



FCC Part 15E Test Report

FCC ID: 2A48K-CPZL

Applicant: ZHANJIANG LUTUO TECHNOLOGY LIMITED COMPANY

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Manufacturer: Shenzhen Yizhi Ruilian Technology Co., Ltd

Address: RM 215, 2nd Floor, Liangji Building, East Ring Road, Fukang Community, Longhua Street, Longhua District, Shenzhen

EUT: Decoder

Trade Mark: N/A

Model Number: CP-ZL-AUDI-Q5U
CP-ZL-AUDI-Q5L, CP-ZL-AUDI-A3, CP-ZL-AUDI-B9, CP-ZL-AUDI-Q3, CP-ZL-AUDI-Q1,
CP-ZL-AUDI-C6, CP-ZL-AUDI-A6, CP-ZL-AUDI-A7C, CP-ZL-AUDI-A8, CP-ZL-AUDI-A1,
CP-ZL-BENZ-50, CP-ZL-BENZ-45, CP-ZL-BMW-CIC, CP-ZL-BMW-NBT,
CP-ZL-BMW-EVO, CP-ZL-LX-HC, CP-ZL-LX-MC, CP-ZL-LX-LC, CP-ZL-LX-MIX

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Test Date: Jun. 06, 2024 – Jun. 21, 2024

Date of Report: Jun. 21, 2024

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

Test Result: Pass

Report Number: DL-240606027ER

Prepared (Test Engineer): Alisa Song

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.



Table of Contents	Page
1 . SUMMARY OF TEST RESULTS	5
1.1 MEASUREMENT UNCERTAINTY	5
2 . GENERAL INFORMATION	6
2.1 GENERAL DESCRIPTION OF EUT	6
2.2 DESCRIPTION OF TEST MODES	7
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	8
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	8
2.5 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING	8
2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS	9
3 . EMC EMISSION TEST	10
3.1 CONDUCTED EMISSION MEASUREMENT	10
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS	10
3.1.2 TEST PROCEDURE	10
3.1.3 DEVIATION FROM TEST STANDARD	10
3.1.4 TEST SETUP	11
3.1.5 EUT OPERATING CONDITIONS	11
3.1.6 TEST RESULTS	11
3.2 RADIATED EMISSION MEASUREMENT	12
3.2.1 RADIATED EMISSION LIMITS	12
3.2.2 TEST PROCEDURE	13
3.2.3 DEVIATION FROM TEST STANDARD	13
3.2.4 TEST SETUP	13
3.2.5 EUT OPERATING CONDITIONS	14
3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)	15
TEMPERATURE:	15
RELATIVE HUMIDITY:	15
PRESSURE:	15
TEST VOLTAGE :	15
TEST MODE :	15
POLARIZATION :	15
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)	16
TEMPERATURE:	16
RELATIVE HUMIDITY:	16
PRESSURE:	16
POLARIZATION :	16



Table of Contents	Page
TEST VOLTAGE :	16
TEST MODE :	16
TEST VOLTAGE	17
3.2.8 TEST RESULTS (1GHZ~40GHZ)	18
3.3 RADIATED BAND EMISSION MEASUREMENT	23
3.3.1 TEST REQUIREMENT:	23
3.3.2 TEST PROCEDURE	23
3.3.3 DEVIATION FROM TEST STANDARD	23
3.3.4 TEST SETUP	24
3.3.5 EUT OPERATING CONDITIONS	24
3.3 CONDUCTED BAND EMISSION MEASUREMENT	30
3.3.1 TEST REQUIREMENT:	30
3.3.2 TEST PROCEDURE	30
3.3.3 DEVIATION FROM TEST STANDARD	30
3.3.4 TEST SETUP	30
3.3.5 EUT OPERATING CONDITIONS	30
4 . AVERAGE OUTPUT POWER	33
4.1 APPLIED PROCEDURES / LIMIT	33
4.1.1 TEST PROCEDURE	33
4.1.2 DEVIATION FROM STANDARD	33
4.1.3 TEST SETUP	33
4.1.4 EUT OPERATION CONDITIONS	33
4.1.5 TEST RESULTS	34
5 . POWER SPECTRAL DENSITY TEST	38
5.1 APPLIED PROCEDURES / LIMIT	38
5.1.1 TEST PROCEDURE	38
5.1.2 DEVIATION FROM STANDARD	38
5.1.3 TEST SETUP	38
5.1.4 EUT OPERATION CONDITIONS	38
5.1.5 TEST RESULTS	39
6 . 26DB&99% BANDWIDTH TEST	43
6.1 APPLIED PROCEDURES / LIMIT	43
6.1.1 TEST PROCEDURE	43
6.1.2 DEVIATION FROM STANDARD	43
6.1.3 TEST SETUP	43
6.1.4 EUT OPERATION CONDITIONS	43
6.1.5 TEST RESULTS	44
7 . DUTY CYCLE TEST SIGNAL	48
7.1 APPLIED PROCEDURES / LIMIT	48



Table of Contents	Page
7.1.1 TEST PROCEDURE	48
7.1.2 DEVIATION FROM STANDARD	48
7.1.3 TEST SETUP	48
7.1.4 EUT OPERATION CONDITIONS	48
7.1.5 TEST RESULTS	49
8 . FREQUENCY STABILITY	51
8.1 APPLIED PROCEDURES / LIMIT	51
8.1.1 TEST PROCEDURE	51
8.1.2 DEVIATION FROM STANDARD	51
8.1.3 TEST SETUP	51
8.1.4 EUT OPERATION CONDITIONS	51
8.1.5 TEST RESULTS	52
9 . TRANSMISSION IN THE ABSENCE OF DATA	54
9.1 STANDARD REQUIREMENT	54
9.2 TEST RESULT	54
10 . ANTENNA REQUIREMENT	54
10.1 STANDARD REQUIREMENT	54
10.2 EUT ANTENNA	54
11 . TEST SEUUP PHOTO	54
12 . EUT PHOTO	54

**1. SUMMARY OF TEST RESULTS**

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	N/A	
15.407(b), 15.209	Radiated Spurious Emission	PASS	
15.407 (b)	Band Edge Emission	PASS	
15.407 (a)	Peak Output Power	PASS	
15.407 (a)	Power Spectral Density	PASS	
15.403(i) 15.407(e)	26dB bandwidth and 99%dB Bandwidth	PASS	
15.407(g)	Frequency Stability	PASS	
15.407(c)	Transmission in case of Absence of Information	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

1.1 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	$\pm 2\%$
8	Bandwidth	$\pm 0.2\text{MHz}$
9	Power Spectral Density	$\pm 2.45\text{dBm}$
10	Frequency Stability	$\pm 0.3\text{MHz}$
11	DUTY CYCLE	$\pm 0.53\text{dB}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Decoder
Trademark	N/A
Model No.:	CP-ZL-AUDI-Q5U CP-ZL-AUDI-Q5L, CP-ZL-AUDI-A3, CP-ZL-AUDI-B9, CP-ZL-AUDI-Q3, CP-ZL-AUDI-Q1, CP-ZL-AUDI-C6, CP-ZL-AUDI-A6, CP-ZL-AUDI-A7C, CP-ZL-AUDI-A8, CP-ZL-AUDI-A1, CP-ZL-BENZ-50, CP-ZL-BENZ-45, CP-ZL-BMW-CIC, CP-ZL-BMW-NBT, CP-ZL-BMW-EVO, CP-ZL-LX-HC, CP-ZL-LX-MC, CP-ZL-LX-LC, CP-ZL-LX-MIX
Model Difference	The product's different for model number.
Operation Frequency:	5180-5240MHz(802.11a/n/ac(HT20)) 5190-5230MHz(802.11n/ac(HT40)) 5210MHzMHz (802.11ac(HT80))
Channel numbers:	See channel list
Channel separation:	20MHz/40MHz/80MHz
Modulation technology:	64QAM, 16QAM, QPSK, BPSK for OFDM
Rate of Transmitter	802.11a: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps,54Mbps 802.11n: Up to 500Mbps
Antenna Type:	External Antenna
Antenna gain:	2.1dBi
Power supply:	DC 12V

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/n(HT20)/ac(HT20)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

Channel List for 802.11n(HT40)/ac(HT40)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

Channel List for 802.11ac(HT80)			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210	/	/

2.2 DESCRIPTION OF TEST MODES

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

Description		
Pretest Mode	Channel	Band 1
Mode 1	802.11a/n/acHT20	CH36, CH44, CH48
Mode 2	802.11n/acHT40	CH38, CH46
Mode 3	802.11acHT80	CH42
Mode 4	Other	Link Mode

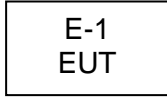
For Radiated Emission		
Pretest Mode	Channel	Band 1
Mode 1	802.11a/n/acHT20	CH36, CH44, CH48
Mode 2	802.11n/acHT40	CH38, CH46
Mode 3	802.11acHT80	CH42
Mode 4	Other	Link Mode

Note: 1. The measurements are performed at the highest, middle, lowest available channels.
 2. 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.



2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated 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.

Table with 5 columns: Item, Equipment, Model/Type No., Series No., Note. Row 1: E-1, Decoder, CP-ZL-AUDI-Q5U, N/A, EUT.

Table with 5 columns: 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.

Table titled 'Max output power Setting' with columns for Test software Version, Mode, Data Rate, and Power Setting of Softwave across different test programs.

**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. 04, 2023	Nov. 03, 2024
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Nov. 04, 2023	Nov. 03, 2024
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Nov. 04, 2023	Nov. 03, 2024
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Nov. 04, 2023	Nov. 03, 2024
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Nov. 04, 2023	Nov. 03, 2024
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Nov. 04, 2023	Nov. 03, 2024
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Nov. 04, 2023	Nov. 03, 2024
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Nov. 04, 2023	Nov. 03, 2024
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Nov. 04, 2023	Nov. 03, 2024
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Nov. 04, 2023	Nov. 03, 2024
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Nov. 04, 2023	Nov. 03, 2024
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Nov. 04, 2023	Nov. 03, 2024
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Nov. 04, 2023	Nov. 03, 2024
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Nov. 04, 2023	Nov. 03, 2024
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Nov. 04, 2023	Nov. 03, 2024
16	D.C. Power Supply	LongWei	PS-305D	010964729	Nov. 04, 2023	Nov. 03, 2024

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	ChengYu	843 Room	843	Sep. 20, 2022	Sep. 19, 2025
2	EMI Receiver	R&S	ESR	101421	Nov. 04, 2023	Nov. 03, 2024
3	LISN	R&S	ENV216	102417	Nov. 04, 2023	Nov. 03, 2024
4	843 Cable 1#	ChengYu	CE Cable	001	Nov. 04, 2023	Nov. 03, 2024

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
0.5 -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

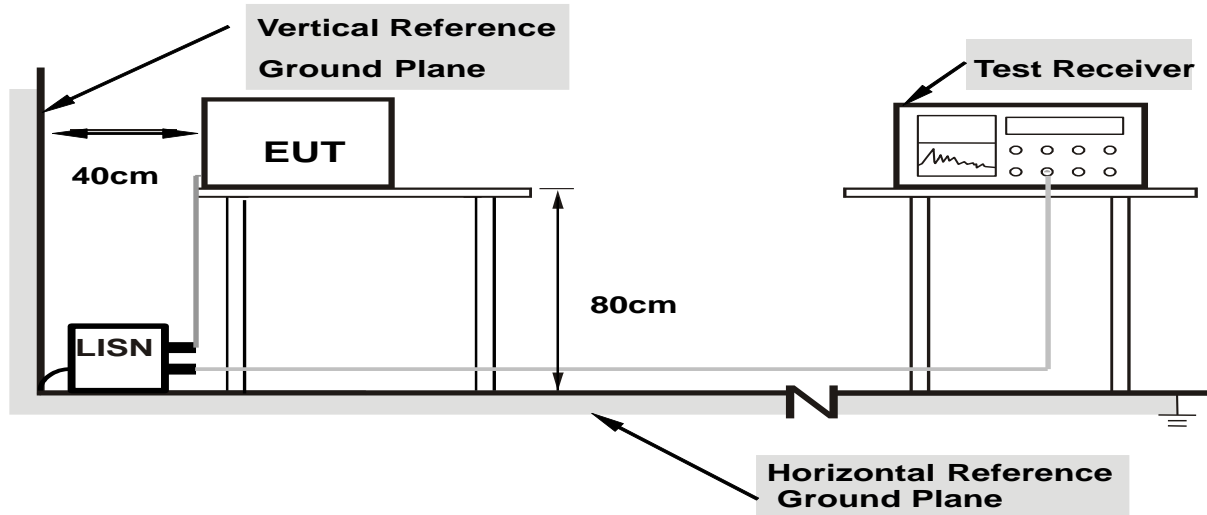
3.1.2 TEST PROCEDURE

- 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

The EUT is powered by DC, no requirements for this item.



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
216~960	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	40GHz
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:

- a. 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.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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:

- g. 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).
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel

Note:

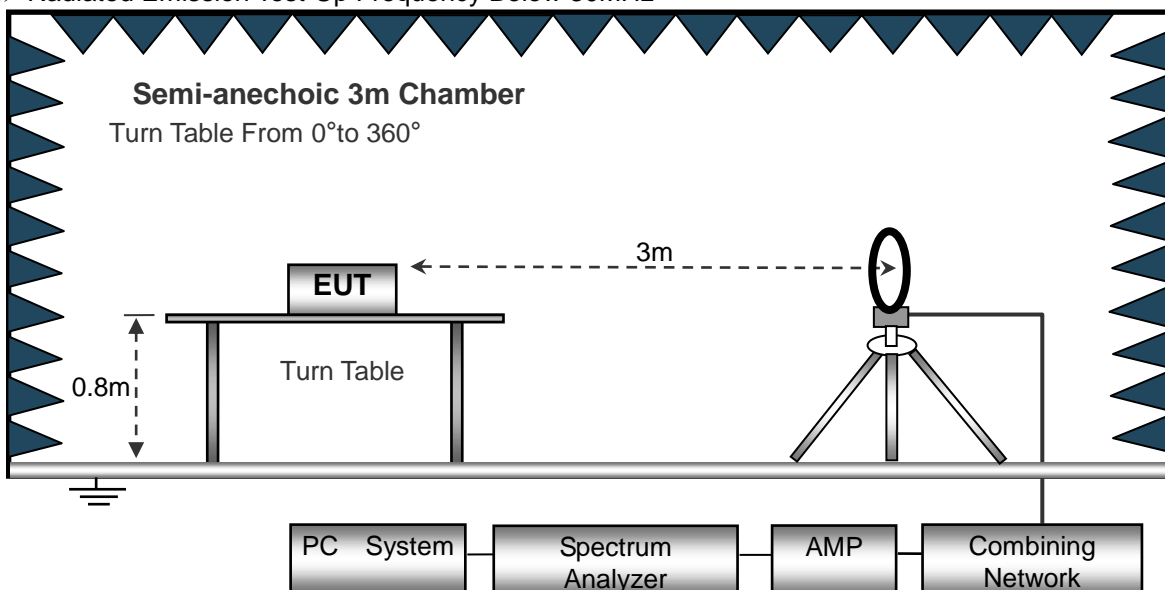
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

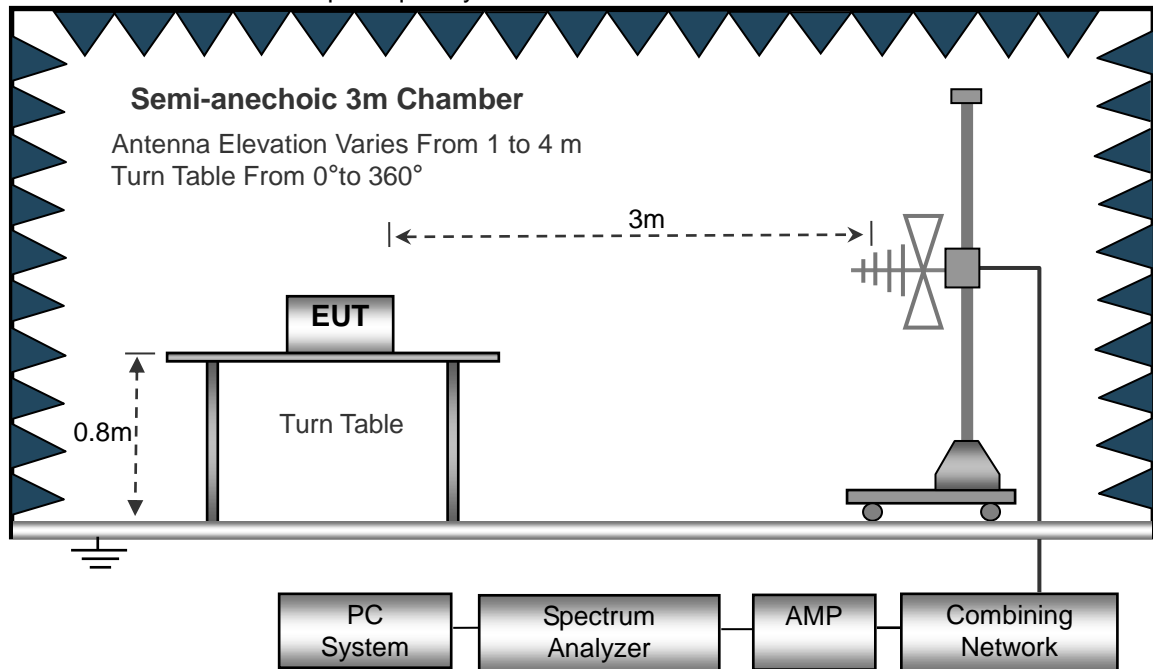
No deviation

3.2.4 TEST SETUP

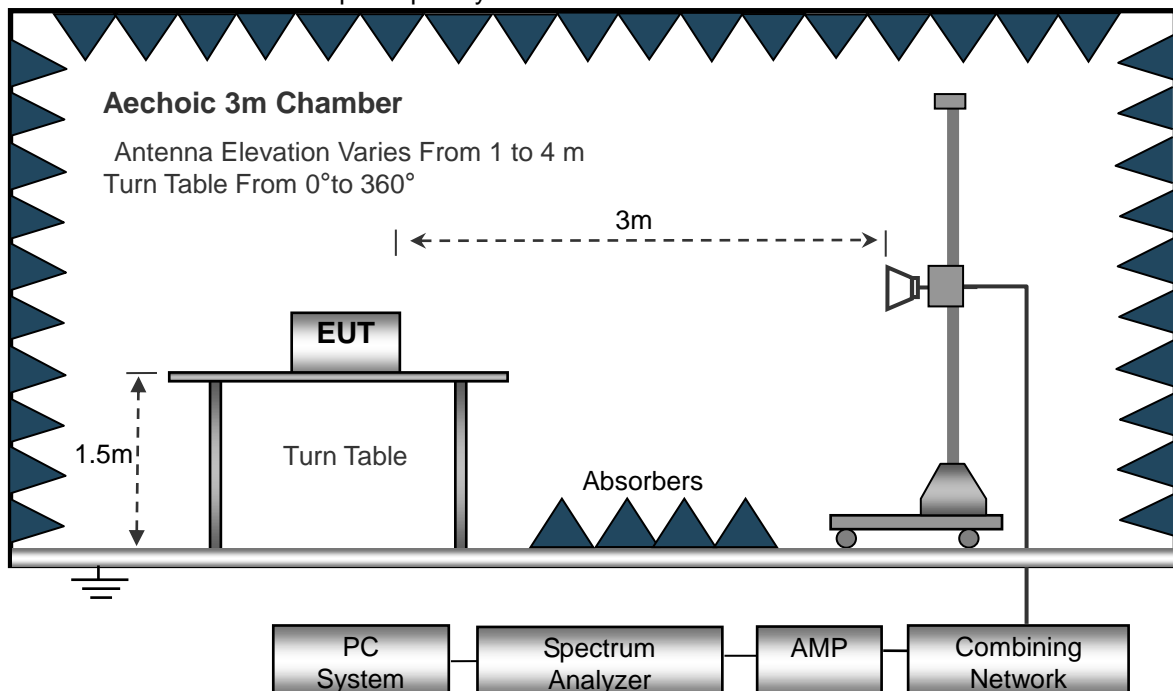
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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°C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 12V
Test Mode :	Mode 4	Polarization :	--

Freq. (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	State 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.

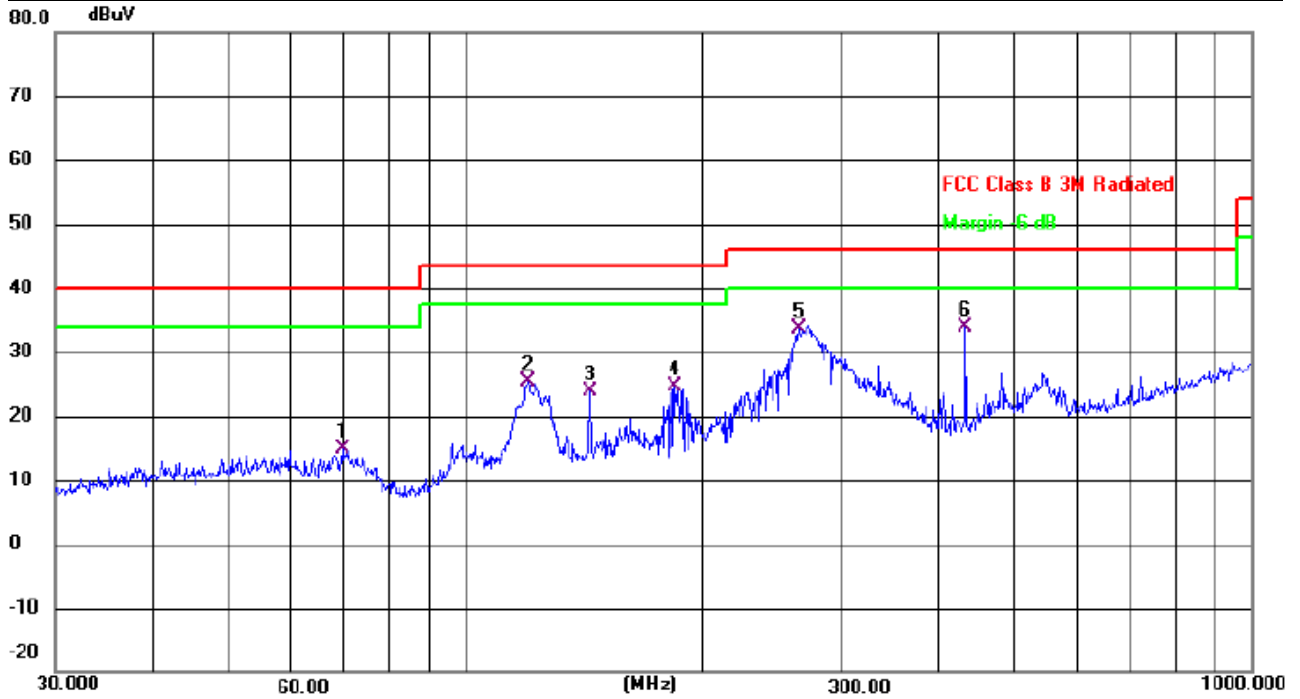
Distance extrapolation factor = $40 \log(\text{specific distance}/\text{test distance})$ (dB);

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



3.2.7 TEST RESULTS (Between 30MHz – 1GHz)

Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 12V		
Test Mode :	Mode 4		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dB	Margin dB	Detector
1		69.6004	30.10	-15.28	14.82	40.00	-25.18	QP
2		119.8556	41.85	-16.50	25.35	43.50	-18.15	QP
3		143.8295	41.38	-17.57	23.81	43.50	-19.69	QP
4		184.4898	40.22	-15.65	24.57	43.50	-18.93	QP
5		265.6757	45.99	-12.32	33.67	46.00	-12.33	QP
6	*	432.5456	43.02	-9.04	33.98	46.00	-12.02	QP

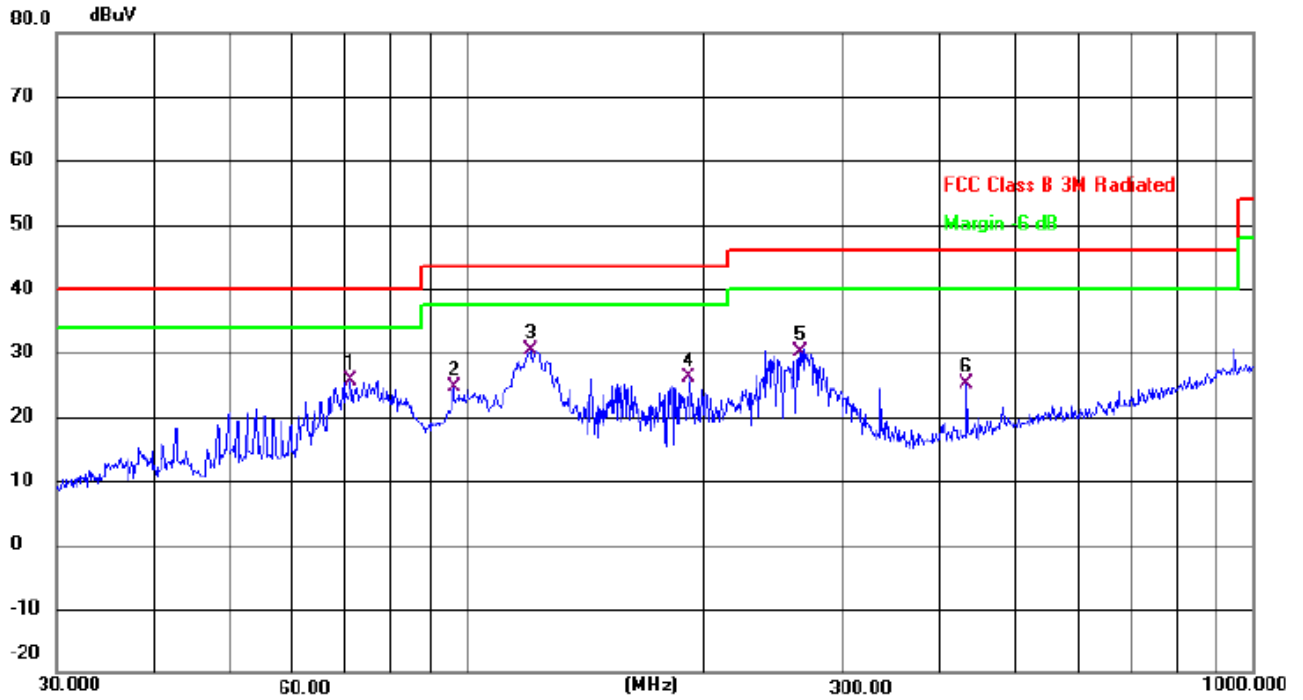
Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

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



Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
test voltage :	DC 12V		
Test Mode :	Mode 4		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dB	Margin dB	Detector
1		71.0803	41.22	-15.62	25.60	40.00	-14.40	QP
2		96.0986	41.30	-16.73	24.57	43.50	-18.93	QP
3	*	120.2766	46.79	-16.50	30.29	43.50	-13.21	QP
4		191.7450	41.40	-15.22	26.18	43.50	-17.32	QP
5		265.6757	42.51	-12.32	30.19	46.00	-15.81	QP
6		432.5457	34.13	-9.04	25.09	46.00	-20.91	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

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



3.2.8 TEST RESULTS (1ghz~40ghZ)

802.11a band 1

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:5180									
V	10360	56.19	49.05	15.3	37.39	59.83	74	-14.17	PK
V	10360	41.85	49.05	15.3	37.39	45.49	54	-8.51	AV
V	15540	56.36	49.16	15.27	40.45	62.92	74	-11.08	PK
V	15540	39.19	49.16	15.27	40.45	45.75	54	-8.25	AV
H	10360	56.52	49.05	15.3	37.39	60.16	74	-13.84	PK
H	10360	40.43	49.05	15.3	37.39	44.07	54	-9.93	AV
H	15540	59.24	49.16	15.27	40.45	65.8	74	-8.20	PK
H	15540	38.29	49.16	15.27	40.45	44.85	54	-9.15	AV
operation frequency:5200									
V	10400	57.38	49.09	15.34	37.42	61.05	74	-12.95	PK
V	10400	39.33	49.09	15.34	37.42	43	54	-11.00	AV
V	15600	59.85	49.18	15.29	40.47	66.43	74	-7.57	PK
V	15600	38.46	49.18	15.29	40.47	45.04	54	-8.96	AV
H	10400	56.85	49.09	15.34	37.42	60.52	74	-13.48	PK
H	10400	39.84	49.09	15.34	37.42	43.51	54	-10.49	AV
H	15600	59.99	49.18	15.29	40.47	66.57	74	-7.43	PK
H	15600	38.47	49.18	15.29	40.47	45.05	54	-8.95	AV
operation frequency:5240									
V	10480	58.63	49.11	15.37	37.46	62.35	74	-11.65	PK
V	10480	39.38	49.11	15.37	37.46	43.1	54	-10.90	AV
V	15720	59.55	49.21	15.34	40.51	66.19	74	-7.81	PK
V	15720	38.29	49.21	15.34	40.51	44.93	54	-9.07	AV
H	10480	57.14	49.11	15.37	31.31	54.71	74	-19.29	PK
H	10480	45.39	49.11	15.37	31.31	42.96	54	-11.04	AV
H	15720	57.48	49.21	15.34	40.51	64.12	74	-9.88	PK
H	15720	37.36	49.21	15.34	40.51	44	54	-10.00	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.



802.11n HT20

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:5180									
V	10360	56.61	49.05	15.3	37.39	60.25	74	-13.75	PK
V	10360	38.88	49.05	15.3	37.39	42.52	54	-11.48	AV
V	15540	56.43	49.16	15.27	40.45	62.99	74	-11.01	PK
V	15540	38.88	49.16	15.27	40.45	45.44	54	-8.56	AV
H	10360	56.96	49.05	15.3	37.39	60.6	74	-13.40	PK
H	10360	39.87	49.05	15.3	37.39	43.51	54	-10.49	AV
H	15540	54.84	49.16	15.27	40.45	61.4	74	-12.60	PK
H	15540	38.69	49.16	15.27	40.45	45.25	54	-8.75	AV
operation frequency:5200									
V	10400	56.33	49.09	15.34	37.42	60	74	-14.00	PK
V	10400	39.85	49.09	15.34	37.42	43.52	54	-10.48	AV
V	15600	55.63	49.18	15.29	40.47	62.21	74	-11.79	PK
V	15600	38.41	49.18	15.29	40.47	44.99	54	-9.01	AV
H	10400	55.53	49.09	15.34	37.42	59.2	74	-14.80	PK
H	10400	40.63	49.09	15.34	37.42	44.3	54	-9.70	AV
H	15600	55.34	49.18	15.29	40.47	61.92	74	-12.08	PK
H	15600	39.97	49.18	15.29	40.47	46.55	54	-7.45	AV
operation frequency:5240									
V	10480	57.89	49.11	15.37	37.46	61.61	74	-12.39	PK
V	10480	40.25	49.11	15.37	37.46	43.97	54	-10.03	AV
V	15720	54.88	49.21	15.34	40.51	61.52	74	-12.48	PK
V	15720	38.26	49.21	15.34	40.51	44.9	54	-9.10	AV
H	10480	57.14	49.11	15.37	31.31	54.71	74	-19.29	PK
H	10480	44.57	49.11	15.37	31.31	42.14	54	-11.86	AV
H	15720	55.63	49.21	15.34	40.51	62.27	74	-11.73	PK
H	15720	39.18	49.21	15.34	40.51	45.82	54	-8.18	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.



802.11n HT40

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:5190									
V	10380	56.96	49.07	15.33	37.41	60.63	74	-13.37	PK
V	10380	39.38	49.07	15.33	37.41	43.05	54	-10.95	AV
V	15570	56.83	49.17	15.28	40.46	63.4	74	-10.60	PK
V	15570	38.38	49.17	15.28	40.46	44.95	54	-9.05	AV
H	10380	56.46	49.07	15.33	37.41	60.13	74	-13.87	PK
H	10380	40.17	49.07	15.33	37.41	43.84	54	-10.16	AV
H	15570	54.65	49.17	15.28	40.46	61.22	74	-12.78	PK
H	15570	38.89	49.17	15.28	40.46	45.46	54	-8.54	AV
operation frequency:5230									
V	10460	57.68	49.11	15.37	37.46	61.4	74	-12.60	PK
V	10460	39.26	49.11	15.37	37.46	42.98	54	-11.02	AV
V	15690	54.35	49.21	15.34	40.51	60.99	74	-13.01	PK
V	15690	38.33	49.21	15.34	40.51	44.97	54	-9.03	AV
H	10460	57.68	49.11	15.37	31.31	55.25	74	-18.75	PK
H	10460	44.36	49.11	15.37	31.31	41.93	54	-12.07	AV
H	15690	55.85	49.21	15.34	40.51	62.49	74	-11.51	PK
H	15690	39.14	49.21	15.34	40.51	45.78	54	-8.22	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.



802.11ac HT20

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:5180									
V	10360	56.16	49.05	15.3	37.39	59.8	74	-14.20	PK
V	10360	39.97	49.05	15.3	37.39	43.61	54	-10.39	AV
V	15540	56.56	49.16	15.27	40.45	63.12	74	-10.88	PK
V	15540	38.34	49.16	15.27	40.45	44.9	54	-9.10	AV
H	10360	56.28	49.05	15.3	37.39	59.92	74	-14.08	PK
H	10360	38.36	49.05	15.3	37.39	42	54	-12.00	AV
H	15540	54.17	49.16	15.27	40.45	60.73	74	-13.27	PK
H	15540	39.83	49.16	15.27	40.45	46.39	54	-7.61	AV
operation frequency:5200									
V	10400	56.63	49.09	15.34	37.42	60.3	74	-13.70	PK
V	10400	41.28	49.09	15.34	37.42	44.95	54	-9.05	AV
V	15600	55.33	49.18	15.29	40.47	61.91	74	-12.09	PK
V	15600	40.87	49.18	15.29	40.47	47.45	54	-6.55	AV
H	10400	55.96	49.09	15.34	37.42	59.63	74	-14.37	PK
H	10400	40.54	49.09	15.34	37.42	44.21	54	-9.79	AV
H	15600	55.85	49.18	15.29	40.47	62.43	74	-11.57	PK
H	15600	41.28	49.18	15.29	40.47	47.86	54	-6.14	AV
operation frequency:5240									
V	10480	57.36	49.11	15.37	37.46	61.08	74	-12.92	PK
V	10480	40.74	49.11	15.37	37.46	44.46	54	-9.54	AV
V	15720	54.96	49.21	15.34	40.51	61.6	74	-12.40	PK
V	15720	39.85	49.21	15.34	40.51	46.49	54	-7.51	AV
H	10480	57.33	49.11	15.37	31.31	54.9	74	-19.10	PK
H	10480	44.98	49.11	15.37	31.31	42.55	54	-11.45	AV
H	15720	55.52	49.21	15.34	40.51	62.16	74	-11.84	PK
H	15720	40.64	49.21	15.34	40.51	47.28	54	-6.72	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.									



802.11ac 40

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:5190									
V	10380	56.36	49.07	15.33	37.41	60.03	74	-13.97	PK
V	10380	40.27	49.07	15.33	37.41	43.94	54	-10.06	AV
V	15570	56.65	49.17	15.28	40.46	63.22	74	-10.78	PK
V	15570	39.53	49.17	15.28	40.46	46.1	54	-7.90	AV
H	10380	56.34	49.07	15.33	37.41	60.01	74	-13.99	PK
H	10380	40.88	49.07	15.33	37.41	44.55	54	-9.45	AV
H	15570	54.26	49.17	15.28	40.46	60.83	74	-13.17	PK
H	15570	39.84	49.17	15.28	40.46	46.41	54	-7.59	AV
operation frequency:5230									
V	10460	57.85	49.11	15.37	37.46	61.57	74	-12.43	PK
V	10460	41.63	49.11	15.37	37.46	45.35	54	-8.65	AV
V	15690	54.97	49.21	15.34	40.51	61.61	74	-12.39	PK
V	15690	39.11	49.21	15.34	40.51	45.75	54	-8.25	AV
H	10460	57.96	49.11	15.37	31.31	55.53	74	-18.47	PK
H	10460	44.34	49.11	15.37	31.31	41.91	54	-12.09	AV
H	15690	55.38	49.21	15.34	40.51	62.02	74	-11.98	PK
H	15690	40.63	49.21	15.34	40.51	47.27	54	-6.73	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.

802.11ac HT80

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:5210									
V	10420	56.85	49.07	15.33	37.41	60.52	74	-13.48	PK
V	10420	41.46	49.07	15.33	37.41	45.13	54	-8.87	AV
V	15630	56.24	49.17	15.28	40.46	62.81	74	-11.19	PK
V	15630	39.17	49.17	15.28	40.46	45.74	54	-8.26	AV
H	10420	56.63	49.07	15.33	37.41	60.3	74	-13.70	PK
H	10420	41.38	49.07	15.33	37.41	45.05	54	-8.95	AV
H	15630	54.63	49.17	15.28	40.46	61.2	74	-12.80	PK
H	15630	40.98	49.17	15.28	40.46	47.55	54	-6.45	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:

15.407 (b)

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	5000MHz
Stop Frequency	5420MHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 0.1 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. Test the EUT in the lowest channel,the Highest channel

Note:

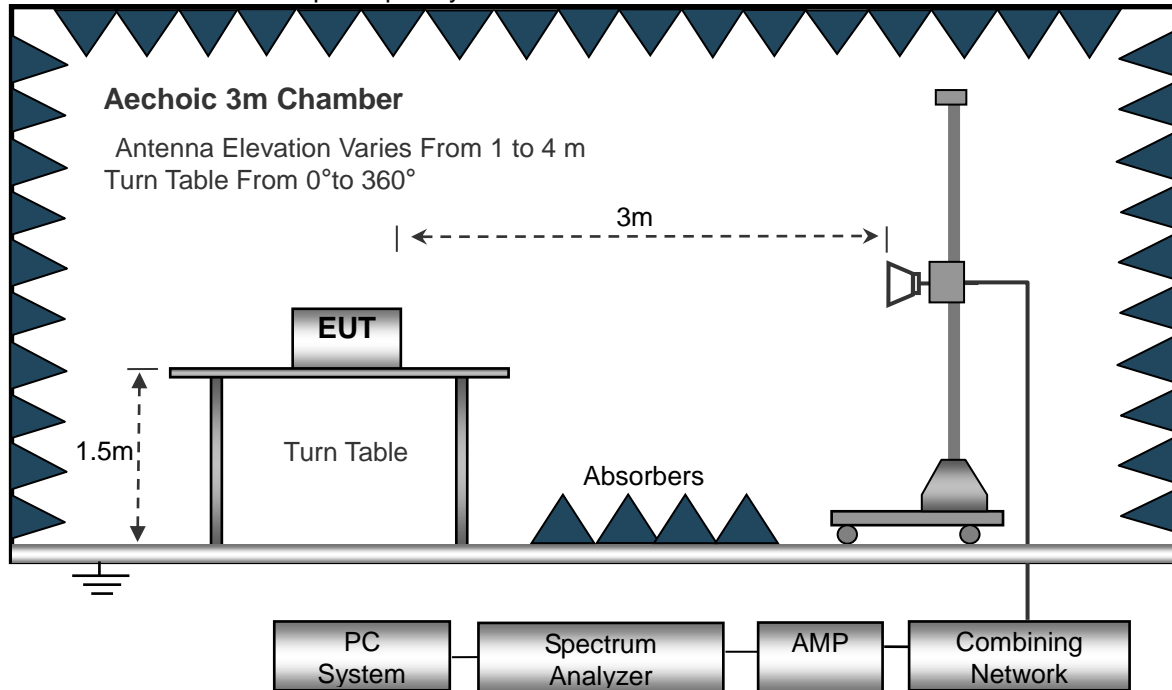
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 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**

802.11a

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:5180									
V	5150	53.23	49.12	15.6	37.34	57.05	74	-16.95	PK
V	5150	39.41	49.12	15.6	37.34	43.23	54	-10.77	AV
V	5145	54.23	49.19	15.24	40.43	60.71	74	-13.29	PK
V	5145	36.98	49.19	15.24	40.43	43.46	54	-10.54	AV
H	5150	52.46	49.12	15.6	37.34	56.28	74	-17.72	PK
H	5150	37.84	49.12	15.6	37.34	41.66	54	-12.34	AV
H	5145	54.28	49.19	15.24	40.43	60.76	74	-13.24	PK
H	5145	33.46	49.19	15.24	40.43	39.94	54	-14.06	AV
operation frequency:5240									
V	5350	53.69	49.13	15.32	37.46	57.34	74	-16.66	PK
V	5350	35.85	49.13	15.32	37.46	39.5	54	-14.5	AV
V	5370	53.47	49.24	15.36	40.51	60.1	74	-13.9	PK
V	5370	32.43	49.24	15.36	40.51	39.06	54	-14.94	AV
H	5350	52.29	49.13	15.32	31.31	49.79	74	-24.21	PK
H	5350	40.94	49.13	15.32	31.31	38.44	54	-15.56	AV
H	5370	52.32	49.24	15.36	40.51	58.95	74	-15.05	PK
H	5370	32.99	49.24	15.36	40.51	39.62	54	-14.38	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.									



802.11n HT20

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:5180									
V	5150	51.38	49.12	15.6	37.34	55.2	74	-18.8	PK
V	5150	33.24	49.12	15.6	37.34	37.06	54	-16.94	AV
V	5145	51.96	49.19	15.24	40.43	58.44	74	-15.56	PK
V	5145	33.94	49.19	15.24	40.43	40.42	54	-13.58	AV
H	5150	51.42	49.12	15.6	37.34	55.24	74	-18.76	PK
H	5150	33.39	49.12	15.6	37.34	37.21	54	-16.79	AV
H	5145	50.84	49.19	15.24	40.43	57.32	74	-16.68	PK
H	5145	32.82	49.19	15.24	40.43	39.3	54	-14.7	AV
operation frequency:5240									
V	5350	53.18	49.13	15.32	37.46	56.83	74	-17.17	PK
V	5350	34.63	49.13	15.32	37.46	38.28	54	-15.72	AV
V	5370	50.18	49.24	15.36	40.51	56.81	74	-17.19	PK
V	5370	33.64	49.24	15.36	40.51	40.27	54	-13.73	AV
H	5350	54.77	49.13	15.32	31.31	52.27	74	-21.73	PK
H	5350	36.59	49.13	15.32	31.31	34.09	54	-19.91	AV
H	5370	51.52	49.24	15.36	40.51	58.15	74	-15.85	PK
H	5370	33.74	49.24	15.36	40.51	40.37	54	-13.63	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.



802.11ac HT20

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:5180									
V	5150	52.26	49.12	15.33	37.41	55.88	74	-18.12	PK
V	5150	34.88	49.12	15.33	37.41	38.5	54	-15.5	AV
V	5145	51.23	49.19	15.28	40.46	57.78	74	-16.22	PK
V	5145	33.37	49.19	15.28	40.46	39.92	54	-14.08	AV
H	5150	52.14	49.12	15.33	37.41	55.76	74	-18.24	PK
H	5150	34.19	49.12	15.33	37.41	37.81	54	-16.19	AV
H	5145	50.44	49.19	15.28	40.46	56.99	74	-17.01	PK
H	5145	33.49	49.19	15.28	40.46	40.04	54	-13.96	AV
operation frequency:5240									
V	5350	53.23	49.13	15.32	37.46	56.88	74	-17.12	PK
V	5350	36.54	49.13	15.32	37.46	40.19	54	-13.81	AV
V	5370	50.59	49.24	15.36	40.51	57.22	74	-16.78	PK
V	5370	33.55	49.24	15.36	40.51	40.18	54	-13.82	AV
H	5350	53.63	49.13	15.32	31.31	51.13	74	-22.87	PK
H	5350	40.98	49.13	15.32	31.31	38.48	54	-15.52	AV
H	5370	51.34	49.24	15.36	40.51	57.97	74	-16.03	PK
H	5370	35.59	49.24	15.36	40.51	42.22	54	-11.78	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.									



802.11n HT40

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:5190									
V	5150	52.63	49.12	15.6	37.39	56.5	74	-17.5	PK
V	5150	35.78	49.12	15.6	37.39	39.65	54	-14.35	AV
V	5145	51.52	49.19	15.24	40.45	58.02	74	-15.98	PK
V	5145	34.79	49.19	15.24	40.45	41.29	54	-12.71	AV
H	5150	52.65	49.12	15.6	37.39	56.52	74	-17.48	PK
H	5150	34.16	49.12	15.6	37.39	38.03	54	-15.97	AV
H	5145	50.77	49.19	15.24	40.45	57.27	74	-16.73	PK
H	5145	35.74	49.19	15.24	40.45	42.24	54	-11.76	AV
operation frequency:5230									
V	5350	53.96	49.13	15.34	37.46	57.63	74	-16.37	PK
V	5350	37.95	49.13	15.34	37.46	41.62	54	-12.38	AV
V	5370	50.83	49.24	15.35	40.51	57.45	74	-16.55	PK
V	5370	36.85	49.24	15.35	40.51	43.47	54	-10.53	AV
H	5350	54.84	49.13	15.34	31.31	52.36	74	-21.64	PK
H	5350	41.78	49.13	15.34	31.31	39.3	54	-14.7	AV
H	5370	52.66	49.24	15.35	40.51	59.28	74	-14.72	PK
H	5370	36.37	49.24	15.35	40.51	42.99	54	-11.01	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.



802.11ac HT40

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:5190									
V	5150	52.53	49.12	15.32	37.41	56.14	74	-17.86	PK
V	5150	37.64	49.12	15.32	37.41	41.25	54	-12.75	AV
V	5145	52.19	49.19	15.36	40.46	58.82	74	-15.18	PK
V	5145	36.67	49.19	15.36	40.46	43.3	54	-10.7	AV
H	5150	52.63	49.12	15.32	37.41	56.24	74	-17.76	PK
H	5150	37.65	49.12	15.32	37.41	41.26	54	-12.74	AV
H	5145	51.96	49.19	15.36	40.46	58.59	74	-15.41	PK
H	5145	36.54	49.19	15.36	40.46	43.17	54	-10.83	AV
operation frequency:5230									
V	5350	54.39	49.13	15.34	37.34	57.94	74	-16.06	PK
V	5350	36.27	49.13	15.34	37.34	39.82	54	-14.18	AV
V	5370	51.66	49.24	15.35	40.43	58.2	74	-15.8	PK
V	5370	36.95	49.24	15.35	40.43	43.49	54	-10.51	AV
H	5350	54.63	49.13	15.34	37.34	58.18	74	-15.82	PK
H	5350	41.41	49.13	15.34	37.34	44.96	54	-9.04	AV
H	5370	50.58	49.24	15.35	40.43	57.12	74	-16.88	PK
H	5370	35.76	49.24	15.35	40.43	42.3	54	-11.7	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.

802.11ac HT80

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:5210									
V	5350	52.85	49.13	15.32	37.48	56.52	74	-17.48	PK
V	5350	35.33	49.13	15.32	37.48	39	54	-15	AV
V	5370	51.34	49.24	15.36	40.42	57.88	74	-16.12	PK
V	5370	35.68	49.24	15.36	40.42	42.22	54	-11.78	AV
H	5350	52.76	49.13	15.32	37.48	56.43	74	-17.57	PK
H	5350	36.28	49.13	15.32	37.48	39.95	54	-14.05	AV
H	5370	50.93	49.24	15.36	40.42	57.47	74	-16.53	PK
H	5370	35.87	49.24	15.36	40.42	42.41	54	-11.59	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 CONDUCTED 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.

Spectrum Parameter	Setting	
Attenuation	Auto	
Start Frequency	5150MHz	5725MHz
Stop Frequency	5250MHz	5850MHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average	

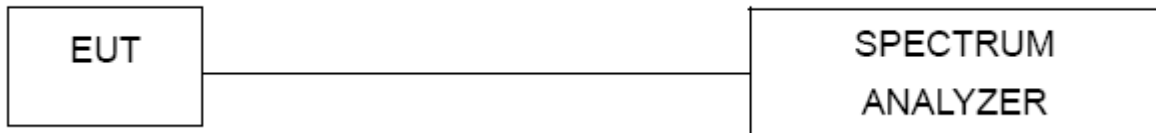
3.3.2 TEST PROCEDURE

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



3.3.5 EUT OPERATING CONDITIONS

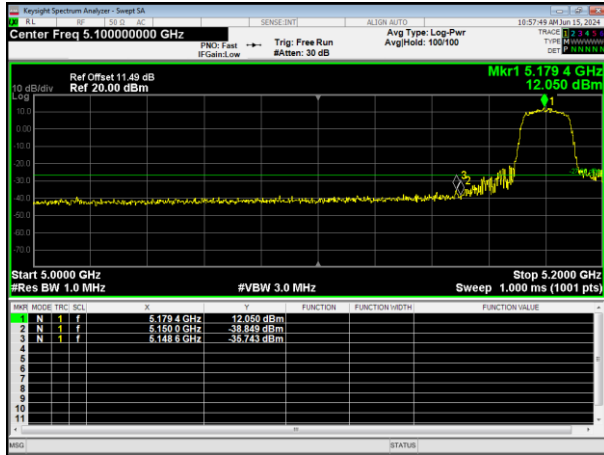
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



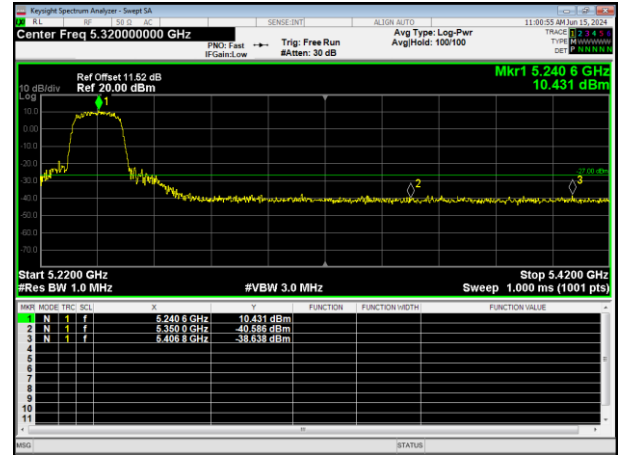
3.3.6 TEST RESULT

The Offset set integrates the related parameters of antenna gain plus line loss.

802.11a

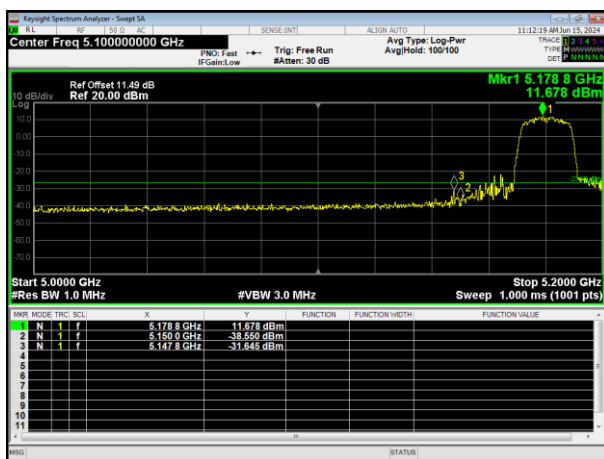


5180MHz

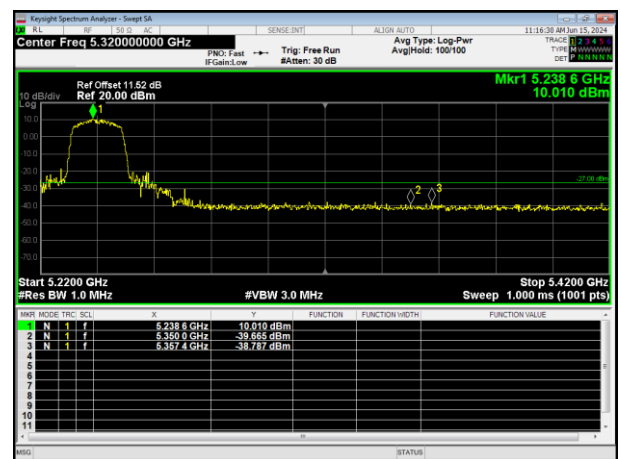


5240MHz

802.11ac HT20

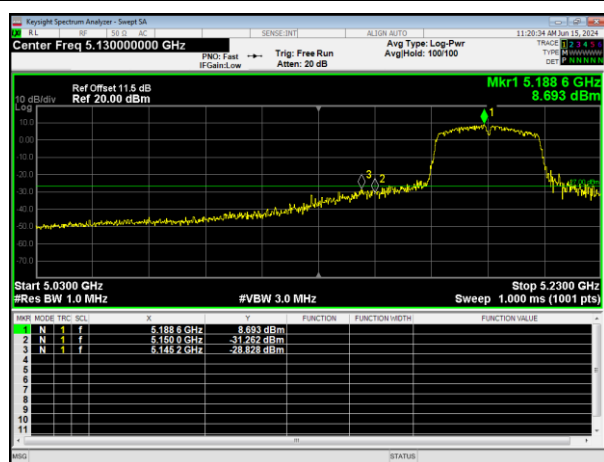


5180MHz

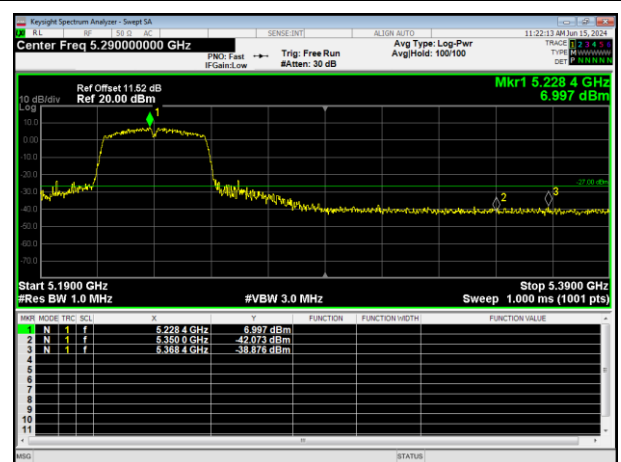


5240MHz

802.11ac HT40



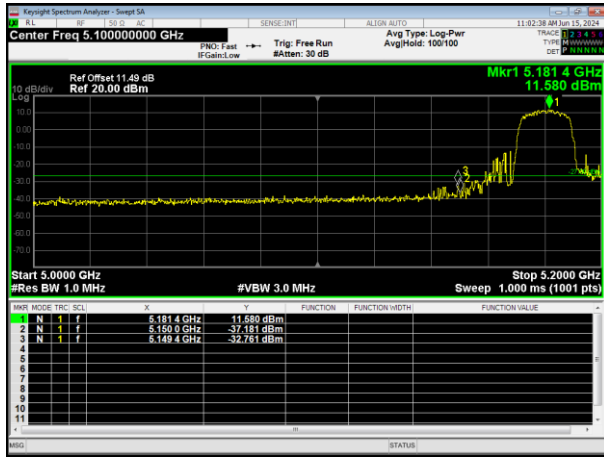
5190MHz



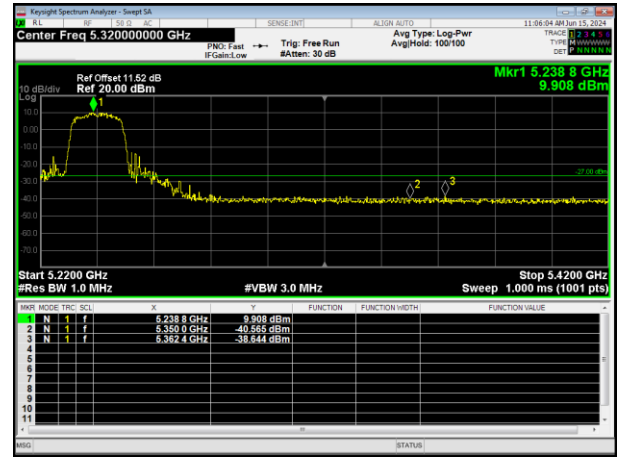
5230MHz



802.11n HT20

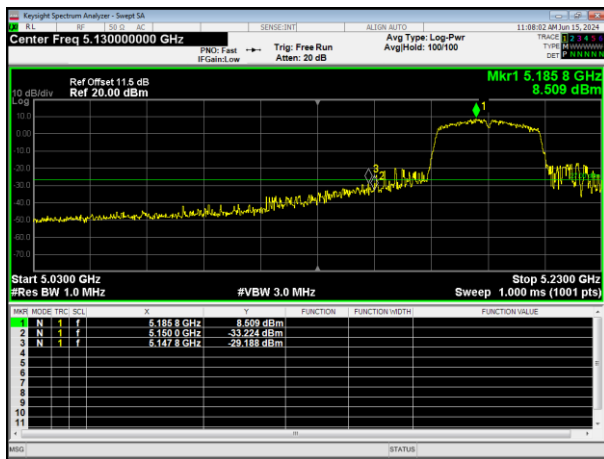


5180MHz

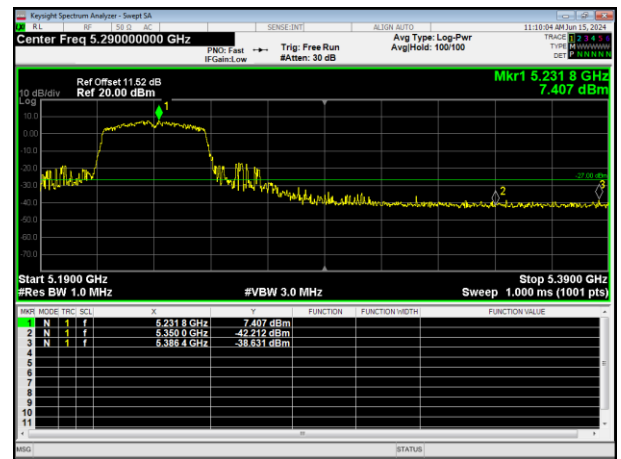


5240MHz

802.11ac HT40

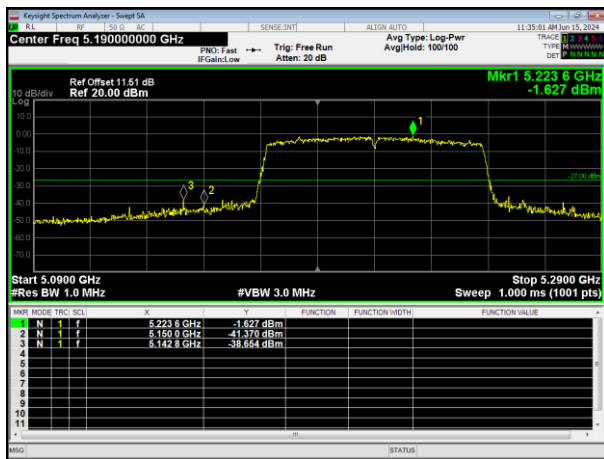


5190MHz



5230MHz

802.11ac HT80



5210MHz



4. 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.

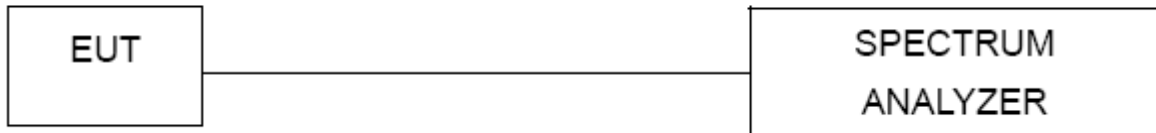
4.1.1 TEST PROCEDURE

- 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 = 1MHz
Span \geq 99%OBW(30MHz/60MHz/120MHz etc.)
VBW \geq 3*RBW
Sweep = auto
Detector function = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
Trace = max hold

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

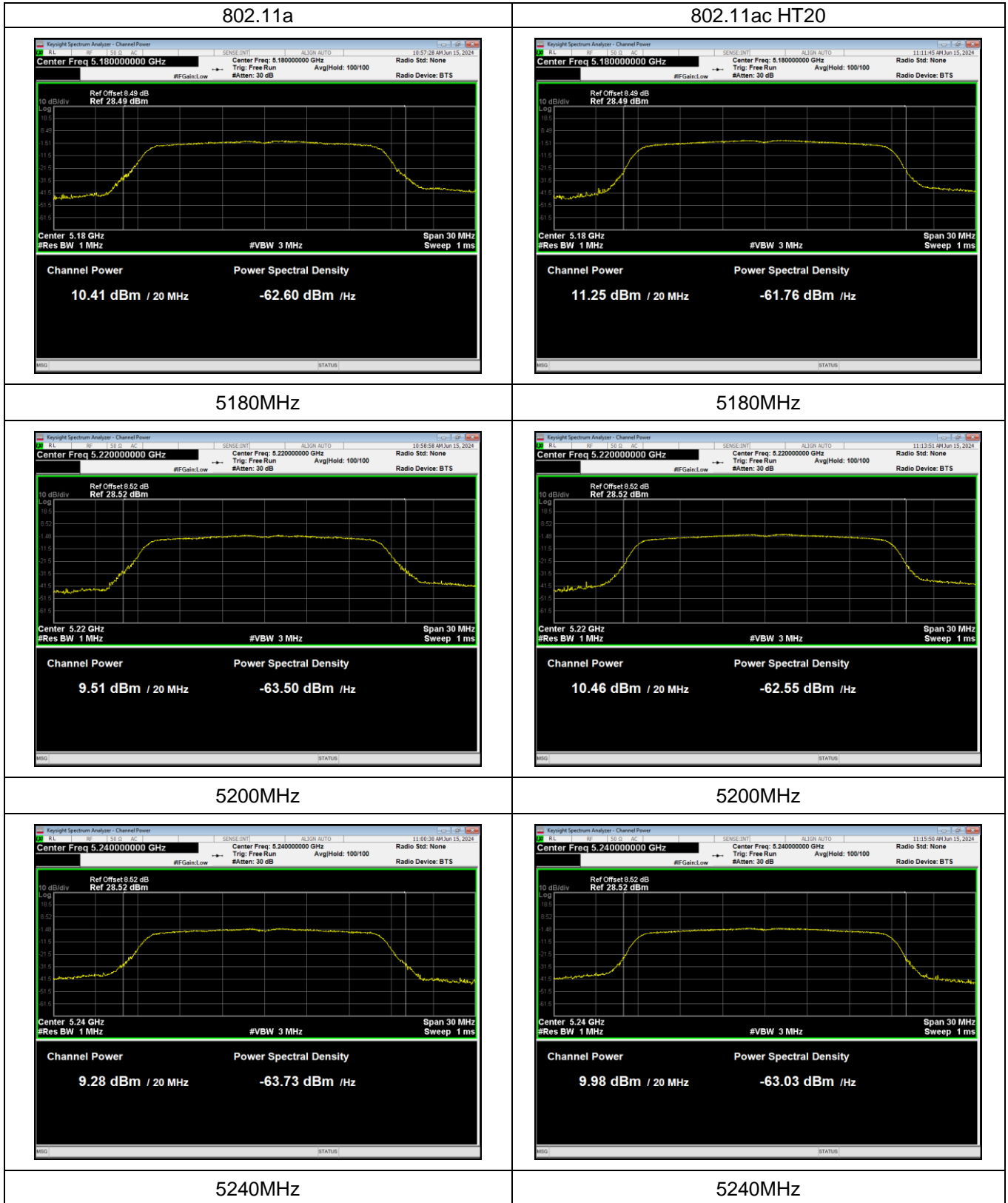
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



4.1.5 TEST RESULTS

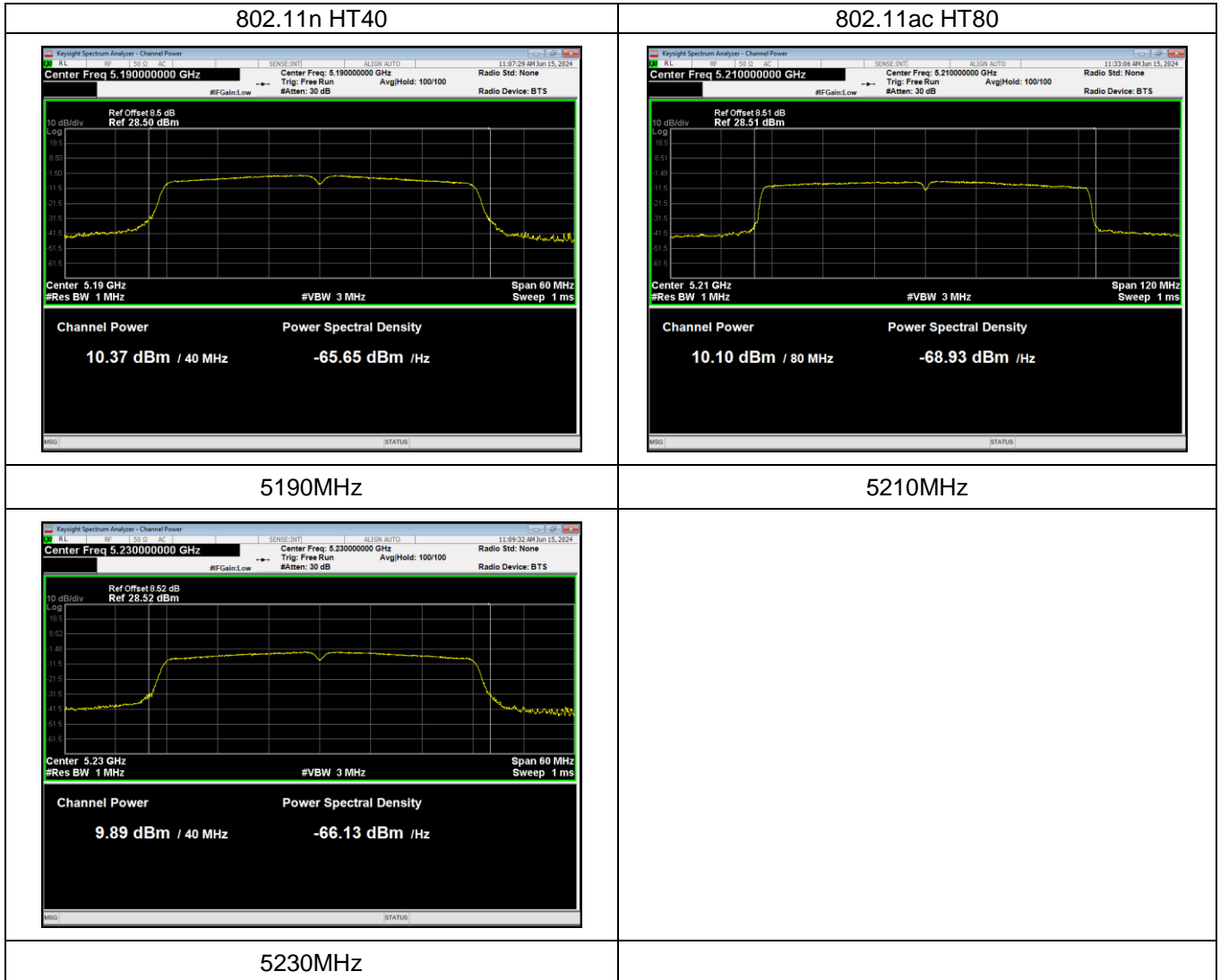
Temperature:	25 °C	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	DC 12V

Band	Mode	Test Channel	Average Output Power (dBm)	Duty factor (dB)	Total Output Power(dB)	LIMIT (dBm)
Band 1	802.11a	Low	10.414	0.87	11.284	23.98
		Middle	9.513	0.87	10.383	23.98
		High	9.285	0.87	10.155	23.98
	802.11ac HT20	Low	11.248	0.13	11.378	23.98
		Middle	10.462	0.13	10.592	23.98
		High	9.979	0.13	10.109	23.98
	802.11ac HT40	Low	10.577	0.32	10.897	23.98
		High	9.379	0.32	9.699	23.98
	802.11ac HT80	/	10.096	0.5	10.596	23.98
	802.11n HT20	Low	11.252	0.13	11.382	23.98
		Middle	10.359	0.13	10.489	23.98
		High	10.062	0.13	10.192	23.98
	802.11n HT40	Low	10.375	0.26	10.635	23.98
		High	9.894	0.26	10.154	23.98





<p style="text-align: center;">802.11ac HT40</p> <p>Center Freq: 5.190000000 GHz Center Freq: 5.190000000 GHz Trig: Free Run #Gain: Low #Atten: 30 dB AvgHold: 100/100 Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 8.5 dB Ref: 28.50 dBm</p> <p>Center: 5.19 GHz #Res BW: 1 MHz #VBW: 3 MHz Span: 60 MHz Sweep: 1 ms</p> <p>Channel Power: 10.58 dBm / 40 MHz Power Spectral Density: -65.44 dBm / Hz</p>	<p style="text-align: center;">802.11n HT20</p> <p>Center Freq: 5.180000000 GHz Center Freq: 5.180000000 GHz Trig: Free Run #Gain: Low #Atten: 30 dB AvgHold: 100/100 Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 8.49 dB Ref: 28.49 dBm</p> <p>Center: 5.18 GHz #Res BW: 1 MHz #VBW: 3 MHz Span: 30 MHz Sweep: 1 ms</p> <p>Channel Power: 11.25 dBm / 20 MHz Power Spectral Density: -61.76 dBm / Hz</p>
<p style="text-align: center;">5190MHz</p> <p>Center Freq: 5.230000000 GHz Center Freq: 5.230000000 GHz Trig: Free Run #Gain: Low #Atten: 30 dB AvgHold: 100/100 Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 9.52 dB Ref: 28.52 dBm</p> <p>Center: 5.23 GHz #Res BW: 1 MHz #VBW: 3 MHz Span: 60 MHz Sweep: 1 ms</p> <p>Channel Power: 9.38 dBm / 40 MHz Power Spectral Density: -66.64 dBm / Hz</p>	<p style="text-align: center;">5180MHz</p> <p>Center Freq: 5.220000000 GHz Center Freq: 5.220000000 GHz Trig: Free Run #Gain: Low #Atten: 30 dB AvgHold: 100/100 Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 8.52 dB Ref: 28.52 dBm</p> <p>Center: 5.22 GHz #Res BW: 1 MHz #VBW: 3 MHz Span: 30 MHz Sweep: 1 ms</p> <p>Channel Power: 10.36 dBm / 20 MHz Power Spectral Density: -62.65 dBm / Hz</p>
<p style="text-align: center;">5230MHz</p> <p>Center Freq: 5.240000000 GHz Center Freq: 5.240000000 GHz Trig: Free Run #Gain: Low #Atten: 30 dB AvgHold: 100/100 Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 8.52 dB Ref: 28.52 dBm</p> <p>Center: 5.24 GHz #Res BW: 1 MHz #VBW: 3 MHz Span: 30 MHz Sweep: 1 ms</p> <p>Channel Power: 10.06 dBm / 20 MHz Power Spectral Density: -62.95 dBm / Hz</p>	<p style="text-align: center;">5200MHz</p> <p>Center Freq: 5.240000000 GHz Center Freq: 5.240000000 GHz Trig: Free Run #Gain: Low #Atten: 30 dB AvgHold: 100/100 Radio Std: None Radio Device: BTS</p> <p>Ref Offset: 8.52 dB Ref: 28.52 dBm</p> <p>Center: 5.24 GHz #Res BW: 1 MHz #VBW: 3 MHz Span: 30 MHz Sweep: 1 ms</p> <p>Channel Power: 10.06 dBm / 20 MHz Power Spectral Density: -62.95 dBm / Hz</p>
	<p style="text-align: center;">5240MHz</p>





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.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	RBW ≥ 1MHz for band 1 RBW ≥ 510KHz for band 4
VB	VBW ≥ 3RBW
Detector	RMS (i.e., power averaging).
Trace	Max Hold
Sweep Time	Auto

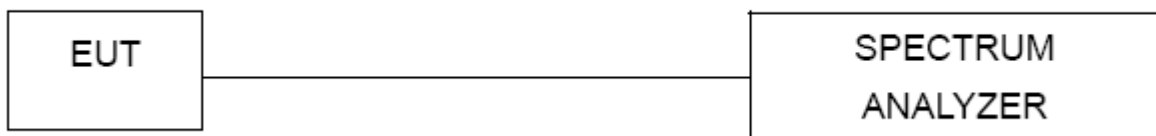
5.1.1 TEST PROCEDURE

- Place the EUT on the table and set it in transmitting mode.
- The testing follows FCC KDB 789033 D02.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
- 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)
- Use the cursor on spectrum to peak search the highest level of trace
- 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.
- Duty factor Reference is made to the test results in Section 7.1.5.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

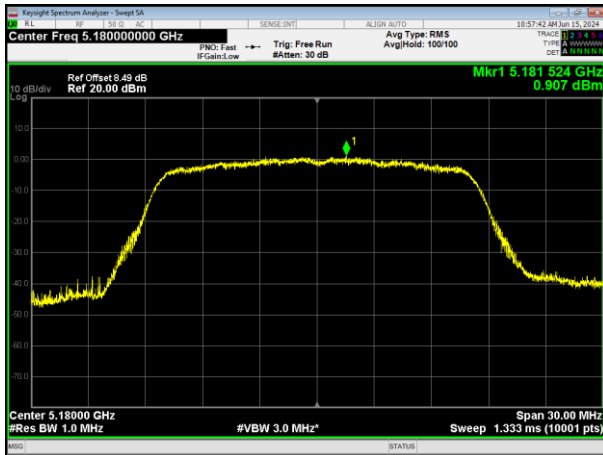
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

**5.1.5 TEST RESULTS**

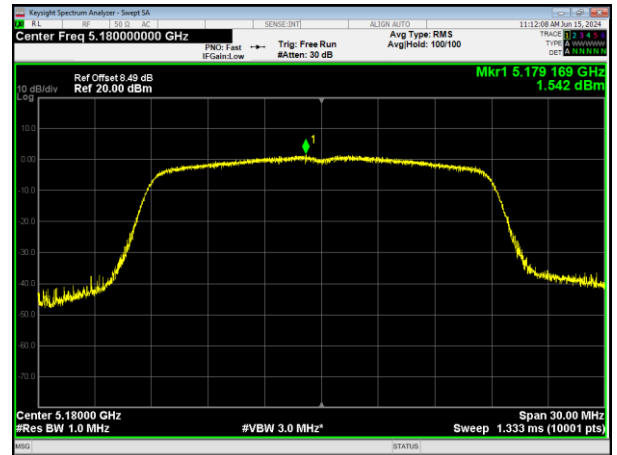
	Mode	Test Channel	Reading Level (dBm)	Duty factor (dB)	PSD (dBm/MHz)	Limit (dBm)	Result
Band1	802.11a	Low	0.907	0.87	1.777	11.00	PASS
		Middle	0.222	0.87	1.092	11.00	PASS
		High	0.185	0.87	1.055	11.00	PASS
	802.11ac20	Low	1.542	0.13	1.672	11.00	PASS
		Middle	0.622	0.13	0.752	11.00	PASS
		High	0.107	0.13	0.237	11.00	PASS
	802.11ac40	Low	-1.922	0.32	-1.602	11.00	PASS
		High	-3.184	0.32	-2.864	11.00	PASS
	802.11ac80	/	-6.262	0.5	-5.762	11.00	PASS
	802.11n20	Low	1.336	0.13	1.466	11.00	PASS
		Middle	0.488	0.13	0.618	11.00	PASS
		High	0.091	0.13	0.221	11.00	PASS
	802.11n40	Low	-2.063	0.26	-1.803	11.00	PASS
		High	-2.786	0.26	-2.526	11.00	PASS



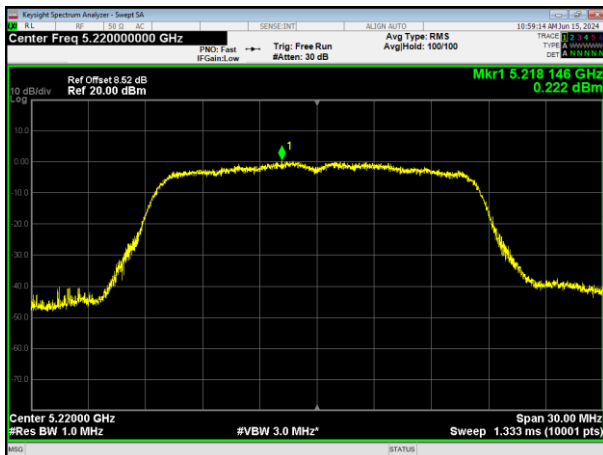
802.11a



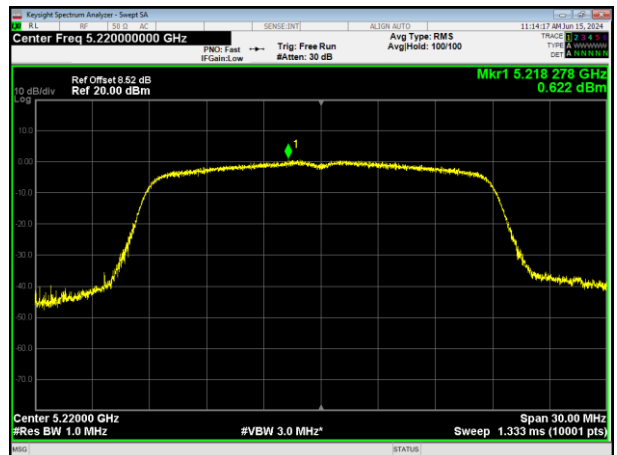
802.11ac HT20



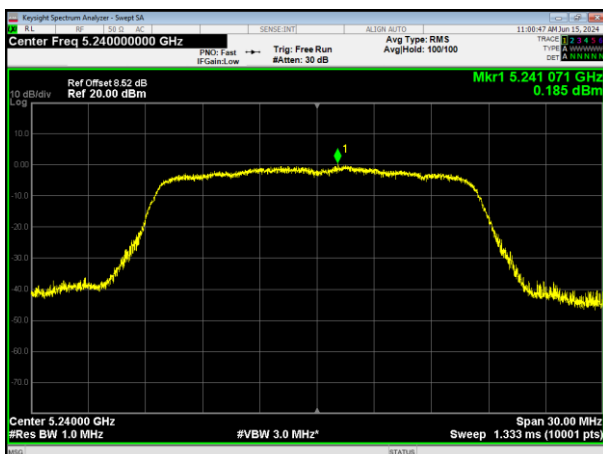
5180MHz



5180MHz



5200MHz



5200MHz

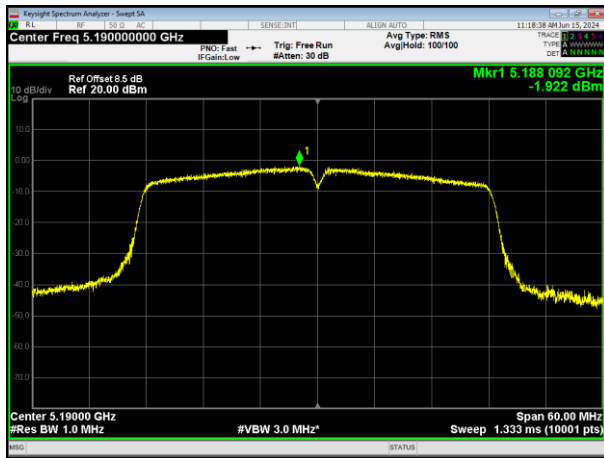


5240MHz

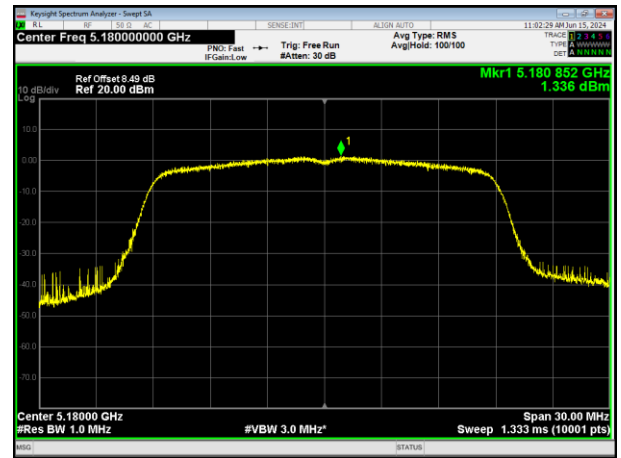
5240MHz



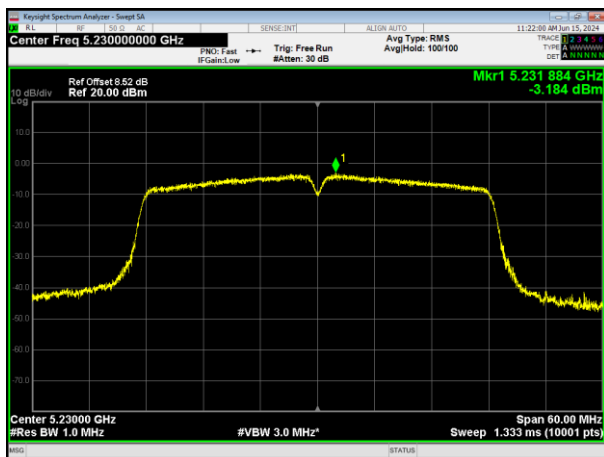
802.11ac HT40



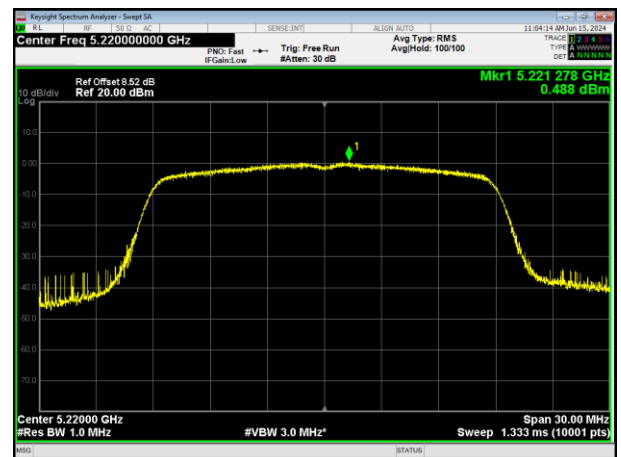
802.11n HT20



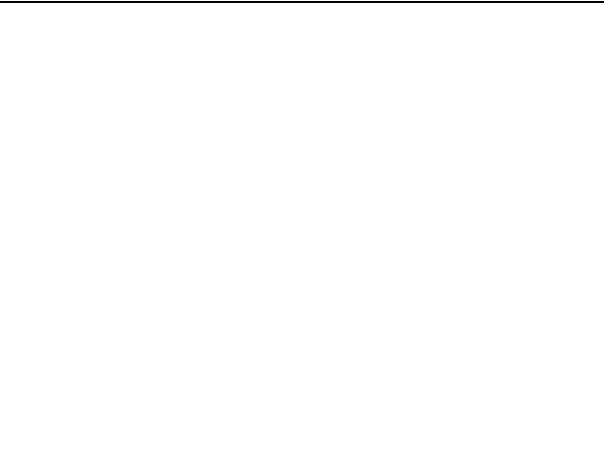
5190MHz



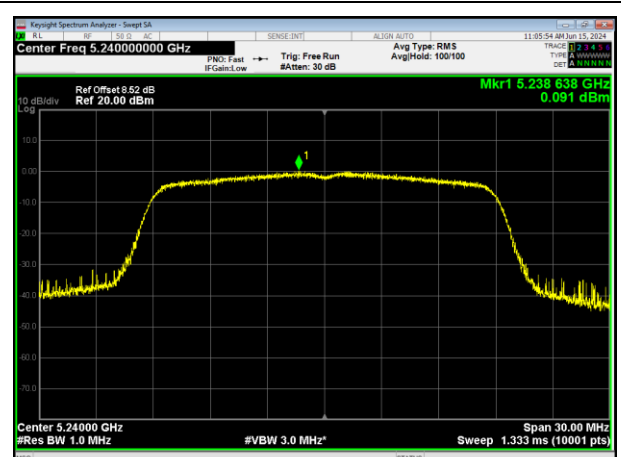
5180MHz



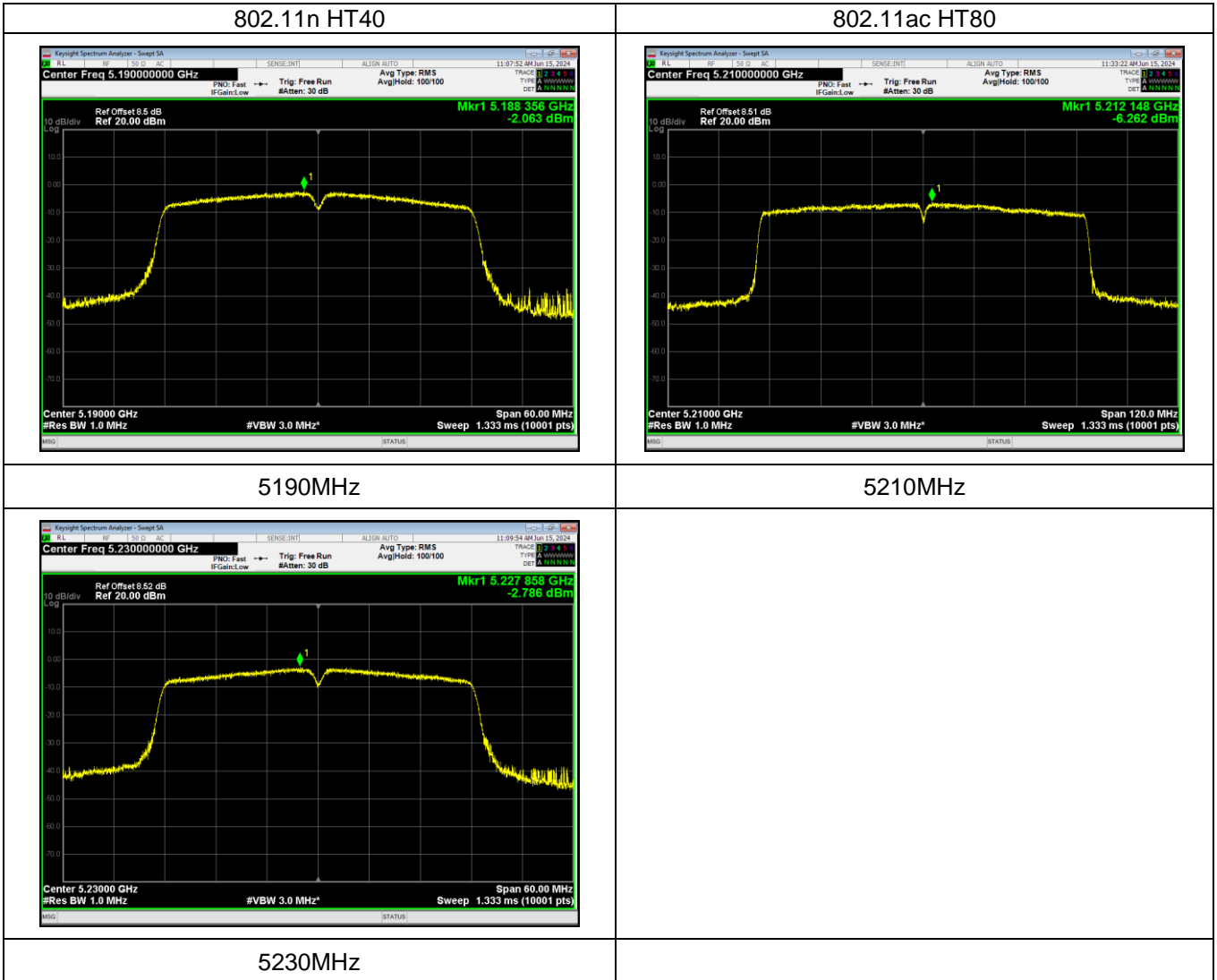
5230MHz



5200MHz



5240MHz





6. 26DB&99% 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.

6.1.1 TEST PROCEDURE

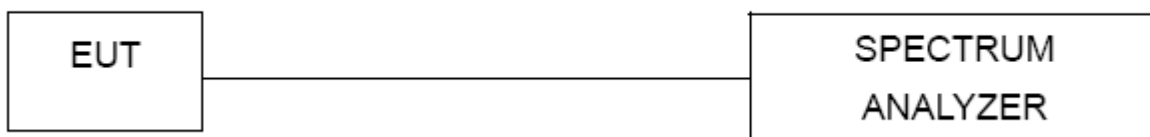
Table with 2 columns: Spectrum Parameters, Setting. Title: 26dB Bandwidth. Rows include RBW, VBW, Span, Sweep Time, Detector, Trace Mode.

Table with 2 columns: Spectrum Parameters, Setting. Title: 99% Occupied Bandwidth. Rows include RBW, VBW, Span, Sweep Time, Detector, Trace Mode.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

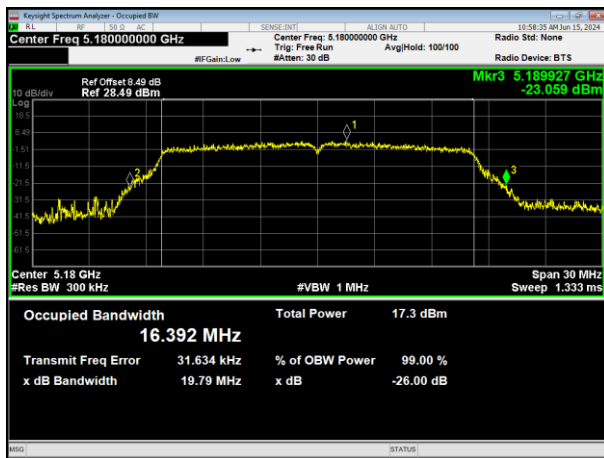
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**6.1.5 TEST RESULTS**

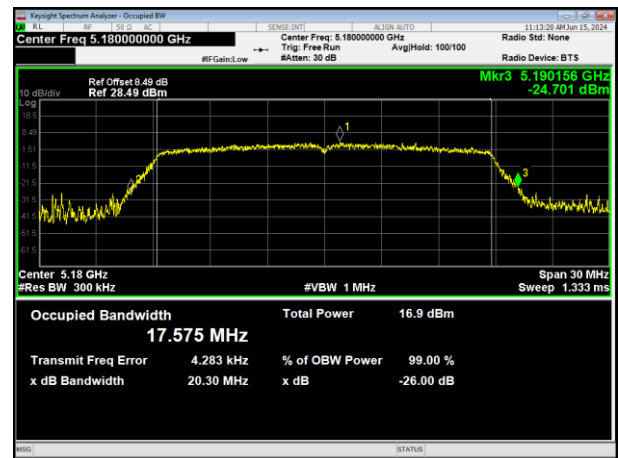
		Test Channel	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	Result
Band 1	802.11a	Low	19.79	16.392	Pass
		Middle	19.794	16.469	Pass
		High	19.843	16.479	Pass
	802.11ac HT20	Low	20.304	17.575	Pass
		Middle	20.366	17.588	Pass
		High	20.528	17.652	Pass
	802.11ac HT40	Low	39.497	35.810	Pass
		High	39.848	35.872	Pass
	802.11ac HT80	/	79.42	75.326	Pass
	802.11n HT20	Low	20.178	17.591	Pass
		Middle	20.362	17.617	Pass
		High	20.479	17.627	Pass
	802.11n HT40	Low	39.749	35.830	Pass
		High	39.867	35.856	Pass



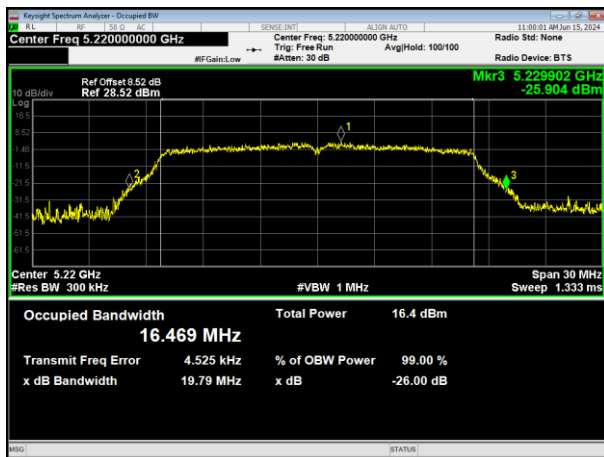
802.11a



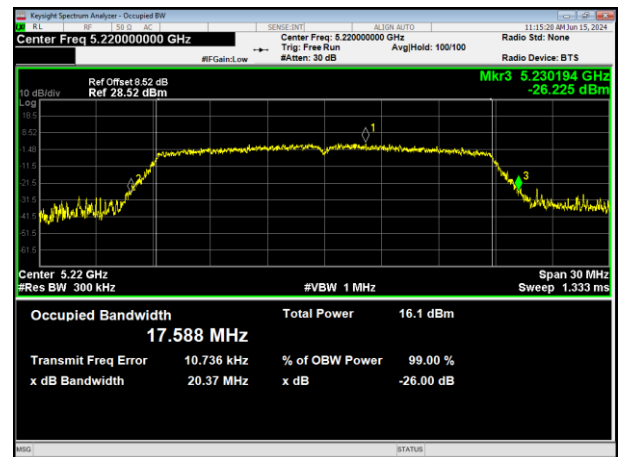
802.11ac HT20



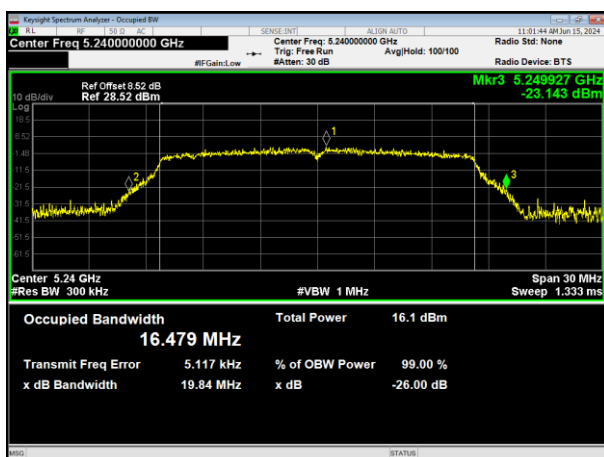
5180MHz



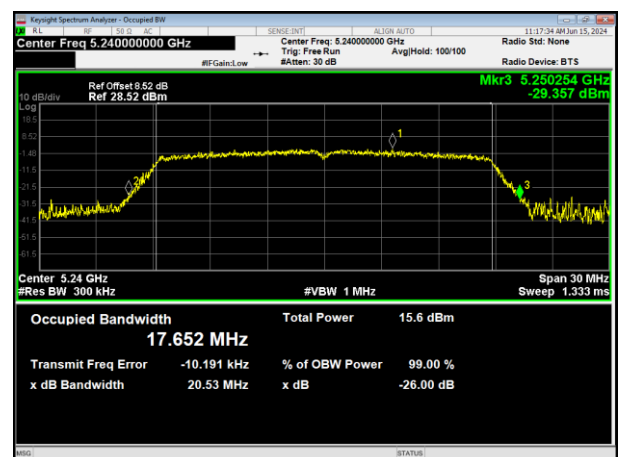
5180MHz



5200MHz



5200MHz

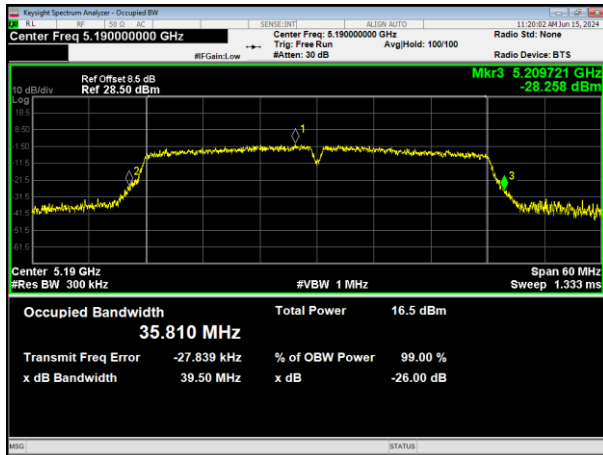


5240MHz

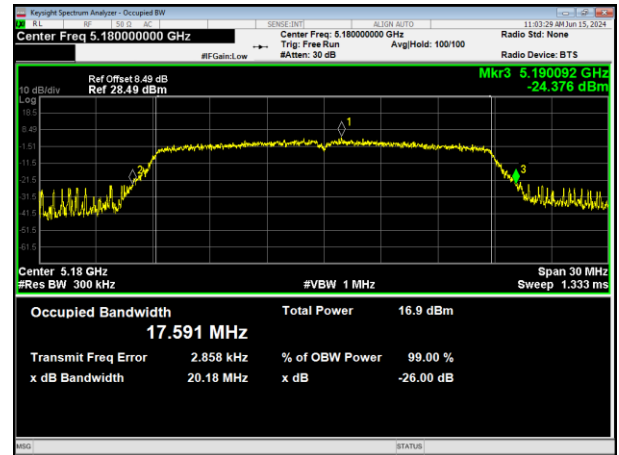
5240MHz



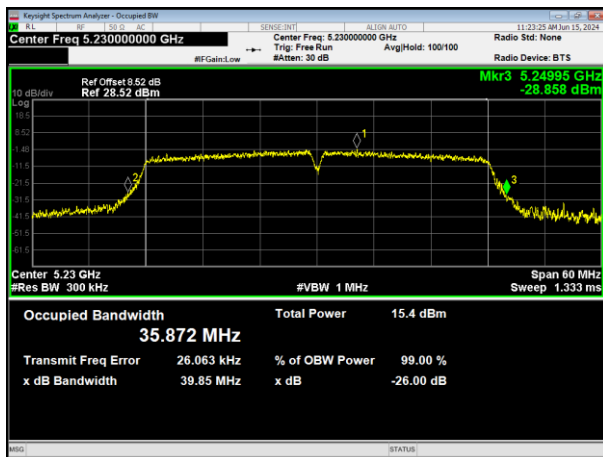
802.11ac HT40



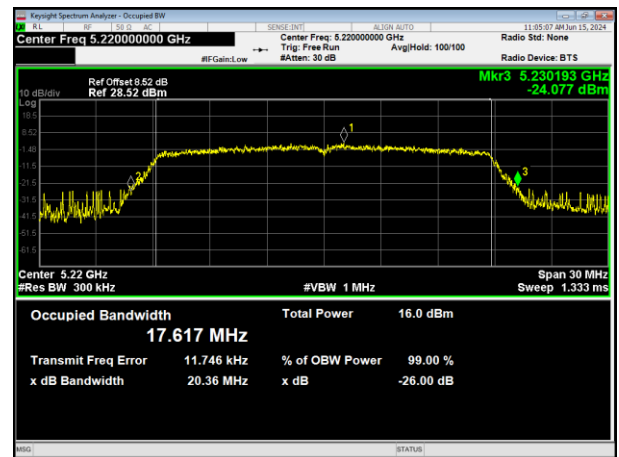
802.11n HT20



5190MHz



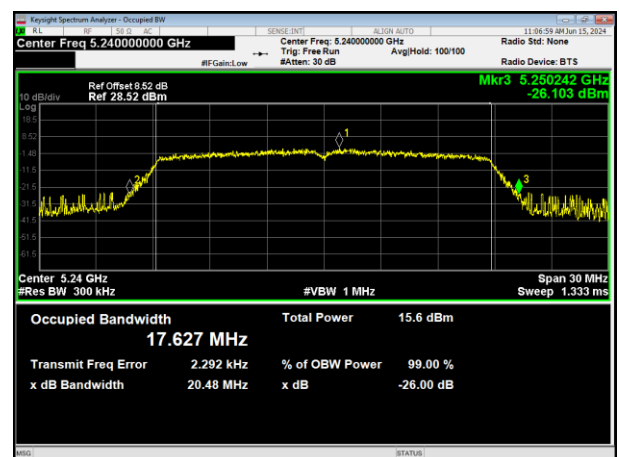
5180MHz



5230MHz



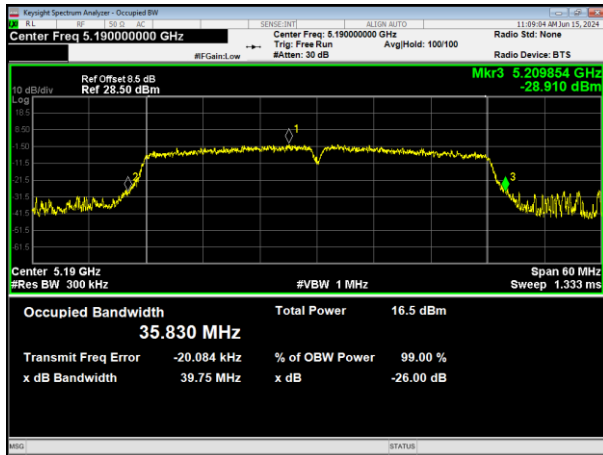
5200MHz



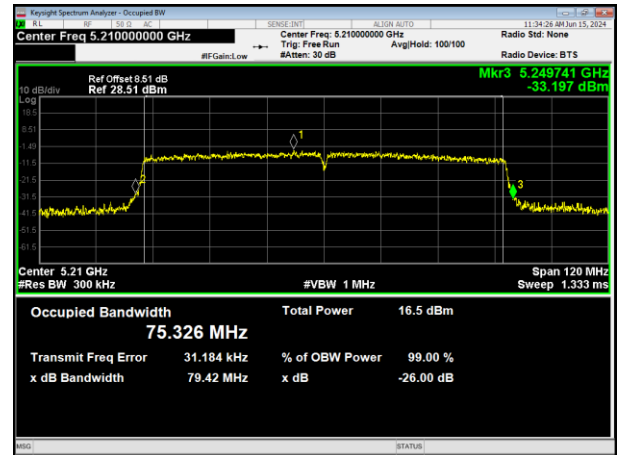
5240MHz



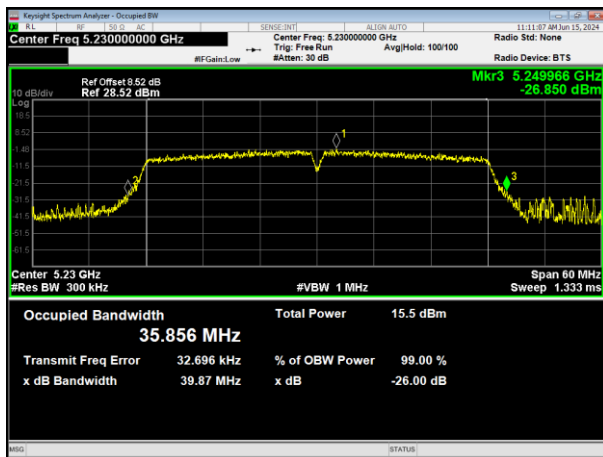
802.11n HT40



802.11ac HT80



5190MHz



5210MHz

5230MHz



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.

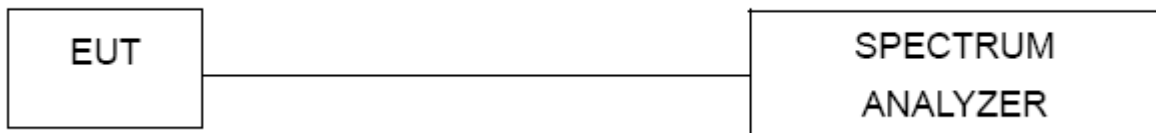
7.1.1 TEST PROCEDURE

1. Set RBW = 1 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

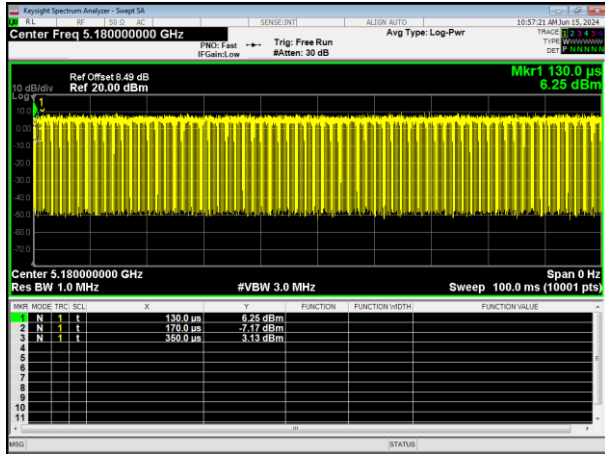
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**7.1.5 TEST RESULTS**

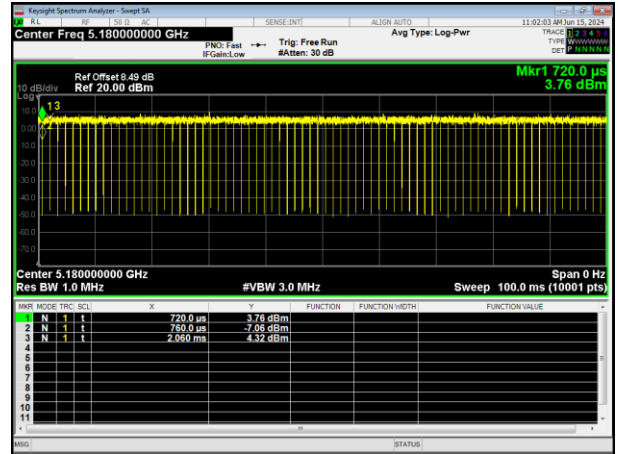
Operation Mode		Duty Cycle(%)	Duty Fator (dB) $10 * \log (1/ \text{Duty cycle})$
Band 1	802.11a	81.82	0.87
	802.11n(HT20)	97.01	0.13
	802.11n(HT40)	94.2	0.26
	802.11ac(HT20)	97.04	0.13
	802.11ac(HT40)	92.86	0.32
	802.11ac(HT80)	89.19	0.5



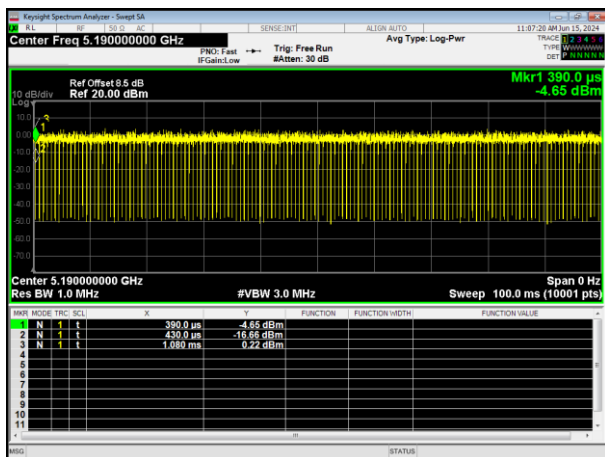
802.11a



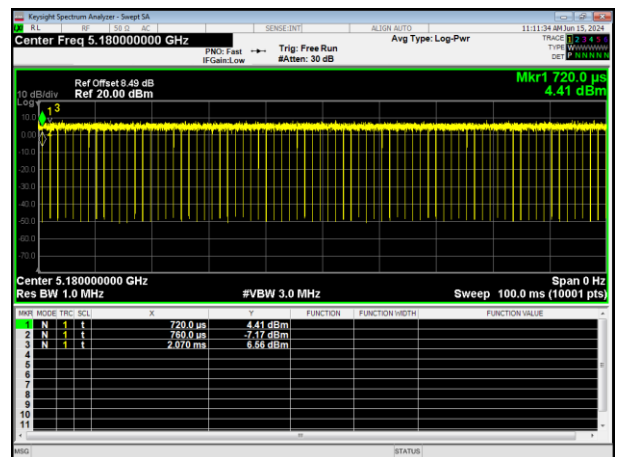
802.11n HT20



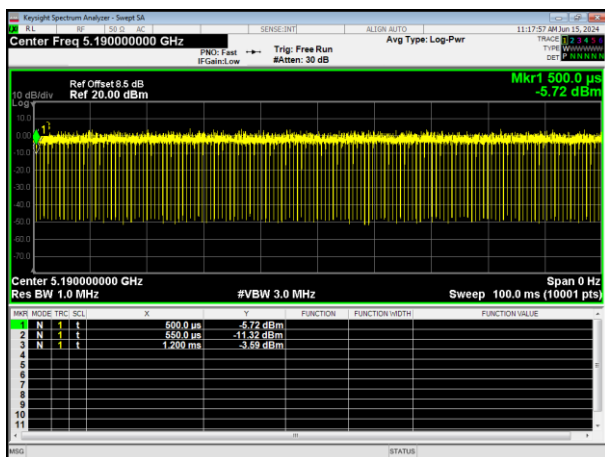
802.11n HT40



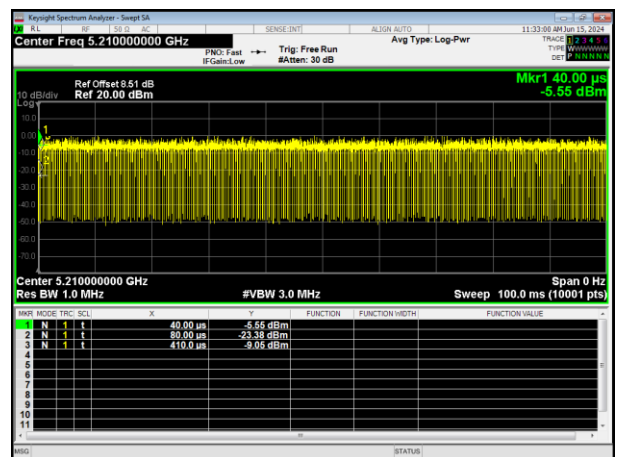
802.11ac HT20



802.11ac HT40



802.11ac HT80





8. FREQUENCY STABILITY

8.1 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.

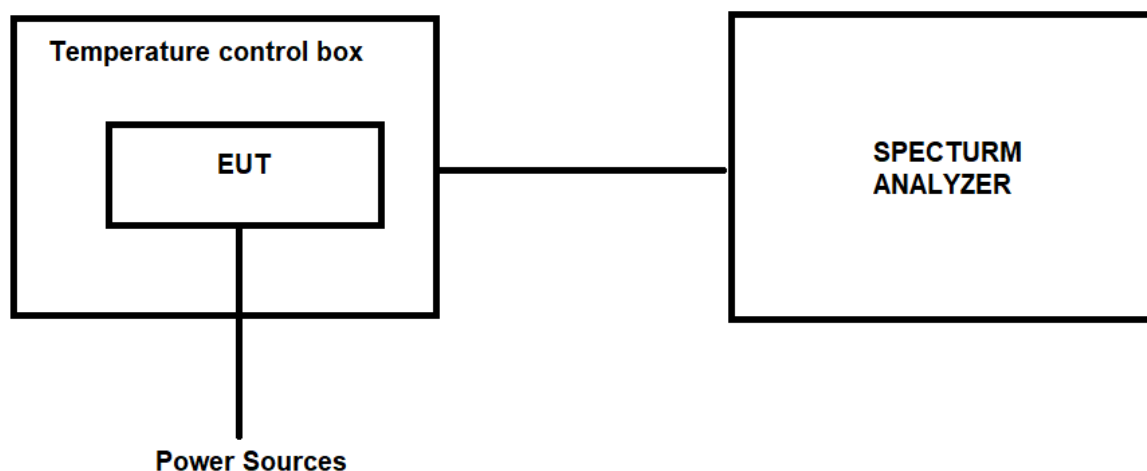
8.1.1 TEST PROCEDURE

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.
7. The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -20°C to 55°C. The temperature was incremented by 10°C intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

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 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



8.1.5 TEST RESULTS

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)			Δ Frequency (PPM)		
			802.11a	802.11n HT20	802.11ac HT20	802.11a	802.11n HT20	802.11ac HT20
13.2V	-20°C	5180	5180.0338	5180.0341	5180.0341	6.5251	6.5830	6.5830
		5220	5220.0363	5220.0336	5220.0333	6.9540	6.4368	6.3793
		5240	5240.0214	5240.0244	5240.0252	4.0840	4.6565	4.8092
10.8V		5180	5180.0236	5180.0247	5180.0214	4.5560	4.7683	4.1313
		5220	5220.0314	5220.0343	5220.0369	6.0153	6.5709	7.0690
		5240	5240.0296	5240.0264	5240.0234	5.6489	5.0382	4.4656
12V	25°C	5180	5180.0541	5180.0549	5180.0546	10.4440	10.5985	10.5405
		5220	5220.0263	5220.0234	5220.0228	5.0383	4.4828	4.3678
		5240	5240.0314	5240.0369	5240.0324	5.9924	7.0420	6.1832
13.2V	50°C	5180	5180.0369	5180.0355	5180.0329	7.1236	6.8533	6.3514
		5220	5220.0241	5220.0236	5220.0224	4.6169	4.5211	4.2912
		5240	5240.0369	5240.0385	5240.0319	7.0420	7.3473	6.0878
10.8V	50°C	5180	5180.0352	5180.0341	5180.0352	6.7954	6.5830	6.7954
		5220	5220.0224	5220.0263	5220.0246	4.2912	5.0383	4.7126
		5240	5240.0339	5240.0325	5240.0364	6.4695	6.2023	6.9466



Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)		Δ Frequency (PPM)	
			802.11n HT40	802.11ac HT40	802.11n HT40	802.11ac HT40
13.2V	-20°C	5190	5190.0241	5190.0214	4.6435	4.1233
		5230	5230.0363	5230.0369	6.9407	7.0554
10.8V		5190	5190.0251	5190.0284	4.8362	5.4721
		5230	5230.0385	5230.0361	7.3614	6.9025
12V	25°C	5190	5190.0256	5190.0269	4.9326	5.1830
		5230	5230.0637	5230.0552	12.1797	10.5545
13.2V	50°C	5190	5190.0613	5190.0641	11.8112	12.3507
		5230	5230.0584	5230.0559	11.1663	10.6883
10.8V	50°C	5190	5190.0569	5190.0541	10.9634	10.4239
		5230	5230.0345	5230.0368	6.5966	7.0363

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (PPM)
			802.11ac HT80	802.11ac HT80
13.2V	-20°C	5210	5210.0125	2.3992
10.8V			5210.0224	4.2994
12V	25°C	5210	5210.0469	9.0019
13.2V	50°C	5210	5210.0355	6.8138
10.8V	50°C	5210	5210.0324	6.2188



9. TRANSMISSION IN THE ABSENCE OF DATA

9.1 STANDARD REQUIREMENT

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

9.2 TEST RESULT

No non-compliance noted:
Refer to the theory of operation.

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: 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.

10.2 EUT ANTENNA

The EUT antenna is External antenna, It comply with the standard requirement.

11. TEST SEUUP PHOTO

Reference to the appendix I for details.

12. EUT PHOTO

Reference to the appendix II for details.

***** END OF REPORT *****