

TEST REPORT

Reference No. : WTD21D09098668W003
FCC ID..... : 2ADCSIFC67X1
Applicant..... : SMART Wireless Computing Inc.
Address : 39870 Eureka Dr, Newark, CA 94560, United States of America
Manufacturer : SMART Wireless Computing Inc.
Address : 39870 Eureka Dr, Newark, CA 94560, United States of America
Product..... : System on Module-IFC67X1
Model(s)..... : IFC67X1
Standards..... : FCC CFR47 Part 15 E Section 15.407
Date of Receipt sample..... : 2021-09-16
Date of Test..... : 2021-09-16 to 2021-11-17
Date of Issue : 2021-11-17
Test Result : Pass

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD21D09098668 W003	2021-09-16	2021-09-16 to 2021-11-17	2021-11-17	Original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	System on Module-IFC67X1
Model(s):	IFC67X1
Wi-Fi Specification:	2.4G-802.11b/g/n HT20/n HT40 5G-802.11a/n/ac HT20 /n/ac HT40 / ac HT80/ ac HT80+ HT80
Bluetooth Version:	Bluetooth v5.0 with BLE
GNSS:	Support
Hardware Version:	IFC67X1-XX-PX
Software Version:	Android 9.0

4.2 Details of E.U.T.

Operation Frequency:	802.11a/n/ac (HT20): U-NII-1: 5180-5240MHz, U-NII-2A: 5260-5320MHz(DFS), U-NII-2C: 5500-5700MHz(DFS), U-NII-3:5745-5825MHz 802.11n/ac (HT40): U-NII-1: 5190-5230MHz, U-NII-2A: 5270-5310MHz(DFS), U-NII-2C: 5510-5670MHz(DFS), U-NII-3: 5755-5795MHz 802.11ac (HT80): U-NII-1: 5210MHz, U-NII-2A: 5290MHz(DFS), U-NII-2C: 5530-5610MHz(DFS), U-NII-3: 5775MHz 802.11ac (HT80+HT80):5250MHz, 5570Mhz Overlapping channels: 5690MHz (ac HT80), 5710MHz (n/ac HT40), 5720MHz (a/n/ac HT20)
Max. RF output power:	ANT 0: 14.922dBm ANT 1: 16.020dbm Total:18.84dBm
Type of Modulation:	OFDM
Antenna installation:	Stamped Metal Antenna,PCB printed antenna
Antenna Gain:	PCB printed antenna (2.8dBi), Stamped Metal Antenna (4.5dBi)
Ratings:	DC 3.3V

4.3 Channel List

U-NII-1 (5.15-5.25GHz)			
channel	Frequency(MHz)	channel	Frequency(MHz)
36	5180	38	5190
40	5200	42	5210
44	5220	46	5230
48	5240	50	5250

U-NII-2A (5.25-5.35GHz)			
channel	Frequency(MHz)	channel	Frequency(MHz)
52	5260	54	5270
56	5280	58	5290
60	5300	62	5310
64	5320		

U-NII-2C (5.47-5.725GHz)			
channel	Frequency(MHz)	channel	Frequency(MHz)
100	5500	102	5510
104	5520	108	5540
110	5550	112	5560
114	5570	116	5580
118	5590	120	5600
124	5620	126	5630
128	5640	132	5660
134	5670	136	5680
140	5700		

U-NII-3 (5.725-5.85GHz)			
channel	Frequency(MHz)	channel	Frequency(MHz)
149	5745	151	5755
153	5765	155	5775
157	5785	159	5795
161	5805	165	5825

Overlapping channels			
channel	Frequency(MHz)	channel	Frequency(MHz)
138	5690	142	5710
144	5720		

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11a/n/ac(HT20):

channel	Frequency(MHz)	channel	Frequency(MHz)
36	5180	40	5200
48	5240		

channel	Frequency(MHz)	channel	Frequency(MHz)
52	5260	56	5280
64	5320		

channel	Frequency(MHz)	channel	Frequency(MHz)
100	5500	120	5600
140	5700		

channel	Frequency(MHz)	channel	Frequency(MHz)
144	5720		

channel	Frequency(MHz)	channel	Frequency(MHz)
149	5745	157	5785
165	5825		

For 802.11n/ac(HT40)/ ac(HT80):

channel	Frequency(MHz)	channel	Frequency(MHz)
38	5190	42	5210
46	5230		

channel	Frequency(MHz)	channel	Frequency(MHz)
54	5270	58	5290
62	5310		

channel	Frequency(MHz)	channel	Frequency(MHz)
102	5510	106	5530
110	5550	134	5670

channel	Frequency(MHz)	channel	Frequency(MHz)
138	5690	142	5710

channel	Frequency(MHz)	channel	Frequency(MHz)
151	5755	155	5775
159	5795		

For 802.11ac(HT80+HT80):

channel	Frequency(MHz)	channel	Frequency(MHz)
50	5250	114	5570

5 Test Mode Description:

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Transmitting duty cycle is no less 98%.

The software is installed in operation system, named "QRCT4.exe", Version 4

Test Items	Mode	Data Rate	TX/RX
Radiated Emissions	802.11a (HT20)	6 Mbps	TX
	802.11n (HT20/40)	MCS0	TX
	802.11ac(HT20/40/80)		
	802.11ac(HT80+ HT80)		
Duty Cycle	802.11a (HT20)	6 Mbps	TX
	802.11n (HT20/40)	MCS0	TX
	802.11ac(HT20/40/80)		
	802.11ac(HT80+ HT80)		
Band Edge	802.11a (HT20)	6 Mbps	TX
	802.11n (HT20/40)	MCS0	TX
	802.11ac(HT20/40/80)		
	802.11ac(HT80+ HT80)		
6dB Bandwidth	802.11a (HT20)	6 Mbps	TX
	802.11n (HT20/40)	MCS0	TX
	802.11ac(HT20/40/80)		
	802.11ac(HT80+ HT80)		
26dB Bandwidth and 99% Occupied Bandwidth	802.11a (HT20)	6 Mbps	TX
	802.11n (HT20/40)	MCS0	TX
	802.11ac(HT20/40/80)		
	802.11ac(HT80+ HT80)		
Conducted Output Power	802.11a (HT20)	6 Mbps	TX
	802.11n (HT20/40)	MCS0	TX
	802.11ac(HT20/40/80)		
	802.11ac(HT80+ HT80)		
Power Spectral Density	802.11a (HT20)	6 Mbps	TX
	802.11n (HT20/40)	MCS0	TX
	802.11ac(HT20/40/80)		
	802.11ac(HT80+ HT80)		
Frequency Stability	Un-modulation	/	TX

5.1 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

6 Equipment Used during Test

6.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	2021-04-26	2022-04-25
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	2021-04-26	2022-04-25
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2021-08-23	2022-08-22
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2021-04-26	2022-04-25
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2021-04-26	2022-04-25
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2021-07-30	2022-07-29
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2021-07-26	2022-07-25
8	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2021-04-26	2022-04-25
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2021-04-26	2022-04-25
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2020-10-31 2021-10-28	2021-10-29 2022-10-27
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	2021-04-26	2022-04-25
4	Cable	HUBER+SUHNER	CBL2	525178	2021-04-26	2022-04-25
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2021-04-26	2022-04-25
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	2021-04-26	2022-04-25
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	2021-04-26	2022-04-25

6.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
Computer	Dell	K053	/
Mouse	Lenovo	AP01	/
Transfer/carrier board	SMART Wireless Computing Inc.	/	/

6.3 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

6.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

7 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207(a)	N/A
Radiated Emissions	15.407(a) 15.205(a) 15.209(a)	PASS
Duty Cycle	KDB 789033	--
6dB Bandwidth	15.407(a)	PASS
26 dB Emission Bandwidth & 99% Occupied Bandwidth	15.407(a)	PASS
Maximum Conducted Output Power	15.407(a)	PASS
Power Spectral Density	15.407(a)	PASS
Unwanted Emissions that fall Outside of the Restricted Bands	15.407(a)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

8 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.407

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Distance	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

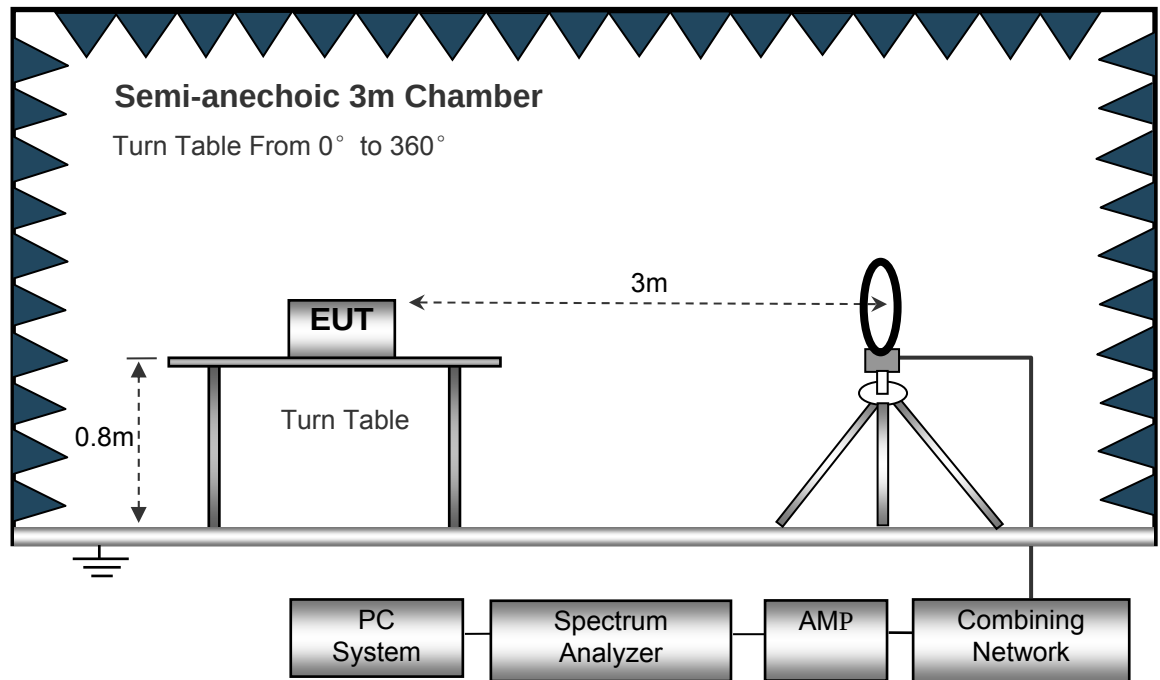
EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

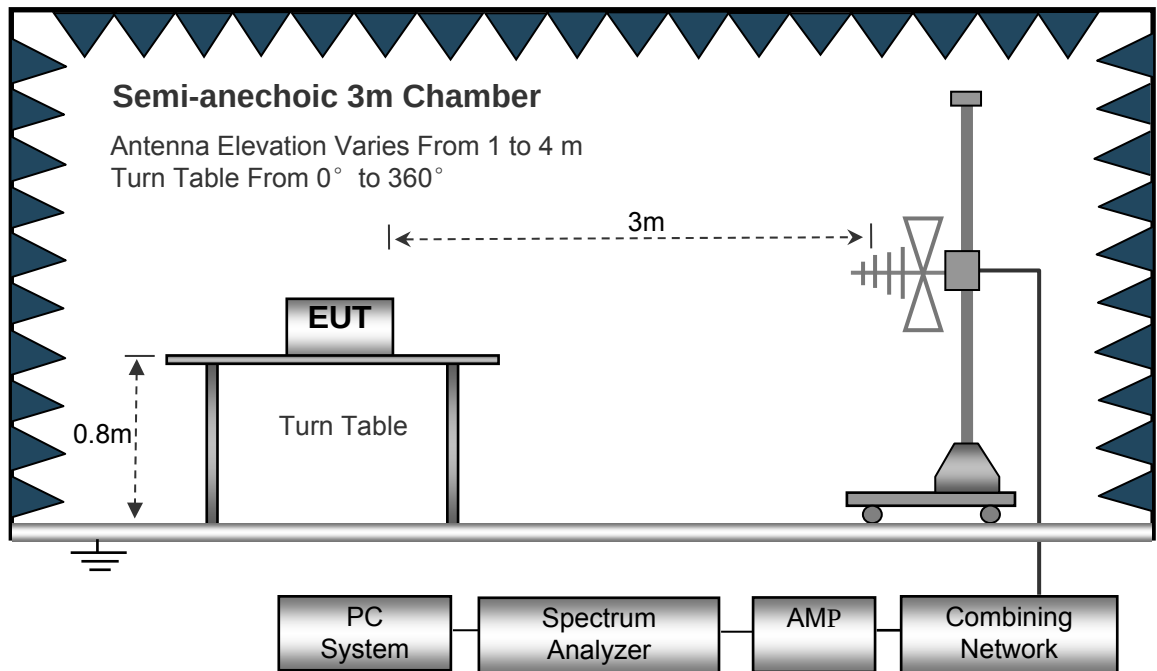
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10: 2013.

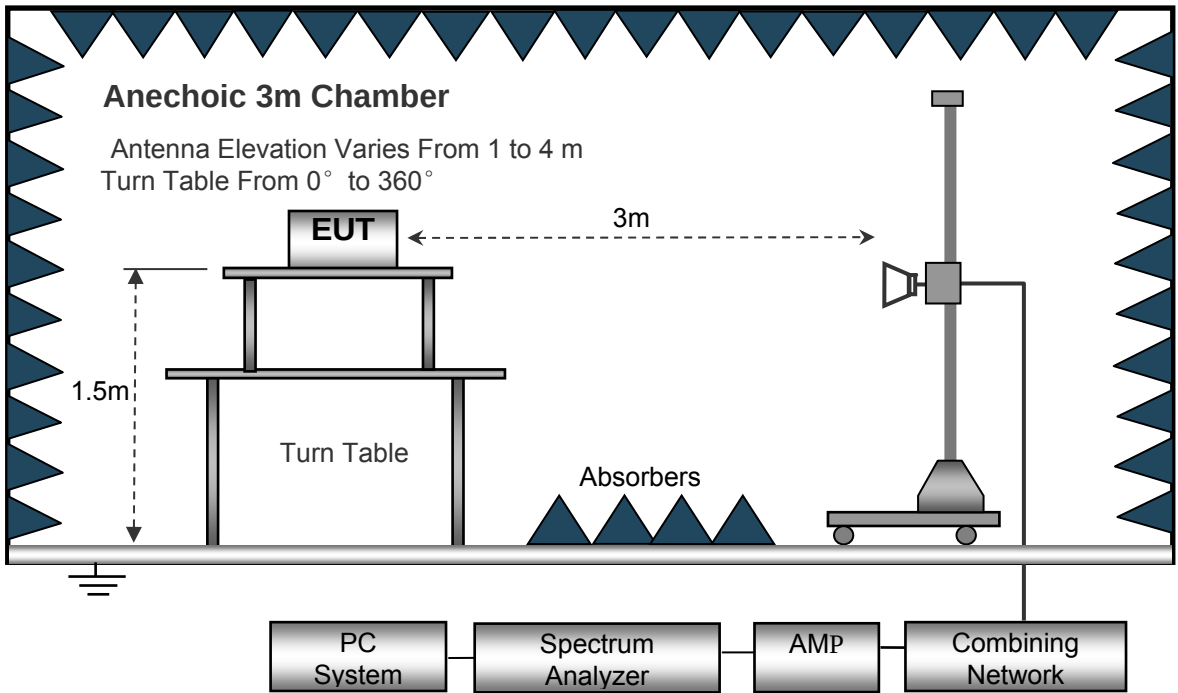
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



8.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed Auto
Detector PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed Auto
Detector PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

8.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used during radiated emissions above 1GHz measurement.

8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

8.6 Summary of Test Results

Remark: Both ANT0 and ANT1 have tests, For 802.11a, Only record the Low channel data of the worst case ANT0 and U-NII-1, and 802.11n/ac worst case is MIMO(record the Low channel data)

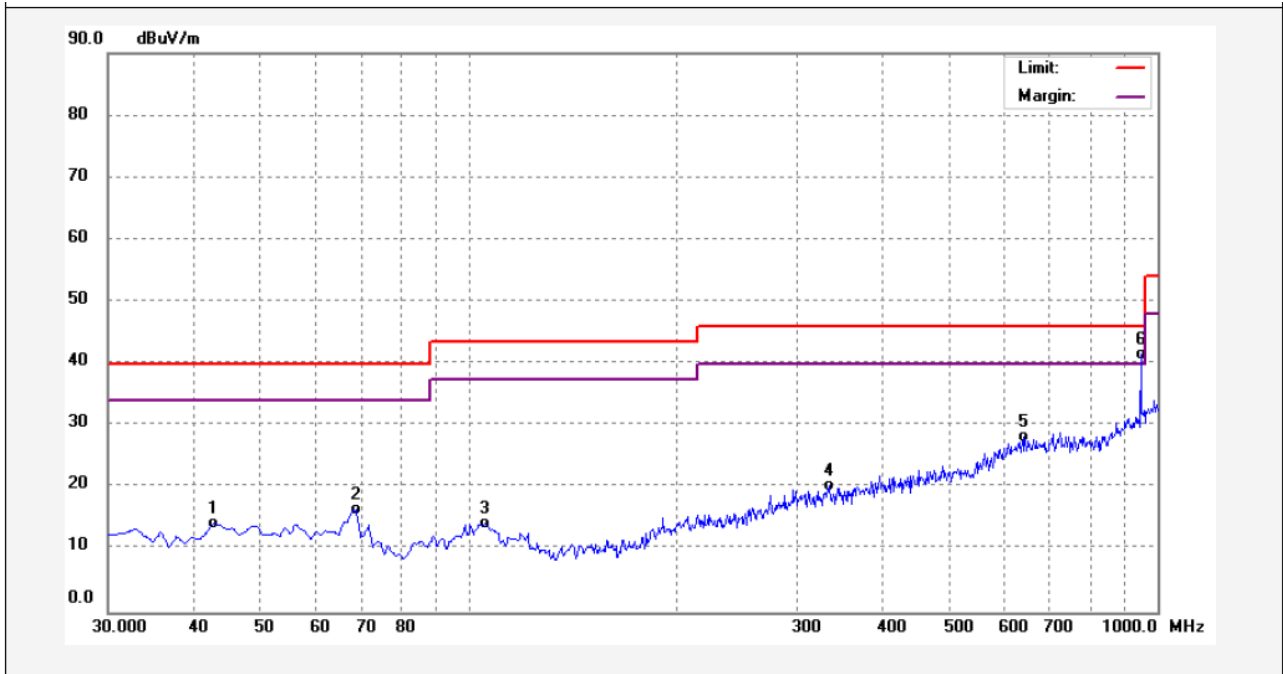
Test Frequency: 9KHz~30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 1GHz (only the worst-case plots for each mode)

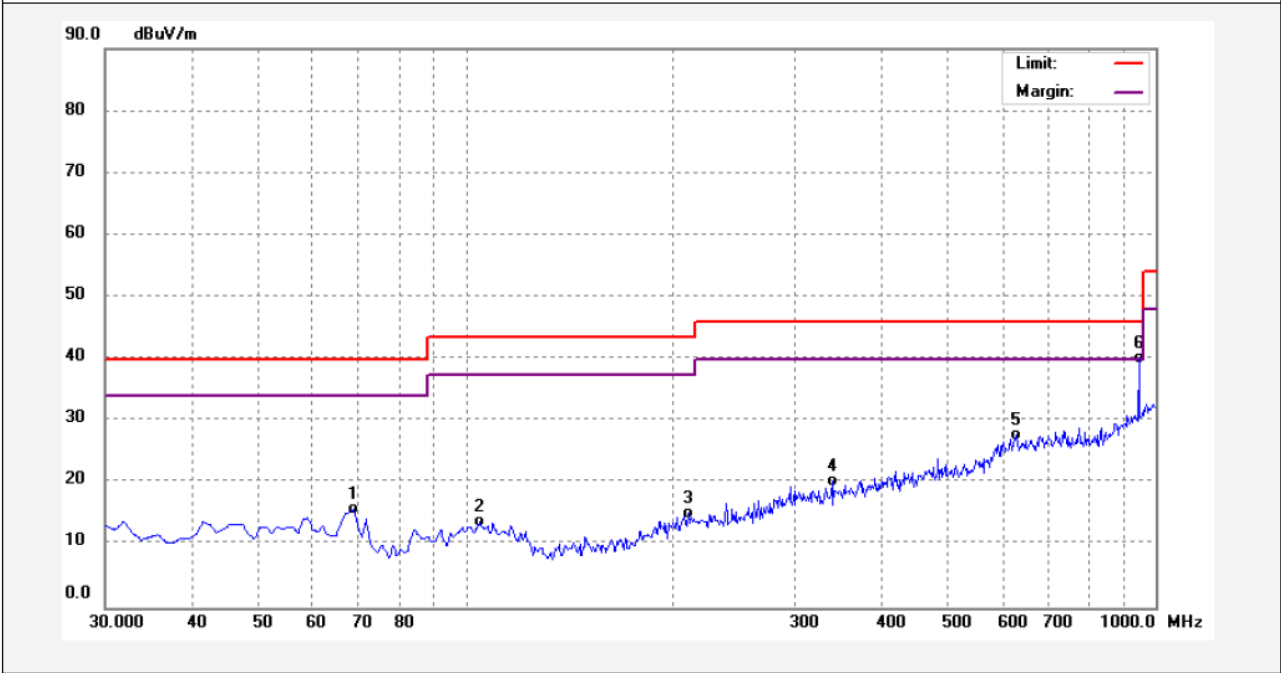
WIFI: Stamped Metal Antenna

802.11a: Low Channel 5180MHz (Vertical)



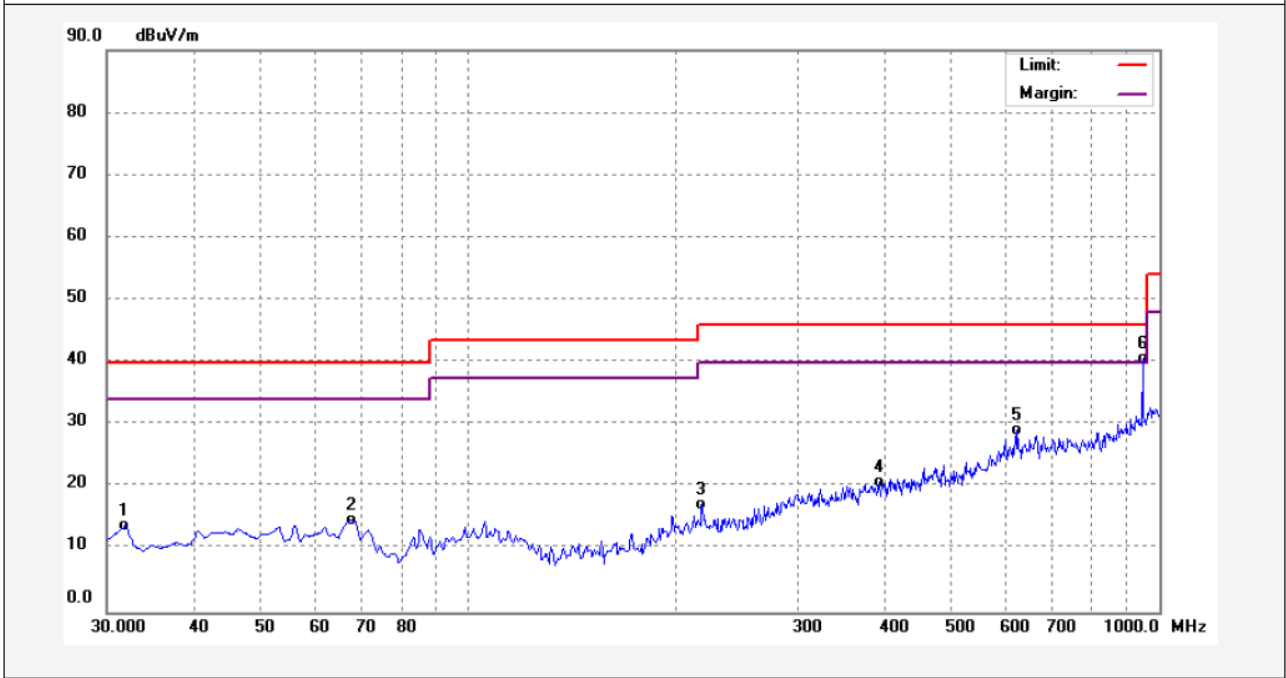
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	42.6099	28.21	-13.90	14.31	40.00	-25.69	QP	
2	68.7999	31.35	-14.87	16.48	40.00	-23.52	QP	
3	105.6599	27.57	-13.32	14.25	43.50	-29.25	QP	
4	334.5799	27.80	-7.45	20.35	46.00	-25.65	QP	
5	642.0700	28.99	-0.83	28.16	46.00	-17.84	QP	
6	948.5900	37.42	4.13	41.55	46.00	-4.45	QP	

802.11a: Low Channel 5180MHz (Horizontal)



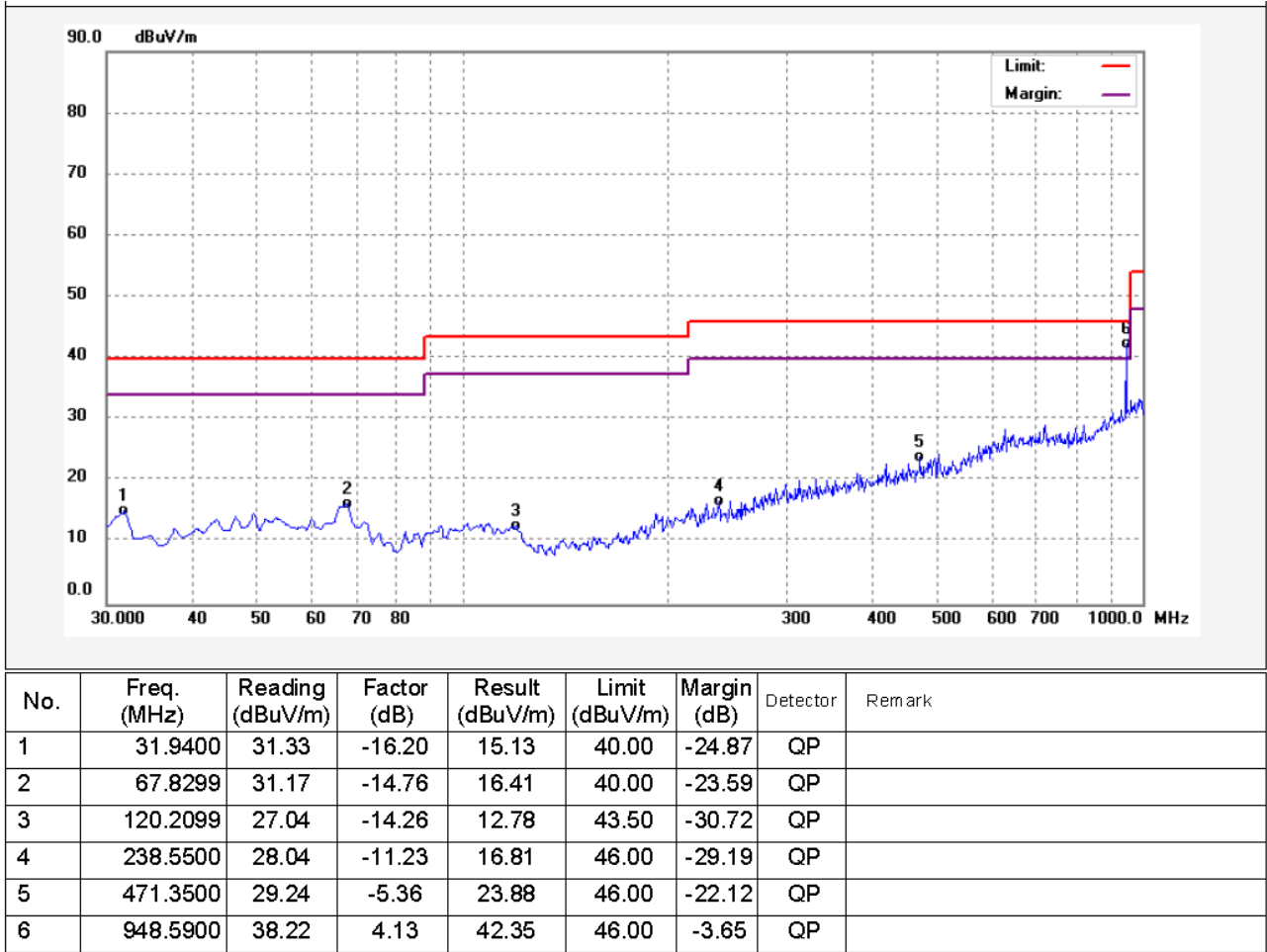
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	68.7999	30.67	-14.87	15.80	40.00	-24.20	QP	
2	104.6899	27.03	-13.27	13.76	43.50	-29.74	QP	
3	210.4199	27.18	-11.92	15.26	43.50	-28.24	QP	
4	340.3999	27.78	-7.40	20.38	46.00	-25.62	QP	
5	629.4600	28.85	-0.96	27.89	46.00	-18.11	QP	
6	948.5900	35.93	4.13	40.06	46.00	-5.94	QP	

802.11n: Low Channel 5190MHz (Vertical)

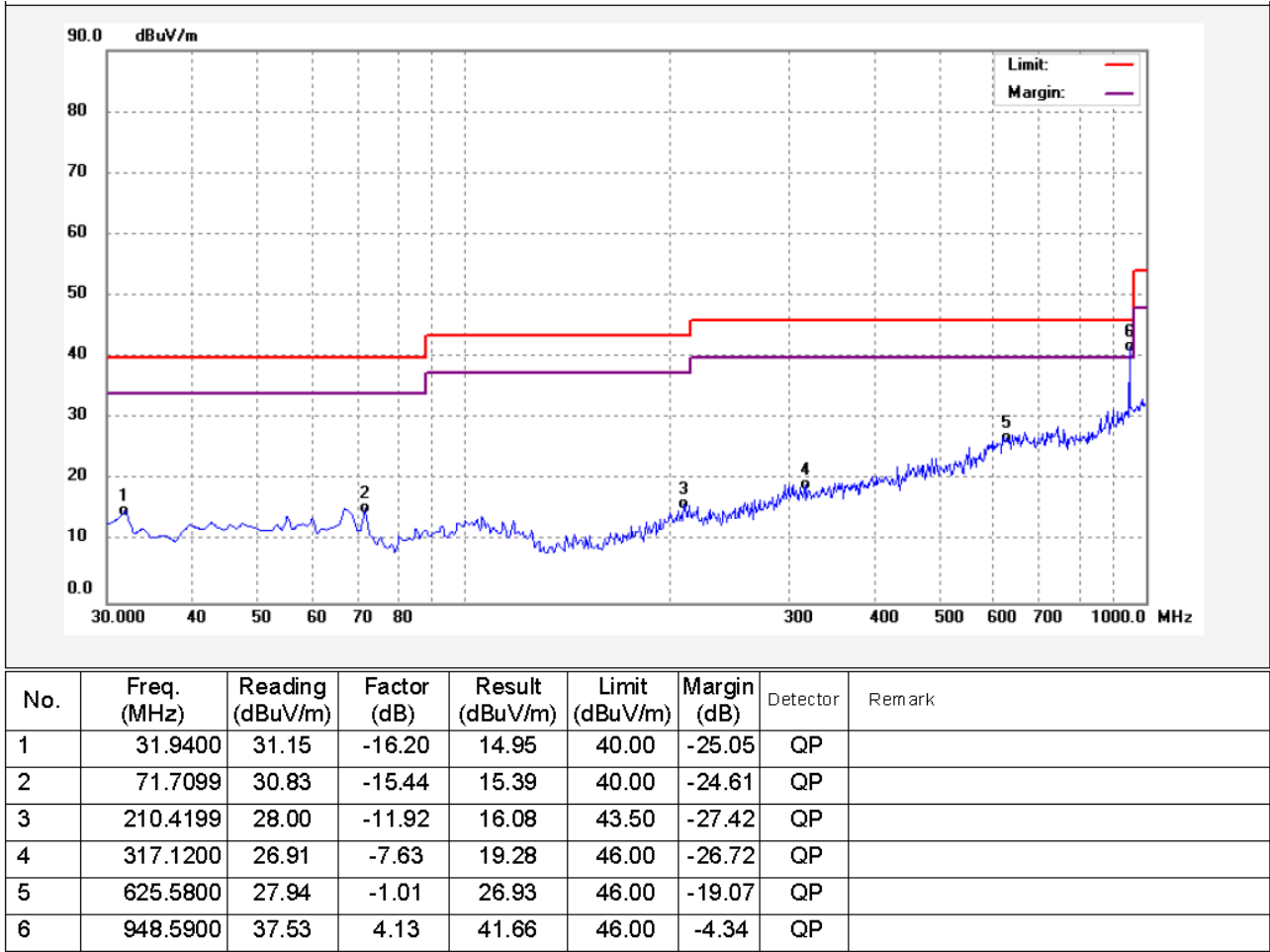


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	31.9400	30.09	-16.20	13.89	40.00	-26.11	QP	
2	67.8299	29.54	-14.76	14.78	40.00	-25.22	QP	
3	218.1800	29.05	-11.74	17.31	46.00	-28.69	QP	
4	394.7200	27.34	-6.49	20.85	46.00	-25.15	QP	
5	624.6100	30.08	-1.01	29.07	46.00	-16.93	QP	
6	948.5900	36.48	4.13	40.61	46.00	-5.39	QP	

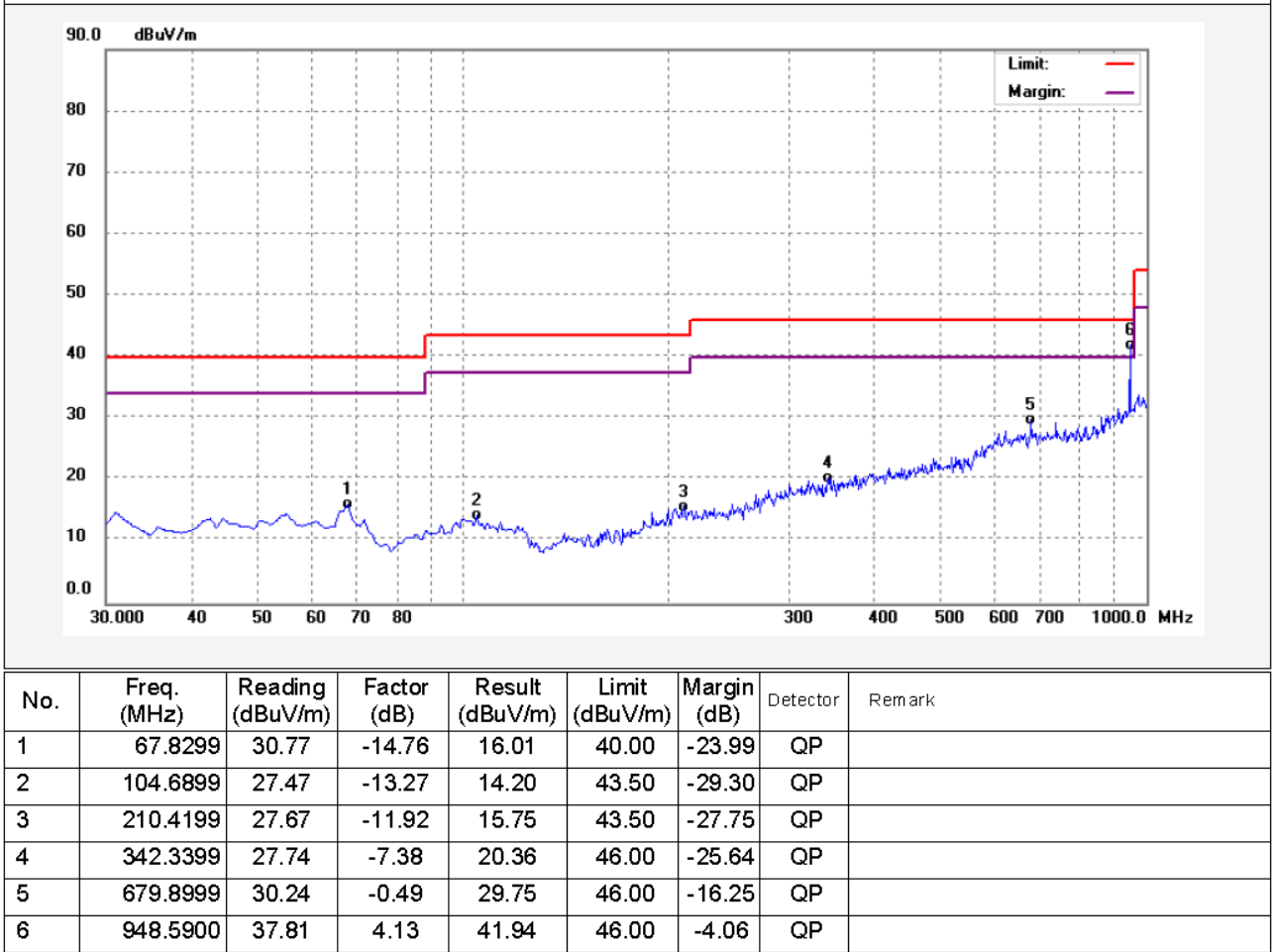
802.11n: Low Channel 5190MHz (Horizontal)



802.11ac: Low Channel 5210MHz (Vertical)

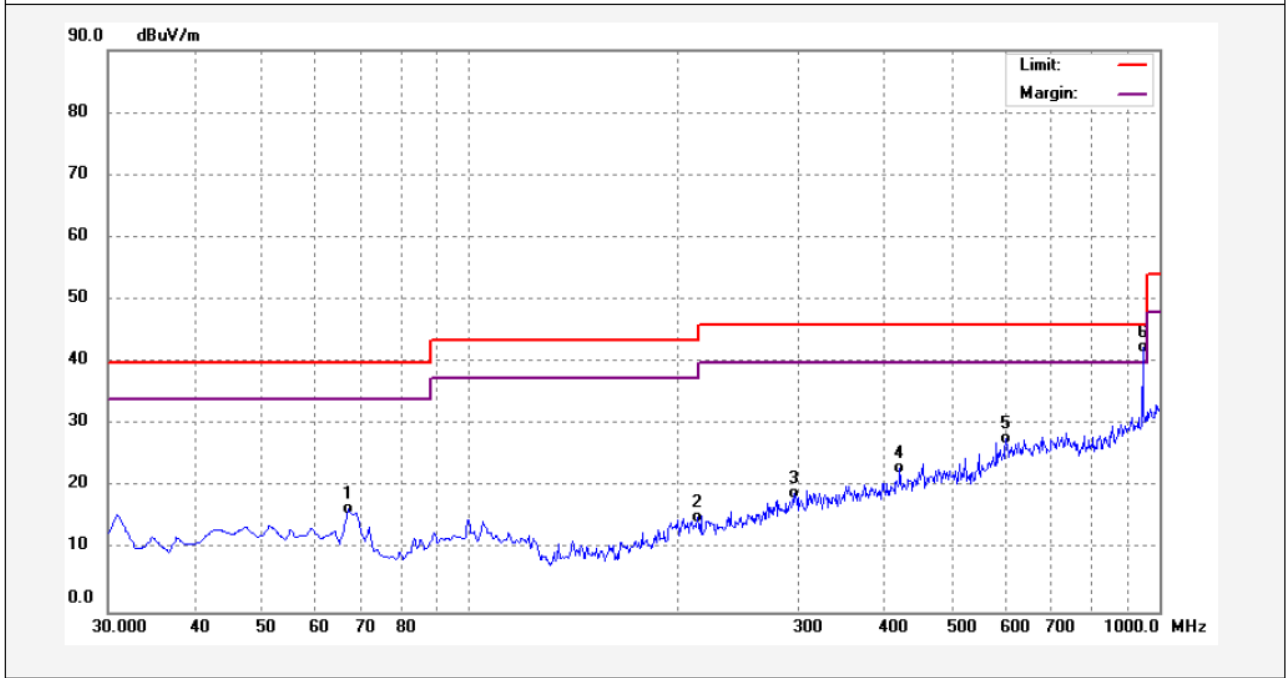


802.11ac: Low Channel 5210MHz (Horizontal)



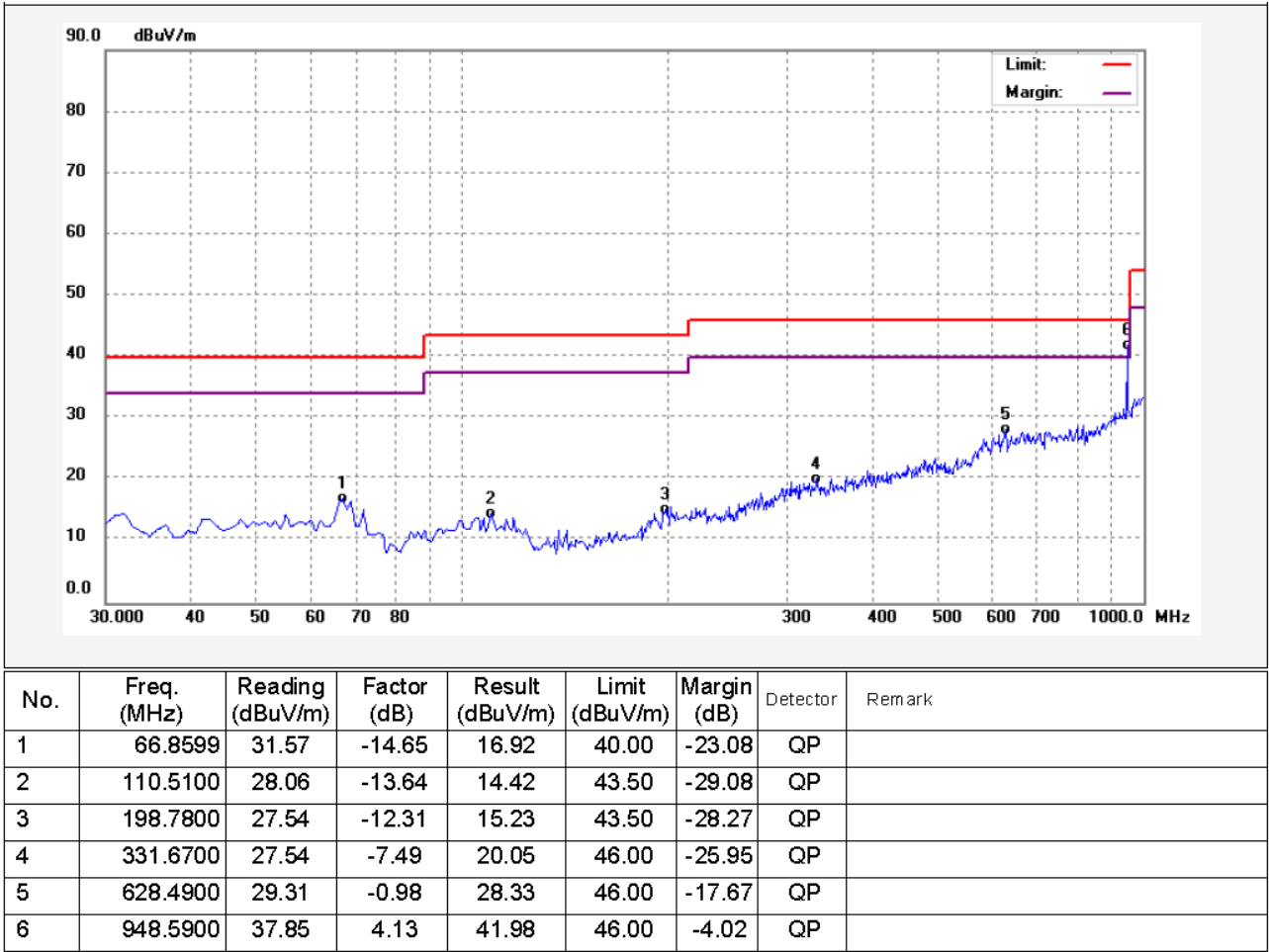
WIFI: ,PCB printed antenna

802.11a: Low Channel 5180MHz (Vertical)

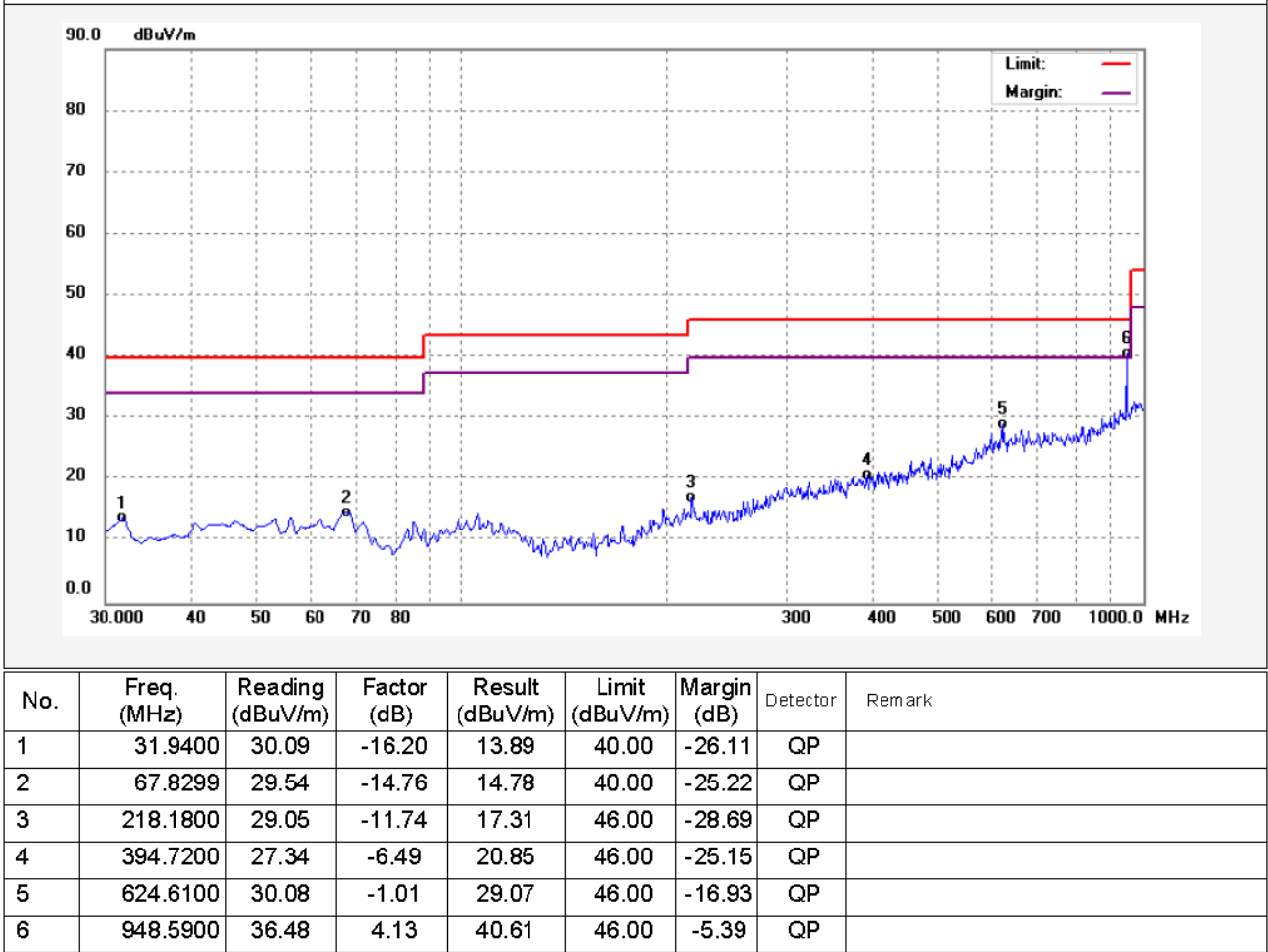


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	66.8599	31.09	-14.65	16.44	40.00	-23.56	QP	
2	214.3000	27.09	-11.83	15.26	43.50	-28.24	QP	
3	295.7799	27.02	-8.06	18.96	46.00	-27.04	QP	
4	420.9100	29.16	-6.10	23.06	46.00	-22.94	QP	
5	600.3600	29.11	-1.27	27.84	46.00	-18.16	QP	
6	948.5900	38.23	4.13	42.36	46.00	-3.64	QP	

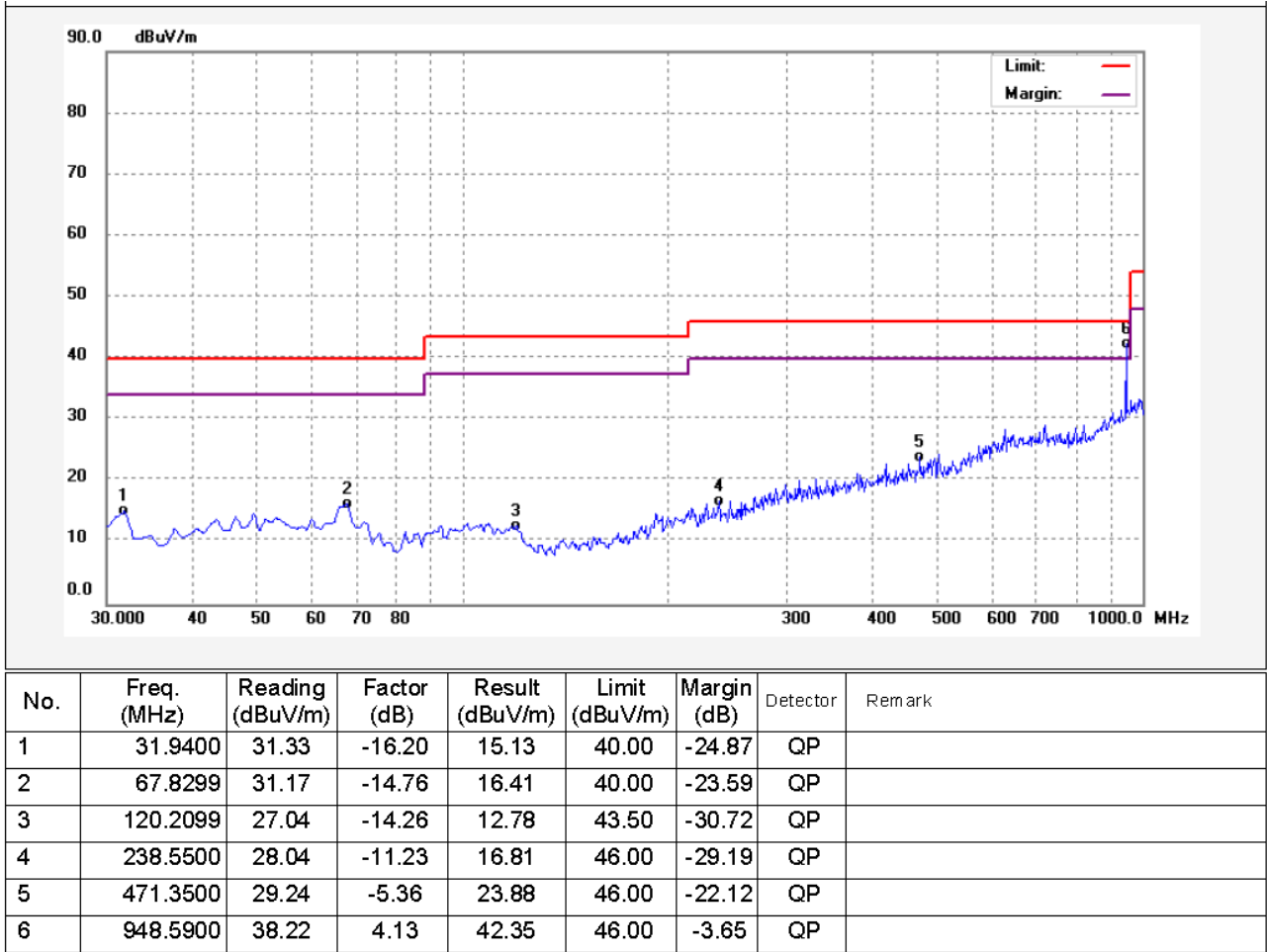
802.11a: Low Channel 5180MHz (Horizontal)



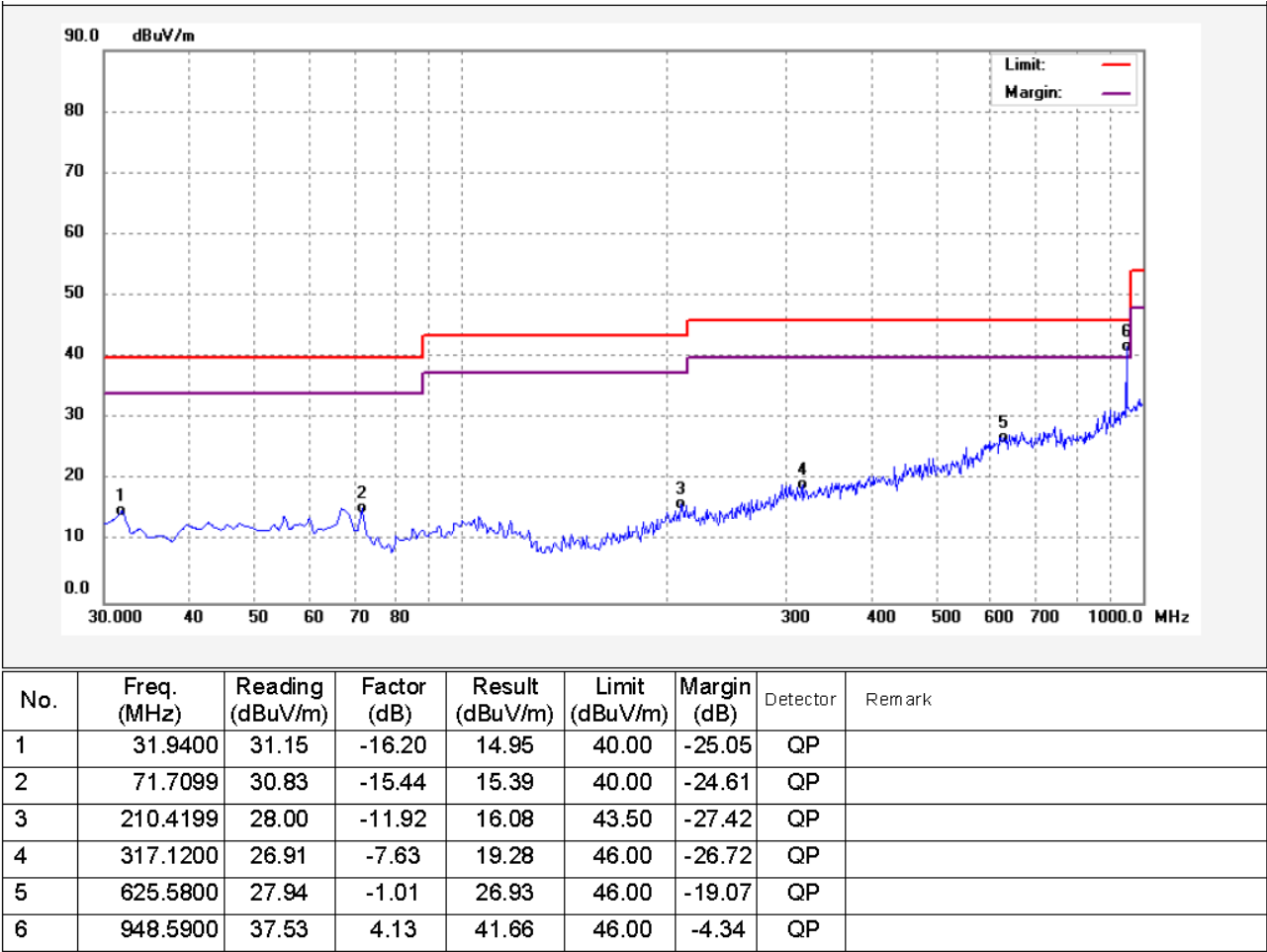
802.11n: Low Channel 5190MHz (Vertical)



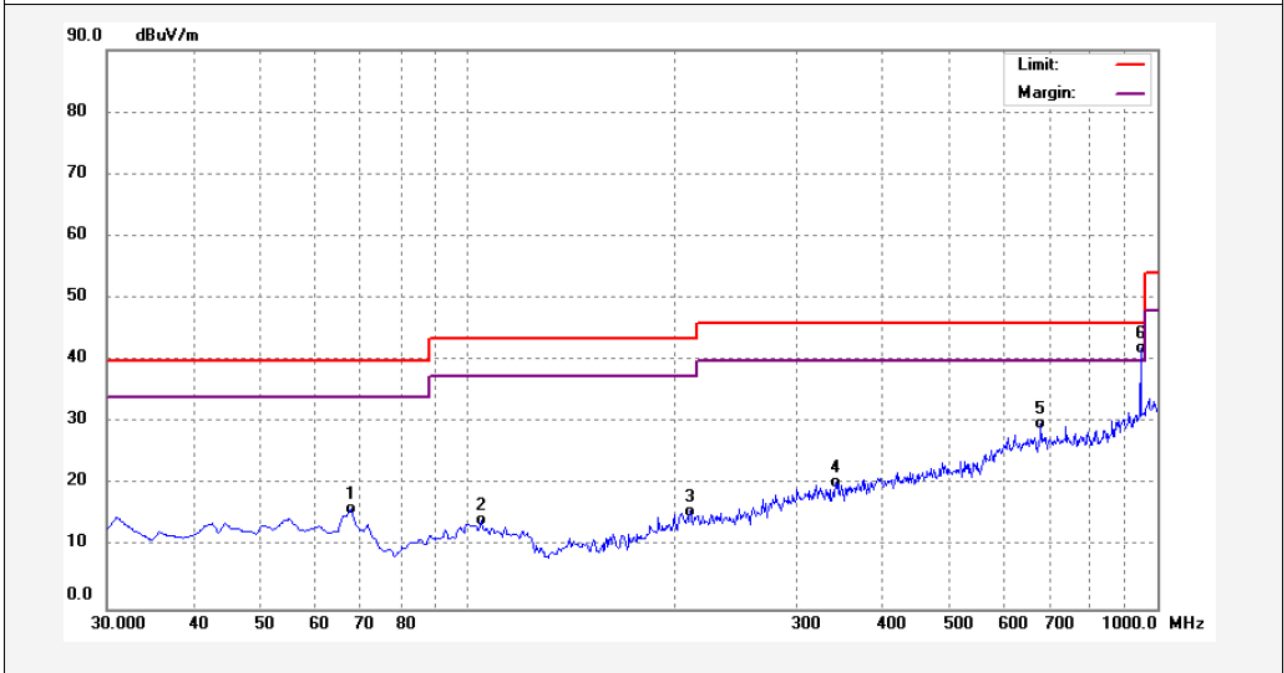
802.11n: Low Channel 5190MHz (Horizontal)



802.11ac: Low Channel 5210MHz (Vertical)



802.11ac: Low Channel 5210MHz (Horizontal)



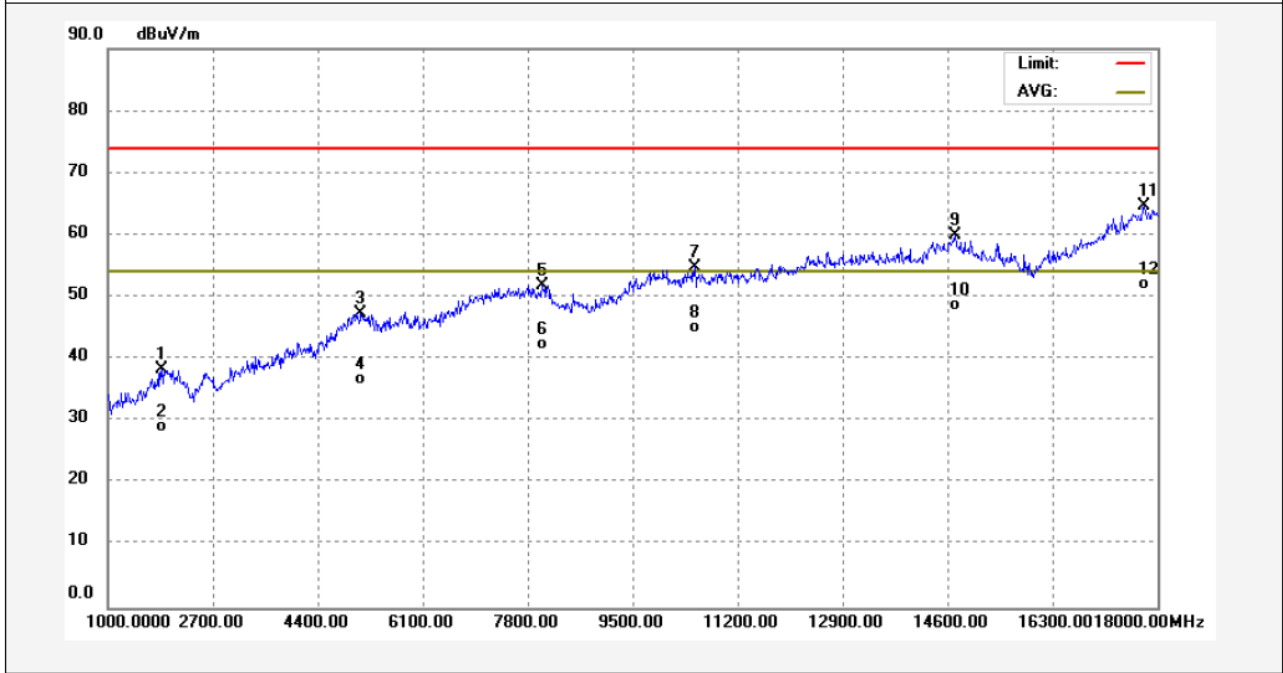
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	67.8299	30.77	-14.76	16.01	40.00	-23.99	QP	
2	104.6899	27.47	-13.27	14.20	43.50	-29.30	QP	
3	210.4199	27.67	-11.92	15.75	43.50	-27.75	QP	
4	342.3399	27.74	-7.38	20.36	46.00	-25.64	QP	
5	679.8999	30.24	-0.49	29.75	46.00	-16.25	QP	
6	948.5900	37.81	4.13	41.94	46.00	-4.06	QP	

Test Frequency : 1GHz ~ 18GHz

Remark: The current test plots doesn't have the fundamental signal, It's blocked by the filter

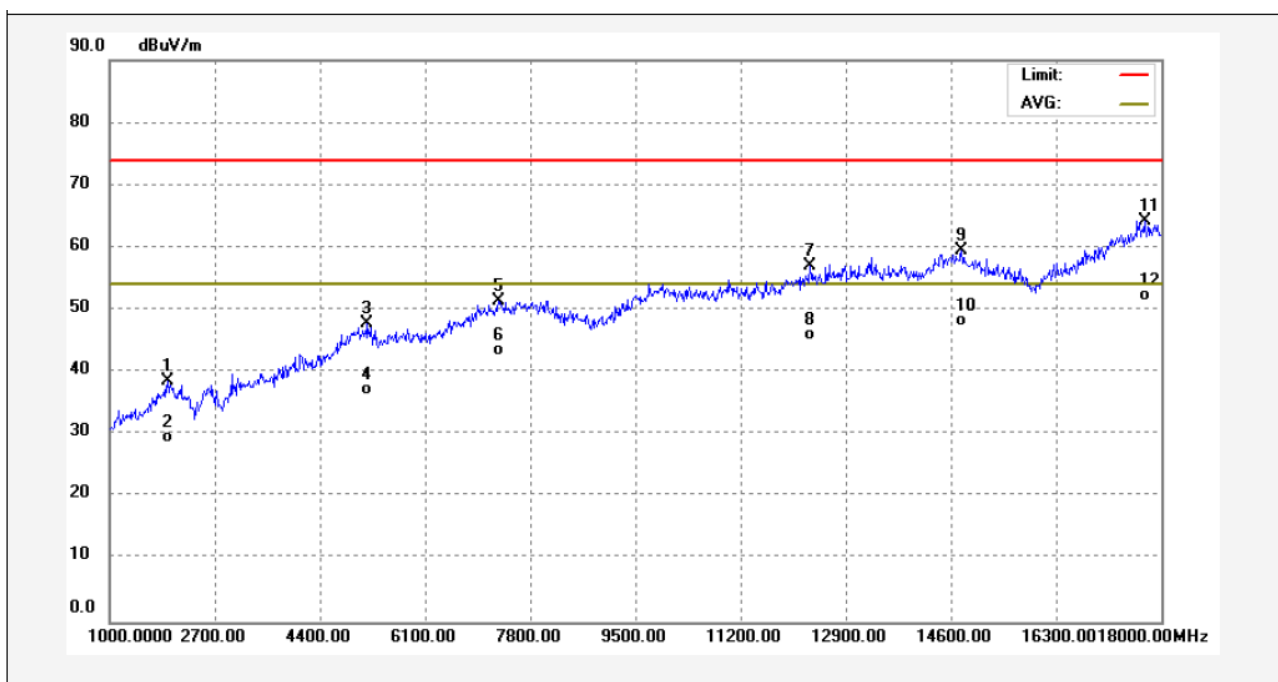
WIFI: Stamped Metal Antenna

802.11a: Low Channel 5180MHz (Vertical)



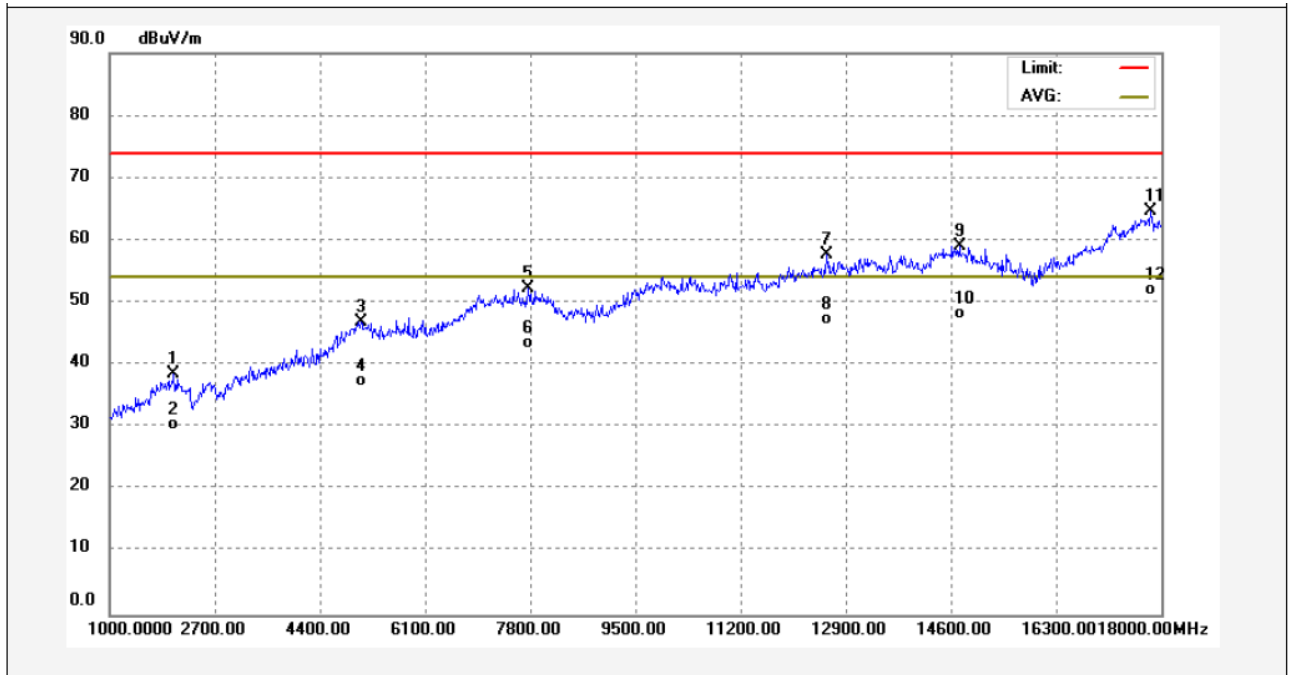
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1867.000	49.57	-11.26	38.31	74.00	-35.69	peak	
2	1867.000	40.39	-11.26	29.13	54.00	-24.87	AVG	
3	5097.000	49.09	-1.71	47.38	74.00	-26.62	peak	
4	5097.000	38.54	-1.71	36.83	54.00	-17.17	AVG	
5	8038.000	49.73	2.21	51.94	74.00	-22.06	peak	
6	8038.000	40.25	2.21	42.46	54.00	-11.54	AVG	
7	10503.000	50.28	4.62	54.90	74.00	-19.10	peak	
8	10503.000	40.51	4.62	45.13	54.00	-8.87	AVG	
9	14719.000	49.73	10.20	59.93	74.00	-14.07	peak	
10	14719.000	38.47	10.20	48.67	54.00	-5.33	AVG	
11	17779.000	48.66	16.02	64.68	74.00	-9.32	peak	
12	17779.000	36.11	16.02	52.13	54.00	-1.87	AVG	

802.11a: Low Channel 5180MHz (Horizontal)



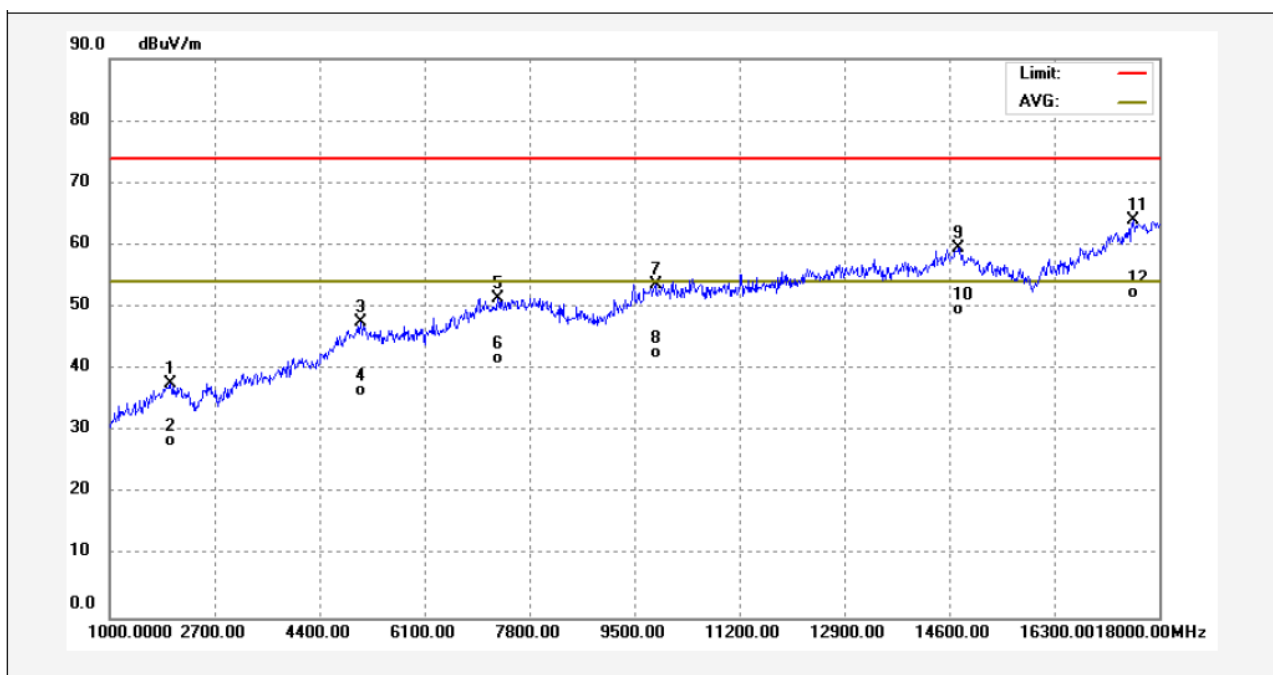
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1935.000	47.51	-8.97	38.54	74.00	-35.46	peak	
2	1935.000	38.53	-8.97	29.56	54.00	-24.44	AVG	
3	5165.000	51.60	-3.69	47.91	74.00	-26.09	peak	
4	5165.000	40.88	-3.69	37.19	54.00	-16.81	AVG	
5	7290.000	48.96	2.56	51.52	74.00	-22.48	peak	
6	7290.000	41.03	2.56	43.59	54.00	-10.41	AVG	
7	12322.000	50.44	6.67	57.11	74.00	-16.89	peak	
8	12322.000	39.28	6.67	45.95	54.00	-8.05	AVG	
9	14770.000	50.46	9.06	59.52	74.00	-14.48	peak	
10	14770.000	39.21	9.06	48.27	54.00	-5.73	AVG	
11	17728.000	46.11	18.06	64.17	74.00	-9.83	peak	
12	17728.000	34.33	18.06	52.39	54.00	-1.61	AVG	

802.11n: Low Channel 5190MHz (Vertical)

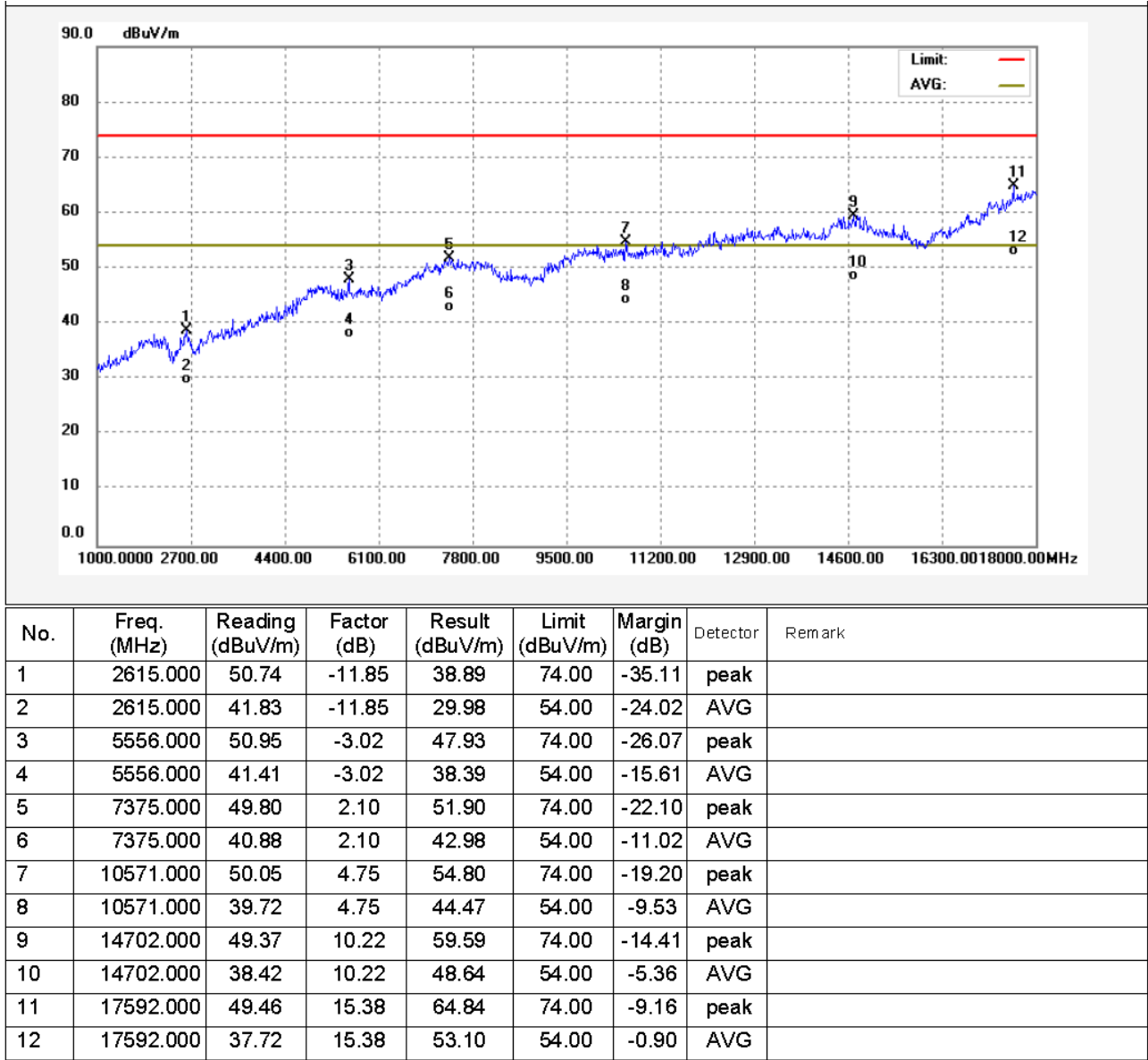


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2037.000	47.20	-8.52	38.68	74.00	-35.32	peak	
2	2037.000	38.93	-8.52	30.41	54.00	-23.59	AVG	
3	5063.000	50.74	-3.91	46.83	74.00	-27.17	peak	
4	5063.000	41.32	-3.91	37.41	54.00	-16.59	AVG	
5	7766.000	49.56	2.80	52.36	74.00	-21.64	peak	
6	7766.000	40.82	2.80	43.62	54.00	-10.38	AVG	
7	12594.000	50.49	7.13	57.62	74.00	-16.38	peak	
8	12594.000	40.13	7.13	47.26	54.00	-6.74	AVG	
9	14736.000	49.86	9.16	59.02	74.00	-14.98	peak	
10	14736.000	39.04	9.16	48.20	54.00	-5.80	AVG	
11	17830.000	46.32	18.28	64.60	74.00	-9.40	peak	
12	17830.000	33.90	18.28	52.18	54.00	-1.82	AVG	

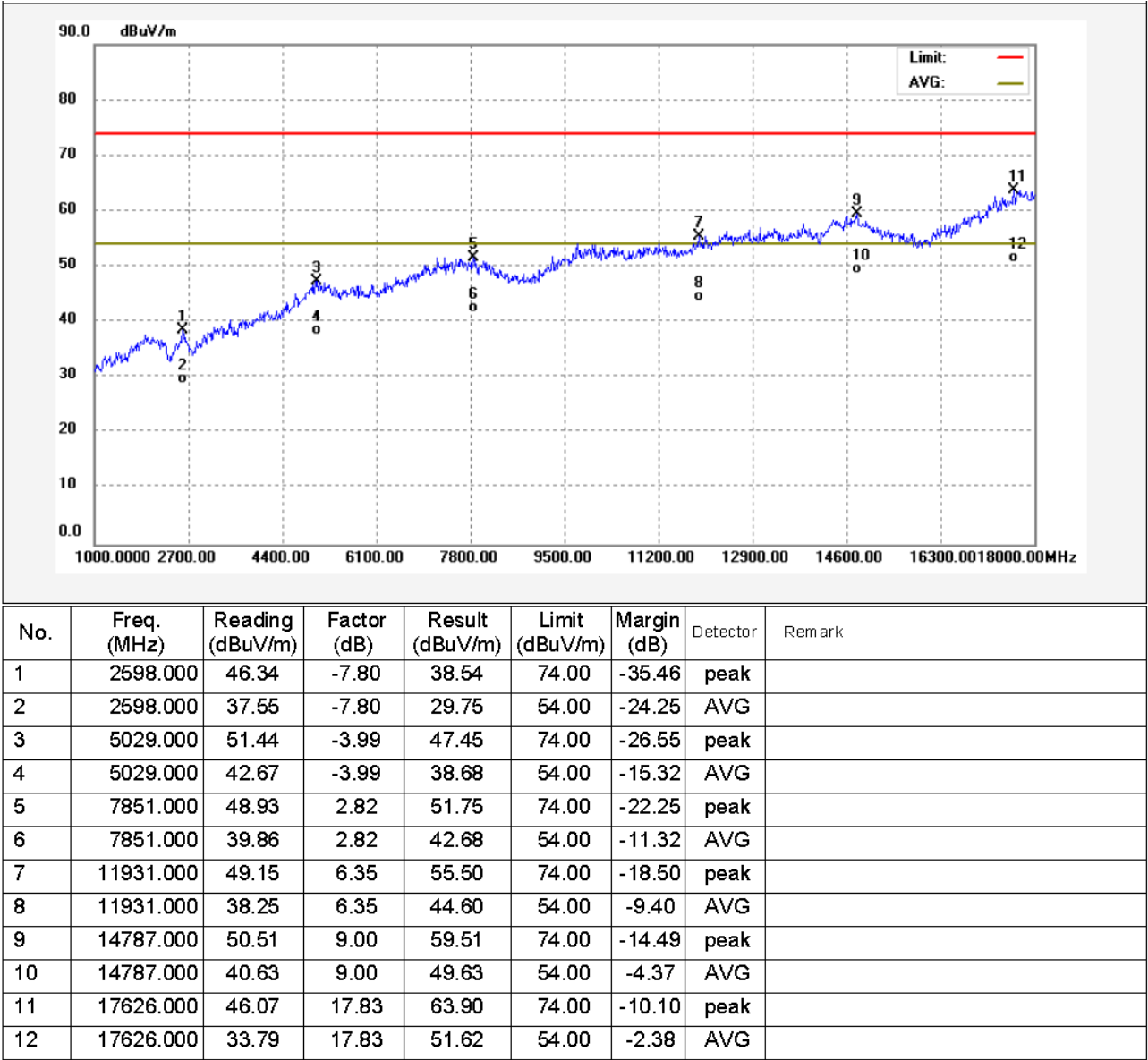
802.11n: Low Channel 5190MHz (Horizontal)



802.11ac: Low Channel 5210MHz (Vertical)

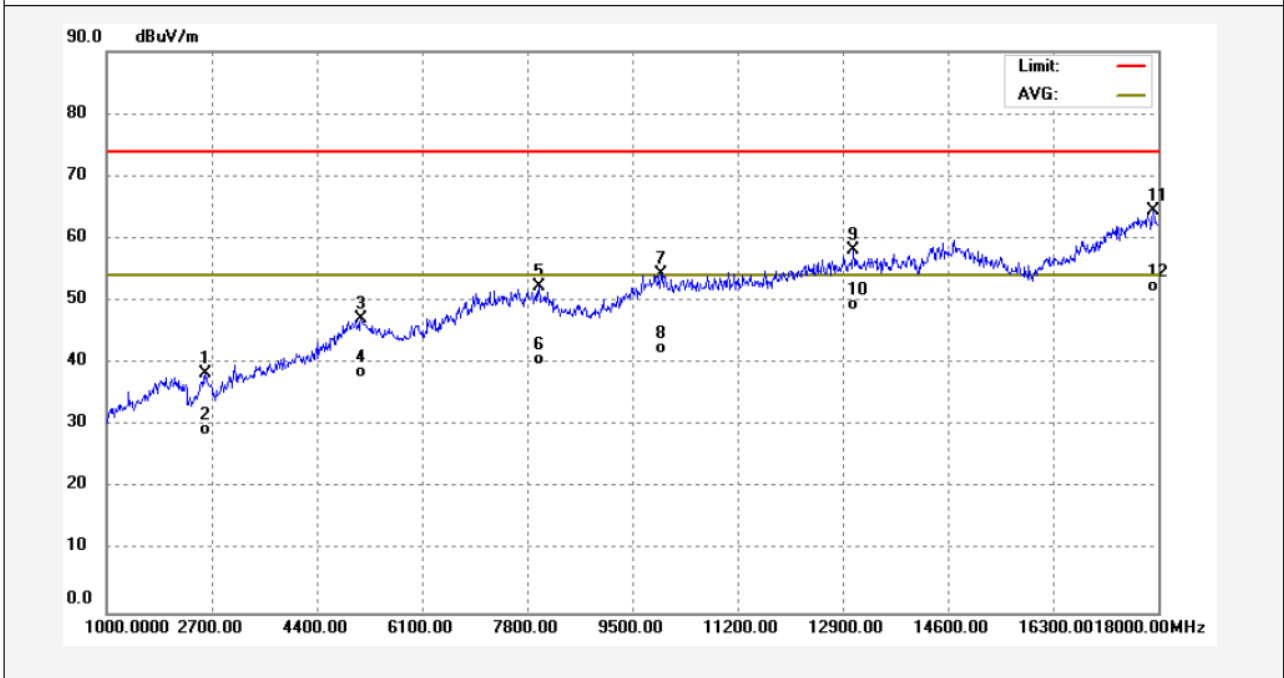


802.11ac: Low Channel 5210MHz (Horizontal)



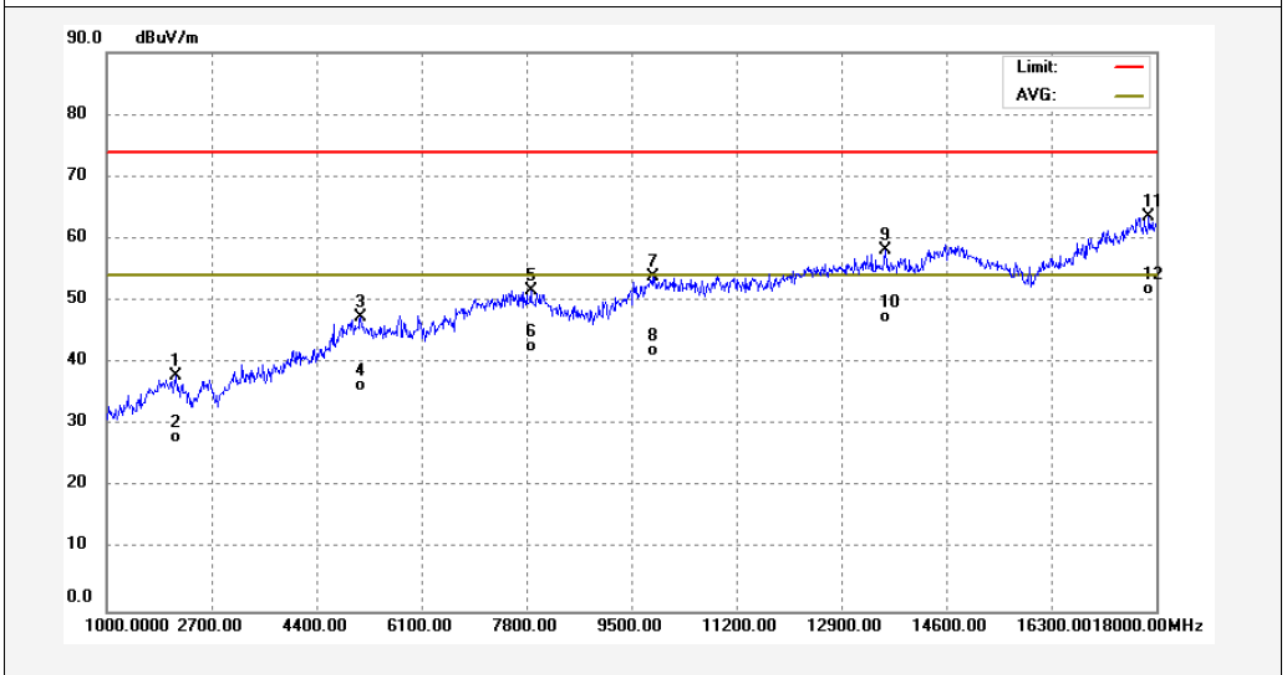
WIFI: PCB printed antenna

802.11a: Low Channel 5180MHz (Vertical)



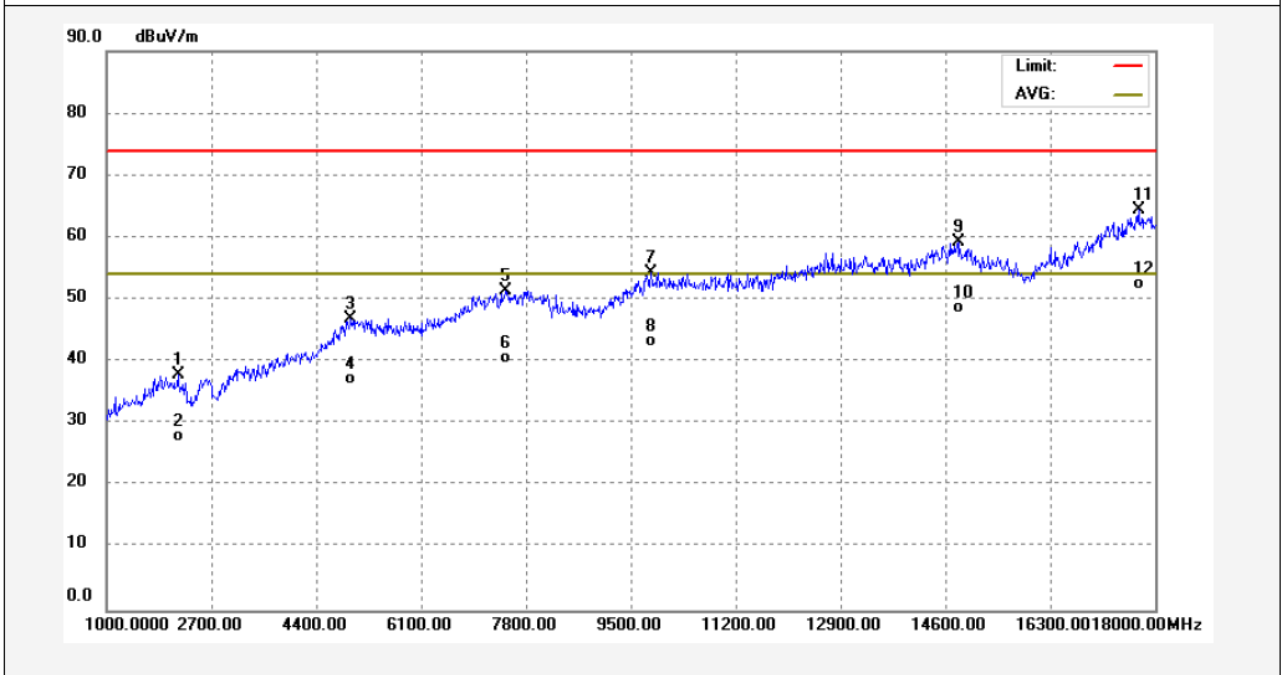
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2598.000	46.13	-7.80	38.33	74.00	-35.67	peak	
2	2598.000	37.13	-7.80	29.33	54.00	-24.67	AVG	
3	5114.000	50.86	-3.81	47.05	74.00	-26.95	peak	
4	5114.000	42.32	-3.81	38.51	54.00	-15.49	AVG	
5	7987.000	49.38	2.85	52.23	74.00	-21.77	peak	
6	7987.000	37.83	2.85	40.68	54.00	-13.32	AVG	
7	9959.000	49.27	5.02	54.29	74.00	-19.71	peak	
8	9959.000	37.34	5.02	42.36	54.00	-11.64	AVG	
9	13070.000	49.77	8.46	58.23	74.00	-15.77	peak	
10	13070.000	40.89	8.46	49.35	54.00	-4.65	AVG	
11	17915.000	45.92	18.47	64.39	74.00	-9.61	peak	
12	17915.000	33.94	18.47	52.41	54.00	-1.59	AVG	

802.11a: Low Channel 5180MHz (Horizontal)



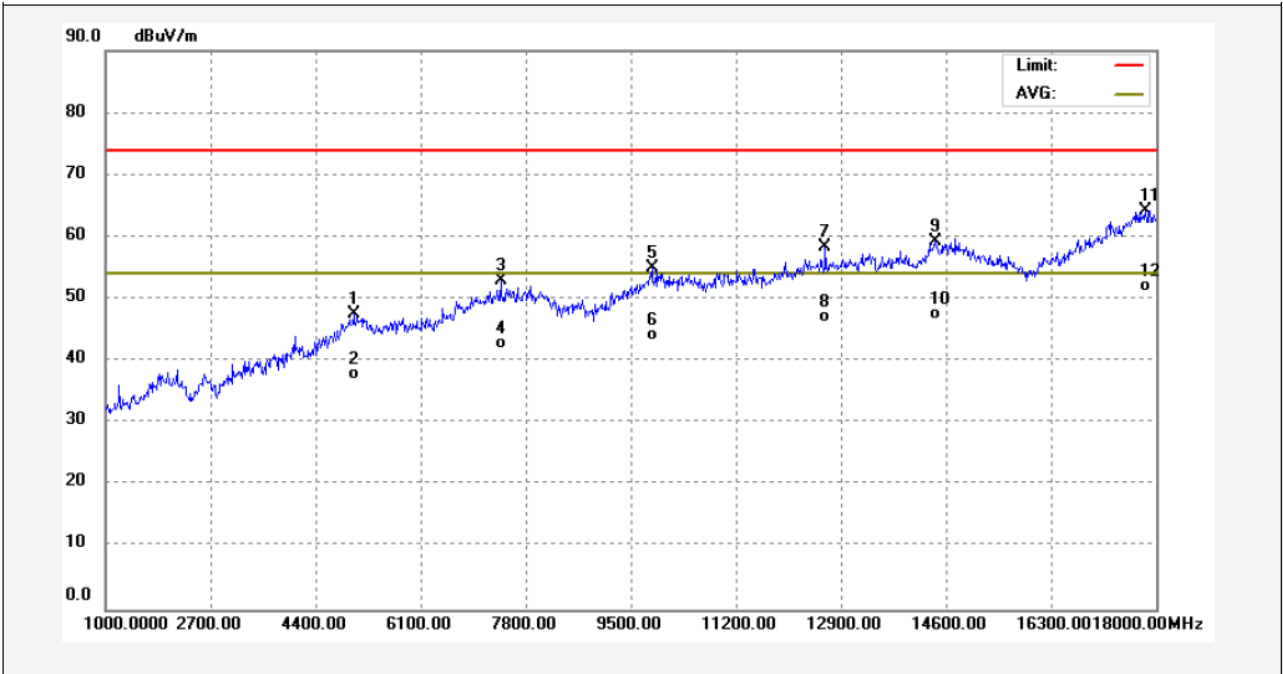
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2122.000	48.64	-10.82	37.82	74.00	-36.18	peak	
2	2122.000	38.92	-10.82	28.10	54.00	-25.90	AVG	
3	5114.000	49.04	-1.77	47.27	74.00	-26.73	peak	
4	5114.000	38.03	-1.77	36.26	54.00	-17.74	AVG	
5	7868.000	49.48	2.17	51.65	74.00	-22.35	peak	
6	7868.000	40.39	2.17	42.56	54.00	-11.44	AVG	
7	9840.000	50.11	3.76	53.87	74.00	-20.13	peak	
8	9840.000	38.23	3.76	41.99	54.00	-12.01	AVG	
9	13614.000	48.75	9.50	58.25	74.00	-15.75	peak	
10	13614.000	37.86	9.50	47.36	54.00	-6.64	AVG	
11	17881.000	47.32	16.35	63.67	74.00	-10.33	peak	
12	17881.000	35.44	16.35	51.79	54.00	-2.21	AVG	

802.11n: Low Channel 5190MHz (Vertical)



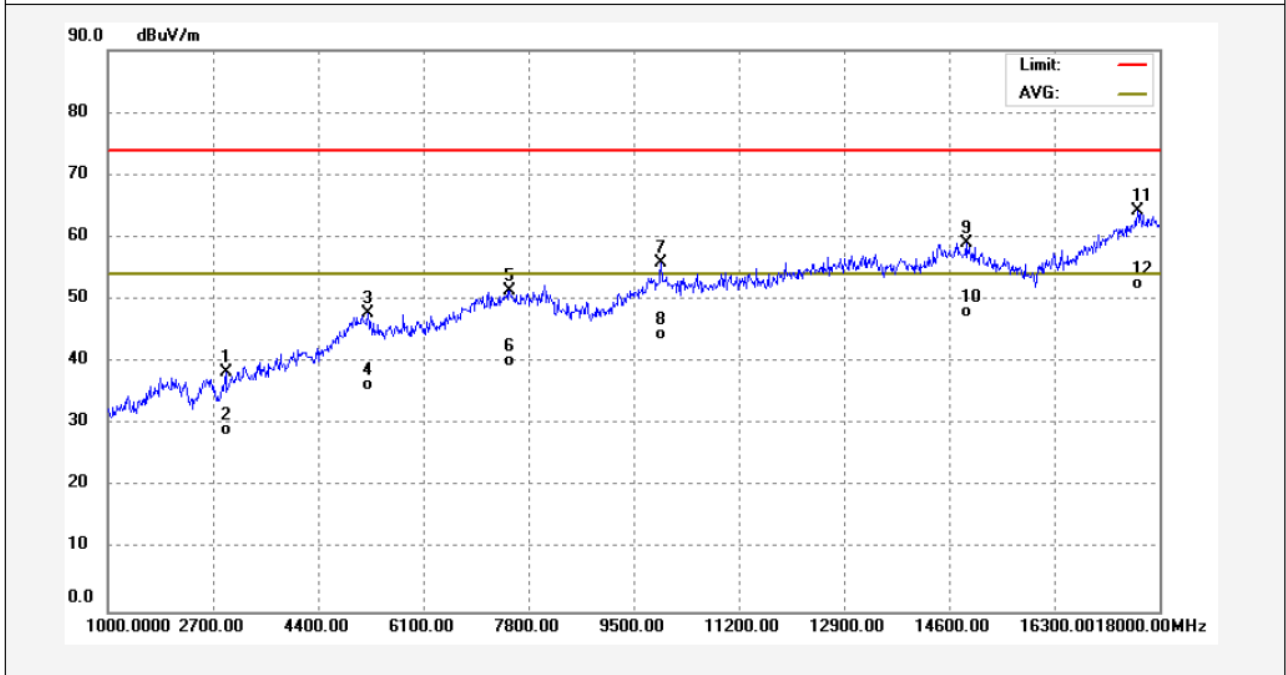
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2156.000	48.88	-10.94	37.94	74.00	-36.06	peak	
2	2156.000	39.04	-10.94	28.10	54.00	-25.90	AVG	
3	4961.000	48.51	-1.65	46.86	74.00	-27.14	peak	
4	4961.000	38.78	-1.65	37.13	54.00	-16.87	AVG	
5	7477.000	49.53	1.96	51.49	74.00	-22.51	peak	
6	7477.000	38.57	1.96	40.53	54.00	-13.47	AVG	
7	9823.000	50.56	3.74	54.30	74.00	-19.70	peak	
8	9823.000	39.59	3.74	43.33	54.00	-10.67	AVG	
9	14804.000	49.15	10.12	59.27	74.00	-14.73	peak	
10	14804.000	38.60	10.12	48.72	54.00	-5.28	AVG	
11	17728.000	48.67	15.83	64.50	74.00	-9.50	peak	
12	17728.000	36.72	15.83	52.55	54.00	-1.45	AVG	

802.11n: Low Channel 5190MHz (Horizontal)



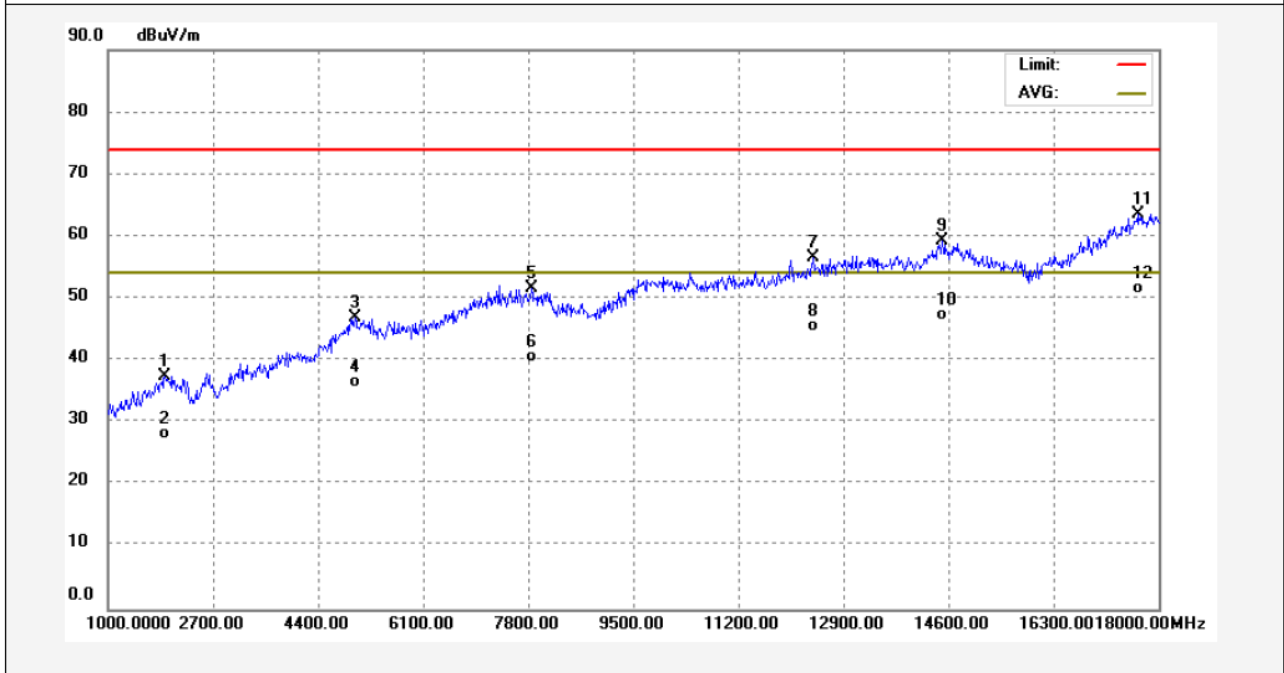
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	5012.000	51.50	-4.02	47.48	74.00	-26.52	peak	
2	5012.000	41.90	-4.02	37.88	54.00	-16.12	AVG	
3	7392.000	50.26	2.64	52.90	74.00	-21.10	peak	
4	7392.000	40.21	2.64	42.85	54.00	-11.15	AVG	
5	9840.000	50.13	4.83	54.96	74.00	-19.04	peak	
6	9840.000	39.38	4.83	44.21	54.00	-9.79	AVG	
7	12645.000	51.21	7.27	58.48	74.00	-15.52	peak	
8	12645.000	39.89	7.27	47.16	54.00	-6.84	AVG	
9	14430.000	49.18	10.07	59.25	74.00	-14.75	peak	
10	14430.000	37.45	10.07	47.52	54.00	-6.48	AVG	
11	17830.000	45.98	18.28	64.26	74.00	-9.74	peak	
12	17830.000	33.89	18.28	52.17	54.00	-1.83	AVG	

802.11ac: Low Channel 5210MHz (Vertical)



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2904.000	45.72	-7.46	38.26	74.00	-35.74	peak	
2	2904.000	36.61	-7.46	29.15	54.00	-24.85	AVG	
3	5199.000	51.33	-3.61	47.72	74.00	-26.28	peak	
4	5199.000	39.87	-3.61	36.26	54.00	-17.74	AVG	
5	7494.000	48.64	2.73	51.37	74.00	-22.63	peak	
6	7494.000	37.47	2.73	40.20	54.00	-13.80	AVG	
7	9942.000	50.84	4.98	55.82	74.00	-18.18	peak	
8	9942.000	39.35	4.98	44.33	54.00	-9.67	AVG	
9	14872.000	50.45	8.71	59.16	74.00	-14.84	peak	
10	14872.000	39.28	8.71	47.99	54.00	-6.01	AVG	
11	17643.000	46.38	17.87	64.25	74.00	-9.75	peak	
12	17643.000	34.65	17.87	52.52	54.00	-1.48	AVG	

802.11ac: Low Channel 5210MHz (Horizontal)



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1918.000	48.35	-10.93	37.42	74.00	-36.58	peak	
2	1918.000	39.17	-10.93	28.24	54.00	-25.76	AVG	
3	4995.000	48.35	-1.40	46.95	74.00	-27.05	peak	
4	4995.000	38.02	-1.40	36.62	54.00	-17.38	AVG	
5	7851.000	49.44	2.16	51.60	74.00	-22.40	peak	
6	7851.000	38.43	2.16	40.59	54.00	-13.41	AVG	
7	12407.000	49.60	6.93	56.53	74.00	-17.47	peak	
8	12407.000	38.62	6.93	45.55	54.00	-8.45	AVG	
9	14498.000	48.74	10.44	59.18	74.00	-14.82	peak	
10	14498.000	36.82	10.44	47.26	54.00	-6.74	AVG	
11	17660.000	47.87	15.60	63.47	74.00	-10.53	peak	
12	17660.000	36.03	15.60	51.63	54.00	-2.37	AVG	

Test Frequency: 18GHz~40GHz

The measurements were more than 20 dB below the limit and not reported.

9 Duty cycle

Test Requirement:	47 CFR Part 15C 15.407 KDB789033 D02 General U-NII Test Procedures New Rules v02r01, Section (B)
Test Method:	ANSI C63.10: 2013
Test Limit:	N/A
Test Result:	PASS
Remark:	Through Pre-scan, The duty cycle set for channel low, middle and high are same, and the duty cycle test is performed at channel low only, The report only records the test data of antenna 0

9.1 Summary of Test Results

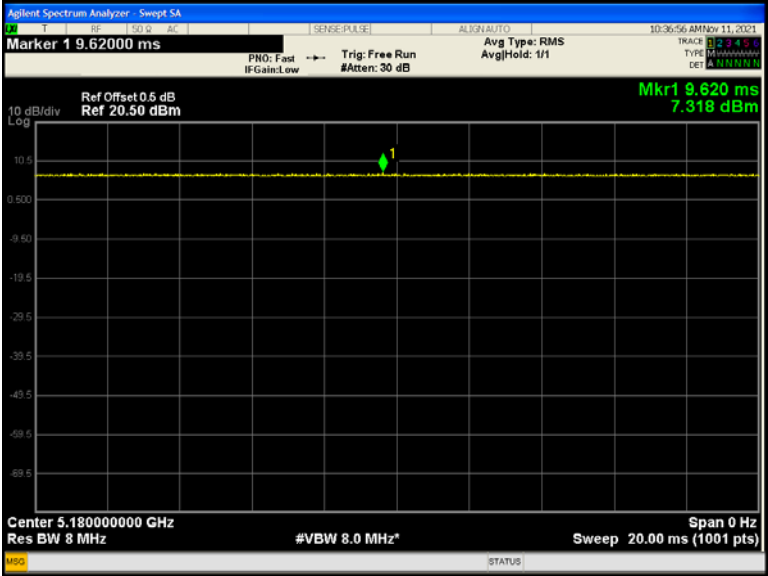
802.11a(HT20) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	100	100	100
52	100	100	100
100	100	100	100
149	100	100	100
802.11n(HT20) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	100	100	100
52	100	100	100
100	100	100	100
149	100	100	100
802.11ac(HT20) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	100	100	100
52	100	100	100
100	100	100	100
149	100	100	100
802.11n(HT40) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
38	100	100	100
54	100	100	100
102	100	100	100
151	100	100	100
802.11ac(HT40) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
38	100	100	100
54	100	100	100
102	100	100	100
151	100	100	100

802.11ac(HT80) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
42	100	100	100
58	100	100	100
106	100	100	100
155	100	100	100
802.11ac(HT80+ HT80) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
50	100	100	100
114	100	100	100
802.11a(HT20) mode (Overlapping channels)			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
144	100	100	100
802.11n(HT20) mode (Overlapping channels)			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
144	100	100	100
802.11ac(HT20) mode (Overlapping channels)			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
144	100	100	100
802.11n(HT40) mode (Overlapping channels)			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
142	100	100	100
802.11ac(HT40) mode (Overlapping channels)			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
142	100	100	100
802.11ac(HT80) mode (Overlapping channels)			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
138	100	100	100

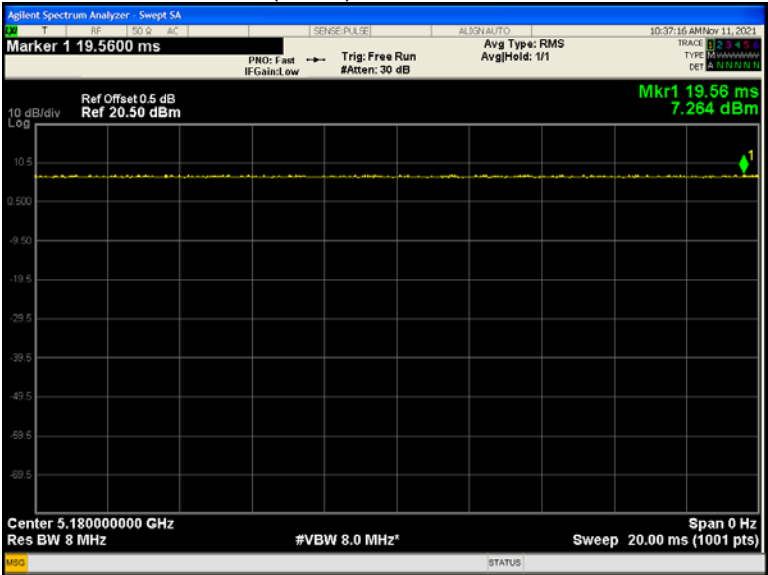
Test result plots shown as follows:

ANT0

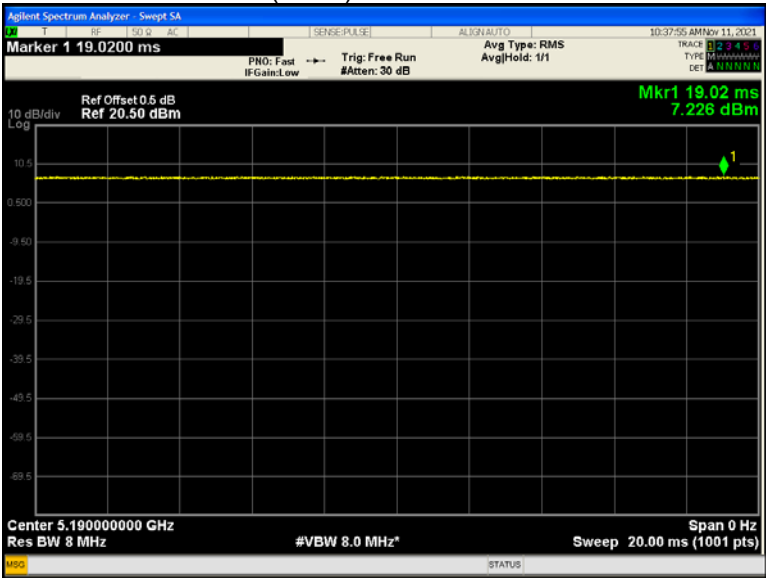
802.11a U-NII-1 Low channel



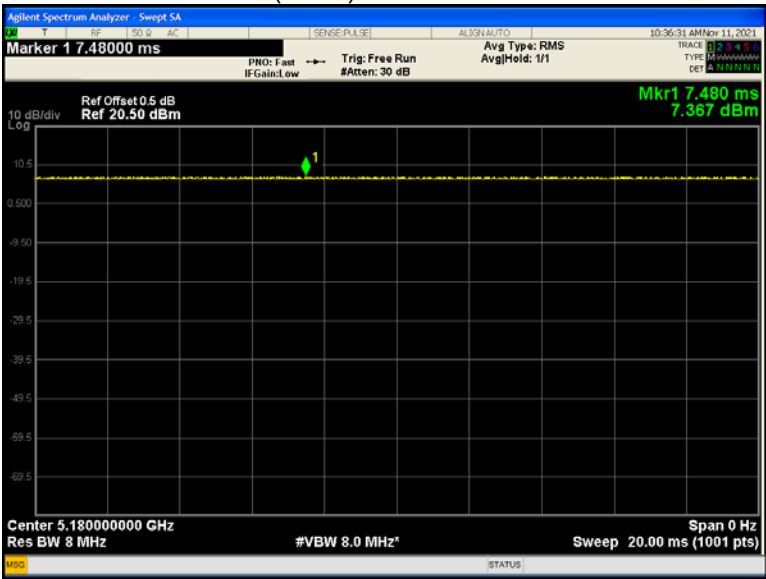
802.11n(HT20) U-NII-1 Low channel



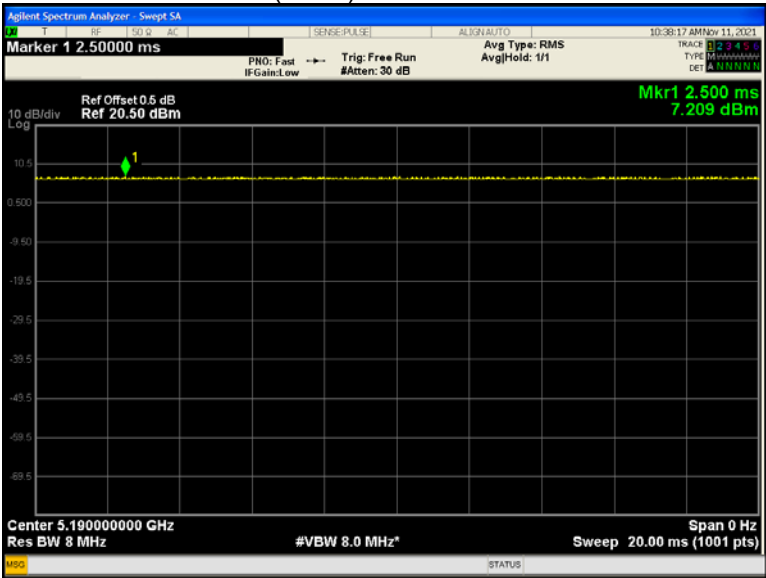
802.11n(HT40) U-NII-1 Low channel



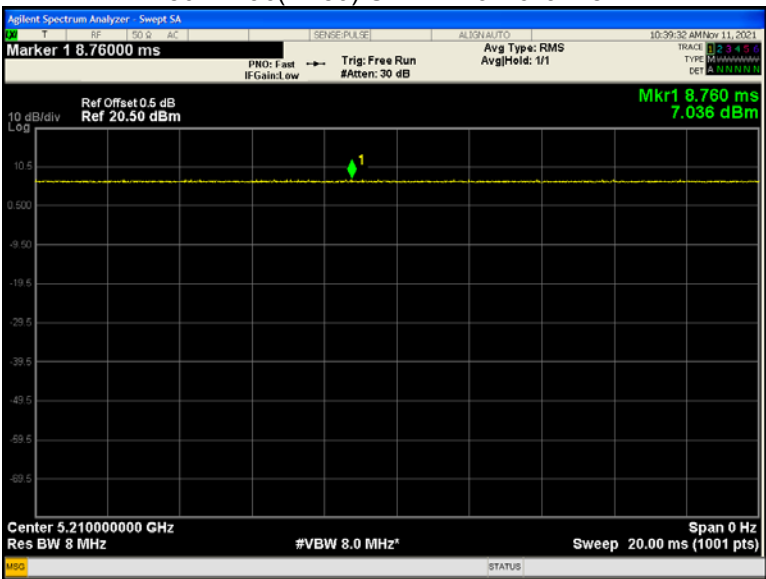
802.11ac(HT20) U-NII-1 Low channel



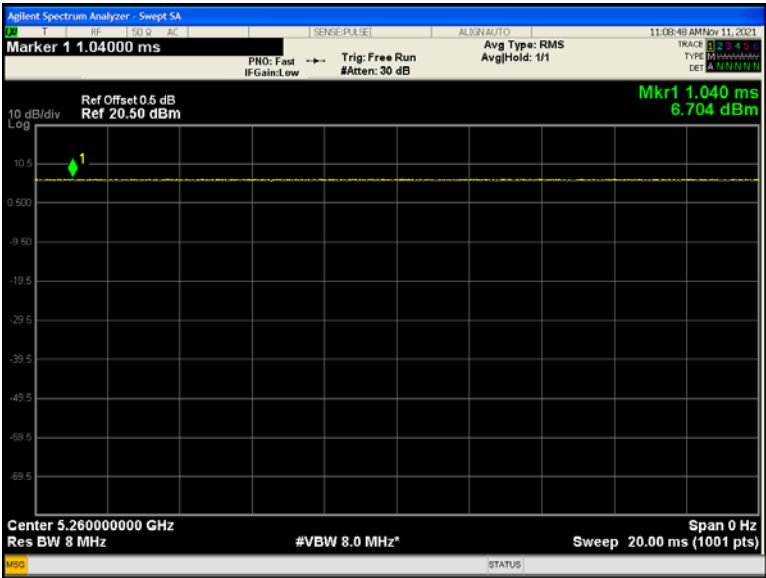
802.11ac(HT40) U-NII-1 Low channel



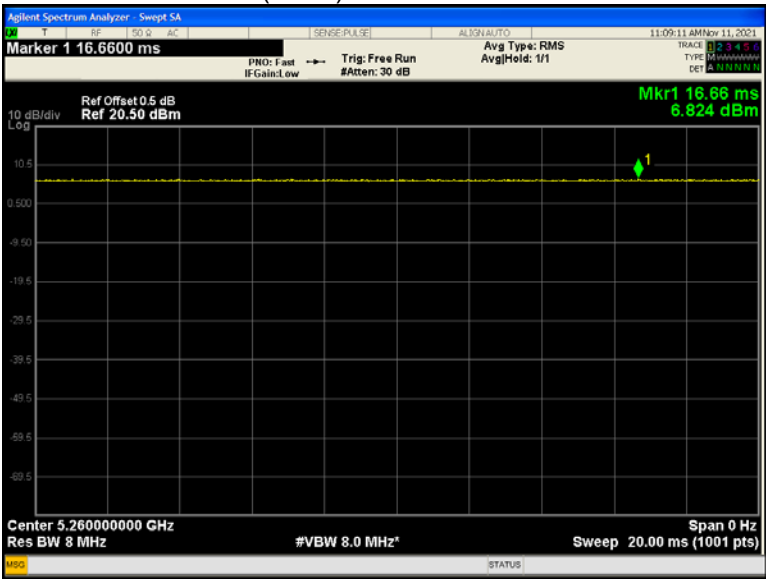
802.11ac(HT80) U-NII-1 Low channel



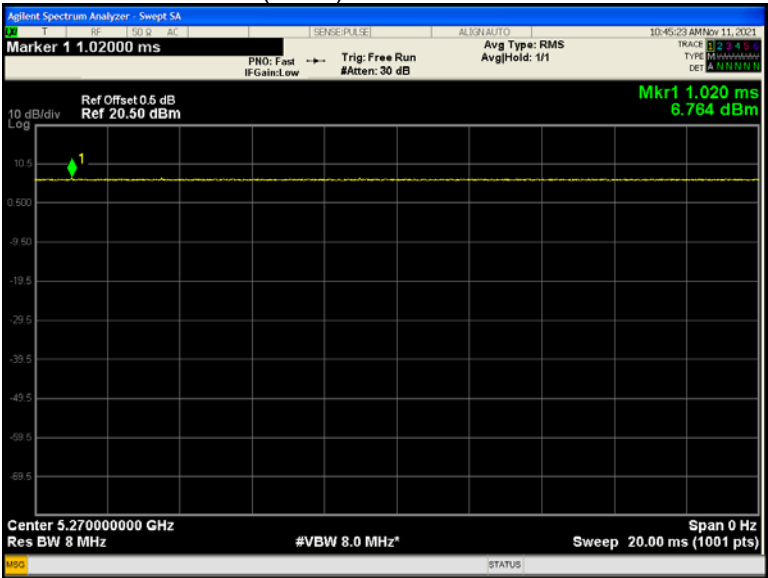
802.11a U-NII-2A Low channel



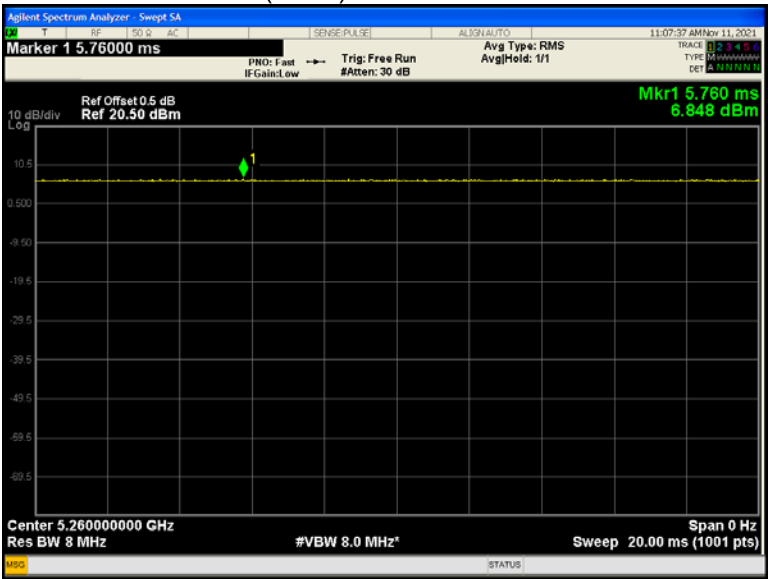
802.11n(HT20) U-NII-2A Low channel



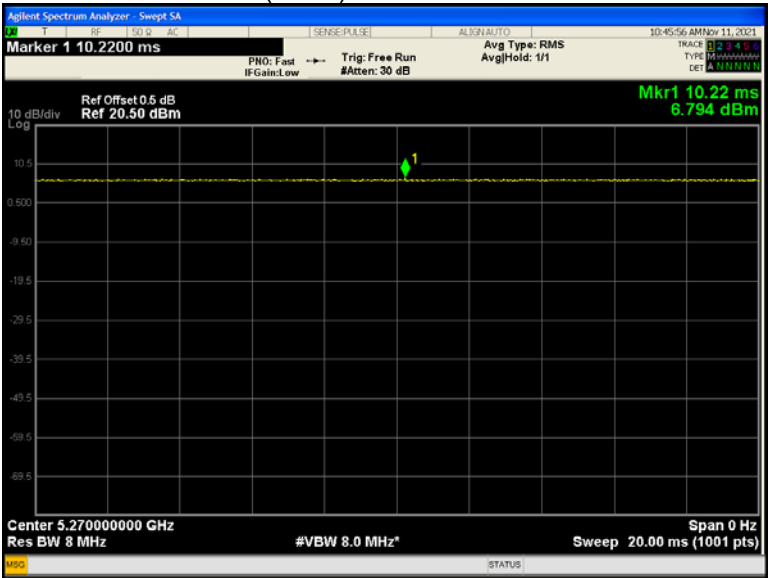
802.11n(HT40) U-NII-2A Low channel



802.11ac(HT20) U-NII-2A Low channel



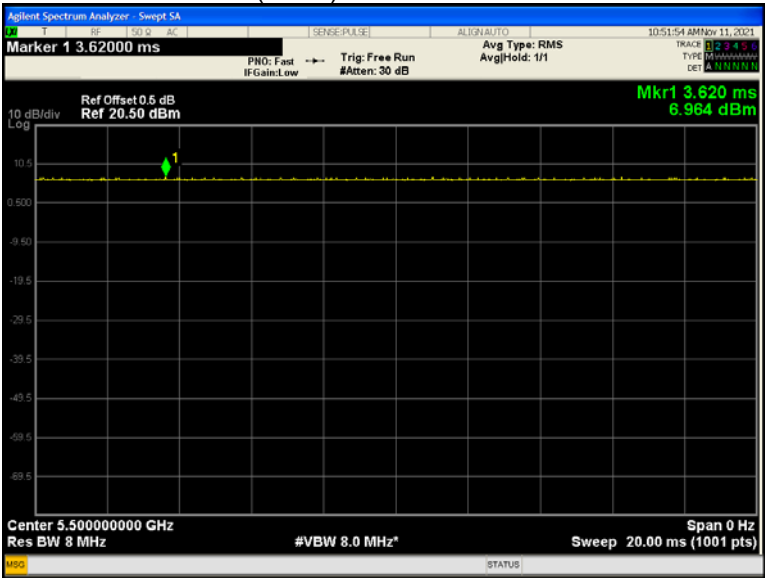
802.11ac(HT40) U-NII-2A Low channel



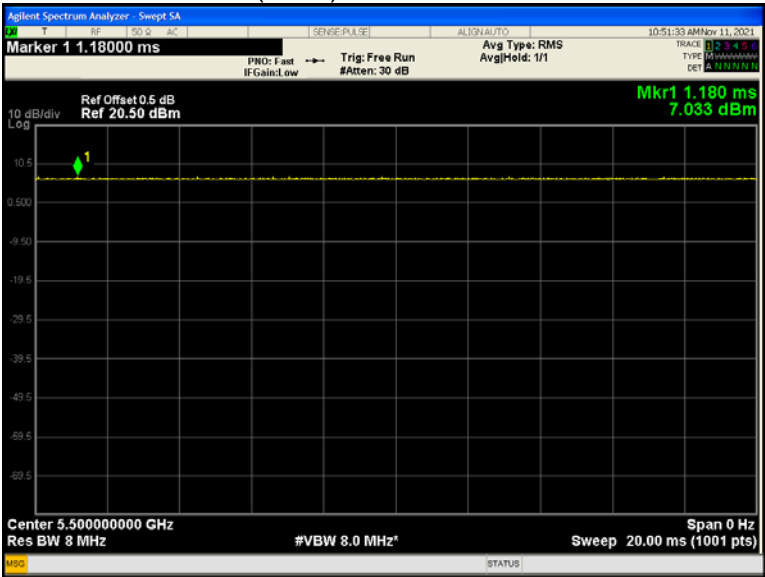
802.11ac(HT80) U-NII-2A Low channel



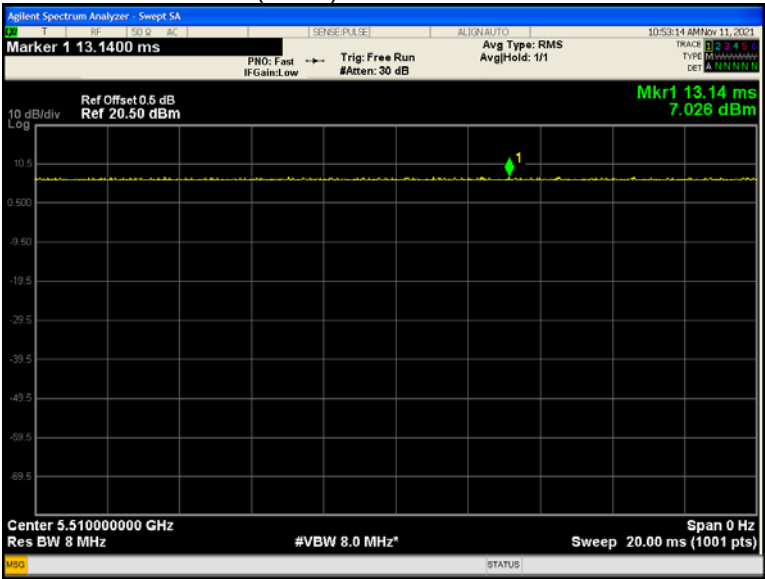
802.11a(HT20) U-NII-2C Low channel



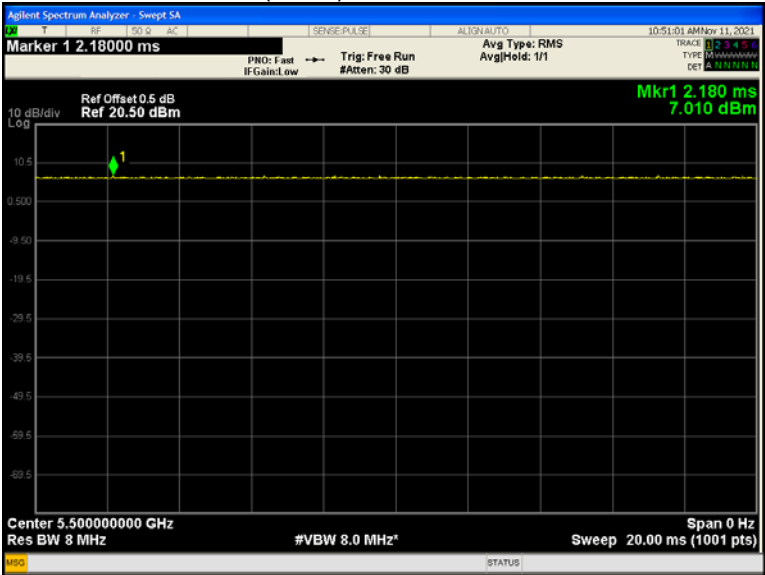
802.11n(HT20) U-NII-2C Low channel



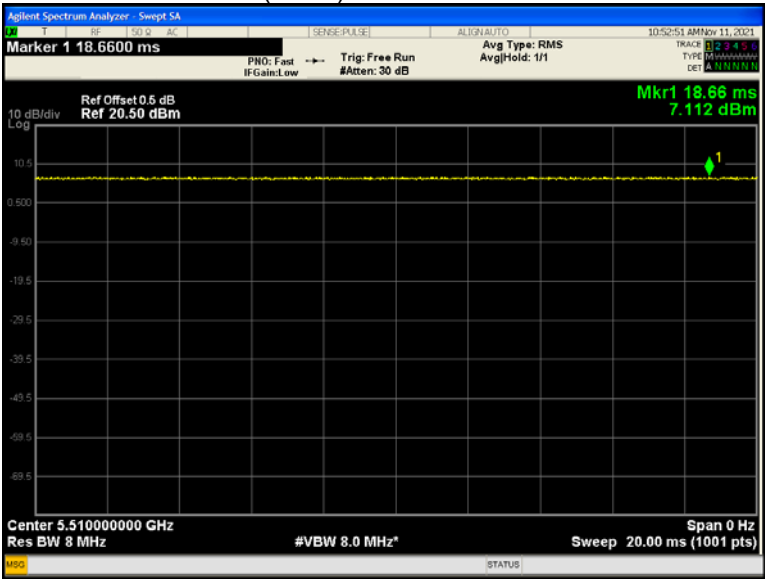
802.11n(HT40) U-NII-2C Low channel



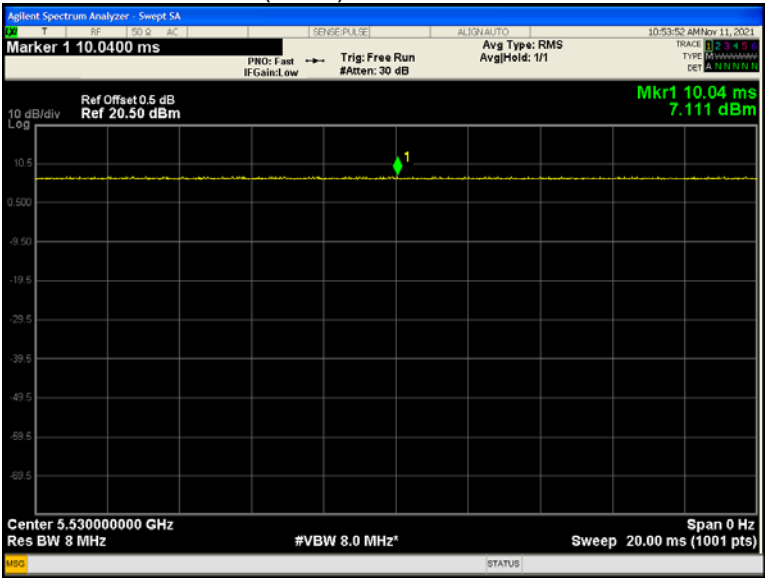
802.11ac(HT20) U-NII-2C Low channel



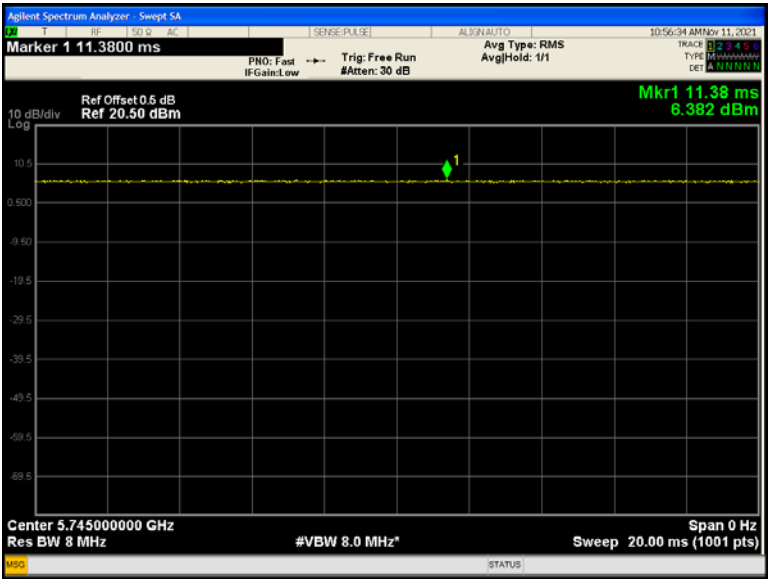
802.11ac(HT40) U-NII-2C Low channel



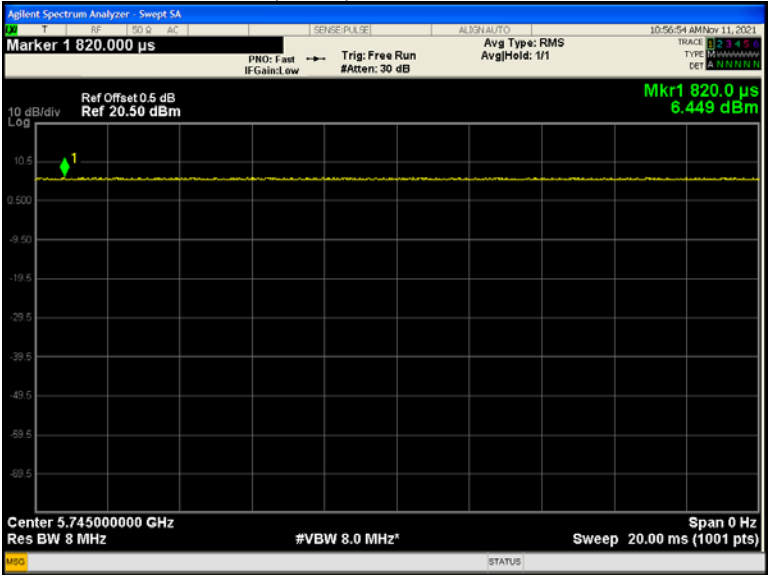
802.11ac(HT80) U-NII-2C Low channel



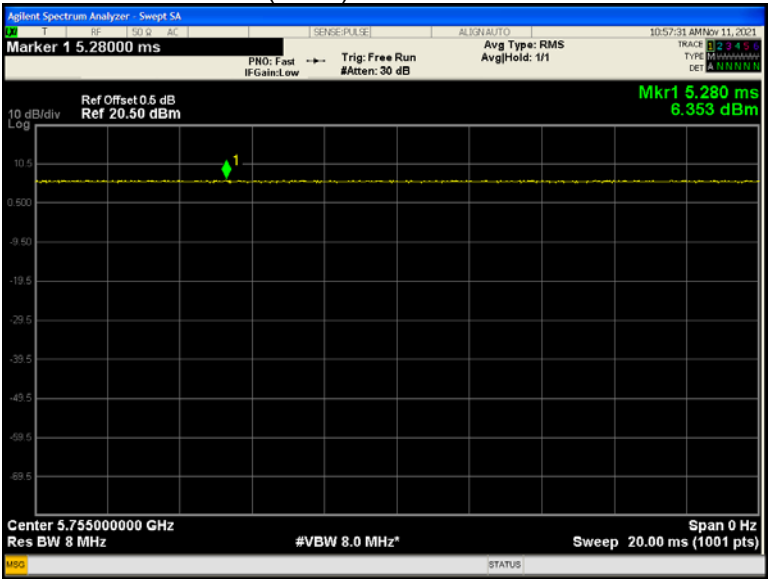
802.11a U-NII-3 Low channel



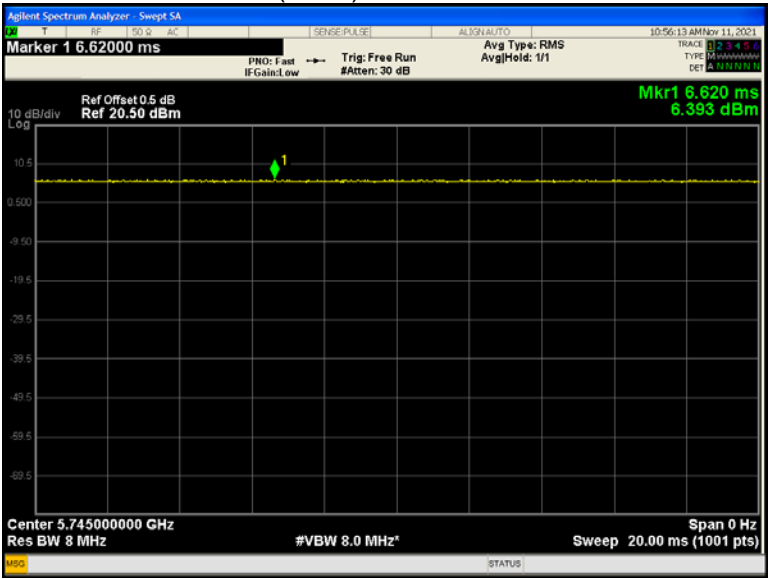
802.11n(HT20) U-NII-3 Low channel



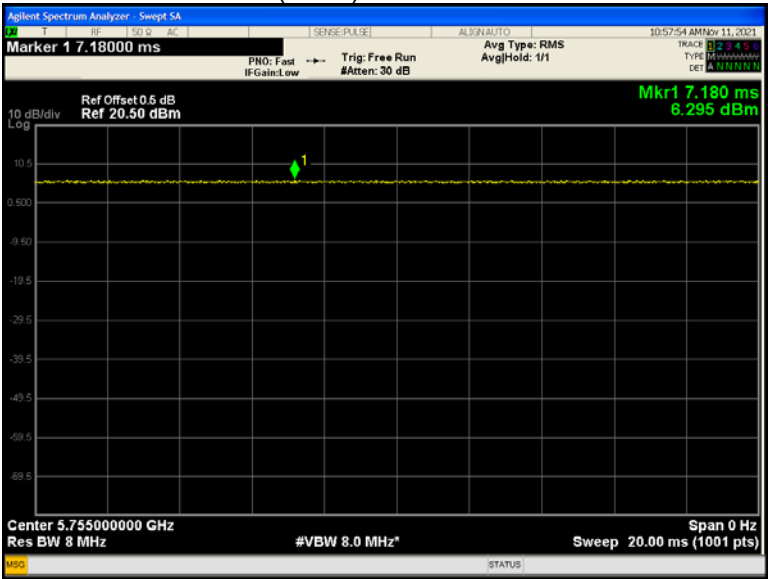
802.11n(HT40) U-NII-3 Low channel



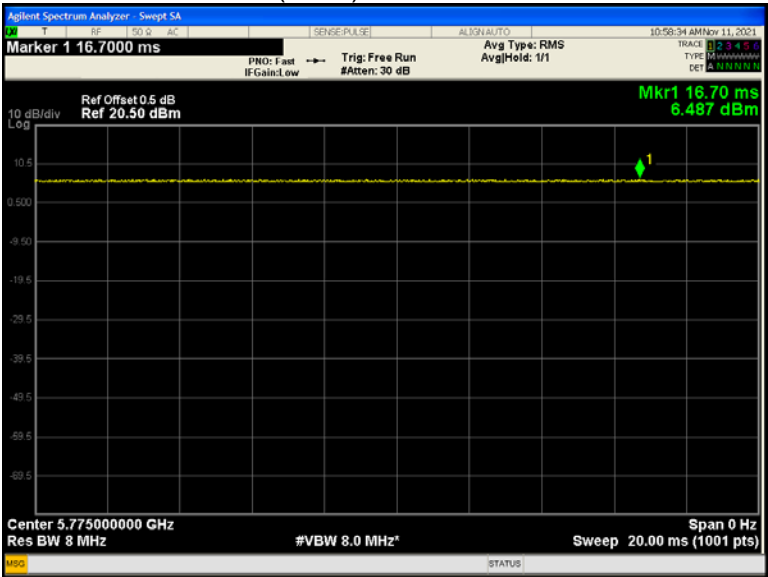
802.11ac(HT20) U-NII-3 Low channel



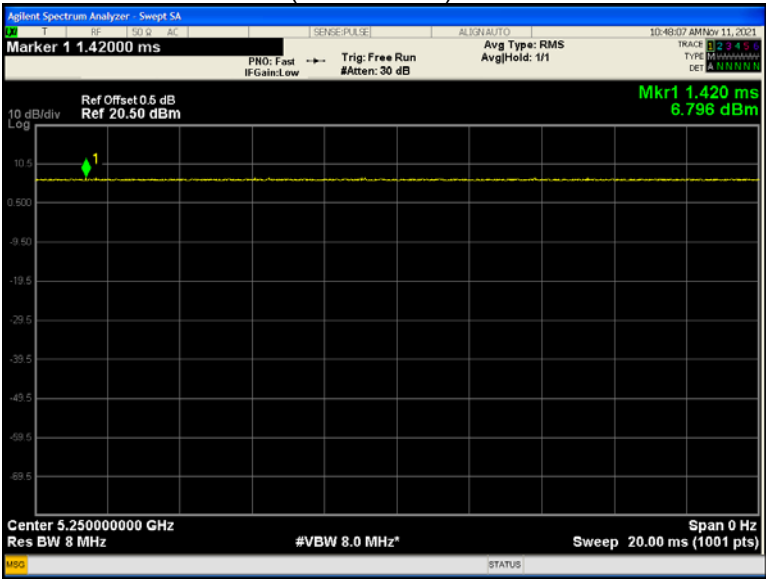
802.11ac(HT40) U-NII-3 Low channel



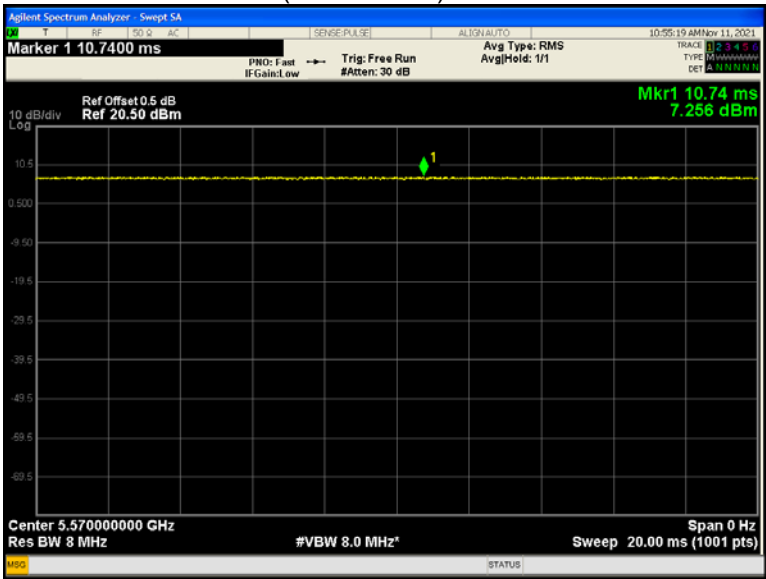
802.11ac(HT80) U-NII-3 Low channel



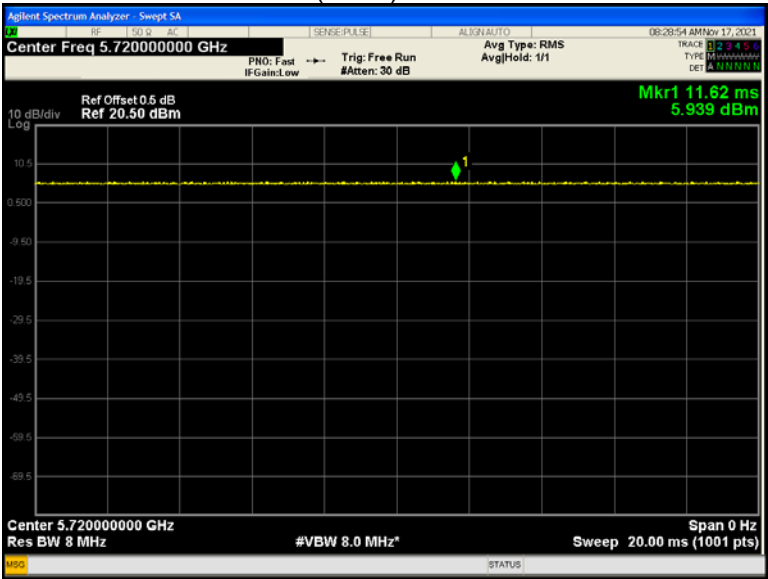
802.11ac(HT80+HT80) 50 channel



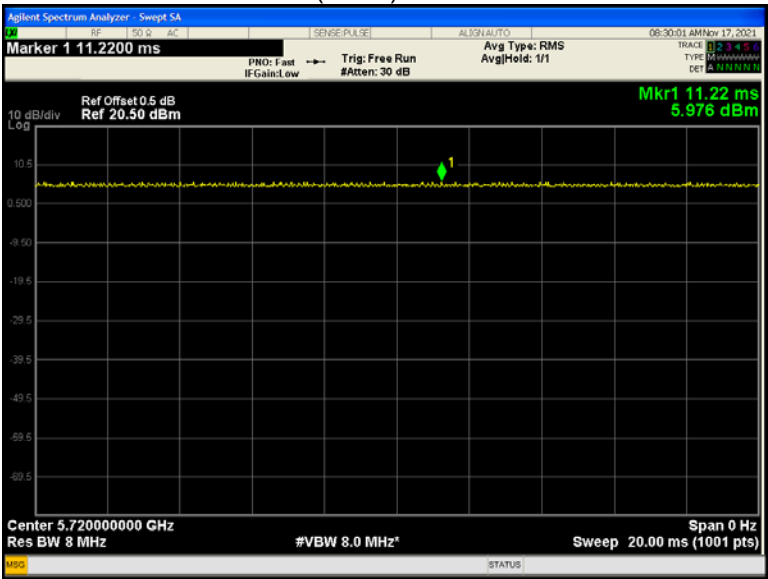
802.11ac(HT80+HT80) 114 channel



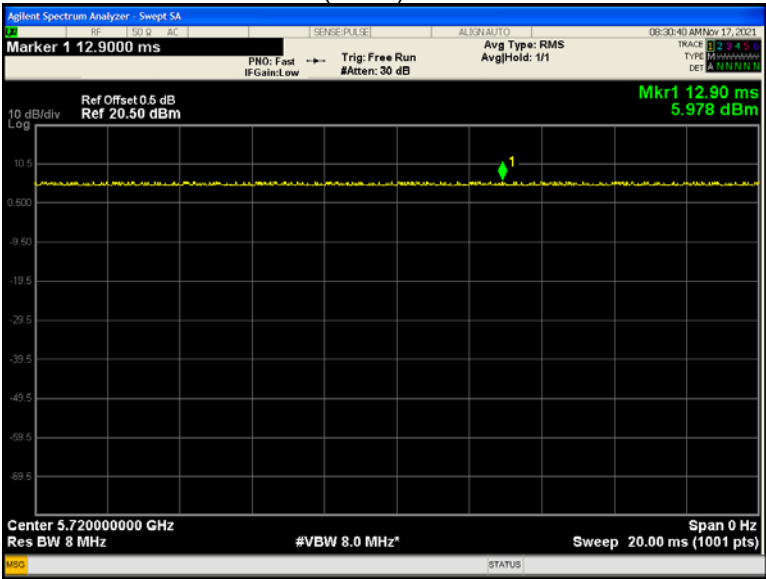
802.11a(HT20) 144 channel



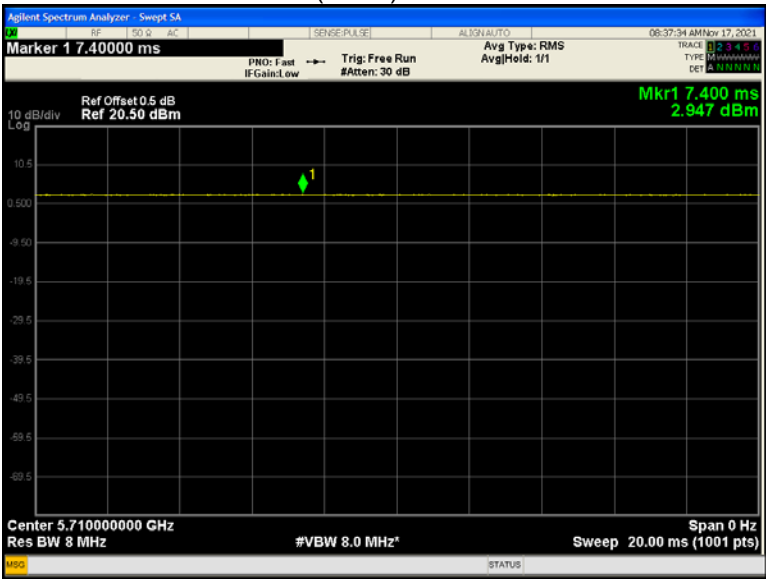
802.11n(HT20) 144 channel



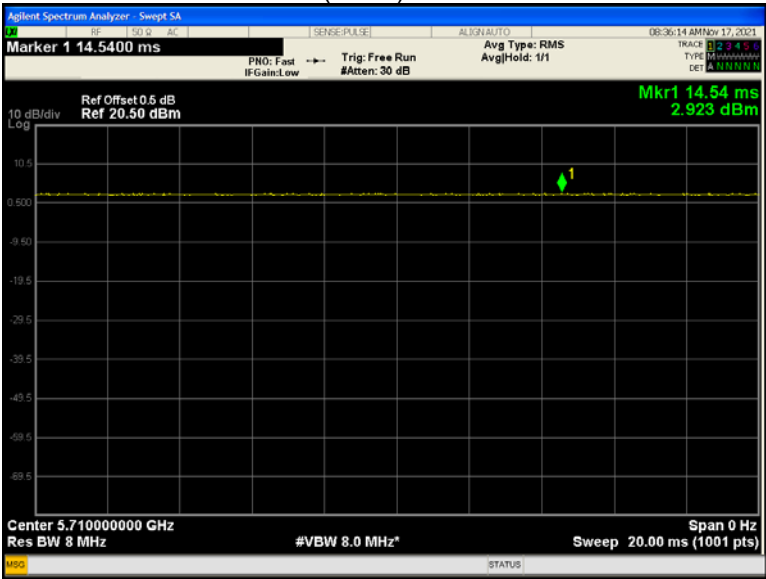
802.11ac(HT20) 144 channel



802.11n(HT40) 142 channel



802.11ac(HT40) 142 channel



802.11ac(HT80) 138 channel



10 Band Edge

Test Requirement:	FCC CFR47 Part 15 Section 15.407
Test Method:	ANSI C63.10 2013
Test Limit:	(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.
Test Result:	PASS

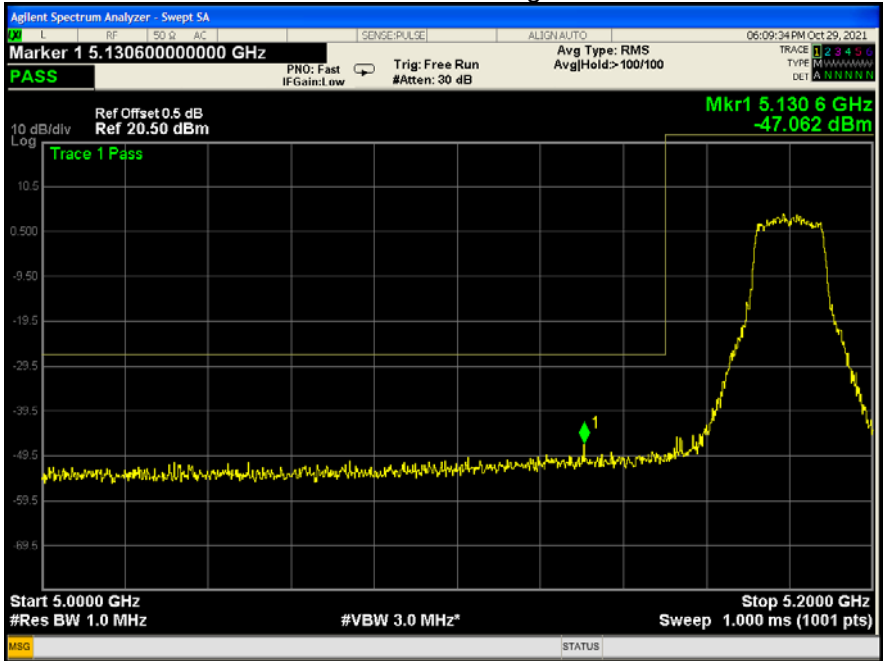
10.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 1000 kHz and VBW of spectrum analyzer to 3000 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

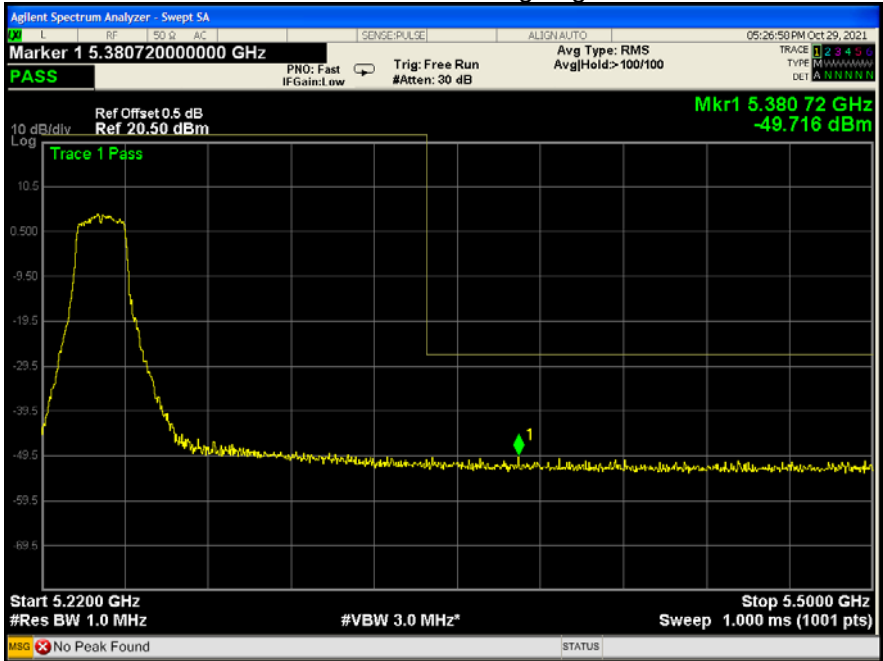
10.2 Test Result

Test result plots shown as follows: Antenna 0

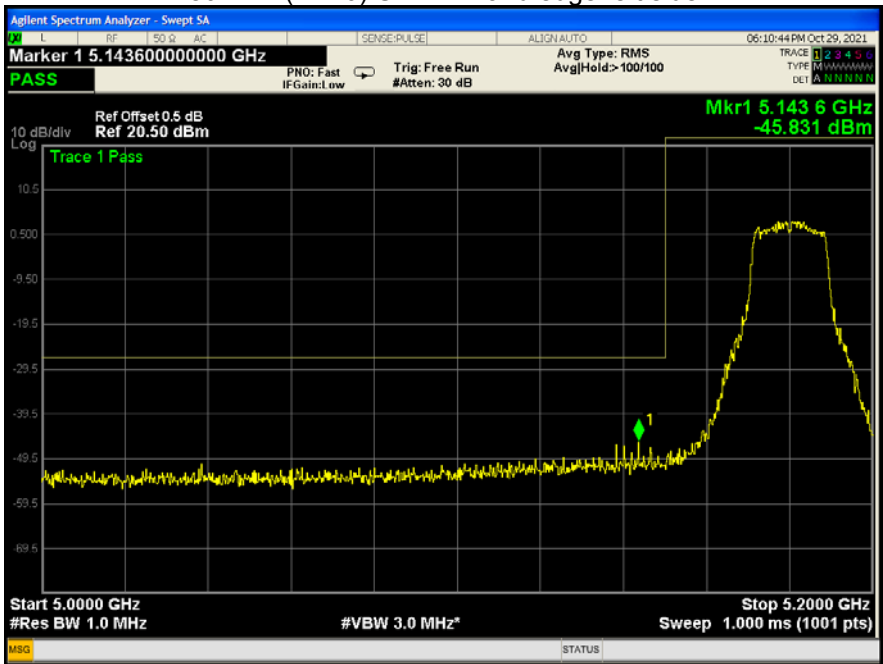
802.11a U-NII-1 Band edge-left side



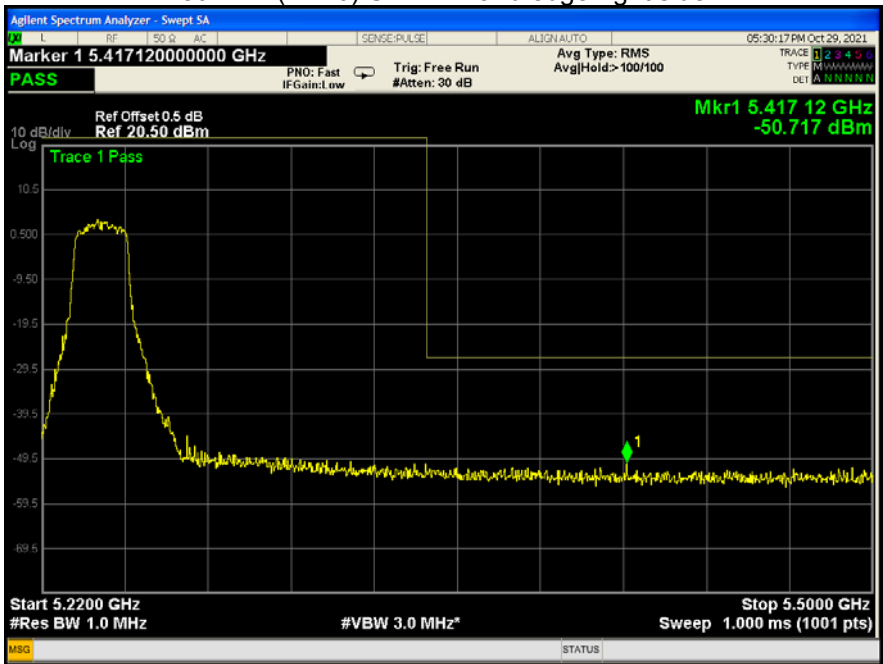
802.11a U-NII-1 Band edge-right side



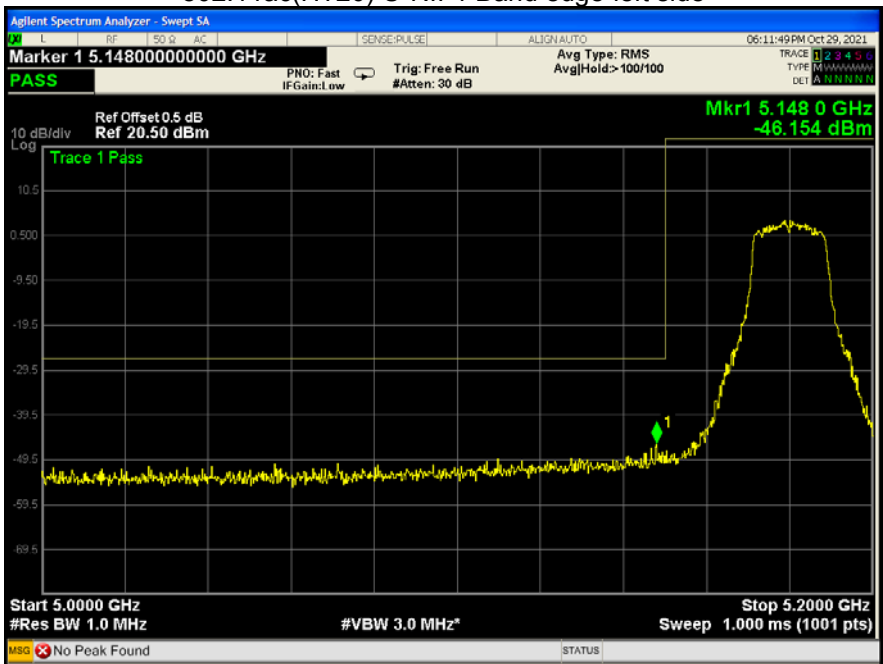
802.11n(HT20) U-NII-1 Band edge-left side



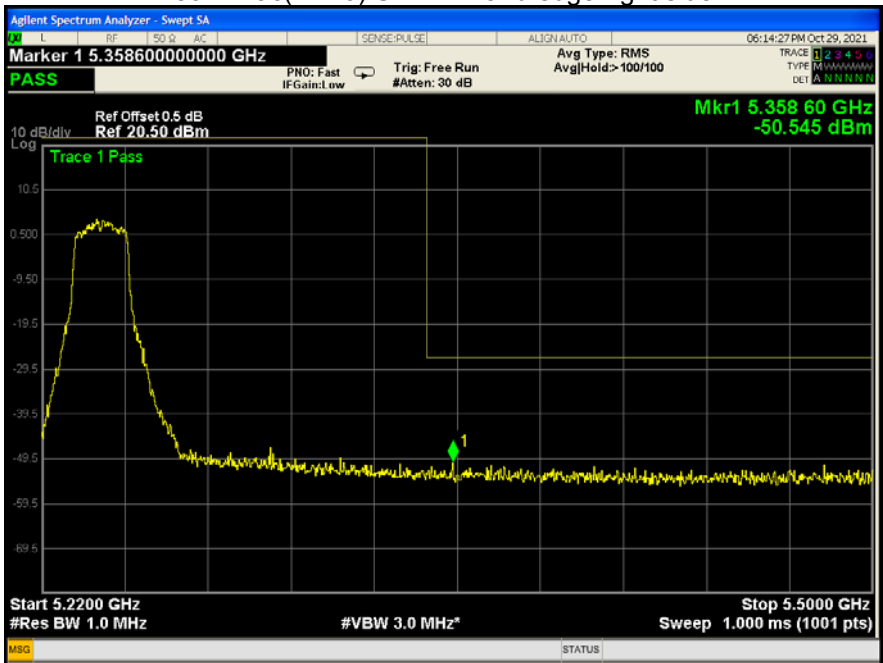
802.11n(HT20) U-NII-1 Band edge-right side



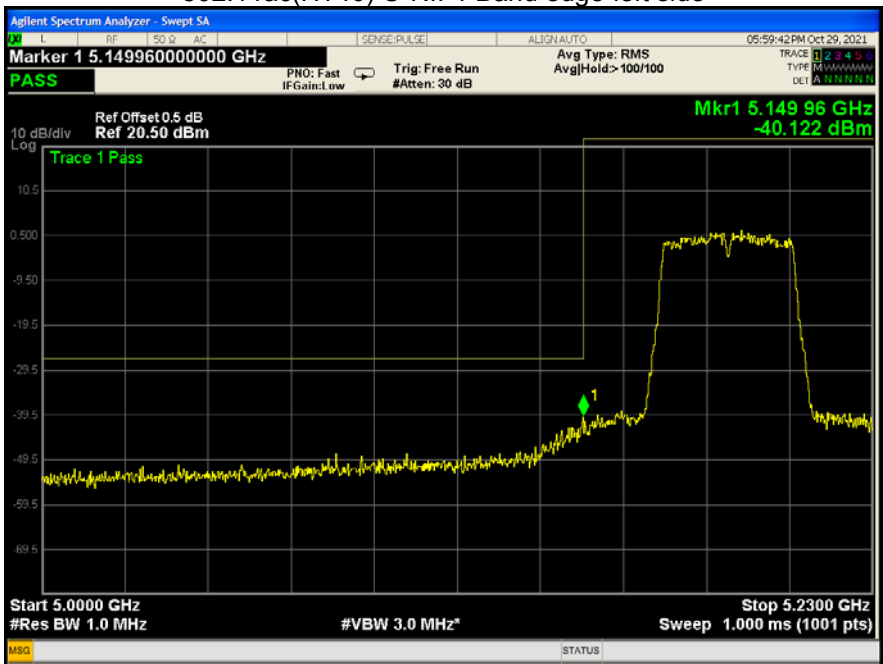
802.11ac(HT20) U-NII-1 Band edge-left side



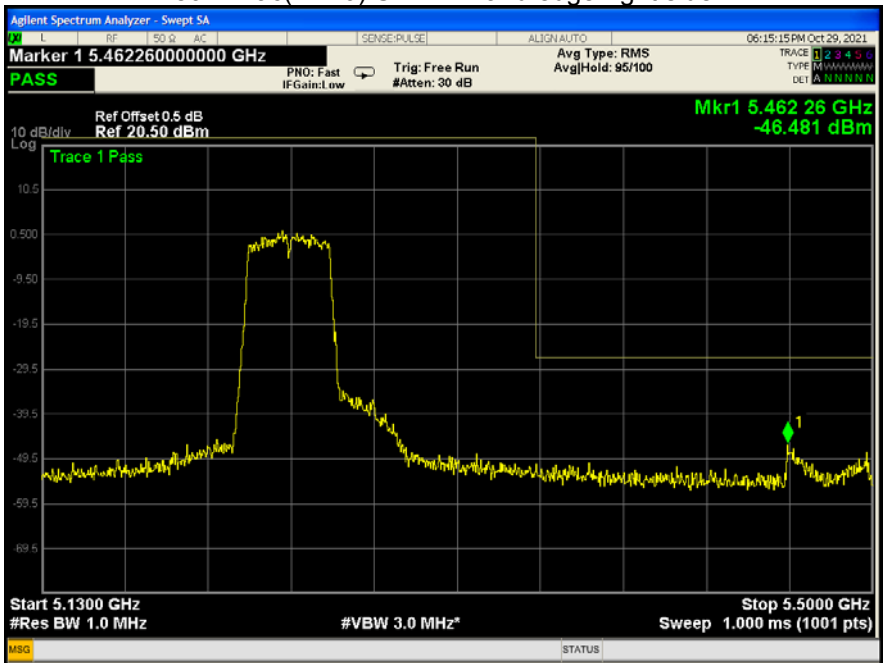
802.11ac(HT20) U-NII-1 Band edge-right side



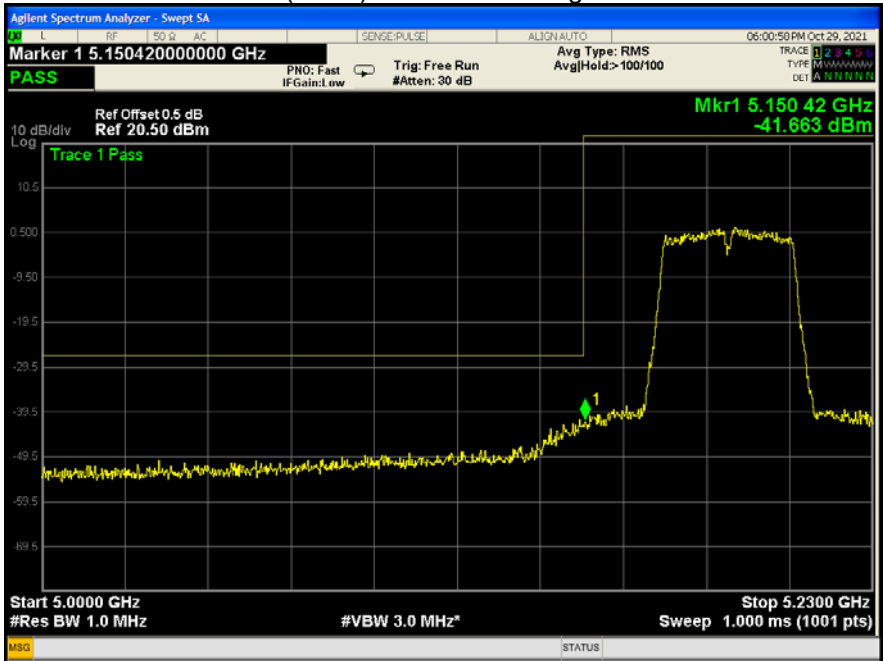
802.11ac(HT40) U-NII-1 Band edge-left side



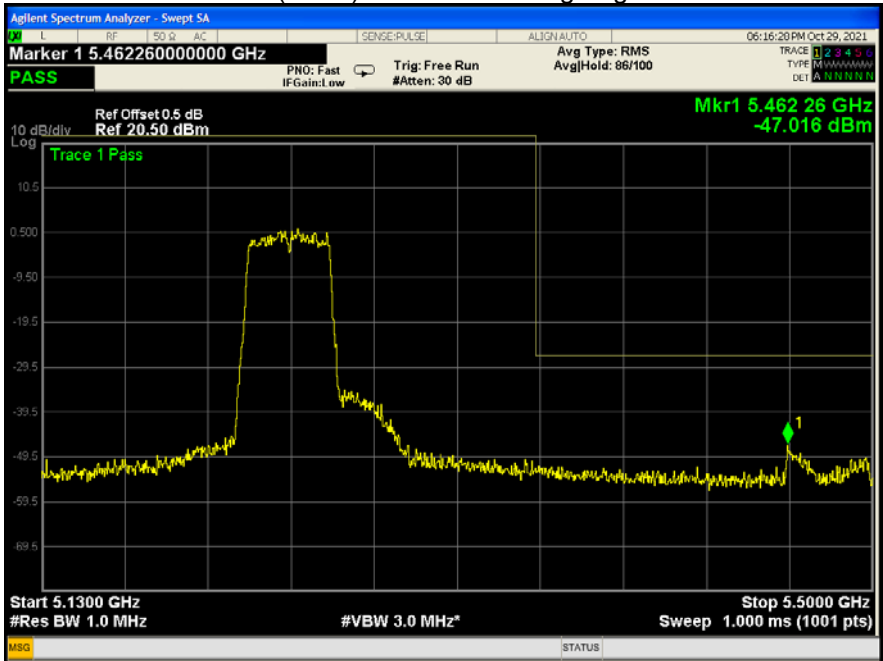
802.11ac(HT40) U-NII-1 Band edge-right side



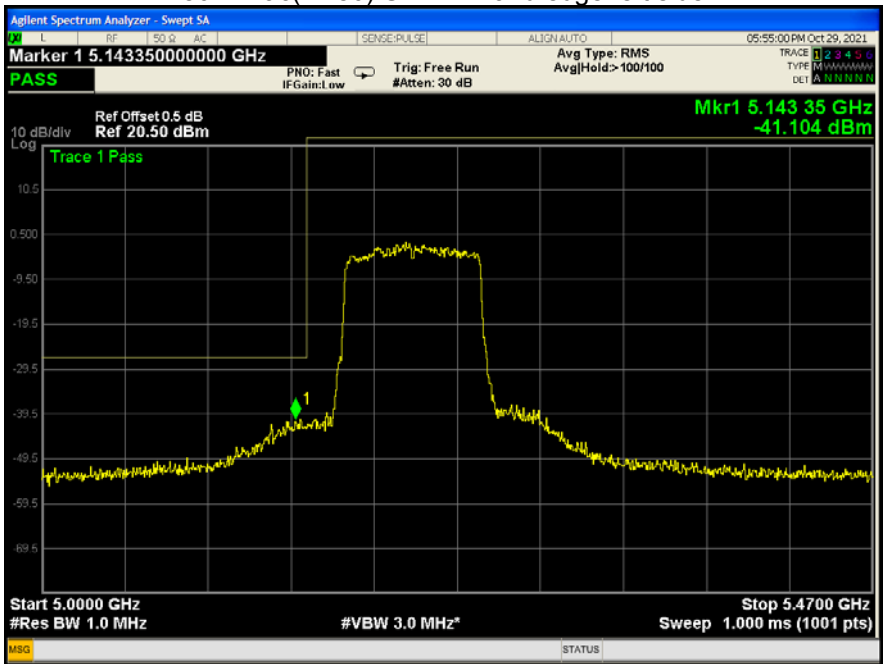
802.11n(HT40) U-NII-1 Band edge-left side



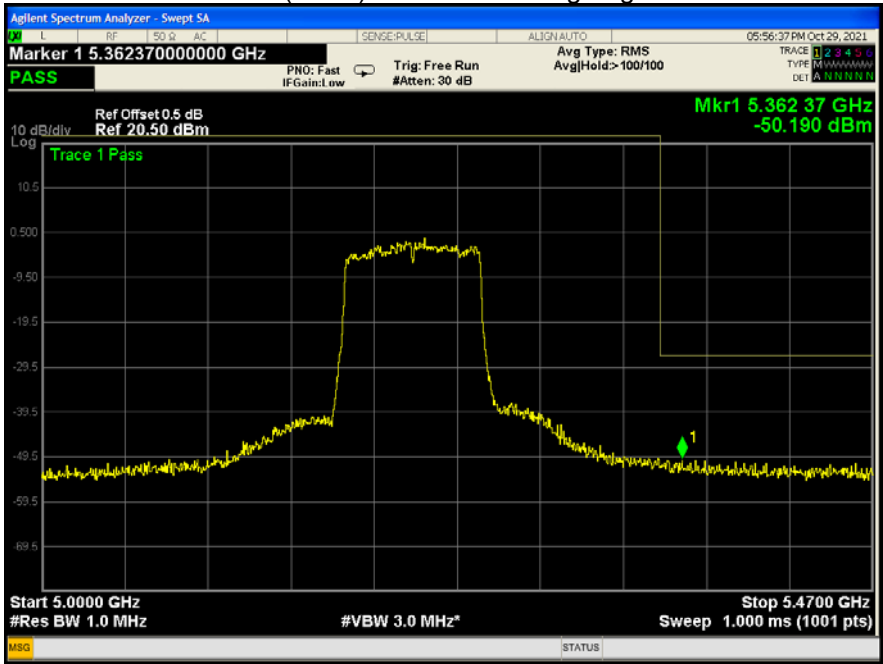
802.11n(HT40) U-NII-1 Band edge-right side



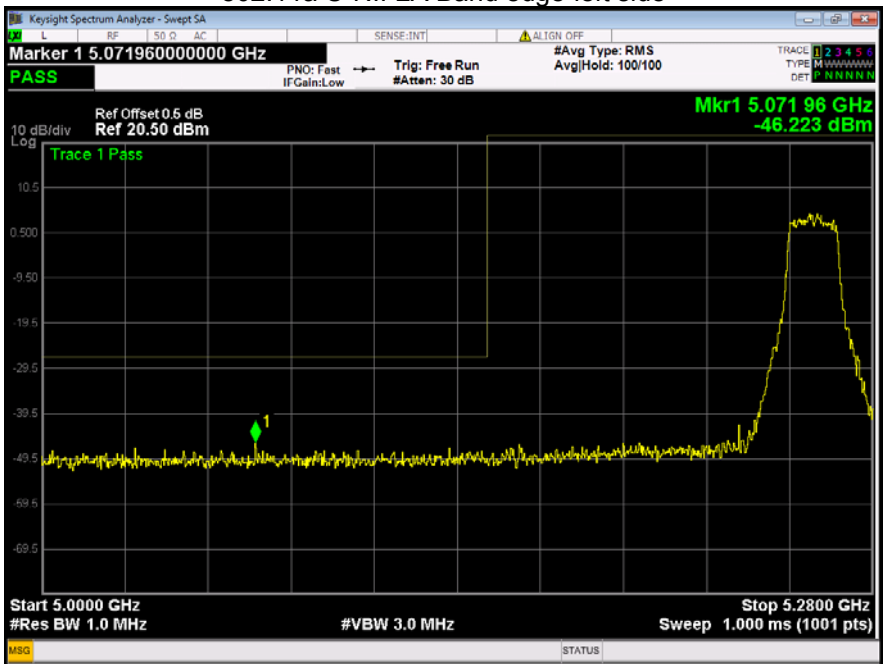
802.11ac(HT80) U-NII-1 Band edge-left side



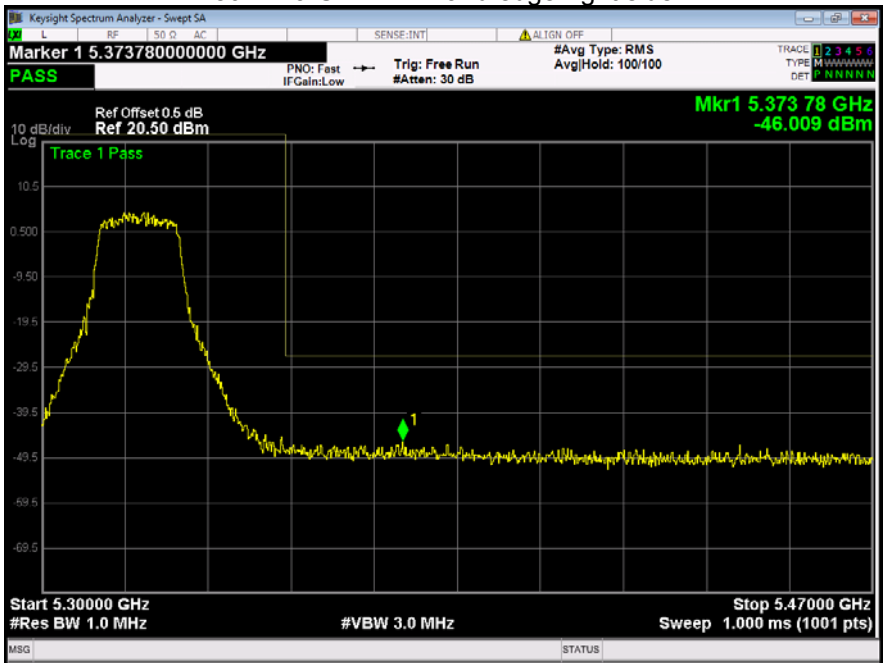
802.11ac(HT80) U-NII-1 Band edge-right side



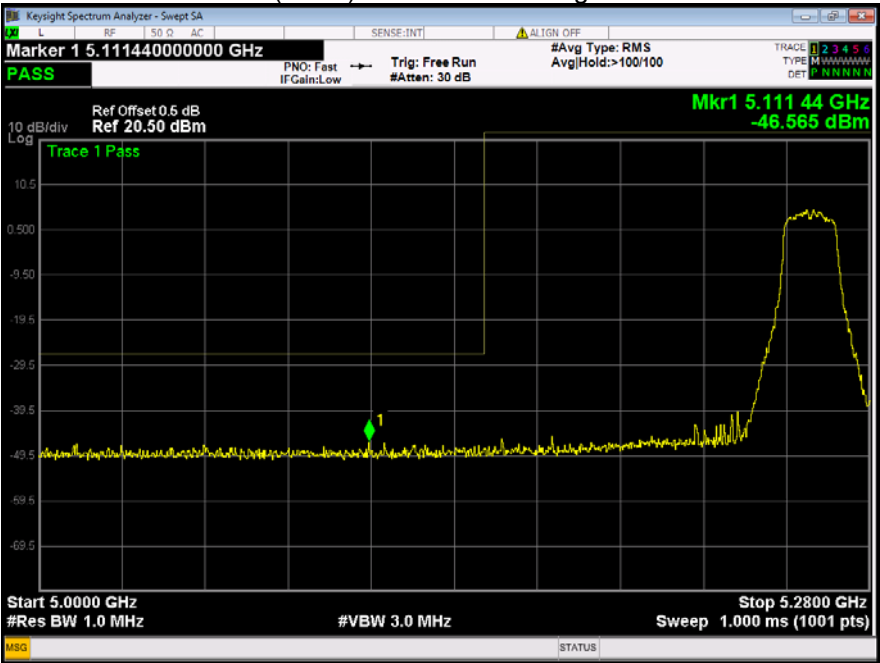
802.11a U-NII-2A Band edge-left side



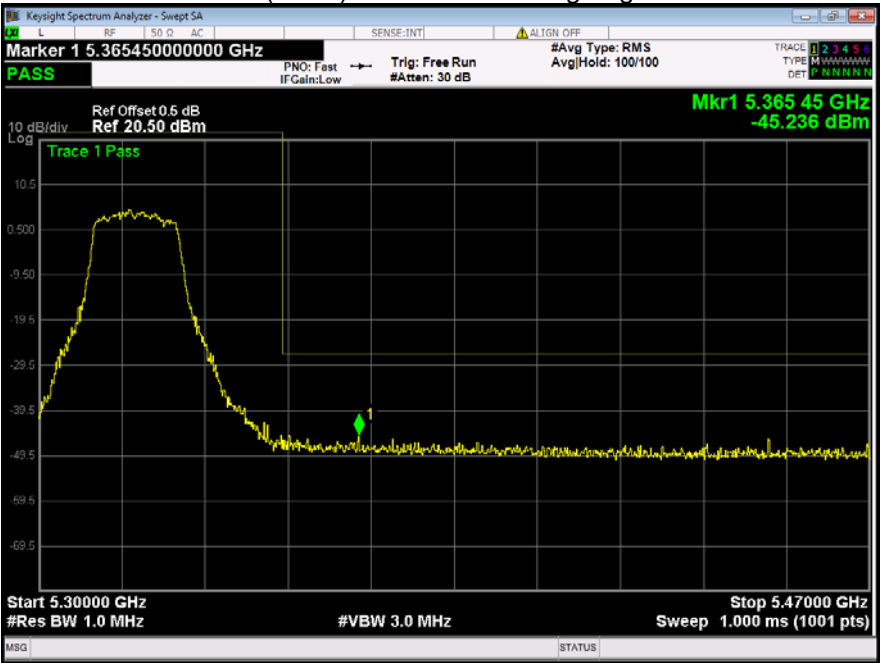
802.11a U-NII-2A Band edge-right side



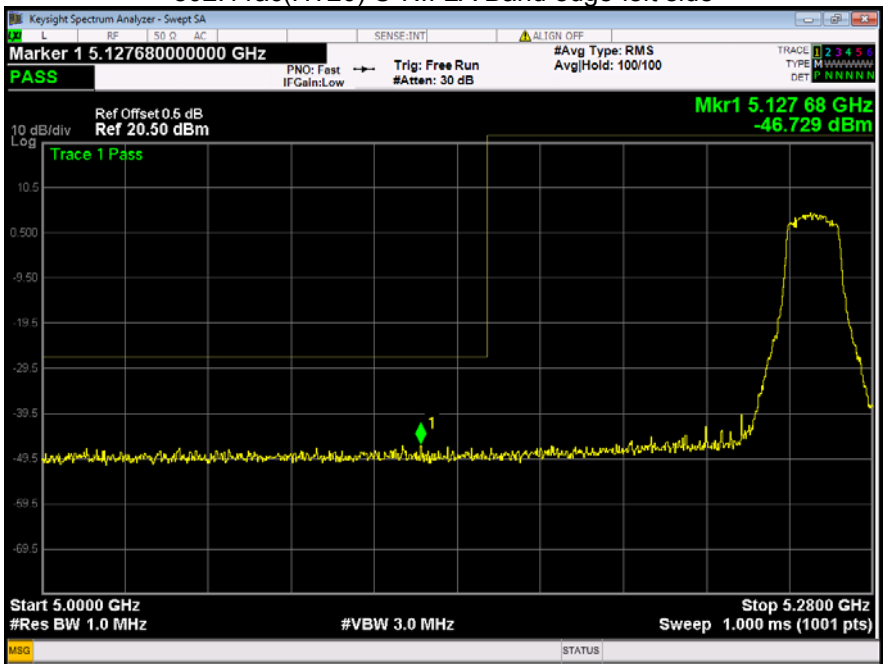
802.11n(HT20) U-NII-2A Band edge-left side



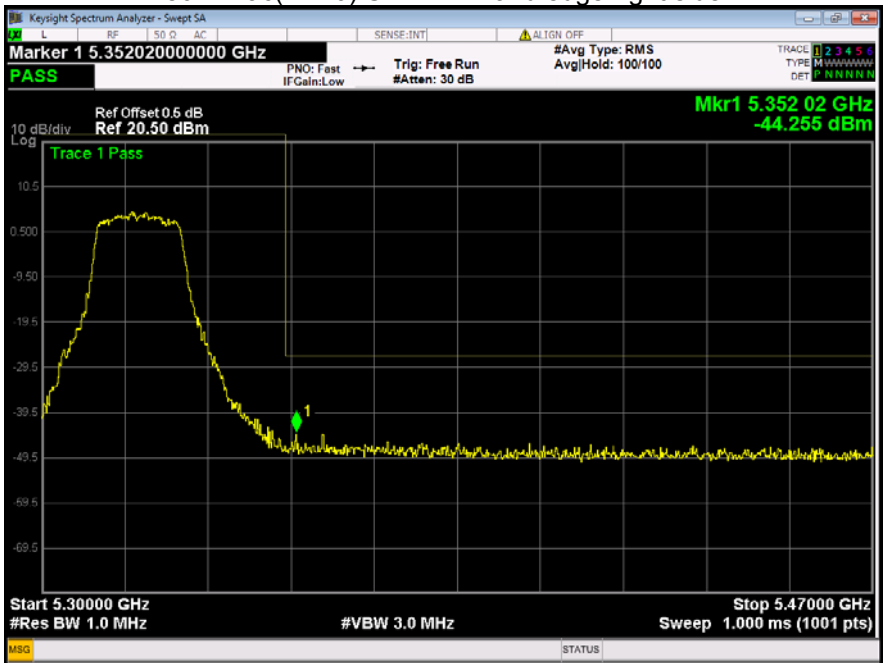
802.11n(HT20) U-NII-2A Band edge-right side



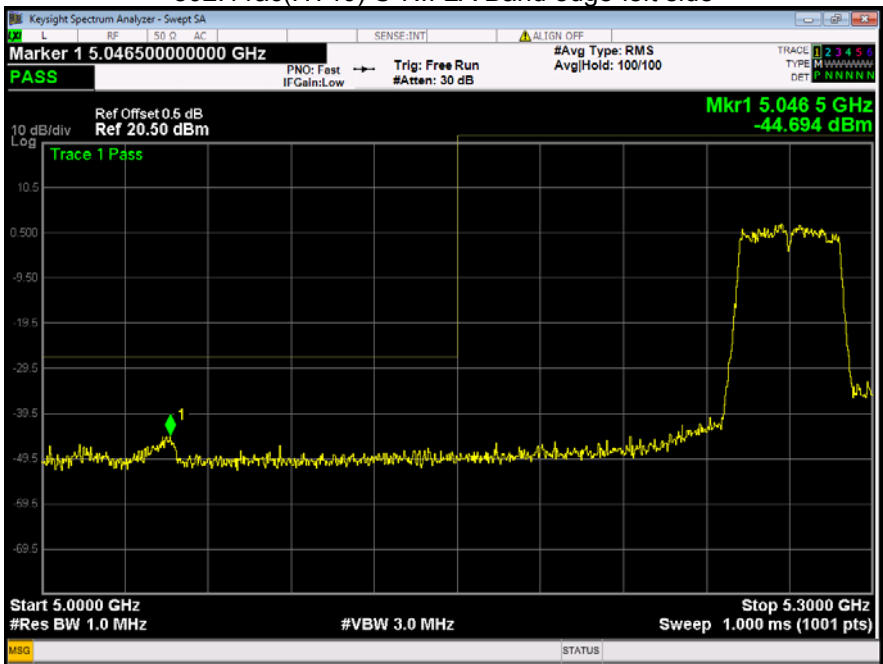
802.11ac(HT20) U-NII-2A Band edge-left side



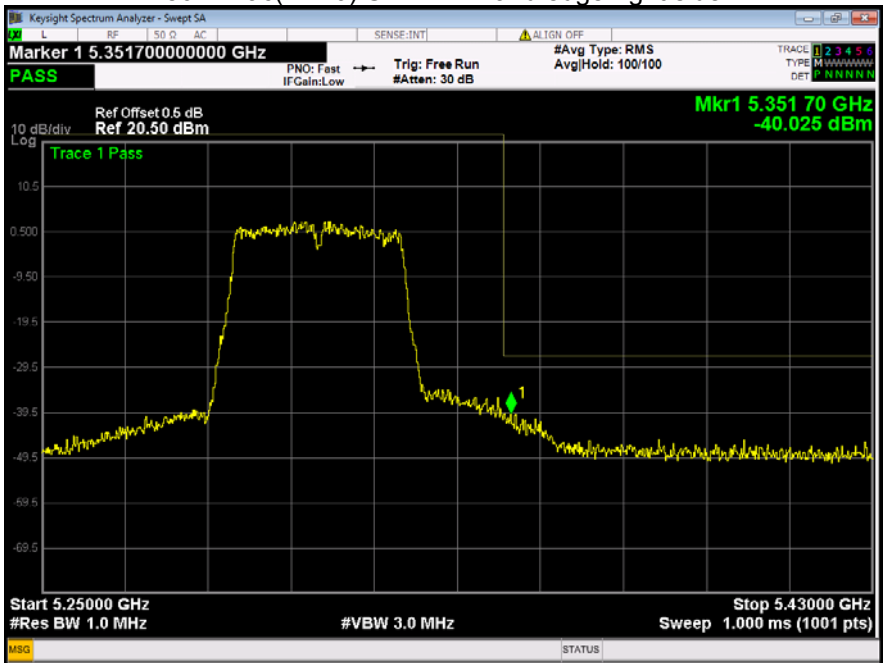
802.11ac(HT20) U-NII-2A Band edge-right side



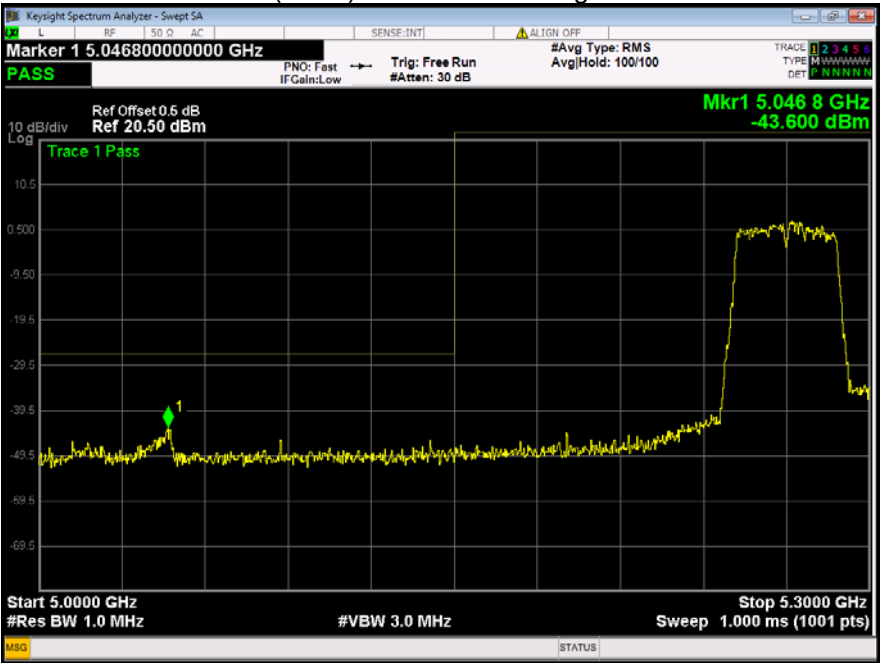
802.11ac(HT40) U-NII-2A Band edge-left side



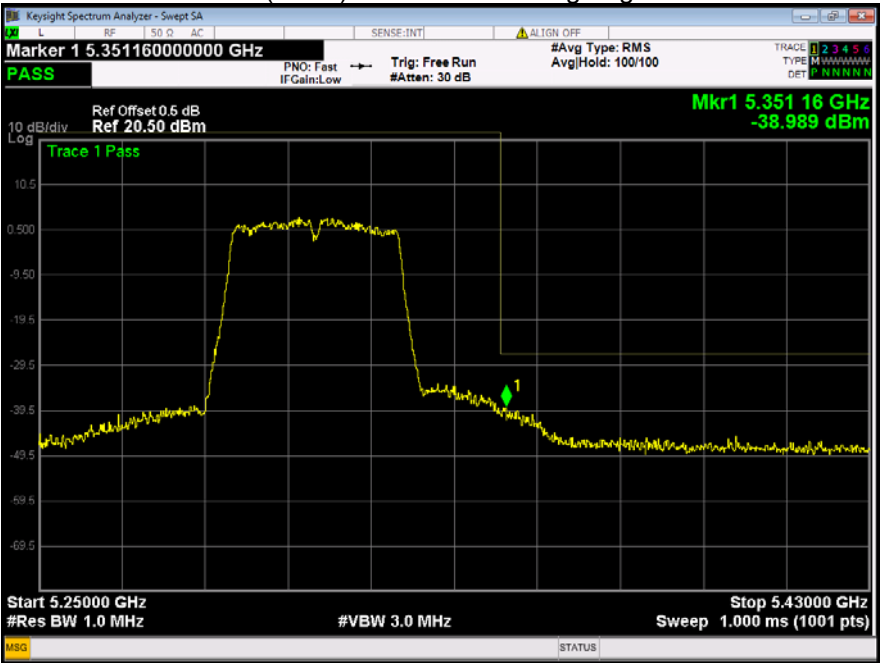
802.11ac(HT40) U-NII-2A Band edge-right side



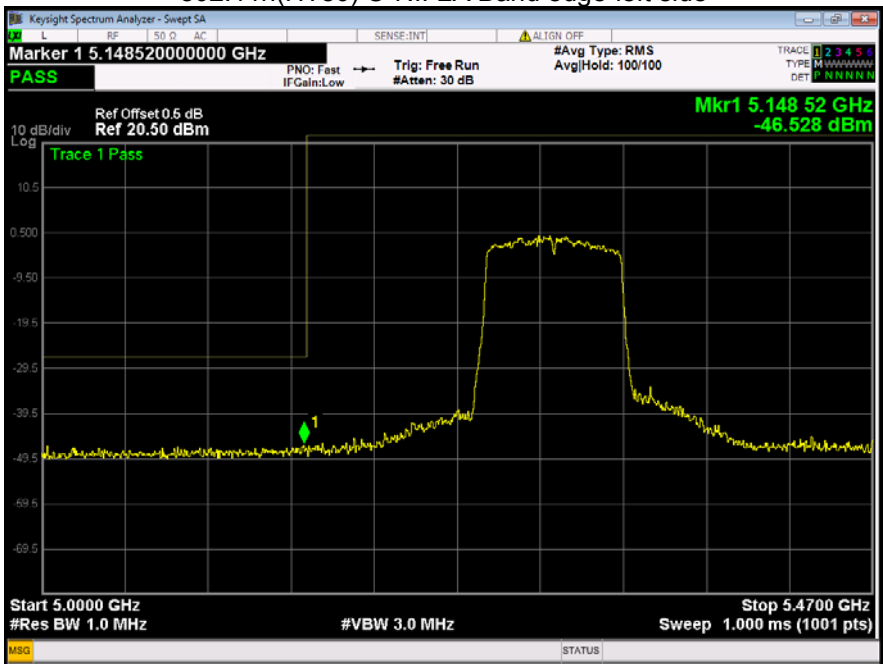
802.11n(HT40) U-NII-2A Band edge-left side



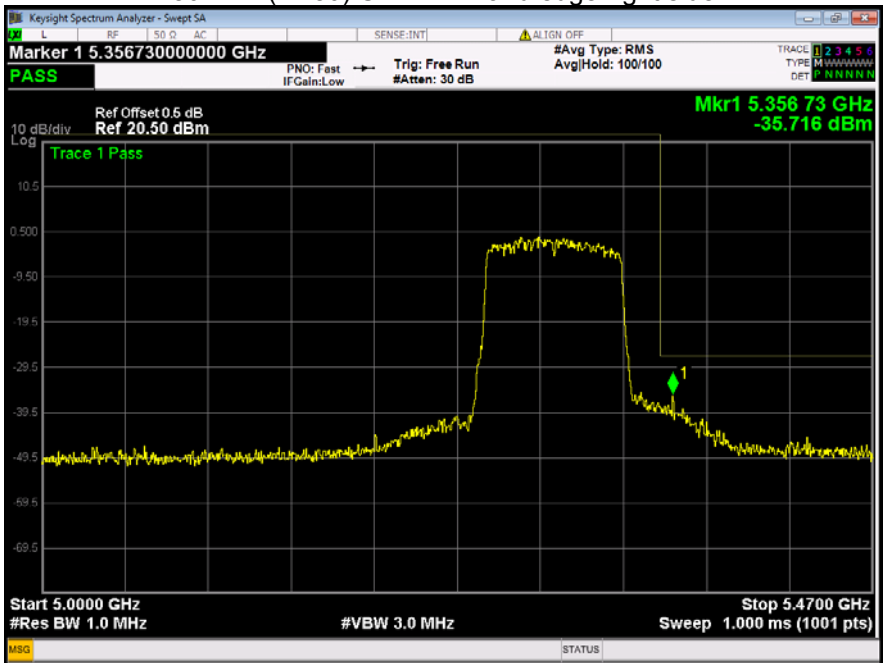
802.11n(HT40) U-NII-2A Band edge-right side



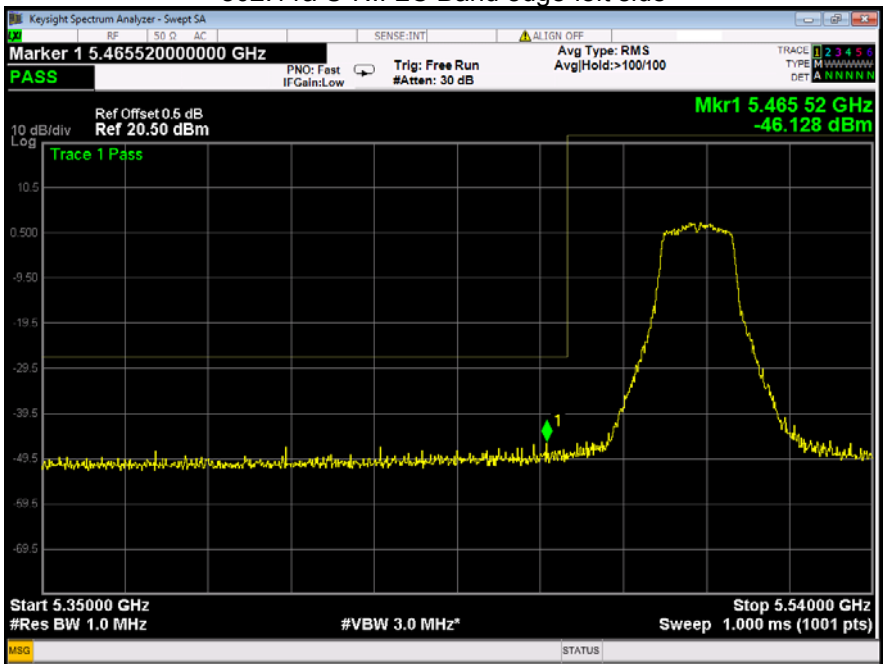
802.11n(HT80) U-NII-2A Band edge-left side



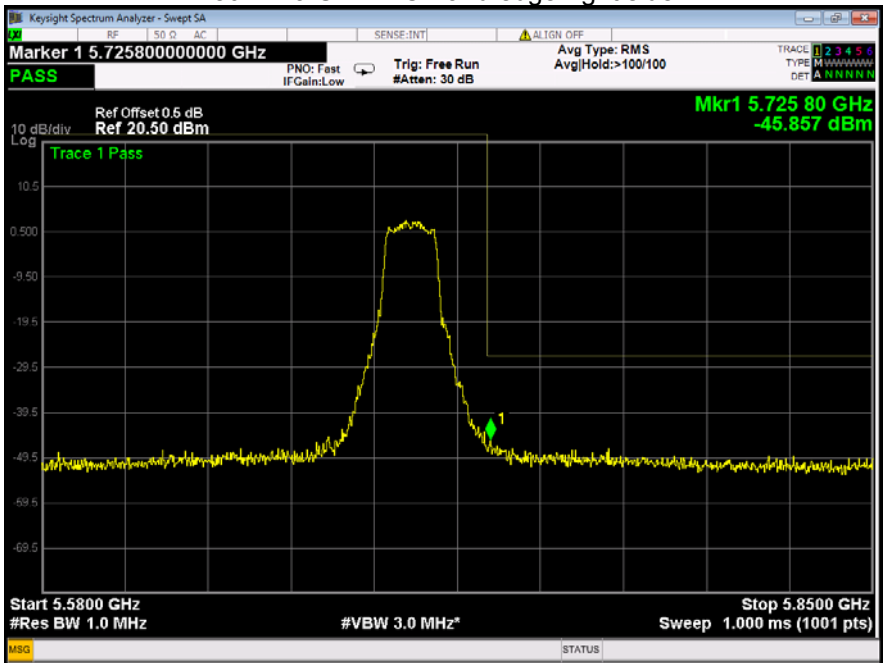
802.11n(HT80) U-NII-2A Band edge-right side



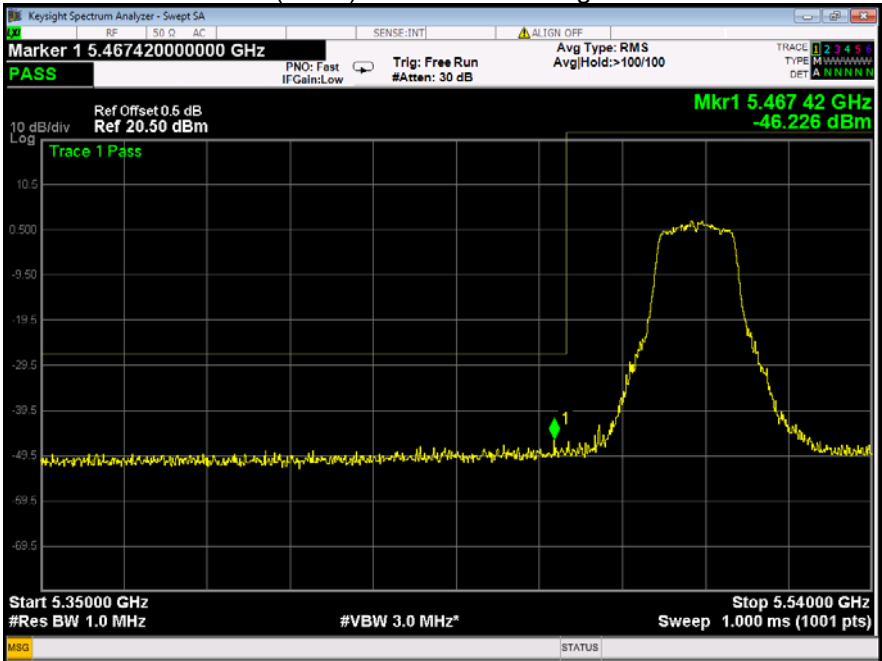
802.11a U-NII-2C Band edge-left side



802.11a U-NII-2C Band edge-right side



802.11n(HT20) U-NII-2C Band edge-left side



802.11n(HT20) U-NII-2C Band edge-right side

