

FCC TEST REPORT

For

Benq Corporation

QCast Mirror HDMI Wireless Dongle

Model No.: QP20

Prepared For : Benq Corporation

Address : 16 Jihu Road, Neihu, Taipei 114, Taiwan

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited

Address : 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

Tel: (86) 755-26066544 Fax: (86) 755-26014772

Report Number : R0217060265W2

Date of Test : Jun. 22~Jul. 06, 2017

Date of Report : Jul. 06, 2017

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TEST REPORT

Applicant : Benq Corporation
Manufacturer : Benq Corporation
Product Name : QCast Mirror HDMI Wireless Dongle
Model No. : QP20
Trade Mark : BenQ
Rating(s) : Input DC 5V, 1A

Test Standard(s) : FCC Part15 Subpart E 2016, Paragraph 15.407
Test Method(s) : ANSI C63.10: 2013,
KDB 789033 D02 General UNII Test Procedures New Rules v01r04

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart E requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Jun. 22~Jul. 06, 2017

Prepared by :



Winkey Wang

(Tested Engineer / Winkey Wang)

Reviewer :

Tangcy. T.

(Project Manager / Tangcy. T)

Approved & Authorized Signer :

Tom Chen

(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	Benq Corporation
Address	:	16 Jihu Road, Neihu, Taipei 114, Taiwan
Manufacturer	:	Benq Corporation
Address	:	16 Jihu Road, Neihu, Taipei 114, Taiwan

1.2. Description of Device (EUT)

Product Name	:	QCast Mirror HDMI Wireless Dongle
Model No.	:	QP20
Trade Mark	:	BenQ
Test Power Supply	:	AC 120V, 60Hz for adapter/AC 240V, 60Hz for adapter
Product Description	Operation Frequency:	WIFI 2.4G: 2412-2462MHz / 2422-2452MHz WIFI 5G: 5180MHz~5240MHz / 5190MHz~5230MHz/ 5210MHz
	Number of Channel:	WIFI 2.4G: 11 Channels for 802.11b/ g/ n(HT20) 7 Channels for 802.11n(HT40) WIFI 5G: 4 Channels for 802.11a 4 Channels for 802.11n(HT20) 4 Channels for 802.11ac(HT20) 2 Channels for 802.11n(HT40) 2 Channels for 802.11ac(HT40) 1 Channels for 802.11ac(HT80)
	Modulation Type:	OFDM with BPSK/QPSK/16QAM/64QAM for 802.11a/b/g/n; OFDM with BPSK/QPSK/16QAM/64QAM/ 256QAM for 802.11ac
	Antenna Type:	PCB Antenna
	Antenna Gain(Peak):	1.5 dBi
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2)This report is for WIFI 5G		

1.3. Auxiliary Equipment Used During Test

Notebook	:	Manufacturer: FUJITSU LIMITED M/N: LH531 S/N: 518127-01R2300775
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		Input: DC 19V, 4.22A
AC ADAPTER (For Notebook)	:	Manufacturer: FUJITSU LIMITED M/N: ADP-602H A P/N: CP281868-04 Input: AC 100-240V, 50/60Hz 4.22A Output: DC 19V, 3.16A
DEBUG Board	:	Manufacturer: Benq Corporation M/N: DEBUG20140922
Digital Projector	:	Manufacturer: BENQ M/N: GP20+ Input: AC 100-240V, 50/60Hz

1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Mode	Test channel	Frequency (MHz)
OFDM(802.11a/n20/ac20)	CH 36	5180MHz
	CH 40	5200MHz
	CH 48	5240MHz
OFDM(802.11n40/ac40)	CH 38	5190MHz
	CH 46	5230MHz
OFDM(802.11ac80)	CH 42	5210MHz

Note:

1. The measurements are performed at the highest, middle, lowest available channels.
2. The EUT has been tested as an independent unit. And Continual Transmitting in maximum power.
3. For the relevant Conducted Measurement, the temporary antenna connector is used during the measurement. Antenna Connector Impedance: 50 Ω , Cable Loss: 1.0 dB
4. The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is more than 98%

1.5. List of channels

802.11a/n20/ac20

Channel	Freq. (MHz)	Channel	Freq. (MHz)
36	5180	44	5220
40	5200	48	5240

802.11n40/ac40

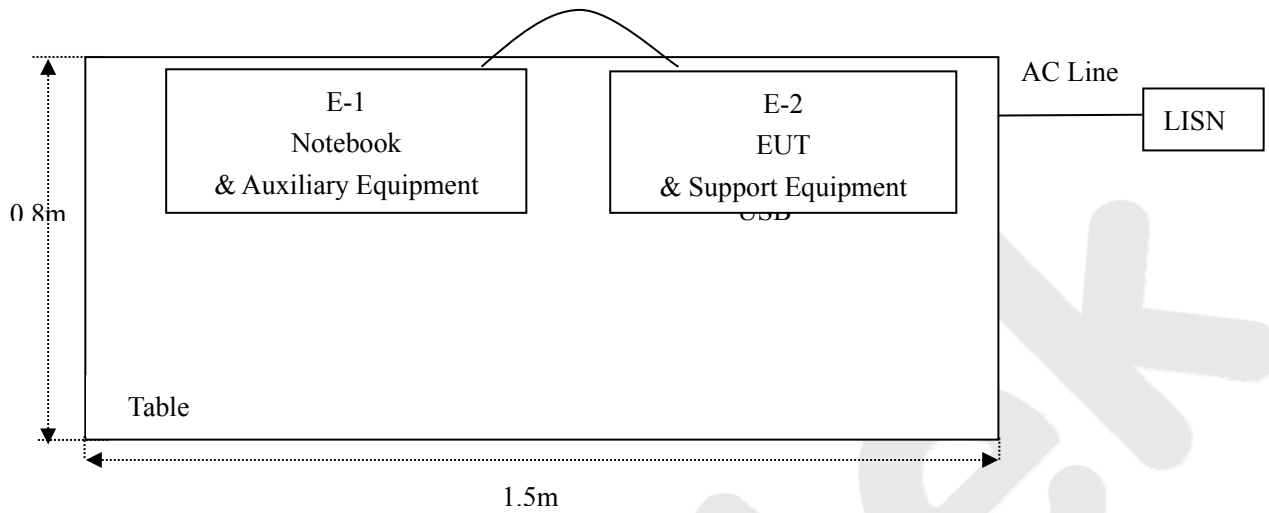
Channel	Freq. (MHz)	Channel	Freq. (MHz)
38	5190	46	5230

802.11ac80

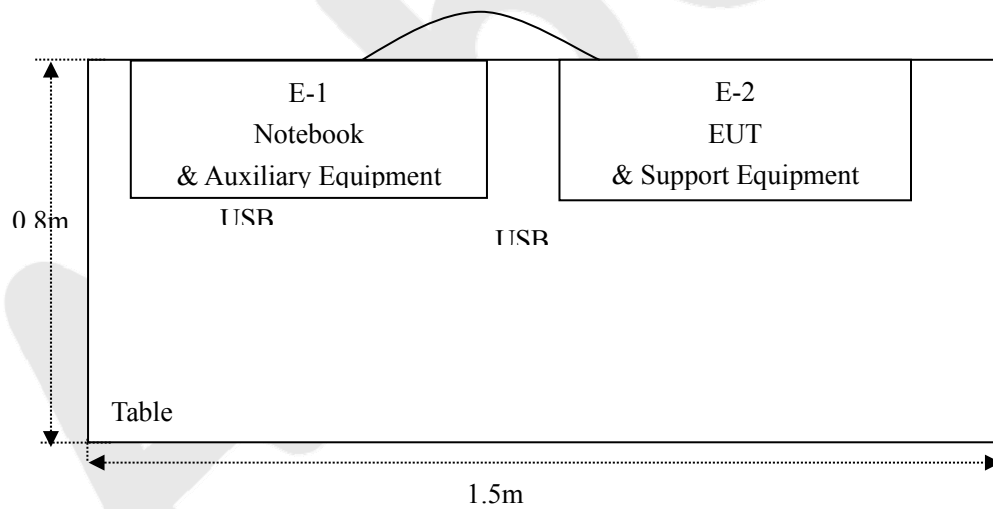
Channel	Freq. (MHz)
42	5210

1.6. Description Of Test Setup

CE



RE



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	May 27, 2017	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	May 27, 2017	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 27, 2017	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	May 27, 2017	1 Year
5.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	May 27, 2017	1 Year
6.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	May 27, 2017	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	May 31, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 31, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	HFH2-Z2	100047	Apr. 03, 2017	1 Year
10.	Pre-amplifier	SONOMA	310N	186860	May 27, 2017	1 Year
11.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
12.	Power Sensor	DAER	RPR3006W	15I00041SN045	May 27, 2017	1 Year
13.	Power Sensor	DAER	RPR3006W	15I00041SN046	May 27, 2017	1 Year
14.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	May 27, 2017	1 Year
15.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	May 27, 2017	1 Year
16.	Signal Generator	Agilent	E4421B	MY41000743	May 27, 2017	1 Year
17.	DC Power supply	IVYTECH	IV6003	1601D6030007	May 26, 2017	1 Year
18.	TEMP&HUMI PROGRAMMABLE CHAMBER	Sertep	ZJ-HWHS80 B	ZJ-17042804	Mar. 03, 2017	1 Year

1.8. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal)
		Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

1.9. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, 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 752021, July 06, 2016.

ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

Test Location

All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

2. Summary of Test Results

Standard	Test Type	Result
15.207 & 15.407	Conducted Emission	PASS
15.205/15.209	Spurious Emission	PASS
15.407(b)	Band Edge	PASS
15.407(a)(5)	Occupy Bandwidth	PASS
15.407(a)(1)(3)	Maximum Conducted Output Power	PASS
15.407(a)(1)(3)	Peak Power Spectral Density	PASS
15.203/15.407g	Antenna Requirement	PASS

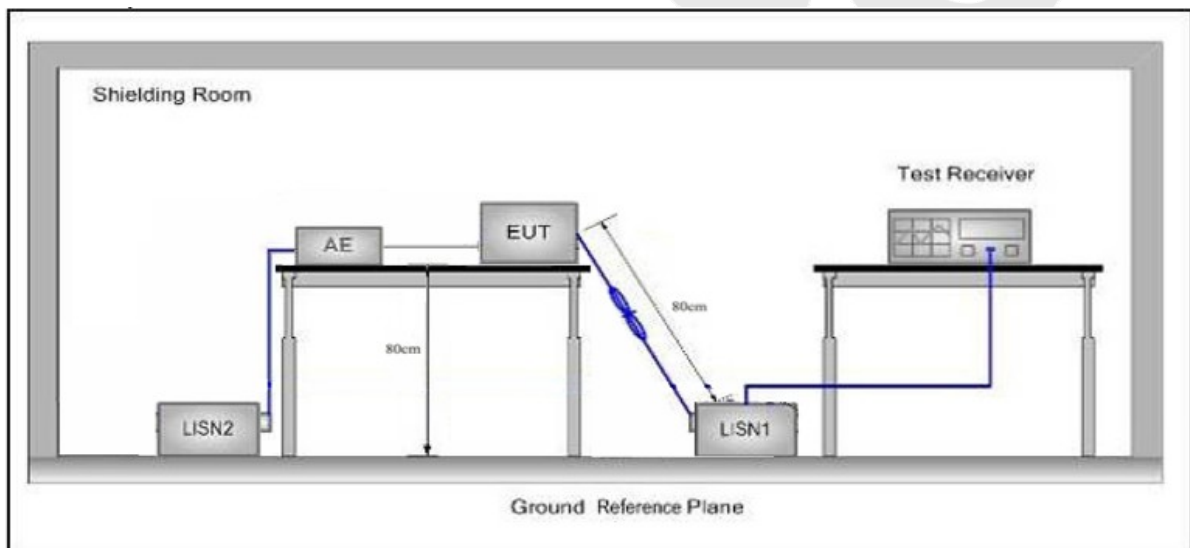
3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207&15.407		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50

Remark: (1) *Decreasing linearly with logarithm of the frequency.
(2) The lower limit shall apply at the transition frequency.

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

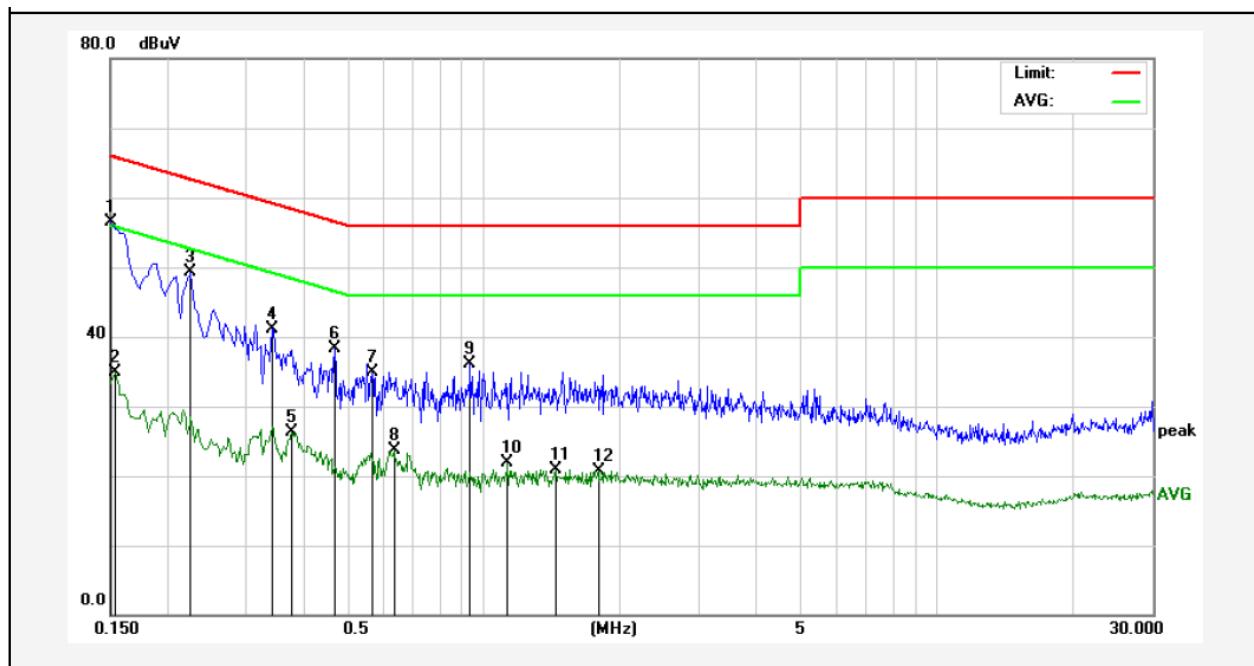
The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

Please to see the following pages

Conducted Emission Test Data

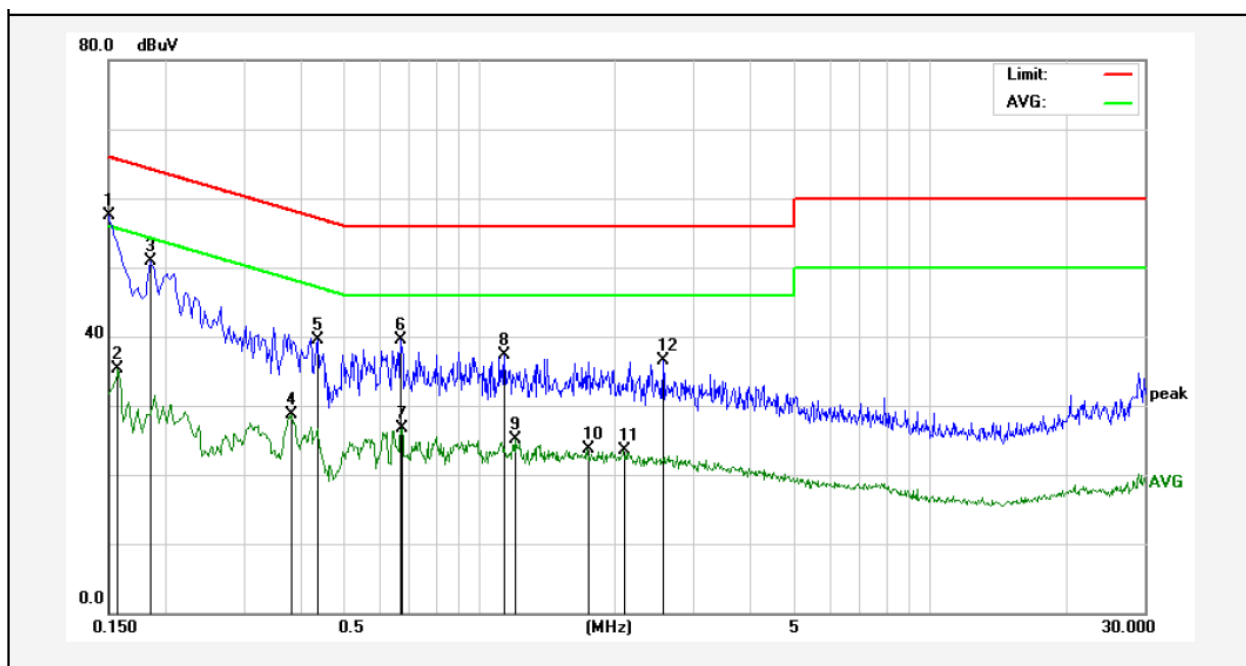
Test Site: 1# Shielded Room
Operating Condition: Keeping TX mode
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1500	36.67	19.90	56.57	65.99	-9.42	QP	
2	0.1539	15.10	19.90	35.00	55.78	-20.78	AVG	
3	0.2260	29.48	19.89	49.37	62.59	-13.22	peak	
4	0.3420	21.23	19.91	41.14	59.15	-18.01	QP	
5	0.3780	6.44	19.93	26.37	48.32	-21.95	AVG	
6	0.4700	18.31	19.97	38.28	56.51	-18.23	QP	
7	0.5700	15.00	20.00	35.00	56.00	-21.00	QP	
8	0.6340	3.74	20.02	23.76	46.00	-22.24	AVG	
9	0.9380	16.01	20.10	36.11	56.00	-19.89	QP	
10	1.1340	1.86	20.12	21.98	46.00	-24.02	AVG	
11	1.4420	0.76	20.13	20.89	46.00	-25.11	AVG	
12	1.7940	0.59	20.14	20.73	46.00	-25.27	AVG	

Conducted Emission Test Data

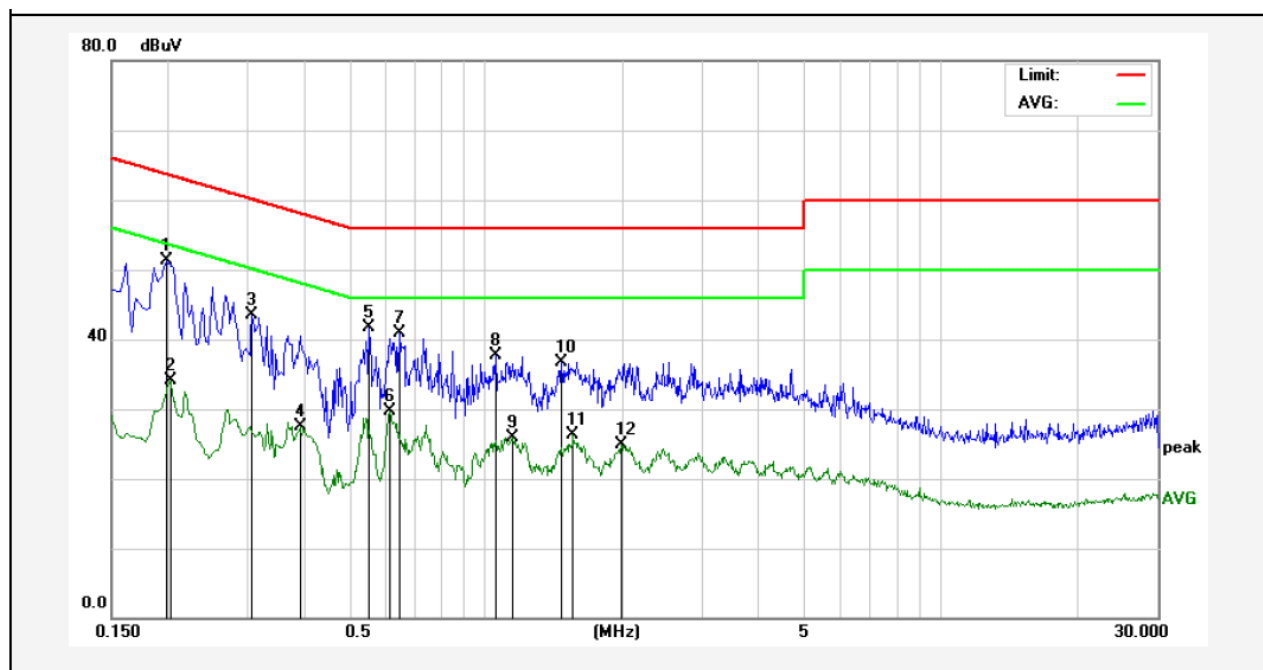
Test Site: 1# Shielded Room
Operating Condition: Keeping TX mode
Test Specification: AC 120V, 60Hz for adapter
Comment: Neutral Line
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1500	37.60	19.90	57.50	65.99	-8.49	QP	
2	0.1580	15.33	19.90	35.23	55.56	-20.33	AVG	
3	0.1860	31.01	19.90	50.91	64.21	-13.30	QP	
4	0.3820	8.83	19.93	28.76	48.23	-19.47	AVG	
5	0.4380	19.48	19.95	39.43	57.10	-17.67	QP	
6	0.6700	19.46	20.03	39.49	56.00	-16.51	QP	
7	0.6740	6.70	20.03	26.73	46.00	-19.27	AVG	
8	1.1380	17.21	20.12	37.33	56.00	-18.67	QP	
9	1.2020	4.90	20.12	25.02	46.00	-20.98	AVG	
10	1.7420	3.53	20.13	23.66	46.00	-22.34	AVG	
11	2.0980	3.31	20.14	23.45	46.00	-22.55	AVG	
12	2.5540	16.29	20.15	36.44	56.00	-19.56	QP	

Conducted Emission Test Data

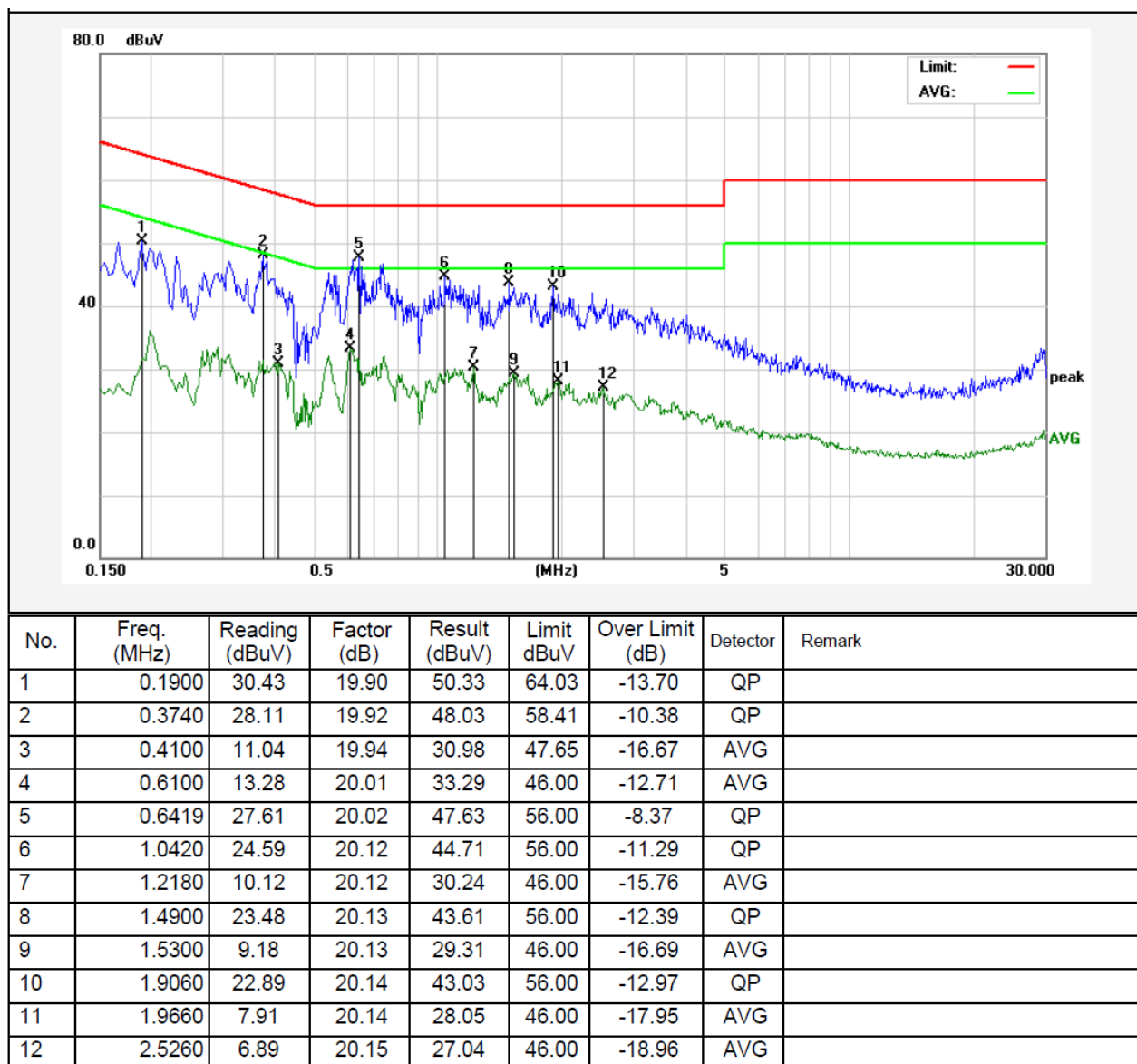
Test Site: 1# Shielded Room
Operating Condition: Keeping TX mode
Test Specification: AC 240V, 60Hz for adapter
Comment: Live Line
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1980	31.40	19.90	51.30	63.69	-12.39	QP	
2	0.2020	14.18	19.90	34.08	53.52	-19.44	AVG	
3	0.3060	23.70	19.89	43.59	60.08	-16.49	QP	
4	0.3899	7.59	19.93	27.52	48.06	-20.54	AVG	
5	0.5540	21.80	20.00	41.80	56.00	-14.20	QP	
6	0.6140	9.63	20.01	29.64	46.00	-16.36	AVG	
7	0.6460	20.85	20.02	40.87	56.00	-15.13	QP	
8	1.0500	17.58	20.12	37.70	56.00	-18.30	QP	
9	1.1420	5.83	20.12	25.95	46.00	-20.05	AVG	
10	1.4700	16.67	20.13	36.80	56.00	-19.20	QP	
11	1.5540	6.14	20.13	26.27	46.00	-19.73	AVG	
12	1.9900	4.74	20.14	24.88	46.00	-21.12	AVG	

Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: Keeping TX mode
Test Specification: AC 240V, 60Hz for adapter
Comment: Neutral Line
Tem.:25°C Hum.:50%



4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209, 15.205 and 15.407				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	68.2	Peak	3

Remark:

(1)The lower limit shall apply at the transition frequency.

(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

(3) Above 1GHz limit: $E[dB\mu V/m] = EIRP[dBm] + 95.2 = 68.2 \text{ dBuV/m}$, for $EIPR[dBm] = -27dBm$.

4.2. Test Setup

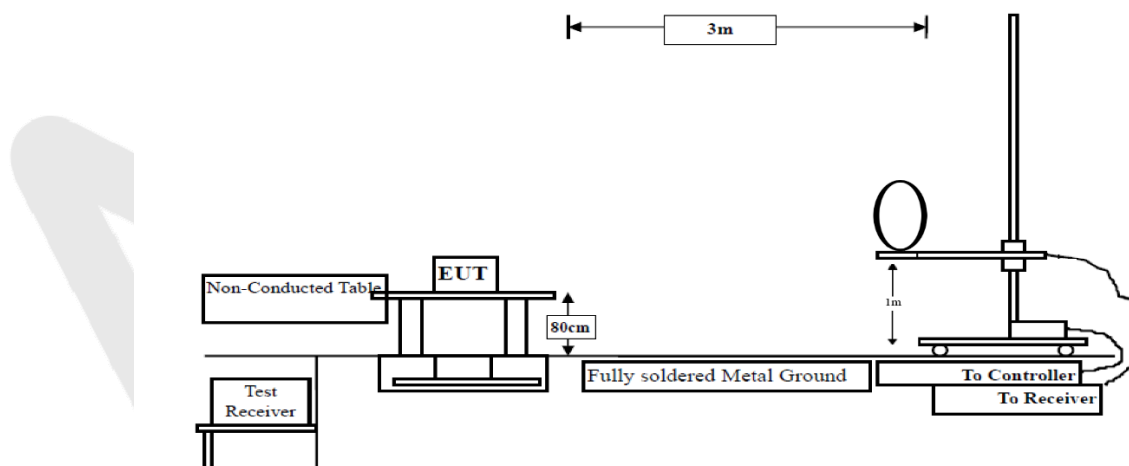


Figure 1. Below 30MHz

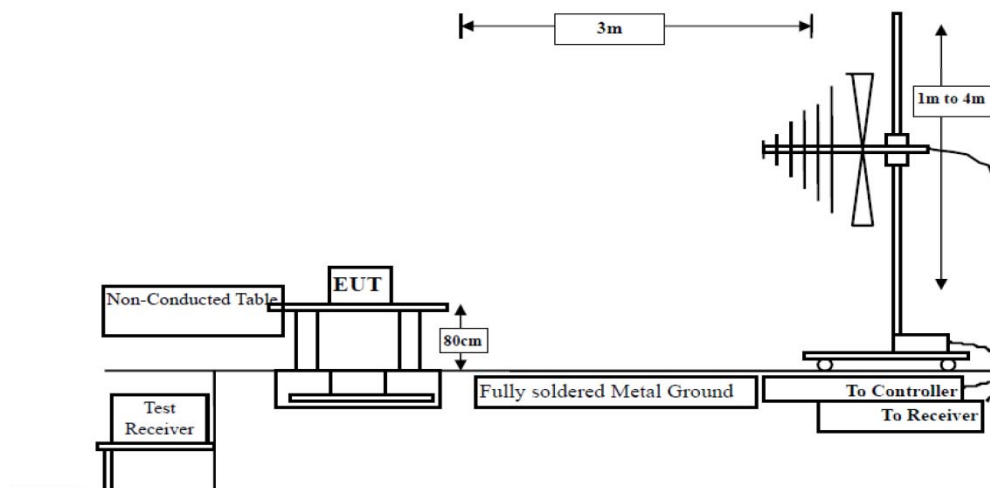


Figure 2. 30MHz to 1GHz

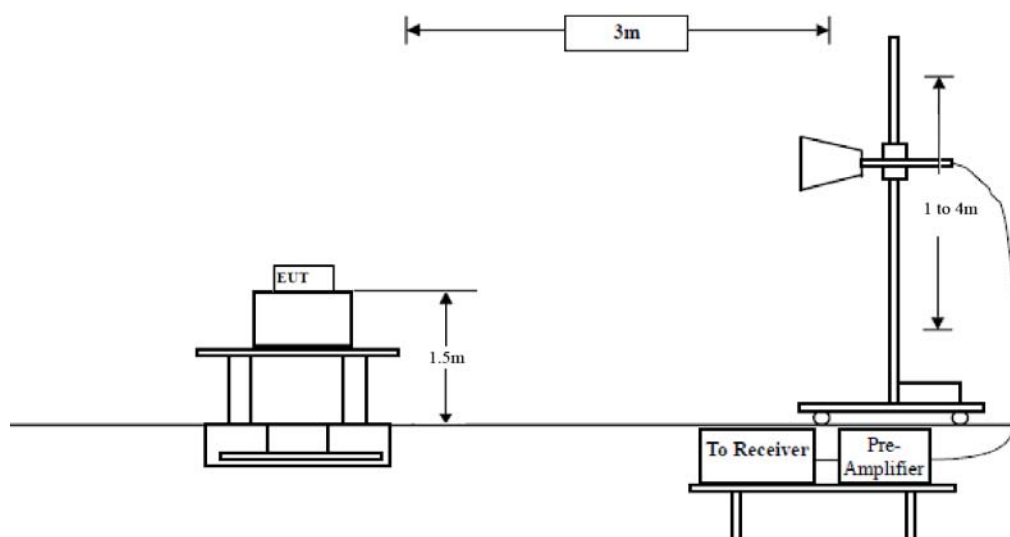


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW = 300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz, Set the spectrum analyzer as:

RBW = 1MHz, VBW = 1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.

RBW = 1MHz, VBW = 10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

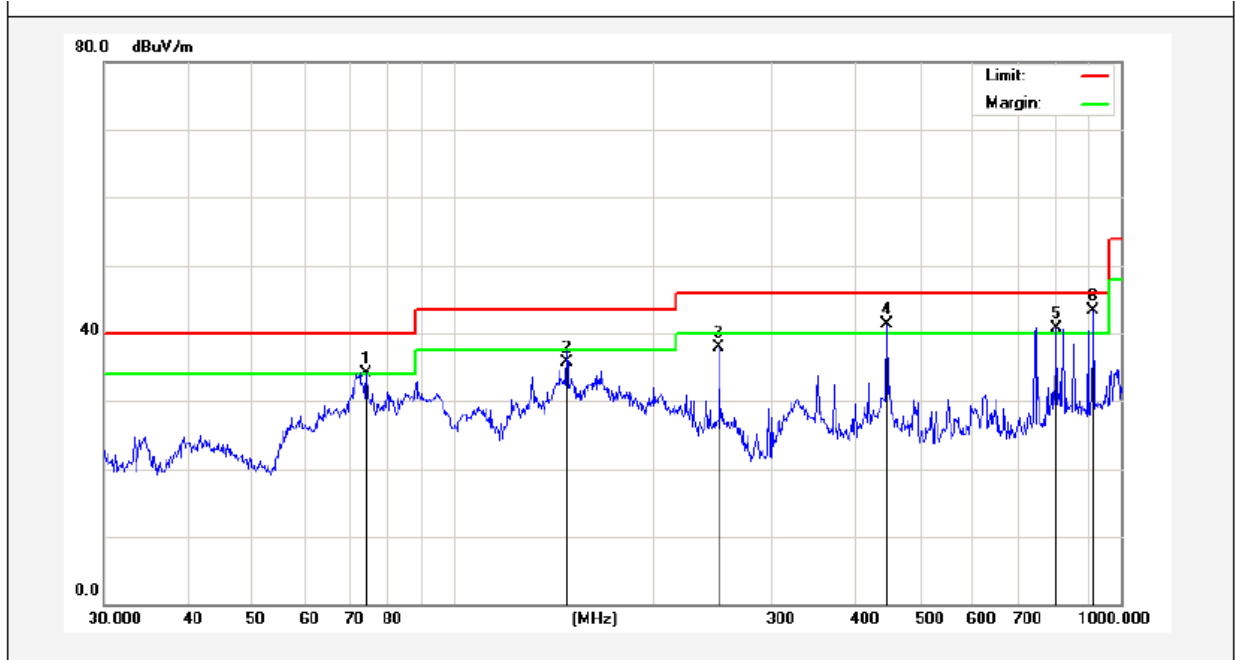
4.4. Test Data

PASS

The test results of 9kHz-30MHz and above 18000MHz are attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Test Results (30~1000MHz)

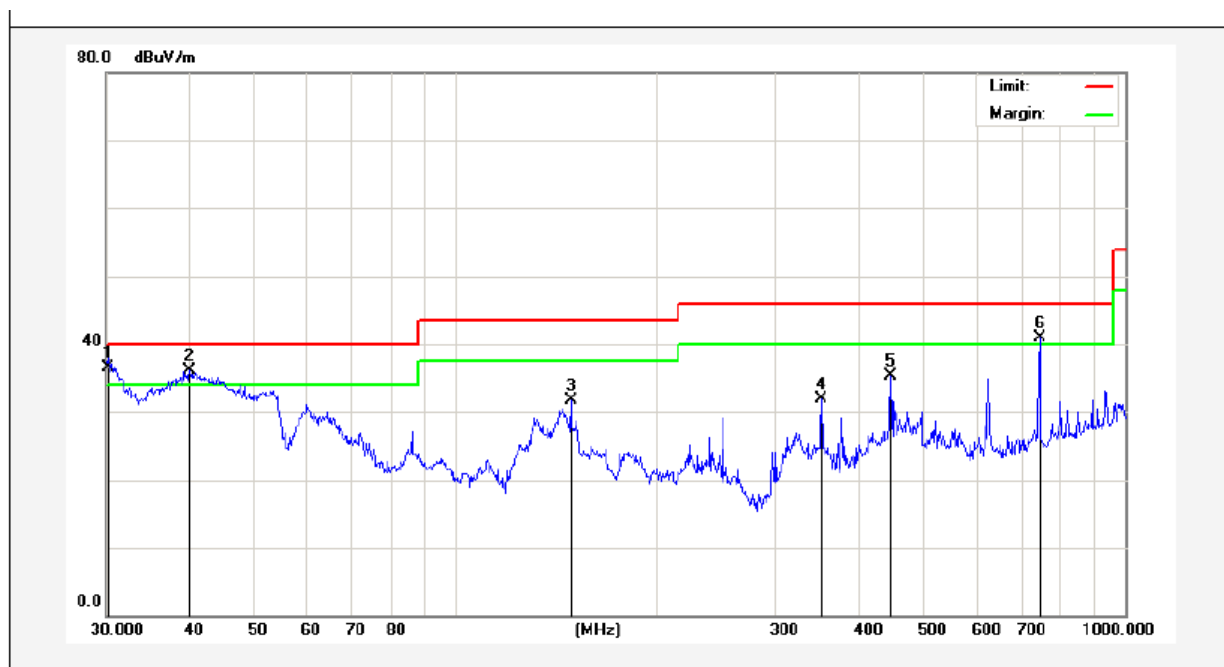
Job No.: 0217060265W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH
Standard: FCC PART 15C Power Source: AC 120V/60Hz
Test Mode: TX Mode Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	74.1351	54.49	-20.42	34.07	40.00	-5.93	QP	300	99	
2	147.9214	59.16	-23.37	35.79	43.50	-7.71	QP	300	88	
3	250.3012	56.56	-18.56	38.00	46.00	-8.00	QP	300	44	
4	446.4141	53.57	-12.17	41.40	46.00	-4.60	QP	300	66	
5	801.7863	47.31	-6.54	40.77	46.00	-5.23	QP	300	149	
6	909.6667	47.97	-4.61	43.36	46.00	-2.64	QP	300	333	

Test Results (30~1000MHz)

Job No.: 0217060265W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH
Standard: FCC PART 15C Power Source: AC 120V/60Hz
Test Mode: TX Mode Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	30.2111	53.30	-16.84	36.46	40.00	-3.54	QP	300	77	
2	39.9942	46.41	-10.37	36.04	40.00	-3.96	QP	300	25	
3	148.4410	50.01	-18.36	31.65	43.50	-11.85	QP	300	94	
4	351.7078	44.76	-12.93	31.83	46.00	-14.17	QP	300	79	
5	446.4141	46.86	-11.49	35.37	46.00	-10.63	QP	300	189	
6	744.8661	48.00	-7.15	40.85	46.00	-5.15	QP	300	222	

Test Results (Above 1000MHz)

Test mode:	IEEE 802.11a	Test channel:	Low CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10360.00	43.15	31.98	17.08	33.91	58.30	68.20	-9.90	V
15540.00	36.28	32.65	20.03	34.85	54.11	68.20	-14.09	V
10360.00	39.47	31.98	17.08	33.91	54.62	68.20	-13.58	H
15540.00	33.56	32.65	20.03	34.85	51.39	68.20	-16.81	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10360.00	32.14	31.98	17.08	33.91	47.29	54.00	-6.71	V
15540.00	29.62	32.65	20.03	34.85	47.45	54.00	-6.55	V
10360.00	29.45	31.98	17.08	33.91	44.60	54.00	-9.40	H
15540.00	28.91	32.65	20.03	34.85	46.74	54.00	-7.26	H

Test mode:	IEEE 802.11a	Test channel:	Mid CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10400.00	42.60	32.44	17.18	33.91	58.31	68.20	-9.89	V
15600.00	35.97	32.78	20.12	34.86	54.01	68.20	-14.19	V
10400.00	37.86	32.44	17.18	33.91	53.57	68.20	-14.63	H
15600.00	36.22	32.78	20.12	34.86	54.26	68.20	-13.94	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10400.00	30.43	32.44	17.18	33.91	46.14	54.00	-7.86	V
15600.00	29.54	32.78	20.12	34.86	47.58	54.00	-6.42	V
10400.00	30.15	32.44	17.18	33.91	45.86	54.00	-8.14	H
15600.00	30.22	32.78	20.12	34.86	48.26	54.00	-5.74	H

Test mode:	IEEE 802.11a	Test channel:	High CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10480.00	41.65	32.59	18.02	33.92	58.34	68.20	-9.86	V
15720.00	40.08	32.87	20.15	34.88	58.22	68.20	-9.98	V
10480.00	42.63	32.59	18.02	33.92	59.32	68.20	-8.88	H
15720.00	40.41	32.87	20.15	34.88	58.55	68.20	-9.65	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10480.00	30.16	32.59	18.02	33.92	46.85	54.00	-7.15	V
15720.00	30.25	32.87	20.15	34.88	48.39	54.00	-5.61	V
10480.00	29.16	32.59	18.02	33.92	45.85	54.00	-8.15	H
15720.00	29.27	32.87	20.15	34.88	47.41	54.00	-6.59	H

Test mode:	IEEE 802.11n(HT20)	Test channel:	Low CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10360.00	40.12	31.98	17.08	33.91	55.27	68.20	-12.93	V
15540.00	37.65	32.65	20.03	34.85	55.48	68.20	-12.72	V
10360.00	37.16	31.98	17.08	33.91	52.31	68.20	-15.89	H
15540.00	36.98	32.65	20.03	34.85	54.81	68.20	-13.39	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10360.00	30.17	31.98	17.08	33.91	45.32	54.00	-8.68	V
15540.00	28.55	32.65	20.03	34.85	46.38	54.00	-7.62	V
10360.00	30.99	31.98	17.08	33.91	46.14	54.00	-7.86	H
15540.00	28.64	32.65	20.03	34.85	46.47	54.00	-7.53	H

Test mode:	IEEE 802.11n(HT20)	Test channel:	Mid CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10400.00	41.60	32.44	17.18	33.91	57.31	68.20	-10.89	V
15600.00	39.12	32.78	20.12	34.86	57.16	68.20	-11.04	V
10400.00	38.64	32.44	17.18	33.91	54.35	68.20	-13.85	H
15600.00	36.36	32.78	20.12	34.86	54.40	68.20	-13.80	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10400.00	29.25	32.44	17.18	33.91	44.96	54.00	-9.04	V
15600.00	26.99	32.78	20.12	34.86	45.03	54.00	-8.97	V
10400.00	29.04	32.44	17.18	33.91	44.75	54.00	-9.25	H
15600.00	28.47	32.78	20.12	34.86	46.51	54.00	-7.49	H

Test mode:	IEEE 802.11n(HT20)	Test channel:	High CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10480.00	42.10	32.59	18.02	33.92	58.79	68.20	-9.41	V
15720.00	38.45	32.87	20.15	34.88	56.59	68.20	-11.61	V
10480.00	37.22	32.59	18.02	33.92	53.91	68.20	-14.29	H
15720.00	38.50	32.87	20.15	34.88	56.64	68.20	-11.56	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10480.00	32.09	32.59	18.02	33.92	48.78	54.00	-5.22	V
15720.00	33.17	32.87	20.15	34.88	51.31	54.00	-2.69	V
10480.00	30.26	32.59	18.02	33.92	46.95	54.00	-7.05	H
15720.00	28.68	32.87	20.15	34.88	46.82	54.00	-7.18	H

Test mode:	IEEE 802.11n(ac20)	Test channel:	Low CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10360.00	41.90	31.98	17.08	33.91	57.05	68.20	-11.15	V
15540.00	36.54	32.65	20.03	34.85	54.37	68.20	-13.83	V
10360.00	38.39	31.98	17.08	33.91	53.54	68.20	-14.66	H
15540.00	35.17	32.65	20.03	34.85	53.00	68.20	-15.20	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10360.00	32.25	31.98	17.08	33.91	47.40	54.00	-6.60	V
15540.00	30.12	32.65	20.03	34.85	47.95	54.00	-6.05	V
10360.00	30.33	31.98	17.08	33.91	45.48	54.00	-8.52	H
15540.00	27.26	32.65	20.03	34.85	45.09	54.00	-8.91	H

Test mode:	IEEE 802.11n(ac20)	Test channel:	Mid CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10400.00	40.84	32.44	17.18	33.91	56.55	68.20	-11.65	V
15600.00	37.42	32.78	20.12	34.86	55.46	68.20	-12.74	V
10400.00	39.28	32.44	17.18	33.91	54.99	68.20	-13.21	H
15600.00	36.15	32.78	20.12	34.86	54.19	68.20	-14.01	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10400.00	32.14	32.44	17.18	33.91	47.85	54.00	-6.15	V
15600.00	28.50	32.78	20.12	34.86	46.54	54.00	-7.46	V
10400.00	28.97	32.44	17.18	33.91	44.68	54.00	-9.32	H
15600.00	27.66	32.78	20.12	34.86	45.70	54.00	-8.30	H

Test mode:	IEEE 802.11n(ac20)	Test channel:	High CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10480.00	41.23	32.59	18.02	33.92	57.92	68.20	-10.28	V
15720.00	37.96	32.87	20.15	34.88	56.10	68.20	-12.10	V
10480.00	38.97	32.59	18.02	33.92	55.66	68.20	-12.54	H
15720.00	39.05	32.87	20.15	34.88	57.19	68.20	-11.01	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10480.00	30.52	32.59	18.02	33.92	47.21	54.00	-6.79	V
15720.00	28.56	32.87	20.15	34.88	46.70	54.00	-7.30	V
10480.00	28.84	32.59	18.02	33.92	45.53	54.00	-8.47	H
15720.00	29.63	32.87	20.15	34.88	47.77	54.00	-6.23	H

Test mode:	IEEE 802.11n(HT40)	Test channel:	Low CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10380.00	38.16	31.98	17.08	33.91	53.31	68.20	-14.89	V
15570.00	36.74	32.65	20.03	34.85	54.57	68.20	-13.63	V
10380.00	37.53	31.98	17.08	33.91	52.68	68.20	-15.52	H
15570.00	35.93	32.65	20.03	34.85	53.76	68.20	-14.44	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10380.00	30.28	31.98	17.08	33.91	45.43	54.00	-8.57	V
15570.00	28.75	32.65	20.03	34.85	46.58	54.00	-7.42	V
10380.00	30.20	31.98	17.08	33.91	45.35	54.00	-8.65	H
15570.00	27.63	32.65	20.03	34.85	45.46	54.00	-8.54	H

Test mode:	IEEE 802.11n(HT40)	Test channel:	High CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10460.00	43.25	32.59	18.02	33.92	59.94	68.20	-8.26	V
15690.00	39.29	32.87	20.15	34.88	57.43	68.20	-10.77	V
10460.00	37.52	32.59	18.02	33.92	54.21	68.20	-13.99	H
15690.00	39.54	32.87	20.15	34.88	57.68	68.20	-10.52	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10460.00	32.46	32.59	18.02	33.92	49.15	54.00	-4.85	V
15690.00	29.81	32.87	20.15	34.88	47.95	54.00	-6.05	V
10460.00	32.04	32.59	18.02	33.92	48.73	54.00	-5.27	H
15690.00	28.65	32.78	20.12	34.86	46.69	54.00	-7.31	H

Test mode:	IEEE 802.11ac(HT40)	Test channel:	Low CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10380.00	37.85	31.98	17.08	33.91	53.00	68.20	-15.20	V
15570.00	35.24	32.65	20.03	34.85	53.07	68.20	-15.13	V
10380.00	39.11	31.98	17.08	33.91	54.26	68.20	-13.94	H
15570.00	35.63	32.65	20.03	34.85	53.46	68.20	-14.74	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10380.00	32.42	31.98	17.08	33.91	47.57	54.00	-6.43	V
15570.00	28.59	32.65	20.03	34.85	46.42	54.00	-7.58	V
10380.00	31.23	31.98	17.08	33.91	46.38	54.00	-7.62	H
15570.00	27.64	32.65	20.03	34.85	45.47	54.00	-8.53	H

Test mode:	IEEE 802.11ac(HT40)	Test channel:	High CH
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10460.00	42.14	32.59	18.02	33.92	58.83	68.20	-9.37	V
15690.00	38.47	32.87	20.15	34.88	56.61	68.20	-11.59	V
10460.00	39.53	32.59	18.02	33.92	56.22	68.20	-11.98	H
15690.00	37.59	32.87	20.15	34.88	55.73	68.20	-12.47	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10460.00	32.40	32.59	18.02	33.92	49.09	54.00	-4.91	V
15690.00	29.12	32.87	20.15	34.88	47.26	54.00	-6.74	V
10460.00	30.68	32.59	18.02	33.92	47.37	54.00	-6.63	H
15690.00	28.39	32.78	20.12	34.86	46.43	54.00	-7.57	H

Test mode:	IEEE 802.11ac(HT80)	Test channel:	
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10420.00	42.63	32.44	17.18	33.91	58.34	68.20	-9.86	V
15630.00	37.74	32.78	20.12	34.86	55.78	68.20	-12.42	V
10420.00	37.98	32.44	17.18	33.91	53.69	68.20	-14.51	H
15630.00	36.45	32.78	20.12	34.86	54.49	68.20	-13.71	H

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol.
10420.00	31.21	32.44	17.18	33.91	46.92	54.00	-7.08	V
15630.00	27.62	32.78	20.12	34.86	45.66	54.00	-8.34	V
10420.00	30.45	32.44	17.18	33.91	46.16	54.00	-7.84	H
15630.00	30.73	32.78	20.12	34.86	48.77	54.00	-5.23	H

Note:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamplifier Factor

Radiated Band Edge:

Test Mode: 802.11a								
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	42.45	28.65	13.58	31.04	53.64	68.20	-14.56	H
5350.00	43.12	29.16	14.68	31.96	55.00	68.20	-13.20	H
5150.00	43.16	28.65	13.58	31.04	54.35	68.20	-13.85	V
5350.00	42.97	29.16	14.68	31.96	54.85	68.20	-13.35	V
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	35.47	28.65	13.58	31.04	46.66	54.00	-7.34	H
5350.00	35.68	29.16	14.68	31.96	47.56	54.00	-6.44	H
5150.00	35.25	28.65	13.58	31.04	46.44	54.00	-7.56	V
5350.00	36.23	29.16	14.68	31.96	48.11	54.00	-5.89	V

Test Mode: 802.11n20								
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	41.58	28.65	13.58	31.04	52.77	68.20	-15.43	H
5350.00	42.24	29.16	14.68	31.96	54.12	68.20	-14.08	H
5150.00	42.44	28.65	13.58	31.04	53.63	68.20	-14.57	V
5350.00	43.11	29.16	14.68	31.96	54.99	68.20	-13.21	V
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	34.56	28.65	13.58	31.04	45.75	54.00	-8.25	H
5350.00	35.79	29.16	14.68	31.96	47.67	54.00	-6.33	H
5150.00	34.58	28.65	13.58	31.04	45.77	54.00	-8.23	V
5350.00	36.13	29.16	14.68	31.96	48.01	54.00	-5.99	V

Test Mode: 802.11ac20								
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	41.41	28.65	13.58	31.04	52.60	68.20	-15.60	H
5350.00	42.73	29.16	14.68	31.96	54.61	68.20	-13.59	H
5150.00	43.52	28.65	13.58	31.04	54.71	68.20	-13.49	V
5350.00	42.88	29.16	14.68	31.96	54.76	68.20	-13.44	V
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	34.56	28.65	13.58	31.04	45.75	54.00	-8.25	H
5350.00	34.76	29.16	14.68	31.96	46.64	54.00	-7.36	H
5150.00	34.15	28.65	13.58	31.04	45.34	54.00	-8.66	V
5350.00	35.54	29.16	14.68	31.96	47.42	54.00	-6.58	V

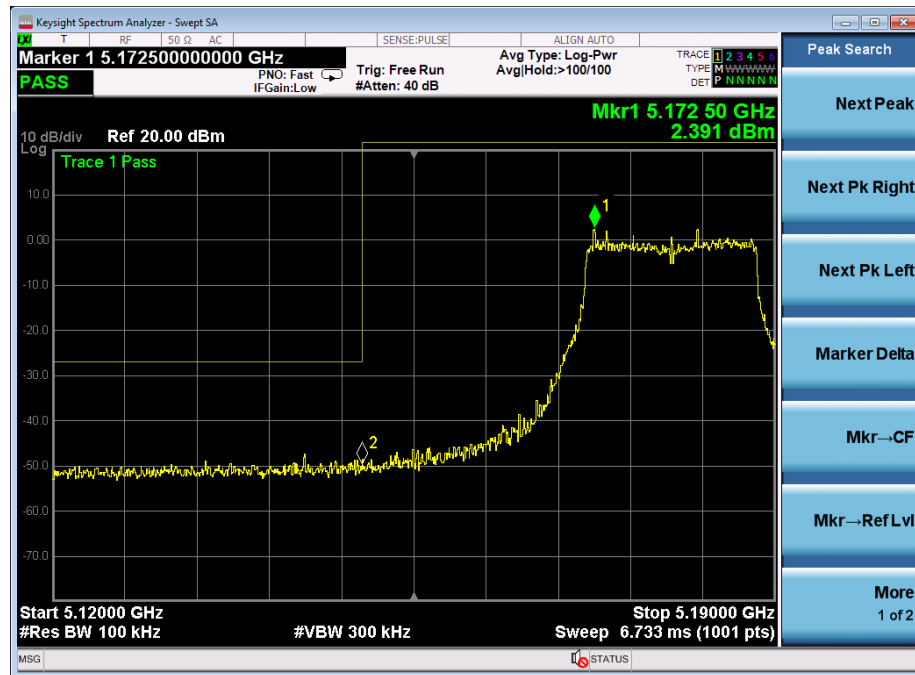
Test Mode: 802.11n40								
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	41.92	28.65	13.58	31.04	53.11	68.20	-15.09	H
5350.00	42.77	29.16	14.68	31.96	54.65	68.20	-13.55	H
5150.00	42.56	28.65	13.58	31.04	53.75	68.20	-14.45	V
5350.00	43.86	29.16	14.68	31.96	55.74	68.20	-12.46	V
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	34.24	28.65	13.58	31.04	45.43	54.00	-8.57	H
5350.00	34.58	29.16	14.68	31.96	46.46	54.00	-7.54	H
5150.00	32.99	28.65	13.58	31.04	44.18	54.00	-9.82	V
5350.00	36.47	29.16	14.68	31.96	48.35	54.00	-5.65	V

Test Mode: 802.11ac40								
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	41.55	28.65	13.58	31.04	52.74	68.20	-15.46	H
5350.00	42.68	29.16	14.68	31.96	54.56	68.20	-13.64	H
5150.00	41.64	28.65	13.58	31.04	52.83	68.20	-15.37	V
5350.00	43.72	29.16	14.68	31.96	55.60	68.20	-12.60	V
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	34.51	28.65	13.58	31.04	45.70	54.00	-8.30	H
5350.00	34.73	29.16	14.68	31.96	46.61	54.00	-7.39	H
5150.00	34.15	28.65	13.58	31.04	45.34	54.00	-8.66	V
5350.00	35.08	29.16	14.68	31.96	46.96	54.00	-7.04	V

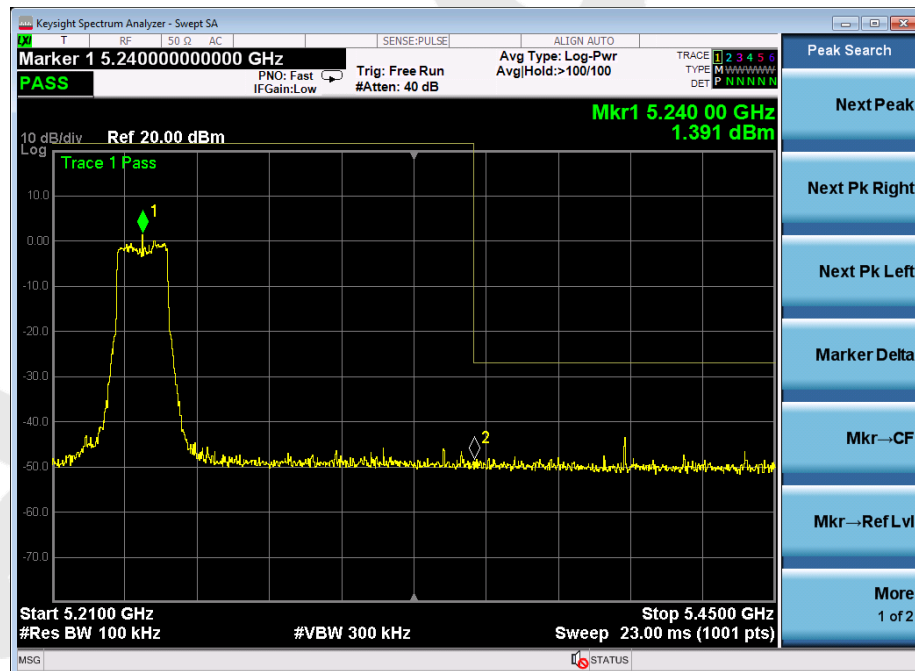
Test Mode: 802.11ac80								
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	41.45	28.65	13.58	31.04	52.64	68.20	-15.56	H
5350.00	42.47	29.16	14.68	31.96	54.35	68.20	-13.85	H
5150.00	41.82	28.65	13.58	31.04	53.01	68.20	-15.19	V
5350.00	43.86	29.16	14.68	31.96	55.74	68.20	-12.46	V
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
5150.00	34.52	28.65	13.58	31.04	45.71	54.00	-8.29	H
5350.00	34.59	29.16	14.68	31.96	46.47	54.00	-7.53	H
5150.00	33.91	28.65	13.58	31.04	45.10	54.00	-8.90	V
5350.00	33.87	29.16	14.68	31.96	45.75	54.00	-8.25	V

For conducted test:

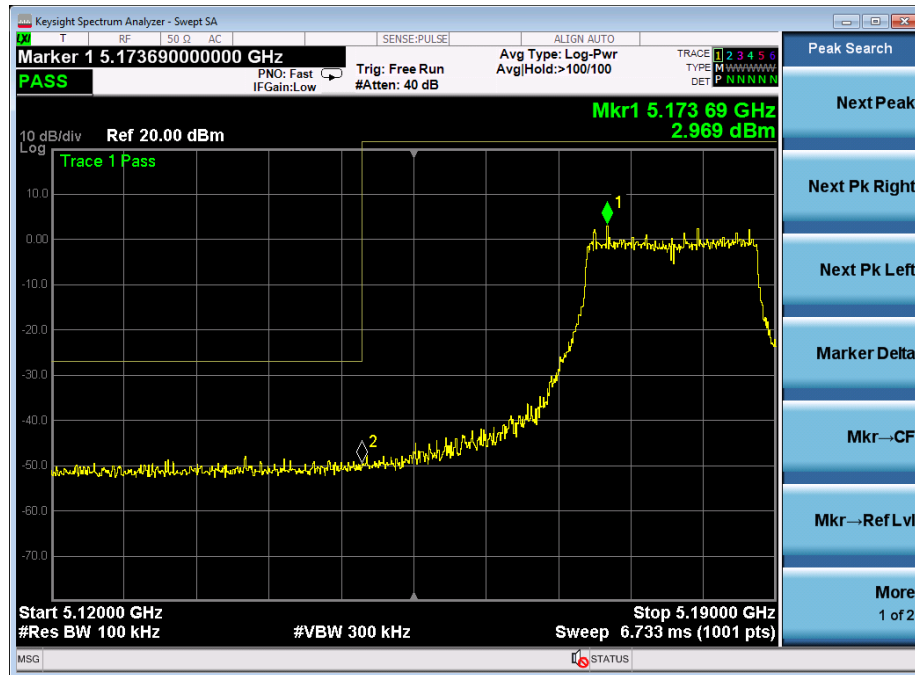
802.11a: Band Edge, Left Side



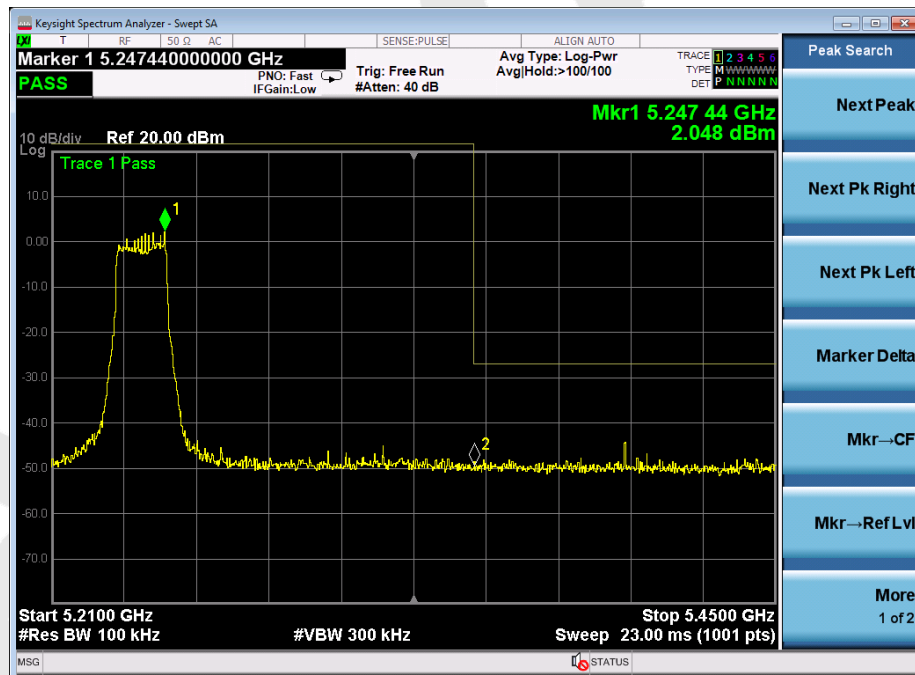
802.11a: Band Edge, Right Side



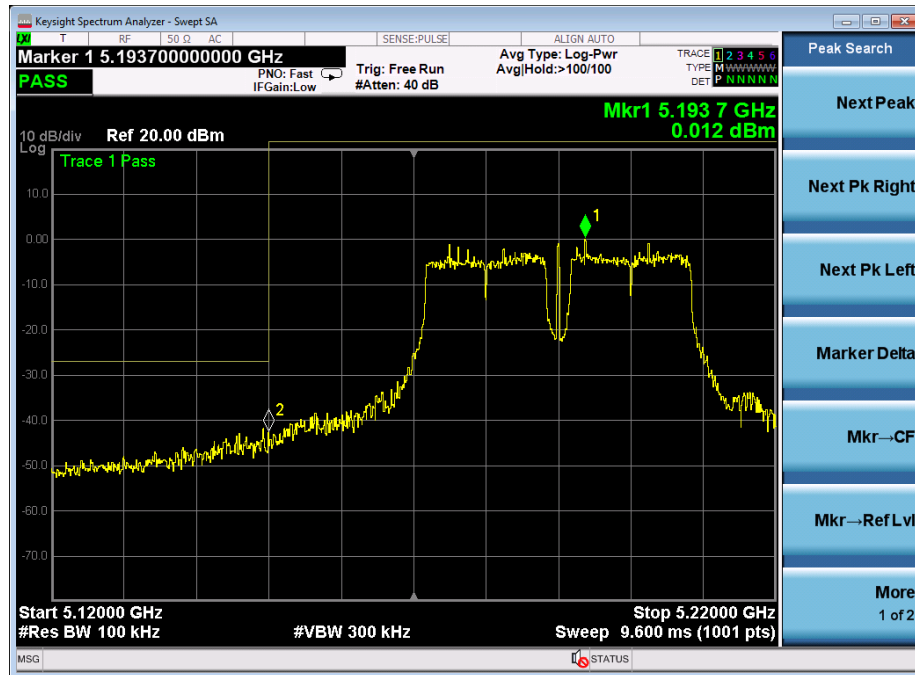
802.11n(20): Band Edge, Left Side



802.11n(20): Band Edge, Right Side



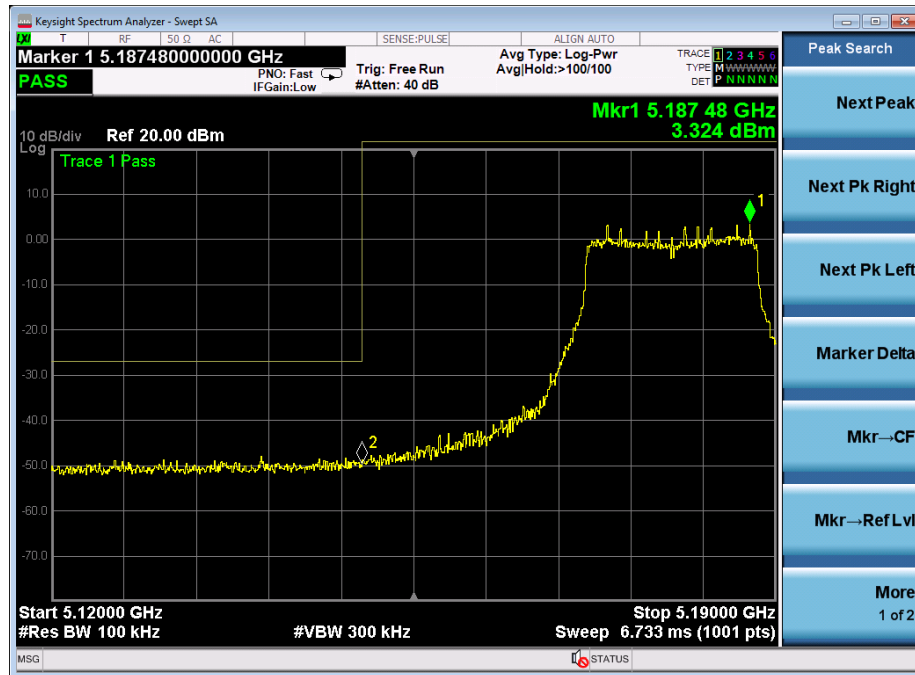
802.11ac(20): Band Edge, Left Side



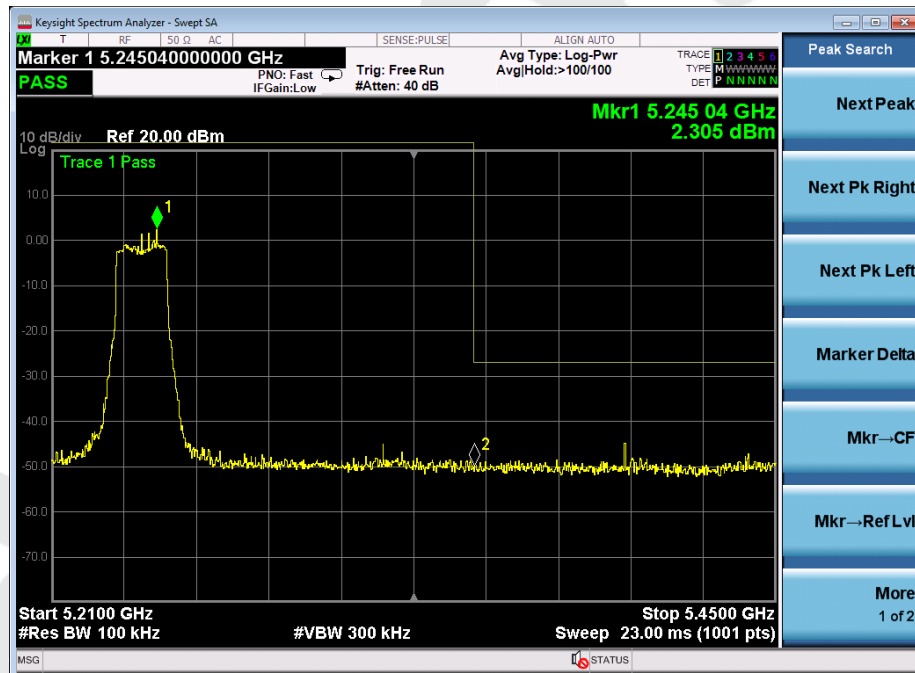
802.11ac(20): Band Edge, Right Side



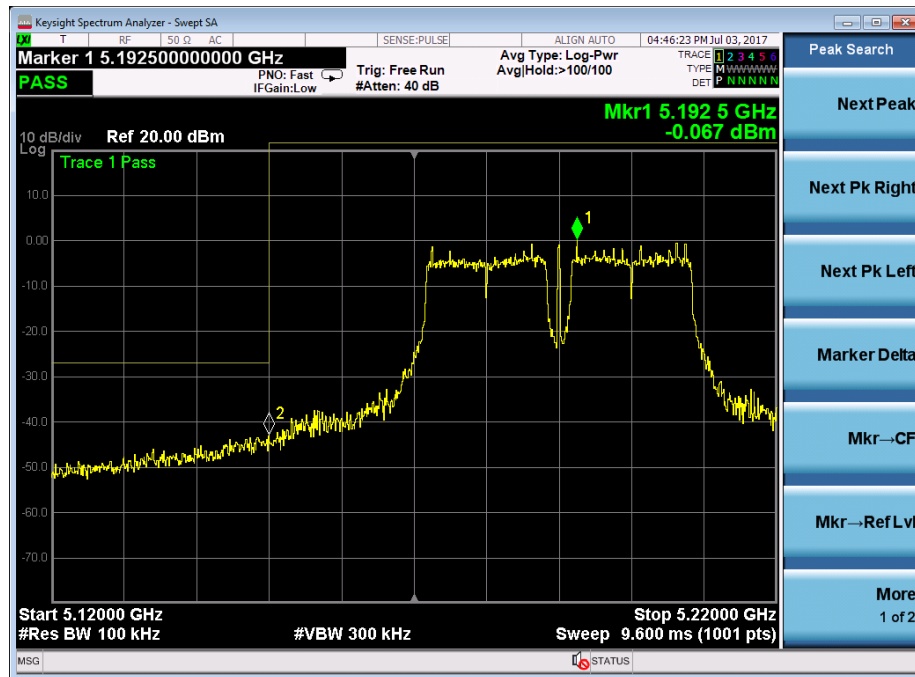
802.11n(40): Band Edge, Left Side



802.11n(40): Band Edge, Right Side



802.11ac(40): Band Edge, Left Side



802.11ac(40): Band Edge, Right Side



802.11ac(80): Band Edge, Left Side & Right Side

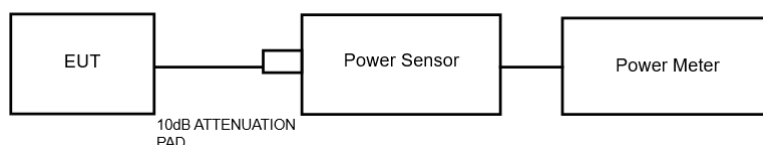


5. Maximum Peak Output Power Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.407 (a)(1) (3)
Test Limit	24dBm

5.2. Test Setup



5.3. Test Procedure

1. The Transmitter output (antenna port) was connected to the power meter.
2. Turn on the EUT and power meter and then record the power value.
3. Repeat above procedures on all channels needed to be tested.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

5.4. Test Data

Test Item	:	Max. peak output power	Test Mode	:	CH Low ~ CH High
Test Voltage	:	AC 120V/60Hz	Temperature	:	24°C
Test Result	:	PASS	Humidity	:	55%RH

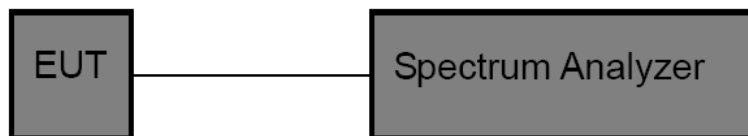
Mode	Channel Frequency (MHz)	Peak Power output (dBm)	Limit (dBm)	Results
802.11a	5180	13.69	24.00	PASS
	5200	14.08	24.00	PASS
	5240	14.32	24.00	PASS
802.11n20	5180	14.77	24.00	PASS
	5200	14.43	24.00	PASS
	5240	14.96	24.00	PASS
802.11ac20	5180	13.22	24.00	PASS
	5200	13.69	24.00	PASS
	5240	13.44	24.00	PASS
802.11n40	5190	12.47	24.00	PASS
	5230	13.27	24.00	PASS
802.11ac40	5190	13.17	24.00	PASS
	5230	13.03	24.00	PASS
802.11ac80	5210	13.72	24.00	PASS

6. Occupy Bandwidth Test

6.1. Test Standard

Test Standard	FCC Part15 C Section 15.407 (a)(5)
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6.2. Test Setup



6.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

3. Set the spectrum analyzer as:

26 dB & 99% bandwidth

RBW = approximately 1% of the emission bandwidth;
Set the VBW > RBW;
Detector= Peak
Trace mode= Max hold.
Sweep- auto couple.

6 dB bandwidth

RBW = 100kHz;
Set the video bandwidth (VBW) ≥ 3 RBW;
Detector= Peak
Trace mode= Max hold.
Sweep- auto couple.

4. Measure the maximum width of the emission that is 26dB /6dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer.
5. Repeat until all the rest channels are investigated.

6.4. Test Data

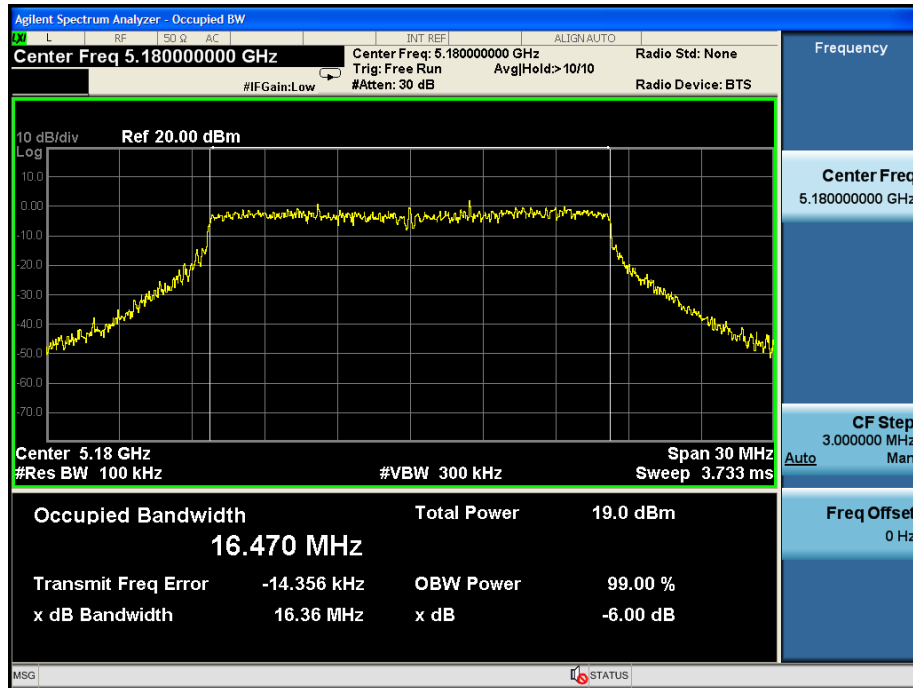
Test Item : 6dB & 26dB BW
Test Voltage : AC 120V/60Hz
Test Result : PASS

Test Mode : CH Low ~ CH High
Temperature : 24°C
Humidity : 55%RH

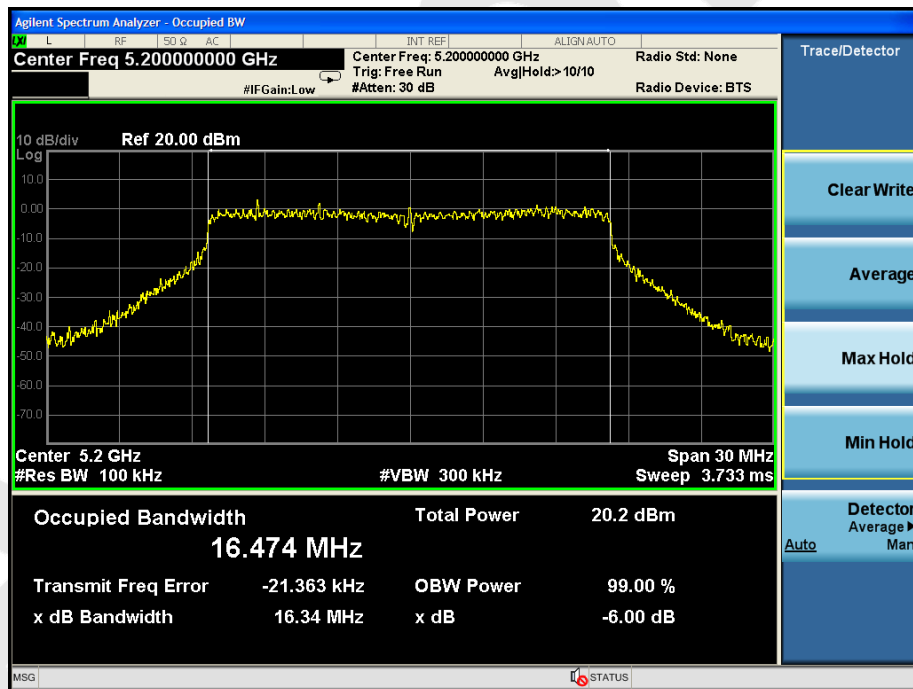
Mode	Channel Frequency (MHz)	6dB BW(MHz)	Limit	Results
802.11a	5180	16.36	>0.5MHz	PASS
	5200	16.34		PASS
	5240	16.35		PASS
802.11n20	5180	17.57		PASS
	5200	17.56		PASS
	5240	17.56		PASS
802.11ac20	5180	14.51		PASS
	5200	15.18		PASS
	5240	15.18		PASS
802.11n40	5190	36.04		PASS
	5230	33.84		PASS
802.11ac40	5190	35.16		PASS
	5230	35.12		PASS
802.11ac80	5210	75.33		PASS

Mode	Channel Frequency (MHz)	26dB BW(MHz)	99% Bandwidth (MHz)
802.11a	5180	21.49	17.653
	5200	20.30	16.589
	5240	20.33	16.567
802.11n20	5180	21.40	17.699
	5200	21.35	17.683
	5240	21.63	17.725
802.11ac20	5180	23.66	17.142
	5200	25.14	17.760
	5240	24.02	17.793
802.11n40	5190	40.72	36.142
	5230	39.91	36.151
802.11ac40	5190	43.55	36.139
	5230	44.64	36.144
802.11ac80	5210	81.41	75.509

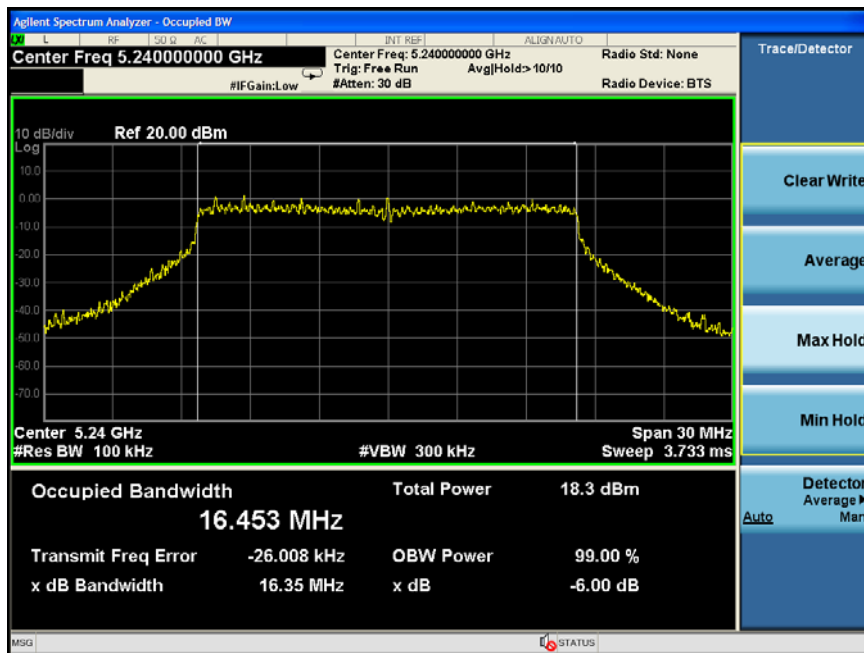
6dB Bandwidth



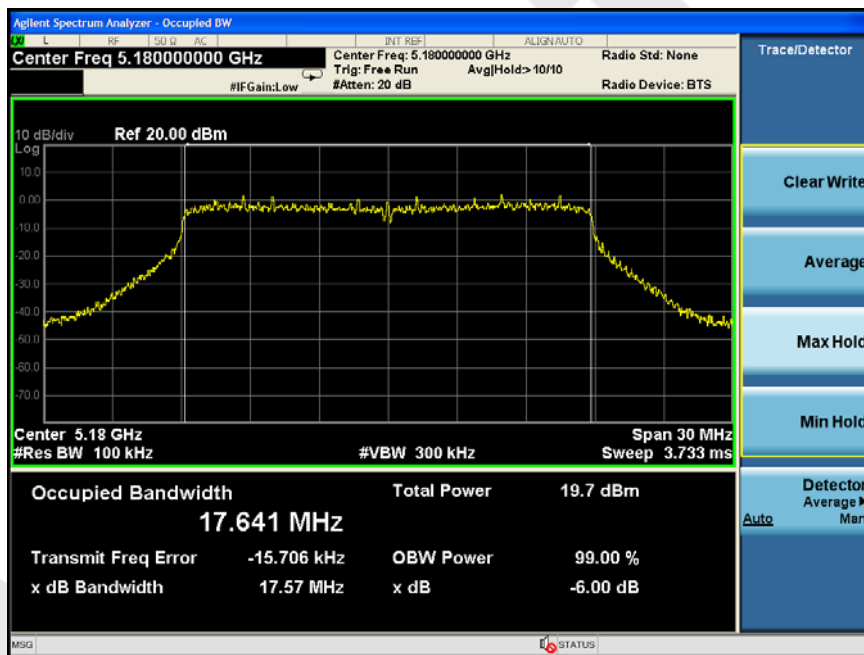
Test Mode: 802.11a--Low



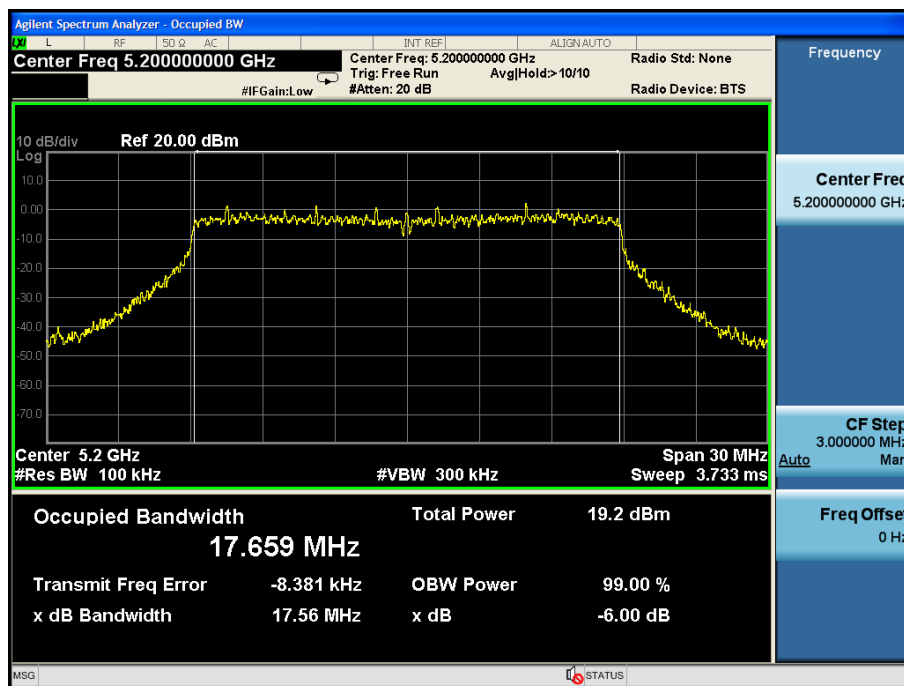
Test Mode: 802.11a---Middle



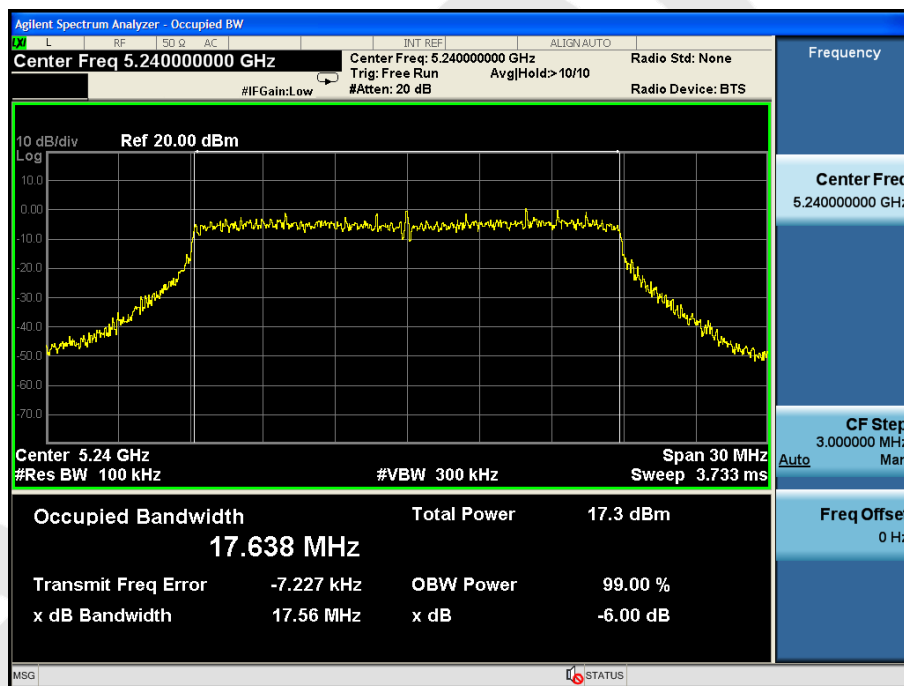
Test Mode: 802.11a---High



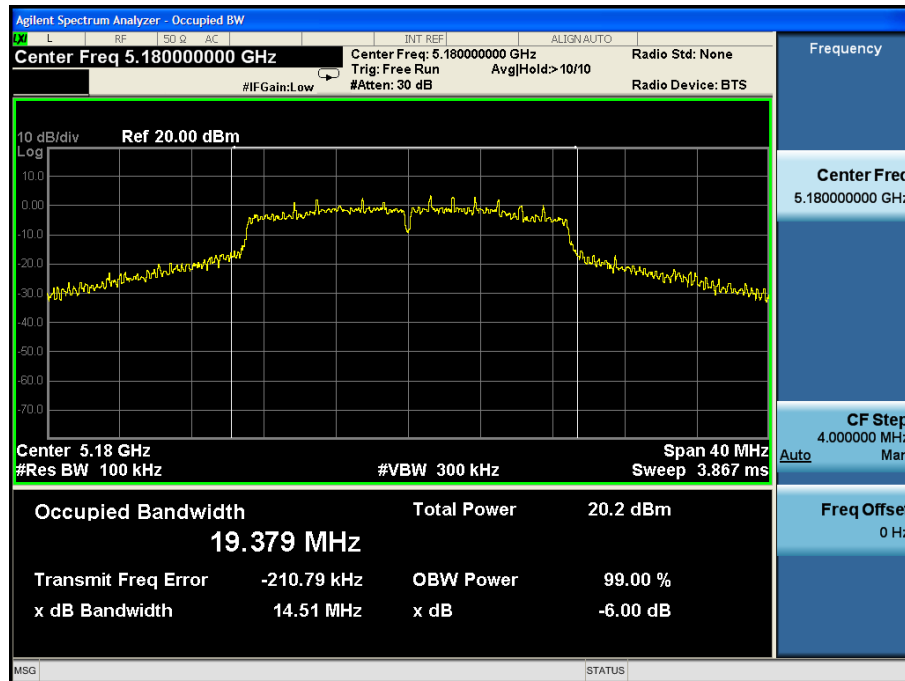
Test Mode: 802.11n20---Low



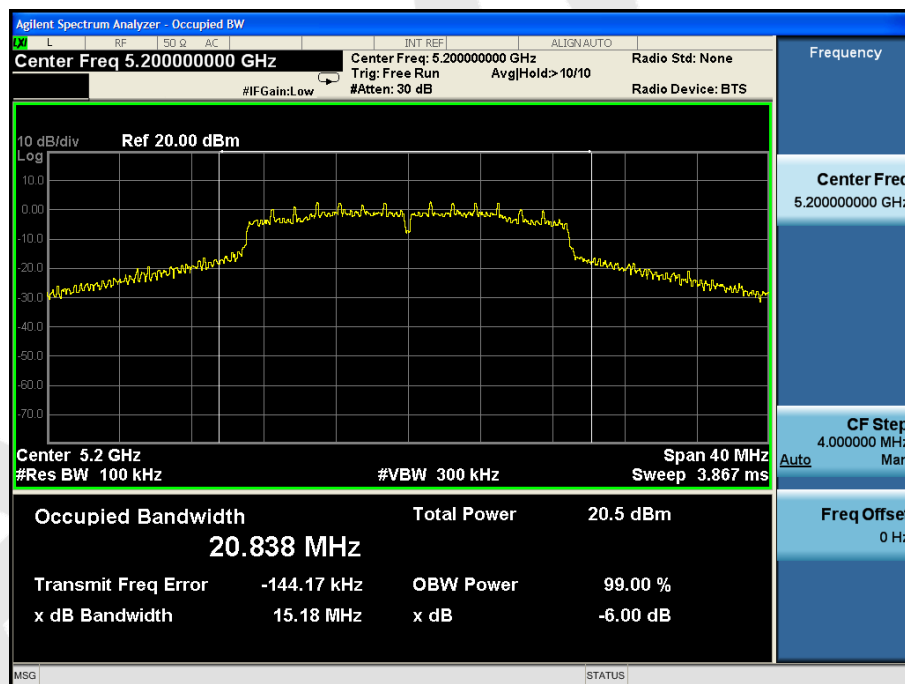
Test Mode: 802.11n20---Middle



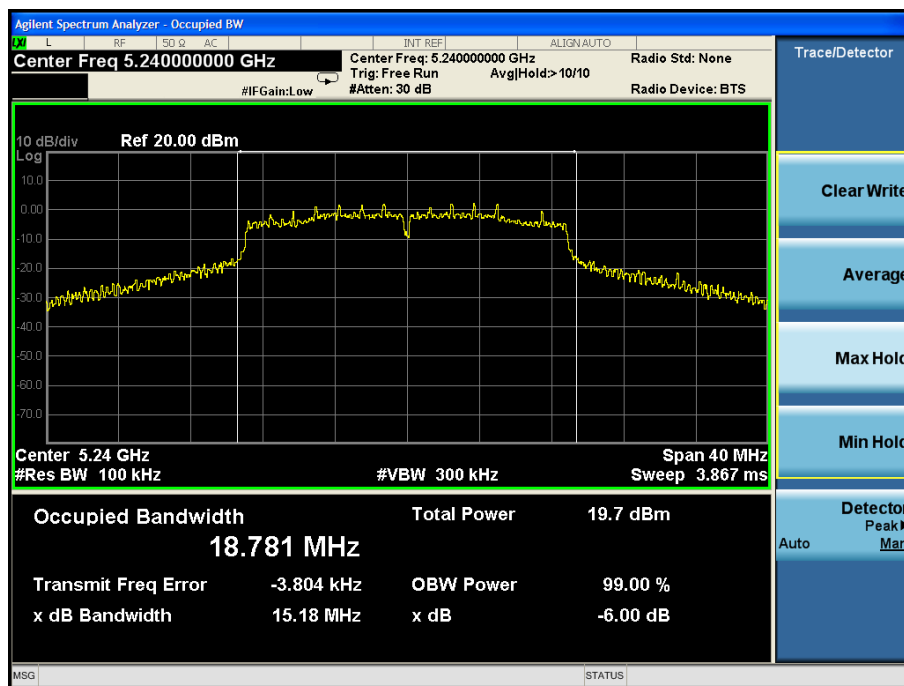
Test Mode: 802.11n20---High



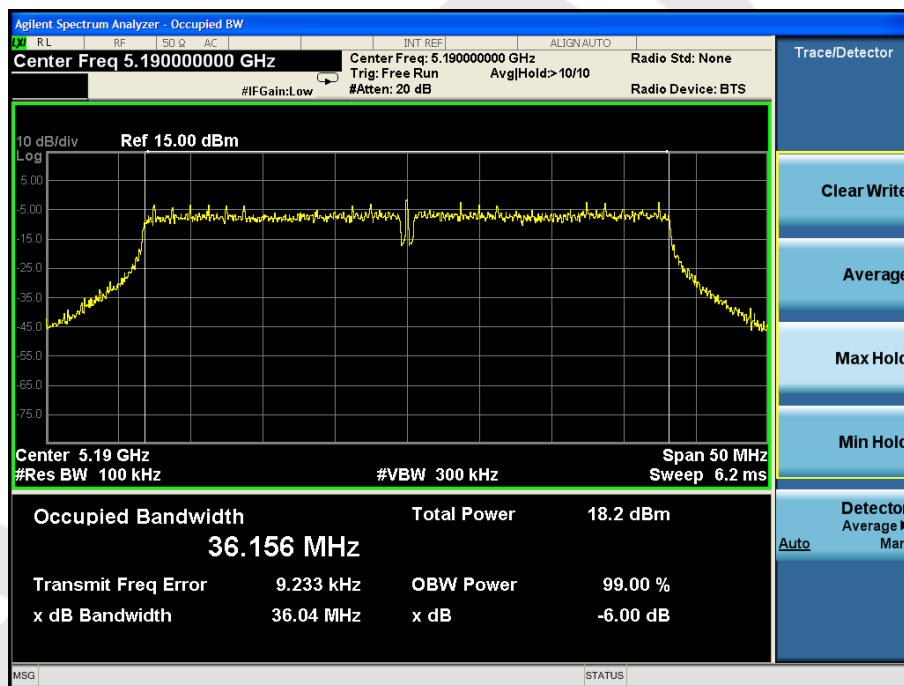
Test Mode: 802.11ac20--Low



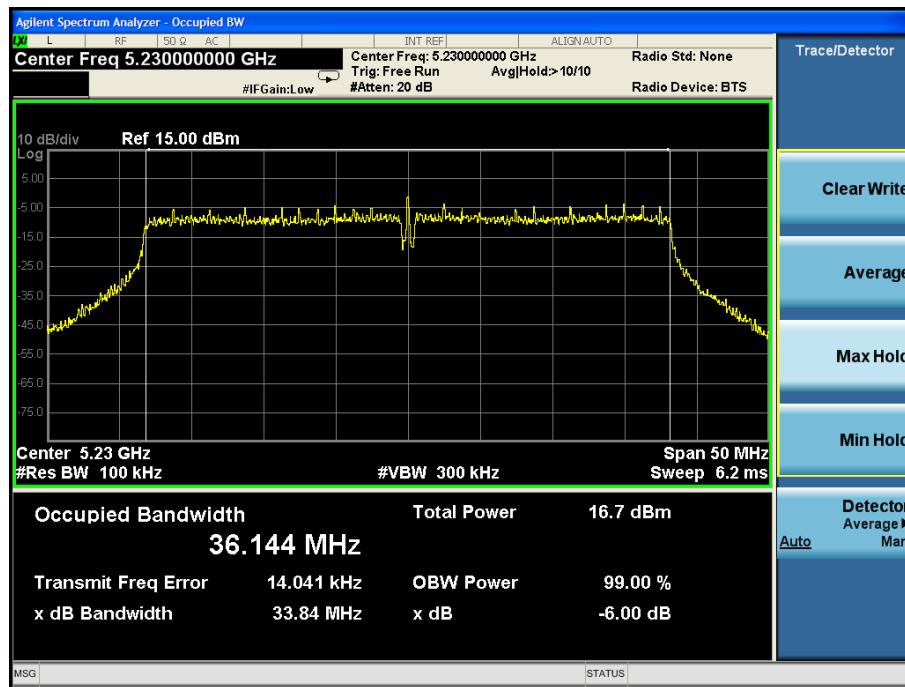
Test Mode: 802.11ac20---Middle



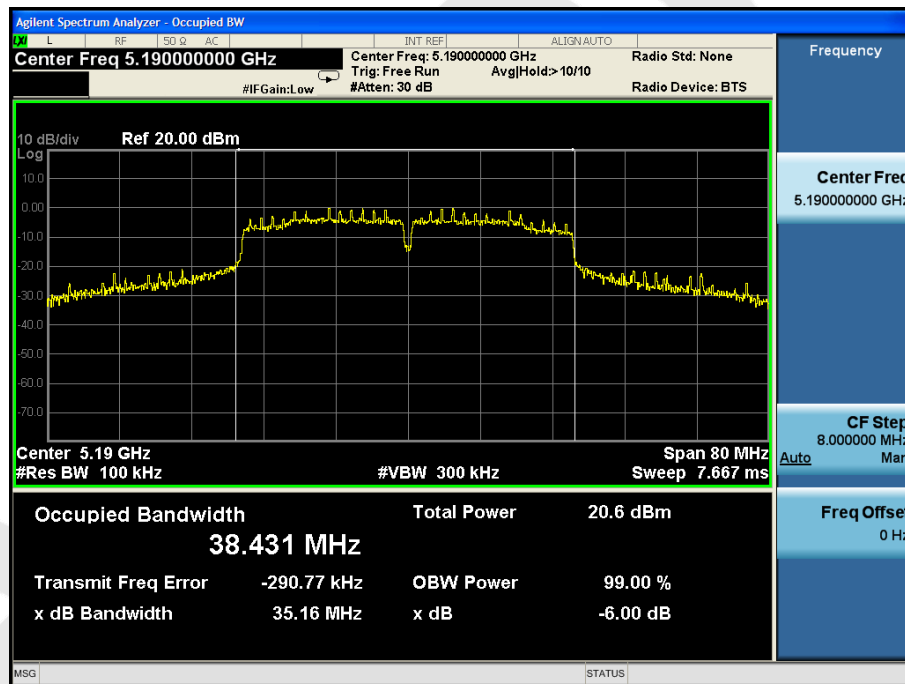
Test Mode: 802.11ac20---High



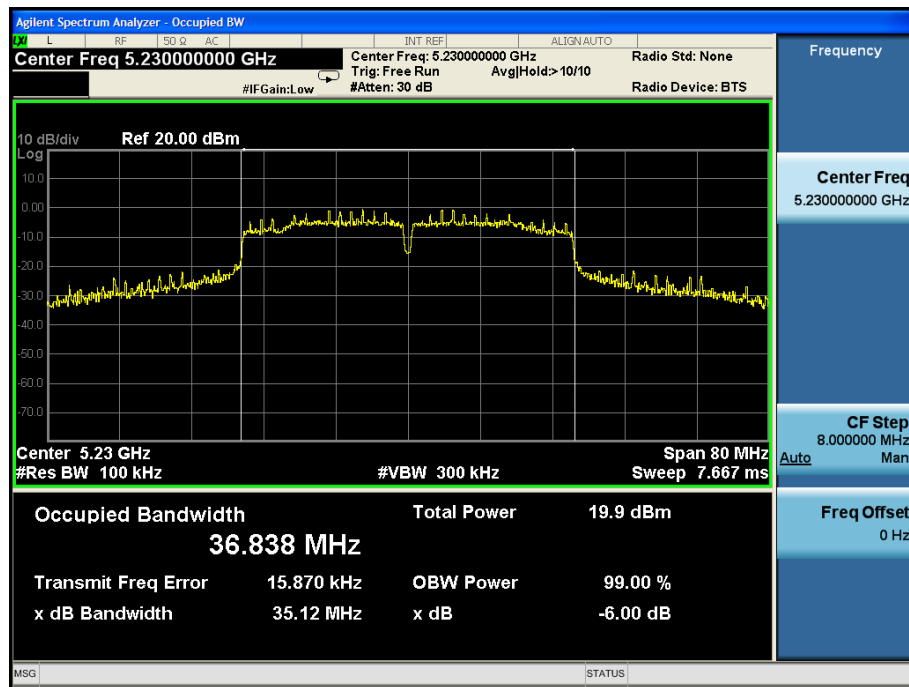
Test Mode: 802.11n40---Low



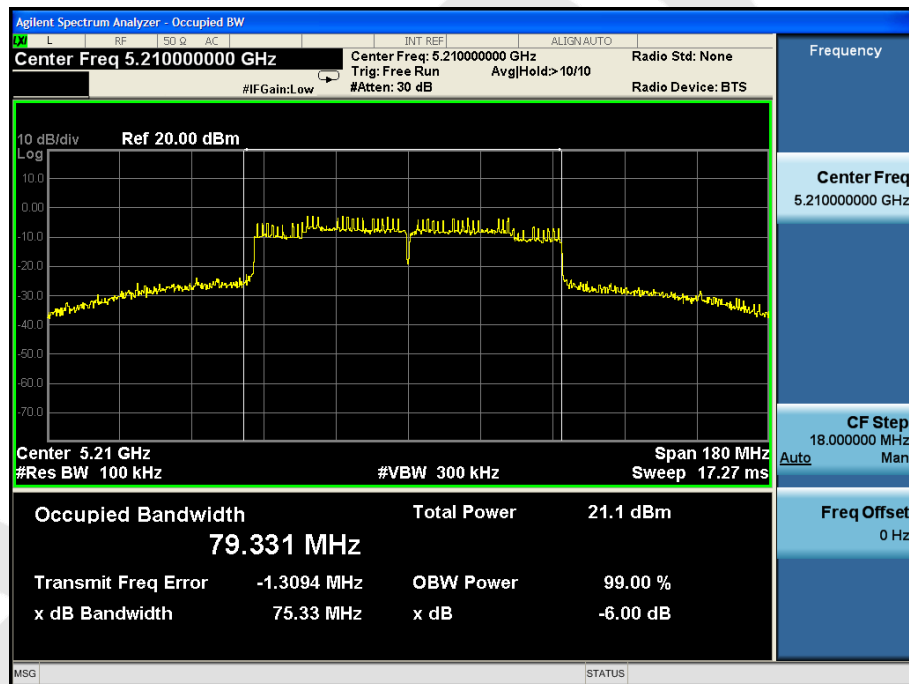
Test Mode: 802.11n40---High



Test Mode: 802.11ac40---Low

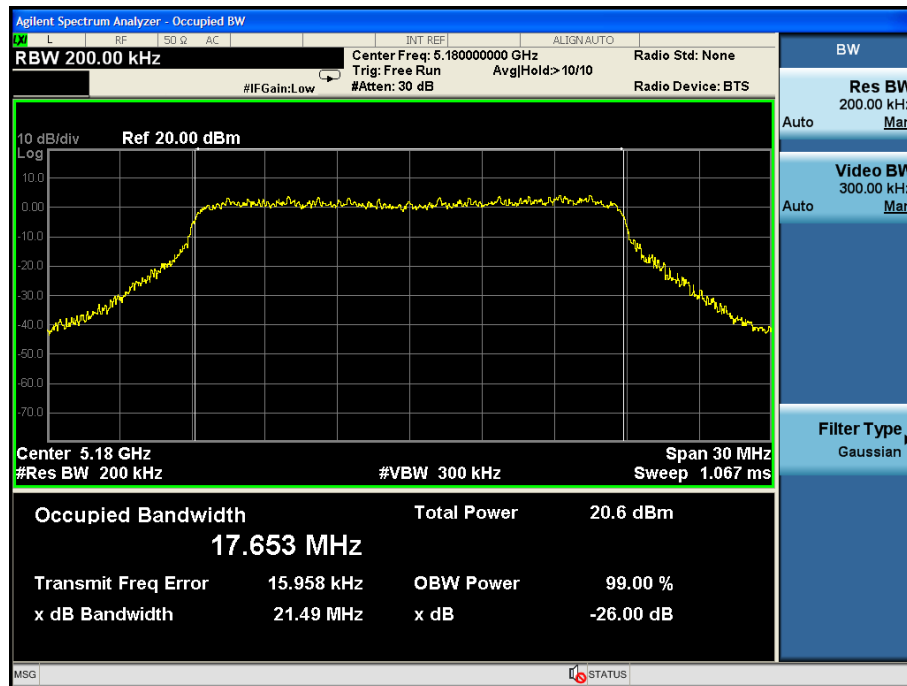


Test Mode: 802.11ac40---High

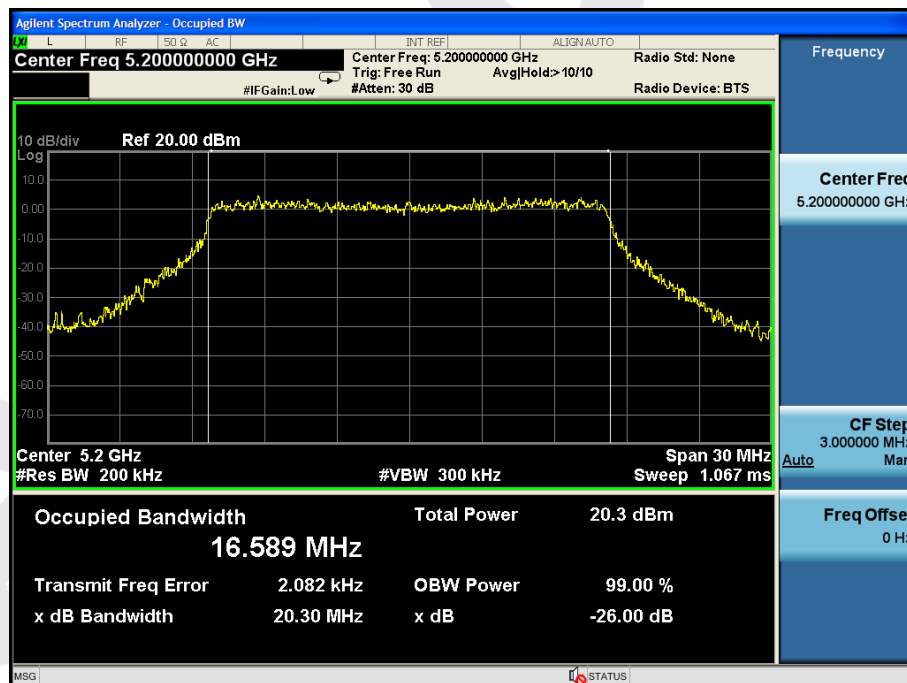


Test Mode: 802.11ac80

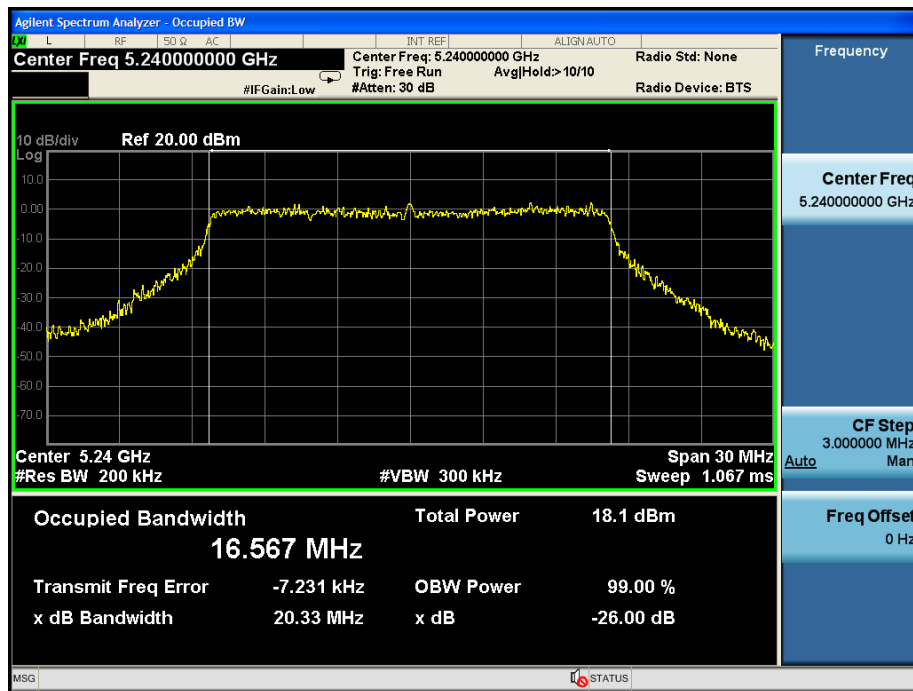
26dB & 99% Bandwidth



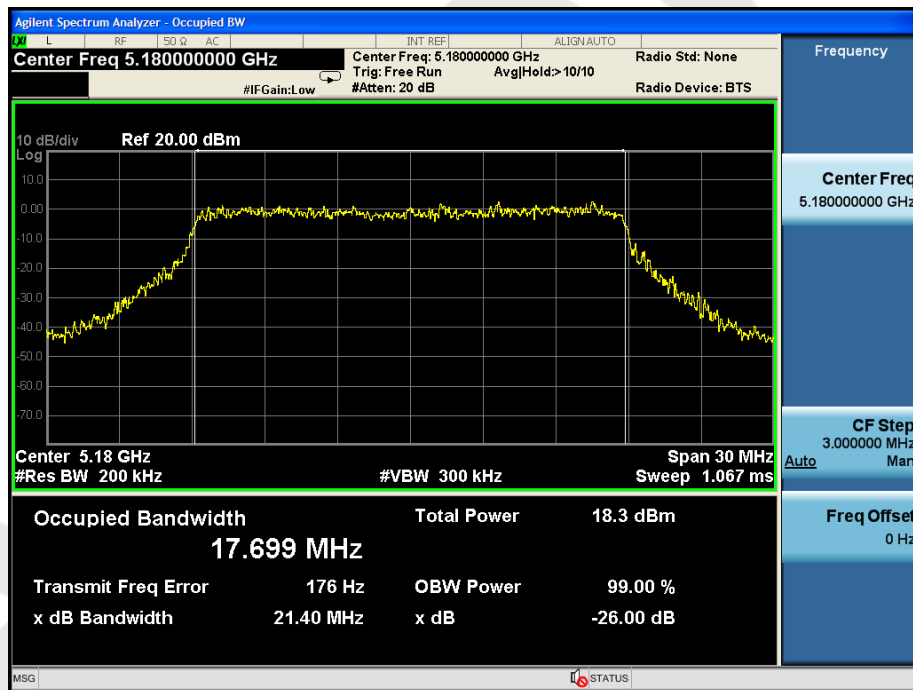
Test Mode: 802.11a--Low



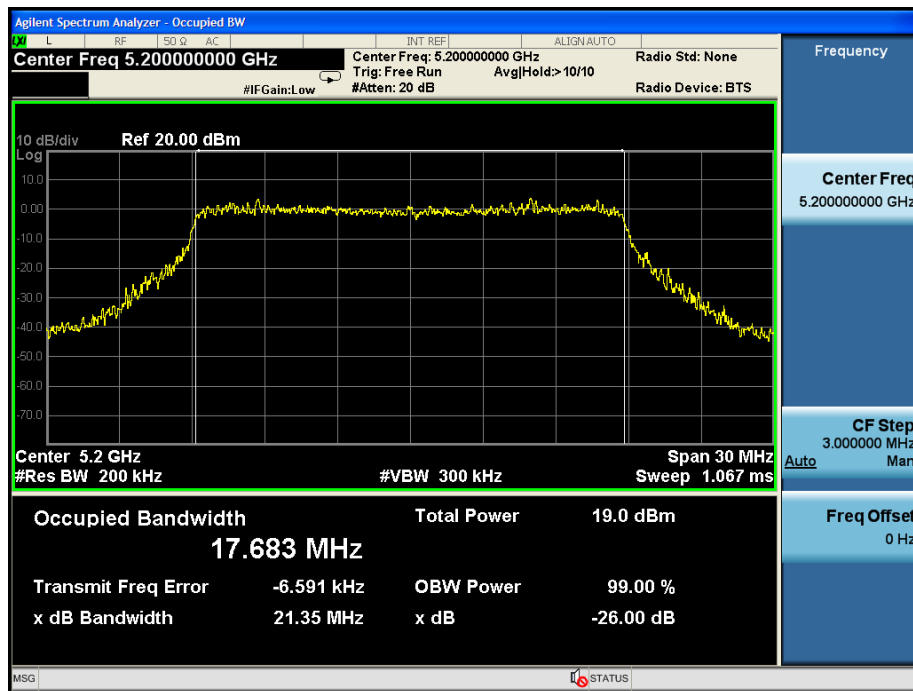
Test Mode: 802.11a---Middle



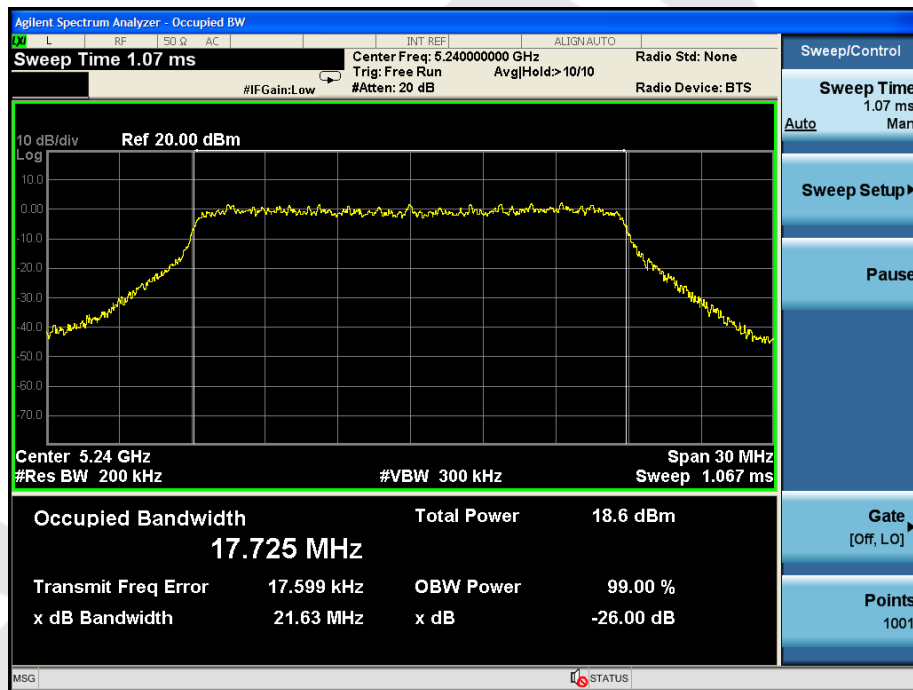
Test Mode: 802.11a---High



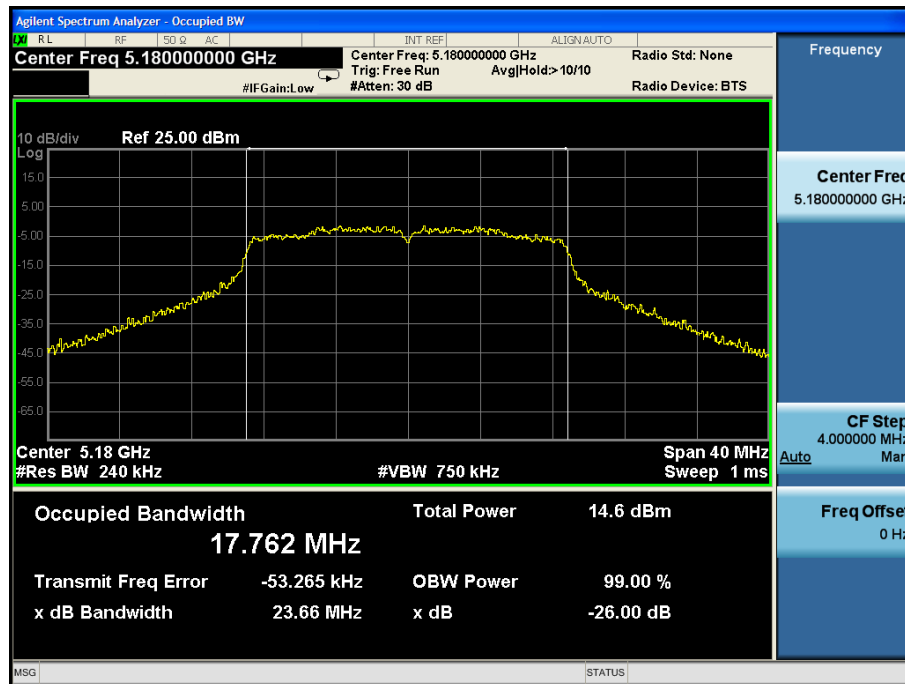
Test Mode: 802.11n20---Low



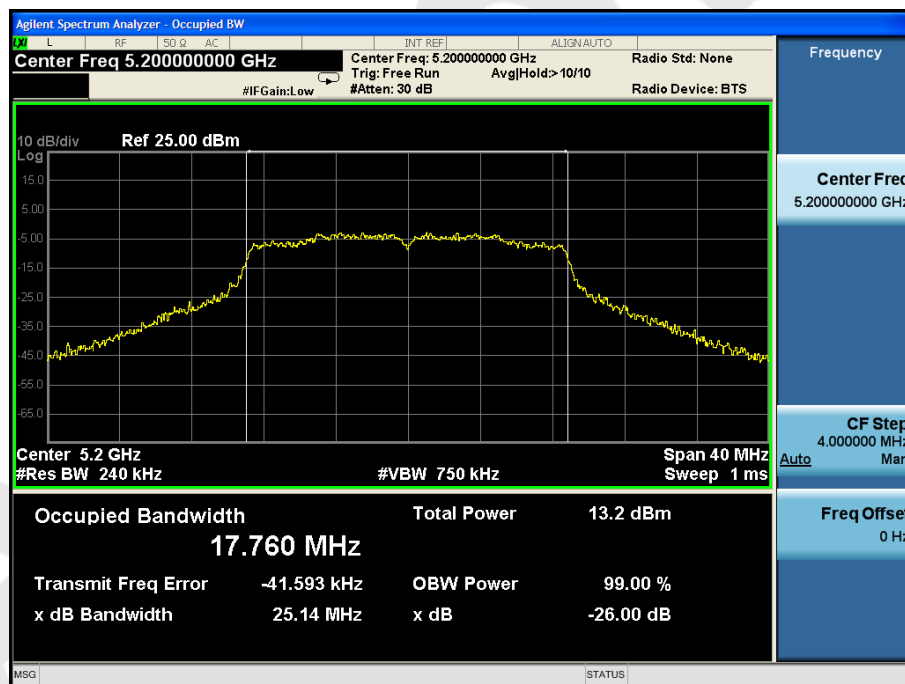
Test Mode: 802.11n20---Middle



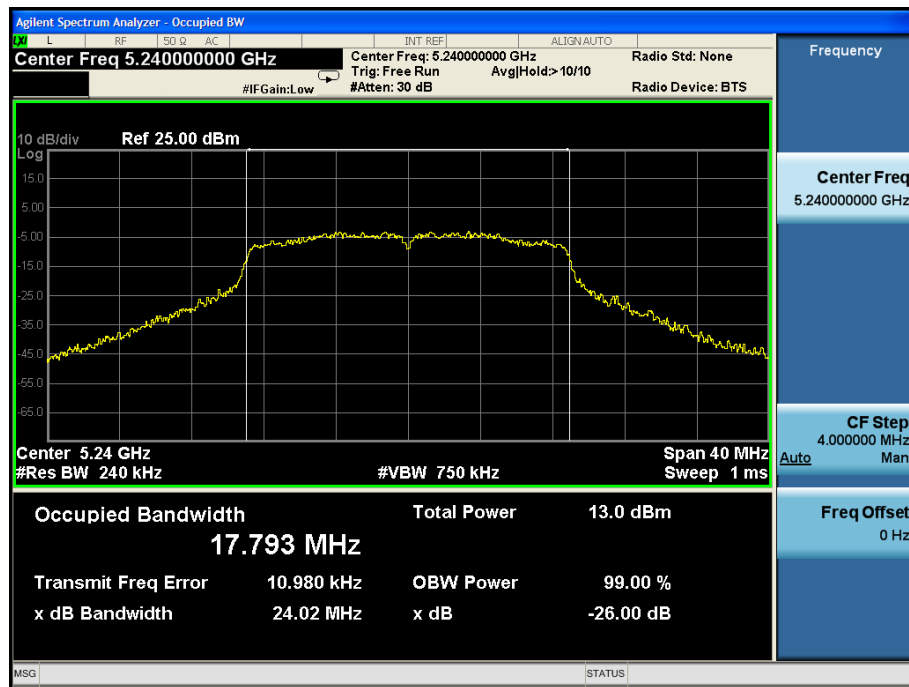
Test Mode: 802.11n20---High



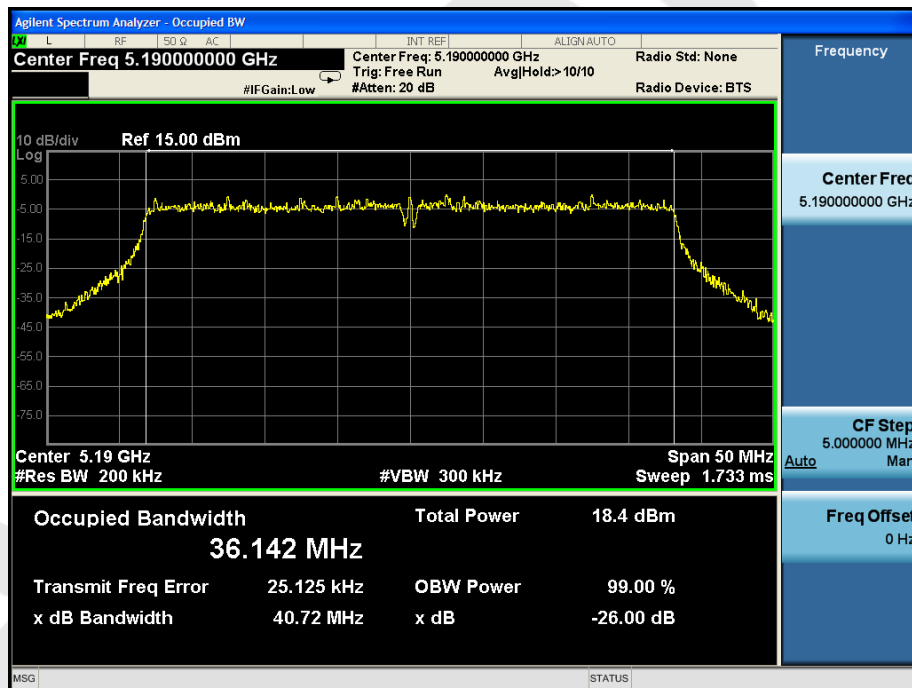
Test Mode: 802.11ac20--Low



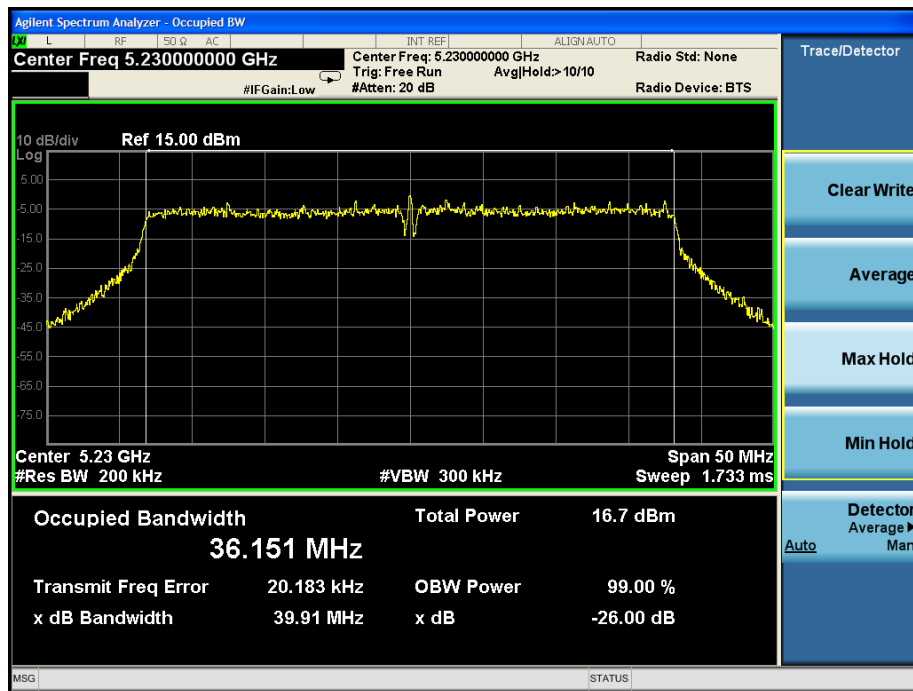
Test Mode: 802.11ac20---Middle



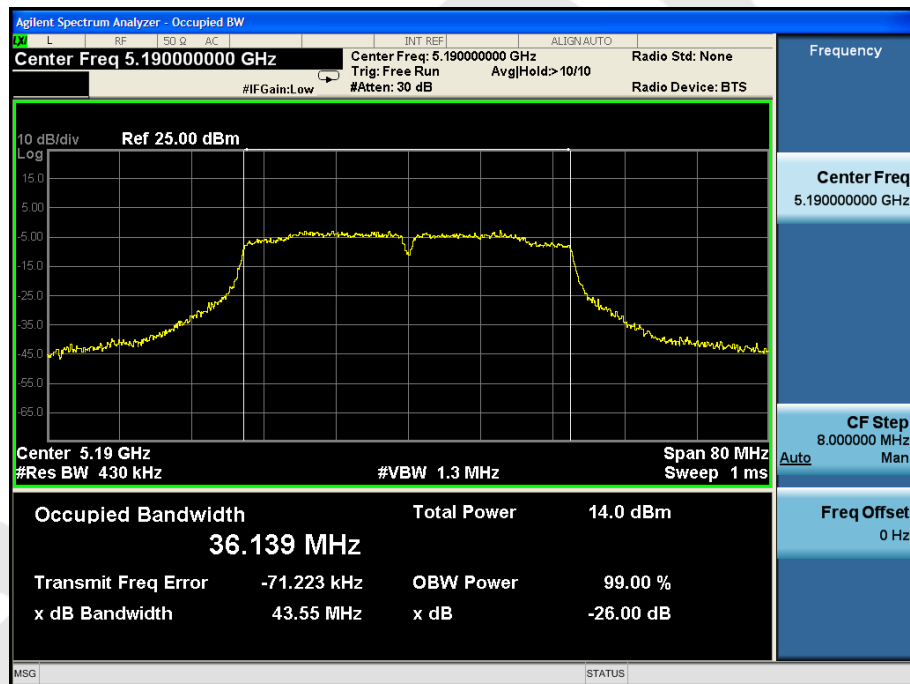
Test Mode: 802.11ac20---High



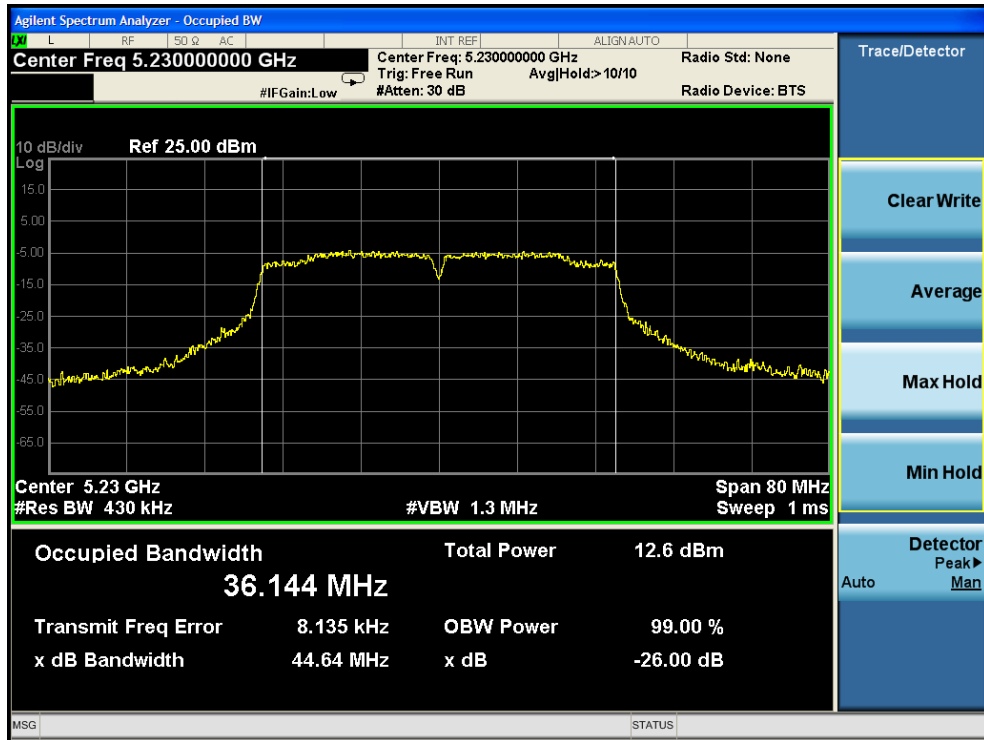
Test Mode: 802.11n40---Low



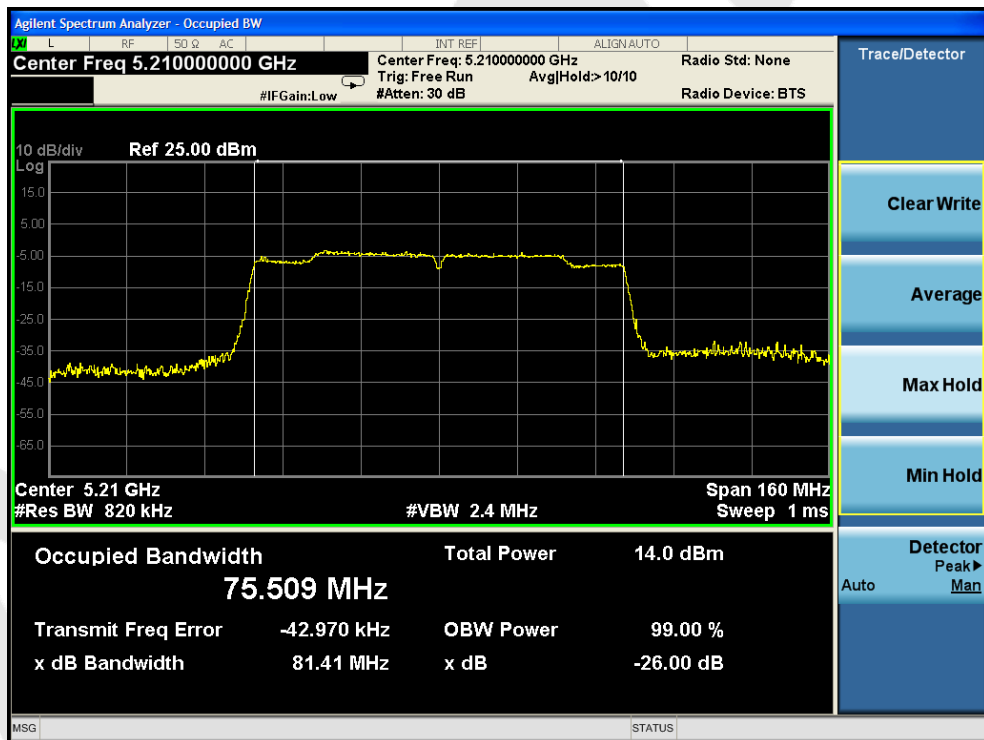
Test Mode: 802.11n40---High



Test Mode: 802.11ac40---Low



Test Mode: 802.11ac40---High



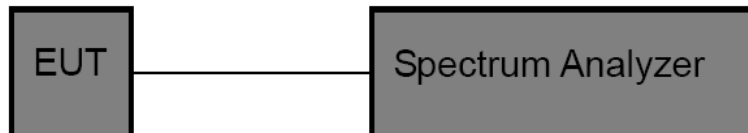
Test Mode: 802.11ac80

7. Power Spectral Density Test

7.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.407 (a) (1) (2) (3)
Test Limit	11dBm

7.2. Test Setup



7.3. Test Procedure

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz).

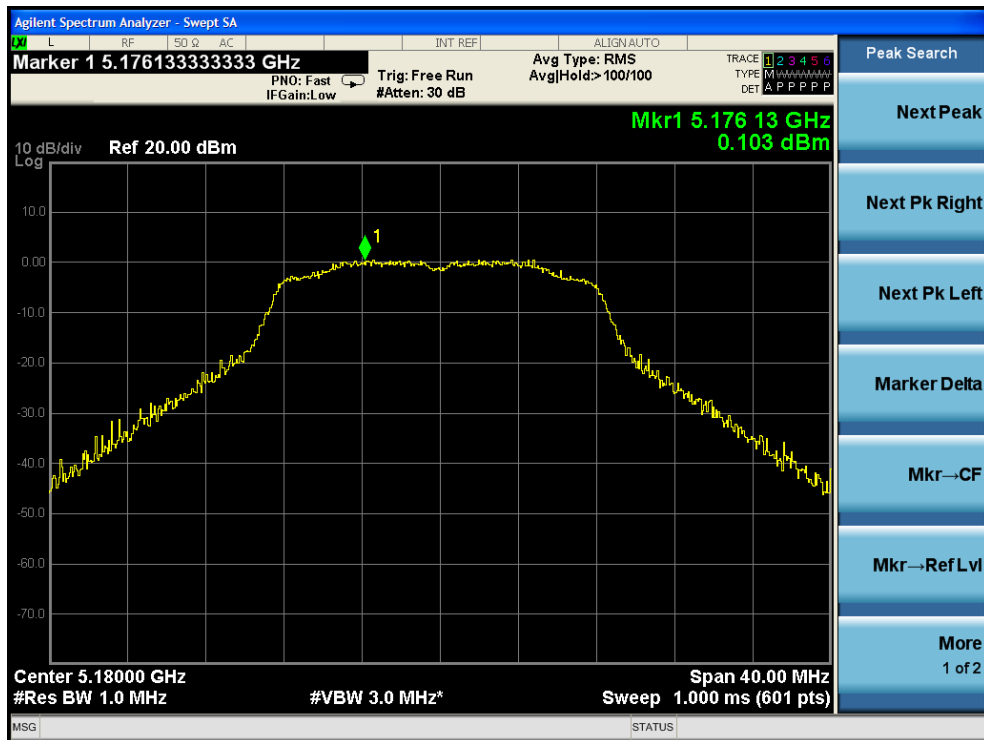
1. The EUT is directly connected to the spectrum analyzer;
2. Set RBW =1MHz;
3. Set VBW $\geq$ 3 RBW=3MHz;
3. Set the span to encompass the entire emissions bandwidth (EBW) of the signal;
5. Detector=RMS;
6. Sweep time= auto couple;
7. Trace mode=max. hold;

7.4. Test Data

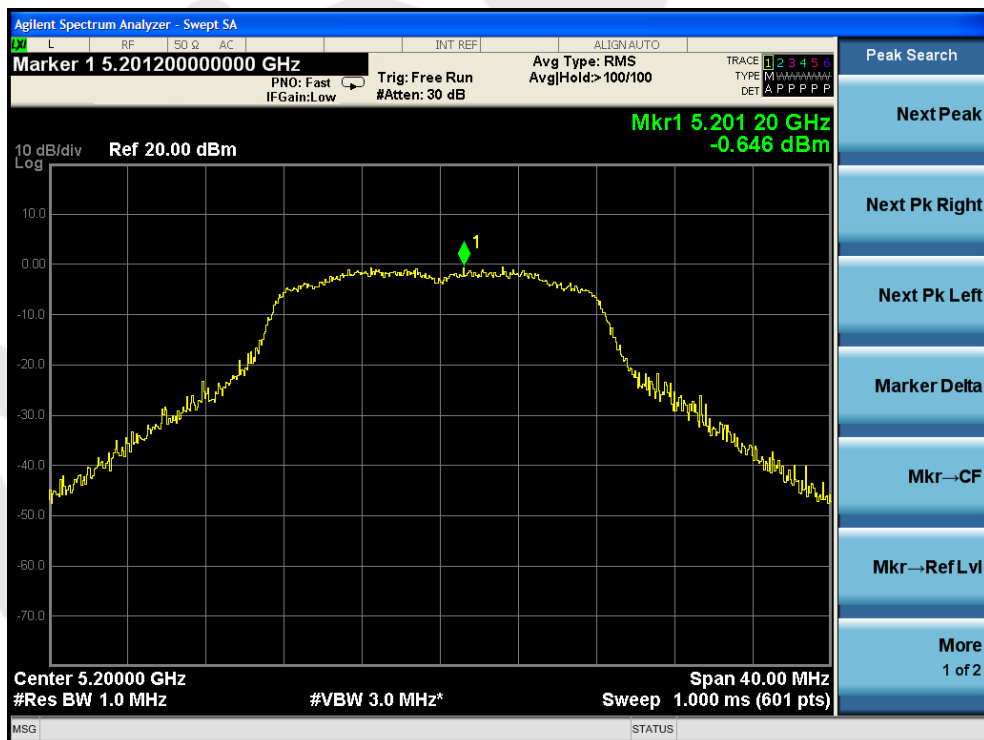
Test Item : Power Spectral Density
Test Voltage : AC 120V/60HZ
Test Result : PASS

Test Mode : CH Low ~ CH High
Temperature : 24°C
Humidity : 55%RH

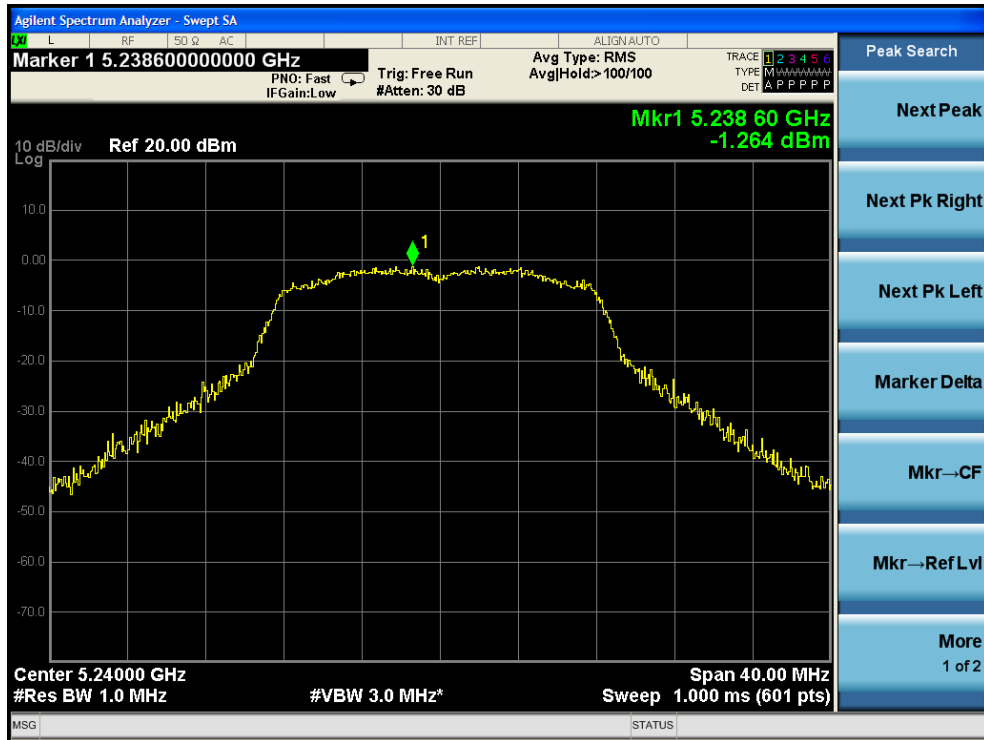
Mode	Channel Frequency (MHz)	Final Power Spectral Density (dBm)	Limit	Results
802.11a	5180	0.103	11dBm	PASS
	5200	-0.646		PASS
	5240	-1.264		PASS
802.11n20	5180	-0.451		PASS
	5200	-1.621		PASS
	5240	-1.175		PASS
802.11ac20	5180	-0.820		PASS
	5200	-0.903		PASS
	5240	-1.993		PASS
802.11n40	5190	-4.239		PASS
	5230	-4.782		PASS
802.11ac40	5190	-4.269		PASS
	5230	-4.690		PASS
802.11ac80	5190	-7.420		PASS



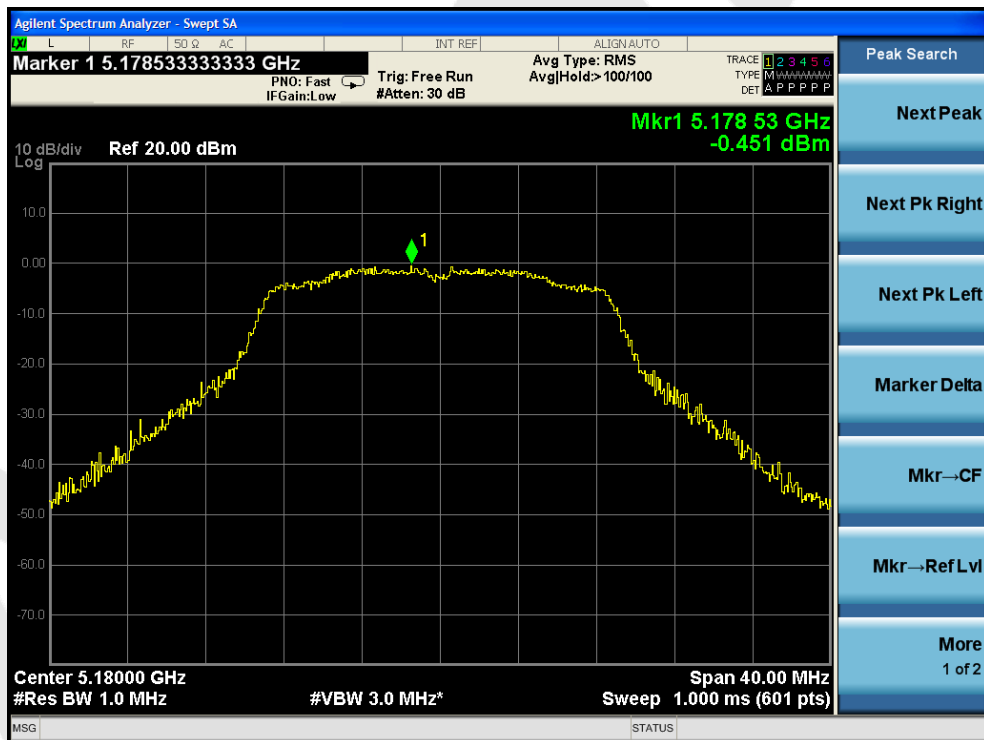
Test Mode: 802.11a--Low



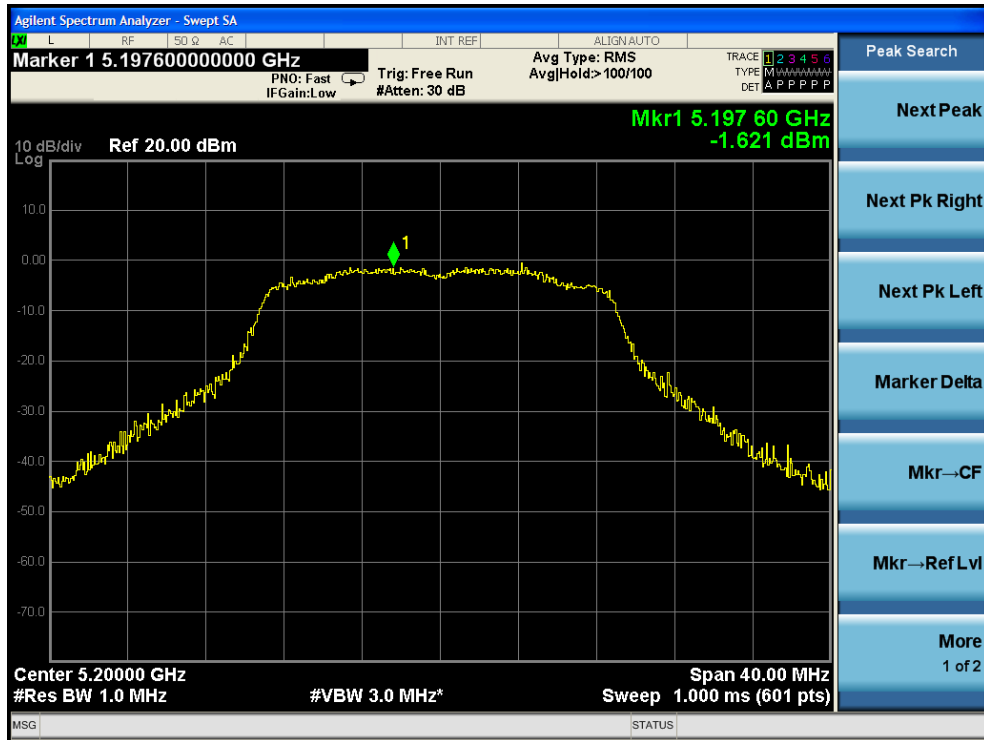
Test Mode: 802.11a---Middle



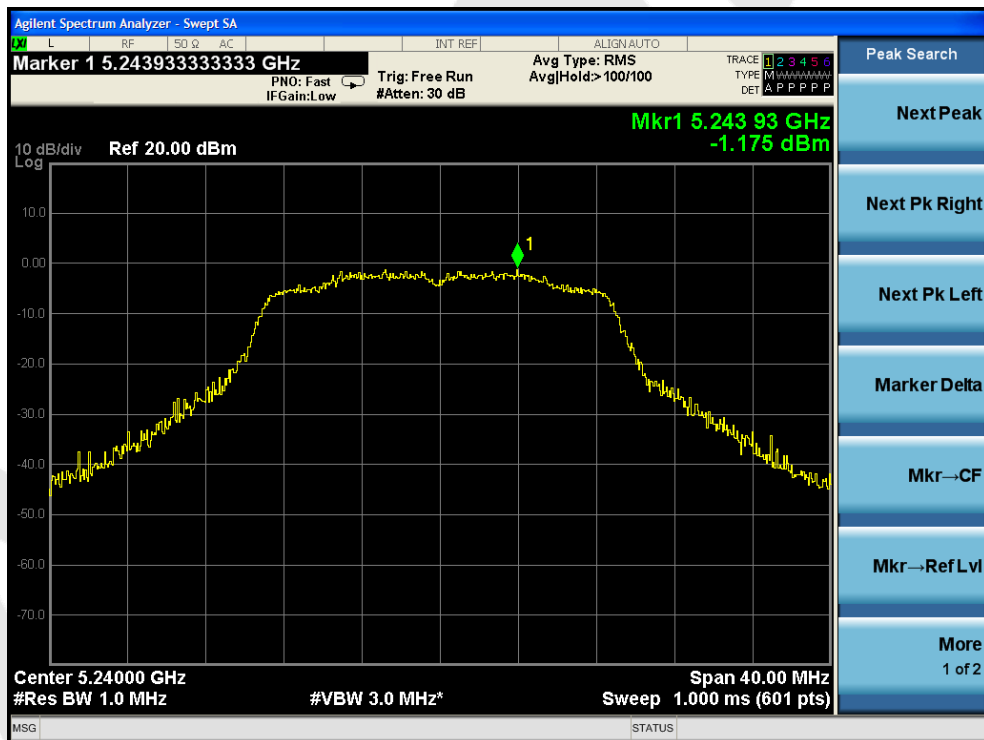
Test Mode: 802.11a---High



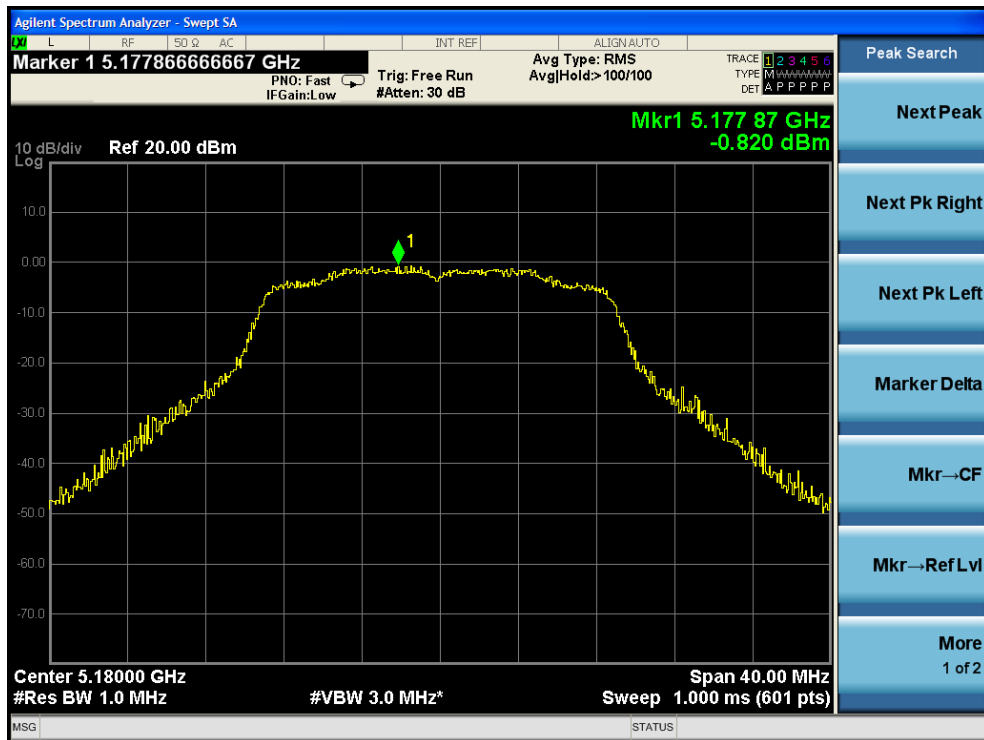
Test Mode: 802.11n20---Low



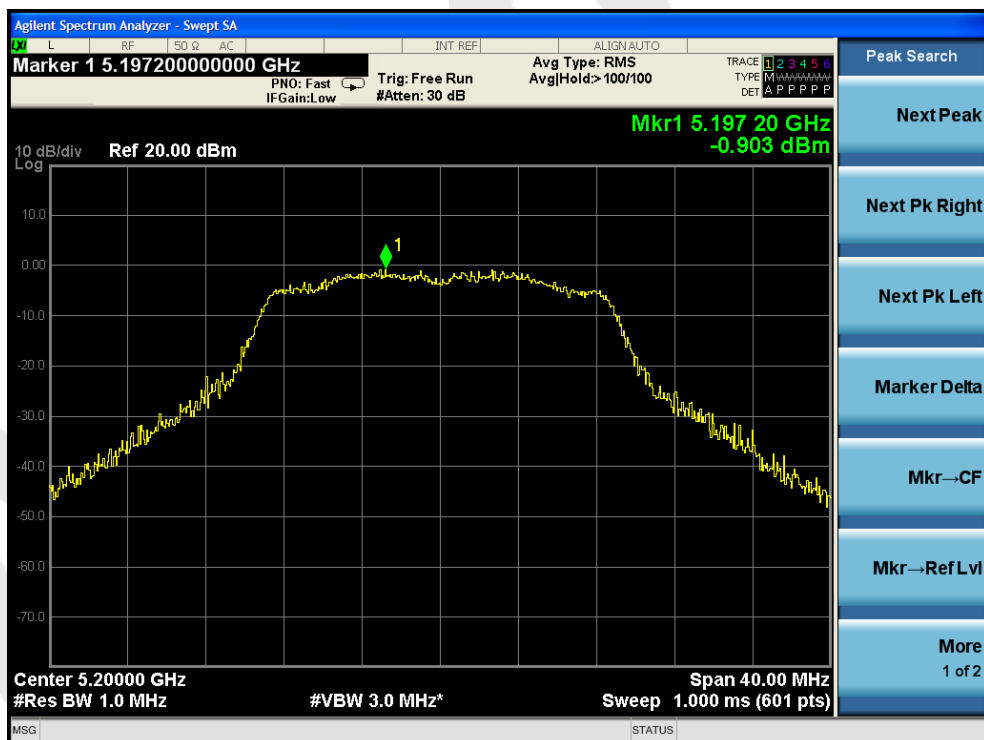
Test Mode: 802.11n20---Middle



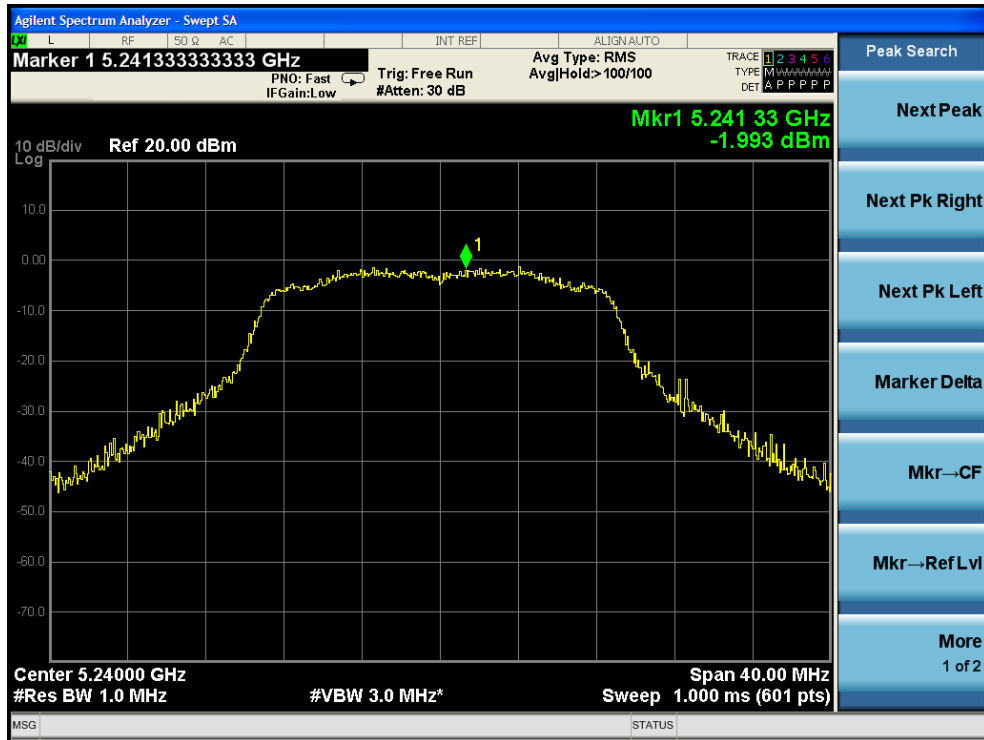
Test Mode: 802.11n20---High



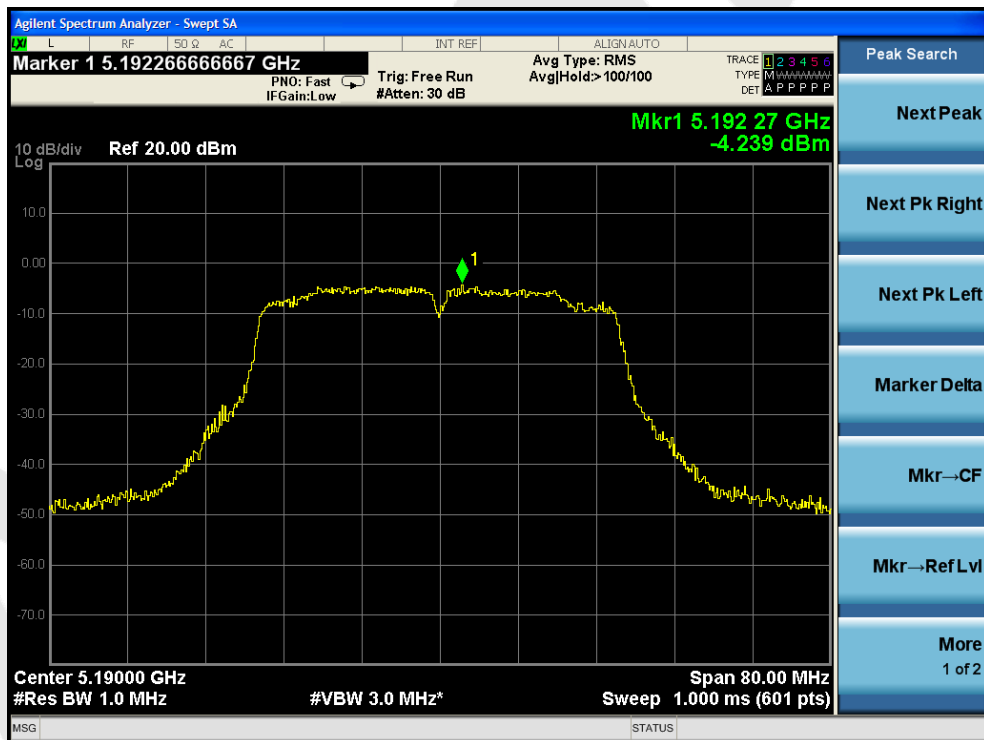
Test Mode: 802.11ac20--Low



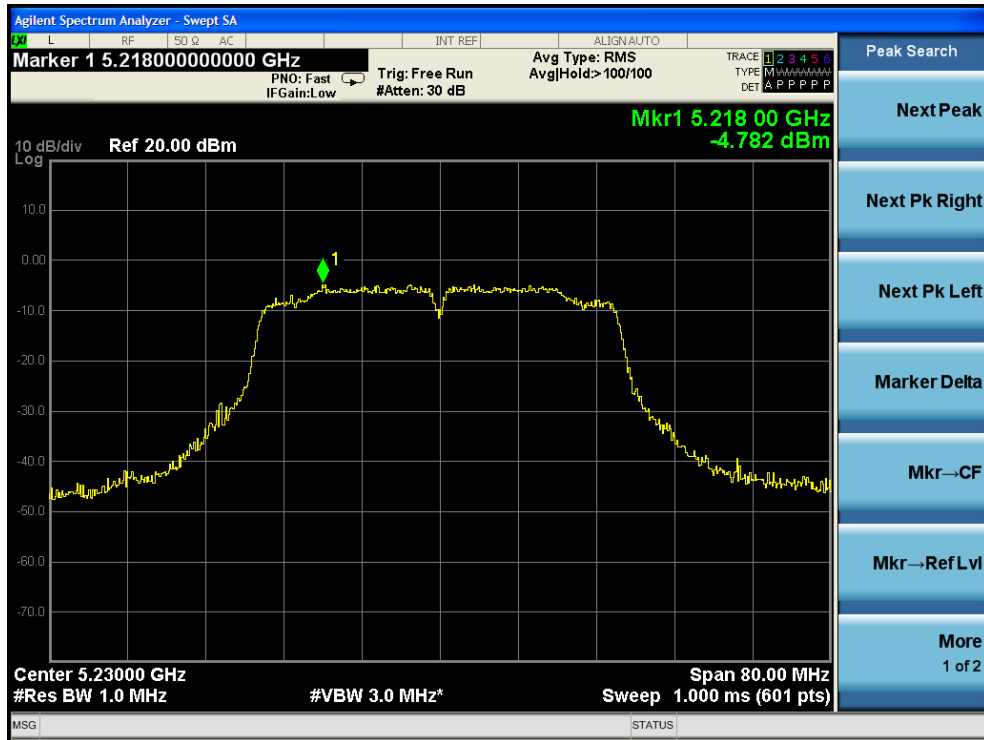
Test Mode: 802.11ac20---Middle



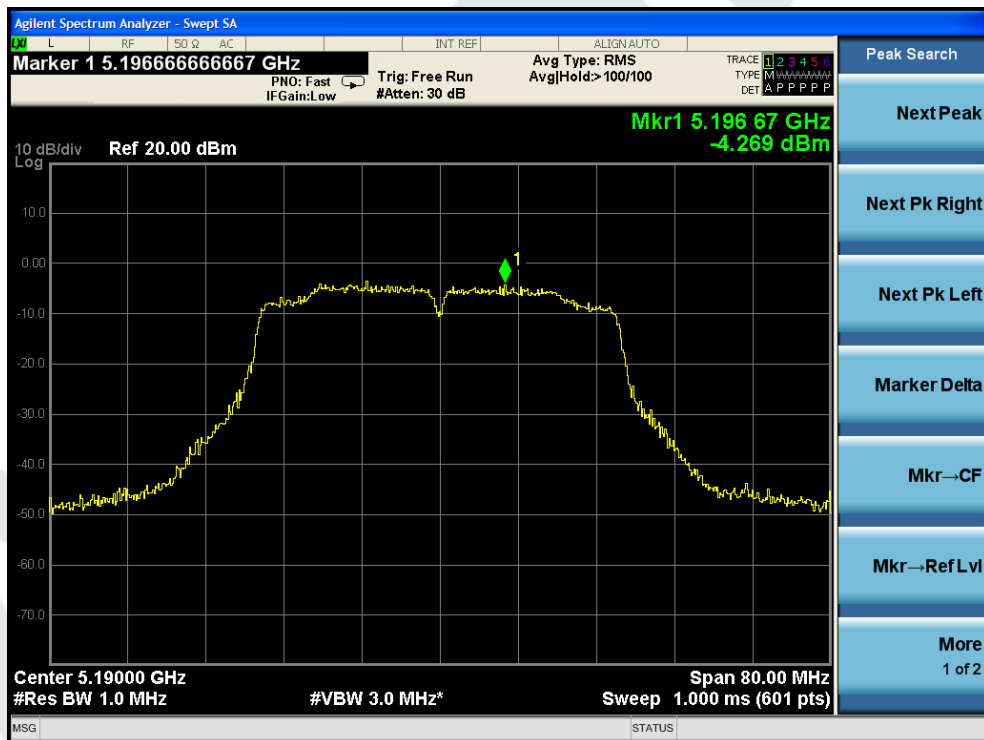
Test Mode: 802.11ac20---High



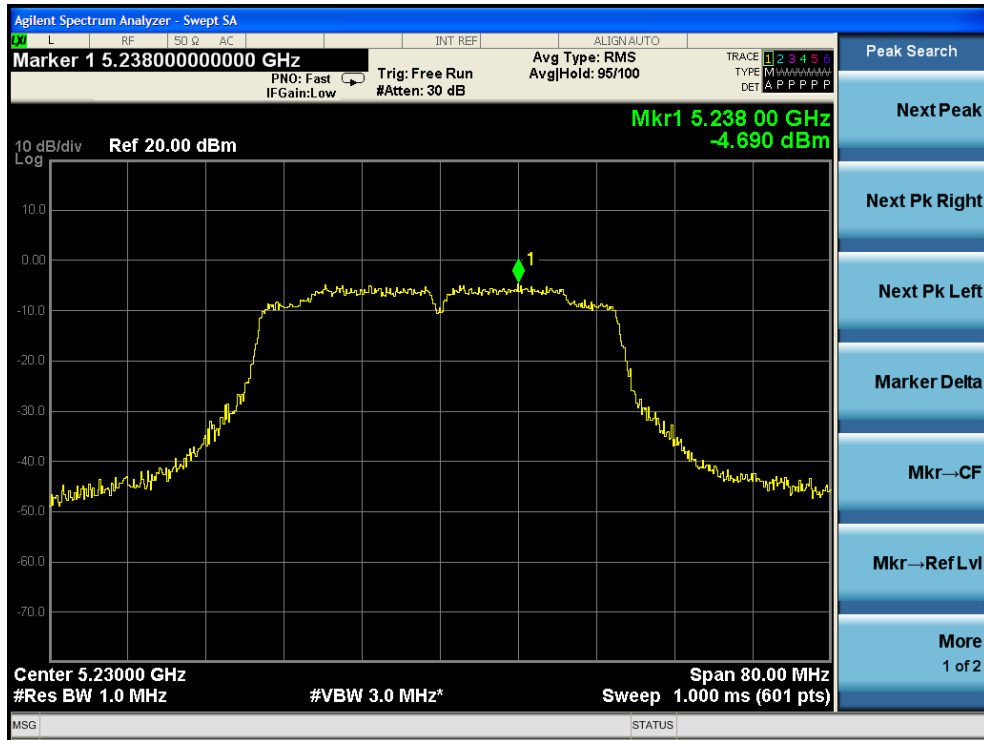
Test Mode: 802.11n40---Low



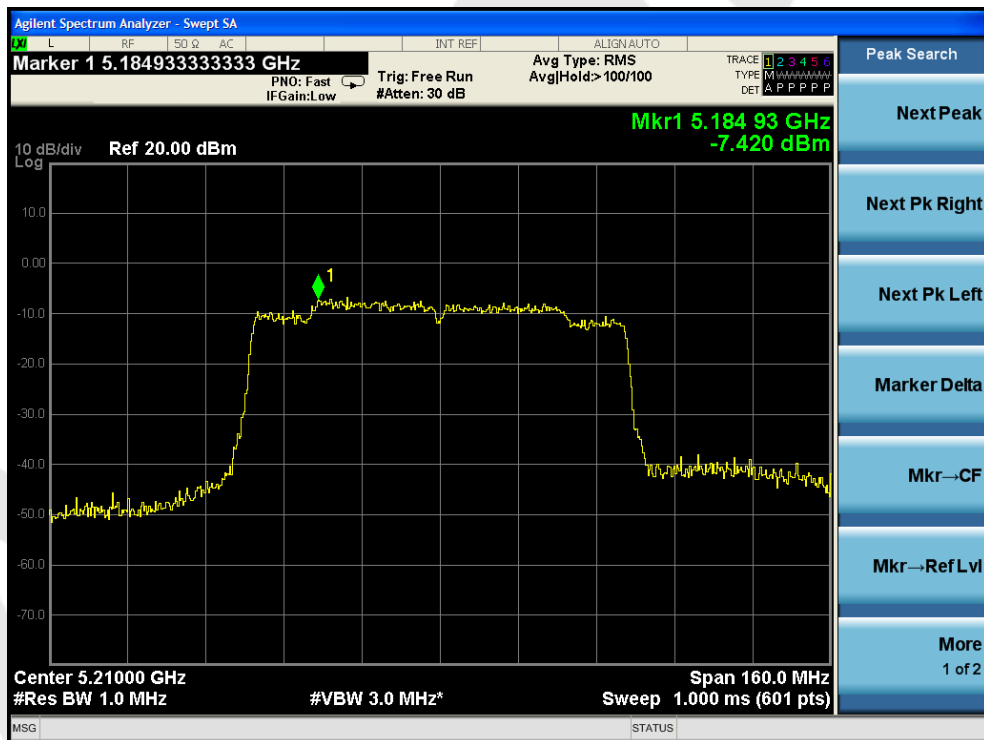
Test Mode: 802.11n40---High



Test Mode: 802.11ac40---Low



Test Mode: 802.11ac40---High



Test Mode: 802.11ac80

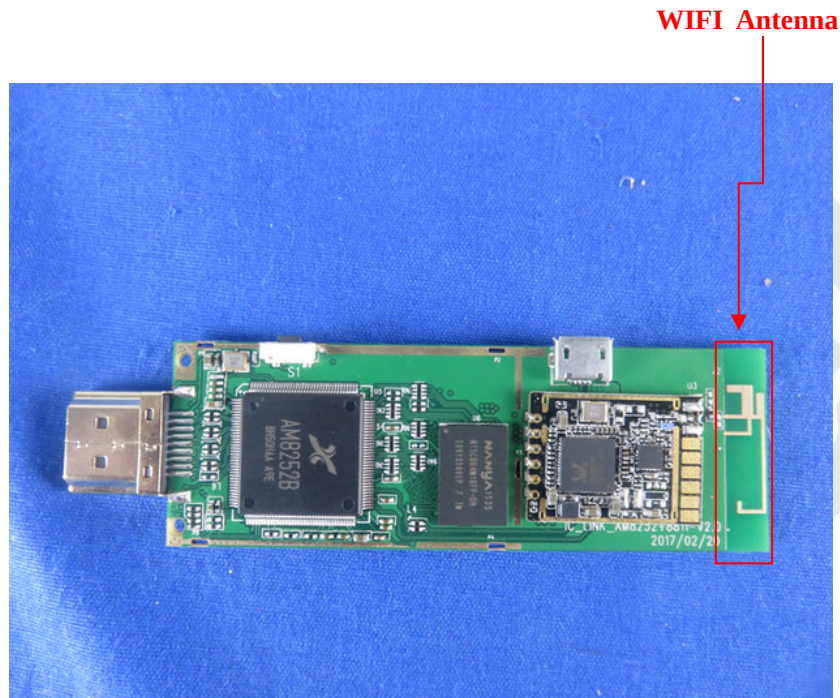
8. Antenna Requirement

8.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203 /15.407
Requirement	1) 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 2) 15.407 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

8.2. Antenna Connected Construction

The WIFI antenna is a PCB antenna which permanently attached, and the best case gain of the antenna is 1.5dBi. It complies with the standard requirement.

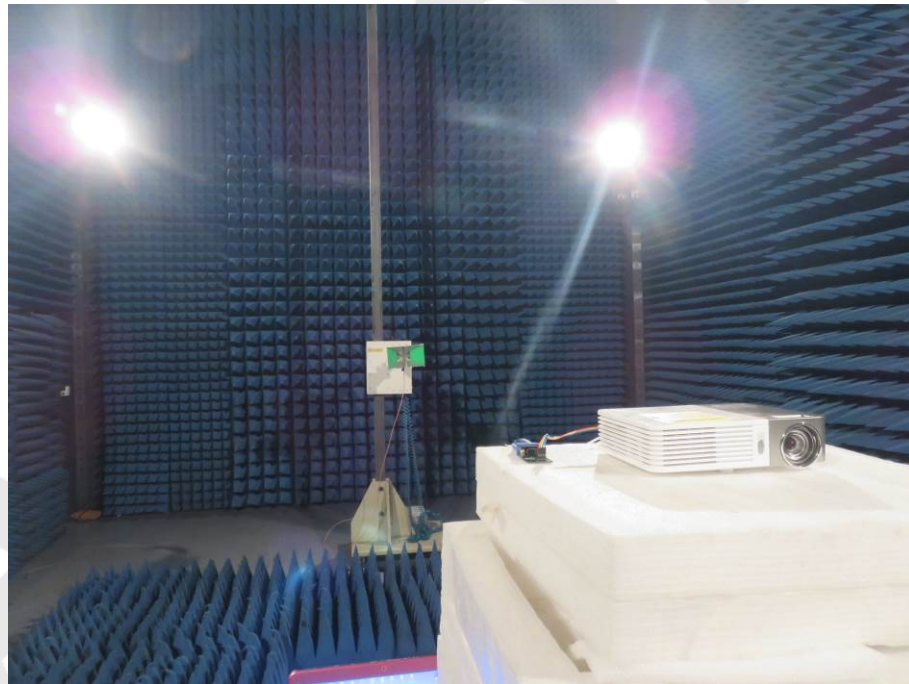
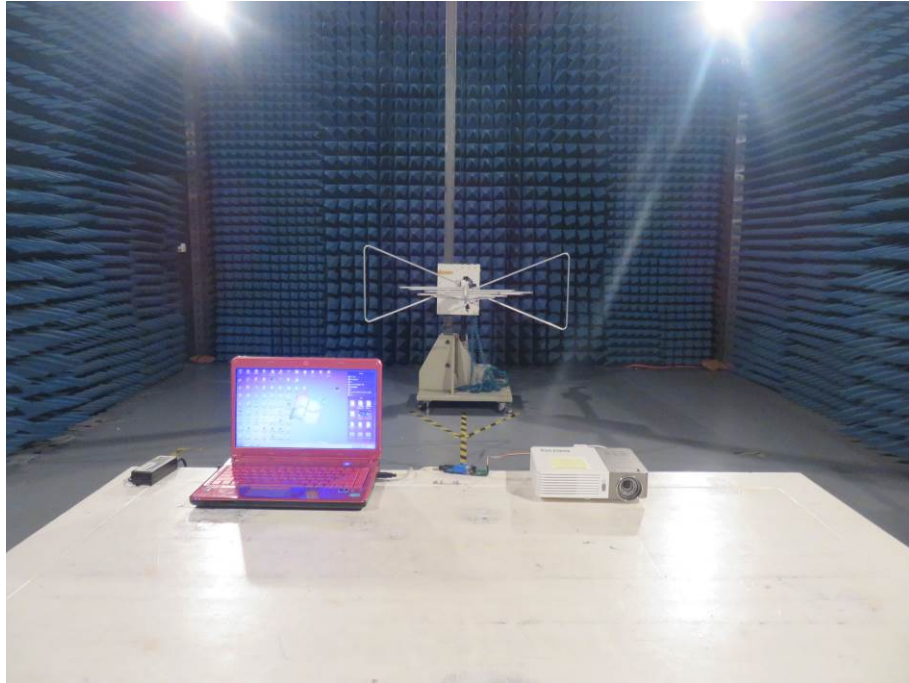


APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Measurement

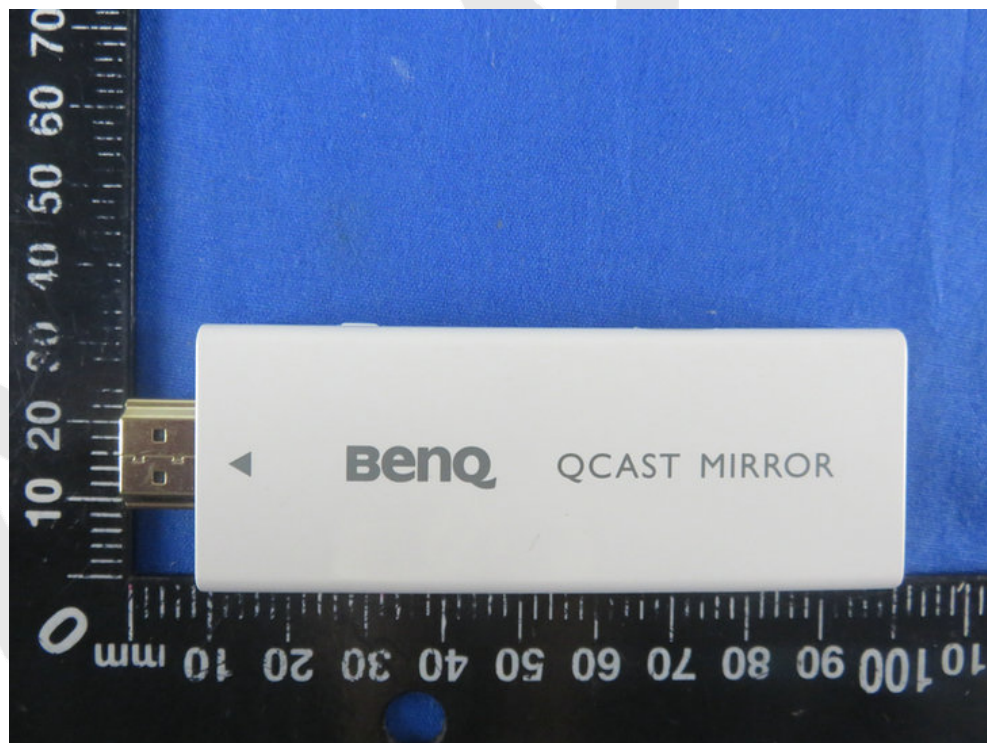


Photo of Radiation Emission Test

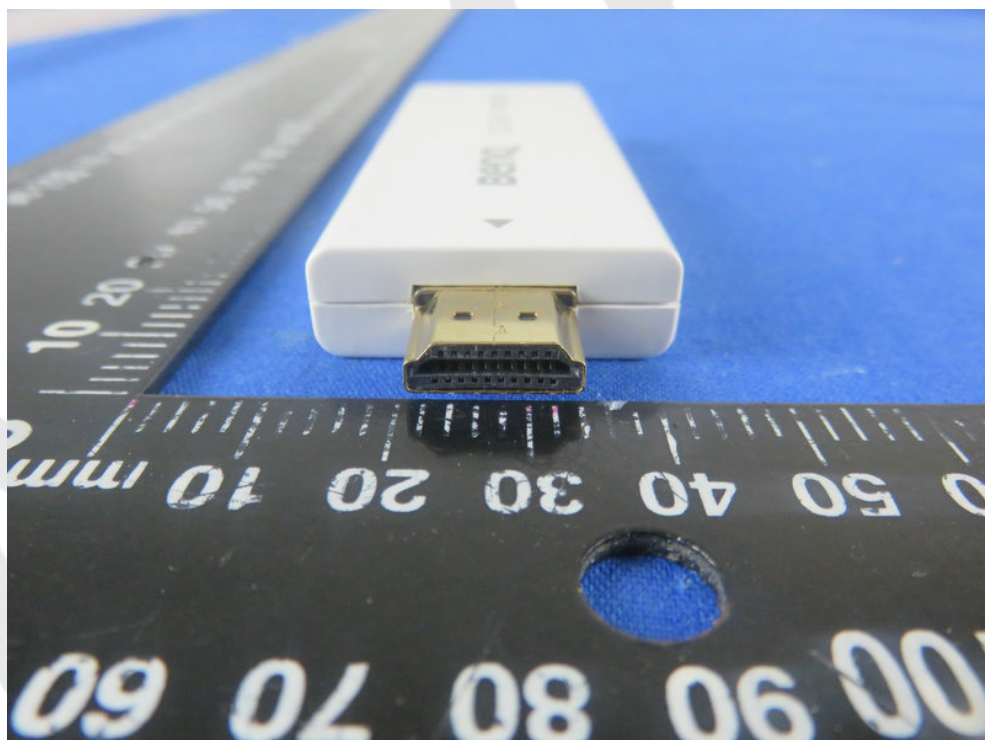


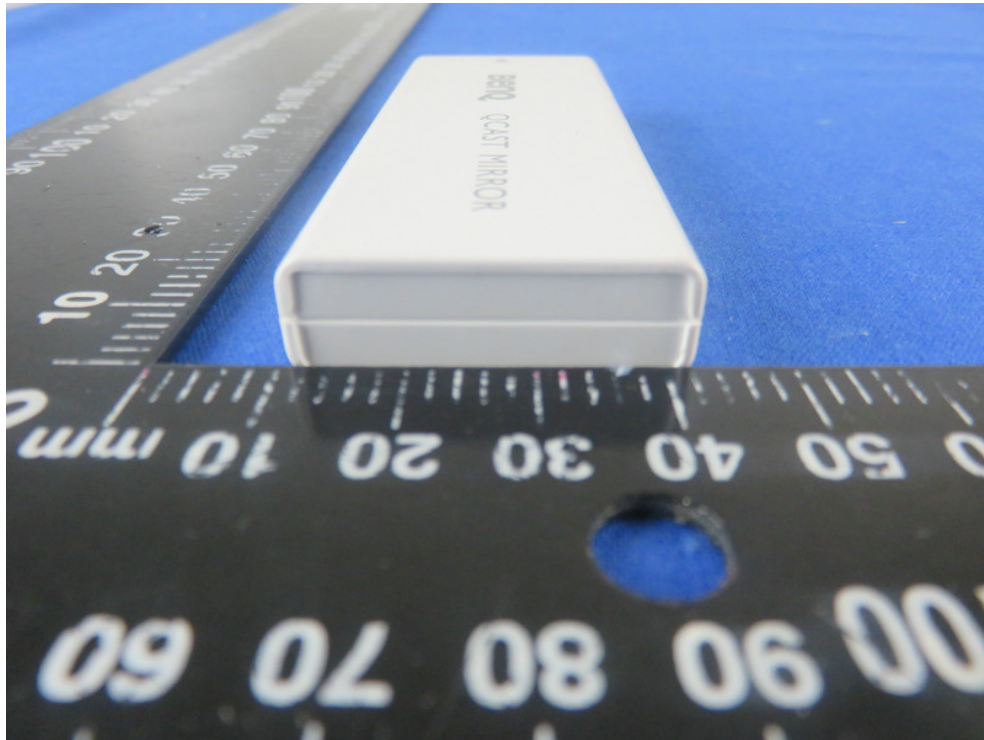


APPENDIX II -- EXTERNAL PHOTOGRAPH









APPENDIX III -- INTERNAL PHOTOGRAPH

