



FCC Part 15E Test Report

FCC ID: 2A5I9-SJ11

Applicant: Shenzhen Zhencheng Technology Co., Ltd

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Manufacturer: Shenzhen Zhencheng Technology Co., Ltd

Address: 3/F, Building C, NO.2, Road 1, ShangXue Industrial Area, Bantian Street, Longgang District, ShenZhen, Guangdong 518129, China

EUT: ACTION CAMERA

Trade Mark: SJCAM

Model Number: SJ11 Active Camera

Date of Receipt: Feb. 17, 2023

Test Date: Feb. 17, 2023 – Feb. 28, 2023

Date of Report: Feb. 28, 2023

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

Test Result: Pass

Report Number: DL-20230228029E

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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			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
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 expended 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:	ACTION CAMERA
Trademark	SJCAM
Model No.:	SJ11 Active Camera
Model Difference	N/A
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:	Internal Antenna
Antenna gain:	3.1dBi
Power supply:	DC 5V from adapter DC 3.8V from battery

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

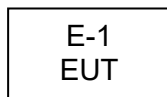
For Radiated Emission		
Pretest Mode	Channel	Band 1
Mode 1	802.11a/n/acHT20	CH36, CH44, CH48
Mode 2	802.11n/acHT40	CH38, CH46
Mode 3	802.11acHT80	CH42
Mode 4	Other	Link Mode

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.

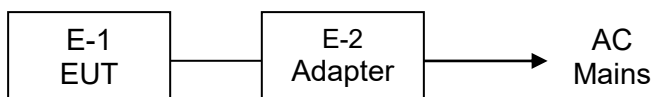


2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



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	ACTION CAMERA	SJ11 Active Camera	N/A	EUT
E-2	Adapter	AD65G	N/A	

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: AXDN-0002.0			
Mode	802.11a	802.11n HT20	802.11n HT40	802.11ac HT20/HT40/HT80
Data Rate	6Mbps	MSC0	MSC0	MSC0
Power Setting of Softwave	60	60	66	66



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. 05, 2022	Nov. 04, 2023
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Nov. 05, 2022	Nov. 04, 2023
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Nov. 05, 2022	Nov. 04, 2023
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Nov. 05, 2022	Nov. 04, 2023
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Nov. 05, 2022	Nov. 04, 2023
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Nov. 05, 2022	Nov. 04, 2023
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Nov. 05, 2022	Nov. 04, 2023
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Nov. 05, 2022	Nov. 04, 2023
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Nov. 05, 2022	Nov. 04, 2023
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Nov. 05, 2022	Nov. 04, 2023
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Nov. 05, 2022	Nov. 04, 2023
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Nov. 05, 2022	Nov. 04, 2023
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Nov. 05, 2022	Nov. 04, 2023
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Nov. 05, 2022	Nov. 04, 2023
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Nov. 05, 2022	Nov. 04, 2023
16	D.C. Power Supply	LongWei	PS-305D	010964729	Nov. 05, 2022	Nov. 04, 2023

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. 05, 2022	Nov. 04, 2023
3	LISN	R&S	ENV216	102417	Nov. 05, 2022	Nov. 04, 2023
4	843 Cable 1#	ChengYu	CE Cable	001	Nov. 05, 2022	Nov. 04, 2023

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

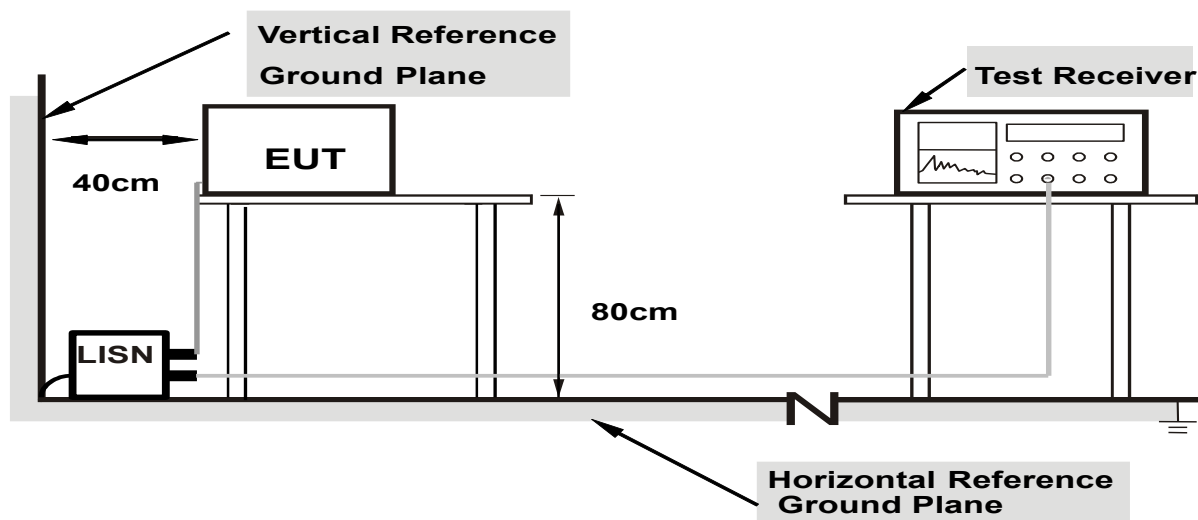
3.1.2 TEST PROCEDURE

- 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

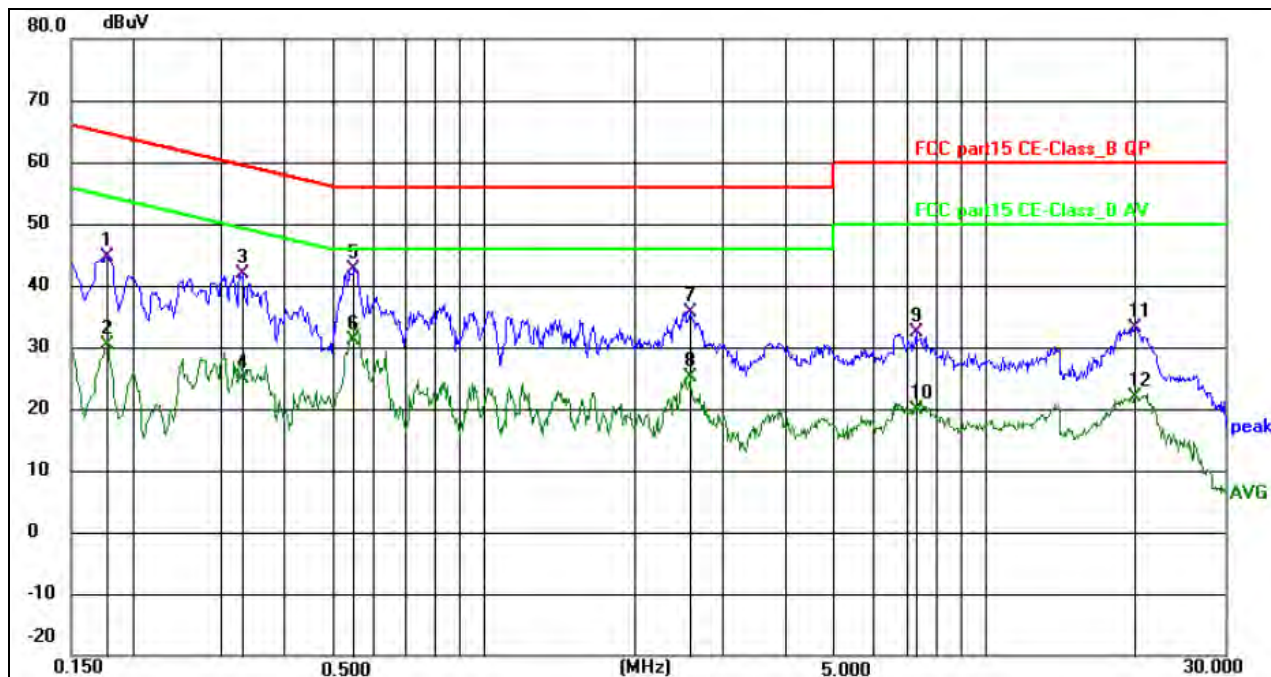
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.

3.1.6 TEST RESULTS



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



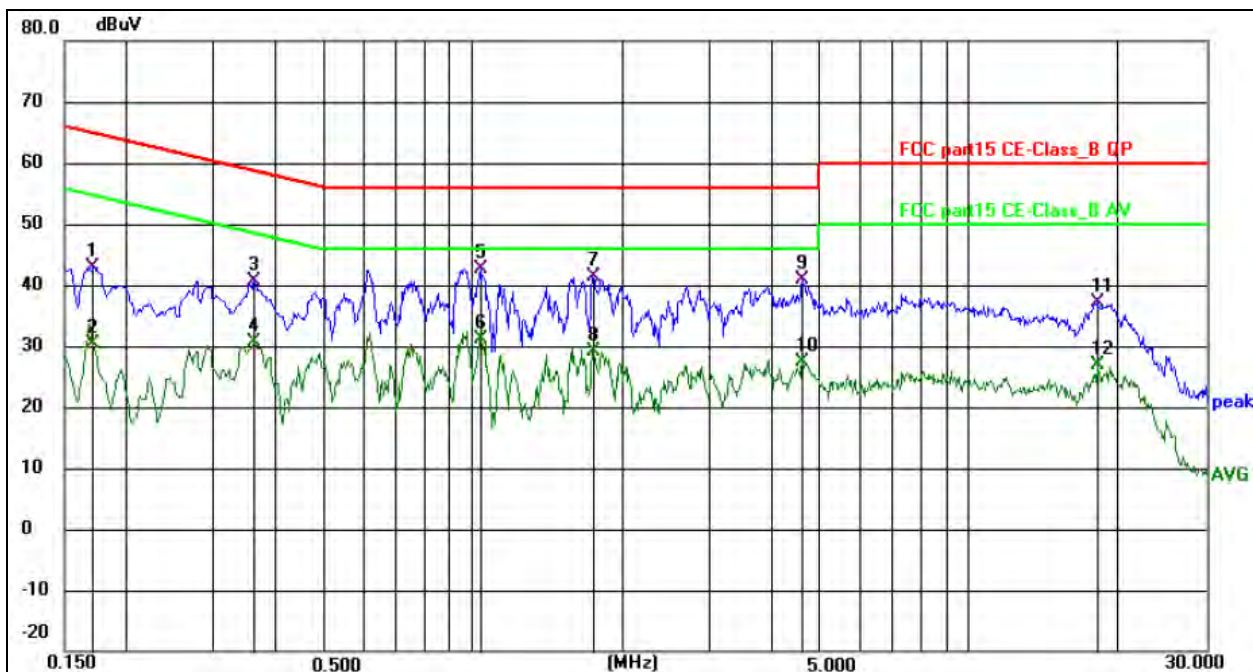
Remark:

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.176800	34.62	9.95	44.57	64.63	-20.06	QP	P	
2	0.176800	20.36	9.95	30.31	54.63	-24.32	AVG	P	
3	0.330000	32.74	9.04	41.78	59.45	-17.67	QP	P	
4	0.330000	15.94	9.04	24.98	49.45	-24.47	AVG	P	
5 *	0.550300	33.41	9.25	42.66	56.00	-13.34	QP	P	
6	0.550300	22.00	9.25	31.25	46.00	-14.75	AVG	P	
7	2.580000	26.59	9.11	35.70	56.00	-20.30	QP	P	
8	2.580000	16.06	9.11	25.17	46.00	-20.83	AVG	P	
9	7.277800	22.66	9.75	32.41	60.00	-27.59	QP	P	
10	7.277800	10.17	9.75	19.92	50.00	-30.08	AVG	P	
11	19.905000	22.83	10.40	33.23	60.00	-26.77	QP	P	
12	19.905000	11.42	10.40	21.82	50.00	-28.18	AVG	P	



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



Remark:

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.171100	33.13	9.72	42.85	64.91	-22.06	QP	P	
2	0.171100	20.70	9.72	30.42	54.91	-24.49	AVG	P	
3	0.361300	31.45	9.16	40.61	58.70	-18.09	QP	P	
4	0.361300	21.37	9.16	30.53	48.70	-18.17	AVG	P	
5 *	1.032000	33.24	9.42	42.66	56.00	-13.34	QP	P	
6	1.032000	21.71	9.42	31.13	46.00	-14.87	AVG	P	
7	1.752000	31.56	9.74	41.30	56.00	-14.70	QP	P	
8	1.752000	19.33	9.74	29.07	46.00	-16.93	AVG	P	
9	4.600500	31.07	9.80	40.87	56.00	-15.13	QP	P	
10	4.600500	17.59	9.80	27.39	46.00	-18.61	AVG	P	
11	18.127500	26.77	10.37	37.14	60.00	-22.86	QP	P	
12	18.127500	16.56	10.37	26.93	50.00	-23.07	AVG	P	



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:

- 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:

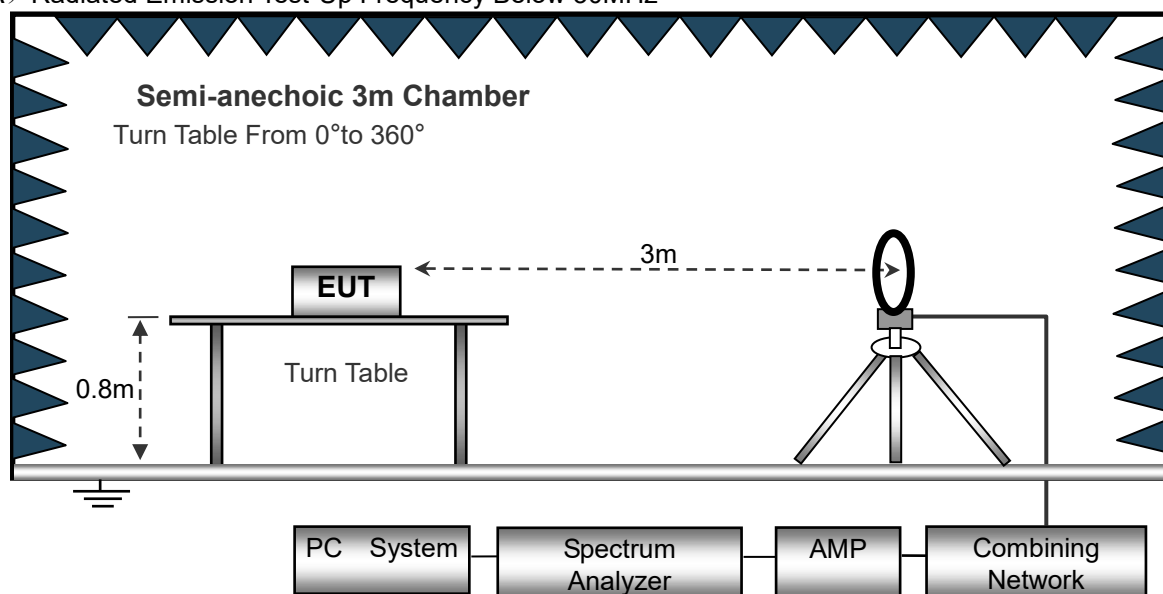
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

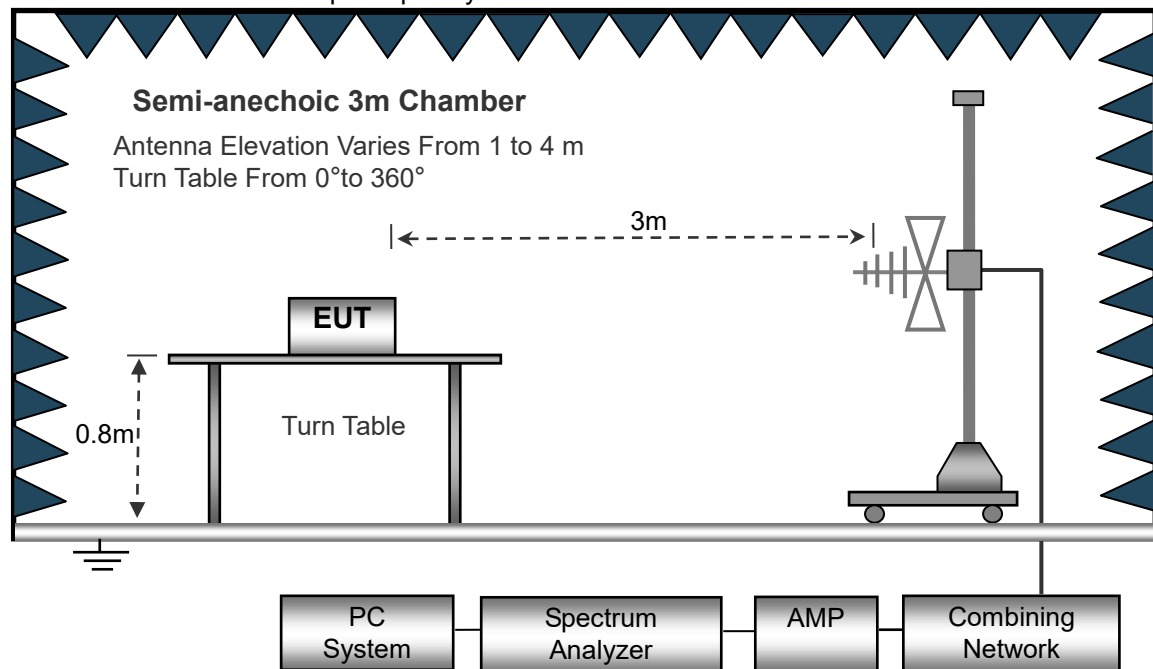
No deviation

3.2.4 TEST SETUP

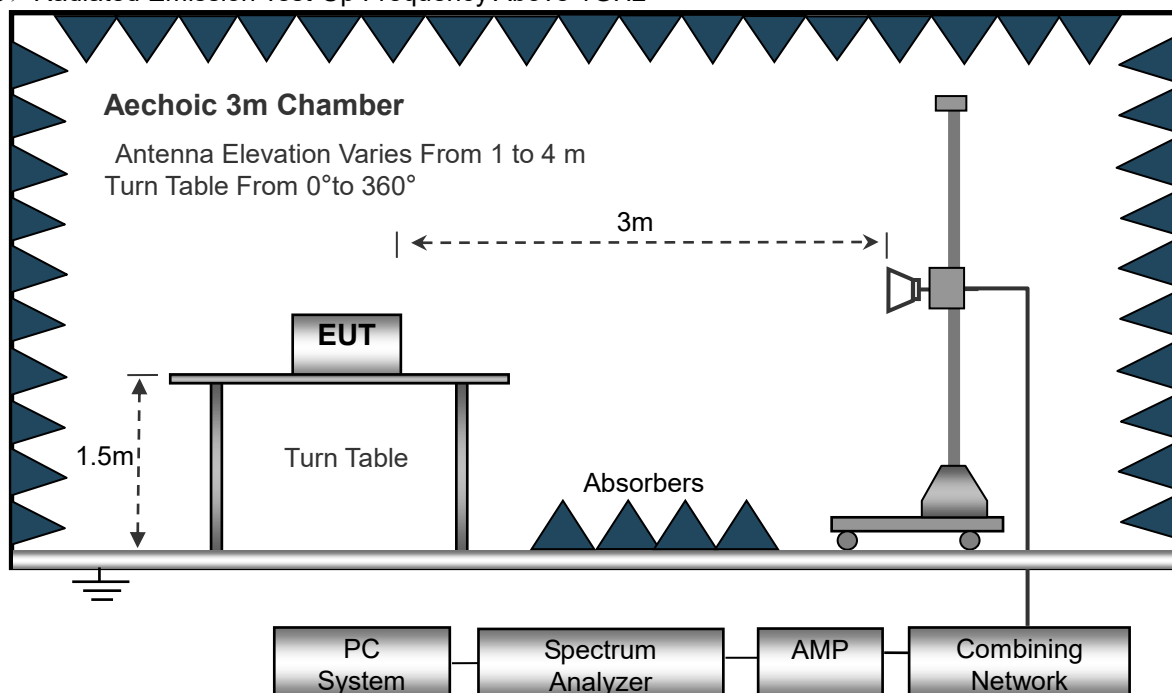
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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 :	DC 3.8V
Test Mode :	Mode 4	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.

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

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 3.8V		
Test Mode :	Mode 4		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Margin dB	Detector
1		58.8185	23.72	-11.20	12.52	40.00	-27.48	QP
2		174.4241	24.89	-14.89	10.00	43.50	-33.50	QP
3		336.0352	29.60	-10.20	19.40	46.00	-26.60	QP
4		528.2458	29.83	-6.45	23.38	46.00	-22.62	QP
5		721.7259	30.69	-3.46	27.23	46.00	-18.77	QP
6	*	815.9678	30.19	-2.03	28.16	46.00	-17.84	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

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



Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
test voltage :	DC 3.8V		
Test Mode :	Mode 4		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		47.9940	32.04	-11.40	20.64	40.00	-19.36	QP
2		71.5806	29.81	-15.36	14.45	40.00	-25.55	QP
3		239.9874	27.69	-11.36	16.33	46.00	-29.67	QP
4	!	528.2458	47.12	-5.53	41.59	46.00	-4.41	QP
5	*	625.0780	46.02	-4.17	41.85	46.00	-4.15	QP
6		721.7259	38.04	-2.32	35.72	46.00	-10.28	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	56.34	49.05	15.3	37.39	59.98	74	-14.02	PK
V	10360	41.16	49.05	15.3	37.39	44.8	54	-9.20	AV
V	15540	56.62	49.16	15.27	40.45	63.18	74	-10.82	PK
V	15540	39.15	49.16	15.27	40.45	45.71	54	-8.29	AV
H	10360	56.06	49.05	15.3	37.39	59.7	74	-14.30	PK
H	10360	40.47	49.05	15.3	37.39	44.11	54	-9.89	AV
H	15540	59.11	49.16	15.27	40.45	65.67	74	-8.33	PK
H	15540	38.09	49.16	15.27	40.45	44.65	54	-9.35	AV
operation frequency:5200									
V	10400	57.45	49.09	15.34	37.42	61.12	74	-12.88	PK
V	10400	39.33	49.09	15.34	37.42	43	54	-11.00	AV
V	15600	59.47	49.18	15.29	40.47	66.05	74	-7.95	PK
V	15600	38.15	49.18	15.29	40.47	44.73	54	-9.27	AV
H	10400	56.96	49.09	15.34	37.42	60.63	74	-13.37	PK
H	10400	39.77	49.09	15.34	37.42	43.44	54	-10.56	AV
H	15600	59.45	49.18	15.29	40.47	66.03	74	-7.97	PK
H	15600	38.36	49.18	15.29	40.47	44.94	54	-9.06	AV
operation frequency:5240									
V	10480	58.58	49.11	15.37	37.46	62.3	74	-11.70	PK
V	10480	39.24	49.11	15.37	37.46	42.96	54	-11.04	AV
V	15720	59.16	49.21	15.34	40.51	65.8	74	-8.20	PK
V	15720	38.37	49.21	15.34	40.51	45.01	54	-8.99	AV
H	10480	57.25	49.11	15.37	31.31	54.82	74	-19.18	PK
H	10480	45.56	49.11	15.37	31.31	43.13	54	-10.87	AV
H	15720	57.48	49.21	15.34	40.51	64.12	74	-9.88	PK
H	15720	37.54	49.21	15.34	40.51	44.18	54	-9.82	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.



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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	38.68	49.05	15.3	37.39	42.32	54	-11.68	AV
V	15540	56.54	49.16	15.27	40.45	63.1	74	-10.90	PK
V	15540	38.26	49.16	15.27	40.45	44.82	54	-9.18	AV
H	10360	56.63	49.05	15.3	37.39	60.27	74	-13.73	PK
H	10360	39.38	49.05	15.3	37.39	43.02	54	-10.98	AV
H	15540	54.16	49.16	15.27	40.45	60.72	74	-13.28	PK
H	15540	38.37	49.16	15.27	40.45	44.93	54	-9.07	AV
operation frequency:5200									
V	10400	56.22	49.09	15.34	37.42	59.89	74	-14.11	PK
V	10400	39.74	49.09	15.34	37.42	43.41	54	-10.59	AV
V	15600	55.36	49.18	15.29	40.47	61.94	74	-12.06	PK
V	15600	38.37	49.18	15.29	40.47	44.95	54	-9.05	AV
H	10400	55.55	49.09	15.34	37.42	59.22	74	-14.78	PK
H	10400	40.36	49.09	15.34	37.42	44.03	54	-9.97	AV
H	15600	55.07	49.18	15.29	40.47	61.65	74	-12.35	PK
H	15600	39.25	49.18	15.29	40.47	45.83	54	-8.17	AV
operation frequency:5240									
V	10480	57.16	49.11	15.37	37.46	60.88	74	-13.12	PK
V	10480	40.57	49.11	15.37	37.46	44.29	54	-9.71	AV
V	15720	54.34	49.21	15.34	40.51	60.98	74	-13.02	PK
V	15720	38.66	49.21	15.34	40.51	45.3	54	-8.70	AV
H	10480	57.17	49.11	15.37	31.31	54.74	74	-19.26	PK
H	10480	44.63	49.11	15.37	31.31	42.2	54	-11.80	AV
H	15720	55.34	49.21	15.34	40.51	61.98	74	-12.02	PK
H	15720	39.25	49.21	15.34	40.51	45.89	54	-8.11	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.



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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	56.77	49.07	15.33	37.41	60.44	74	-13.56	PK
V	10380	39.26	49.07	15.33	37.41	42.93	54	-11.07	AV
V	15570	56.28	49.17	15.28	40.46	62.85	74	-11.15	PK
V	15570	38.34	49.17	15.28	40.46	44.91	54	-9.09	AV
H	10380	56.66	49.07	15.33	37.41	60.33	74	-13.67	PK
H	10380	40.37	49.07	15.33	37.41	44.04	54	-9.96	AV
H	15570	54.66	49.17	15.28	40.46	61.23	74	-12.77	PK
H	15570	38.27	49.17	15.28	40.46	44.84	54	-9.16	AV
operation frequency:5230									
V	10460	57.15	49.11	15.37	37.46	60.87	74	-13.13	PK
V	10460	39.66	49.11	15.37	37.46	43.38	54	-10.62	AV
V	15690	54.47	49.21	15.34	40.51	61.11	74	-12.89	PK
V	15690	38.34	49.21	15.34	40.51	44.98	54	-9.02	AV
H	10460	57.26	49.11	15.37	31.31	54.83	74	-19.17	PK
H	10460	44.87	49.11	15.37	31.31	42.44	54	-11.56	AV
H	15690	55.36	49.21	15.34	40.51	62	74	-12.00	PK
H	15690	39.01	49.21	15.34	40.51	45.65	54	-8.35	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.									



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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	56.76	49.05	15.3	37.39	60.4	74	-13.60	PK
V	10360	39.58	49.05	15.3	37.39	43.22	54	-10.78	AV
V	15540	56.15	49.16	15.27	40.45	62.71	74	-11.29	PK
V	15540	38.33	49.16	15.27	40.45	44.89	54	-9.11	AV
H	10360	56.17	49.05	15.3	37.39	59.81	74	-14.19	PK
H	10360	38.24	49.05	15.3	37.39	41.88	54	-12.12	AV
H	15540	54.26	49.16	15.27	40.45	60.82	74	-13.18	PK
H	15540	39.38	49.16	15.27	40.45	45.94	54	-8.06	AV
operation frequency:5200									
V	10400	56.56	49.09	15.34	37.42	60.23	74	-13.77	PK
V	10400	41.77	49.09	15.34	37.42	45.44	54	-8.56	AV
V	15600	55.53	49.18	15.29	40.47	62.11	74	-11.89	PK
V	15600	40.35	49.18	15.29	40.47	46.93	54	-7.07	AV
H	10400	55.14	49.09	15.34	37.42	58.81	74	-15.19	PK
H	10400	40.56	49.09	15.34	37.42	44.23	54	-9.77	AV
H	15600	55.08	49.18	15.29	40.47	61.66	74	-12.34	PK
H	15600	41.24	49.18	15.29	40.47	47.82	54	-6.18	AV
operation frequency:5240									
V	10480	57.43	49.11	15.37	37.46	61.15	74	-12.85	PK
V	10480	40.38	49.11	15.37	37.46	44.1	54	-9.90	AV
V	15720	54.16	49.21	15.34	40.51	60.8	74	-13.20	PK
V	15720	39.95	49.21	15.34	40.51	46.59	54	-7.41	AV
H	10480	57.16	49.11	15.37	31.31	54.73	74	-19.27	PK
H	10480	44.87	49.11	15.37	31.31	42.44	54	-11.56	AV
H	15720	55.64	49.21	15.34	40.51	62.28	74	-11.72	PK
H	15720	40.06	49.21	15.34	40.51	46.7	54	-7.30	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.



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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	56.23	49.07	15.33	37.41	59.9	74	-14.10	PK
V	10380	40.42	49.07	15.33	37.41	44.09	54	-9.91	AV
V	15570	56.21	49.17	15.28	40.46	62.78	74	-11.22	PK
V	15570	39.56	49.17	15.28	40.46	46.13	54	-7.87	AV
H	10380	56.43	49.07	15.33	37.41	60.1	74	-13.90	PK
H	10380	40.32	49.07	15.33	37.41	43.99	54	-10.01	AV
H	15570	54.24	49.17	15.28	40.46	60.81	74	-13.19	PK
H	15570	39.56	49.17	15.28	40.46	46.13	54	-7.87	AV
operation frequency:5230									
V	10460	57.22	49.11	15.37	37.46	60.94	74	-13.06	PK
V	10460	41.57	49.11	15.37	37.46	45.29	54	-8.71	AV
V	15690	54.33	49.21	15.34	40.51	60.97	74	-13.03	PK
V	15690	39.25	49.21	15.34	40.51	45.89	54	-8.11	AV
H	10460	57.17	49.11	15.37	31.31	54.74	74	-19.26	PK
H	10460	44.25	49.11	15.37	31.31	41.82	54	-12.18	AV
H	15690	55.19	49.21	15.34	40.51	61.83	74	-12.17	PK
H	15690	40.05	49.21	15.34	40.51	46.69	54	-7.31	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.

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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	56.23	49.07	15.33	37.41	59.9	74	-14.10	PK
V	10420	41.67	49.07	15.33	37.41	45.34	54	-8.66	AV
V	15630	56.52	49.17	15.28	40.46	63.09	74	-10.91	PK
V	15630	39.13	49.17	15.28	40.46	45.7	54	-8.30	AV
H	10420	56.35	49.07	15.33	37.41	60.02	74	-13.98	PK
H	10420	41.26	49.07	15.33	37.41	44.93	54	-9.07	AV
H	15630	54.07	49.17	15.28	40.46	60.64	74	-13.36	PK
H	15630	40.36	49.17	15.28	40.46	46.93	54	-7.07	AV

Remark:

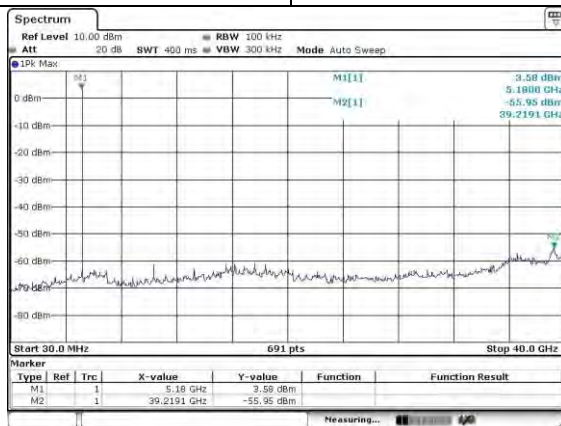
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to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



For Conducted

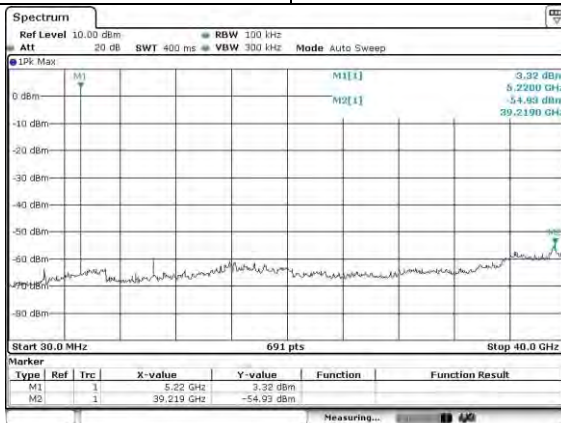
During the test, pre-scan the all modulation, the modulation below were found to have the worst test results, as reflected in the report.

Test channel:	Band 1/802.11a Lowest channel
Limits(dB/m):	-27



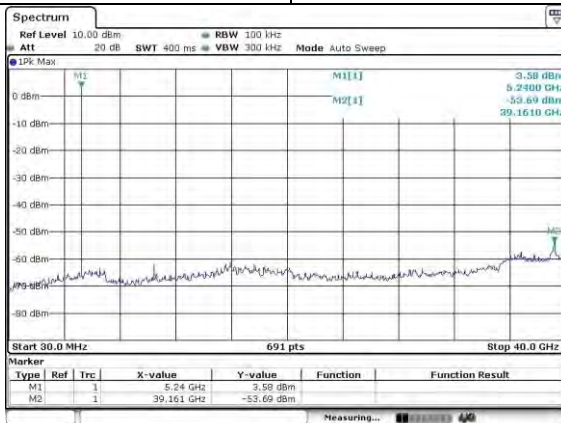
0.03Hz~40GHz

Test channel:	Band 1/802.11a Middle channel
Limits(dB/m):	-27



0.03GHz~40GHz

Test channel:	Band 1/802.11a Highest channel
Limits(dB/m):	-27



0.03GHz~40GHz



3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

RSS-247 Section 5.5

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:

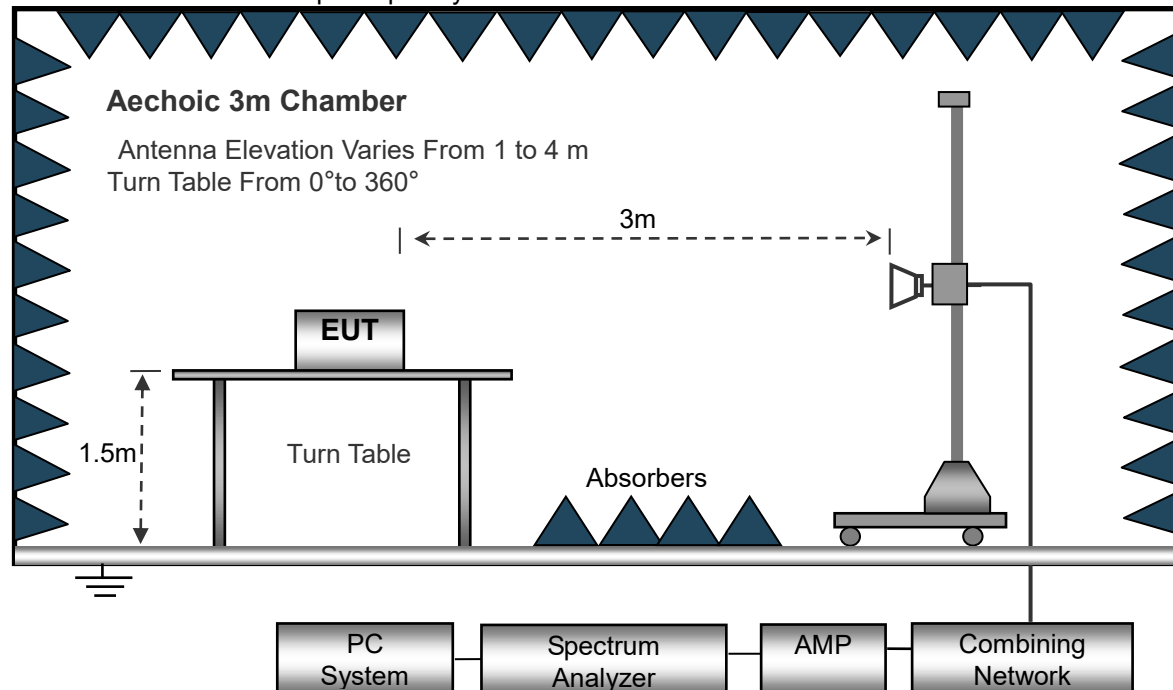
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

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	39.85	49.12	15.6	37.34	43.67	54	-10.33	AV
V	5145	54.26	49.19	15.24	40.43	60.74	74	-13.26	PK
V	5145	36.37	49.19	15.24	40.43	42.85	54	-11.15	AV
H	5150	52.94	49.12	15.6	37.34	56.76	74	-17.24	PK
H	5150	37.51	49.12	15.6	37.34	41.33	54	-12.67	AV
H	5145	54.36	49.19	15.24	40.43	60.84	74	-13.16	PK
H	5145	33.18	49.19	15.24	40.43	39.66	54	-14.34	AV
operation frequency:5240									
V	5350	53.13	49.13	15.32	37.46	56.78	74	-17.22	PK
V	5350	35.45	49.13	15.32	37.46	39.1	54	-14.9	AV
V	5370	53.24	49.24	15.36	40.51	59.87	74	-14.13	PK
V	5370	32.21	49.24	15.36	40.51	38.84	54	-15.16	AV
H	5350	52.13	49.13	15.32	31.31	49.63	74	-24.37	PK
H	5350	40.28	49.13	15.32	31.31	37.78	54	-16.22	AV
H	5370	52.46	49.24	15.36	40.51	59.09	74	-14.91	PK
H	5370	32.74	49.24	15.36	40.51	39.37	54	-14.63	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.									



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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	51.23	49.12	15.6	37.34	55.05	74	-18.95	PK
V	5150	33.15	49.12	15.6	37.34	36.97	54	-17.03	AV
V	5145	51.46	49.19	15.24	40.43	57.94	74	-16.06	PK
V	5145	33.17	49.19	15.24	40.43	39.65	54	-14.35	AV
H	5150	51.15	49.12	15.6	37.34	54.97	74	-19.03	PK
H	5150	33.46	49.12	15.6	37.34	37.28	54	-16.72	AV
H	5145	50.86	49.19	15.24	40.43	57.34	74	-16.66	PK
H	5145	32.64	49.19	15.24	40.43	39.12	54	-14.88	AV
operation frequency:5240									
V	5350	53.63	49.13	15.32	37.46	57.28	74	-16.72	PK
V	5350	34.17	49.13	15.32	37.46	37.82	54	-16.18	AV
V	5370	50.26	49.24	15.36	40.51	56.89	74	-17.11	PK
V	5370	33.55	49.24	15.36	40.51	40.18	54	-13.82	AV
H	5350	54.13	49.13	15.32	31.31	51.63	74	-22.37	PK
H	5350	36.27	49.13	15.32	31.31	33.77	54	-20.23	AV
H	5370	51.25	49.24	15.36	40.51	57.88	74	-16.12	PK
H	5370	33.53	49.24	15.36	40.51	40.16	54	-13.84	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	52.18	49.12	15.33	37.41	55.8	74	-18.2	PK
V	5150	34.54	49.12	15.33	37.41	38.16	54	-15.84	AV
V	5145	51.26	49.19	15.28	40.46	57.81	74	-16.19	PK
V	5145	33.68	49.19	15.28	40.46	40.23	54	-13.77	AV
H	5150	52.43	49.12	15.33	37.41	56.05	74	-17.95	PK
H	5150	34.64	49.12	15.33	37.41	38.26	54	-15.74	AV
H	5145	50.45	49.19	15.28	40.46	57	74	-17	PK
H	5145	33.53	49.19	15.28	40.46	40.08	54	-13.92	AV
operation frequency:5240									
V	5350	53.67	49.13	15.32	37.46	57.32	74	-16.68	PK
V	5350	36.36	49.13	15.32	37.46	40.01	54	-13.99	AV
V	5370	50.14	49.24	15.36	40.51	56.77	74	-17.23	PK
V	5370	33.63	49.24	15.36	40.51	40.26	54	-13.74	AV
H	5350	53.18	49.13	15.32	31.31	50.68	74	-23.32	PK
H	5350	40.29	49.13	15.32	31.31	37.79	54	-16.21	AV
H	5370	51.83	49.24	15.36	40.51	58.46	74	-15.54	PK
H	5370	35.65	49.24	15.36	40.51	42.28	54	-11.72	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.									



802.11n 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	52.13	49.12	15.6	37.39	56	74	-18	PK
V	5150	35.48	49.12	15.6	37.39	39.35	54	-14.65	AV
V	5145	51.54	49.19	15.24	40.45	58.04	74	-15.96	PK
V	5145	34.61	49.19	15.24	40.45	41.11	54	-12.89	AV
H	5150	52.63	49.12	15.6	37.39	56.5	74	-17.5	PK
H	5150	34.78	49.12	15.6	37.39	38.65	54	-15.35	AV
H	5145	50.16	49.19	15.24	40.45	56.66	74	-17.34	PK
H	5145	35.67	49.19	15.24	40.45	42.17	54	-11.83	AV
operation frequency:5230									
V	5350	53.66	49.13	15.34	37.46	57.33	74	-16.67	PK
V	5350	37.65	49.13	15.34	37.46	41.32	54	-12.68	AV
V	5370	50.27	49.24	15.35	40.51	56.89	74	-17.11	PK
V	5370	36.36	49.24	15.35	40.51	42.98	54	-11.02	AV
H	5350	54.25	49.13	15.34	31.31	51.77	74	-22.23	PK
H	5350	41.26	49.13	15.34	31.31	38.78	54	-15.22	AV
H	5370	52.67	49.24	15.35	40.51	59.29	74	-14.71	PK
H	5370	36.84	49.24	15.35	40.51	43.46	54	-10.54	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	52.86	49.12	15.32	37.41	56.47	74	-17.53	PK
V	5150	37.68	49.12	15.32	37.41	41.29	54	-12.71	AV
V	5145	52.44	49.19	15.36	40.46	59.07	74	-14.93	PK
V	5145	36.56	49.19	15.36	40.46	43.19	54	-10.81	AV
H	5150	52.97	49.12	15.32	37.41	56.58	74	-17.42	PK
H	5150	37.61	49.12	15.32	37.41	41.22	54	-12.78	AV
H	5145	51.26	49.19	15.36	40.46	57.89	74	-16.11	PK
H	5145	36.68	49.19	15.36	40.46	43.31	54	-10.69	AV

operation frequency:5230

V	5350	54.63	49.13	15.34	37.34	58.18	74	-15.82	PK
V	5350	36.28	49.13	15.34	37.34	39.83	54	-14.17	AV
V	5370	51.44	49.24	15.35	40.43	57.98	74	-16.02	PK
V	5370	36.96	49.24	15.35	40.43	43.5	54	-10.5	AV
H	5350	54.17	49.13	15.34	37.34	57.72	74	-16.28	PK
H	5350	41.33	49.13	15.34	37.34	44.88	54	-9.12	AV
H	5370	50.25	49.24	15.35	40.43	56.79	74	-17.21	PK
H	5370	35.66	49.24	15.35	40.43	42.2	54	-11.8	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

052: F40-1100

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	52.17	49.13	15.32	37.48	55.84	74	-18.16	PK
V	5350	35.25	49.13	15.32	37.48	38.92	54	-15.08	AV
V	5370	51.26	49.24	15.36	40.42	57.8	74	-16.2	PK
V	5370	35.64	49.24	15.36	40.42	42.18	54	-11.82	AV
H	5350	52.46	49.13	15.32	37.48	56.13	74	-17.87	PK
H	5350	36.27	49.13	15.32	37.48	39.94	54	-14.06	AV
H	5370	50.23	49.24	15.36	40.42	56.77	74	-17.23	PK
H	5370	35.25	49.24	15.36	40.42	41.79	54	-12.21	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	

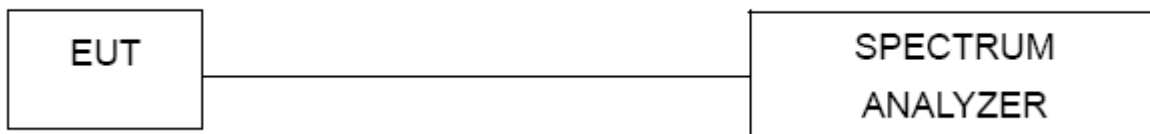
3.3.2 TEST PROCEDURE

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



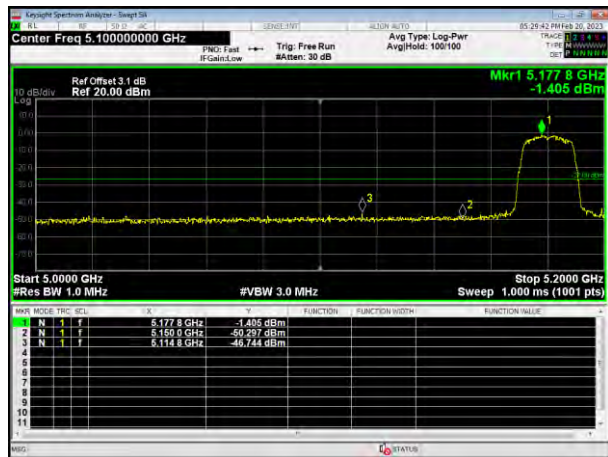
3.3.5 EUT OPERATING CONDITIONS

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.

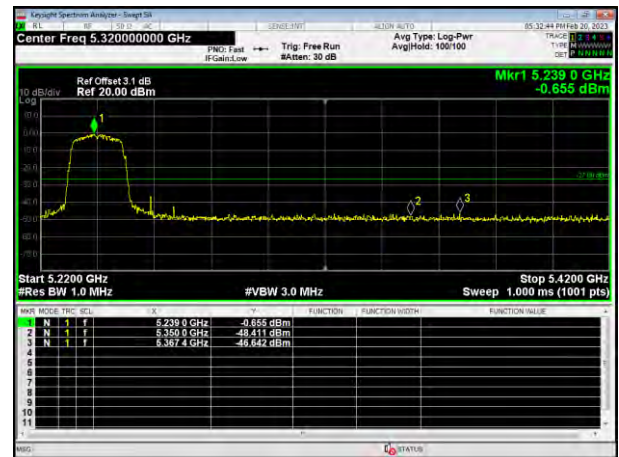


3.3.6 TEST RESULT

802.11a

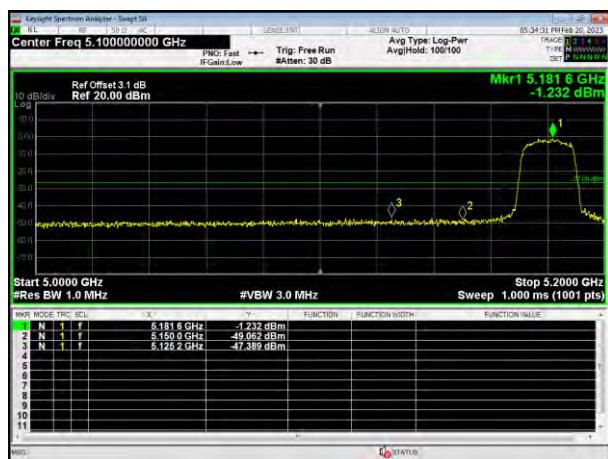


5180MHz

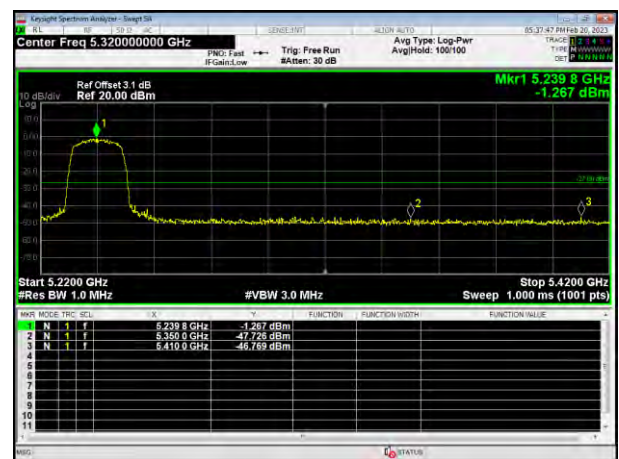


5240MHz

802.11n HT20

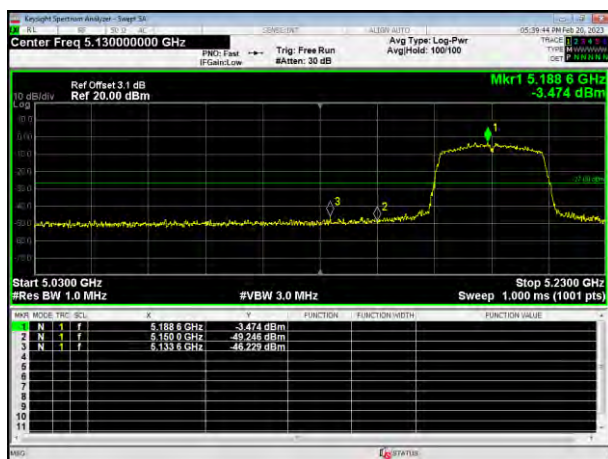


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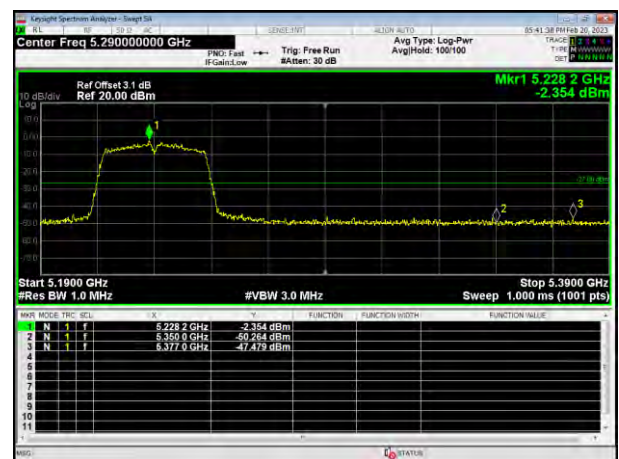


5240MHz

802.11n HT40



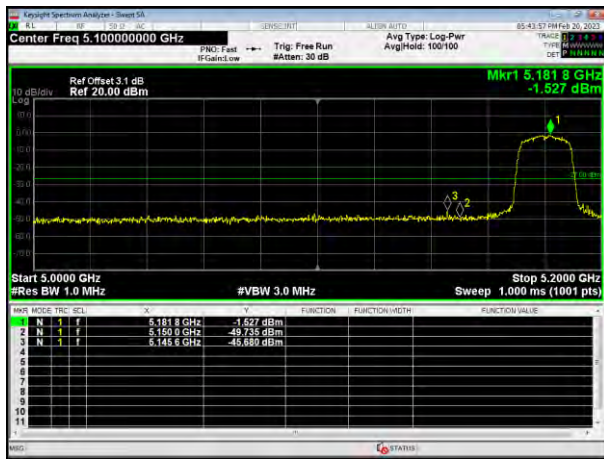
5190MHz



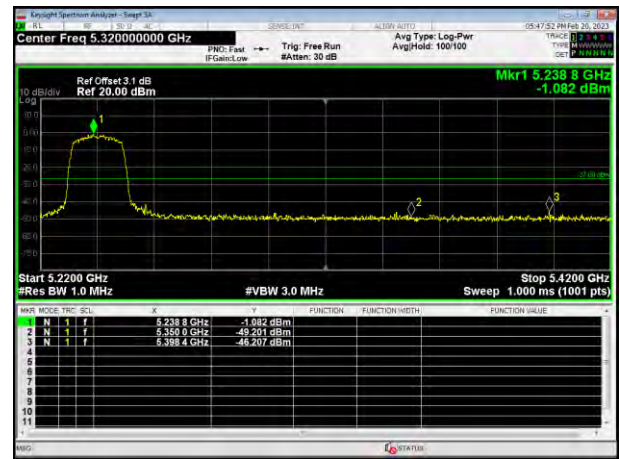
5230MHz



802.11ac HT20

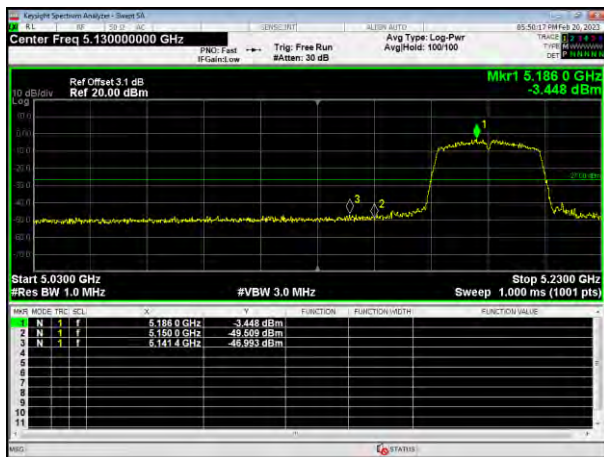


5180MHz

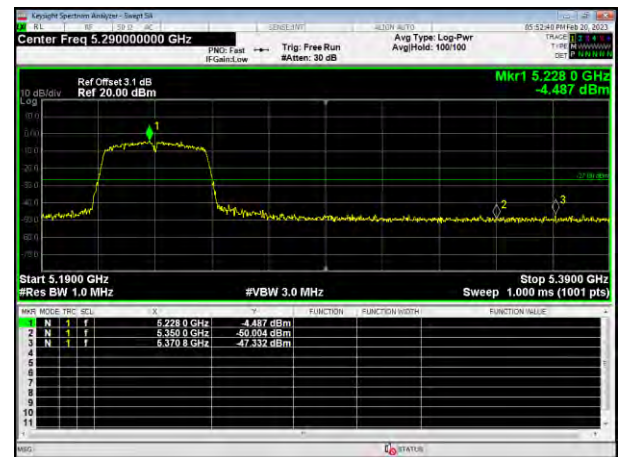


5240MHz

802.11ac HT40

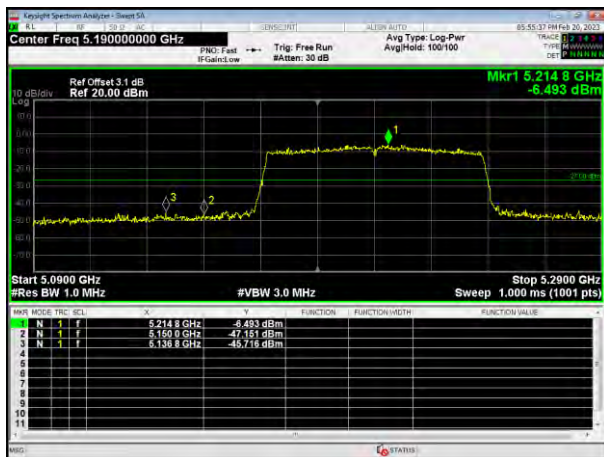


5190MHz



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 > 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 = 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 :	AC 120V/60Hz

Band	Mode	Test Channel	Average Output Power (dBm)	Duty factor (dB)	Total Output Power(dB)	LIMIT (dBm)
Band 1	802.11a	Low	6.59	0.11	6.7	23.98
		Middle	6.87	0.11	6.98	23.98
		High	7.58	0.11	7.69	23.98
	802.11n HT20	Low	6.92	0.2	7.12	23.98
		Middle	7.27	0.2	7.47	23.98
		High	7.40	0.2	7.6	23.98
	802.11n HT40	Low	6.84	0.39	7.23	23.98
		High	7.16	0.39	7.55	23.98
	802.11ac HT20	Low	6.88	0.29	7.17	23.98
		Middle	7.24	0.29	7.53	23.98
		High	7.31	0.29	7.6	23.98
	802.11ac HT40	Low	6.68	0.52	7.2	23.98
		High	6.39	0.52	6.91	23.98
	802.11ac HT80	/	6.34	0.86	7.2	23.98



802.11a



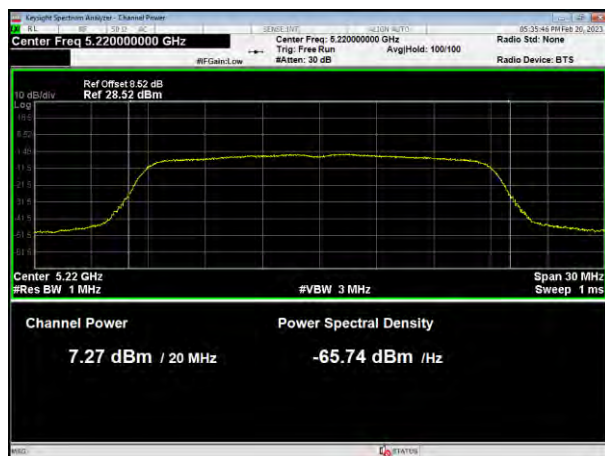
802.11n HT20



5180MHz



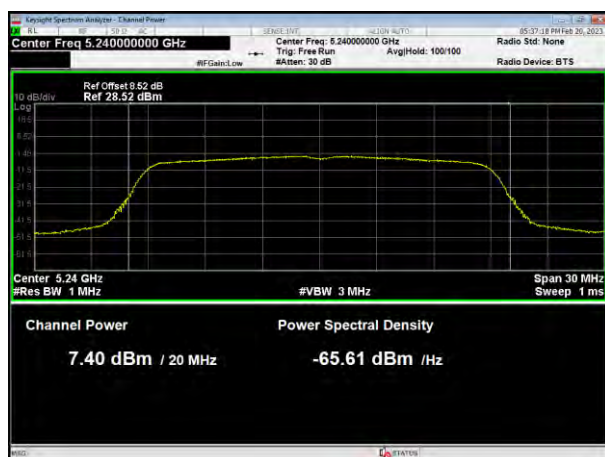
5180MHz



5200MHz



5200MHz

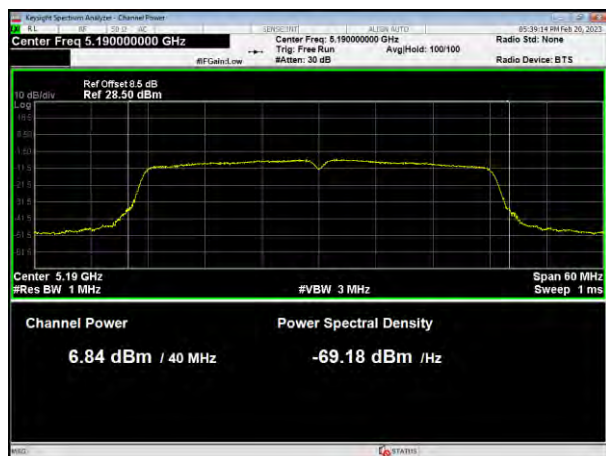


5240MHz

5240MHz



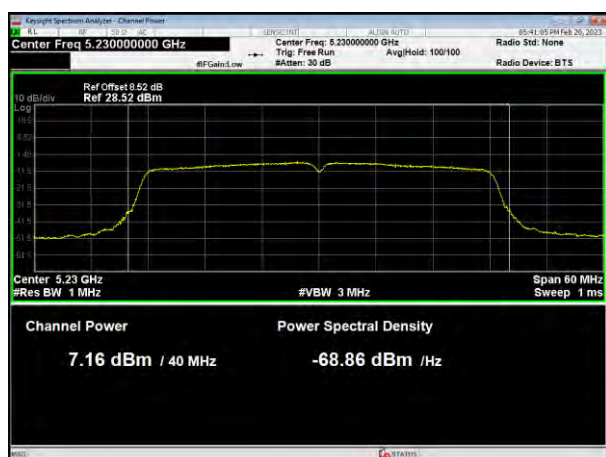
802.11n HT40



802.11ac HT20



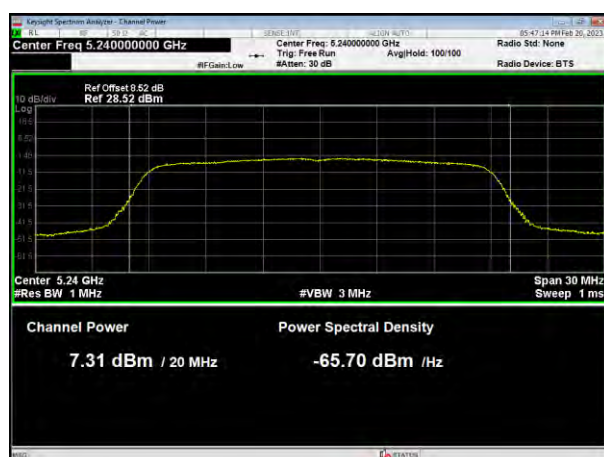
5190MHz



5180



5230MHz

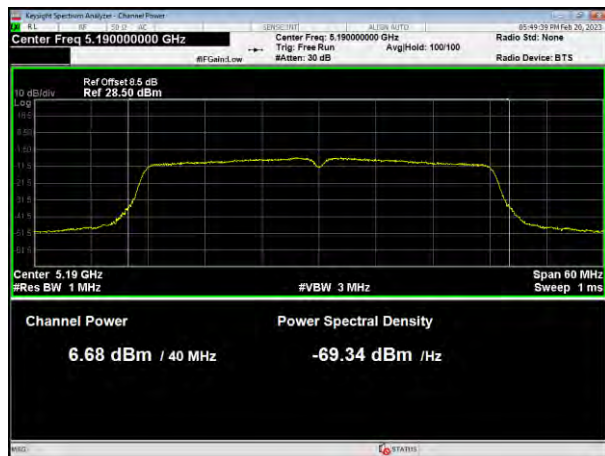


5200

5240



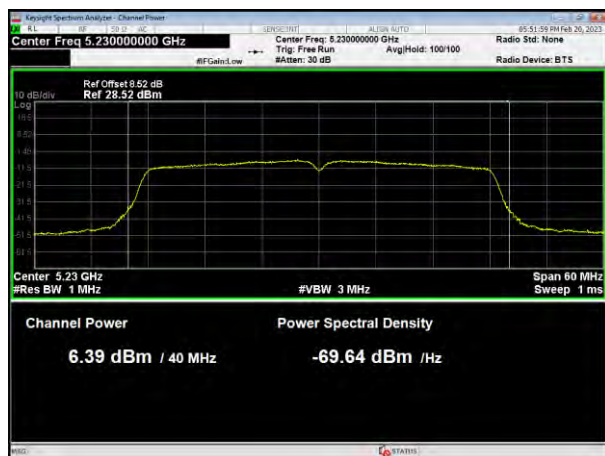
802.11ac HT40



802.11ac HT80



5190MHz



5210

5230MHz



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 $\geq$ 1MHz for band 1 RBW $\geq$ 510KHz for band 4
VB	VBW $\geq$ 3RBW
Detector	RMS (i.e., power averaging).
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.
7. 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	-3.25	0.11	-3.14	11.00	PASS
		Middle	-2.93	0.11	-2.82	11.00	PASS
		High	-2.201	0.11	-2.091	11.00	PASS
	802.11n20	Low	-2.886	0.2	-2.686	11.00	PASS
		Middle	-2.463	0.2	-2.263	11.00	PASS
		High	-2.289	0.2	-2.089	11.00	PASS
	802.11n40	Low	-5.65	0.39	-5.26	11.00	PASS
		High	-5.037	0.39	-4.647	11.00	PASS
	802.11ac20	Low	-3.059	0.29	-2.769	11.00	PASS
		Middle	-2.501	0.29	-2.211	11.00	PASS
		High	-2.324	0.29	-2.034	11.00	PASS
	802.11ac40	Low	-6.338	0.52	-5.818	11.00	PASS
		High	-6.167	0.52	-5.647	11.00	PASS
	802.11ac80	/	-9.489	0.86	-8.629	11.00	PASS



802.11a



802.11n HT20



5180MHz



5180MHz



5200MHz



5200MHz



5240MHz

5240MHz



802.11n HT40



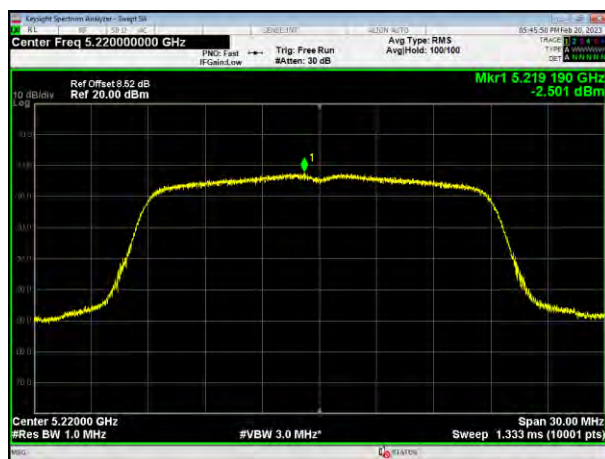
802.11ac HT20



5190MHz

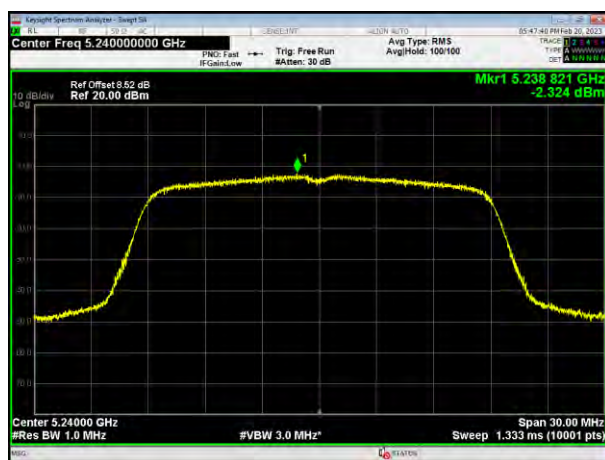


5180MHz

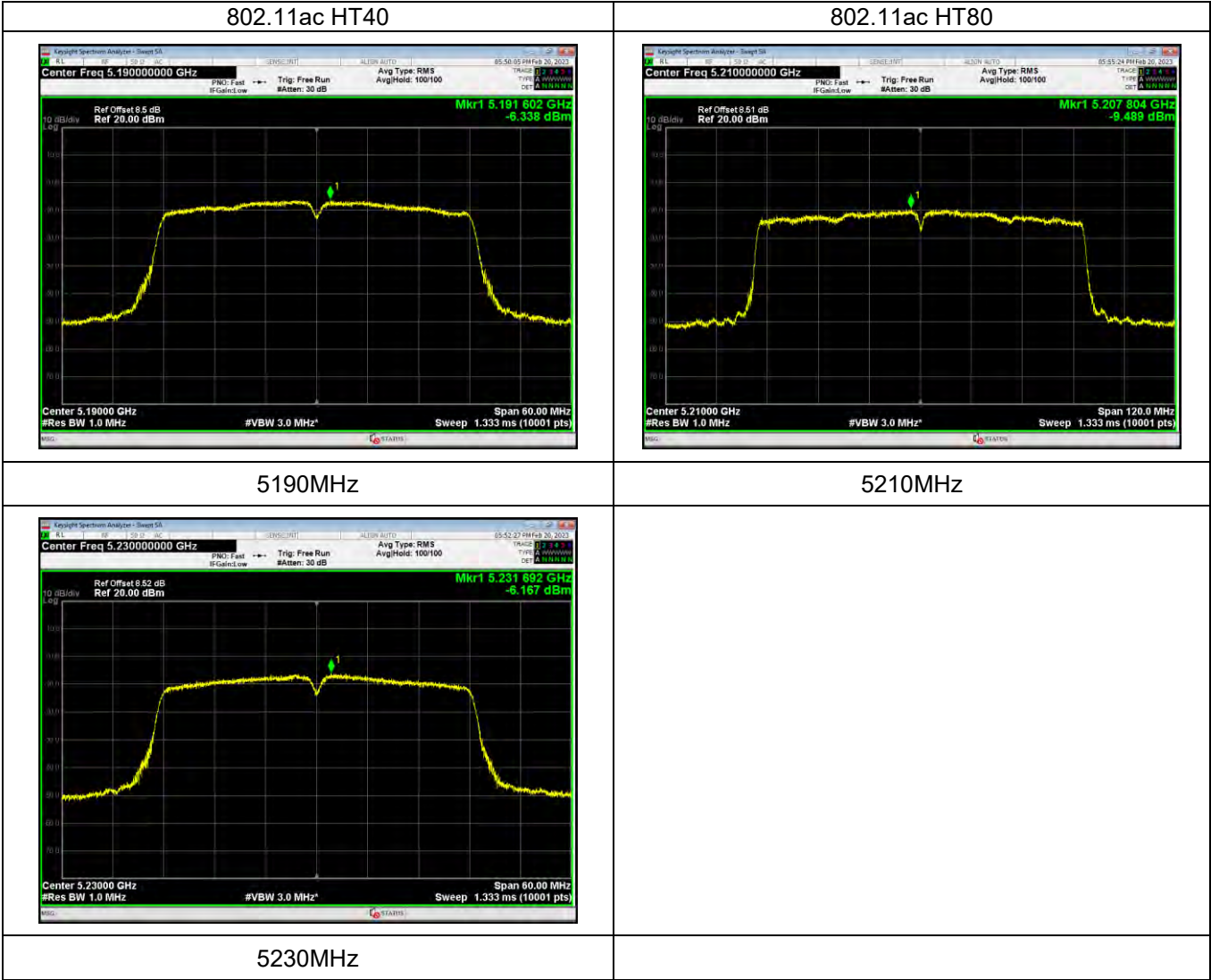


5230MHz

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

26dB Bandwidth	
Spectrum Parameters	Setting
RBW	approximately 1% of the emission bandwidth
VBW	>RBW
Span	30MHz(20MHz Bandwidth mode) 60MHz(40MHz Bandwidth mode) 120MHz(80MHz Bandwidth mode)
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

99% Occupied Bandwidth	
Spectrum Parameters	Setting
RBW	1% to 5% of the OBW
VBW	Approximately three times the RBW
Span	between 1.5 times and 5.0 times the OBW
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

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	20.11	17.512	Pass
		Middle	20.02	17.540	Pass
		High	20.19	17.539	Pass
	802.11n HT20	Low	19.85	17.531	Pass
		Middle	20.01	17.504	Pass
		High	19.93	17.546	Pass
	802.11n HT40	Low	40.31	35.917	Pass
		High	40.18	35.954	Pass
	802.11ac HT20	Low	19.97	75.204	Pass
		Middle	19.78	17.551	Pass
		High	19.89	17.514	Pass
	802.11ac HT40	Low	40.03	17.538	Pass
		High	39.91	35.988	Pass
	802.11ac HT80	/	79.99	35.938	Pass



802.11a



802.11n HT20



5180MHz



5180MHz



5200MHz



5200MHz



5240MHz

5240MHz



802.11n HT40



802.11ac HT20



5190MHz



5180MHz



5230MHz



5200MHz

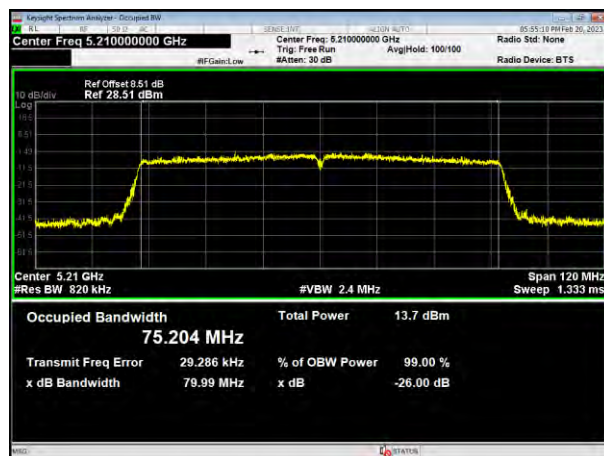
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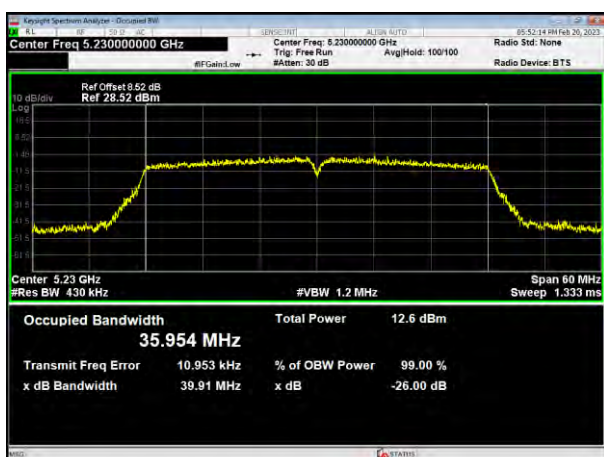
802.11ac HT40



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

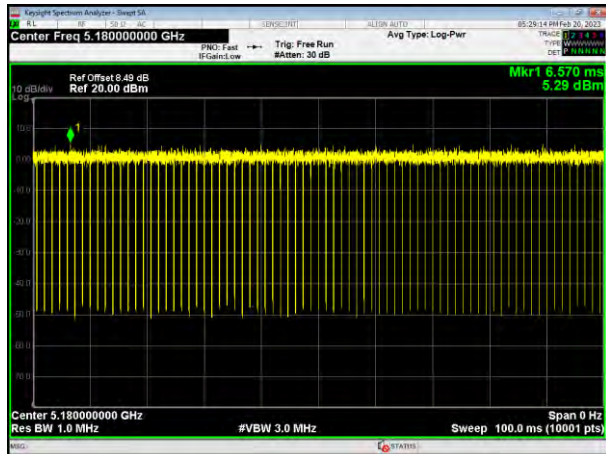
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**7.1.5 TEST RESULTS**

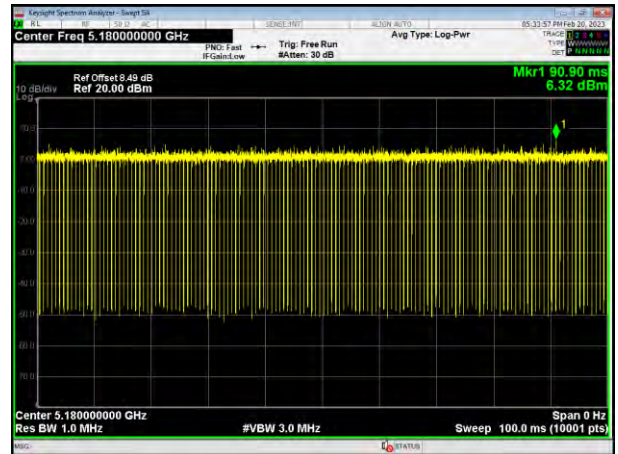
Operation Mode		Duty Cycle(%)	Duty Fator (dB) 10 * log (1/ Duty cycle)
Band 1	802.11a	97.57	0.11
	802.11n(HT20)	95.39	0.2
	802.11n(HT40)	91.4	0.39
	802.11ac(HT20)	93.63	0.29
	802.11ac(HT40)	88.76	0.52
	802.11ac(HT80)	82.03	0.86



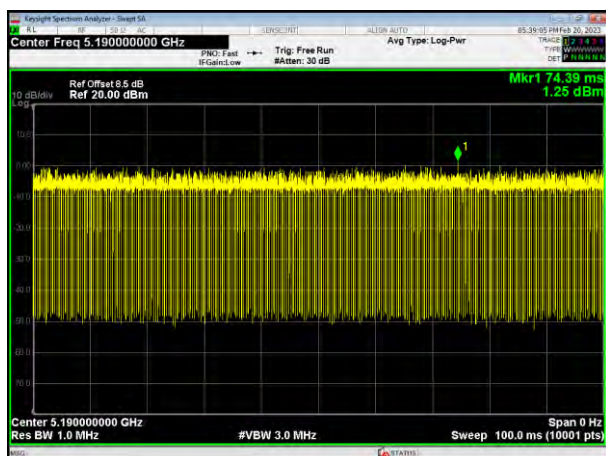
802.11a



802.11n HT20



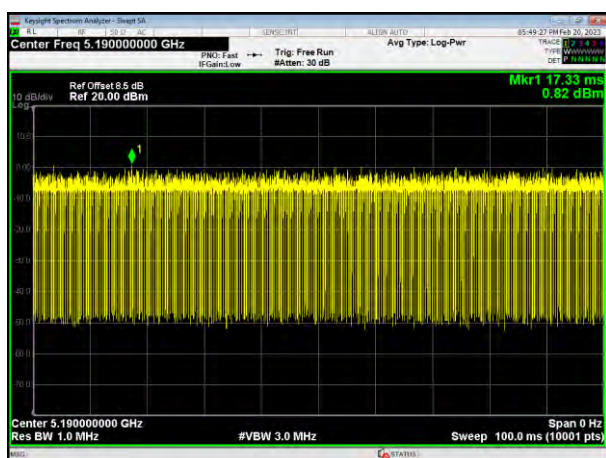
802.11n HT40



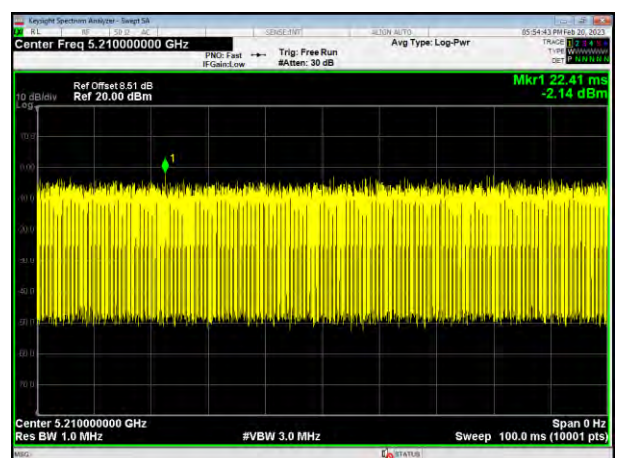
802.11ac HT20



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.

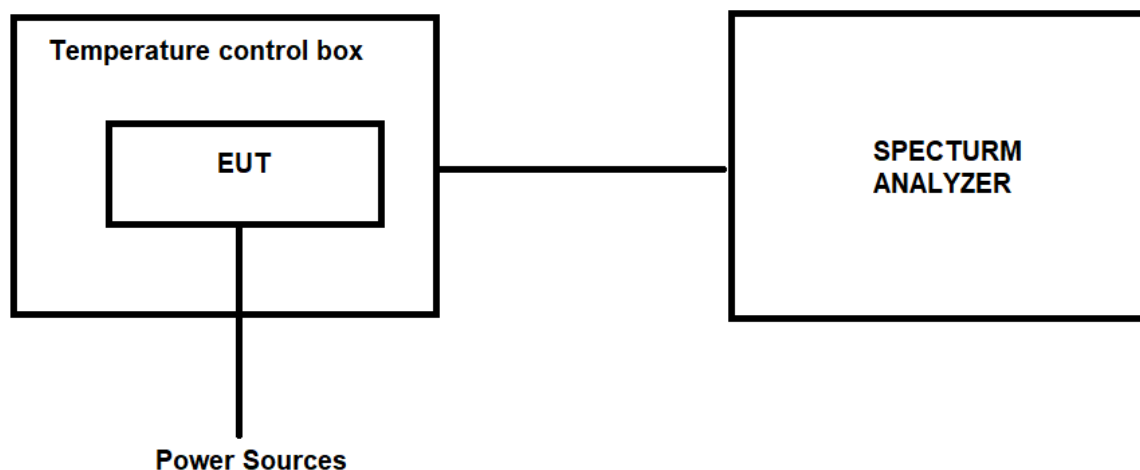
8.1.1 TEST PROCEDURE

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.

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
4.07V	-20℃	5180	5180.0323	5180.0354	5180.0336	0.0001673	0.0001834	0.0001740
		5220	5220.0314	5220.0316	5220.0367	0.0001639	0.0001650	0.0001916
		5240	5240.0238	5240.0265	5240.0226	0.0001247	0.0001389	0.0001184
3.33V		5180	5180.0214	5180.0273	5180.0264	0.0001109	0.0001414	0.0001368
		5220	5220.0363	5220.0358	5220.0358	0.0001895	0.0001869	0.0001869
		5240	5240.0222	5240.0252	5240.0244	0.0001163	0.0001320	0.0001279
3.7V	25℃	5180	5180.0547	5180.0553	5180.0563	0.0002833	0.0002865	0.0002916
		5220	5220.0265	5220.0284	5220.0238	0.0001383	0.0001482	0.0001242
		5240	5240.0353	5240.0346	5240.0342	0.0001850	0.0001813	0.0001792
4.07V	50℃	5180	5180.0317	5180.0367	5180.0354	0.0001642	0.0001901	0.0001834
		5220	5220.0275	5220.0245	5220.0237	0.0001436	0.0001279	0.0001237
		5240	5240.0326	5240.0354	5240.0375	0.0001708	0.0001855	0.0001965
3.33V	50℃	5180	5180.0345	5180.0326	5180.0364	0.0001787	0.0001689	0.0001886
		5220	5220.0213	5220.0227	5220.0276	0.0001112	0.0001185	0.0001441
		5240	5240.0327	5240.0355	5240.0358	0.0001713	0.0001860	0.0001876



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
4.07V	-20℃	5190	5190.0214	5190.0236	0.0001111	0.0001225
		5230	5230.0363	5230.0364	0.0001898	0.0001904
3.33V		5190	5190.0258	5190.0236	0.0001339	0.0001225
		5230	5230.0344	5230.0345	0.0001799	0.0001804
3.7V	25℃	5190	5190.0279	5190.0254	0.0001448	0.0001318
		5230	5230.0667	5230.0532	0.0003488	0.0002782
4.07V	50℃	5190	5190.0655	5190.0648	0.0003399	0.0003363
		5230	5230.0564	5230.0554	0.0002950	0.0002897
3.33V	50℃	5190	5190.0556	5190.0533	0.0002886	0.0002766
		5230	5230.0338	5230.0345	0.0001768	0.0001804

Test Voltage	Test Temp.	Measured Frequency (MHz)	Spectrum Frequency (MHz)	Δ Frequency (PPM)
			802.11ac HT80	802.11ac HT80
4.07V	-20°C	5210	5210.0133	0.0000693
3.33V		5210	5210.0285	0.0001485
3.7V	25°C	5210	5210.0478	0.0002490
4.07V	50°C	5210	5210.0314	0.0001636
3.33V	50°C	5210	5210.0336	0.0001751



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.

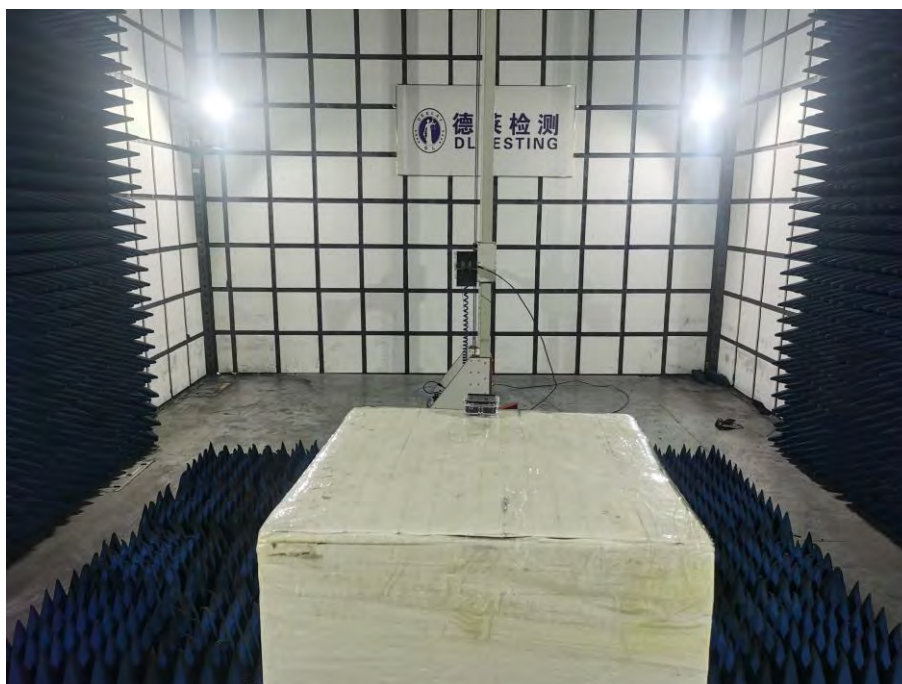
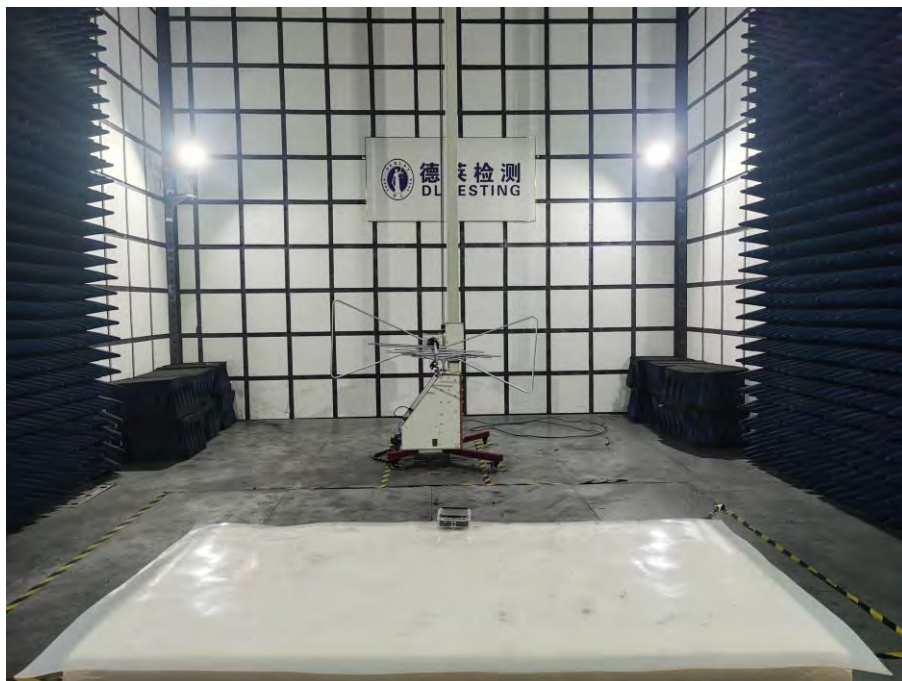
10.2 EUT ANTENNA

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



11. TEST SEUUP PHOTO

Radiated Measurement Photos





Conducted Measurement Photos

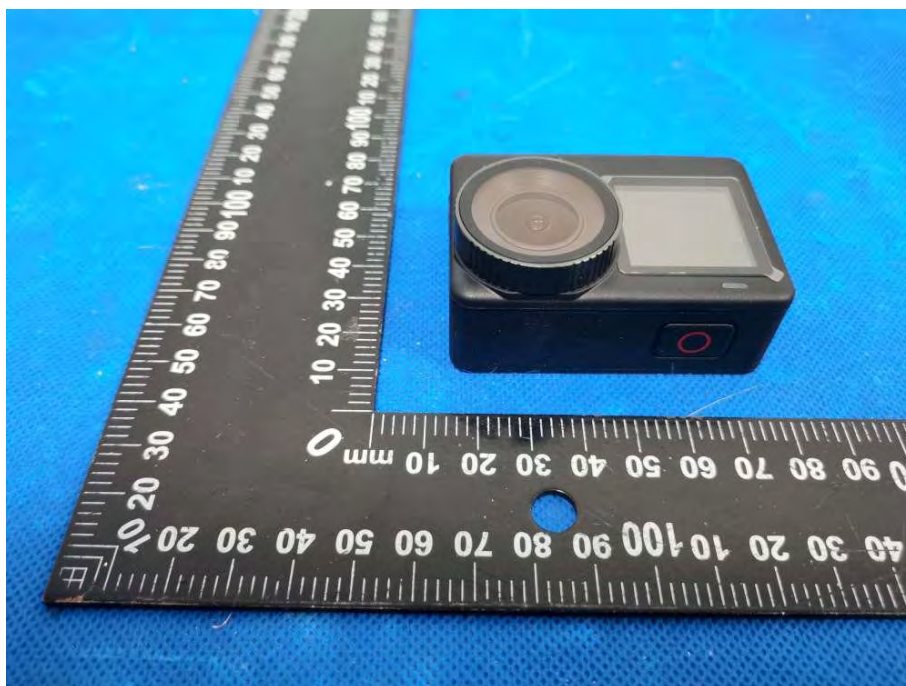


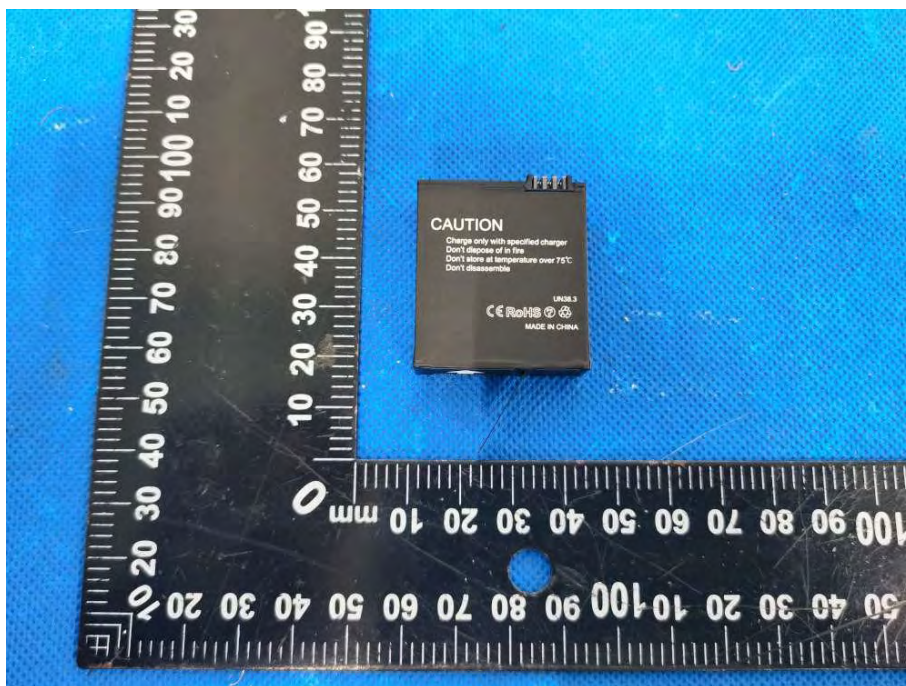


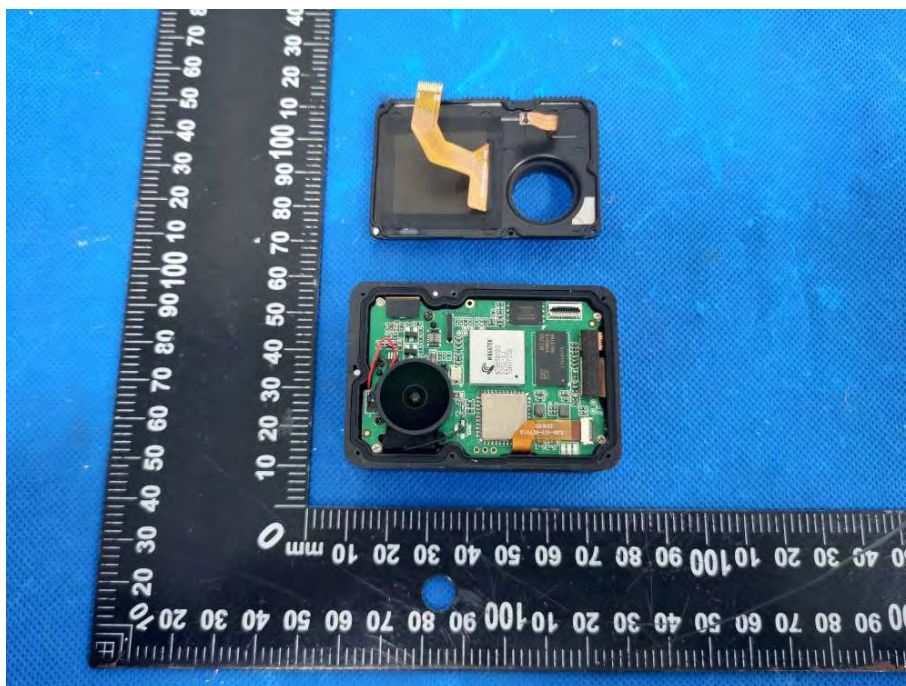
12. EUT PHOTO

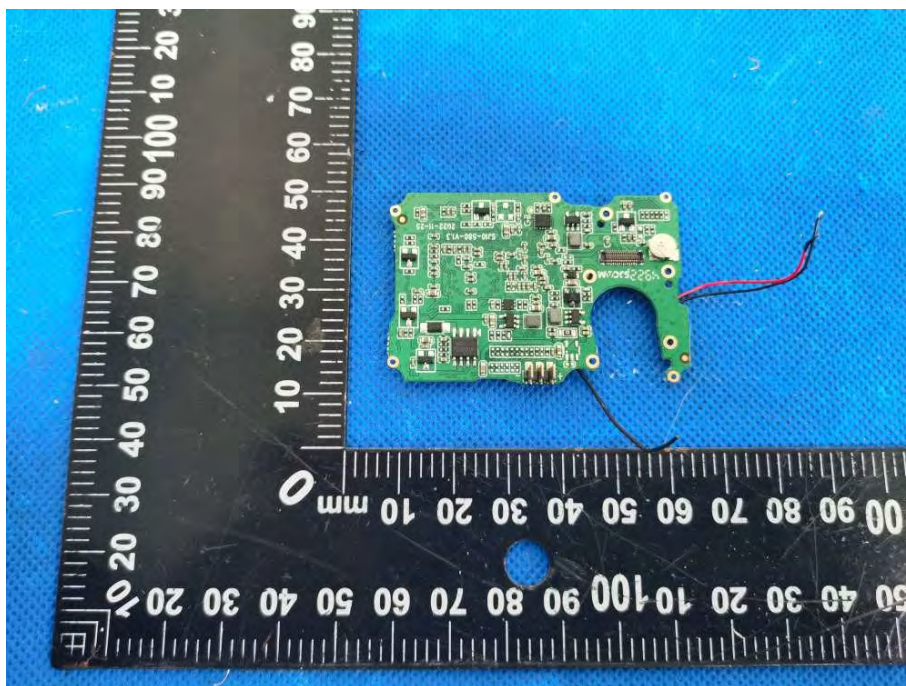
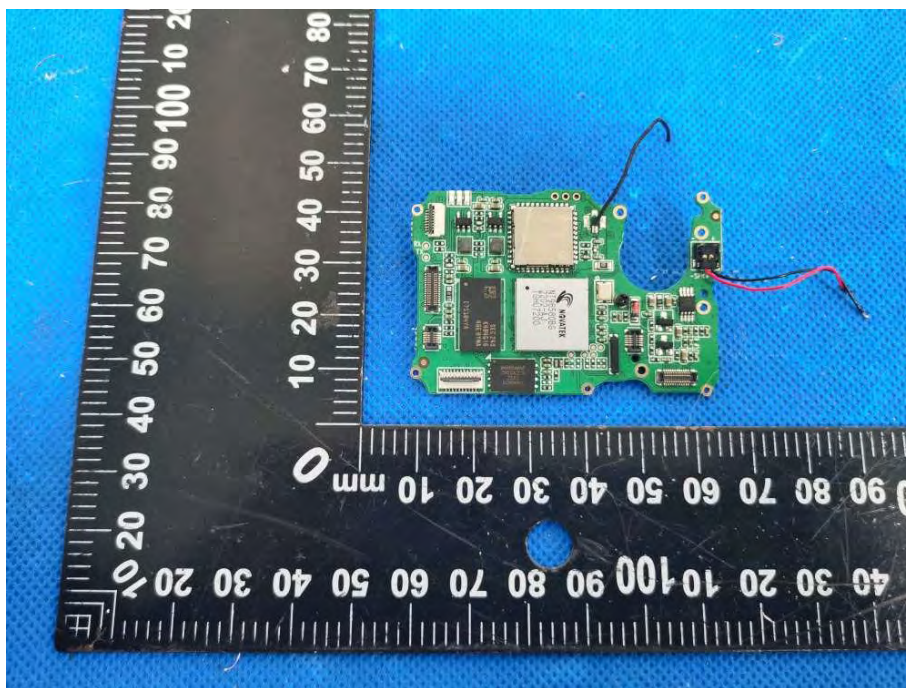


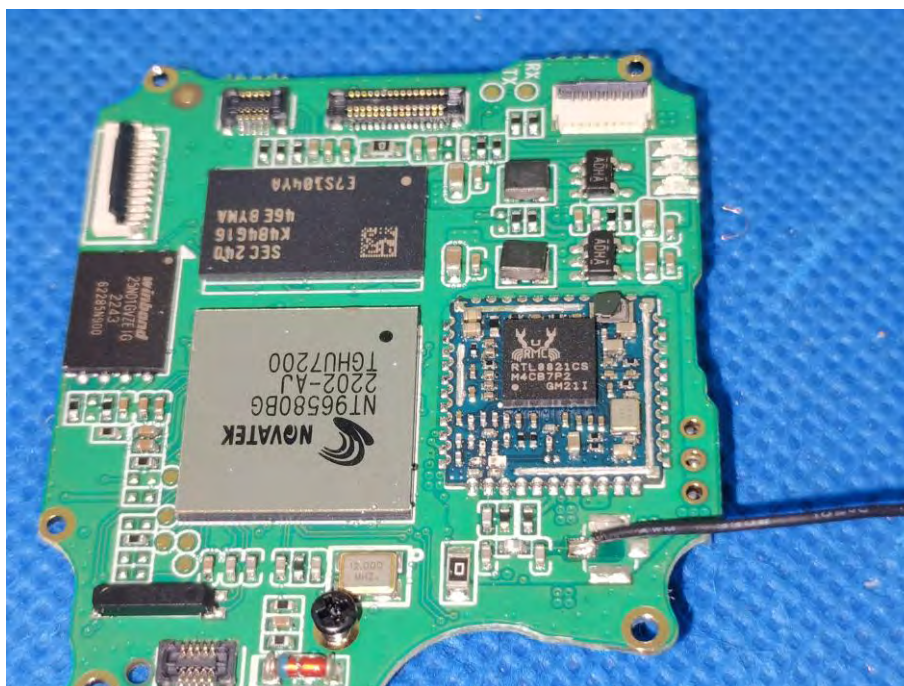
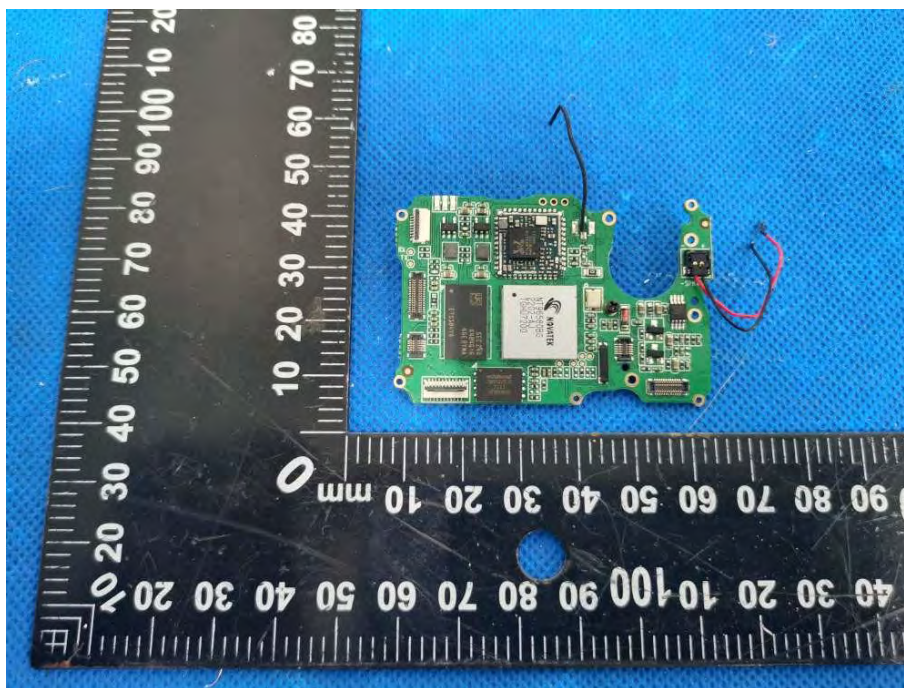












***** END OF REPORT *****