

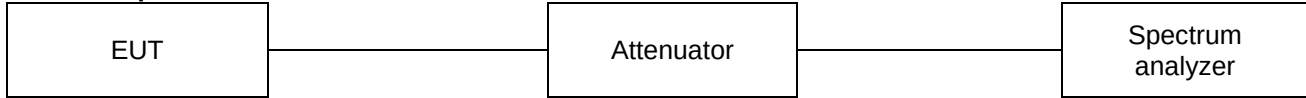


3.4. Power spectral density

Test procedure

KDB 789033 D02 v02r01 – Section F

Test setup



Section F

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power...." (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
3. Make the following adjustments to the peak value of the spectrum, if applicable:
 - a) If Method SA-2 or SA-2 Alternative was used, add $10 \log (1/x)$, where x is the duty cycle, to the peak of the spectrum.
 - b) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4. The result is the Maximum PSD over 1 MHz reference bandwidth.
5. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
 - a) Set $RBW \geq 1/T$, where T is defined in section II.B.I.a)
 - b) Set $VBW \geq 3$ RBW.
 - c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log (500 \text{ kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ kHz})$ is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
 - d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10 \log (1 \text{ MHz}/RBW)$ to the measured result, whereas $RBW (< 1 \text{ MHz})$ is the reduced resolution bandwidth of spectrum analyzer set during measurement.
 - e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note.

As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since $RBW=100 \text{ kHz}$ is available on nearly all spectrum analyzers.

**Limit**

Band	EUT Category		Limit
UNII-1		Outdoor access point	17 dBm/MHz
		Indoor access point	
		Fixed point-to-point access point	
	✓	Mobile and portable client device	11 dBm/MHz
UNII-2A			11 dBm/MHz
UNII-2C			11 dBm/MHz
UNII-3	✓		30 dBm/500 kHz

Note.

1. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceed 6 dBi.

IC Limit

Band	EUT Category	Limit
UNII-1	✓	10 dBm/MHz
UNII-2A		11 dBm/MHz
UNII-2C		11 dBm/MHz
UNII-3	✓	30 dBm/500 kHz

Note.

1. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceed 6 dBi.



Test results

Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit
802.11a (6 Mbps)	5 180	UNII-1	1.91	-	-	5.10	4.64	11.00 (dB m/MHz)
	5 220		1.62				5.03	
	5 240		1.56				4.52	
	5 745	UNII-3	-0.21		-		2.12	30.00 (dBm/500 kHz)
	5 785		0.81				1.06	
	5 825		0.54				0.90	
802.11n_ HT20 (MCS0)	5 180	UNII-1	-0.25	-	-		2.69	11.00 (dB m/MHz)
	5 220		-0.66				3.13	
	5 240		-0.71				2.40	
	5 745	UNII-3	-2.80		-		0.37	30.00 (dBm/500 kHz)
	5 785		-1.52				1.01	
	5 825		-1.78				0.34	
802.11ac_ VHT20 (MCS0)	5 180	UNII-1	-0.38	-	-		3.17	11.00 (dB m/MHz)
	5 220		-0.67				2.85	
	5 240		-1.03				3.14	
	5 745	UNII-3	-2.58		-		0.43	30.00 (dBm/500 kHz)
	5 785		-1.43				0.40	
	5 825		-1.55				-0.03	



Mode	Frequency (MHz)	Band	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Ant Gain	Sum Note3	Limit
802.11n_ HT40 (MCS0)	5 190	UNII-1	-3.75	-	1.53	5.10	1.16	11.00 (dB m/MHz)
	5 230		-4.36				0.87	
	5 755	UNII-3	-5.42		1.27		-2.02	30.00 (dBm/500 kHz)
	5 795		-5.03				-2.26	
802.11ac VHT40 (MCS0)	5 190	UNII-1	-5.97	-	1.45		0.64	11.00 (dB m/MHz)
	5 230		-6.39				1.26	
	5 755	UNII-3	-7.55		1.37		-1.40	30.00 (dBm/500 kHz)
	5 795		-7.07				-1.18	
802.11ac VHT80 (MCS0)	5 210	UNII-1	-14.93	-	1.51		-1.20	11.00 (dB m/MHz)
	5 775	UNII-3	-15.32		1.21		-4.09	30.00 (dBm/500 kHz)

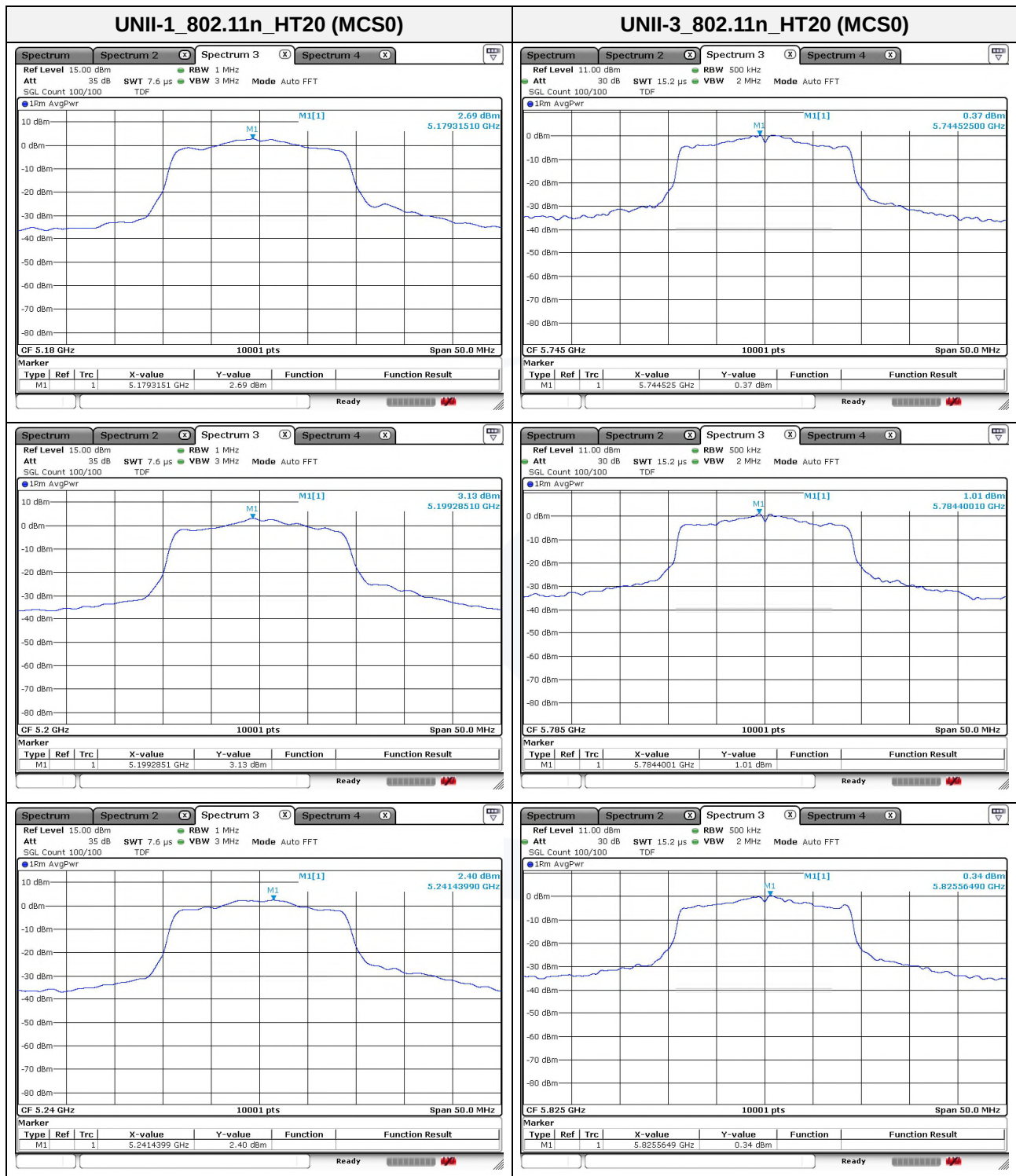
Note.

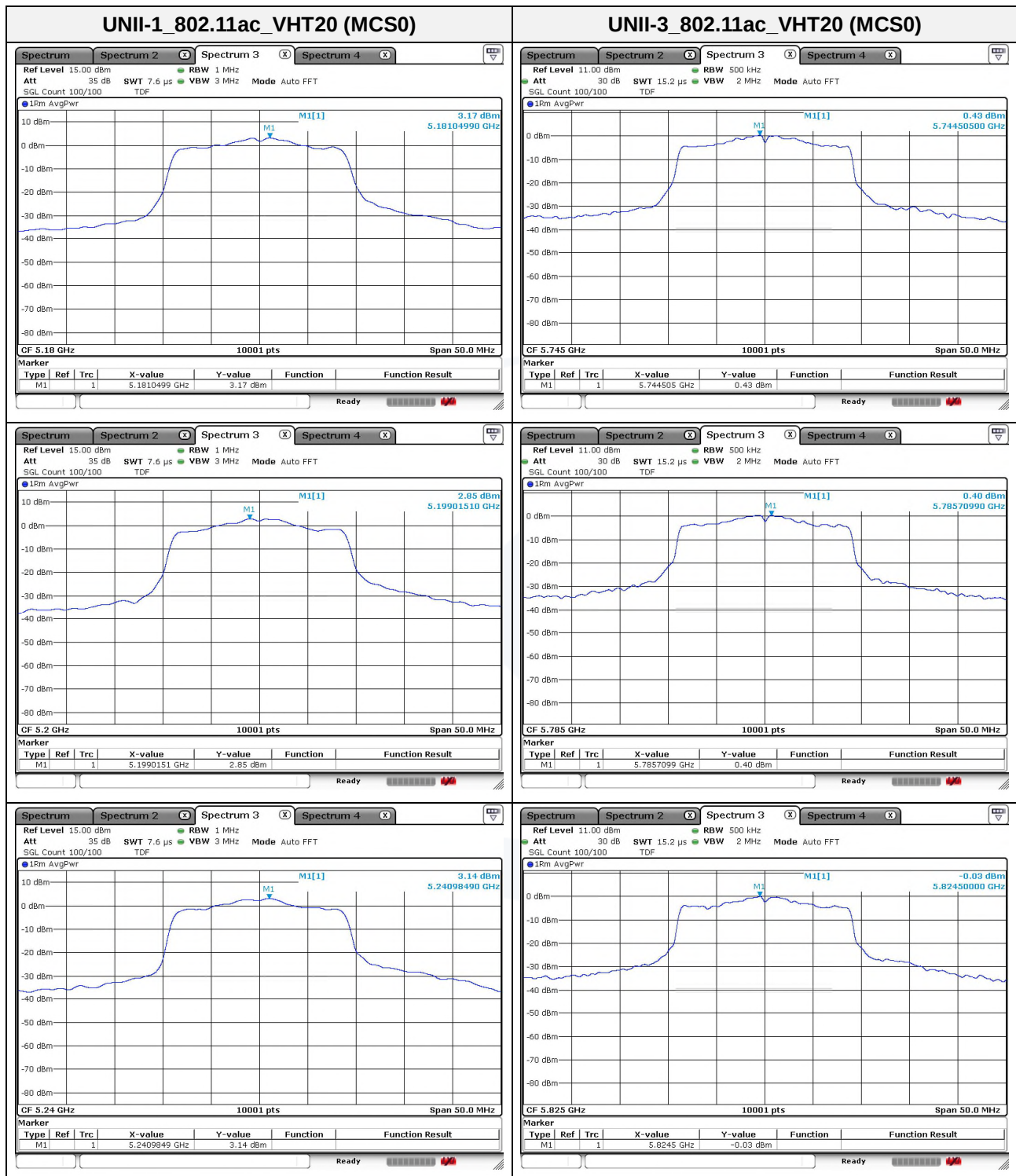
1. UNII-1 = $10\log(1 \text{ MHz}/1 \text{ MHz})$
UNII-3 = $10\log(500 \text{ kHz}/500 \text{ kHz})$
2. Refer to the page 52, 53 on this report.
3. $\text{Sum(dBm)} = \text{PSD(dBm)} + \text{RBWF} + \text{Duty correction factor (dB)}$

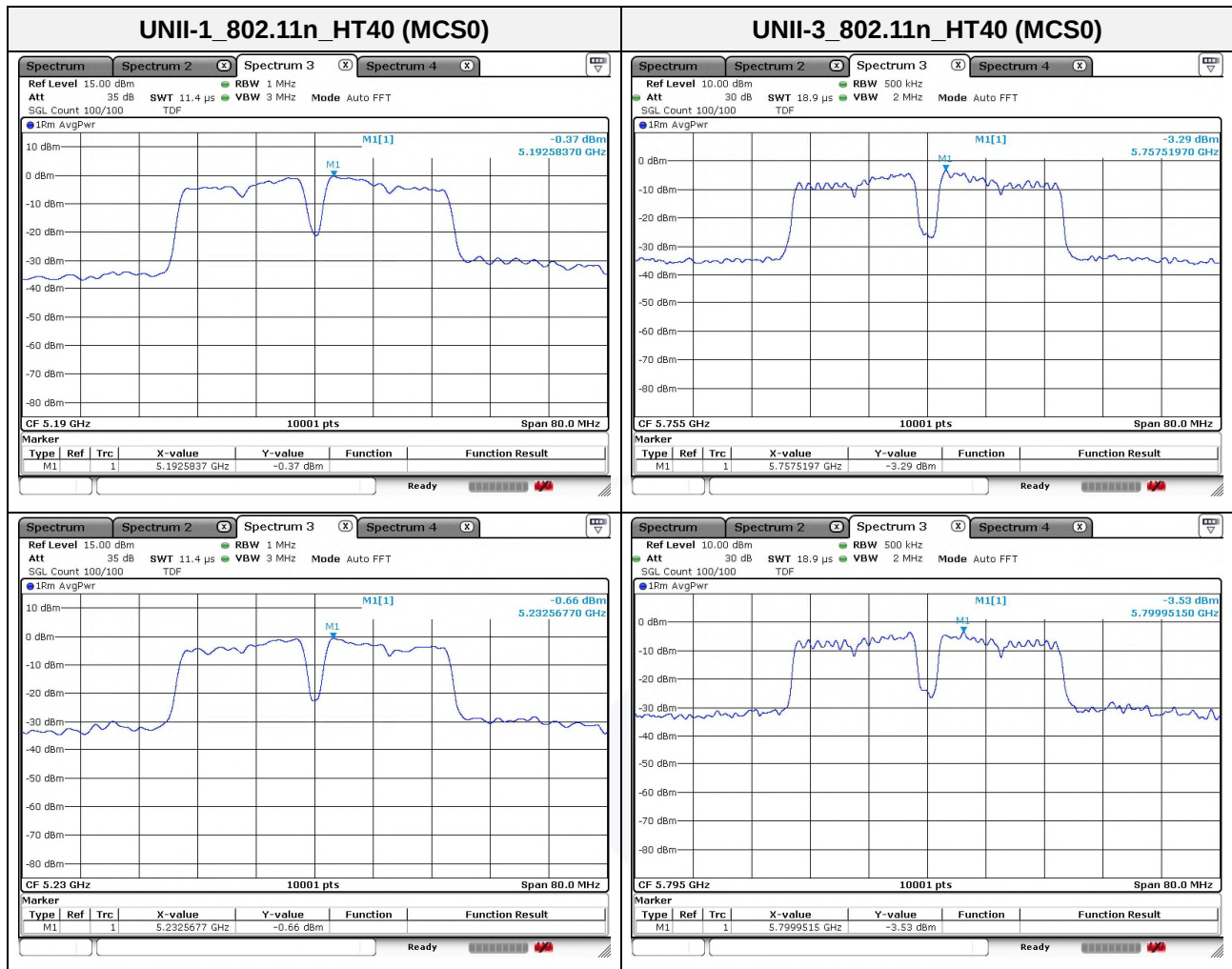


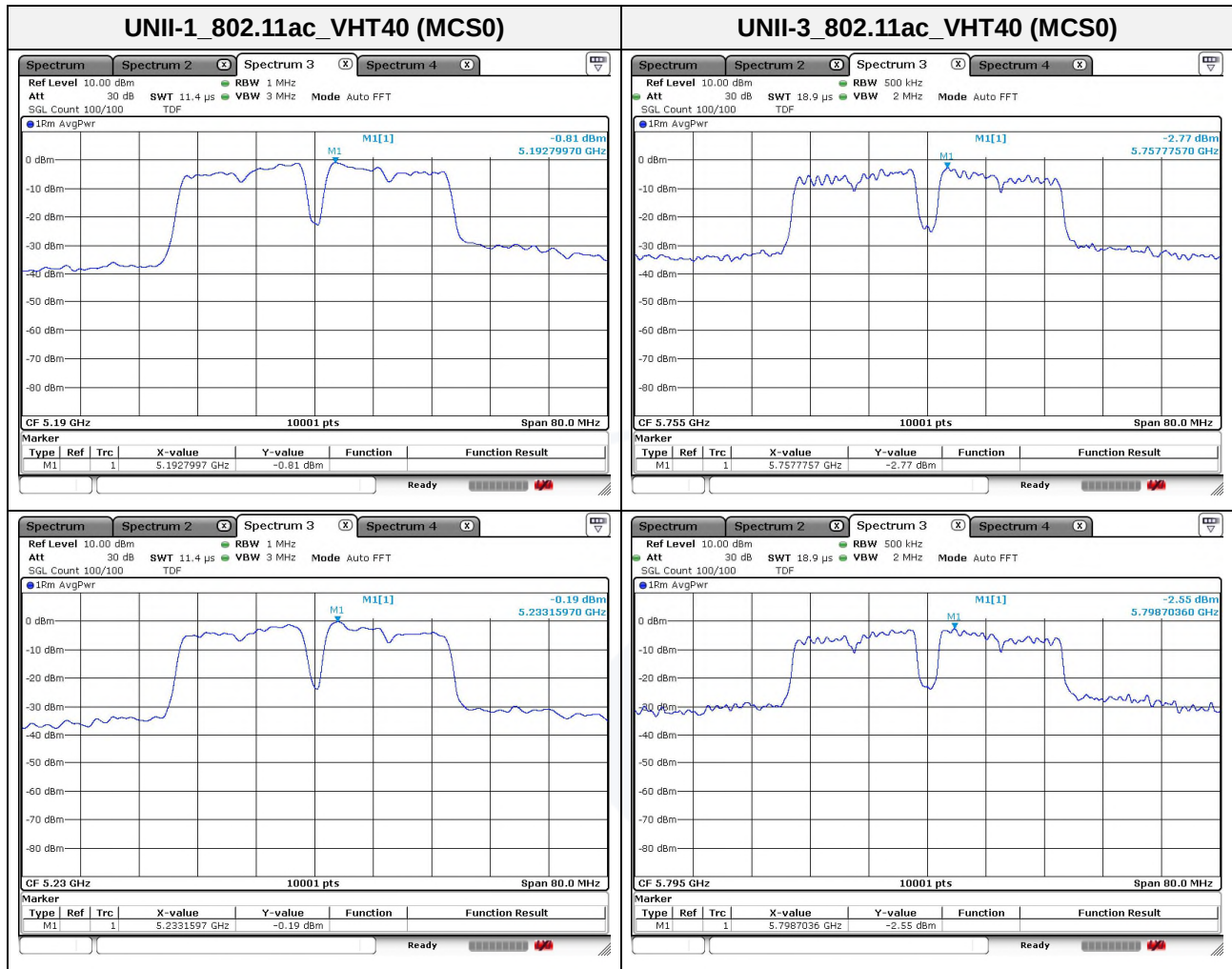
Test Plot

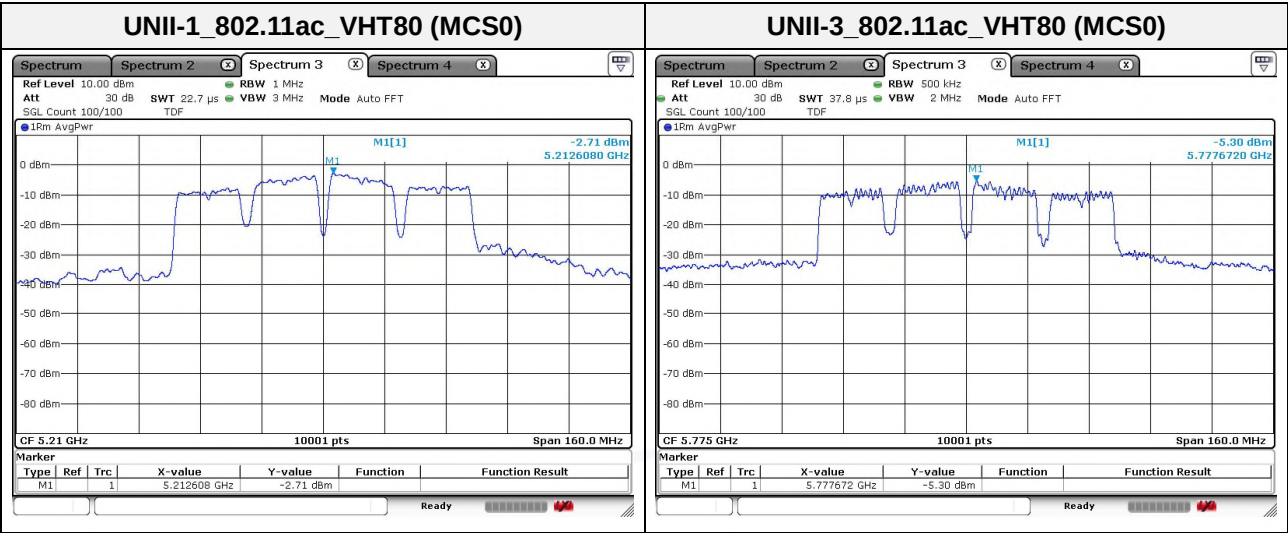














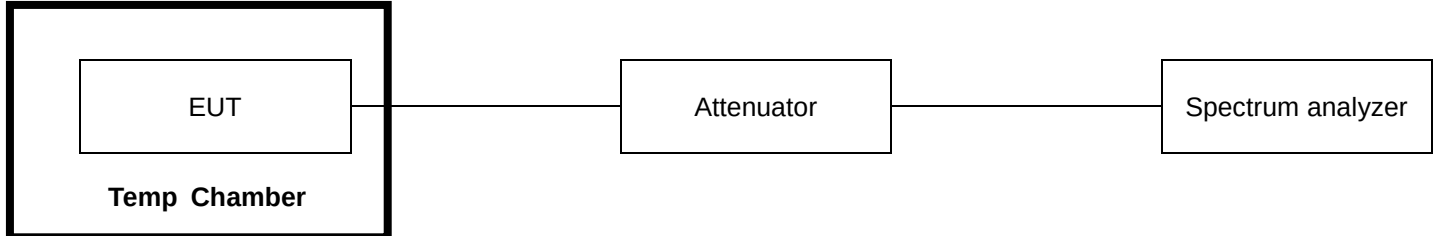
3.5. Frequency Stability

Test procedure

For FCC, ANSI C63.10-2020, clause 6.8.1

For IC, ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, clause 6.8.1

Test setup



1. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
7. While maintaining a constant temperature inside the environmental chamber, turn the EUT on and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

Limit

N/A

**Test results**

Mode: UNII-1

Operating frequency: 5 180 MHz

Test voltage (%)	Test voltage (V)	Temperature (°C)	Maintaining time	Measure frequency (MHz)	Frequency deviation (Hz)	Deviation (%)
100 %	DC 11.1 V	-10.0	Startup	5 180.061 250	61 250	0.001 18
			2 minutes	5 180.061 200	61 200	0.001 18
			5 minutes	5 180.061 150	61 150	0.001 18
			10 minutes	5 180.061 200	61 200	0.001 18
100 %		0.0	Startup	5 180.045 500	45 500	0.000 88
			2 minutes	5 180.045 550	45 550	0.000 88
			5 minutes	5 180.045 650	45 650	0.000 88
			10 minutes	5 180.045 600	45 600	0.000 88
100 %		10.0	Startup	5 180.034 500	34 500	0.000 67
			2 minutes	5 180.034 550	34 550	0.000 67
			5 minutes	5 180.034 550	34 550	0.000 67
			10 minutes	5 180.034 500	34 500	0.000 67
100 %		20.0	Startup	5 180.020 500	20 500	0.000 40
			2 minutes	5 180.020 450	20 450	0.000 39
			5 minutes	5 180.020 400	20 400	0.000 39
			10 minutes	5 180.020 550	20 550	0.000 40
100 %		25.9	Startup	5 180.006 250	6 250	0.000 12
			2 minutes	5 180.006 300	6 300	0.000 12
			5 minutes	5 180.006 200	6 200	0.000 12
			10 minutes	5 180.006 350	6 350	0.000 12
100 %		30.0	Startup	5 180.010 500	10 500	0.000 20
			2 minutes	5 180.010 450	10 450	0.000 20
			5 minutes	5 180.010 400	10 400	0.000 20
			10 minutes	5 180.010 550	10 550	0.000 20
100 %		40.0	Startup	5 180.022 000	22 000	0.000 42
			2 minutes	5 180.022 050	22 050	0.000 43
			5 minutes	5 180.021 900	21 900	0.000 42
			10 minutes	5 180.021 950	21 950	0.000 42
100 %		50.0	Startup	5 180.030 200	30 200	0.000 58
			2 minutes	5 180.030 150	30 150	0.000 58
			5 minutes	5 180.030 100	30 100	0.000 58
			10 minutes	5 180.030 250	30 250	0.000 58
85 %		25.9	Startup	5 180.006 150	6 150	0.000 12
			2 minutes	5 180.006 200	6 200	0.000 12
			5 minutes	5 180.006 250	6 250	0.000 12
			10 minutes	5 180.006 050	6 050	0.000 12
115 %		25.9	Startup	5 180.006 150	6 150	0.000 12
			2 minutes	5 180.006 350	6 350	0.000 12
			5 minutes	5 180.006 250	6 250	0.000 12
			10 minutes	5 180.006 350	6 350	0.000 12



Mode: UNII-3

Operating frequency: 5 745 MHz

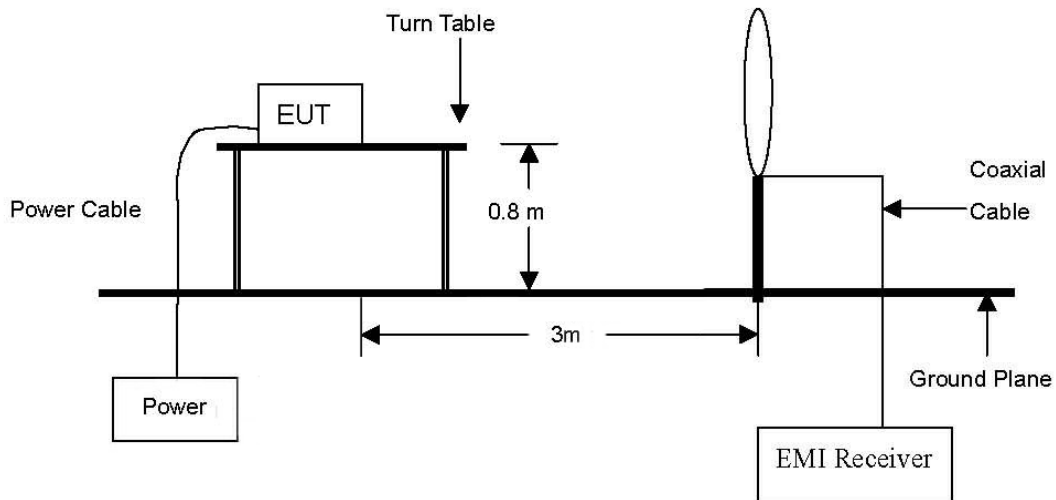
Test voltage (%)	Test voltage (V)	Temperature (°C)	Maintaining time	Measure frequency (MHz)	Frequency deviation (Hz)	Deviation (%)
100 %	DC 11.1 V	-10.0	Startup	5 180.061 450	61 450	0.001 19
			2 minutes	5 180.061 400	61 400	0.001 19
			5 minutes	5 180.061 400	61 400	0.001 19
			10 minutes	5 180.061 500	61 500	0.001 19
100 %		0.0	Startup	5 180.044 200	44 200	0.000 85
			2 minutes	5 180.044 150	44 150	0.000 85
			5 minutes	5 180.044 150	44 150	0.000 85
			10 minutes	5 180.044 100	44 100	0.000 85
100 %		10.0	Startup	5 180.034 550	34 550	0.000 67
			2 minutes	5 180.034 600	34 600	0.000 67
			5 minutes	5 180.034 600	34 600	0.000 67
			10 minutes	5 180.034 650	34 650	0.000 67
100 %		20.0	Startup	5 180.018 750	18 750	0.000 36
			2 minutes	5 180.018 800	18 800	0.000 36
			5 minutes	5 180.018 900	18 900	0.000 36
			10 minutes	5 180.018 950	18 950	0.000 37
100 %		25.9	Startup	5 180.009 400	9 400	0.000 18
			2 minutes	5 180.009 450	9 450	0.000 18
			5 minutes	5 180.009 400	9 400	0.000 18
			10 minutes	5 180.009 450	9 450	0.000 18
100 %		30.0	Startup	5 180.014 000	14 000	0.000 27
			2 minutes	5 180.014 050	14 050	0.000 27
			5 minutes	5 180.014 000	14 000	0.000 27
			10 minutes	5 180.013 950	13 950	0.000 27
100 %		40.0	Startup	5 180.024 250	24 250	0.000 47
			2 minutes	5 180.024 200	24 200	0.000 47
			5 minutes	5 180.024 150	24 150	0.000 47
			10 minutes	5 180.024 200	24 200	0.000 47
100 %		50.0	Startup	5 180.038 250	38 250	0.000 74
			2 minutes	5 180.038 300	38 300	0.000 74
			5 minutes	5 180.038 350	38 350	0.000 74
			10 minutes	5 180.038 400	38 400	0.000 74
85 %	DC 9.435 V	25.9	Startup	5 180.009 350	9 350	0.000 18
			2 minutes	5 180.009 400	9 400	0.000 18
			5 minutes	5 180.009 450	9 450	0.000 18
			10 minutes	5 180.009 450	9 450	0.000 18
115 %	DC 12.765 V	25.9	Startup	5 180.009 350	9 350	0.000 18
			2 minutes	5 180.009 300	9 300	0.000 18
			5 minutes	5 180.009 250	9 250	0.000 18
			10 minutes	5 180.009 300	9 300	0.000 18



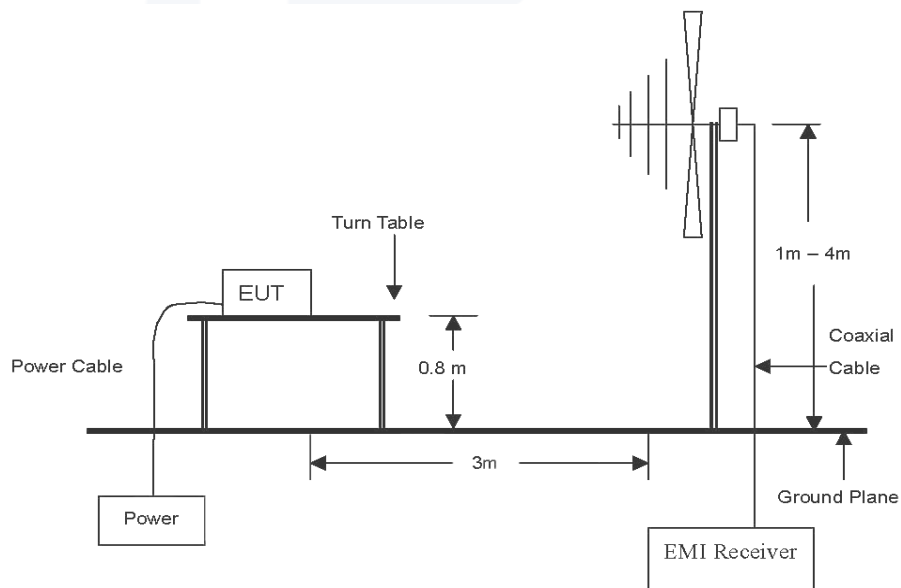
3.6. Radiated restricted band and emissions

Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.

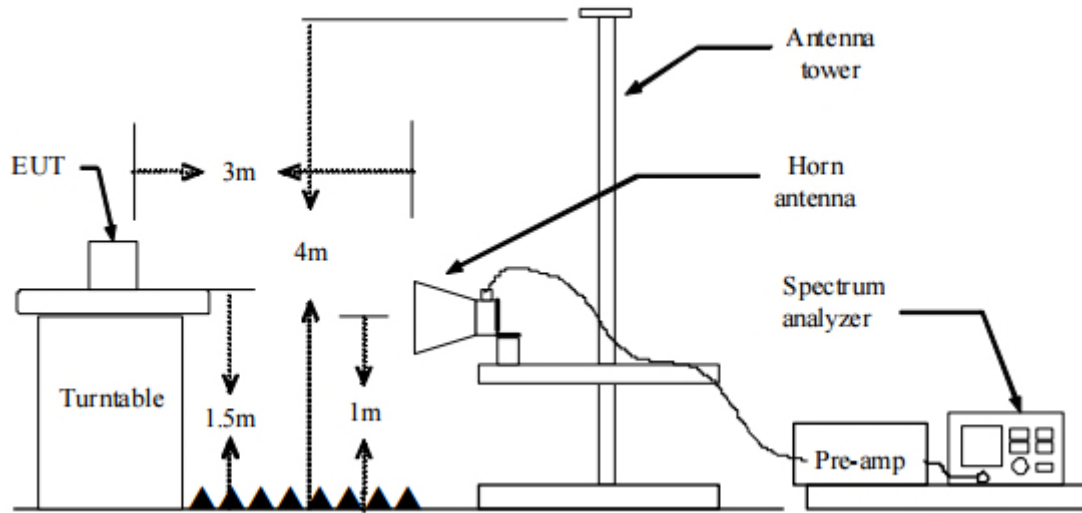


The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.





The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz emissions, whichever is lower.



Test procedure

Radiated emissions from the EUT were measured according to the dictates in section 11.11 & 11.12 of ANSI C63.10-2020 (FCC) & ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 (IC).

Test procedure below 30 MHz

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel, ground parallel and perpendicular of the antenna are set to make the measurement. It was determined that parallel was worst-case orientation; therefore, all final radiated testing was performed with the EUT in parallel.
3. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
4. The test-receiver system was set to average or quasi peak detect function and Specified Bandwidth with Maximum hold mode.

Test procedure above 30 MHz

1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The antenna is a bi-log antenna, a horn antenna ,and its height are varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
4. The test receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
5. Spectrum analyzer settings for $f < 1$ GHz:
 - ① Span = wide enough to fully capture the emission being measured
 - ② RBW = 100 kHz
 - ③ VBW $\geq$ RBW
 - ④ Detector = quasi peak
 - ⑤ Sweep time = auto
 - ⑥ Trace = max hold



6. Spectrum analyzer settings for $f \geq 1$ GHz: Peak

- ① Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- ② RBW = 1 MHz
- ③ VBW ≥ 3 MHz
- ④ Detector = peak
- ⑤ Sweep time = auto
- ⑥ Trace = max hold
- ⑦ Trace was allowed to stabilize

7. Spectrum analyzer settings for $f \geq 1$ GHz: Average

- ① Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- ② RBW = 1 MHz
- ③ VBW $\geq 3 \times$ RBW
- ④ Detector = RMS, if $\text{span}/(\# \text{ of points in sweep}) \leq (\text{RBW}/2)$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
- ⑤ Averaging type = power(i.e., RMS)
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
- ⑥ Sweep = auto
- ⑦ Trace = max hold
- ⑧ Perform a trace average of at least 100 traces.
- ⑨ A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (RMS) mode was used in step ⑤, then the applicable correction factor is $10 \log(1/x)$, where x is the duty cycle.
 - 2) If linear voltage averaging mode was used in step ⑤, then the applicable correction factor is $20 \log(1/x)$, where x is the duty cycle.
 - 3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

**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.

FCC 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	$2400/F(\text{kHz})$
0.490 ~ 1.705	30	$24000/F(\text{kHz})$
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.



According to 15.407(b), (b) Undesirable emission limits: Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of –27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
 - i) All emissions shall be limited to a level of –27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
 - ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in § 15.207.
- (7) The provisions of §15.205 apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

**IC Limit**

According to RSS-Gen, Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits :

Frequency (MHz)	Distance (Meters)	Radiated ($\mu\text{W/m}$)
0.009 ~ 0.490	300	2 400 / $F(\text{kHz})$
0.490 ~ 1.705	30	24 000 / $F(\text{kHz})$
1.705 ~ 30.0	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960*	3	500

* Unless otherwise specified, for all frequencies greater than 1 GHz, the radiated emission limits for licence-exempt radio apparatus stated in applicable RSSs (including RSS-Gen) are based on measurements using a linear average detector function having a minimum resolution bandwidth of 1 MHz. If an average limit is specified for the EUT, then the peak emission shall also be measured with instrumentation properly adjusted for such factors as pulse desensitization to ensure the peak emission is less than 20 dB above the average limit.

Note: Transmitting devices are not permitted in restricted frequency bands unless stated otherwise in the specific RSS.



According to RSS-247 7.3, The equipment output power and e.i.r.p. shall be measured in terms of average value. If the transmission is in bursts, the provisions of RSS-Gen for pulsed operation shall apply.

Equipment operating in the bands 5 470-5 725 MHz shall comply with the following unwanted emission limits:

- a. for devices with fundamental emissions fully contained within the 5 470-5 725 MHz band, all unwanted emissions outside the band 5 470-5 725 MHz shall not exceed -27 dBm /MHz peak e.i.r.p. spectral density.
- b. for devices with bandwidth overlapping the band edge of 5 725 MHz, all unwanted emissions shall not exceed -27 dBm /MHz peak e.i.r.p. spectral density at 5 850 MHz instead of 5 725 MHz.

Equipment operating in the band 5 725-5 850 MHz shall comply with the following peak e.i.r.p. spectral density limits:

- a. 27 dBm /MHz at frequencies from the band edges decreasing linearly to 15.6 dBm /MHz at 5 MHz above or below the band edges;
- b. 15.6 dBm /MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm /MHz at 25 MHz above or below the band edges;
- c. 10 dBm /MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm /MHz at 75 MHz above or below the band edges; and
- d. -27 dBm /MHz at frequencies more than 75 MHz above or below the band edges.

**Duty cycle**

Regarding to KDB 789033 D02 v02r01, B)2)b), the maximum duty cycles of all modes were investigated and set the spectrum analyzer as below.

Set RBW $\geq$ OBW if possible; otherwise, set RBW to the largest available value. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$, where T is defined in II.B.1.a), and the number of sweep points across duration T exceeds 100.

For the band 5.150-5.250 GHz

Test mode	T _{on} time (ms)	Period (ms)	Duty cycle (Linear)	Duty cycle (%)	Duty cycle correction factor (dB)
802.11a	2.07	2.09	0.99	99.04	-
802.11n_HT20	1.92	1.94	0.99	98.97	-
802.11ac_VHT20	1.94	1.96	0.99	98.98	-
802.11n_HT40	0.052	0.074	0.70	70.27	1.53
802.11ac_VHT40	0.053	0.074	0.72	71.62	1.45
802.11ac_VHT80	0.053	0.075	0.71	70.67	1.51

For the band 5.725-5.85 GHz

Test mode	T _{on} time (ms)	Period (ms)	Duty cycle (Linear)	Duty cycle (%)	Duty cycle correction factor (dB)
802.11a	2.07	2.09	0.99	99.04	-
802.11n_HT20	1.92	1.94	0.99	98.97	-
802.11ac_VHT20	1.94	1.96	0.99	98.98	-
802.11n_HT40	0.056	0.075	0.75	74.67	1.27
802.11ac_VHT40	0.054	0.074	0.73	72.97	1.37
802.11ac_VHT80	0.056	0.074	0.76	75.68	1.21

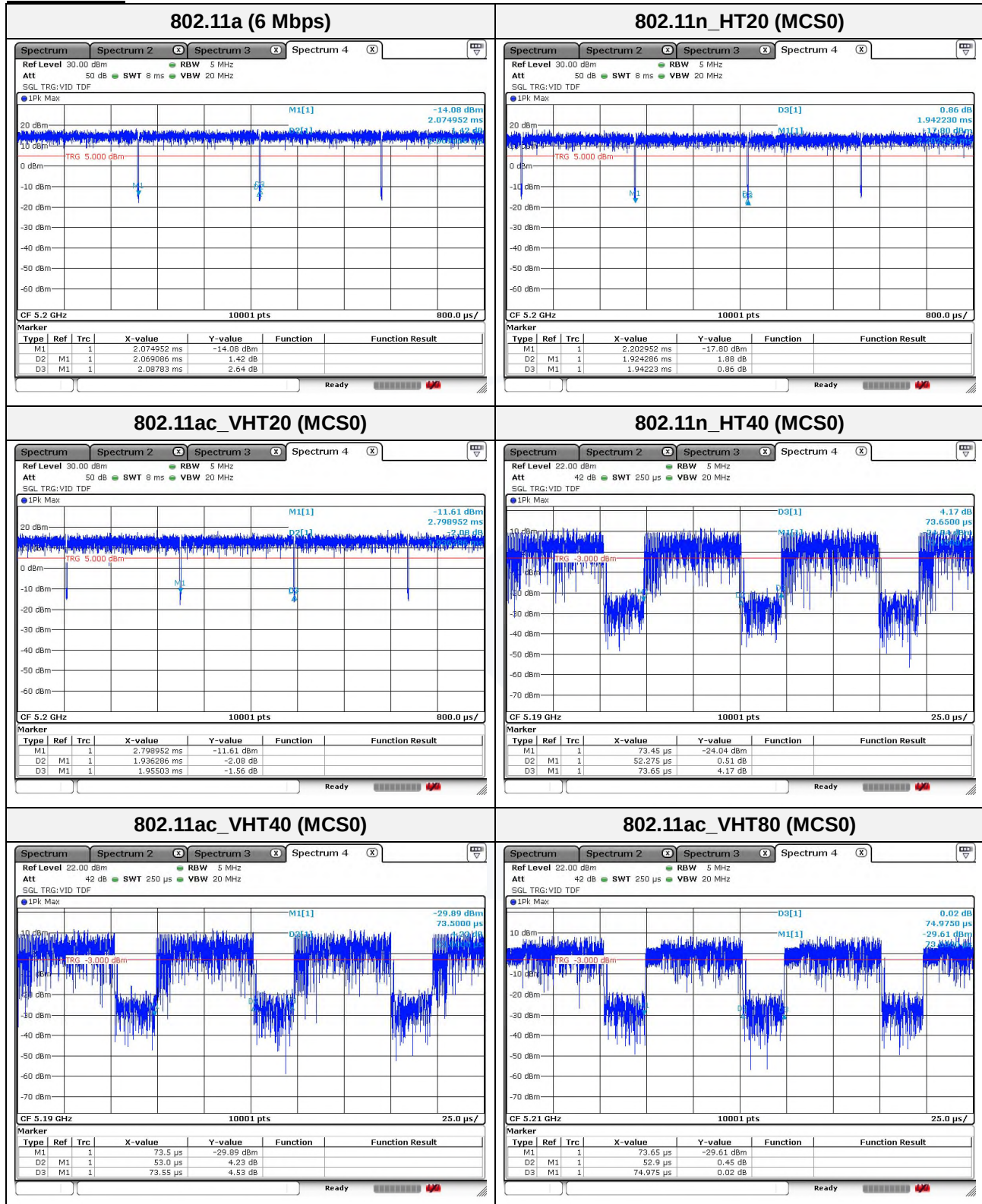
Note:

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

DCF(Duty cycle correction factor (dB)) = $10\log(1/\text{duty cycle})$

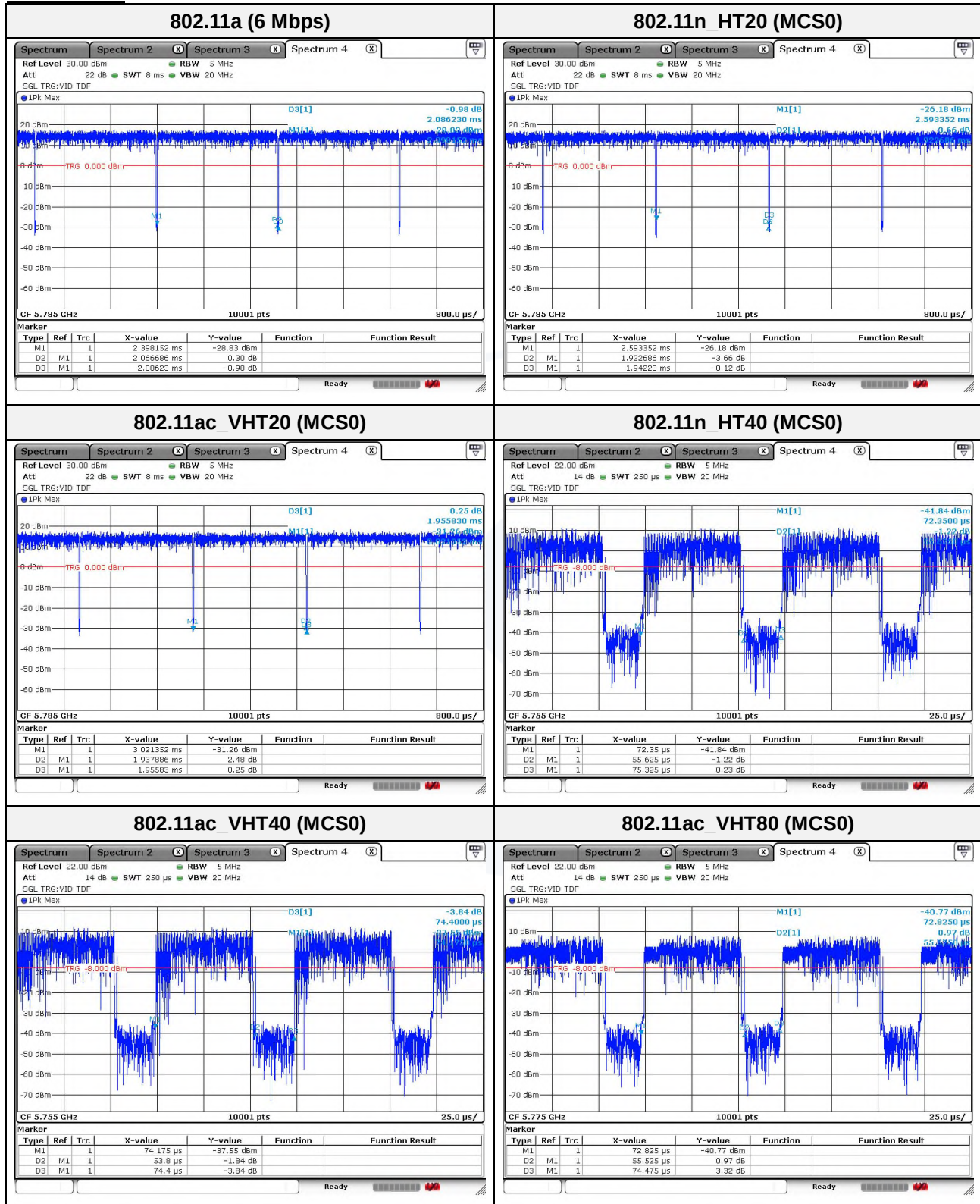


Mode:UNII-1





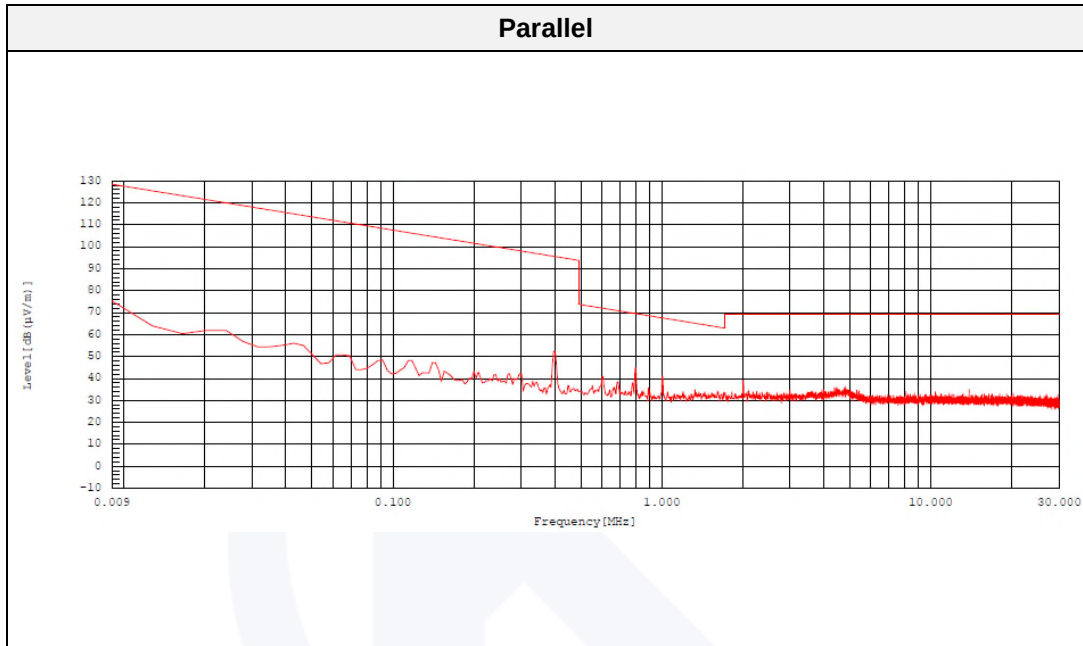
Mode:UNII-3





Test results (Below 30 MHz)

Mode: 802.11a (6 Mbps) (Worst Case)
Power: AC 120 V
Band: UNII-1
Distance of measurement: 3 meter
Channel 36 (Worst Case)

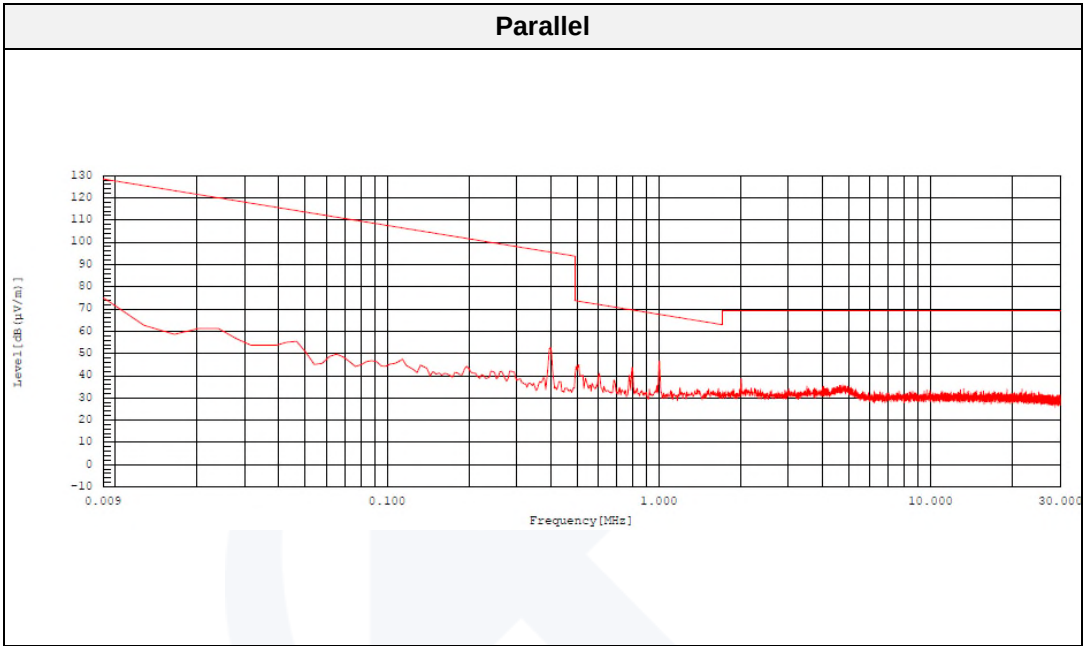


Note.

1. No spurious emission were detected under 30 MHz.



Mode: 802.11a (6 Mbps) (Worst Case)
Power: AC 120 V
Band: UNII-3
Distance of measurement: 3 meter
Channel 149 (Worst Case)

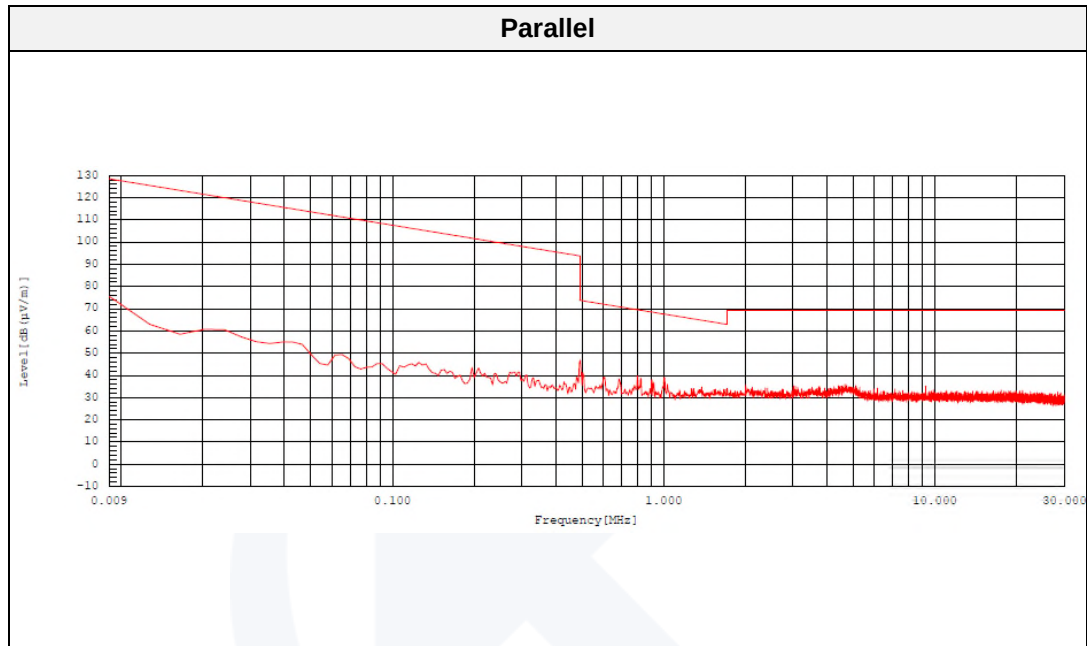


Note.

1. No spurious emission were detected under 30 MHz.



Mode: 802.11a (6 Mbps) (Worst Case)
Power: DC 11.1 V
Band: UNII-1
Distance of measurement: 3 meter
Channel 36 (Worst Case)

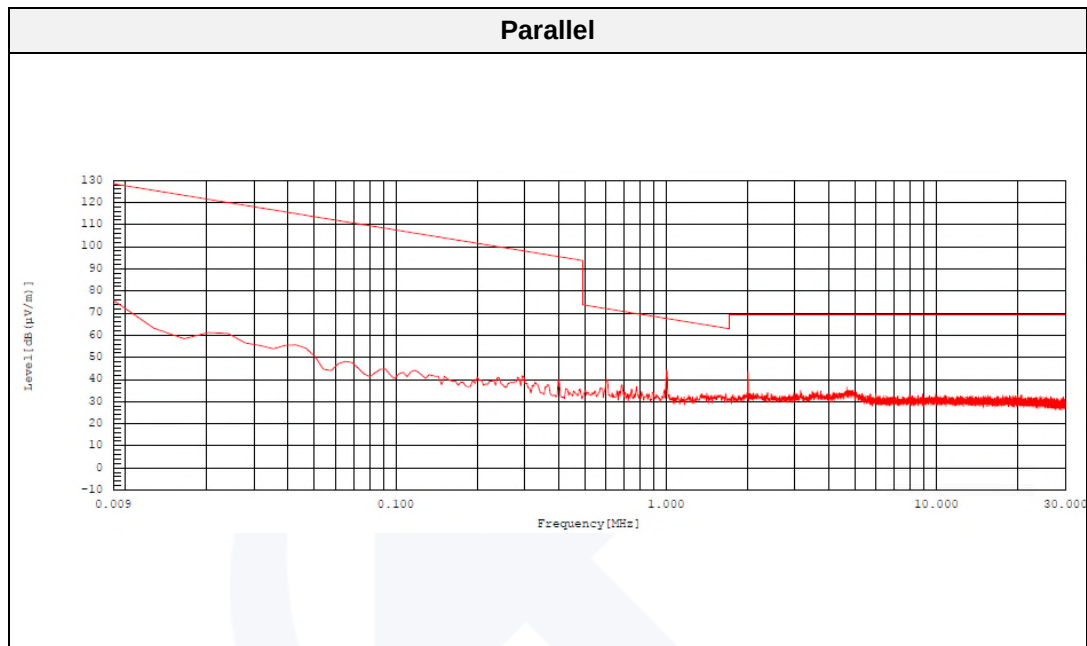


Note.

1. No spurious emission were detected under 30 MHz.



Mode: 802.11a (6 Mbps) (Worst Case)
Power: DC 11.1 V
Band: UNII-3
Distance of measurement: 3 meter
Channel 52 (Worst Case)

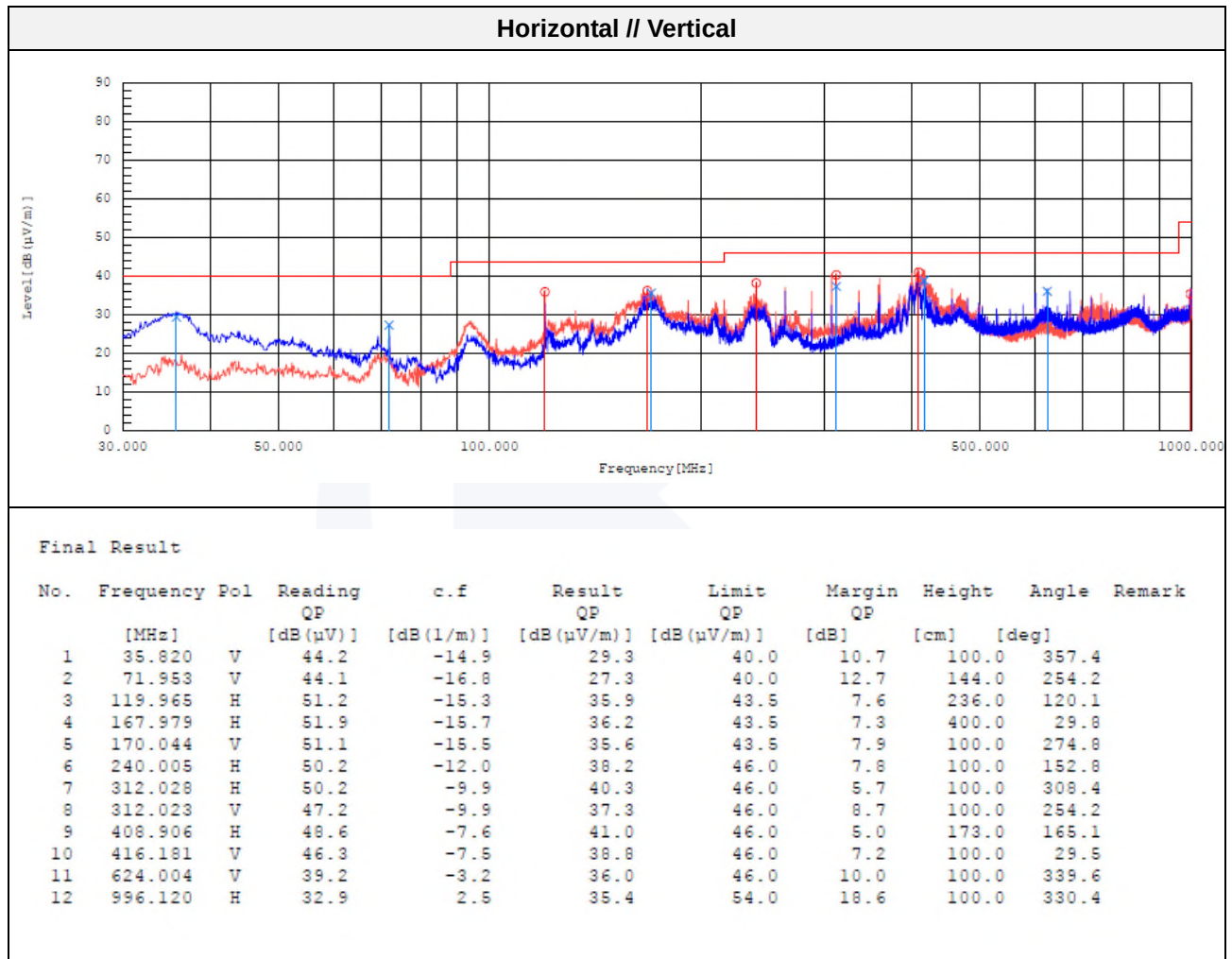


Note.

1. No spurious emission were detected under 30 MHz.

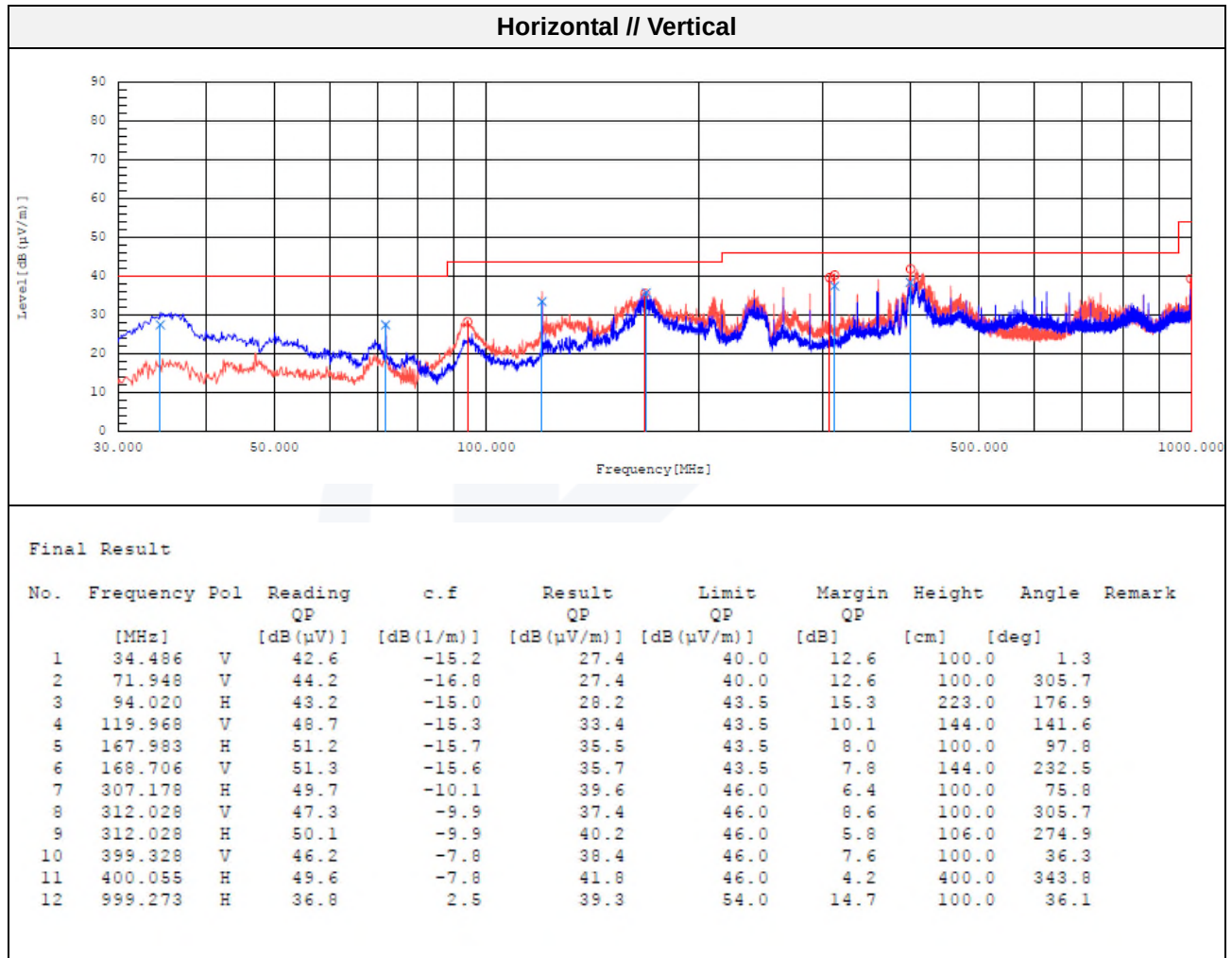
**Test results (Below 1 000 MHz)**

Band 802.11a (6 Mbps) (Worst Case)
Power: AC 120 V
Band: UNII-1
Distance of measurement: 3 meter
Channel 36 (Worst Case)



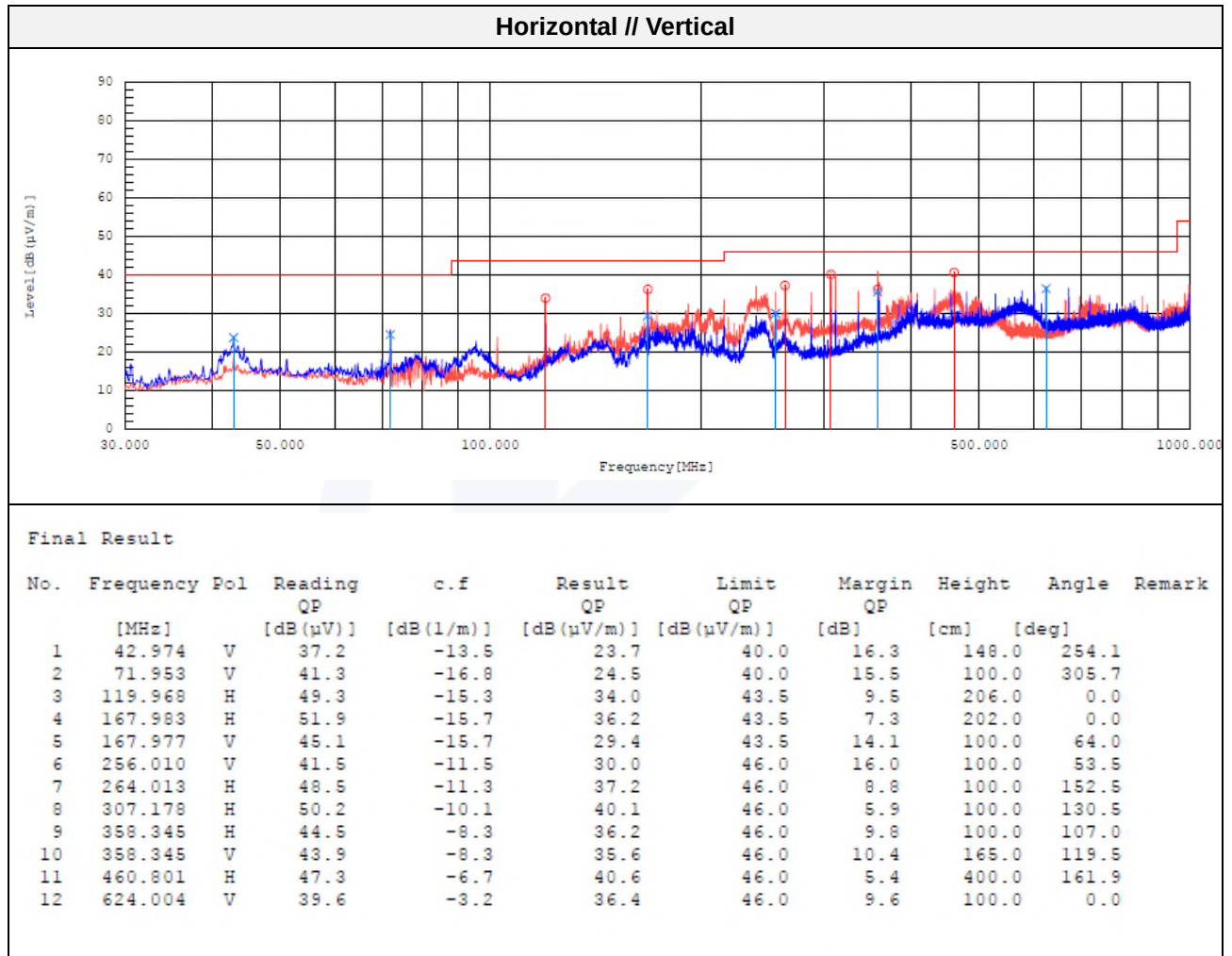


Band 802.11a (6 Mbps) (Worst Case)
Power: AC 120 V
Band: UNII-3
Distance of measurement: 3 meter
Channel 149 (Worst Case)



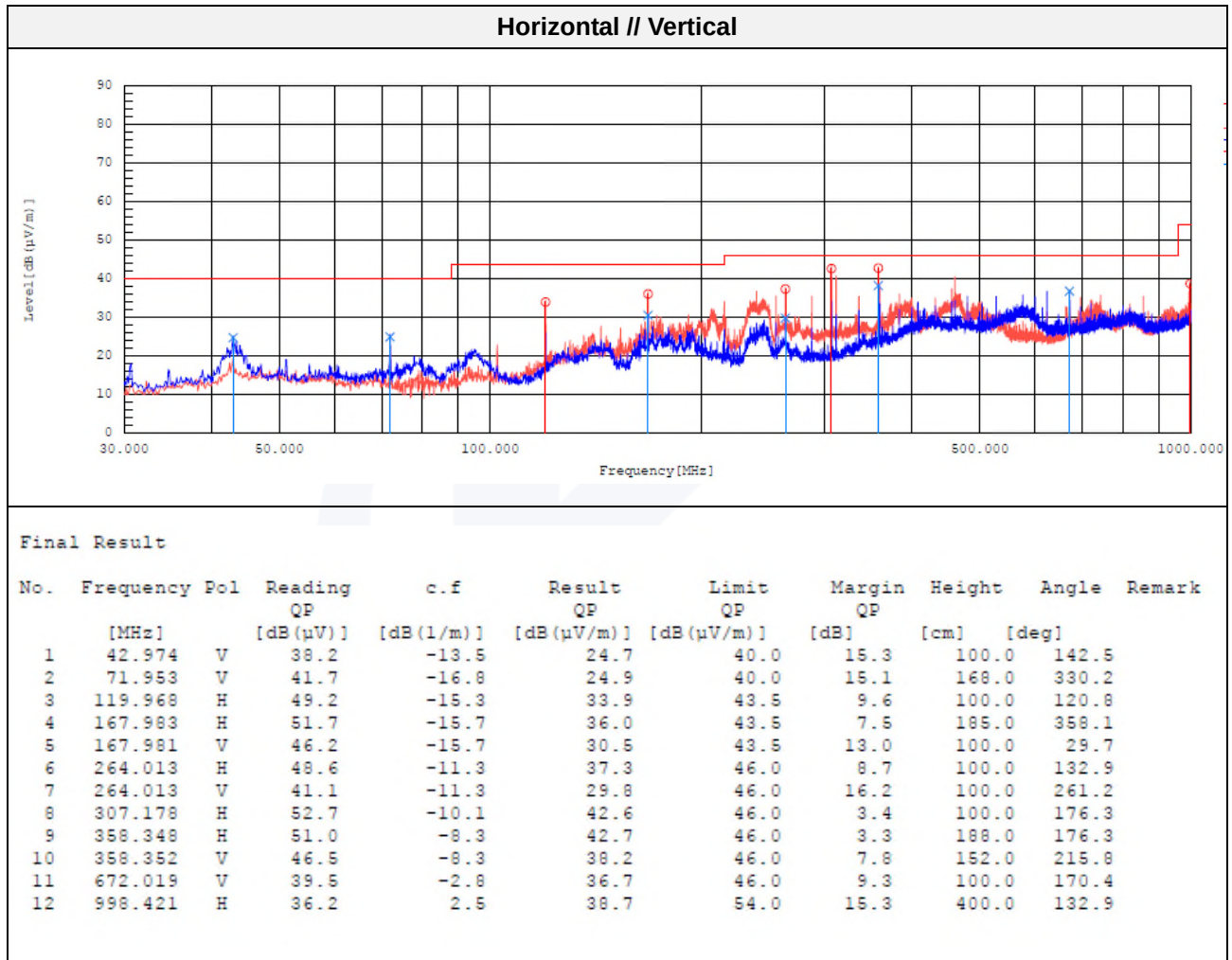


Band 802.11a (6 Mbps) (Worst Case)
Power: DC 11.1 V
Band: UNII-1
Distance of measurement: 3 meter
Channel 36 (Worst Case)





Band 802.11a (6 Mbps) (Worst Case)
Power: DC 11.1 V
Band: UNII-3
Distance of measurement: 3 meter
Channel 149 (Worst Case)



**Test results (Above 1 000 MHz)**

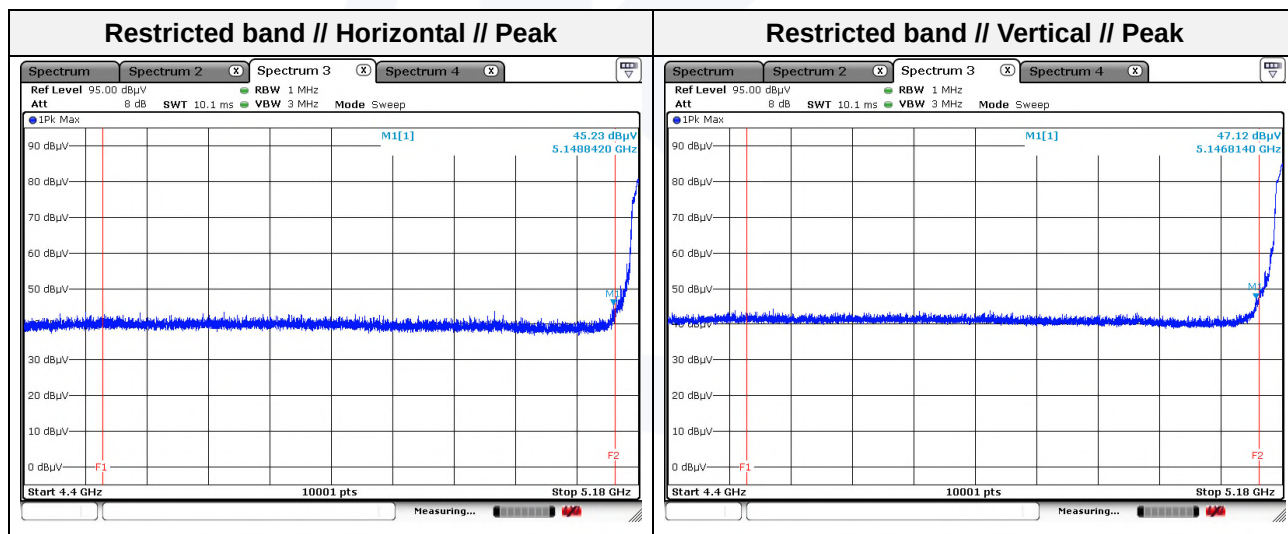
Mode:	802.11a (6 Mbps)
Power	AC 120 V
Band:	UNII-1
Distance of measurement:	3 meter
Channel:	36

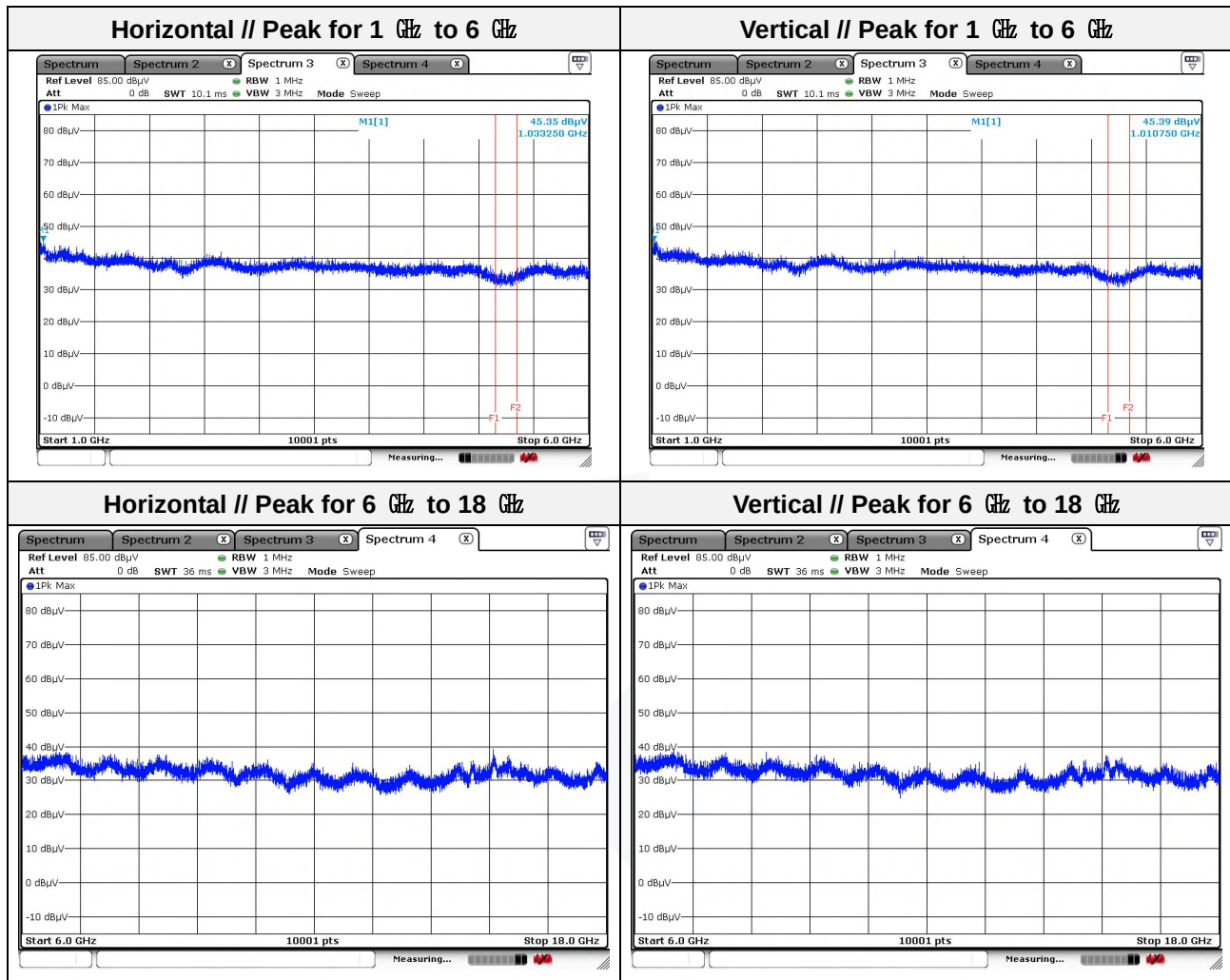
- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 010.75	45.39	Peak	V	-7.82	-	37.57	74.00	36.43
1 033.25	45.35	Peak	H	-7.70	-	37.65	74.00	36.35

- Band edge

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 146.81	47.12	Peak	V	6.47	-	53.59	74.00	20.41
5 148.84	45.23	Peak	H	6.48	-	51.71	74.00	22.29





Note.

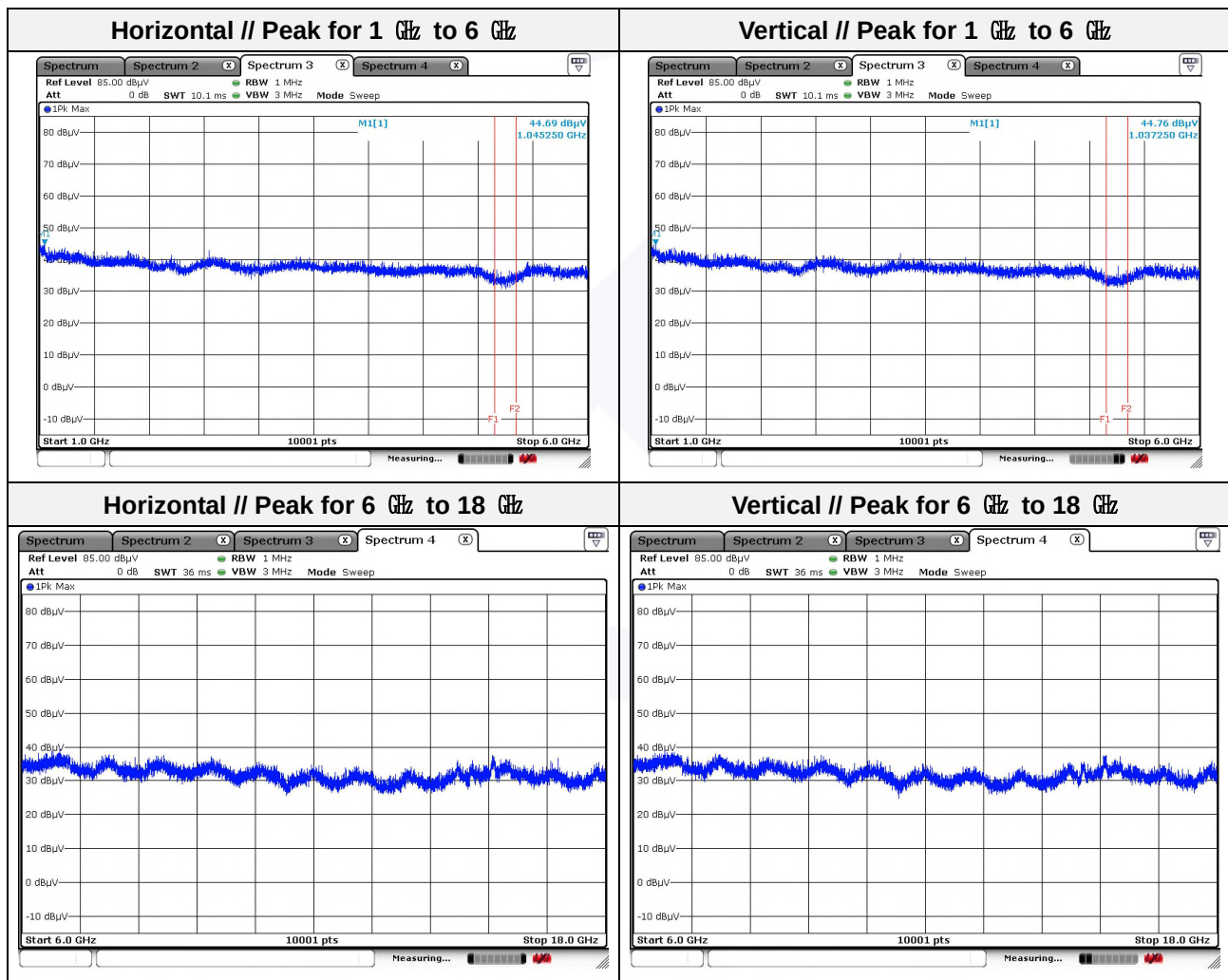
1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Mode: 802.11a (6 Mbps)
Power: AC 120 V
Band: UNII-1
Distance of measurement: 3 meter
Channel: 40

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 037.25	44.76	Peak	V	-7.68	-	37.08	74.00	36.92
1 045.25	44.69	Peak	H	-7.64	-	37.05	74.00	36.95

**Note.**

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



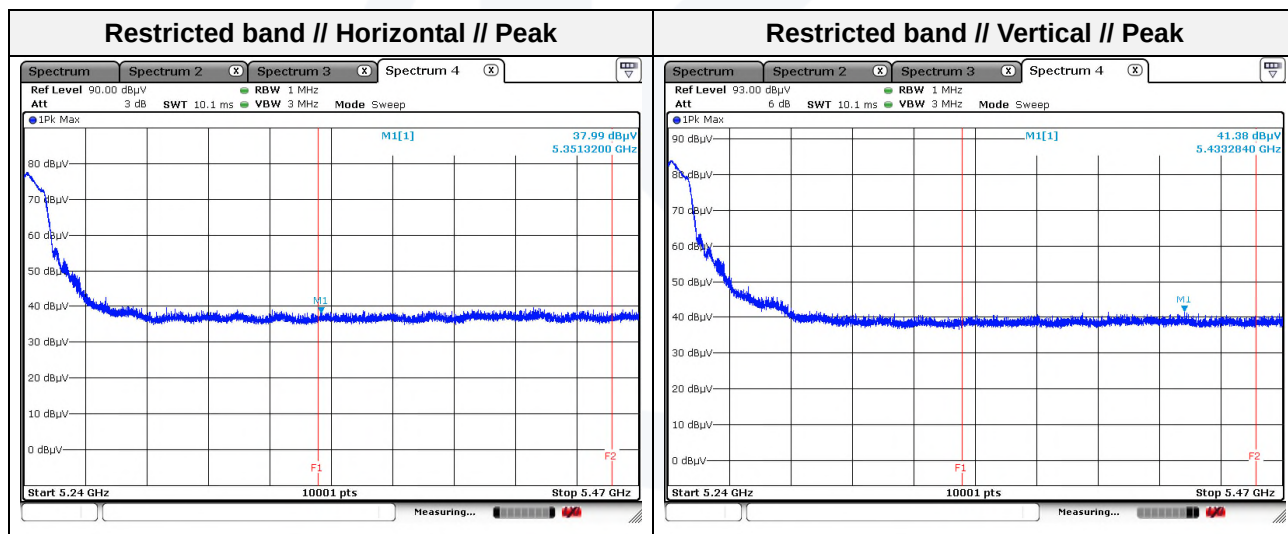
Mode:	802.11a (6 Mbps)
Power	AC 120 V
Band:	UNII-1
Distance of measurement:	3 meter
Channel:	48

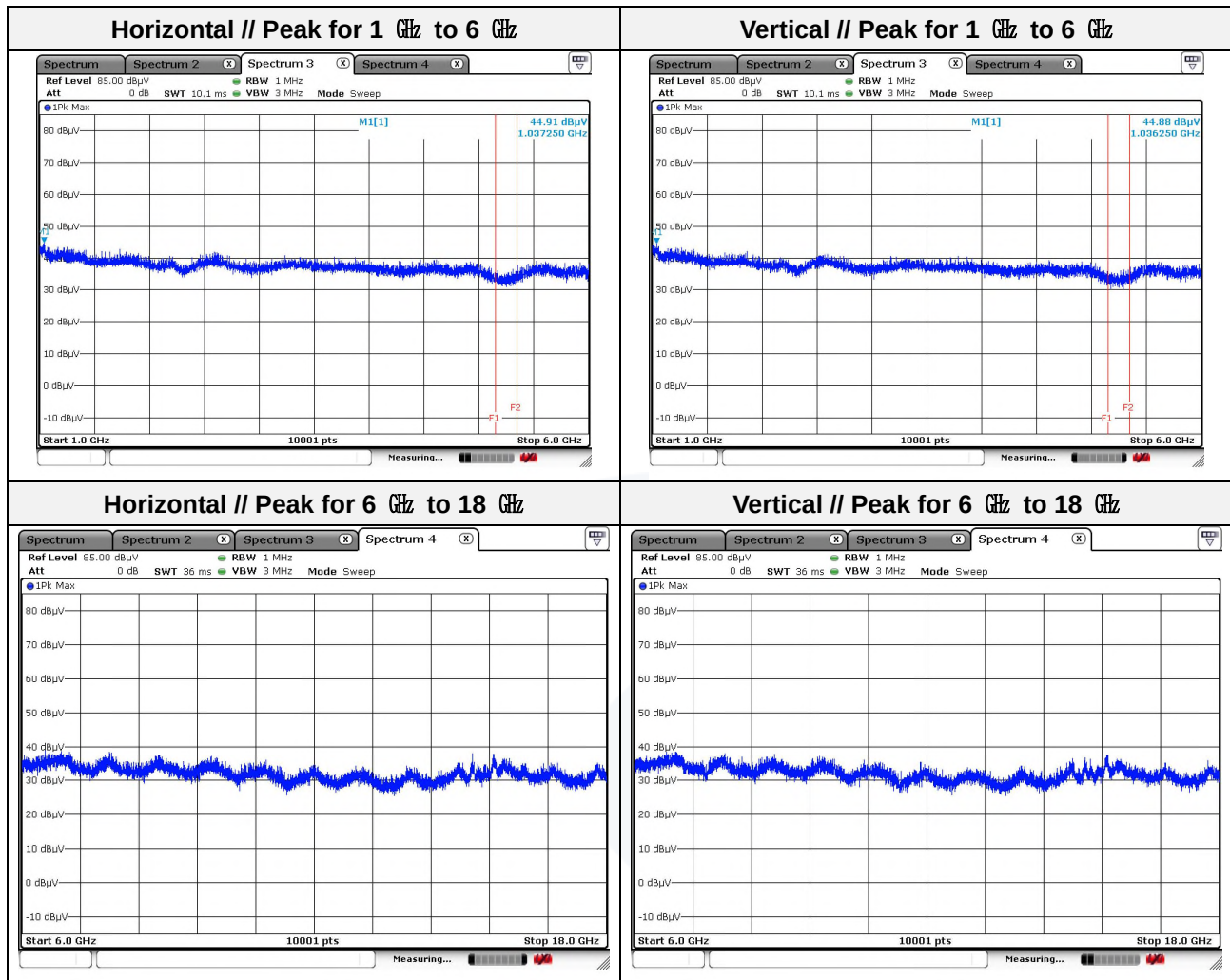
- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 036.25	44.88	Peak	V	-7.69	-	37.19	74.00	36.81
1 037.25	44.91	Peak	H	-7.68	-	37.23	74.00	36.77

- Band edge

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 351.32	37.99	Peak	H	6.51	-	44.50	74.00	29.50
5 433.28	41.38	Peak	V	6.50	-	47.88	74.00	26.12





Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



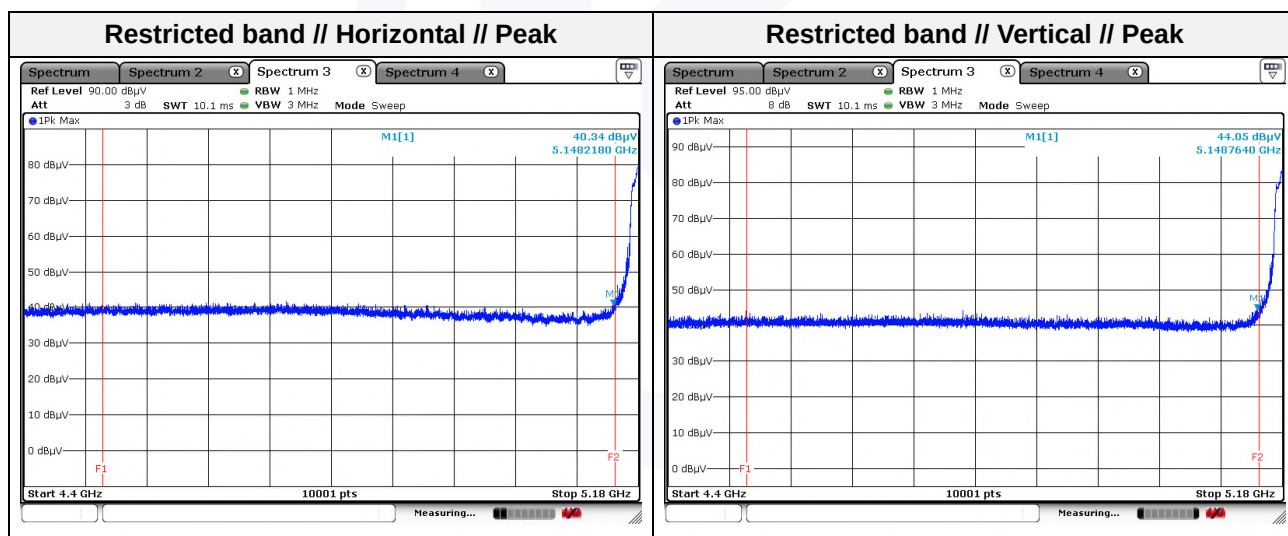
Mode:	802.11n_HT20 (MCS0)
Power	AC 120 V
Band:	UNII-1
Distance of measurement:	3 meter
Channel:	36

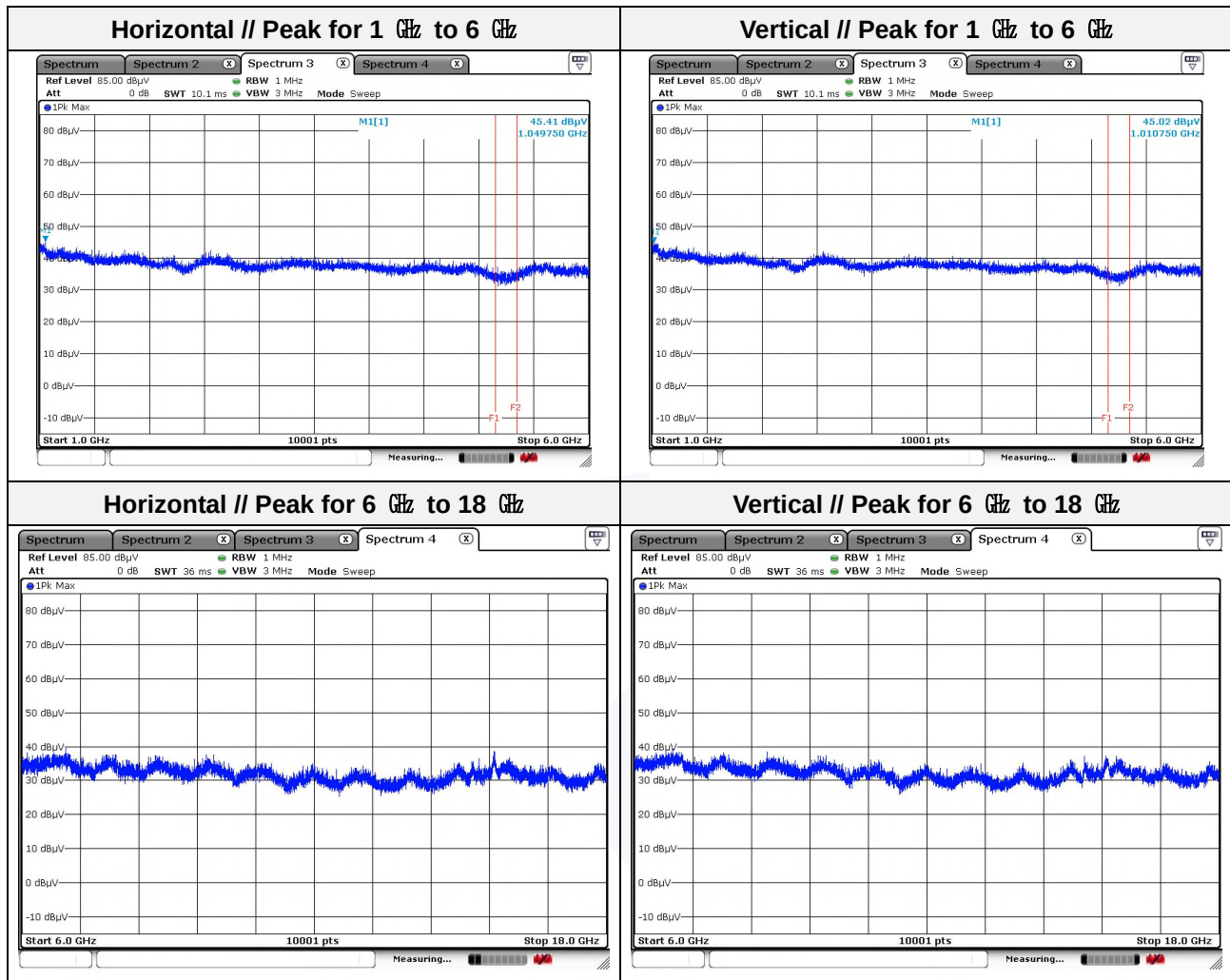
- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 010.75	45.02	Peak	V	-7.82	-	37.20	74.00	36.80
1 049.75	45.41	Peak	H	-7.62	-	37.79	74.00	36.21

- Band edge

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 148.22	40.34	Peak	H	6.48	-	46.82	74.00	27.18
5 148.76	44.05	Peak	V	6.48	-	50.53	74.00	23.47





Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.