



FCC Test Report

FCC ID : 2A8WL-BWNIP-4L-BS

Applicant: SHARETRONIC DATA TECHNOLOGY (HONG KONG) LIMITED

Address: Room 1904 19/F Tung Wai Commercial Building 109-111 Gloucester Rd Wan Chai HK

Manufacturer: EWIC PHILIPPINES INC.

Address: BLDG NOS 7&8 L2 B4 EZP Warehouse Laguna Technopark Annex, Barangay BO Binan, Binan, Philippines, 4024

EUT: Wire Free Camera with Battery

Trade Mark: N/A

Model Number: FBWNIP-4L-BS-U-301, BTWN81-4-3BL-B, CAM-2PK-B4LWNPU-FP-B, CAM-B4LWNPU-FP-B, BWNIP-4L-BS-U-301

Date of Receipt: Aug. 29, 2022

Test Date: Aug. 30, 2022 - Oct. 08, 2022

Date of Report: Oct. 09, 2022

Prepared By: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China

Applicable Standards: FCC PART 15 C 15.407
ANSI C63.10:2013

Test Result: Pass

Report Number: DL-20220915012E-3

Prepared (Test Engineer): Pxing Huang

Reviewer (Supervisor): Jack Bu

Approved (Manager): Jade Yang



This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E (5.2G)			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.209 15.407(b)	Radiated Spurious Emission	PASS	
15.205 15.407(b)	Band Edge Emission	PASS	
15.407(a)	Maximum Conducted Average Output Power	PASS	
15.407(a)	Power Spectral Density	PASS	
15.407(a)	26dB bandwidth and 99%dB Bandwidth	PASS	
15.407(g)	Frequency Stability	PASS	
15.203	Antenna Requirement	PASS	

FCC Part15 (15.407) , Subpart E (5.8G)			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.209 15.407(b)	Radiated Spurious Emission	PASS	
15.205 15.407(b)	Band Edge Emission	PASS	
15.407(a)	Maximum Conducted Average Output Power	PASS	
15.407(a)	Power Spectral Density	PASS	
15.407(e)	6 dB bandwidth	PASS	
15.407(g)	Frequency Stability	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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



1.1 TEST FACILITY

Shenzhen DL Testing Technology Co., Ltd.

Add. : 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China

FCC Test Firm Registration Number: 854456

Designation Number: CN1307

ISED Registration number: 27485

IC Registered No.:CN0118

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$ providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 2.56\text{dB}$
2	RF power,conducted	$\pm 0.42\text{dB}$
3	Spurious emissions,conducted	$\pm 2.76\text{dB}$
4	All emissions,radiated(<1G)	$\pm 3.65\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Wire Free Camera with Battery
Trademark	N/A
Model No.:	FBWNIP-4L-BS-U-301
Sample ID:	DL-20220915012E-1#
Serial No.:	BTWN81-4-3BL-B, CAM-2PK-B4LWNPU-FP-B, CAM-B4LWNPU-FP-B, BWNIP-4L-BS-U-301
Model Difference	PCB board, circuit, structure and internal of these model(s) are the same, Only model name is different for these model.
Operation Frequency:	5180-5240, 5745-5825MHz(802.11a/ac/n/ax(HT20)) 5190-5230, 5755-5795MHz(802.11ac/n/ax(HT40))
Channel numbers:	See channel list
Channel separation:	20MHz, 40MHz
Modulation technology:	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM for 802.11a/n/ac/ax
Rate of Transmitter	802.11a: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps 802.11n: Up to 500Mbps
Antenna Type:	Internal Antenna
Antenna gain:	2.9dBi
Power supply:	DC 3.7V by battery (5200mAh); Charging input: DC 5V
Battery Information:	Model: 18650 Nominal Voltage: 3.7V Nominal Capacity: 5200mAh/19.24Wh

Note:

- 1.For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.The EUT's all information provided by client.



2. Channel List

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

Channel List for 802.11a/ac/n/ax(20)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

Channel List for 802.11ac/n/ax(40)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

Channel List for 802.11ac/n/ax(40)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795



2.2 DESCRIPTION OF TEST MODES

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

Pretest Mode	Description	
Channel	Band 1	Band 4
Low	5180MHz(802.11a/n/ac/ax HT20) 5190(802.11n/ac/ax HT40)	5745MHz(802.11a/n/ac/ax HT20) 5755(802.11n/ac/ax HT40)
Middle	5200MHz	5785MHz
High	5240MHz(802.11a/n/ac/ax HT20) 5230(802.11n/ac/ax HT40)	5825MHz(802.11a/n/ac/ax HT20) 5795(802.11n/ac/ax HT40)
Other	Link Mode	

For Conducted & Radiated Emission		
Final Test Mode	Description	
Channel	Band 1	Band 4
Low	5180MHz(802.11a/n/ac/ax HT20) 5190(802.11n/ac/ax HT40)	5745MHz(802.11a/n/ac/ax HT20) 5755(802.11n/ac/ax HT40)
Middle	5200MHz	5785MHz
High	5240MHz(802.11a/n/ac/ax HT20) 5230(802.11n/ac/ax HT40)	5825MHz(802.11a/n/ac/ax HT20) 5795(802.11n/ac/ax HT40)
Other	Link Mode	

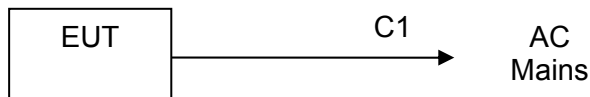
Note: 1. The measurements are performed at the highest, middle, lowest available channels.

2. During the test, the duty cycle >98%, 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.

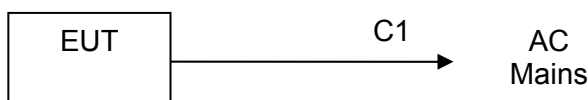


2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Model/Type No.	Series No.	Note
E-1	Wire Free Camera with Battery	FBWNIP-4L-BS-U-301	N/A	EUT
AE	Notebook	B40-80	MP07F6JD	AE

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the end product.

Max output power Setting				
Test software Version	Test program: SecureCRT			
Mode	802.11a	802.11n HT20	802.11n HT40	802.11ac HT20
Data Rate	1Mbps	MSC0	MSC0	MSC0
Power Setting of Softwave	11	11	11	11

Max output power Setting				
Test software Version	Test program: SecureCRT			
Mode	802.11ac HT40	802.11ax HT20	802.11ax HT40	
Data Rate	MSC0	MSC0	MSC0	
Power Setting of Softwave	11	11	11	



2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation test, Band-edge test and 6db bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4408B	MY50140780	Nov. 06, 2021	Nov. 05, 2022
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Nov. 06, 2021	Nov. 05, 2022
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Nov. 06, 2021	Nov. 05, 2022
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Nov. 06, 2021	Nov. 05, 2022
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Nov. 06, 2021	Nov. 05, 2022
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Nov. 06, 2021	Nov. 05, 2022
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Nov. 06, 2021	Nov. 05, 2022
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Nov. 06, 2021	Nov. 05, 2022
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Nov. 06, 2021	Nov. 05, 2022
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Nov. 06, 2021	Nov. 05, 2022
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Nov. 06, 2021	Nov. 05, 2022
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Nov. 06, 2021	Nov. 05, 2022
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Nov. 06, 2021	Nov. 05, 2022
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Nov. 06, 2021	Nov. 05, 2022
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Nov. 06, 2021	Nov. 05, 2022
16	D.C. Power Supply	LongWei	PS-305D	010964729	Nov. 06, 2021	Nov. 05, 2022

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	ChengYu	843 Room	843	Nov. 25, 2019	Nov. 24, 2022
2	EMI Receiver	R&S	ESR	101421	Dec. 07, 2020	Dec. 06, 2021
3	LISN	R&S	ENV216	102417	Dec. 07, 2020	Dec. 06, 2021
4	843 Cable 1#	ChengYu	CE Cable	001	Dec. 07, 2020	Dec. 06, 2021

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMCC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMCC	FA-03A2
3	RF test system	MAIWEI	MTS8310	2.0.0.0
4	RF communication test system	MAIWEI	MTS8200	2.0.0.0



3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

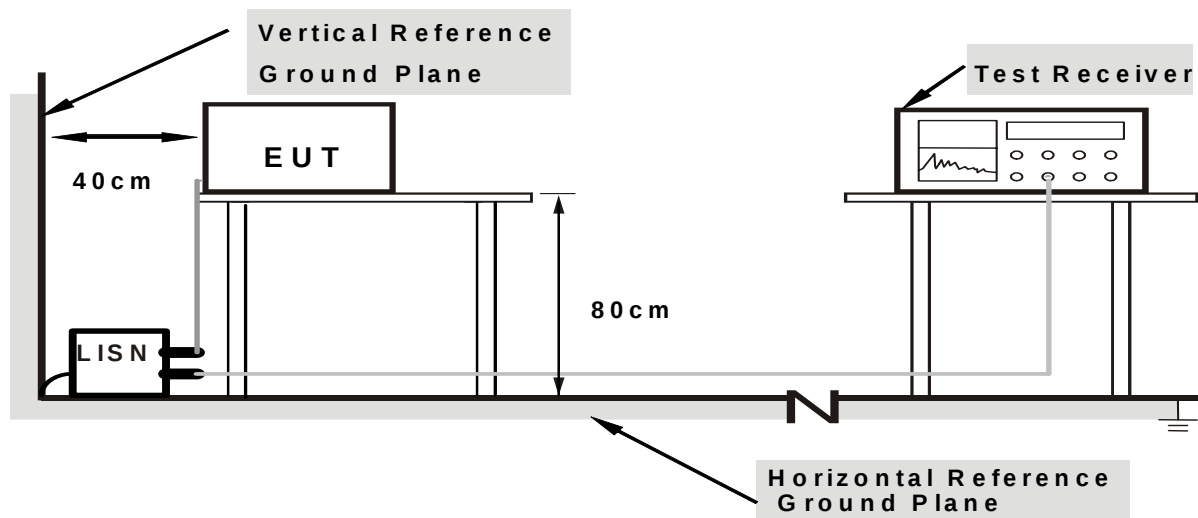
3.1.2 TEST PROCEDURE

- a. 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.
- b. 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.
- c. 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.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

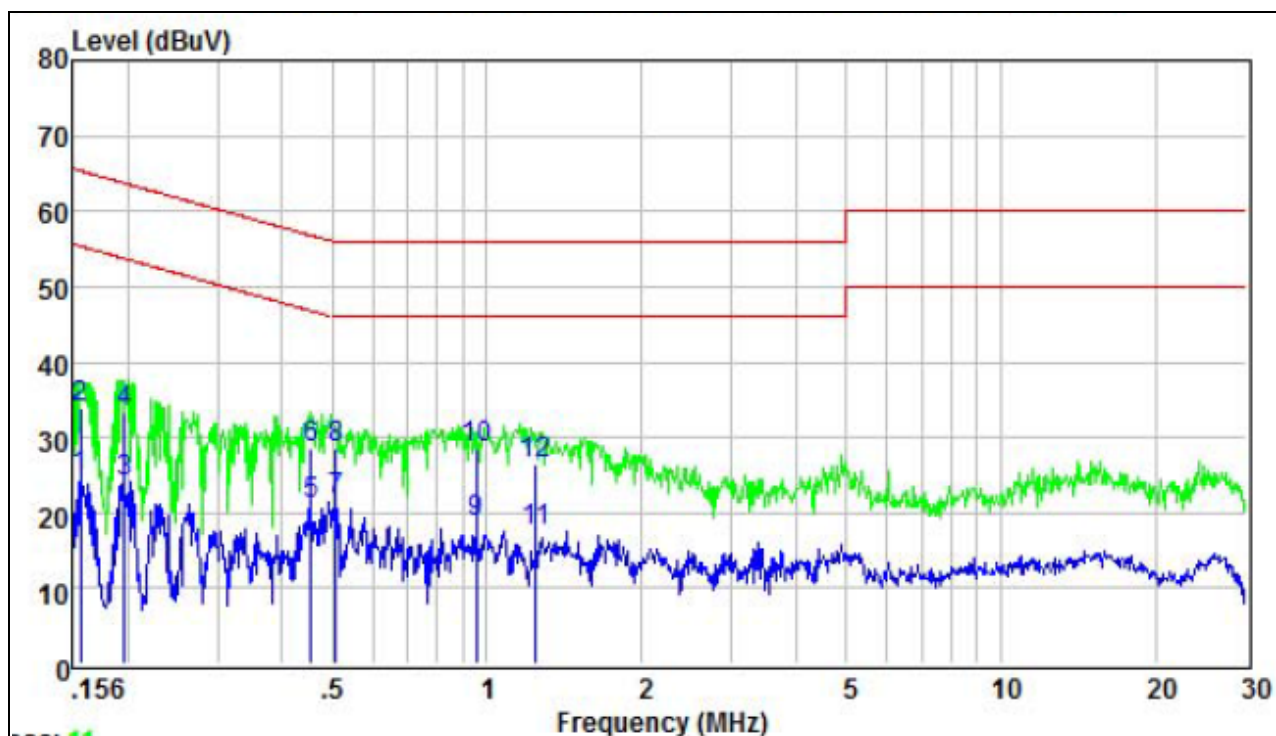
3.1.6 TEST RESULTS

Remark:

1. All modes were tested at AC 120V and 240V, only the worst result of AC 120V was reported.
2. Remark: We tested at 802.11a/802.11n HT20/802.11n HT40/802.11ac HT20/802.11ac HT40/802.11ax H20/802.11ax HT40 mode and recored the worst data 802.11b mode for in report.



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
TEST VOLTAGE :	AC 120V/60Hz	Test Mode:	Transmitting 802.11b mode



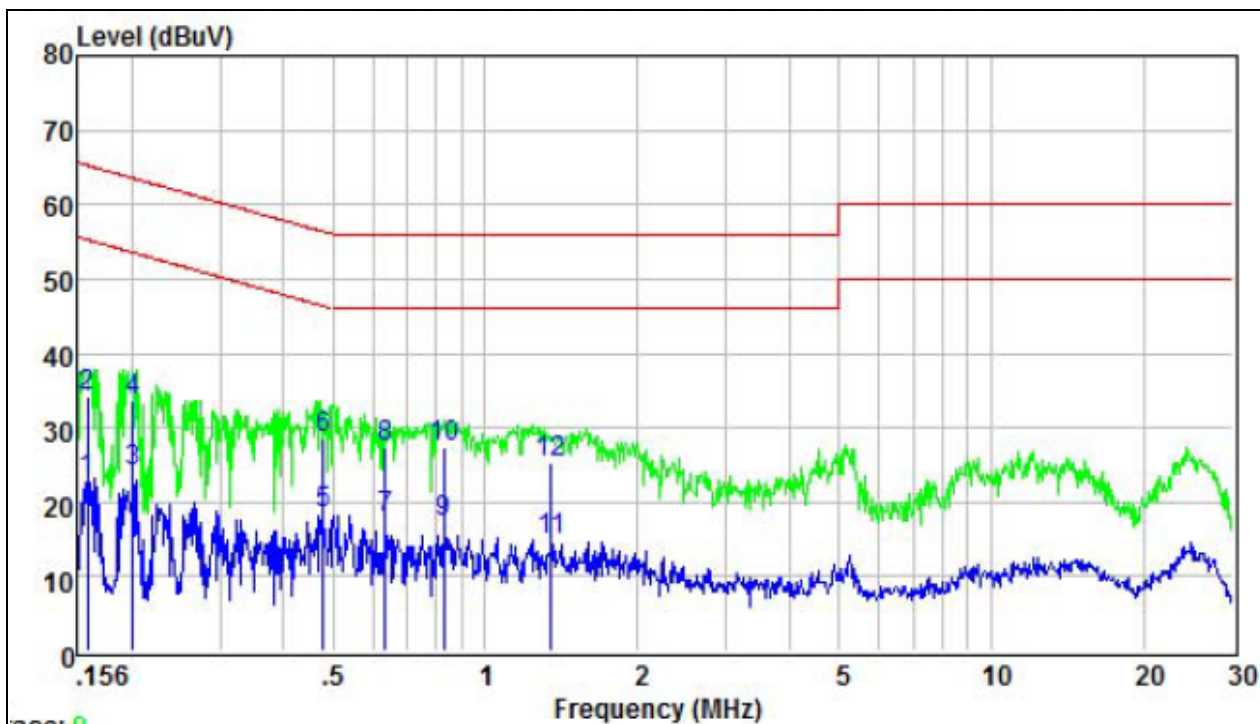
Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.16	15.09	9.45	0.01	24.55	55.34	-30.79	Average
2	0.16	24.32	9.45	0.01	33.78	65.34	-31.56	QP
3	0.20	14.76	9.46	0.01	24.23	53.71	-29.48	Average
4	0.20	23.73	9.46	0.01	33.20	63.71	-30.51	QP
5	0.45	11.60	9.49	0.01	21.10	46.80	-25.70	Average
6	0.45	19.16	9.49	0.01	28.66	56.80	-28.14	QP
7	0.51	12.13	9.49	0.01	21.63	46.00	-24.37	Average
8	0.51	19.00	9.49	0.01	28.50	56.00	-27.50	QP
9	0.95	9.23	9.51	0.01	18.75	46.00	-27.25	Average
10	0.95	18.98	9.51	0.01	28.50	56.00	-27.50	QP
11	1.25	7.90	9.52	0.01	17.43	46.00	-28.57	Average
12	1.25	16.83	9.52	0.01	26.36	56.00	-29.64	QP



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
TEST VOLTAGE :	AC 120V/60Hz	Test Mode:	Transmitting 802.11b mode



ace: 0

Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.16	13.42	9.37	0.01	22.80	55.30	-32.50	Average
2	0.16	24.92	9.37	0.01	34.30	65.30	-31.00	QP
3	0.20	14.56	9.38	0.01	23.95	53.58	-29.63	Average
4	0.20	24.11	9.38	0.01	33.50	63.58	-30.08	QP
5	0.48	9.11	9.41	0.01	18.53	46.36	-27.83	Average
6	0.48	19.08	9.41	0.01	28.50	56.36	-27.86	QP
7	0.63	8.52	9.42	0.01	17.95	46.00	-28.05	Average
8	0.63	18.07	9.42	0.01	27.50	56.00	-28.50	QP
9	0.83	7.77	9.43	0.01	17.21	46.00	-28.79	Average
10	0.83	17.86	9.43	0.01	27.30	56.00	-28.70	QP
11	1.35	5.36	9.44	0.01	14.81	46.00	-31.19	Average
12	1.35	15.90	9.44	0.01	25.35	56.00	-30.65	QP



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~230	180	3
230~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

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

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
RB / VB (emission in restricted band)	1 MHz / 1 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



3.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel, the middle channel, the Highest channel

Note:

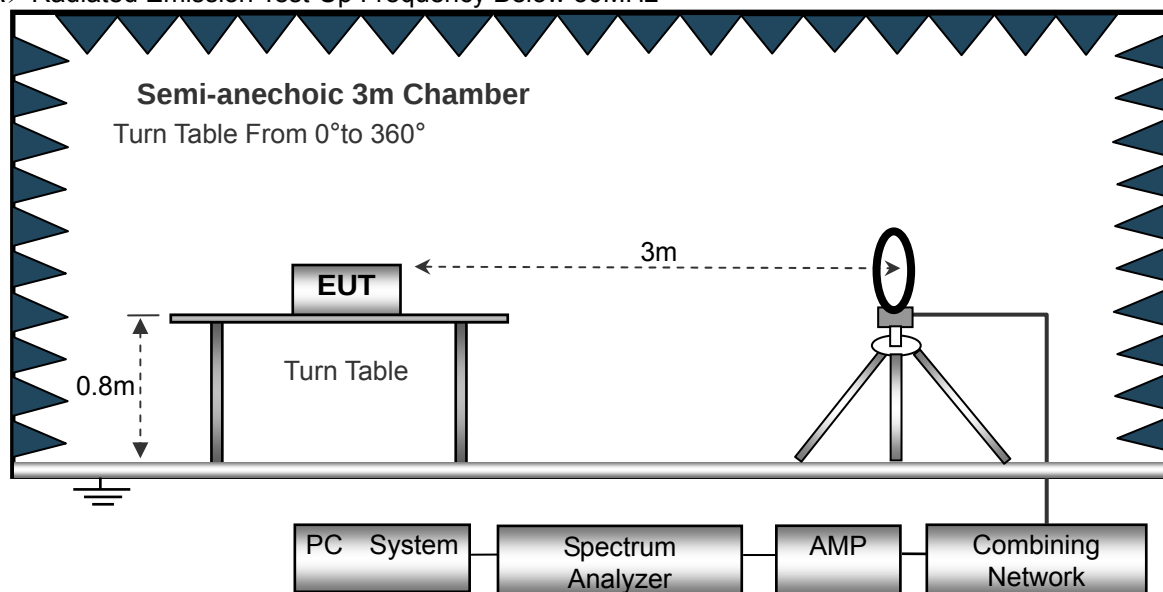
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

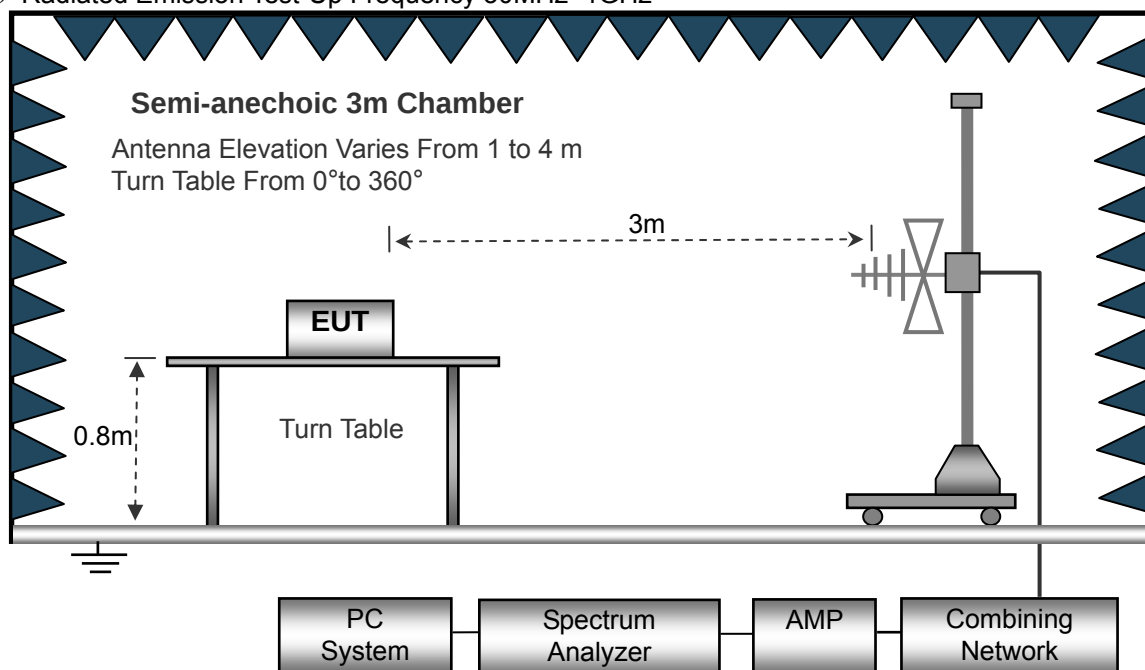
No deviation

3.2.4 TEST SETUP

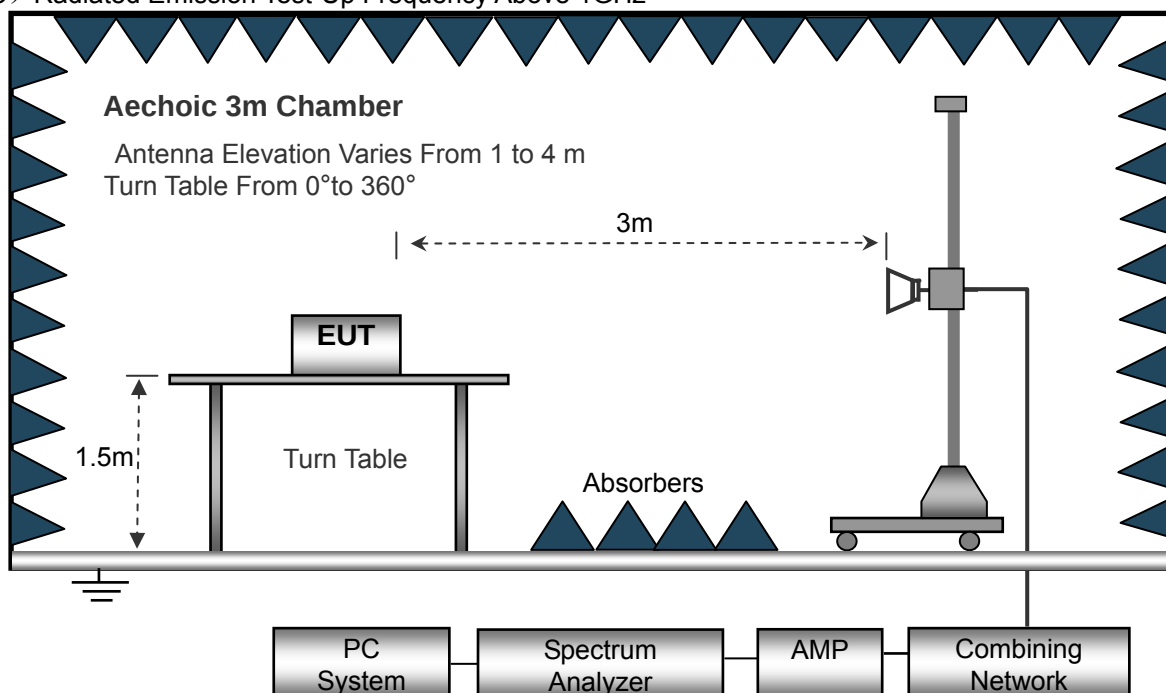
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**3.2.6 TEST RESULTS (Between 9KHz – 30 MHz)**

Temperature:	20℃	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Mode 5	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

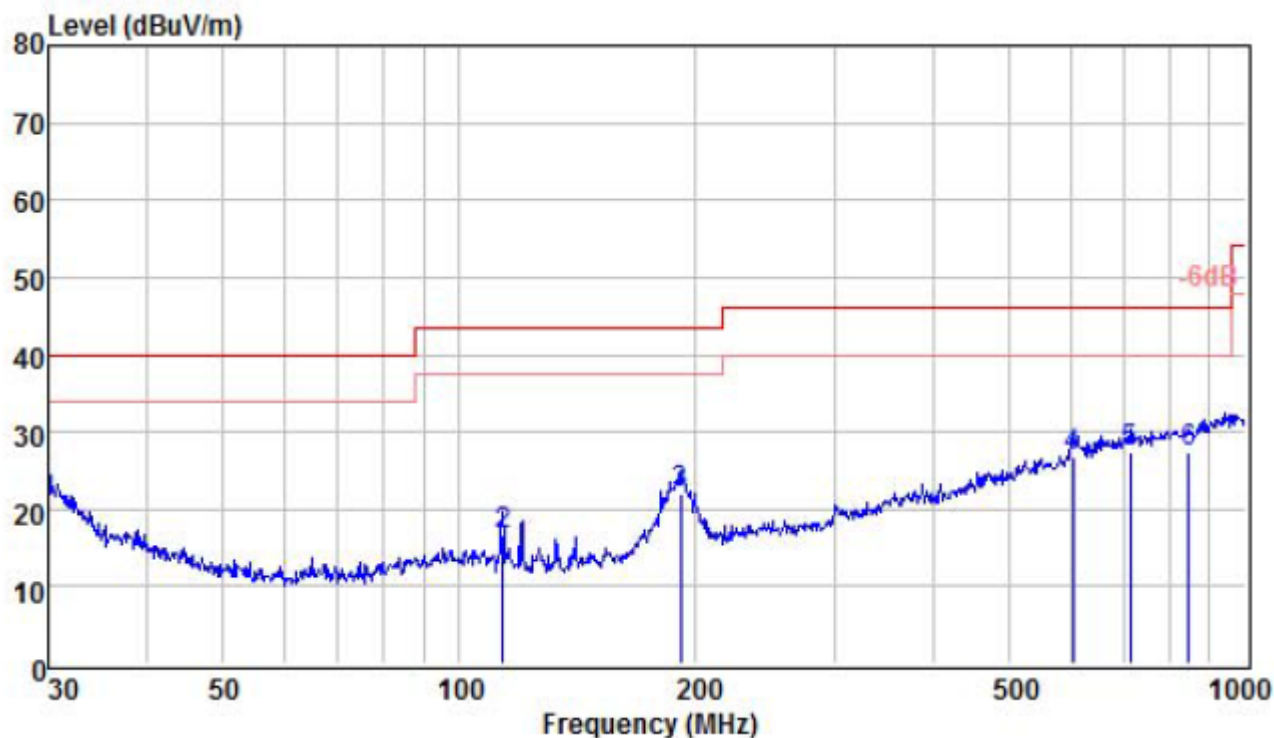
Limit line = specific limits(dBuv) + distance extrapolation factor.

Remark:

1. All modes of 802.11a/n/ac were test at Low, Middle, and High channel, only the worst result of 802.11a Low Channel was reported for below 1GHz test.
2. Remark: We tested at 802.11a/802.11n HT20/802.11n HT40/802.11ac HT20/802.11ac HT40 /802.11ax HT20/802.11ax HT40 mode and recored the worst data 802.11b mode in report.

**3.2.7 TEST RESULTS (Between 30MHz – 1GHz)**

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz		
Test Mode :	Transmitting 802.11b mode		



	Freq	Read Level	Antenna Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	
1	30.00	1.37	18.80	0.58	20.75	40.00	-19.25	QP
2	113.71	6.78	8.90	0.83	16.51	43.50	-26.99	QP
3	191.07	10.64	10.55	0.88	22.07	43.50	-21.43	QP
4	603.54	4.40	20.77	1.50	26.67	46.00	-19.33	QP
5	714.17	2.97	22.25	1.99	27.21	46.00	-18.79	QP
6	848.06	2.12	23.10	2.16	27.38	46.00	-18.62	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Limit – Level;



3.2.8 TEST RESULTS (1ghz~40ghz)

802.11b band 1(Record the wors test data in report.)

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:5180									
V	10360.00	54.36	30.55	5.77	24.66	54.24	74.00	-13.96	PK
V	10360.00	44.36	30.55	5.77	24.66	44.24	54.00	-9.76	AV
V	15540.00	53.39	30.33	6.32	24.55	53.93	74.00	-14.27	PK
V	15540.00	44.12	30.33	6.32	24.55	44.66	54.00	-9.34	AV
H	10360.00	52.36	30.85	7.45	24.69	53.65	74.00	-14.55	PK
H	10360.00	42.16	30.85	7.45	24.69	43.45	54.00	-10.55	AV
H	15540.00	53.61	31.02	8.99	25.57	57.15	74.00	-11.05	PK
H	15540.00	42.18	31.02	8.99	25.57	45.72	54.00	-8.28	AV
operation frequency:5200									
V	10400.00	54.86	30.55	5.77	24.66	54.74	74.00	-13.46	PK
V	10400.00	45.77	30.55	5.77	24.66	45.65	54.00	-8.35	AV
V	15600.00	52.78	30.33	6.32	24.55	53.32	74.00	-14.88	PK
V	15600.00	45.87	30.33	6.32	24.55	46.41	54.00	-7.59	AV
H	10400.00	53.63	30.85	7.45	24.69	54.92	74.00	-13.28	PK
H	10400.00	42.89	30.85	7.45	24.69	44.18	54.00	-9.82	AV
H	15600.00	54.09	31.02	8.99	25.57	57.63	74.00	-10.57	PK
H	15600.00	43.87	31.02	8.99	25.57	47.41	54.00	-6.59	AV
operation frequency:5240									
V	10480.00	55.03	30.55	5.77	24.66	54.91	68.20	-13.29	PK
V	10480.00	46.89	30.55	5.77	24.66	46.77	54.00	-7.23	AV
V	15720.00	50.89	30.33	6.32	24.55	51.43	68.20	-16.77	PK
V	15720.00	45.74	30.33	6.32	24.55	46.28	54.00	-7.72	AV
H	10480.00	54.72	30.85	7.45	24.69	56.01	68.20	-12.19	PK
H	10480.00	43.03	30.85	7.45	24.69	44.32	54.00	-9.68	AV
H	15720.00	53.18	31.02	8.99	25.57	56.72	68.20	-11.48	PK
H	15720.00	43.99	31.02	8.99	25.57	47.53	54.00	-6.47	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.



802.11b band 4(Record the wors test data in report)

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:5745									
V	11490.00	54.29	30.55	5.77	24.66	54.17	74.00	-14.03	PK
V	11490.00	46.77	30.55	5.77	24.66	46.65	54.00	-7.35	AV
V	17235.00	51.53	30.33	6.32	24.55	52.07	74.00	-16.13	PK
V	17235.00	45.15	30.33	6.32	24.55	45.69	54.00	-8.31	AV
H	11490.00	54.6	30.85	7.45	24.69	55.89	74.00	-12.31	PK
H	11490.00	43.47	30.85	7.45	24.69	44.76	54.00	-9.24	AV
H	17235.00	53.77	31.02	8.99	25.57	57.31	74.00	-10.89	PK
H	17235.00	43.85	31.02	8.99	25.57	47.39	54.00	-6.61	AV
operation frequency:5785									
V	11570.00	53.47	30.55	5.77	24.66	53.35	74.00	-14.85	PK
V	11570.00	46.09	30.55	5.77	24.66	45.97	54.00	-8.03	AV
V	17355.00	50.68	30.33	6.32	24.55	51.22	74.00	-16.98	PK
V	17355.00	42.89	30.33	6.32	24.55	43.43	54.00	-10.57	AV
H	11570.00	53.78	30.85	7.45	24.69	55.07	74.00	-13.13	PK
H	11570.00	43.59	30.85	7.45	24.69	44.88	54.00	-9.12	AV
H	17355.00	51.03	31.02	8.99	25.57	54.57	74.00	-13.63	PK
H	17355.00	42.35	31.02	8.99	25.57	45.89	54.00	-8.11	AV
operation frequency:5825									
V	11650.00	53.66	30.55	5.77	24.66	53.54	74.00	-14.66	PK
V	11650.00	45.05	30.55	5.77	24.66	44.93	54.00	-9.07	AV
V	17475.00	52.08	30.33	6.32	24.55	52.62	74.00	-15.58	PK
V	17475.00	44.88	30.33	6.32	24.55	45.42	54.00	-8.58	AV
H	11650.00	54.66	30.85	7.45	24.69	55.95	74.00	-12.25	PK
H	11650.00	45.78	30.85	7.45	24.69	47.07	54.00	-6.93	AV
H	17475.00	53.93	31.02	8.99	25.57	57.47	74.00	-10.73	PK
H	17475.00	43.53	31.02	8.99	25.57	47.07	54.00	-6.93	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.



3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.407

(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.

(4) 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.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.3.2 TEST PROCEDURE

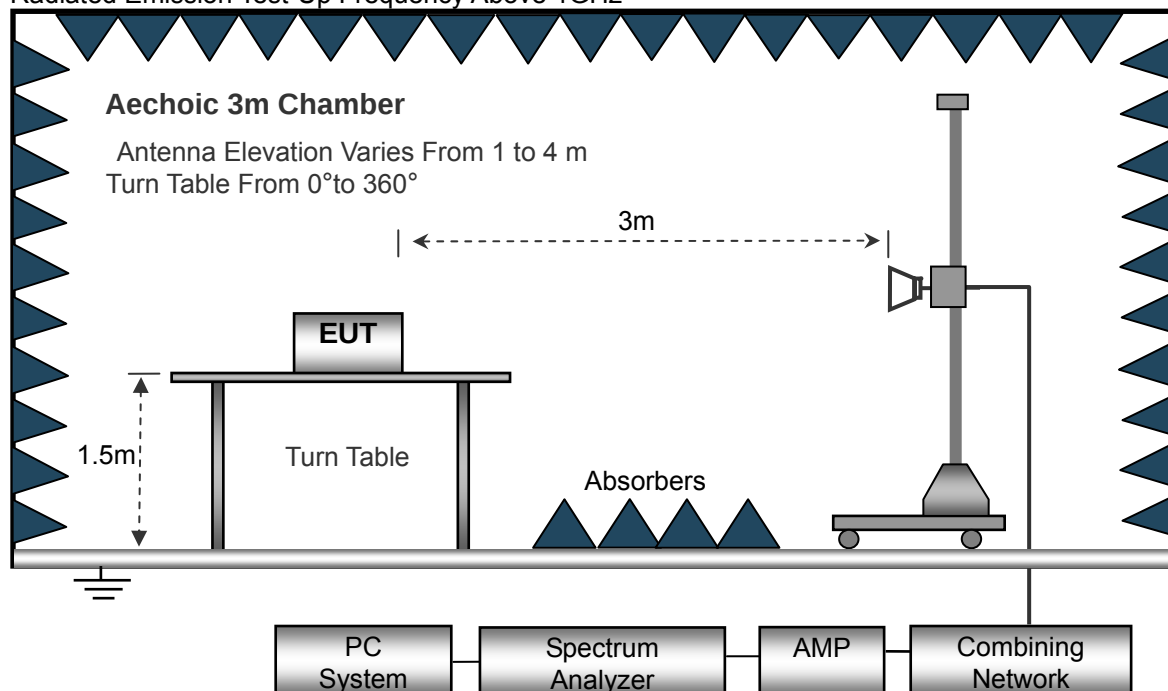
Test method: FCC KDB 789033 G)& Parts 15.407(b)(4) & 15.209(a)

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**3.3.6 TEST RESULT(RECORD THE WORS TEST DATA IN REPORT.)**

Modulation	Test Frequency (MHz)	Max Level Frequency (MHz)	Max Level (dBμV/m)	EIRP (dBm)	Limit (dBm)	Result
802.11ac	5180	5148.63	52.46	-42.74	-27.00	Pass
	5240	5255.34	51.88	-43.32	-27.00	Pass
	5745	5723.67	51.64	-43.56	-27.00	Pass
	5825	5853.16	51.61	-43.59	-27.00	Pass
802.11ac(HT40)	5190	5147.69	51.87	-43.33	-27.00	Pass
	5230	5253.42	52.00	-43.20	-27.00	Pass
	5755	5723.11	51.54	-43.66	-27.00	Pass
	5795	5853.61	51.62	-43.58	-27.00	Pass

Remark: 1. According to KDB 789033 D02 section H) d) (iii), for measurement above 1000MHz@3m distance, the limit of EIRP is calculated as follows: $EIRP[dBm] = E[dB\mu V/m] - 95.2$



4. MAXIMUM CONDUCTED AVERAGE OUTPUT POWER

4.1 APPLIED PROCEDURES / LIMIT

For mobile and portable 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.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

4.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW > the 20 dB bandwidth of the emission being measured
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
VBW $\geq$ RBW
Sweep = auto
Detector function = peak
Trace = max hold

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

**4.1.5 TEST RESULTS**

Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	AC 120V/60Hz

U-NII 1

Type	Channel	Output power (dBm)	Antenna Gain (dBi)	Eirp (dBm)	Limit (dBm)	Result
802.11a	Low	13.012	2.9	15.912	23.00	Pass
	Moddle	13.115	2.9	16.015		
	High	13.001	2.9	15.901		
802.11n(HT20)	Low	13.221	2.9	16.121	23.00	Pass
	Moddle	13.056	2.9	15.956		
	High	13.169	2.9	16.069		
802.11n(HT40)	Low	12.013	2.9	14.913	23.00	Pass
	High	12.235	2.9	15.135		
802.11ac(HT20)	Low	11.569	2.9	14.469	23.00	Pass
	Moddle	11.586	2.9	14.486		
	High	11.696	2.9	14.596		
802.11ac(HT40)	Low	10.031	2.9	12.931	23.00	Pass
	High	10.526	2.9	13.426		
802.11ax(HT20)	Low	11.305	2.9	14.205	23.00	Pass
	Moddle	11.212	2.9	14.112		
	High	11.010	2.9	13.910		
802.11ax(HT40)	Low	10.002	2.9	12.902	23.00	Pass
	High	10.110	2.9	13.010		

U-NII 3

Type	Channel	Output power Ant1 (dBm)	Limit (dBm)	Result
802.11a	Low	12.869	30.00	Pass
	Moddle	12.568		
	High	12.366		
802.11n(HT20)	Low	13.015	30.00	Pass
	Moddle	12.883		
	High	12.789		
802.11n(HT40)	Low	12.013	30.00	Pass
	High	12.102		
802.11ac(HT20)	Low	11.036	30.00	Pass
	Moddle	11.286		
	High	11.863		
802.11ac(HT40)	Low	10.010	30.00	Pass
	High	10.003		
802.11ax(HT20)	Low	10.559	30.00	Pass
	Moddle	10.336		
	High	10.635		
802.11ax(HT40)	Low	10.003	30.00	Pass
	High	10.060		



5. POWER SPECTRAL DENSITY TEST

5.1 APPLIED PROCEDURES / LIMIT

In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.
In addition, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	RBW $\geq$ 1MHz for band 1 RBW $\geq$ 510KHz for band 4
VB	VBW $\geq$ 3RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.1.1 TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
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).
we test all antennas, the antenna 1 was worst mode and the data recording in the report.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

**5.1.5 TEST RESULTS****U-NII 1**

Type	Channel	Power Spectral Density (dBm/MHz)	Antenna Gain (dBi)	PSD Eirp (dBm/MHz)	Limit (dBm/MHz)	Result
802.11a	Low	1.660	2.9	4.560	11.00	Pass
	Moddle	0.014	2.9	2.914		
	High	-0.026	2.9	2.874		
802.11n(HT20)	Low	1.602	2.9	4.502	11.00	Pass
	Moddle	0.204	2.9	3.104		
	High	-0.132	2.9	2.768		
802.11n(HT40)	Low	-0.336	2.9	2.564	11.00	Pass
	High	-1.820	2.9	1.080		
802.11ac(HT20)	Low	0.085	2.9	2.985	11.00	Pass
	Moddle	0.605	2.9	3.505		
	High	-0.652	2.9	2.248		
802.11ac(HT40)	Low	-1.565	2.9	1.335	11.00	Pass
	High	-1.286	2.9	1.614		
802.11ax(HT20)	Low	1.960	2.9	4.860	11.00	Pass
	Moddle	1.257	2.9	4.157		
	High	0.522	2.9	3.422		
802.11ax(HT40)	Low	0.415	2.9	3.315	11.00	Pass
	High	-1.671	2.9	1.229		

U-NII 3

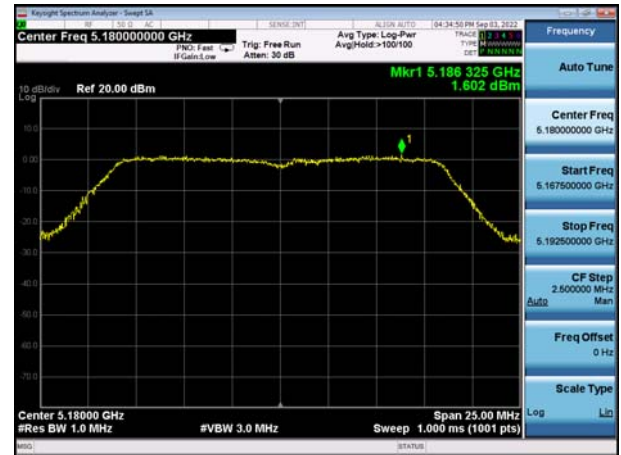
Type	Channel	Power Spectral Density Ant1 (dBm/500KHz)	Limit (dBm/500KHz)	Result
802.11a	Low	-1.250	30	Pass
	Moddle	-0.764		
	High	-2.966		
802.11n(HT20)	Low	-3.190		Pass
	Moddle	-3.002		
	High	-3.414		
802.11n(HT40)	Low	-4.590		Pass
	High	-4.986		
802.11ac(HT20)	Low	-1.385		Pass
	Moddle	-3.344		
	High	-3.001		
802.11ac(HT40)	Low	-3.701		Pass
	High	-5.202		
802.11ax(HT20)	Low	-2.993		Pass
	Moddle	-2.716		
	High	-2.906		
802.11ax(HT40)	Low	-2.669		Pass
	High	-2.559		



802.11a



802.11n HT20



5180MHz



5180MHz



5200MHz



5200MHz



5240MHz

5240MHz



802.11n HT40



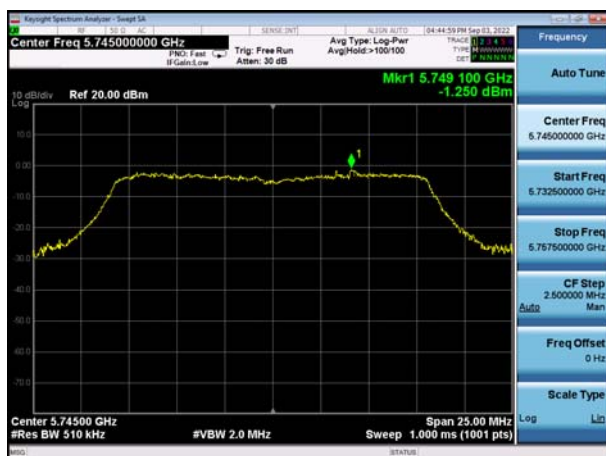
5190MHz



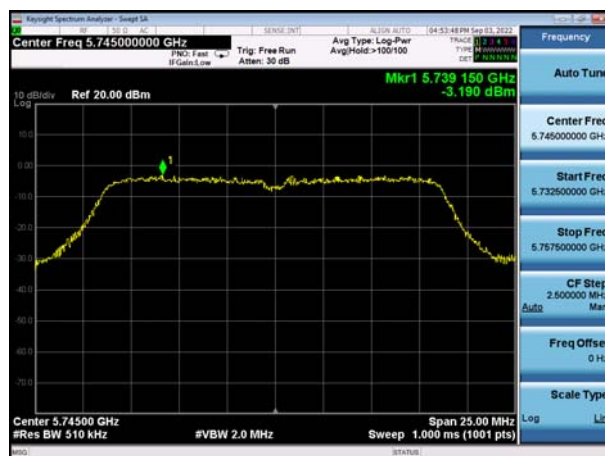
5230MHz



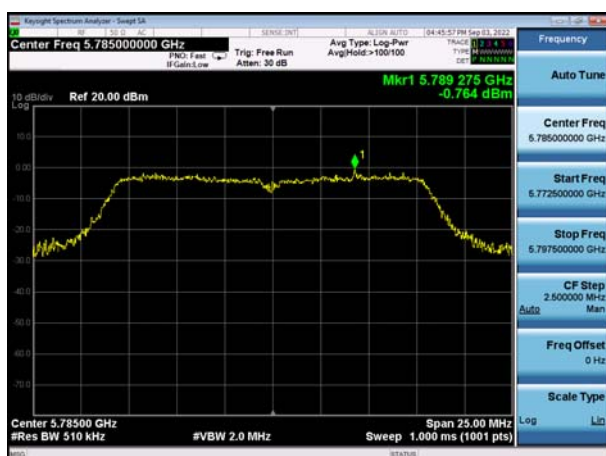
802.11a



802.11n HT20



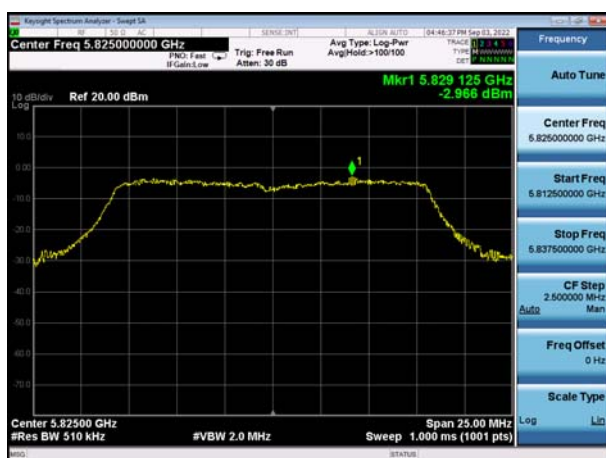
5745MHz



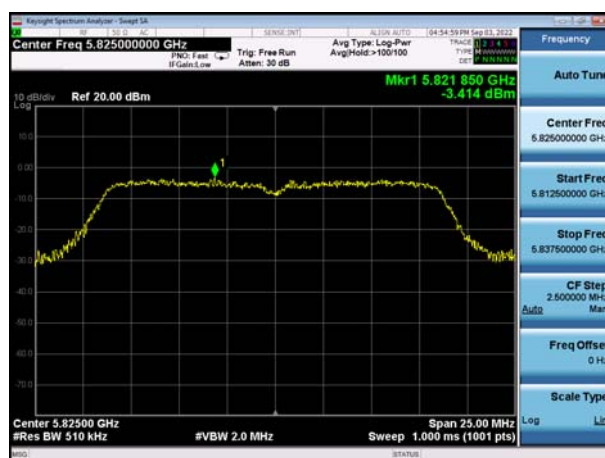
5745MHz



5785MHz



5785MHz



5825MHz

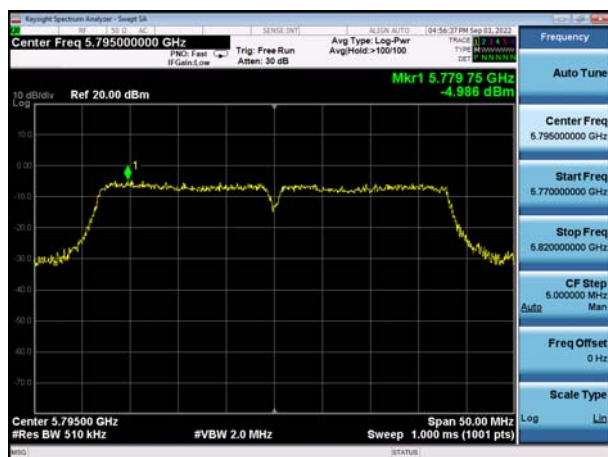
5825MHz



802.11n HT40



5755MHz



5795MHz



802.11ac HT20



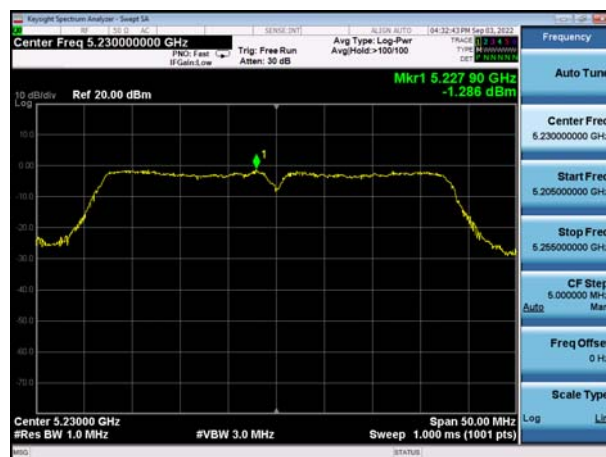
802.11ac HT40



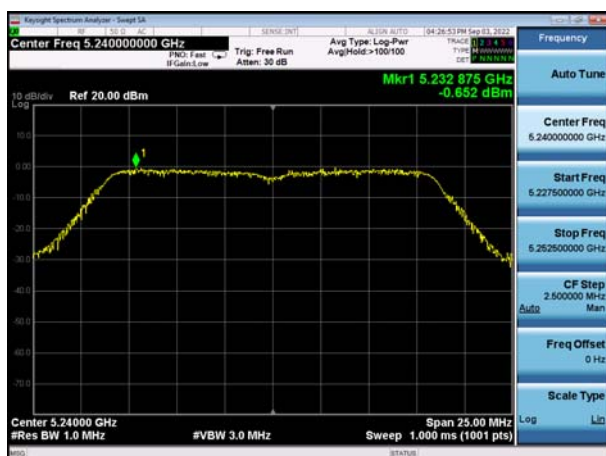
5180MHz



5190MHz



5200MHz



5230MHz



5240MHz

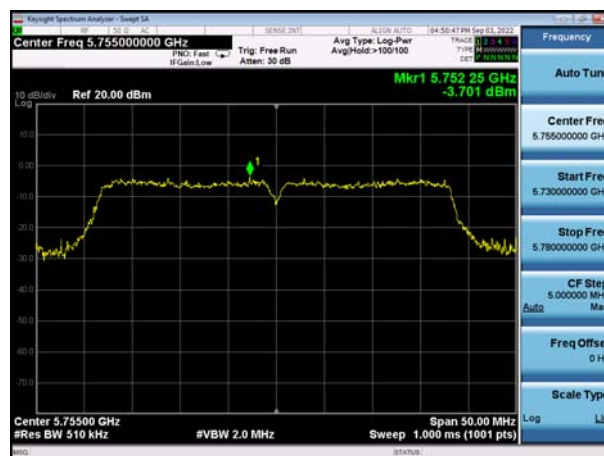
5210MHz(802.11ac HT80)



802.11ac HT20



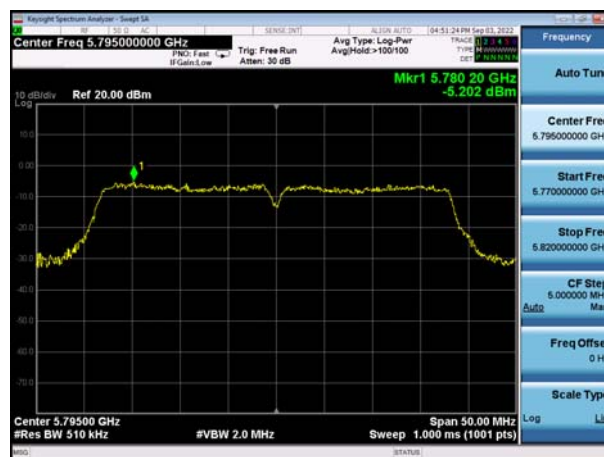
802.11ac HT40



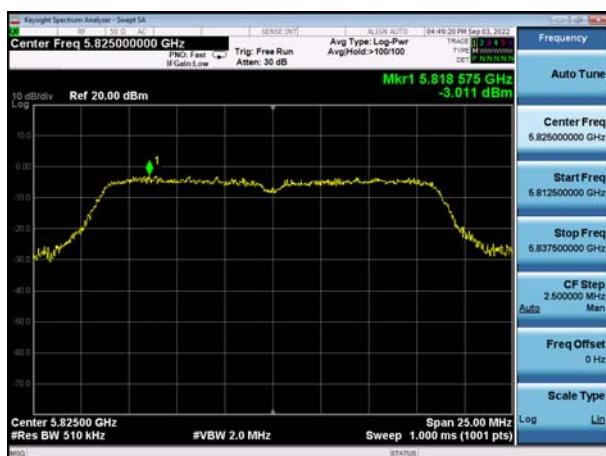
5745MHz



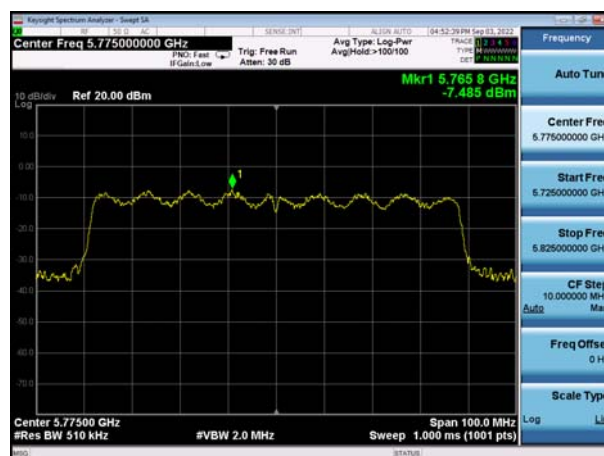
5755MHz



5785MHz



5795MHz



5825MHz

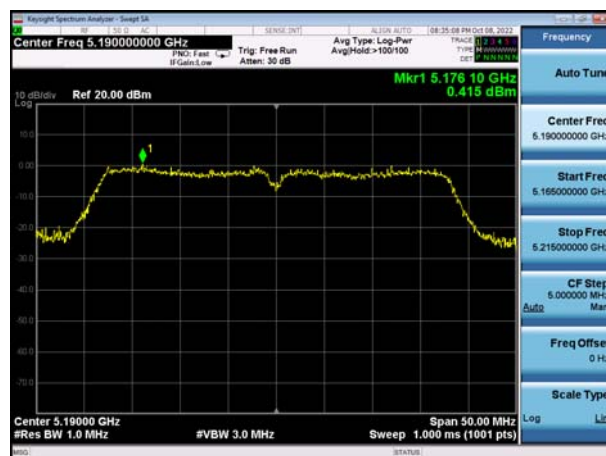
5775MHz(802.11ac HT80)



802.11ax HT20



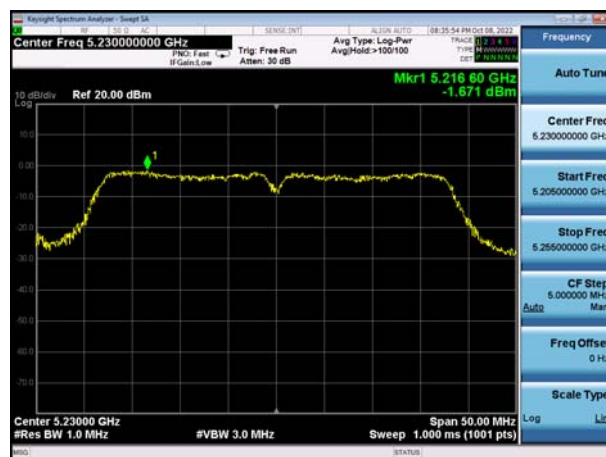
802.11ax HT40



5180MHz



5190MHz



5200MHz



5230MHz



5240MHz



802.11ax HT20



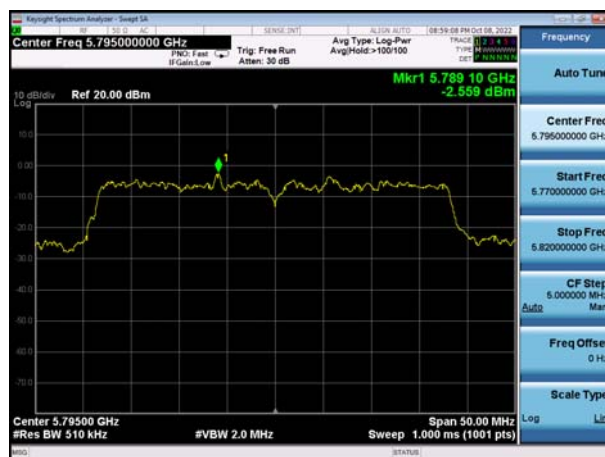
802.11ax HT40



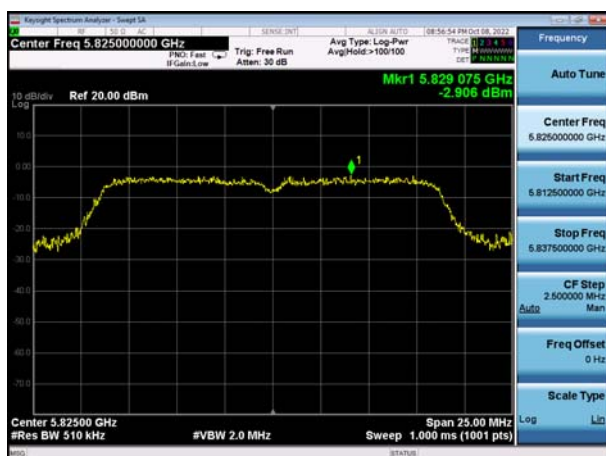
5745MHz



5755MHz



5785MHz



5795MHz



5825MHz



6. 26DB & 6DB BANDWIDTH TEST

6.1 APPLIED PROCEDURES / LIMIT

The 26 dB bandwidth is used to determine the conducted power limits.

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C.

The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

6.1.1 TEST PROCEDURE

1. Set RBW = 300 kHz.
2. Set the video bandwidth (VBW) $\geq 3\text{RBW}$.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. 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 20 dB relative to the maximum level measured in the fundamental emission.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



6.1.5 TEST RESULTS

		Test Channel	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth Limit (MHz)	Result
Band 1	802.11a	Low	24.49	16.824	>0.5	Pass
		Middle	21.48	16.746	>0.5	Pass
		High	21.14	16.774	>0.5	Pass
	802.11n HT20	Low	25.21	17.803	>0.5	Pass
		Middle	22.05	17.791	>0.5	Pass
		High	21.68	17.768	>0.5	Pass
	802.11n HT40	Low	43.38	36.296	>0.5	Pass
		High	43.31	36.277	>0.5	Pass

		Test Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	6dB Bandwidth Limit (MHz)	Result
Band 4	802.11a	Low	16.34	16.440	>0.5	Pass
		Middle	16.37	16.467	>0.5	Pass
		High	16.36	16.446	>0.5	Pass
	802.11n HT20	Low	17.24	17.626	>0.5	Pass
		Middle	17.55	17.628	>0.5	Pass
		High	17.04	17.630	>0.5	Pass
	802.11n HT40	Low	36.34	36.226	>0.5	Pass
		High	36.30	36.190	>0.5	Pass

		Test Channel	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth Limit (MHz)	Result
Band 1	802.11ac HT20	Low	24.11	17.783	>0.5	Pass
		Middle	21.35	17.757	>0.5	Pass
		High	21.68	17.757	>0.5	Pass
	802.11ac HT40	Low	43.58	36.296	>0.5	Pass
		High	43.47	36.282	>0.5	Pass

		Test Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	6dB Bandwidth Limit (MHz)	Result
Band 4	802.11ac HT20	Low	17.31	17.620	>0.5	Pass
		Middle	16.91	17.635	>0.5	Pass
		High	17.11	17.624	>0.5	Pass
	802.11ac HT40	Low	36.31	36.228	>0.5	Pass
		High	36.32	36.225	>0.5	Pass



		Test Channel	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	26dB Bandwidth Limit (MHz)	Result
Band 1	802.11ax HT20	Low	21.88	17.760	>0.5	Pass
		Middle	21.85	17.752	>0.5	Pass
		High	21.56	17.776	>0.5	Pass
	802.11ax HT40	Low	43.42	36.271	>0.5	Pass
		High	43.02	36.264	>0.5	Pass

		Test Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	6dB Bandwidth Limit (MHz)	Result
Band 4	802.11ax HT20	Low	16.54	17.796	>0.5	Pass
		Middle	17.05	17.763	>0.5	Pass
		High	17.24	17.788	>0.5	Pass
	802.11ax HT40	Low	36.03	36.226	>0.5	Pass
		High	36.02	36.232	>0.5	Pass



(26dB Bandwidth)

802.11a



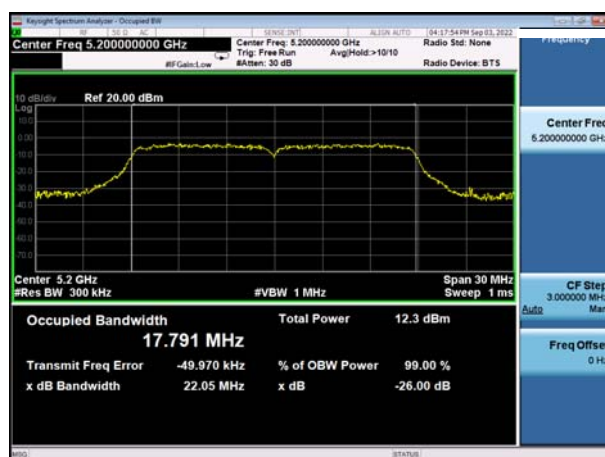
802.11n HT20



5180MHz



5180MHz



5200MHz



5200MHz



5240MHz

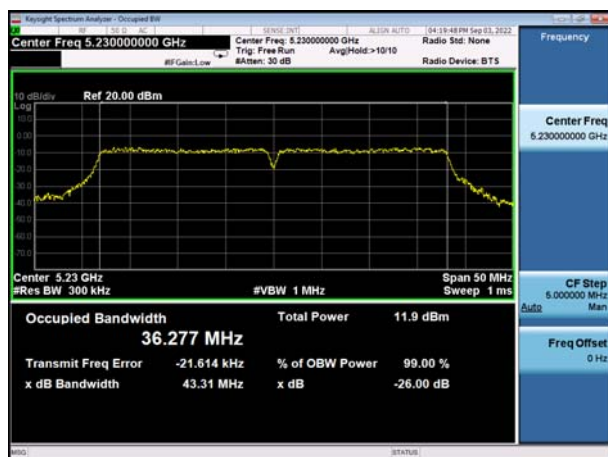
5240MHz



802.11n HT40



5190MHz

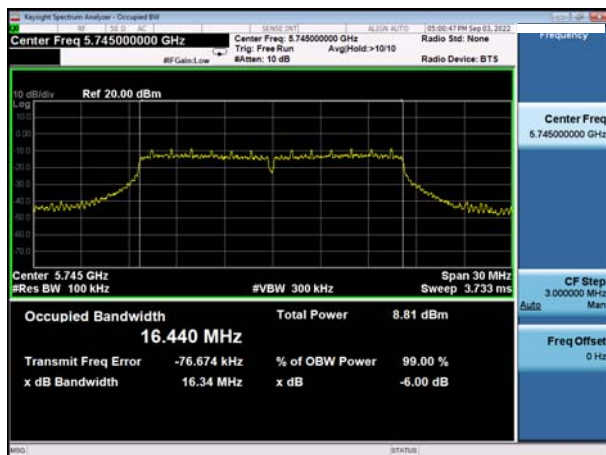


5230MHz

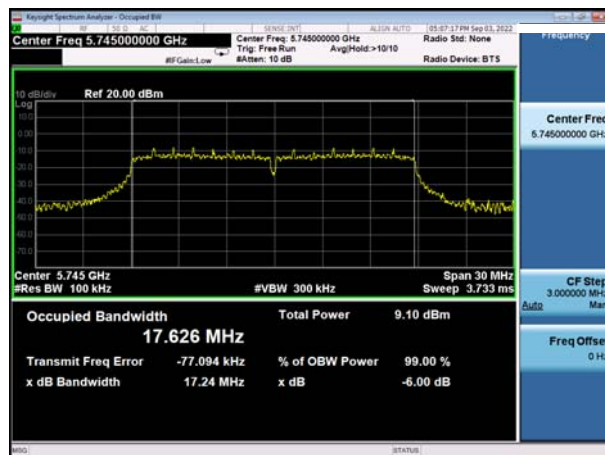


(6dB Bandwidth)

802.11a



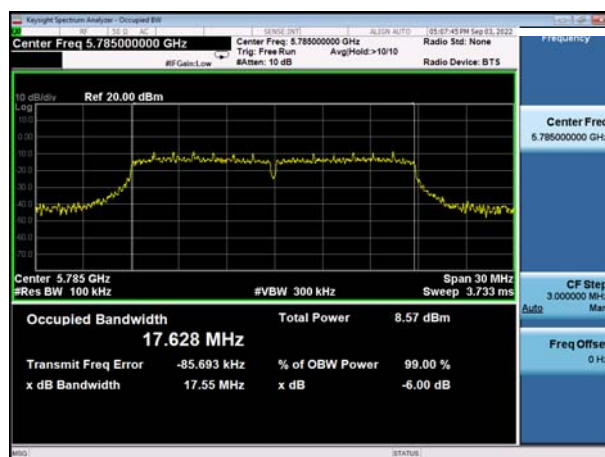
802.11n HT20



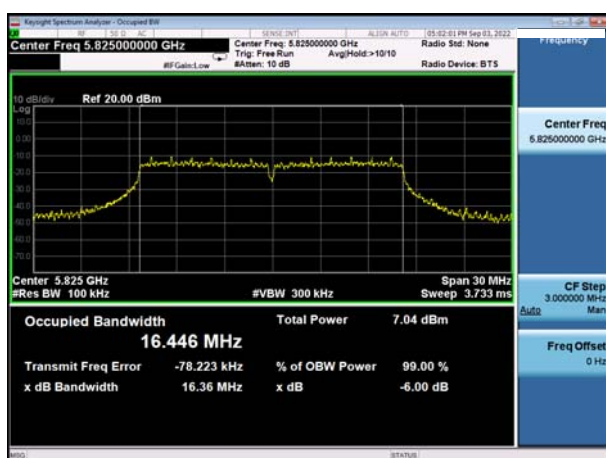
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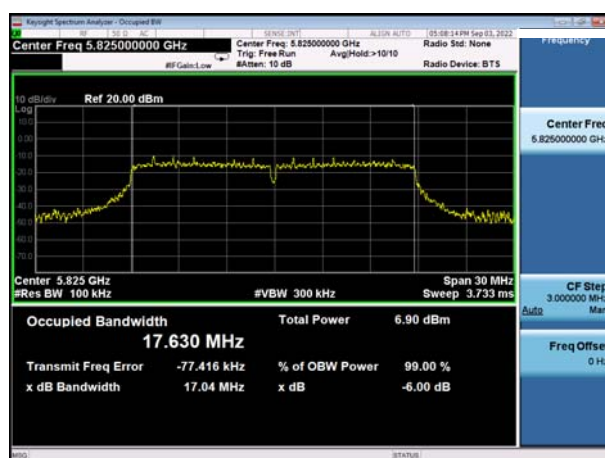
5745MHz



5785MHz



5785MHz

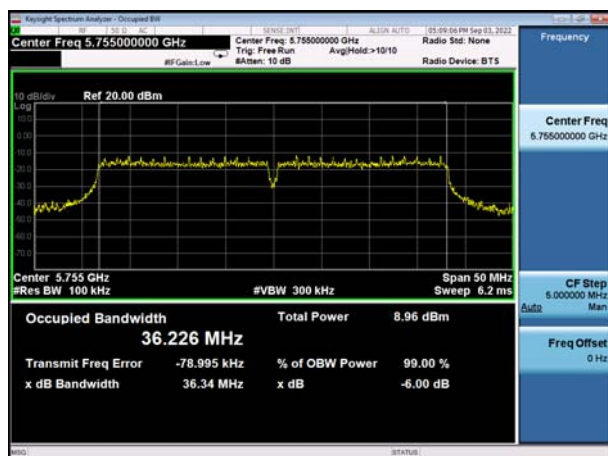


5825MHz

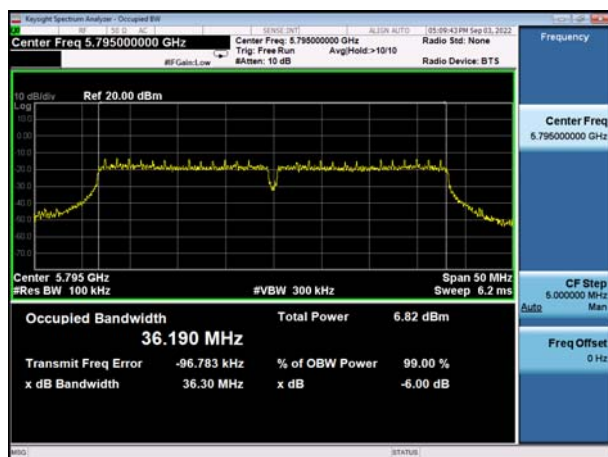
5825MHz



802.11n HT40



5755MHz



5795MHz

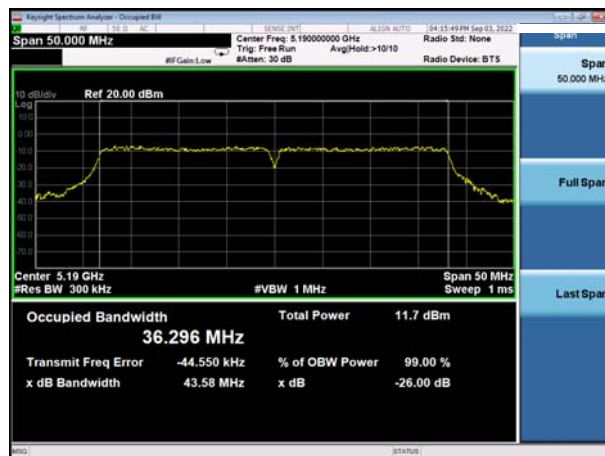


(26dB Bandwidth)

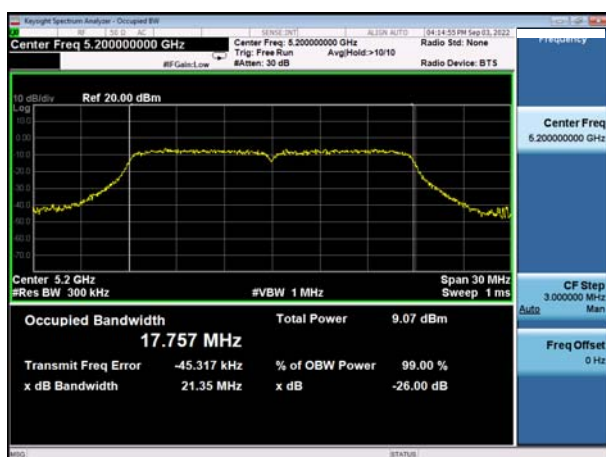
802.11ac HT20



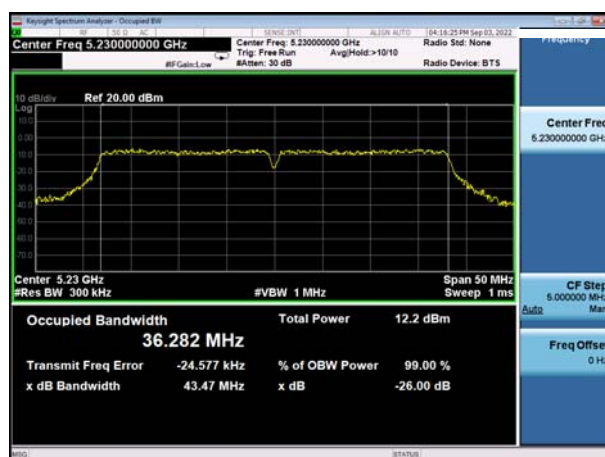
802.11ac HT40



5180MHz



5190MHz



5200MHz



5230MHz

5240MHz

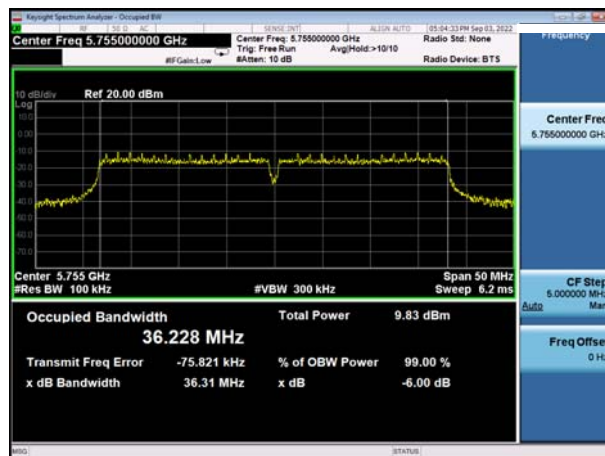


(6dB Bandwidth)

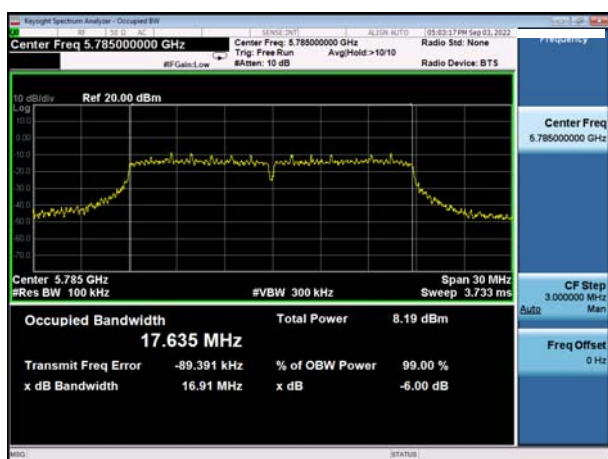
802.11ac HT20



802.11ac HT40



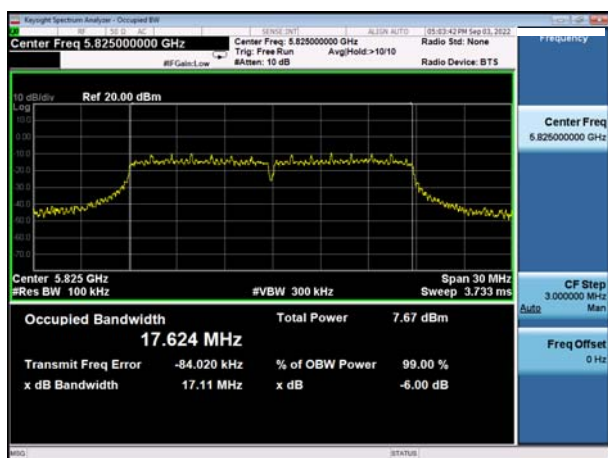
5745MHz



5755MHz



5785MHz



5795MHz

5825MHz

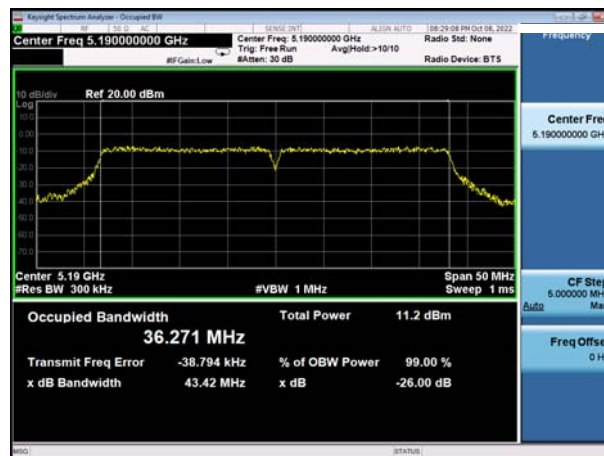


(26dB Bandwidth)

802.11ax HT20



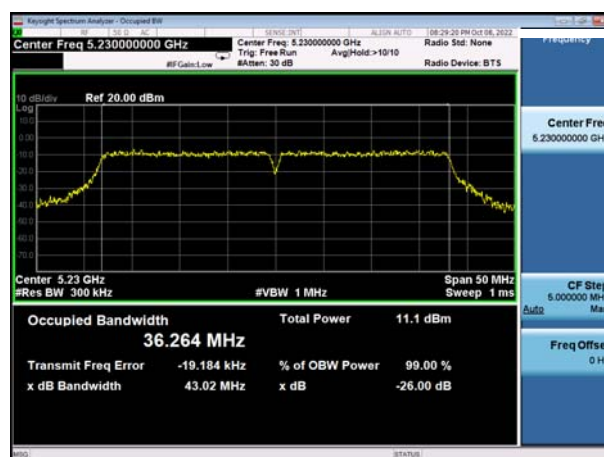
802.11ax HT40



5180MHz



5190MHz



5200MHz



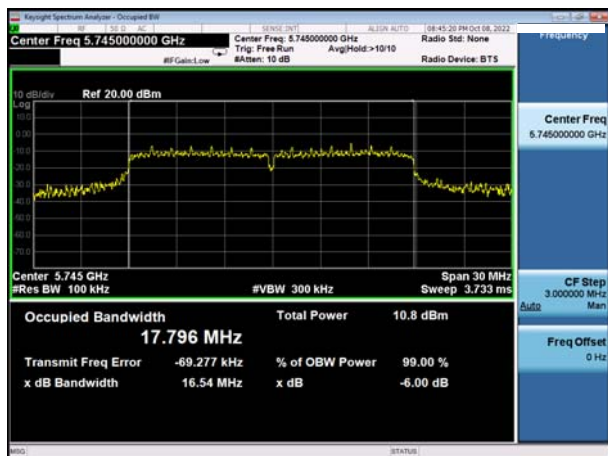
5230MHz

5240MHz

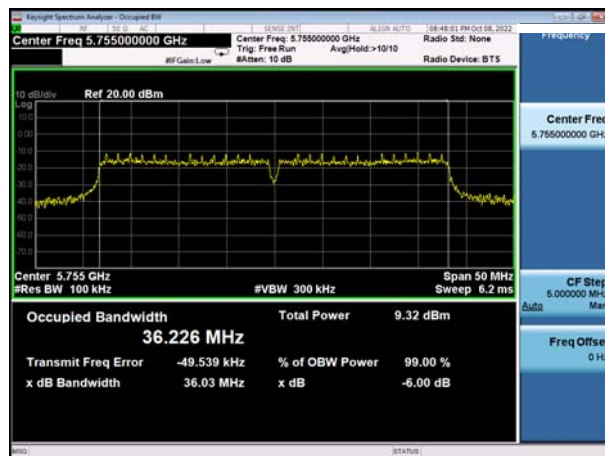


(6dB Bandwidth)

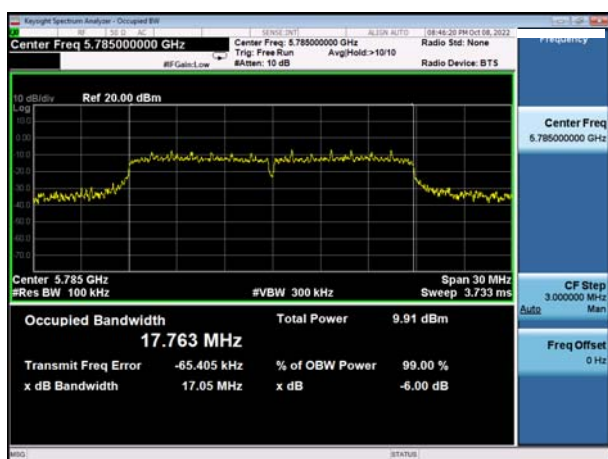
802.11ax HT20



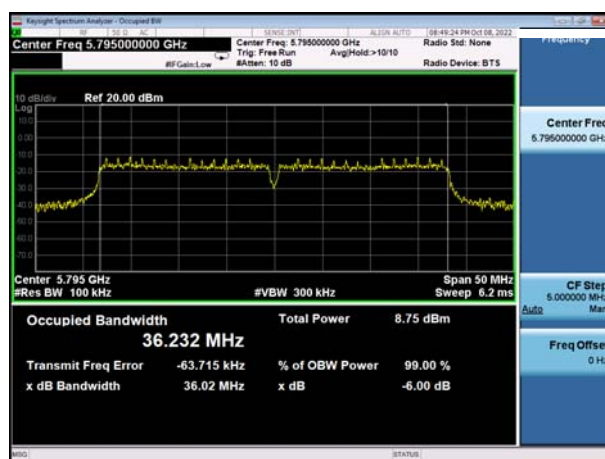
802.11ax HT40



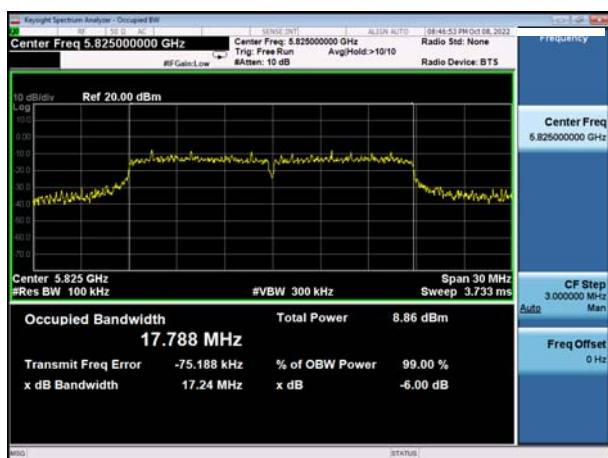
5745MHz



5755MHz



5785MHz



5795MHz

5825MHz



7. DUTY CYCLE TEST SIGNAL

7.1 APPLIED PROCEDURES / LIMIT

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

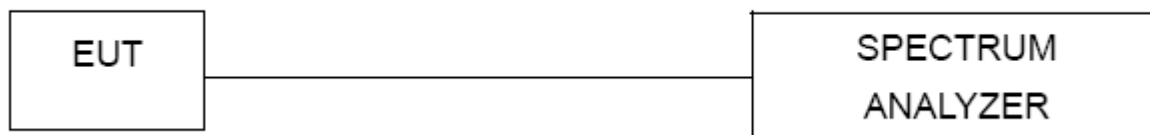
7.1.1 TEST PROCEDURE

1. Set RBW = 8 MHz.
2. Set the video bandwidth (VBW) $\geq$ RBW.
3. Detector = Peak.
4. Sweep = auto couple.
5. Allow the trace to stabilize.
6. Span=0

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**7.1.5 TEST RESULTS**

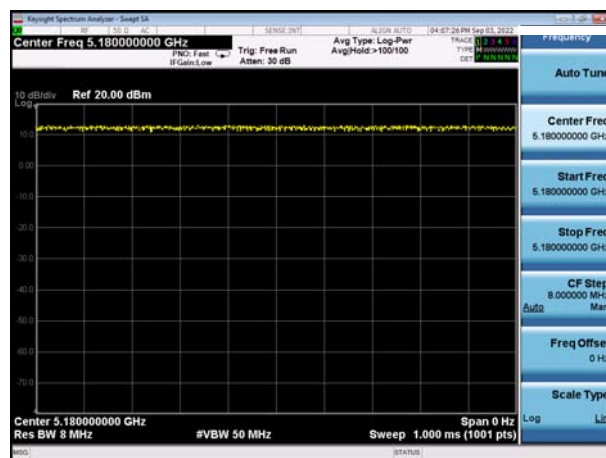
Operation Mode	Duty Cycle	Duty Fator (dB) 10 * log (1/ Duty cycle)
802.11a	100%	0
802.11n(HT20)	100%	0
802.11n(HT40)	100%	0
802.11a	100%	0
802.11n(HT20)	100%	0
802.11n(HT40)	100%	0
802.11ac(HT20)	100%	0
802.11ac(HT40)	100%	0
802.11ac(HT20)	100%	0
802.11ac(HT40)	100%	0
802.11ax(HT20)	100%	0
802.11ax(HT40)	100%	0
802.11ax(HT20)	100%	0
802.11ax(HT40)	100%	0



802.11a



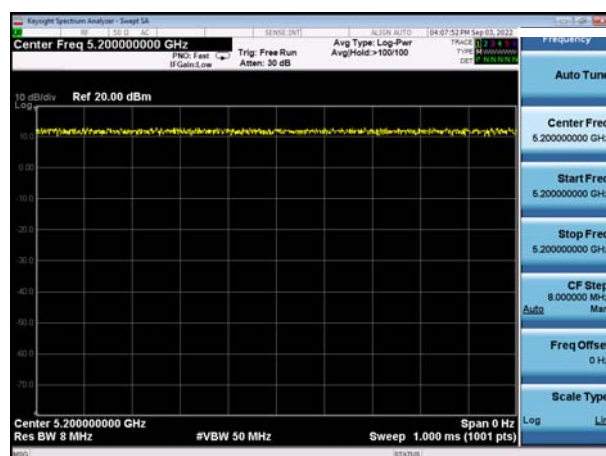
802.11n HT20



5180MHz



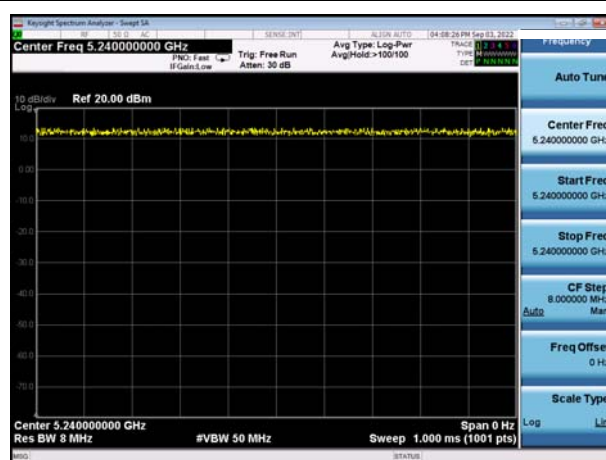
5180MHz



5200MHz



5200MHz

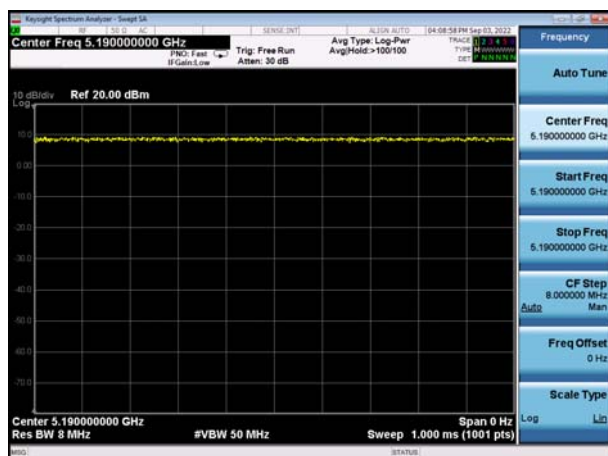


5240MHz

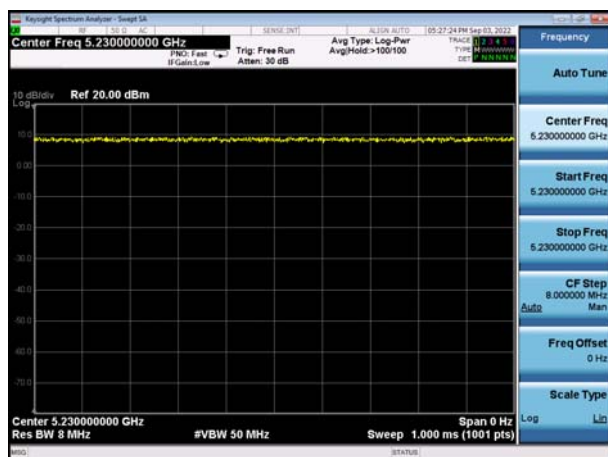
5240MHz



802.11n HT40



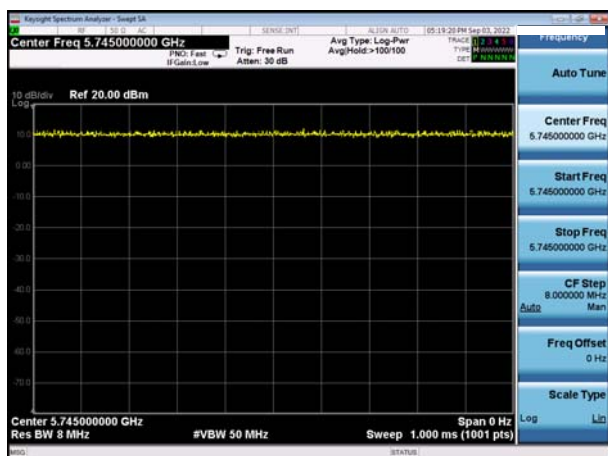
5190MHz



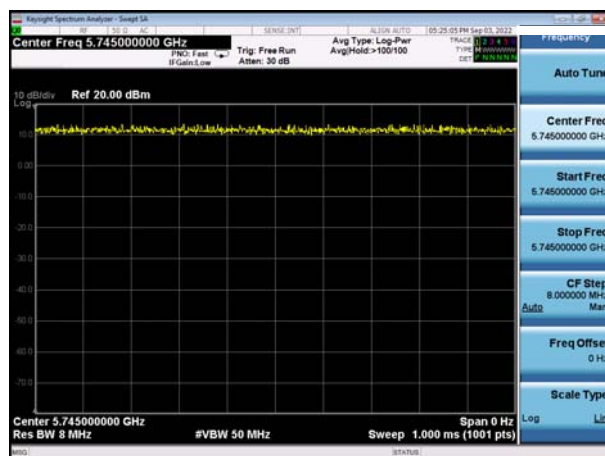
5230MHz



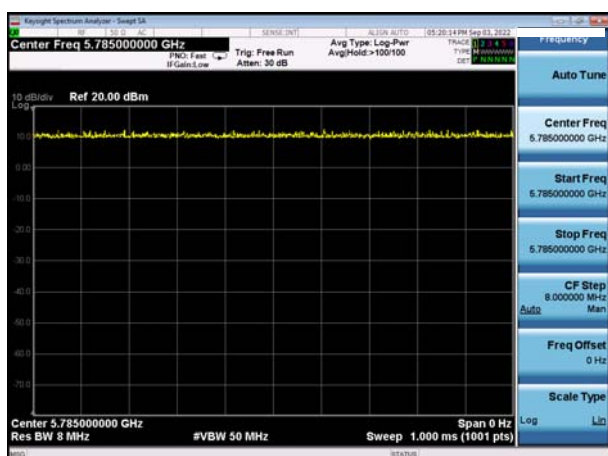
802.11a



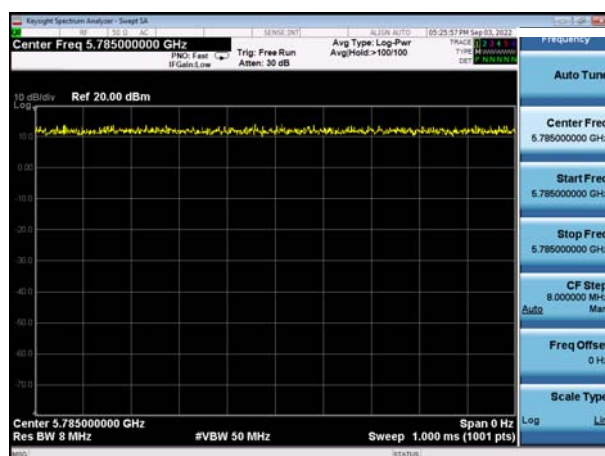
802.11n HT20



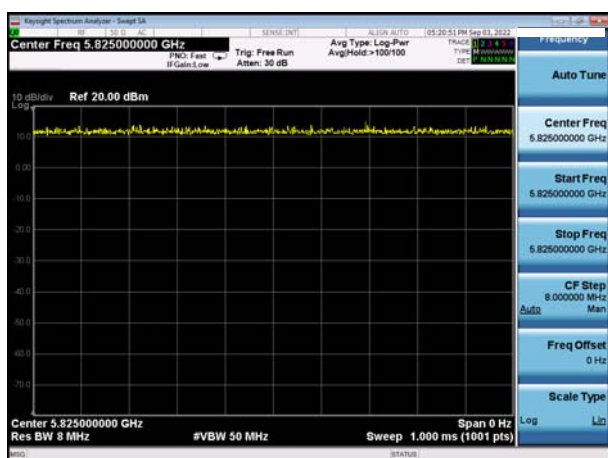
5745MHz



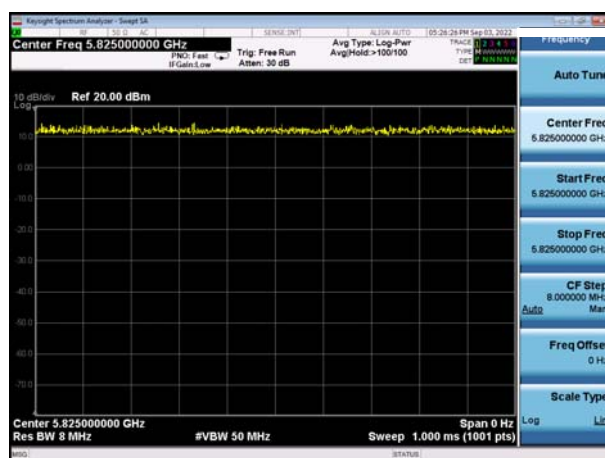
5745MHz



5785MHz



5785MHz

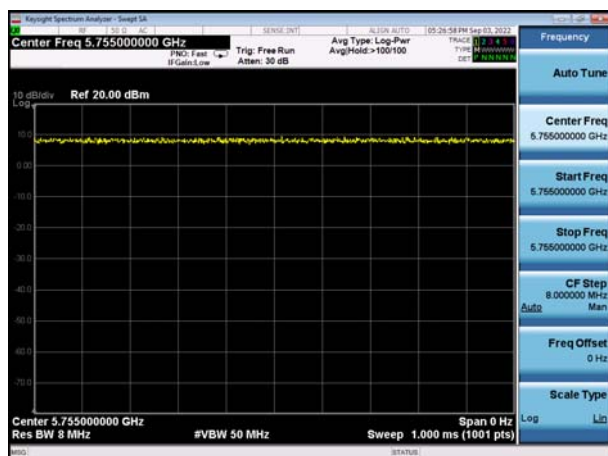


5825MHz

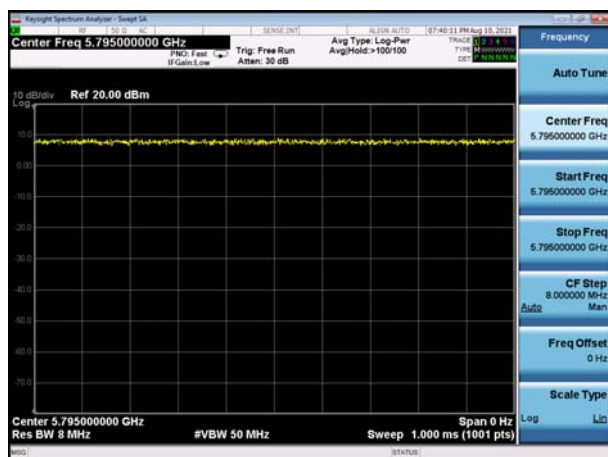
5825MHz



802.11n HT40



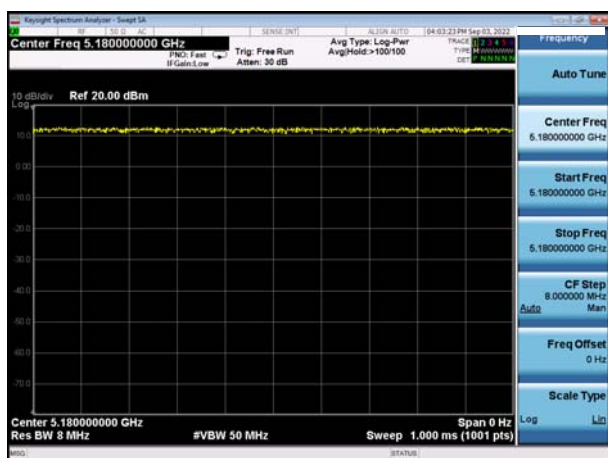
5755MHz



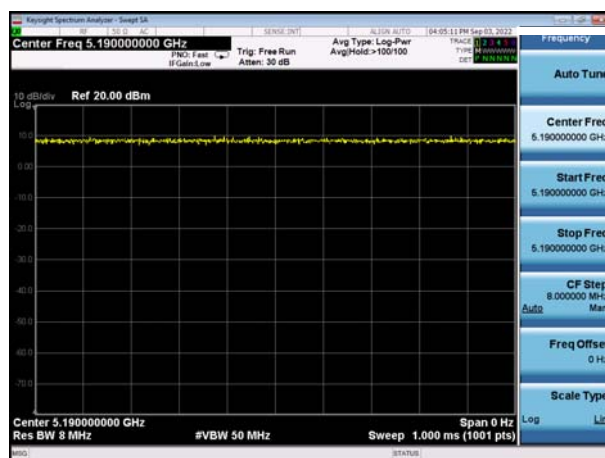
5795MHz



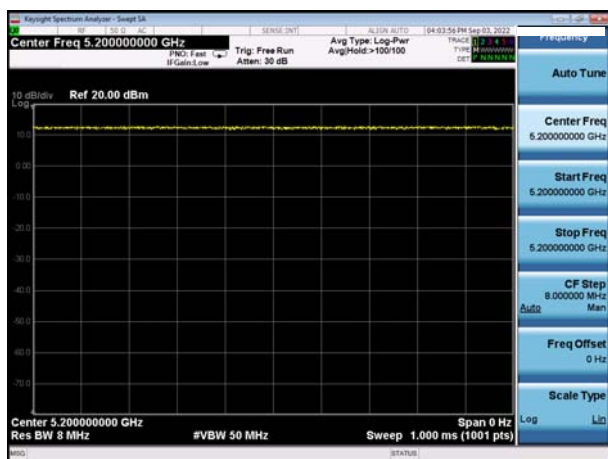
802.11ac HT20



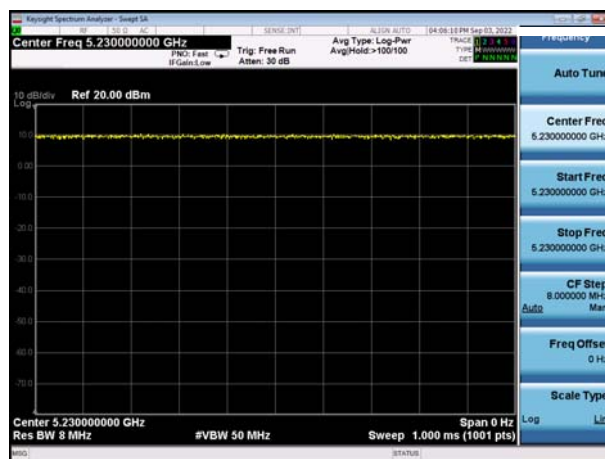
802.11ac HT40



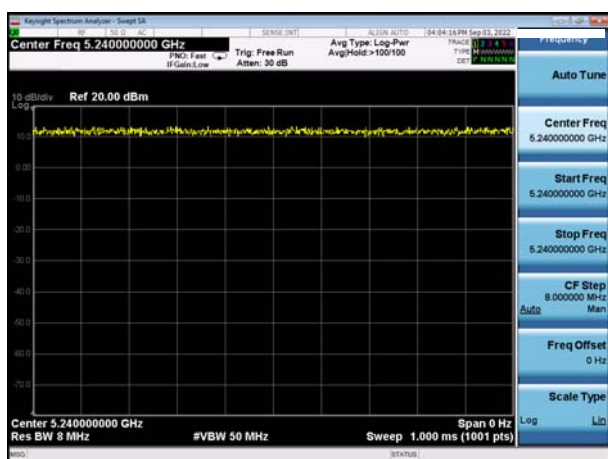
5180MHz



5190MHz



5200MHz

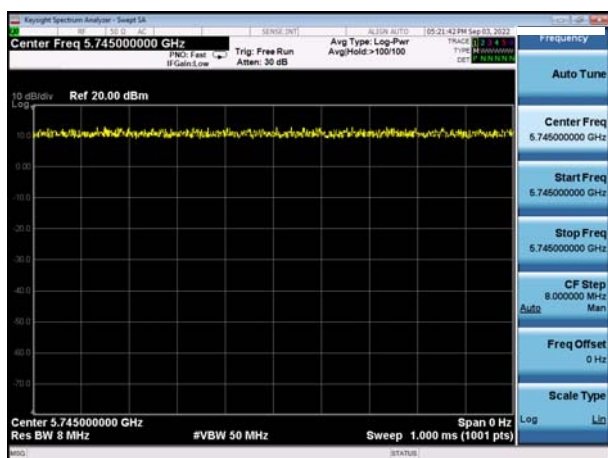


5230MHz

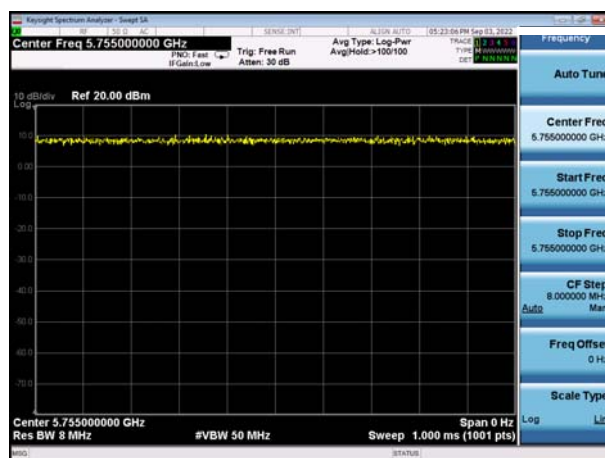
5240MHz



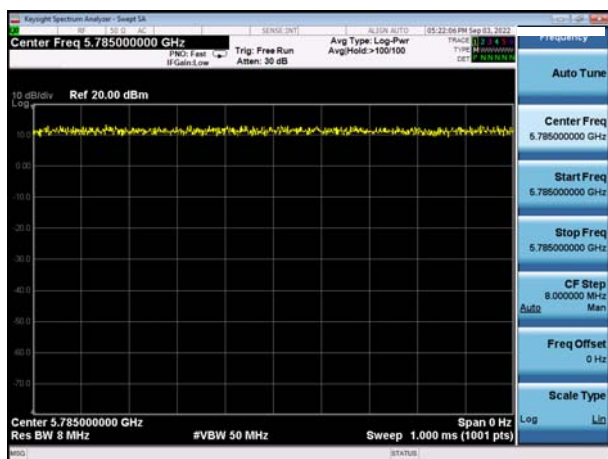
802.11ac HT20



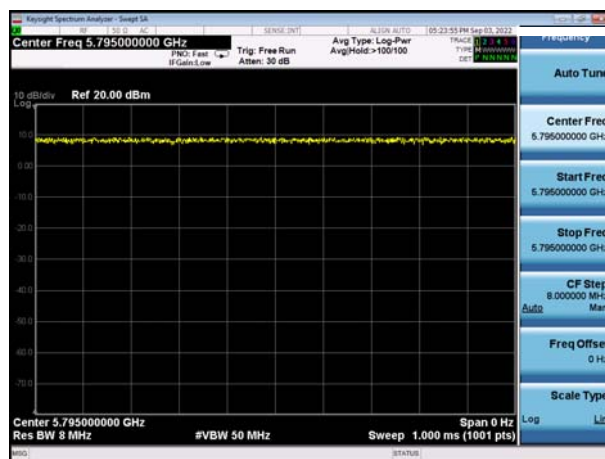
802.11ac HT40



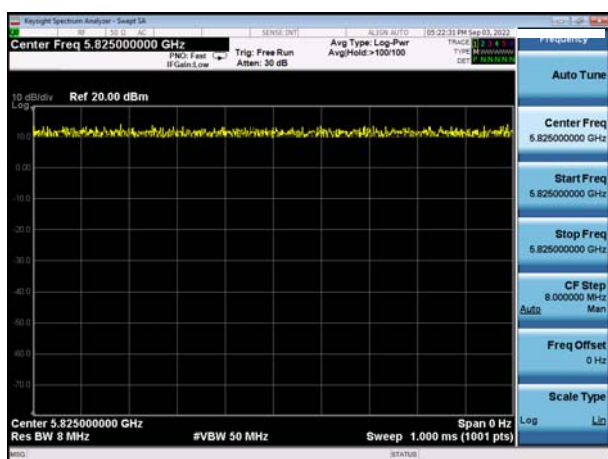
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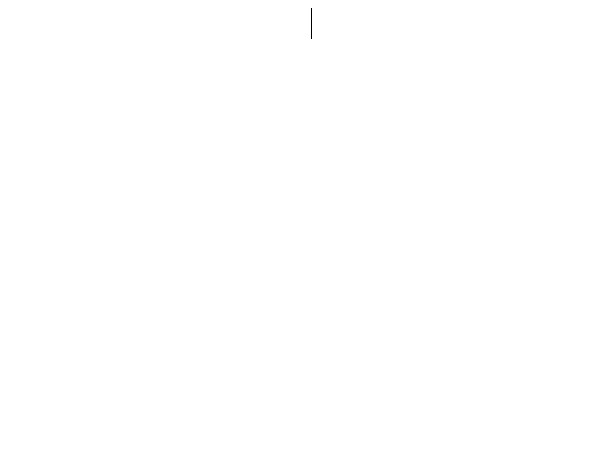
5755MHz



5785MHz



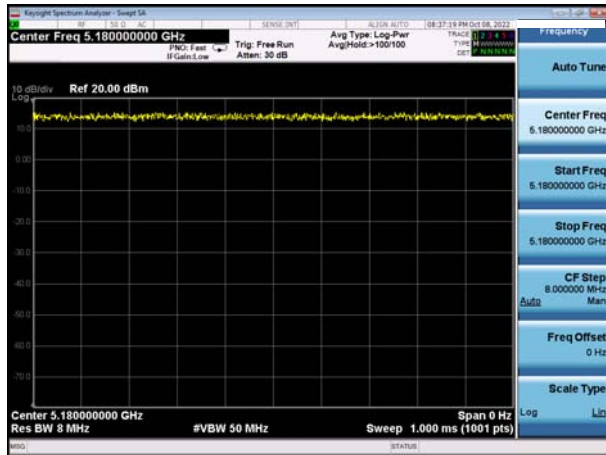
5795MHz



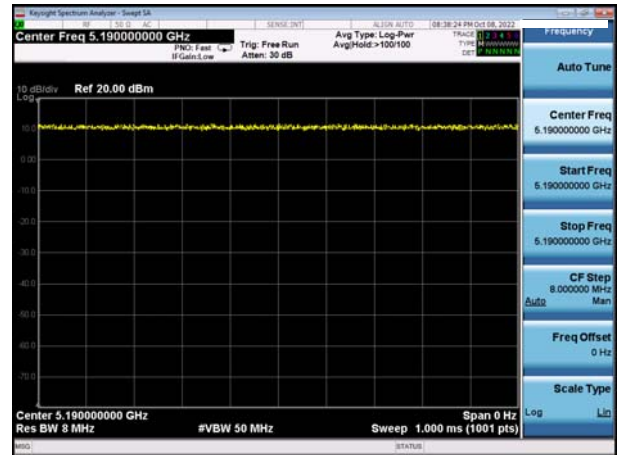
5825MHz



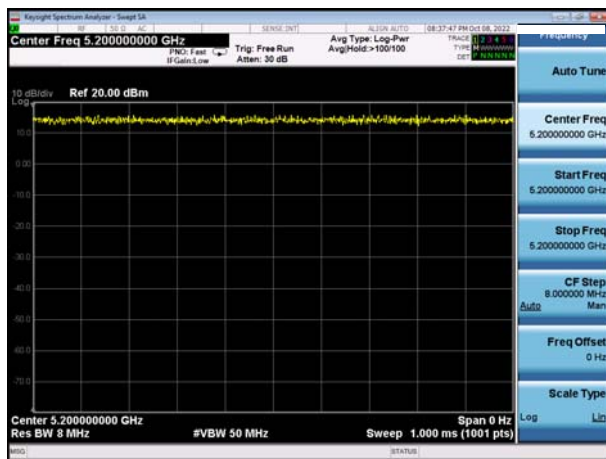
802.11ax HT20



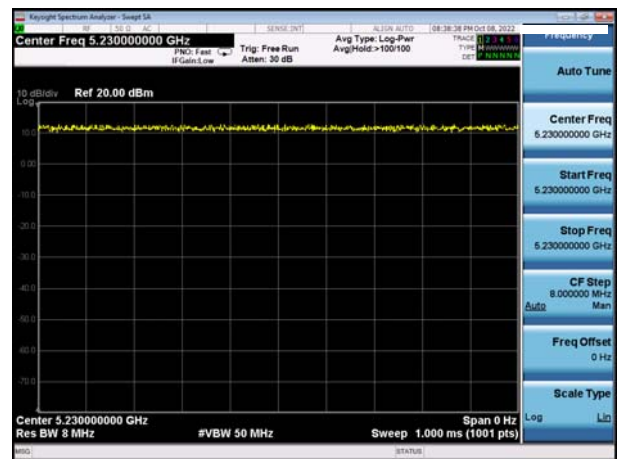
802.11ax HT40



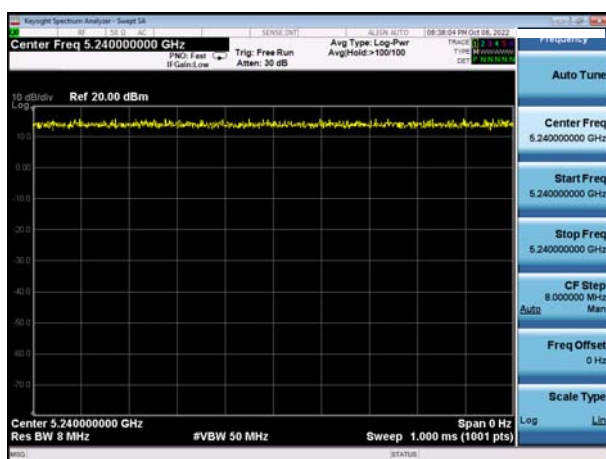
5180MHz



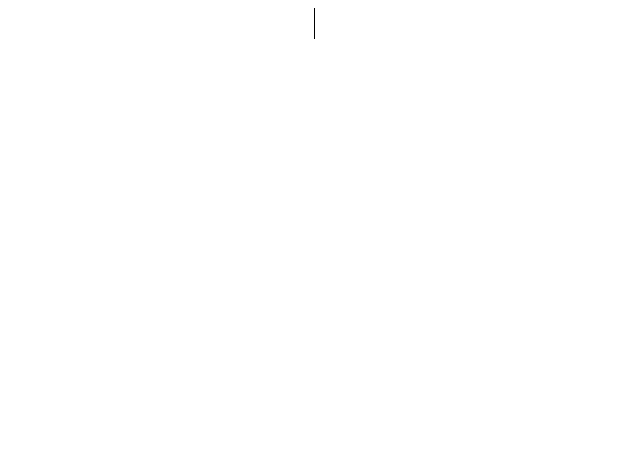
5190MHz



5200MHz



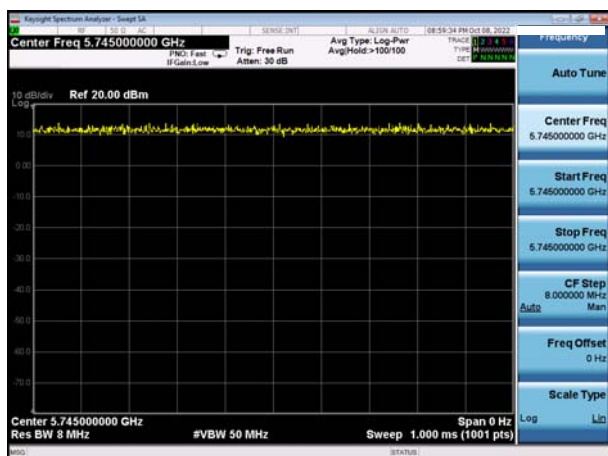
5230MHz



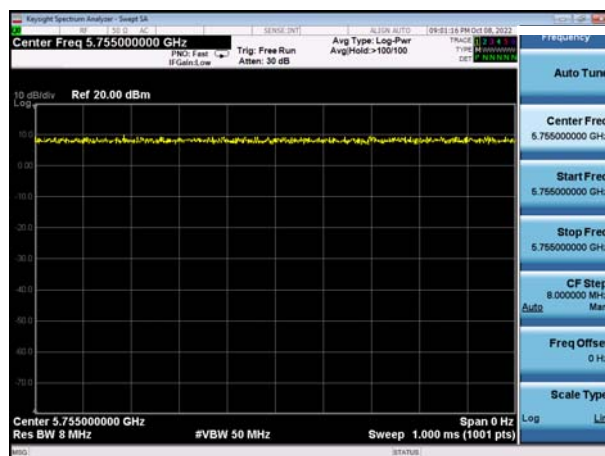
5240MHz



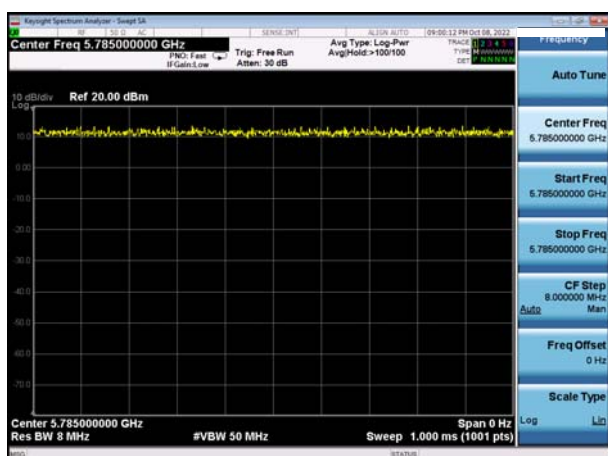
802.11ax HT20



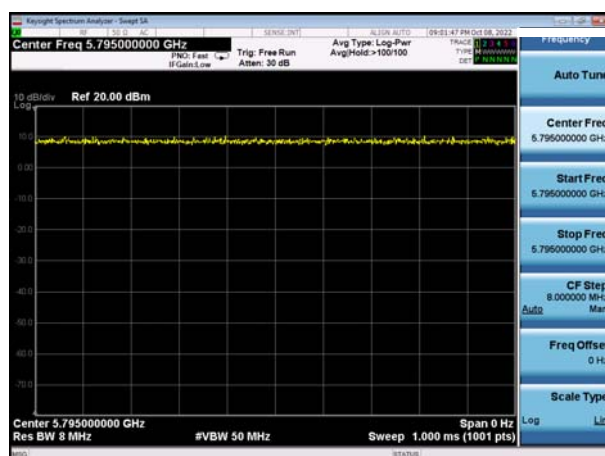
802.11ax HT40



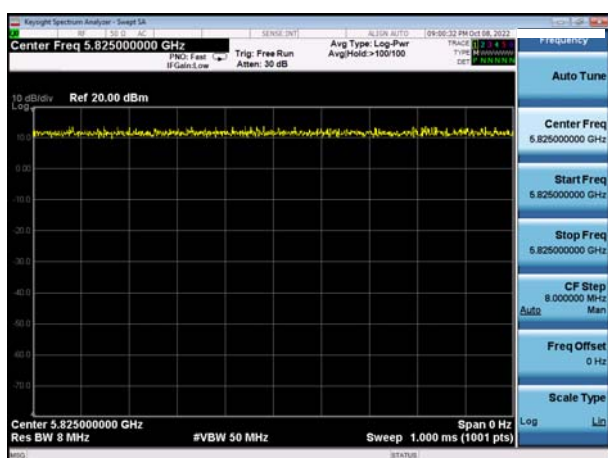
5745MHz



5755MHz



5785MHz



5795MHz

5825MHz



8. OUT OF BAND EMISSIONS

8.1 APPLICABLE STANDARD

According to FCC Part 15 C Section 15.407

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.

8.1.1 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.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP





8.1.4 EUT OPERATION CONDITIONS

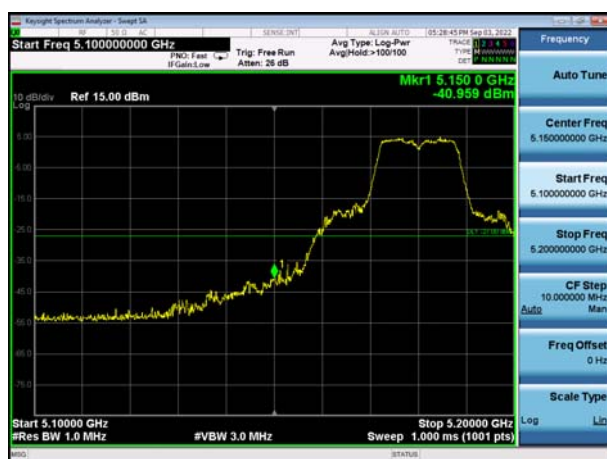
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 TEST RESULTS

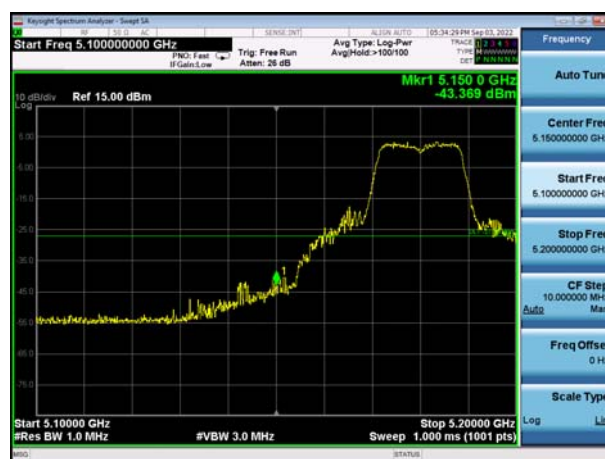
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz

5.180~5.240 GHz

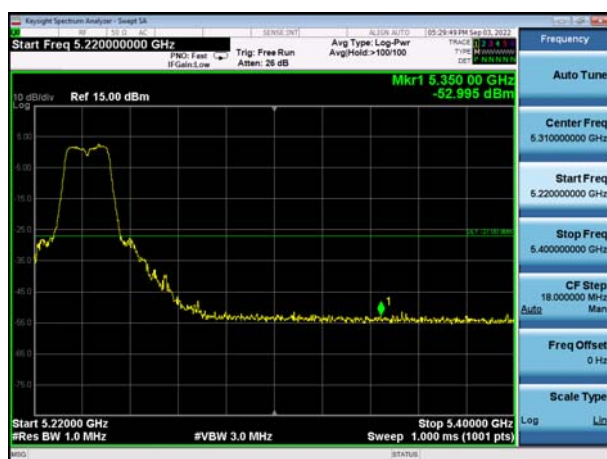
(802.11a) Band Edge, Left Side



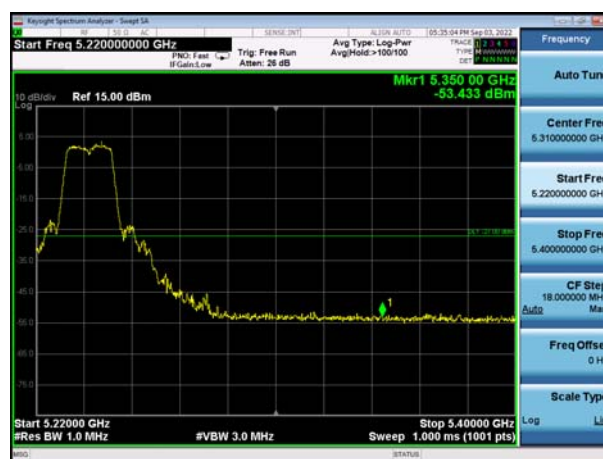
(802.11n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side



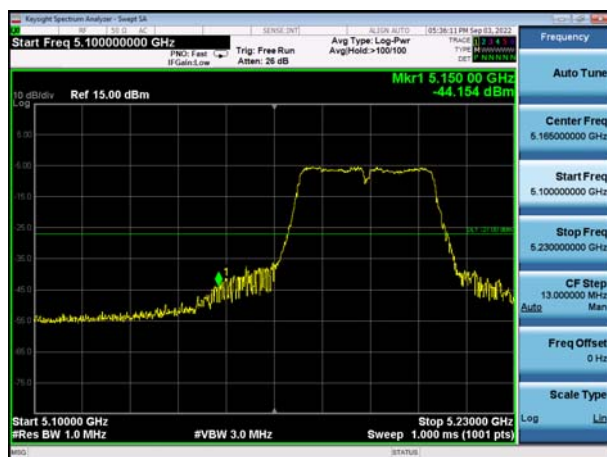
(802.11n20) Band Edge, Right Side



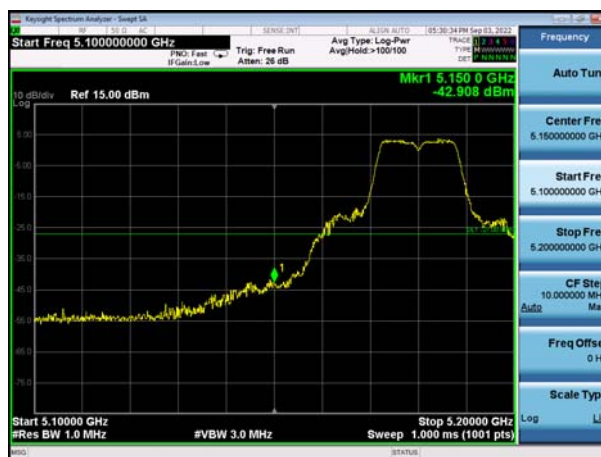


5.180~5.240 GHz

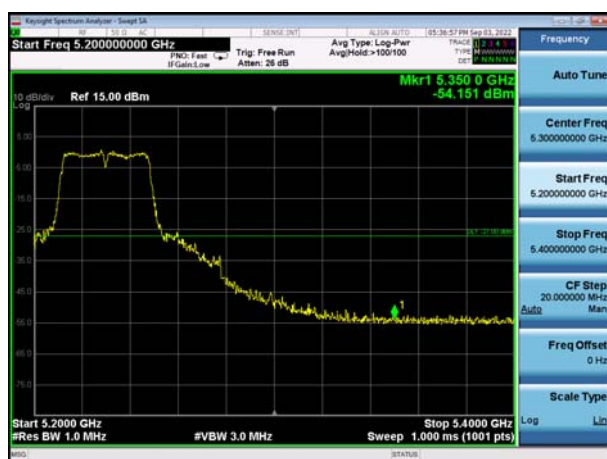
(802.11n40) Band Edge, Left Side



(802.ac20) Band Edge, Left Side



(802.11n40) Band Edge, Right Side



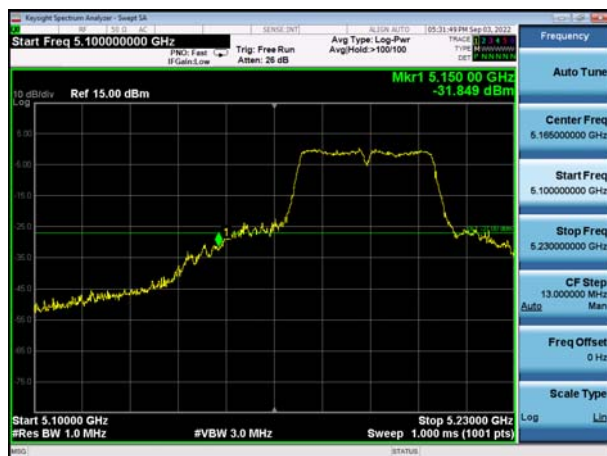
(802.11ac20) Band Edge, Right Side



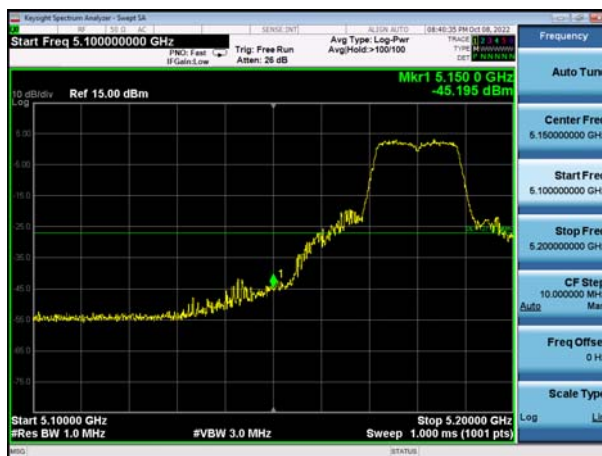


5.180~5.240 GHz

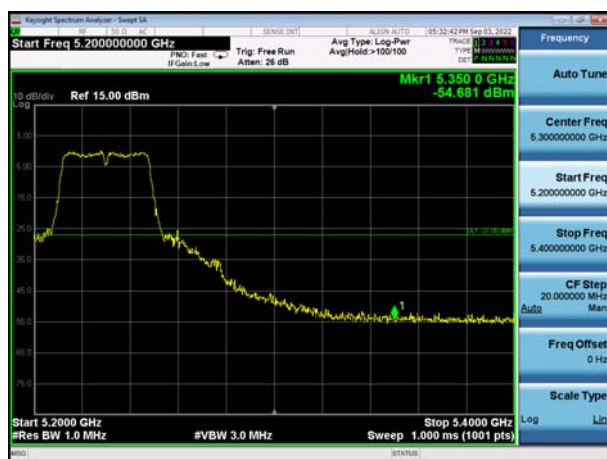
(802.ac40) Band Edge, Left Side



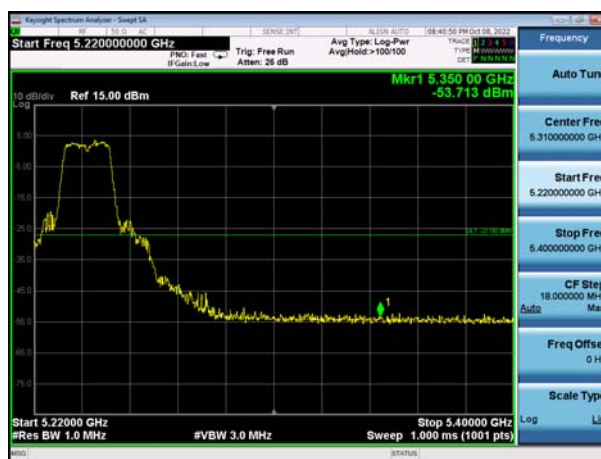
(802.ax20) Band Edge, Left Side



(802.11ac40) Band Edge, Right Side



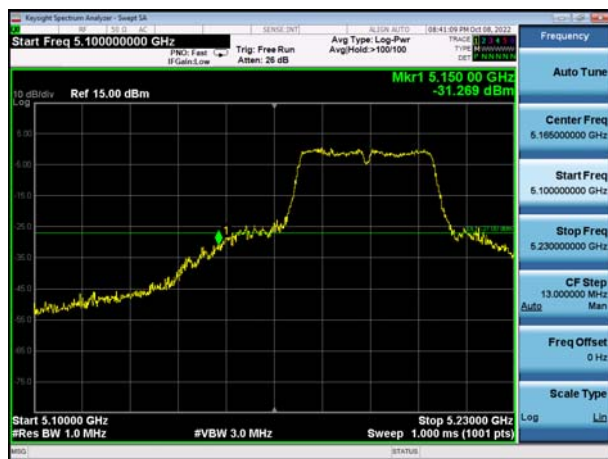
(802.11ax20) Band Edge, Right Side



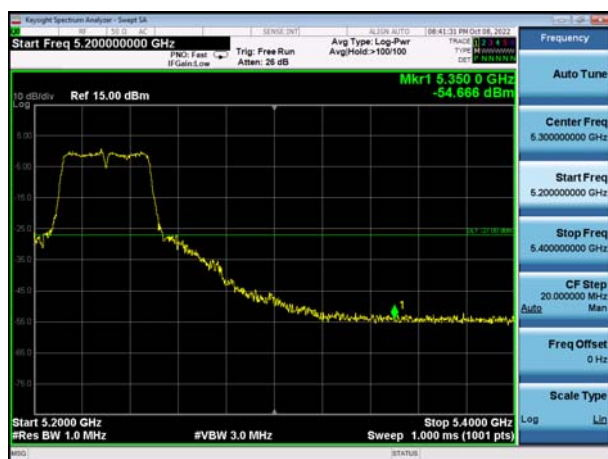


5.180~5.240 GHz

(802.ax40) Band Edge, Left Side



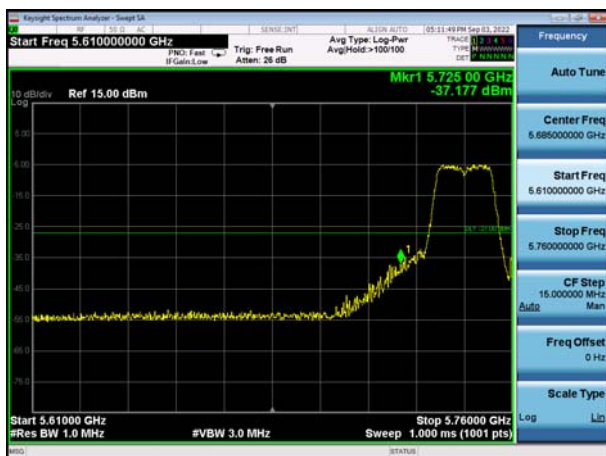
(802.11ax40) Band Edge, Right Side



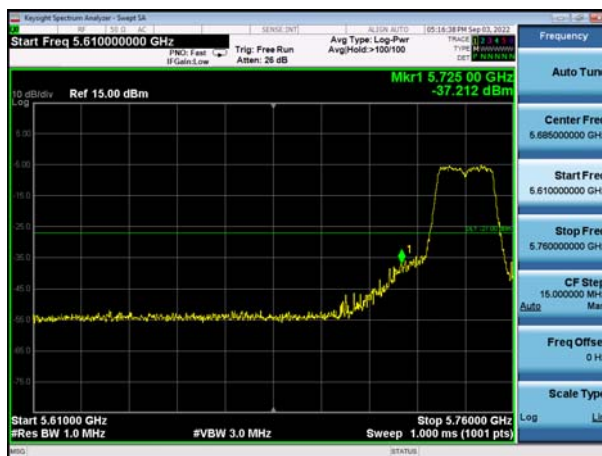


5.745~5.825 GHz

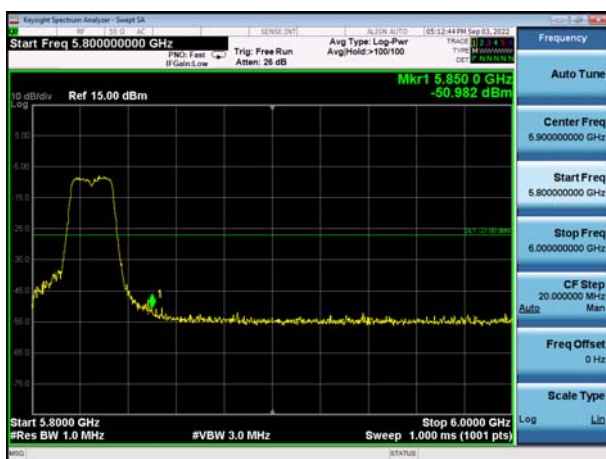
(802.11a) Band Edge, Left Side



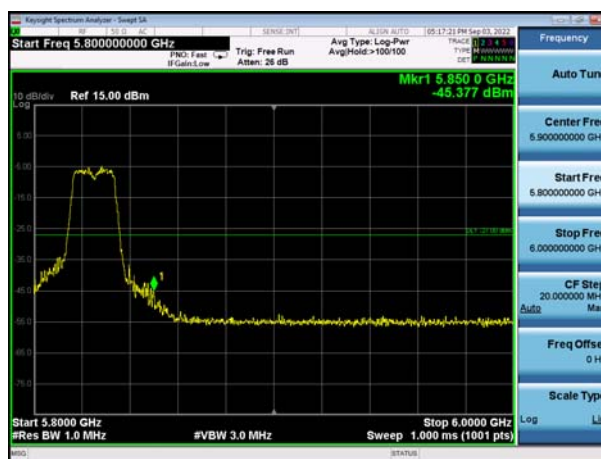
(802.11n20) Band Edge, Left Side



(802.11a) Band Edge, Right Side



(802.11n20) Band Edge, Right Side



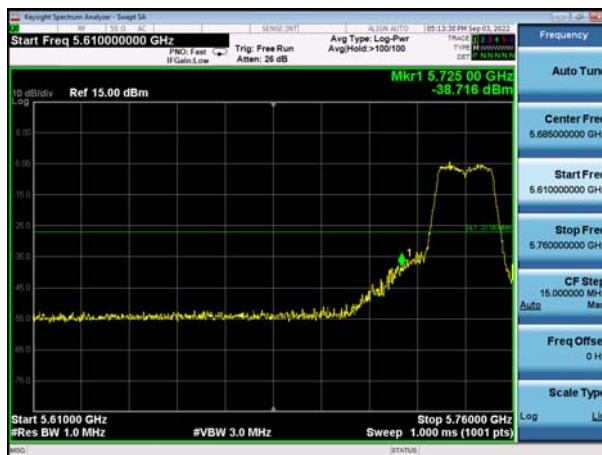


5.745~5.825 GHz

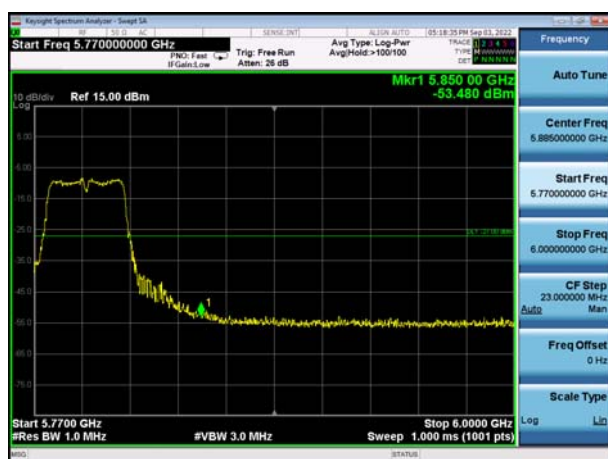
(802.11n40) Band Edge, Left Side



(802.11ac20) Band Edge



(802.11n40) Band Edge, Right Side



(802.11ac20) Band Edge, Right Side



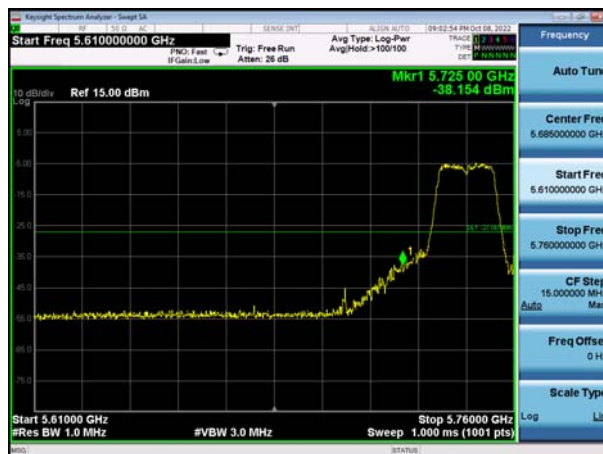


5.745~5.825 GHz

(802.11ac40) Band Edge, Left Side



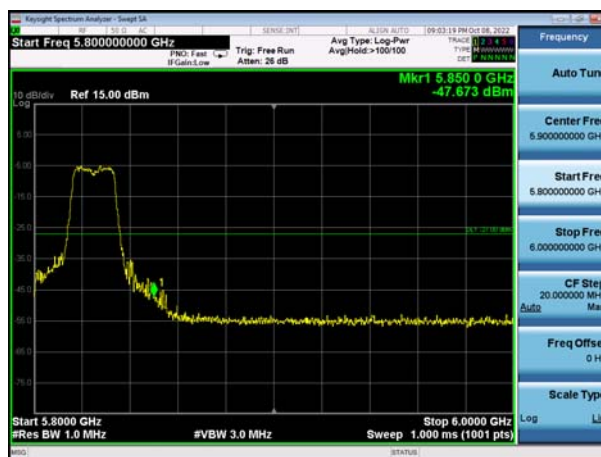
(802.11ax20) Band Edge



(802.11ac40) Band Edge, Right Side



(802.11ax20) Band Edge, Right Side



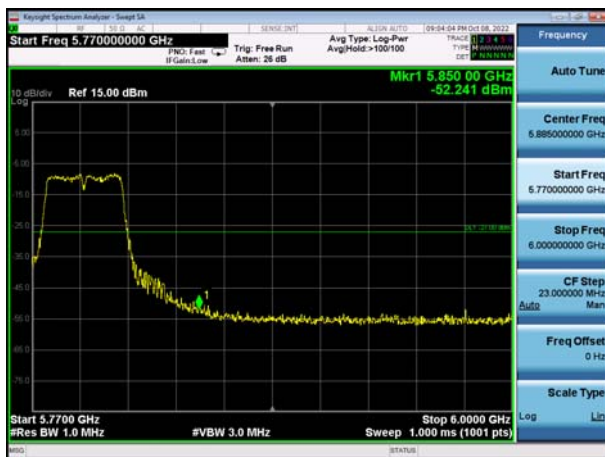


5.745~5.825 GHz

(802.11ax40) Band Edge, Left Side



(802.11ax40) Band Edge, Right Side





9. FREQUENCY STABILITY

9.1 APPLIED PROCEDURES / LIMIT

Manufacturers 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.

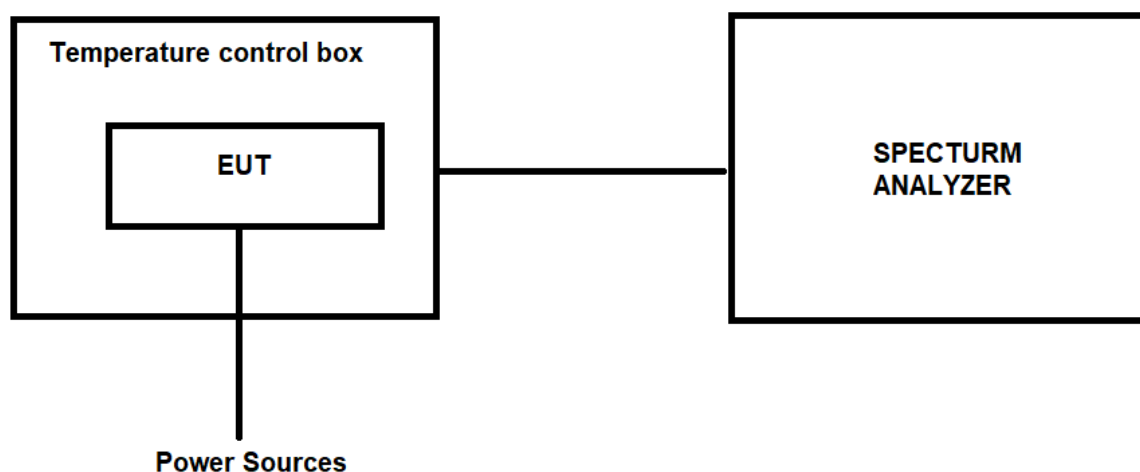
9.1.1 TEST PROCEDURE

1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
2. Set EUT as normal operation.
3. Turn the EUT on and couple its output to spectrum.
4. Turn the EUT off and set the chamber to the highest temperature specified.
5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
6. Repeat step with the temperature chamber set to the lowest temperature.

9.1.2 DEVIATION FROM STANDARD

No deviation.

9.1.3 TEST SETUP



9.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



9.1.5 TEST RESULTS

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)			Δ Frequency (MHz)		
			802.11a	802.n HT20	802.ac HT20	802.11a	802.n HT20	802.ac HT20
AC120V	-20℃	5180.000	5180.0428	5180.0357	5180.0366	-0.0428	-0.0357	-0.0366
		5220.000	5220.0347	5220.0347	5220.0351	-0.0347	-0.0347	-0.0351
		5240.000	5240.0248	5240.0255	5240.0269	-0.0248	-0.0255	-0.0269
		5745.000	5745.0342	5745.0326	5745.0363	-0.0342	-0.0326	-0.0363
		5785.000	5785.0362	5785.0333	5785.0365	-0.0362	-0.0333	-0.0365
		5825.000	5825.0342	5825.0342	5825.0351	-0.0342	-0.0342	-0.0351
AC120V		5180.000	5180.0248	5180.0274	5180.0299	-0.0248	-0.0274	-0.0299
		5220.000	5220.0318	5220.0325	5220.0363	-0.0318	-0.0325	-0.0363
		5240.000	5240.0276	5240.0254	5240.0268	-0.0276	-0.0254	-0.0268
		5745.000	5745.0294	5745.0261	5745.0267	-0.0294	-0.0261	-0.0267
		5785.000	5785.0347	5785.0343	5785.0366	-0.0347	-0.0343	-0.0366
		5825.000	5825.0418	5825.0429	5825.0446	-0.0418	-0.0429	-0.0446
AC120V	25℃	5180.000	5180.0517	5180.0553	5180.0551	-0.0517	-0.0553	-0.0551
		5220.000	5220.0249	5220.0242	5220.0269	-0.0249	-0.0242	-0.0269
		5240.000	5240.0361	5240.0351	5240.0366	-0.0361	-0.0351	-0.0366
		5745.000	5745.0347	5745.0327	5745.0348	-0.0347	-0.0327	-0.0348
		5785.000	5785.0428	5785.0443	5785.0469	-0.0428	-0.0443	-0.0469
		5825.000	5825.0294	5825.0259	5825.0269	-0.0294	-0.0259	-0.0269
AC120V	50℃	5180.000	5180.0347	5180.0357	5180.0639	-0.0347	-0.0357	-0.0639
		5220.000	5220.0264	5220.0261	5220.0278	-0.0264	-0.0261	-0.0278
		5240.000	5240.0318	5240.0326	5240.0336	-0.0318	-0.0326	-0.0336
		5745.000	5745.0614	5745.0642	5745.0601	-0.0614	-0.0642	-0.0601
		5785.000	5785.0418	5785.0461	5785.0431	-0.0418	-0.0461	-0.0431
		5825.000	5825.0611	5825.0642	5825.0601	-0.0611	-0.0642	-0.0601
AC120V	50℃	5180.000	5180.0336	5180.0326	5180.0311	-0.0336	-0.0326	-0.0311
		5220.000	5220.0275	5220.0246	5220.0232	-0.0275	-0.0246	-0.0232
		5240.000	5240.0361	5240.0374	5240.0389	-0.0361	-0.0374	-0.0389
		5745.000	5745.0484	5745.0451	5745.0436	-0.0484	-0.0451	-0.0436
		5785.000	5785.0294	5785.0263	5785.0299	-0.0294	-0.0263	-0.0299
		5825.000	5825.0741	5825.0741	5825.0663	-0.0741	-0.0741	-0.0663



Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)		Δ Frequency (MHz)	
			802.11n HT40	802.11ac HT40	802.11n HT40	802.11ac HT40
AC120V	-20℃	5190.000	5190.0268	5190.0323	-0.0268	-0.0323
		5230.000	5230.0364	5230.0351	-0.0364	-0.0351
		5755.000	5755.0517	5755.0369	-0.0517	-0.0369
		5795.000	5795.0641	5795.0523	-0.0641	-0.0523
AC120V		5190.000	5190.0297	5190.0296	-0.0297	-0.0296
		5230.000	5230.0384	5230.0363	-0.0384	-0.0363
		5755.000	5755.0275	5755.0403	-0.0275	-0.0403
		5795.000	5795.0466	5795.0501	-0.0466	-0.0501
AC120V	25℃	5190.000	5190.0258	5190.0303	-0.0258	-0.0303
		5230.000	5230.0618	5230.0343	-0.0618	-0.0343
		5755.000	5755.0268	5755.0435	-0.0268	-0.0435
		5795.000	5795.0517	5795.0503	-0.0517	-0.0503
AC120V	50℃	5190.000	5190.0617	5190.0559	-0.0617	-0.0559
		5230.000	5230.0547	5230.0406	-0.0547	-0.0406
		5755.000	5755.0417	5755.0411	-0.0417	-0.0411
		5795.000	5795.0349	5795.0502	-0.0349	-0.0502
AC120V	50℃	5190.000	5190.0521	5190.0469	-0.0521	-0.0469
		5230.000	5230.0329	5230.0435	-0.0329	-0.0435
		5755.000	5755.0337	5755.0431	-0.0337	-0.0431
		5795.000	5795.0419	5795.0489	-0.0419	-0.0489



Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)
			802.ax HT40	802.ax HT40
AC120V	-20℃	5180.000	5180.0402	-0.0402
		5220.000	5220.0356	-0.0356
		5240.000	5240.0306	-0.0306
		5745.000	5745.0401	-0.0401
		5785.000	5785.0296	-0.0296
		5825.000	5825.0388	-0.0388
AC120V	-20℃	5180.000	5180.0299	-0.0299
		5220.000	5220.0333	-0.0333
		5240.000	5240.0369	-0.0369
		5745.000	5745.0287	-0.0287
		5785.000	5785.0405	-0.0405
		5825.000	5825.0367	-0.0367
AC120V	25℃	5180.000	5180.0445	-0.0445
		5220.000	5220.0289	-0.0289
		5240.000	5240.0353	-0.0353
		5745.000	5745.0415	-0.0415
		5785.000	5785.0406	-0.0406
		5825.000	5825.0306	-0.0306
AC120V	50℃	5180.000	5180.0333	-0.0333
		5220.000	5220.0289	-0.0289
		5240.000	5240.0366	-0.0366
		5745.000	5745.0485	-0.0485
		5785.000	5785.0408	-0.0408
		5825.000	5825.0552	-0.0552
AC120V	50℃	5180.000	5180.0396	-0.0396
		5220.000	5220.0288	-0.0288
		5240.000	5240.0367	-0.0367
		5745.000	5745.0456	-0.0456
		5785.000	5785.0339	-0.0339
		5825.000	5825.0536	-0.0536



Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (MHz)
			802.ax HT40	802.ax HT40
AC120V	-20℃	5190.000	5190.0289	-0.0289
		5230.000	5230.0353	-0.0353
		5755.000	5755.0507	-0.0507
		5795.000	5795.0458	-0.0458
AC120V		5190.000	5190.0362	-0.0362
		5230.000	5230.0415	-0.0415
		5755.000	5755.0339	-0.0339
		5795.000	5795.0458	-0.0458
AC120V	25℃	5190.000	5190.0365	-0.0365
		5230.000	5230.0558	-0.0558
		5755.000	5755.0366	-0.0366
		5795.000	5795.0528	-0.0528
AC120V	50℃	5190.000	5190.0553	-0.0553
		5230.000	5230.0469	-0.0469
		5755.000	5755.0436	-0.0436
		5795.000	5795.0425	-0.0425
AC120V	50℃	5190.000	5190.0553	-0.0553
		5230.000	5230.0447	-0.0447
		5755.000	5755.0386	-0.0386
		5795.000	5795.0435	-0.0435