



诺检标准
NTT STANDARD

TEST REPORT

FCC ID: 2BLLA-NP71

Product : Touchscreen display
Model Name : NP71, DCMWM490-BLK
Brand : N/A
Report No. : SZNTT26036029E1-4

Prepared for

EFAN TECH (SHENZHEN) CO.,LTD

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Prepared by

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1 TEST RESULT CERTIFICATION

Applicant : EFAN TECH (SHENZHEN) CO.,LTD
Address : Room 704, Block A, Building 3, Tongtai Headquarters, 6259 Baoan Avenue, Fuhai Street, Baoan District, Shenzhen, 518000 China
Manufacturer : EFAN TECH (SHENZHEN) CO.,LTD
Address : Room 704, Block A, Building 3, Tongtai Headquarters, 6259 Baoan Avenue, Fuhai Street, Baoan District, Shenzhen, 518000 China
Product name : Touchscreen display
Model name : NP71
Additional model : DCMWM490-BLK
Standards : FCC CFR47 Part 15 Section 15.247
Test procedure : ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
Date of test : Jul. 16, 2026 to Aug. 07, 2026
Date of Issue : Aug. 07, 2026

This device described above has been tested by NTT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Prepared by(Test Engineer):

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2 Test Summary

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.407(b), 15.209	Radiated Spurious Emission	PASS	
15.207	AC Power Line conducted emission	PASS	
15.407 (a) 15.407 (e)	99% , 6dB and 26dB Bandwidth	PASS	
15.407 (a)	Maximum Conducted Output Power	PASS	
15.407(b)	Band Edge	PASS	
15.407 (a)	Power Spectral Density	PASS	
15.407(g)	Frequency Stability	PASS	
15.203	Antenna Requirement	PASS	

Remark:

1. "N/A" denotes test is not applicable in this Test Report.



3 TEST FACILITY

Site Description

Designation Number: CN3446

EMC Lab.

: Test Firm Registration Number: 129414
Accredited by ANAB, Dec. 19, 2025
The Certificate Registration Number is AT-3446

Name of Firm

: Shenzhen NTT Testing Technology Co., Ltd.

Site Location

: 1B, Building 2, Factory Building & 103, Building 3, Factory Building, Dayang Industrial Park No.4, Industrial Avenue, Tangwei Community, Fuhai Sub-district, Bao 'an District, Shenzhen City, China



4 General Information

4.1 General Description of E.U.T.

Product Name:	Touchscreen display
Model No.:	NP71
Sample ID:	SZNTT26036029E1-4
Sample(s) Status:	N/A
series model:	DCMWM490-BLK
Model Different.:	Except for the model name, everything else is the same.
Operation Frequency:	5180MHz~5240MHz(20MHz bandwidth) 5190MHz~5230MHz(40MHz bandwidth)
Number of Channel:	4 channels for 20MHz bandwidth 2 channels for 40MHz bandwidth
Modulation type:	802.11a: (64-QAM, 16-QAM, QPSK, BPSK) OFDM 802.11n: (64-QAM, 16-QAM, QPSK, BPSK) OFDM 802.11ac: (256-QAM, 64-QAM, 16-QAM, QPSK, BPSK) OFDM 802.11ax:(1024-QAM,256-QAM,64-QAM,16-QAM, QPSK, BPSK) OFDMA
Antenna Type:	PCB antenna
Antenna gain:	WIFI 5.1G:2.75dBi
Power supply:	DC-5V Adapter Input: DC-12-24V Adapter output: 5V 2A
Hardware Version:	FC-518-B310Q-V22-0601
Software Version:	HS16B3100V10-2607042203
Note:	N/A
Remark:	the Antenna gain is provided by customer from Antenna spec. and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.



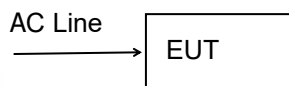
802.11a/n/ac/ax(20MHz) Frequency Channel							
Channel	Frequenc y (MHz)	Channel	Frequenc y (MHz)	Channel	Frequenc y (MHz)	Channel	Frequenc y (MHz)
36	5180	40	5200	44	5220	48	5240

802.11/n/ac/ax(40MHz) Frequency Channel							
Channel	Frequenc y (MHz)	Channel	Frequenc y (MHz)	Channel	Frequenc y (MHz)	Channel	Frequenc y (MHz)
38	5190	46	5230	-	-	-	-

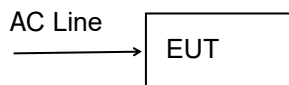


4.2 Test Setup Configuration

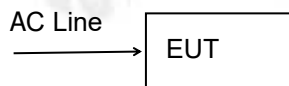
Conducted Emission



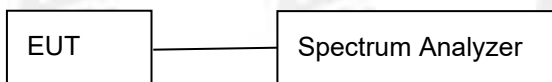
Radiated Emission(30MHz-1GHz)



Radiated Emission(above 1GHz)



RF Conducted Test



4.3 Test Mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

Test Software	The EUT enters engineering mode
Power level setup	Default



5 Equipment During Test

5.1 Equipments List

Conducted emission Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
944 Shielded Room	HSRCE944	/	HTEC	2025/4/30	2028/4/29
EMI Test Receiver	ESCI	/	RS	2025/9/8	2026/9/7
LISN	NNLK 8129	00603	Schwarzbeck	2025/9/8	2026/9/7
LISN	NNHV 8123-400	00694	Schwarzbeck	2025/9/8	2026/9/7
LISN	NNHV 8123-400	00680	Schwarzbeck	2025/9/8	2026/9/7
Cable	RG223-1500MM	NA	RG	2025/9/8	2026/9/7

Radiated emission & Radio Frequency Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
966 Shielded Room	966 Room	/	EMToni	2025/7/24	2028/7/23
EMI Test Receiver	ESCI	101018	RS	2025/9/8	2026/9/7
Amplifier (30MHz-1GHz)	BBV 9718D	00042	SCHWARZBECK	2025/9/8	2026/9/7
Bilog Antenna (30MHz-1GHz)	VULB9168	1858	SCHWARZBECK	2025/9/9	2026/9/8
Horn antenna (1GHz-18GHz)	BBHA 9120 D	02622	SCHWARZBECK	2025/9/9	2026/9/8
Preamplifier (1GHz-18GHz)	BBV 9718D	0024	SCHWARZBECK	2025/9/8	2026/9/7
Spectrum Analyzer (10Hz-40GHz)	FSV 40	100952	Rohde & Schwarz	2025/9/8	2026/9/7
Preamplifier (18GHz-40GHz)	BBV 9721	0056	SCHWARZBECK	2025/9/8	2026/9/7
Double Ridge Guide Horn Antenna (18GHz-40GHz)	SAS-574	588	A.H.System	2025/9/8	2026/9/7



Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHWARZBECK	2025/9/8	2026/9/7
Amplifier (9KHz-30MHz)	CVP 9222 C	00109	SCHWARZBECK	2025/9/8	2026/9/7
MXG Signal Analyzer	N9020A	MY50510202	Agilent	2025/9/8	2026/9/7
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2025/9/8	2026/9/7
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2025/9/8	2026/9/7
Power Sensor	TR1029-2	512364	Techoy	2025/9/8	2026/9/7
Power Meter	ML2495A	/	Anritsu	2025/9/8	2026/9/7
RF Switch	TR1029-1	512364	Techoy	2025/9/8	2026/9/7
Cable	DA800- 4000MM	NA	DA	2025/9/8	2026/9/7
Cable	DA800- 11000MM	NA	DA	2025/9/8	2026/9/7
Oven	GX-3020- M150	NA	GAOXIN	2026/03/10	2027/03/09

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ-EMC	Ver.EMC-CON 3A1.1+
2	EMC radiation test system	FALA	EZ-EMC	Ver.FA-03A2 RE+
3	RF test system	TACHOY	RFTest	V1.0.0
4	RF communication test system	TACHOY	RFTest	V1.0.0



5.2 Measurement Uncertainty

Parameter	Uncertainty
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10 ⁻⁶
Bandwidth	± 1.5 x 10 ⁻⁶
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(9KHz~30MHz)	±4.51dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB
Remark:When making a conformity declaration based on test results for regulations/standards or specifications,the default is to use Clause 4.2.1of ILAC-G8:09/2019 and the guidelines on decision rules and conformity declaration in IEC Guide 115:2023.	

5.3 Description of Support Units

The EUT has been tested as an independent unit .



6 Conducted Emission

Test Requirement: : FCC CFR 47 Part 15 Section 15.207

Test Method: : ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024

Test Result: : PASS

Frequency Range: : 150kHz to 30MHz

Class/Severity: : Class B

Detector: : Peak for pre-scan (9kHz Resolution Bandwidth)

6.1 E.U.T. Operation

Operating Environment :

Temperature: : 26°C

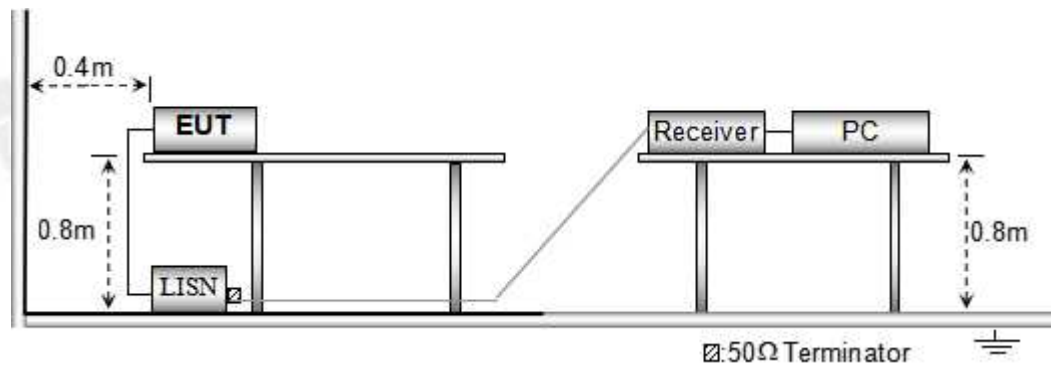
Humidity: : 54 % RH

Atmospheric Pressure: : 101.12 kPa

Test Voltage : AC 120V/60Hz

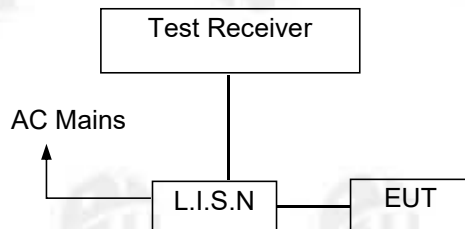
6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024.





6.3 Test SET-UP (Block Diagram of Configuration)



6.4 Measurement Procedure:

1. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
4. LISN at least 80 cm from nearest part of EUT chassis.
5. For the actual test configuration, please refer to the related Item - EUT Test Photos.

6.5 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.



6.6 Measurement Description

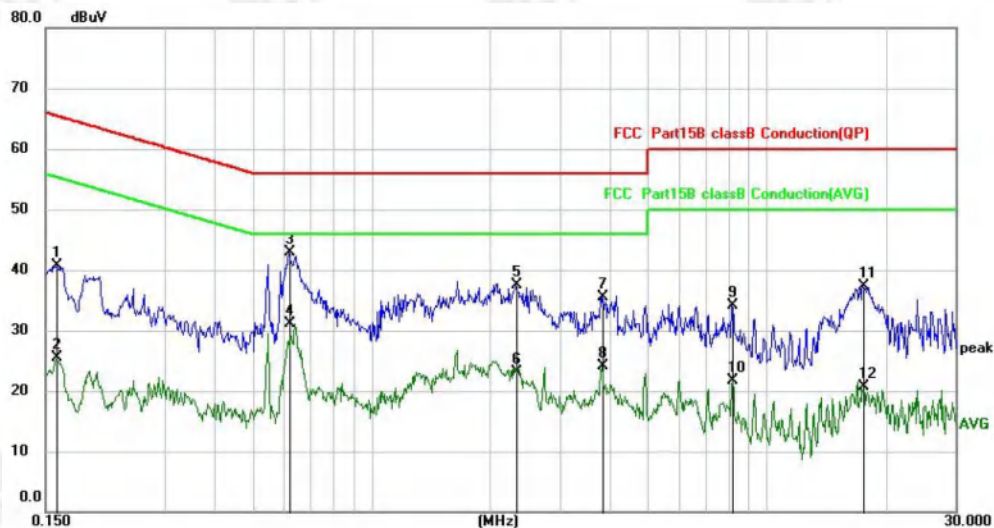
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.7 Conducted Emission Test Result

Pass

All the modulation modes were tested the data of the worst mode (802.11a, Lowest channel) are recorded in the following pages and the others modulation methods do not exceed the limits.

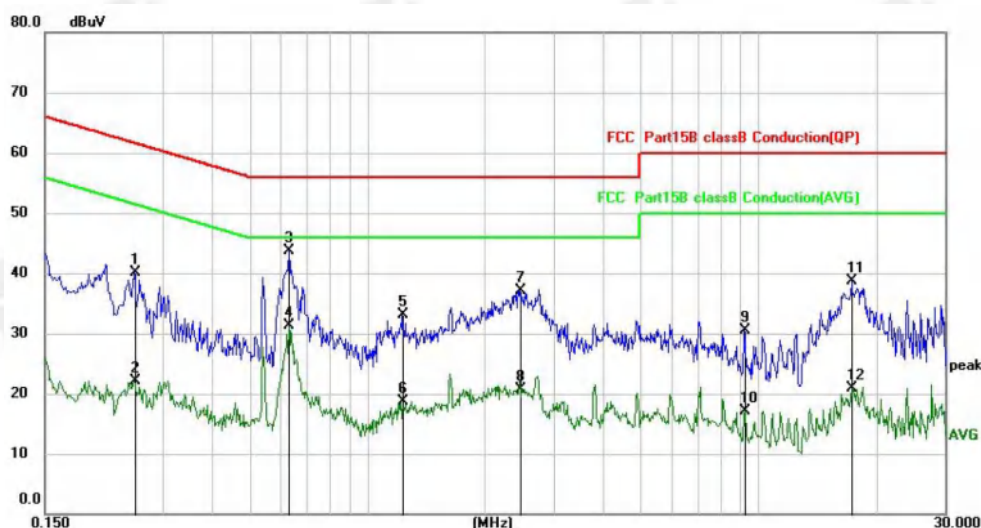
Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	L
Test Voltage :	AC 120V/60Hz		



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	0.1597	29.78	10.86	40.64	65.48	-24.84	QP
2	0.1597	14.67	10.86	25.53	55.48	-29.95	AVG
3 *	0.6179	32.39	10.46	42.85	56.00	-13.15	QP
4	0.6179	20.57	10.46	31.03	46.00	-14.97	AVG
5	2.3300	27.12	10.47	37.59	56.00	-18.41	QP
6	2.3300	12.66	10.47	23.13	46.00	-22.87	AVG
7	3.8340	24.99	10.49	35.48	56.00	-20.52	QP
8	3.8340	13.52	10.49	24.01	46.00	-21.99	AVG
9	8.1700	23.49	10.54	34.03	60.00	-25.97	QP
10	8.1700	11.23	10.54	21.77	50.00	-28.23	AVG
11	17.5537	26.52	10.81	37.33	60.00	-22.67	QP
12	17.5537	9.89	10.81	20.70	50.00	-29.30	AVG



Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	N
Test Voltage :	AC 120V/60Hz		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.2540	29.34	10.71	40.05	61.63	-21.58	QP
2		0.2540	11.48	10.71	22.19	51.63	-29.44	AVG
3	*	0.6303	33.21	10.46	43.67	56.00	-12.33	QP
4		0.6303	20.82	10.46	31.28	46.00	-14.72	AVG
5		1.2300	22.64	10.46	33.10	56.00	-22.90	QP
6		1.2300	8.19	10.46	18.65	46.00	-27.35	AVG
7		2.4500	26.57	10.48	37.05	56.00	-18.95	QP
8		2.4500	10.20	10.48	20.68	46.00	-25.32	AVG
9		9.2500	19.88	10.53	30.41	60.00	-29.59	QP
10		9.2500	6.53	10.53	17.06	50.00	-32.94	AVG
11		17.3379	27.83	10.79	38.62	60.00	-21.38	QP
12		17.3379	10.07	10.79	20.86	50.00	-29.14	AVG

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor
Correct Factor = Insertion loss of LISN + Cable loss.
4. Margin = Measurement Level - Limit



7 Radiated Spurious Emissions

Test Requirement	:	FCC CFR47 Part 15 Section 15.209 & 15.407
Test Method	:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024
Test Result	:	PASS
Measurement Distance	:	3m
Limit	:	See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	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	$20\log^{(500)}$

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54



Undesirable emission limits

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band: 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

Requirement	Limit(EIRP)	Limit (Field strength at 3m)
15.407(b)(1)	PK:-27(dBm/MHz)	PK:68.2(dB μ V/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)		

7.1 EUT Operation

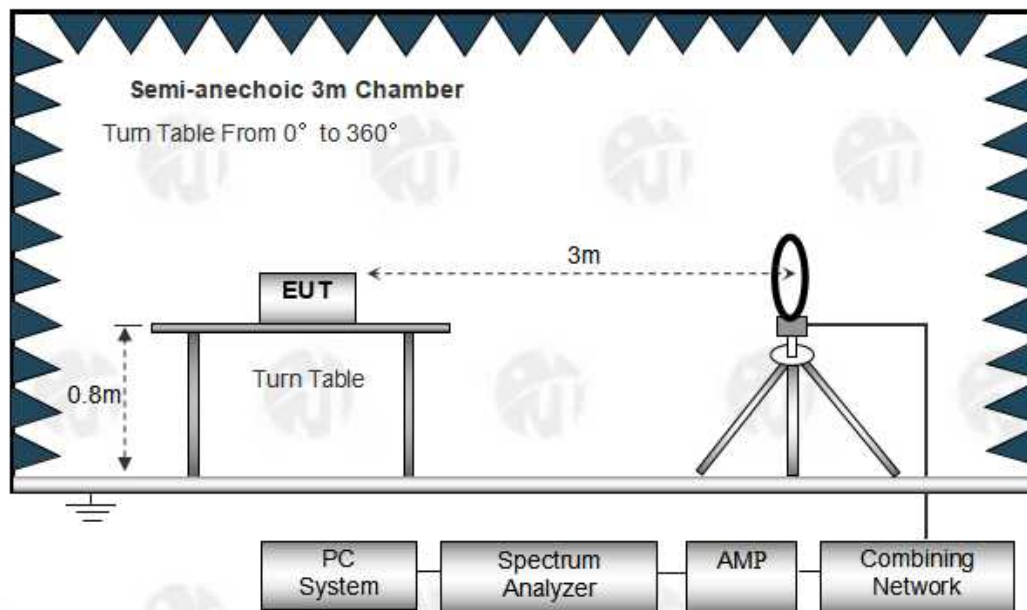
Operating Environment :

Temperature	: 26 °C
Humidity	: 54% RH
Atmospheric Pressure	: 101.3kPa
Test Voltage	: AC 120V60Hz

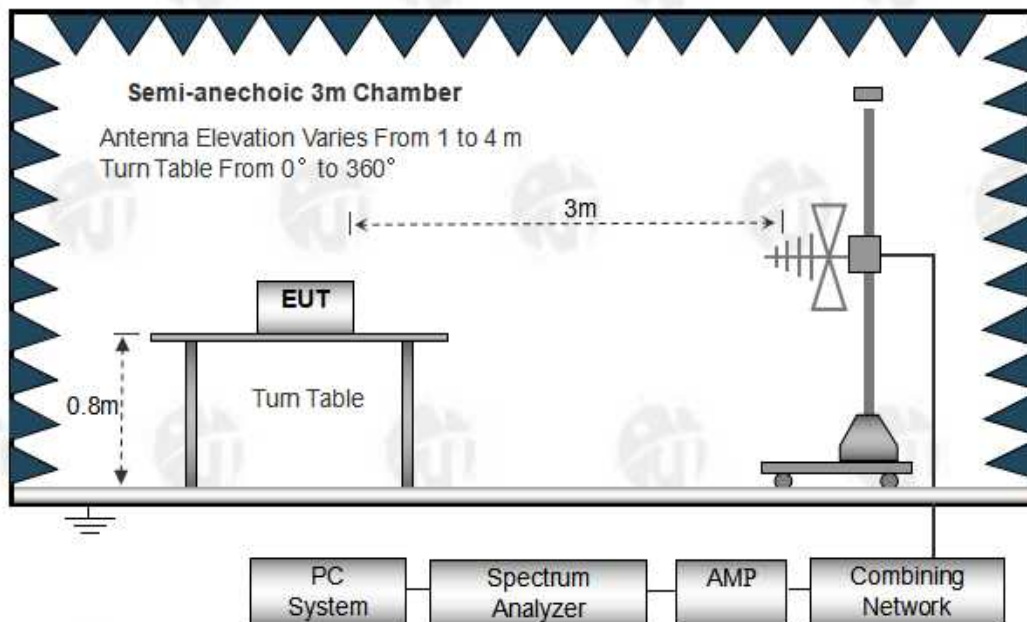
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

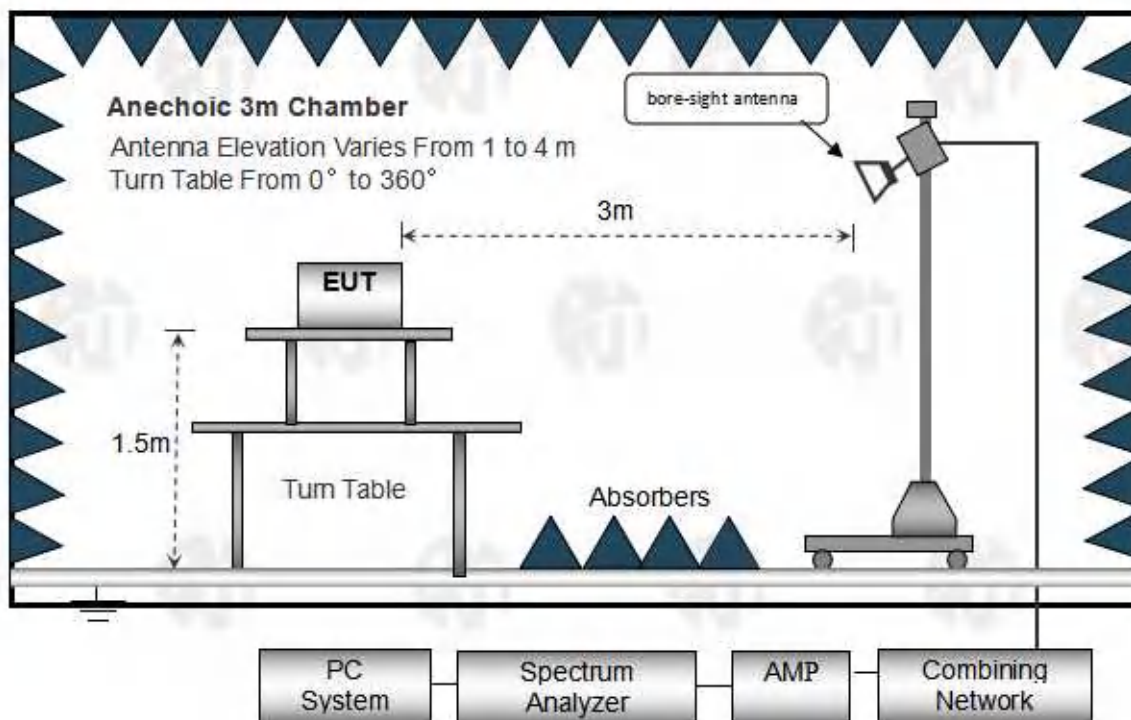
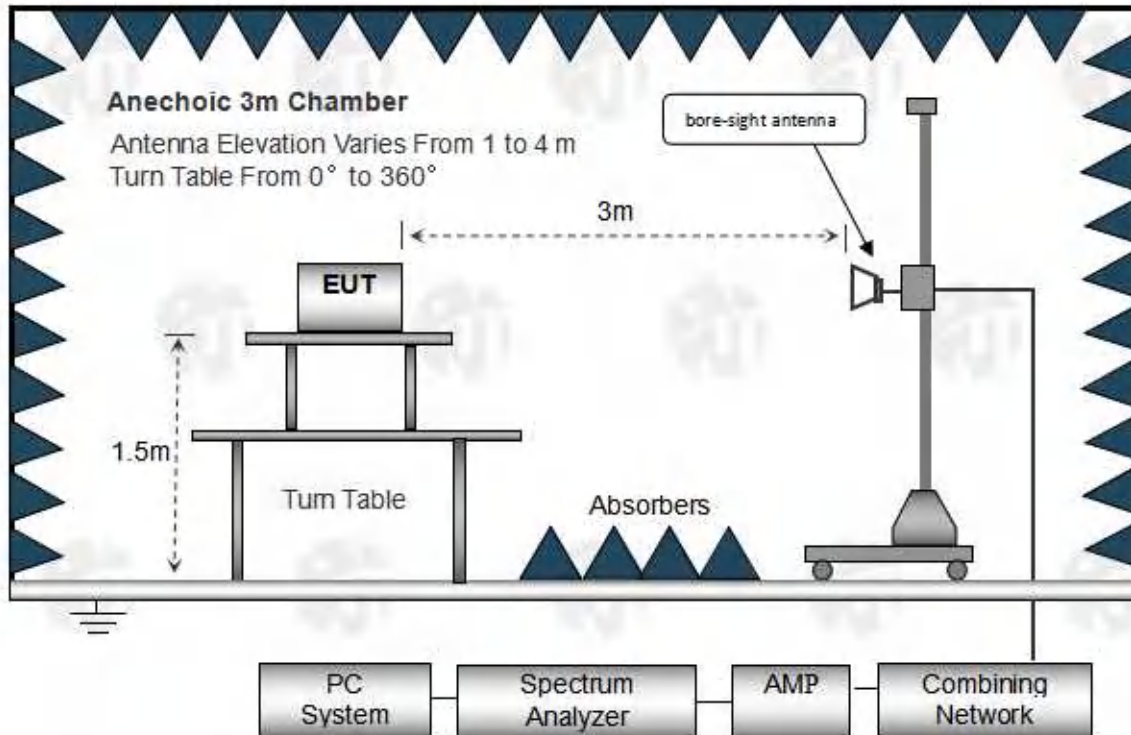
The test setup for emission measurement below 30MHz



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



The test setup for emission measurement above 1 GHz





7.3 Spectrum Analyzer Setup

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 3 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



7.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024.
2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.
7. Test Procedure of measurement (For Above 1GHz):
 - 1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).
 - 2) Change the antenna polarization and repeat 1) with vertical polarization.
 - 3) Make a hardcopy of the spectrum.
 - 4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
 - 5) Change the analyser mode to Clear/ Write and found the cone of emission.
 - 6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.
 - 7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.
 - 8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.



7.5 Summary of Test Results

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant. Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
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Note:

The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

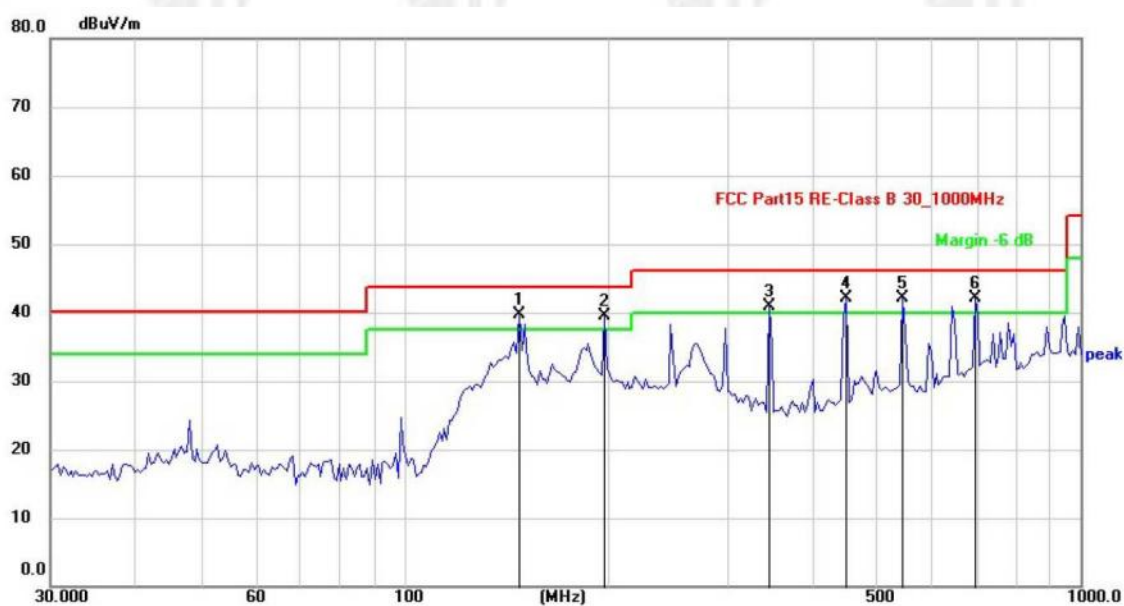
Distance extrapolation factor = $40\log(\text{Specific distance} / \text{test distance})$ (dB);
Limit line = Specific limits (dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

Please refer to the following test plots, Low Channel Worst case 802.11a for record:



Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



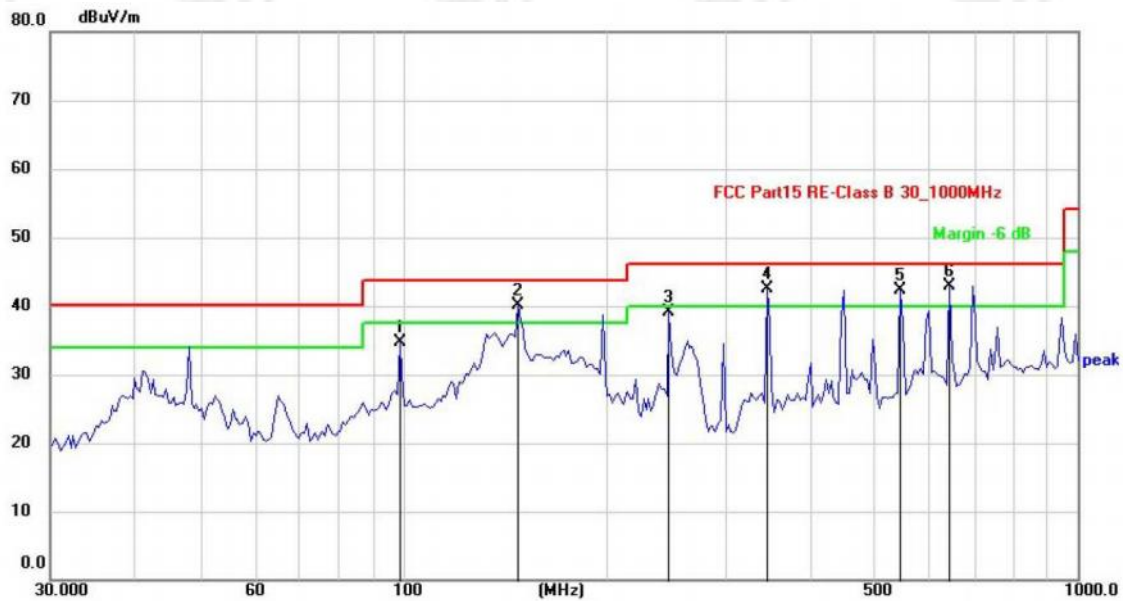
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1	*	147.9214	44.29	-4.60	39.69	43.50	-3.81	QP
2	!	197.5457	45.61	-6.16	39.45	43.50	-4.05	QP
3	!	346.2015	42.75	-1.77	40.98	46.00	-5.02	QP
4	!	450.3446	42.11	0.03	42.14	46.00	-3.86	QP
5	!	546.1390	39.82	2.35	42.17	46.00	-3.83	QP
6	!	698.0795	35.74	6.33	42.07	46.00	-3.93	QP

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

Margin= Emission Level – Limit



Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		98.8324	42.54	-7.93	34.61	43.50	-8.89	QP
2	!	147.9214	44.76	-4.60	40.16	43.50	-3.34	QP
3		248.1165	43.99	-4.81	39.18	46.00	-6.82	QP
4	!	346.2016	44.18	-1.77	42.41	46.00	-3.59	QP
5	!	546.1392	40.00	2.35	42.35	46.00	-3.65	QP
6	*	645.1194	37.90	5.07	42.97	46.00	-3.03	QP

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

Margin= Emission Level - Limit



Test Frequency 1GHz-40GHz

802.11a

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/ m)	Margin (dB)	Detect or Type
Low Channel:5180MHz									
V	10360	52.54	32.7	7.72	38.59	66.15	68.20	-2.05	PK
V	10360	39.40	32.7	7.72	38.59	53.01	54.00	-0.99	AV
V	15540	50.30	31.74	9.44	39.29	67.29	68.20	-0.91	PK
V	15540	34.43	31.74	9.44	39.29	51.42	54.00	-2.58	AV
V	20720	48.28	26.93	6.64	37.94	65.93	68.20	-2.27	PK
V	20720	33.25	26.93	6.64	37.94	50.90	54.00	-3.10	AV
V	25900	44.44	27.1	7.9	39.32	64.56	68.20	-3.64	PK
V	25900	27.80	27.1	7.9	39.32	47.92	54.00	-6.08	AV
H	10360	49.34	32.7	7.72	38.59	62.95	68.20	-5.25	PK
H	10360	39.48	32.7	7.72	38.59	53.09	54.00	-0.91	AV
H	15540	47.00	31.74	9.44	39.29	63.99	68.20	-4.21	PK
H	15540	32.53	31.74	9.44	39.29	49.52	54.00	-4.48	AV
H	20720	47.03	26.93	6.64	37.94	64.68	68.20	-3.52	PK
H	20720	30.25	26.93	6.64	37.94	47.90	54.00	-6.10	AV
H	25900	38.56	27.1	7.9	39.32	58.68	68.20	-9.52	PK
H	25900	25.84	27.1	7.9	39.32	45.96	54.00	-8.04	AV



Polar	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detect or Type
(H/V)	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Middle Channel:5200MHz									
V	10400	52.88	32.69	7.73	38.62	66.54	68.20	-1.66	PK
V	10400	38.98	32.69	7.73	38.62	52.64	54.00	-1.36	AV
V	15600	50.37	31.72	9.45	39.28	67.38	68.20	-0.82	PK
V	15600	34.17	31.72	9.45	39.28	51.18	54.00	-2.82	AV
V	20800	47.27	26.93	6.73	37.96	65.03	68.20	-3.17	PK
V	20800	33.69	26.93	6.73	37.96	51.45	54.00	-2.55	AV
V	26000	44.57	27.1	7.94	39.3	64.71	68.20	-3.49	PK
V	26000	27.65	27.1	7.94	39.3	47.79	54.00	-6.21	AV
H	10400	48.61	32.69	7.73	38.62	62.27	68.20	-5.93	PK
H	10400	41.30	32.69	7.73	38.62	54.96	54.00	0.96	AV
H	15600	48.72	31.72	9.45	39.28	65.73	68.20	-2.47	PK
H	15600	34.07	31.72	9.45	39.28	51.08	54.00	-2.92	AV
H	20800	46.94	26.93	6.73	37.96	64.70	68.20	-3.50	PK
H	20800	30.37	26.93	6.73	37.96	48.13	54.00	-5.87	AV
H	26000	40.02	27.1	7.94	39.3	60.16	68.20	-8.04	PK
H	26000	25.66	27.1	7.94	39.3	45.80	54.00	-8.20	AV



Polar	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detect or Type
(H/V)	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
High Channel:5240MHz									
V	10480	53.32	32.66	7.74	38.68	67.08	68.2	-1.12	PK
V	10480	40.51	32.66	7.74	38.68	54.27	54	0.27	AV
V	15720	50.38	31.68	9.48	39.26	67.44	68.2	-0.76	PK
V	15720	34.58	31.68	9.48	39.26	51.64	54	-2.36	AV
V	20960	48.36	26.94	6.91	37.99	66.32	68.2	-1.88	PK
V	20960	34.24	26.94	6.91	37.99	52.20	54	-1.80	AV
V	26200	44.85	27.1	7.89	39.5	65.14	68.2	-3.06	PK
V	26200	27.54	27.1	7.89	39.5	47.83	54	-6.17	AV
H	10480	50.02	32.66	7.74	38.68	63.78	68.2	-4.42	PK
H	10480	39.70	32.66	7.74	38.68	53.46	54	-0.54	AV
H	15720	48.48	31.68	9.48	39.26	65.54	68.2	-2.66	PK
H	15720	33.61	31.68	9.48	39.26	50.67	54	-3.33	AV
H	20960	48.46	26.94	6.91	37.99	66.42	68.2	-1.78	PK
H	20960	31.07	26.94	6.91	37.99	49.03	54	-4.97	AV
H	26200	39.90	27.1	7.89	39.5	60.19	68.2	-8.01	PK
H	26200	25.99	27.1	7.89	39.5	46.28	54	-7.72	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss - Pre-amplifier, Margin= Emission Level - Limit
 2. If peak below the average limit, the average emission was no test.
 3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
 4. The worst mode is 802.11a, only the worst data is recorded.
- The 1-40GHz range has been tested, and the report only records the worst performance of the 1-30G range.



Restrict Band EMISSION MEASUREMENT

U-NII-1

Frequency	Meter Reading	antenna Factor	cable loss	preamp factor	Emission Level	Limit	Margin	Polar	Detector Type	Result
(MHz)	(dBuV/m)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(H/V)		
802.11a:5180MHz										
5150	59.19	33.14	5.29	33.88	54.99	74.00	-19.01	V	PK	Pass
5150	49.12	33.14	5.29	33.88	44.92	54.00	-9.08	V	AV	Pass
5145	61.31	33.14	5.29	33.88	57.16	74.00	-16.84	V	PK	Pass
5145	51.29	33.14	5.29	33.88	47.14	54.00	-6.86	V	AV	Pass
5150	59.55	33.14	5.29	33.88	55.35	74.00	-18.65	H	PK	Pass
5150	52.16	33.14	5.29	33.88	47.96	54.00	-6.04	H	AV	Pass
5145	61.92	33.14	5.29	33.88	57.77	74.00	-16.23	H	PK	Pass
5145	49.50	33.14	5.29	33.88	45.35	54.00	-8.65	H	AV	Pass
802.11a:5240MHz										
5350	57.87	33.06	5.44	33.72	53.67	74.00	-20.33	V	PK	Pass
5350	50.09	33.06	5.44	33.72	45.89	54.00	-8.11	V	AV	Pass
5370	59.62	33.05	5.45	33.7	55.47	74.00	-18.53	V	PK	Pass
5370	50.05	33.05	5.45	33.7	45.90	54.00	-8.10	V	AV	Pass
5350	59.40	33.06	5.44	33.72	55.20	74.00	-18.80	H	PK	Pass
5350	50.12	33.06	5.44	33.72	45.92	54.00	-8.08	H	AV	Pass
5370	59.89	33.05	5.45	33.7	55.74	74.00	-18.26	H	PK	Pass



5370	49.38	33.05	5.45	33.7	40.98	54.00	-13.02	H	AV	Pass
802.11n20:5180MHz										
5150	59.48	33.14	5.29	33.88	55.28	74.00	-18.72	V	PK	Pass
5150	50.49	33.14	5.29	33.88	46.29	54.00	-7.71	V	AV	Pass
5145	58.93	33.14	5.29	33.88	54.78	74.00	-19.22	V	PK	Pass
5145	49.24	33.14	5.29	33.88	45.09	54.00	-8.91	V	AV	Pass
5150	58.00	33.14	5.29	33.88	53.80	74.00	-20.20	H	PK	Pass
5150	50.89	33.14	5.29	33.88	46.69	54.00	-7.31	H	AV	Pass
5145	60.87	33.14	5.29	33.88	56.72	74.00	-17.28	H	PK	Pass
5145	49.95	33.14	5.29	33.88	45.80	54.00	-8.20	H	AV	Pass
802.11n20:5240MHz										
5350	58.21	33.14	5.29	33.88	54.01	74.00	-19.99	V	PK	Pass
5350	50.76	33.14	5.29	33.88	46.56	54.00	-7.44	V	AV	Pass
5370	58.98	33.14	5.29	33.88	54.83	74.00	-19.17	V	PK	Pass
5370	49.12	33.14	5.29	33.88	44.97	54.00	-9.03	V	AV	Pass
5350	59.94	33.14	5.29	33.88	55.74	74.00	-18.26	H	PK	Pass
5350	52.60	33.14	5.29	33.88	48.40	54.00	-5.60	H	AV	Pass
5370	61.18	33.14	5.29	33.88	57.03	74.00	-16.97	H	PK	Pass
5370	50.03	33.14	5.29	33.88	45.88	54.00	-8.12	H	AV	Pass
802.11ac20:5180MHz										
5150	57.72	33.06	5.44	33.72	53.52	74.00	-20.48	V	PK	Pass
5150	49.05	33.06	5.44	33.72	44.85	54.00	-9.15	V	AV	Pass
5145	61.74	33.05	5.45	33.7	57.59	74.00	-16.41	V	PK	Pass
5145	50.84	33.05	5.45	33.7	46.69	54.00	-7.31	V	AV	Pass
5150	58.62	33.06	5.44	33.72	54.42	74.00	-19.58	H	PK	Pass
5150	51.25	33.06	5.44	33.72	47.05	54.00	-6.95	H	AV	Pass



5145	59.14	33.05	5.45	33.7	54.99	74.00	-19.01	H	PK	Pass
5145	49.98	33.05	5.45	33.7	45.83	54.00	-8.17	H	AV	Pass
802.11ac20:5240MHz										
5350	57.40	33.06	5.44	33.72	53.20	74.00	-20.80	V	PK	Pass
5350	50.82	33.06	5.44	33.72	46.62	54.00	-7.38	V	AV	Pass
5370	58.86	33.05	5.45	33.7	54.71	74.00	-19.29	V	PK	Pass
5370	51.48	33.05	5.45	33.7	47.33	54.00	-6.67	V	AV	Pass
5350	57.64	33.06	5.44	33.72	53.44	74.00	-20.56	H	PK	Pass
5350	51.91	33.06	5.44	33.72	47.71	54.00	-6.29	H	AV	Pass
5370	60.57	33.05	5.45	33.7	56.42	74.00	-17.58	H	PK	Pass
5370	49.58	33.05	5.45	33.7	45.43	54.00	-8.57	H	AV	Pass
802.11ax20:5180MHz										
5150	57.67	33.14	5.29	33.88	53.47	74.00	-20.53	V	PK	Pass
5150	50.95	33.14	5.29	33.88	46.75	54.00	-7.25	V	AV	Pass
5145	60.18	33.14	5.29	33.88	56.03	74.00	-17.97	V	PK	Pass
5145	50.98	33.14	5.29	33.88	46.83	54.00	-7.17	V	AV	Pass
5150	60.08	33.14	5.29	33.88	55.88	74.00	-18.12	H	PK	Pass
5150	52.41	33.14	5.29	33.88	48.21	54.00	-5.79	H	AV	Pass
5145	60.03	33.14	5.29	33.88	55.88	74.00	-18.12	H	PK	Pass
5145	50.75	33.14	5.29	33.88	46.60	54.00	-7.40	H	AV	Pass
802.11ax20:5240MHz										
5350	58.79	33.06	5.44	33.72	54.59	74.00	-19.41	V	PK	Pass
5350	50.76	33.06	5.44	33.72	46.56	54.00	-7.44	V	AV	Pass
5370	59.35	33.05	5.45	33.7	55.20	74.00	-18.80	V	PK	Pass
5370	49.44	33.05	5.45	33.7	45.29	54.00	-8.71	V	AV	Pass
5350	58.92	33.06	5.44	33.72	54.72	74.00	-19.28	H	PK	Pass
5350	52.36	33.06	5.44	33.72	48.16	54.00	-5.84	H	AV	Pass



5370	59.41	33.05	5.45	33.7	55.26	74.00	-18.74	H	PK	Pass
5370	49.69	33.05	5.45	33.7	45.54	54.00	-8.46	H	AV	Pass
802.11n40:5190MHz										
5150	58.44	33.14	5.29	33.88	53.10	74.00	-20.90	V	PK	Pass
5150	50.06	33.14	5.29	33.88	46.90	54.00	-7.10	V	AV	Pass
5145	59.89	33.14	5.29	33.88	55.40	74.00	-18.60	V	PK	Pass
5145	50.20	33.14	5.29	33.88	47.04	54.00	-6.96	V	AV	Pass
5150	59.42	33.14	5.29	33.88	54.68	74.00	-19.32	H	PK	Pass
5150	50.78	33.14	5.29	33.88	45.64	54.00	-8.36	H	AV	Pass
5145	60.18	33.14	5.29	33.88	56.45	74.00	-17.55	H	PK	Pass
5145	50.11	33.14	5.29	33.88	46.89	54.00	-7.11	H	AV	Pass
802.11n40:5230MHz										
5350	57.43	33.06	5.44	33.72	54.05	74.00	-19.95	V	PK	Pass
5350	50.97	33.06	5.44	33.72	47.16	54.00	-6.84	V	AV	Pass
5370	61.51	33.05	5.45	33.7	57.60	74.00	-16.40	V	PK	Pass
5370	49.61	33.05	5.45	33.7	46.39	54.00	-7.61	V	AV	Pass
5350	58.24	33.06	5.44	33.72	55.94	74.00	-18.06	H	PK	Pass
5350	52.53	33.06	5.44	33.72	48.18	54.00	-5.82	H	AV	Pass
5370	59.90	33.05	5.45	33.7	57.72	74.00	-16.28	H	PK	Pass
5370	51.42	33.05	5.45	33.7	45.81	54.00	-8.19	H	AV	Pass
802.11ac40:5190MHz										
5150	58.75	33.14	5.29	33.88	53.20	74.00	-20.80	V	PK	Pass
5150	49.00	33.14	5.29	33.88	46.75	54.00	-7.25	V	AV	Pass
5145	60.28	33.14	5.29	33.88	56.96	74.00	-17.04	V	PK	Pass
5145	50.35	33.14	5.29	33.88	46.21	54.00	-7.79	V	AV	Pass
5150	58.47	33.14	5.29	33.88	55.76	74.00	-18.24	H	PK	Pass
5150	52.14	33.14	5.29	33.88	47.19	54.00	-6.81	H	AV	Pass



5145	61.37	33.14	5.29	33.88	54.87	74.00	-19.13	H	PK	Pass
5145	48.89	33.14	5.29	33.88	44.50	54.00	-9.50	H	AV	Pass
802.11ac40:5230MHz										
5350	59.33	33.06	5.44	33.72	53.59	74.00	-20.41	V	PK	Pass
5350	50.17	33.06	5.44	33.72	44.82	54.00	-9.18	V	AV	Pass
5370	61.44	33.05	5.45	33.7	55.79	74.00	-18.21	V	PK	Pass
5370	50.31	33.05	5.45	33.7	44.70	54.00	-9.30	V	AV	Pass
5350	57.47	33.06	5.44	33.72	54.47	74.00	-19.53	H	PK	Pass
5350	50.53	33.06	5.44	33.72	48.33	54.00	-5.67	H	AV	Pass
5370	60.19	33.05	5.45	33.7	57.06	74.00	-16.94	H	PK	Pass
5370	49.46	33.05	5.45	33.7	44.90	54.00	-9.10	H	AV	Pass
802.11ax40:5190MHz										
5150	59.29	33.14	5.29	33.88	54.40	74.00	-19.60	V	PK	Pass
5150	51.43	33.14	5.29	33.88	44.87	54.00	-9.13	V	AV	Pass
5145	59.75	33.14	5.29	33.88	54.72	74.00	-19.28	V	PK	Pass
5145	49.75	33.14	5.29	33.88	47.17	54.00	-6.83	V	AV	Pass
5150	58.49	33.14	5.29	33.88	55.72	74.00	-18.28	H	PK	Pass
5150	51.56	33.14	5.29	33.88	48.17	54.00	-5.83	H	AV	Pass
5145	59.06	33.14	5.29	33.88	55.61	74.00	-18.39	H	PK	Pass
5145	50.86	33.14	5.29	33.88	47.04	54.00	-6.96	H	AV	Pass
802.11ax40:5230MHz										
5350	59.17	33.06	5.44	33.72	53.38	74.00	-20.62	V	PK	Pass
5350	50.59	33.06	5.44	33.72	46.42	54.00	-7.58	V	AV	Pass
5370	61.07	33.05	5.45	33.7	55.96	74.00	-18.04	V	PK	Pass
5370	51.15	33.05	5.45	33.7	45.88	54.00	-8.12	V	AV	Pass
5350	59.66	33.06	5.44	33.72	54.42	74.00	-19.58	H	PK	Pass



5350	52.27	33.06	5.44	33.72	47.55	54.00	-6.45	H	AV	Pass
5370	59.61	33.05	5.45	33.7	56.59	74.00	-17.41	H	PK	Pass
5370	51.43	33.05	5.45	33.7	44.55	54.00	-9.45	H	AV	Pass

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

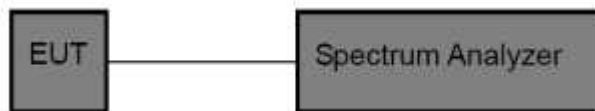


8 Duty cycle

8.1 Limit

Test Requirement: FCC CFR Title 47 Part 15 Subpart C Section 15.407
Test Method: ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to
C63.10a-2024
KDB 789033 D02 v02r01
Test Result: PASS

8.2 Test Setup



8.3 Test Procedure

The zero-span mode on a spectrum analyzer or EMI receiver, if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW $\geq$ EBW if possible; otherwise, set RBW to the largest available value. Set VBW $\geq$ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$, where T is defined in IILB.1.a), and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)



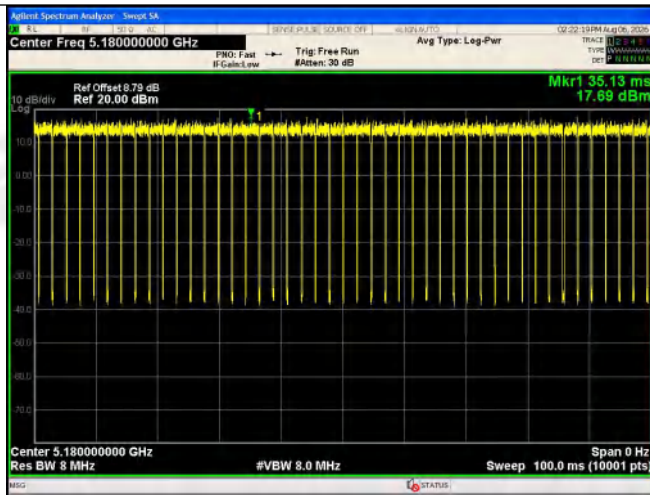
8.4 Test Result

Duty Cycle

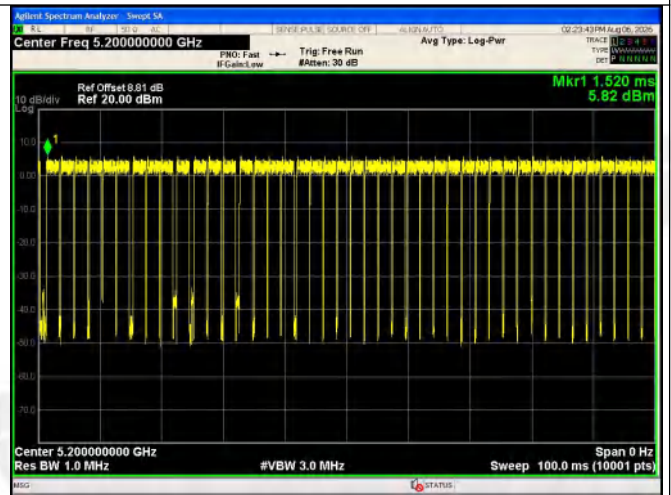
Mode	Channel.	Duty Cycle (%)	Correction Factor (dB)
802.11a	5180	100	0
	5200	91.33	0.39
	5240	92.37	0.34
802.11ac20	5180	100	0
	5200	53.68	2.7
	5240	53.84	2.69
802.11ac40	5190	100	0
	5230	41.96	3.77
802.11n(HT20)	5180	100	0
	5200	47.15	3.27
	5240	61.12	2.14
802.11n(HT40)	5190	100	0
	5230	47.42	3.24
802.11ax20	5180	100	0
	5200	55.19	2.58
	5240	54.46	2.64
802.11ax40	5190	100	0
	5230	41.37	3.83



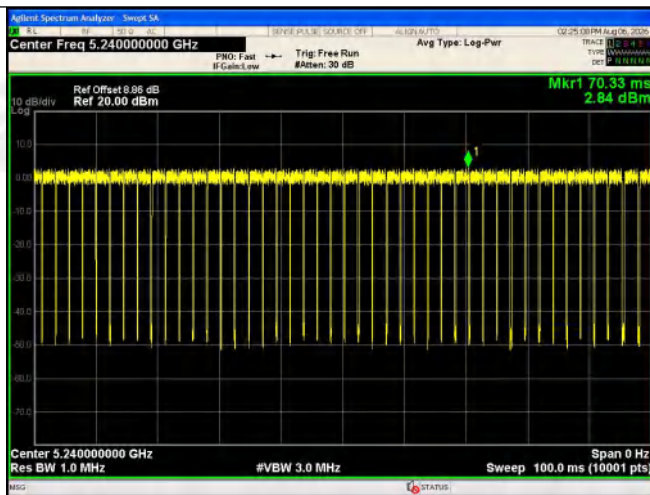
802.11a-5180



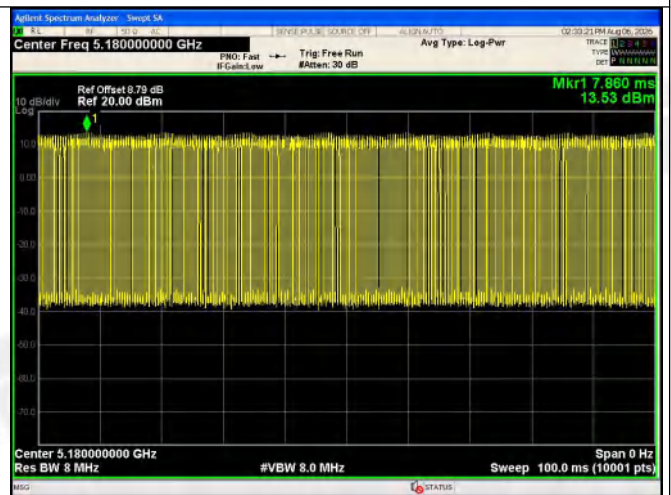
802.11a-5200



802.11a-5240



802.11ac(VHT20)-5180

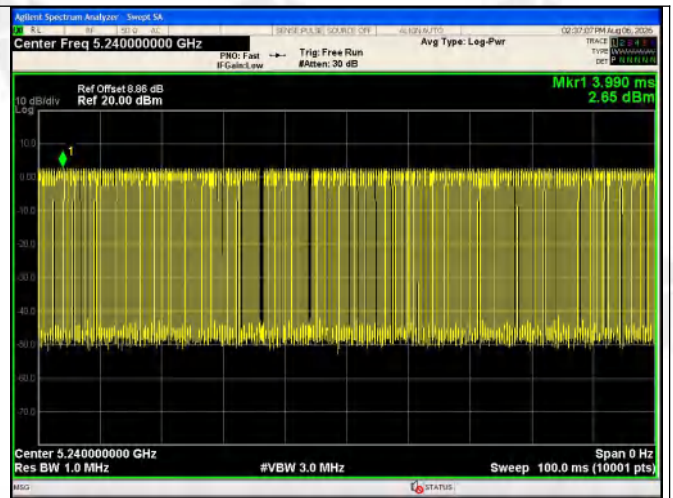


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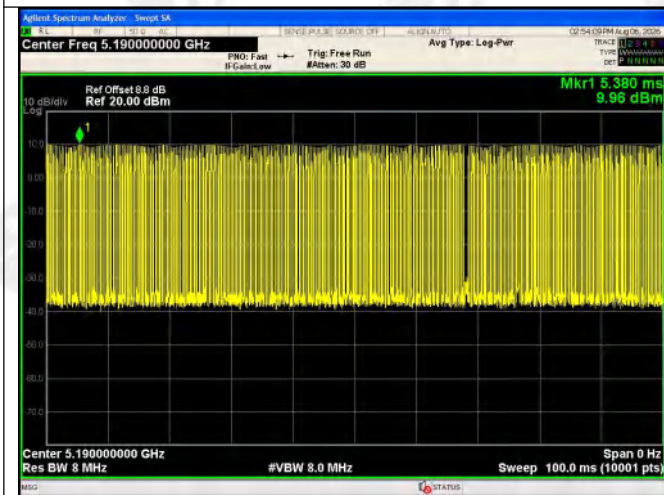
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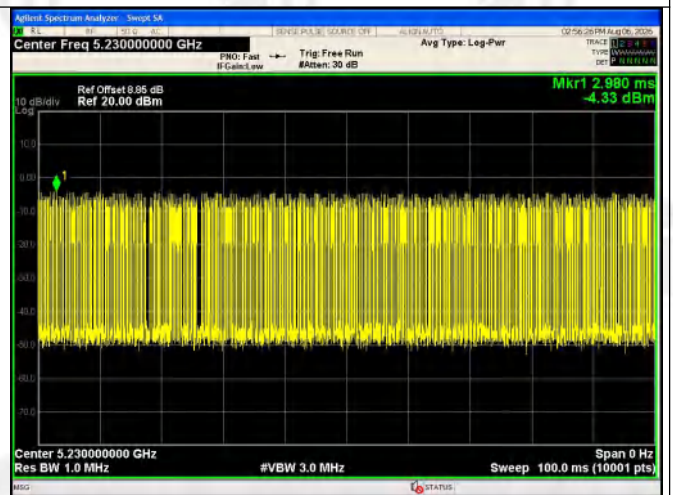
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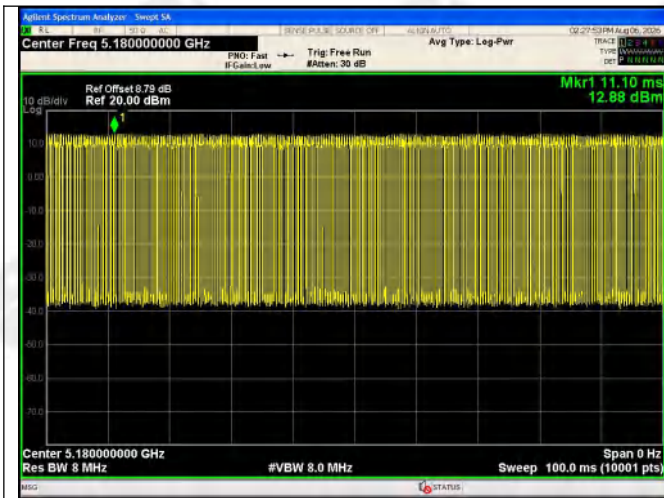
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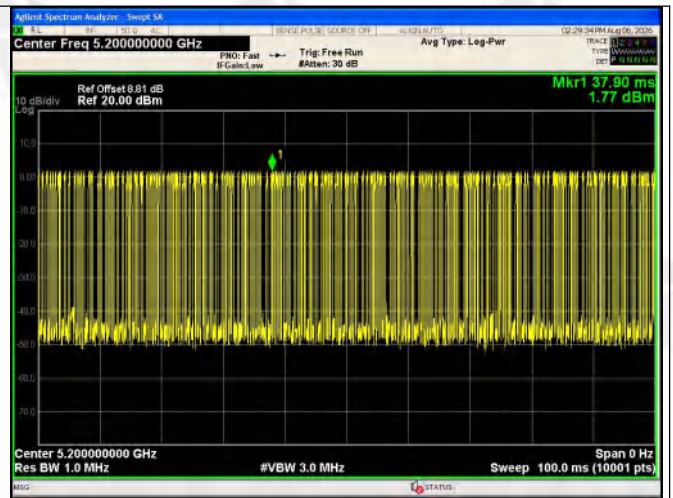
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802.11n(HT20)-5200



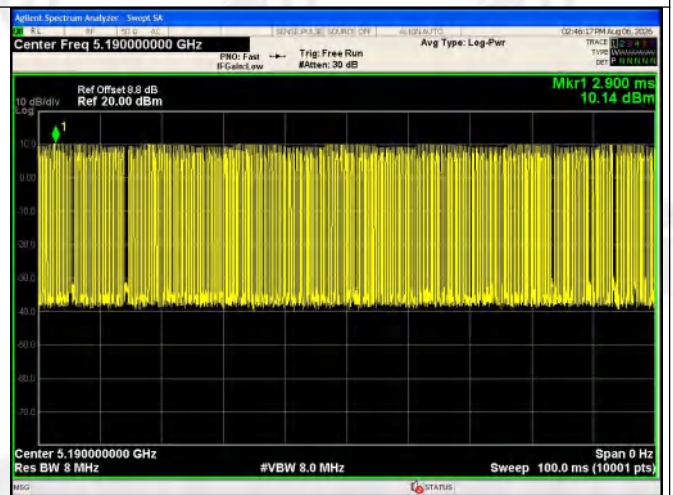
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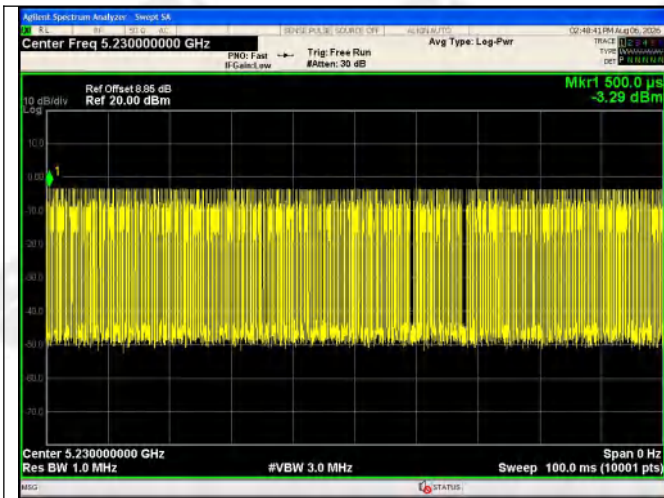
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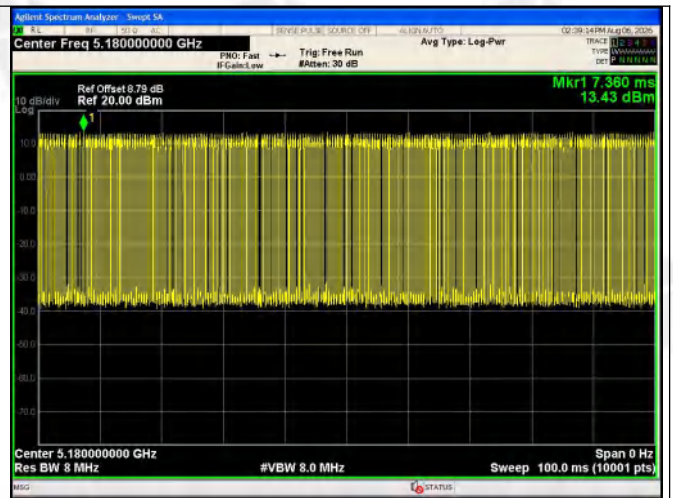
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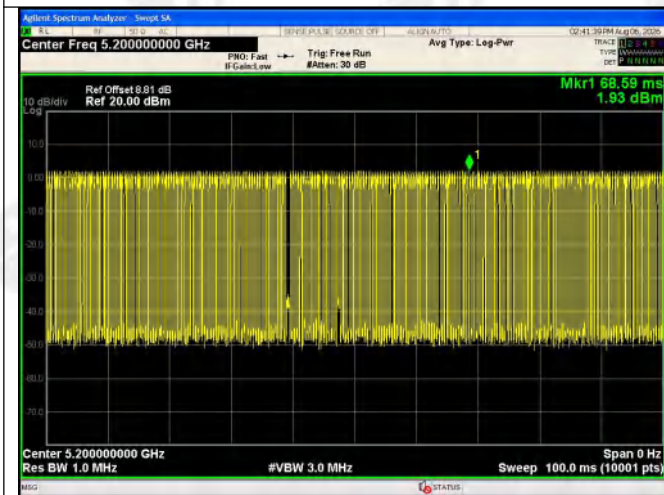
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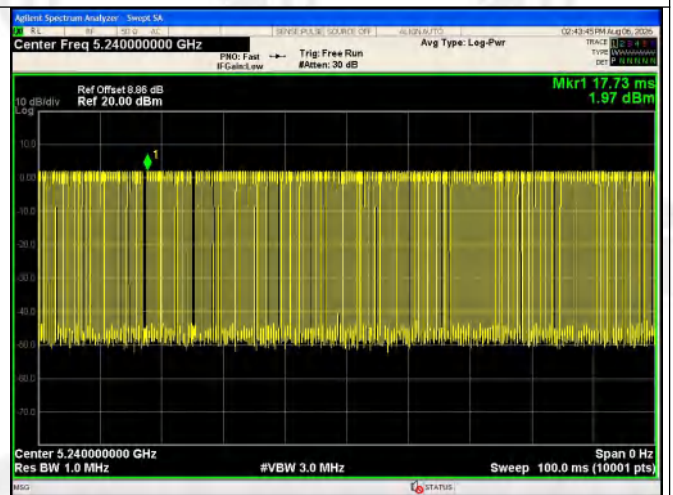
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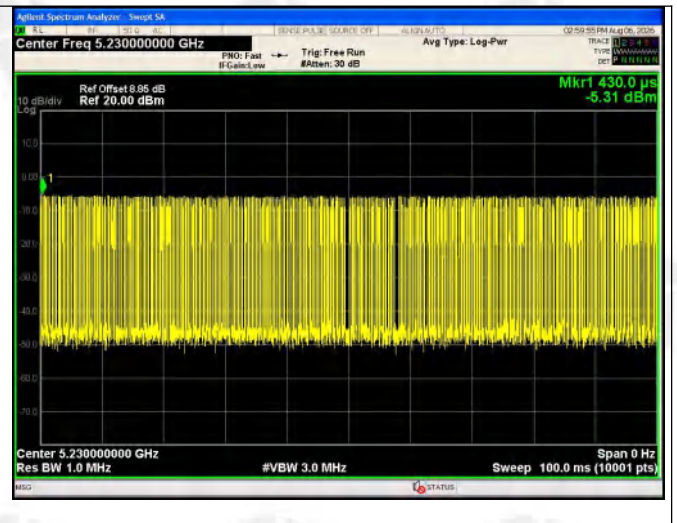
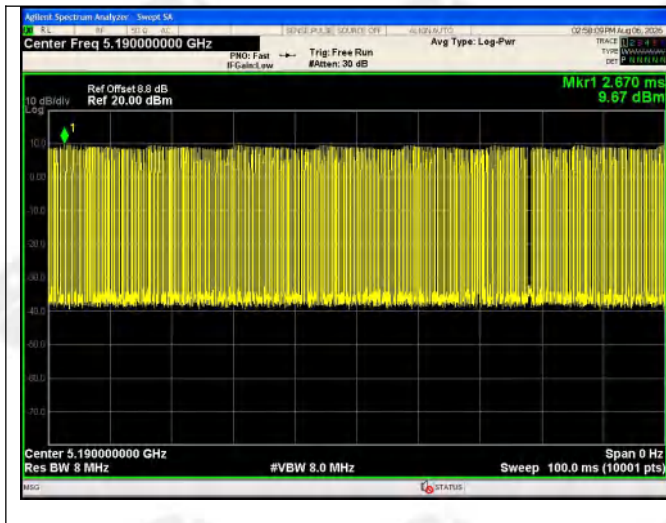
802.11ax(HE20)-5240



802.11ax(HE40)-5190



802.11ax(HE40)-5230





9 POWER SPECTRAL DENSITY TEST

9.1 Test Standard and Limit

According to FCC §15.407(3)

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum

power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi



without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

9.2 Test Setup



9.3 Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above,
2. The testing follows FCC KDB 789033 D02.
3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.

4. For U-NII1, U-NII-2A, U-NII-2C Band:

Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

For U-NII-3 Band:

Set RBW=510 kHz, VBW=3*RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

5. Use the cursor on spectrum to peak search the highest level of trace
6. Record the max. reading and add 10 log(1/duty cycle).



9.4 Test Data

Test mode	Test Channel (MHz)	PSD [dBm/MHz]	Limit [dBm/MHz]	Result
802.11a	5180	-0.985	11	Pass
	5200	-1.417	11	Pass
	5240	-0.214	11	Pass
802.11ac(VHT20)	5180	-6.031	11	Pass
	5200	-5.996	11	Pass
	5240	-4.966	11	Pass
802.11ac(VHT40)	5190	-9.746	11	Pass
	5230	-9.806	11	Pass
802.11n(HT20)	5180	-5.713	11	Pass
	5200	-6.349	11	Pass
	5240	-4.858	11	Pass
802.11n(HT40)	5190	-9.824	11	Pass
	5230	-8.537	11	Pass
802.11ax(HE20)	5180	-6.66	11	Pass
	5200	-5.984	11	Pass
	5240	-5.446	11	Pass
802.11ax(HE40)	5190	-10.218	11	Pass
	5230	-9.579	11	Pass

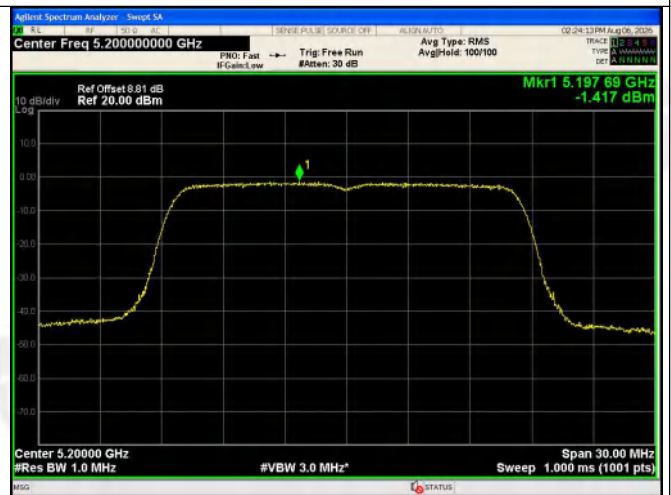


5180-5230MHz

802.11a-5180



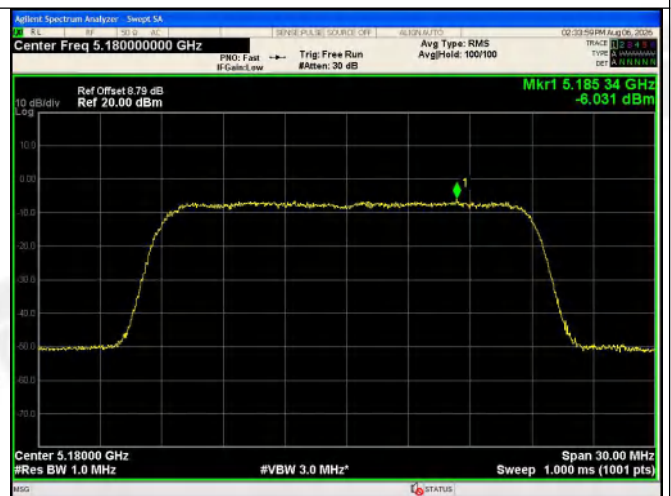
802.11a-5200



802.11a-5240



802.11ac(VHT20)-5180

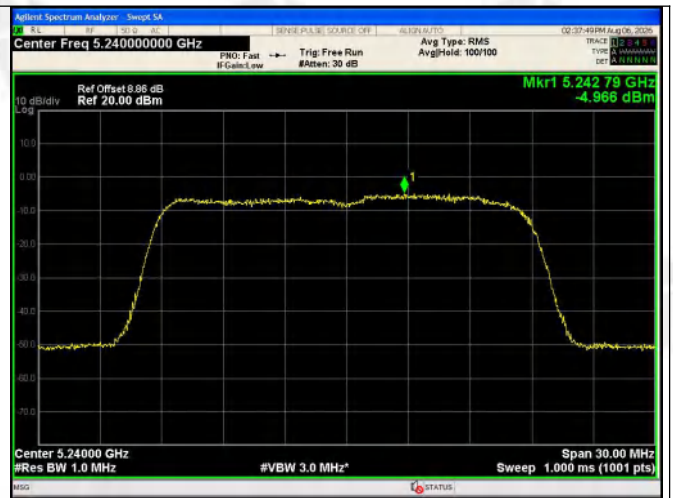


802.11ac(VHT20)-5200

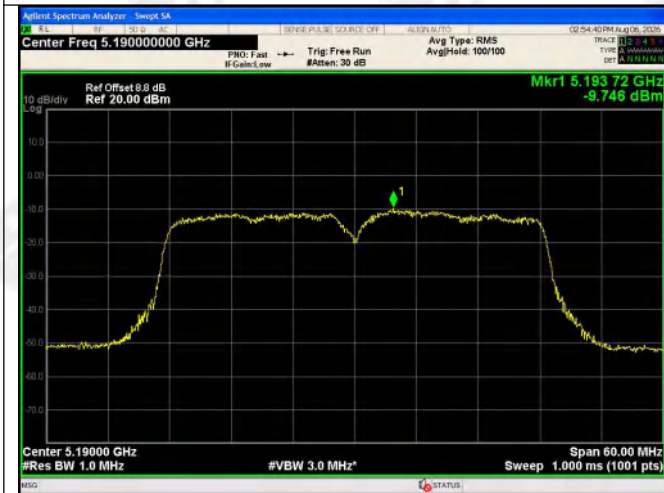
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802.11ac(VHT40)-5190



802.11ac(VHT40)-5230



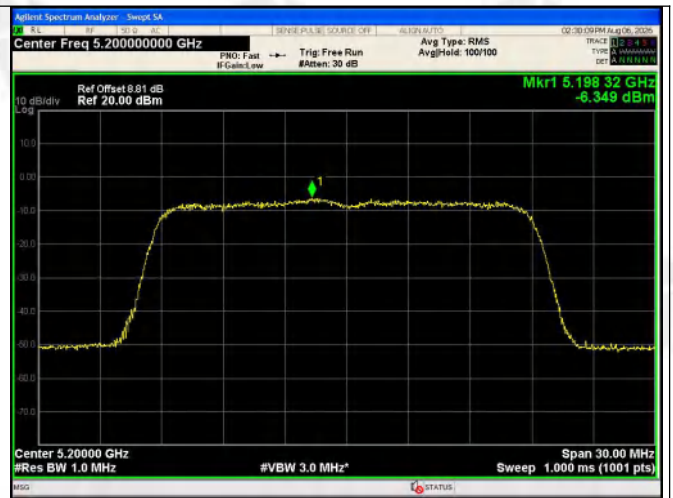
802.11n(HT20)-5180



802.11n(HT20)-5200



802.11n(HT20)-5240



802.11n(HT40)-5190



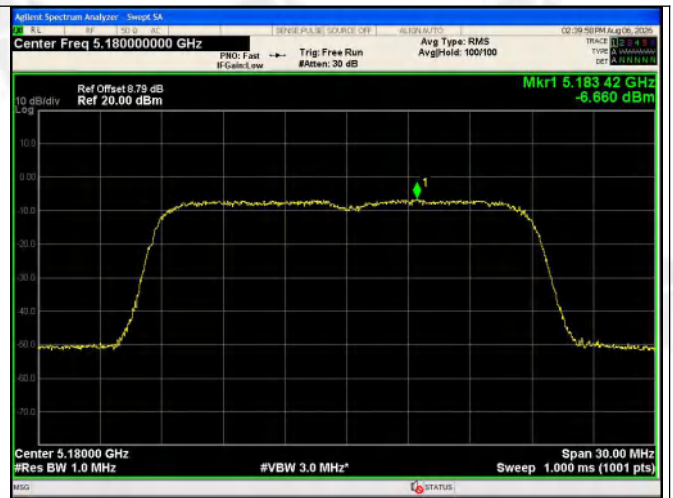
802.11n(HT40)-5230



802.11ax(HE20)-5180



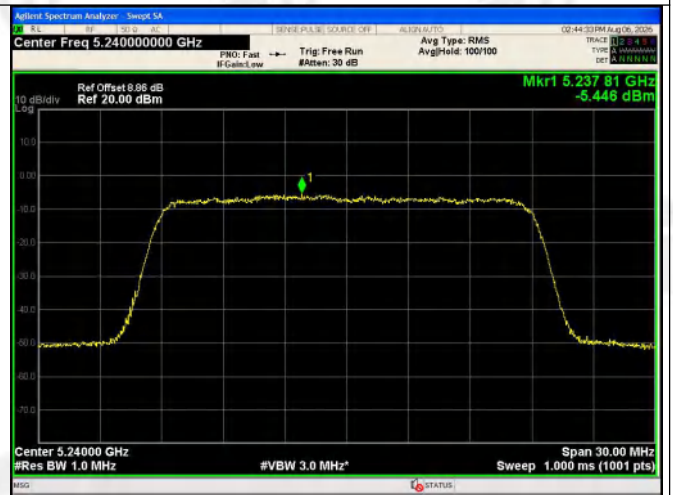
802.11ax(HE20)-5200



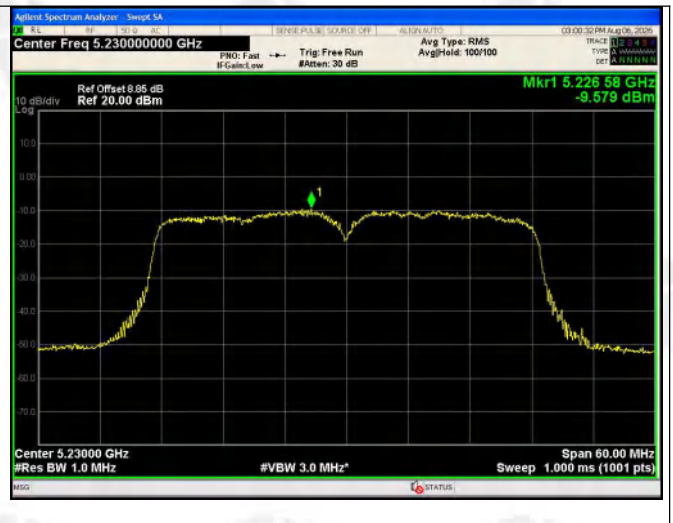
802.11ax(HE20)-5240



802.11ax(HE40)-5190



802.11ax(HE40)-5230



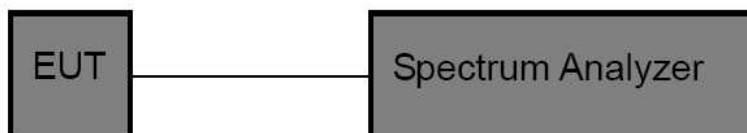


10 26DB & 6DB & 99% Emission Bandwidth Test

10.1 Test Standard

Test Standard	FCC Part15 C Section 15.407
	The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band, the minimum bandwidth 6 dB bandwidth of U-NII devices shall be at least 500KHz. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

10.2 Test Setup



10.3 Test Procedure

The following procedure shall be used for measuring 6db bandwidth:

- Set RBW = 100KHz.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 3.3 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW $\geq 3 \cdot$ RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth fuNCTion of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth fuNCTion, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

The following procedure shall be used for measuring 26db bandwidth:

- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.
- 3) Detector = Peak
- 4) Trace mode = max hold.
- 5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.



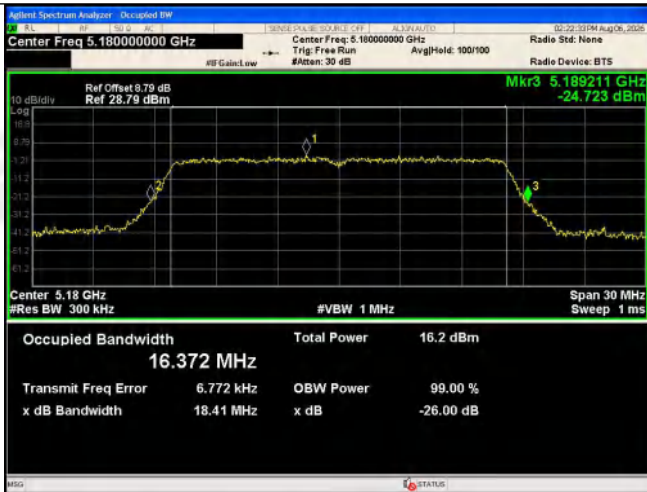
10.4 Test Data

Test mode	Test Channel (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5180	18.409	16.330
	5200	18.696	16.349
	5240	18.791	16.350
802.11ac20	5180	19.441	17.614
	5200	19.46	17.638
	5240	19.439	17.551
802.11ac40	5190	39.716	36.171
	5230	39.875	36.210
802.11n(HT20)	5180	19.282	17.568
	5200	19.37	17.607
	5240	19.252	17.561
802.11n(HT40)	5190	39.081	36.042
	5230	40.259	36.144
802.11ax20	5180	19.494	17.613
	5200	19.402	17.609
	5240	19.264	17.605
802.11ax40	5190	39.65	36.163
	5230	39.73	36.055

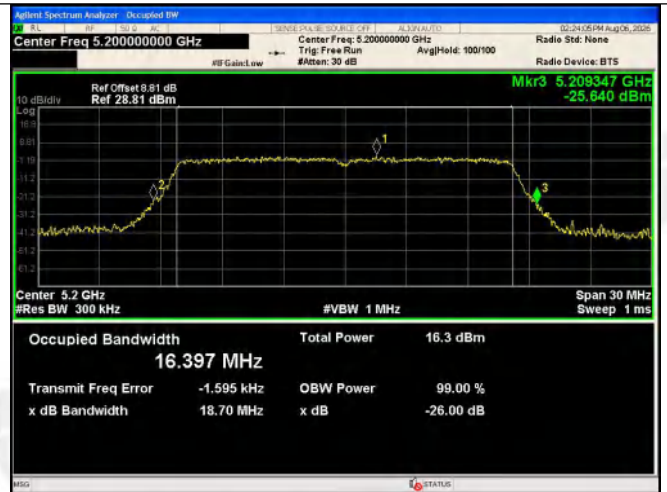


5180-5240MHz
26dB

802.11a-5180



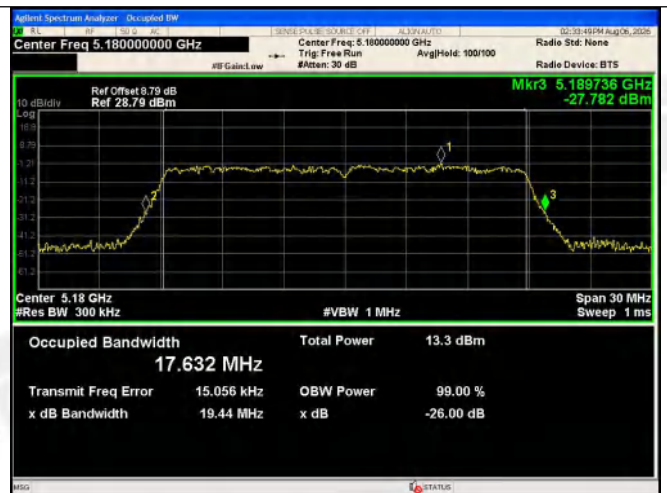
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802.11a-5240

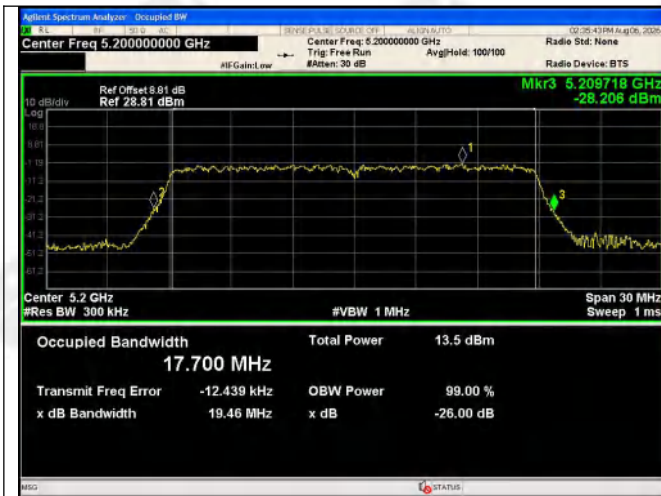


802.11ac(VHT20)-5180

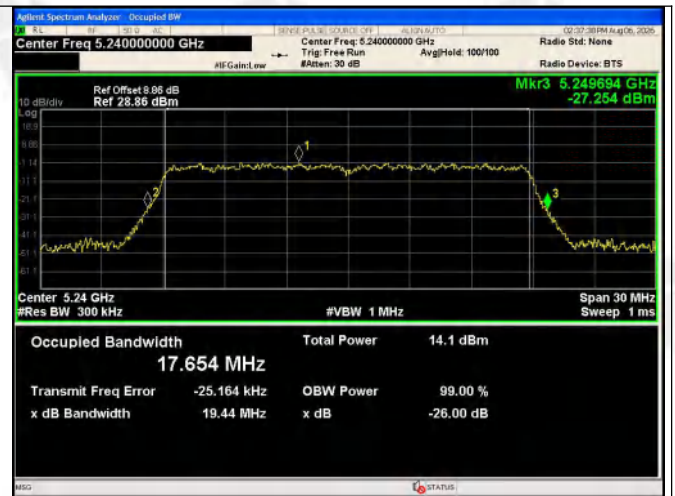


802.11ac(VHT20)-5200

802.11ac(VHT20)-5240



802.11ac(VHT40)-5190



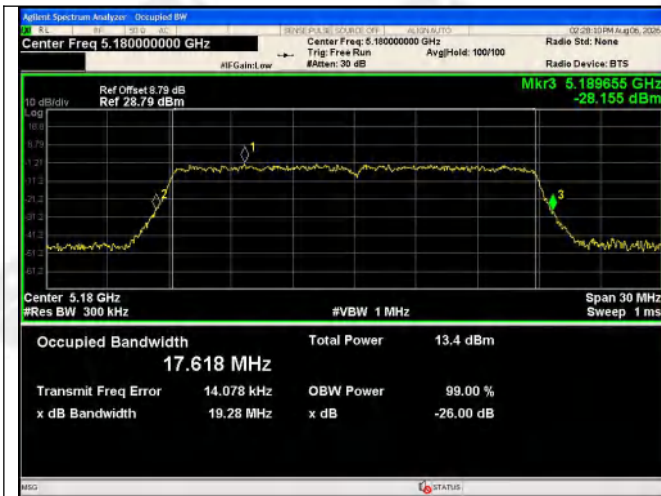
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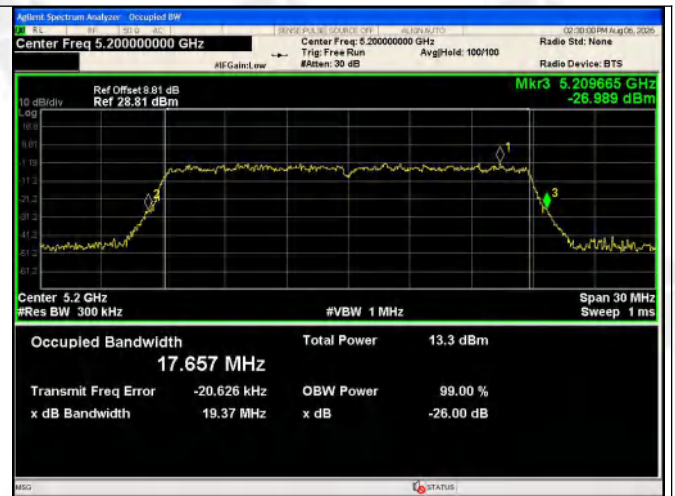
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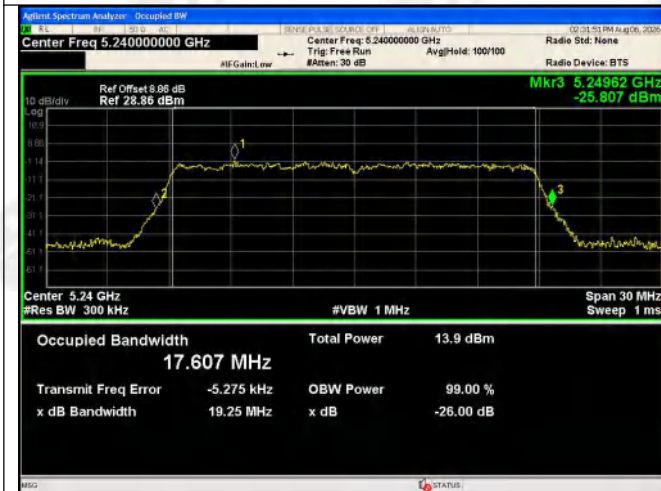
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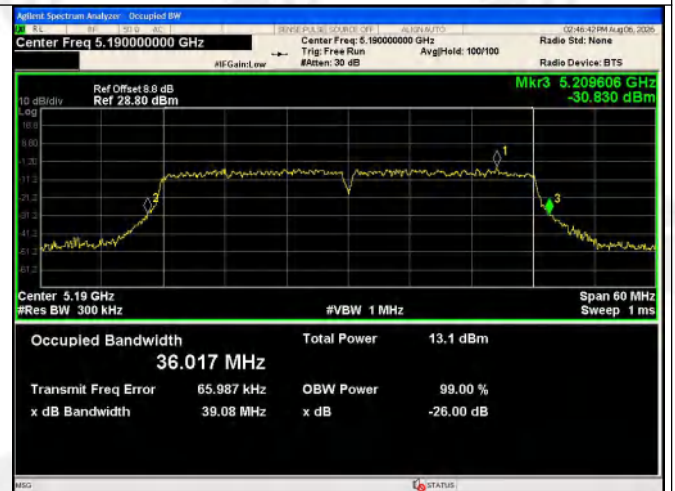
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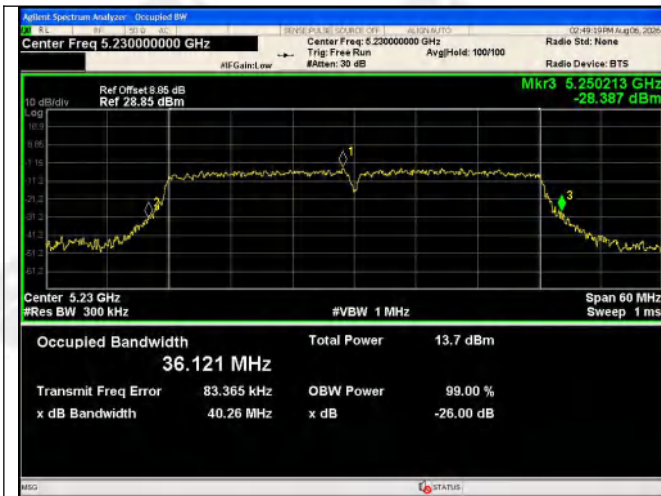
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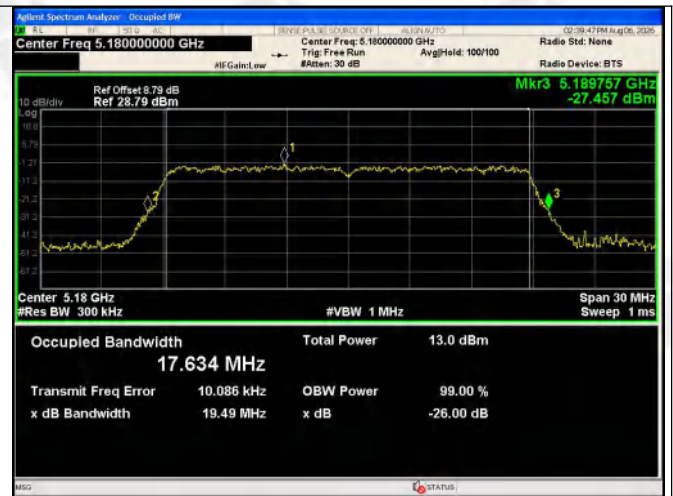
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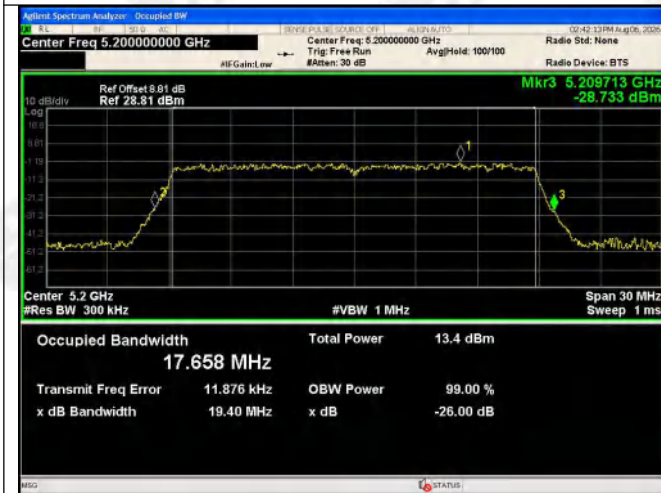
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802.11ax(HE20)-5200



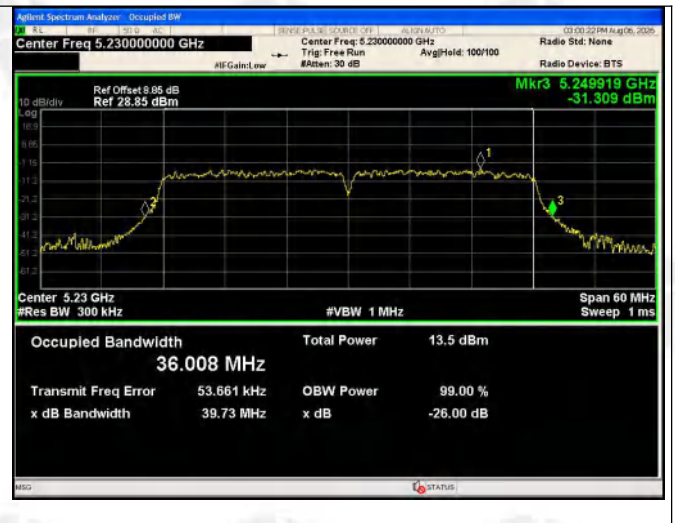
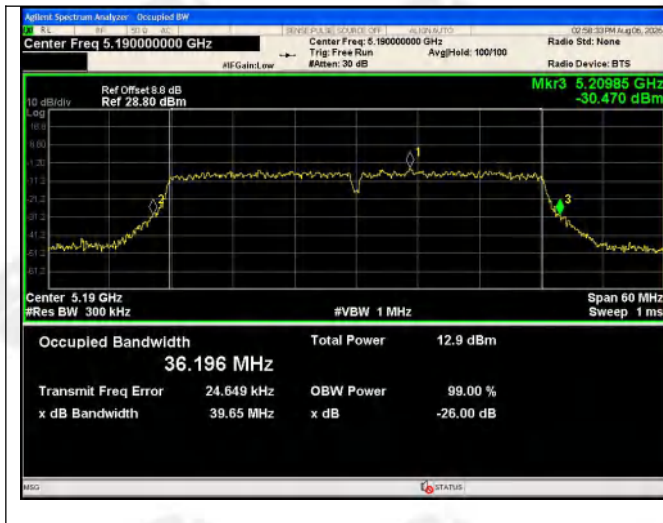
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802.11ax(HE40)-5190



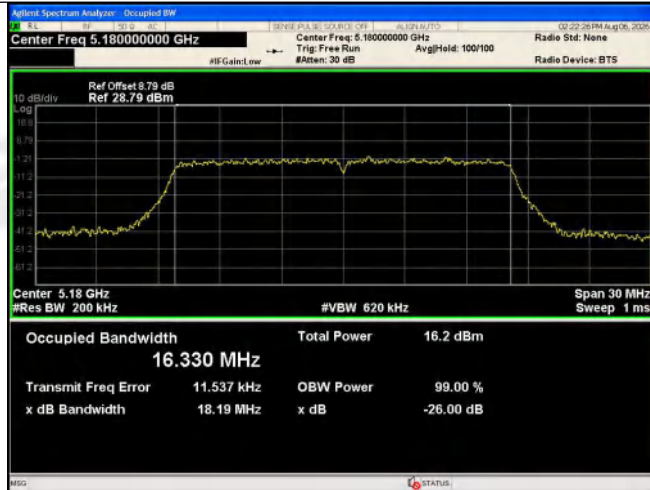
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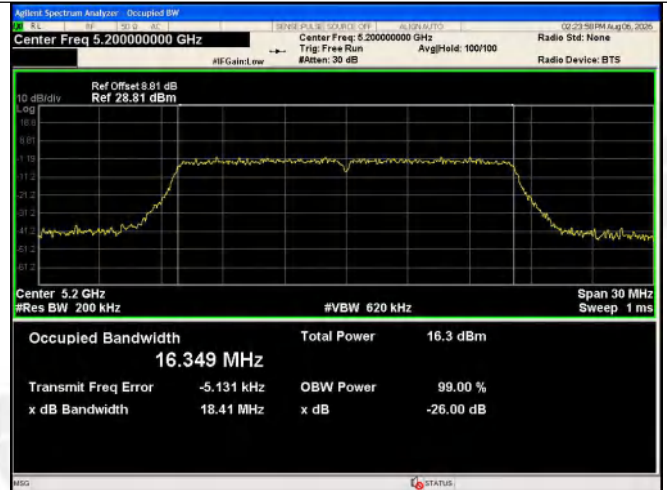


99%

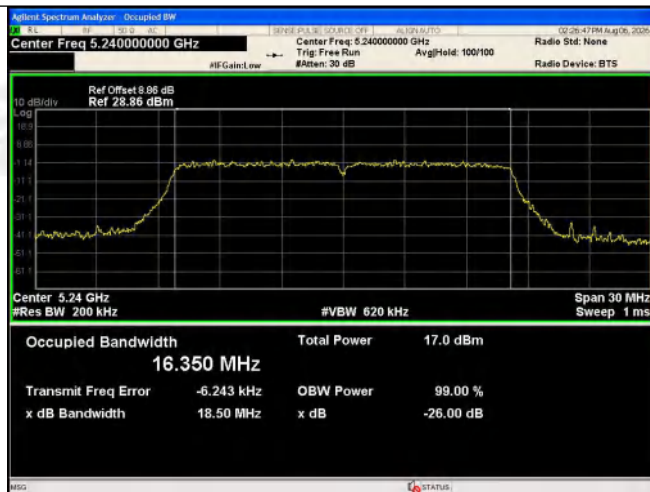
802.11a-5180



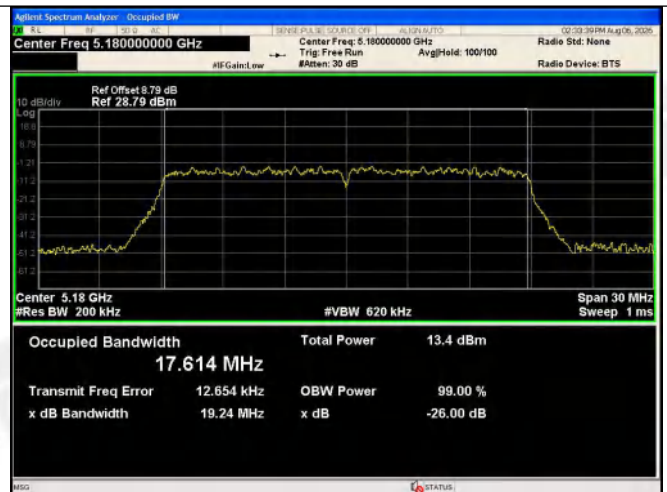
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802.11a-5240

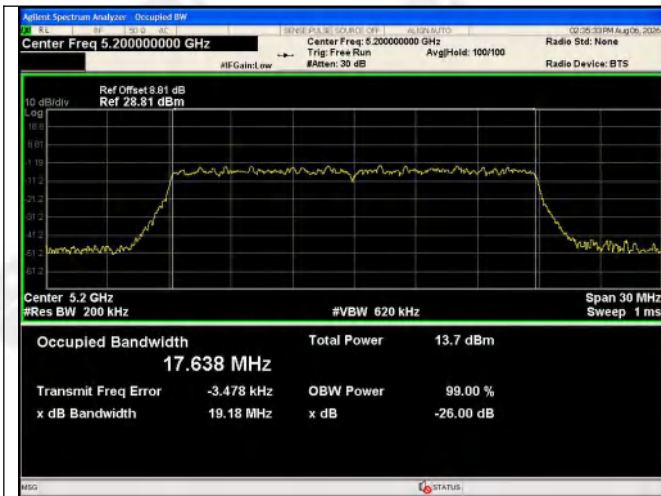


802.11ac(VHT20)-5180

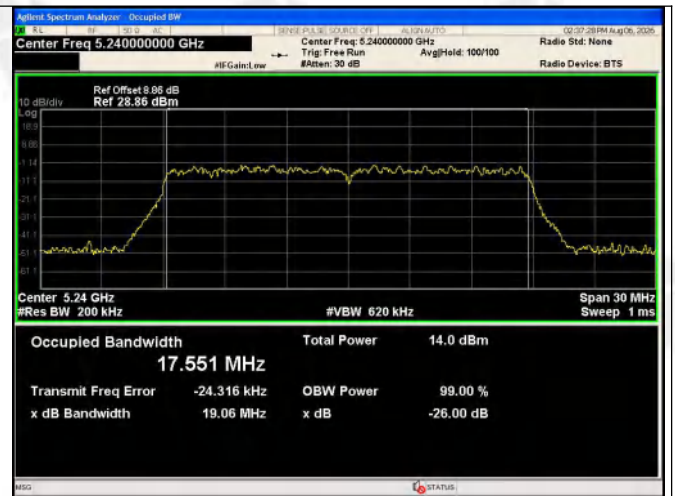


802.11ac(VHT20)-5200

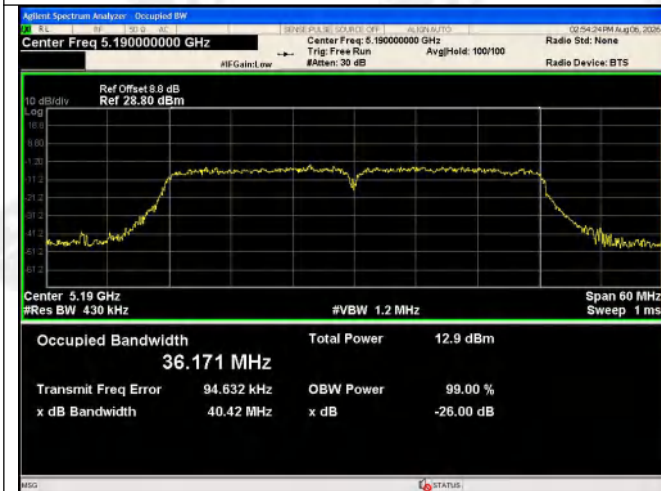
802.11ac(VHT20)-5240



802.11ac(VHT40)-5190



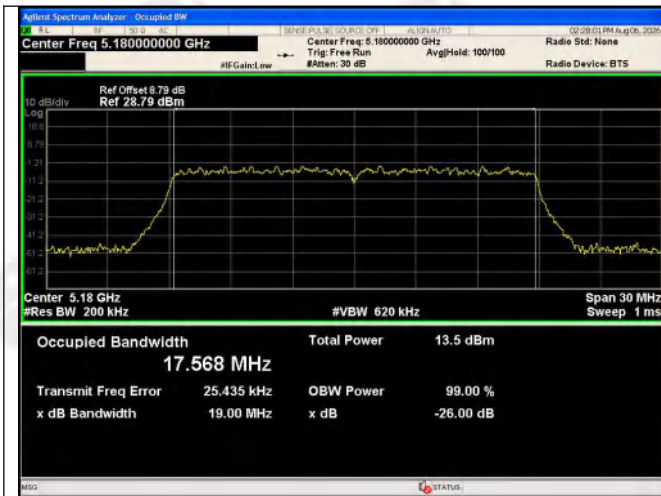
802.11ac(VHT40)-5230



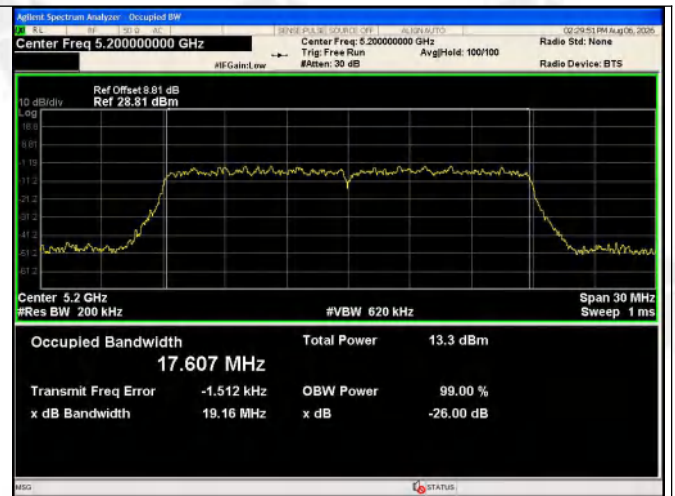
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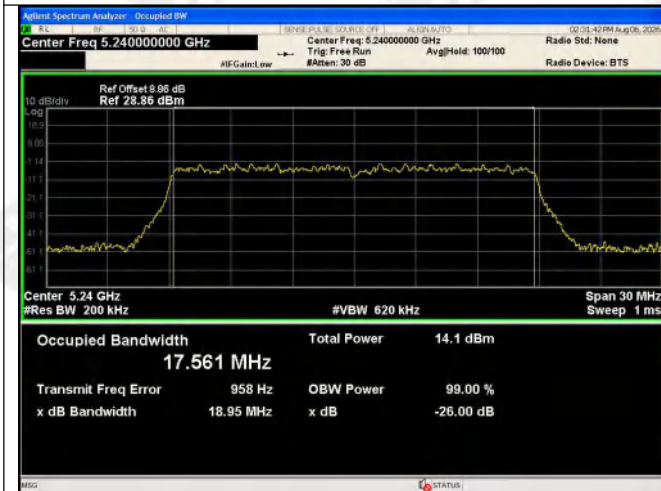
802.11n(HT20)-5200



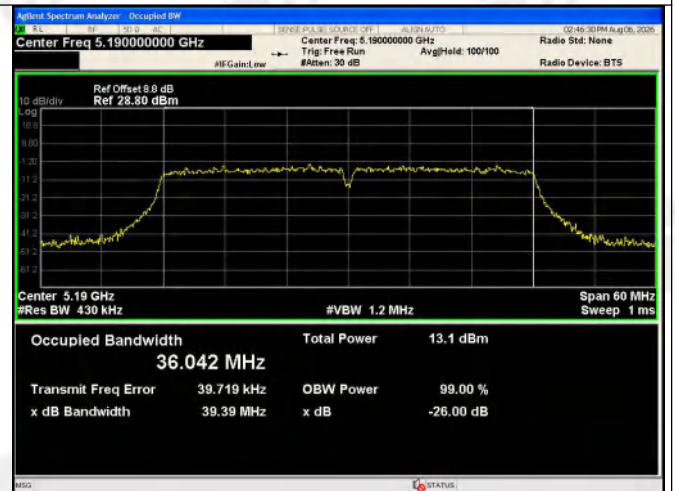
802.11n(HT20)-5240



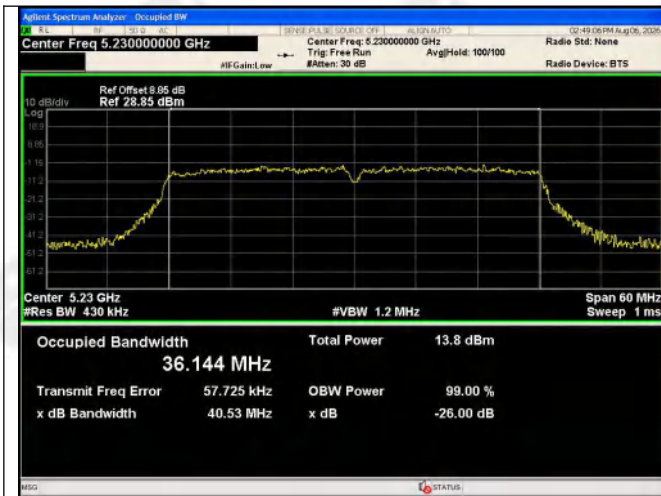
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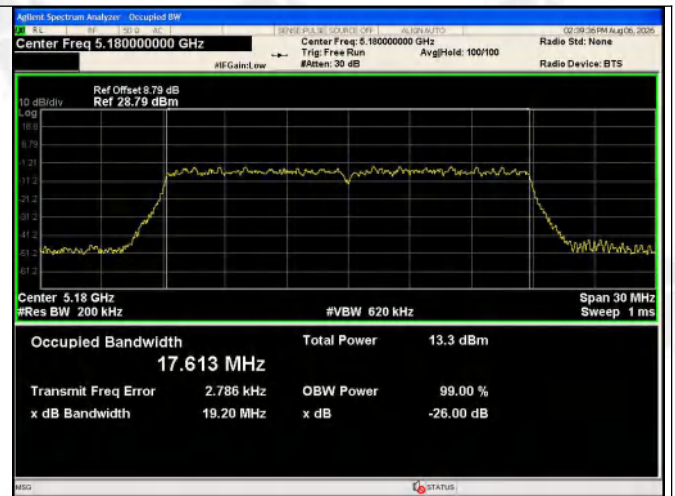
802.11n(HT40)-5230



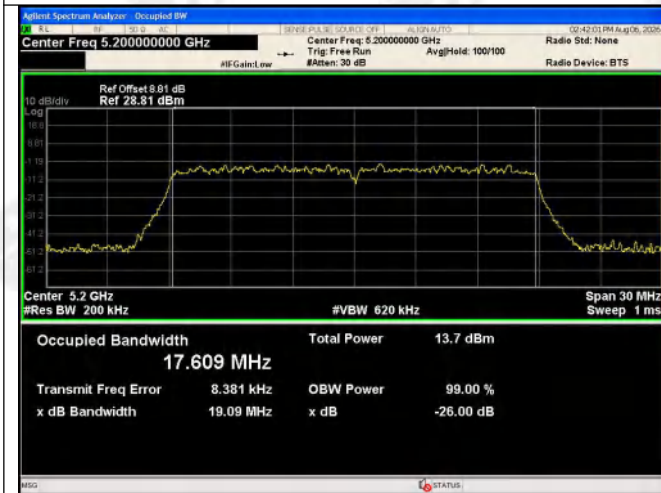
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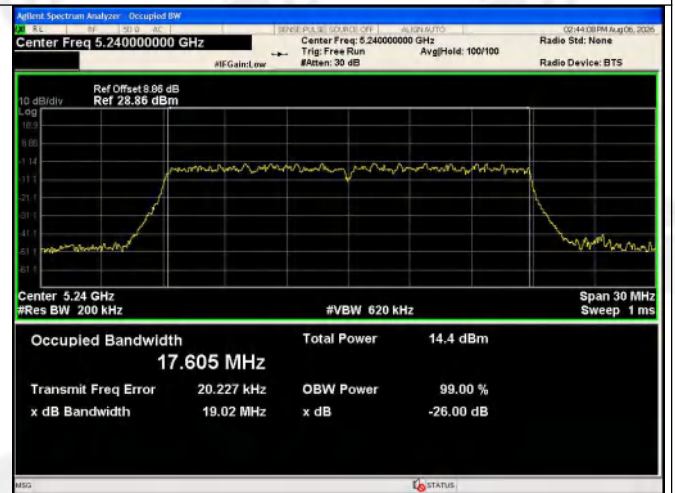
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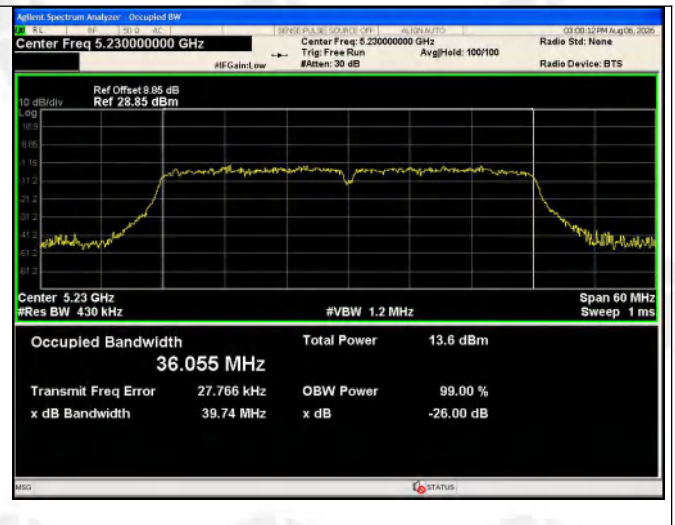
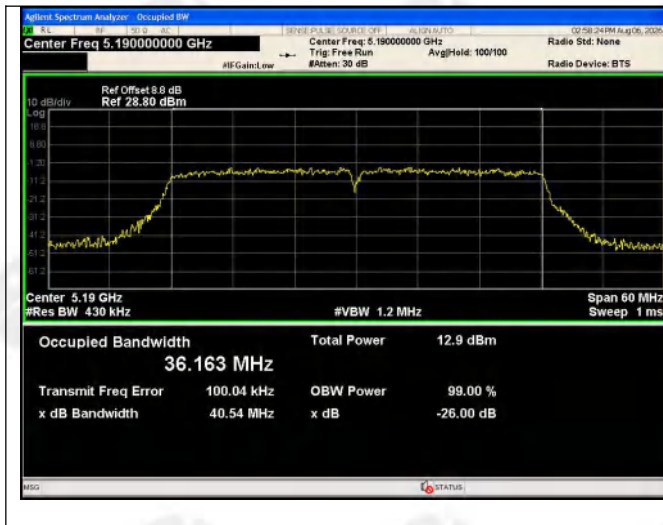
802.11ax(HE20)-5240



802.11ax(HE40)-5190



802.11ax(HE40)-5230





11 Maximum Conducted Output Power

11.1 Test Standard and Limit

According to FCC §15.407

For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power.

For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications,



and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

11.2 Test Setup



11.3 Test Procedure

The EUT was directly connected to the Power meter

1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

Measurement using a Power Meter(PM)

a) Method PM (Measurement using an RF average power meter):

(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:

- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
- At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.

- The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

(i) If the transmitter does not transmit continuously, measure the duty cycle, x , of the transmitter output signal as described in IIL.B.

(ii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.



(iv) Adjust the measurement in dBm by adding $10 \log (1/x)$ where x is the duty cycle (e.g. $10 \log (1/0.25)$ if the duty cycle is 25%).

b) Method PM-G (Measurement using a gated RF average power meter):

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

11.4 Test Data

Test mode1	Test Channel (MHz)	Output Power (dBm)	Limit (dBm)
802.11a	5180	14.821	23.98
	5200	15.083	23.98
	5240	15.337	23.98
802.11ac20	5180	11.766	23.98
	5200	12.197	23.98
	5240	12.424	23.98
802.11ac40	5190	11.197	23.98
	5230	11.787	23.98
802.11n(HT20)	5180	12.074	23.98
	5200	11.809	23.98
	5240	12.546	23.98
802.11n(HT40)	5190	11.462	23.98
	5230	12.171	23.98
802.11ax20	5180	11.509	23.98
	5200	12.044	23.98
	5240	12.642	23.98
802.11ax40	5190	11.287	23.98
	5230	11.973	23.98



12 Out of Band Emissions and Spurious Emission

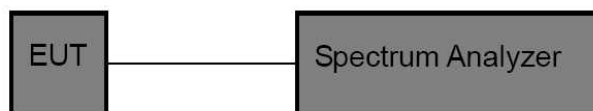
12.1 Test Standard and Limit

According to FCC §15.407(b)

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

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

12.2 Test Setup



12.3 Test Procedure

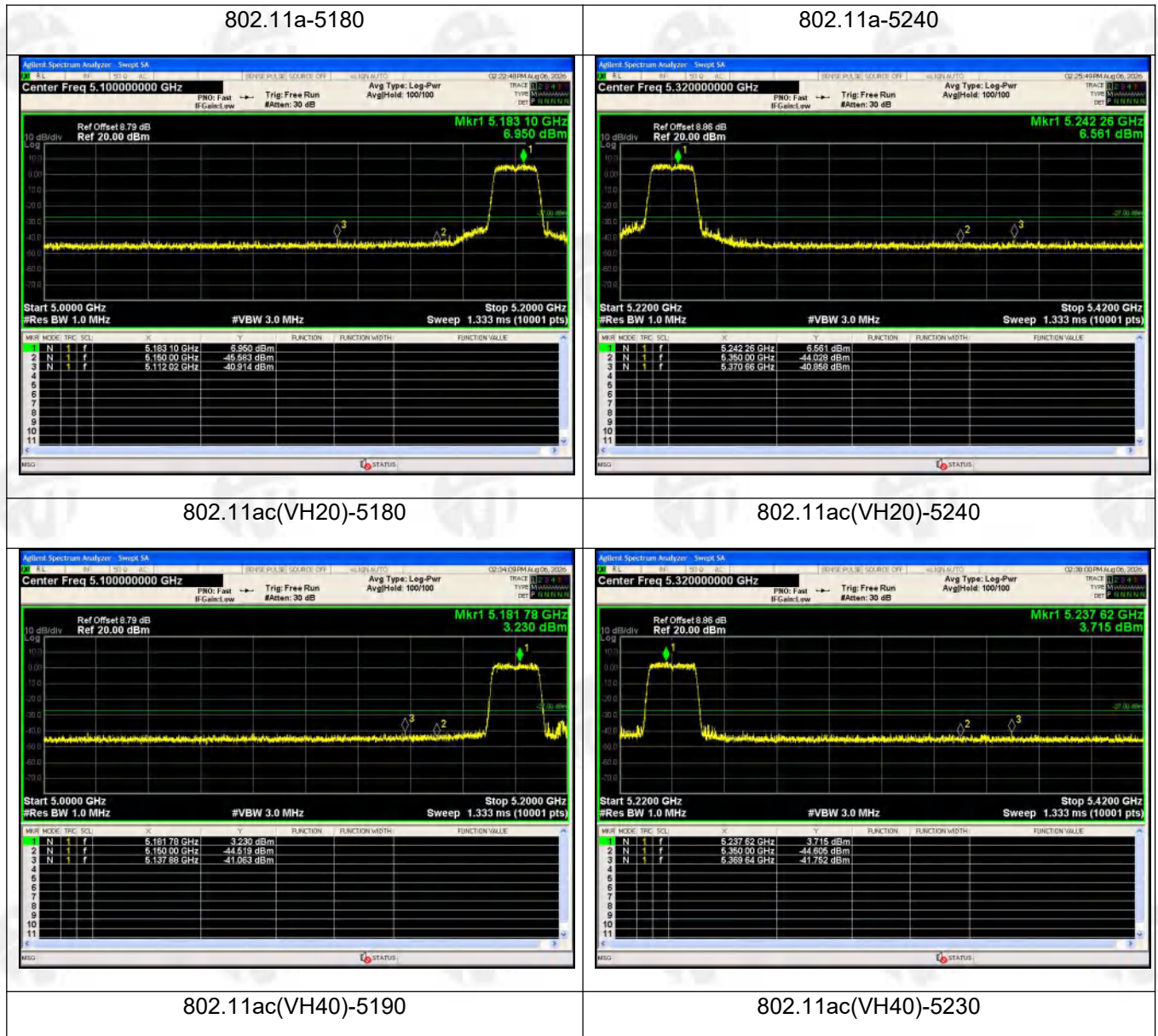
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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 of spectrum analyzer to 1 MHz with a convenient frequency span.
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.

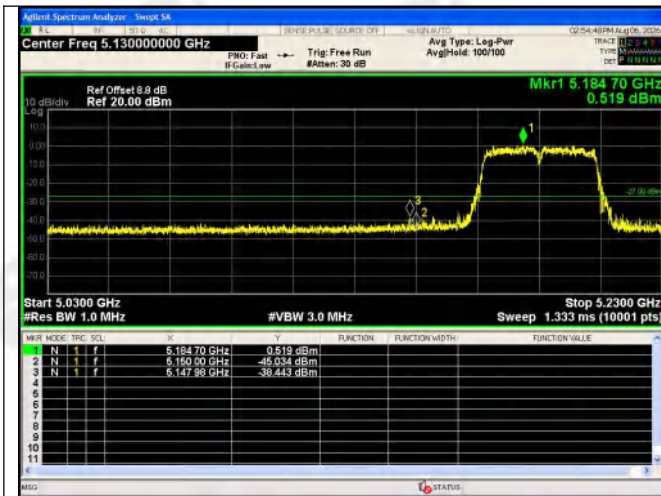


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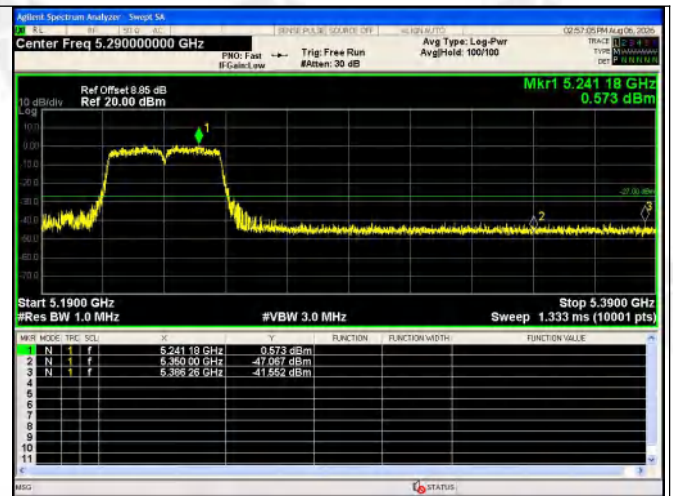
Test Graph

5180-5240MHz

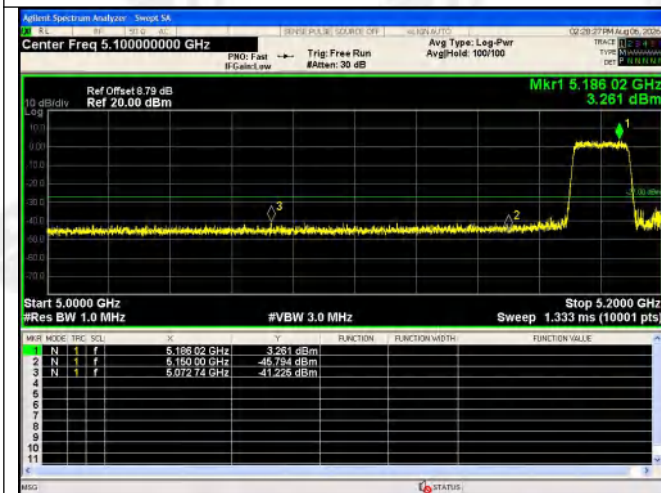




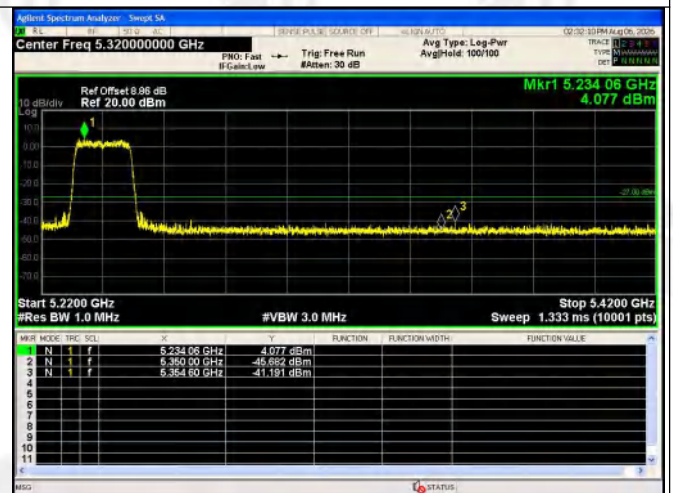
802.11n(HT20)-5180



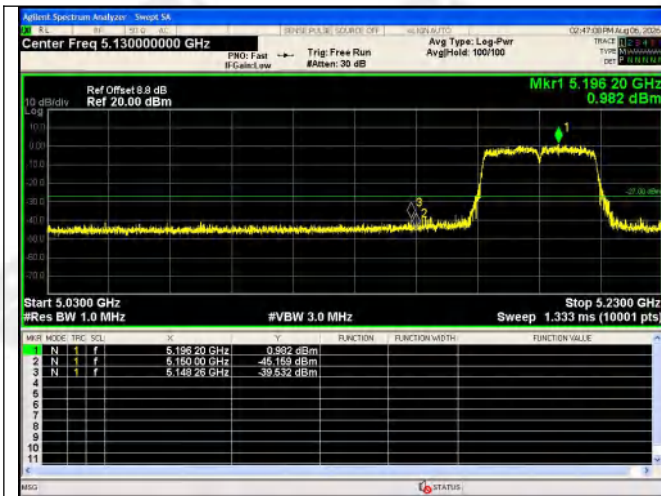
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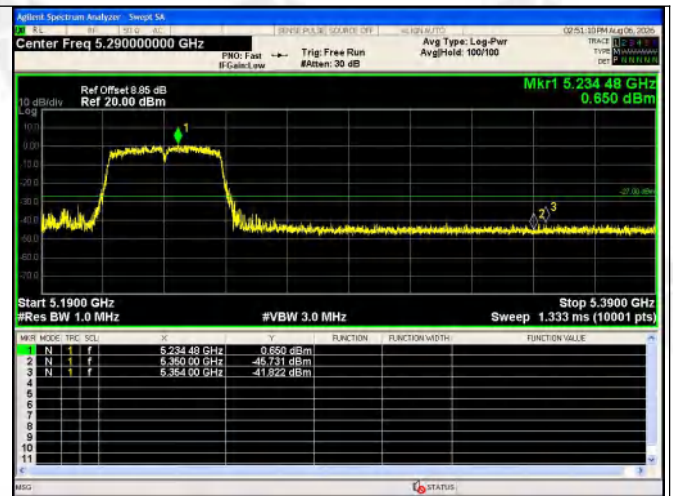
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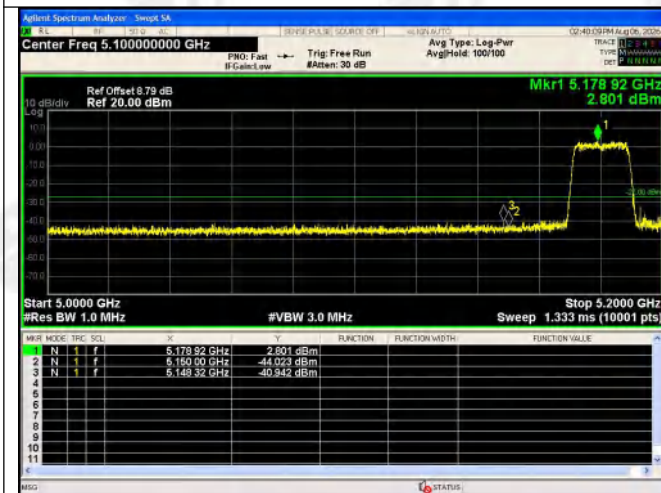
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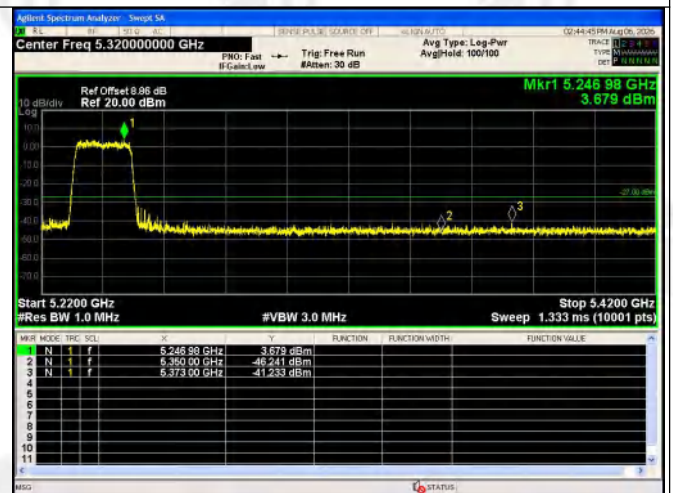
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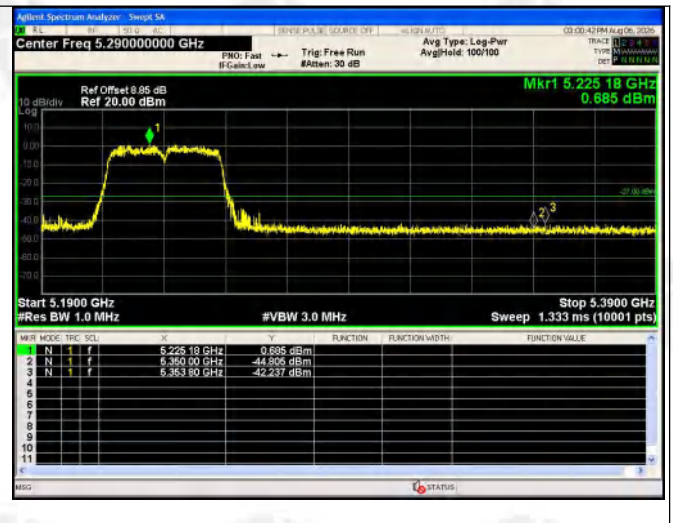
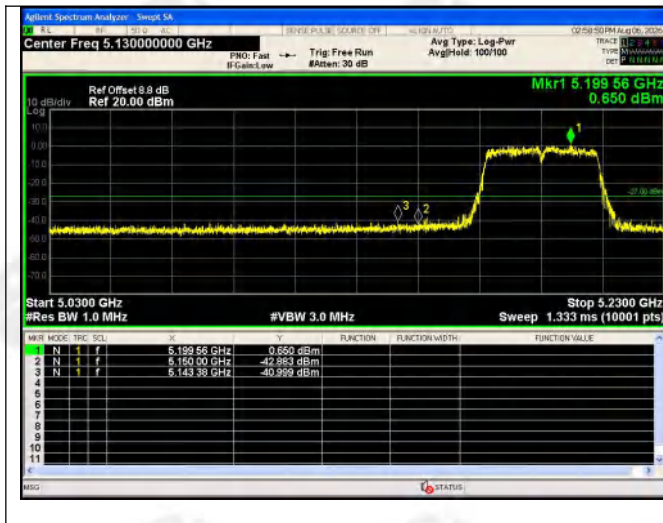
802.11ax(VH20)-5240



802.11ax(VH40)-5190



802.11ax(VH40)-5230





13 Frequency Stability Measurement

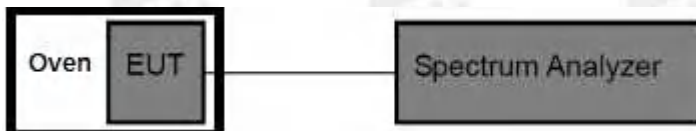
13.1 Test Standard and Limit

FCC

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

13.2 Test Setup



13.3 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f) / f_c \times 10^6$ ppm and the limit is less than ± 20 ppm (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is $-20^\circ\text{C} \sim 50^\circ\text{C}$.



13.4 Test Data

TX Frequency (5150-5250MHz)

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.0	5180.0162	5180	0.0162	3.1337
		V max (V)	5.5	5180.0138	5180	0.0138	2.6726
		V min (V)	4.5	5180.0516	5180	0.0516	9.9630
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	0	5180.0397	5180	0.0397	7.6654
		T (°C)	10	5180.0234	5180	0.0234	4.5106
		T (°C)	20	5180.0037	5180	0.0037	0.7099
		T (°C)	30	5180.0299	5180	0.0299	5.7797
		T (°C)	40	5180.0395	5180	0.0395	7.6349
Limits				±20ppm			
Result				Complies			



Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.0	5200.0022	5200	0.0022	0.4213
		V max (V)	5.5	5200.0394	5200	0.0394	7.5809
		V min (V)	4.5	5200.0509	5200	0.0509	9.7914
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	0	5200.0237	5200	0.0237	4.5661
		T (°C)	10	5200.0118	5200	0.0118	2.2757
		T (°C)	20	5200.0271	5200	0.0271	5.2121
		T (°C)	30	5200.0044	5200	0.0044	0.8456
		T (°C)	40	5200.0411	5200	0.0411	7.8954
Limits				±20ppm			
Result				Complies			



Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (° C)	20	V nom (V)	5.0	5240.0120	5240	0.0120	2.2880
		V max (V)	5.5	5240.0286	5240	0.0286	5.4497
		V min (V)	4.5	5240.0434	5240	0.0434	8.2766
Limits				±20ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	5	T (°C)	0	5240.0425	5240	0.0425	8.1154
		T (°C)	10	5240.0250	5240	0.0250	4.7691
		T (°C)	20	5240.0359	5240	0.0359	6.8464
		T (°C)	30	5240.0414	5240	0.0414	7.8941
		T (°C)	40	5240.0320	5240	0.0320	6.1062
Limits				±20ppm			
Result				Complies			



14 Antenna Requirement

14.1 Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
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.

14.2 Antenna Connected Construction

The antenna is PCB Antenna which permanently attached, and the best case gain of the antenna is 2.75 dBi(WIFI 5.1G). It complies with the standard requirement.



15 TEST SETUP & EUT PHOTOGRAPH

Please see the attachment for details.

----- End of Report -----