

TEST REPORT

Part 15 Subpart E 15.407

Equipment under test SMARTCAM

Model name SNH-P6412BN

Derivative model SNH-C6410/SD

FCC ID NLMSNHP6412BN

Applicant Hanwha Techwin Co., Ltd.

Manufacturer Tianjin Samsung Techwin Opto-Electronic Co., Ltd.

Date of test(s) 2016.06.01 ~ 2016.12.13

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Issued to

Hanwha Techwin Co., Ltd.

1204, Changwon-daero, Seongsan-gu, Chang-won-si,
Gyeongsangnam-do, Korea

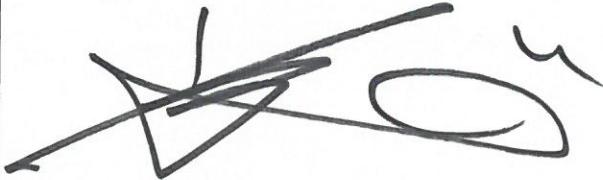
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KES-RF-16T0114-R2
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Revision history

Revision	Date of issue	Test report No.	Description
-	2016.12.07	KES-RF-16T0114	Initial
1	2016.12.13	KES-RF-16T0114-R1	Retest radiated emissions & AC conducted emissions And 99% occupied bandwidth
2	2016.12.14	KES-RF-16T0114-R2	Added output power and derivative model

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1. General information

Applicant: Hanwha Techwin Co., Ltd.
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473-21, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea
FCC rule part(s): 15.407
FCC ID: NLMSNHP6412BN
Test device serial No.: Production Pre-production Engineering

1.1. EUT description

Equipment under test HOME CAMERA
Frequency range 2 412 MHz ~ 2 462 MHz(802.11b/g/n_HT20)
5 745 MHz ~ 5 825 MHz(802.11a/n_HT20),
5 755 MHz ~ 5 795 MHz(802.11n_HT40)
5 180 MHz ~ 5 240 MHz(802.11a/n_HT20),
5 190 MHz ~ 5 230 MHz(802.11n_HT40)
5 260 MHz ~ 5 320 MHz(802.11a/n_HT20),
5 270 MHz ~ 5 310 MHz(802.11n_HT40)
5 500 MHz ~ 5 700 MHz(802.11a/n_HT20),
5 510 MHz ~ 5 670 MHz(802.11n_HT40)
Model: SNH-P6412BN
Derivative model SNH-C6410/SD
Modulation technique DSSS, OFDM
Number of channels 2 412 MHz ~ 2 462 MHz(802.11 b/g/n_HT20) : 11ch
5 745 MHz ~ 5 825 MHz(802.11a/n_HT20) : 5ch
5 755 MHz ~ 5 795 MHz(802.11n_HT40) : 2ch
5 180 MHz ~ 5 240 MHz(802.11a/n_HT20) : 4ch
5 190 MHz ~ 5 230 MHz(802.11n_HT40) : 2ch
5 260 MHz ~ 5 320 MHz(802.11a/n_HT20) : 4ch
5 270 MHz ~ 5 310 MHz(802.11n_HT40) : 2ch
5 500 MHz ~ 5 700 MHz(802.11a/n_HT20) : 11ch
5 510 MHz ~ 5 670 MHz(802.11n_HT40) : 5ch
Antenna specification Antenna type: PIFA Antenna
Power source AC 120V Adapter (Output : DC 5V / 2 A)



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Note:

1. Certificated module is mounted in the EUT as following
 - Applicant: Hanwha Techwin Co., Ltd.
 - Contains FCC ID : NLMSWLQ93T
 - Model: SWL-Q93T
2. The installed module is completed identical as original.
3. The output power documented in module report is same as this filing, the only difference is the power reported in module report is in term of peak power and this report is based on average power.

1.2. Test configuration

The **Hanwha Techwin Co., Ltd. FCC ID: NLMSNHP6412BN** was tested per the guidance of KDB 789033 D02 v01r03 and KDB 662911 D01 v02r01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

1.3. Device modifications

N/A

1.4. Derivation model information

The circuit diagram and software of the basic model and derivative are fundamentally the same.
It is for model management purpose.

1.5. Frequency/channel operations

Band1

Ch.	Frequency (MHz)	Mode
36	5 180	11a/n_HT20
.	.	.
44	5 220	11a/n_HT20
.	.	.
48	5240	11a/n_HT20

Ch.	Frequency (MHz)	Mode
38	5 190	11n_HT40
.	.	.
46	5 230	11n_HT40

Band2A

Ch.	Frequency (MHz)	Mode
52	5 260	11a/n_HT20
.	.	.
60	5 300	11a/n_HT20
.	.	.
64	5 320	11a/n_HT20

Ch.	Frequency (MHz)	Mode
54	5 270	11n_HT40
.	.	.
62	5 310	11n_HT40

Band2C

Ch.	Frequency (MHz)	Mode
100	5 500	11a/n_HT20
.	.	.
116	5 580	11a/n_HT20
.	.	.
140	5 700	11a/n_HT20

Ch.	Frequency (MHz)	Mode
102	5 510	11n_HT40
.	.	.
110	5 550	11n_HT40
.	.	.
134	5 670	11n_HT40

Band3

Ch.	Frequency (MHz)	Mode
149	5 745	11a/n_HT20
.	.	.
157	5 785	11a/n_HT20
.	.	.
165	5 825	11a/n_HT20

Ch.	Frequency (MHz)	Mode
151	5 755	11n_HT40
.	.	.
159	5 795	11n_HT40

1.6. Worst case data rate

1. Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.
2. Worst-case data rates were:

UNII-1	a : <u>6 Mbps</u> , n_HT20/40: <u>MCS0</u> (SISO), <u>MCS8</u> (MIMO)
UNII-2A	a : <u>6 Mbps</u> , n_HT20/40: <u>MCS0</u> (SISO), <u>MCS8</u> (MIMO)
UNII-2C	a : <u>6 Mbps</u> , n_HT20/40: <u>MCS0</u> (SISO), <u>MCS8</u> (MIMO)
UNII-3	a : <u>6 Mbps</u> , n_HT20/40: <u>MCS0</u> (SISO), <u>MCS8</u> (MIMO)

1.7. Using antenna information

Mode		Bandwidth (MHz)	Antenna 0	Antenna 1	Antenna 0+1
a	UNII-1	20	✓	✓	✗
	UNII-2A				
	UNII-2C				
	UNII-3				
an	UNII-1	20/40	✓	✓	✓
	UNII-2A				
	UNII-2C				
	UNII-3				

	Antenna 0 gain(dBi)	Antenna 1 gain(dBi)	Total gain(dBi) ^{Note1}
For 5.2 GHz	2.378	1.152	4.80
For 5.3 GHz	0.974	-0.330	3.36
For 5.5 GHz	2.023	-0.920	3.69
For 5.8 GHz	1.164	-1.010	3.16

Note.

1. Ant Gain = $10\log[(10^{G1/20}+10^{G2/20}+\dots+10^{GN/20})^2/N_{ANT}]$



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2. Summary of tests

Reference	Parameter	Test results
15.407(a)	99 % Occupied Bandwidth	Pass
15.407(a)	Maximum conducted output power	Pass
15.205 15.209	Radiated spurious emission	Pass
15.207	AC conducted emissions	Pass

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3. Test results

3.1. 99% Occupied Bandwidth

Test procedure

KDB 789033 D02 v01r03- Section D

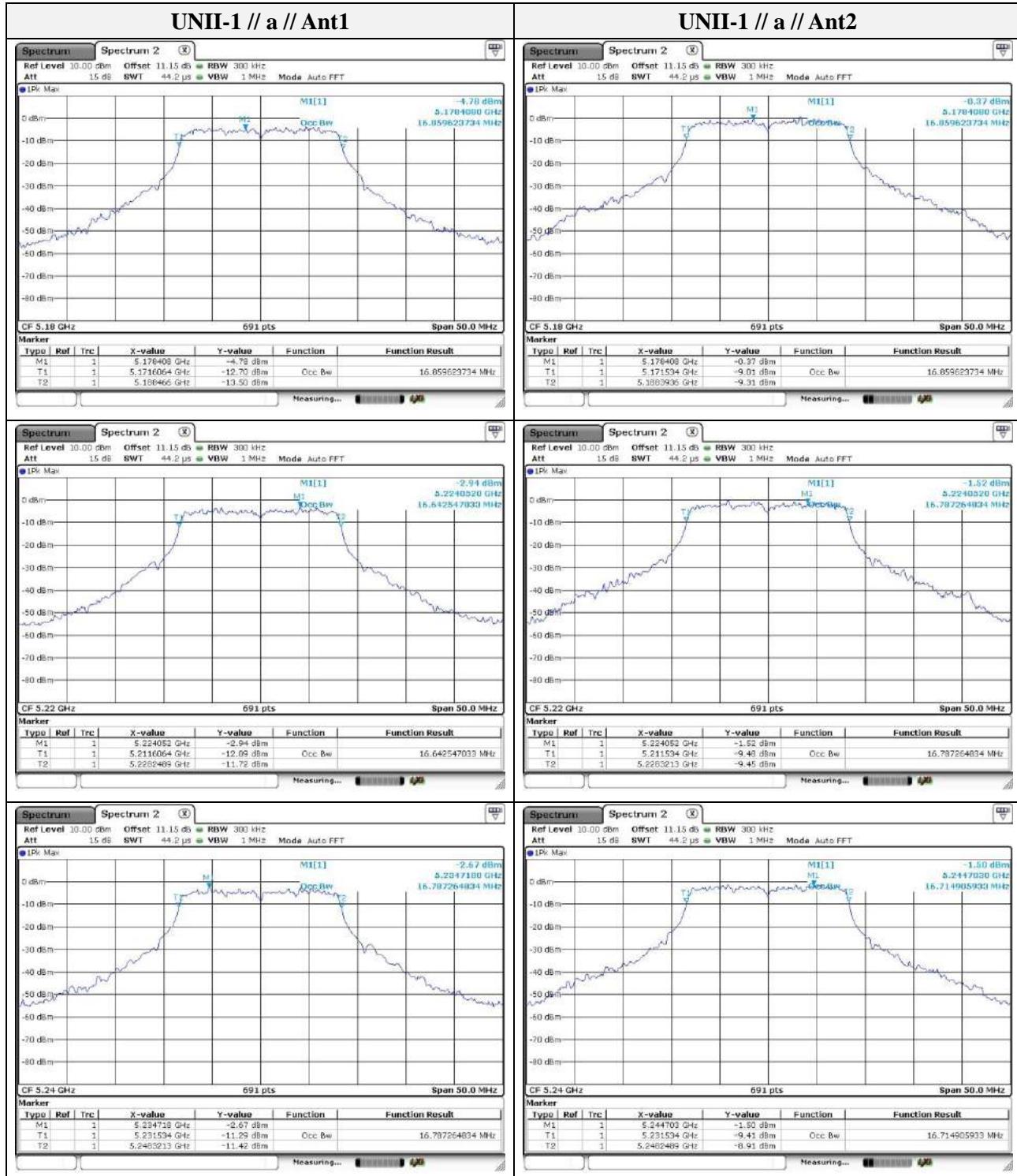
1. Set span = 1.5 times to 5.0 times the OBW.
2. Set RBW = 1% to 5% of the OBW
3. Set the VBW $> 3 \times$ RBW.
4. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak bandwidth function of the instrument (if available).
5. Use the 99% power bandwidth function of the instrument (if available).
6. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

In the result,

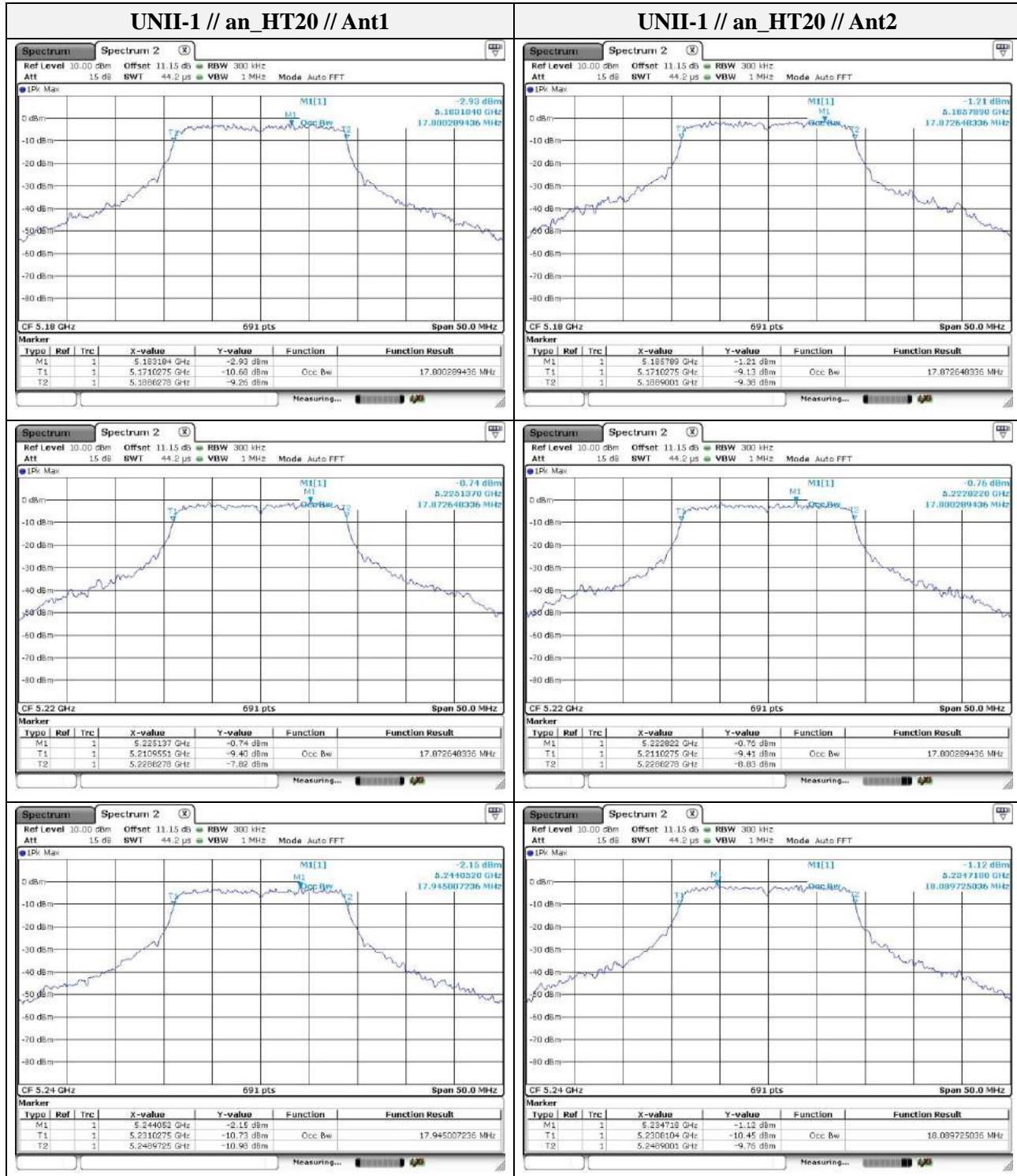
- DFS requirements are not applicable in the 5 150 MHz ~ 5 250 MHz.

Test results

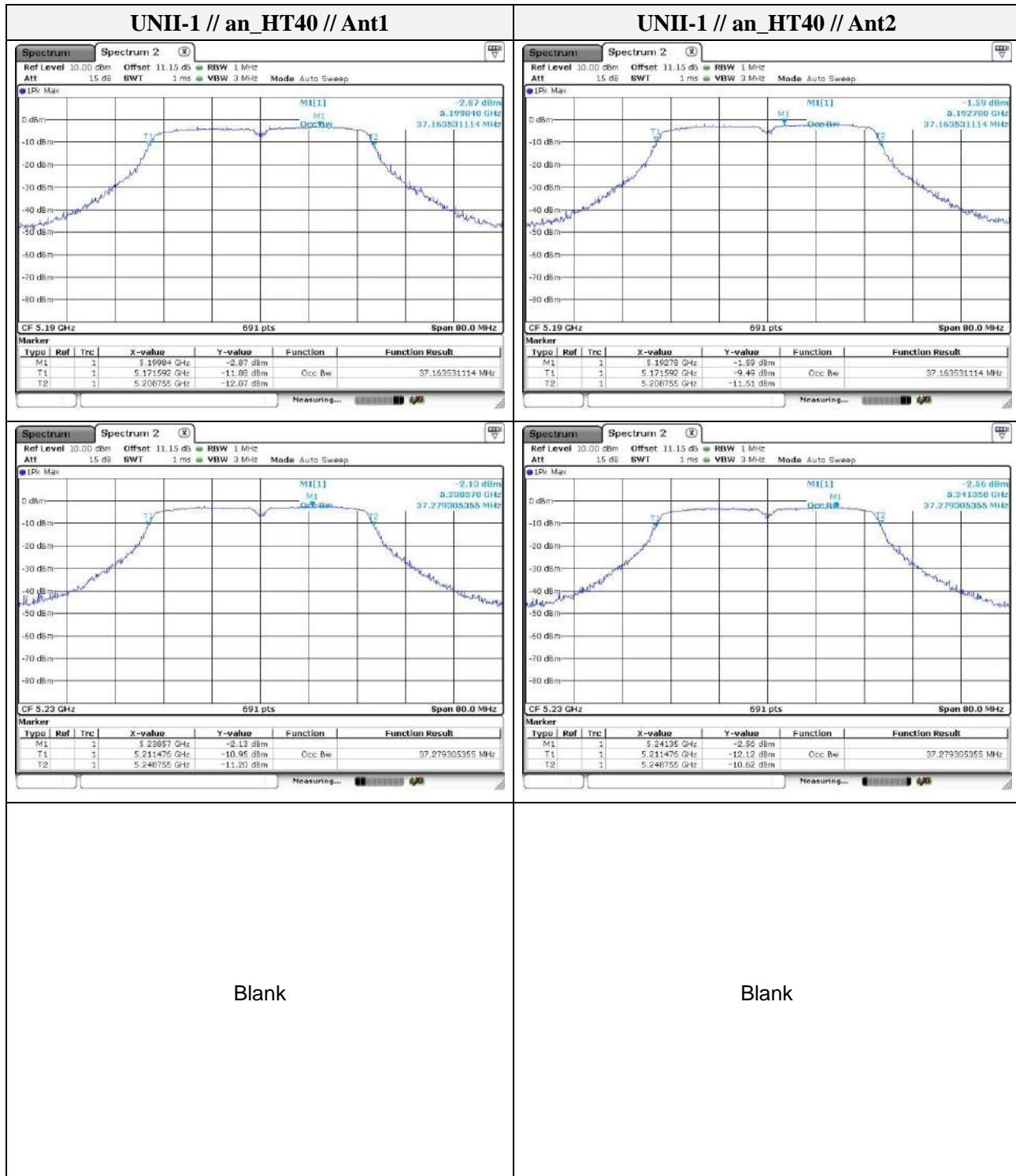
Band	Frequency(MHz)	Mode	99 % bandwidth(MHz)	
			Ant1	Ant2
UNII-1	5 180	a	16.86	16.86
	5 220		16.64	16.79
	5 240		16.79	16.71
	5 180	HT20	17.80	17.87
	5 220		17.87	17.80
	5 240		17.95	18.09
	5 190	HT40	37.16	37.16
	5 230		37.28	37.28
UNII-2A	5 260	a	16.86	16.79
	5 300		16.79	16.86
	5 320		16.86	16.79
	5 260	HT20	17.87	17.80
	5 300		17.87	17.87
	5 320		17.80	17.95
	5 270	HT40	37.28	37.40
	5 310		37.16	37.40



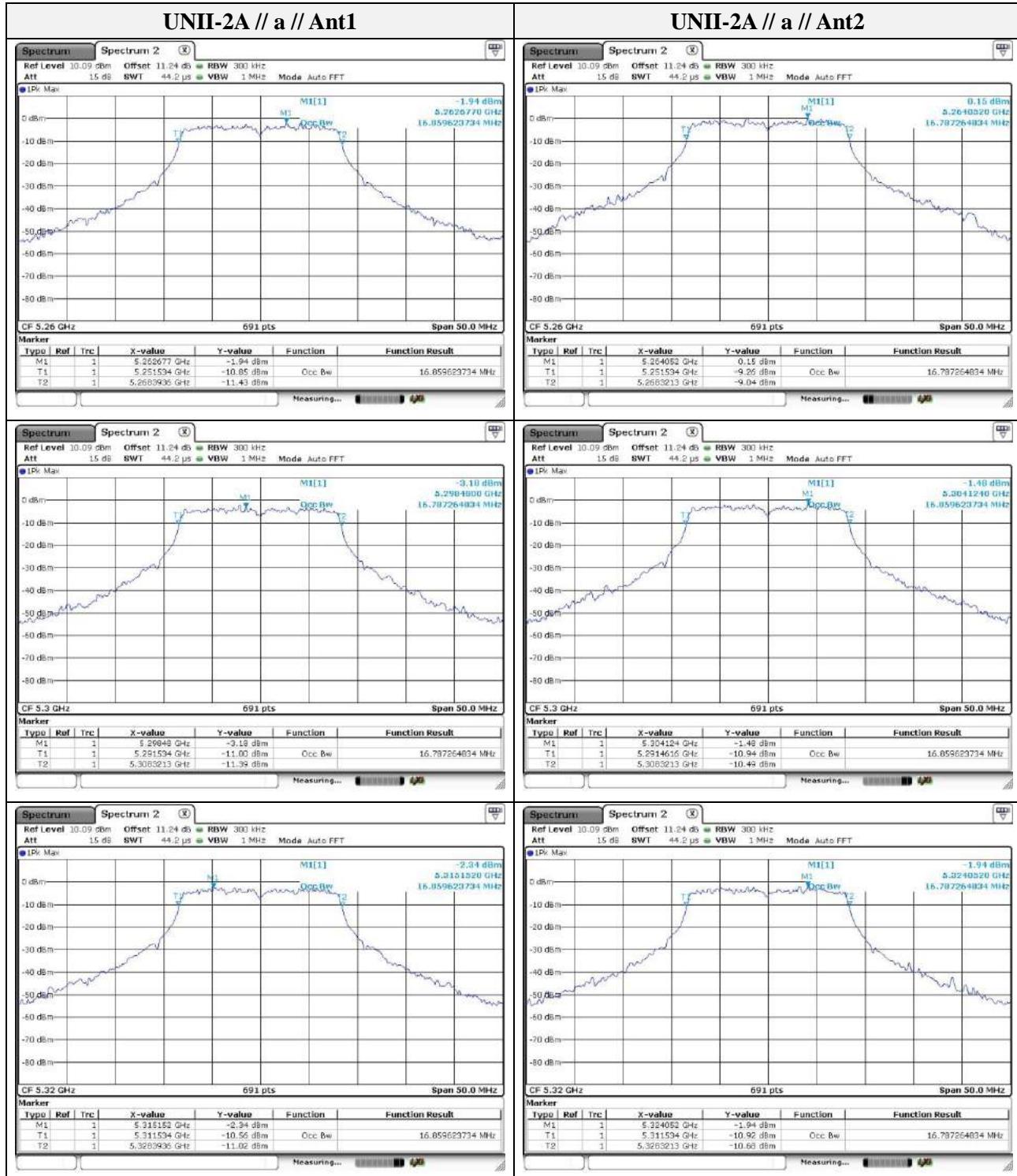
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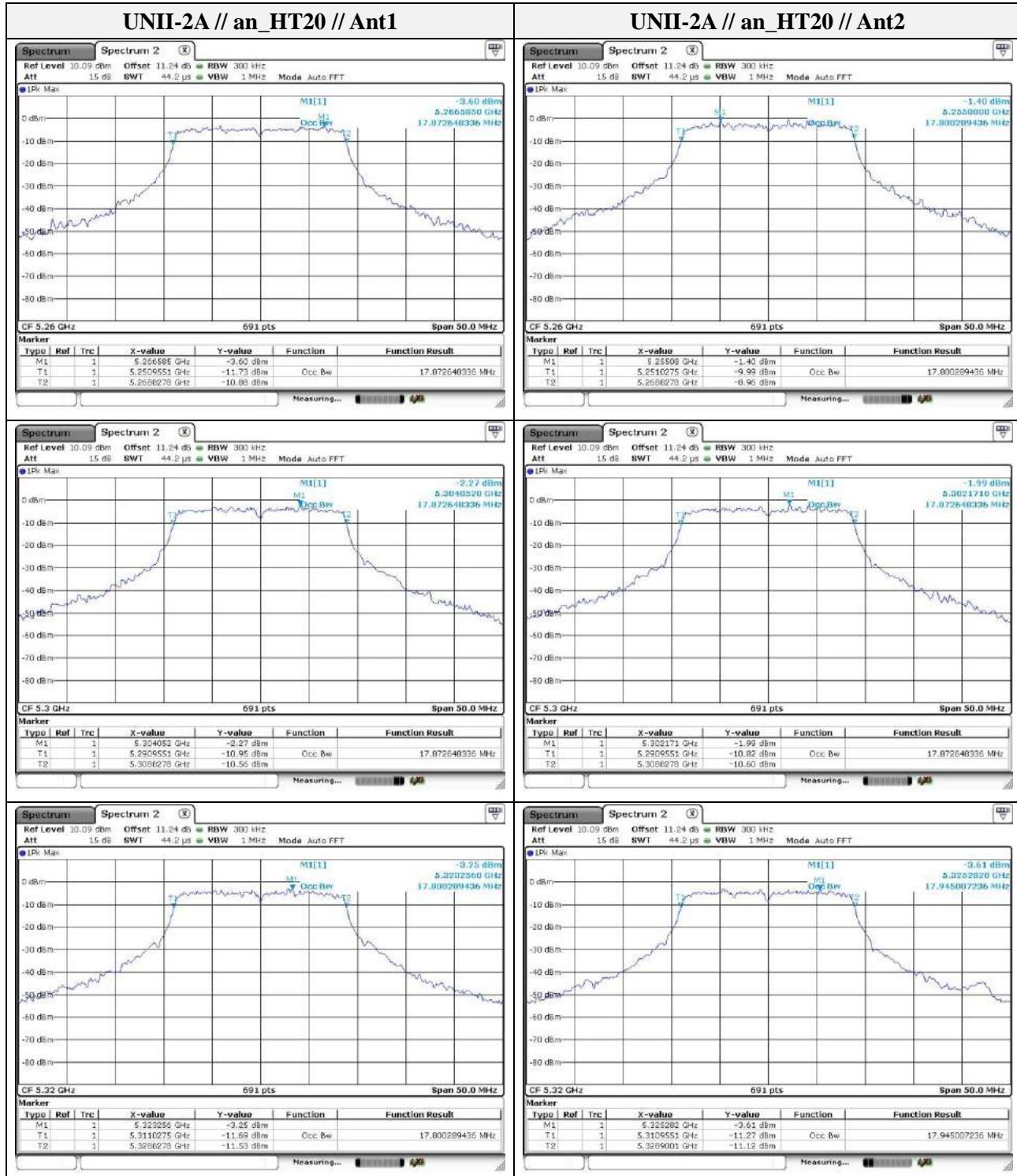
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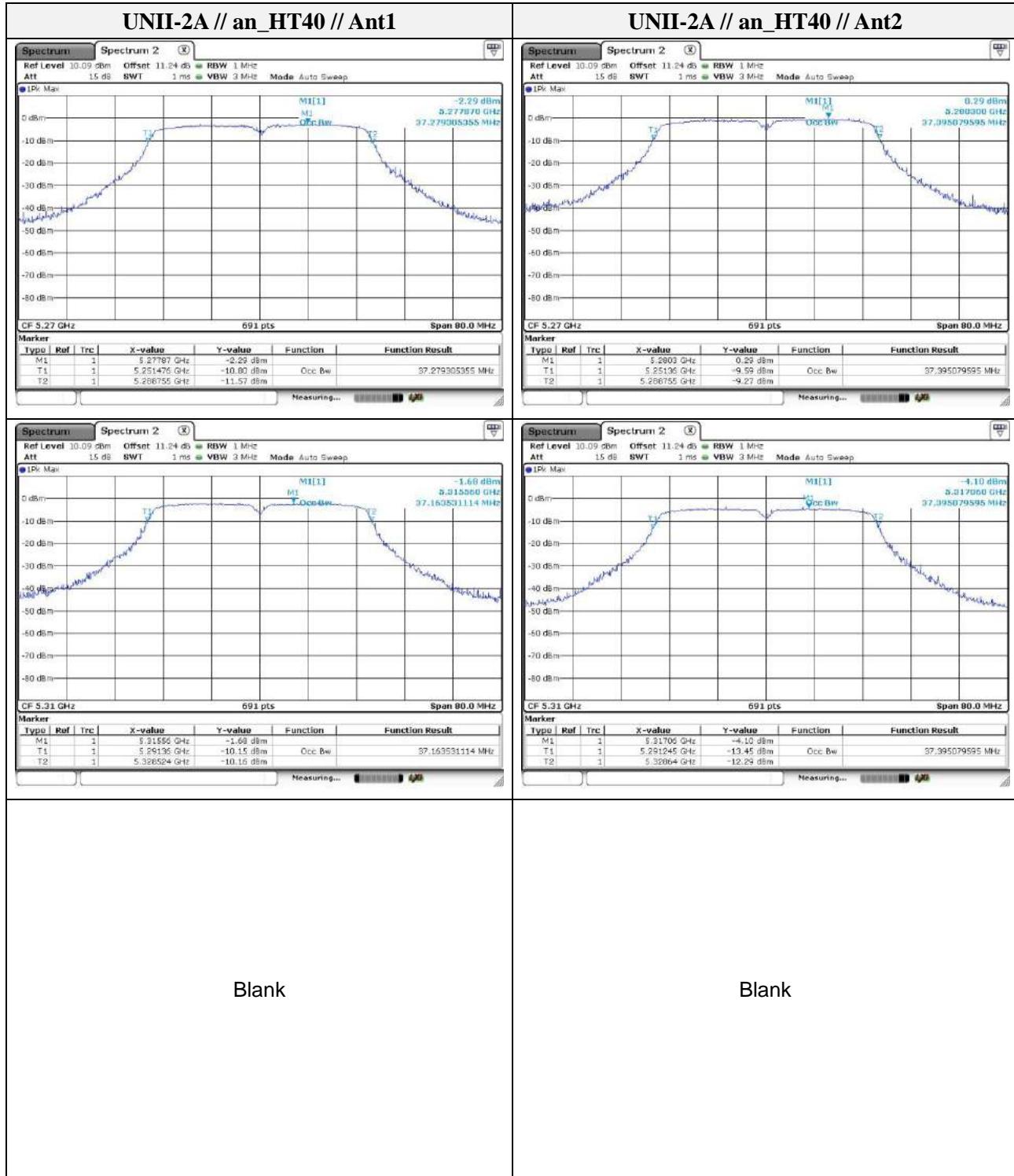
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3.2. Maximum conducted output power

Test procedure

KDB 789033 D02 v01r03– Section E.3.a) or b)

Method PM (Measurement using an RF average power meter):

- i. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.
 - The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
 - At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
 - The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
- ii. If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B.
- iii. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- iv. Adjust the measurement in dBm by adding $10 \log (1/x)$ where x is the duty cycle (e.g., $10 \log (1/0.25)$ if the duty cycle is 25 %).

Method PM-G (Measurement using a gated RF average power meter):

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Limit

Band	EUT Category		Limit
UNII-1		Outdoor access point	1 W (30 dBm)
		Indoor access point	
		Fixed point-to-point access point	
	✓	Mobile and portable client device	250 mW(24 dBm)
UnII-2A	✓		250 mW or 11 dBm + 10logB*
UNII-2C	✓		250 mW or 11 dBm + 10logB*
UNII-3	✓		1 W (30 dBm)

Test results

Band	mode	Frequency (MHz)	Detector mode	DCF Note1	Output power(dBm)			Limit (dBm)
					Ant 1	Ant 2	Ant 1+2	
UNII-1	a	5 180	AV	-	8.13	10.34	-	24.00
		5 220			7.95	10.01	-	
		5 240			8.33	9.75	-	
	an20	5 180		-	8.74	9.89	12.36	
		5 220			9.66	9.59	12.64	
		5 240			8.53	9.91	12.28	
	an40	5 190		-	8.46	9.82	12.20	
		5 230			9.05	8.59	11.84	
UNII-2A	a	5 260	AV	-	8.50	9.85	-	24.00
		5 300			8.43	8.90	-	
		5 320			8.92	8.73	-	
	an20	5 260		-	8.11	9.45	11.84	
		5 300			8.61	8.55	11.59	
		5 320			8.41	8.40	11.41	
	an40	5 270		-	8.20	8.58	11.41	
		5 310			8.86	7.76	11.35	
UNII-2C	a	5 500	AV	-	9.69	6.32	-	24.00
		5 580			9.38	8.87	-	
		5 700			9.84	9.17	-	
	an20	5 500		-	8.35	6.16	10.40	
		5 580			8.43	7.41	10.96	
		5 700			9.10	8.67	11.90	
	an40	5 510		-	6.39	6.97	9.70	
		5 550			6.10	8.52	10.48	
		5 670			5.14	8.35	10.05	
UNII-3	a	5 745	AV	-	5.35	8.44	-	30.00
		5 785			5.45	7.92	-	
		5 825			5.38	7.83	-	
	an20	5 745		-	4.45	8.88	10.22	
		5 785			4.55	7.82	9.49	
		5 825			4.49	8.13	9.69	
	an40	5 755		-	5.43	8.35	10.14	
		5 795			5.60	8.80	10.50	

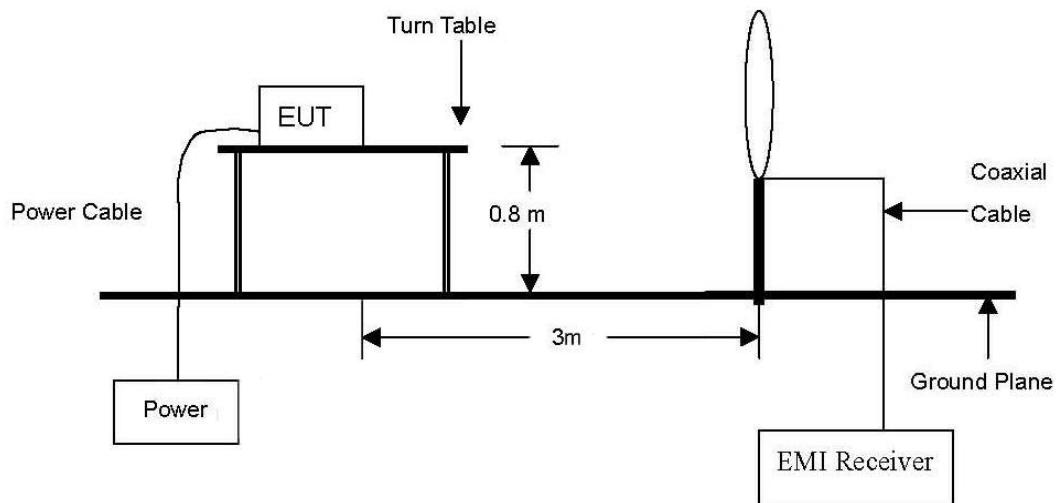
Note.

1. Refer to the page 24 on this report.

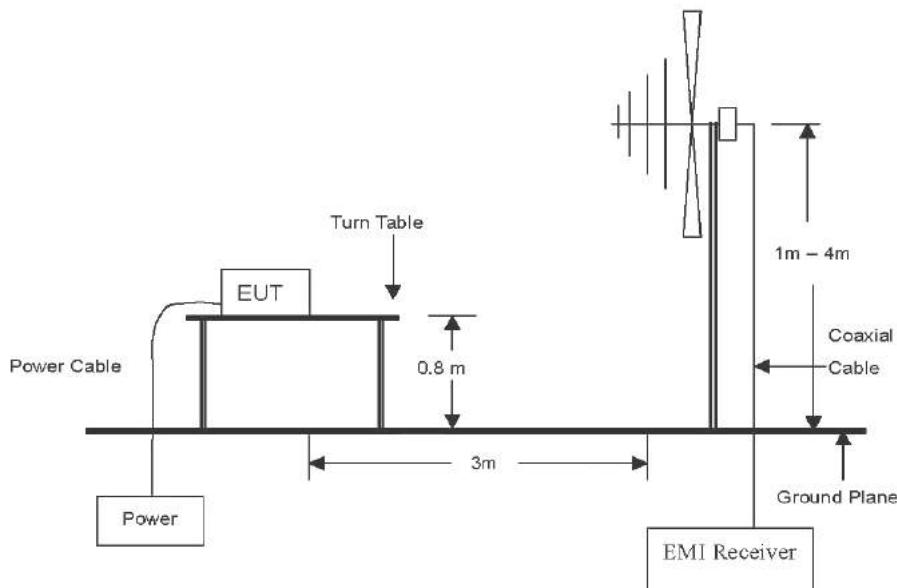
3.3. Radiated restricted band and emissions

Test setup

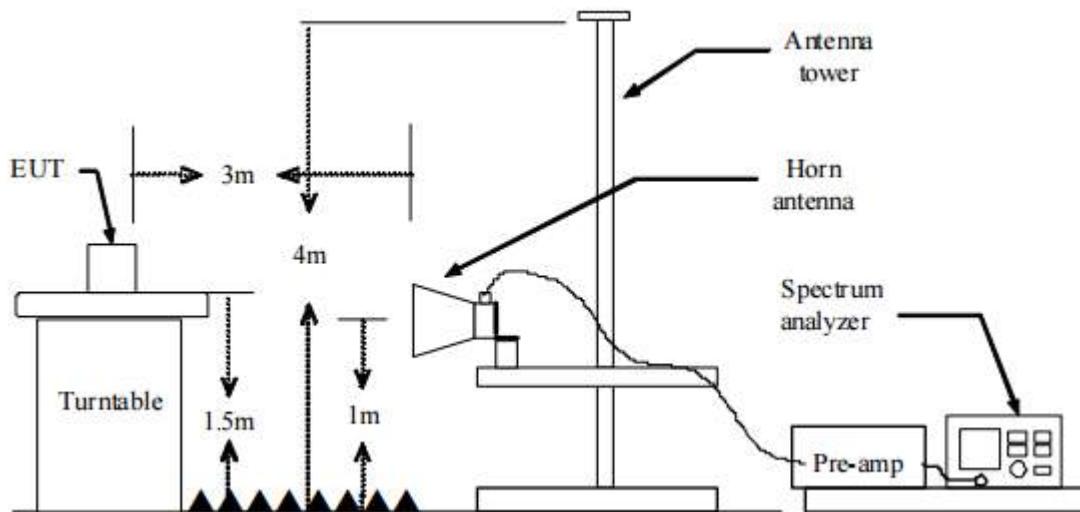
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.



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 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 and perpendicular 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 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. Spectrum analyzer settings for $f < 1$ GHz:
 ①Span = wide enough to fully capture the emission being measured
 ②RBW = 100 kHz
 ③VBW \geq RBW
 ④Detector = quasi peak
 ⑤Sweep time = auto
 ⑥Trace = max hold
2. Spectrum analyzer settings for $f \geq 1$ GHz: Peak
 ①Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
 ②RBW = 1 MHz
 ③VBW \geq 3 MHz
 ④Detector = peak
 ⑤Sweep time = auto
 ⑥Trace = max hold
 ⑦Trace was allowed to stabilize

3. 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 $\text{RBW} = 1$ MHz
- ③ $\text{VBW} \geq 3 \times \text{RBW}$
- 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
3. CF(Correction factors(dB)) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d (dB)
4. Field strength(dB μ V/m) = Level(dB μ V) + CF (dB) + or DCF(dB)
5. Margin(dB) = Limit(dB μ V/m) - Field strength(dB μ V/m)
6. 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.
7. 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.
8. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.



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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 N/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.

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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.

Duty cycle

Regarding to KDB 558074 D01_v03r05, 6.0, 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 $> 50/T$ and the number of sweep points across duration T exceeds 100.

For the band 5.15-5.25 GHz

Test mode	T _{on} time (ms)	Period (ms)	Duty cycle (Linear)	Duty cycle (%)	Duty cycle correction factor (dB)
802.11a	10.00	10.00	1	100	0
802.11an_HT20	10.00	10.00	1	100	0
802.11an_HT40	10.00	10.00	1	100	0

For the band 5.250-5.350 GHz

Test mode	T _{on} time (ms)	Period (ms)	Duty cycle (Linear)	Duty cycle (%)	Duty cycle correction factor (dB)
802.11a	10.00	10.00	1	100	0
802.11an_HT20	10.00	10.00	1	100	0
802.11an_HT40	10.00	10.00	1	100	0

For the band 5.470-5.725 GHz

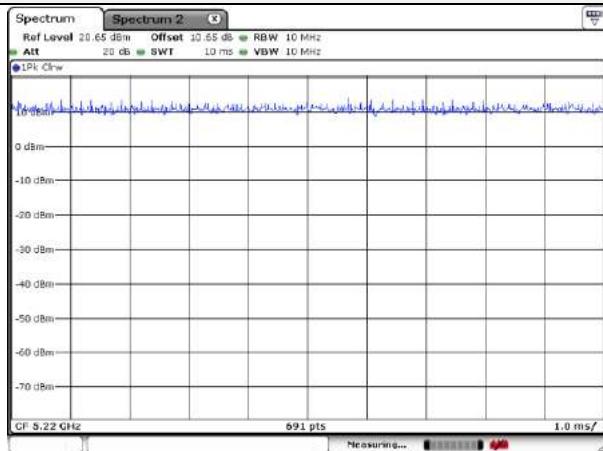
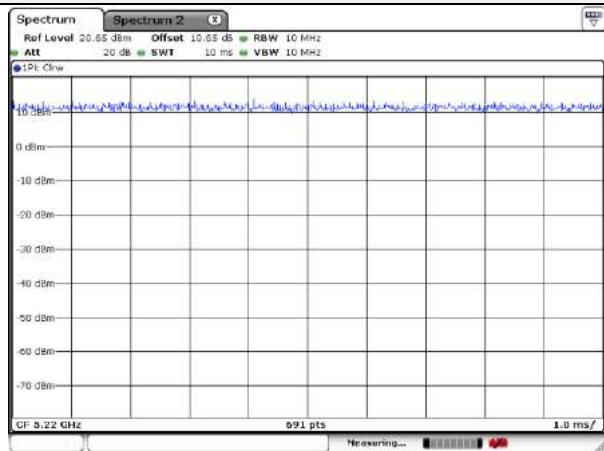
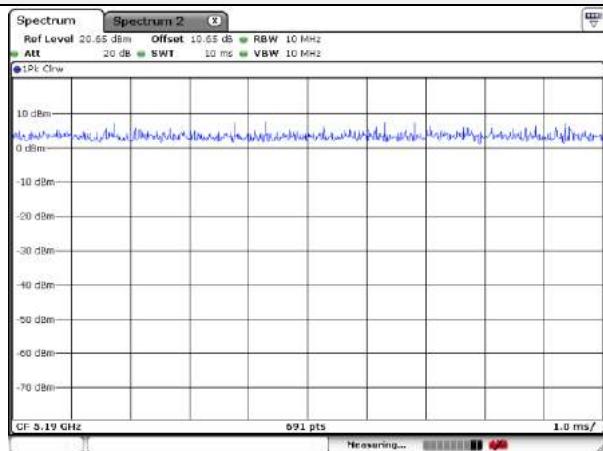
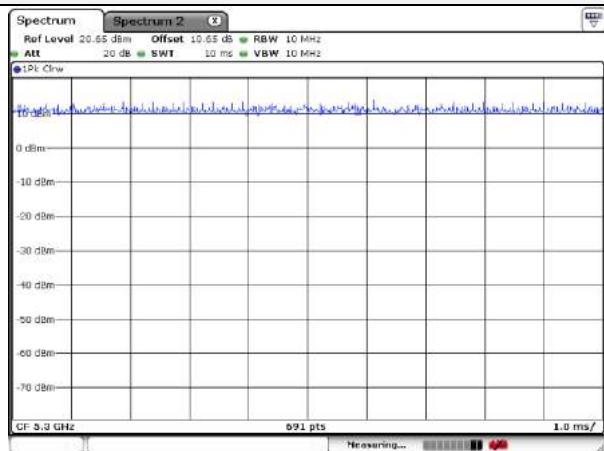
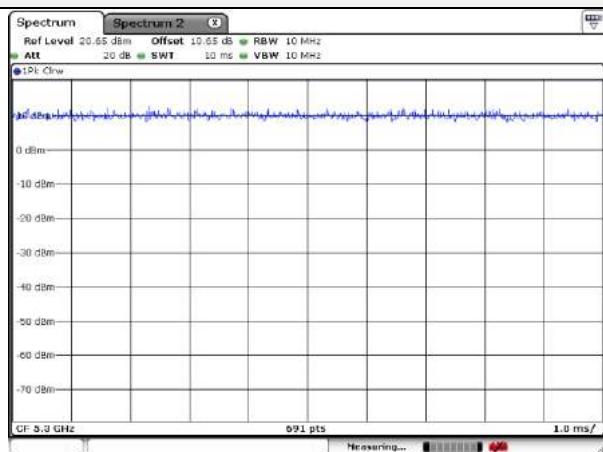
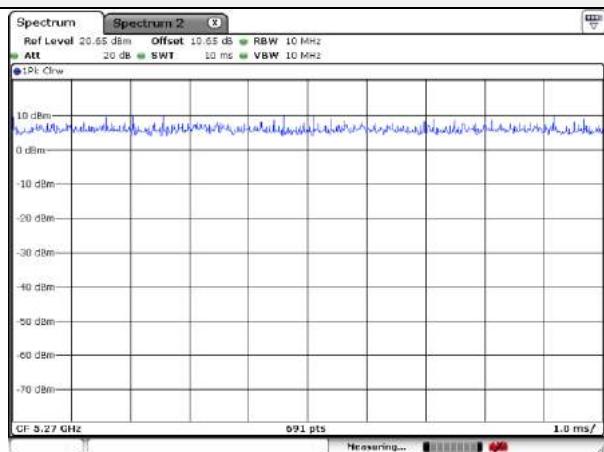
Test mode	T _{on} time (ms)	Period (ms)	Duty cycle (Linear)	Duty cycle (%)	Duty cycle correction factor (dB)
802.11a	10.00	10.00	1	100	0
802.11an_HT20	10.00	10.00	1	100	0
802.11an_HT40	10.00	10.00	1	100	0

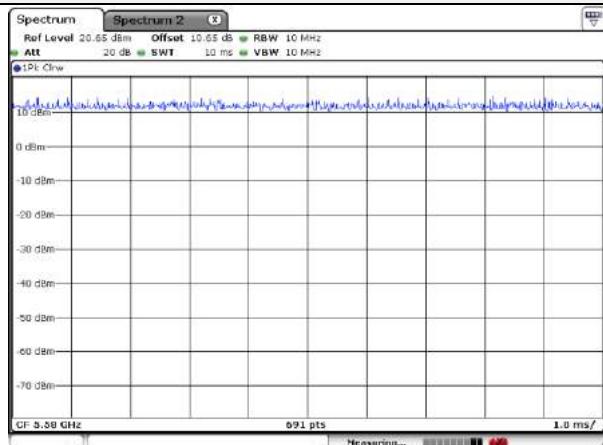
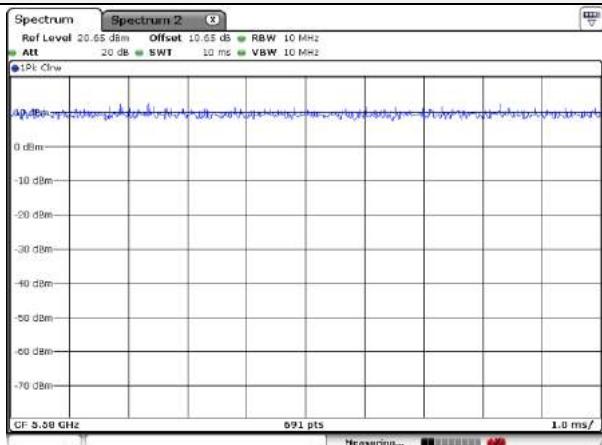
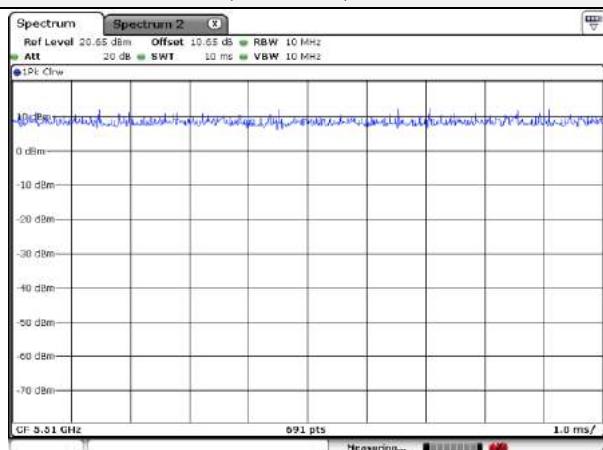
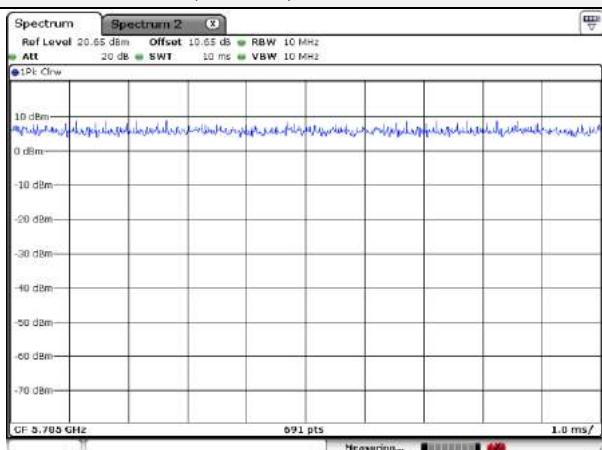
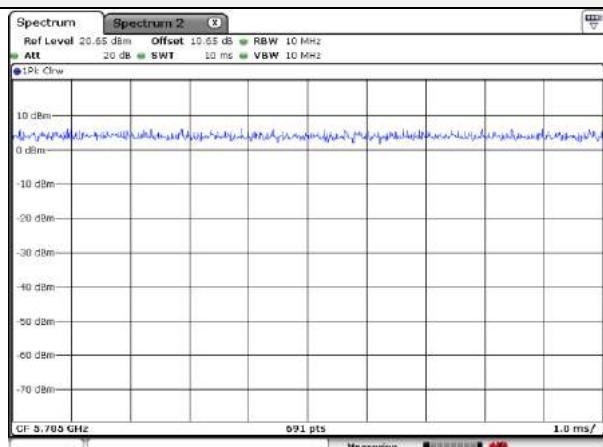
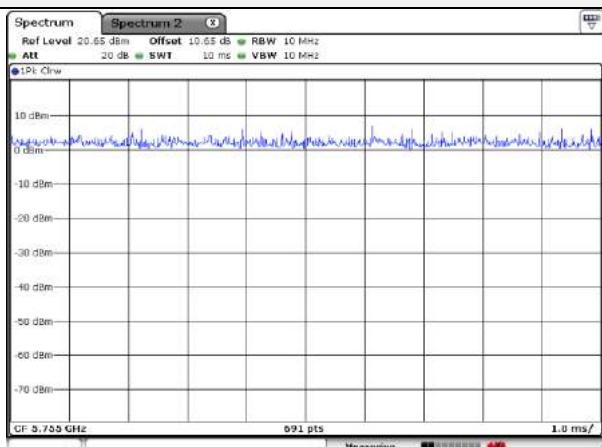
For the band 5.725-5.85 GHz

Test mode	T _{on} time (ms)	Period (ms)	Duty cycle (Linear)	Duty cycle (%)	Duty cycle correction factor (dB)
802.11a	10.00	10.00	1	100	0
802.11an_HT20	10.00	10.00	1	100	0
802.11an_HT40	10.00	10.00	1	100	0

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

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

802.11a (UNII-1) // Middle channel

802.11n_HT20 (UNII-1) // Middle channel

802.11n_HT40 (UNII-1) // Low channel

802.11a (UNII-2A) // Middle channel

802.11n_HT20 (UNII-2A) // Middle channel

802.11n_HT40 (UNII-2A) // Low channel


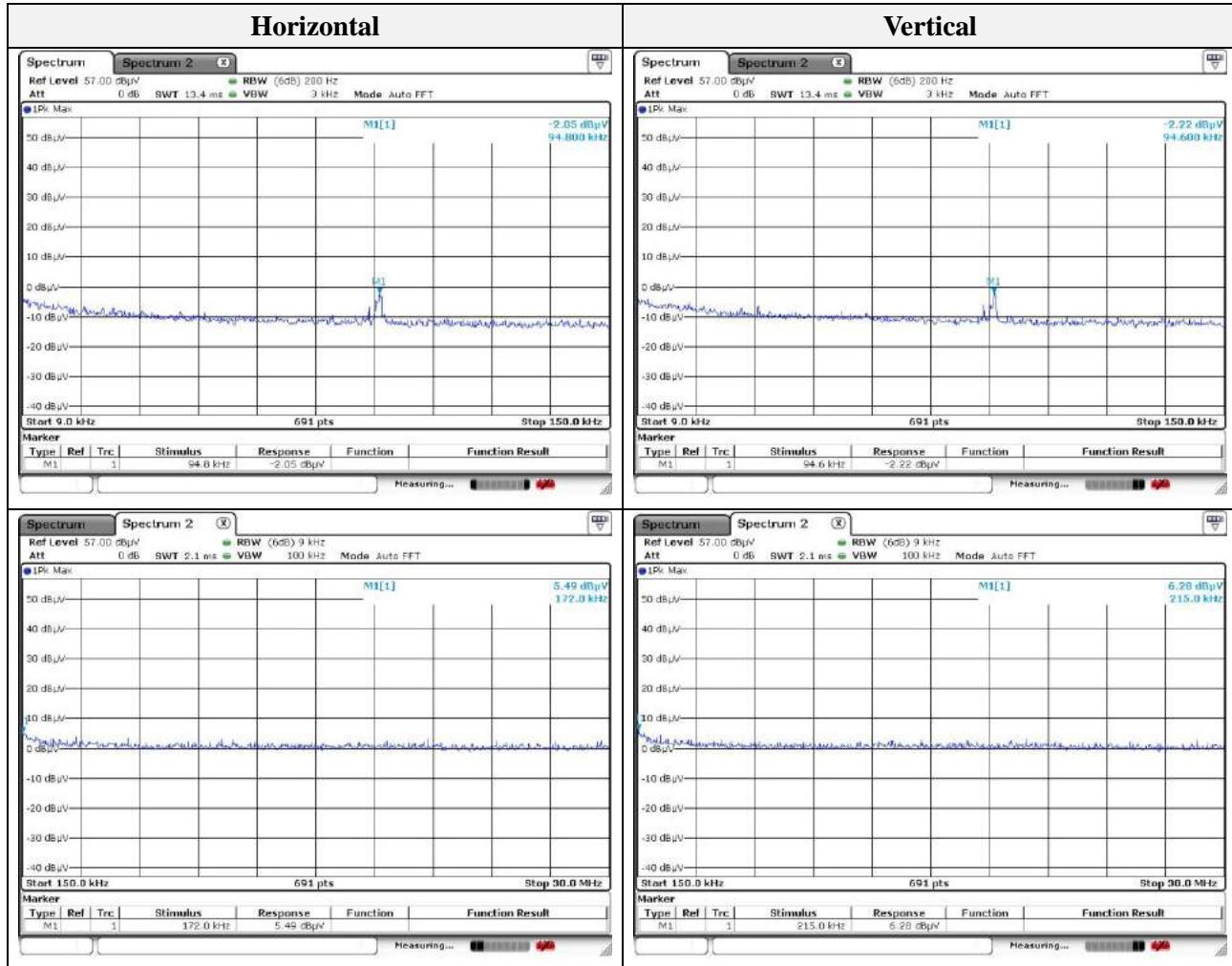
802.11a (UNII-2B) // Middle channel

802.11n_HT20 (UNII-2C) // Middle channel

802.11n_HT40 (UNII-2C) // Middle channel

802.11a (UNII-3) // Middle channel

802.11a (UNII-3) // Middle channel

802.11a (UNII-3) // Low channel


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Test results (Below 30 MHz) – Worst case

Mode: UNII-2C(MIMO)
 Distance of measurement: 3 meter
 Channel: 116

Frequency (MHz)	Level (dB μ V)	Ant. Pol. (H/V)	CF (dB)	F _d (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emissions were detected within 20 dB of the limit							

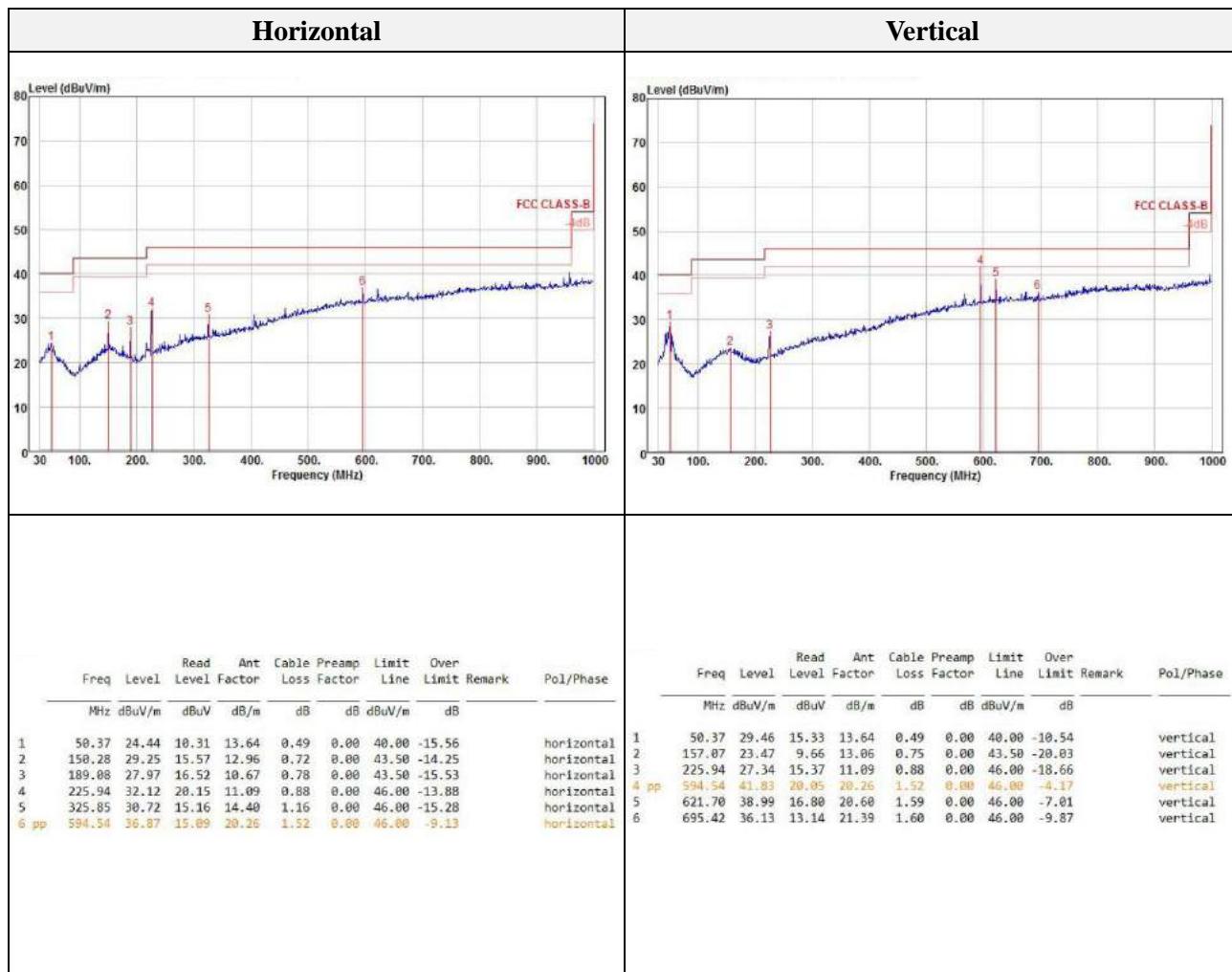


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Test results (Below 1 000 MHz) – Worst case

 Mode: UNII-2C(MIMO)

 Distance of measurement: 3 meter

 Channel: 116


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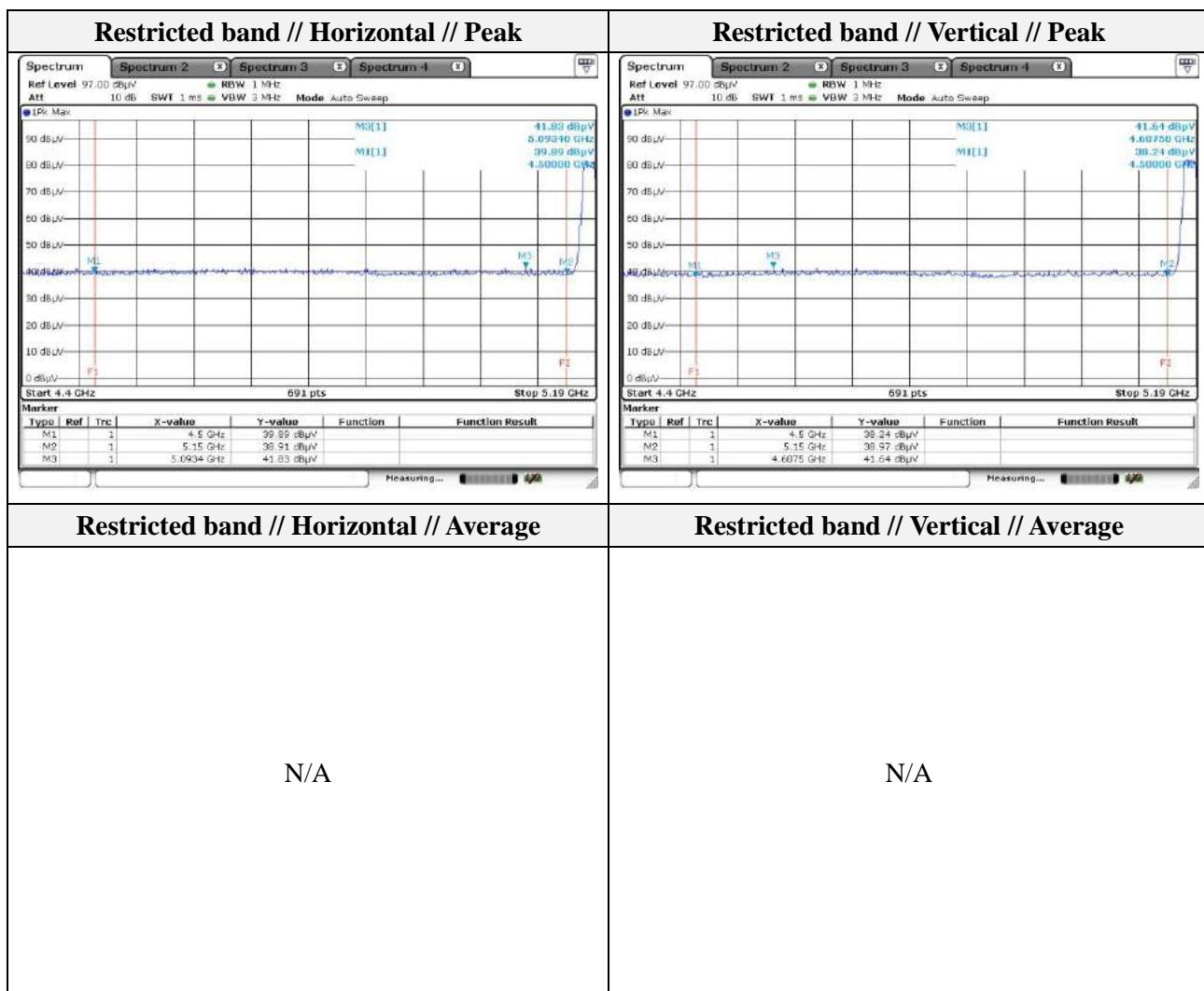
Test results (Above 1 000 MHz)
Ant 1

 Mode: **UNII-1**

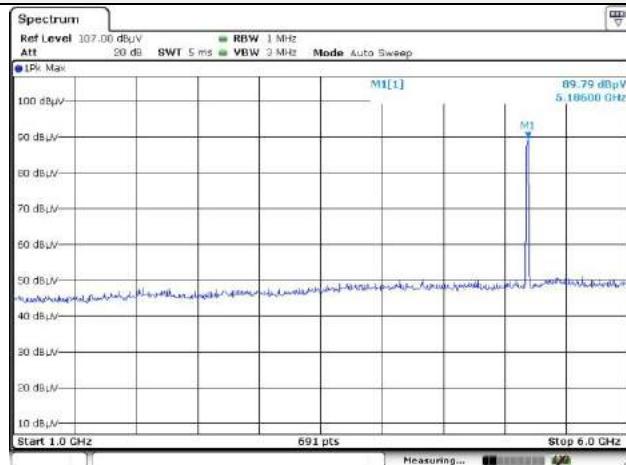
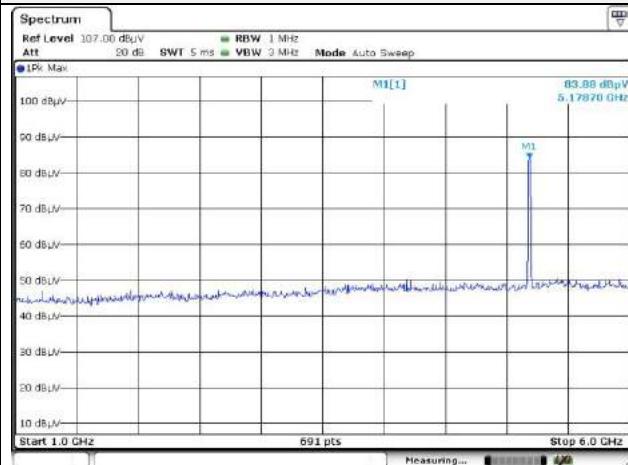
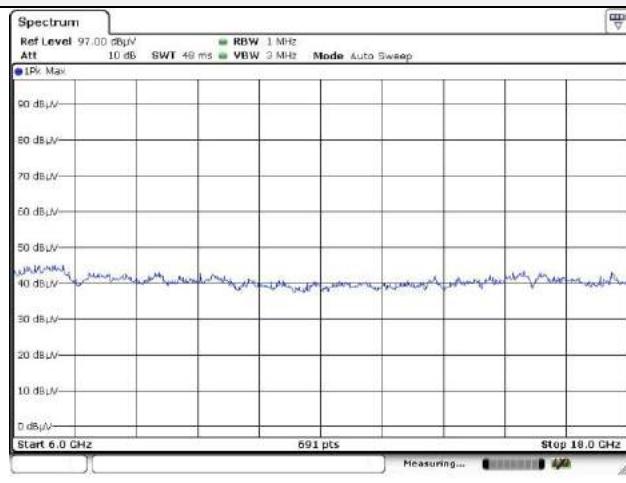
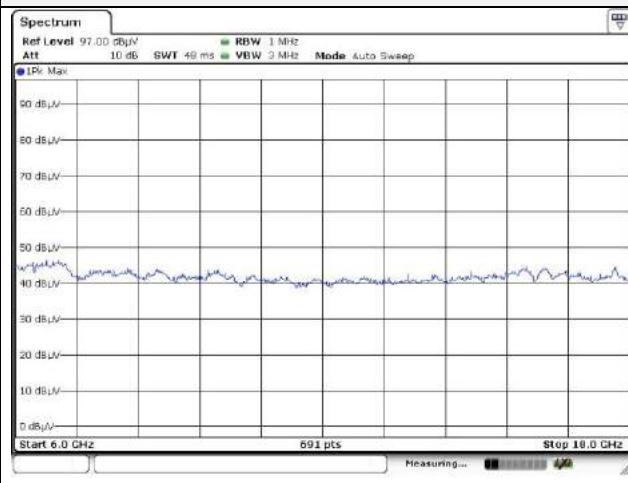
 Distance of measurement: **3 meter**

 Channel: **36**

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5093.40	41.83	Peak	H	-3.43	-	38.40	74.00	35.60
4607.50	41.64	Peak	V	-4.98	-	36.66	74.00	37.34


Note.

1. Average test was not performed because peak result is lower than the average limit.

Horizontal // Peak for 1 GHz to 6 GHz

Vertical // Peak for 1 GHz to 6 GHz

Horizontal // Peak for 6 GHz to 18 GHz

Vertical // Peak for 6 GHz to 18 GHz


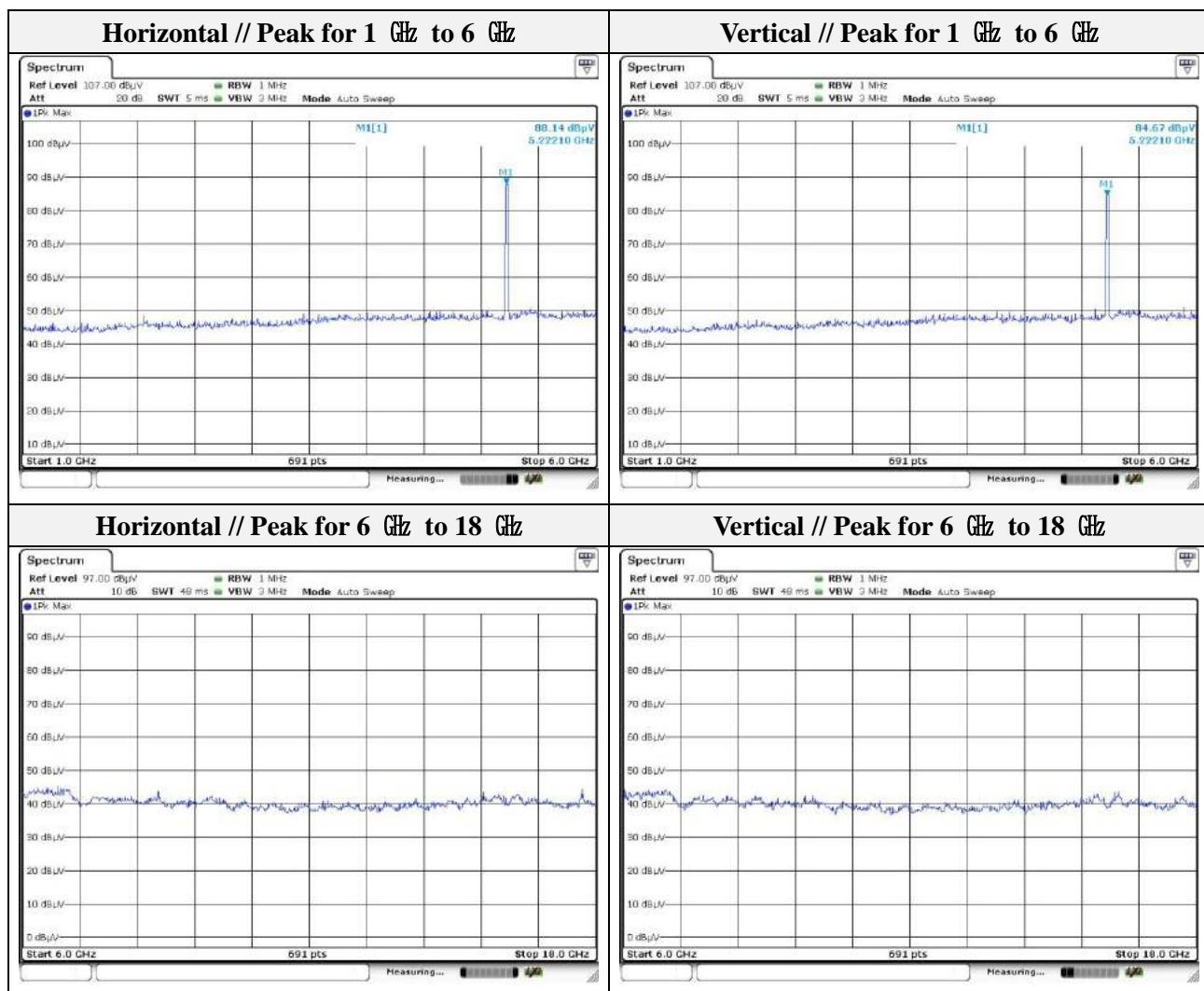
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Mode: UNII-1

Distance of measurement: 3 meter

Channel: 44

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



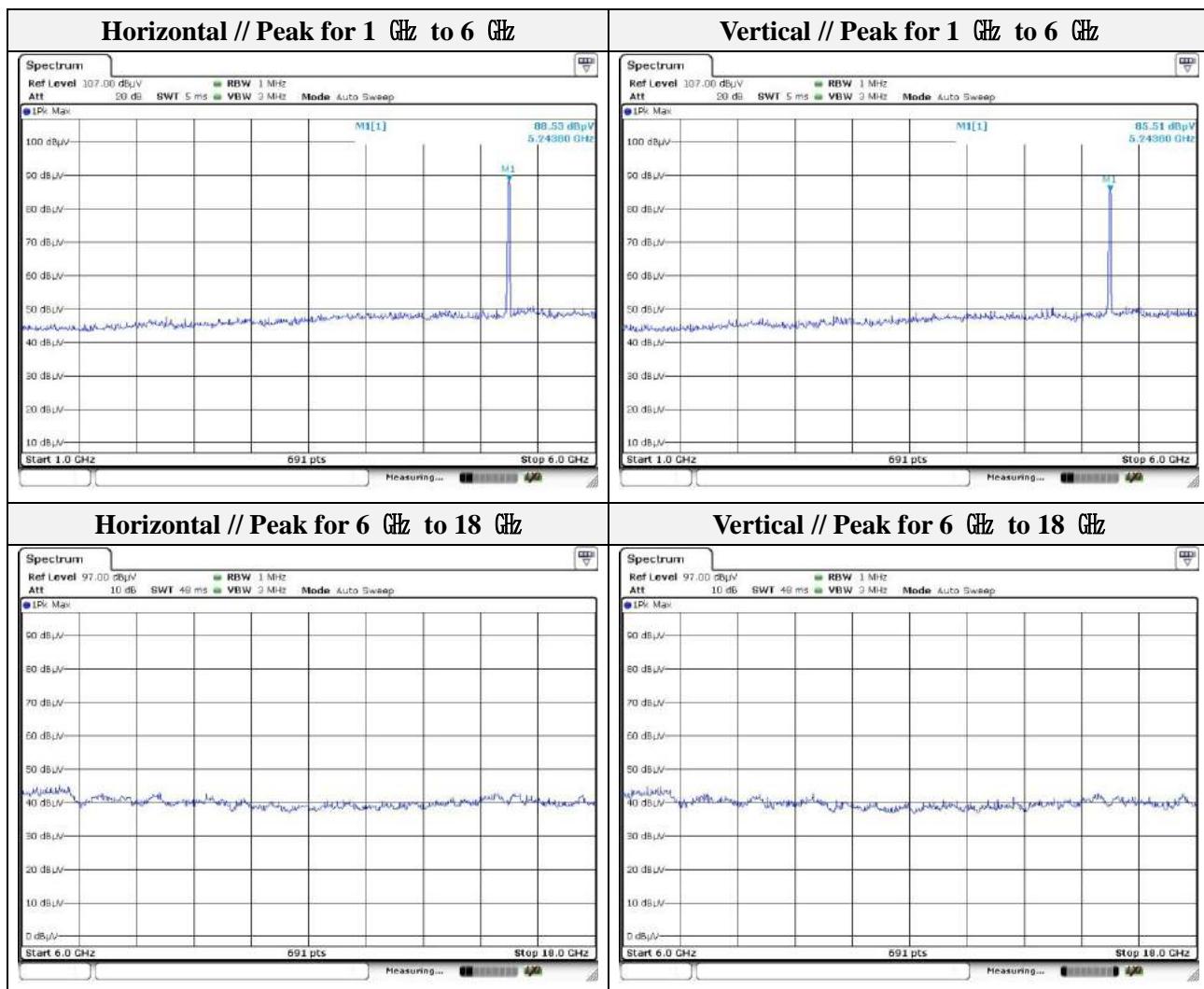
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Mode: UNII-1

 Distance of measurement: 3 meter

 Channel: 48

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



Note.

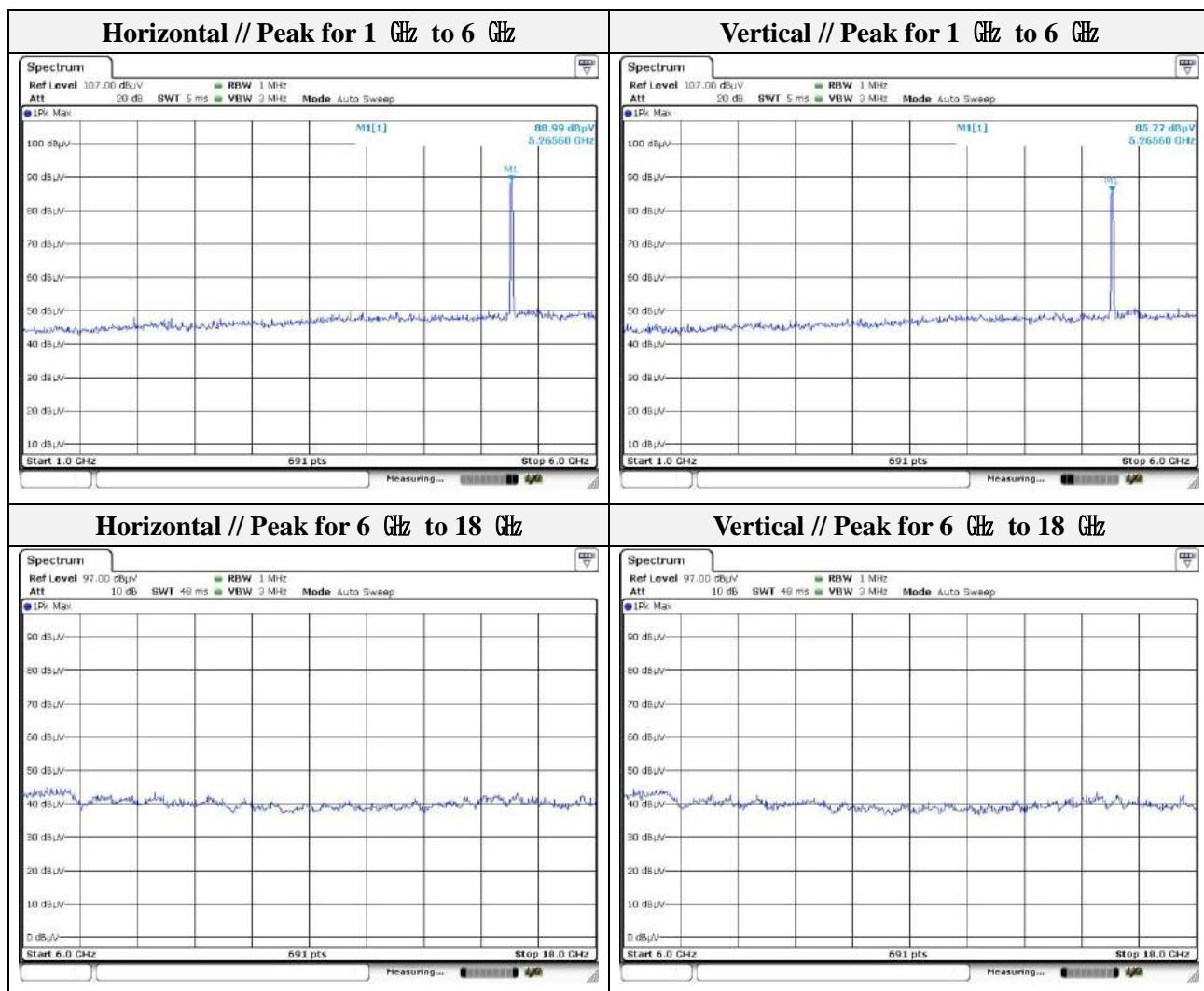
1. No spurious emission were detected above 6 GHz.

Mode: UNII-2A

Distance of measurement: 3 meter

Channel: 52

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



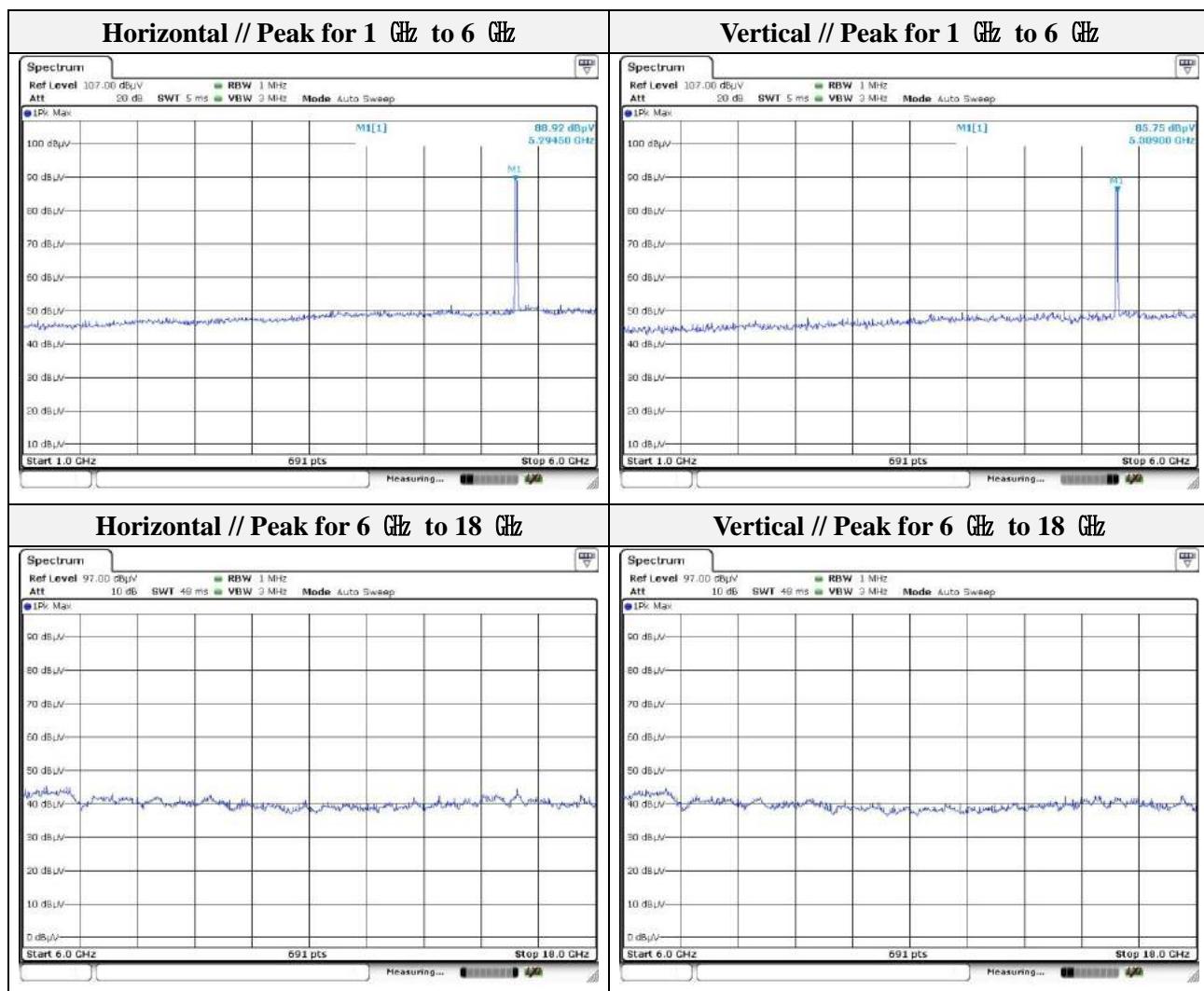
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Mode: UNII-2A

Distance of measurement: 3 meter

Channel: 60

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



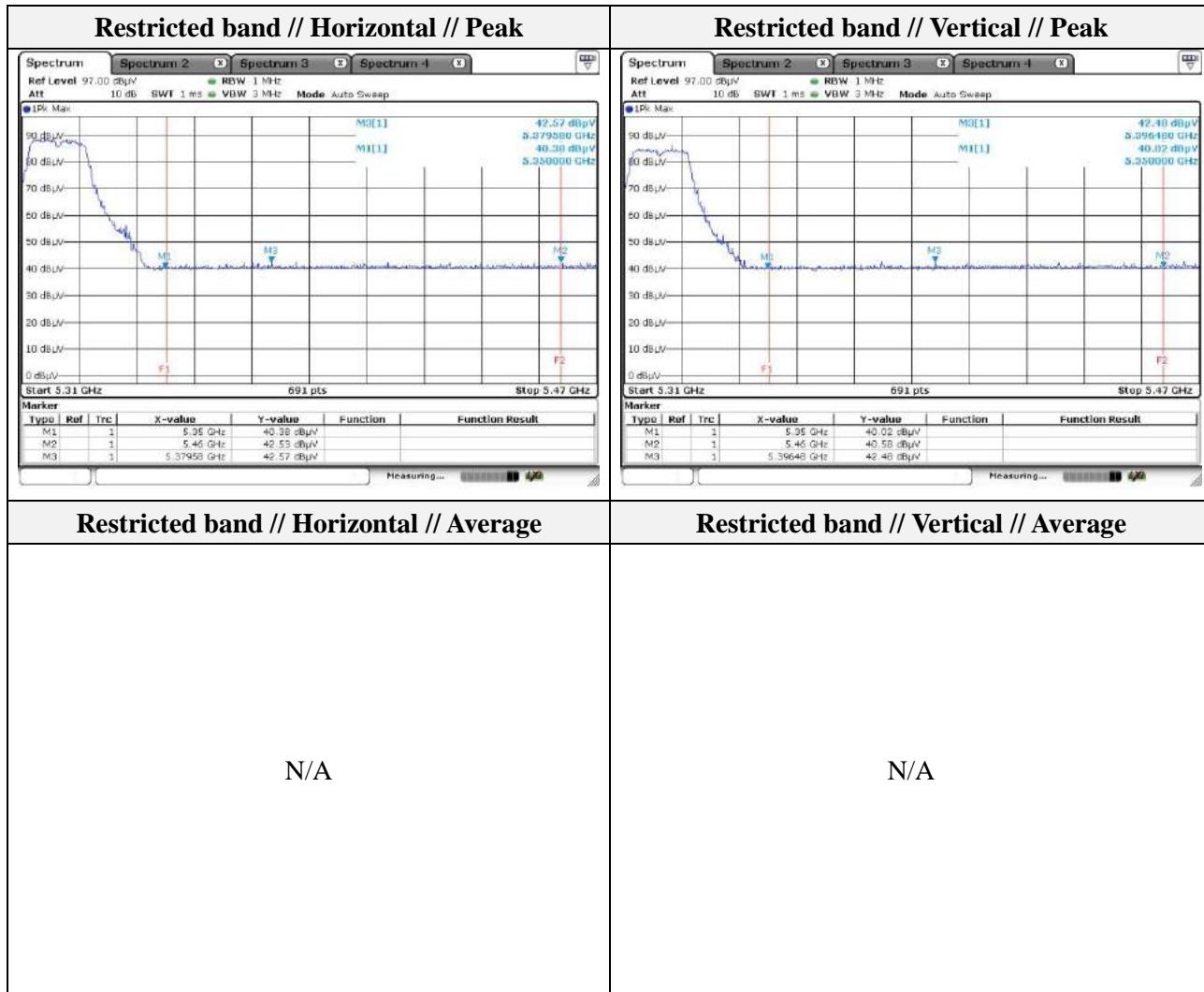
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Mode: **UNII-2A**

Distance of measurement: **3 meter**

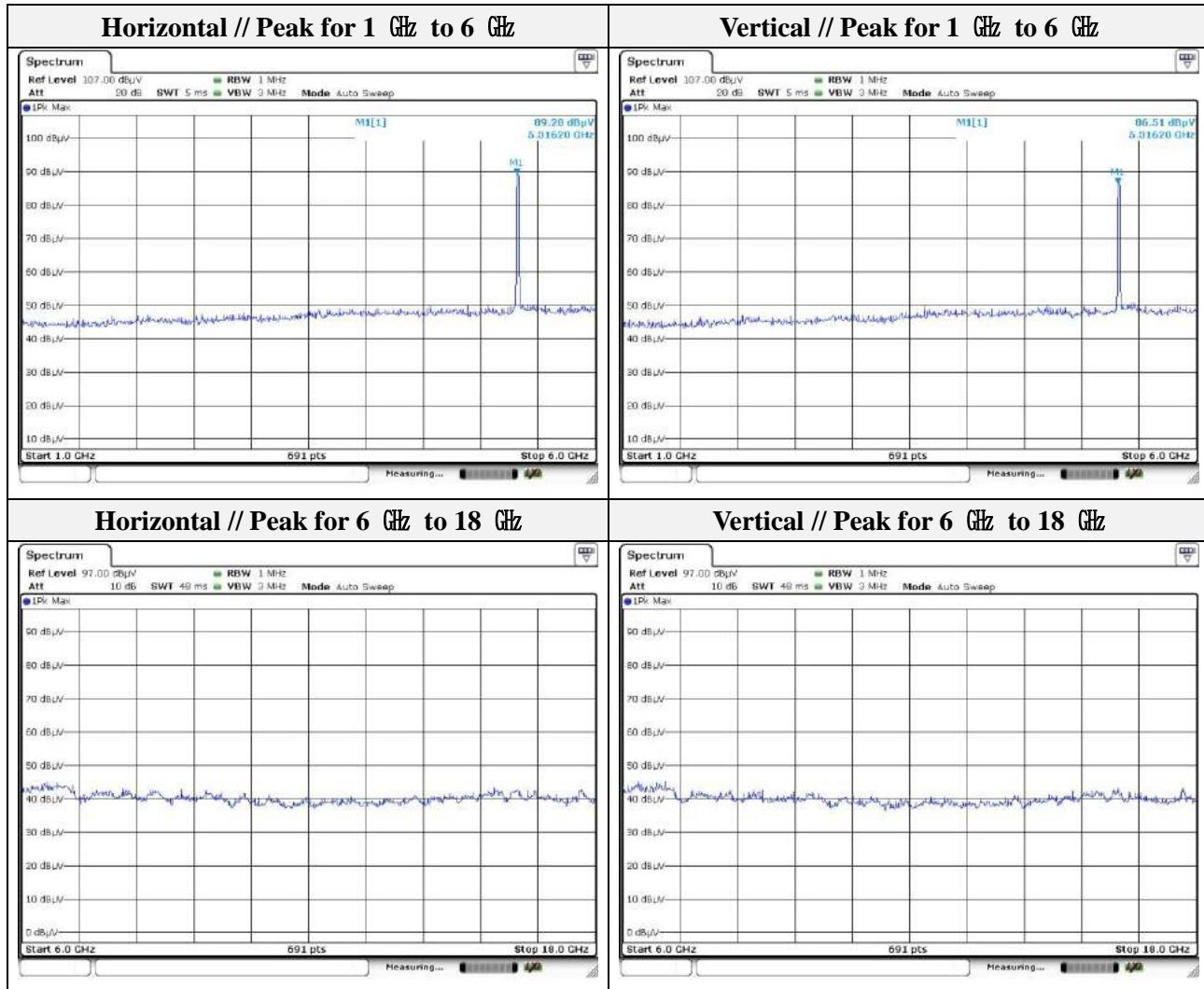
Channel: **64**

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5379.60	42.57	Peak	H	-3.61	-	38.96	74.00	35.04
5396.50	42.48	Peak	V	-3.63	-	38.85	74.00	35.15



Note.

1. Average test was not performed because peak result is lower than the average limit.



Note.

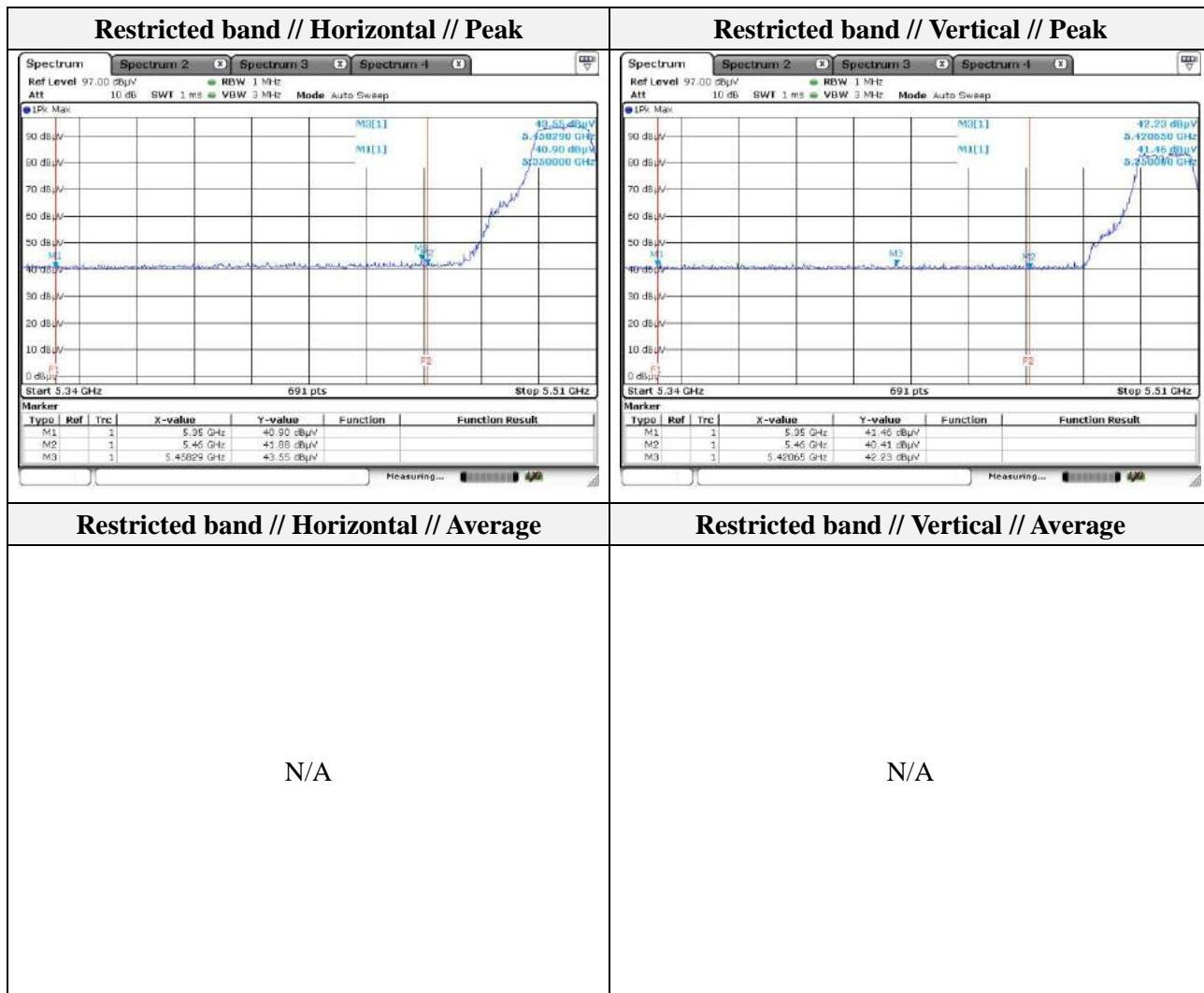
1. No spurious emission were detected above 6 GHz.

Mode: UNII-2C

Distance of measurement: 3 meter

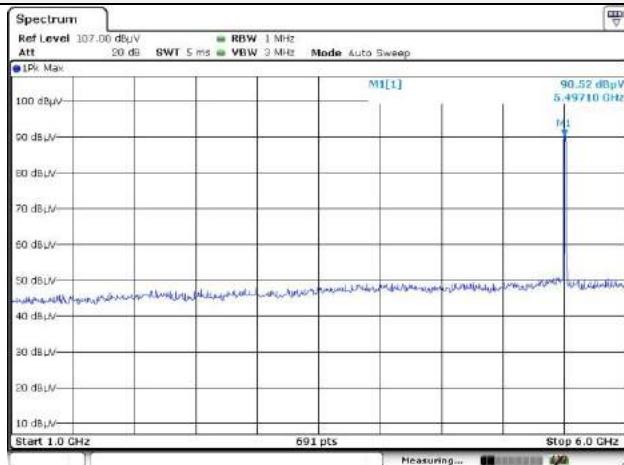
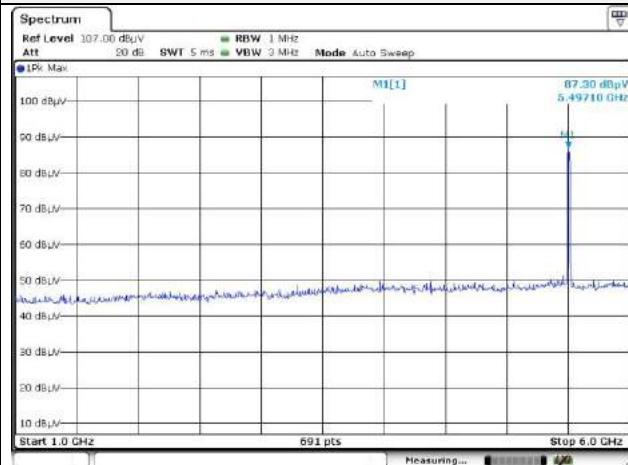
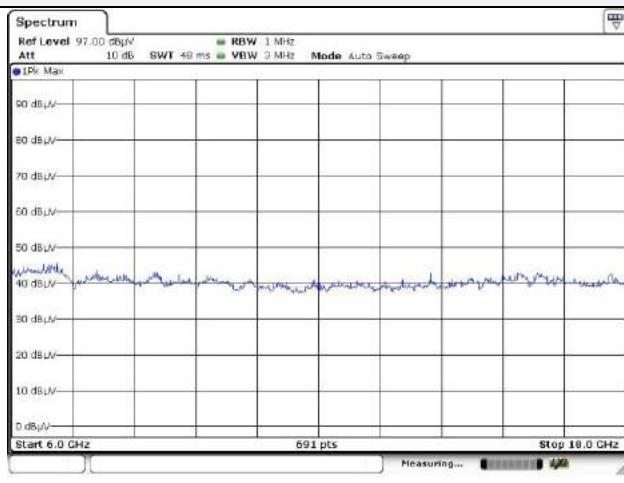
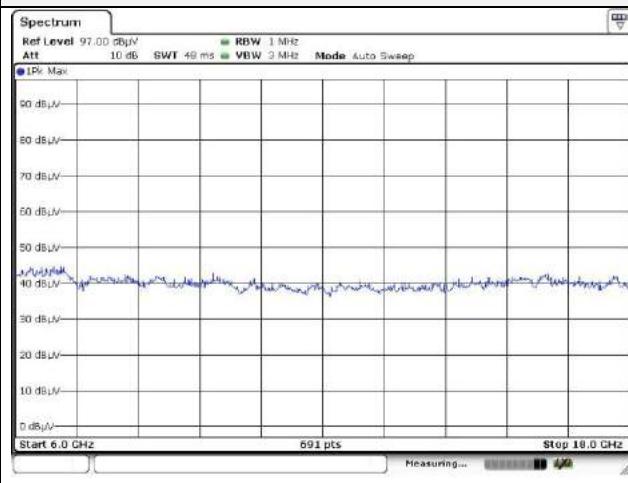
Channel: 100

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5458.30	43.55	Peak	H	-3.55	-	40.00	74.00	34.00
5420.70	42.23	Peak	V	-3.60	-	38.63	74.00	35.37



Note.

1. Average test was not performed because peak result is lower than the average limit.

Horizontal // Peak for 1 GHz to 6 GHz

Vertical // Peak for 1 GHz to 6 GHz

Horizontal // Peak for 6 GHz to 18 GHz

Vertical // Peak for 6 GHz to 18 GHz


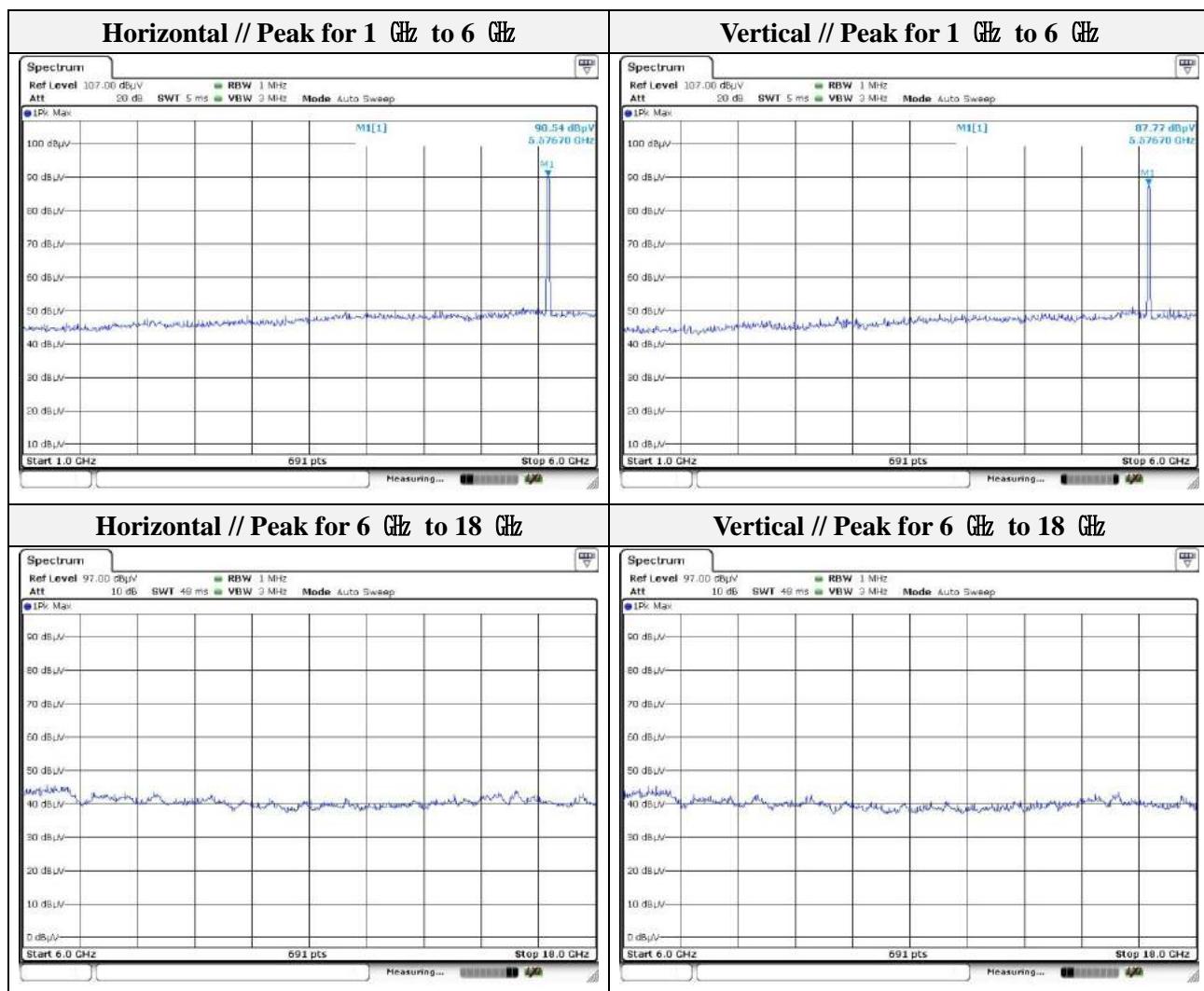
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Mode: UNII-2C

Distance of measurement: 3 meter

Channel: 116

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



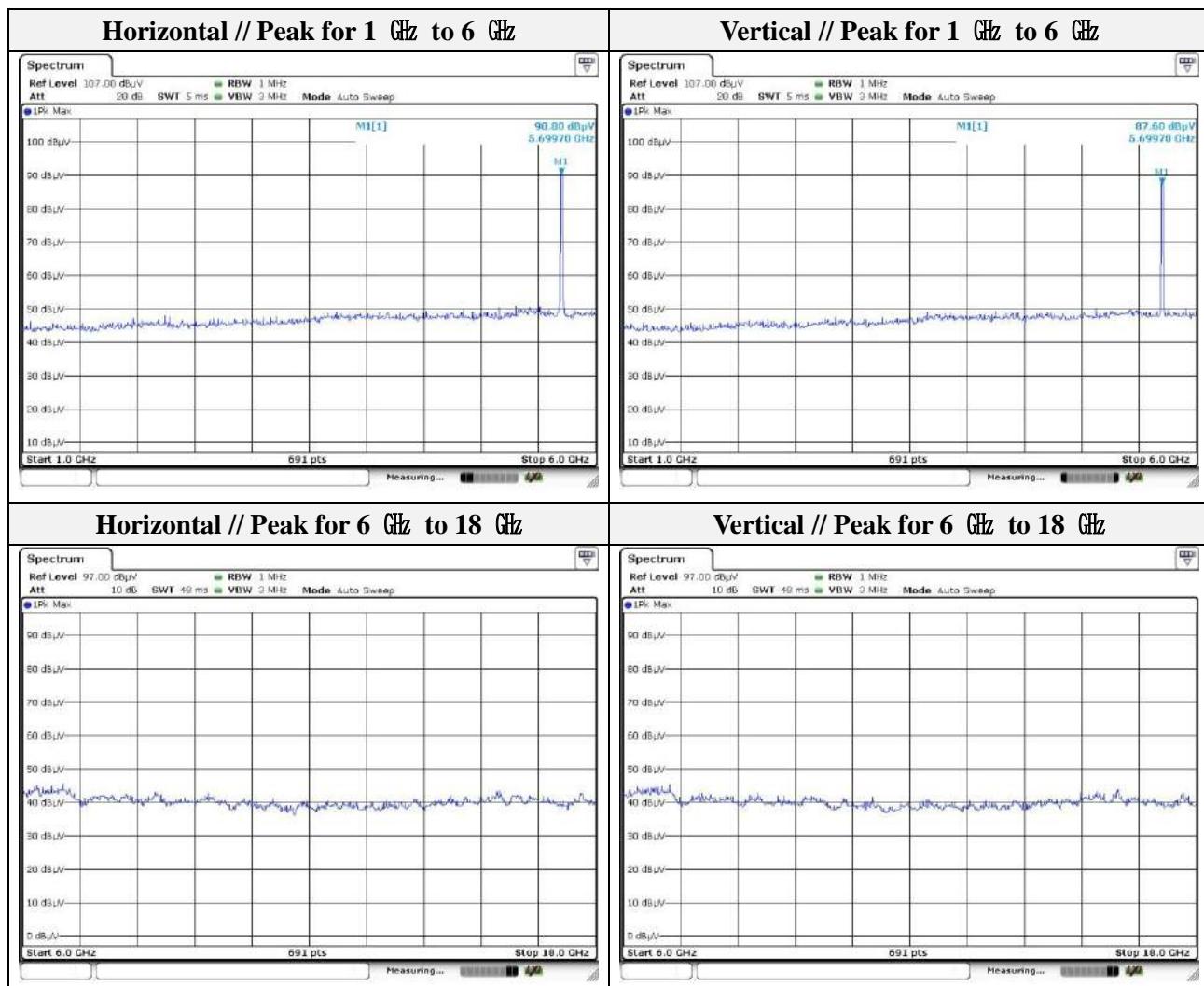
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Mode: UNII-2C

Distance of measurement: 3 meter

Channel: 140

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



Note.

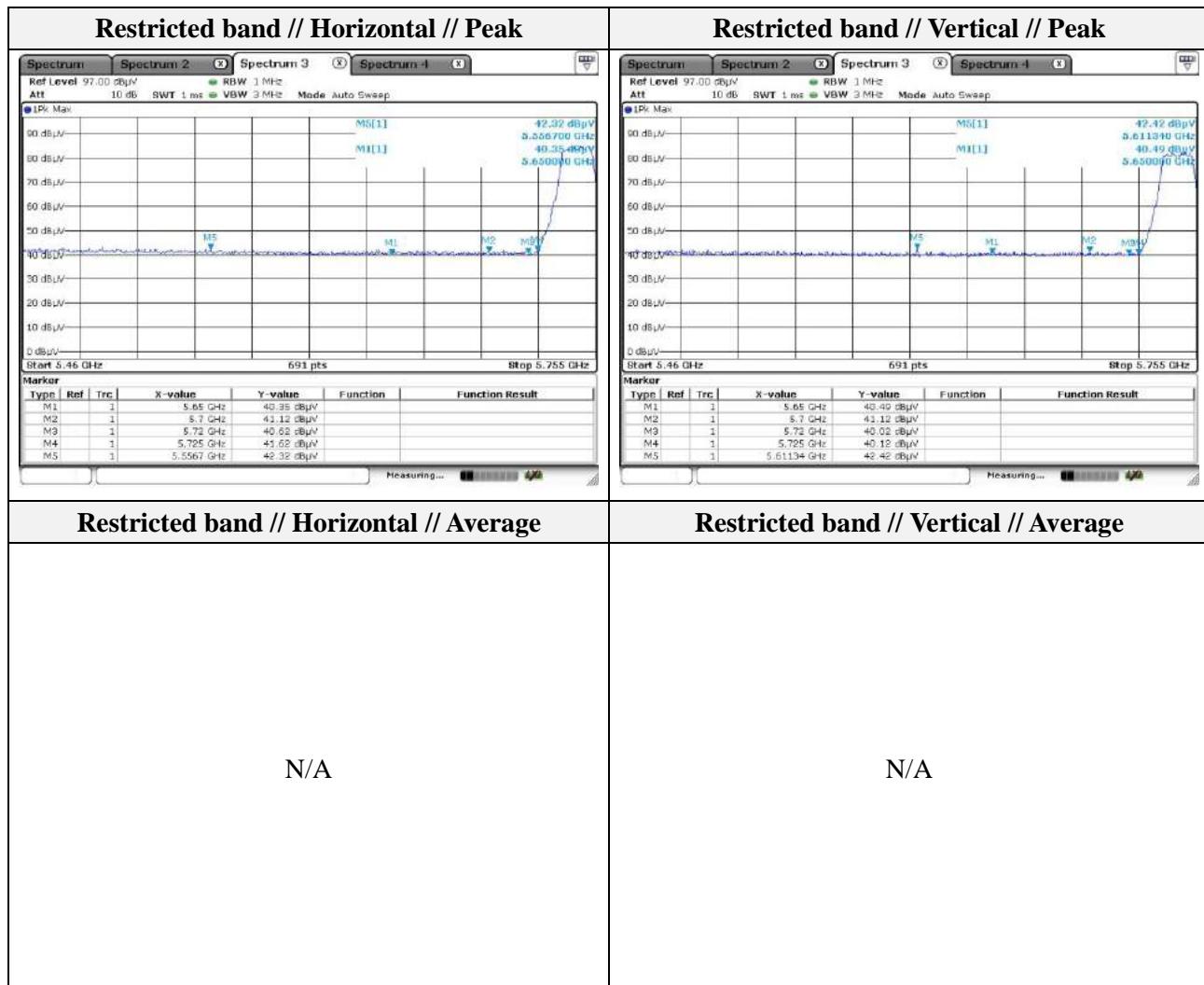
1. No spurious emission were detected above 6 GHz.

Mode: UNII-3

Distance of measurement: 3 meter

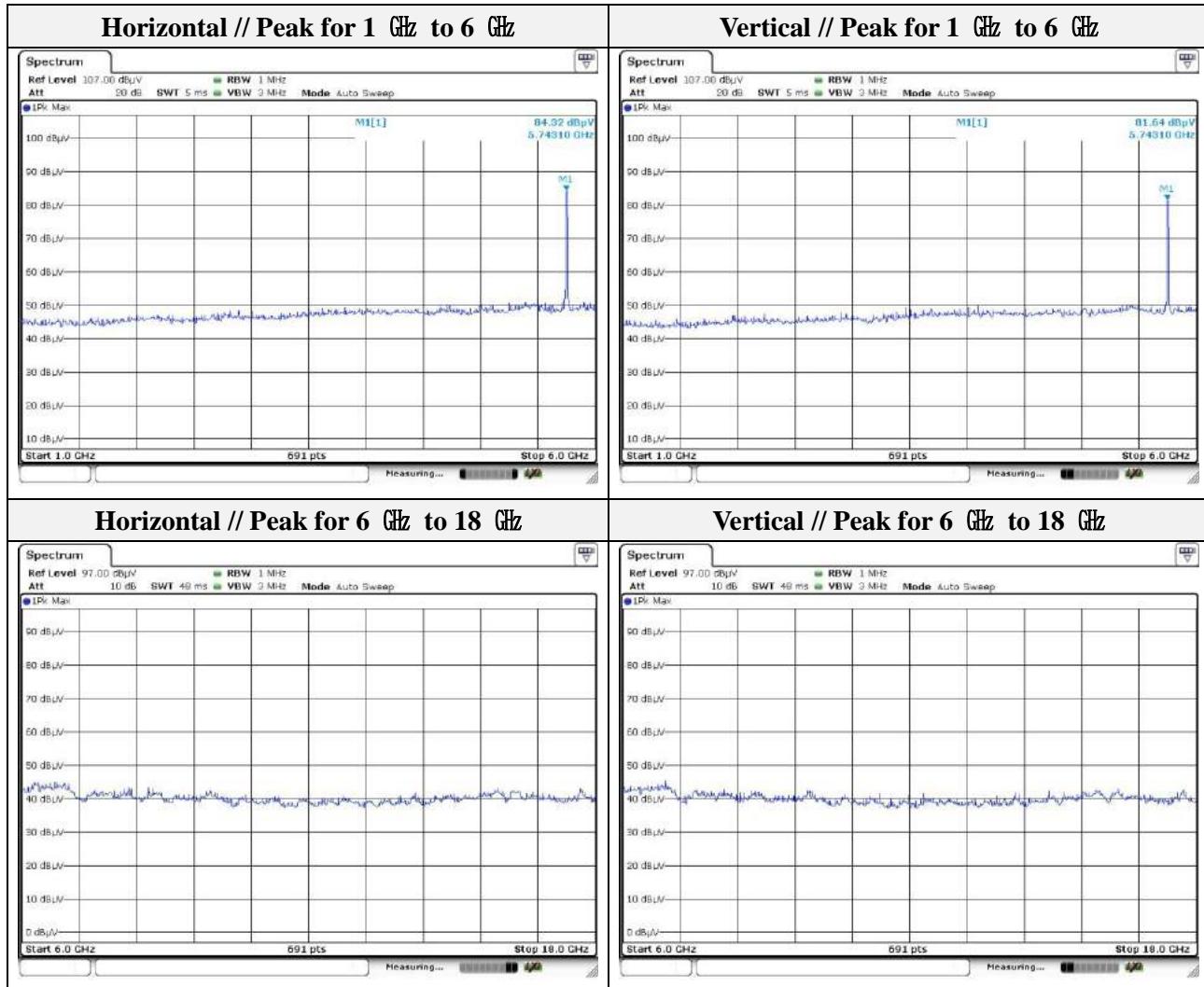
Channel: 149

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5725.00	41.62	Peak	H	-2.49	-	39.13	122.20	83.07
5556.70	42.32	Peak	H	-3.18	-	39.14	108.11	68.97
5725.00	40.12	Peak	V	-2.49	-	37.63	122.20	84.57
5611.34	42.42	Peak	V	-2.91	-	39.51	68.20	28.69



Note.

1. Average test was not performed because peak result is lower than the average limit.



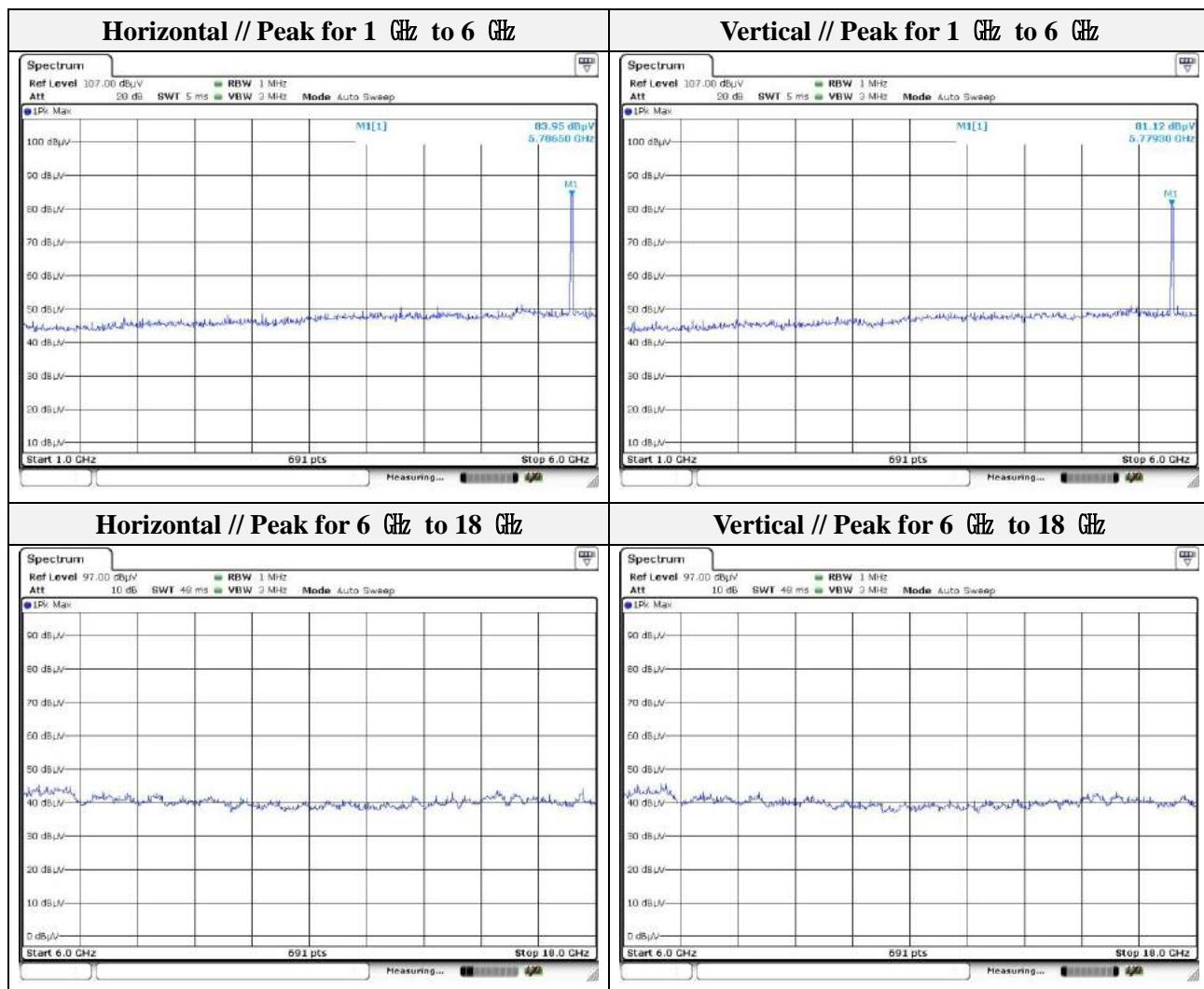
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 The test results in the report only apply to the tested sample.

Mode: UNII-3

 Distance of measurement: 3 meter

 Channel: 157

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



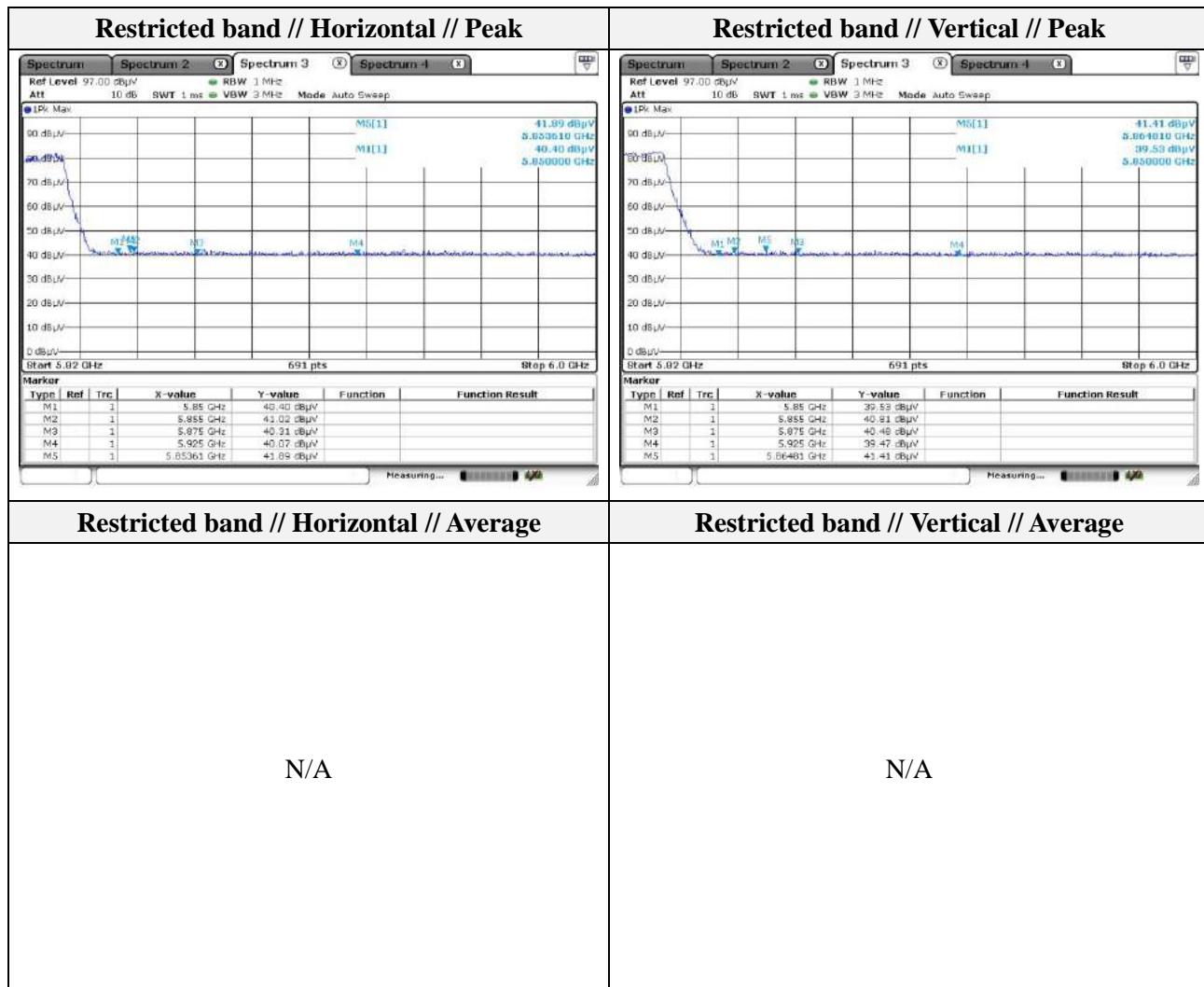
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
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Mode: UNII-3

Distance of measurement: 3 meter

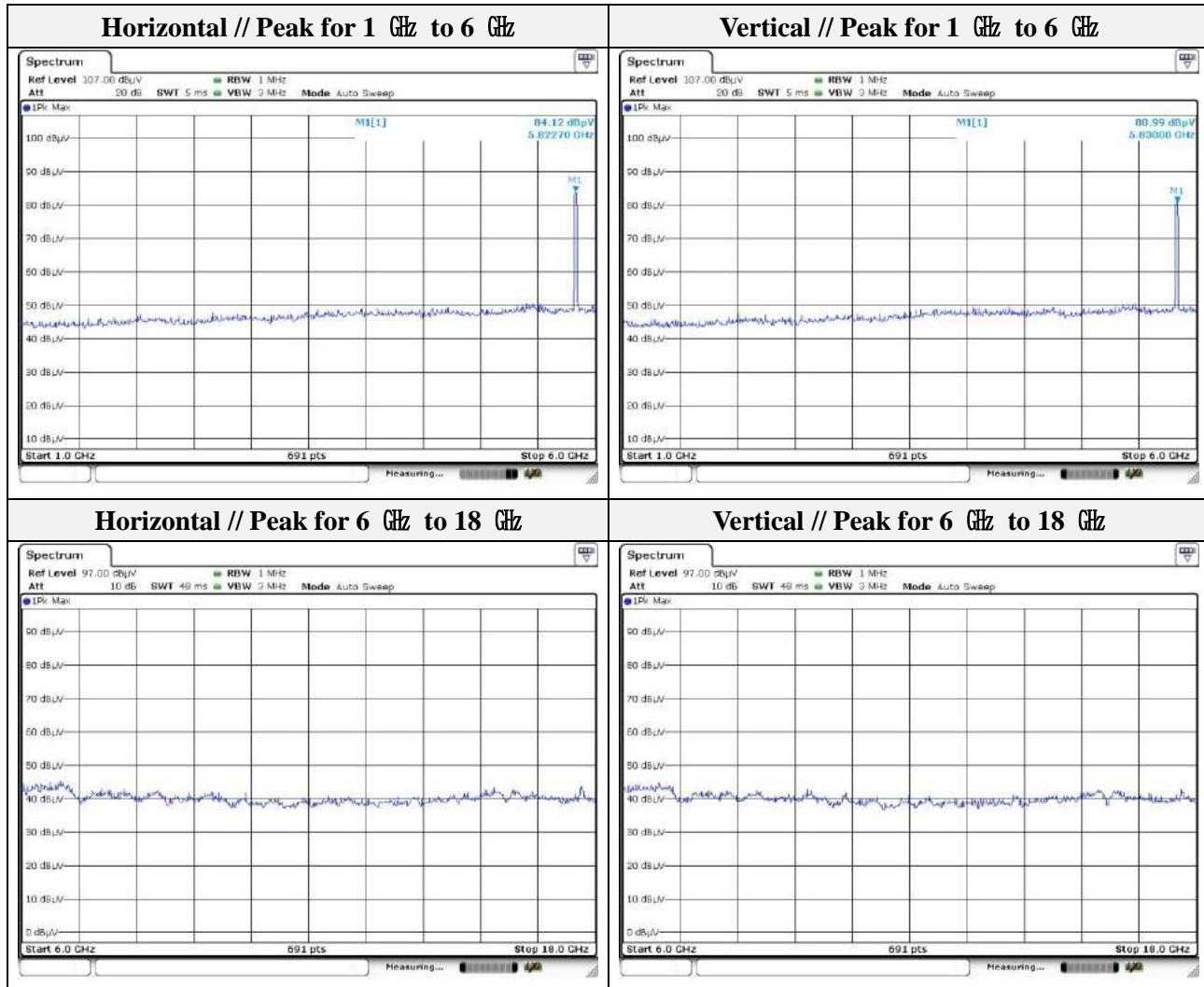
Channel: 165

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5850.00	40.40	Peak	H	-2.07	-	38.33	122.20	83.87
5853.61	41.89	Peak	H	-2.06	-	39.83	113.97	74.14
5850.00	39.53	Peak	V	-2.07	-	37.46	122.20	84.74
5864.81	41.41	Peak	V	-2.02	-	39.39	108.05	68.66



Note.

1. Average test was not performed because peak result is lower than the average limit.



Note.

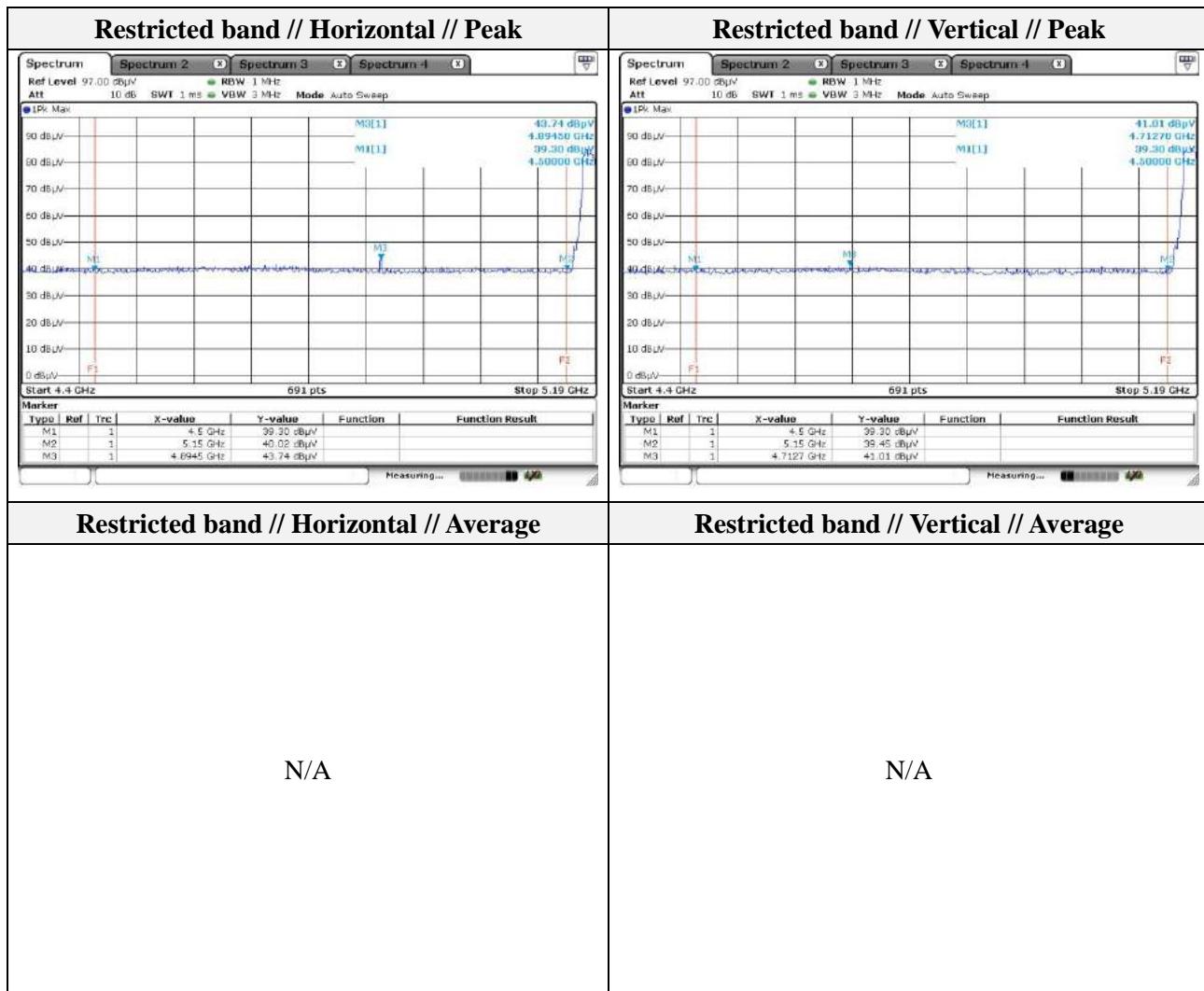
1. No spurious emission were detected above 6 GHz.

Mode: UNII-1(HT20)

Distance of measurement: 3 meter

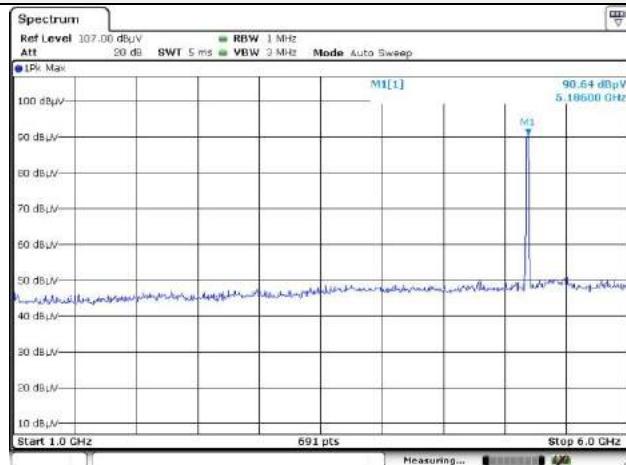
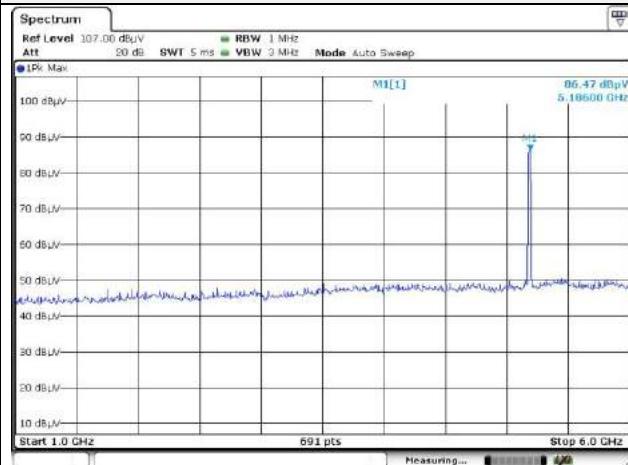
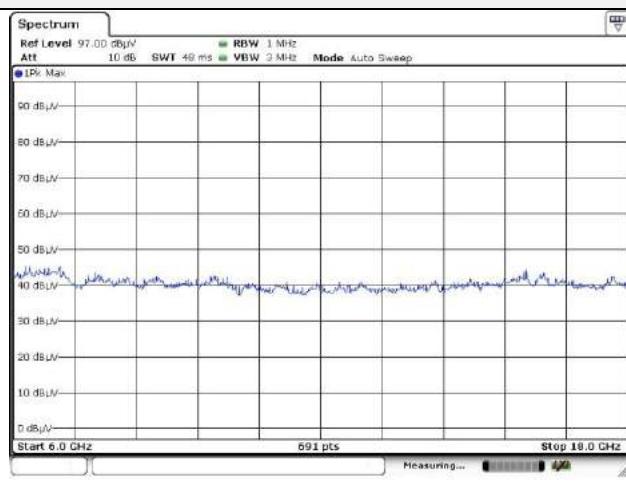
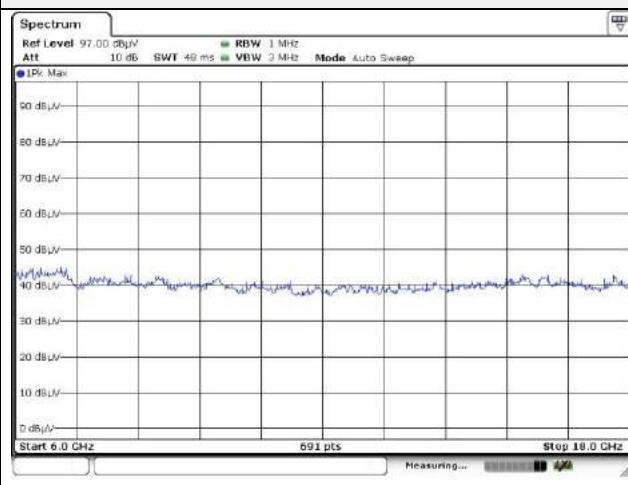
Channel: 36

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
4894.50	43.74	Peak	H	-3.80	-	39.94	74.00	34.06
4712.70	41.01	Peak	V	-4.52	-	36.49	74.00	37.51



Note.

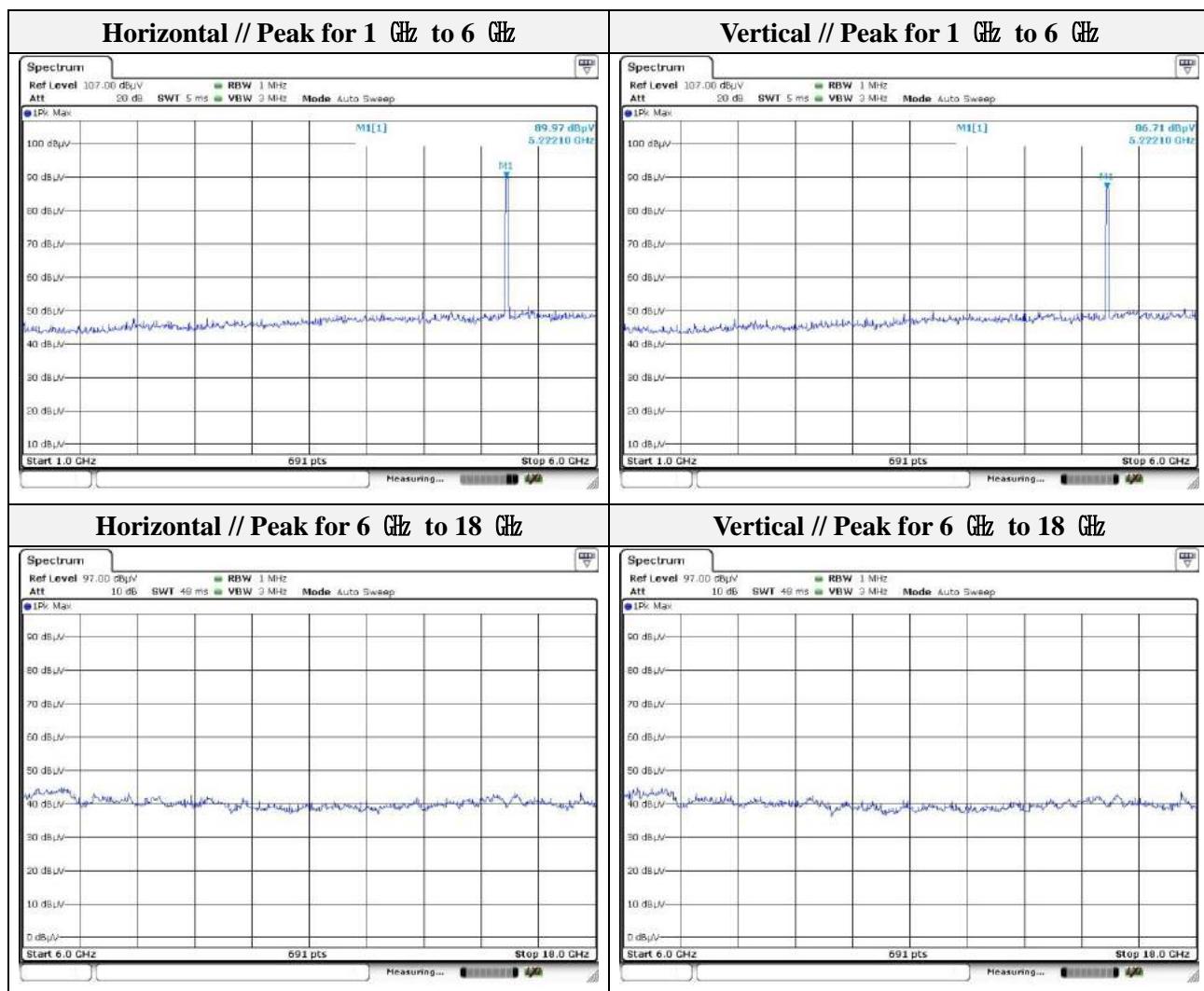
1. Average test was not performed because peak result is lower than the average limit.

Horizontal // Peak for 1 GHz to 6 GHz

Vertical // Peak for 1 GHz to 6 GHz

Horizontal // Peak for 6 GHz to 18 GHz

Vertical // Peak for 6 GHz to 18 GHz


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Mode: UNII-1(HT20)
 Distance of measurement: 3 meter
 Channel: 44

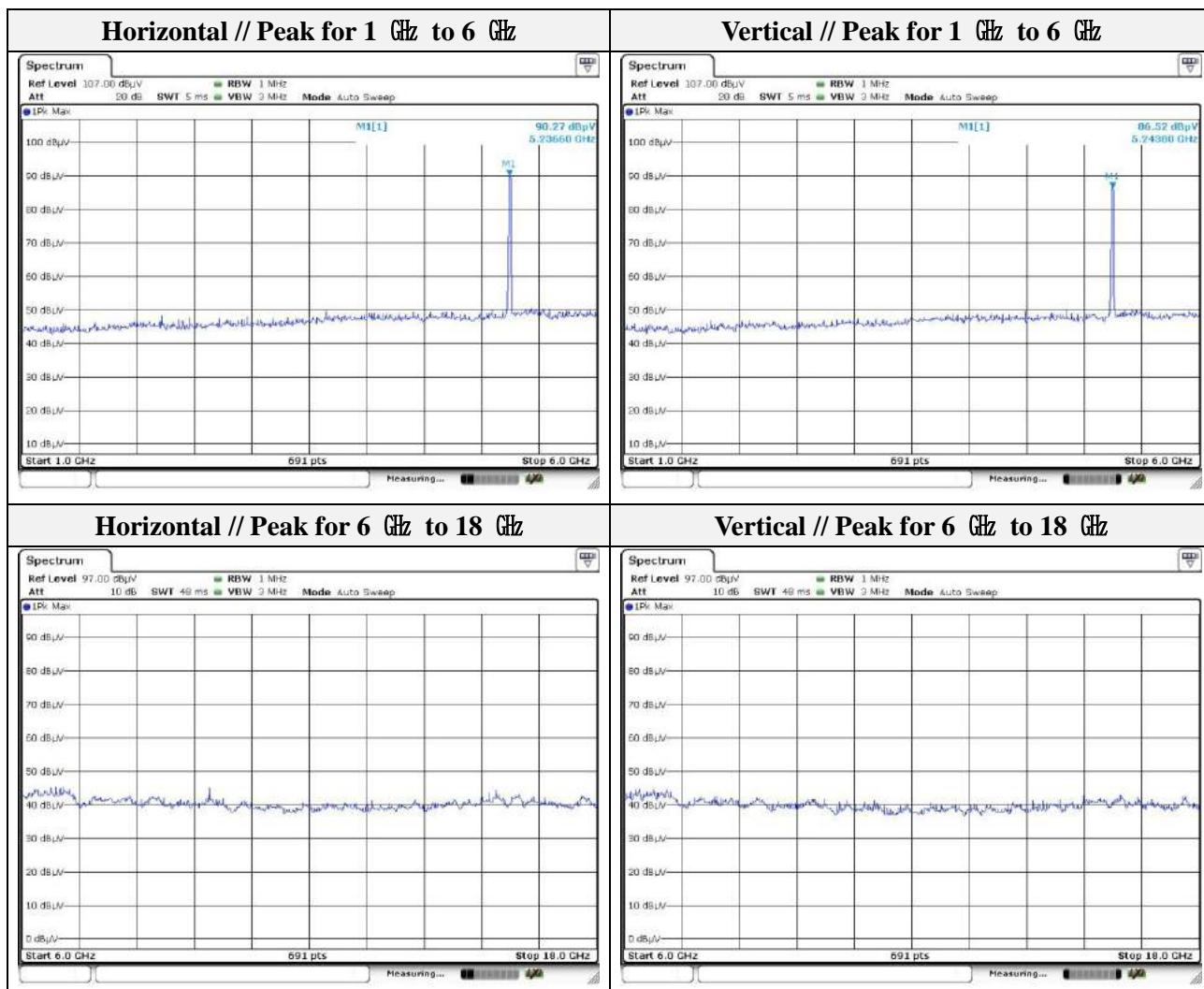
Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



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Mode: UNII-1(HT20)
 Distance of measurement: 3 meter
 Channel: 48

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								

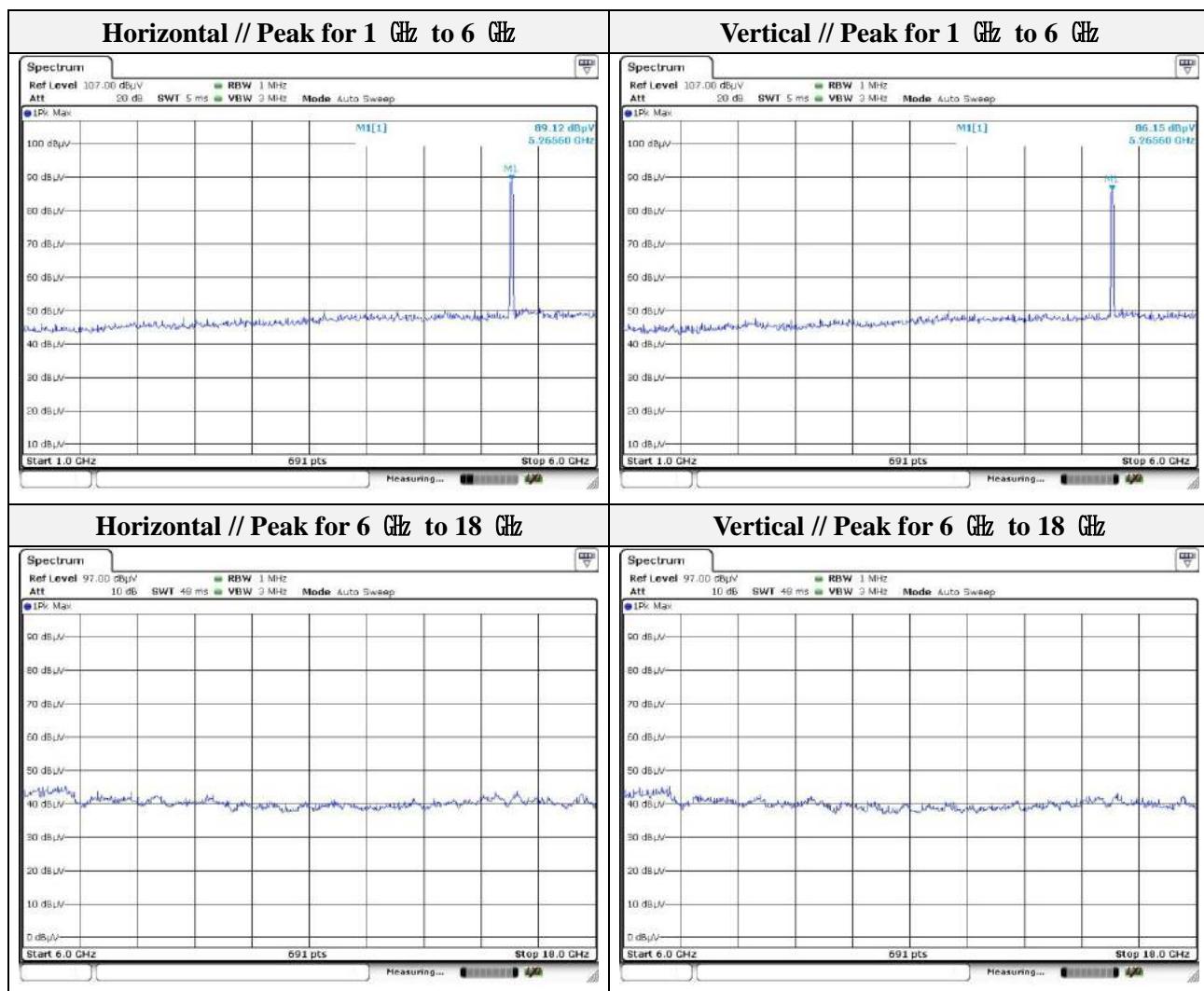


Note.

1. No spurious emission were detected above 6 GHz.

Mode: UNII-2A(HT20)
 Distance of measurement: 3 meter
 Channel: 52

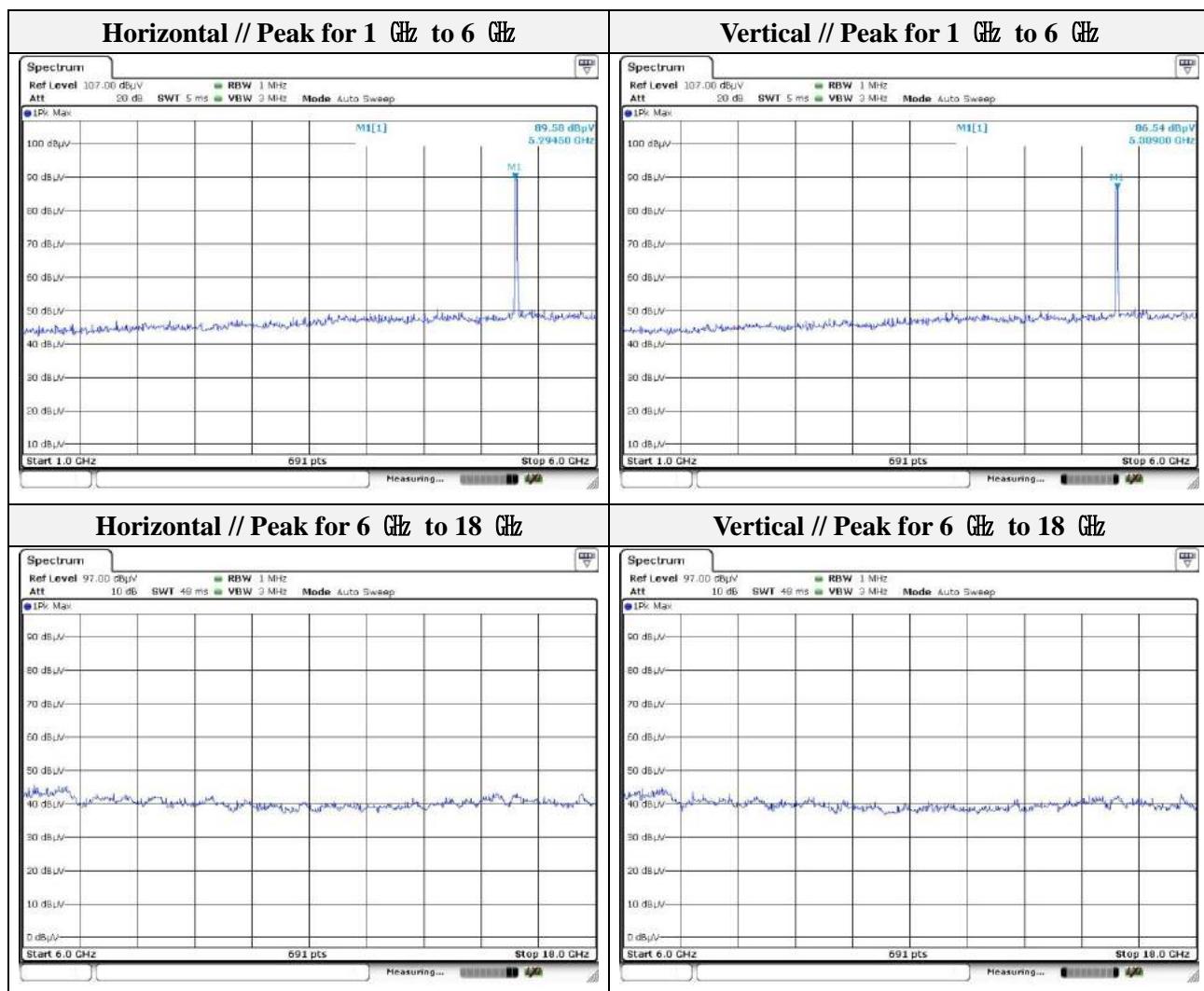
Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



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Mode: UNII-2A(HT20)
 Distance of measurement: 3 meter
 Channel: 60

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



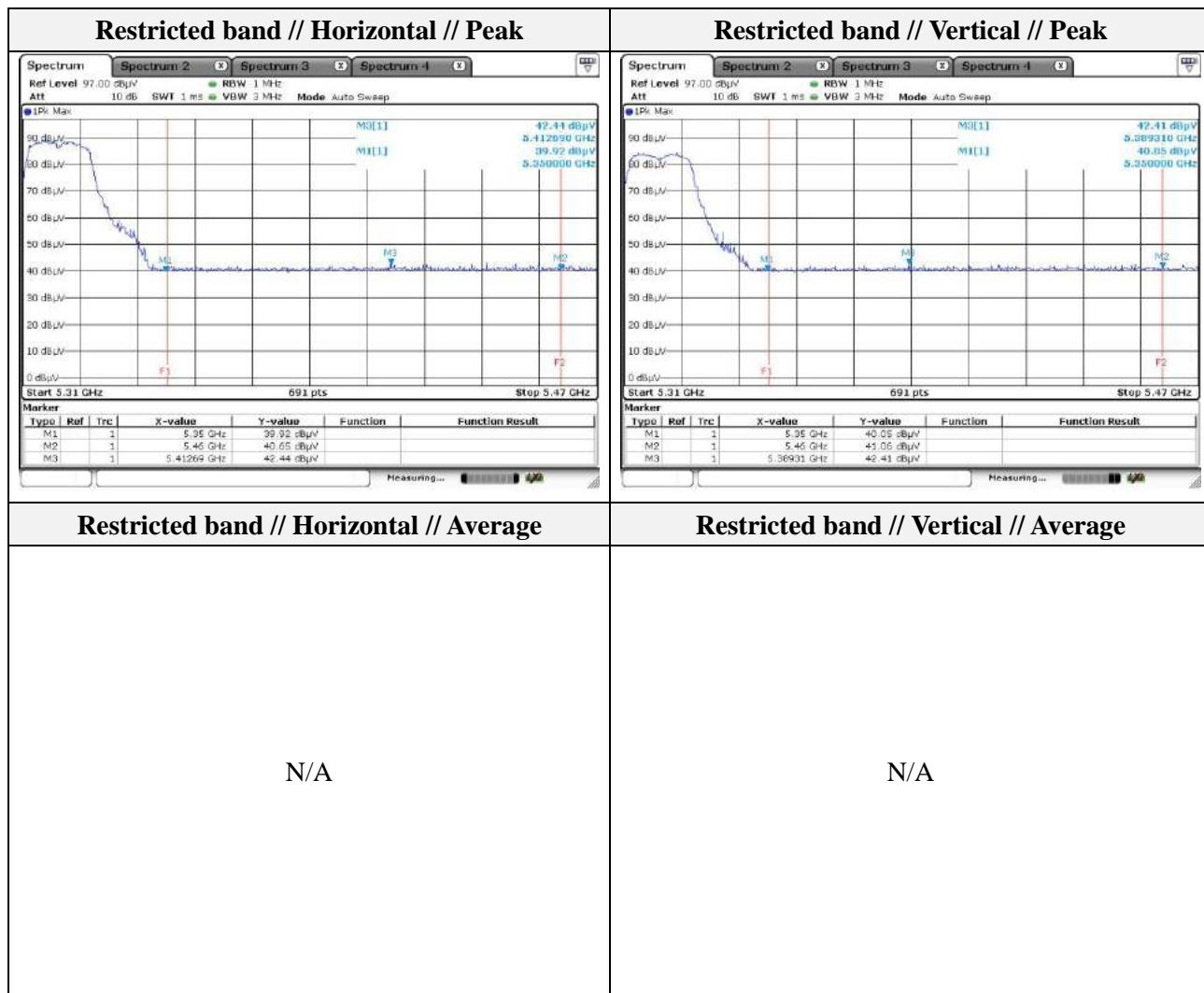
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 The test results in the report only apply to the tested sample.

Mode: **UNII-2A(HT20)**

Distance of measurement: **3 meter**

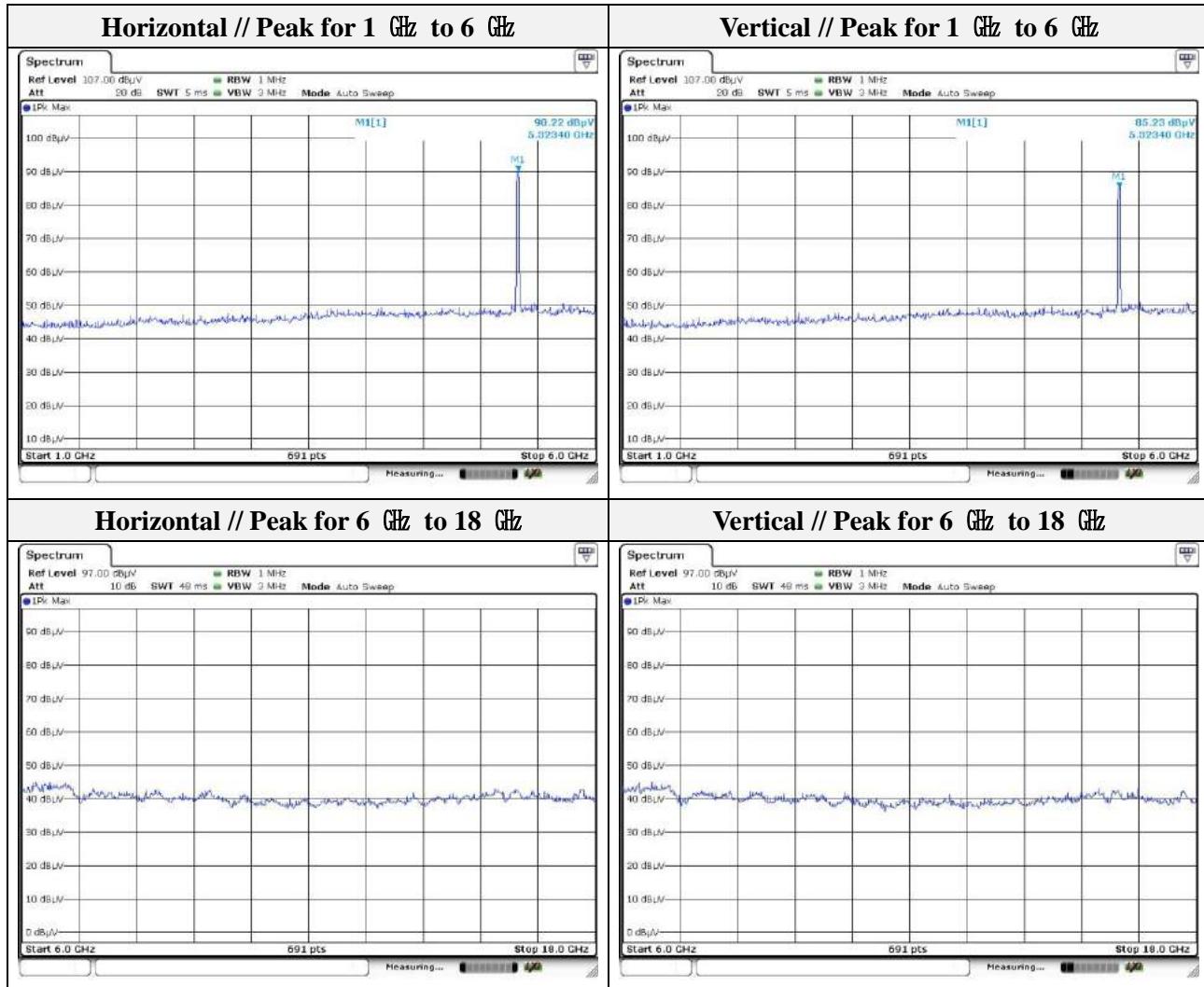
Channel: **64**

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
5412.70	42.44	Peak	H	-3.61	-	38.83	74.00	35.17
5389.30	42.41	Peak	V	-3.62	-	38.79	74.00	35.21



Note.

1. Average test was not performed because peak result is lower than the average limit.



Note.

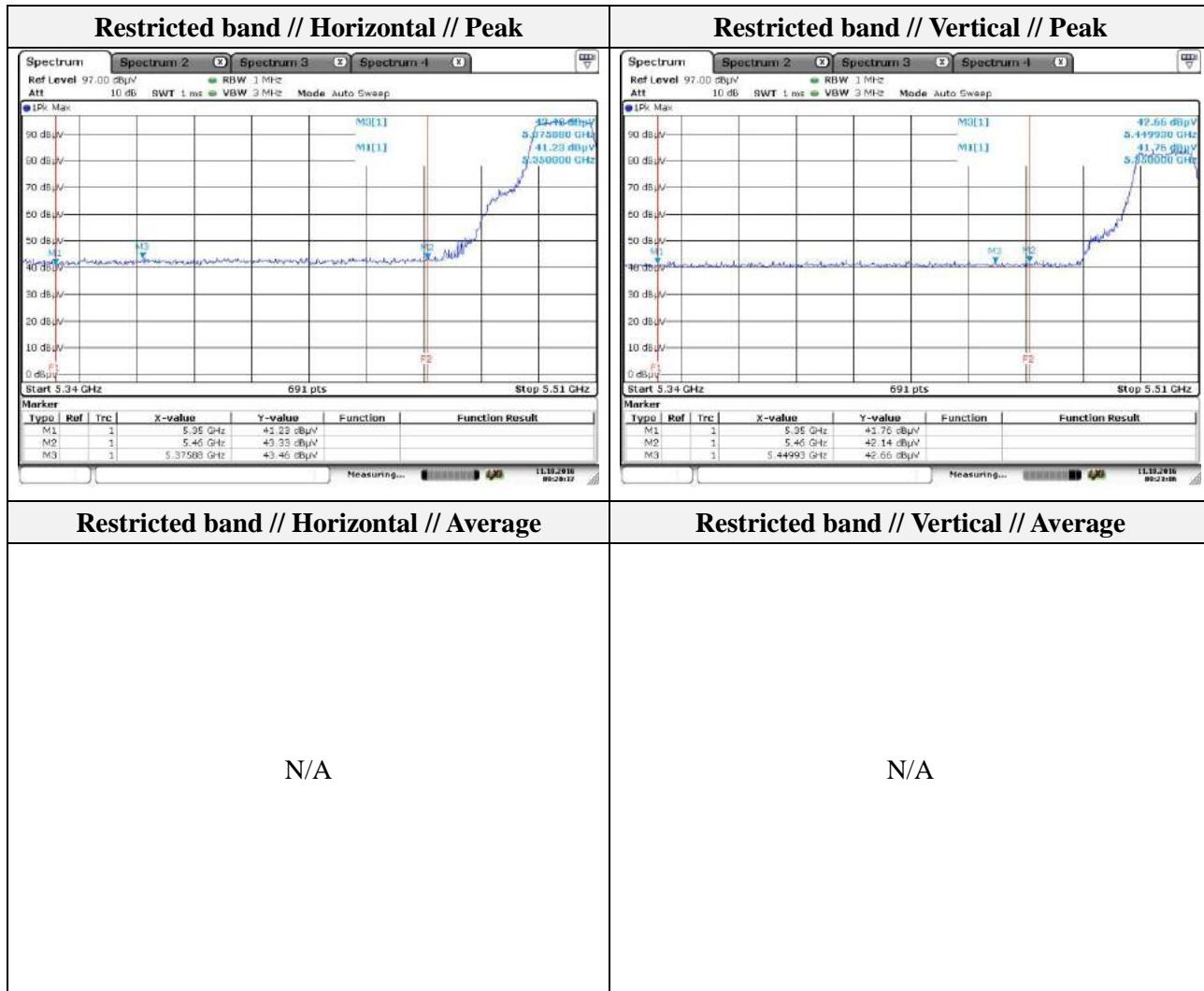
1. No spurious emission were detected above 6 GHz.

Mode: **UNII-2C(HT20)**

Distance of measurement: **3 meter**

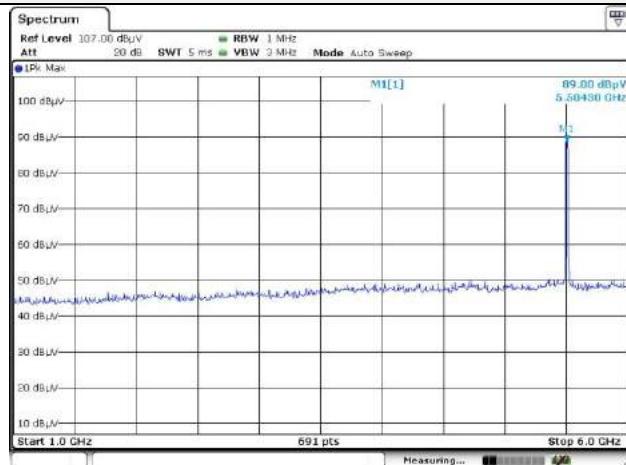
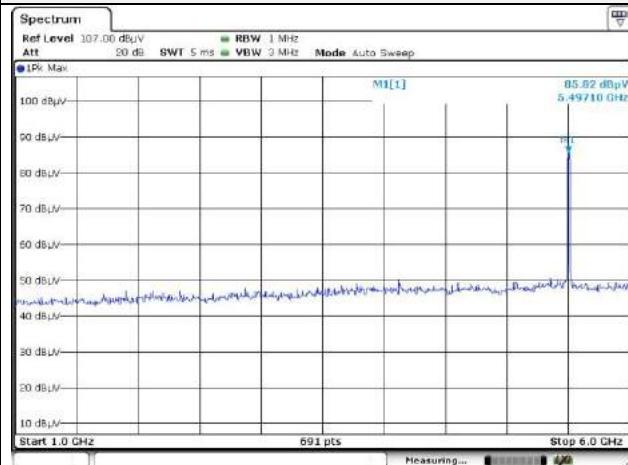
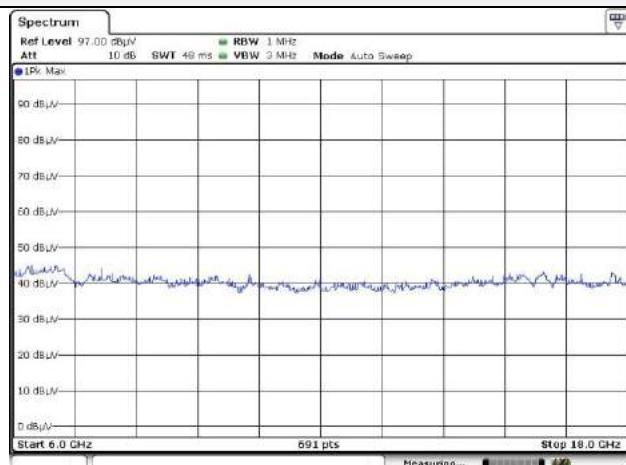
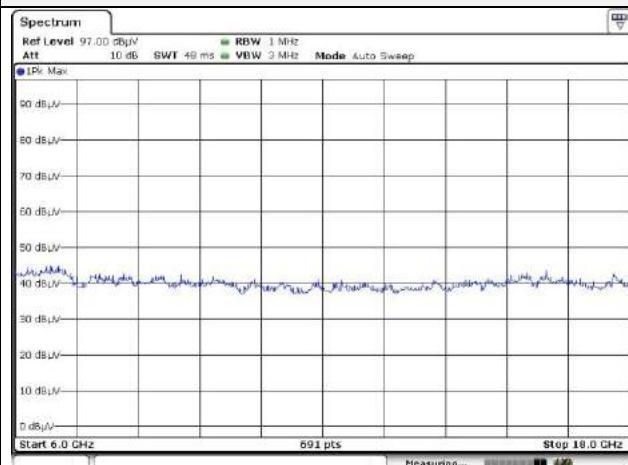
Channel: **100**

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5375.88	43.46	Peak	H	-3.60	-	39.86	74.00	34.14
5449.93	42.66	Peak	V	-3.56	-	39.10	74.00	34.90



Note.

1. Average test was not performed because peak result is lower than the average limit.

Horizontal // Peak for 1 GHz to 6 GHz

Vertical // Peak for 1 GHz to 6 GHz

Horizontal // Peak for 6 GHz to 18 GHz

Vertical // Peak for 6 GHz to 18 GHz


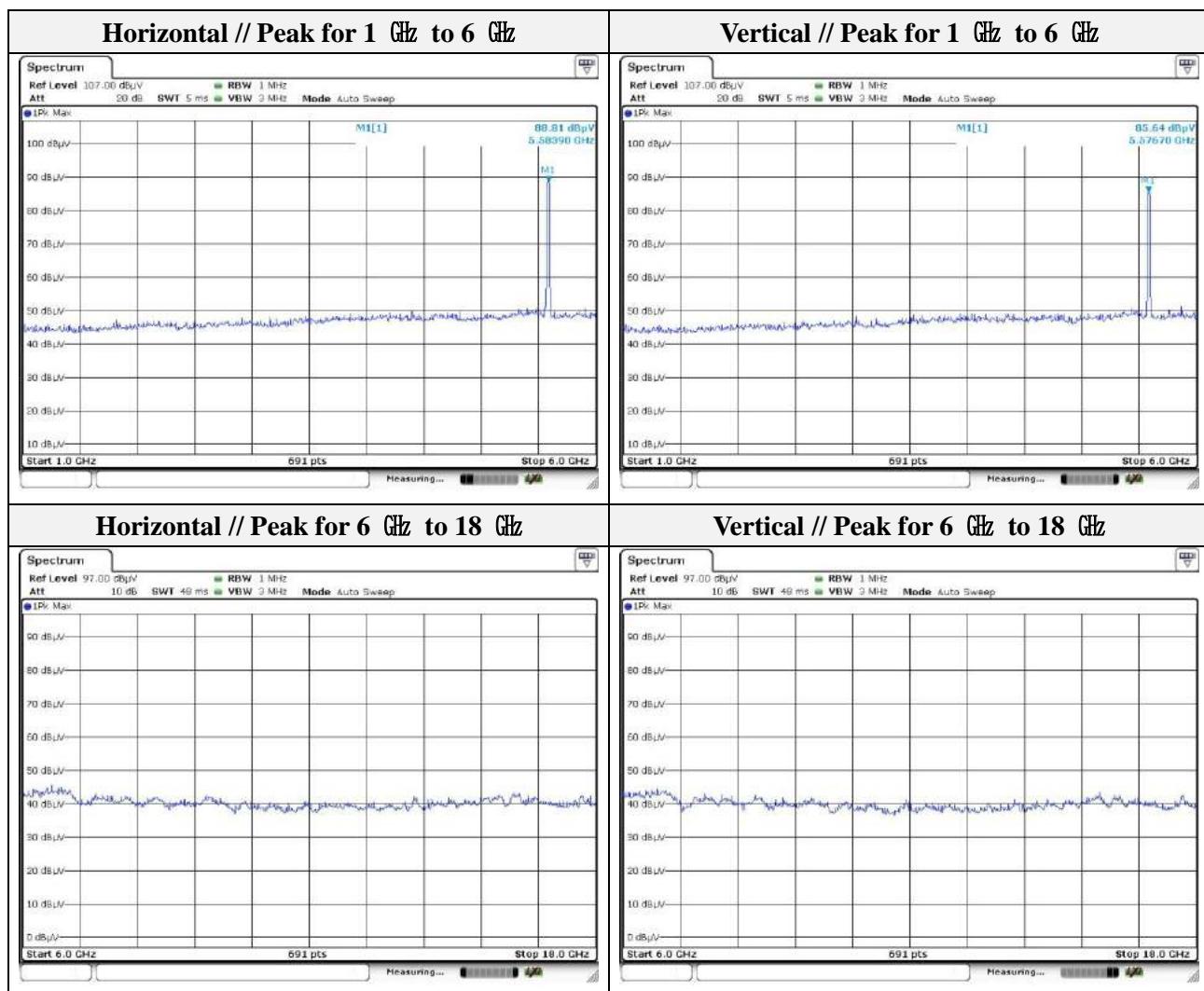
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Mode: UNII-2C(HT20)

Distance of measurement: 3 meter

Channel: 116

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



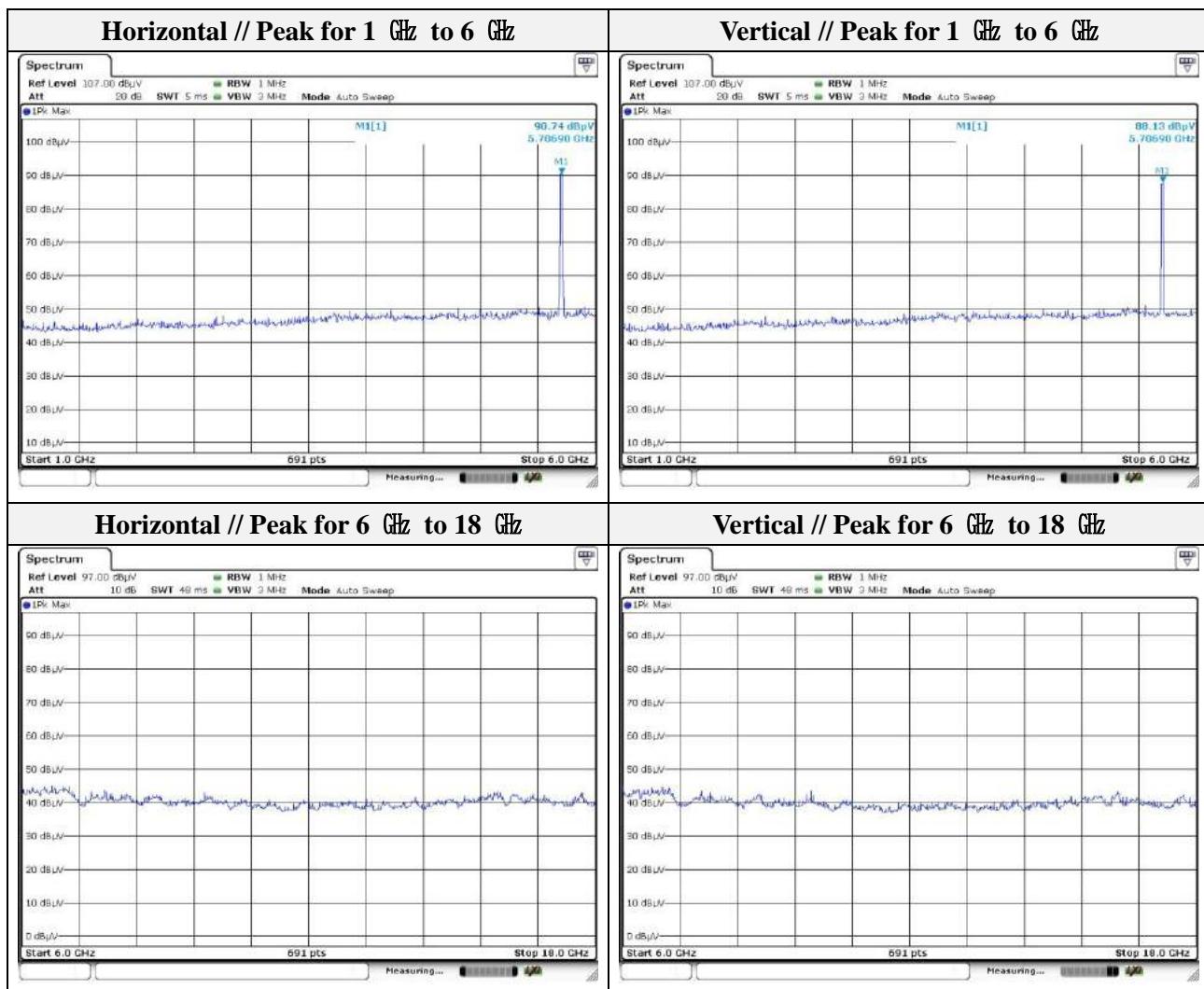
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Mode: UNII-2C(HT20)

Distance of measurement: 3 meter

Channel: 140

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
No spurious emission were detected above 6 GHz.								



Note.

1. No spurious emission were detected above 6 GHz.