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TEST REPORT

of

FCC Part 15 Subpart E §15.407
IC RSS-247 Issue 2 and RSS-Gen Issue 5

FCC ID: 2AVZC-A000010007A
IC Certification: 26076-A000010007A

1. Equipment Under Test	:	BT/Wi-Fi Combo Module Gen6
2. Model Name	:	A000010007A
3. Variant Model Name(s)	:	-
4. Applicant	:	Markone technology CO., Ltd.
5. Manufacturer	:	SUNTEL VINA
6. Date of Receipt	:	2020.01.21
7. Date of Test(s)	:	2020.02.01 ~ 2020.06.08
8. Date of Issue	:	2020.07.01

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

1) The results of this test report are effective only to the items tested.
2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.

Tested by: **Murphy Kim**

Technical Manager: **Jungmin Yang**

SGS Korea Co., Ltd. Gunpo Laboratory

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
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- Designation number: KR0150

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1.2. Details of Applicant

Applicant	:	Markone technology CO., Ltd.
Address	:	232, Yeongudanji-ro, Ochang-eup, Cheongwon-gu, Cheongju-si, Chungcheongbuk-do, South Korea, 28119
Contact Person	:	Lee, James
Phone No.	:	+82 10 9916 2536

1.3. Details of Manufacturer

Company	:	SUNTEL VINA
Address	:	Lot XN8, Dai An Industrial Zone Extension, Lai Cach Town, Cam Giang District, Hai Duong Province, Viet Nam. (SUNTEL VINA)

1.4. Description of EUT

Kind of Product		BT/Wi-Fi Combo Module Gen6
Model Name		A000010007A
Model Serial Number		Conducted Sample: 001 Radiated Sample: 002
Power Supply		DC 3.3 V
Frequency Range		5 180 ㎒ ~ 5 240 ㎒ (Band 1: 11a/n_HT20, 11ac_VHT20) 5 190 ㎒ ~ 5 230 ㎒ (Band 1: 11n_HT40, 11ac_VHT40) 5 210 ㎒ (Band 1: 11ac_VHT80) 5 745 ㎒ ~ 5 825 ㎒ (Band 3: 11a/n_HT20, 11ac_VHT20) 5 755 ㎒ ~ 5 795 ㎒ (Band 3: 11n_HT40, 11ac_VHT40) 5 775 ㎒ (Band 3: 11ac_VHT80)
Modulation Technique		OFDM
Number of Channels		4 channel (Band 1: 11a/n_HT20, 11ac_VHT20) 2 channel (Band 1: 11n_HT40, 11ac_VHT40) 1 channel (Band 1: 11ac_VHT80) 5 channel (Band 3: 11a/n_HT20, 11ac_VHT20) 2 channel (Band 3: 11n_HT40, 11ac_VHT40) 1 channel (Band 3: 11ac_VHT80)
Antenna Type		PCB & Cable Assembly antenna
Antenna Gain	**ANT 1**	5 150 ㎒ ~ 5 250 ㎒: 2.84 ㏈i 5 725 ㎒ ~ 5 850 ㎒: 2.73 ㏈i
	ANT 2	5 150 ㎒ ~ 5 250 ㎒: 2.54 ㏈i 5 725 ㎒ ~ 5 850 ㎒: 2.45 ㏈i
H/W Version		V02
S/W Version		V10

1.5. Declaration by the Manufacturer

- The EUT not supported transmitter power control(TPC).
- The EUT supports only U-NII 1 and U-NII 3 Band.

1.6. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	Agilent	E8257D	MY51501169	Nov. 21, 2019	Annual	Nov. 21, 2020
Signal Generator	R&S	SMBV100A	255834	Jun. 10, 2019	Annual	Jun. 10, 2020
Spectrum Analyzer	R&S	FSV30	103102	Jun. 05, 2019	Annual	Jun. 05, 2020
Spectrum Analyzer	Agilent	N9020A	MY53421758	Sep. 11, 2019	Annual	Sep. 11, 2020
Spectrum Analyzer	Agilent	N9030A	US51350132	Nov. 15, 2019	Annual	Nov. 15, 2020
Power Meter	Anritsu	ML2495A	1223004	Jun. 05, 2019	Annual	Jun. 05, 2020
Power Sensor	Anritsu	MA2411B	1207272	Jun. 05, 2019	Annual	Jun. 05, 2020
Attenuator	AEROFLEX / INMET	40AH2W-10	40G-3	Jun. 20, 2019	Annual	Jun. 20, 2020
Low Pass Filter	Mini-Circuits	NLP-1200+	V9500401023-2	Jun. 05, 2019	Annual	Jun. 05, 2020
High Pass Filter	Wainwright Instrument GmbH	WHKX6.0/18G-10SS	51	Jun. 07, 2019	Annual	Jun. 07, 2020
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-6SS	15	Jun. 07, 2019	Annual	Jun 07, 2020
DC Power Supply	Agilent	U8002A	MY53150029	Jun. 10, 2019	Annual	Jun. 10, 2020
Preamplifier	H.P.	8447F	2944A03909	Aug. 07, 2019	Annual	Aug. 07, 2020
Signal Conditioning Unit	R&S	SCU-18	10117	Jun. 12, 2019	Annual	Jun. 12, 2020
Preamplifier	MITEQ Inc.	JS44-18004000-35-8P	1546891	May 08, 2020	Annual	May 08, 2021
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 22, 2019	Biennial	Aug. 22, 2021
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB 9163	396	Mar. 21, 2019	Biennial	Mar. 21, 2021
Horn Antenna	R&S	HF907	100019	Jun. 18, 2019	Biennial	Jun. 18, 2021
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA 9170	BBHA9170431	Sep. 10, 2018	Biennial	Sep. 10, 2020
Test Receiver	R&S	ESU26	100109	Feb. 18, 2020	Annual	Feb. 18, 2021
Turn Table	Innco systems GmbH	DS 1200 S	N/A	N.C.R.	N/A	N.C.R.
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/383 30516/L	N.C.R.	N/A	N.C.R.
Antenna Mast	Innco systems GmbH	MA4640-XP-ET	MA4640/536/383 30516/L	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N/A	N.C.R.	N/A	N.C.R.
Test Receiver	R&S	ESCI 7	100911	Feb. 19, 2020	Annual	Feb. 19, 2021
Two-Line V-Network	R&S	ENV216	100190	May 08, 2020	Annual	May 08, 2021
Shield Room	SY Corporation	L × W × H (6.5 m × 3.5 m × 3.5 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	SUCOFLEX	104 (3 m)	MY3258414	Jan. 28, 2020	Semi-annual	Jul. 28, 2020
Coaxial Cable	SUCOFLEX	104 (10 m)	MY3145814	Jan. 28, 2020	Semi-annual	Jul. 28, 2020
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 07/20	Feb. 23, 2020	Semi-annual	Aug. 23, 2020

Note;

Using the software of ttermpro (Version 4.99.0.0 from tera term) to testing of EUT

1.7. Summary of Test Result

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15 Subpart E, IC RSS-247 Issue 2, RSS-Gen Issue 5			
Section in FCC	**Section in IC**	**Test Item(s)**	**Result**
15.205(a) 15.209(a) 15.407(b)(1) 15.407(b)(2) 15.407(b)(3) 15.407(b)(4)	RSS-Gen Issue 5 8.9 RSS-247 Issue 2 6.2.1.2 RSS-247 Issue 2 6.2.2.2 RSS-247 Issue 2 6.2.3.2 RSS-247 Issue 2 6.2.4.2	Transmitter Radiated Spurious Emissions	Complied
15.407(a)	RSS-Gen Issue 5 6.7	26 dB Bandwidth & 99 % Bandwidth	Complied
15.407(e)	RSS-247 Issue 2 6.2.4.1	6 dB Bandwidth	Complied
15.407(a)(1) 15.407(a)(2) 15.407(a)(3)	RSS-247 Issue 2 6.2.1.1 RSS-247 Issue 2 6.2.2.1 RSS-247 Issue 2 6.2.3.1 RSS-247 Issue 2 6.2.4.1	Maximum Conducted Output Power	Complied
15.407(a)(1) 15.407(a)(2) 15.407(a)(3)	RSS-247 Issue 2 6.2.1.1 RSS-247 Issue 2 6.2.2.1 RSS-247 Issue 2 6.2.3.1 RSS-247 Issue 2 6.2.4.1	Peak Power Spectral Density	Complied
15.207	RSS-Gen Issue 5 8.8	AC Power Line Conducted Emission	Complied

1.8. Test Procedure(s)

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 789033 D02 General UNII Test Procedures New Rules v02r01 were used in the measurement of the DUT.

1.9. Sample Calculation

Where relevant, the following sample calculation is provided:

1.9.1. Conducted Test

Offset value (㎧) = Attenuator (㎧) + Cable loss (㎧)

1.9.2. Radiation Test

Field strength level (㎧㎶/m) = Measured level (㎧㎶) + Antenna factor (㎧) + Cable loss (㎧) - Amplifier gain (㎧) + Duty Factor (㎧)

1.10. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
RF Output Power	± 0.34 ㎧
Occupied Bandwidth	± 9.66 ㎑
Power Spectral Density	± 0.61 ㎧
AC Conducted Emission	± 3.45 ㎧
Radiated Emission, 9 ㎑ to 30 ㎒	± 3.59 ㎧
Radiated Emission, below 1 ㎓	± 5.88 ㎧
Radiated Emission, above 1 ㎓	± 5.94 ㎧

Uncertainty figures are valid to a confidence level of 95 %.

1.11. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL000460	2020.03.25	Initial
1	F690501-RF-RTL000460-1	2020.06.08	Added the ISED standard
2	F690501-RF-RTL000460-2	2020.07.01	Added the software information for EUT test

1.12. Duty Cycle of EUT

Regarding to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, B, the maximum duty cycles of all modes were investigated and set the spectrum analyzer as below.
Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value, Set VBW ≥ RBW.
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.

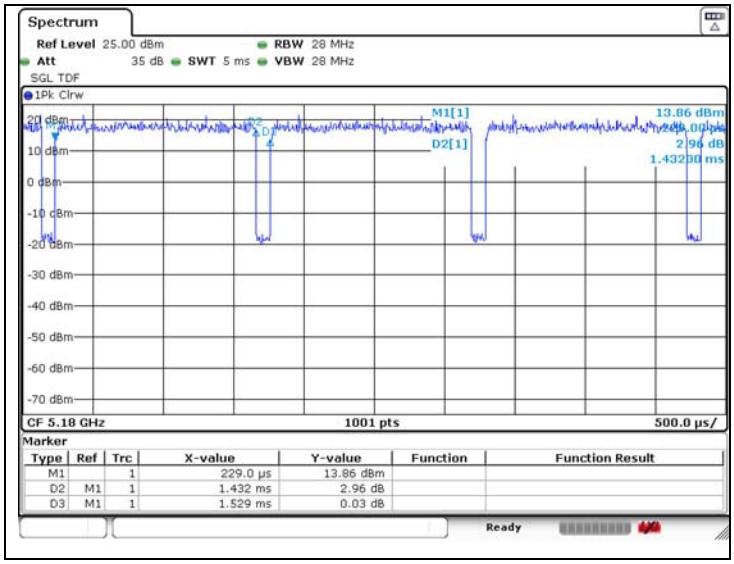
Mode	Data Rate (Mbps)	Duty Cycle (%)	Correction factor (dB)
11a	6	93.66	0.28
11n_HT20	MCS8	86.97	0.61
11n_HT40	MCS8	77.95	1.08
11ac_VHT80	MCS0	76.55	1.16

Remark;

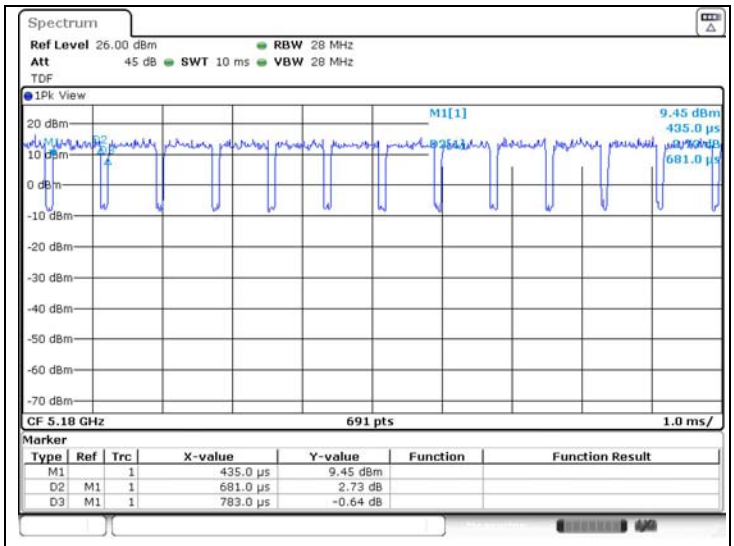
1. As measured duty cycles of EUT, all of mode and data rate keep constant period and are converted to log scale (power averaging) to compensate correction factor to result of average test items.
2. Duty cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (dB) = 10 log (1 / Duty cycle)

- Test plots

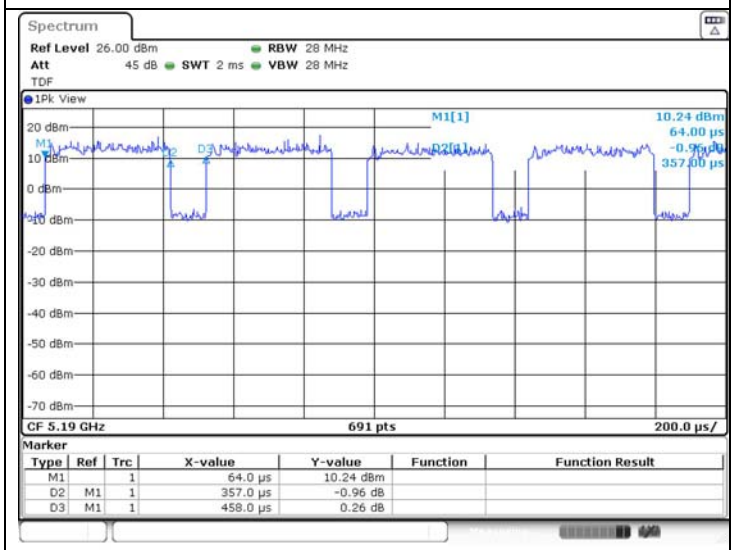
802.11a



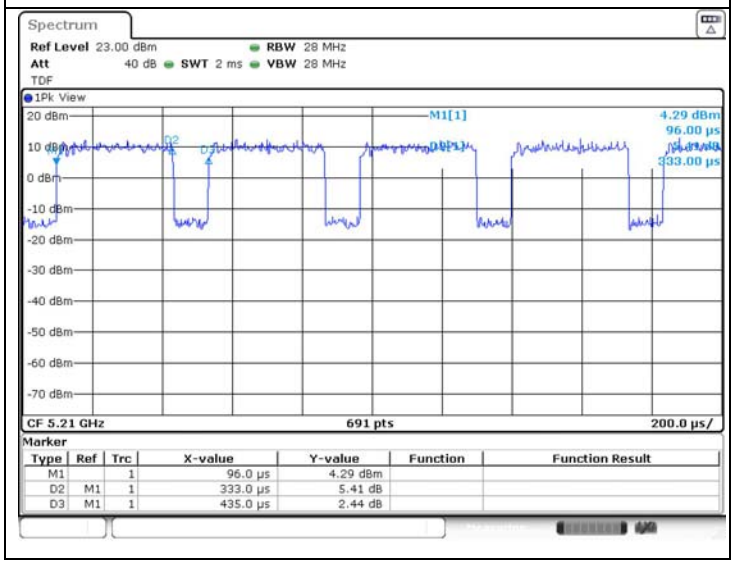
802.11n_HT20



802.11n_HT40



802.11ac_VHT80

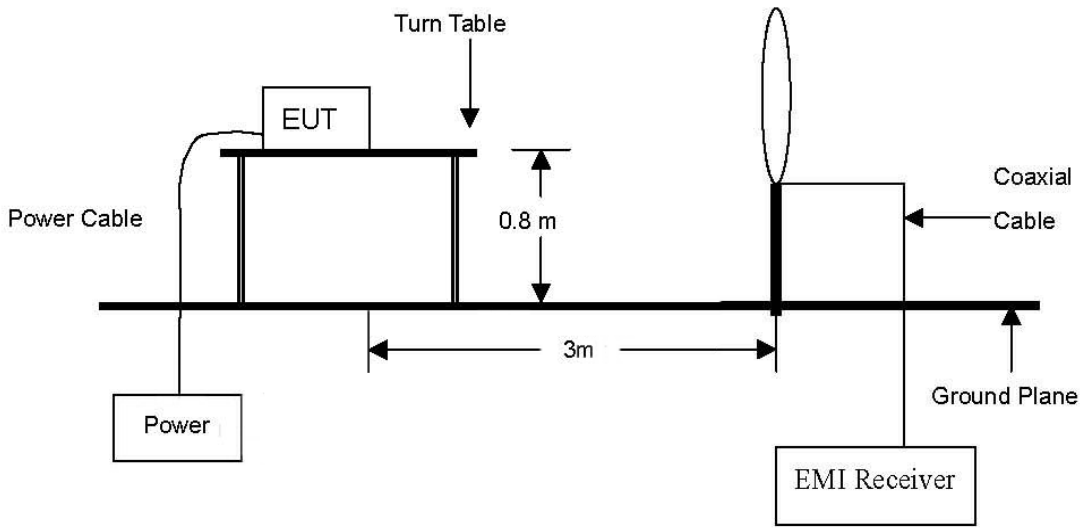


2. Transmitter Radiated Spurious Emissions

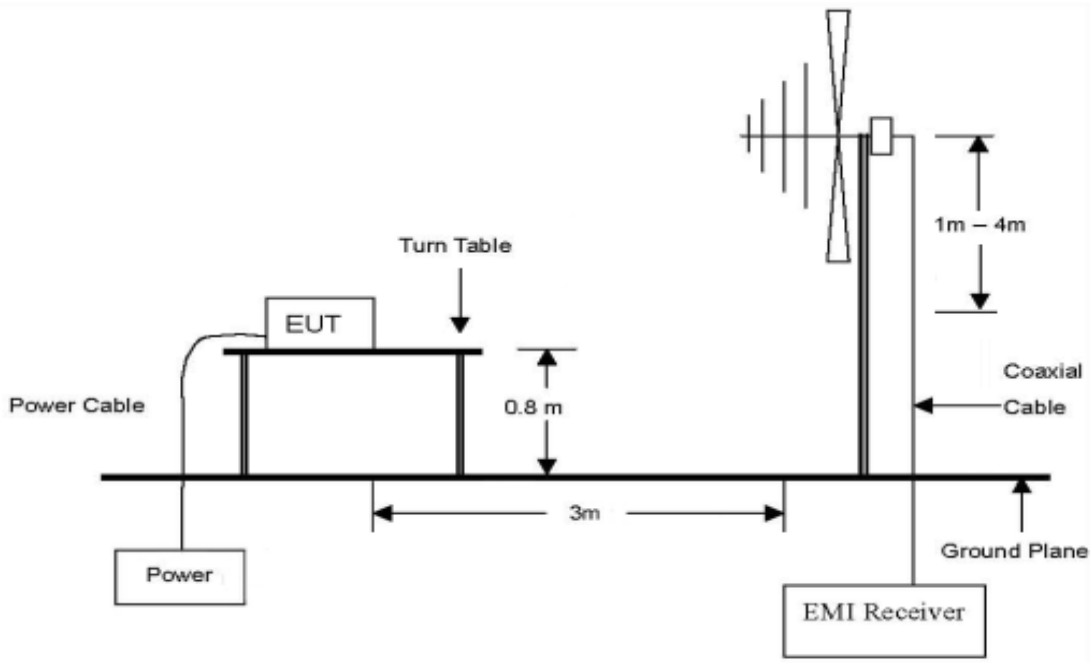
2.1. Test Setup

2.1.1. Transmitter radiated spurious emissions

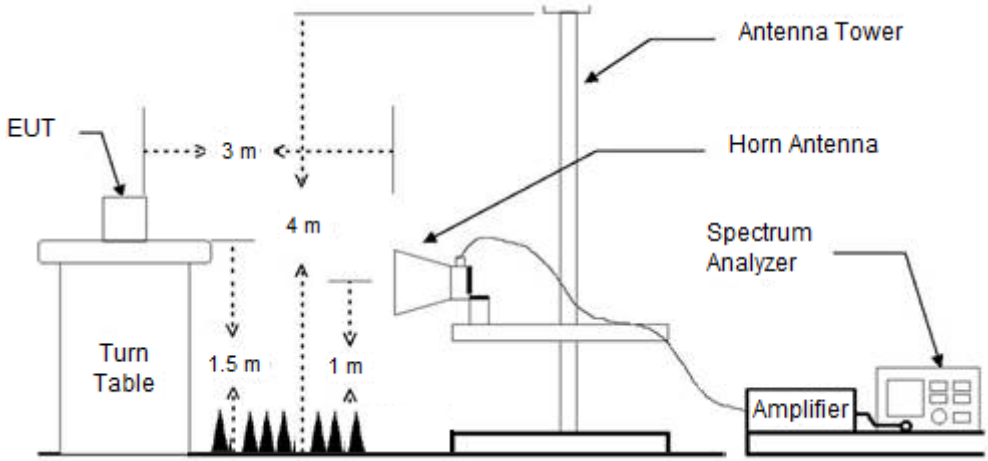
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ emissions.



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



The diagram below shows the test setup that is utilized to make the measurements for emission. The spurious emissions were investigated form 1 ㎓ to the 10th harmonic of the highest fundamental frequency or 40 ㎓, whichever is lower.



2.2. Limit

2.2.1. FCC

According to § 15.407(b)

(1) For transmitters operating in the 5.15-5.25 ㎓ band: All emissions outside of the 5.15-5.35 ㎓ band shall not exceed an e.i.r.p. of -27 ㏈m/㎒.

(4) For transmitters operating in the 5.725-5.85 ㎓ band:

(i) All emissions shall be limited to a level of -27 ㏈m/㎒ at 75 ㎒ or more above or below the band edge increasing linearly to 10 ㏈m/㎒ at 25 ㎒ above or below the band edge, and from 25 ㎒ above or below the band edge increasing linearly to a level of 15.6 ㏈m/㎒ at 5 ㎒ above or below the band edge, and from 5 ㎒ above or below the band edge increasing linearly to a level of 27 ㏈m/㎒ at the band edge.

According to § 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 (㎒)	Field Strength (㎛V/m)	Measurement Distance (Meters)
0.009-0.490	2 400/F(㎑)	300
0.490-1.705	24 000/F(㎑)	30
1.705-30.0	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 ㎒, 76-88 ㎒, 174-216 ㎒ or 470-806 ㎒. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

2.2.2. IC

According to RSS-247 Issue 2,

6.2.1.2 Frequency band 5 150-5 250 ㎒

For transmitters with operating frequencies in the band 5 150-5 250 ㎒, all emissions outside the band 5 150-5 350 ㎒ shall not exceed -27 ㏈m/㎒ e.i.r.p. Any unwanted emissions that fall into the band 5 250-5 350 ㎒ shall be attenuated below the channel power by at least 26 ㏈, when measured using a resolution bandwidth between 1 and 5 % of the occupied bandwidth (i.e. 99% bandwidth), above 5 250 ㎒. The 26 ㏈ bandwidth may fall into the 5 250-5 350 ㎒ band; however, if the occupied bandwidth also falls within the 5 250- 5350 ㎒ band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5 250-5 350 ㎒ including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5 250-5 350 ㎒ band.

6.2.4.2 Frequency band 5 725-5 850 ㎒

Devices operating in the band 5 725-5 850 ㎒ with antenna gain greater than 10 ㏈i can have unwanted emissions that comply with either the limits in this section or in section 5.5 until six (6) months after the publication date of this standard for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2018.

Devices operating in the band 5 725-5 850 ㎒ with antenna gain of 10 ㏈i or less can have unwanted emissions that comply with either the limits in this section or in section 5.5 until April 1, 2018 for certification. Certified devices that do not comply with emission limits in this section shall not be manufactured, imported, distributed, leased, offered for sale or sold after April 1, 2020.

Devices operating in the band 5 725-5 850 ㎒ shall have e.i.r.p. of unwanted emissions comply with the following:

a) 27 ㏈m/㎒ at frequencies from the band edges decreasing linearly to 15.6 ㏈m/㎒ at 5 ㎒ above or below the band edges;

b) 15.6 ㏈m/㎒ at 5 ㎒ above or below the band edges decreasing linearly to 10 ㏈m/㎒ at 25 ㎒ above or below the band edges;

c) 10 ㏈m/㎒ at 25 ㎒ above or below the band edges decreasing linearly to -27 ㏈m/㎒ at 75 ㎒ above or below the band edges; and

d) -27 ㏈m/㎒ at frequencies more than 75 ㎒ above or below the band edges.

2.3. Test Procedures

Radiated spurious emissions from the EUT were measured according to the dictates in section G of KDB 789033 D02 General UNII Test Procedures New Rules v02r01 and ANSI C63.10-2013.

2.3.1. Test Procedures for emission below 30 ㎒

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.

2.3.2. Test Procedures for emission from above 30 ㎒

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 below 1 ㎓ and 1.5 meter above the ground at a 3 meter anechoic chamber test site above 1 ㎓. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 ㎓, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 ㎓, the EUT was set 3 meter away from the interference-receiving antenna.
3. The antenna is a bi-log antenna, a horn antenna and its height is 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.
4. 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.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note;

All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

- II.G.4. Unwanted emissions measurements below 1 ㎓.
Compliance shall be demonstrated using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.

- II.G.5. Unwanted maximum emissions measurements above 1 ㎓.
Peak emission levels are measured by setting the analyzer as follows:
Set to RBW = 1 ㎒, VBW ≥ 3 ㎒, Detector = Peak, Sweep time = auto, Trace mode= Max hold.

- II.G.6. Average unwanted emissions measurements above 1 ㎓.
Set to RBW = 1 ㎒, VBW ≥ 3 ㎒, Detector = power averaging (rms), Averaging type = power averaging (rms), Sweep time = auto, Perform a trace average of at least 100 traces If the transmission is continuous, If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 % duty cycle, at least 200 traces shall be averaged.

If tests are performed with the EUT transmitting at a duty cycle less than 98 %, 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 % duty cycle. The correction factor is computed as follows:

- If power averaging (rms) mode was used in II.G.6.c)(iv), the correction factor is 10 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 %, then 3 ㏈ must be added to the measured emission levels.

- Definition of the test orthogonal plan for EUT was described in the test setup photo.
The test orthogonal plan of EUT is **X – axis** during radiation test.

2.4. Test result

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

2.4.1. Radiated Spurious Emission below 1 000 ㎒

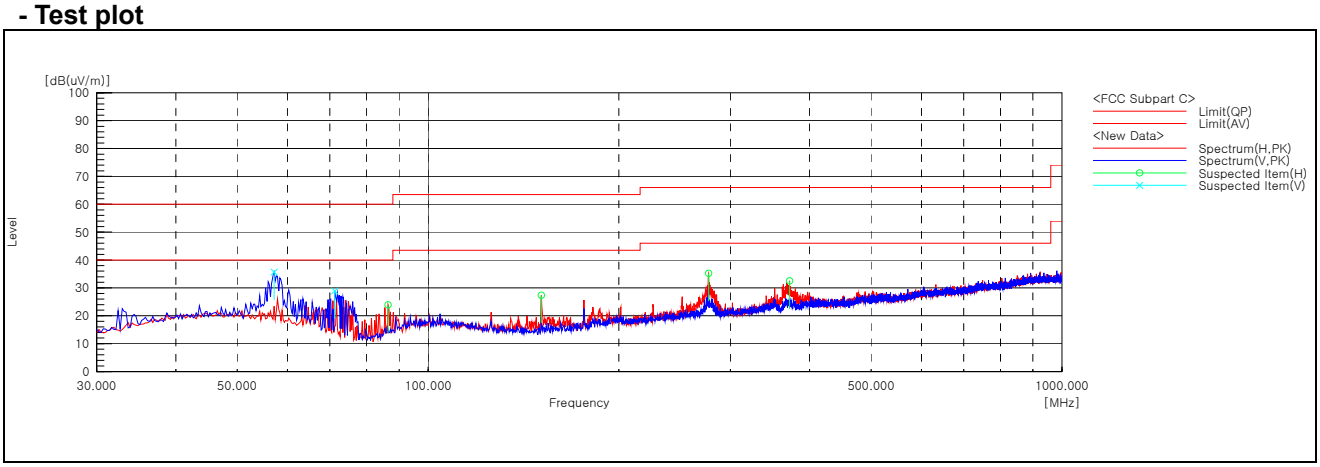
The frequency spectrum from 9 ㎑ to 1 000 ㎒ was investigated. All reading values are peak values.

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
57.16	43.20	Peak	V	18.85	-26.27	**35.78**	40.00	4.22
71.23	41.20	Peak	V	13.93	-25.88	29.25	40.00	10.75
86.50	36.00	Peak	H	13.85	-25.34	24.51	40.00	15.49
151.01	38.50	Peak	H	13.90	-25.20	27.20	43.50	16.30
277.11	40.30	Peak	H	18.74	-24.93	34.11	46.00	11.89
371.68	35.80	Peak	H	20.57	-24.73	31.64	46.00	14.36
Above 400.00	Not detected	-	-	-	-	-	-	-

Remark;

1. Spurious emissions for all channels and modes were investigated and almost the same below 1 ㎓.
2. Reported spurious emissions are in **11a_ANT1 (Band 3) / 6 Mbps / Low channel** as worst case among other modes.
3. Radiated spurious emission measurement as below.
   (Actual = Reading + AF + AMP + CL)
4. According to §15.31(o), emission levels are not report much lower than the limits by over 20 ㏈.

- Test plot



2.4.2. Radiated Spurious Emission above 1 000 ㎒

OFDM: 802.11a (6 Mbps) Band 1_ANT 1

A. Low Channel (5 180 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 500.00	40.38	Peak	H	32.10	-33.56	-	38.92	74.00	35.08
*4 500.00	29.70	Average	H	32.10	-33.56	0.28	28.52	54.00	25.48
*5 147.27	58.70	Peak	H	33.49	-32.67	-	59.52	74.00	14.48
*5 148.06	44.74	Average	H	33.50	-32.67	0.28	45.85	54.00	8.15
*5 150.00	61.29	Peak	H	33.50	-32.67	-	62.12	74.00	11.88
*5 150.00	46.19	Average	H	33.50	-32.67	0.28	**47.30**	54.00	6.70

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 360.15	49.56	Peak	H	37.60	-27.18	-	59.98	68.23	8.25
Above 10 400.00	Not detected	-	-	-	-	-	-	-	-

B. Middle Channel (5 220 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 440.00	48.91	Peak	H	37.68	-27.25	-	59.34	68.23	8.89
Above 10 500.00	Not detected	-	-	-	-	-	-	-	-

C. High Channel (5 240 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 479.75	49.06	Peak	H	37.64	-27.18	-	59.52	68.23	8.71
Above 10 500.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11a (6 Mbps) Band 3_ANT 1

A. Low Channel (5 745 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 600.10	43.50	Peak	H	34.00	-32.19	45.31	68.23	22.92
5 699.63	52.03	Peak	H	34.10	-32.07	54.06	104.95	50.89
5 719.50	62.79	Peak	H	34.06	-32.11	64.74	110.69	45.95
5 724.00	76.62	Peak	H	34.05	-32.11	78.56	119.95	41.39

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

B. Middle Channel (5 785 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

C. High Channel (5 825 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 850.35	67.23	Peak	H	34.30	-31.94	69.59	121.43	51.84
5 855.00	55.35	Peak	H	34.31	-31.94	57.72	110.83	53.11
5 875.85	50.33	Peak	H	34.35	-31.98	52.70	104.60	51.90
5 970.29	44.37	Peak	H	34.60	-31.82	47.15	68.46	21.31

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11a (6 Mbps) Band 1_ANT 2

A. Low Channel (5 180 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 500.00	37.86	Peak	H	32.10	-33.56	-	36.40	74.00	37.60
*4 500.00	32.49	Average	H	32.10	-33.56	0.28	31.31	54.00	22.69
*5 146.78	59.35	Peak	H	33.49	-32.67	-	60.17	74.00	13.83
*5 148.36	46.38	Average	H	33.50	-32.67	0.28	47.49	54.00	6.51
*5 150.00	59.01	Peak	H	33.50	-32.67	-	59.84	74.00	14.16
*5 150.00	46.74	Average	H	33.50	-32.67	0.28	**47.85**	54.00	6.15

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 360.15	49.23	Peak	H	37.60	-27.18	-	59.65	68.23	8.58
Above 10 400.00	Not detected	-	-	-	-	-	-	-	-

B. Middle Channel (5 220 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 440.00	49.08	Peak	H	37.68	-27.25	-	59.51	68.23	8.72
Above 10 500.00	Not detected	-	-	-	-	-	-	-	-

C. High Channel (5 240 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 480.00	48.79	Peak	H	37.64	-27.18	-	59.25	68.23	8.98
Above 10 500.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11a (6 Mbps) Band 3_ANT 2

A. Low Channel (5 745 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 630.82	44.38	Peak	H	34.00	-32.15	**46.23**	68.23	22.00
5 700.00	52.81	Peak	H	34.10	-32.07	54.84	105.23	50.39
5 719.50	61.92	Peak	H	34.06	-32.11	63.87	110.69	46.82
5 724.21	68.15	Peak	H	34.05	-32.11	70.09	120.43	50.34

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

B. Middle Channel (5 785 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

C. High Channel (5 825 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 850.58	57.51	Peak	H	34.30	-31.94	59.87	120.91	61.04
5 857.01	56.00	Peak	H	34.31	-31.95	58.36	110.26	51.90
5 878.15	50.83	Peak	H	34.36	-31.98	53.21	102.90	49.69
5 973.97	42.23	Peak	H	34.60	-31.80	45.03	68.50	23.47

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11n_HT20 (MCS8) Band 1_ANT 1+ANT 2

A. Low Channel (5 180 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 500.00	39.01	Peak	H	32.10	-33.56	-	37.55	74.00	36.45
*4 500.00	29.90	Average	H	32.10	-33.56	0.61	29.05	54.00	24.95
*5 148.06	48.59	Peak	H	33.50	-32.67	-	49.42	74.00	24.58
*5 148.06	39.07	Average	H	33.50	-32.67	0.61	40.51	54.00	13.49
*5 150.00	46.83	Peak	H	33.50	-32.67	-	47.66	74.00	26.34
*5 150.00	39.00	Average	H	33.50	-32.67	0.61	40.44	54.00	13.56

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 360.10	44.19	Peak	H	37.60	-27.18	-	54.61	68.23	13.62
Above 10 400.00	Not detected	-	-	-	-	-	-	-	-

B. Middle Channel (5 220 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 439.80	44.31	Peak	H	37.68	-27.25	-	**54.74**	68.23	13.49
Above 10 500.00	Not detected	-	-	-	-	-	-	-	-

C. High Channel (5 240 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 480.10	43.02	Peak	H	37.64	-27.18	-	53.48	68.23	14.75
Above 10 500.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11n_HT20 (MCS8) Band 3_ANT 1+ANT 2

A. Low Channel (5 745 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 606.66	41.30	Peak	H	34.00	-32.18	43.12	68.23	25.11
5 690.62	48.71	Peak	H	34.08	-32.09	50.70	98.29	47.59
5 718.06	54.07	Peak	H	34.06	-32.11	56.02	110.28	54.26
5 722.57	63.94	Peak	H	34.05	-32.11	65.88	116.69	50.81

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

B. Middle Channel (5 785 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

C. High Channel (5 825 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 850.35	50.73	Peak	H	34.30	-31.94	53.09	121.43	68.34
5 857.24	49.91	Peak	H	34.31	-31.95	52.27	110.20	57.93
5 877.23	47.93	Peak	H	34.35	-31.98	50.30	103.58	53.28
5 940.42	41.76	Peak	H	34.56	-31.93	**44.39**	68.23	23.84

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11n_HT40 (MCS8) Band 1_ANT 1+ANT 2

A. Low Channel (5 190 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 500.00	37.94	Peak	H	32.10	-33.56	-	36.48	74.00	37.52
*4 500.00	30.55	Average	H	32.10	-33.56	1.08	30.17	54.00	23.83
*5 146.48	54.41	Peak	H	33.49	-32.67	-	55.23	74.00	18.77
*5 147.27	43.49	Average	H	33.49	-32.67	1.08	45.39	54.00	8.61
*5 150.00	55.90	Peak	H	33.50	-32.67	-	56.73	74.00	17.27
*5 150.00	44.10	Average	H	33.50	-32.67	1.08	**46.01**	54.00	7.99

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 379.90	43.58	Peak	H	37.60	-27.26	-	53.92	68.23	14.31
Above 10 400.00	Not detected	-	-	-	-	-	-	-	-

B. High Channel (5 230 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 460.10	42.17	Peak	H	37.68	-27.21	-	52.64	68.23	15.59
Above 10 500.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11n_HT40 (MCS8) Band 3_ANT 1+ANT 2

A. Low Channel (5 755 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 644.75	43.05	Peak	H	34.00	-32.14	**44.91**	68.23	23.32
5 694.92	49.04	Peak	H	34.09	-32.08	51.05	101.47	50.42
5 720.00	62.03	Peak	H	34.06	-32.11	63.98	110.83	46.85
5 720.20	64.54	Peak	H	34.06	-32.11	66.49	112.01	45.52

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

B. High Channel (5 795 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 851.50	46.16	Peak	H	34.30	-31.94	48.52	118.81	70.29
5 868.50	45.89	Peak	H	34.34	-31.97	48.26	107.05	58.79
5 879.53	44.13	Peak	H	34.36	-31.98	46.51	101.88	55.37
5 974.20	41.30	Peak	H	34.60	-31.80	44.10	68.51	24.41

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11ac_VHT80 (MCS0) Band 1_ANT 1+ANT 2

A. Low Channel (5 210 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 500.00	38.43	Peak	H	32.10	-33.56	-	36.97	74.00	37.03
*4 500.00	30.06	Average	H	32.10	-33.56	1.16	29.76	54.00	24.24
*5 112.54	58.77	Peak	H	33.43	-32.68	-	59.52	74.00	14.48
*5 137.01	44.00	Average	H	33.47	-32.68	1.16	**45.95**	54.00	8.05
*5 150.00	60.00	Peak	H	33.50	-32.67	-	60.83	74.00	13.17
*5 150.00	43.43	Average	H	33.50	-32.67	1.16	45.42	54.00	8.58

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
10 419.95	43.64	Peak	H	37.64	-27.28	-	54.00	68.23	14.23
Above 10 500.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11ac_VHT80 (MCS0) Band 3_ANT 1+ANT 2

A. Middle Channel (5 775 ㎒)

Radiated Emissions			Ant.	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
5 642.50	46.64	Peak	H	34.00	-32.14	**48.50**	68.23	19.73
5 685.91	57.62	Peak	H	34.07	-32.08	59.61	94.80	35.19
5 718.27	65.14	Peak	H	34.06	-32.11	67.09	110.34	43.25
5 722.98	63.05	Peak	H	34.05	-32.11	64.99	117.62	52.63
5 850.81	58.42	Peak	H	34.30	-31.94	60.78	120.38	59.60
5 862.99	58.06	Peak	H	34.33	-31.96	60.43	108.59	48.16
5 879.53	48.88	Peak	H	34.36	-31.98	51.26	101.88	50.62
5 948.92	43.58	Peak	H	34.60	-31.91	46.27	68.23	21.96

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
Above 1 000.00	Not detected	-	-	-	-	-	-	-	-

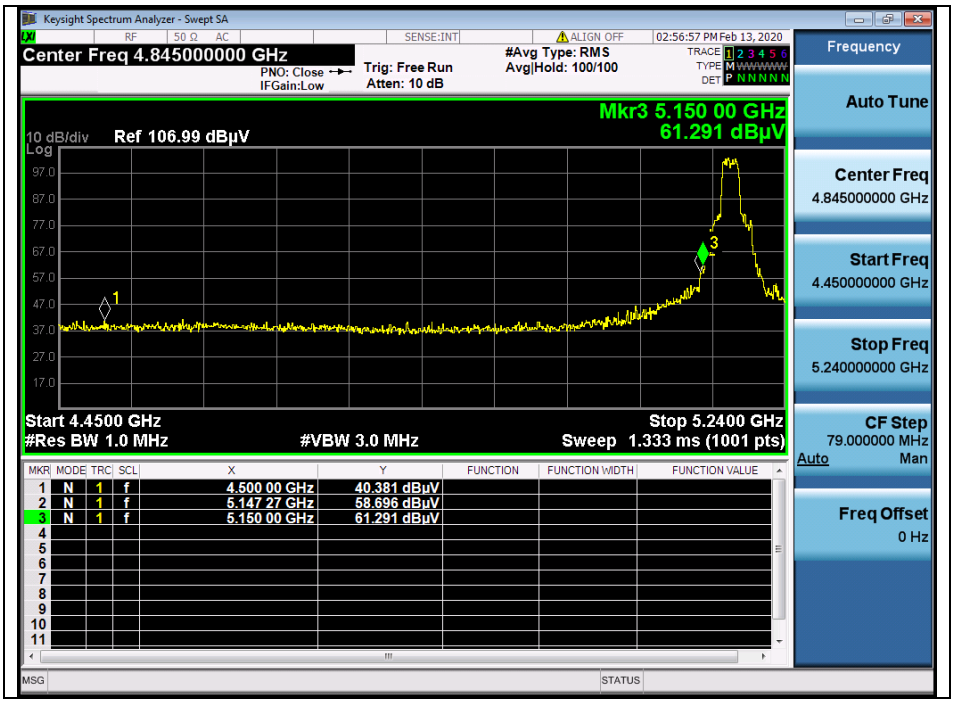
Remark;

1. "*" means the restricted band.
2. Radiated emissions measured in frequency above 1 000 ㎒ were made with an instrument using Peak / average detector mode if frequency was in restricted band. Otherwise the frequency was out of restricted band, only peak detector should be used.
3. Actual = Reading + AF + AMP + CL + (DF)
4. If frequency was out of restricted band, the calculation method for peak limit is same as below.
   68.23 dB㎶/m = EIRP - 20 log (d) + 104.77 = -27 - 20 log (3) + 104.77
5. In case of the emissions within ±75 ㎒ from band edge of band 3, limit should be adjusted to emission mask of 15.407(4)(i).
6. According to § 15.31(o), emission levels are not reported much lower than the limits by over 20 ㏈.
7. The maximized peak measured value complies with the average limit, to perform an average measurement is unnecessary.

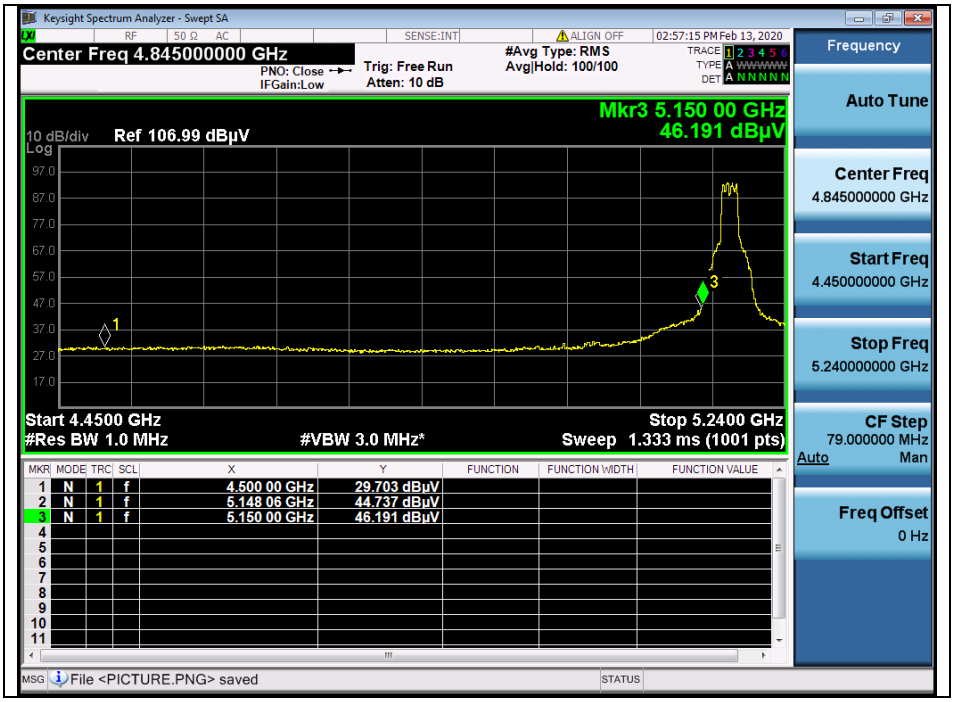
- Test plots

OFDM: 802.11a (6 Mbps)_ANT 1

Low channel Band edge (Peak) - Band 1

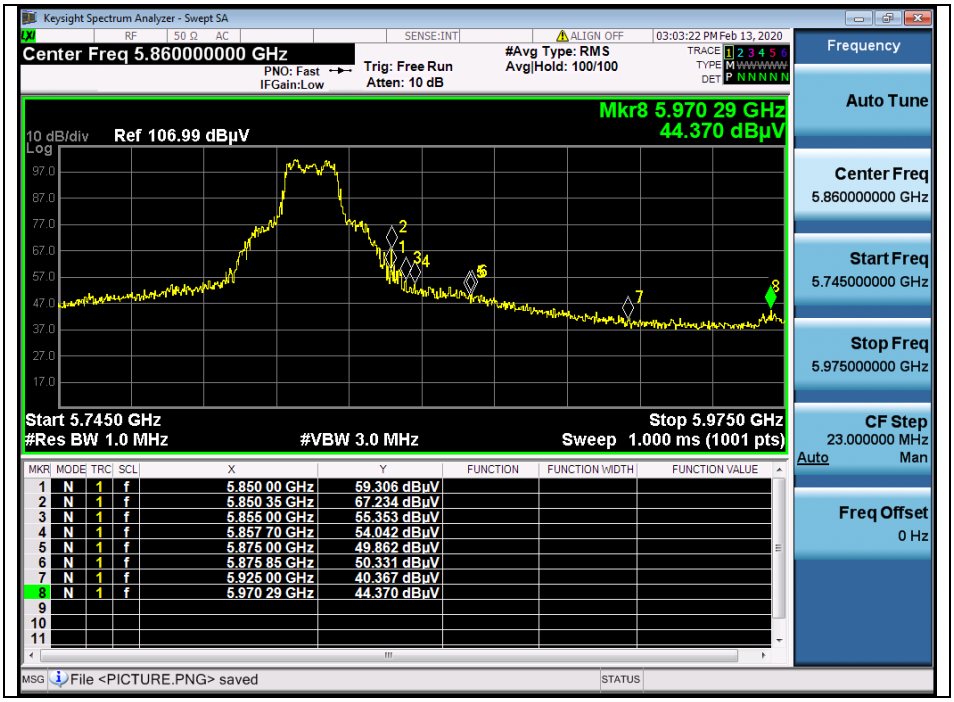


Low channel Band edge (Average) - Band 1



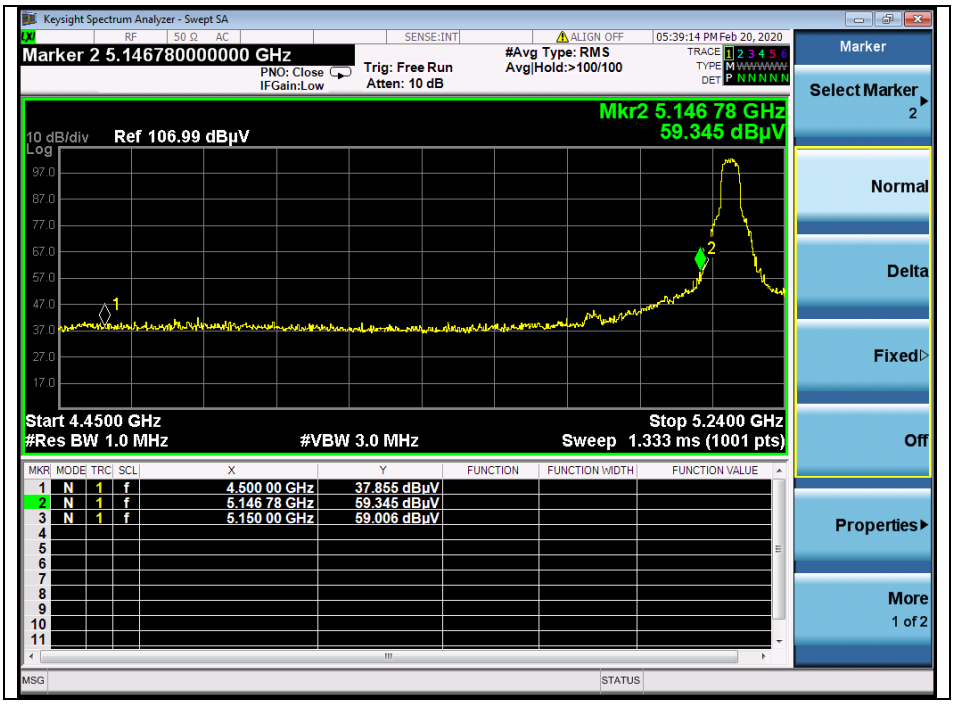
Low channel Band edge (Peak) - Band 3

High channel Band edge (Peak) - Band 3

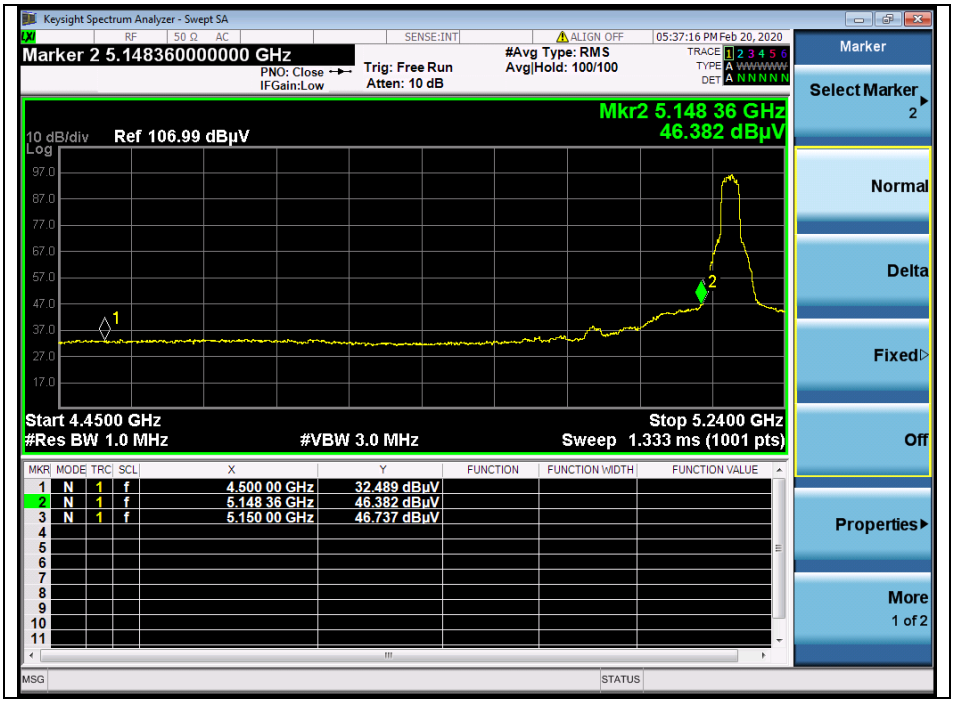


OFDM: 802.11a (6 Mbps)_ANT 2

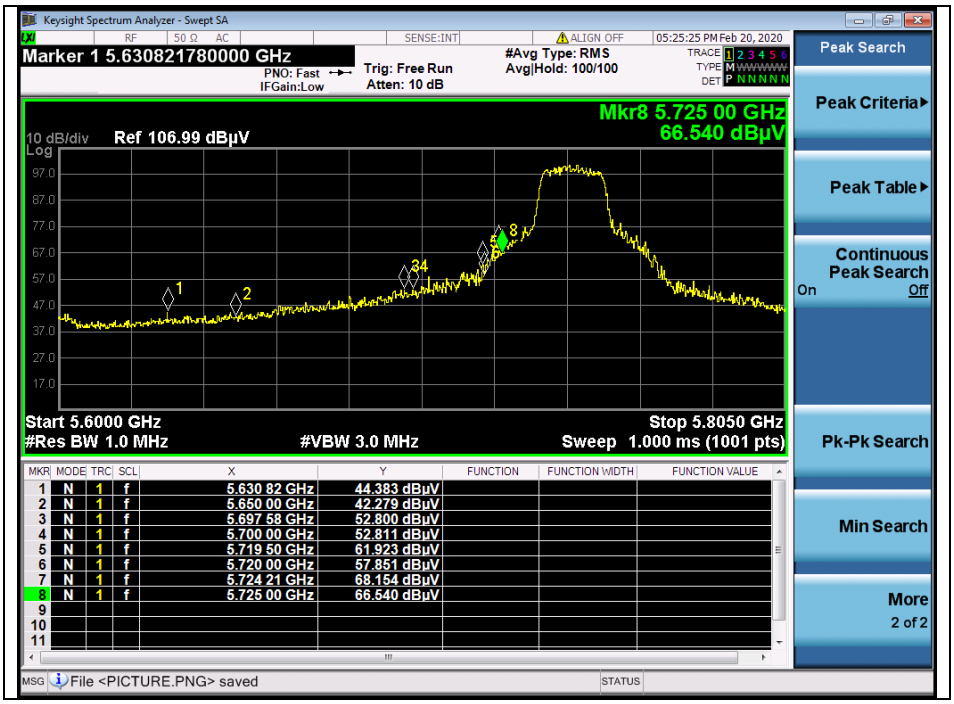
Low channel Band edge (Peak) - Band 1



Low channel Band edge (Average) - Band 1



Low channel Band edge (Peak) - Band 3



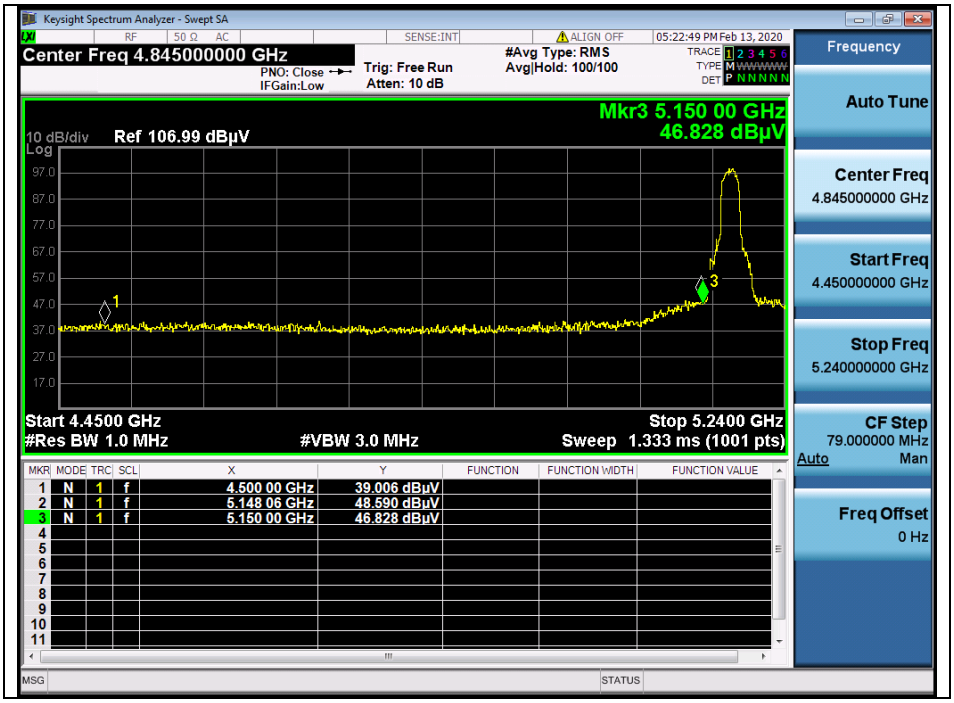
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	5.630 82 GHz	44.383 dBµV			
2	N	1	f	5.650 00 GHz	42.279 dBµV			
3	N	1	f	5.697 58 GHz	52.800 dBµV			
4	N	1	f	5.700 00 GHz	52.811 dBµV			
5	N	1	f	5.719 50 GHz	61.923 dBµV			
6	N	1	f	5.720 00 GHz	57.851 dBµV			
7	N	1	f	5.724 21 GHz	68.154 dBµV			
8	N	1	f	5.725 00 GHz	66.540 dBµV			
9								
10								
11								

High channel Band edge (Peak) - Band 3

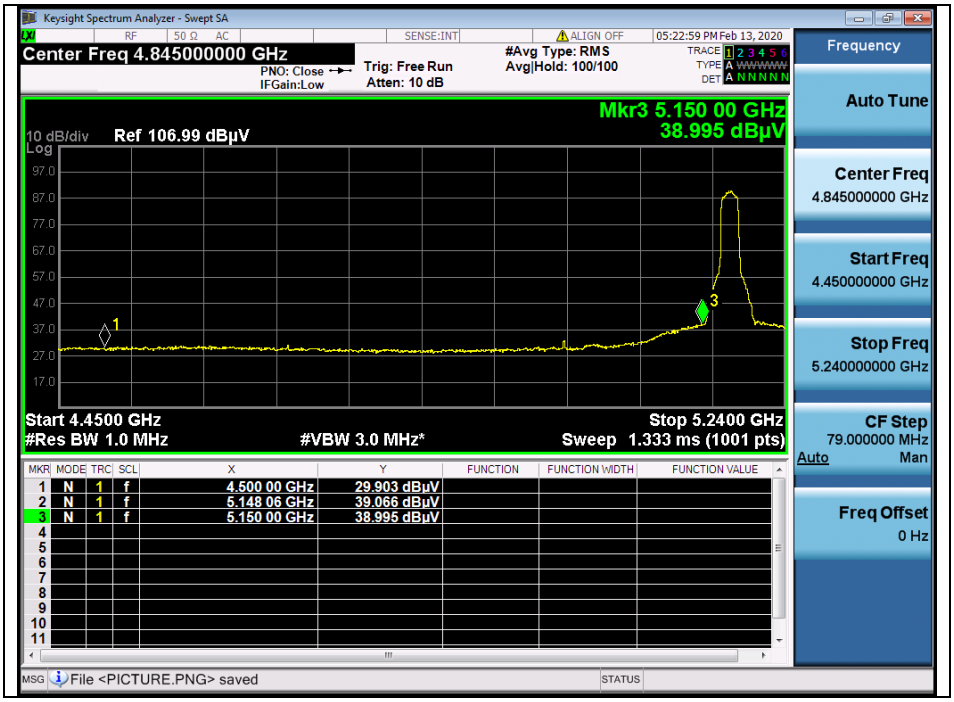
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	5.850 00 GHz	55.583 dBµV			
2	N	1	f	5.850 58 GHz	57.511 dBµV			
3	N	1	f	5.855 00 GHz	50.238 dBµV			
4	N	1	f	5.857 01 GHz	56.001 dBµV			
5	N	1	f	5.875 00 GHz	46.925 dBµV			
6	N	1	f	5.878 15 GHz	50.834 dBµV			
7	N	1	f	5.925 00 GHz	39.960 dBµV			
8	N	1	f	5.973 97 GHz	42.228 dBµV			
9								
10								
11								

OFDM: 802.11n_HT20 (MCS8)_ANT 1+ANT 2

Low channel Band edge (Peak) - Band 1



Low channel Band edge (Average) - Band 1

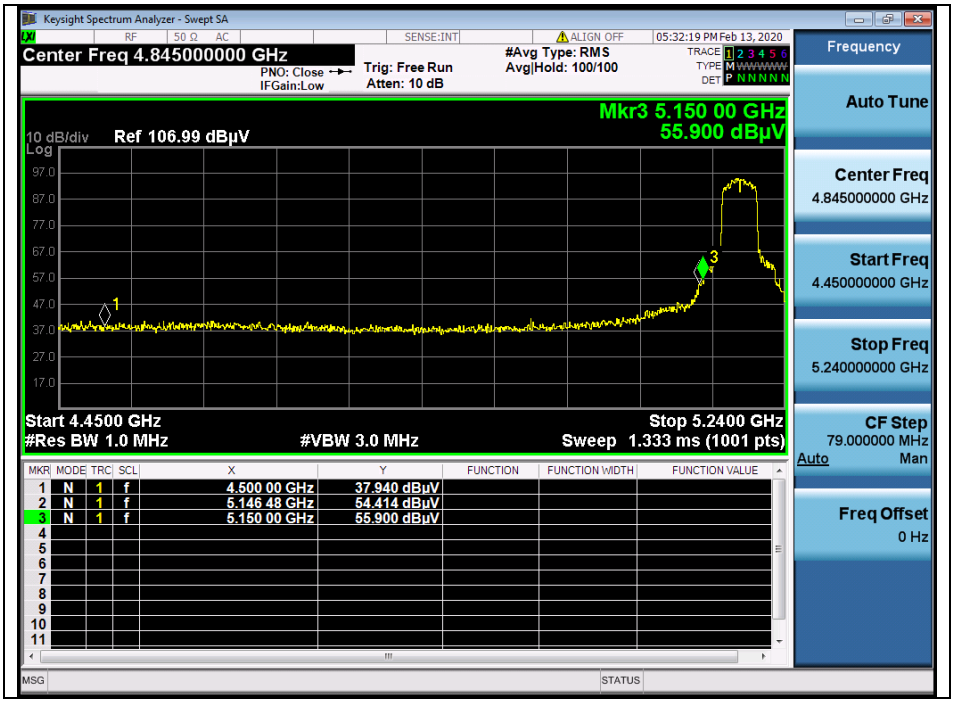


Low channel Band edge (Peak) - Band 3

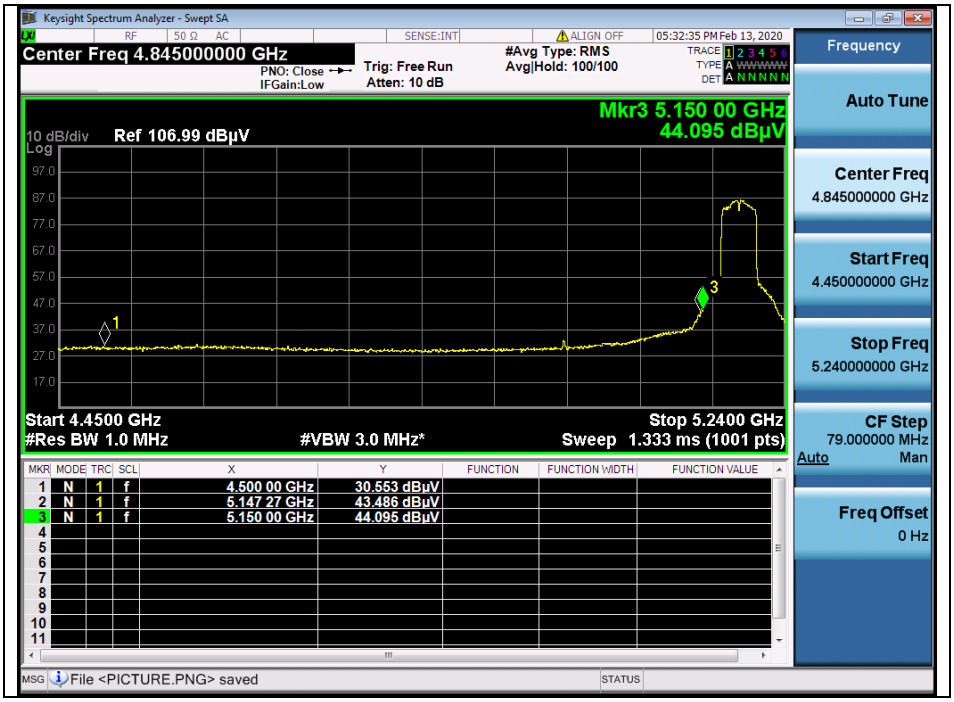
High channel Band edge (Peak) - Band 3

OFDM: 802.11n_HT40 (MCS8)_ANT 1+ANT 2

Low channel Band edge (Peak) - Band 1



Low channel Band edge (Average) - Band 1

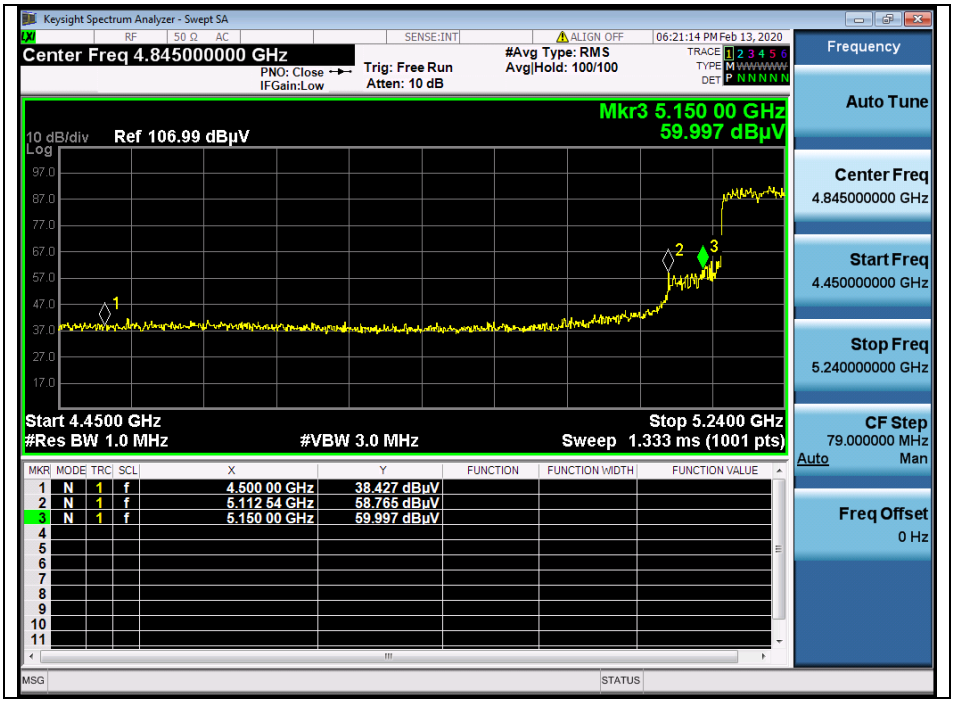


Low channel Band edge (Peak) - Band 3

High channel Band edge (Peak) - Band 3

OFDM: 802.11ac_VHT80 (MCS0)_ANT 1+ANT 2

Middle channel Band edge (Peak) - Band 1



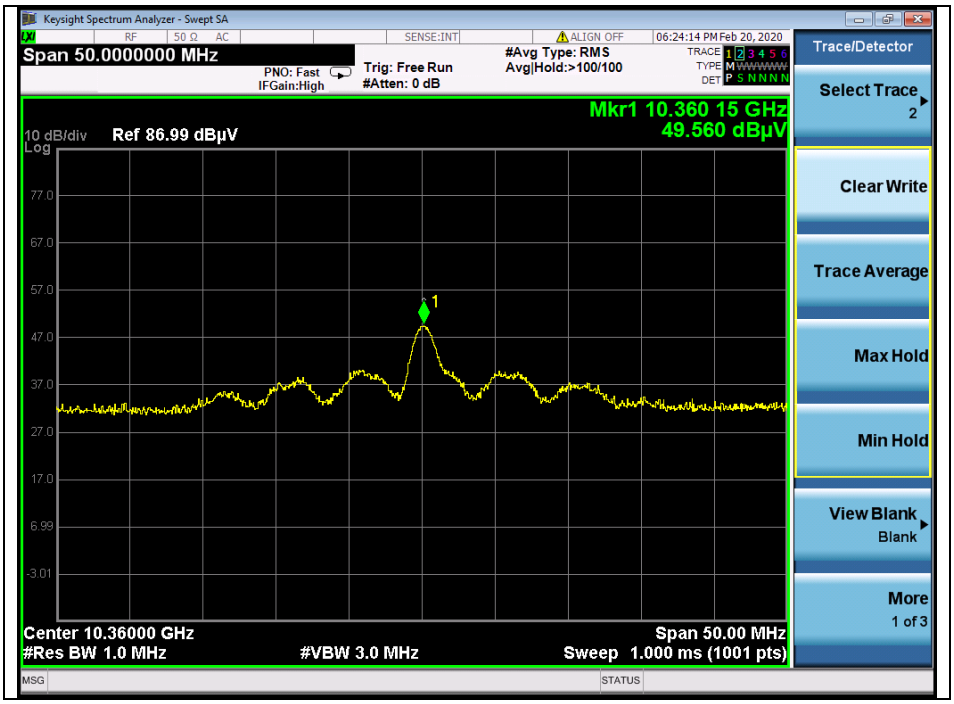
Middle channel Band edge (Average) - Band 1

Low channel Band edge (Peak) - Band 3

High channel Band edge (Peak) - Band 3

OFDM: 802.11a (6 Mbps)_ANT 1

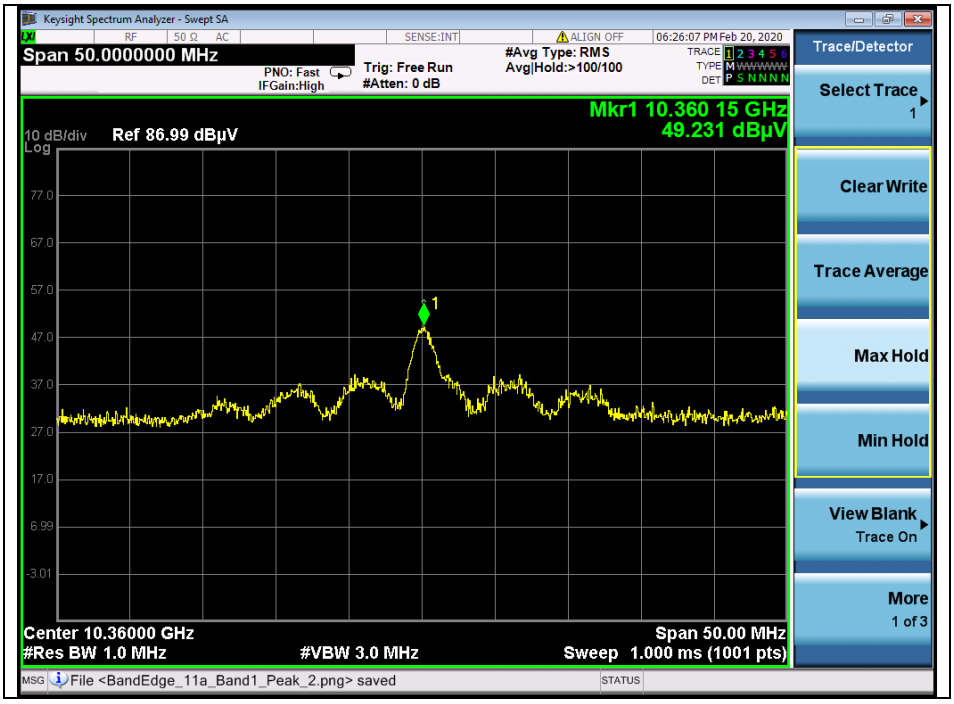
Low channel 2nd harmonic (Peak)



Middle channel 2nd harmonic (Peak)

High channel 2nd harmonic (Peak)

OFDM: 802.11a (6 Mbps)_ANT 2
Low channel 2nd harmonic (Peak)

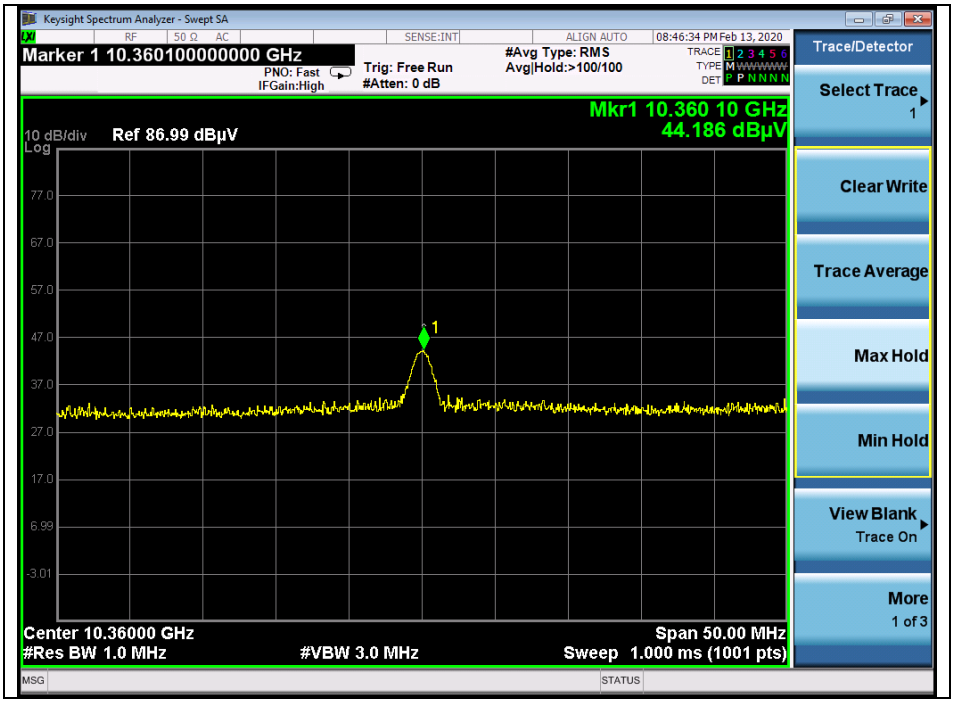


Middle channel 2nd harmonic (Peak)

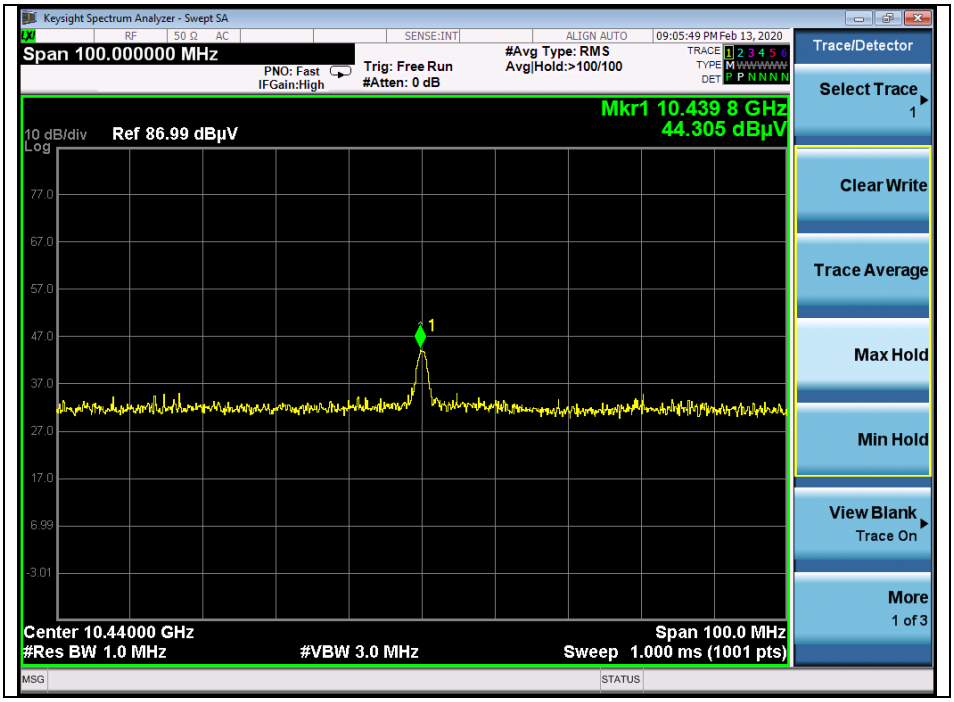
High channel 2nd harmonic (Peak)

OFDM: 802.11n_HT20 (MCS8)_ANT 1+ANT 2

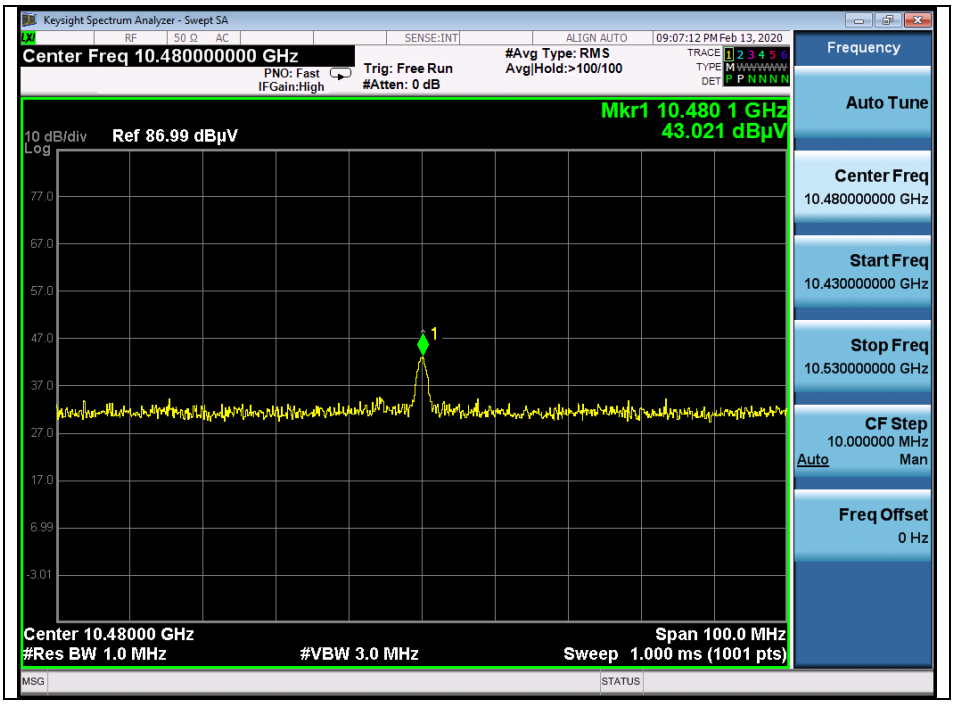
Low channel 2nd harmonic (Peak)



Middle channel 2nd harmonic (Peak)

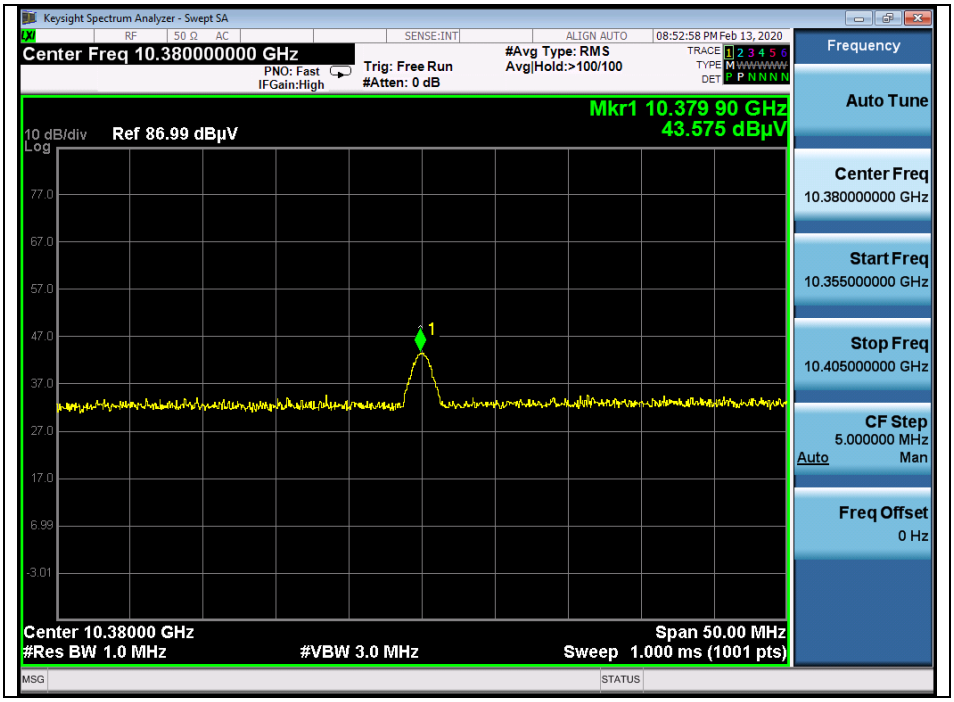


High channel 2nd harmonic (Peak)

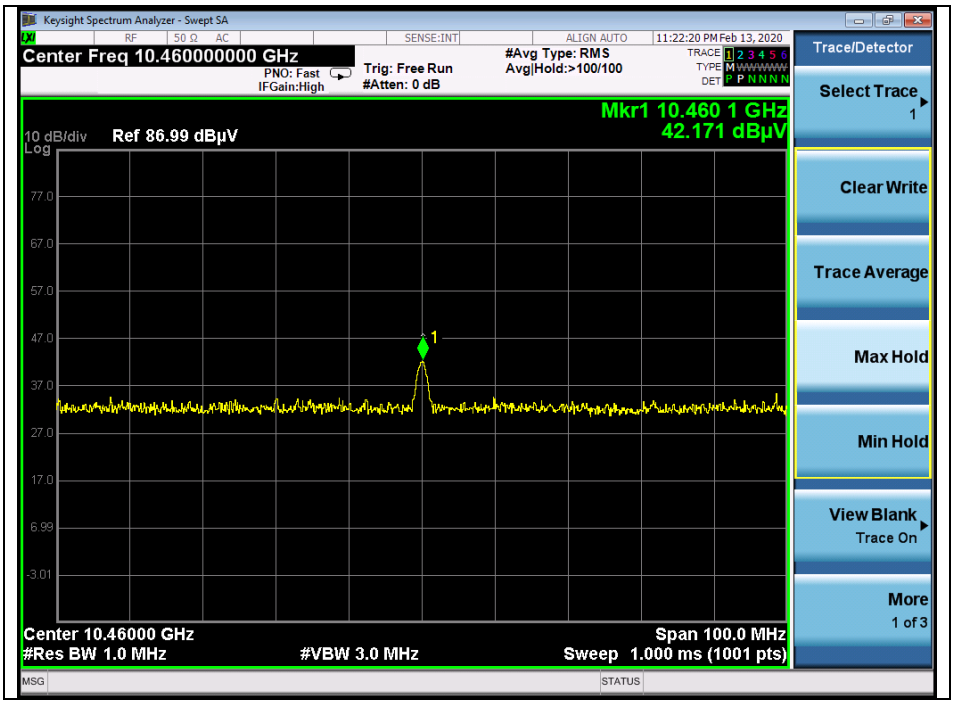


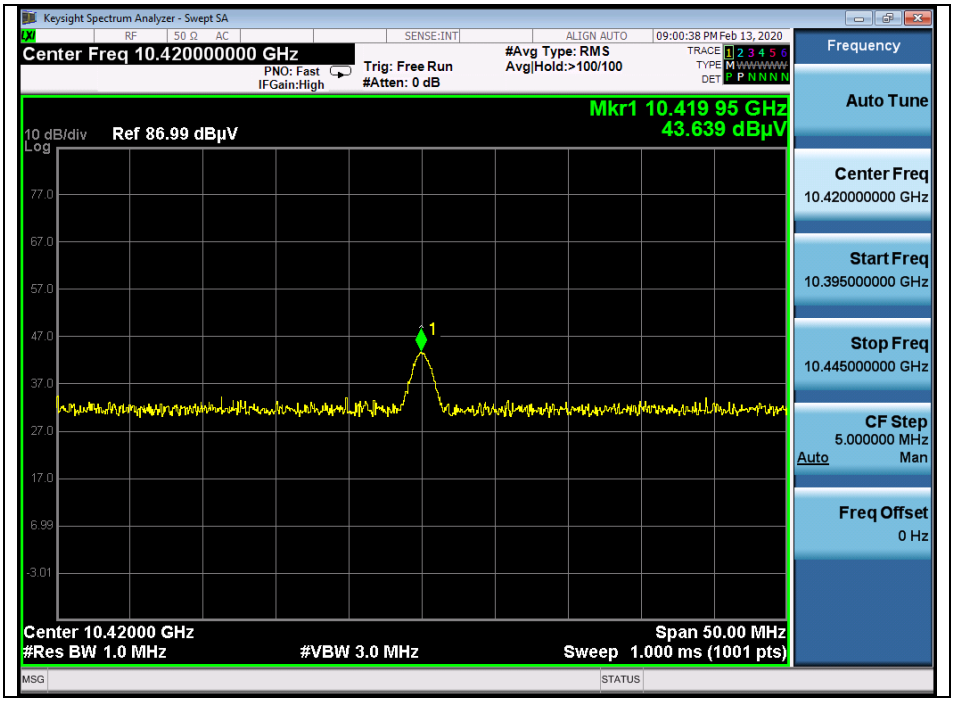
OFDM: 802.11n_HT40 (MCS8)_ANT 1+ANT 2

Low channel 2nd harmonic (Peak)



High channel 2nd harmonic (Peak)



OFDM: 802.11ac_VHT80 (MCS0)_ANT 1+ANT 2

Middle channel 2nd harmonic (Peak)