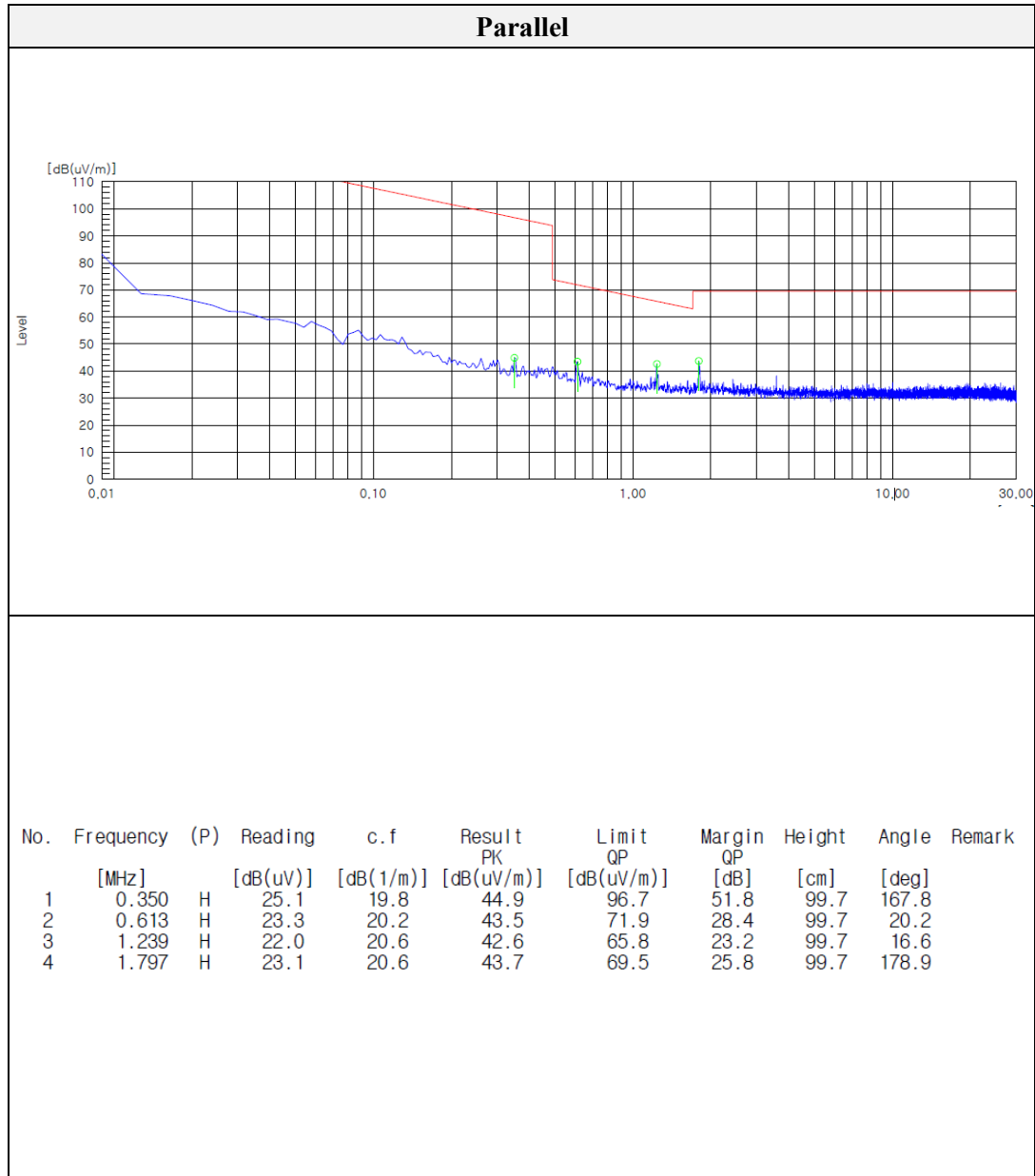
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Test results (Below 30 MHz)

Distance of measurement: 3 meter

Mode: 802.11ah_2 MHz (Worst case)

Channel: 06



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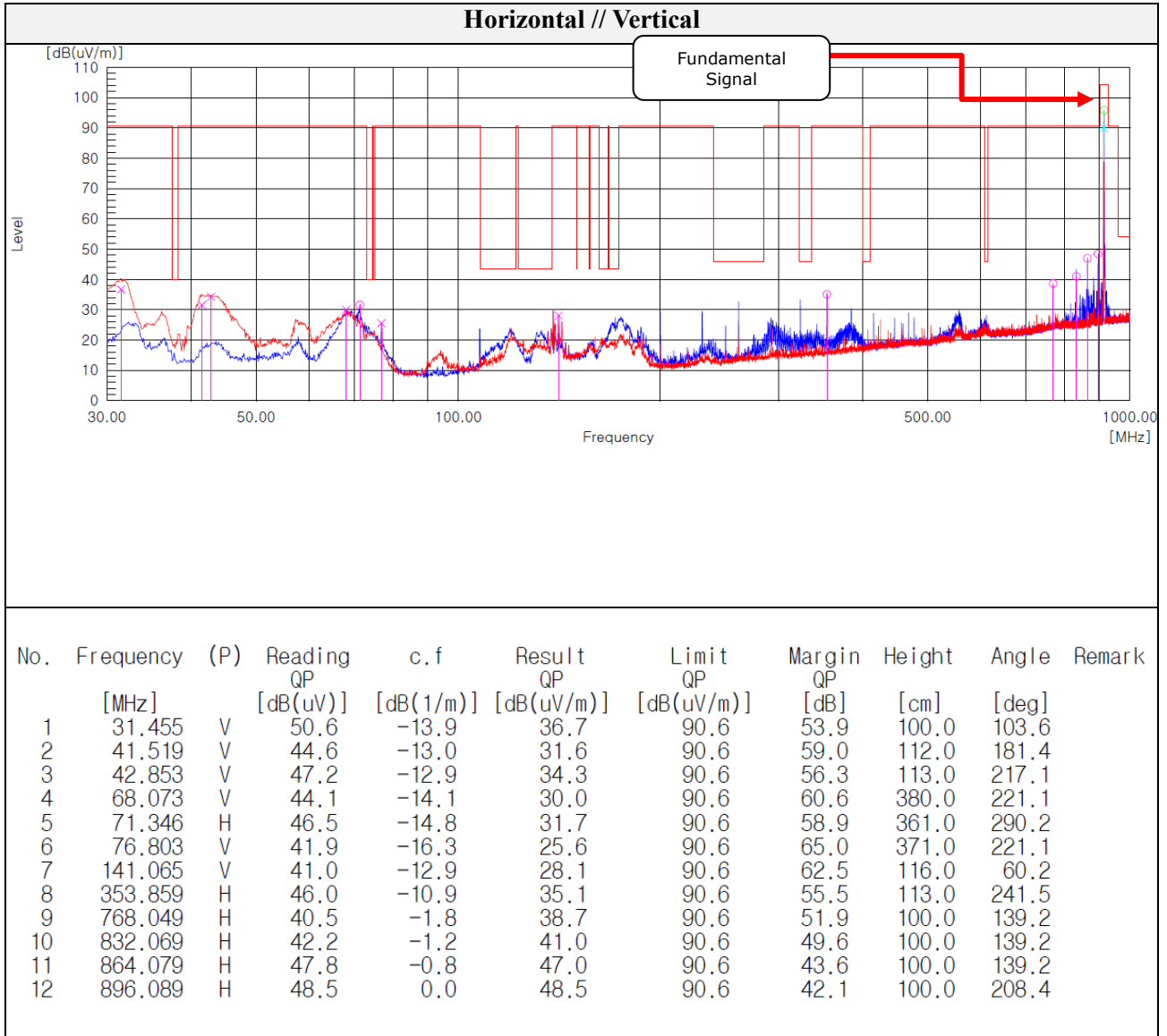
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Test results (Below 1 000 MHz)

Distance of measurement: 3 meter

Mode: 802.11ah_2 MHz (Worst case)

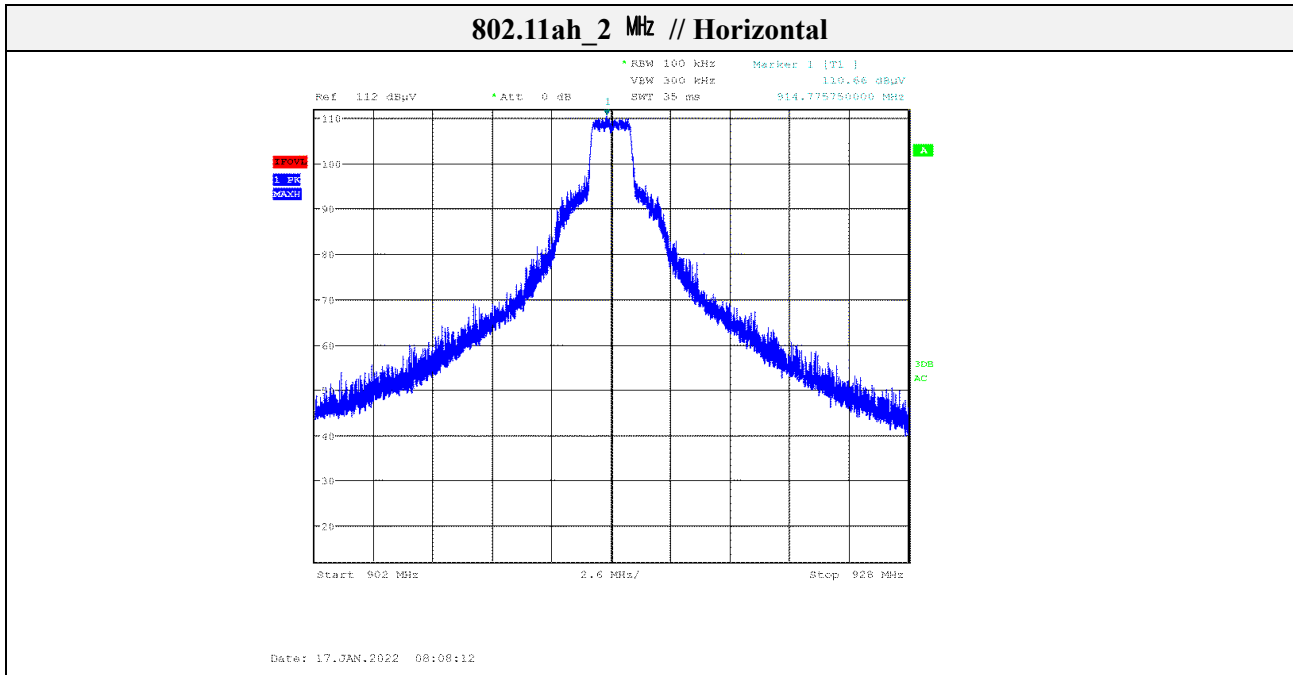
Channel: 06



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Note.

1. In the Worst case **802.11ah_2 Mhz**, Fundamental signal level was **110.66 dBμV**. So except for Restr icted band(Part 15.205), limit of spurious emission is applied as **90.6 dBμV.(≡ 90.66 dBμV)**



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Test results (Above 1 000 MHz)

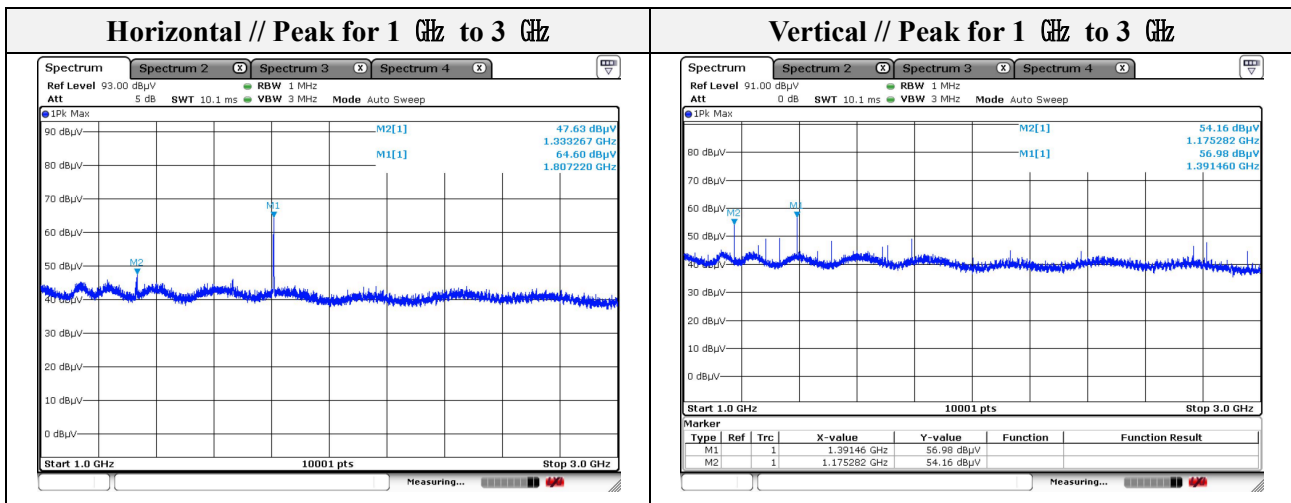
Distance of measurement: 3 meter

Mode: 802.11ah_1 MHz

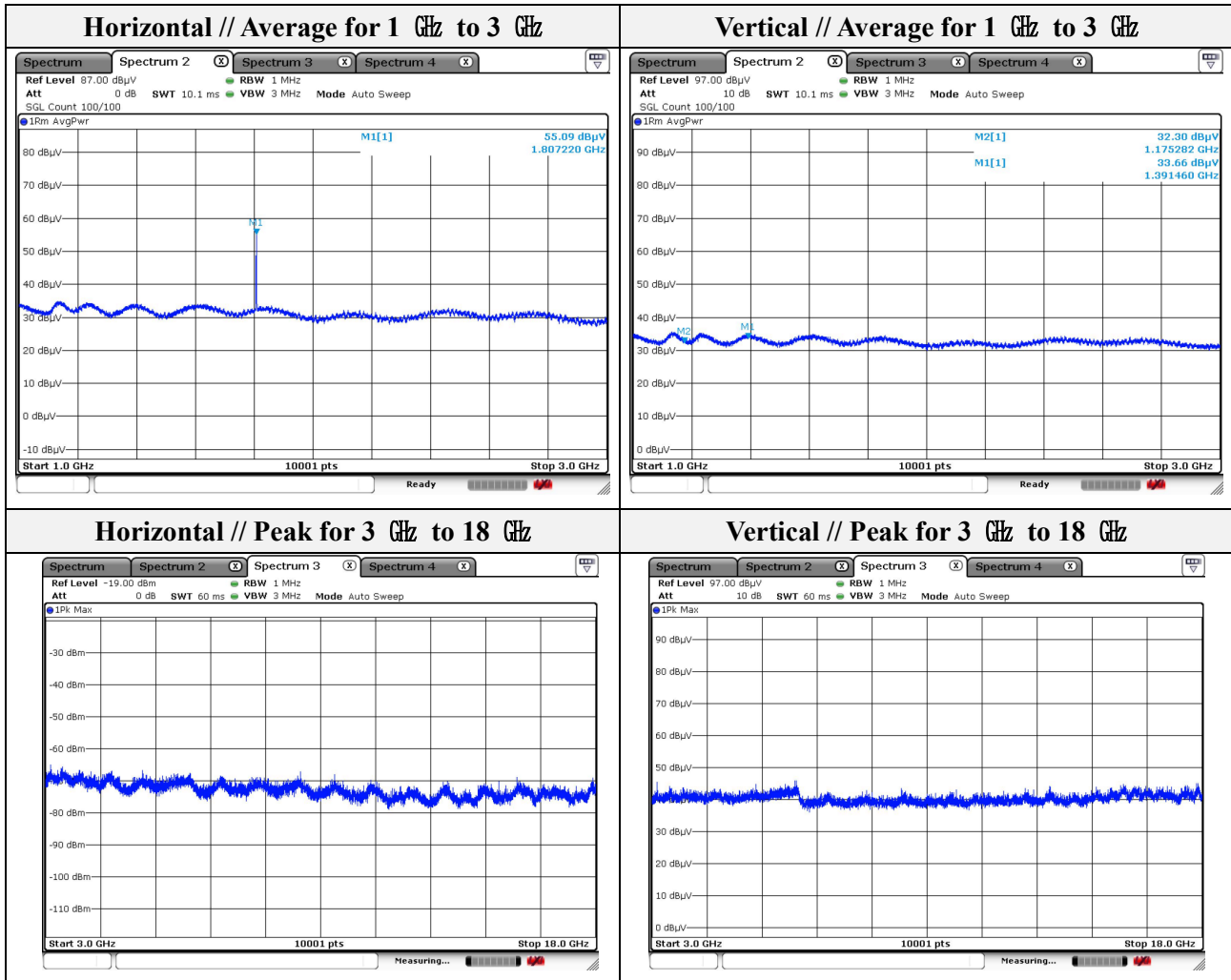
Channel: 01

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 175.28	54.16	Peak	V	-10.23	-	43.93	74.00	30.07
1 175.28	32.30	Average	V	-10.23	0.37	22.44	54.00	31.56
1 333.27	47.63	Peak	H	-9.38	-	38.25	74.00	35.75
1 391.46	56.98	Peak	V	-9.07	-	47.91	74.00	26.09
1 391.46	33.66	Average	V	-9.07	0.37	24.96	54.00	29.04
1 807.22	64.60	Peak	H	-6.03	-	58.57	74.00	15.43
1 807.22	55.09	Average	H	-6.03	0.37	49.43	54.00	4.57



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Note.

1. No spurious emission were detected at horizontal above 3 GHz.



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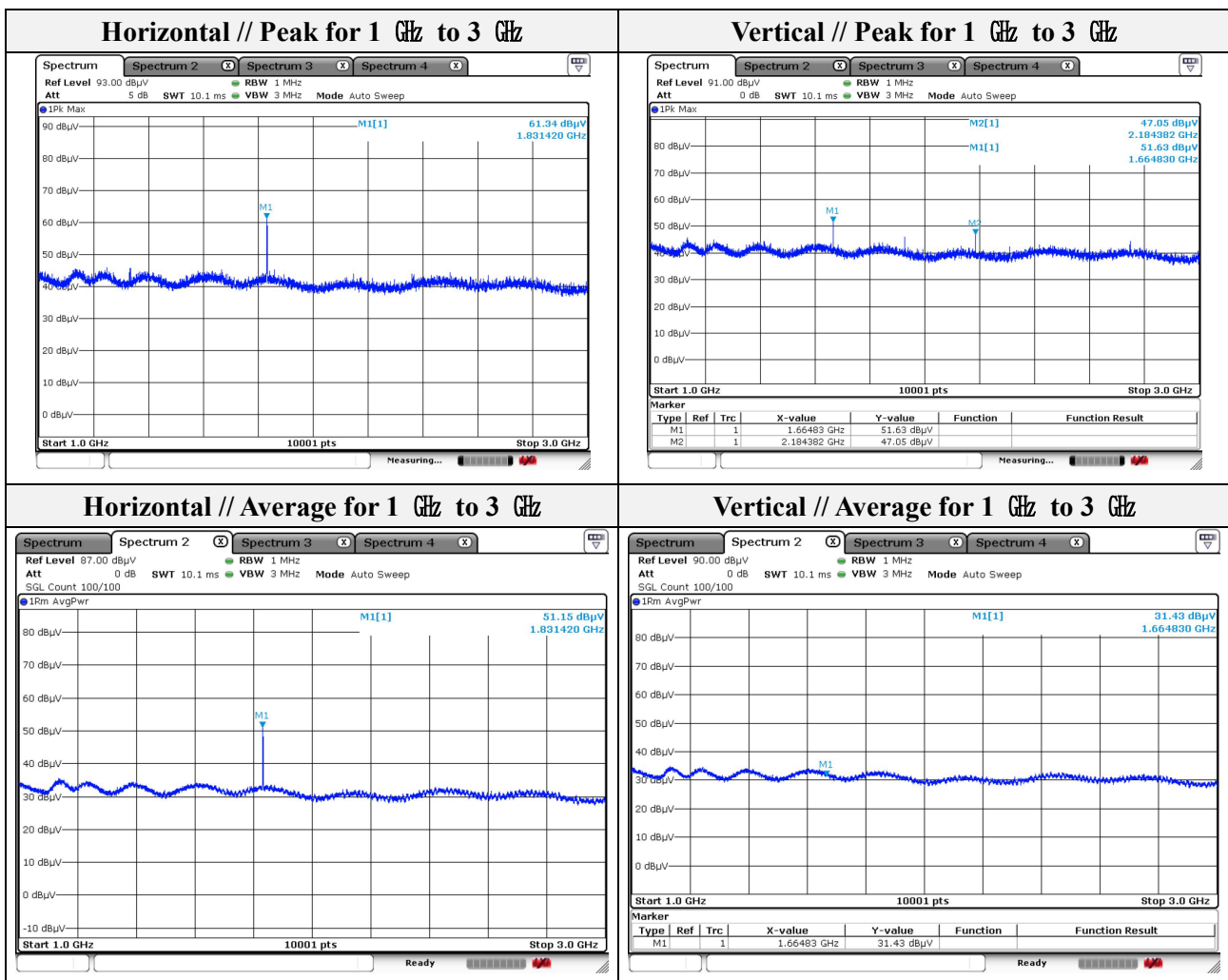
Distance of measurement: 3 meter

Mode: 802.11ah_1 MHz

Channel: 13

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 664.83	51.63	Peak	V	-7.14	-	44.49	74.00	29.51
1 664.83	31.43	Average	V	-7.14	0.37	24.66	54.00	29.34
1 831.42	61.34	Peak	H	-5.83	-	55.51	74.00	18.49
1 831.42	51.15	Average	H	-5.83	0.37	46.06	54.00	7.94
2 184.38	47.05	Peak	V	-3.65	-	43.40	74.00	30.60



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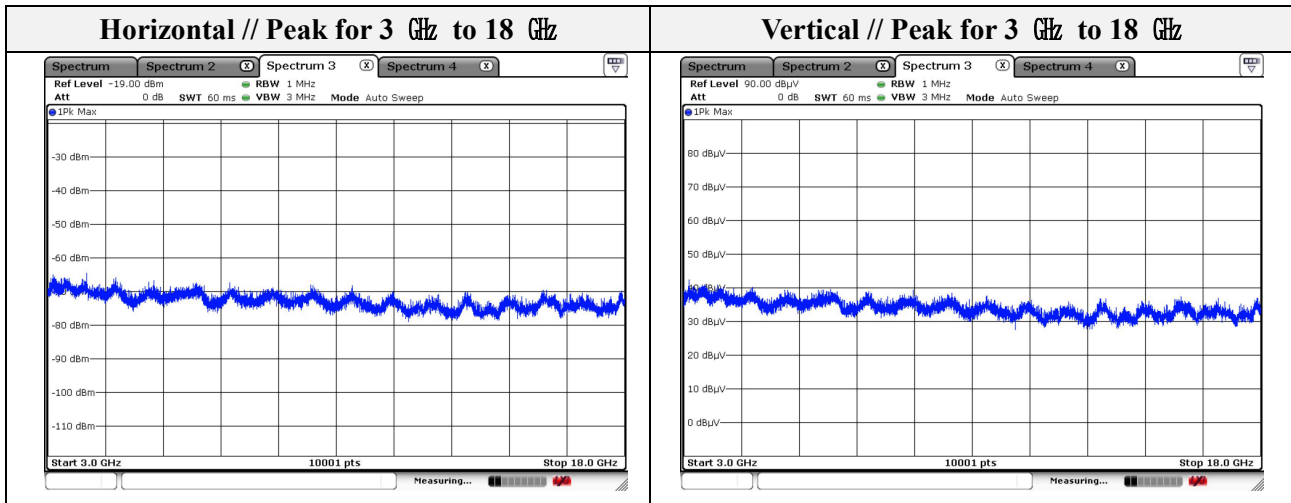
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Note.

1. No spurious emission were detected at horizontal above 3 GHz.

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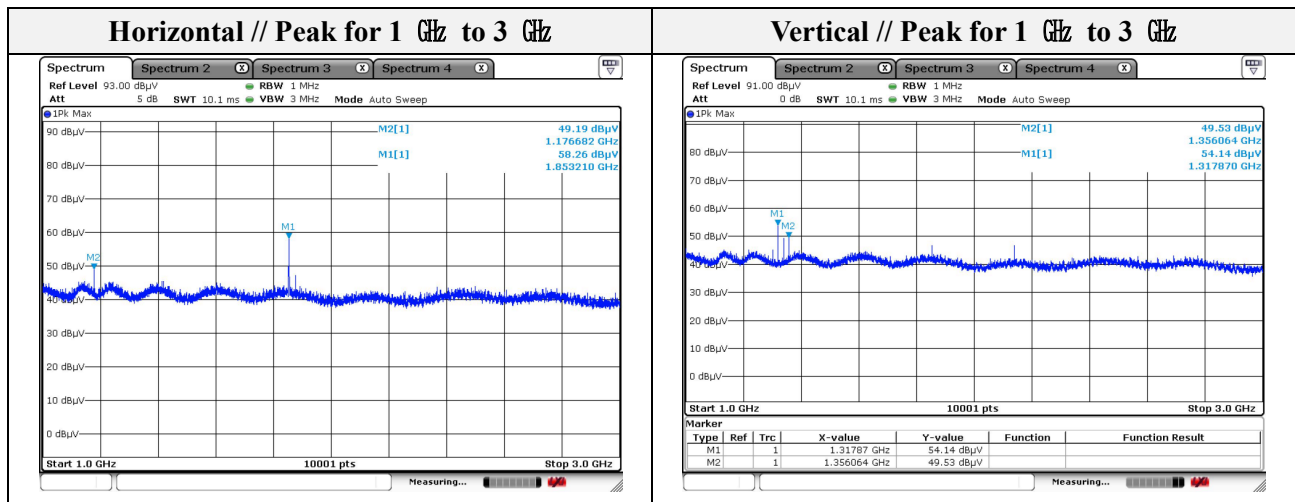
Distance of measurement: 3 meter

Mode: 802.11ah_1 MHz

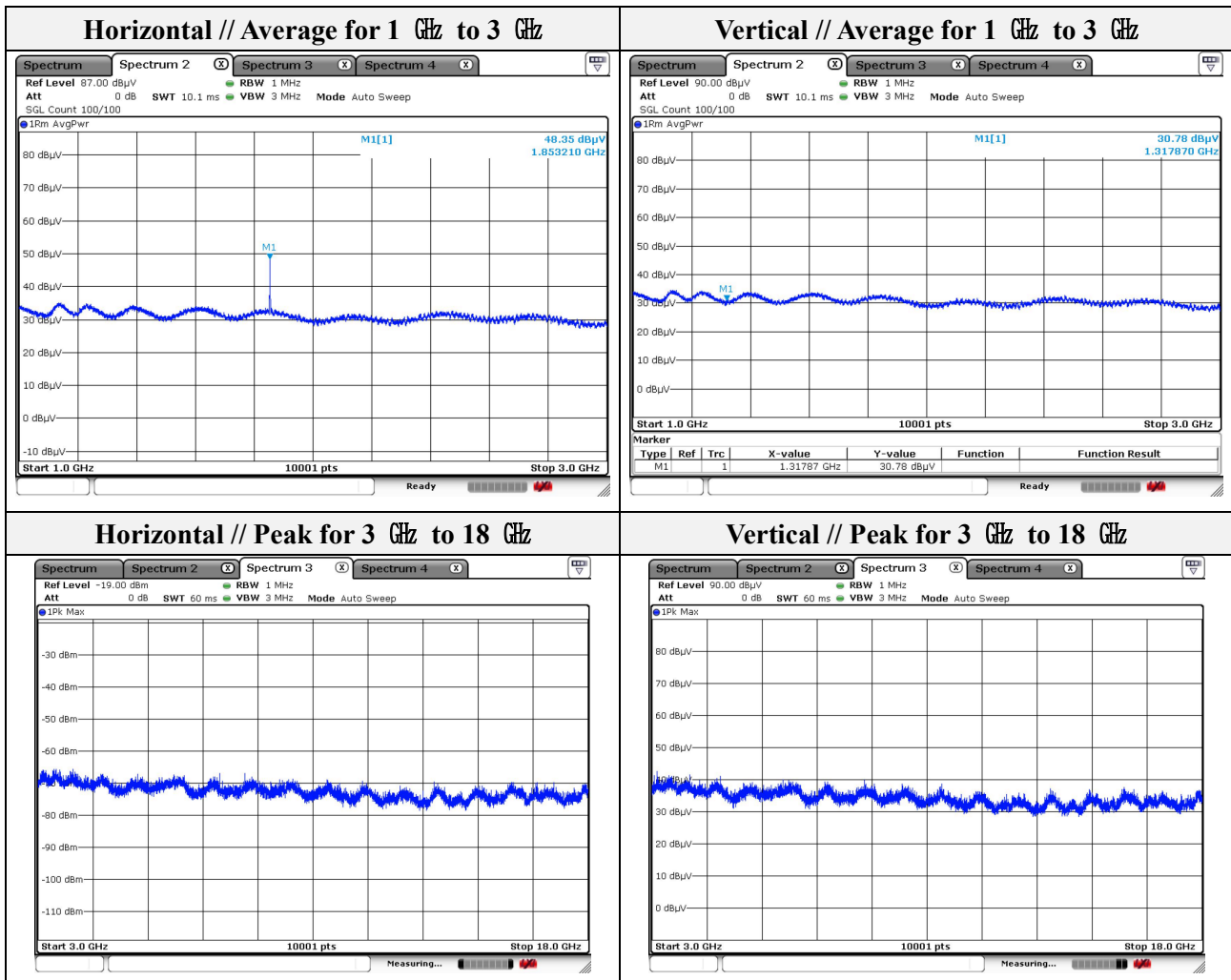
Channel: 24

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 176.68	49.19	Peak	H	1176.68	-	38.97	74.00	35.03
1 317.87	54.14	Peak	V	1317.87	-	44.67	74.00	29.33
1 317.87	30.78	Average	V	1317.87	0.37	21.68	54.00	32.32
1 356.06	49.53	Peak	V	1356.06	-	40.27	74.00	33.73
1 853.21	58.26	Peak	H	1853.21	-	52.61	74.00	21.39
1 853.21	48.35	Average	H	1853.21	0.37	43.07	54.00	10.93



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Note.

1. No spurious emission were detected at horizontal above 3 GHz.



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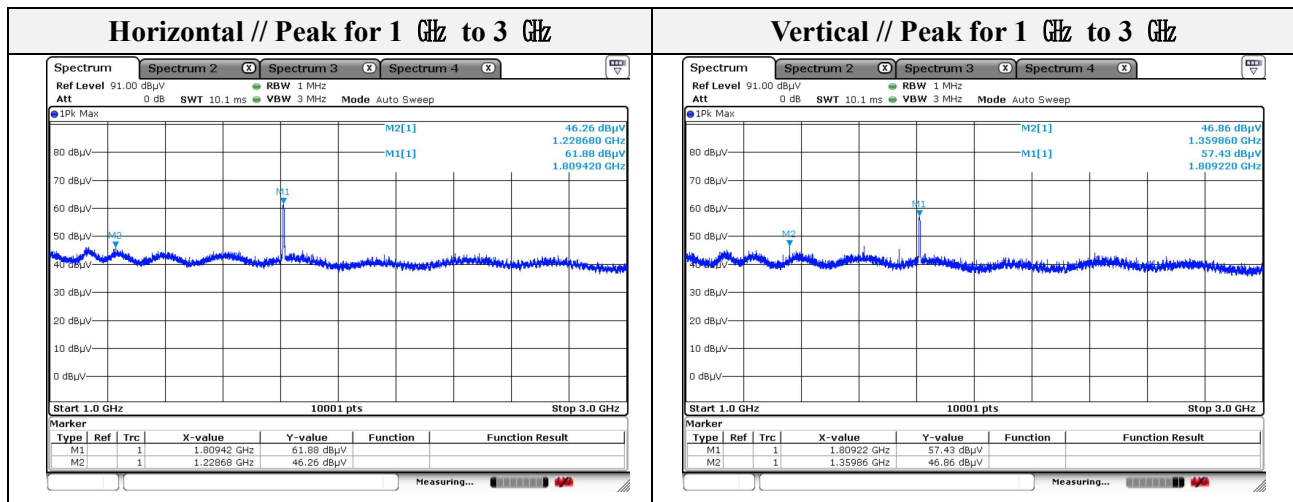
Distance of measurement: 3 meter

Mode: 802.11ah_2 MHz

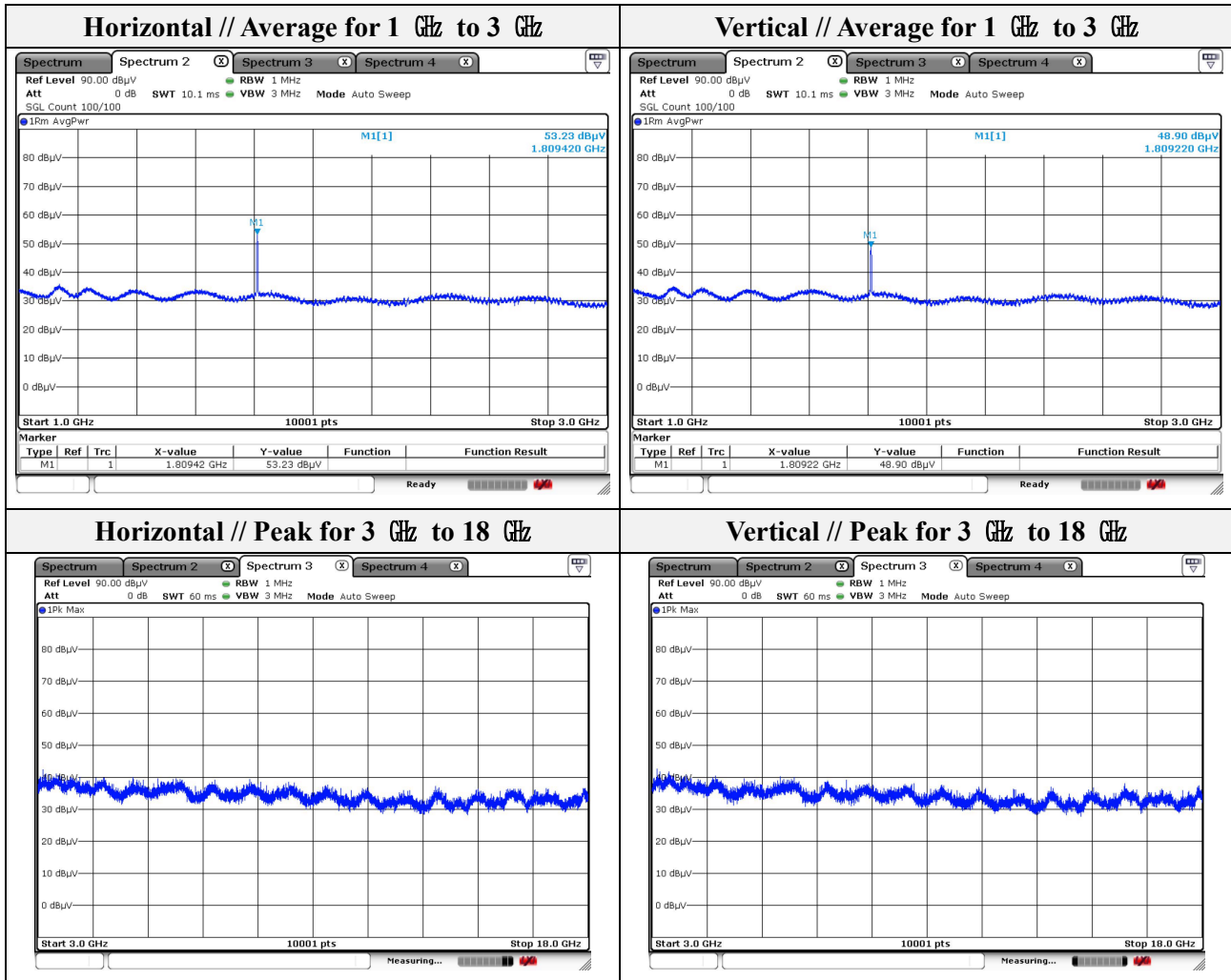
Channel: 01

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 228.68	46.26	Peak	H	-9.94	-	36.32	74.00	37.68
1 359.86	46.86	Peak	V	-9.24	-	37.62	74.00	36.38
1 809.22	57.43	Peak	V	-6.01	-	51.42	74.00	22.58
1 809.22	48.90	Average	V	-6.01	0.86	43.75	54.00	10.25
1 809.42	61.88	Peak	H	-6.01	-	55.87	74.00	18.13
1 809.42	53.23	Average	H	-6.01	0.86	48.08	54.00	5.92



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Note.

1. No spurious emission were detected at horizontal above 3 GHz.