



TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR25-SRF0078 Page (1) of (70)	KCTL
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1. Client

- Name : SHINHEE C&M.Co.,Ltd
- Address : 77, Barangongdan-ro 1-gil, Hyangnam-eup, Hwaseong-si, Gyeonggi-do, Republic of Korea
- Date of Receipt : 2024-07-11

2. Use of Report : Certification

3. Name of Product / Model : SHCNM Controller / SHSC-WB001

4. Manufacturer / Country of Origin : SHINHEE C&M.Co.,Ltd / Korea

5. FCC ID : 2BOB2SHSC-WB001

5. Date of Test : 2025-03-01 to 2025-03-18

6. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing
 (Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

7. Test method used : FCC Part 15 Subpart E, 15.407

8. Test Result : Refer to the test result in the test report

Affirmation	Tested by Name : Minwoo Kim (Signature)	Technical Manager Name : Harim Lee (Signature)
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2025-03-26

Eurofins KCTL Co.,Ltd.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.

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REPORT REVISION HISTORY

Date	Revision	Page No
2025-03-26	Originally issued	-

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General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ Statement not required by the standard or client used for type testing

CONTENTS

1.	General information	4
2.	Device information	4
2.1.	Accessory information	5
2.2.	Frequency/channel operations.....	5
2.3.	Simultaneous Tx Condition	6
3.	Antenna requirement	7
4.	Summary of tests	7
5.	Measurement uncertainty	8
6.	Measurement results explanation example	9
7.	Test results	10
7.1.	Spurious Emission, Band Edge and Restricted bands.....	10
7.2.	AC Conducted emission	68
8.	Measurement equipment	70

1. General information

Client : SHINHEE C&M.Co.,Ltd
 Address : 77, Barangongdan-ro 1-gil, Hyangnam-eup, Hwaseong-si, Gyeonggi-do, Republic of Korea
 Manufacturer : SHINHEE C&M.Co.,Ltd
 Address : 77, Barangongdan-ro 1-gil, Hyangnam-eup, Hwaseong-si, Gyeonggi-do, Republic of Korea
 Laboratory : Eurofins KCTL Co.,Ltd.
 Address : 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
 Accreditations : FCC Site Designation No: KR0040, FCC Site Registration No: 687132
 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056
 CAB Identifier: KR0040
 ISED Number: 8035A
 KOLAS No.: KT231

2. Device information

Equipment under test : SHCNM Controller
 Model : SHSC-WB001
 Modulation technique : Bluetooth(BDR/EDR) : GFSK, π /4DQPSK, 8DPSK
 Bluetooth(BLE) : GFSK
 WIFI(802.11a/b/g/n/ac) : DSSS, OFDM
 Number of channels : Bluetooth : 79 ch
 BLE : 40 ch
 2.4 GHz WLAN : 13 ch (20 MHz), 7 ch (40 MHz)
 UNII-1 : 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)
 UNII-2A : 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)
 Power source : 100 ~ 240 V 50/60 Hz
 Antenna specification : Dipole Antenna
 Antenna gain : BT/BLE/2.4 GHz WLAN : 2.00 dBi
 UNII-1 : 5.00 dBi
 UNII-2A : 5.00 dBi
 Frequency range : Bluetooth : 2 402 MHz ~ 2 480 MHz (BDR/EDR/BLE)
 2.4 GHz WLAN : 2 412 MHz ~ 2 472 MHz (802.11b/g/n_HT20)
 2 422 MHz ~ 2 452 MHz (802.11n_HT40)
 UNII-1 : 5 180 MHz ~ 5 240 MHz (802.11a/n/ac_HT20/VHT20)
 5 190 MHz ~ 5 230 MHz (802.11n/ac_HT40/VHT40)
 5 210 MHz (802.11ac_VHT80)
 UNII-2A : 5 260 MHz ~ 5 320 MHz (802.11a/n/ac_HT20/VHT20)
 5 270 MHz ~ 5 310 MHz (802.11n/ac_HT40/VHT40)
 5 290 MHz (802.11ac_VHT80)
 Software version : SH_SW 2.1
 Hardware version : SH_HW 1.4
 Test device serial No. : N/A
 Operation temperature : -20 °C ~ 50 °C

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
-	-	-	-	-

2.2. Frequency/channel operations

This device contains the following capabilities:

Bluetooth(BDR/EDR/BLE), WLAN 2.4 GHz(802.11b/g/n_HT20/HT40)

WLAN 5 GHz(802.11a/n_HT20/40/ac_VHT20/40/80)

UNII-1

Ch.	Frequency (MHz)
36	5 180
40	5 200
48	5 240

UNII-2A

Ch.	Frequency (MHz)
52	5 260
56	5 280
64	5 320

Table 2.2.1. 802.11a/n_HT20 mode

UNII-1

Ch.	Frequency (MHz)
38	5 190
46	5 230

UNII-2A

Ch.	Frequency (MHz)
54	5 270
62	5 310

Table 2.2.2. 802.11n_HT40 mode

UNII-1

Ch.	Frequency (MHz)
42	5 210

UNII-2A

Ch.	Frequency (MHz)
58	5 290

Table 2.2.3 802.11ac_VHT80 mode

2.3. Simultaneous Tx Condition

The device supports simultaneous transmission operation, which allows for two channels to operate independent of one another in the Bluetooth Low Energy, 5 GHz bands simultaneously.

Simultaneous Tx condition – not RSDB

Mode	# of TX	WLAN 5 GHz	Bluetooth Low Energy
Bluetooth Low Energy + 5G WLAN	2	O	O

Notes.

Simultaneous condition was performed as a worst case which is configured as a combination of lowest margin for each mode during radiated spurious emission.



3. Antenna requirement

Requirement of FCC part section 15.203:

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

- The transmitter has attached Dipole Antenna (external antenna) on the board.
- The E.U.T Complies with the requirement of §15.203, §15.407

4. Summary of tests

FCC Part section(s)	Parameter	Test Condition	Test results
15.207(a)	AC Conducted Emissions	Conducted	Pass
15.407(b), 15.205(a), 15.209(a)	Spurious emission	Radiated	Pass
	Band-edge, restricted band		Pass

Notes:

1. These test items were performed. Please refer to original module report.
 - Report No. RFBUI-WTW-P21040655-1, RFBUI-WTW-P21040655-4 issued on Apr. 21, 2021 by Bureau Veritas Consumer Products Services (H.K.) Ltd., (FCC ID: TX2-RTL8852BE)
2. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
3. 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.
4. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that Z orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in Z orientation.
5. The test procedure(s) in this report were performed in accordance as following.
 - ANSI C63.10-2013
 - KDB 789033 D02 v02r01
5. The worst-case data rates were:
 - 802.11a mode: 6Mbps
 - 802.11n HT20 mode: MCS0
 - 802.11n HT40 mode: MCS0
 - 802.11ac VHT80 mode: MCS0

5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicated a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty ($\pm$)	
Radiated spurious emissions	Below 30 MHz	2.3 dB
	30 MHz ~ 1 000 MHz	2.5 dB
	1 000 MHz ~ 18 000 MHz	4.7 dB
	Above 18 000 GHz	4.8 dB
Conducted Emissions	150 kHz to 30 MHz	2.8 dB

6. Measurement results explanation example

The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.

With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Frequency (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	10.02	9 000	11.91
50	10.06	10 000	12.14
100	10.13	11 000	12.69
200	10.19	12 000	12.26
300	10.24	13 000	12.04
400	10.29	14 000	12.15
500	10.34	15 000	12.44
600	10.36	16 000	12.38
700	10.43	17 000	12.44
800	10.45	18 000	12.53
900	10.48	19 000	12.57
1 000	10.51	20 000	12.42
2 000	10.84	21 000	12.78
3 000	10.80	22 000	12.64
4 000	11.18	23 000	12.86
5 000	11.28	24 000	13.56
6 000	11.34	25 000	15.18
7 000	11.49	26 000	13.00
8 000	11.93	26 500	13.44

Note.

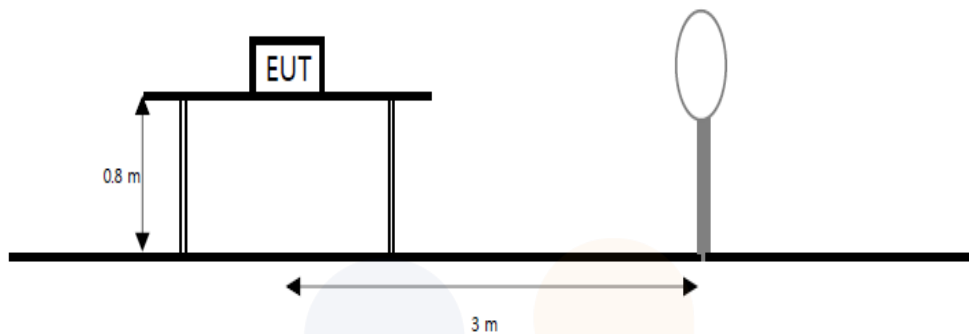
Offset(dB) = RF cable loss(dB) + Attenuator(dB)

7. Test results

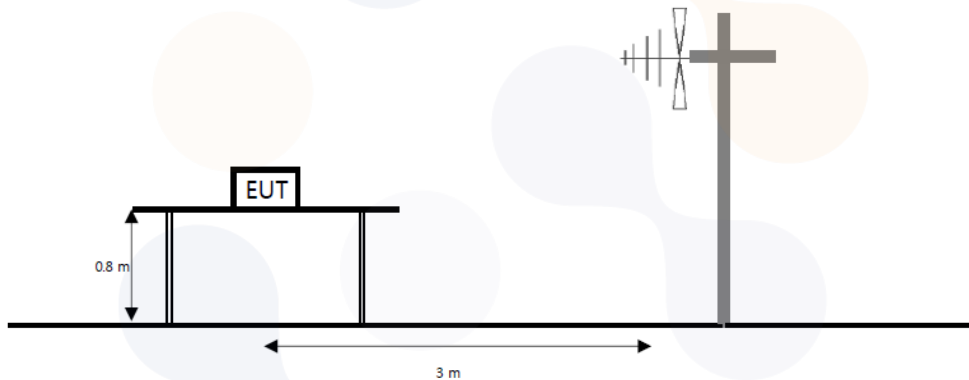
7.1. Spurious Emission, Band Edge and Restricted bands

Test setup

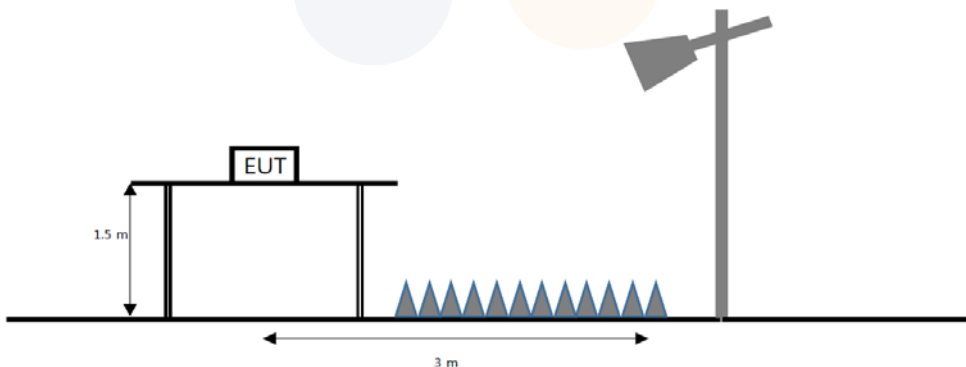
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



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.



Limit

According to section 15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength ($\mu V/m$)	Measurement distance (m)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**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., Section 15.231 and 15.241.

According to section 15.205(a) and (b), only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 – 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.386 75	25	2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	156.7 - 156.9	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	162.012 5 - 167.17	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	167.72 - 173.2	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	240 - 285	3 600 – 4 400	Above 38.6
13.36 - 13.41	322 - 335.4		

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in section 15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in section 15.35 apply to these measurements.

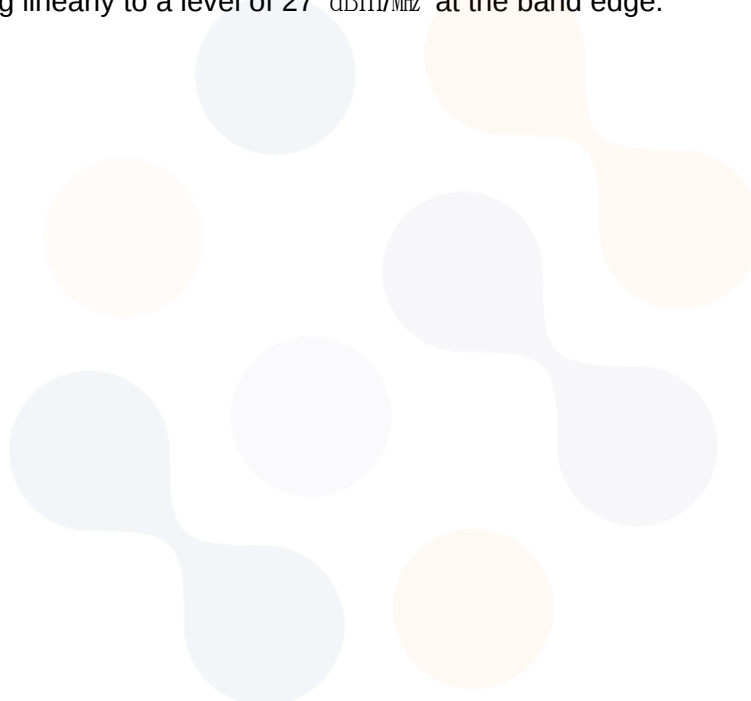
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According to section 15.407(b), undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

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

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.

For transmitters operating in the 5.725-5.85 GHz band: 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.



Test procedure

ANSI C63.10-2013 Section 12.7.5, 12.7.6, 12.7.7.2
 KDB 789033 D02 V02r01 – Section G

Test settings

Peak field strength measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW $\geq$ (3 $\times$ RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

Frequency	RBW
9 kHz to 150 kHz	200 Hz to 300 Hz
0.15 MHz to 30 MHz	9 kHz to 10 kHz
30 MHz to 1 000 MHz	100 kHz to 120 kHz
> 1 000 MHz	1 MHz

Average field strength measurements

Trace averaging with continuous EUT transmission at full power

If the EUT can be configured or modified to transmit continuously ($D \geq 98\%$), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

1. RBW = 1 MHz (unless otherwise specified).
2. VBW $\geq$ (3 $\times$ RBW).
3. Detector = RMS (power averaging), 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.
4. 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 to use linear voltage averaging. Log or dB averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and the duty cycle is constant (duty cycle variations are less than $\pm 2\%$), then the following procedure shall be used:

1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 MHz (unless otherwise specified).
4. VBW $\geq$ [3 $\times$ RBW].
5. Detector = RMS (power averaging), 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.

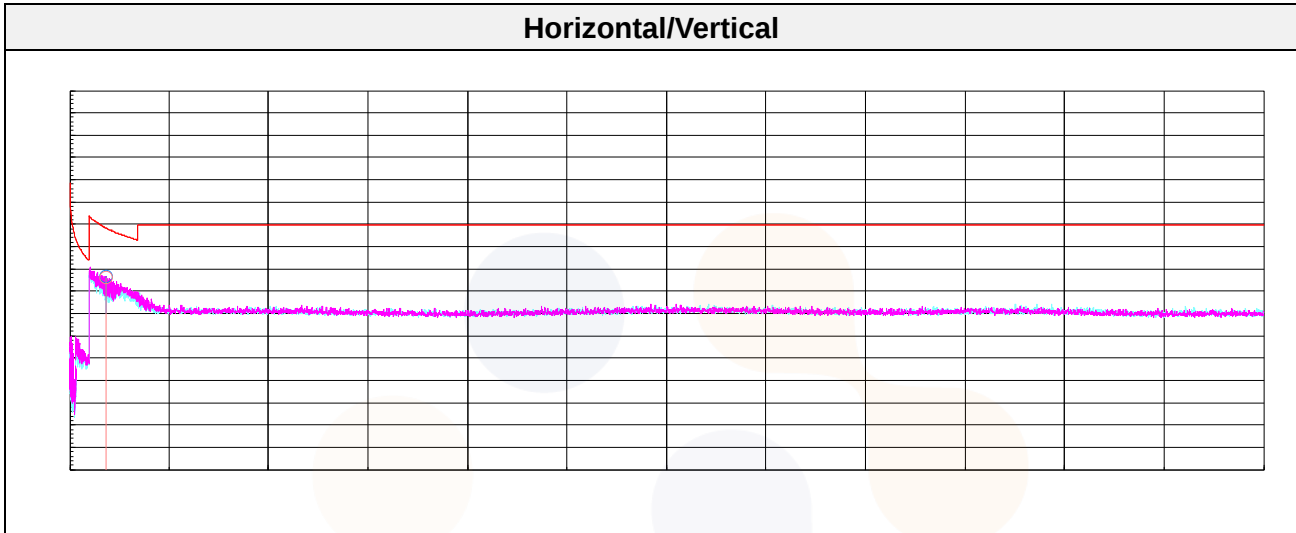
6. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
7. Sweep time = auto.
8. Perform a trace average of at least 100 traces.
9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (rms) mode was used in step f), then the applicable correction factor is $[10 \log (1 / D)]$, where D is the duty cycle.
 - 2) If linear voltage averaging mode was used in step f), then the applicable correction factor is $[20 \log (1 / D)]$, where D is the duty cycle.
 - 3) If a specific emission is demonstrated to be continuous ($D \geq 98\%$) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Notes:

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. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d (dB)
3. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. ¹⁾ means restricted band.
6. According to part 15.31(f)(2), an extrapolation factor of 40 dB/decade is applied because measured distance of radiated emission is 3m
7. Below 30 MHz frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 dB of the limit, then the following statement shall be made: "No spurious emissions were detected within 20 dB of the limit."
8. For above 1 GHz pre-scan to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

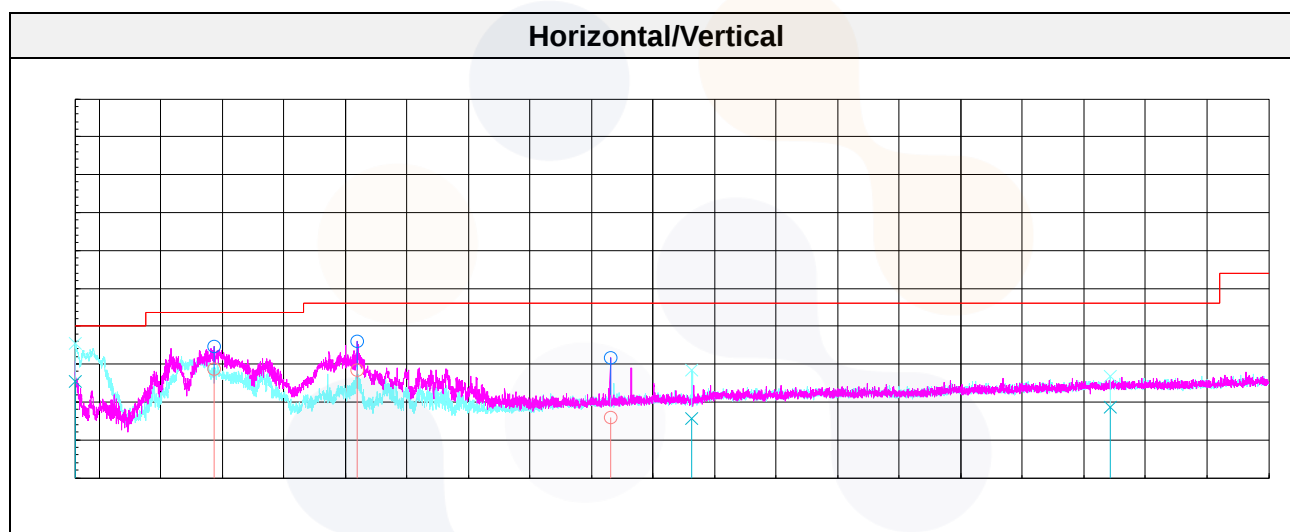
Test results (Below 30 MHz) – Worst case: 802.11n HT40_UNII 1_5 190 MHz

Frequency	Pol.	Reading	Ant. Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data								
0.92	H	58.20	20.28	-32.33	40.00	6.15	28.30	22.15



Test results (Below 1 000 MHz) – Worst case: 802.11n HT40_UNII 1_5 190 MHz

Frequency	Pol.	Reading	Amp. + Cable	Antenna Factor	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Quasi peak data								
30.24	V	32.60	24.70	-32.02	-	25.28	40.00	14.72
143.13	H	43.00	17.20	-31.35	-	28.85	43.50	14.65
259.65 ¹⁾	H	39.70	19.56	-30.94	-	28.32	46.00	17.68
465.17	H	23.60	22.80	-30.55	-	15.85	46.00	30.15
531.61	V	22.80	23.28	-30.57	-	15.51	46.00	30.49
871.23	V	21.60	26.30	-29.34	-	18.56	46.00	27.44



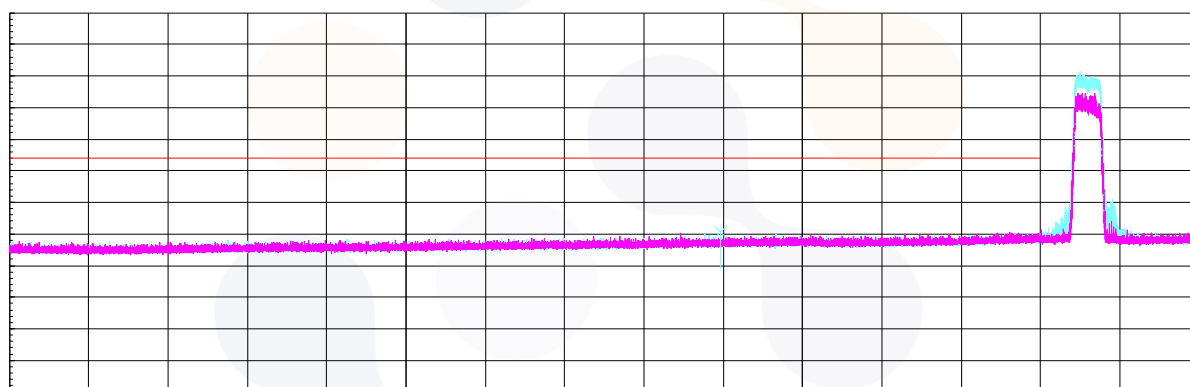
Test results (Above 1 000 MHz)

802.11a UNII 1

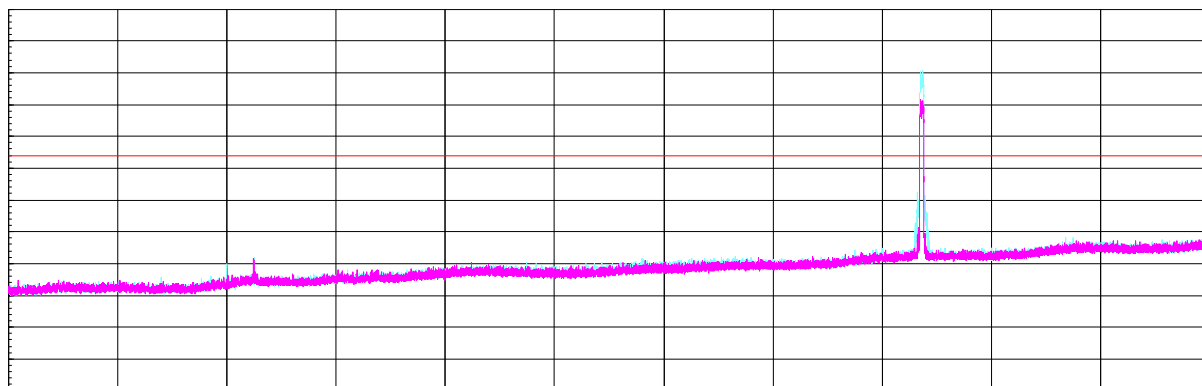
Lowest Channel (5 180 MHz)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
4 948.45 ¹⁾	V	45.20	32.89	-27.51	-	50.58	74.00	23.42
10 317.62	H	56.20	38.90	-44.58	-	50.52	68.20	17.68
15 553.18 ¹⁾	V	54.90	37.99	-42.44	-	50.45	74.00	23.55
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

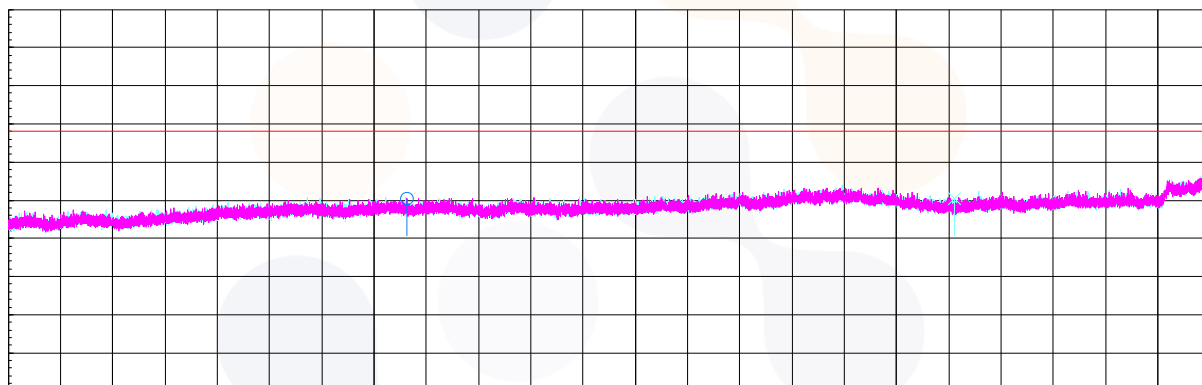
Horizontal/Vertical for Band-edge



Horizontal/Vertical for 1 GHz ~ 6.5 GHz



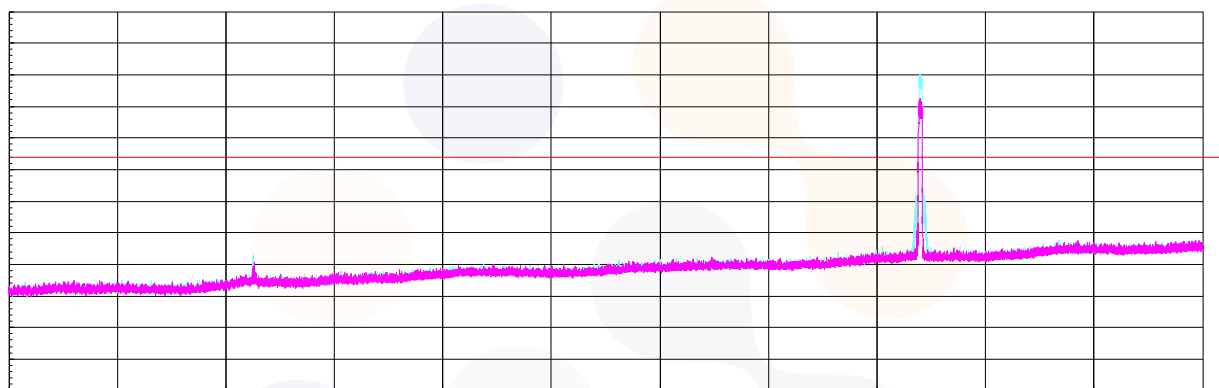
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



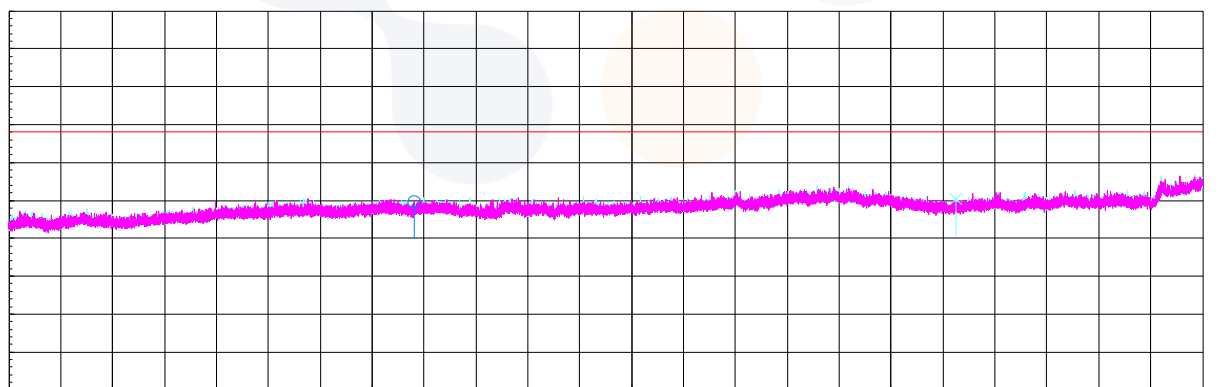
Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
10 406.55	H	55.40	38.80	-44.54	-	49.66	68.20	18.54
15 628.70 ¹⁾	V	54.90	37.84	-42.43	-	50.31	74.00	23.69
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



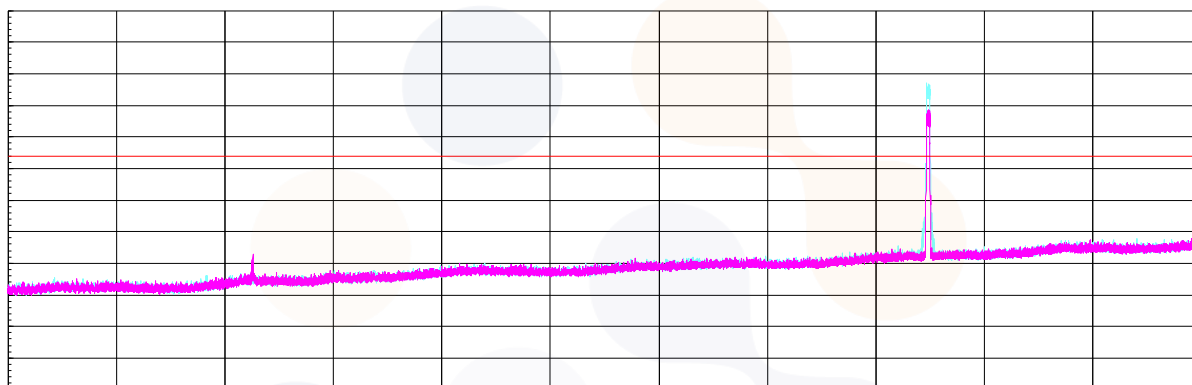
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



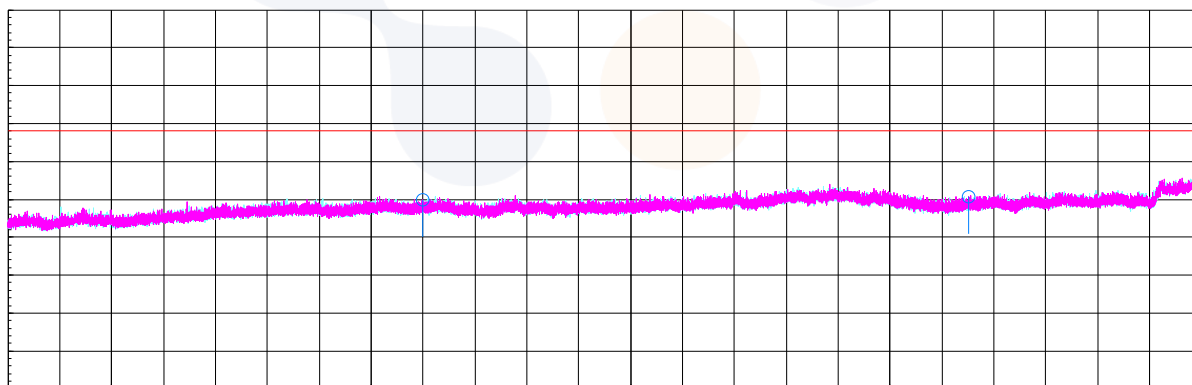
Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
10 498.55	H	55.60	39.00	-44.50	-	50.10	68.20	18.10
15 756.73 ¹⁾	H	55.20	37.90	-42.40	-	50.70	74.00	23.30
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



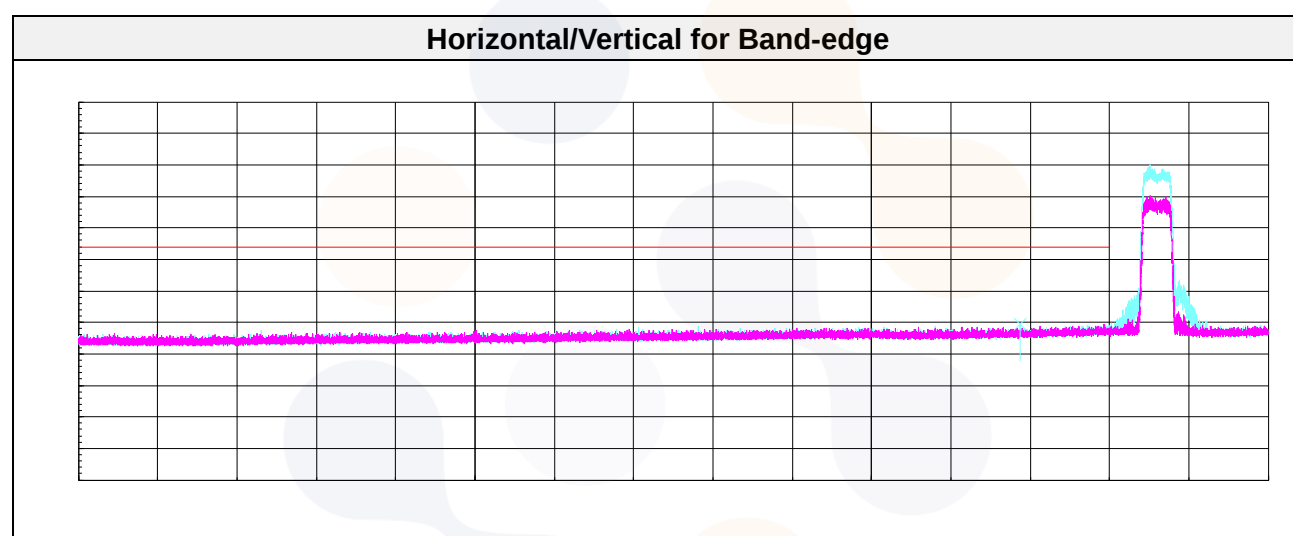
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



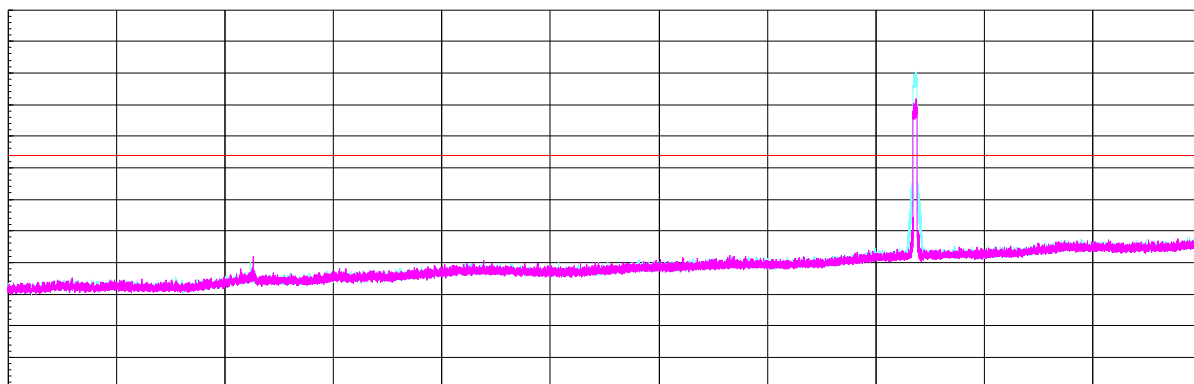
802.11n HT20 UNII 1

Lowest Channel (5 180 MHz)

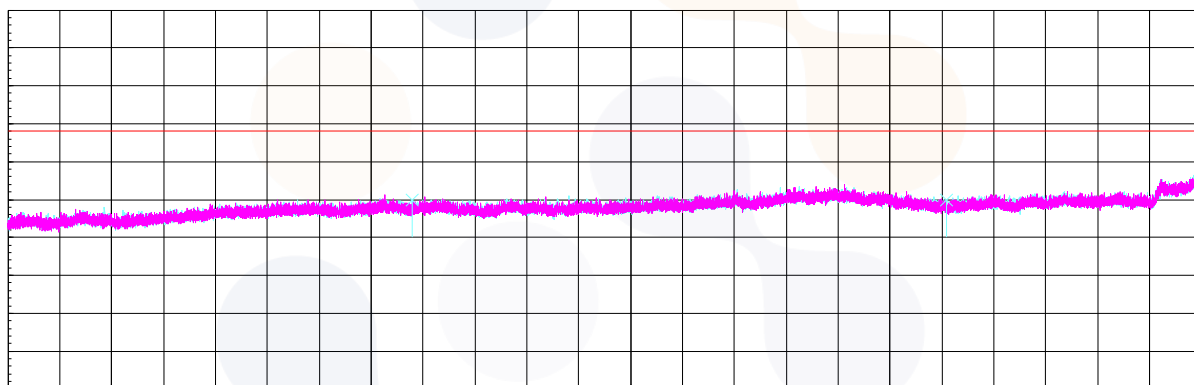
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB($\mu V/m$))	(dB($\mu V/m$))	(dB)
Peak data								
5 093.50 ¹⁾	V	43.70	33.29	-27.40	-	49.59	74.00	24.41
10 398.50	V	55.50	38.70	-44.54	-	49.66	68.20	18.54
15 544.75 ¹⁾	V	54.40	38.11	-42.44	-	50.07	74.00	23.93
Average Data								
No spurious emissions were detected within 20 dB of the limit.								



Horizontal/Vertical for 1 GHz ~ 6.5 GHz



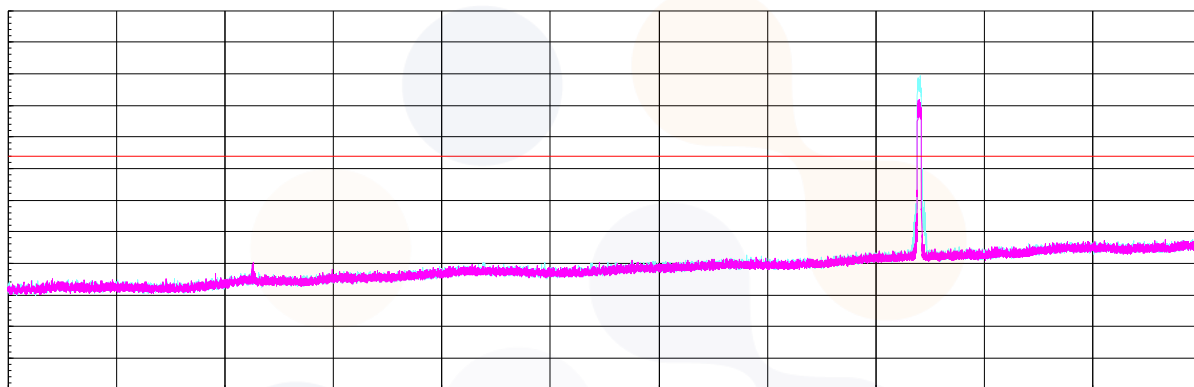
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



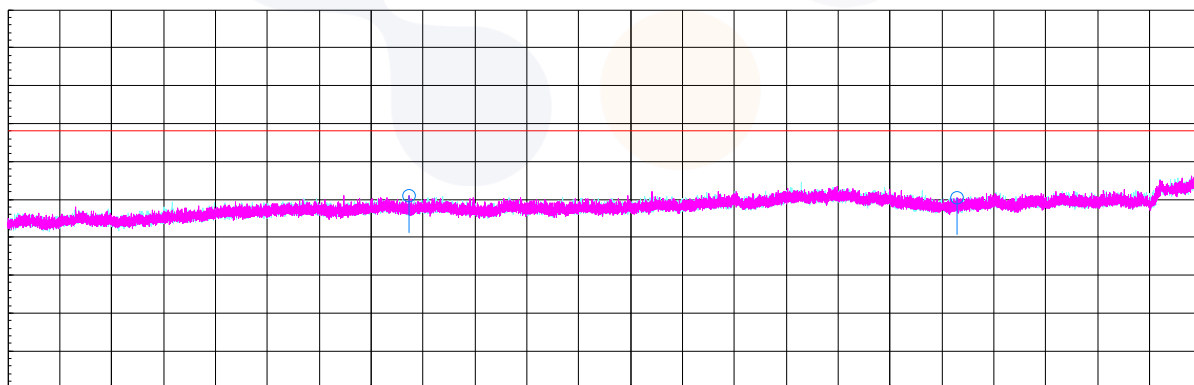
Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
10 366.30	H	56.90	38.77	-44.56	-	51.11	68.20	17.09
15 639.82 ¹⁾	H	55.00	37.82	-42.43	-	50.39	74.00	23.61
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



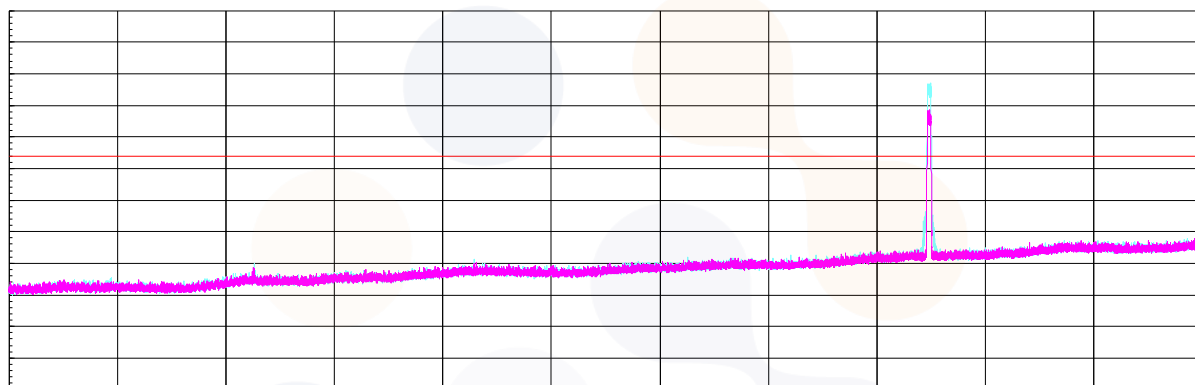
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



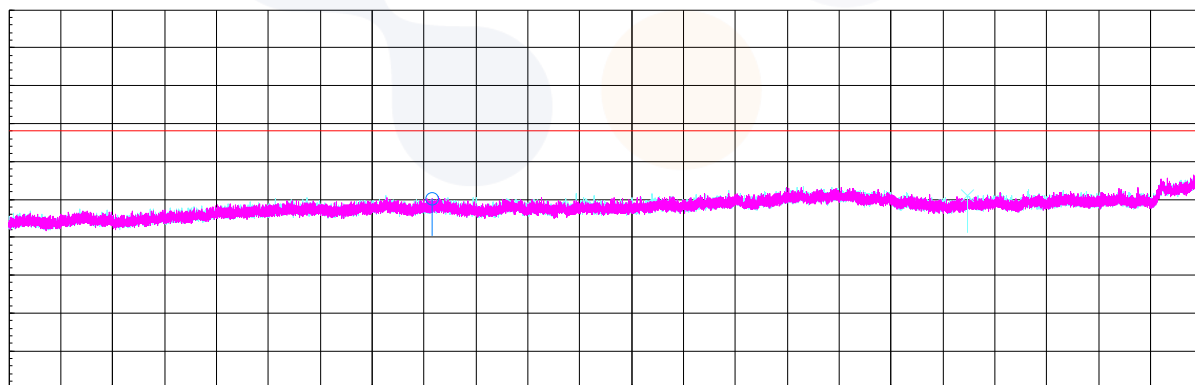
Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
10 577.13	H	55.60	39.05	-44.60	-	50.05	68.20	18.15
15 737.95 ¹⁾	V	55.50	37.90	-42.42	-	50.98	74.00	23.02
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



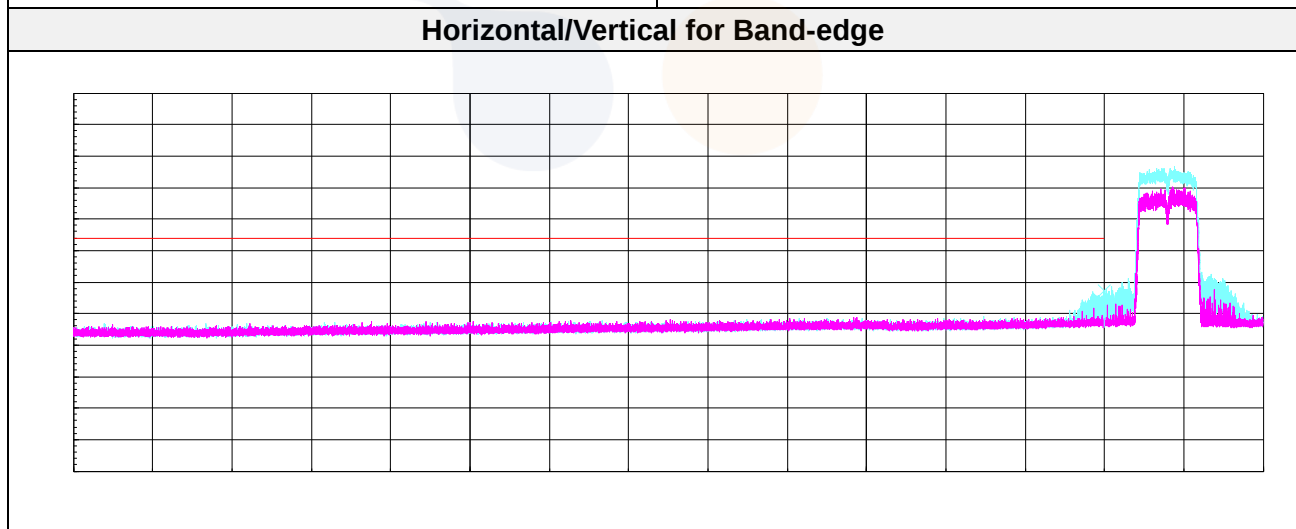
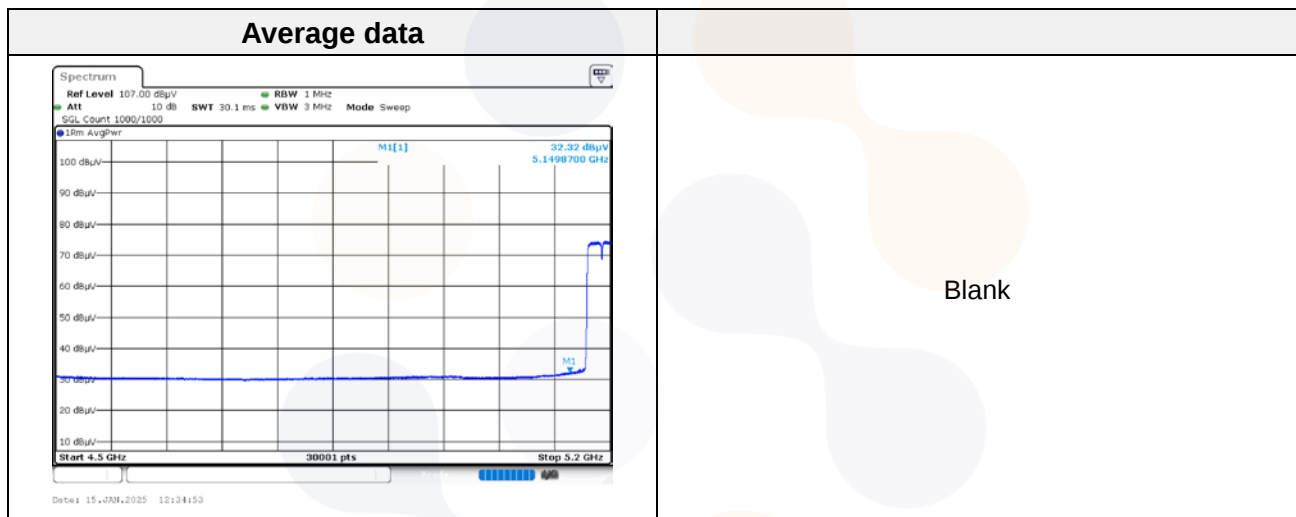
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



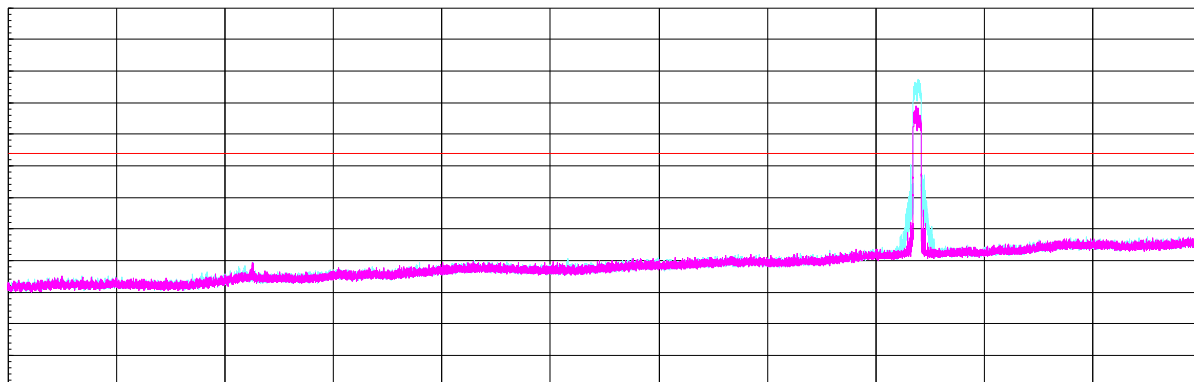
802.11n HT40 UNII 1

Lowest Channel (5 190 MHz)

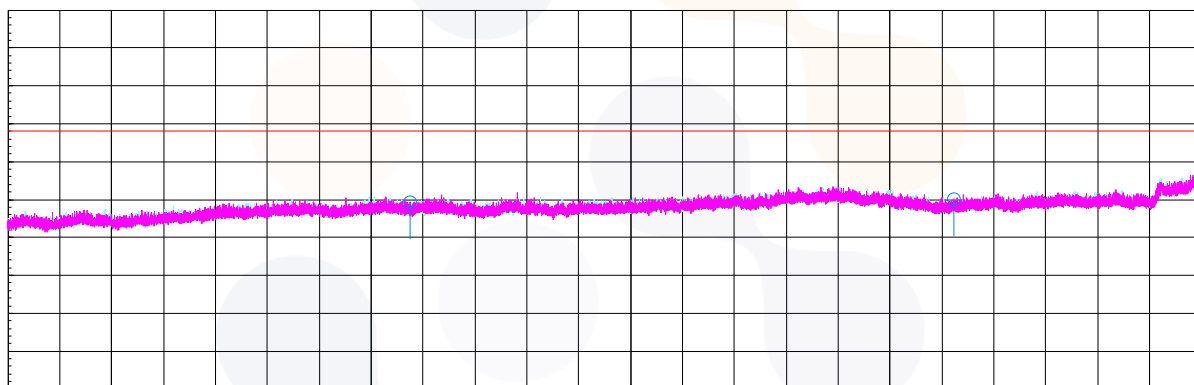
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
5 149.87 ¹⁾	V	51.40	33.20	-27.26	-	57.34	74.00	16.66
10 379.72	H	55.30	38.74	-44.55	-	49.49	68.20	18.71
15 617.97 ¹⁾	H	54.70	37.86	-42.43	-	50.13	74.00	23.87
Average Data								
5 149.87 ¹⁾	V	32.32	33.20	-27.26	0.33	38.59	54.00	15.41



Horizontal/Vertical for 1 GHz ~ 6.5 GHz



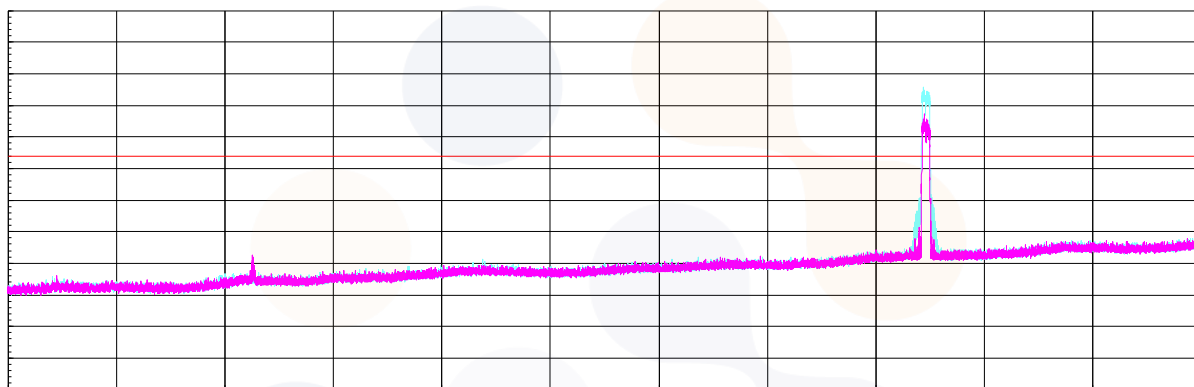
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



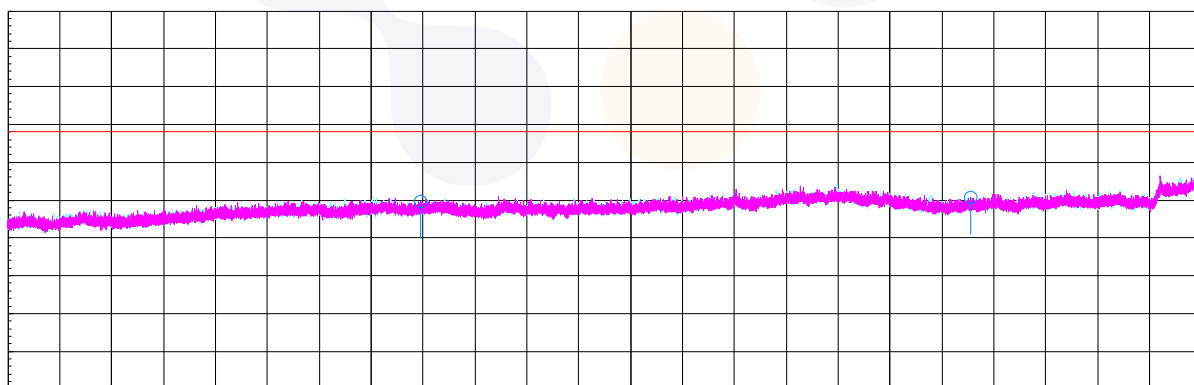
Highest Channel (5 230 MHz)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
10 476.32	H	55.30	38.95	-44.51	-	49.74	68.20	18.46
15 776.67 ¹⁾	H	55.10	37.90	-42.34	-	50.66	74.00	23.34
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



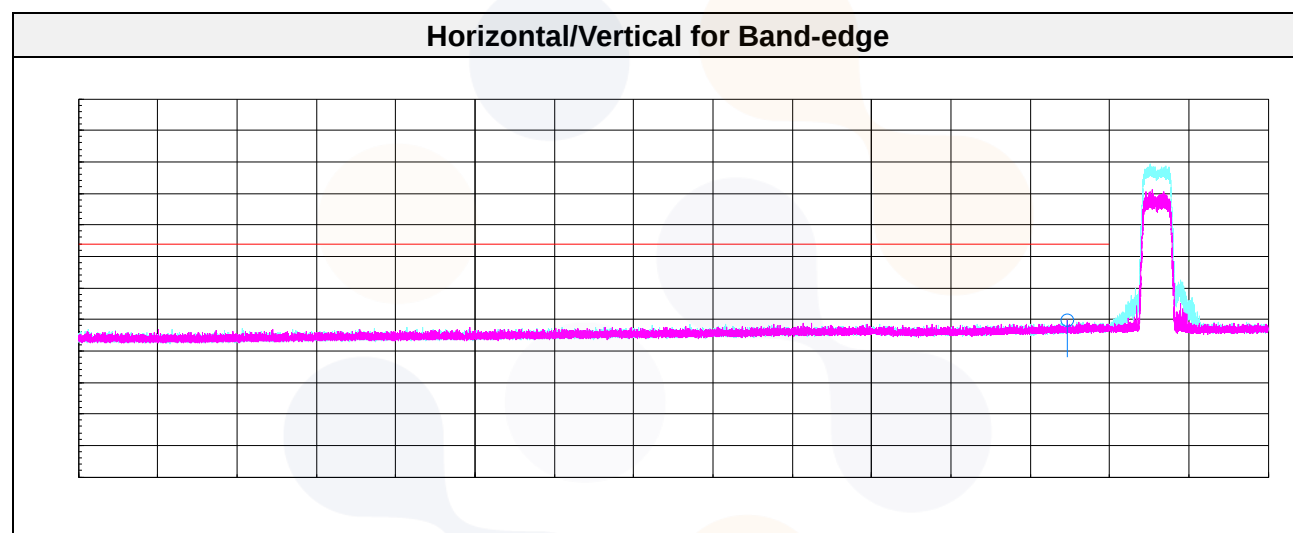
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



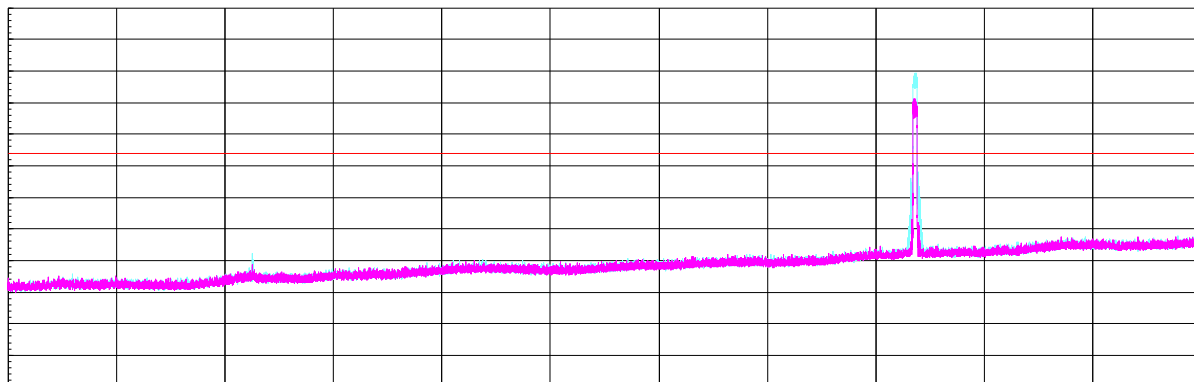
802.11ac VHT20 UNII 1

Lowest Channel (5 180 MHz)

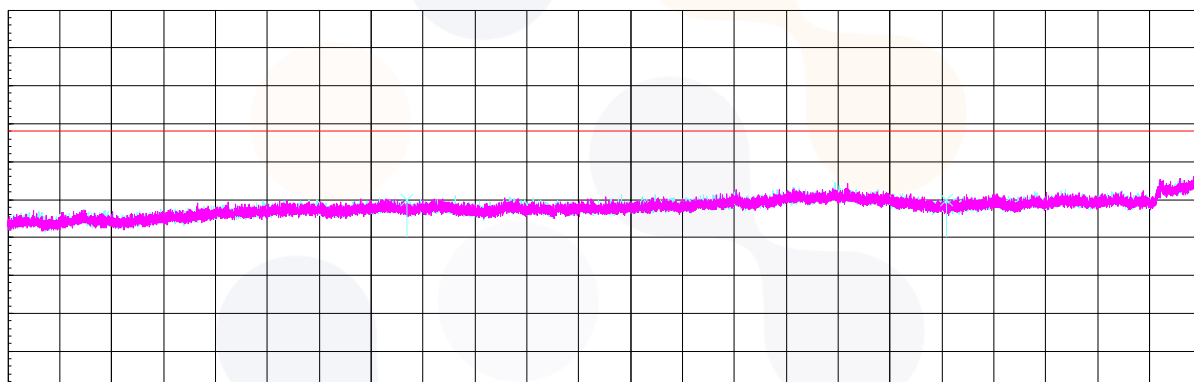
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB($\mu V/m$))	(dB($\mu V/m$))	(dB)
Peak data								
5 123.35 ¹⁾	H	43.80	33.20	-27.32	-	49.68	74.00	24.32
10 341.00	V	55.60	38.90	-44.57	-	49.93	68.20	18.27
15 541.30 ¹⁾	V	54.20	38.12	-42.44	-	49.88	74.00	24.12
Average Data								
No spurious emissions were detected within 20 dB of the limit.								



Horizontal/Vertical for 1 GHz ~ 6.5 GHz



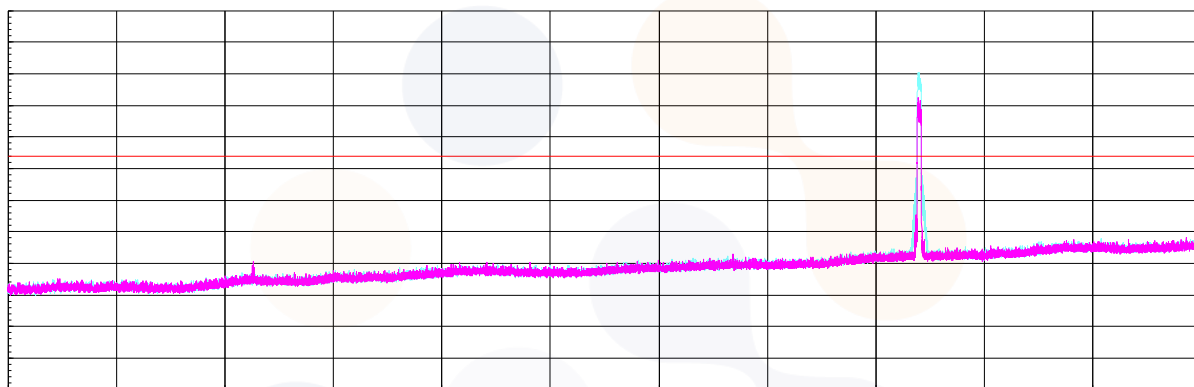
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



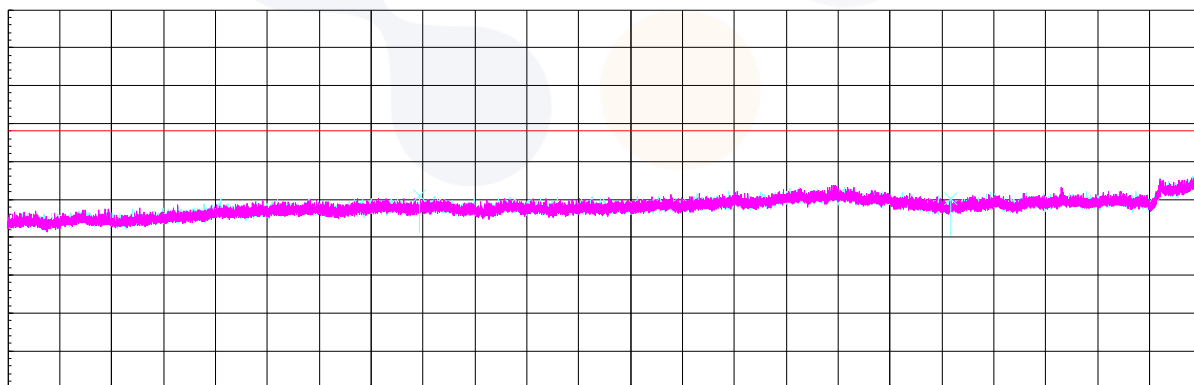
Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB($\mu V/m$))	(dB($\mu V/m$))	(dB)
Peak data								
10 470.95	V	56.50	38.94	-44.51	-	50.93	68.20	17.27
15 581.93 ¹⁾	V	54.70	37.87	-42.43	-	50.14	74.00	23.86
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



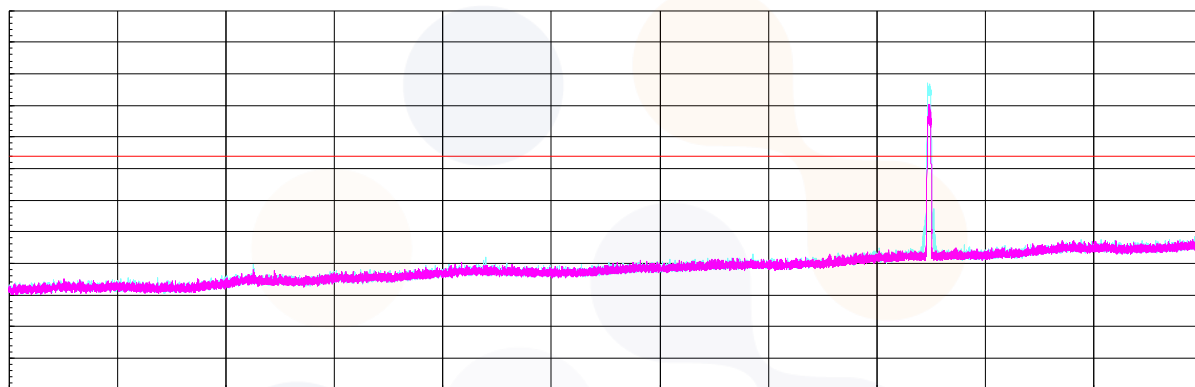
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



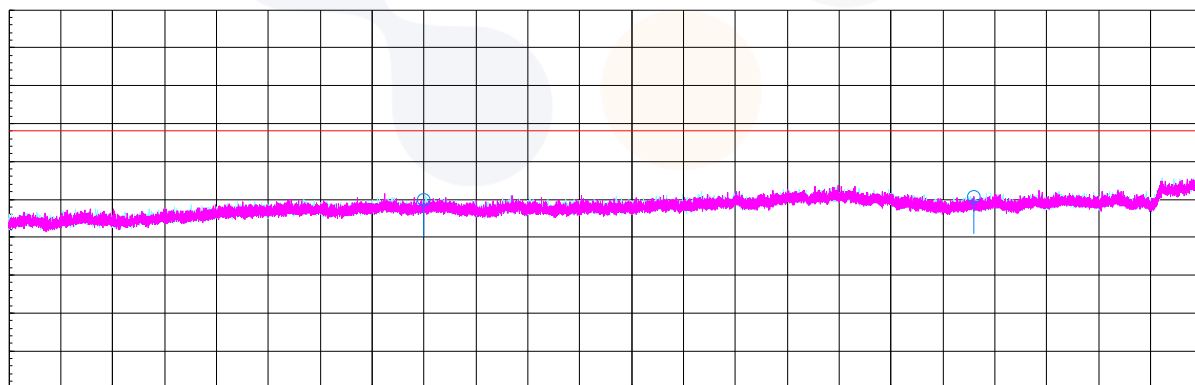
Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
10 497.40	H	55.30	38.99	-44.50	-	49.79	68.20	18.41
15 793.15 ¹⁾	H	55.10	37.90	-42.30	-	50.70	74.00	23.30
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



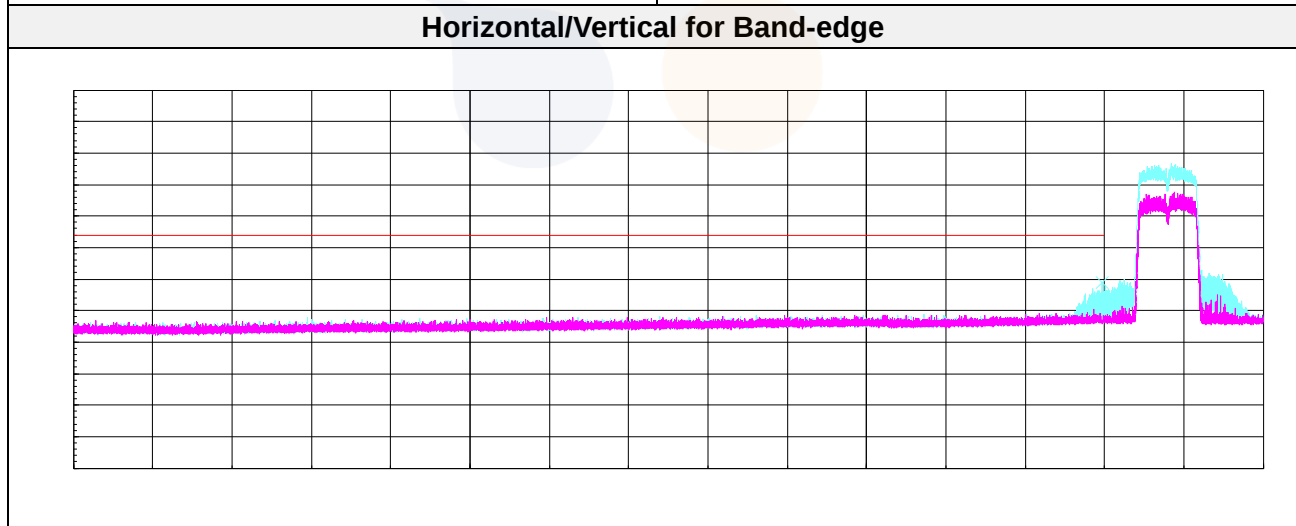
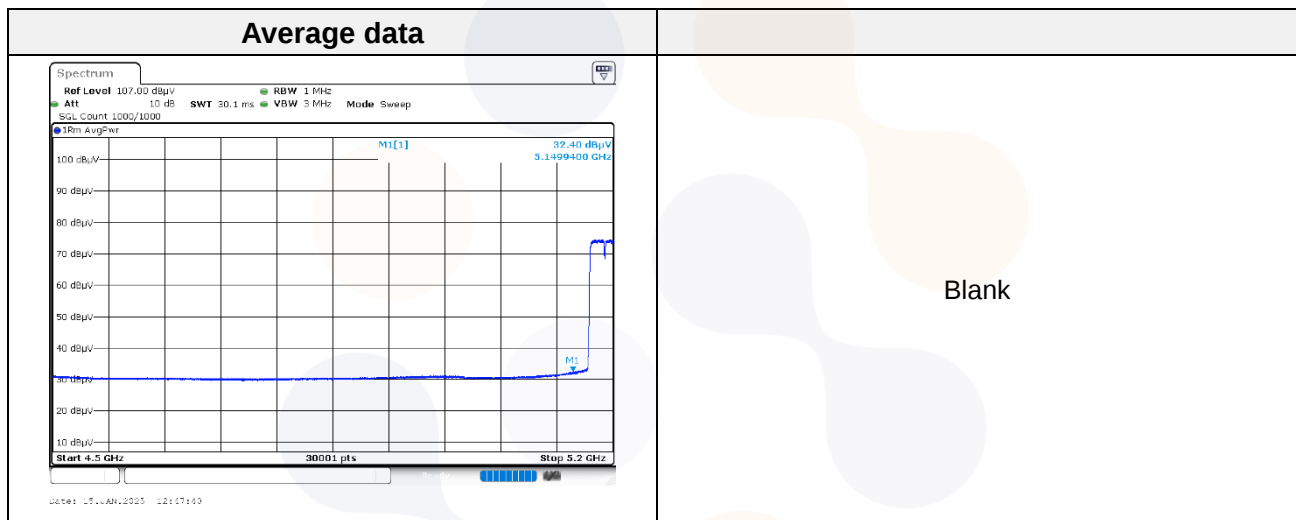
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



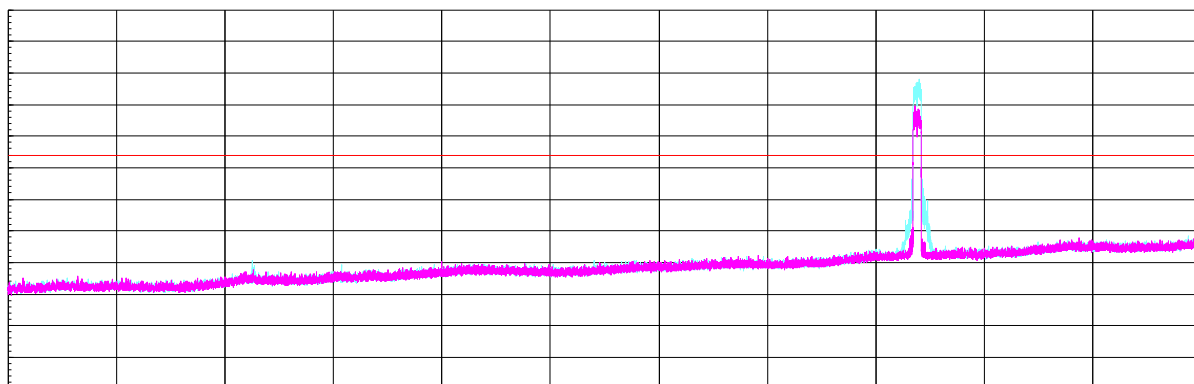
802.11ac VHT40 UNII 1

Lowest Channel (5 190 MHz)

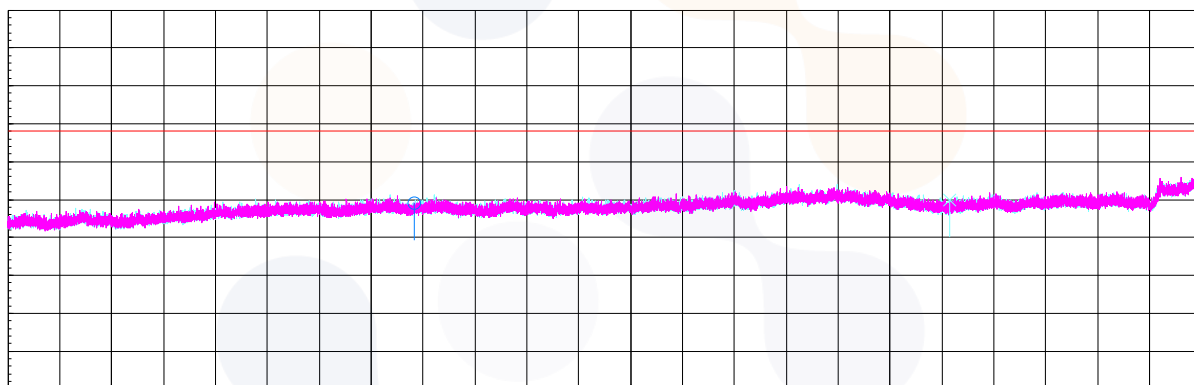
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
5 149.94 ¹⁾	V	53.10	33.20	-27.26	-	59.04	74.00	14.96
10 413.07	H	54.90	38.80	-44.54	-	49.16	68.20	19.04
15 577.72 ¹⁾	V	54.40	37.89	-42.43	-	49.86	74.00	24.14
Average Data								
5 149.94 ¹⁾	V	32.40	33.20	-27.26	1.12	39.46	54.00	14.54



Horizontal/Vertical for 1 GHz ~ 6.5 GHz



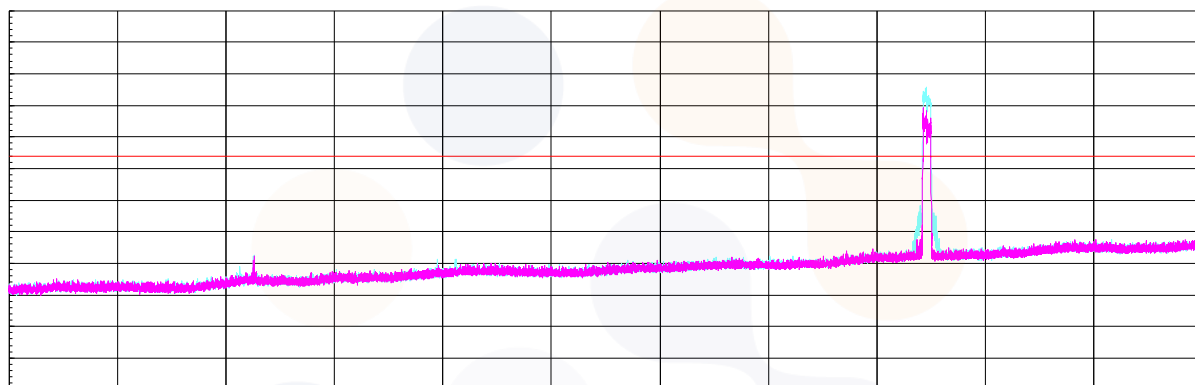
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



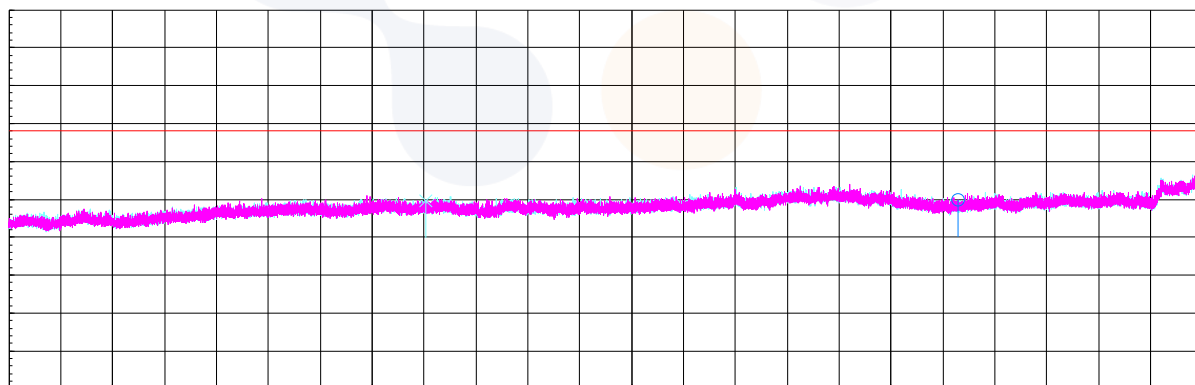
Highest Channel (5 230 MHz)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
10 515.42	V	55.10	38.90	-44.52	-	49.48	68.20	18.72
15 649.02 ¹⁾	H	54.40	37.80	-42.43	-	49.77	74.00	24.23
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



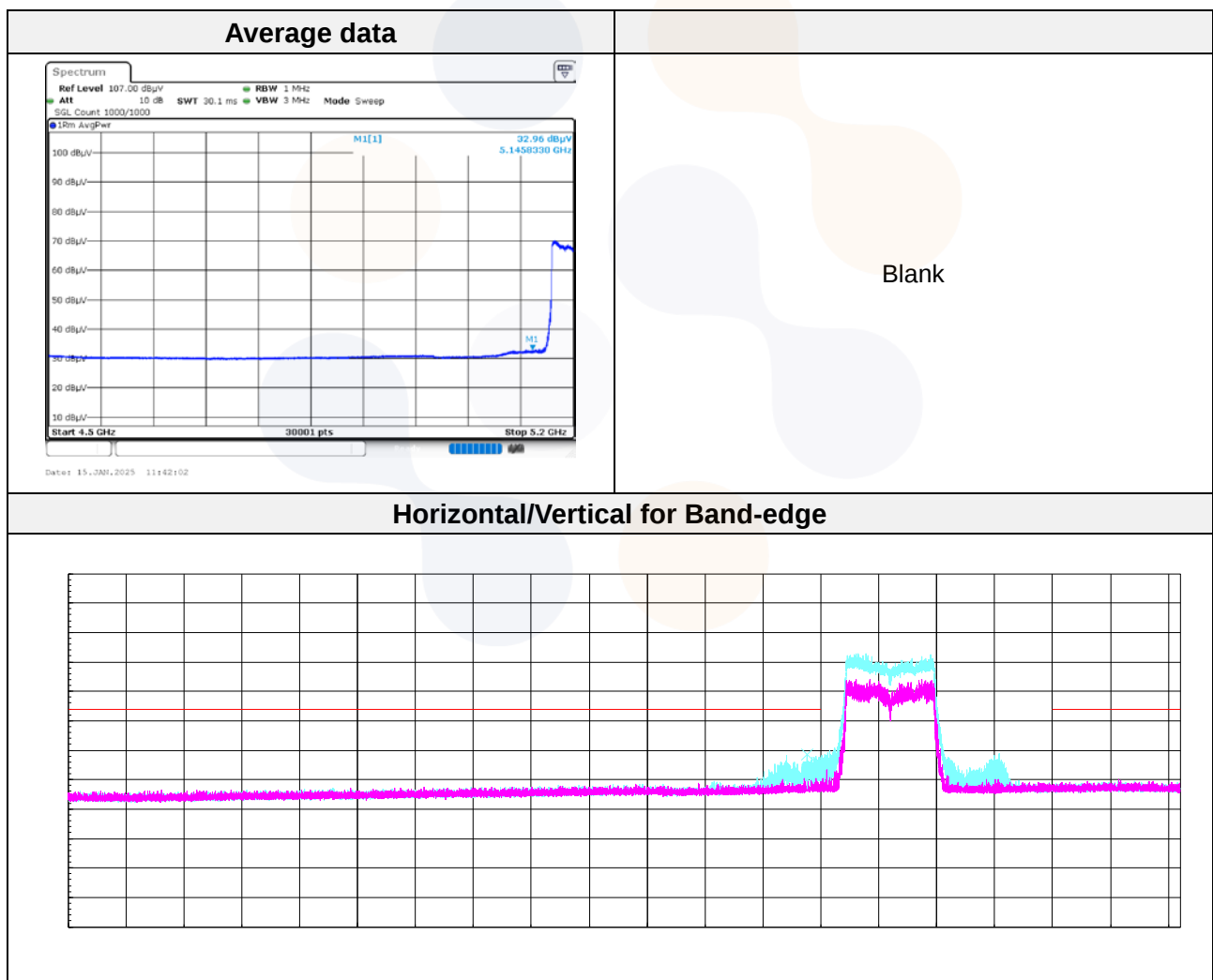
Horizontal/Vertical for 6.5 GHz ~ 18 GHz



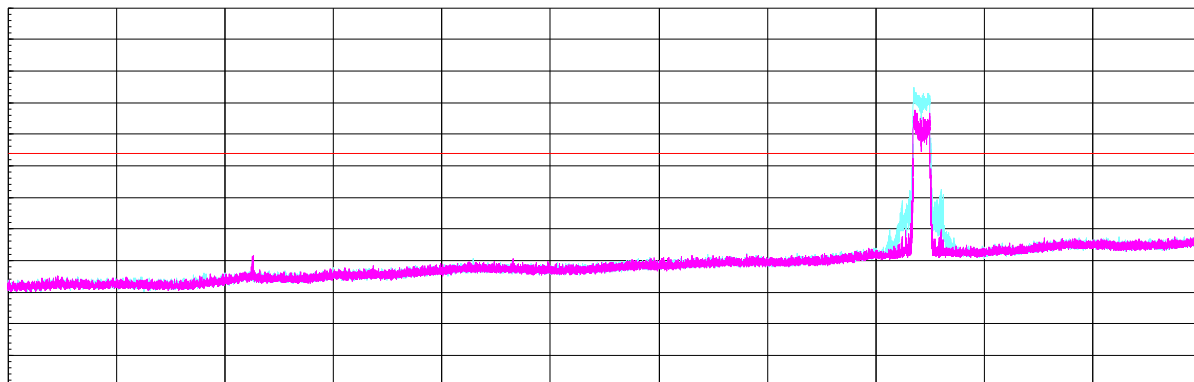
802.11ac VHT80 UNII 1

Lowest Channel (5 210 MHz)

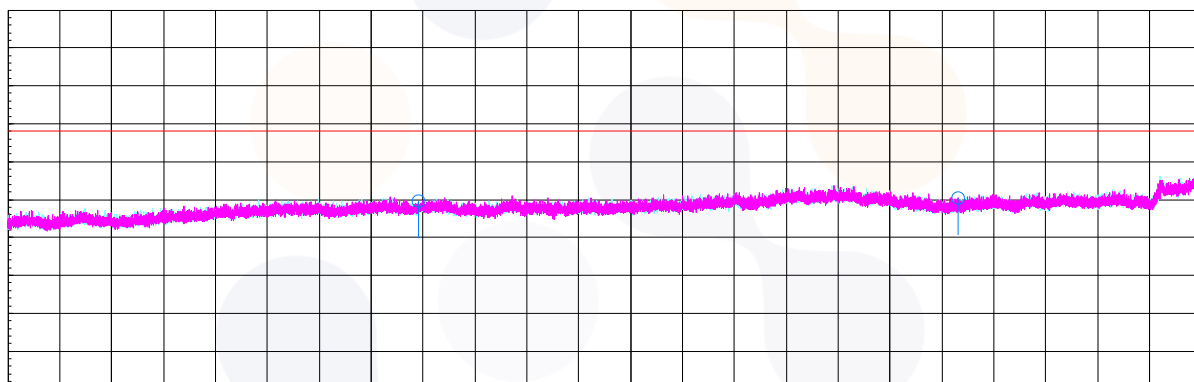
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
5 145.83 ¹⁾	V	52.60	33.20	-27.27	-	58.53	74.00	15.47
10 452.55	H	55.20	38.91	-44.52	-	49.59	68.20	18.61
15 655.92 ¹⁾	H	54.90	37.90	-42.43	-	50.37	74.00	23.63
Average Data								
5 145.83 ¹⁾	V	32.96	33.20	-27.27	1.87	40.76	54.00	13.24



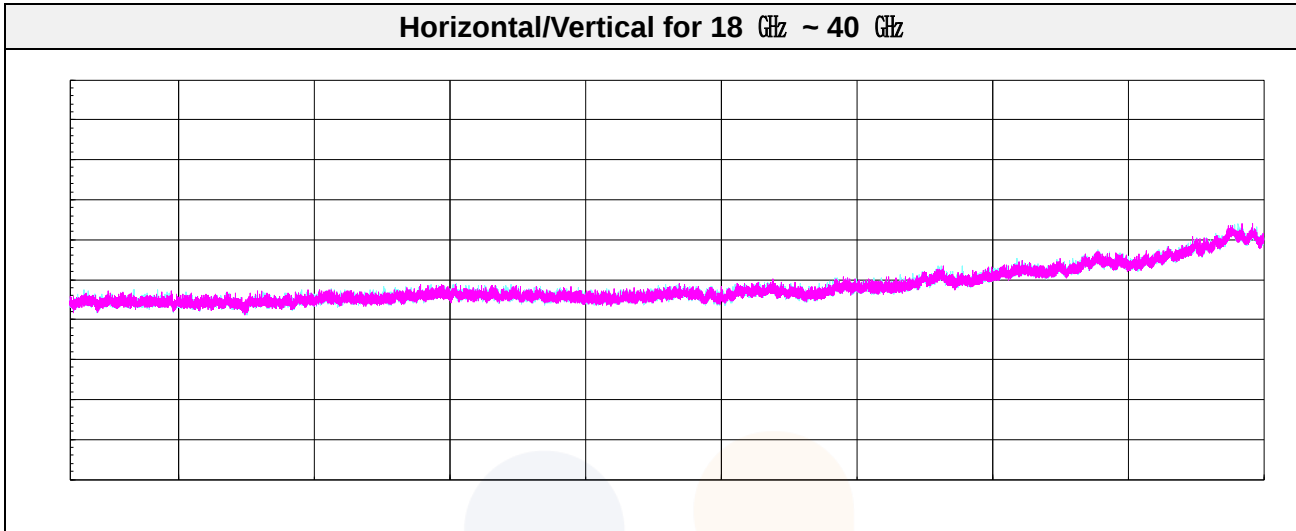
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Test results (Above 18 GHz) – Worst case: 802.11n HT20_UNII 1_5 200 MHz

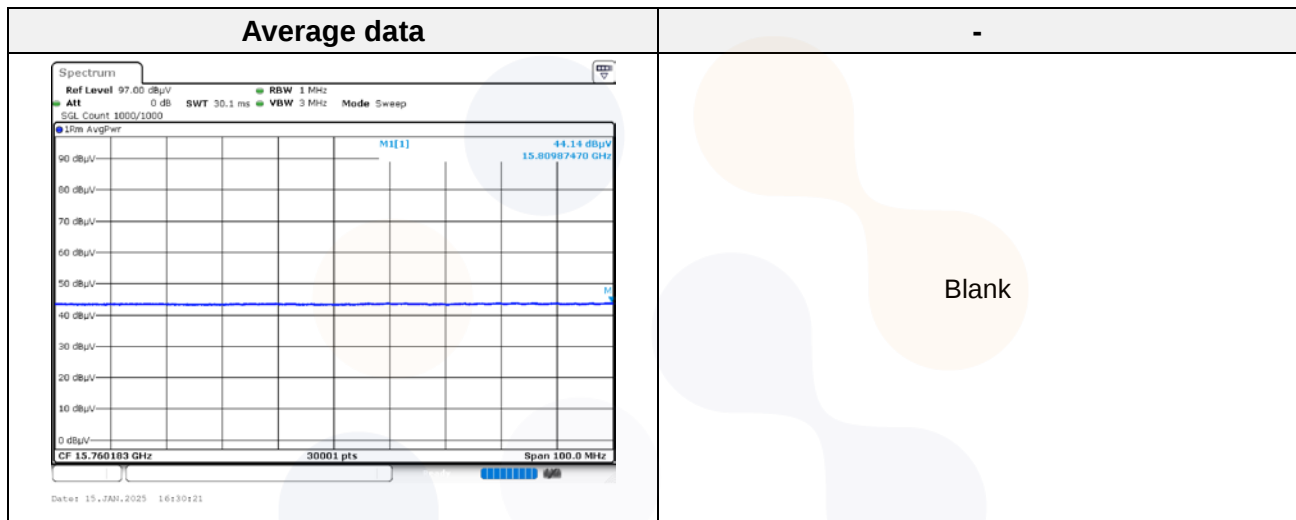


Note: The Worst case was based on the lowest margin condition considering Harmonic and Spurious Emission.

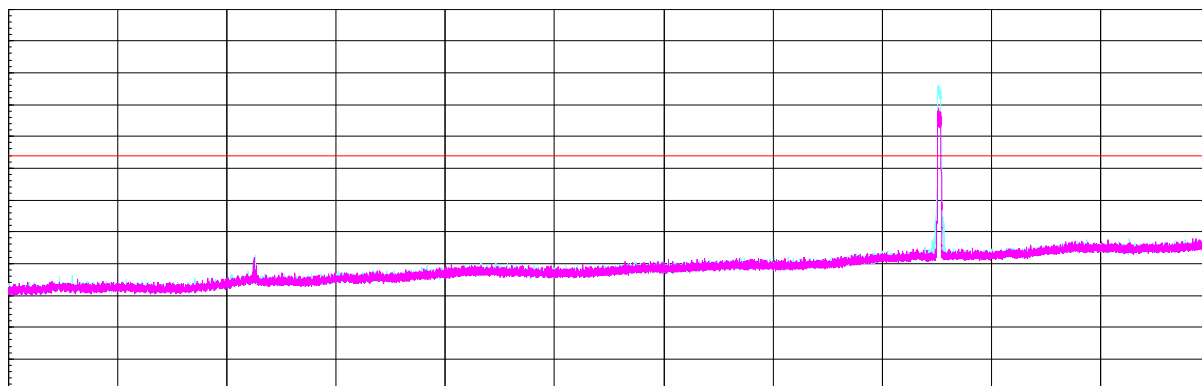
802.11a UNII 2A

Lowest Channel (5 260 MHz)

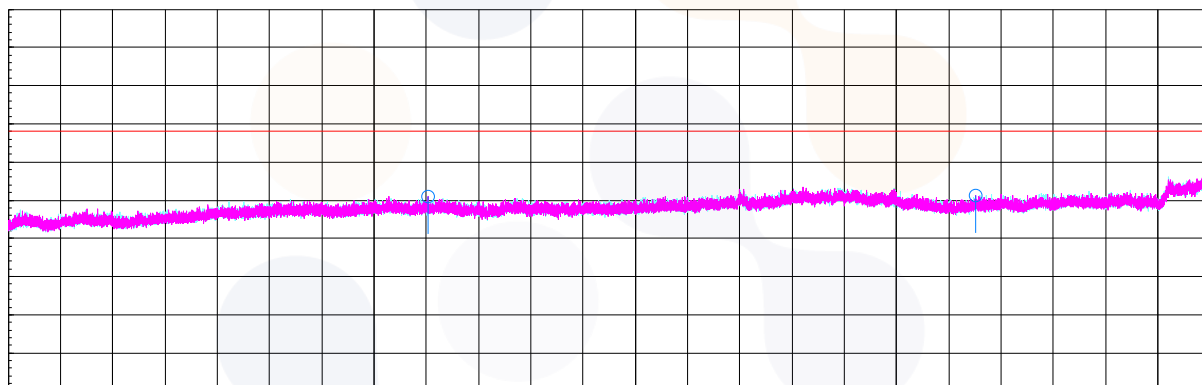
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
10 516.95	H	56.50	38.90	-44.52	-	50.88	68.20	17.32
15 809.87 ¹⁾	H	55.70	37.90	-42.25	-	51.35	74.00	22.65
Average Data								
15 809.87 ¹⁾	H	44.14	37.90	-42.25	0.29	40.08	54.00	13.92



Horizontal/Vertical for 1 GHz ~ 6.5 GHz

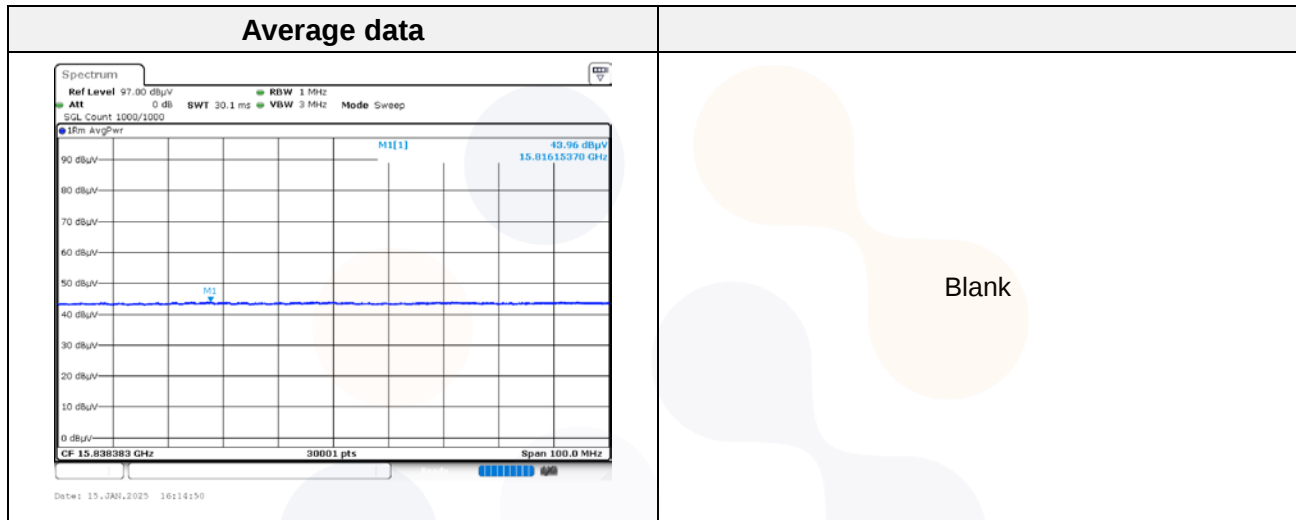


Horizontal/Vertical for 6.5 GHz ~ 18 GHz

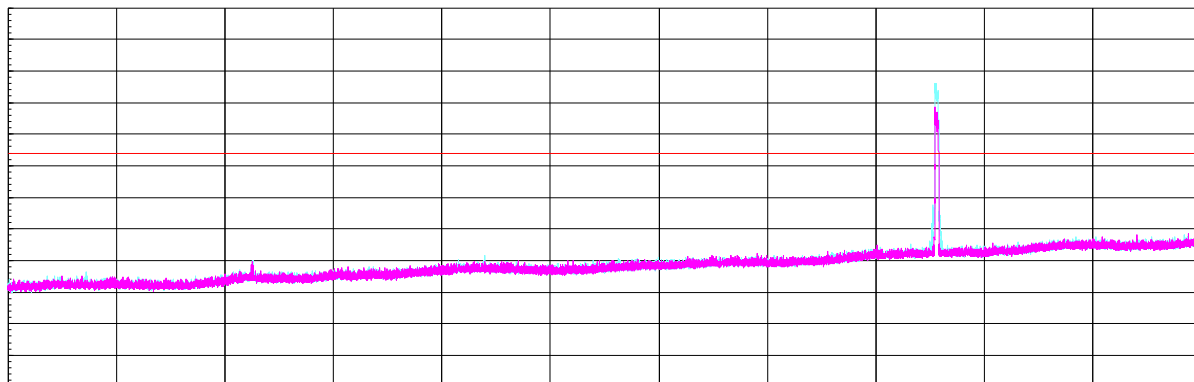


Middle Channel (5 280 MHz)

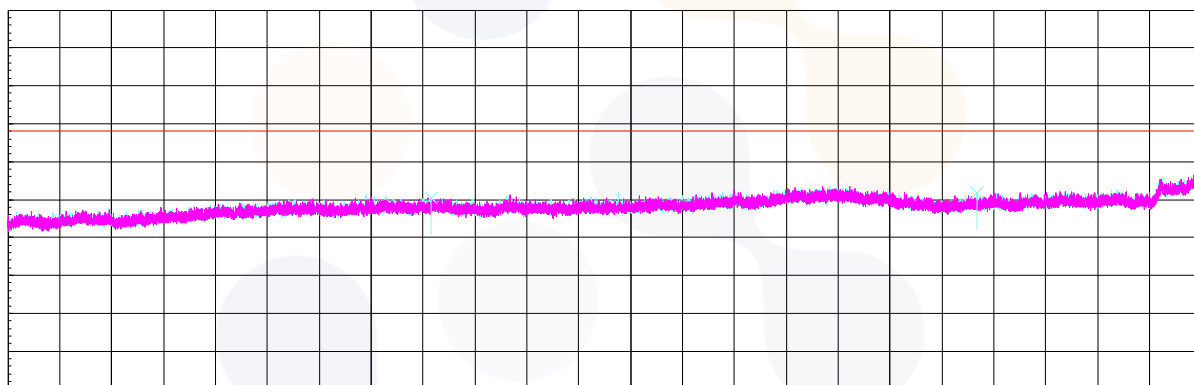
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
10 582.88	V	56.00	39.07	-44.61	-	50.46	68.20	17.74
15 816.15 ¹⁾	V	55.90	37.90	-42.23	-	51.57	74.00	22.43
Average Data								
15 816.15 ¹⁾	V	43.96	37.90	-42.23	0.29	39.92	54.00	14.08



Horizontal/Vertical for 1 GHz ~ 6.5 GHz

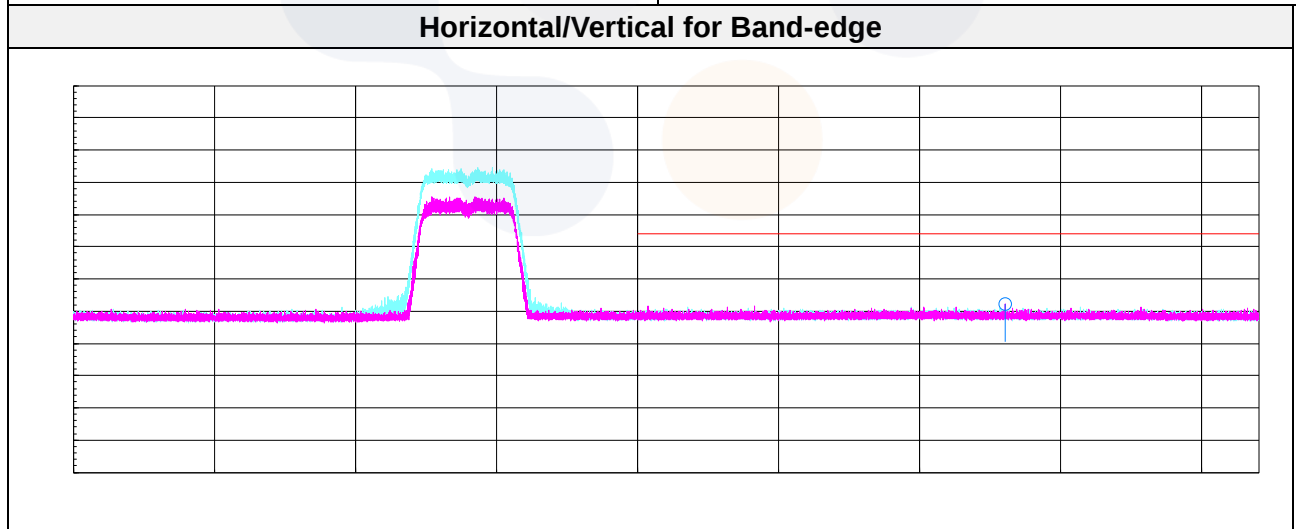
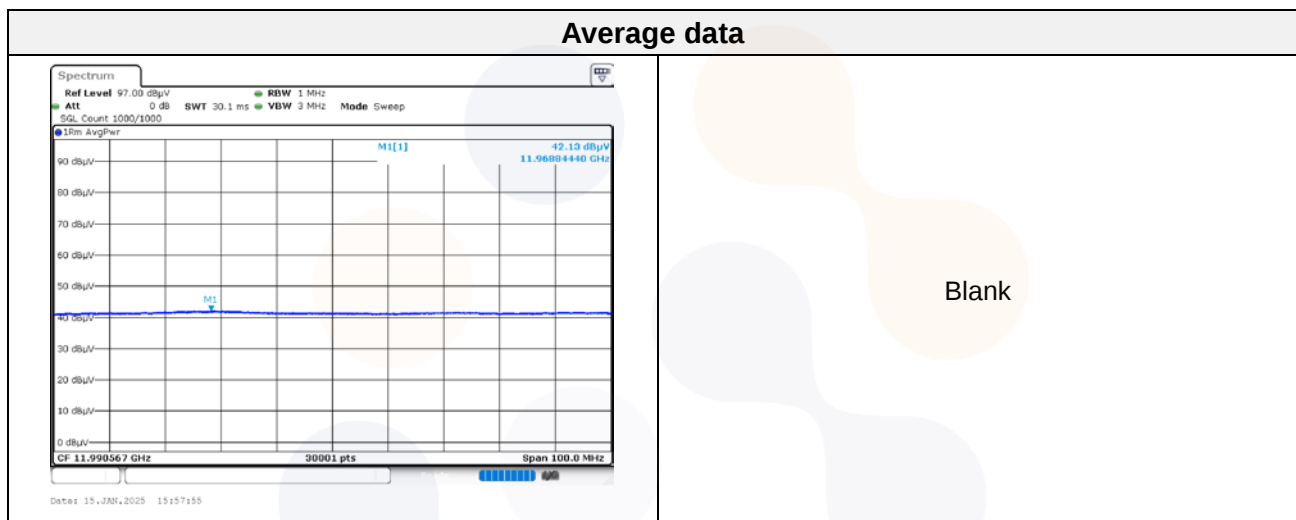


Horizontal/Vertical for 6.5 GHz ~ 18 GHz

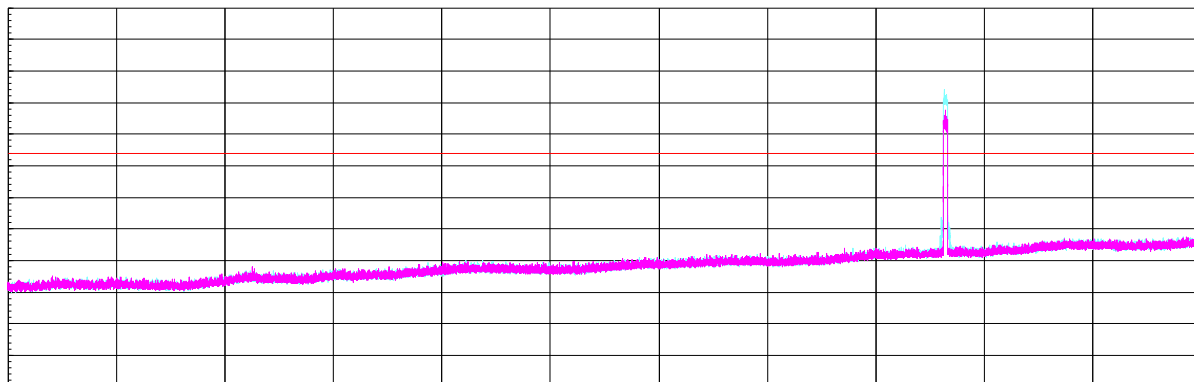


Highest Channel (5 320 MHz)

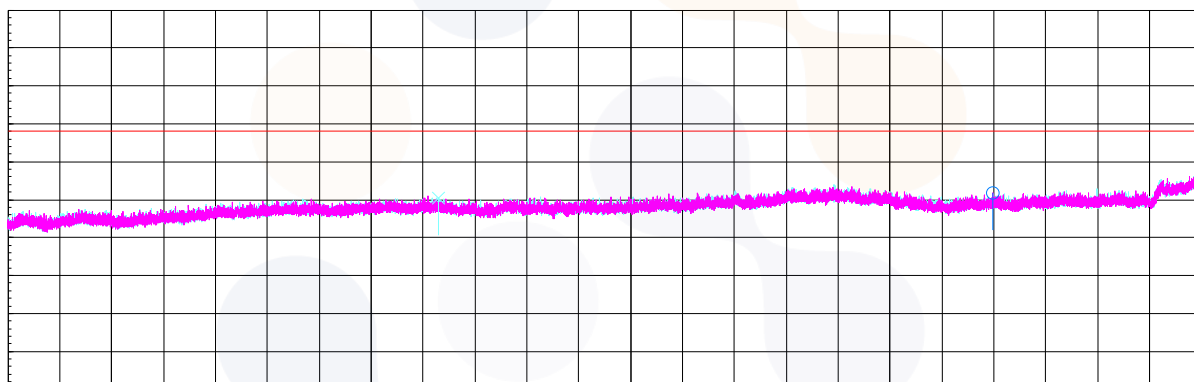
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
5 392.94 ¹⁾	H	46.10	33.00	-26.88	-	52.22	74.00	21.78
10 650.73 ¹⁾	V	56.10	39.10	-44.70	-	50.50	74.00	23.50
11 968.84 ¹⁾	H	55.40	38.80	-42.09	-	52.11	74.00	21.89
Average Data								
11 968.84 ¹⁾	H	42.13	38.80	-42.09	0.29	39.13	54.00	14.87



Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



802.11n HT20 UNII 2A

Lowest Channel (5 260 MHz)

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
10 540.72	H	55.50	38.90	-44.55	-	49.85	68.20	18.35
15 818.87 ¹⁾	H	55.80	37.90	-42.22	-	51.48	74.00	22.52
Average Data								
15 818.87 ¹⁾	H	44.01	37.90	-42.22	0.33	40.02	54.00	13.98

