FCC TEST REPORT
FCC ID:ZHZDUO-1G-32

Report Number	**ZKT-2307265789E**
Date of Test	Jul. 26, 2023 to Aug. 16, 2023
Date of issue	Aug. 16, 2023
Total number of pages	62
Test Result	PASS
Testing Laboratory	**Shenzhen ZKT Technology Co., Ltd.**
Address	1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China
Applicant's name	**Dragino Technology Co., Limited**
Address	Room 202, Block B, BCT Incubation Bases, No.8 CaiYunRoad LongCheng Street, LongGang District ; Shenzhen 518116,China
Manufacturer's name	**Dragino Technology Co., Limited**
Address	Room 202, Block B, BCT Incubation Bases, No.8 CaiYunRoad LongCheng Street, LongGang District ; Shenzhen 518116,China
Test specification:	
Standard	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10:2013
Test procedure	/
Non-standard test method	N/A
Test Report Form No	/
Test Report Form(s) Originator	ZKT Testing
Master TRF	Dated: 2020-01-06

This device described above has been tested by ZKT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Product name	**Wireless IoT Module**
Trademark	DRAGINO
Model/Type reference	DUO-1G-32 DUO-2G-32
Ratings	Input: 12V⎓2.0A

Testing procedure and testing location:

Testing Laboratory.....:	**Shenzhen ZKT Technology Co., Ltd.**
Address.....:	1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China
Tested by (name + signature).....:	Jim Liu
Reviewer (name + signature).....:	Jackson Fang
Approved (name + signature).....:	Lake Xie

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1. VERSION

ReportNo.	Version	Description	Approved
ZKT-2307265789E	Rev.01	Initial issue of report	Aug. 16, 2023

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Result	Remark
FCC part 15.203/15.247 (c)	Antenna requirement	PASS	
FCC part 15.207	AC Power Line Conducted Emission	PASS	
FCC part 15.247 (b)(3)	Conducted Peak Output Power	PASS	
FCC part 15.247 (a)(2)	Channel Bandwidth	PASS	
FCC part 15.247 (e)	Power Spectral Density	PASS	
FCC part 15.247(d)	Band Edge	PASS	
FCC part 15.205/15.209	Spurious Emission	PASS	
ANSI C63.10:2013	Duty cycle	PASS	

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

2.1 TEST FACILITY

Shenzhen ZKT Technology Co., Ltd.
Add. : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 692225
Designation Number: CN1299
IC Registered No.: 27033
CAB identifier: CN0110

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± 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	3m camber Radiated spurious emission(9KHz-30MHz)	U=4.5dB
2	3m camber Radiated spurious emission(30MHz-1GHz)	U=4.8dB
3	3m chamber Radiated spurious emission(1GHz-6GHz)	U=4.9dB
4	3m chamber Radiated spurious emission(6GHz-40GHz)	U=5.0dB
5	Conducted disturbance	U=3.2dB
6	RF Band Edge	U=1.68dB
7	RF power conducted	U=1.86dB
8	RF conducted Spurious Emission	U=2.2dB
9	RF Occupied Bandwidth	U=1.8MHz
10	RF Power Spectral Density	U=1.75dB
11	humidity uncertainty	U=5.3%
12	Temperature uncertainty	U=0.59℃

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Product Name:	Wireless IoT Module
Model No.:	DUO-1G-32
Model Different.:	Only the model name and memory size differ.
Serial No.:	DUO-2G-32
Sample ID	ZKT-2307265789E-1
Sample(s) Status:	Engineer sample
Channel numbers:	802.11b/802.11g /802.11n(HT20):11 802.11n(HT40):7
Channel separation:	5MHz
Modulation technology:	802.11b: Direct Sequence Spread Spectrum(DSSS) 802.11g/802.11n(HT20/HT40): Orthogonal Frequency Division Multiplexing(OFDM)
Antenna Type and Antenna gain:	The 2.4G WIFI 802.11b, 802.11g, working in SISO model, then the antenna gain as below: 802.11b,802.11g: FPCB Antenna 1: 2.08dBi 802.11b,802.11g: FPCB Antenna 2: 2.08dBi
	The 2.4G WIFI 802.11n20, 802.11n40 can MIMO model, then the antenna gain as below: Directional gain=2.08dBi+10×log(1+1)dB=5.09dBi
Power supply:	Input: 12V⎓2.0A
Power Adapter:	Input: AC 100-240V ~ 50/60Hz, 1A (Max) Output: 12V⎓2.0A
Power Adapter Mode:	TP04-120200U

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	Frequency (MHz)	
	802.11b/802.11g/802.11n(HT20)	802.11n(HT40)
Lowest channel	2412MHz	2422MHz
Middle channel	2437MHz	2437MHz
Highest channel	2462MHz	2452MHz

3.2 DESCRIPTION OF TEST MODES

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

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

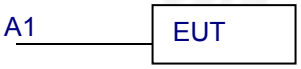
Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)
Data rate	1Mbps	6Mbps	6.5Mbps	13Mbps

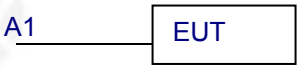
Test Software	Realtek Test Tool
Power level setup	<15dBm

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

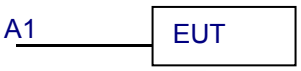
Conducted Emission



Radiated Emission



Conducted Spurious



3.4 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	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Wireless IoT Module	DRAGINO	DUO-1G-32	DUO-2G-32	EUT
A1	Class 2 Power Supply	Itertek	TP04-120200U	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

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

3.5EQUIPMENTS LIST FOR ALL TEST ITEMS

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	Oct. 21, 2022	Oct. 20, 2023
2	LISN	CYBERTEK	EM5040A	E1850400149	Oct. 21, 2022	Oct. 20, 2023
3	Test Cable	N/A	C-01	N/A	Oct. 21, 2022	Oct. 20, 2023
4	Test Cable	N/A	C-02	N/A	Oct. 21, 2022	Oct. 20, 2023
5	Test Cable	N/A	C-03	N/A	Oct. 21, 2022	Oct. 20, 2023
6	EMI Test Receiver	R&S	ESCI3	101393	Oct. 28, 2022	Oct. 27, 2023
7	Triple-Loop Antenna	N/A	RF300	N/A	Oct. 28, 2022	Oct. 27, 2023
8	Absorbing Clamp	DZ	ZN23201	15034	Oct. 31, 2022	Oct. 30, 2023
9	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	\	\

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	9020A	MY55370835	Oct. 28, 2022	Oct. 27, 2023
2	Spectrum Analyzer (10kHz-39.9GHz)	R&S	FSQ	100363	Oct. 28, 2022	Oct. 27, 2023
3	EMI Test Receiver (9kHz-7GHz)	R&S	ESCI7	101169	Oct. 28, 2022	Oct. 27, 2023
4	Bilog Antenna (30MHz-1500MHz)	Schwarzbeck	VULB9168	N/A	Nov. 02, 2022	Nov. 01, 2023
5	Horn Antenna (1GHz-18GHz)	Agilent	AH-118	071145	Nov. 01, 2022	Oct. 31, 2023
6	Horn Antenna (15GHz-40GHz)	A.H.System	SAS-574	588	Oct. 28, 2022	Oct. 27, 2023
7	Loop Antenna	TESEQ	HLA6121	58357	Nov. 01, 2022	Oct. 31, 2023
8	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	060747	Nov. 15, 2022	Nov. 14, 2023
9	Amplifier (1GHz-26.5GHz)	Agilent	8449B	3008A00315	Oct. 28, 2022	Oct. 27, 2023
10	Amplifier (500MHz-40GHz)	Quanjuda	DLE-161	097	Oct. 28, 2022	Oct. 27, 2023
11	Test Cable	N/A	R-01	N/A	Oct. 28, 2022	Oct. 27, 2023
12	Test Cable	N/A	R-02	N/A	Oct. 28, 2022	Oct. 27, 2023
13	Test Cable	N/A	R-03	N/A	Oct. 28, 2022	Oct. 27, 2023
14	D.C. Power Supply	LongWei	TPR-6405D	N/A	\	\
15	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	\	\
16	Turntable	MF	MF-7802BS	N/A	\	\
17	Antenna tower	MF	MF-7802BS	N/A	\	\

RF Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	9020A	MY55370835	Oct. 28, 2022	Oct. 27, 2023
2	Test Cable	N/A	RF-01	N/A	Oct. 28, 2022	Oct. 27, 2023
3	Test Cable	N/A	RF-02	N/A	Oct. 28, 2022	Oct. 27, 2023
4	Test Cable	N/A	RF-03	N/A	Oct. 28, 2022	Oct. 27, 2023
5	ESG Signal Generator	Agilent	E4421B	N/A	Oct. 21, 2022	Oct. 20, 2023
6	Signal Generator	Agilent	N5182A	N/A	Oct. 21, 2022	Oct. 20, 2023
7	Magnetic Field Probe Tester	Narda	ELT-400	0-0344	Nov. 15, 2022	Nov. 14, 2023
8	Wideband Radio Communication Test	R&S	CMW500	106504	Oct. 28, 2022	Oct. 27, 2023
9	MWRF Power Meter Test system	MW	MW100-RP CB	N/A	Oct. 21, 2022	Oct. 20, 2023
10	Power Meter	KEYSIGHT	N1912A P	N/A	A.05.00	Oct. 21, 2022
11	RF Software	MW	MTS8310	V2.0.0.0	\	\

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION Limits

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

Note:

(1) *Decreases with the logarithm of the frequency.

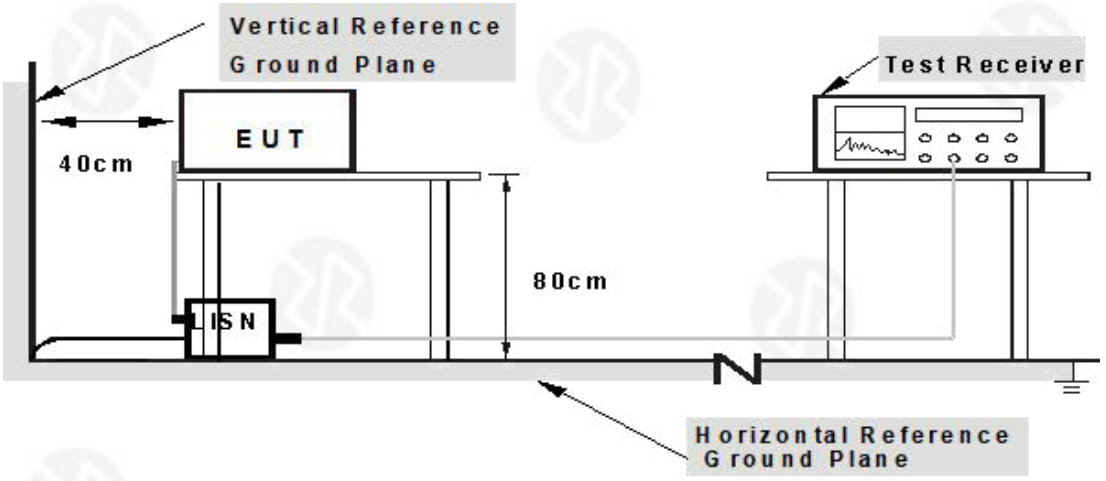
4.1.2 TEST PROCEDURE

a. The EUT was placed 0.1 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.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



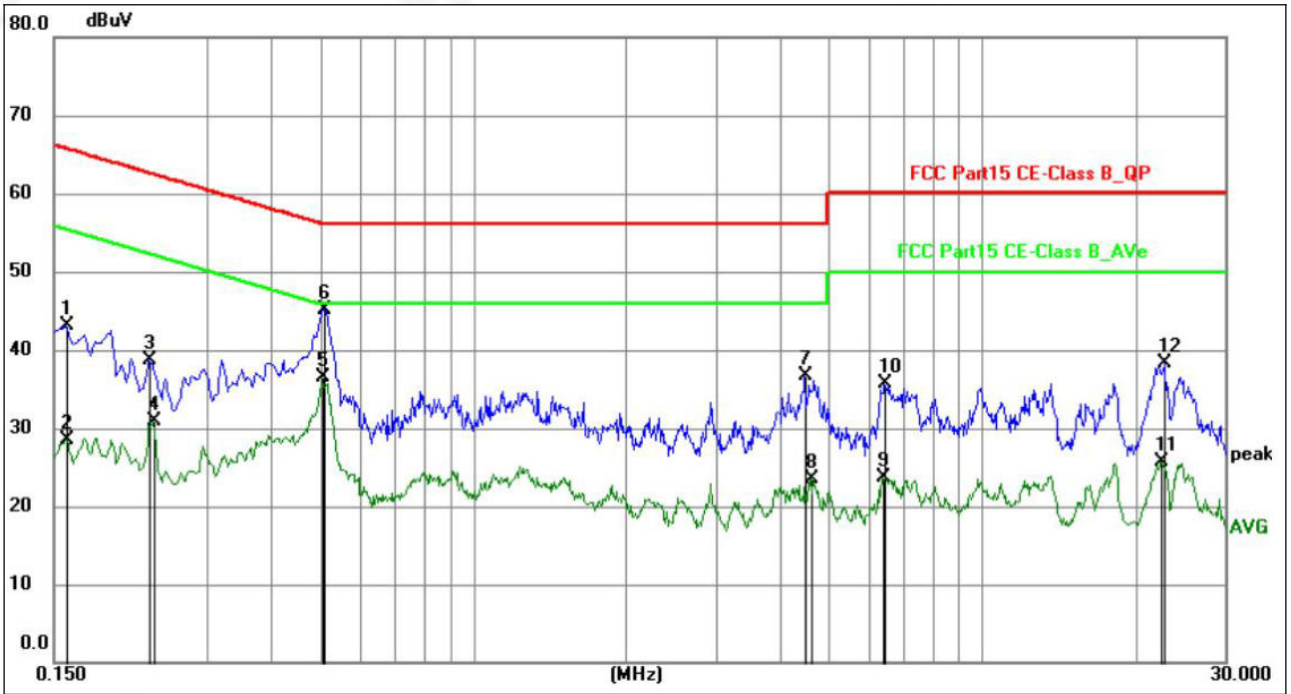
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

4.1.5 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.

4.1.6 TEST RESULT

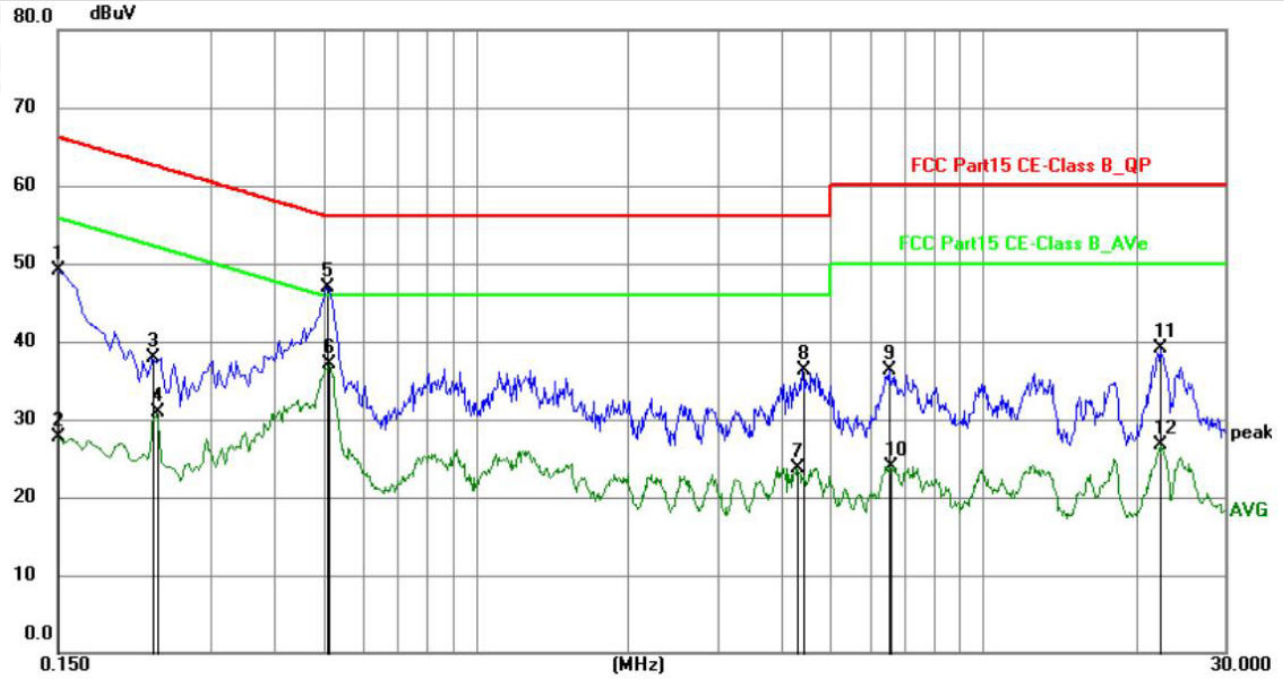
Temperature :	26℃	Relative Humidity:	54%
Pressure :	101kPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Channel :	802.11n20(MIMO) 2412MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1590	22.64	20.52	43.16	65.52	-22.36	QP	P	
2	0.1590	8.00	20.52	28.52	55.52	-27.00	AVG	P	
3	0.2310	18.04	20.67	38.71	62.41	-23.70	QP	P	
4	0.2355	10.26	20.67	30.93	52.25	-21.32	AVG	P	
5	0.5055	16.03	20.55	36.58	46.00	-9.42	AVG	P	
6	0.5100	24.64	20.55	45.19	56.00	-10.81	QP	P	
7	4.4790	15.88	20.90	36.78	56.00	-19.22	QP	P	
8	4.6140	2.58	20.91	23.49	46.00	-22.51	AVG	P	
9	6.3645	2.59	21.12	23.71	50.00	-26.29	AVG	P	
10	6.4320	14.54	21.13	35.67	60.00	-24.33	QP	P	
11	22.4430	4.06	21.74	25.80	50.00	-24.20	AVG	P	
12	22.8570	16.49	21.75	38.24	60.00	-21.76	QP	P	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor
4.Only the worst test data was recorded is 802.11n20(MIMO) 2412MHz.

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	N
Test Voltage ：	AC 120V/60Hz	Test Channel：	802.11n20(MIMO) 2412MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	28.48	20.58	49.06	66.00	-16.94	QP	P	
2	0.1500	7.10	20.58	27.68	56.00	-28.32	AVG	P	
3	0.2310	17.12	20.78	37.90	62.41	-24.51	QP	P	
4	0.2355	10.12	20.78	30.90	52.25	-21.35	AVG	P	
5	0.5100	26.23	20.69	46.92	56.00	-9.08	QP	P	
6	0.5144	16.36	20.69	37.05	46.00	-8.95	AVG	P	
7	4.3034	2.74	20.96	23.70	46.00	-22.30	AVG	P	
8	4.4115	15.33	20.97	36.30	56.00	-19.70	QP	P	
9	6.5445	15.21	21.16	36.37	60.00	-23.63	QP	P	
10	6.5895	2.80	21.16	23.96	50.00	-26.04	AVG	P	
11	22.3215	17.52	21.65	39.17	60.00	-20.83	QP	P	
12	22.3215	5.01	21.65	26.66	50.00	-23.34	AVG	P	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor
4.Only the worst test data was recorded is 802.11n20(MIMO) 2412MHz.

4.2 RADIATED EMISSION MEASUREMENT

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>9kHz to 25GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td>9KHz-150KHz</td><td>Quasi-peak</td><td>200Hz</td><td>600Hz</td><td>Quasi-peak</td></tr>
<tr><td>150KHz-30MHz</td><td>Quasi-peak</td><td>9KHz</td><td>30KHz</td><td>Quasi-peak</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average</td></tr>
</table>
</td></tr>
</table>

4.2.1 RADIATED EMISSION LIMITS

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

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).

4.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.1 meters above the ground at a 3 meter semi-anechoiccamber. 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 avariable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum valueof 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 toheights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1meter) 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 bestopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dBmargin would be re-tested one by one using peak, quasi-peak or average method as specified and then reportedin 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 andchange form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

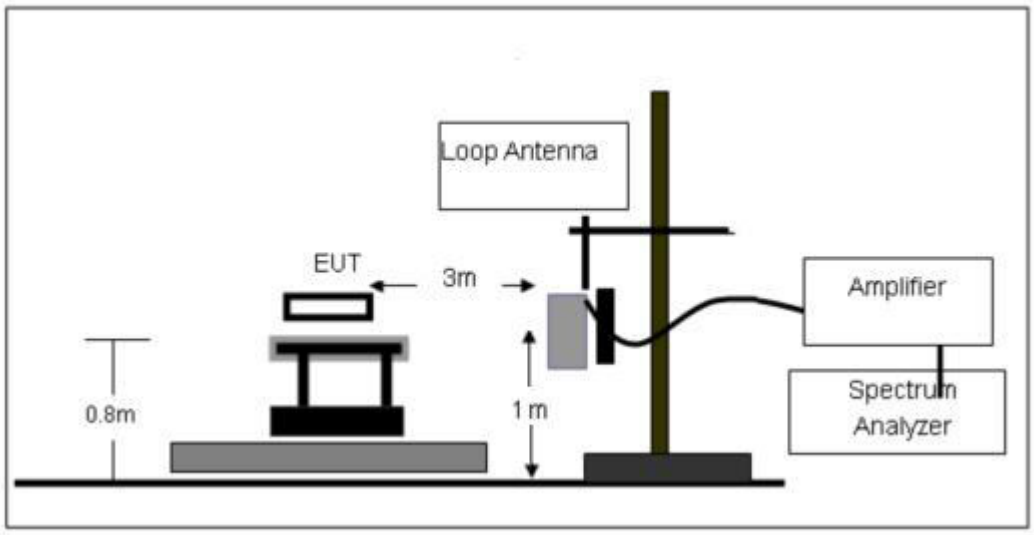
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3 DEVIATION FROM TEST STANDARD

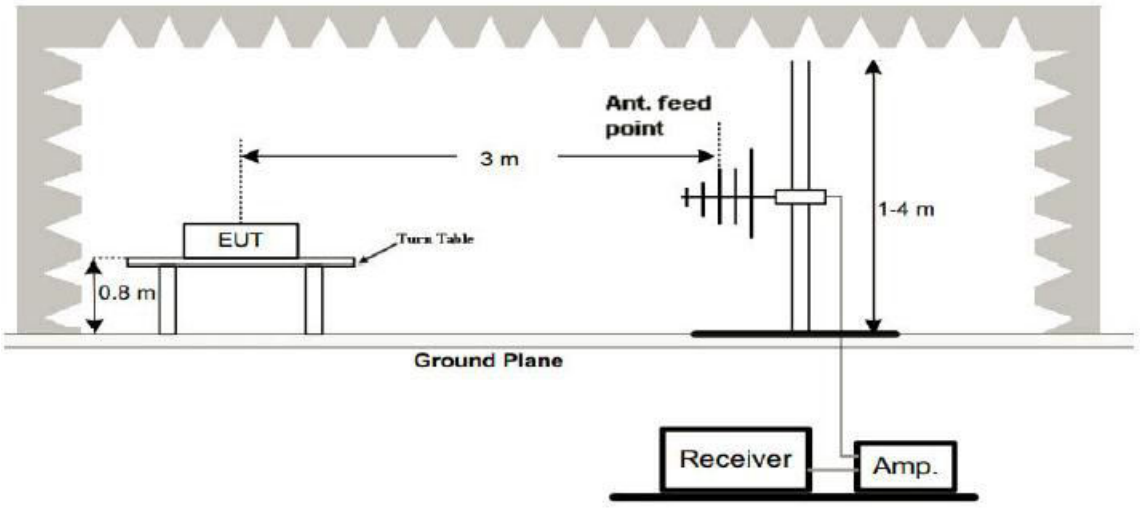
No deviation

4.2.4 TEST SETUP

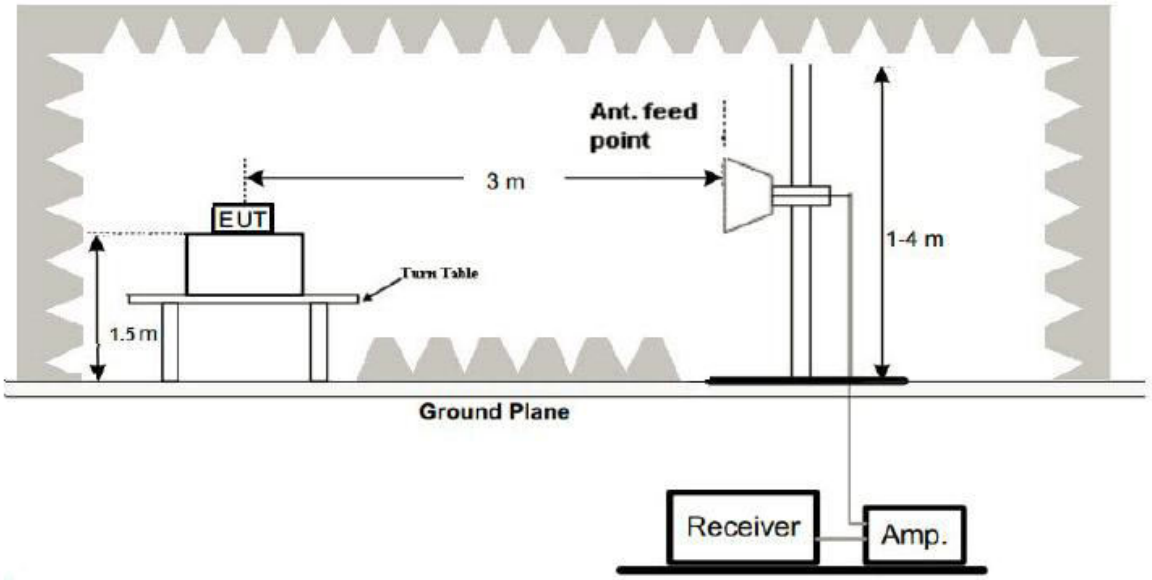
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



4.2.5 EUT OPERATING 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.

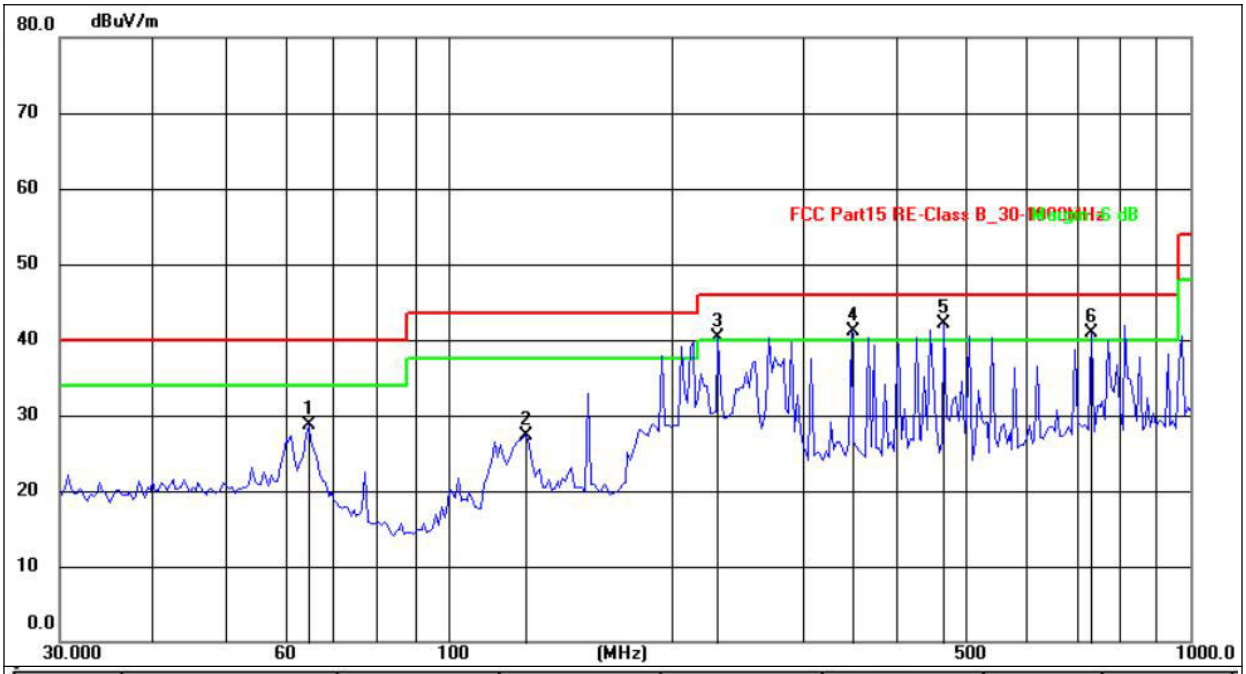
4.2.6 TEST RESULTS

Between 9KHz – 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

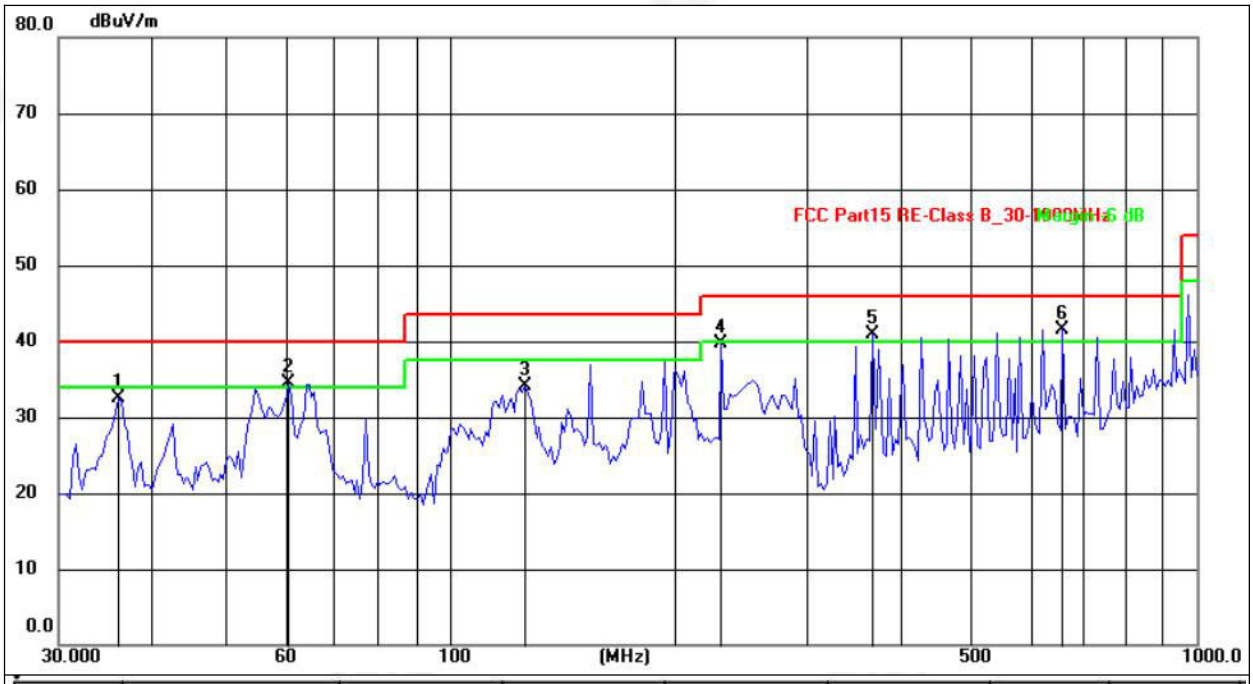
Between 30MHz – 1GHz

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	DC 12V	Test Channel :	802.11n20(MIMO) 2412MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	64.8864	38.23	-9.53	28.70	40.00	-11.30	QP
2	127.4407	39.27	-11.97	27.30	43.50	-16.20	QP
3	231.3119	51.17	-10.93	40.24	46.00	-5.76	QP
4	349.2500	51.85	-10.78	41.07	46.00	-4.93	QP
5	466.4164	49.34	-7.29	42.05	46.00	-3.95	QP
6	735.7802	41.69	-0.79	40.90	46.00	-5.10	QP

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 12V	Test Channel :	802.11n20(MIMO) 2412MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	36.0638	43.92	-11.44	32.48	40.00	-7.52	QP
2	61.0243	46.91	-12.42	34.49	40.00	-5.51	QP
3	126.3285	49.34	-15.24	34.10	43.50	-9.40	QP
4	231.3119	53.95	-14.32	39.63	46.00	-6.37	QP
5	368.1116	50.90	-10.08	40.82	46.00	-5.18	QP
6	662.3106	43.28	-1.68	41.60	46.00	-4.40	QP

Remarks:
1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2.The emission levels of other frequencies are very lower than the limit and not show in test report.
3.The test data shows only the worst case 802.11n20 MIMO 2412MHz.

1GHz~25GHz

802.11b

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2412MHz									
V	4824.00	52.16	30.55	5.77	24.66	52.04	74.00	-21.96	PK
V	4824.00	43.10	30.55	5.77	24.66	42.98	54.00	-11.02	AV
V	7236.00	52.47	30.33	6.32	24.55	53.01	74.00	-20.99	PK
V	7236.00	43.92	30.33	6.32	24.55	44.46	54.00	-9.54	AV
V	9648.00	53.15	30.85	7.45	24.69	54.44	74.00	-19.56	PK
V	9648.00	43.40	30.85	7.45	24.69	44.69	54.00	-9.31	AV
V	12060.00	54.25	31.02	8.99	25.57	57.79	74.00	-16.21	PK
V	12060.00	43.29	31.02	8.99	25.57	46.83	54.00	-7.17	AV
H	4824.00	50.75	30.55	5.77	24.66	50.63	74.00	-23.37	PK
H	4824.00	43.48	30.55	5.77	24.66	43.36	54.00	-10.64	AV
H	7236.00	50.21	30.33	6.32	24.55	50.75	74.00	-23.25	PK
H	7236.00	43.81	30.33	6.32	24.55	44.35	54.00	-9.65	AV
H	9648.00	52.18	30.85	7.45	24.69	53.47	74.00	-20.53	PK
H	9648.00	43.48	30.85	7.45	24.69	44.77	54.00	-9.23	AV
H	12060.00	54.39	31.02	8.99	25.57	57.93	74.00	-16.07	PK
H	12060.00	43.65	31.02	8.99	25.57	47.19	54.00	-6.81	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2437MHz									
V	4874.00	53.25	30.55	5.77	24.66	53.13	74.00	-20.87	PK
V	4874.00	43.06	30.55	5.77	24.66	42.94	54.00	-11.06	AV
V	7311.00	54.31	30.33	6.32	24.55	54.85	74.00	-19.15	PK
V	7311.00	43.00	30.33	6.32	24.55	43.54	54.00	-10.46	AV
V	9748.00	53.82	30.85	7.45	24.69	55.11	74.00	-18.89	PK
V	9748.00	43.05	30.85	7.45	24.69	44.34	54.00	-9.66	AV
V	12185.00	54.89	31.02	8.99	25.57	58.43	74.00	-15.57	PK
V	12185.00	43.77	31.02	8.99	25.57	47.31	54.00	-6.69	AV
H	4874.00	53.86	30.55	5.77	24.66	53.74	74.00	-20.26	PK
H	4874.00	43.71	30.55	5.77	24.66	43.59	54.00	-10.41	AV
H	7311.00	50.43	30.33	6.32	24.55	50.97	74.00	-23.03	PK
H	7311.00	43.59	30.33	6.32	24.55	44.13	54.00	-9.87	AV
H	9748.00	54.15	30.85	7.45	24.69	55.44	74.00	-18.56	PK
H	9748.00	43.72	30.85	7.45	24.69	45.01	54.00	-8.99	AV
H	12185.00	50.43	31.02	8.99	25.57	53.97	74.00	-20.03	PK
H	12185.00	43.73	31.02	8.99	25.57	47.27	54.00	-6.73	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:2462MHz									
V	4924.00	51.65	30.55	5.77	24.66	51.53	74.00	-22.47	PK
V	4924.00	43.56	30.55	5.77	24.66	43.44	54.00	-10.56	AV
V	7386.00	50.55	30.33	6.32	24.55	51.09	74.00	-22.91	PK
V	7386.00	43.15	30.33	6.32	24.55	43.69	54.00	-10.31	AV
V	9848.00	52.93	30.85	7.45	24.69	54.22	74.00	-19.78	PK
V	9848.00	43.16	30.85	7.45	24.69	44.45	54.00	-9.55	AV
V	12310.00	50.86	31.02	8.99	25.57	54.40	74.00	-19.60	PK
V	12310.00	43.76	31.02	8.99	25.57	47.30	54.00	-6.70	AV
H	4924.00	54.07	30.55	5.77	24.66	53.95	74.00	-20.05	PK
H	4924.00	43.52	30.55	5.77	24.66	43.40	54.00	-10.60	AV
H	7386.00	54.85	30.33	6.32	24.55	55.39	74.00	-18.61	PK
H	7386.00	43.42	30.33	6.32	24.55	43.96	54.00	-10.04	AV
H	9848.00	50.96	30.85	7.45	24.69	52.25	74.00	-21.75	PK
H	9848.00	43.30	30.85	7.45	24.69	44.59	54.00	-9.41	AV
H	12310.00	51.49	31.02	8.99	25.57	55.03	74.00	-18.97	PK
H	12310.00	43.62	31.02	8.99	25.57	47.16	54.00	-6.84	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.
4. The test data shows only the worst case ANT1.

802.11g

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2412MHz									
V	4824.00	53.15	30.55	5.77	24.66	53.03	74.00	-20.97	PK
V	4824.00	43.92	30.55	5.77	24.66	43.80	54.00	-10.20	AV
V	7236.00	51.73	30.33	6.32	24.55	52.27	74.00	-21.73	PK
V	7236.00	43.42	30.33	6.32	24.55	43.96	54.00	-10.04	AV
V	9648.00	53.71	30.85	7.45	24.69	55.00	74.00	-19.00	PK
V	9648.00	43.18	30.85	7.45	24.69	44.47	54.00	-9.53	AV
V	12060.00	54.85	31.02	8.99	25.57	58.39	74.00	-15.61	PK
V	12060.00	43.09	31.02	8.99	25.57	46.63	54.00	-7.37	AV
H	4824.00	53.03	30.55	5.77	24.66	52.91	74.00	-21.09	PK
H	4824.00	43.40	30.55	5.77	24.66	43.28	54.00	-10.72	AV
H	7236.00	52.79	30.33	6.32	24.55	53.33	74.00	-20.67	PK
H	7236.00	43.86	30.33	6.32	24.55	44.40	54.00	-9.60	AV
H	9648.00	50.34	30.85	7.45	24.69	51.63	74.00	-22.37	PK
H	9648.00	43.45	30.85	7.45	24.69	44.74	54.00	-9.26	AV
H	12060.00	52.52	31.02	8.99	25.57	56.06	74.00	-17.94	PK
H	12060.00	43.37	31.02	8.99	25.57	46.91	54.00	-7.09	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2437MHz									
V	4874.00	53.67	30.55	5.77	24.66	53.55	74.00	-20.45	PK
V	4874.00	43.88	30.55	5.77	24.66	43.76	54.00	-10.24	AV
V	7311.00	54.38	30.33	6.32	24.55	54.92	74.00	-19.08	PK
V	7311.00	43.02	30.33	6.32	24.55	43.56	54.00	-10.44	AV
V	9748.00	52.19	30.85	7.45	24.69	53.48	74.00	-20.52	PK
V	9748.00	43.73	30.85	7.45	24.69	45.02	54.00	-8.98	AV
V	12185.00	51.15	31.02	8.99	25.57	54.69	74.00	-19.31	PK
V	12185.00	43.26	31.02	8.99	25.57	46.80	54.00	-7.20	AV
H	4874.00	54.88	30.55	5.77	24.66	54.76	74.00	-19.24	PK
H	4874.00	43.93	30.55	5.77	24.66	43.81	54.00	-10.19	AV
H	7311.00	52.17	30.33	6.32	24.55	52.71	74.00	-21.29	PK
H	7311.00	43.30	30.33	6.32	24.55	43.84	54.00	-10.16	AV
H	9748.00	52.93	30.85	7.45	24.69	54.22	74.00	-19.78	PK
H	9748.00	43.85	30.85	7.45	24.69	45.14	54.00	-8.86	AV
H	12185.00	52.15	31.02	8.99	25.57	55.69	74.00	-18.31	PK
H	12185.00	43.19	31.02	8.99	25.57	46.73	54.00	-7.27	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:2462MHz									
V	4924.00	54.79	30.55	5.77	24.66	54.67	74.00	-19.33	PK
V	4924.00	43.72	30.55	5.77	24.66	43.60	54.00	-10.40	AV
V	7386.00	52.92	30.33	6.32	24.55	53.46	74.00	-20.54	PK
V	7386.00	43.78	30.33	6.32	24.55	44.32	54.00	-9.68	AV
V	9848.00	52.76	30.85	7.45	24.69	54.05	74.00	-19.95	PK
V	9848.00	43.99	30.85	7.45	24.69	45.28	54.00	-8.72	AV
V	12310.00	54.53	31.02	8.99	25.57	58.07	74.00	-15.93	PK
V	12310.00	43.30	31.02	8.99	25.57	46.84	54.00	-7.16	AV
H	4924.00	53.24	30.55	5.77	24.66	53.12	74.00	-20.88	PK
H	4924.00	43.08	30.55	5.77	24.66	42.96	54.00	-11.04	AV
H	7386.00	51.18	30.33	6.32	24.55	51.72	74.00	-22.28	PK
H	7386.00	43.72	30.33	6.32	24.55	44.26	54.00	-9.74	AV
H	9848.00	52.65	30.85	7.45	24.69	53.94	74.00	-20.06	PK
H	9848.00	43.64	30.85	7.45	24.69	44.93	54.00	-9.07	AV
H	12310.00	52.13	31.02	8.99	25.57	55.67	74.00	-18.33	PK
H	12310.00	43.97	31.02	8.99	25.57	47.51	54.00	-6.49	AV

Remark:
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
4. The test data shows only the worst case ANT1.

802.11n20

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2412MHz									
V	4824.00	51.44	30.55	5.77	24.66	51.32	74.00	-22.68	PK
V	4824.00	43.57	30.55	5.77	24.66	43.45	54.00	-10.55	AV
V	7236.00	51.85	30.33	6.32	24.55	52.39	74.00	-21.61	PK
V	7236.00	43.25	30.33	6.32	24.55	43.79	54.00	-10.21	AV
V	9648.00	53.26	30.85	7.45	24.69	54.55	74.00	-19.45	PK
V	9648.00	43.67	30.85	7.45	24.69	44.96	54.00	-9.04	AV
V	12060.00	54.44	31.02	8.99	25.57	57.98	74.00	-16.02	PK
V	12060.00	43.96	31.02	8.99	25.57	47.50	54.00	-6.50	AV
H	4824.00	51.02	30.55	5.77	24.66	50.90	74.00	-23.10	PK
H	4824.00	43.58	30.55	5.77	24.66	43.46	54.00	-10.54	AV
H	7236.00	52.12	30.33	6.32	24.55	52.66	74.00	-21.34	PK
H	7236.00	43.51	30.33	6.32	24.55	44.05	54.00	-9.95	AV
H	9648.00	53.21	30.85	7.45	24.69	54.50	74.00	-19.50	PK
H	9648.00	43.51	30.85	7.45	24.69	44.80	54.00	-9.20	AV
H	12060.00	53.85	31.02	8.99	25.57	57.39	74.00	-16.61	PK
H	12060.00	43.24	31.02	8.99	25.57	46.78	54.00	-7.22	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2437MHz									
V	4874.00	52.54	30.55	5.77	24.66	52.42	74.00	-21.58	PK
V	4874.00	43.60	30.55	5.77	24.66	43.48	54.00	-10.52	AV
V	7311.00	54.06	30.33	6.32	24.55	54.60	74.00	-19.40	PK
V	7311.00	43.08	30.33	6.32	24.55	43.62	54.00	-10.38	AV
V	9748.00	52.61	30.85	7.45	24.69	53.90	74.00	-20.10	PK
V	9748.00	43.38	30.85	7.45	24.69	44.67	54.00	-9.33	AV
V	12185.00	51.46	31.02	8.99	25.57	55.00	74.00	-19.00	PK
V	12185.00	43.38	31.02	8.99	25.57	46.92	54.00	-7.08	AV
H	4874.00	51.63	30.55	5.77	24.66	51.51	74.00	-22.49	PK
H	4874.00	43.55	30.55	5.77	24.66	43.43	54.00	-10.57	AV
H	7311.00	52.83	30.33	6.32	24.55	53.37	74.00	-20.63	PK
H	7311.00	43.12	30.33	6.32	24.55	43.66	54.00	-10.34	AV
H	9748.00	53.59	30.85	7.45	24.69	54.88	74.00	-19.12	PK
H	9748.00	43.99	30.85	7.45	24.69	45.28	54.00	-8.72	AV
H	12185.00	51.39	31.02	8.99	25.57	54.93	74.00	-19.07	PK
H	12185.00	43.30	31.02	8.99	25.57	46.84	54.00	-7.16	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:2462MHz									
V	4924.00	53.64	30.55	5.77	24.66	53.52	74.00	-20.48	PK
V	4924.00	43.34	30.55	5.77	24.66	43.22	54.00	-10.78	AV
V	7386.00	52.64	30.33	6.32	24.55	53.18	74.00	-20.82	PK
V	7386.00	43.08	30.33	6.32	24.55	43.62	54.00	-10.38	AV
V	9848.00	51.70	30.85	7.45	24.69	52.99	74.00	-21.01	PK
V	9848.00	43.52	30.85	7.45	24.69	44.81	54.00	-9.19	AV
V	12310.00	54.75	31.02	8.99	25.57	58.29	74.00	-15.71	PK
V	12310.00	43.14	31.02	8.99	25.57	46.68	54.00	-7.32	AV
H	4924.00	54.75	30.55	5.77	24.66	54.63	74.00	-19.37	PK
H	4924.00	43.83	30.55	5.77	24.66	43.71	54.00	-10.29	AV
H	7386.00	51.04	30.33	6.32	24.55	51.58	74.00	-22.42	PK
H	7386.00	43.80	30.33	6.32	24.55	44.34	54.00	-9.66	AV
H	9848.00	53.17	30.85	7.45	24.69	54.46	74.00	-19.54	PK
H	9848.00	43.37	30.85	7.45	24.69	44.66	54.00	-9.34	AV
H	12310.00	53.17	31.02	8.99	25.57	56.71	74.00	-17.29	PK
H	12310.00	43.61	31.02	8.99	25.57	47.15	54.00	-6.85	AV

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

802.11n40

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2422MHz									
V	4844.00	54.12	30.55	5.77	24.66	54.00	74.00	-20.00	PK
V	4844.00	43.65	30.55	5.77	24.66	43.53	54.00	-10.47	AV
V	7266.00	51.07	30.33	6.32	24.55	51.61	74.00	-22.39	PK
V	7266.00	43.53	30.33	6.32	24.55	44.07	54.00	-9.93	AV
V	9688.00	52.07	30.85	7.45	24.69	53.36	74.00	-20.64	PK
V	9688.00	43.66	30.85	7.45	24.69	44.95	54.00	-9.05	AV
V	12110.00	50.65	31.02	8.99	25.57	54.19	74.00	-19.81	PK
V	12110.00	43.44	31.02	8.99	25.57	46.98	54.00	-7.02	AV
H	4844.00	53.53	30.55	5.77	24.66	53.41	74.00	-20.59	PK
H	4844.00	43.87	30.55	5.77	24.66	43.75	54.00	-10.25	AV
H	7266.00	54.78	30.33	6.32	24.55	55.32	74.00	-18.68	PK
H	7266.00	43.15	30.33	6.32	24.55	43.69	54.00	-10.31	AV
H	9688.00	52.07	30.85	7.45	24.69	53.36	74.00	-20.64	PK
H	9688.00	43.04	30.85	7.45	24.69	44.33	54.00	-9.67	AV
H	12110.00	53.98	31.02	8.99	25.57	57.52	74.00	-16.48	PK
H	12110.00	43.40	31.02	8.99	25.57	46.94	54.00	-7.06	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2437MHz									
V	4874.00	51.11	30.55	5.77	24.66	50.99	74.00	-23.01	PK
V	4874.00	43.29	30.55	5.77	24.66	43.17	54.00	-10.83	AV
V	7311.00	52.94	30.33	6.32	24.55	53.48	74.00	-20.52	PK
V	7311.00	43.27	30.33	6.32	24.55	43.81	54.00	-10.19	AV
V	9748.00	54.81	30.85	7.45	24.69	56.10	74.00	-17.90	PK
V	9748.00	43.67	30.85	7.45	24.69	44.96	54.00	-9.04	AV
V	12185.00	51.26	31.02	8.99	25.57	54.80	74.00	-19.20	PK
V	12185.00	44.00	31.02	8.99	25.57	47.54	54.00	-6.46	AV
H	4874.00	52.85	30.55	5.77	24.66	52.73	74.00	-21.27	PK
H	4874.00	43.07	30.55	5.77	24.66	42.95	54.00	-11.05	AV
H	7311.00	54.39	30.33	6.32	24.55	54.93	74.00	-19.07	PK
H	7311.00	43.70	30.33	6.32	24.55	44.24	54.00	-9.76	AV
H	9748.00	54.79	30.85	7.45	24.69	56.08	74.00	-17.92	PK
H	9748.00	43.26	30.85	7.45	24.69	44.55	54.00	-9.45	AV
H	12185.00	53.71	31.02	8.99	25.57	57.25	74.00	-16.75	PK
H	12185.00	43.23	31.02	8.99	25.57	46.77	54.00	-7.23	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:2452MHz									
V	4904.00	53.58	30.55	5.77	24.66	53.46	74.00	-20.54	PK
V	4904.00	43.89	30.55	5.77	24.66	43.77	54.00	-10.23	AV
V	7356.00	54.02	30.33	6.32	24.55	54.56	74.00	-19.44	PK
V	7356.00	43.54	30.33	6.32	24.55	44.08	54.00	-9.92	AV
V	9808.00	54.92	30.85	7.45	24.69	56.21	74.00	-17.79	PK
V	9808.00	43.27	30.85	7.45	24.69	44.56	54.00	-9.44	AV
V	12260.00	50.21	31.02	8.99	25.57	53.75	74.00	-20.25	PK
V	12260.00	43.54	31.02	8.99	25.57	47.08	54.00	-6.92	AV
H	4904.00	51.81	30.55	5.77	24.66	51.69	74.00	-22.31	PK
H	4904.00	43.08	30.55	5.77	24.66	42.96	54.00	-11.04	AV
H	7356.00	54.17	30.33	6.32	24.55	54.71	74.00	-19.29	PK
H	7356.00	43.11	30.33	6.32	24.55	43.65	54.00	-10.35	AV
H	9808.00	52.21	30.85	7.45	24.69	53.50	74.00	-20.50	PK
H	9808.00	43.72	30.85	7.45	24.69	45.01	54.00	-8.99	AV
H	12260.00	53.02	31.02	8.99	25.57	56.56	74.00	-17.44	PK
H	12260.00	43.90	31.02	8.99	25.57	47.44	54.00	-6.56	AV

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

5.RADIATED BAND EMISSIONMEASUREMENT

5.1 TEST REQUIREMENT:

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.
Test site:	Measurement Distance: 3m
Receiver setup:	See table below

Frequency	Detector	RBW	VBW	Value
Above 1GHz	Peak	1MHz	3MHz	Peak
	Average	1MHz	3MHz	Average

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (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).

5.2 TEST PROCEDURE

Above 1GHz test procedure as below:

a. 1. The EUT was placed on the top of a rotating table 1.5 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 bestopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dBmargin would be re-tested one by one using peak, quasi-peak or average method as specified and then reportedin a data sheet.

g. Test the EUT in the lowest channel,the Highest channel

Note:

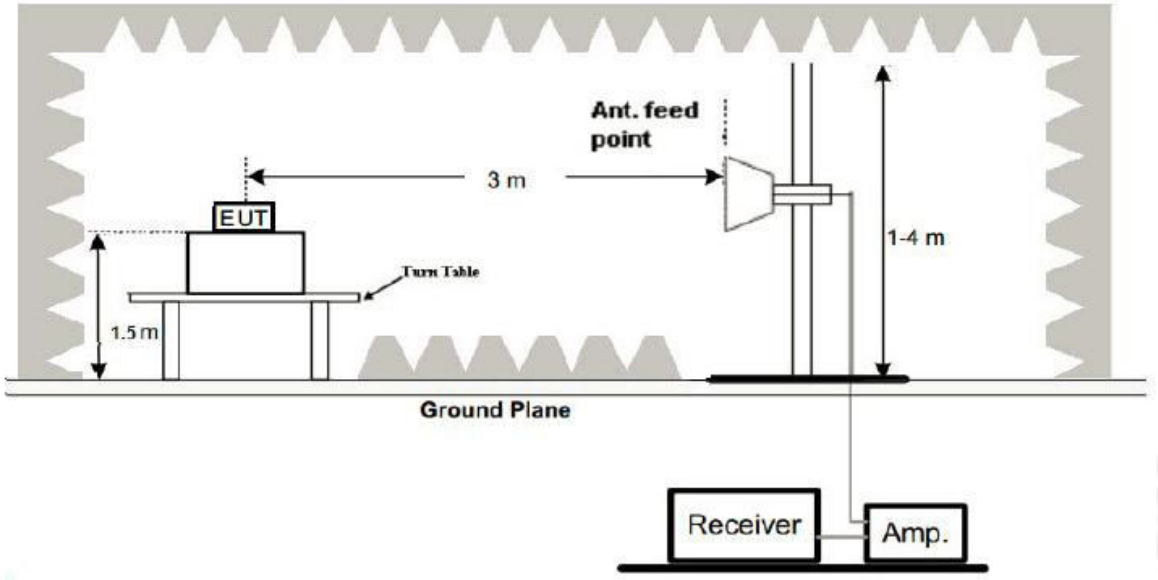
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

5.3 DEVIATION FROM TEST STANDARD

No deviation

5.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



5.5 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.

5.6 TEST RESULT

	Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Detector Type	Result
802.11b	LowChannel 2412MHz									
	H	2390.00	53.40	30.22	4.85	23.98	52.01	74.00	PK	PASS
	H	2390.00	44.79	30.22	4.85	23.98	43.40	54.00	AV	PASS
	H	2400.00	53.80	30.22	4.85	23.98	52.41	74.00	PK	PASS
	H	2400.00	44.61	30.22	4.85	23.98	43.22	54.00	AV	PASS
	V	2390.00	53.79	30.22	4.85	23.98	52.40	74.00	PK	PASS
	V	2390.00	44.20	30.22	4.85	23.98	42.81	54.00	AV	PASS
	V	2400.00	53.50	30.22	4.85	23.98	52.11	74.00	PK	PASS
	V	2400.00	44.33	30.22	4.85	23.98	42.94	54.00	AV	PASS
	HighChannel 2462MHz									
	H	2483.50	53.01	30.22	4.85	23.98	51.62	74.00	PK	PASS
	H	2483.50	44.49	30.22	4.85	23.98	43.10	54.00	AV	PASS
	H	2500.00	54.77	30.22	4.85	23.98	53.38	74.00	PK	PASS
	H	2500.00	44.30	30.22	4.85	23.98	42.91	54.00	AV	PASS
	V	2483.50	54.14	30.22	4.85	23.98	52.75	74.00	PK	PASS
	V	2483.50	44.29	30.22	4.85	23.98	42.90	54.00	AV	PASS
	V	2500.00	53.67	30.22	4.85	23.98	52.28	74.00	PK	PASS
	V	2500.00	44.33	30.22	4.85	23.98	42.94	54.00	AV	PASS
802.11g	LowChannel 2412MHz									
	H	2390.00	53.44	30.22	4.85	23.98	52.05	74.00	PK	PASS
	H	2390.00	44.20	30.22	4.85	23.98	42.81	54.00	AV	PASS
	H	2400.00	53.22	30.22	4.85	23.98	51.83	74.00	PK	PASS
	H	2400.00	44.63	30.22	4.85	23.98	43.24	54.00	AV	PASS
	V	2390.00	54.88	30.22	4.85	23.98	53.49	74.00	PK	PASS
	V	2390.00	44.20	30.22	4.85	23.98	42.81	54.00	AV	PASS
	V	2400.00	53.47	30.22	4.85	23.98	52.08	74.00	PK	PASS
	V	2400.00	44.80	30.22	4.85	23.98	43.41	54.00	AV	PASS
	High Channel 2462MHz									
	H	2483.50	53.23	30.22	4.85	23.98	51.84	74.00	PK	PASS
	H	2483.50	44.30	30.22	4.85	23.98	42.91	54.00	AV	PASS
	H	2500.00	54.30	30.22	4.85	23.98	52.91	74.00	PK	PASS
	H	2500.00	44.38	30.22	4.85	23.98	42.99	54.00	AV	PASS
	V	2483.50	54.44	30.22	4.85	23.98	53.05	74.00	PK	PASS
	V	2483.50	44.54	30.22	4.85	23.98	43.15	54.00	AV	PASS
	V	2500.00	53.07	30.22	4.85	23.98	51.68	74.00	PK	PASS
	V	2500.00	44.02	30.22	4.85	23.98	42.63	54.00	AV	PASS
802.11n20	LowChannel 2412MHz									
	H	2390.00	54.74	30.22	4.85	23.98	53.35	74.00	PK	PASS
	H	2390.00	44.54	30.22	4.85	23.98	43.15	54.00	AV	PASS
	H	2400.00	54.64	30.22	4.85	23.98	53.25	74.00	PK	PASS
	H	2400.00	44.08	30.22	4.85	23.98	42.69	54.00	AV	PASS
	V	2390.00	53.94	30.22	4.85	23.98	52.55	74.00	PK	PASS
	V	2390.00	44.54	30.22	4.85	23.98	43.15	54.00	AV	PASS
	V	2400.00	53.51	30.22	4.85	23.98	52.12	74.00	PK	PASS
	V	2400.00	44.29	30.22	4.85	23.98	42.90	54.00	AV	PASS
	High Channel 2462MHz									
	H	2483.50	54.92	30.22	4.85	23.98	53.53	74.00	PK	PASS
	H	2483.50	44.43	30.22	4.85	23.98	43.04	54.00	AV	PASS
	H	2500.00	53.93	30.22	4.85	23.98	52.54	74.00	PK	PASS
	H	2500.00	44.87	30.22	4.85	23.98	43.48	54.00	AV	PASS
	V	2483.50	54.09	30.22	4.85	23.98	52.70	74.00	PK	PASS
	V	2483.50	44.56	30.22	4.85	23.98	43.17	54.00	AV	PASS

	V	2500.00	53.78	30.22	4.85	23.98	52.39	74.00	PK	PASS
	V	2500.00	44.03	30.22	4.85	23.98	42.64	54.00	AV	PASS
802.11n40	LowChannel 2422MHz									
	H	2390.00	54.48	30.22	4.85	23.98	53.09	74.00	PK	PASS
	H	2390.00	44.59	30.22	4.85	23.98	43.20	54.00	AV	PASS
	H	2400.00	54.92	30.22	4.85	23.98	53.53	74.00	PK	PASS
	H	2400.00	44.06	30.22	4.85	23.98	42.67	54.00	AV	PASS
	V	2390.00	54.45	30.22	4.85	23.98	53.06	74.00	PK	PASS
	V	2390.00	44.01	30.22	4.85	23.98	42.62	54.00	AV	PASS
	V	2400.00	54.20	30.22	4.85	23.98	52.81	74.00	PK	PASS
	V	2400.00	44.03	30.22	4.85	23.98	42.64	54.00	AV	PASS
	High Channel 2452MHz									
	H	2483.50	54.29	30.22	4.85	23.98	52.90	74.00	PK	PASS
	H	2483.50	44.05	30.22	4.85	23.98	42.66	54.00	AV	PASS
	H	2500.00	54.68	30.22	4.85	23.98	53.29	74.00	PK	PASS
	H	2500.00	44.83	30.22	4.85	23.98	43.44	54.00	AV	PASS
	V	2483.50	54.55	30.22	4.85	23.98	53.16	74.00	PK	PASS
	V	2483.50	44.54	30.22	4.85	23.98	43.15	54.00	AV	PASS
	V	2500.00	54.00	30.22	4.85	23.98	52.61	74.00	PK	PASS
	V	2500.00	44.42	30.22	4.85	23.98	43.03	54.00	AV	PASS

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit
2. Only the worst data recorded was ANT 1.
3. Both of ANT 1&2 has been tested. The worst ANT1 has attenuated 3db below the limit. So the MIMO mode deemed to passed.

6.POWER SPECTRAL DENSITY TEST

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB558074 D01DTS Meas Guidancev05r02

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8dBm/3kHz	2400-2483.5	PASS

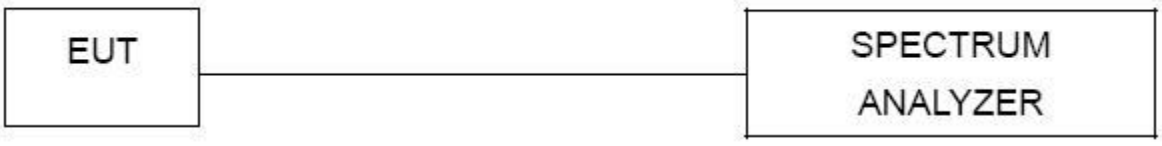
6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



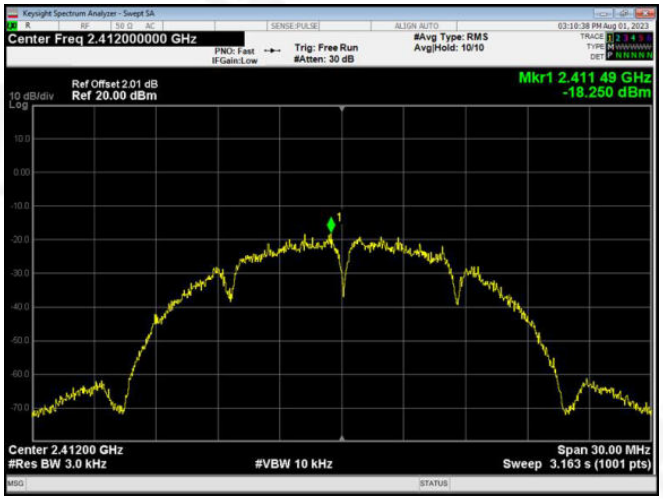
6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULT

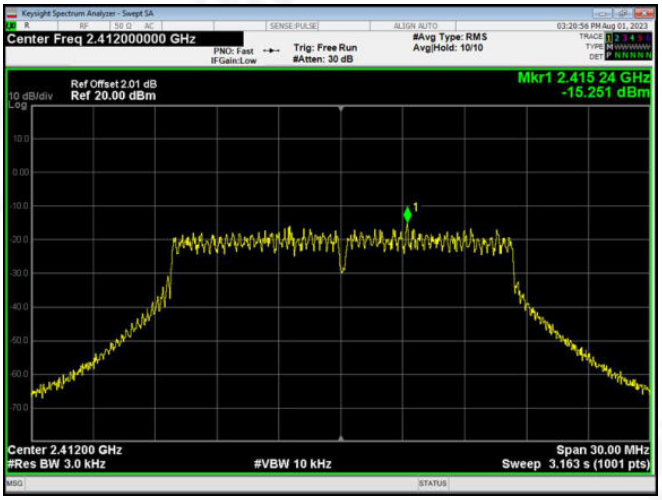
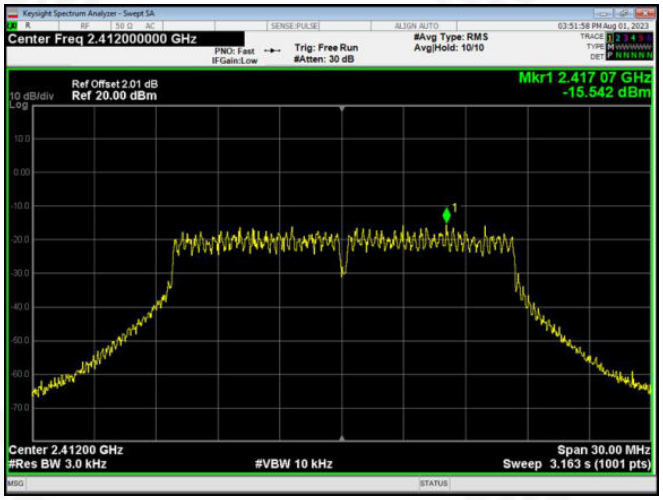
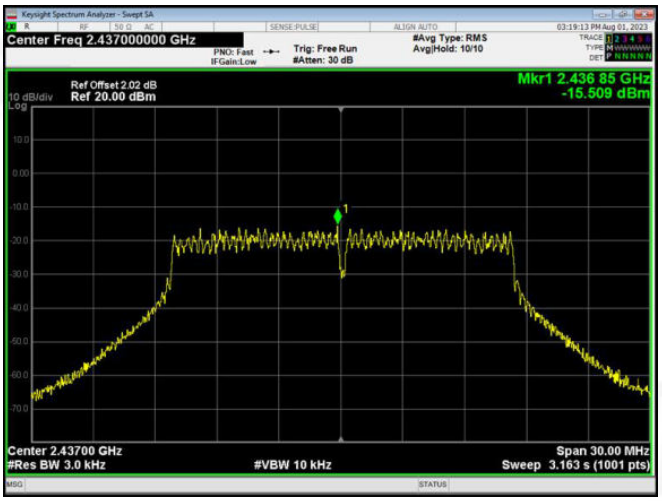
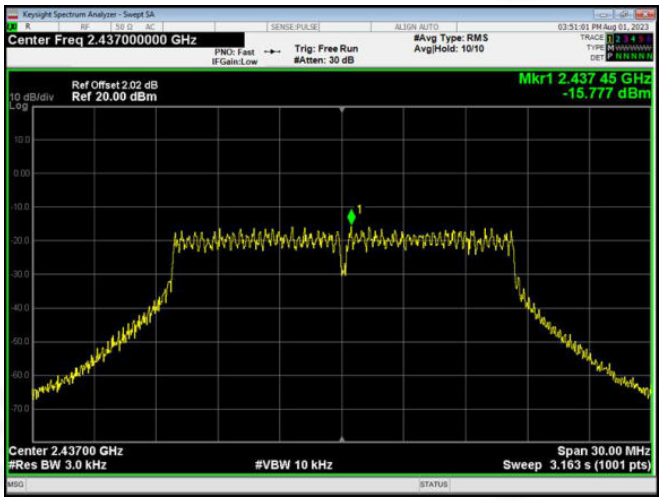
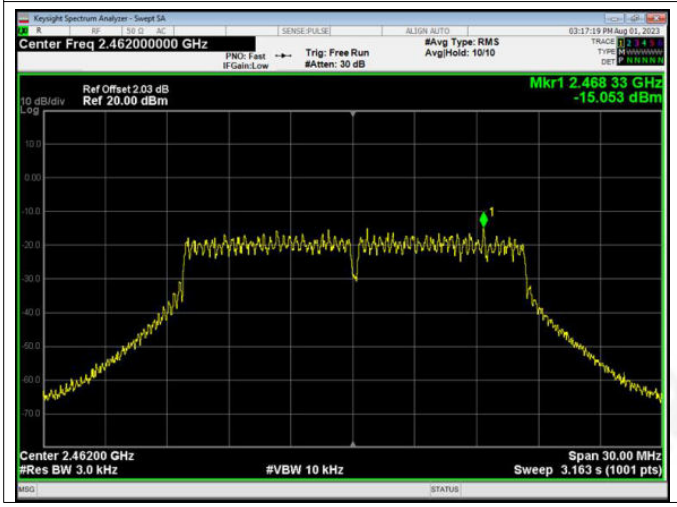
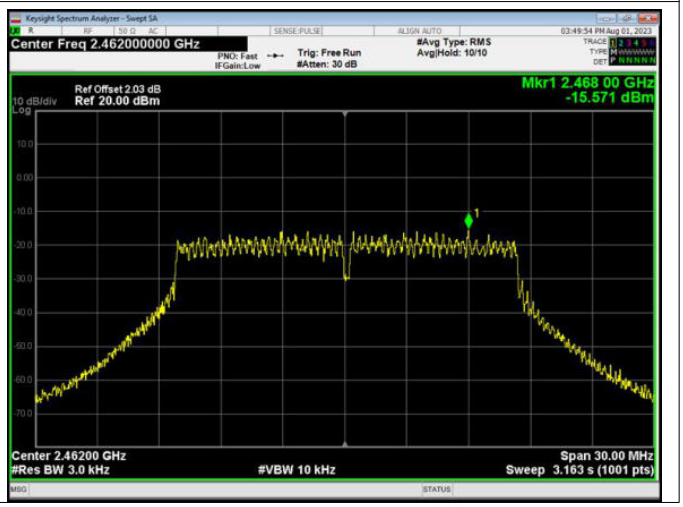
Temperature :	26℃	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 12V
Test Mode :	TX b Mode		

Frequency	Power Spectral Density (dBm/3kHz) ANT1	Power Spectral Density (dBm/3kHz) ANT2	Limit (dBm/3kHz)	Result
2412 MHz	-18.250	-17.921	8	PASS
2437 MHz	-17.966	-18.026	8	PASS
2462 MHz	-17.686	-16.644	8	PASS

ANT1	ANT2
CH01	CH01
	
CH06	CH06
	
CH11	CH11
	

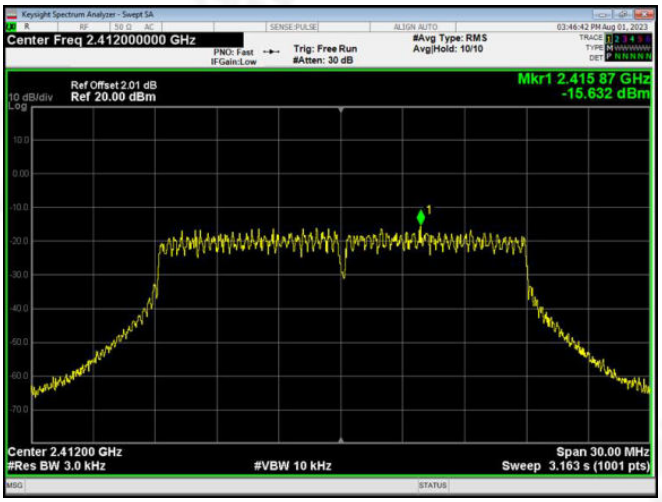
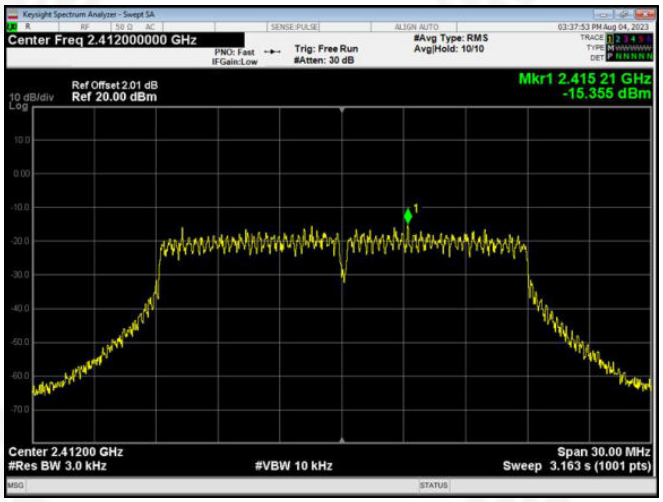
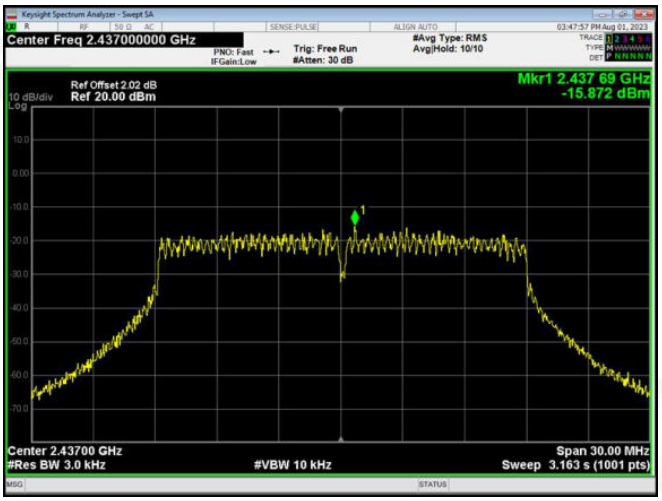
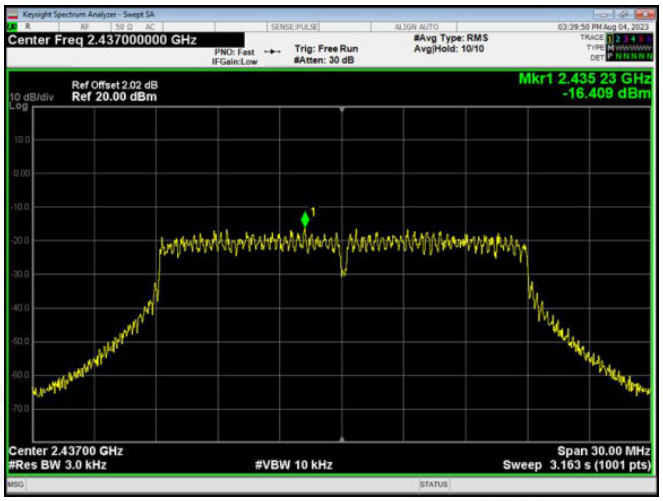
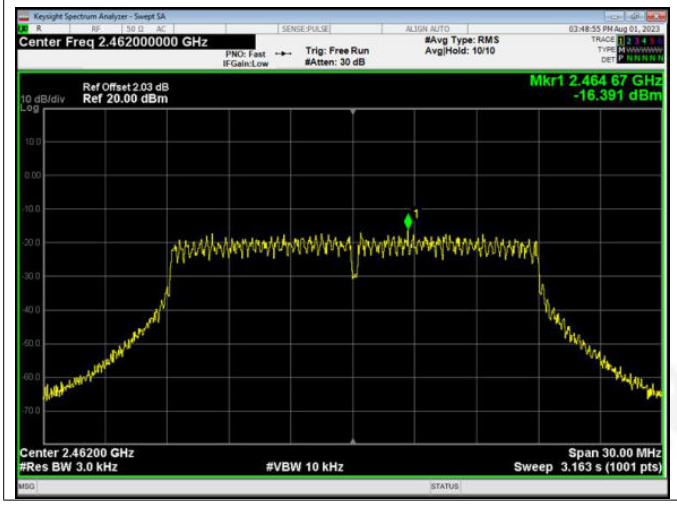
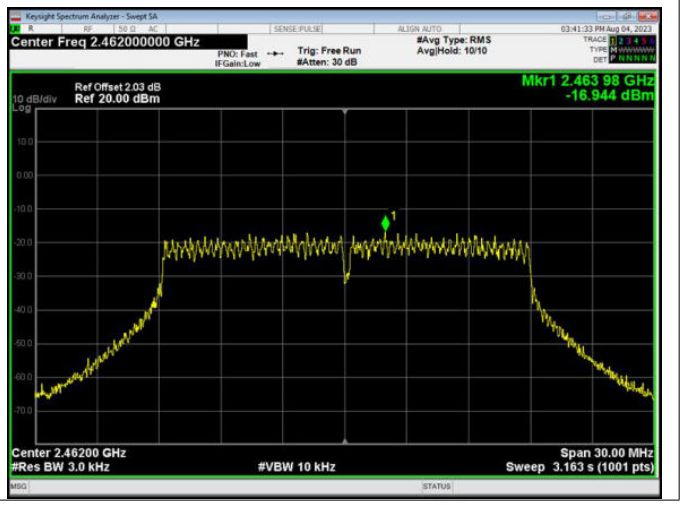
Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage：	DC 12V
Test Mode ：	TX g Mode		

Frequency	Power Spectral Density (dBm/3kHz) ANT1	Power Spectral Density (dBm/3kHz) ANT2	Limit (dBm/3kHz)	Result
2412 MHz	-15.251	-15.542	8	PASS
2437 MHz	-15.509	-15.777	8	PASS
2462 MHz	-15.053	-15.571	8	PASS

ANT1	ANT2
CH01	CH01
	
CH06	CH06
	
CH11	CH11
	

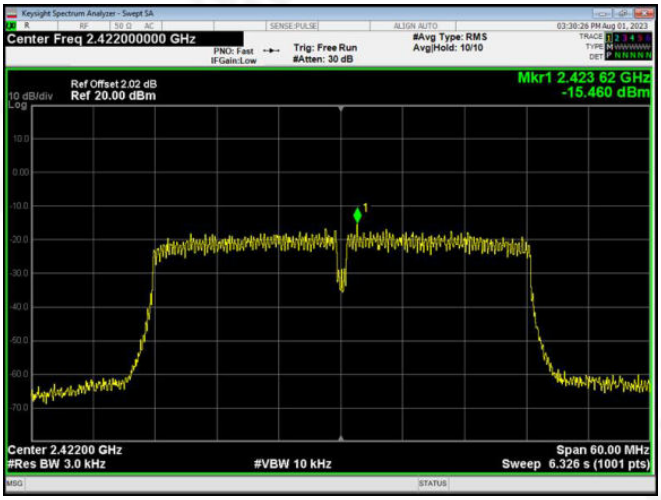
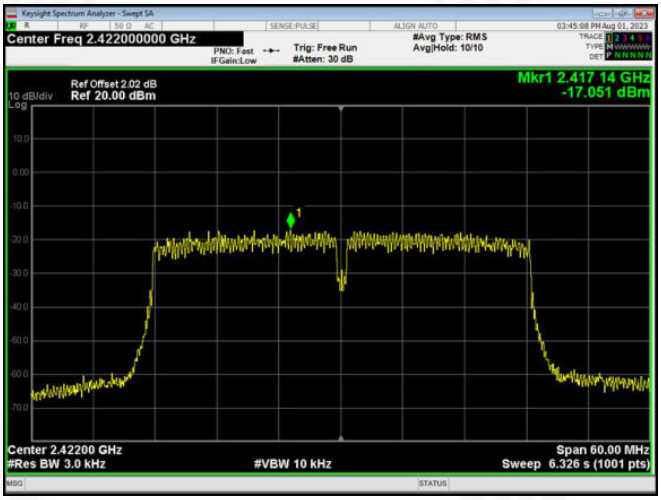
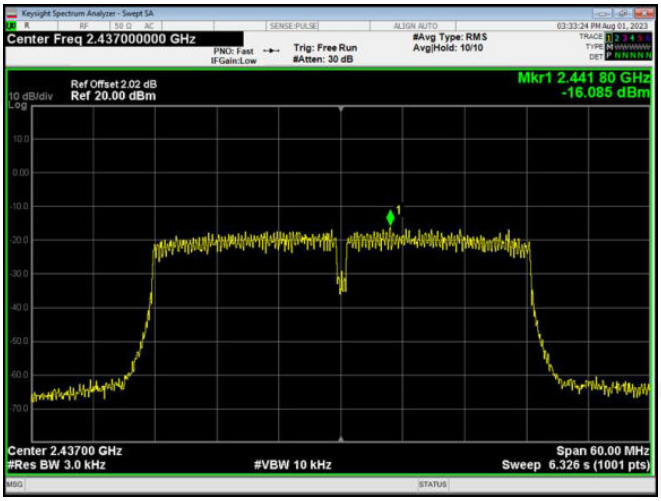
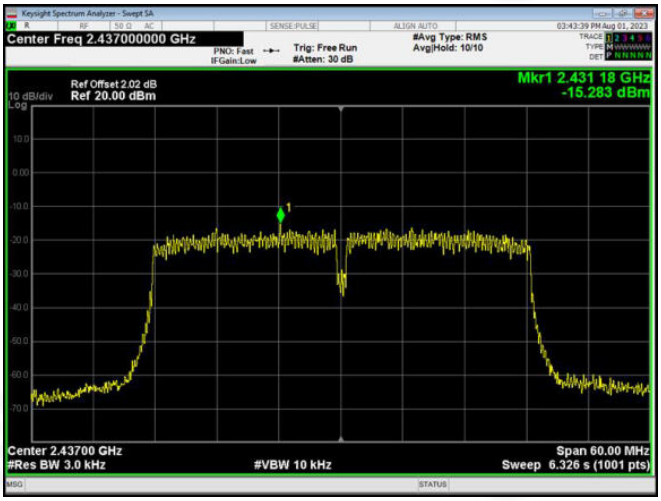
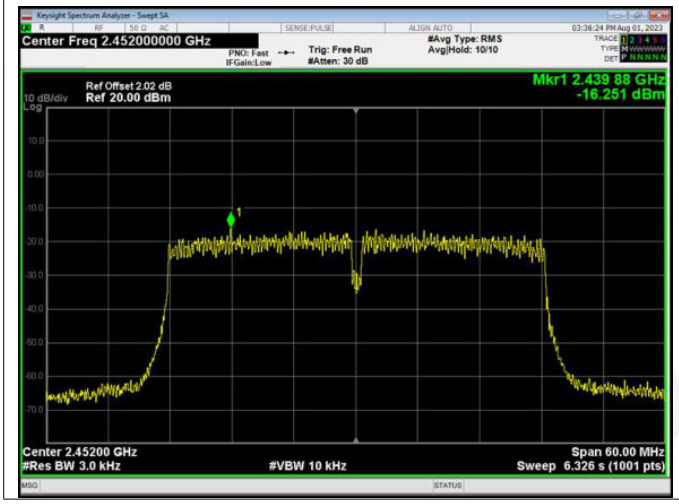
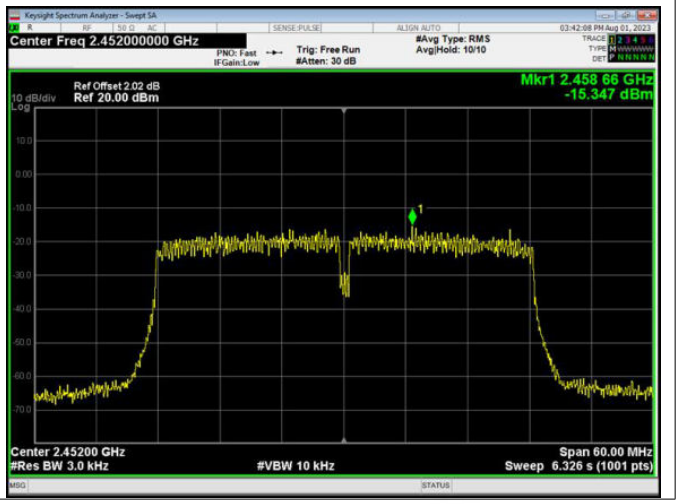
Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage：	DC 12V
Test Mode ：	TX n Mode(20M)		

Frequency	Power Spectral Density (dBm/3kHz) Ant1	Power Spectral Density (dBm/3kHz) Ant2	Power Spectral Density (dBm/3kHz) Total	Limit (dBm/3kHz)	Result
2412 MHz	-15.632	-15.355	-12.48	8	PASS
2437 MHz	-15.872	-16.409	-13.12	8	PASS
2462 MHz	-16.391	-16.944	-13.65	8	PASS

ANT1	ANT2
CH01	CH01
	
CH06	CH06
	
CH11	CH11
	

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage：	DC 12V
Test Mode ：	TX n Mode(40M)		

Frequency	Power Spectral Density (dBm/3kHz) Ant1	Power Spectral Density (dBm/3kHz) Ant2	Power Spectral Density (dBm/3kHz) Total	Limit (dBm/3kHz)	Result
2422 MHz	-15.460	-17.051	-13.17	8	PASS
2437 MHz	-16.085	-15.283	-12.66	8	PASS
2452 MHz	-16.251	-15.347	-12.77	8	PASS

ANT1	ANT2
CH03	CH03
	
CH06	CH06
	
CH09	CH09
	

7. CHANNEL BANDWIDTH

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.10:2013 and KDB558074 D01DTS Meas Guidancev05r02

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

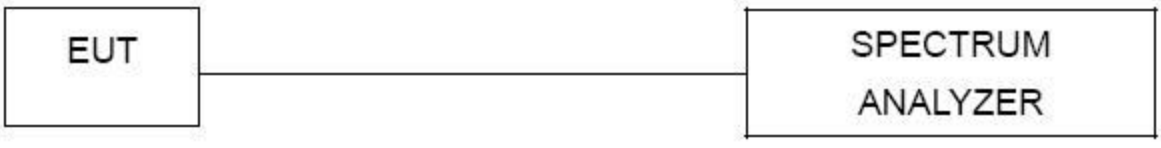
7.2 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 xRBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 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.

7.6 TEST RESULT

Temperature :	26℃	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 12V
Test Mode :	TX b Mode		

ANT1						
Test CH	-6dB Occupy Bandwidth (MHz)					
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)	Limit(KHz)	Result
Lowest	10.04	16.30	17.07	35.06	>500	Pass
Middle	9.553	16.34	17.57	35.01		
Highest	10.05	16.30	16.54	34.05		

ANT2						
Test CH	-6dB Occupy Bandwidth (MHz)					
	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)	Limit(KHz)	Result
Lowest	9.526	16.36	17.20	35.40	>500	Pass
Middle	9.035	16.31	17.32	35.10		
Highest	10.07	16.30	17.55	33.85		

Test plot as follows: ANT1

802.11b **802.11g**

Lowest channel

Middle channel

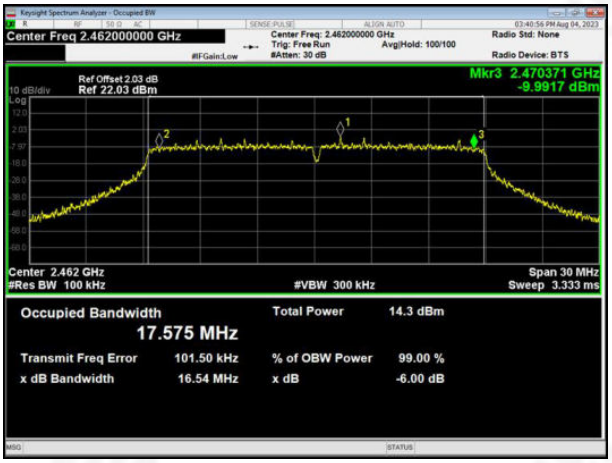
Highest channel

802.11n20	802.11n40

Lowest channel

Middle channel

Highest channel

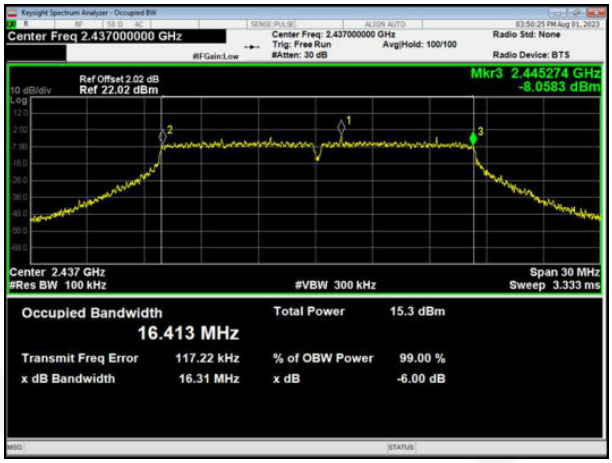


Test plot as follows: ANT2

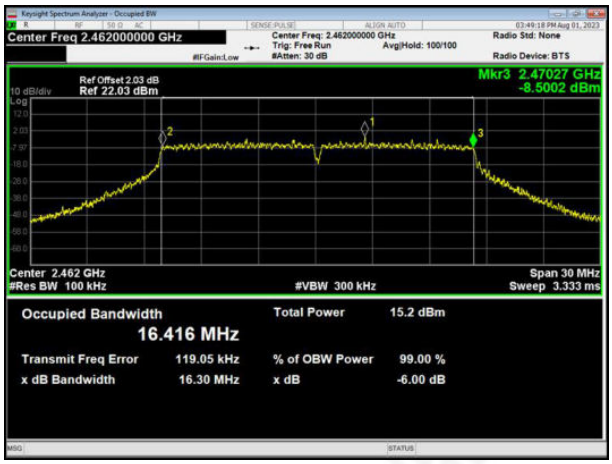
802.11b **802.11g**

Lowest channel

Middle channel

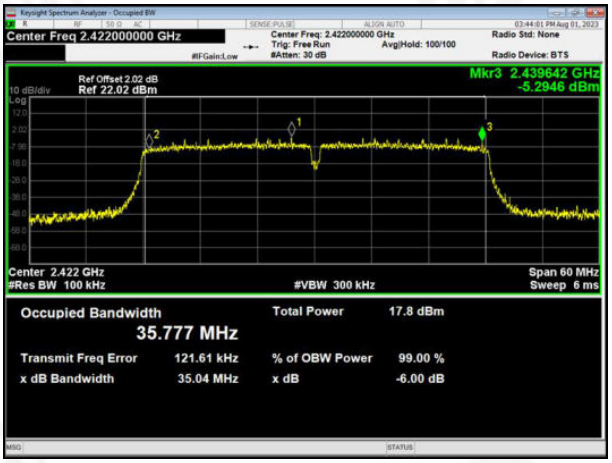


Highest channel



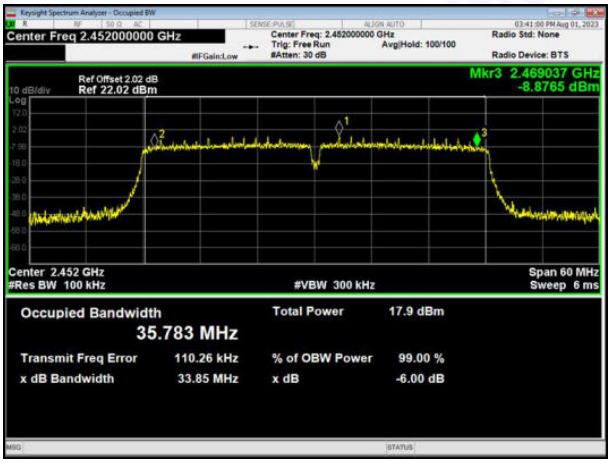
802.11n20 **802.11n40**

Lowest channel



Middle channel

Highest channel



8.PEAK OUTPUT POWER TEST

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013 and KDB558074 D01DTS Meas Guidancev05r02

8.1 APPLIED PROCEDURES/LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

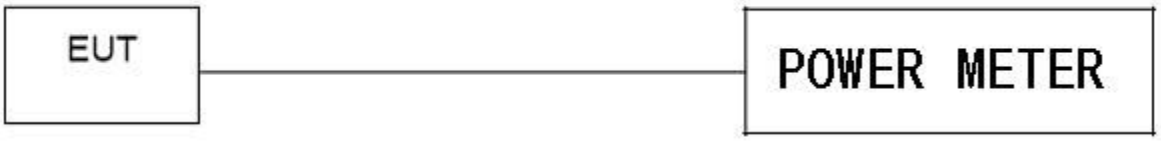
8.2 TEST PROCEDURE

a. The EUT was directly connected to the Power meter

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

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

8.6 TEST RESULT

Temperature :	26℃	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 12V

Test CH	Peak Output Power (dBm)				Limit(dBm)	Result
	802.11b Ant1	802.11b Ant2	802.11g Ant1	802.11g Ant2		
Lowest	14.57	14.64	13.85	13.92	30.00	Pass
Middle	15.17	15.33	13.65	13.86		
Highest	14.66	14.78	14.08	14.15		

Test CH	Peak Output Power (dBm)			Limit(dBm)	Result
	802.11n(HT20) Ant1	802.11n(HT20) Ant2	802.11n(HT20) Total		
Lowest	13.44	13.48	16.47	30.00	Pass
Middle	13.66	13.71	16.70		
Highest	14.03	14.12	17.09		

Test CH	Peak Output Power (dBm)			Limit(dBm)	Result
	802.11n(HT40) Ant1	802.11n(HT40) Ant2	802.11n(HT40) Total		
Lowest	12.48	12.45	15.48	30.00	Pass
Middle	12.62	12.53	15.59		
Highest	13.85	13.76	16.82		

9. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01DTS Meas Guidancev05r02

9.1 APPLICABLE STANDARD

in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in15.209(a).

9.2 TEST PROCEDURE

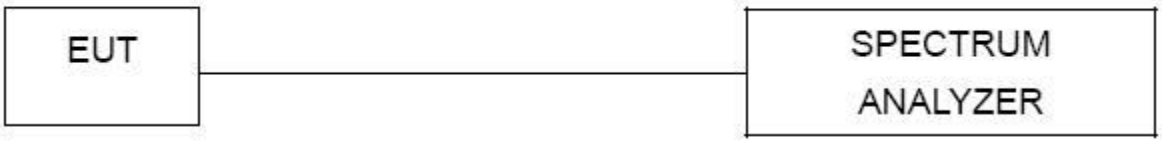
Using the following spectrum analyzer setting:

A) Set the RBW = 100KHz.
B) Set the VBW = 300KHz.
C) Sweep time = auto couple.
D) Detector function = peak.
E) Trace mode = max hold.
F) Allow trace to fully stabilize.

9.3 DEVIATION FROM STANDARD

No deviation.

9.4 TEST SETUP



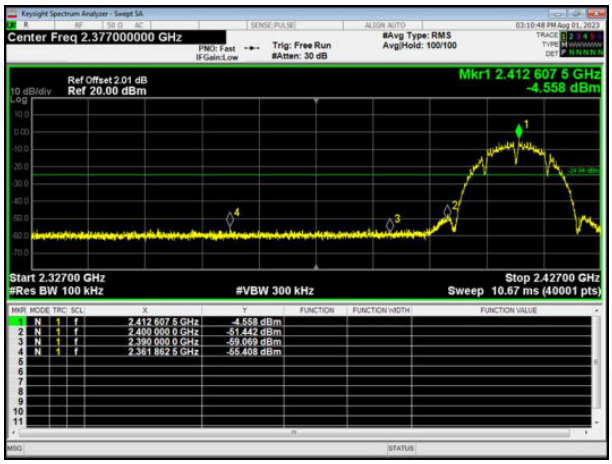
9.5 EUT OPERATION CONDITIONS

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.

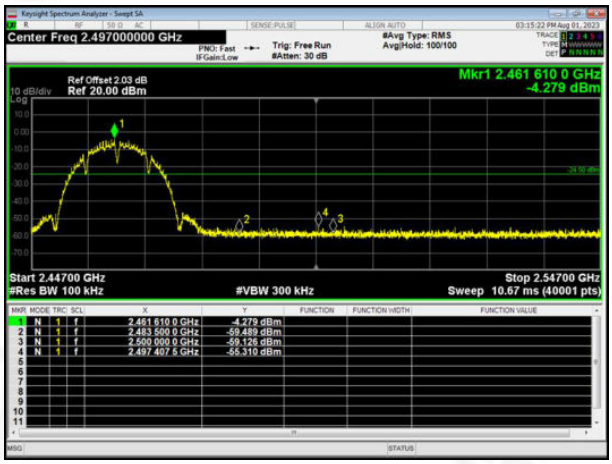
9.6 TEST RESULTS

Test plot as follows:

Test mode:	802.11b

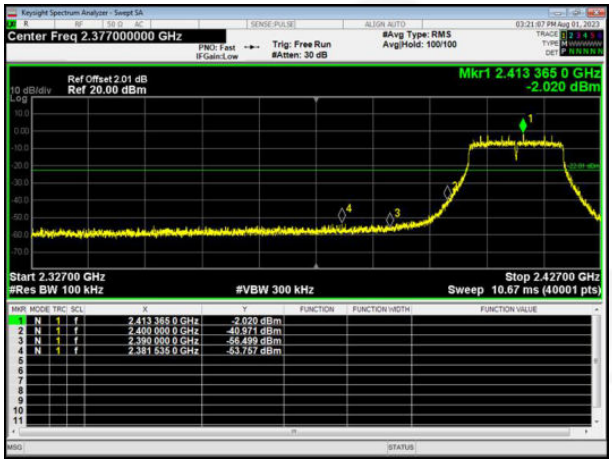


Lowest channel

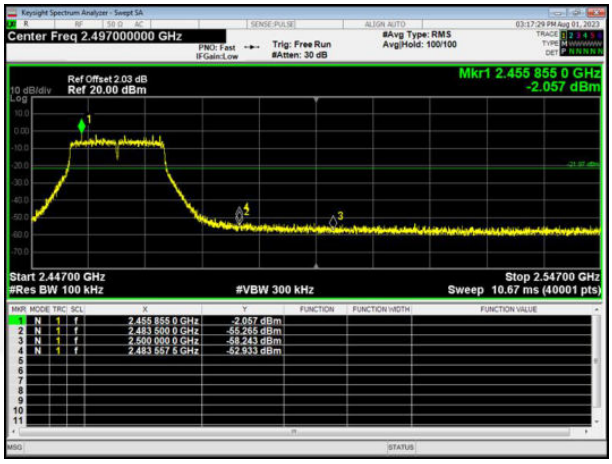


Highest channel

Test mode:	802.11g

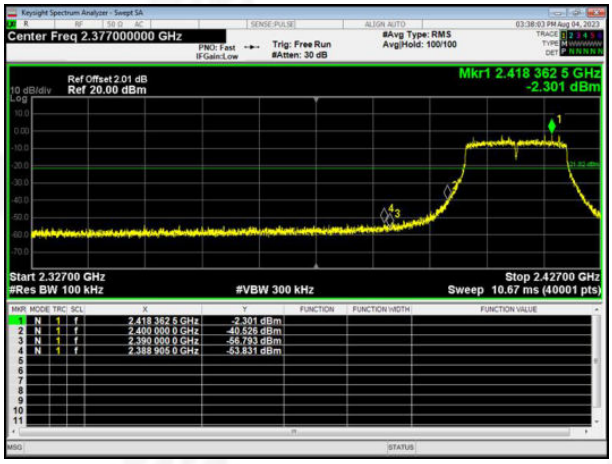


Lowest channel

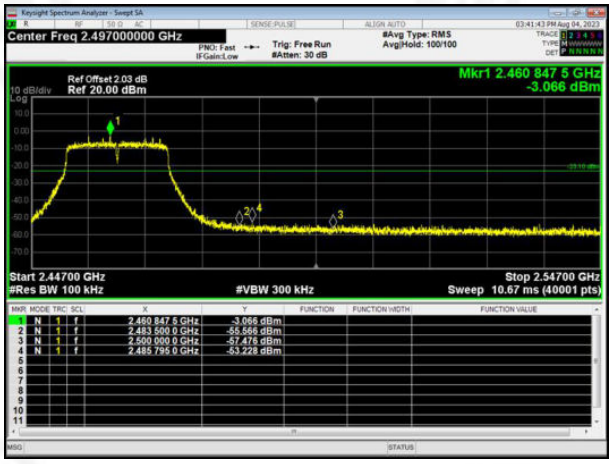


Highest channel

Test mode:	802.11n(HT20)

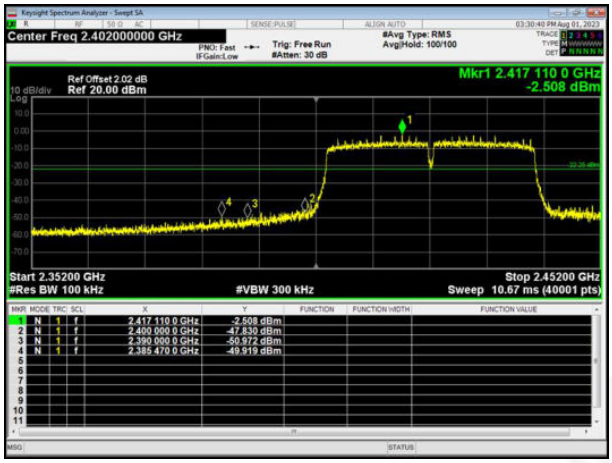


Lowest channel

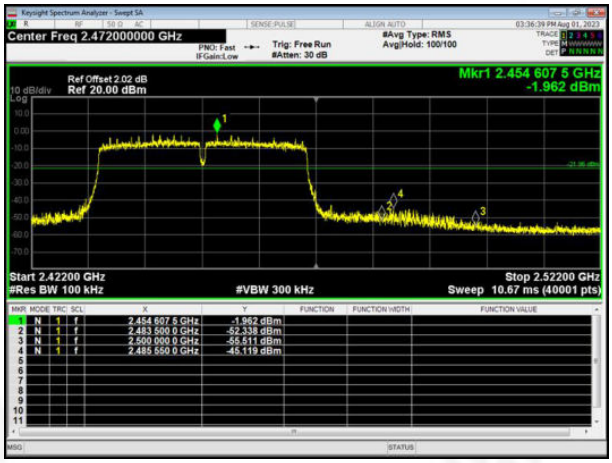


Highest channel

Test mode:	802.11n(HT40)



Lowest channel



Highest channel

Note: Only the worst data recorded was ANT 1.
Both of ANT 1&2 has been tested. The worst ANT1 has attenuated 3db below the limit. So the MIMO mode deemed to passed.

Test plot as follows:

802.11b

Lowest channel

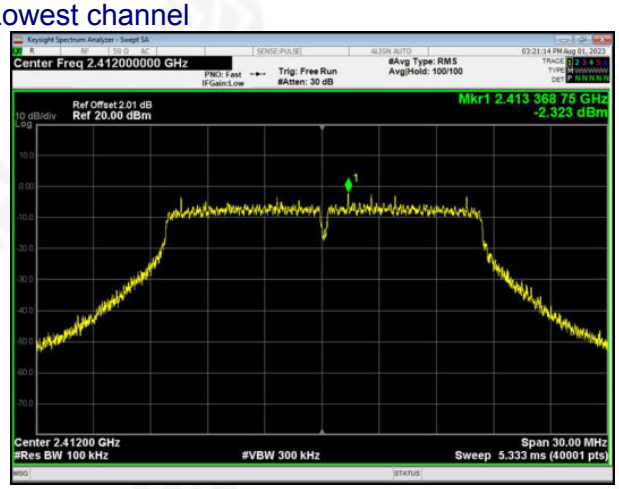
Middle channel

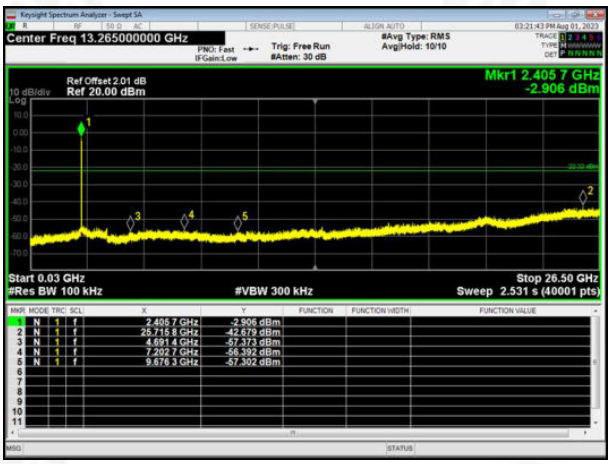
Highest channel

Note: Only the worst data recorded was ANT 1.

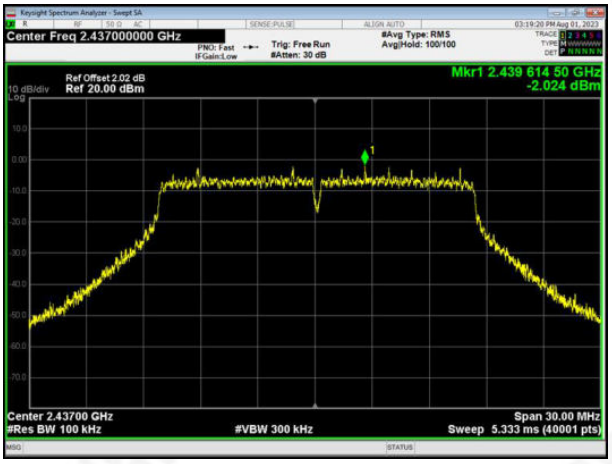
802.11g

Lowest channel

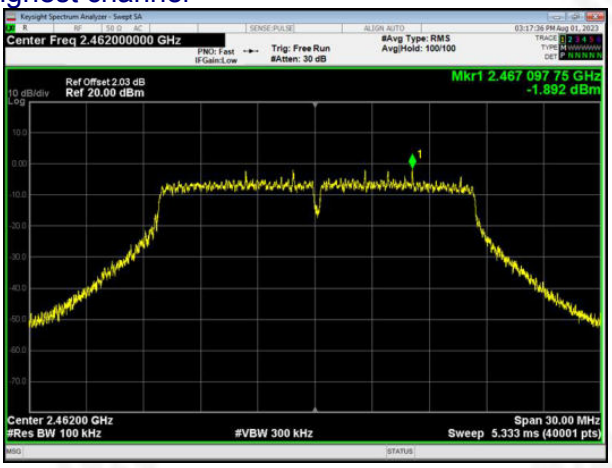




Middle channel



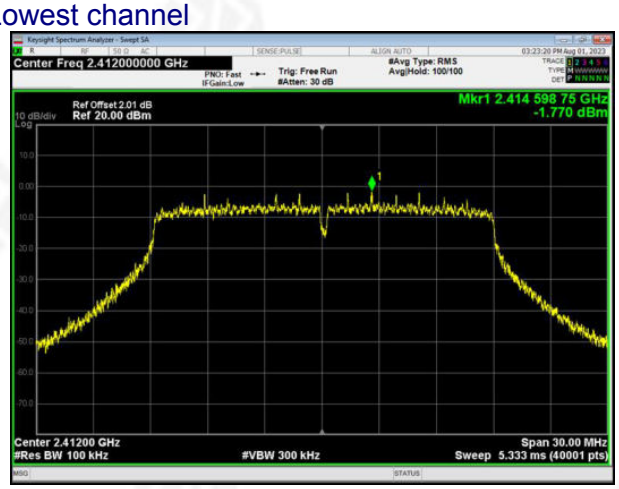
Highest channel

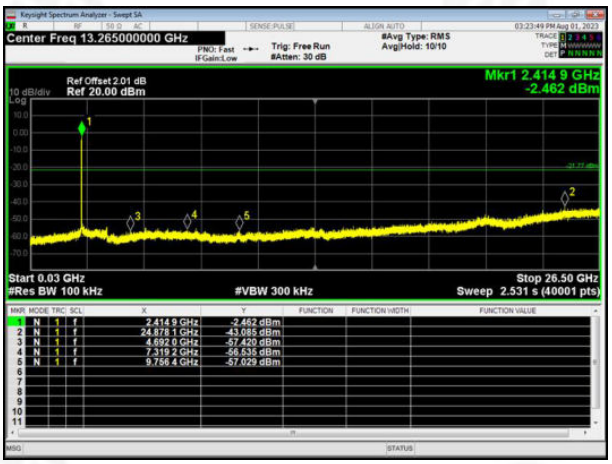


Note: Only the worst data recorded was ANT 1.

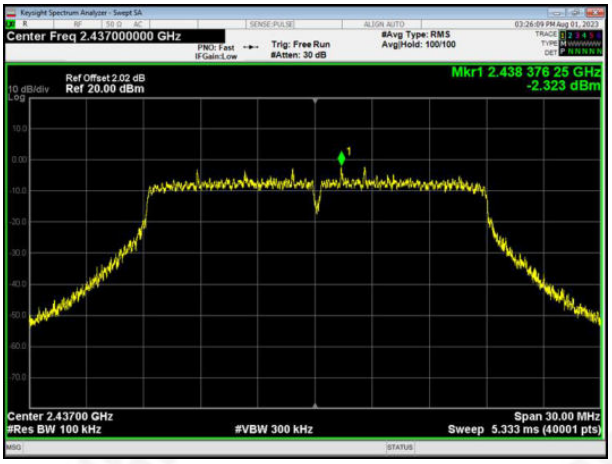
802.11n(HT20)

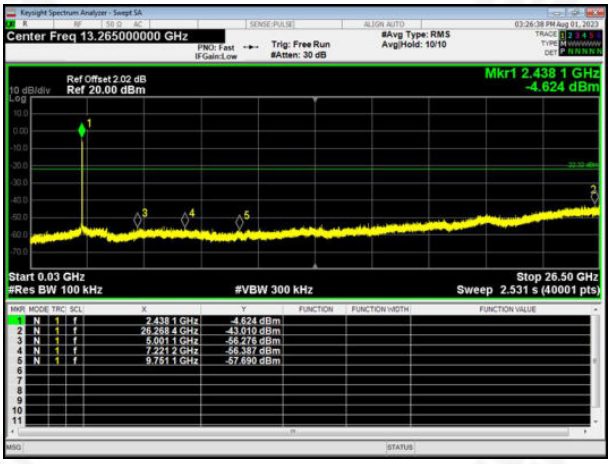
Lowest channel



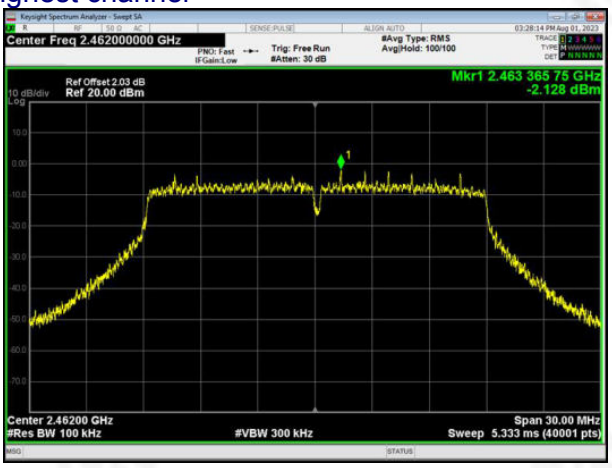


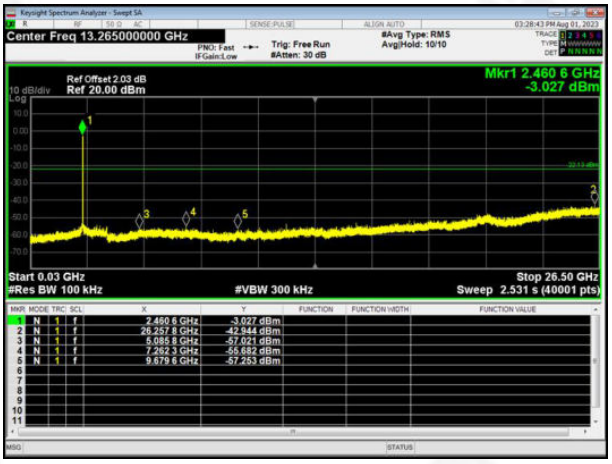
Middle channel





Highest channel

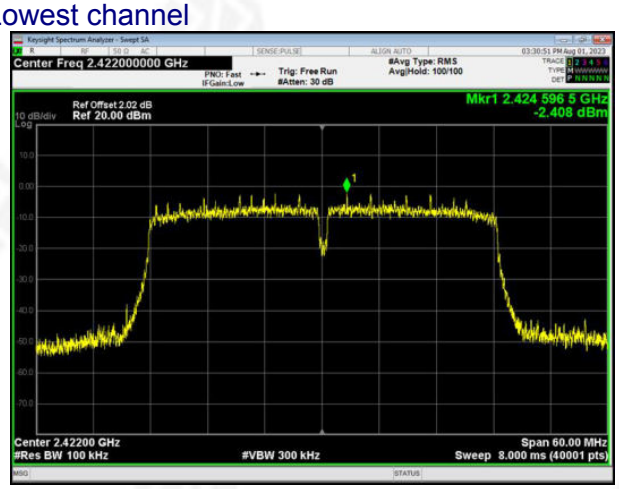


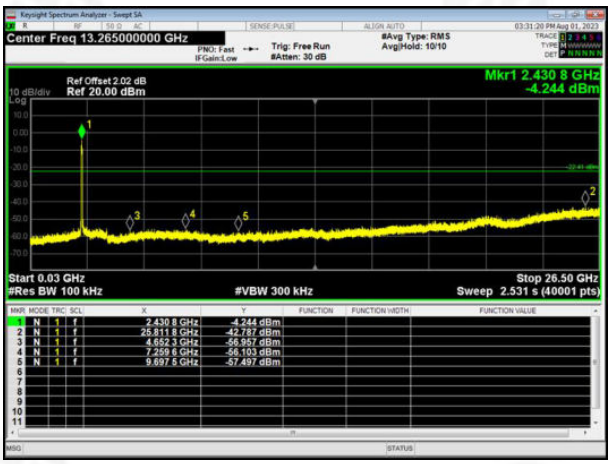


Note: Only the worst data recorded was MIMO.

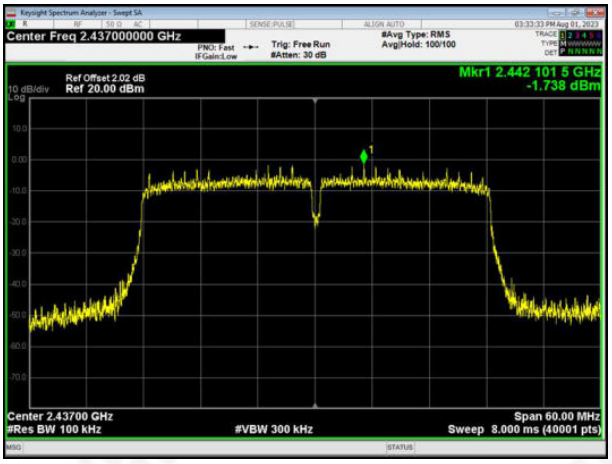
802.11n(HT40)

Lowest channel

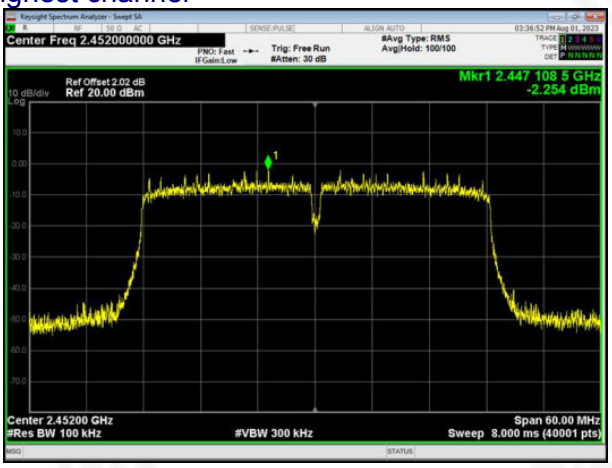




Middle channel



Highest channel



Note: Only the worst data recorded was MIMO.

10.DUTY CYCLE

Test Method:	ANSI C63.10:2013

10.1 APPLIED PROCEDURES / LIMIT

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:

a) A diode detector and an oscilloscope that together have a sufficiently short response time to permit accurate measurements of the ON and OFF times of the transmitted signal.

b) The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:

1) Set the center frequency of the instrument to the center frequency of the transmission.

2) Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.

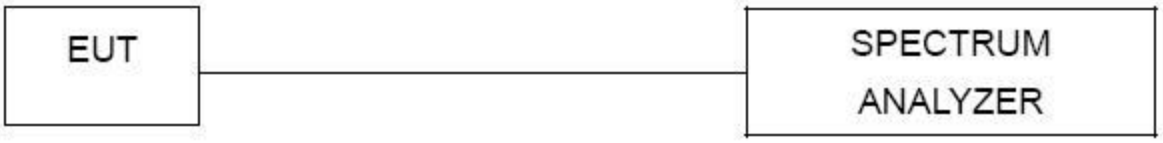
3) Set VBW ≥ RBW. Set detector = peak or average.

4) The zero-span measurement method shall not be used unless both RBW and VBW are > 50/*T* and the number of sweep points across duration *T* exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if $T \leq 16.7$ μs.)

10.2 DEVIATION FROM STANDARD

No deviation.

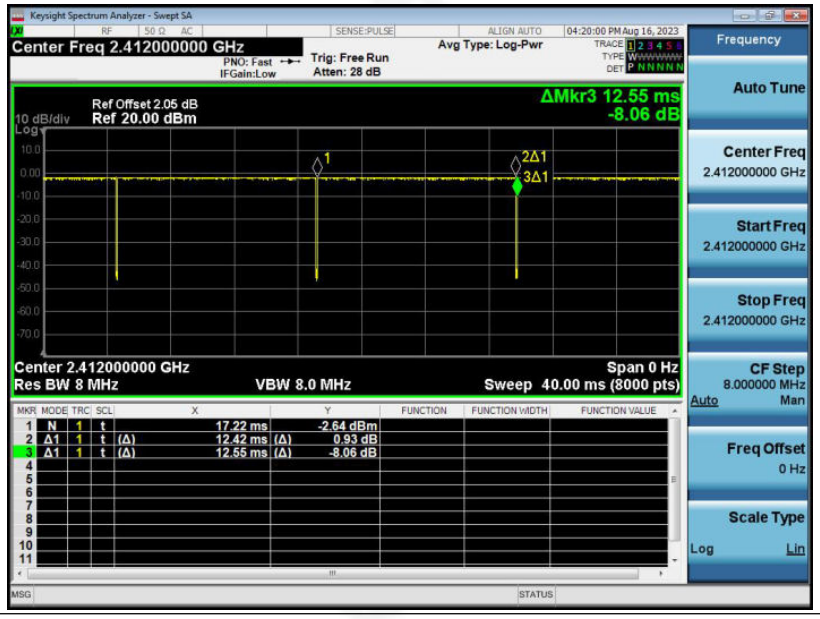
10.3 TEST SETUP



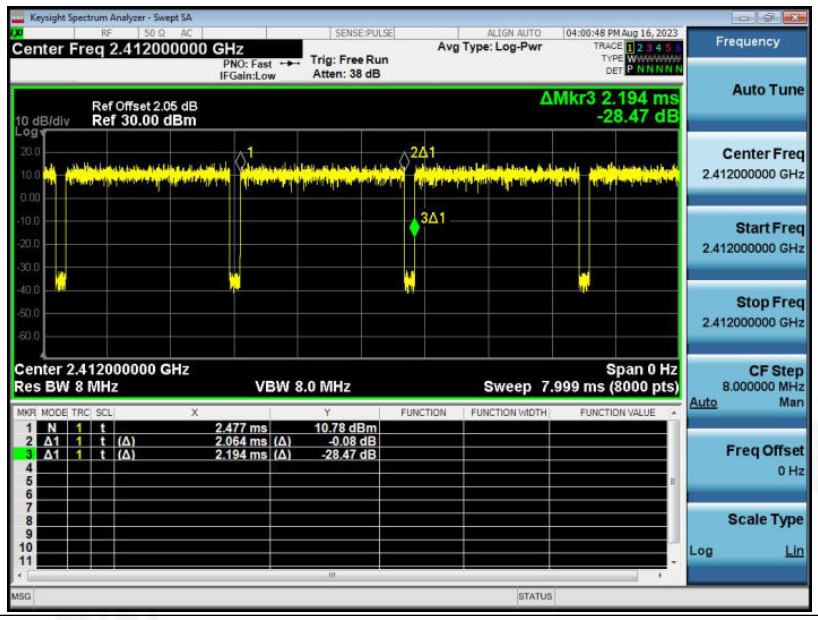
10.4 TEST RESULTS

Mode	Frequency (MHz)	Duty Cycle (%)
802.11b	2412	98.96
802.11g	2412	94.07
802.11n20	2412	93.70
802.11n40	2422	87.90

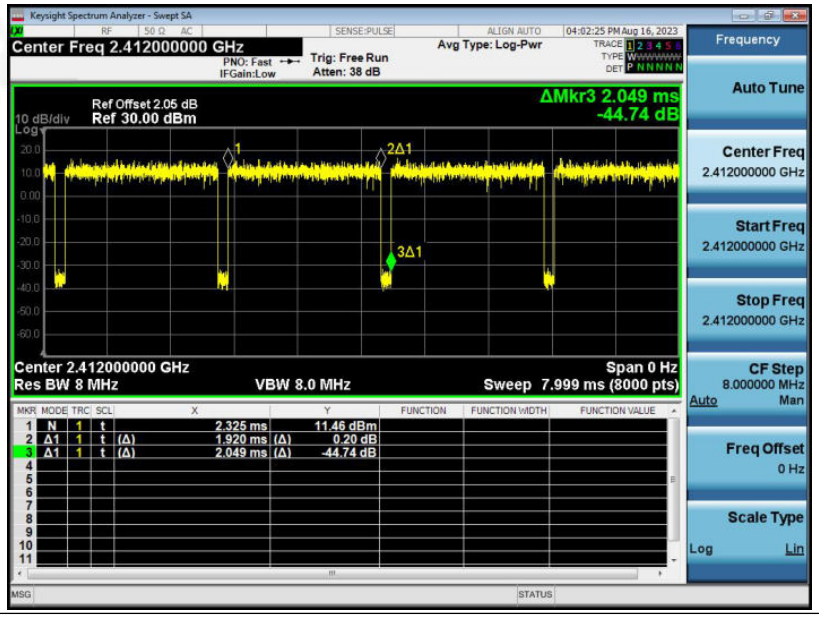
802.11b 2412MHz (ANT1)



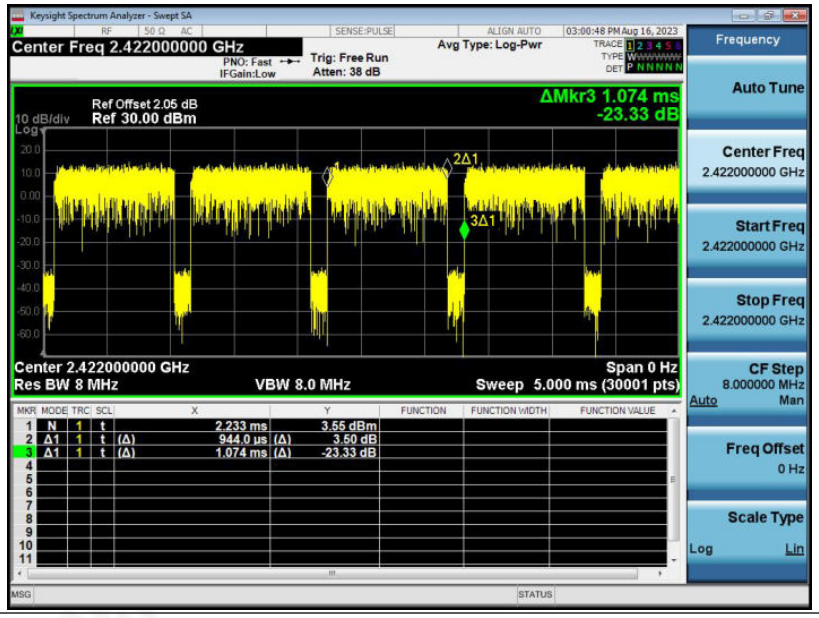
802.11g 2412MHz (ANT1)



802.11n20	2412MHz (MIMO)



802.11n40	2422MHz (MIMO)



Note: All mode have been tested, and the report only reflects the worst case data.

Duty Cycle = Ton /Total*100%

11. ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi. A transmitter can only be sold or operated with antennas with which it was approved.	
EUT Antenna:	
The antenna is FPCB Antenna, the best case gain of the antenna is 2.08dBi, reference to the appendix II for details	

12. TEST SETUP PHOTO

Reference to the appendix I for details.

13. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

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