

TEST REPORT

Reference No. : WTD23D02031234W004
FCC ID..... : 2A6P4-KEY-PHONE-LLC
Applicant..... : KEY PHONE LLC
Address : 816 Myrtle Ave, Brooklyn, NY US
Manufacturer : ShenZhen SongMing Communication Technology Co.Ltd
Address : 2 sets of No.3 Building, Geshan Road, Tangxiachong Community,
Yanlou Street Bao'an District, Shenzhen, China
Product..... : KeyPhone
Model(s)..... : KP523
Brand : KeyPhone
Standards..... : FCC 47CFR Part 15 Section 15.407
Date of Receipt sample..... : 2023-02-27
Date of Test..... : 2023-02-27 to 2023-03-22
Date of Issue : 2023-03-23
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
WTD23D02031234W004	2023-02-27	2023-02-27 to 2023-03-22	2023-03-22	original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	KeyPhone
Model(s):	KP523
Model Description:	N/A
GSM Band(s):	GSM 850/1900MHz
GPRS Class:	12
WCDMA Band(s):	FDD Band II/IV/V
LTE Band(s):	FDD Band 2/4/5/12/17/66
Wi-Fi Specification:	2.4G-802.11b/g/n HT20/n HT40 5G-802.11a/ n(HT20/40)/ac(HT20/40/80)
Bluetooth Version:	Bluetooth v5.0 with BLE
GPS:	Support
Hardware Version:	Q102_MB_V1.1
Software Version:	keyphone_pk523_Q102_232_v1.0_20230109
Highest frequency (Exclude Radio):	1.3GHz
Storage Location:	Internal Storage

4.2 Details of E.U.T.

Operation Frequency:	802.11a/n/ac (VHT20): U-NII-1: 5150-5250MHz, U-NII-3: 5725-5850MHz 802.11n/ac (VHT40): U-NII-1: 5190-5230MHz, U-NII-3: 5755-5795MHz 802.11ac (VHT80): U-NII-1: 5210MHz, U-NII-3: 5775MHz
Max. RF output power:	U-NII-1: 16.04dBm U-NII-3: 13.78dBm
Type of Modulation:	OFDM
Antenna installation:	internal permanent antenna
Antenna Gain:	U-NII-1: 2.3dBi U-NII-3: 2.6dBi
Ratings:	Battery DC 3.8V, 2500mAh DC 5V, 1000mA, charging from adapter (Adapter Input: 100-240V~50/60Hz 0.2A)
Adapter:	Manufacturer: SHENZHEN FUSHIGANG TECHNOLOGY CO., LTD. Model No.: AS0601A-0501000USU

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		

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

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(VHT20):

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

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

For 802.11n/ac(VHT40):

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

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

For 802.11ac(VHT80):

channel	Frequency(MHz)	channel	Frequency(MHz)
42	5210		

channel	Frequency(MHz)	channel	Frequency(MHz)
155	5775		

4.4 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 TermAssist and SecureCRT tool Use together.

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

4.5 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.

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions Test Site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	2022-08-01	2023-07-31
2.	LISN	R&S	ENV216	100115	2022-08-01	2023-07-31
3.	Cable	Top	TYPE16(3.5M)	-	2022-08-01	2023-07-31
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP30	100091	2022-04-28	2023-04-27
2	Amplifier	Agilent	8447D	2944A10178	2022-08-01	2023-07-31
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2022-08-01	2023-07-31
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2022-08-07	2023-08-06
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2022-04-28	2023-04-27
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2022-04-28	2023-04-27
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2022-08-08	2023-08-07
8	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2022-04-28	2023-04-27
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	2022-04-28	2023-04-27
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2022-10-30	2023-10-29
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2022-05-02	2023-05-01
4	Amplifier	ANRITSU	MH648A	M43381	2022-04-28	2023-04-27
5	Cable	HUBER+SUHNER	CBL2	525178	2022-04-28	2023-04-27
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	Spectrum Analyzer	R&S	FSP40	100501	2022-08-01	2023-07-31
2.	EXA Signal Analyzer	Malaysia Keysight	N9010A	MY50520207	2022-04-28	2023-04-27

5.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

5.3 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 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207(a)	PASS
Radiated Emissions	15.407(a) 15.205(a) 15.209(a)	PASS
Duty Cycle	KDB 789033	PASS
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
Restricted bands around fundamental frequency	15.407(a)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

7 Conducted Emission

Test Requirement: FCC 47CFR Part 15 Section 15.207

Test Method: ANSI C63.10:2013

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Limit:

Frequency (MHz)	Limit (dB μ V)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

7.1 E.U.T. Operation

Operating Environment :

Temperature: 23.8 °C

Humidity: 35.0 % RH

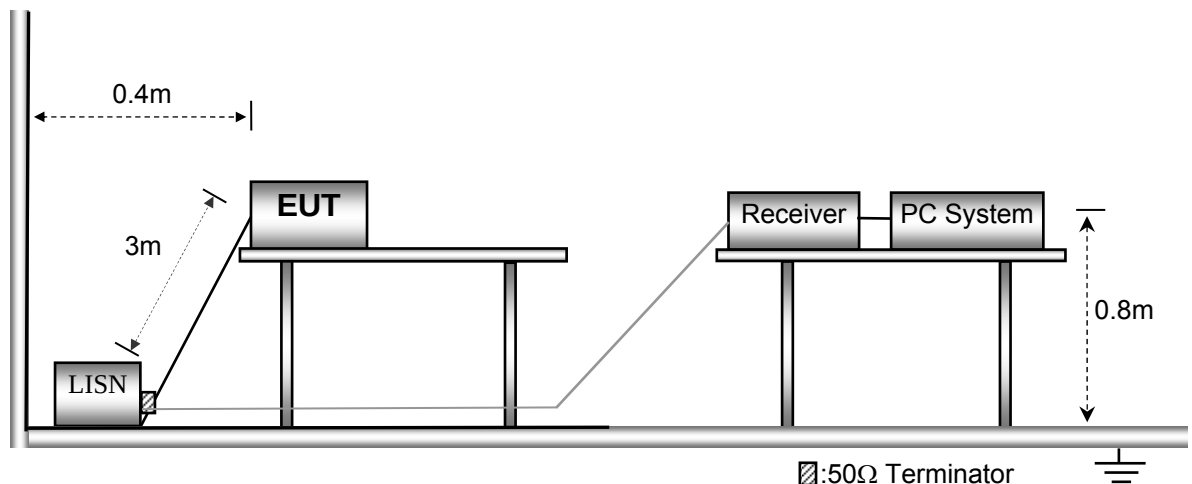
Atmospheric Pressure: 101.2kPa

EUT Operation :

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

7.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



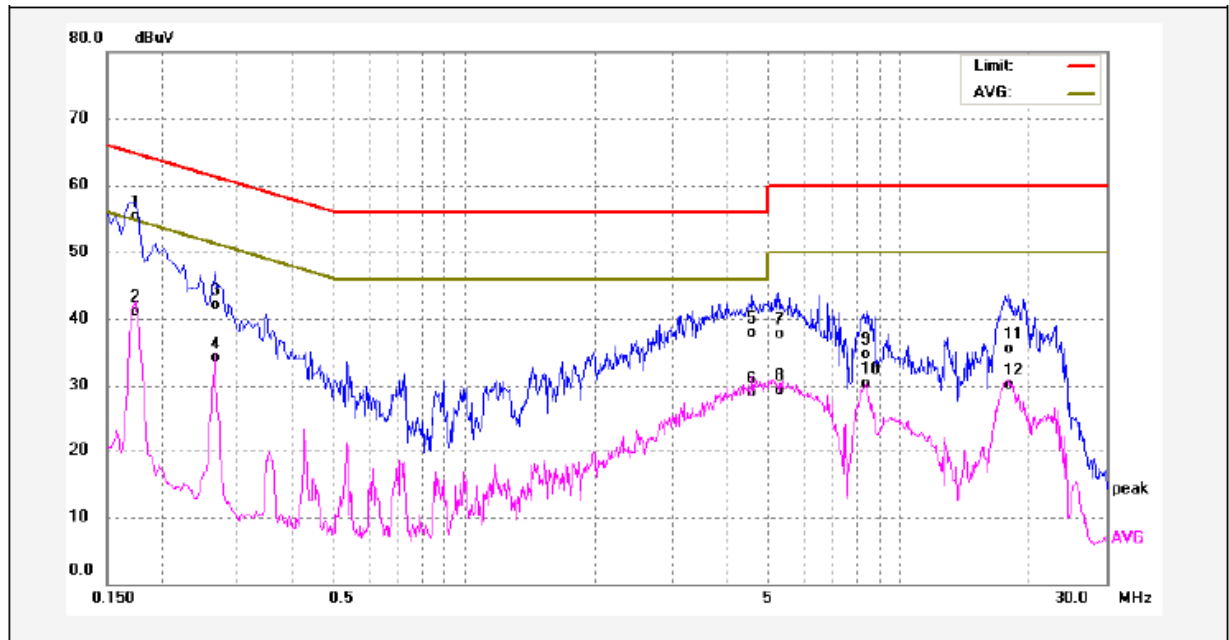
7.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

7.4 Conducted Emission Test Result

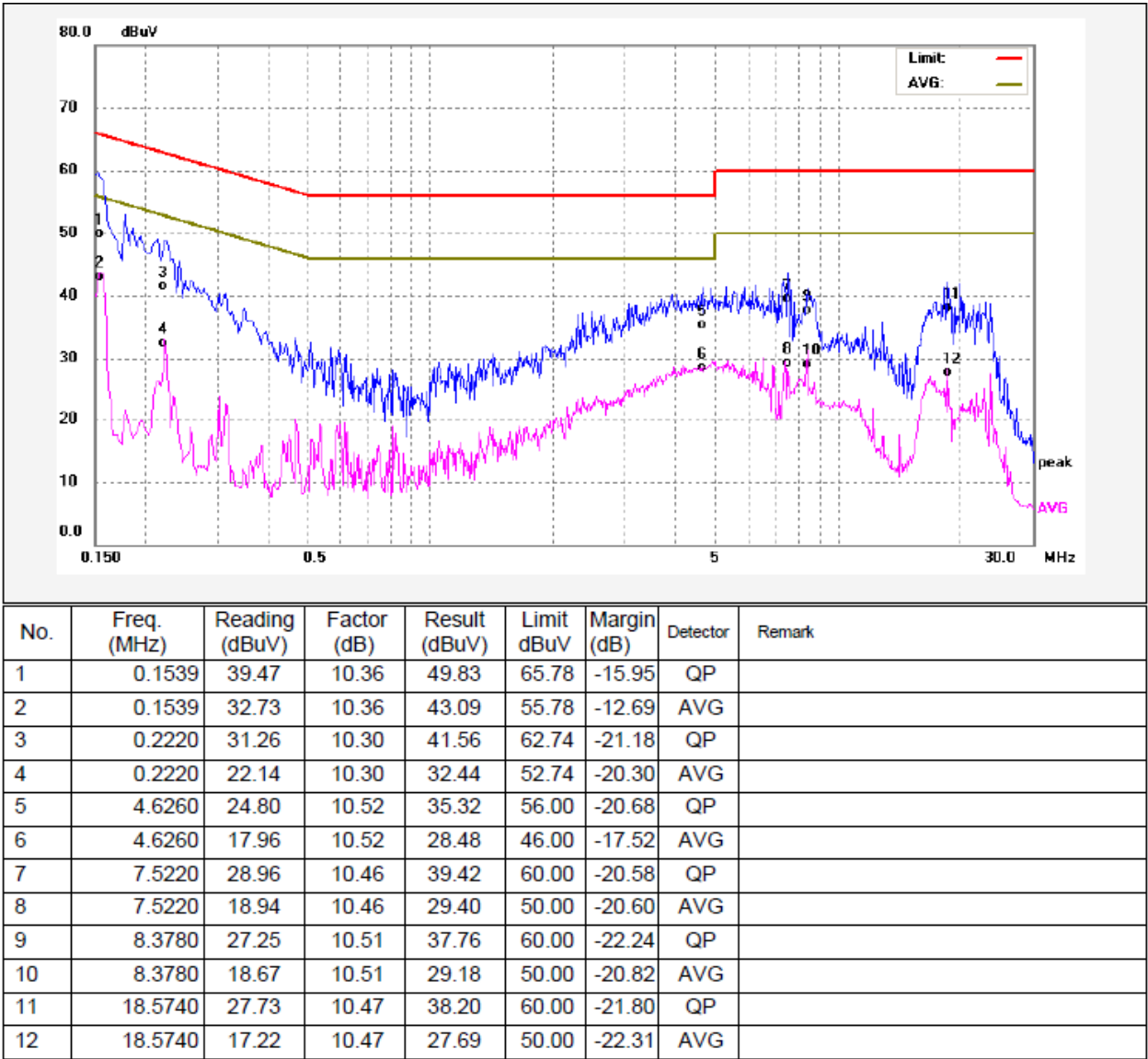
An initial pre-scan was performed on the live and neutral lines.

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.1740	45.02	10.31	55.33	64.76	-9.43	QP	
2	0.1740	30.88	10.31	41.19	54.76	-13.57	AVG	
3	0.2660	31.92	10.27	42.19	61.24	-19.05	QP	
4	0.2660	23.87	10.27	34.14	51.24	-17.10	AVG	
5	4.5780	27.45	10.51	37.96	56.00	-18.04	QP	
6	4.5780	18.46	10.51	28.97	46.00	-17.03	AVG	
7	5.2619	27.11	10.51	37.62	60.00	-22.38	QP	
8	5.2619	18.84	10.51	29.35	50.00	-20.65	AVG	
9	8.3780	24.23	10.49	34.72	60.00	-25.28	QP	
10	8.3780	19.77	10.49	30.26	50.00	-19.74	AVG	
11	17.8740	25.08	10.46	35.54	60.00	-24.46	QP	
12	17.8740	19.67	10.46	30.13	50.00	-19.87	AVG	

Neutral line:



8 Radiated Emissions

Test Requirement: FCC 47CFR 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: 23.2 °C

Humidity: 47.3 % RH

Atmospheric Pressure: 101.2kPa

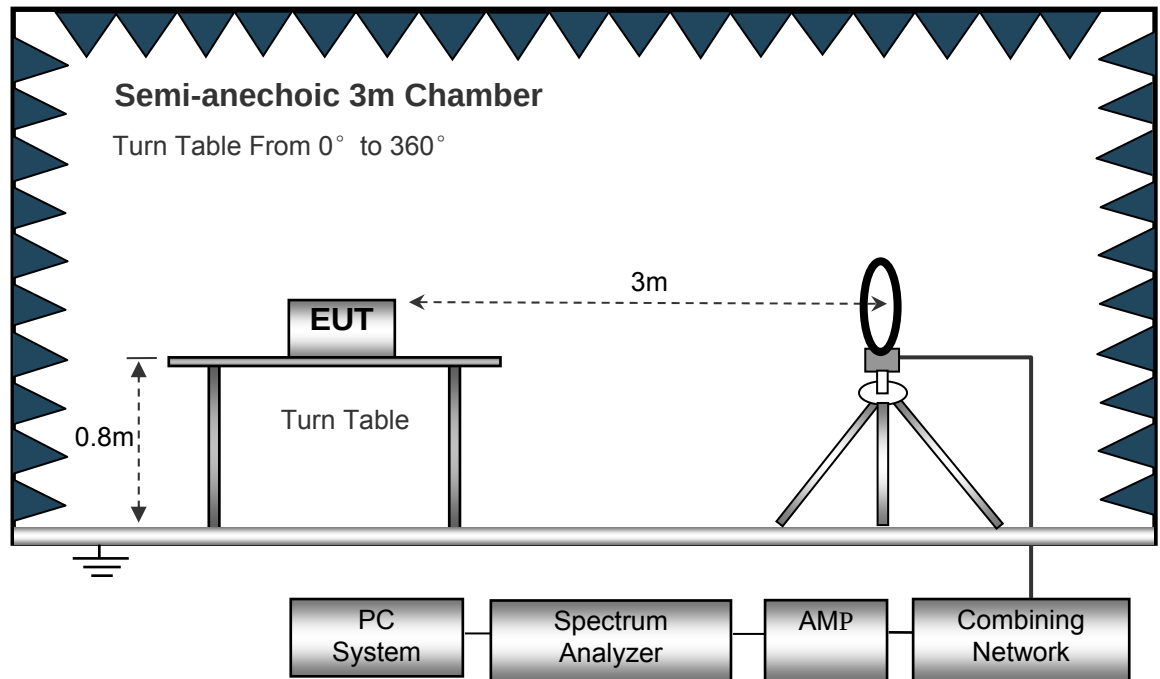
EUT Operation :

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

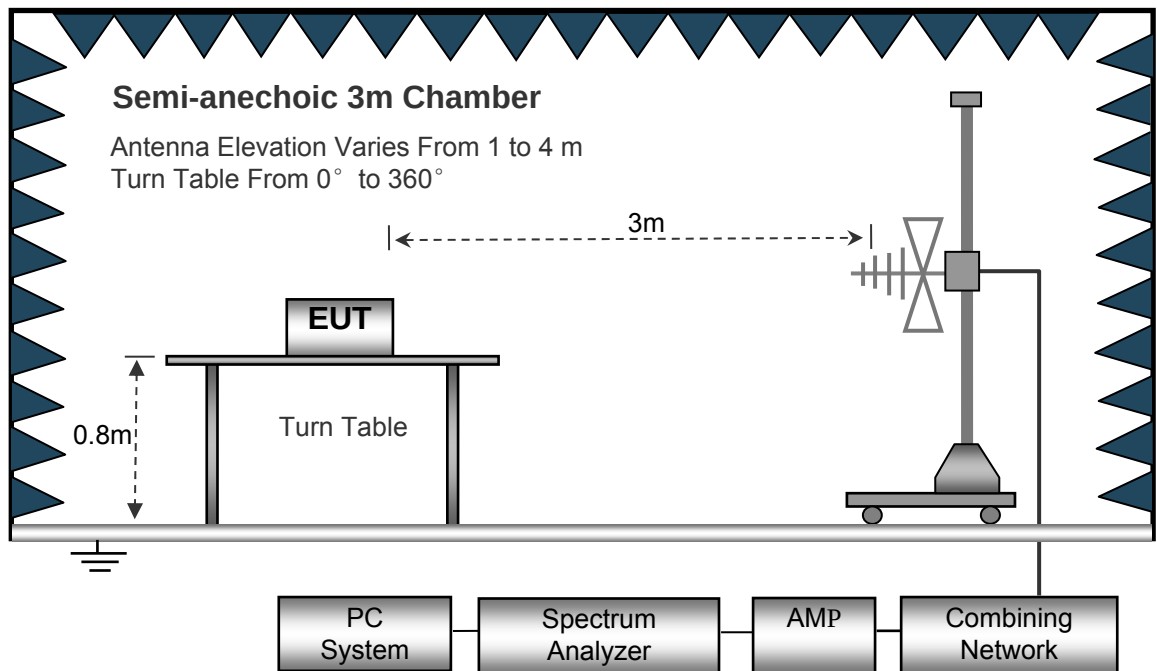
8.2 Test Setup

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

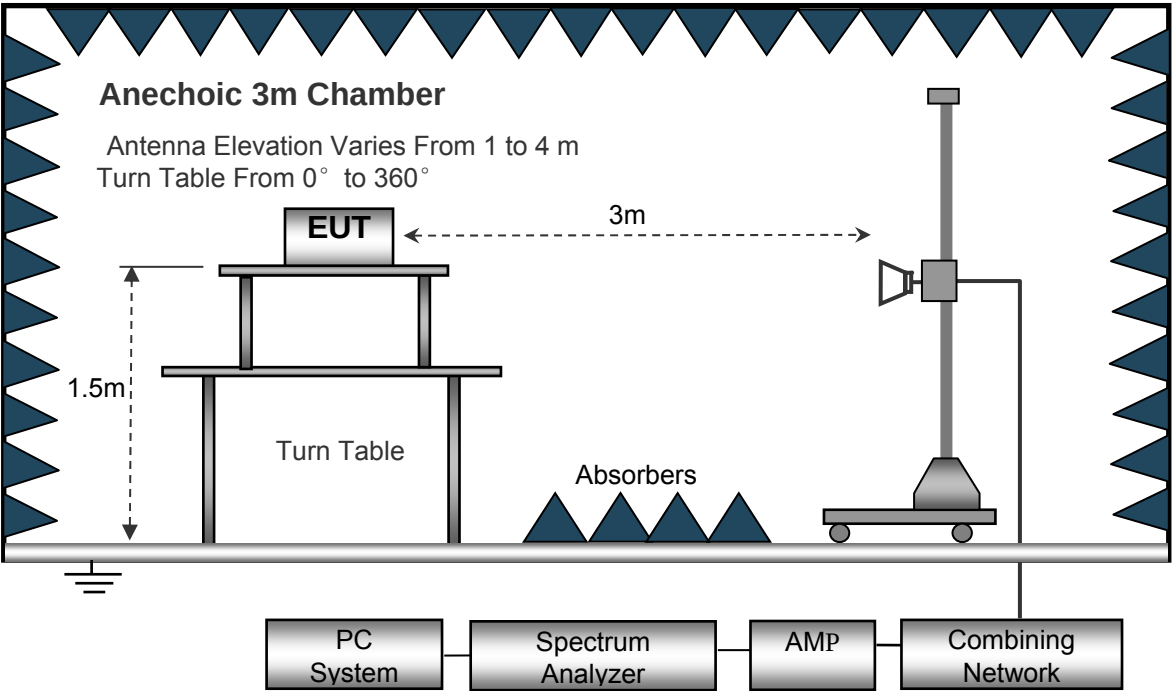
The test setup for emission measurement below 30MHz.



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
DetectorPK
Resolution Bandwidth.....100kHz
Video Bandwidth.....300kHz

Above 1GHz

Sweep Speed Auto
DetectorPK
Resolution Bandwidth.....1MHz
Video Bandwidth.....3MHz
DetectorAve.
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

Test Frequency: 9KHz~30MHz

Frequency	Measurement results dB μ V @3m	Detector PK/QP	Correct factor dB/m	Extrapolation factor dB	Measurement results (calculated) dB μ V/m @30m	Limits dB μ V/m @30m	Margin dB
(MHz)	Measurement results	Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
U-NII-1:802.11a 5180MHz							
6.021	24.86	QP	21.84	40.00	6.70	29.54	-22.84
15.730	25.33	QP	21.35	40.00	6.68	29.54	-22.86
25.680	24.76	QP	20.67	40.00	5.43	29.54	-24.11
U-NII-1:802.11n20 5180MHz							
6.021	25.33	QP	21.84	40.00	7.17	29.54	-22.37
15.730	24.67	QP	21.35	40.00	6.02	29.54	-23.52
25.680	24.60	QP	20.67	40.00	5.27	29.54	-24.27
U-NII-1:802.11ac 20 5180MHz							
6.021	24.19	QP	21.84	40.00	6.03	29.54	-23.51
15.730	25.32	QP	21.35	40.00	6.67	29.54	-22.87
25.680	25.38	QP	20.67	40.00	6.05	29.54	-23.49
U-NII-1:802.11n40 5190MHz							
6.021	25.06	QP	21.84	40.00	6.90	29.54	-22.64
15.730	24.87	QP	21.35	40.00	6.22	29.54	-23.32
25.680	25.04	QP	20.67	40.00	5.71	29.54	-23.83
U-NII-1:802.11ac40 5190MHz							
6.021	25.33	QP	21.84	40.00	7.17	29.54	-22.37
15.730	24.69	QP	21.35	40.00	6.04	29.54	-23.50
25.680	23.51	QP	20.67	40.00	4.18	29.54	-25.36
U-NII-1:802.11ac80 5210MHz							
6.021	25.11	QP	21.84	40.00	6.95	29.54	-22.59
15.730	24.60	QP	21.35	40.00	5.95	29.54	-23.59
25.680	25.13	QP	20.67	40.00	5.80	29.54	-23.74

Frequency	Measurement results dB μ V @3m	Detector PK/QP	Correct factor dB/m	Extrapolation factor dB	Measurement results (calculated) dB μ V/m @30m	Limits dB μ V/m @30m	Margin dB
(MHz)	Measurement results	Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
U-NII-3 802.11a 5745MHz							
6.021	25.12	QP	21.84	40.00	6.96	29.54	-22.58
15.730	24.86	QP	21.35	40.00	6.21	29.54	-23.33
25.680	25.75	QP	20.67	40.00	6.42	29.54	-23.12
U-NII-3 802.11n20 5745MHz							
6.021	23.58	QP	21.84	40.00	5.42	29.54	-24.12
15.730	24.16	QP	21.35	40.00	5.51	29.54	-24.03
25.680	25.75	QP	20.67	40.00	6.42	29.54	-23.12
U-NII-3 802.11ac 5745MHz							
6.021	24.33	QP	21.84	40.00	6.17	29.54	-23.37
15.730	25.02	QP	21.35	40.00	6.37	29.54	-23.17
25.680	24.85	QP	20.67	40.00	5.52	29.54	-24.02
U-NII-3 802.11n40 5755MHz							
6.021	25.11	QP	21.84	40.00	6.95	29.54	-22.59
15.730	24.63	QP	21.35	40.00	5.98	29.54	-23.56
25.680	25.31	QP	20.67	40.00	5.98	29.54	-23.56
U-NII-3 802.11ac40 5755MHz							
6.021	24.58	QP	21.84	40.00	6.42	29.54	-23.12
15.730	25.09	QP	21.35	40.00	6.44	29.54	-23.10
25.680	24.67	QP	20.67	40.00	5.34	29.54	-24.20
U-NII-3 802.11ac80 5775MHz							
6.021	25.10	QP	21.84	40.00	6.94	29.54	-22.60
15.730	24.51	QP	21.35	40.00	5.86	29.54	-23.68
25.680	25.26	QP	20.67	40.00	5.93	29.54	-23.61

Test Frequency : 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11a U-NII-1 Low Channel 5180MHz									
223.45	40.39	QP	248	1.3	H	-11.62	28.77	46.00	-17.23
223.45	36.93	QP	52	1.5	V	-11.62	25.31	46.00	-20.69
4539.63	50.09	PK	242	1.1	H	-2.03	48.06	74.00	-25.94
4539.63	45.73	Ave	242	1.1	H	-2.03	43.70	54.00	-10.30
5149.96	51.60	PK	35	1.5	H	-1.02	50.58	74.00	-23.42
5149.96	47.41	Ave	35	1.5	H	-1.02	46.39	54.00	-7.61
10360.00	41.64	PK	205	1.8	H	5.33	46.97	74.00	-27.03
10360.00	36.29	Ave	205	1.8	H	5.33	41.62	54.00	-12.38
802.11a U-NII-1 Middle channel 5200MHz									
223.45	41.31	QP	228	1.7	H	-11.62	29.69	46.00	-16.31
223.45	37.34	QP	85	1.1	V	-11.62	25.72	46.00	-20.28
4518.18	49.99	PK	222	1.6	H	-1.94	48.05	74.00	-25.95
4518.18	45.78	Ave	222	1.6	H	-1.94	43.84	54.00	-10.16
5110.32	51.04	PK	311	1.3	H	-1.06	49.98	74.00	-24.02
5110.32	47.19	Ave	311	1.3	H	-1.06	46.13	54.00	-7.87
10400.00	41.52	PK	246	1.7	H	5.21	46.73	74.00	-27.27
10400.00	36.67	Ave	246	1.7	H	5.21	41.88	54.00	-12.12

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11a U-NII-1 High channel 5240MHz									
223.45	39.89	QP	171	1.1	H	-11.62	28.27	46.00	-17.73
223.45	37.26	QP	266	1.7	V	-11.62	25.64	46.00	-20.36
4504.84	51.40	PK	317	1.1	H	-2.24	49.16	74.00	-24.84
4504.84	45.03	Ave	317	1.1	H	-2.24	42.79	54.00	-11.21
5123.02	52.76	PK	291	1.0	H	-1.09	51.67	74.00	-22.33
5123.02	46.29	Ave	291	1.0	H	-1.09	45.20	54.00	-8.80
10480.00	41.41	PK	160	1.9	H	5.14	46.55	74.00	-27.45
10480.00	37.61	Ave	160	1.9	H	5.14	42.75	54.00	-11.25
802.11a U-NII-2A Low Channel 5260MHz									
223.45	41.05	QP	21	1.2	H	-11.62	29.43	46.00	-16.57
223.45	36.26	QP	169	1.2	V	-11.62	24.64	46.00	-21.36
4506.50	50.44	PK	268	1.1	H	-2.03	48.41	74.00	-25.59
4506.50	46.32	Ave	268	1.1	H	-2.03	44.29	54.00	-9.71
5147.10	52.53	PK	274	1.4	H	-1.02	51.51	74.00	-22.49
5147.10	48.18	Ave	274	1.4	H	-1.02	47.16	54.00	-6.84
10520.00	41.08	PK	223	1.2	H	5.33	46.41	74.00	-27.59
10520.00	36.85	Ave	223	1.2	H	5.33	42.18	54.00	-11.82

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11a U-NII-3 Low Channel 5745MHz									
223.45	39.38	QP	136	1.7	H	-11.62	27.76	46.00	-18.24
223.45	37.10	QP	28	1.8	V	-11.62	25.48	46.00	-20.52
4530.25	52.18	PK	327	1.9	H	-2.06	50.12	74.00	-23.88
4530.25	45.45	Ave	327	1.9	H	-2.06	43.39	54.00	-10.61
11490.00	41.07	PK	182	1.9	H	5.93	47.00	68.20	-21.20
11490.00	36.62	Ave	182	1.9	H	5.93	42.55	54.00	-11.45
5378.68	46.12	PK	260	1.6	H	-1.25	44.87	74.00	-29.13
5378.68	39.78	Ave	260	1.6	H	-1.25	38.53	54.00	-15.47
802.11a U-NII-3 middle channel 5785MHz									
223.45	40.39	QP	141	1.0	H	-11.62	28.77	46.00	-17.23
223.45	35.94	QP	205	1.3	V	-11.62	24.32	46.00	-21.68
4505.55	53.56	PK	230	1.0	H	-2.03	51.53	74.00	-22.47
4505.55	46.54	Ave	230	1.0	H	-2.03	44.51	54.00	-9.49
11570.00	41.13	PK	284	1.9	H	5.81	46.94	68.20	-21.26
11570.00	36.97	Ave	284	1.9	H	5.81	42.78	54.00	-11.22
5361.77	46.25	PK	171	1.8	H	-1.22	45.03	74.00	-28.97
5361.77	37.05	Ave	171	1.8	H	-1.22	35.83	54.00	-18.17
802.11a U-NII-3 High channel 5825MHz									
223.45	41.52	QP	94	1.6	H	-11.62	29.90	46.00	-16.10
223.45	36.52	QP	316	1.0	V	-11.62	24.90	46.00	-21.10
4514.22	54.19	PK	18	1.4	H	-1.84	52.35	74.00	-21.65
4514.22	47.42	Ave	18	1.4	H	-1.84	45.58	54.00	-8.42
11650.00	42.61	PK	34	1.2	H	5.84	48.45	68.20	-19.75
11650.00	35.90	Ave	34	1.2	H	5.84	41.74	54.00	-12.26
5364.94	46.99	PK	264	1.1	H	-1.30	45.69	74.00	-28.31
5364.94	38.02	Ave	264	1.1	H	-1.30	36.72	54.00	-17.28

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT20) U-NII-1 Low Channel 5180MHz									
223.45	40.90	QP	276	1.5	H	-11.62	29.28	46.00	-16.72
223.45	35.46	QP	332	2.0	V	-11.62	23.84	46.00	-22.16
4530.35	55.27	PK	10	1.0	H	-2.14	53.13	74.00	-20.87
4530.35	47.86	Ave	10	1.0	H	-2.14	45.72	54.00	-8.28
5144.14	47.81	PK	192	1.8	H	-1.06	46.75	74.00	-27.25
5144.14	37.79	Ave	192	1.8	H	-1.06	36.73	54.00	-17.27
10360.00	40.37	PK	315	1.1	H	5.33	45.70	74.00	-28.30
10360.00	36.36	Ave	315	1.1	H	5.33	41.69	54.00	-12.31
802.11n(HT20) U-NII-1 Middle channel 5200MHz									
223.45	41.16	QP	19	1.1	H	-11.62	29.54	46.00	-16.46
223.45	34.59	QP	149	1.0	V	-11.62	22.97	46.00	-23.03
4538.59	54.14	PK	226	2.0	H	-2.12	52.02	74.00	-21.98
4538.59	47.86	Ave	226	2.0	H	-2.12	45.74	54.00	-8.26
5135.43	47.63	PK	299	1.2	H	-1.06	46.57	74.00	-27.43
5135.43	37.06	Ave	299	1.2	H	-1.06	36.00	54.00	-18.00
10400.00	42.69	PK	312	1.5	H	5.21	47.90	74.00	-26.10
10400.00	37.62	Ave	312	1.5	H	5.21	42.83	54.00	-11.17
802.11n(HT20) U-NII-1 High channel 5240MHz									
223.45	40.99	QP	150	1.7	H	-11.62	29.37	46.00	-16.63
223.45	34.97	QP	105	1.3	V	-11.62	23.35	46.00	-22.65
4508.47	53.64	PK	107	1.5	H	-1.96	51.68	74.00	-22.32
4508.47	47.99	Ave	107	1.5	H	-1.96	46.03	54.00	-7.97
5125.14	46.83	PK	105	2.0	H	-1.06	45.77	74.00	-28.23
5125.14	36.16	Ave	105	2.0	H	-1.06	35.10	54.00	-18.90
10480.00	41.76	PK	112	1.8	H	5.14	46.90	74.00	-27.10
10480.00	37.14	Ave	112	1.8	H	5.14	42.28	54.00	-11.72

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT20) U-NII-3 Low Channel 5745MHz									
223.45	35.16	QP	59	1.5	H	-11.62	23.54	46.00	-22.46
223.45	54.59	QP	348	1.8	V	-11.62	42.97	46.00	-3.03
4501.67	47.30	PK	66	1.4	H	-2.06	45.24	74.00	-28.76
4501.67	46.12	Ave	66	1.4	H	-2.06	44.06	54.00	-9.94
11490.00	37.45	PK	178	1.9	H	5.93	43.38	68.20	-24.82
11490.00	43.98	Ave	178	1.9	H	5.93	49.91	54.00	-4.09
5364.90	46.67	PK	230	1.2	H	-1.25	45.42	74.00	-28.58
5364.90	39.93	Ave	230	1.2	H	-1.25	38.68	54.00	-15.32
802.11n(HT20) U-NII-3 middle channel 5785MHz									
223.45	34.17	QP	246	1.5	H	-11.62	22.55	46.00	-23.45
223.45	53.75	QP	173	1.2	V	-11.62	42.13	46.00	-3.87
4510.23	46.89	PK	359	1.5	H	-2.03	44.86	74.00	-29.14
4510.23	44.85	Ave	359	1.5	H	-2.03	42.82	54.00	-11.18
11570.00	35.35	PK	55	1.4	H	5.81	41.16	68.20	-27.04
11570.00	44.40	Ave	55	1.4	H	5.81	50.21	54.00	-3.79
5383.96	45.26	PK	330	1.5	H	-1.22	44.04	74.00	-29.96
5383.96	37.69	Ave	330	1.5	H	-1.22	36.47	54.00	-17.53
802.11n(HT20) U-NII-3 High channel 5825MHz									
223.45	34.47	QP	31	1.5	H	-11.62	22.85	46.00	-23.15
223.45	54.07	QP	169	1.4	V	-11.62	42.45	46.00	-3.55
4521.18	46.58	PK	236	1.9	H	-1.84	44.74	74.00	-29.26
4521.18	44.14	Ave	236	1.9	H	-1.84	42.30	54.00	-11.70
11650.00	36.93	PK	144	1.4	H	5.84	42.77	68.20	-25.43
11650.00	43.41	Ave	144	1.4	H	5.84	49.25	54.00	-4.75
5371.06	45.44	PK	39	1.7	H	-1.30	44.14	74.00	-29.86
5371.06	37.14	Ave	39	1.7	H	-1.30	35.84	54.00	-18.16

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(VHT20) U-NII-1 Low Channel 5180MHz									
223.45	37.85	QP	55	1.8	H	-11.62	26.23	46.00	-19.77
223.45	47.44	QP	186	1.8	V	-11.62	35.82	46.00	-10.18
4502.01	46.58	PK	147	1.4	H	-1.86	44.72	74.00	-29.28
4502.01	36.10	Ave	147	1.4	H	-1.86	34.24	54.00	-19.76
5126.33	41.44	PK	81	1.2	H	-1.06	40.38	74.00	-33.62
5126.33	36.47	Ave	81	1.2	H	-1.06	35.41	54.00	-18.59
10360.00	45.56	PK	80	1.6	H	5.33	50.89	74.00	-23.11
10360.00	38.95	Ave	80	1.6	H	5.33	44.28	54.00	-9.72
802.11ac(VHT20) U-NII-1 Middle channel 5200MHz									
223.45	37.24	QP	54	1.4	H	-11.62	25.62	46.00	-20.38
223.45	47.23	QP	34	1.6	V	-11.62	35.61	46.00	-10.39
4501.44	46.66	PK	294	1.1	H	-1.82	44.84	74.00	-29.16
4501.44	35.78	Ave	294	1.1	H	-1.82	33.96	54.00	-20.04
5113.51	43.29	PK	213	1.9	H	-1.06	42.23	74.00	-31.77
5113.51	35.51	Ave	213	1.9	H	-1.06	34.45	54.00	-19.55
10400.00	41.90	PK	67	1.9	H	5.21	47.11	74.00	-26.89
10400.00	36.59	Ave	67	1.9	H	5.21	41.80	54.00	-12.20
802.11ac(VHT20) U-NII-1 High channel 5240MHz									
223.45	36.40	QP	90	1.7	H	-11.62	24.78	46.00	-21.22
223.45	47.13	QP	277	1.6	V	-11.62	35.51	46.00	-10.49
4512.78	47.04	PK	37	1.3	H	-1.81	45.23	74.00	-28.77
4512.78	36.22	Ave	37	1.3	H	-1.81	34.41	54.00	-19.59
5136.28	42.49	PK	89	1.8	H	-1.06	41.43	74.00	-32.57
5136.28	36.53	Ave	89	1.8	H	-1.06	35.47	54.00	-18.53
10480.00	41.33	PK	113	1.6	H	5.14	46.47	74.00	-27.53
10480.00	37.01	Ave	113	1.6	H	5.14	42.15	54.00	-11.85

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(VHT20) U-NII-3 Low Channel 5745MHz									
223.45	35.78	QP	193	1.1	H	-11.62	24.16	46.00	-21.84
223.45	46.45	QP	208	1.4	V	-11.62	34.83	46.00	-11.17
4505.13	44.62	PK	167	1.9	H	-1.92	42.70	74.00	-31.30
4505.13	33.70	Ave	167	1.9	H	-1.92	31.78	54.00	-22.22
11490.00	39.04	PK	291	1.1	H	5.93	44.97	68.20	-23.23
11490.00	33.65	Ave	291	1.1	H	5.93	39.58	54.00	-14.42
5384.77	46.09	PK	213	1.2	H	-1.03	45.06	74.00	-28.94
5384.77	38.31	Ave	213	1.2	H	-1.03	37.28	54.00	-16.72
802.11ac(VHT20) U-NII-3 middle channel 5785MHz									
223.45	36.20	QP	271	2.0	H	-11.62	24.58	46.00	-21.42
223.45	46.23	QP	345	2.0	V	-11.62	34.61	46.00	-11.39
4518.58	44.02	PK	188	1.8	H	-1.97	42.05	74.00	-31.95
4518.58	32.70	Ave	188	1.8	H	-1.97	30.73	54.00	-23.27
11570.00	41.69	PK	145	1.3	H	5.81	47.50	68.20	-20.70
11570.00	37.08	Ave	145	1.3	H	5.81	42.89	54.00	-11.11
5385.74	46.59	PK	207	1.9	H	-1.05	45.54	74.00	-28.46
5385.74	38.62	Ave	207	1.9	H	-1.05	37.57	54.00	-16.43
802.11ac(VHT20) U-NII-3 High channel 5825MHz									
223.45	35.71	QP	15	1.8	H	-11.62	24.09	46.00	-21.91
223.45	47.18	QP	122	1.0	V	-11.62	35.56	46.00	-10.44
4519.38	44.75	PK	241	1.6	H	-1.88	42.87	74.00	-31.13
4519.38	32.65	Ave	241	1.6	H	-1.88	30.77	54.00	-23.23
11650.00	42.32	PK	4	1.6	H	5.84	48.16	68.20	-20.04
11650.00	36.95	Ave	4	1.6	H	5.84	42.79	54.00	-11.21
5375.44	46.23	PK	113	1.3	H	-1.06	45.17	74.00	-28.83
5375.44	39.76	Ave	113	1.3	H	-1.06	38.70	54.00	-15.30

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT40) U-NII-1 Low Channel 5190MHz									
223.45	35.49	QP	239	1.8	H	-11.62	23.87	46.00	-22.13
223.45	46.46	QP	313	1.7	V	-11.62	34.84	46.00	-11.16
4504.28	42.72	PK	320	1.3	H	-1.89	40.83	74.00	-33.17
4504.28	30.16	Ave	320	1.3	H	-1.89	28.27	54.00	-25.73
5128.79	46.34	PK	254	1.1	H	-1.06	45.28	74.00	-28.72
5128.79	37.25	Ave	254	1.1	H	-1.06	36.19	54.00	-17.81
10380.00	40.32	PK	248	1.9	H	5.26	45.58	74.00	-28.42
10380.00	33.98	Ave	248	1.9	H	5.26	39.24	54.00	-14.76
802.11n(HT40) U-NII-1 High channel 5230MHz									
223.45	34.99	QP	128	1.9	H	-11.62	23.37	46.00	-22.63
223.45	45.46	QP	247	1.9	V	-11.62	33.84	46.00	-12.16
4527.13	42.01	PK	26	1.2	H	-1.94	40.07	74.00	-33.93
4527.13	30.40	Ave	26	1.2	H	-1.94	28.46	54.00	-25.54
5126.00	45.78	PK	24	1.7	H	-1.06	44.72	74.00	-29.28
5126.00	37.70	Ave	24	1.7	H	-1.06	36.64	54.00	-17.36
10460.00	41.58	PK	168	1.2	H	5.28	46.86	74.00	-27.14
10480.00	36.66	Ave	168	1.2	H	5.28	41.94	54.00	-12.06

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT40) U-NII-3 Low Channel 5755MHz									
223.45	36.12	QP	51	2.0	H	-11.62	24.50	46.00	-21.50
223.45	44.15	QP	267	1.6	V	-11.62	32.53	46.00	-13.47
4535.37	40.02	PK	91	1.5	H	-1.96	38.06	74.00	-35.94
4535.37	28.52	Ave	91	1.5	H	-1.96	26.56	54.00	-27.44
11510.00	39.72	PK	342	1.2	H	5.88	45.60	68.20	-22.60
11510.00	34.76	Ave	342	1.2	H	5.88	40.64	54.00	-13.36
5360.35	46.03	PK	257	1.6	H	-1.01	45.02	74.00	-28.98
5360.35	38.32	Ave	257	1.6	H	-1.01	37.31	54.00	-16.69
802.11n(HT40) U-NII-3 High Channel 5795MHz									
223.45	35.58	QP	46	1.3	H	-11.62	23.96	46.00	-22.04
223.45	44.01	QP	245	1.8	V	-11.62	32.39	46.00	-13.61
4520.82	39.90	PK	214	2.0	H	-1.92	37.98	74.00	-36.02
4520.82	27.78	Ave	214	2.0	H	-1.92	25.86	54.00	-28.14
11590.00	40.65	PK	264	1.2	H	5.63	46.28	68.20	-21.92
11590.00	36.87	Ave	264	1.2	H	5.63	42.50	54.00	-11.50
5389.44	46.46	PK	199	1.1	H	-1.04	45.42	74.00	-28.58
5389.44	39.66	Ave	199	1.1	H	-1.04	38.62	54.00	-15.38

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(VHT40) U-NII-1 Low Channel 5190MHz									
223.45	37.04	QP	61	1.4	H	-11.62	25.42	46.00	-20.58
223.45	44.45	QP	329	1.9	V	-11.62	32.83	46.00	-13.17
4510.00	37.51	PK	73	1.6	H	-1.91	35.60	74.00	-38.40
4510.00	24.89	Ave	73	1.6	H	-1.91	22.98	54.00	-31.02
5142.03	46.93	PK	311	1.7	H	-1.06	45.87	74.00	-28.13
5142.03	41.91	Ave	311	1.7	H	-1.06	40.85	54.00	-13.15
10380.00	40.53	PK	278	1.6	H	5.26	45.79	74.00	-28.21
10380.00	33.77	Ave	278	1.6	H	5.26	39.03	54.00	-14.97
802.11ac(VHT40) U-NII-1 High channel 5230MHz									
223.45	37.32	QP	83	1.4	H	-11.62	25.70	46.00	-20.30
223.45	45.05	QP	277	1.2	V	-11.62	33.43	46.00	-12.57
4513.96	37.30	PK	325	1.2	H	-1.93	35.37	74.00	-38.63
4513.96	25.00	Ave	325	1.2	H	-1.93	23.07	54.00	-30.93
5143.27	48.71	PK	340	1.4	H	-1.06	47.65	74.00	-26.35
5143.27	41.99	Ave	340	1.4	H	-1.06	40.93	54.00	-13.07
10460.00	42.52	PK	290	2.0	H	5.28	47.80	74.00	-26.20
10480.00	36.68	Ave	290	2.0	H	5.28	41.96	54.00	-12.04

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(VHT40) U-NII-3 Low Channel 5755MHz									
223.45	37.76	QP	258	1.9	H	-11.62	26.14	46.00	-19.86
223.45	46.25	QP	327	1.2	V	-11.62	34.63	46.00	-11.37
4505.95	34.66	PK	25	1.4	H	-1.92	32.74	74.00	-41.26
4505.95	23.17	Ave	25	1.4	H	-1.92	21.25	54.00	-32.75
11510.00	39.54	PK	75	1.7	H	5.88	45.42	68.20	-22.78
11510.00	33.71	Ave	75	1.7	H	5.88	39.59	54.00	-14.41
5355.68	45.98	PK	35	1.9	H	-1.07	44.91	74.00	-29.09
5355.68	37.52	Ave	35	1.9	H	-1.07	36.45	54.00	-17.55
802.11ac(VHT40) U-NII-3 High Channel 5795MHz									
223.45	37.59	QP	218	1.4	H	-11.62	25.97	46.00	-20.03
223.45	45.46	QP	213	1.1	V	-11.62	33.84	46.00	-12.16
4525.47	34.93	PK	70	1.2	H	-1.86	33.07	74.00	-40.93
4525.47	23.08	Ave	70	1.2	H	-1.86	21.22	54.00	-32.78
11590.00	41.33	PK	112	1.6	H	5.63	46.96	68.20	-21.24
11590.00	36.53	Ave	112	1.6	H	5.63	42.16	54.00	-11.84
5361.87	45.38	PK	242	1.5	H	-1.03	44.35	74.00	-29.65
5361.87	37.30	Ave	242	1.5	H	-1.03	36.27	54.00	-17.73

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11ac(VHT80) U-NII-1 Low Channel 5210MHz									
223.45	46.91	QP	9	1.2	H	-11.62	35.29	46.00	-10.71
233.45	34.66	QP	358	1.9	V	-11.62	23.04	46.00	-22.96
4534.57	27.57	PK	360	1.4	H	-1.88	25.69	74.00	-48.31
4534.57	42.50	Ave	360	1.4	H	-1.88	40.62	54.00	-13.38
5139.28	38.58	PK	66	1.0	H	-1.06	37.52	74.00	-36.48
5139.28	46.50	Ave	66	1.0	H	-1.06	45.44	54.00	-8.56
10420.00	41.62	PK	248	1.7	H	4.65	46.27	74.00	-27.73
10420.00	37.21	Ave	248	1.7	H	4.65	41.86	54.00	-12.14
802.11ac(VHT80) U-NII-3 Low channel 5775MHz									
233.45	35.39	QP	57	1.9	H	-11.62	23.77	46.00	-22.23
233.45	28.12	QP	33	1.1	V	-11.62	16.50	46.00	-29.50
4517.51	43.08	PK	75	1.3	H	-1.85	41.23	74.00	-32.77
4517.51	42.37	Ave	75	1.3	H	-1.85	40.52	54.00	-13.48
11550.00	41.16	PK	5	1.8	H	4.83	45.99	68.20	-22.21
11550.00	36.23	Ave	5	1.8	H	4.83	41.06	54.00	-12.94
5386.37	46.97	PK	91	1.6	H	-1.14	45.83	74.00	-28.17
5386.37	38.22	Ave	91	1.6	H	-1.14	37.08	54.00	-16.92

Test Frequency: 12GHz~40GHz

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

9 Duty cycle

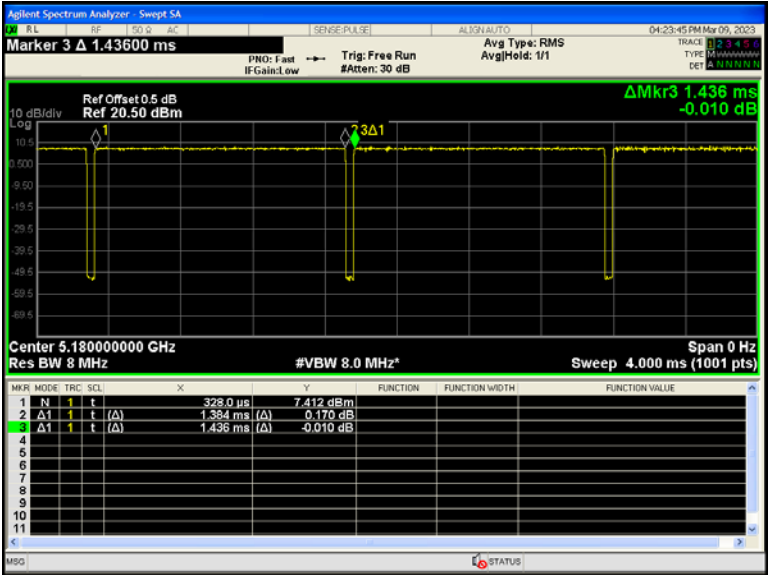
Test Requirement:	FCC 47CFR Part 15 Section 15.407 KDB789033 D02 General U-NII Test Procedures New Rules v02r01, Section (B)
Test Method:	ANSI C63.10: 2013
Test Limit:	N/A
Test Result:	PASS
Remark:	Through Pre-scan, and found 802.11a at lowest channel is the worst case. Only the worst case is recorded in the report.

9.1 Summary of Test Results

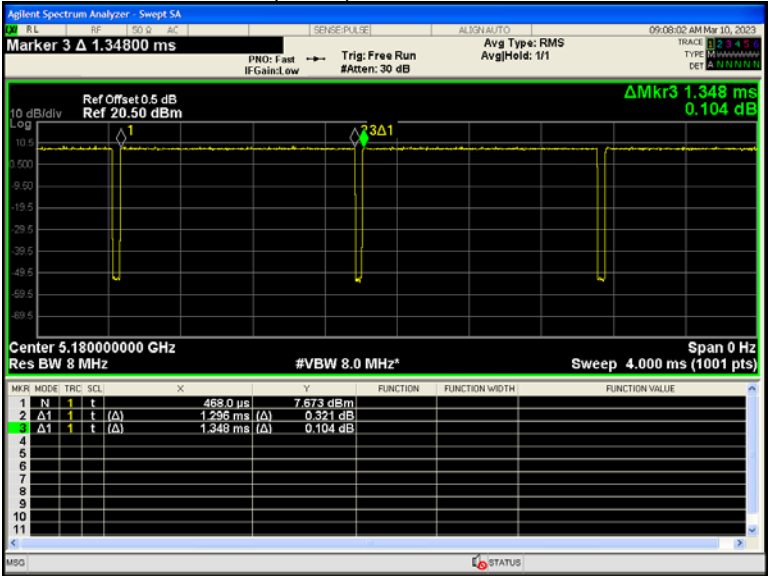
802.11a(HT20) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	1.384	1.436	96.38
149	1.381	1.435	96.24
802.11n(HT20) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	1.296	1.348	96.14
149	1.289	1.339	96.27
802.11ac(VHT20) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
36	1.304	1.356	96.17
149	1.305	1.355	96.31
802.11n(HT40) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
38	0.646	0.692	93.35
151	0.641	0.691	92.76
802.11ac(VHT40) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
38	0.648	0.698	92.84
151	0.647	0.695	93.09
802.11ac(VHT80) mode			
channel	On time(ms)	Period(ms)	Duty Cycle(%)
38	0.323	0.368	87.77
151	0.323	0.369	87.53

Test result plots shown as follows:

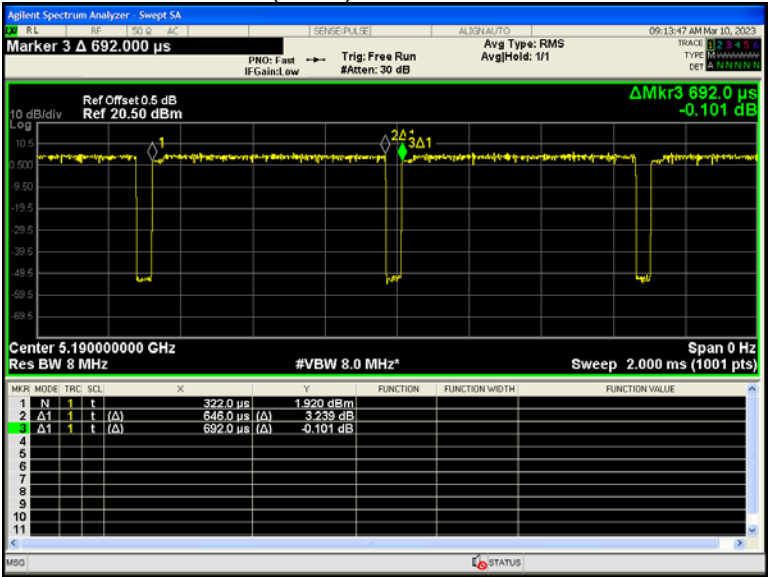
802.11a U-NII-1 Low channel



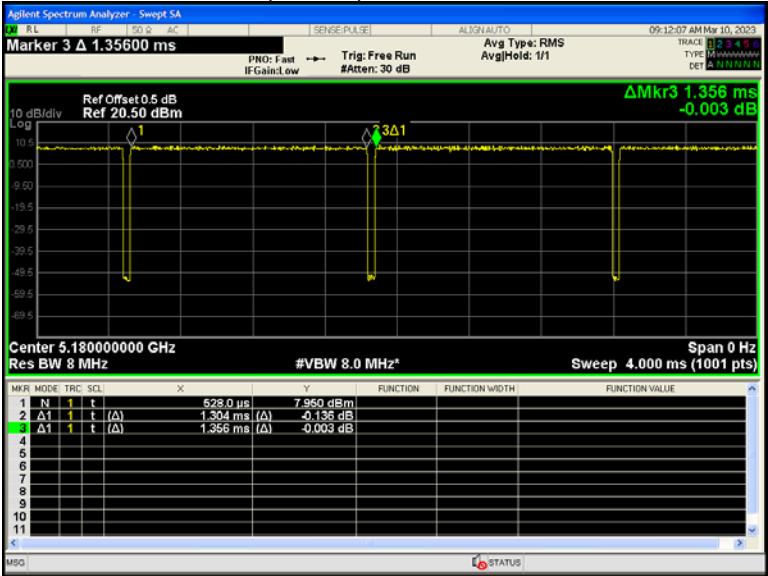
802.11n(HT20) U-NII-1 Low channel



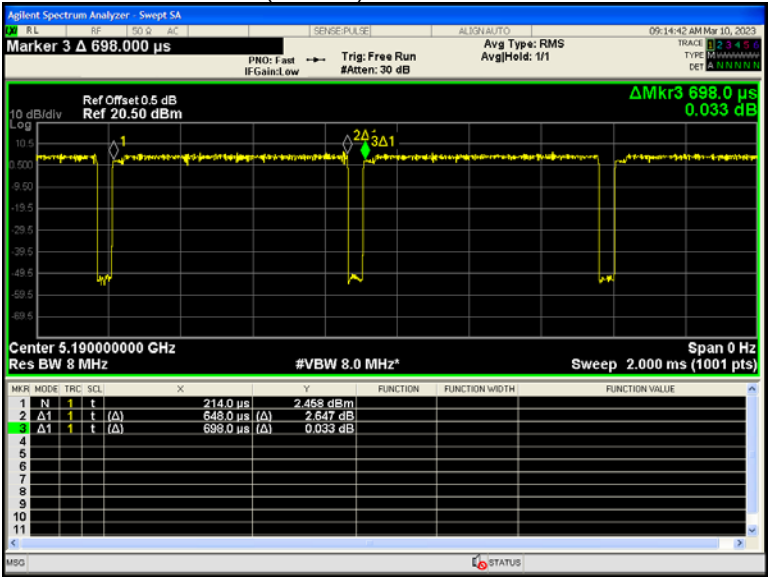
802.11n(HT40) U-NII-1 Low channel



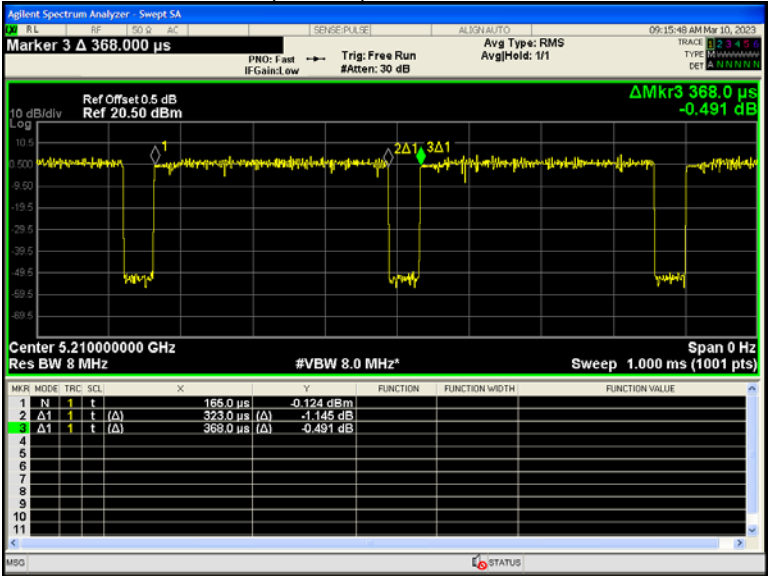
802.11ac(VHT20) U-NII-1 Low channel



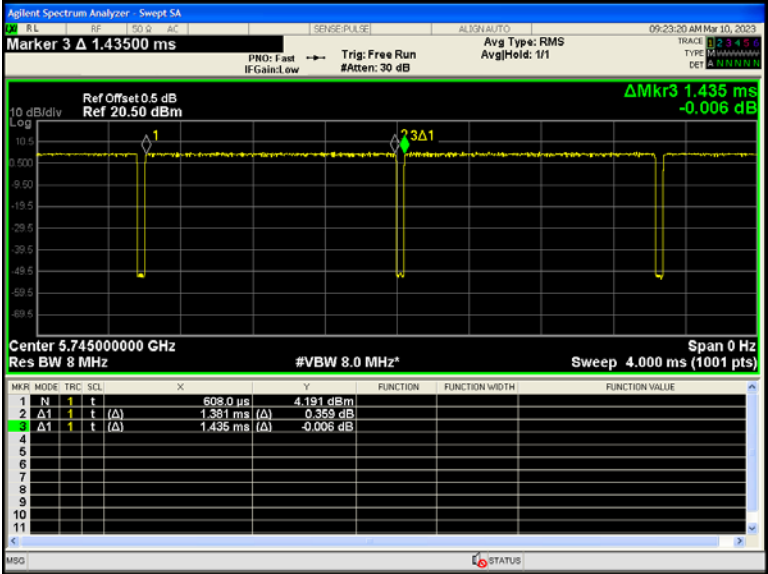
802.11ac(VHT40) U-NII-1 Low channel



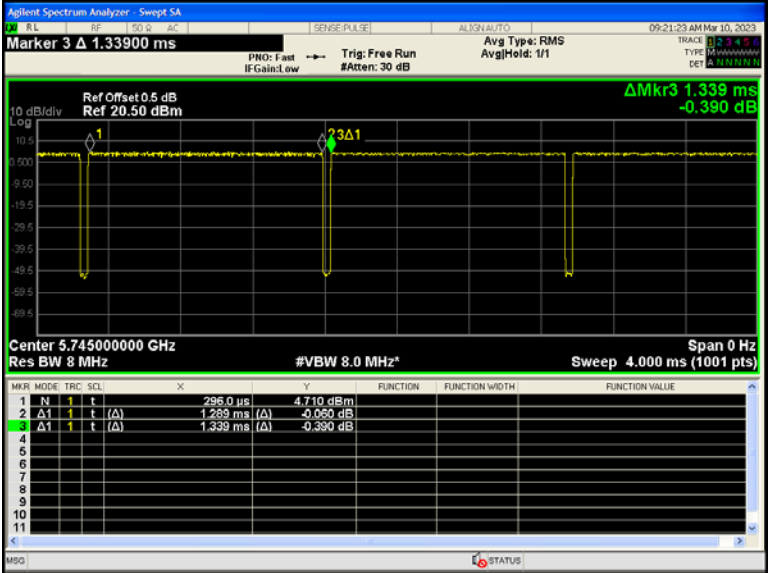
802.11ac(VHT80) U-NII-1 Low channel



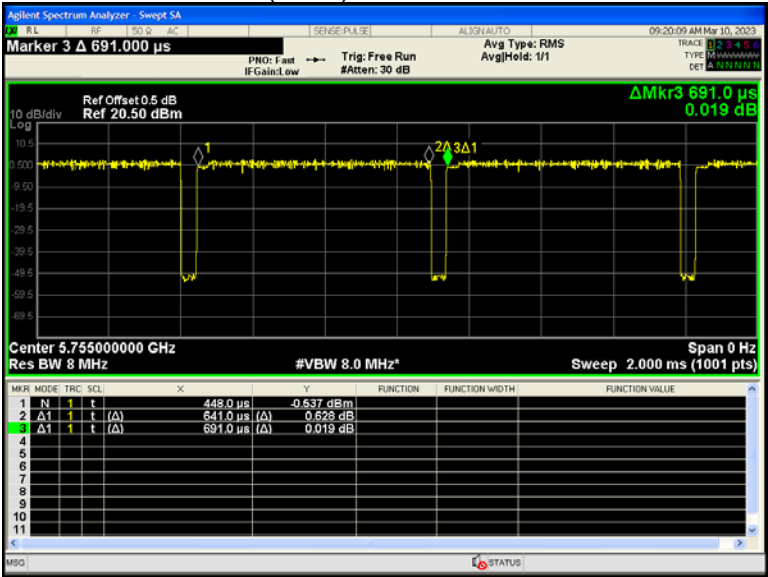
802.11a U-NII-3 Low channel



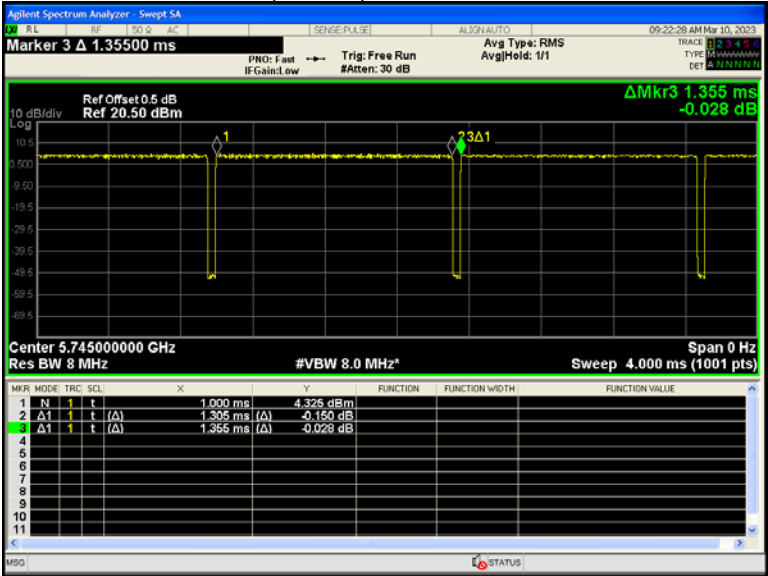
802.11n(HT20) U-NII-3 Low channel



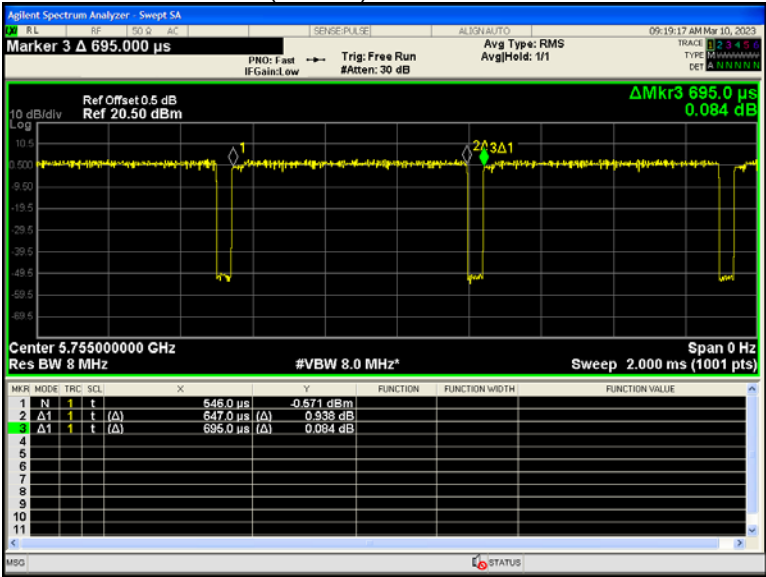
802.11n(HT40) U-NII-3 Low channel



802.11ac(VHT20) U-NII-3 Low channel



802.11ac(VHT40) U-NII-3 Low channel



802.11ac(VHT80) U-NII-3 Low channel



10 Band Edge

Test Requirement:	FCC 47CFR Part 15 Section 15.407
Test Method:	ANSI C63.10 2013
Test Limit:	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 -27dBm/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 5.47-5.725 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. 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

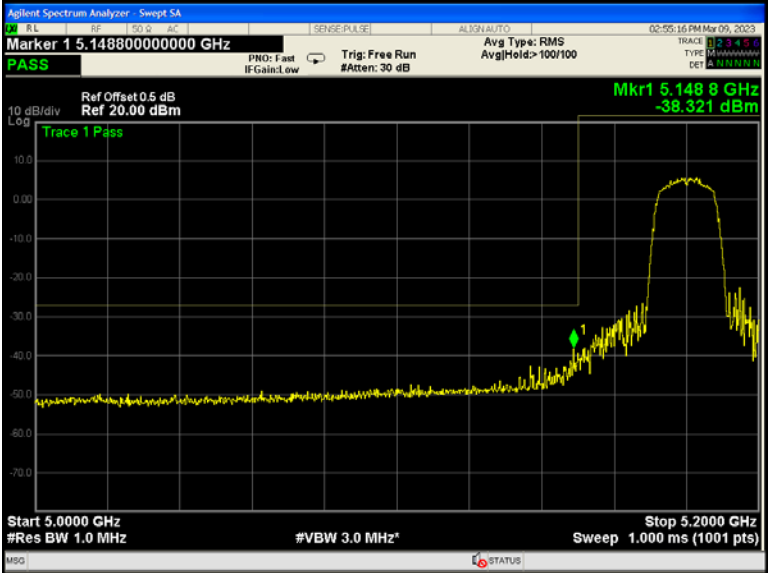
10.1 Test Produce

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 100 kHz and VBW of spectrum analyzer to 300 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.

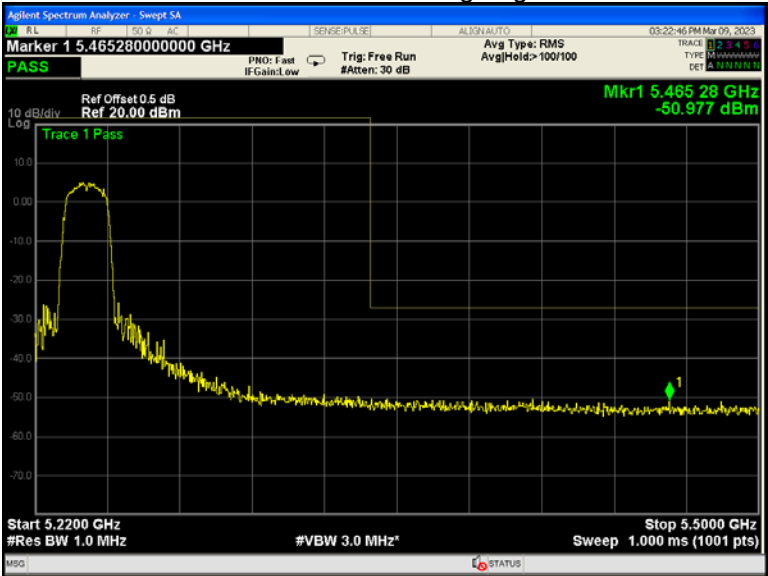
10.2 Test Result

Test result plots shown as follows:

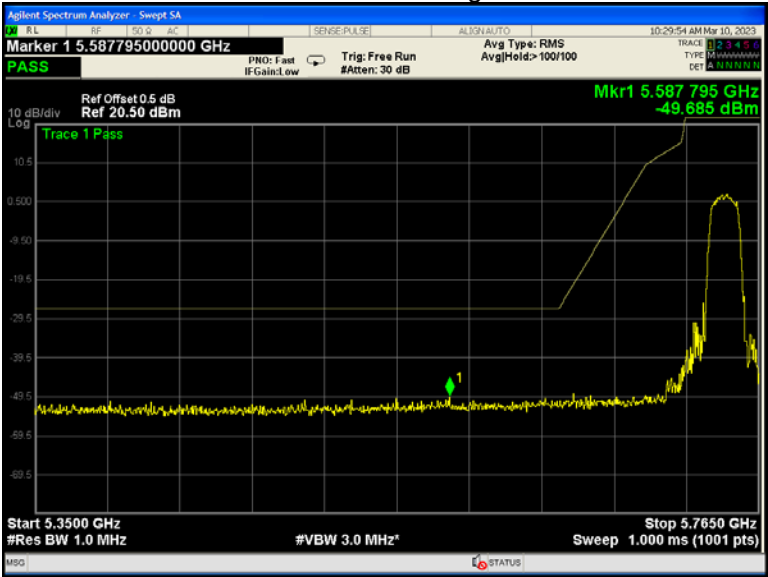
802.11a U-NII-1 Band edge-left side



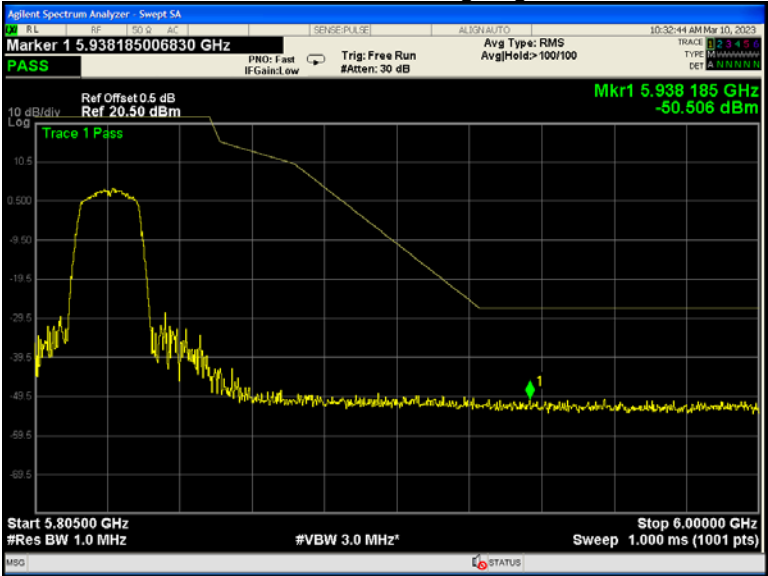
802.11a U-NII-1 Band edge-right side



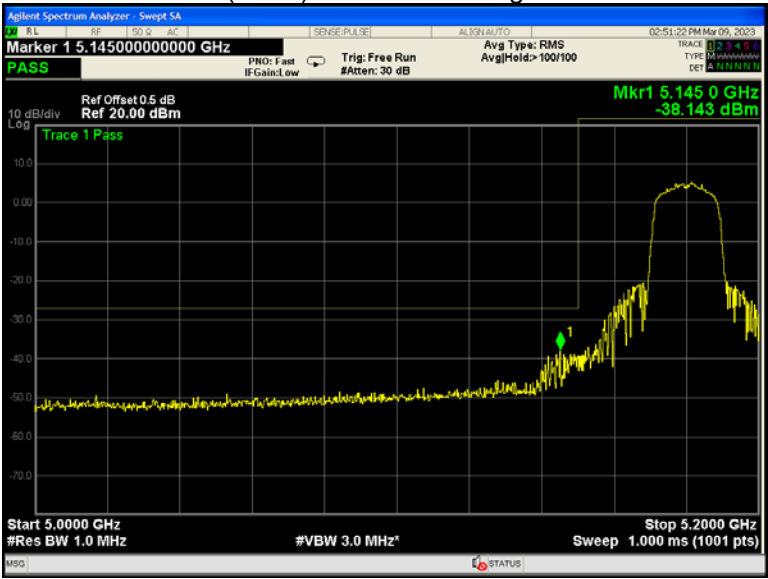
802.11a U-NII-3 Band edge-left side



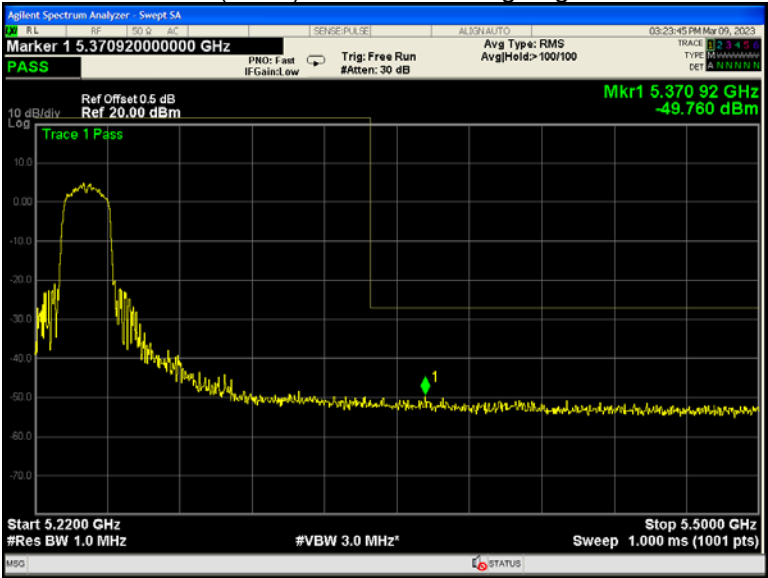
802.11a U-NII-3 Band edge-right side



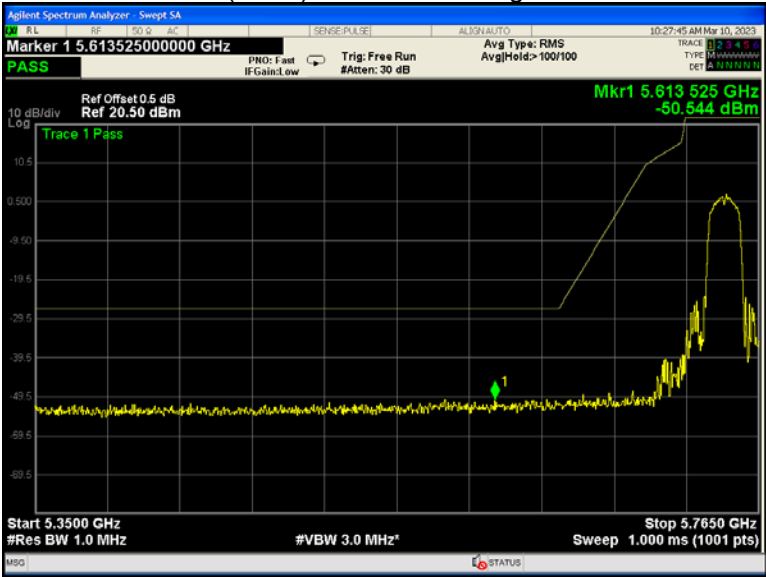
802.11n(HT20) U-NII-1 Band edge-left side



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



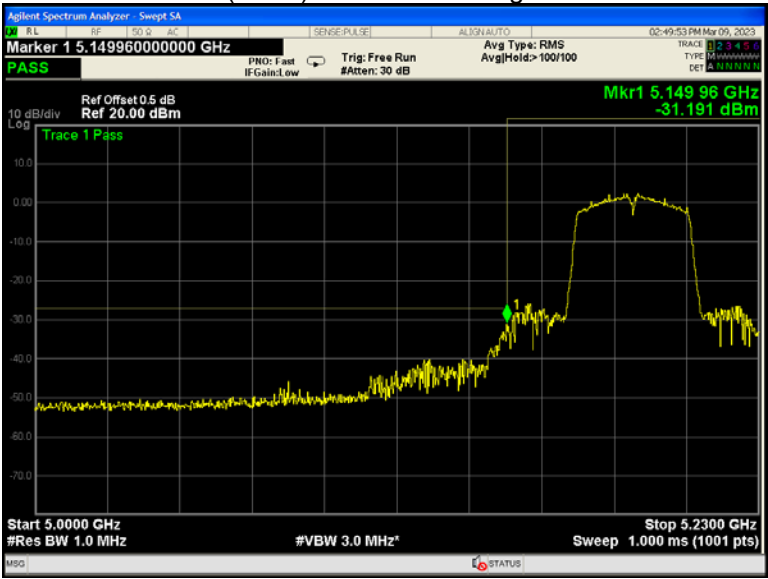
802.11n(HT20) U-NII-3 Band edge-left side



802.11n(HT20) U-NII-3 Band edge-right side



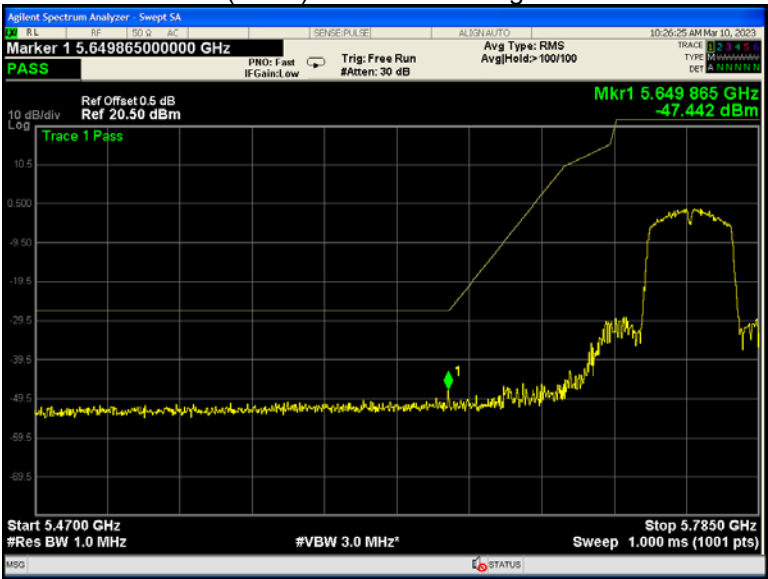
802.11n(HT40) U-NII-1 Band edge-left side



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



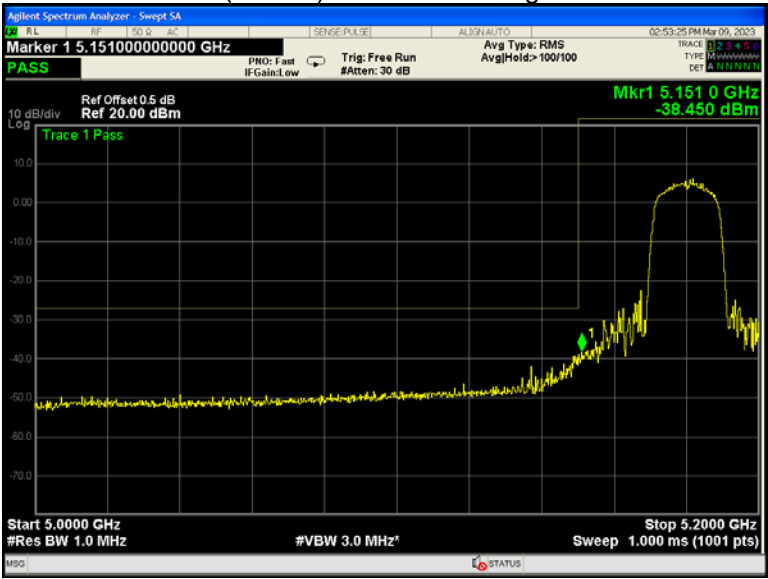
802.11n(HT40) U-NII-3 Band edge-left side



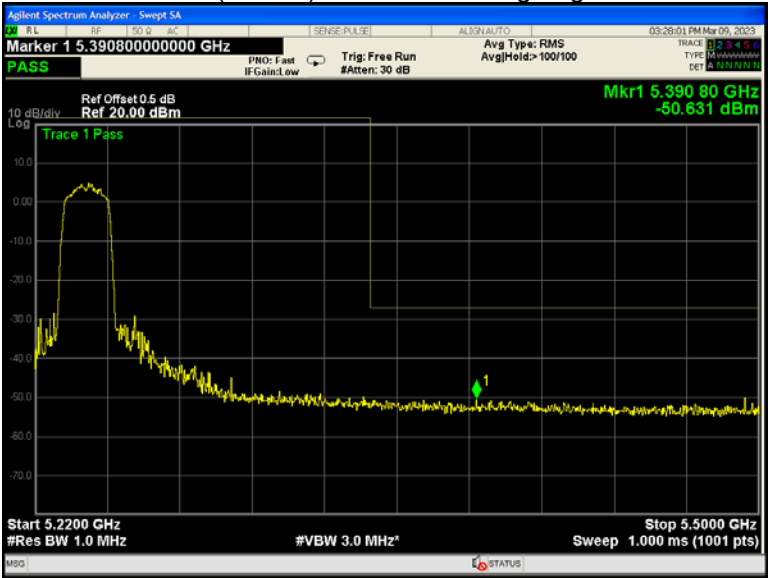
802.11n(HT40) U-NII-3 Band edge-right side



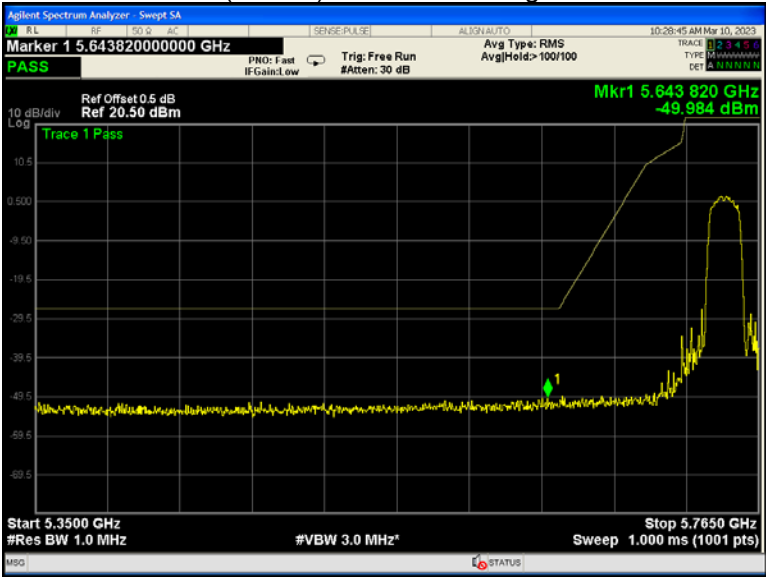
802.11ac(VHT20) U-NII-1 Band edge-left side



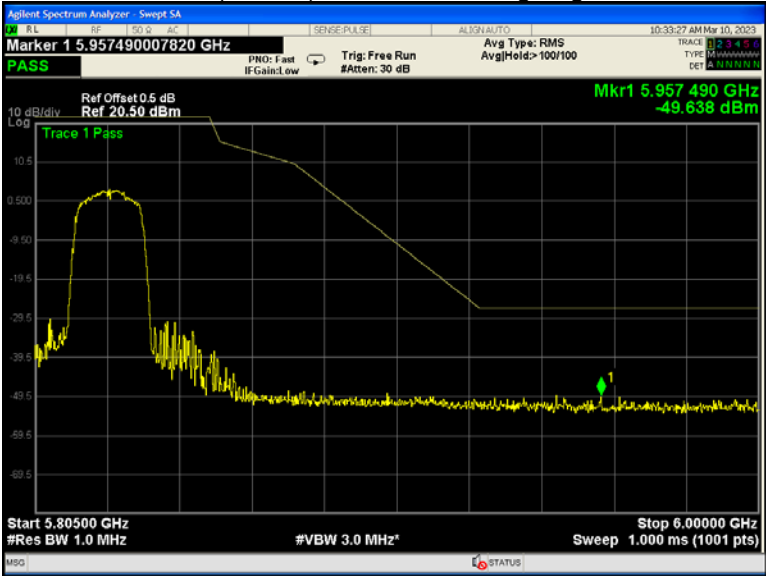
802.11ac(VHT20) U-NII-1 Band edge-right side



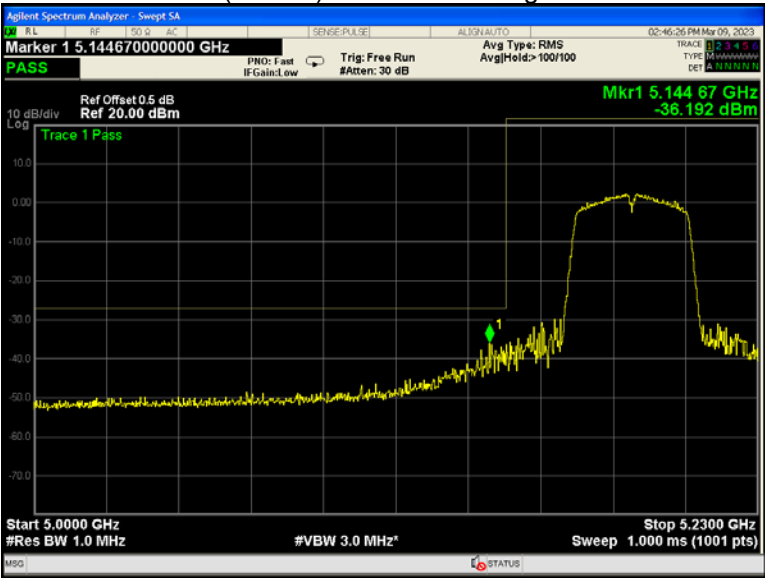
802.11ac(VHT20) U-NII-3 Band edge-left side



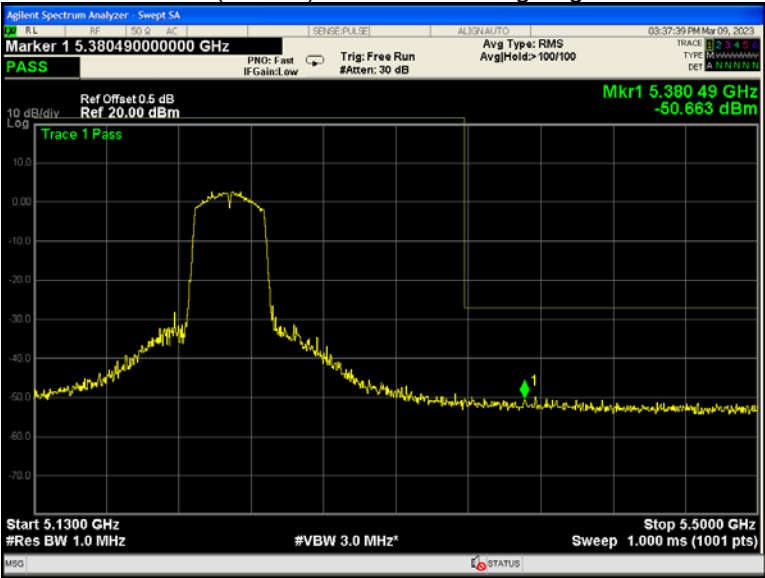
802.11ac(VHT20) U-NII-3 Band edge-right side



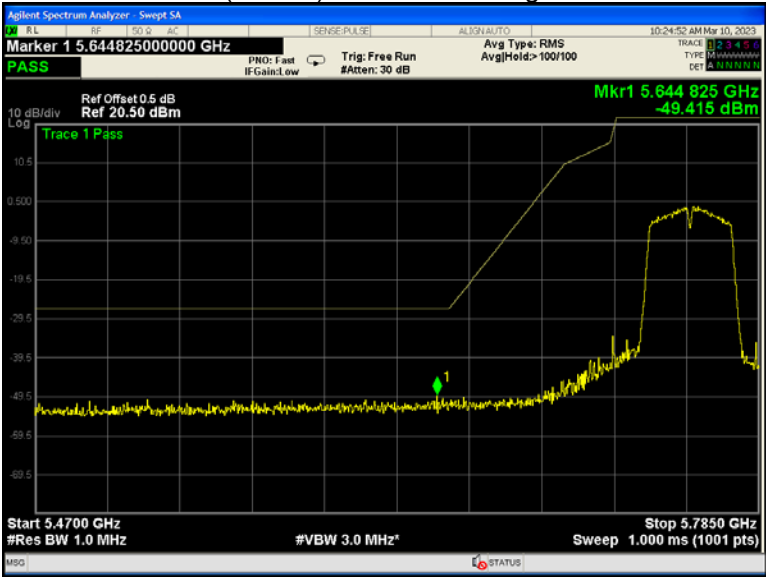
802.11ac(VHT40) U-NII-1 Band edge-left side



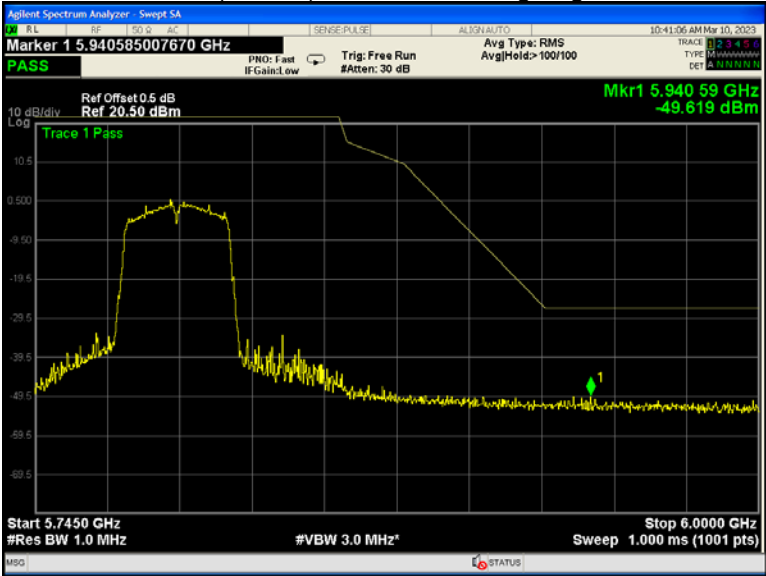
802.11ac(VHT40) U-NII-1 Band edge-right side



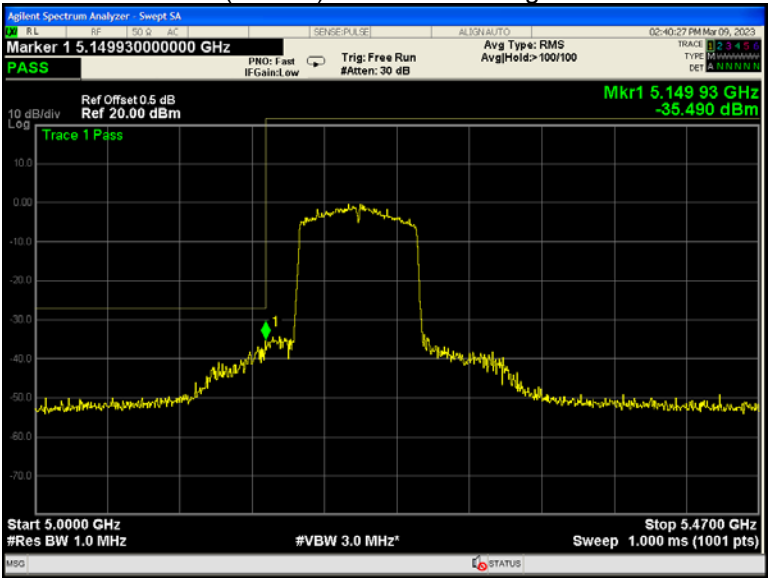
802.11ac(VHT40) U-NII-3 Band edge-left side



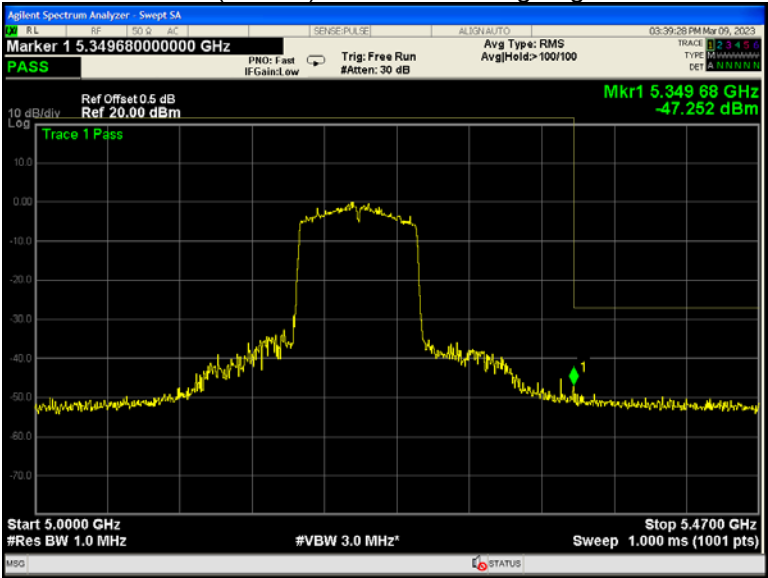
802.11ac(VHT40) U-NII-3 Band edge-right side



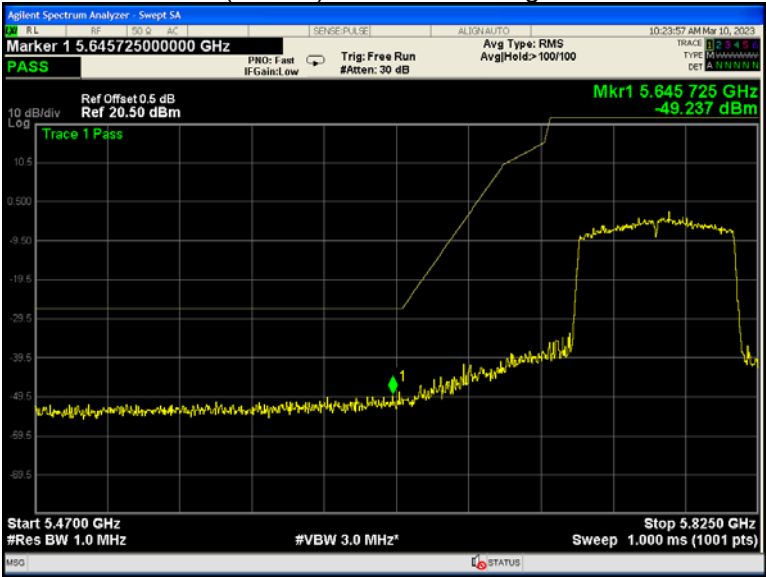
802.11ac(VHT80) U-NII-1 Band edge-left side



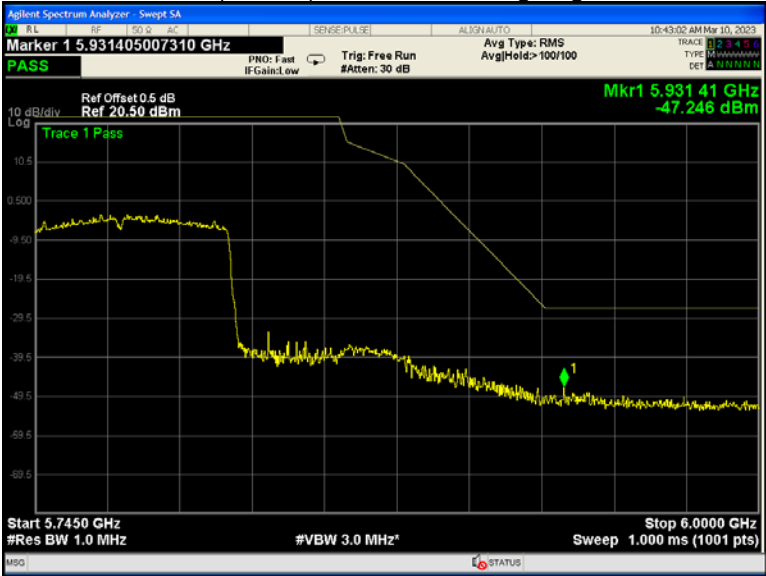
802.11ac(VHT80) U-NII-1 Band edge-right side



802.11ac(VHT80) U-NII-3 Band edge-left side



802.11ac(VHT80) U-NII-3 Band edge-right side



11 6 dB Bandwidth

Test Requirement:	FCC 47CFR Part 15 Section 15.407(e) KDB662911 D01 Multiple Transmitter Output v02r01
Test Method:	KDB789033 D02 General U-NII Test Procedures New Rules v02r01 Section C
Test Limit:	≥ 500 kHz
Test Result:	PASS

11.1 Test Procedure

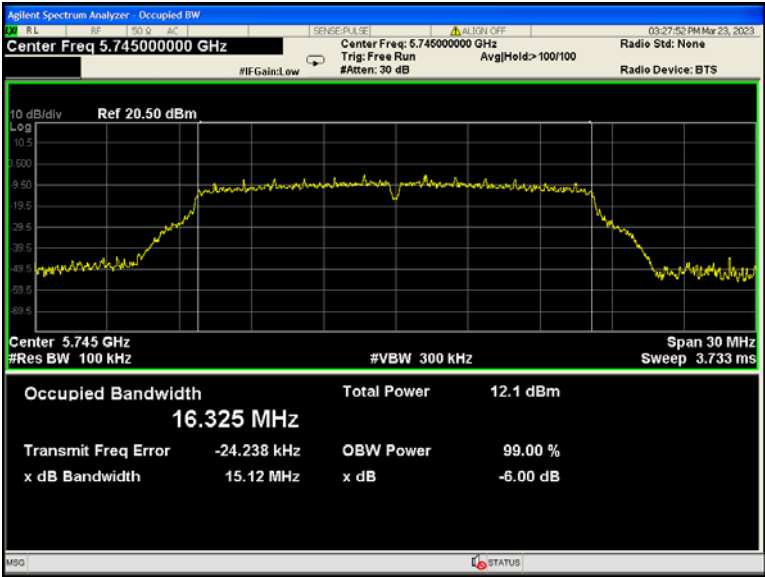
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

11.2 Test Result

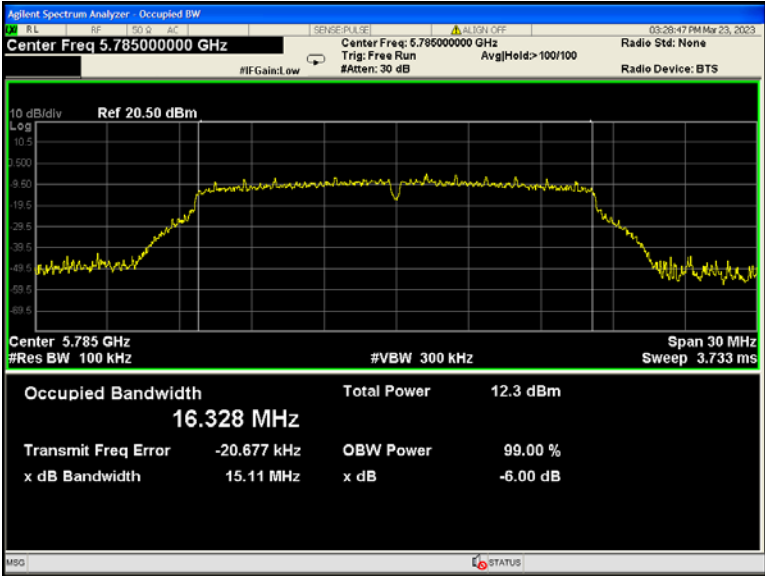
Band	Operation mode	6 dB Bandwidth (MHz)		
		Low	Middle	High
U-NII-3	802.11a	15.12	15.11	15.29
	802.11n(HT20)	15.09	15.10	15.12
	802.11n(HT40)	35.12	/	35.11
	802.11ac(VHT20)	15.09	15.06	15.12
	802.11ac(VHT40)	35.09	/	35.10
	802.11ac(VHT80)	/	75.66	/

Test result plots shown as follows:

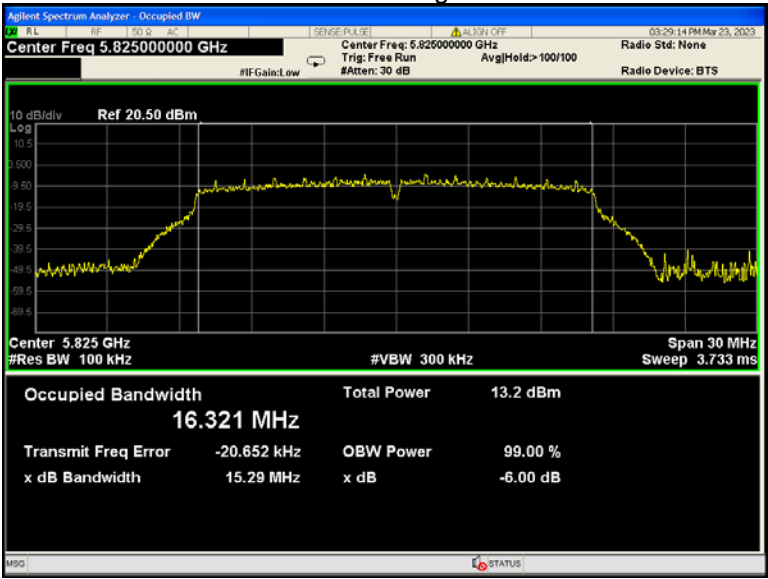
802.11a U-NII-3 Low channel



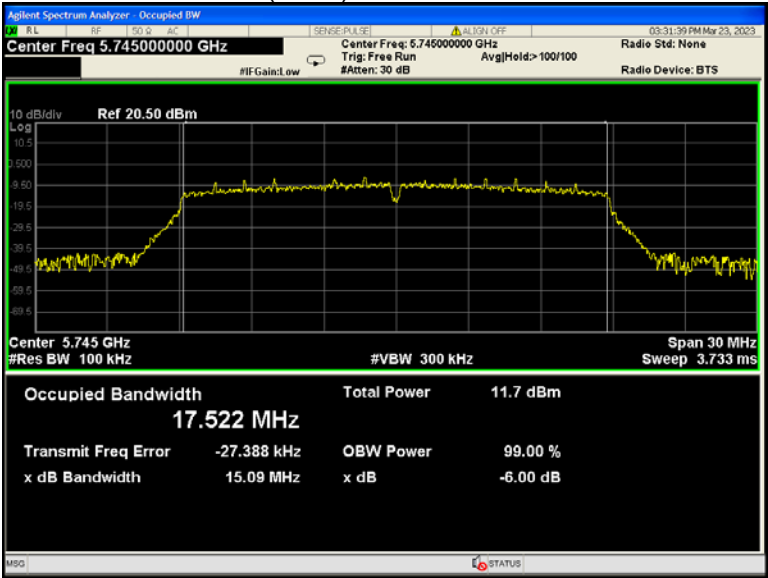
802.11a U-NII-3 Middle channel



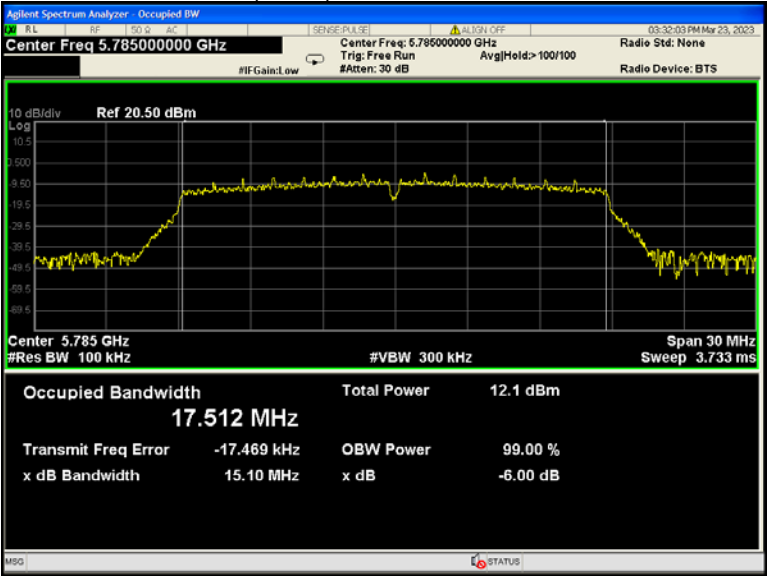
802.11a U-NII-3 High channel



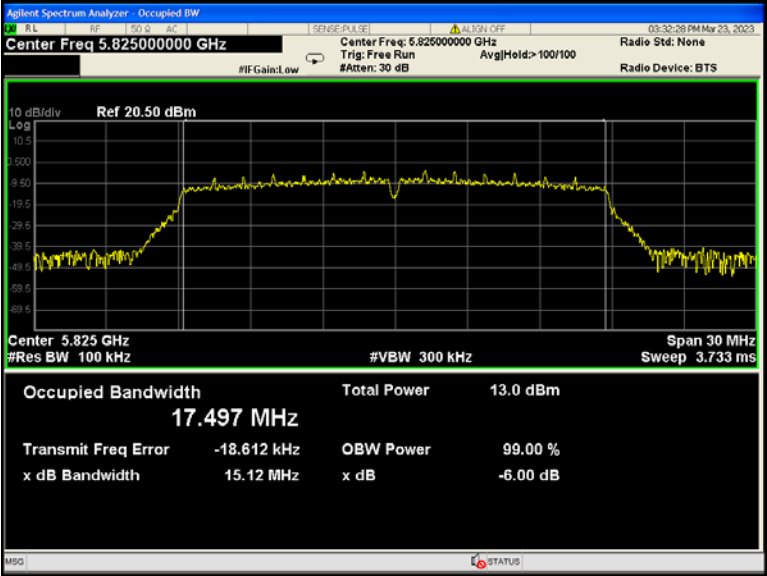
802.11n(HT20) U-NII-3 Low channel



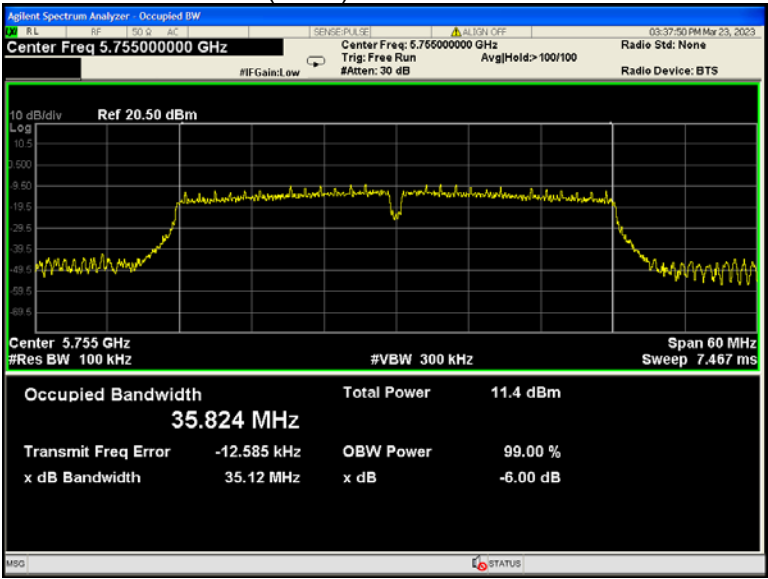
802.11n(HT20) U-NII-3 Middle channel



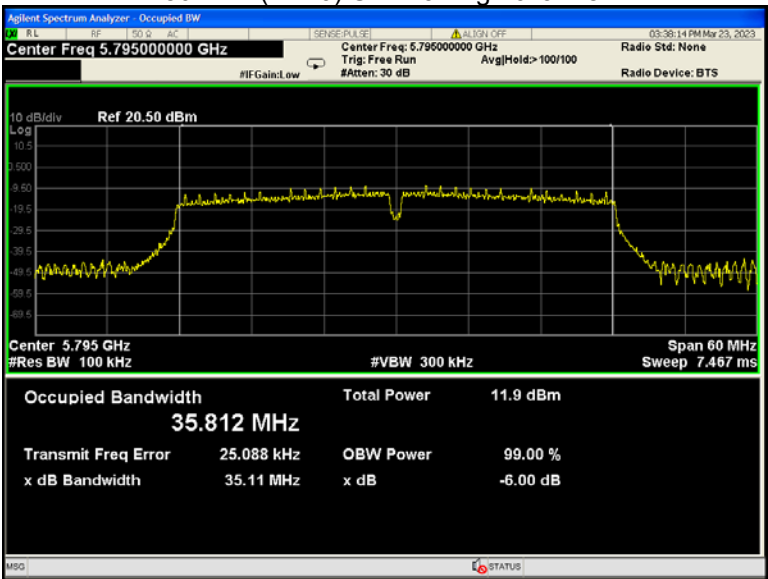
802.11n(HT20) U-NII-3 High channel



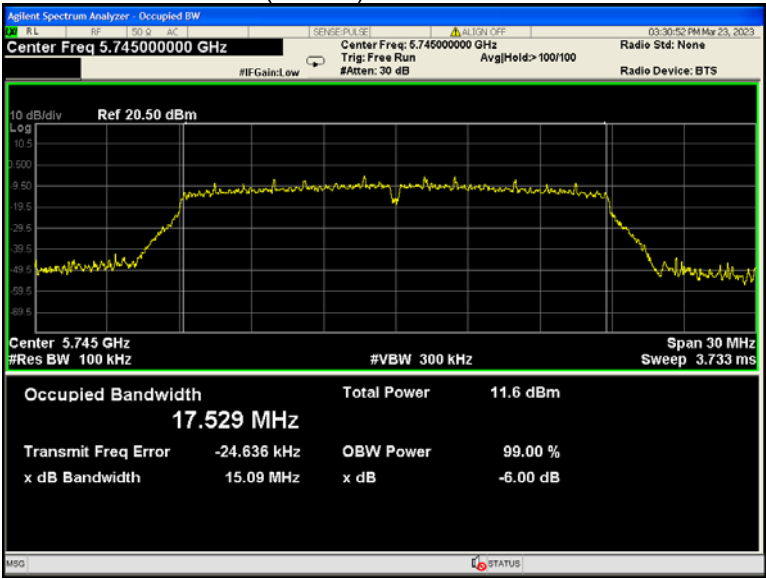
802.11n(HT40) U-NII-3 Low channel



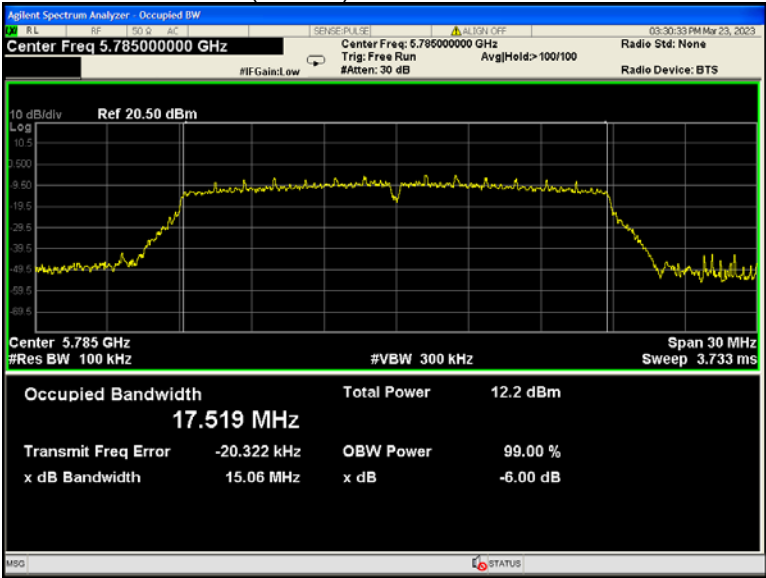
802.11n(HT40) U-NII-3 High channel



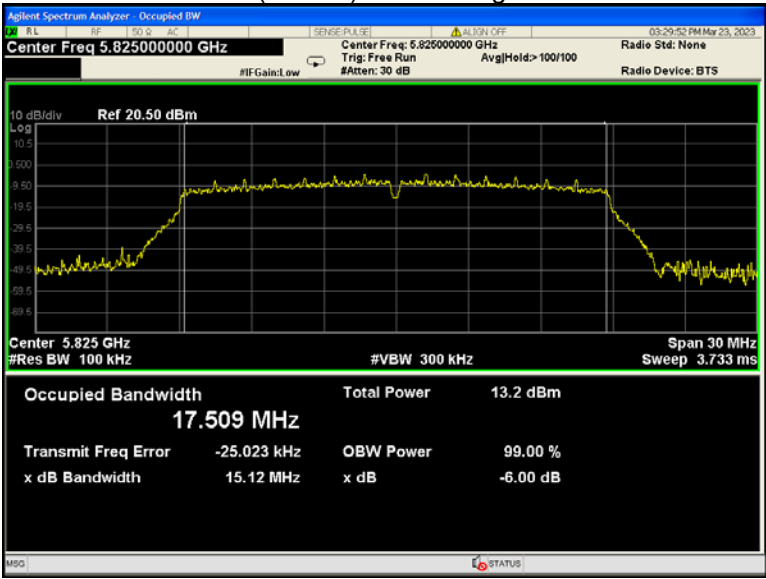
802.11ac(VHT20) U-NII-3 Low channel



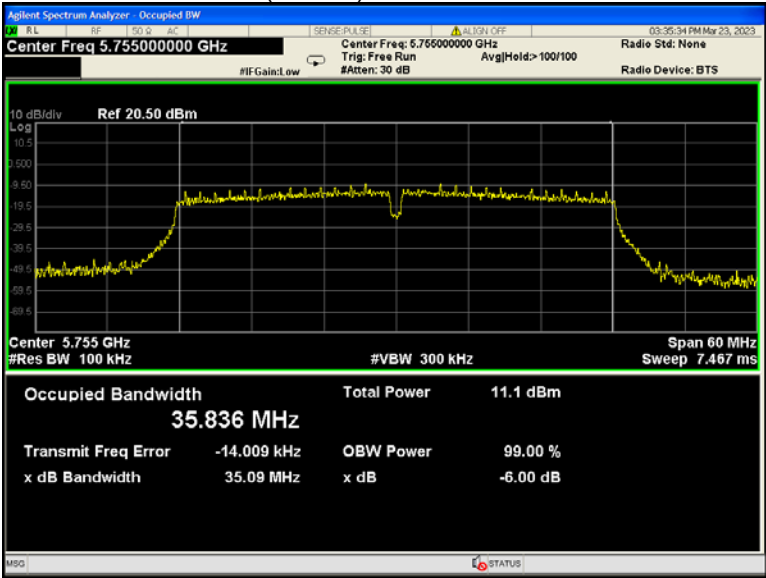
802.11ac(VHT20) U-NII-3 Middle channel



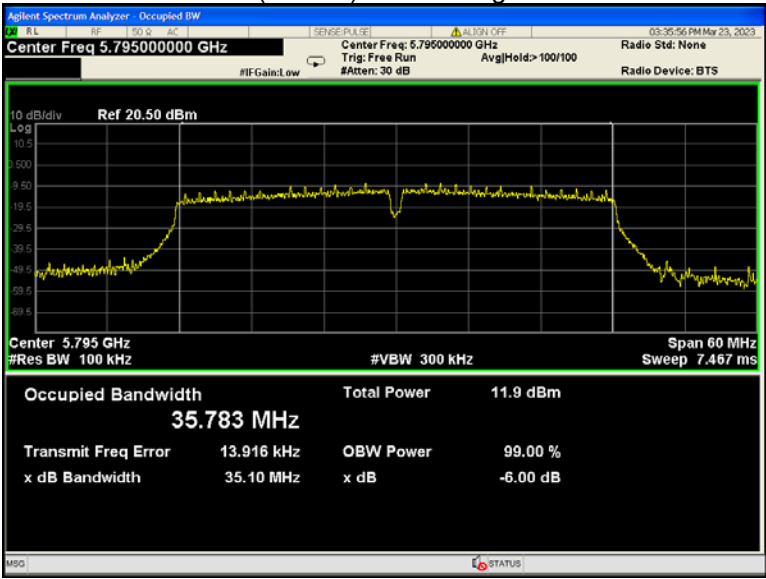
802.11ac(VHT20) U-NII-3 High channel



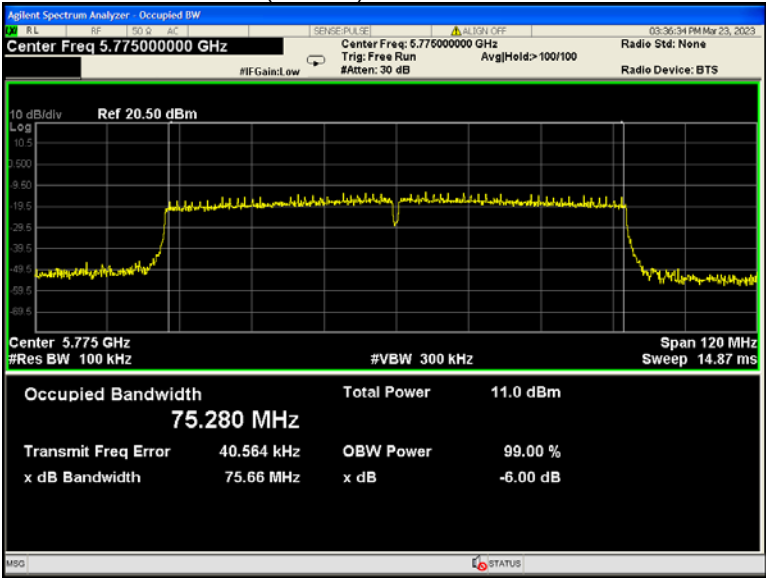
802.11ac(VHT40) U-NII-3 Low channel



802.11ac(VHT40) U-NII-3 High channel



802.11ac(VHT80) U-NII-3 Low channel



12 26 dB Bandwidth and 99% Occupied Bandwidth

Test Requirement:	FCC 47CFR Part 15 Section 15.407 (a) KDB662911 D01 Multiple Transmitter Output v02r01
Test Method:	KDB789033 D02 General U-NII Test Procedures New Rules v02r01 Section D
Test Limit:	No restriction limits
Test Result:	PASS

12.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 1% to 5% of the OBW, VBW = 3x RBW

12.2 Test Result

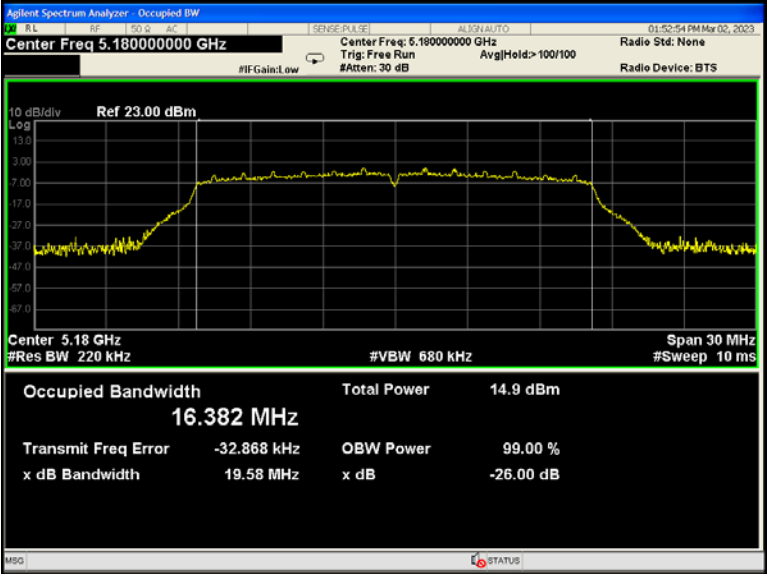
Band	Operation mode	26 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
		Low	Middle	High	Low	Middle	High
U-NII-1	802.11a	19.58	19.40	19.55	16.382	16.375	16.381
	802.11n(HT20)	19.72	19.80	19.78	17.556	17.553	17.569
	802.11n(HT40)	39.45	/	39.41	35.923	/	35.915
	802.11ac(VHT20)	19.60	19.73	19.81	17.560	17.552	17.556
	802.11ac(VHT40)	39.23	/	39.22	35.901	/	35.885
	802.11ac(VHT80)	/	79.67	/	/	75.337	/

Band	Operation mode	99% Bandwidth (MHz)		
		Low	Middle	High
U-NII-3	802.11a	16.385	16.376	16.379
	802.11n(HT20)	17.564	17.566	17.557
	802.11n(HT40)	35.935	/	35.904
	802.11ac(VHT20)	17.557	17.555	17.548
	802.11ac(VHT40)	35.930	/	35.883
	802.11ac(VHT80)	75.407	/	/

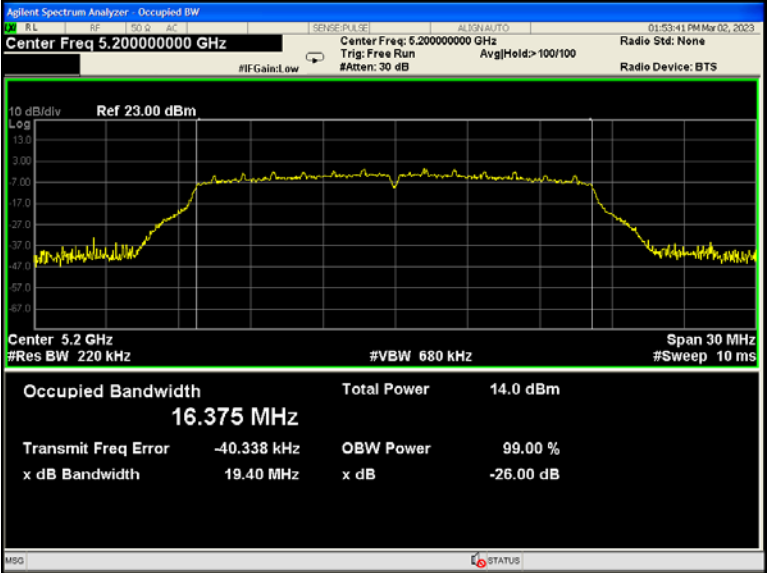
Test result plots shown as follows:

26 dB Bandwidth & 99% Occupied Bandwidth

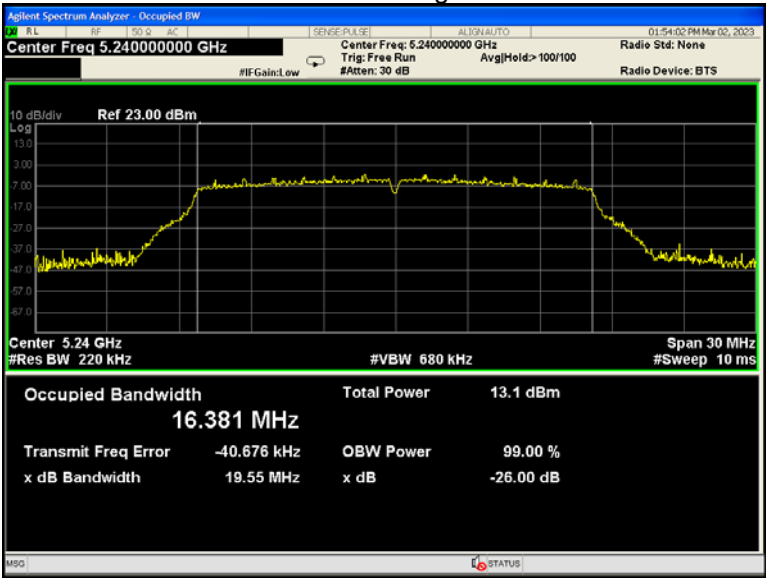
802.11a U-NII-1 Low channel



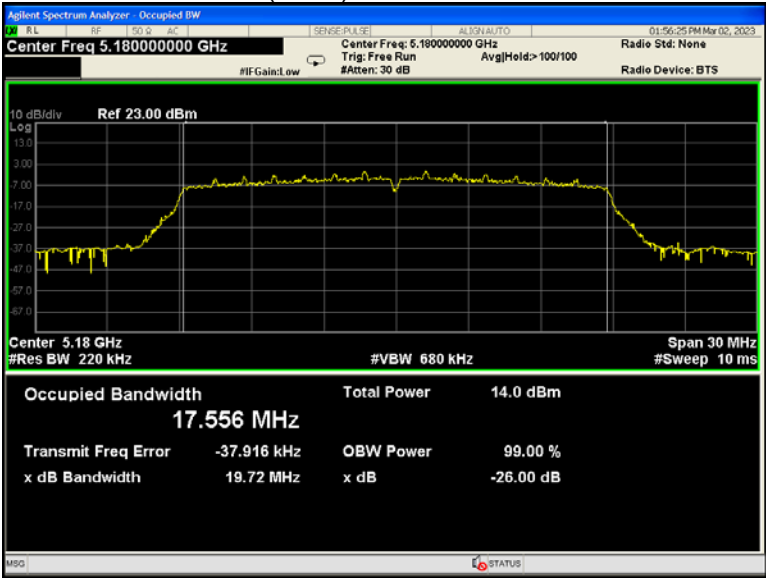
802.11a U-NII-1 Middle channel



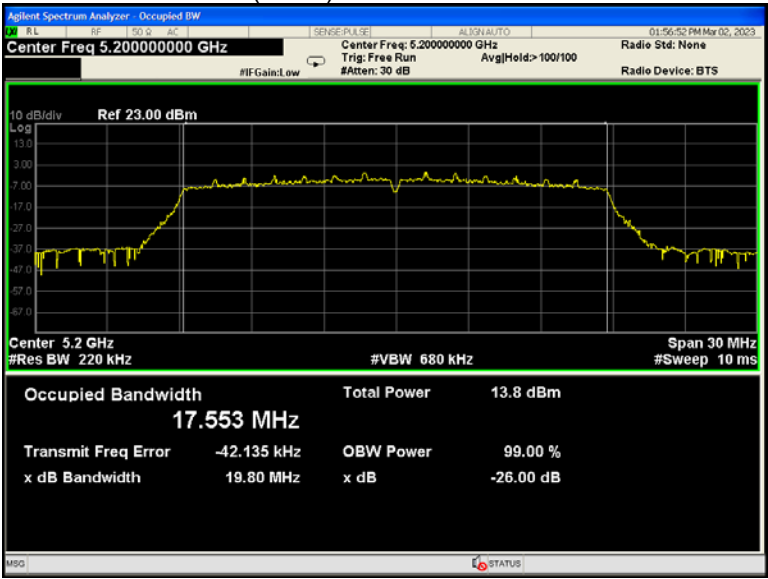
802.11a U-NII-1 High channel



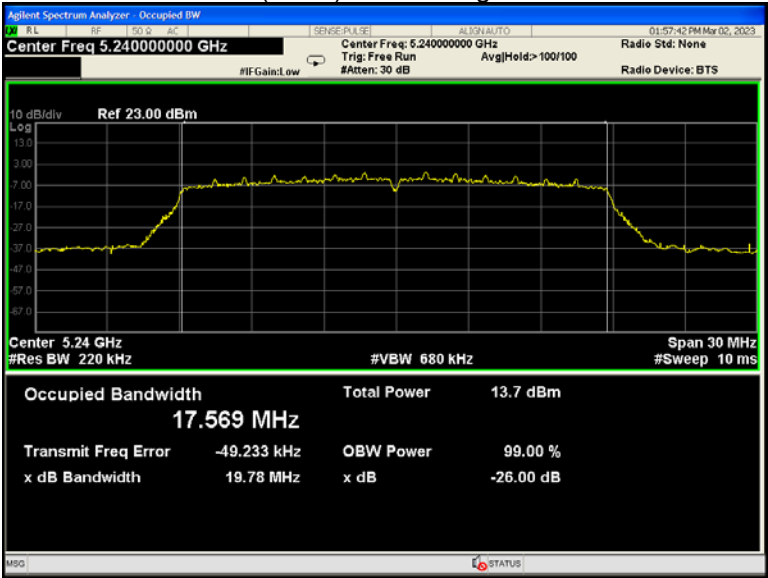
802.11n(HT20) U-NII-1 Low channel



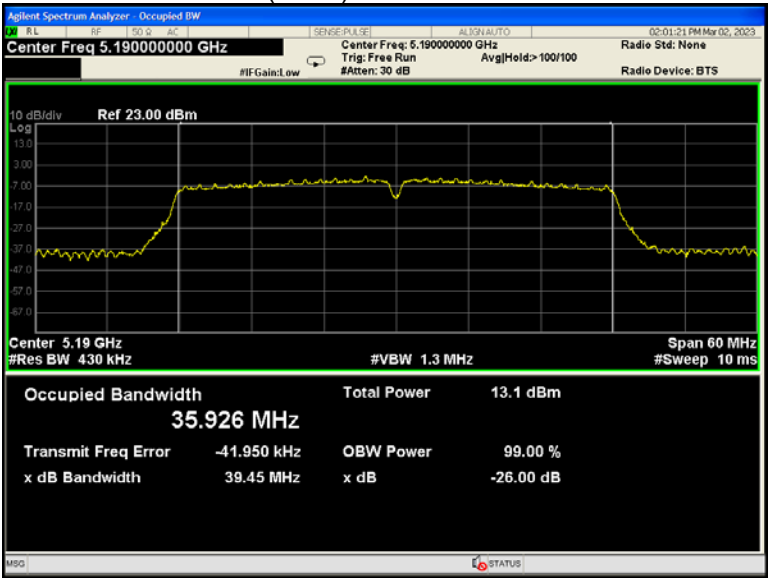
802.11n(HT20) U-NII-1 Middle channel



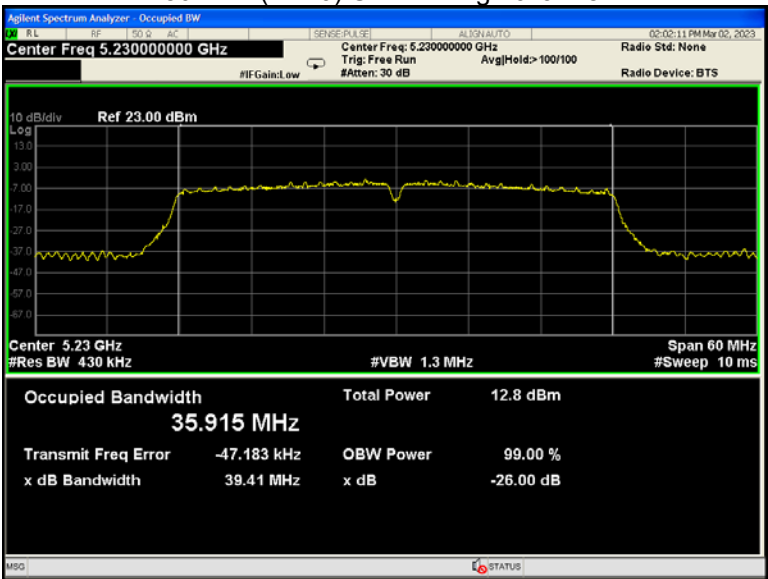
802.11n(HT20) U-NII-1 High channel



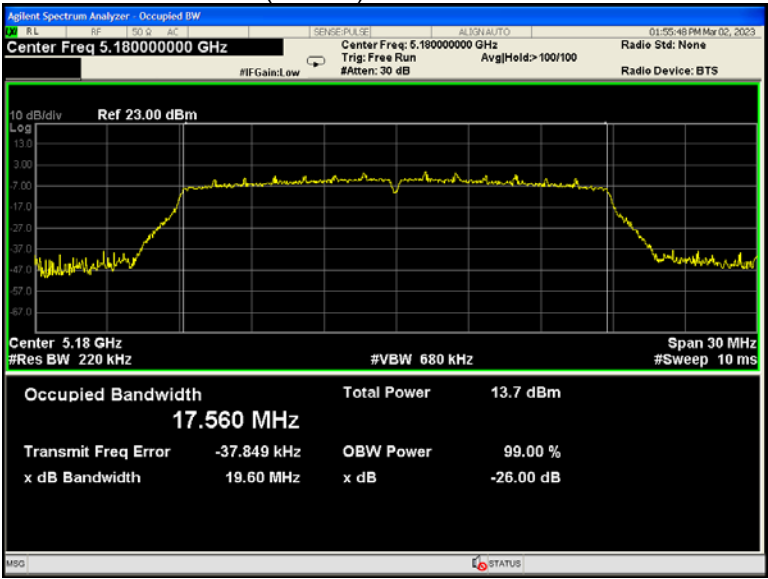
802.11n(HT40) U-NII-1 Low channel



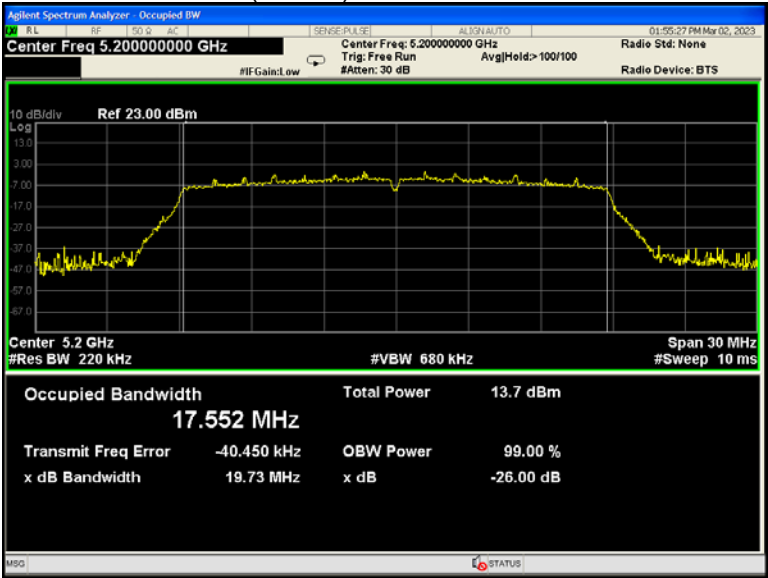
802.11n(HT40) U-NII-1 High channel



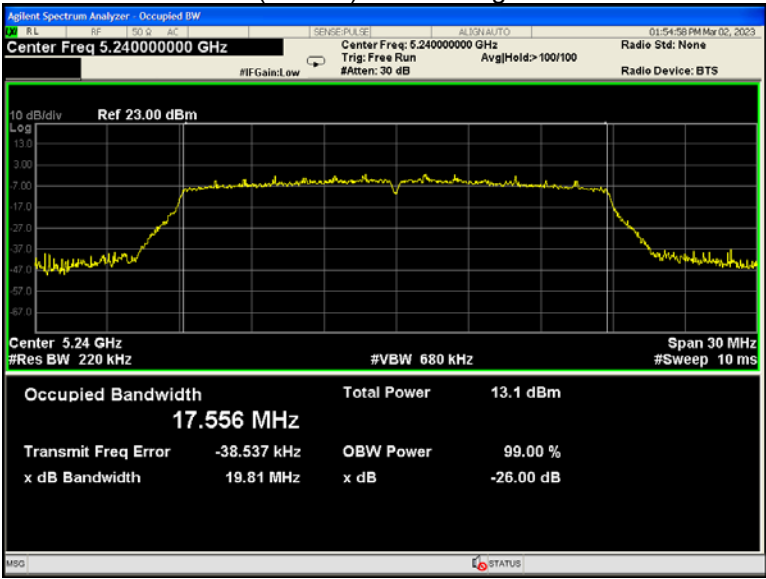
802.11ac(VHT20) U-NII-1 Low channel



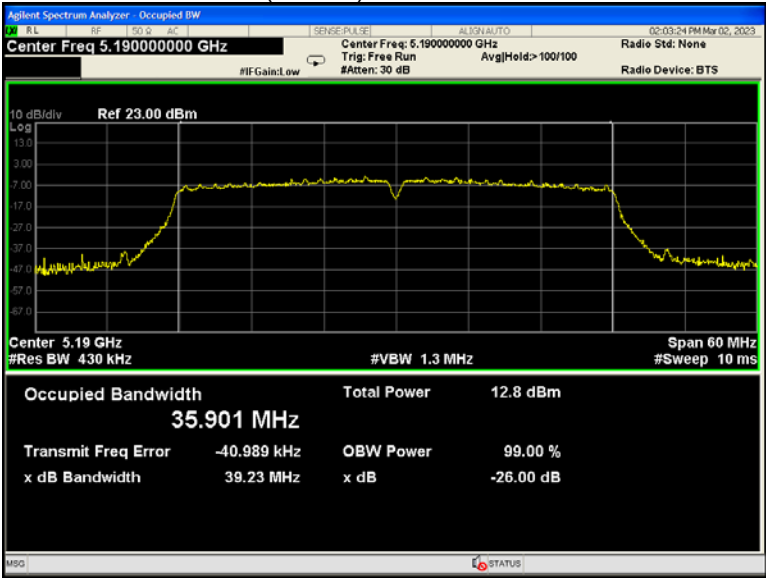
802.11ac(VHT20) U-NII-1 Middle channel



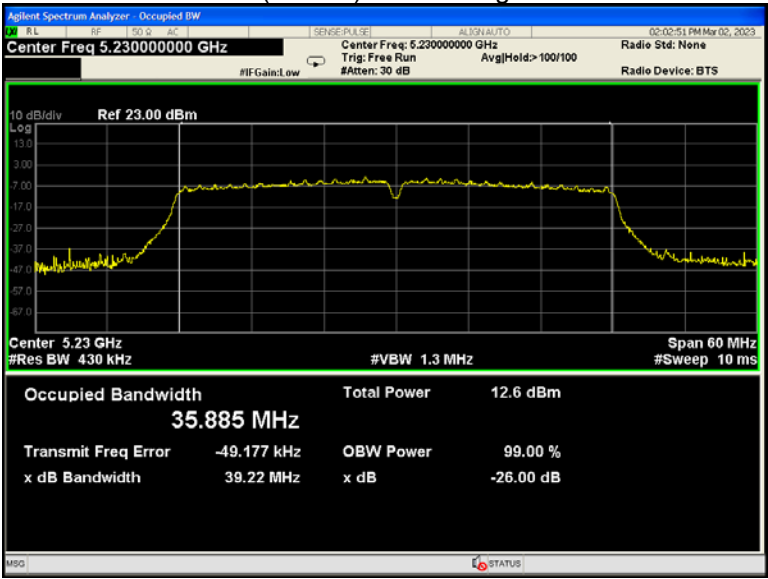
802.11ac(VHT20) U-NII-1 High channel



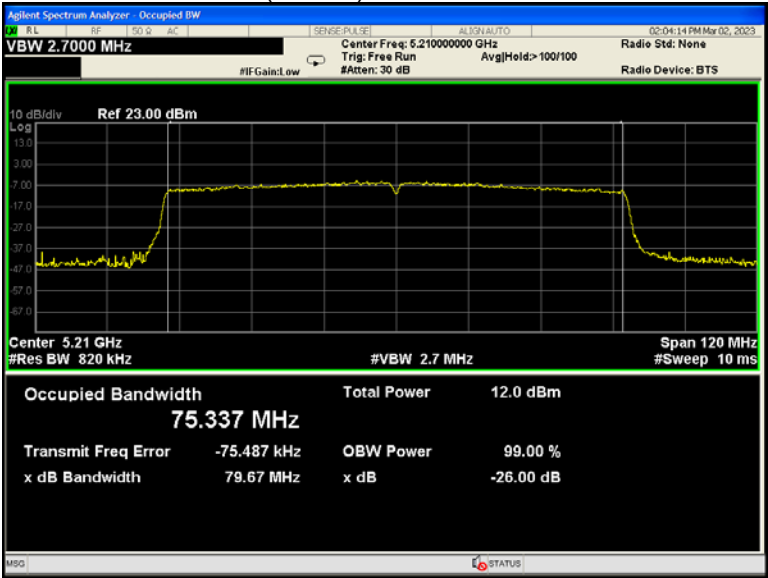
802.11ac(VHT40) U-NII-1 Low channel



802.11ac(VHT40) U-NII-1 High channel



802.11ac(VHT80) U-NII-1 Low channel



13 Conducted Output Power

Test Requirement:	FCC 47CFR Part 15 Section 15.407(a) KDB662911 D01 Multiple Transmitter Output v02r01
Test Method:	KDB789033 D02 General U-NII Test Procedures New Rules v02r01 Section E
Test Limit:	U-NII-1 250mW(24dBm) U-NII-2A 250mW(24dBm) U-NII-2C 250mW(24dBm) U-NII-3 1W(30dBm)
Test Result:	PASS Conducted output power= measurement power+10log(1/x)
Remark:	X is duty cycle=1, so 10log(1/1)=0 Conducted output power= measurement power

13.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

13.2 Test Result

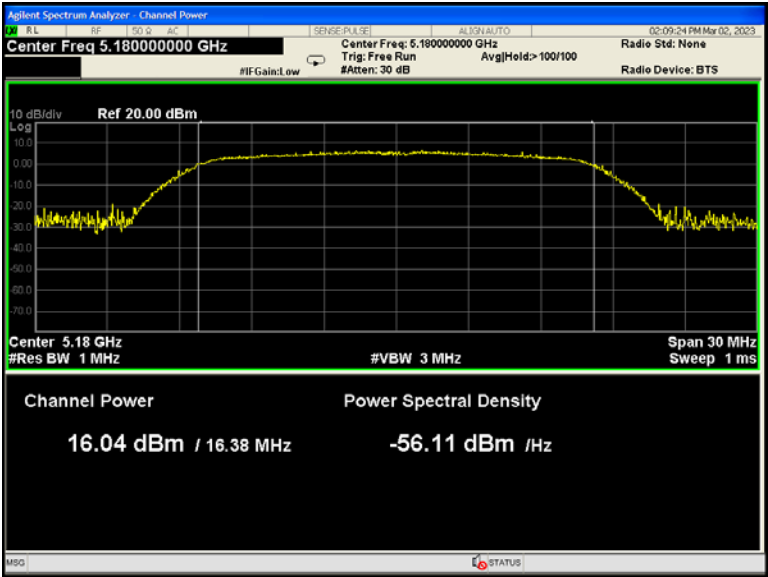
Band	Operation mode	Conducted Output Power (dBm)		
		Low	Middle	High
U-NII-1	802.11a	16.04	15.70	15.23
	802.11n(HT20)	15.72	15.46	15.15
	802.11n(HT40)	15.65	/	15.45
	802.11ac(VHT20)	15.70	15.54	15.10
	802.11ac(VHT40)	15.73	/	15.48
	802.11ac(VHT80)	15.67	/	/

Band	Operation mode	Conducted Output Power (dBm)		
		Low	Middle	High
U-NII-3	802.11a	12.84	13.33	13.78
	802.11n(HT20)	12.63	13.18	13.68
	802.11n(HT40)	12.81	/	13.27
	802.11ac(VHT20)	12.70	13.16	13.75
	802.11ac(VHT40)	12.76	/	13.33
	802.11ac(VHT80)	13.20	/	/

* All transmit signals are completely uncorrelated with each other, Directional gain = G_{ANT} which is less than 6dBi. So the limit does not be reduced.

Test result plots shown as follows:

802.11a U-NII-1 Low channel



802.11a U-NII-1 Middle channel

