Shenzhen Huaxia Testing Technology Co., Ltd.

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Report Template Version: V05
Report Template Revision Date: 2021-11-03

TEST REPORT

Report No.:	CQASZ20220701221E-02
Applicant:	Shenzhen Jiteng Network Technology Co., Ltd
Address of Applicant:	No.1202, Bitian Pavilion, Bizhong Garden, No.10 Bibo First Street, Bibo Community Huangbei Street, Luohu District, Shenzhen City, China
Equipment Under Test (EUT):	
Product:	Mini PC
Model No.:	MiniAir 11
Teat Model No.:	MiniAir 11
Brand Name:	GEEKOM
FCC ID:	2AY4C-GM0402
Standards:	47 CFR Part 15, Subpart C ANSI C63.10: 2013 KDB 558074 D01 15.247 Meas Guidance v05r02 KDB 662911 D01 Multiple Transmitter Output v02r01
Date of Receipt:	2022-07-18
Date of Test:	2022-07-18 to 2022-08-15
Date of Issue:	2022-09-02
Test Result :	**PASS***

***In the configuration tested, the EUT complied with the standards specified above**

Tested By: lewis zhou

(Lewis Zhou)

Reviewed By: Timo Lei

(Timo Lei)

Approved By:

(Jack Ai)

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1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20220701221E-02	Rev.01	Initial report	2022-09-02

2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013	PASS
Conducted Peak & Average Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(3)	ANSI C63.10 2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	ANSI C63.10 2013	PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e)	ANSI C63.10 2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS

3 Contents

Page

4 General Information

4.1 Client Information

Applicant:	Shenzhen Jiteng Network Technology Co., Ltd
Address of Applicant:	No.1202, Bitian Pavilion, Bizhong Garden, No.10 Bibo First Street, Bibo Community Huangbei Street, Luohu District, Shenzhen City, China
Manufacturer:	Shenzhen Jiteng Network Technology Co., Ltd
Address of Manufacturer:	No.1202, Bitian Pavilion, Bizhong Garden, No.10 Bibo First Street, Bibo Community Huangbei Street, Luohu District, Shenzhen City, China
Factory:	SHENZHEN 3NOD ELECTRONICS CO., LTD
Address of Factory:	No.74, Yangyong Road,Yanluo street, Tangxiayong Community, Songgang, Baoan, Shenzhen, Guangdong, P.R.China

4.2 General Description of EUT

Product Name:	Mini PC
Model No.:	MiniAir 11
Test Model No.:	MiniAir 11
Trade Mark:	GEEKOM
Power Supply:	Model:A481-1902360U I/P:100-240V~50-60Hz, 1.5A Output: DC 19.0V⎓ 2.36A
EUT Supports Radios application:	BT: 2402-2480MHz 2.4GHz: Wi-Fi: 802.11b/g/n(HT20): 2412MHz~2462MHz; 802.11n(HT40): 2422MHz~2452MHz 5GHz: Wi-Fi: U-NII-1: 5.15-5.25GHz; U-NII-3: 5.725-5.850GHz

4.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Transfer Rate:	IEEE for 802.11b: 1Mbps/2Mbps/5.5Mbps/11Mbps IEEE for 802.11g : 6Mbps/9Mbps/12Mbps/18Mbps/24Mbps/36Mbps/48Mbps/54Mbps IEEE for 802.11n(HT20) : 6.5Mbps/13Mbps/19.5Mbps/26Mbps/39Mbps/52Mbps/58.5Mbps/65Mbps IEEE for 802.11n(HT40) : 13.5Mbps/27Mbps/40.5Mbps/54Mbps/81Mbps/108Mbps/121.5Mbps/135Mbps
Product Type:	☒ Mobile ☐ Portable ☐ Fix Location
Test Software of EUT:	DRTU

Antenna Type:	metal antenna
Antenna Gain:	Ant 1: 2.48dBi; Ant2: 1.94dBi (provided by the applicant)

Operation Frequency each of channel(802.11b/g/n HT20)							
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		

Operation Frequency each of channel(802.11n HT40)					
Channel	Frequency	Channel	Frequency	Channel	Frequency
3	2422MHz	6	2437MHz	9	2452MHz
4	2427MHz	7	2442MHz		
5	2432MHz	8	2447MHz		

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:

For 802.11b/g/n (HT20):

Channel	Frequency
The Lowest channel	2412MHz
The Middle channel	2437MHz
The Highest channel	2462MHz

For 802.11n (HT40):

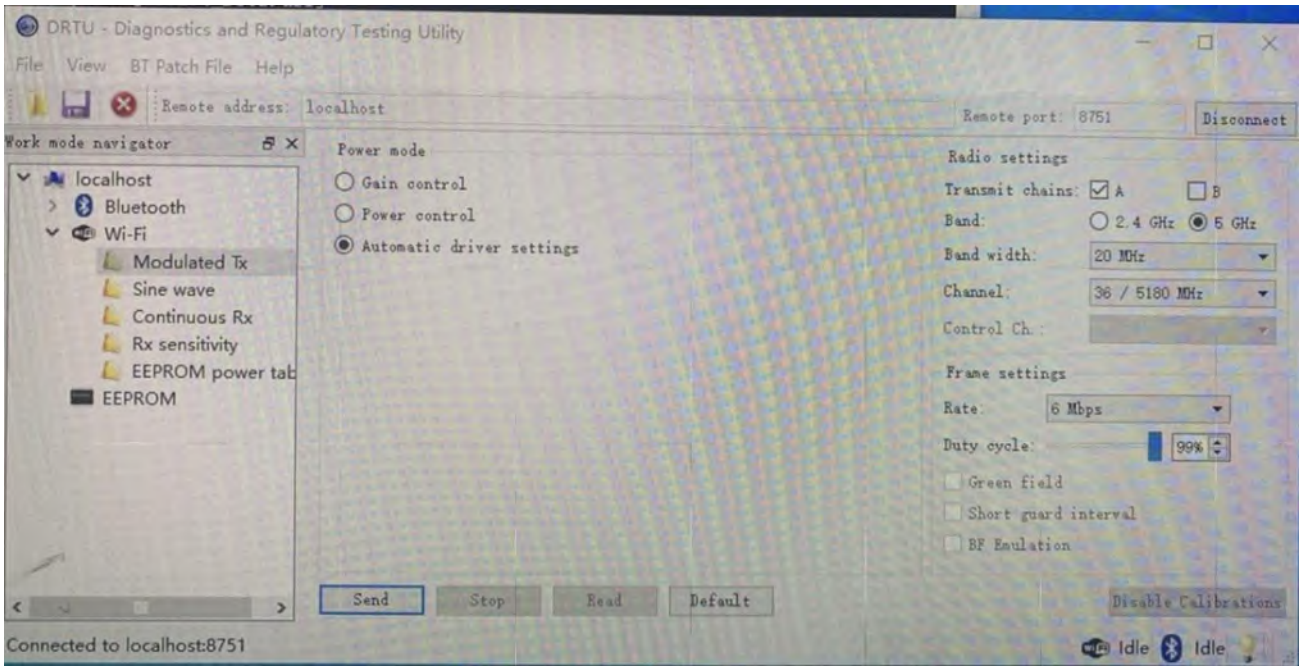
Channel	Frequency
The Lowest channel	2422MHz
The Middle channel	2437MHz
The Highest channel	2452MHz

Note:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.4 Test Environment and Mode

Operating Environment:	
Radiated Emissions:	
Temperature:	25.3 °C
Humidity:	55 % RH
Atmospheric Pressure:	1009 mbar
Conducted Emissions:	
Temperature:	25.6 °C
Humidity:	60 % RH
Atmospheric Pressure:	1009 mbar
Radio conducted item test (RF Conducted test room):	
Temperature:	25.5 °C
Humidity:	52 % RH
Atmospheric Pressure:	1009 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.
Run Software:	



Ant1

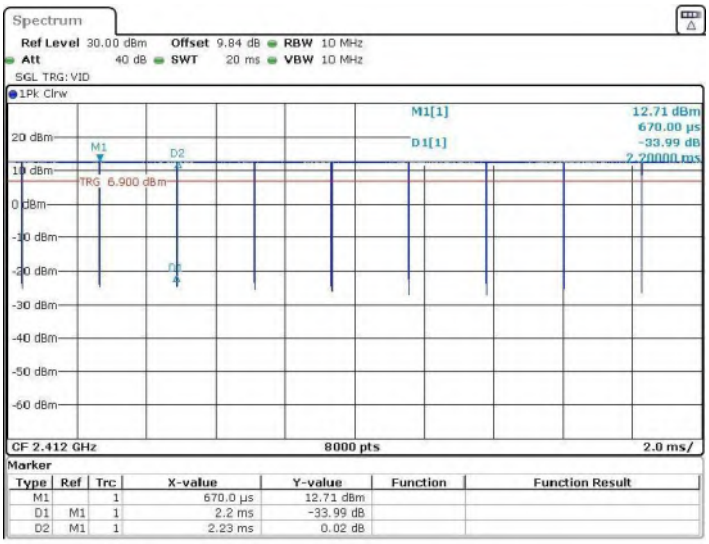
Operated Mode for Worst Duty Cycle:		
Test Mode	Duty Cycle(%)	Average correction factor(dB)
IEEE802.11b	98.65	0.06
IEEE802.11g	98.55	0.06
IEEE802.11n (HT20)	98.44	0.07
IEEE802.11n (HT40)	96.88	0.14

Remark:

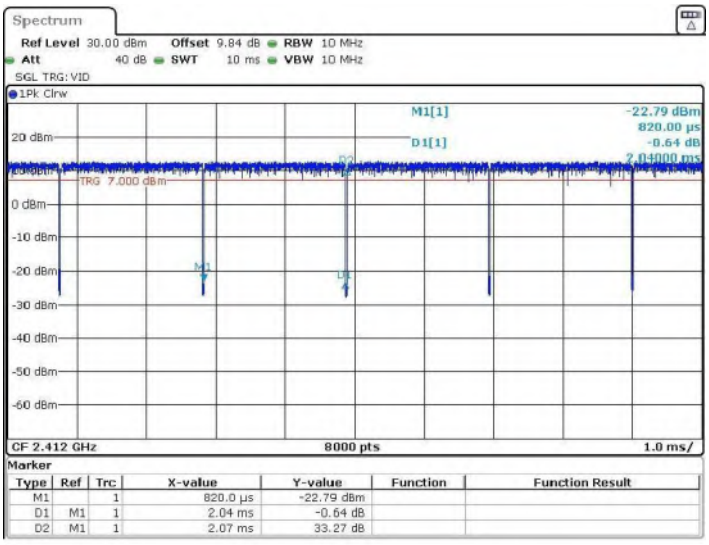
1) Duty cycle= On Time/ Period;

2) Duty Cycle factor = 10 * log(1/ Duty cycle);

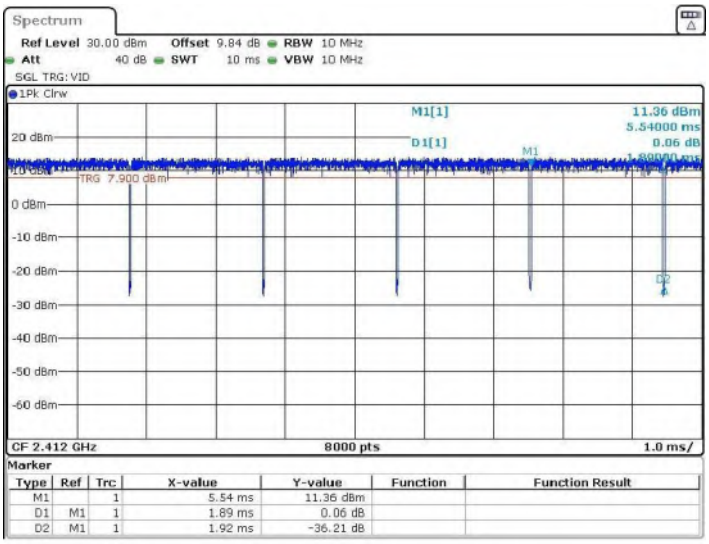
Test Graph_IEEE802.11b Duty Cycle:



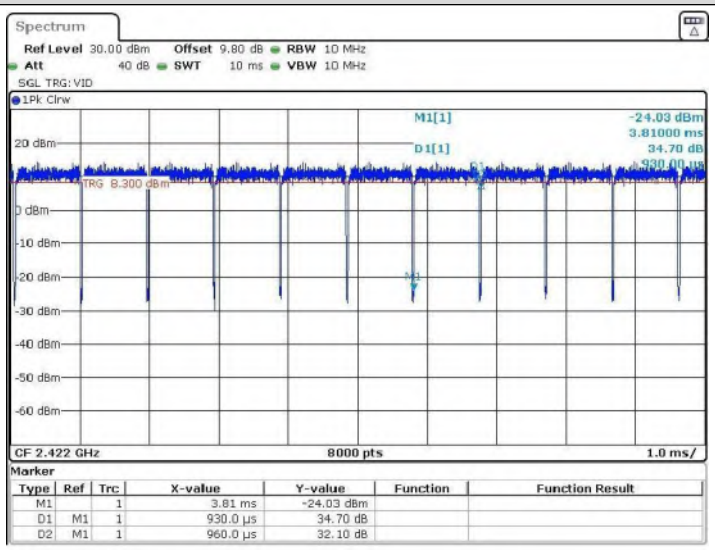
Test Graph_IEEE802.11g Duty Cycle:



Test Graph_IEEE802.11 n (HT20) Duty Cycle:



Test Graph_IEEE802.11 n (HT40) Duty Cycle:



Ant2

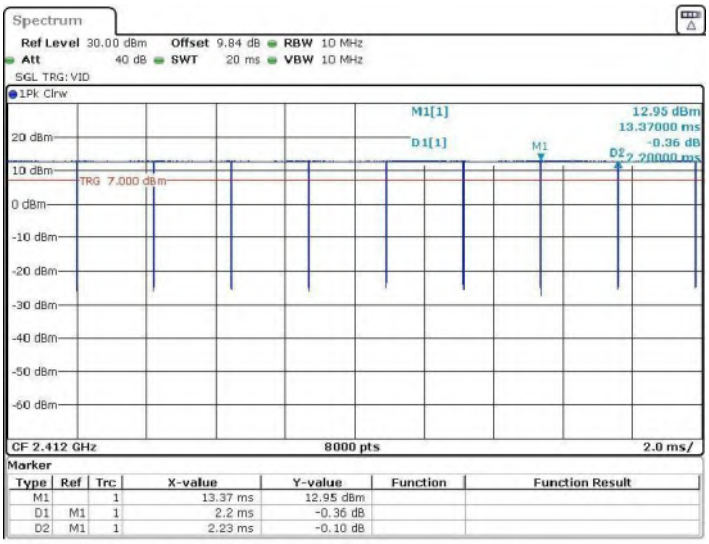
Operated Mode for Worst Duty Cycle:		
Test Mode	Duty Cycle(%)	Average correction factor(dB)
IEEE802.11b	98.65	0.06
IEEE802.11g	99.03	0.04
IEEE802.11n (HT20)	98.44	0.07
IEEE802.11n (HT40)	96.88	0.14

Remark:

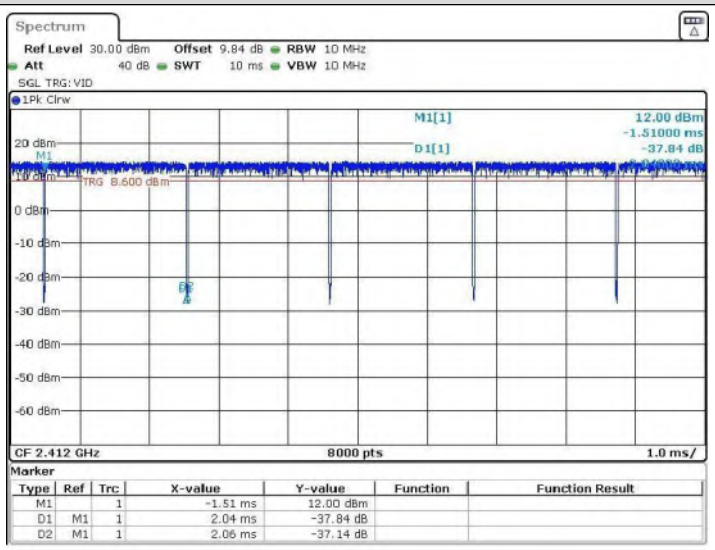
1) Duty cycle= On Time/ Period;

2) Duty Cycle factor = 10 * log(1/ Duty cycle);

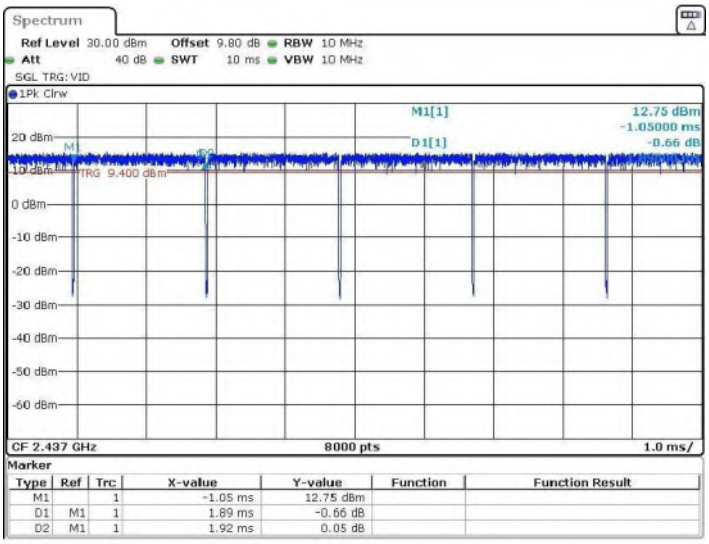
Test Graph_IEEE802.11b Duty Cycle:



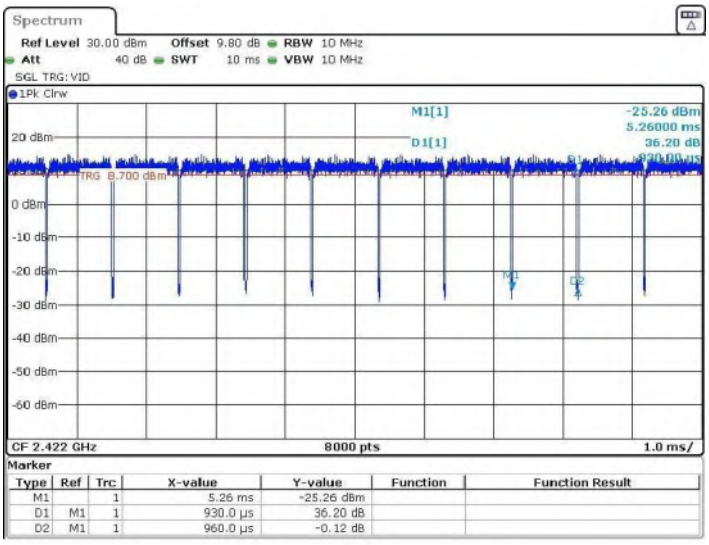
Test Graph_IEEE802.11g Duty Cycle:



Test Graph_IEEE802.11 n (HT20) Duty Cycle:



Test Graph_IEEE802.11 n (HT40) Duty Cycle:



4.5 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
/	/	/	/	/

2) Cable

Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by
/	/	/	/	/

4.6 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China

4.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

- **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.8 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	5.12dB	(1)
2	Radiated Emission (Above 1GHz)	4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	3.34dB	(1)
4	Radio Frequency	3×10^{-8}	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	Frequency Error	5.5 Hz	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.9 Deviation from Standards

None.

4.10 Abnormalities from Standard Conditions

None.

4.11 Other Information Requested by the Customer

None.

4.12 Equipments List

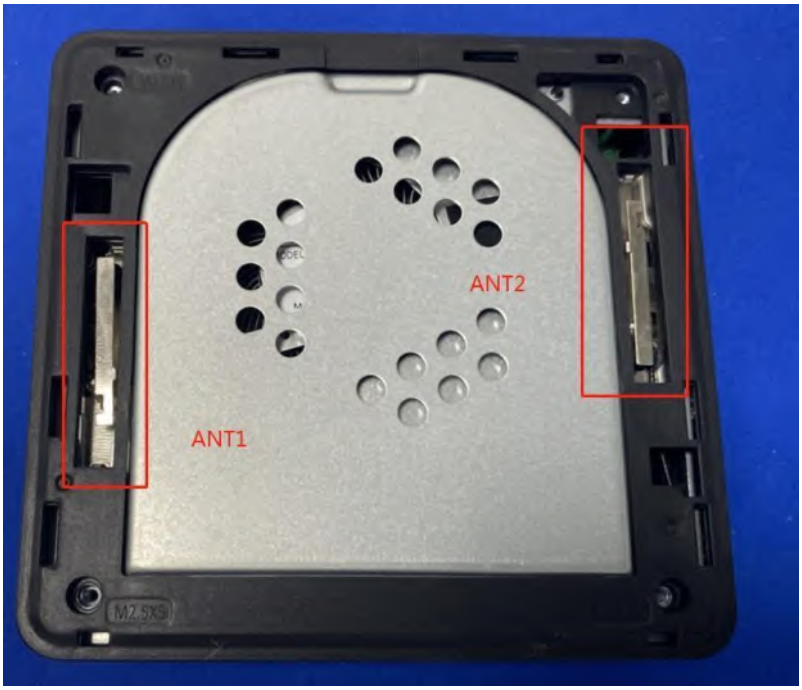
Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2021/09/10	2022/09/09
Spectrum analyzer	R&S	FSU26	CQA-038	2021/09/10	2022/09/09
Spectrum analyzer	R&S	FSU40	CQA-075	2021/09/10	2022/09/09
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2021/09/10	2022/09/09
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2021/09/10	2022/09/09
Preamplifier	EMCI	EMC184055SE	CQA-089	2021/09/10	2022/09/09
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2021/09/16	2024/09/15
Bilog Antenna	R&S	HL562	CQA-011	2021/09/16	2024/09/15
Horn Antenna	R&S	HF906	CQA-012	2021/09/16	2024/09/15
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021/09/16	2024/09/15
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2021/09/10	2022/09/09
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2021/09/10	2022/09/09
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2021/09/10	2022/09/09
Antenna Connector	CQA	RFC-01	CQA-080	2021/09/10	2022/09/09
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2021/09/10	2022/09/09
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2021/09/10	2022/09/09
Power meter	R&S	NRVD	CQA-029	2021/09/10	2022/09/09
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2021/09/10	2022/09/09
EMI Test Receiver	R&S	ESR7	CQA-005	2021/09/10	2022/09/09
LISN	R&S	ENV216	CQA-003	2021/09/10	2022/09/09
Coaxial cable	CQA	N/A	CQA-C009	2021/09/10	2022/09/09
DC power	KEYSIGHT	E3631A	CQA-028	2021/09/10	2022/09/09

Test software:

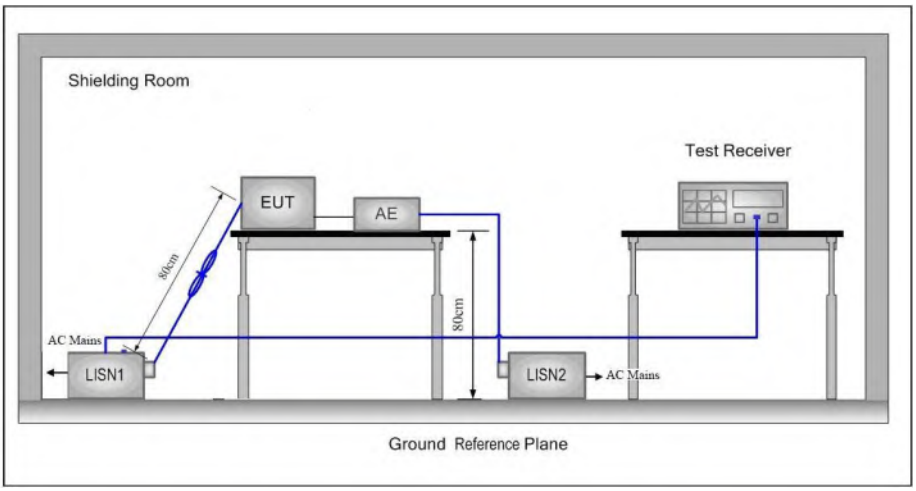
	Manufacturer	Software brand
Radiated Emissions test software	Tonscend	JS1120-3
Conducted Emissions test software	Audix	e3
RF Conducted test software	Audix	e3

5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203
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.	
EUT Antenna:	
The antenna is metal antenna. Ant 1: 2.48dBi; Ant2: 1.94dBi (provided by the applicant)	

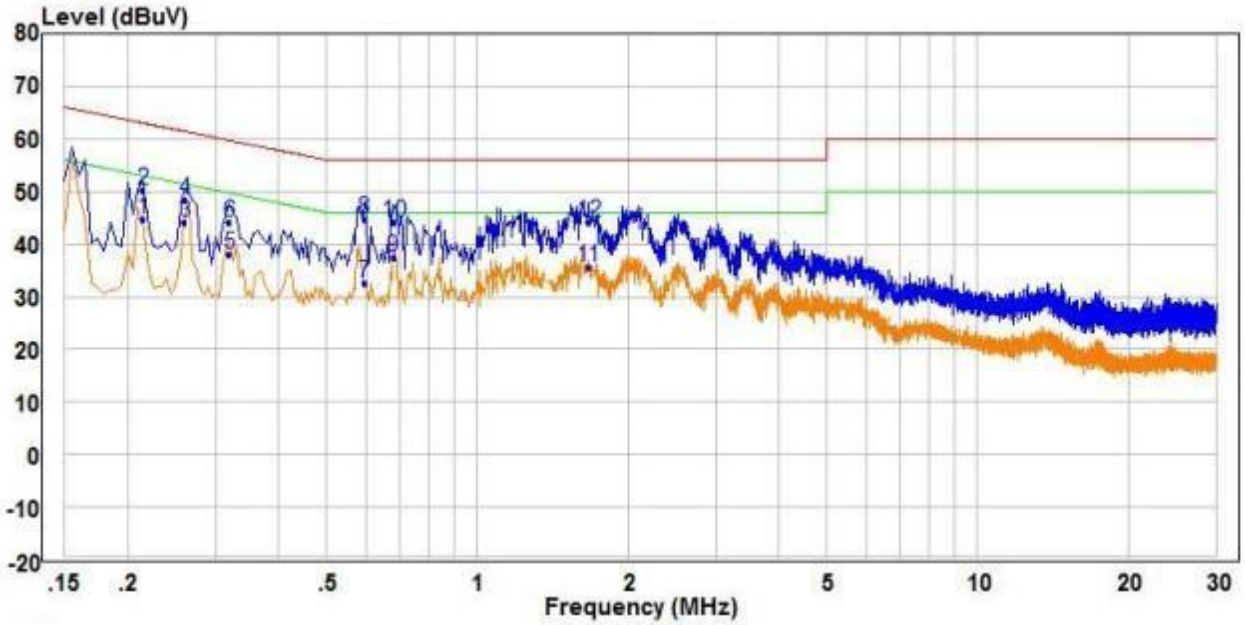
5.2 Conducted Emissions

<table>
<tr><td>Test Requirement:</td><td>47 CFR Part 15C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10: 2013</td></tr>
<tr><td>Test Frequency Range:</td><td>150kHz to 30MHz</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test Procedure:</td><td>1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</td></tr>
<tr><td>Test Setup:</td><td> 
</td></tr>
<tr><td>Exploratory Test Mode:</td><td>Transmitting with all kind of modulations, data rates at lowest, middle and</td></tr>
</table>

	highest channel.
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate of 802.11b at middle channel is the worst case. Only the worst case is recorded in the report.
Test Voltage:	AC120V/60Hz
Test Results:	Pass

Measurement Data

Live Line:

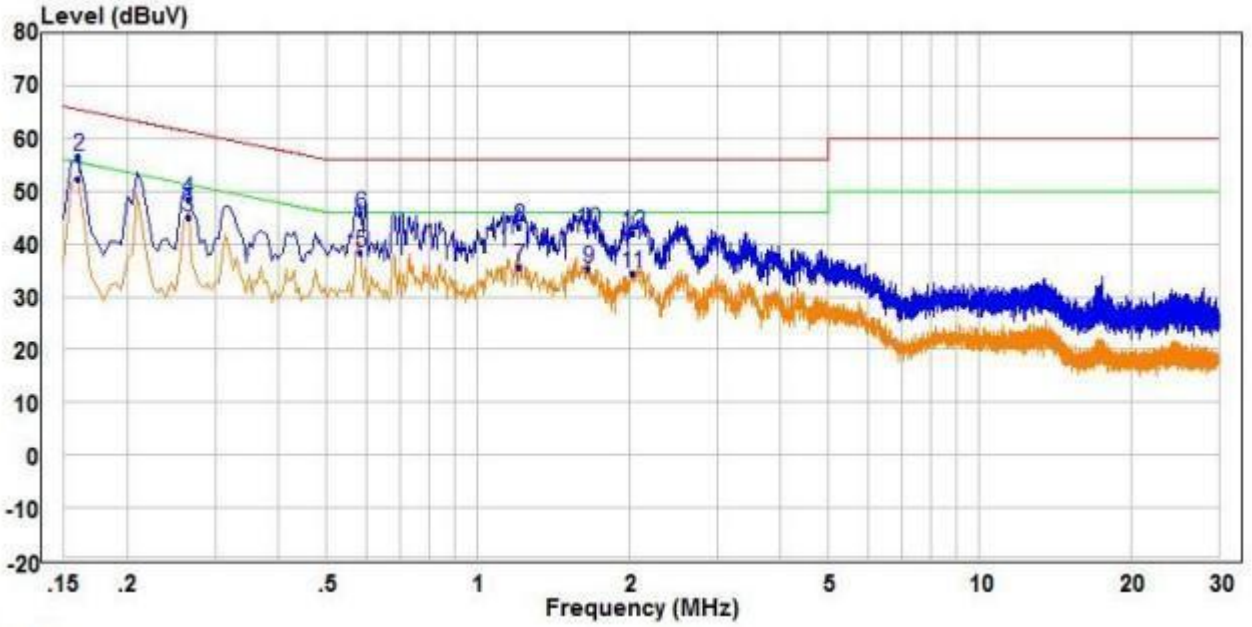


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.215	35.16	9.59	44.75	53.01	-8.26	Average	Line
2	0.215	40.61	9.59	50.20	63.01	-12.81	QP	Line
3 PP	0.260	34.60	9.53	44.13	51.43	-7.30	Average	Line
4	0.260	38.82	9.53	48.35	61.43	-13.08	QP	Line
5	0.320	28.55	9.52	38.07	49.71	-11.64	Average	Line
6	0.320	34.54	9.52	44.06	59.71	-15.65	QP	Line
7	0.595	22.92	9.80	32.72	46.00	-13.28	Average	Line
8 QP	0.595	34.81	9.80	44.61	56.00	-11.39	QP	Line
9	0.680	27.51	9.88	37.39	46.00	-8.61	Average	Line
10	0.680	34.23	9.88	44.11	56.00	-11.89	QP	Line
11	1.665	24.64	11.13	35.77	46.00	-10.23	Average	Line
12	1.665	32.88	11.13	44.01	56.00	-11.99	QP	Line

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT.
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral Line:

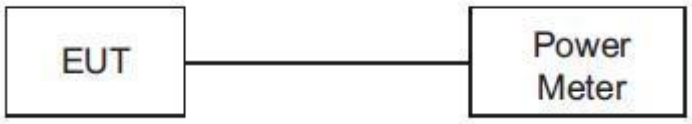


		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	PP	0.160	42.77	9.68	52.45	55.46	-3.01	Average	Neutral
2	QP	0.160	46.97	9.68	56.65	65.46	-8.81	QP	Neutral
3		0.265	35.54	9.52	45.06	51.27	-6.21	Average	Neutral
4		0.265	38.91	9.52	48.43	61.27	-12.84	QP	Neutral
5		0.585	28.58	9.79	38.37	46.00	-7.63	Average	Neutral
6		0.585	35.98	9.79	45.77	56.00	-10.23	QP	Neutral
7		1.210	26.01	9.71	35.72	46.00	-10.28	Average	Neutral
8		1.210	33.43	9.71	43.14	56.00	-12.86	QP	Neutral
9		1.660	25.47	9.73	35.20	46.00	-10.80	Average	Neutral
10		1.660	32.77	9.73	42.50	56.00	-13.50	QP	Neutral
11		2.030	24.68	9.75	34.43	46.00	-11.57	Average	Neutral
12		2.030	32.14	9.75	41.89	56.00	-14.11	QP	Neutral

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT.
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

5.3 Conducted Peak & Average Output Power

Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3)
Test Method:	ANSI C63.10: 2013
Test Setup:	
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40). Only the worst case is recorded in the report.
Limit:	30dBm
Test Results:	Pass

Measurement Data

Ant 1

802.11b mode				
Test channel	Measured Average Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	10.83	10.89	30.00	Pass
Middle	10.43	10.49	30.00	Pass
Highest	10.14	10.2	30.00	Pass
802.11g mode				
Test channel	Measured Average Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	10.01	10.07	30.00	Pass
Middle	10.13	10.19	30.00	Pass
Highest	10.60	10.66	30.00	Pass
802.11n(HT20)mode				
Test channel	Measured Average Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	9.89	9.96	30.00	Pass
Middle	10.33	10.4	30.00	Pass
Highest	10.44	10.51	30.00	Pass
802.11n(HT40)mode				
Test channel	Measured Average Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	10.56	10.7	30.00	Pass
Middle	9.92	10.06	30.00	Pass
Highest	10.28	10.42	30.00	Pass
Remark: 1. Average Output Power was for reference only 2. Average Output Power had added duty cycle factor				

Ant 2

802.11b mode				
Test channel	Measured Average Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	10.49	10.55	30.00	Pass
Middle	10.30	10.36	30.00	Pass
Highest	10.44	10.5	30.00	Pass
802.11g mode				
Test channel	Measured Average Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	9.78	9.82	30.00	Pass
Middle	10.49	10.53	30.00	Pass
Highest	10.54	10.58	30.00	Pass
802.11n(HT20)mode				
Test channel	Measured Average Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	9.82	9.89	30.00	Pass
Middle	10.38	10.45	30.00	Pass
Highest	9.94	10.01	30.00	Pass
802.11n(HT40)mode				
Test channel	Measured Average Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	10.71	10.85	30.00	Pass
Middle	9.93	10.07	30.00	Pass
Highest	10.03	10.17	30.00	Pass
Remark: 1. Average Output Power was for reference only 2. Average Output Power had added duty cycle factor				

Ant 1+Ant 2

802.11n(HT20)mode				
Test channel	Measured Average Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	12.86	12.93	30.00	Pass
Middle	13.36	13.43	30.00	Pass
Highest	13.21	13.28	30.00	Pass
802.11n(HT40)mode				
Test channel	Measured Average Output Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
Lowest	13.65	13.79	30.00	Pass
Middle	12.94	13.08	30.00	Pass
Highest	13.17	13.31	30.00	Pass

Remark:

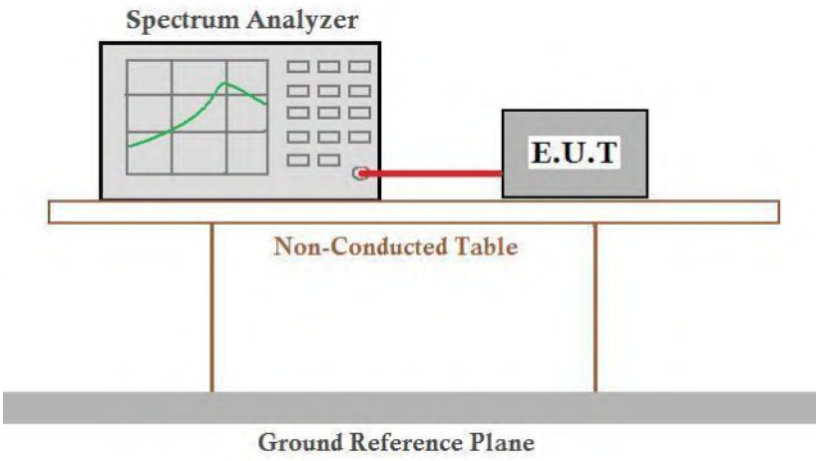
1. Average Output Power was for reference only

2. Average Output Power had added duty cycle factor

3. The EUT supports MIMO and transmit signals are correlated with each other, then

Directional gain = 10 log$[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi = 5.22 dBi<6dBi

5.4 6dB Occupy Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2)
Test Method:	ANSI C63.10: 2013
Test Setup:	 Offset=cable loss+ attenuation factor
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40). Only the worst case is recorded in the report.
Limit:	≥ 500 kHz
Test Results:	Pass

Measurement Data

Ant 1

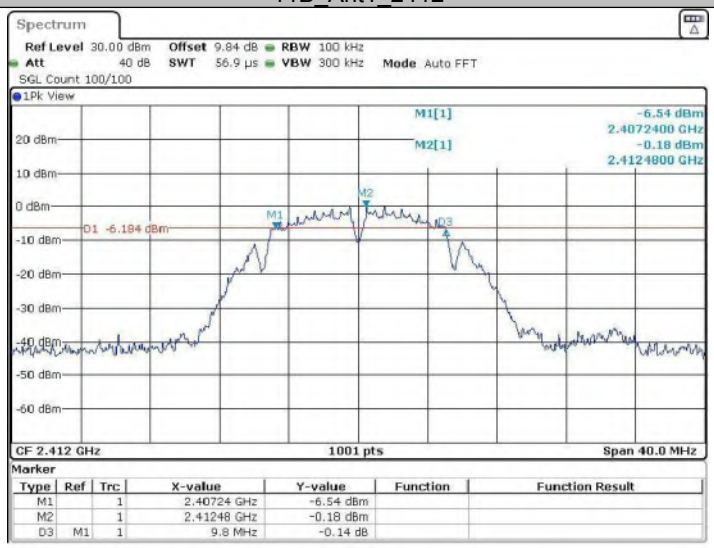
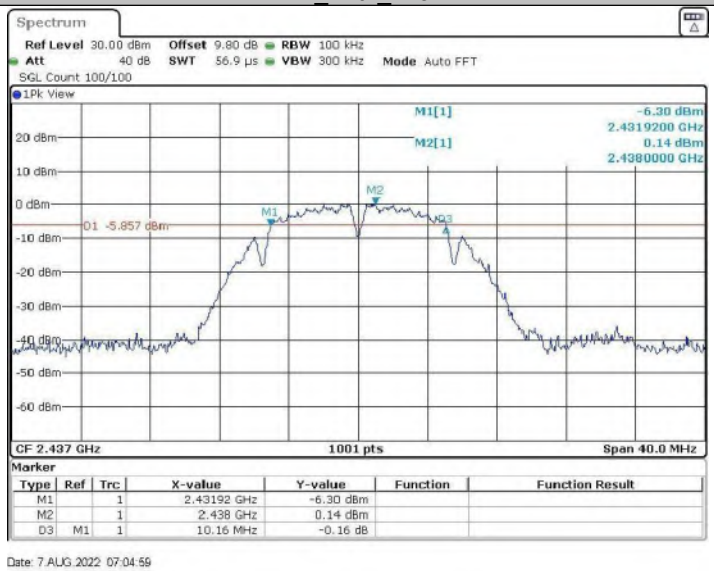
802.11b mode				
Test channel	6dB Occupy Bandwidth (MHz)	99% OBW [MHz]	Limit (kHz)	Result
Lowest	9.800	12.947	≥500	Pass
Middle	10.160	12.907	≥500	Pass
Highest	9.680	12.907	≥500	Pass
802.11g mode				
Test channel	6dB Occupy Bandwidth (MHz)	99% OBW [MHz]	Limit (kHz)	Result
Lowest	16.400	16.783	≥500	Pass
Middle	16.400	16.783	≥500	Pass
Highest	16.400	16.663	≥500	Pass
802.11n(HT20) mode				
Test channel	6dB Occupy Bandwidth (MHz)	99% OBW [MHz]	Limit (kHz)	Result
Lowest	13.920	18.262	≥500	Pass
Middle	17.680	18.022	≥500	Pass
Highest	17.680	17.942	≥500	Pass
802.11n(HT40)mode				
Test channel	6dB Occupy Bandwidth (MHz)	99% OBW [MHz]	Limit (kHz)	Result
Lowest	35.520	36.204	≥500	Pass
Middle	31.200	36.124	≥500	Pass
Highest	35.280	36.284	≥500	Pass
Remark: 1. 99% OBW was for reference only				

Ant 2

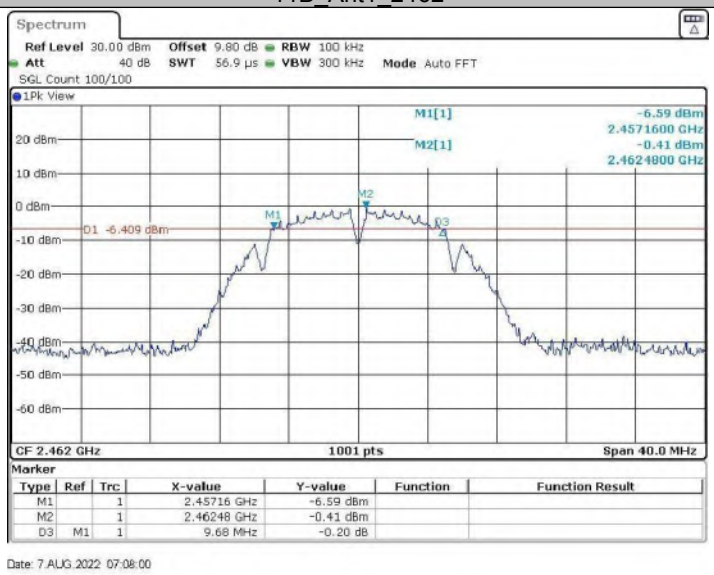
802.11b mode				
Test channel	6dB Occupy Bandwidth (MHz)	99% OBW [MHz]	Limit (kHz)	Result
Lowest	10.160	12.827	≥500	Pass
Middle	9.200	12.827	≥500	Pass
Highest	9.360	12.827	≥500	Pass
802.11g mode				
Test channel	6dB Occupy Bandwidth (MHz)	99% OBW [MHz]	Limit (kHz)	Result
Lowest	16.040	16.823	≥500	Pass
Middle	16.400	17.103	≥500	Pass
Highest	16.400	16.543	≥500	Pass
802.11n(HT20) mode				
Test channel	6dB Occupy Bandwidth (MHz)	99% OBW [MHz]	Limit (kHz)	Result
Lowest	14.760	18.182	≥500	Pass
Middle	16.120	18.022	≥500	Pass
Highest	17.680	17.942	≥500	Pass
802.11n(HT40)mode				
Test channel	6dB Occupy Bandwidth (MHz)	99% OBW [MHz]	Limit (kHz)	Result
Lowest	30.240	36.364	≥500	Pass
Middle	36.240	36.284	≥500	Pass
Highest	30.880	36.044	≥500	Pass
Remark: 1. 99% OBW was for reference only				

Test plot as follows:

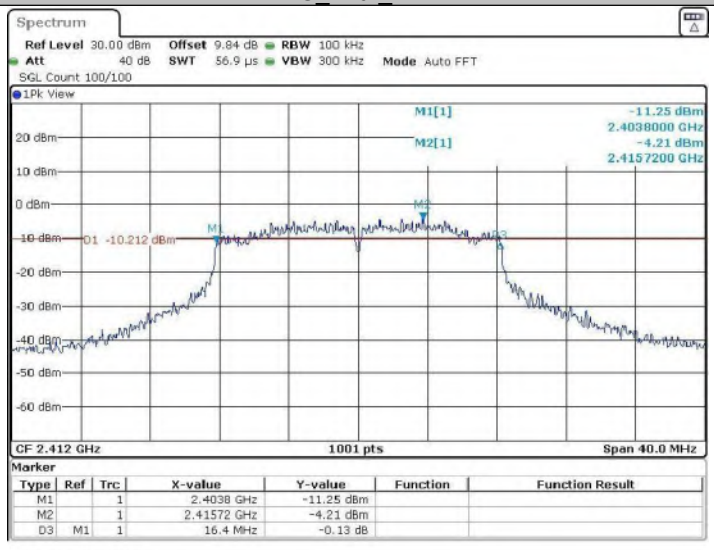
Ant1

11B_Ant1_2412

11B_Ant1_2437


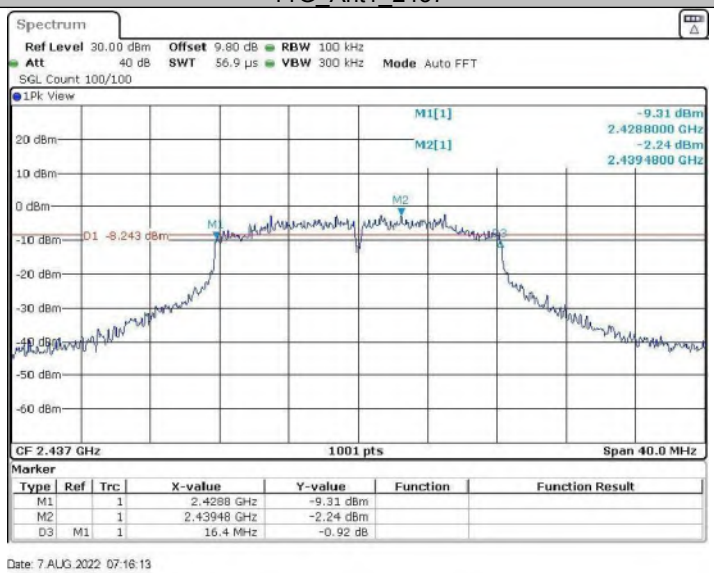
11B_Ant1_2462



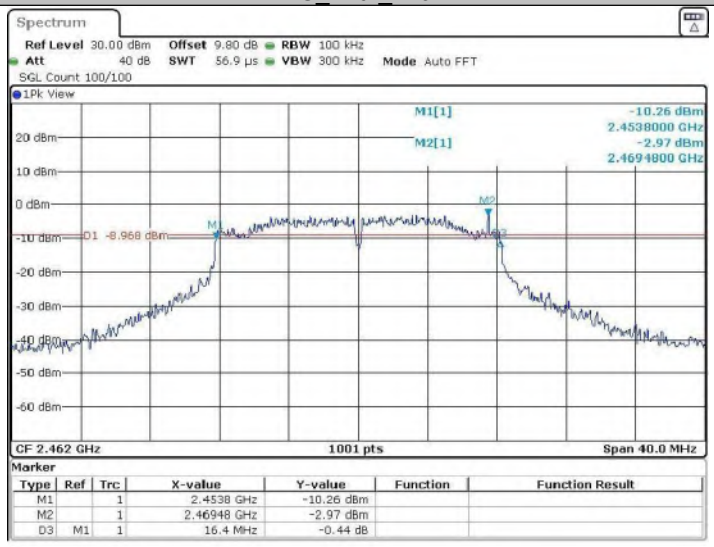
11G_Ant1_2412



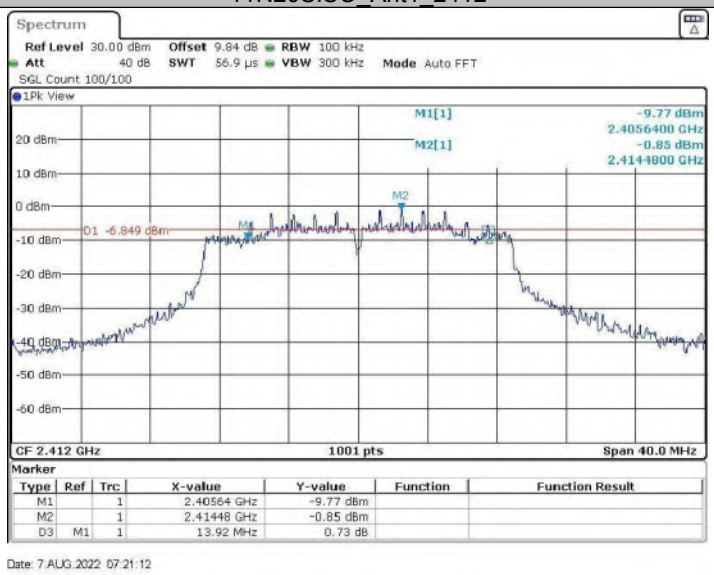
11G_Ant1_2437



11G_Ant1_2462



11N20SISO_Ant1_2412



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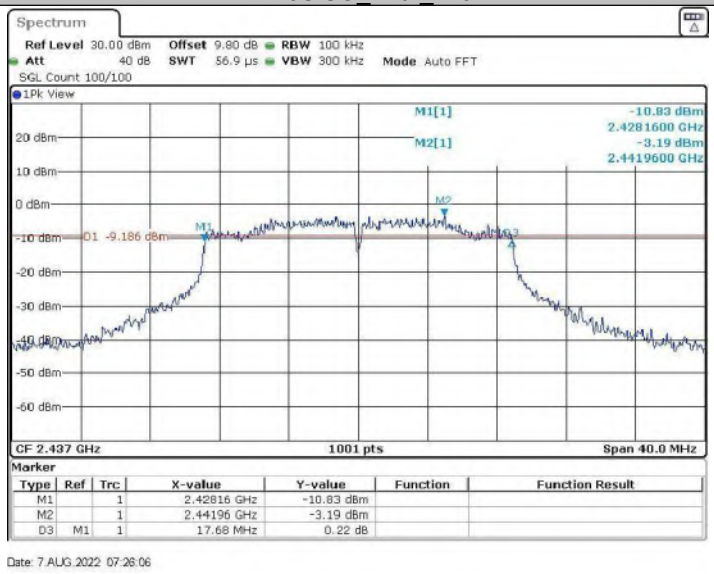

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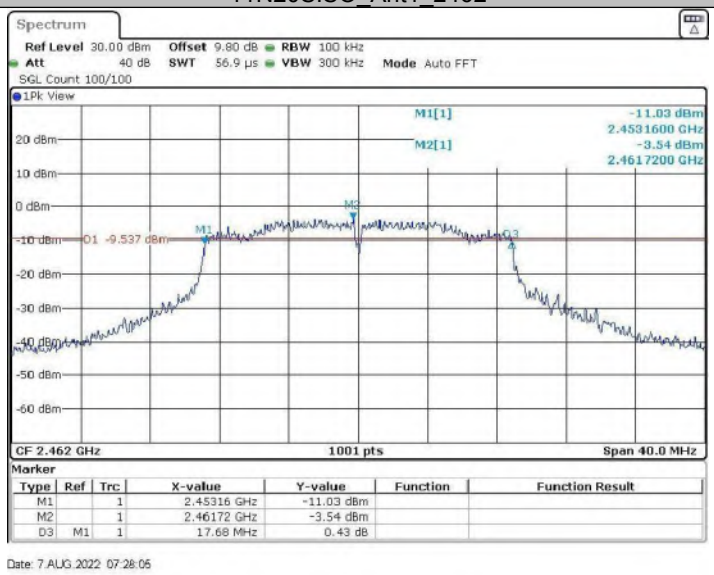
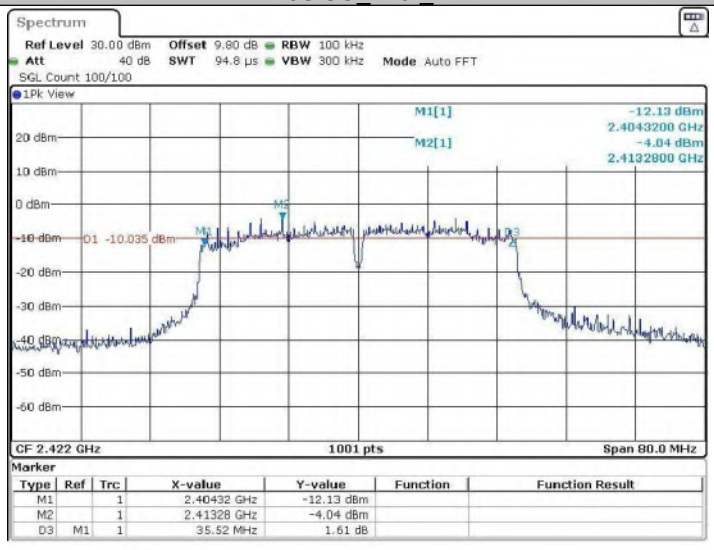
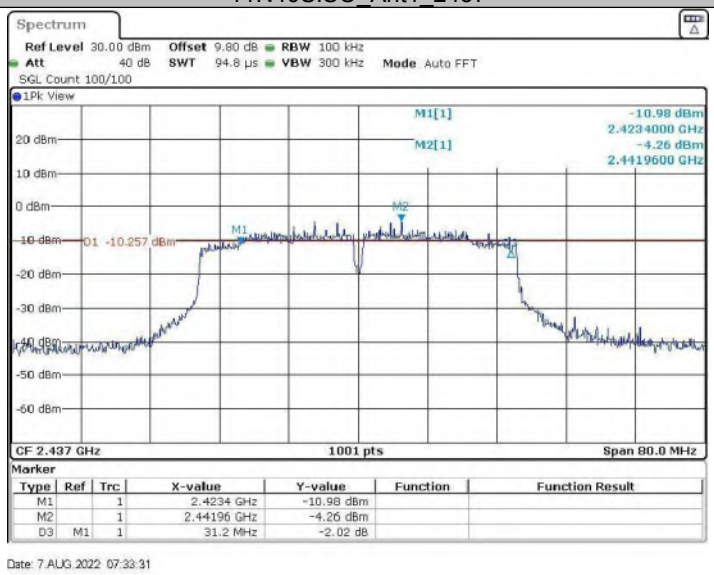


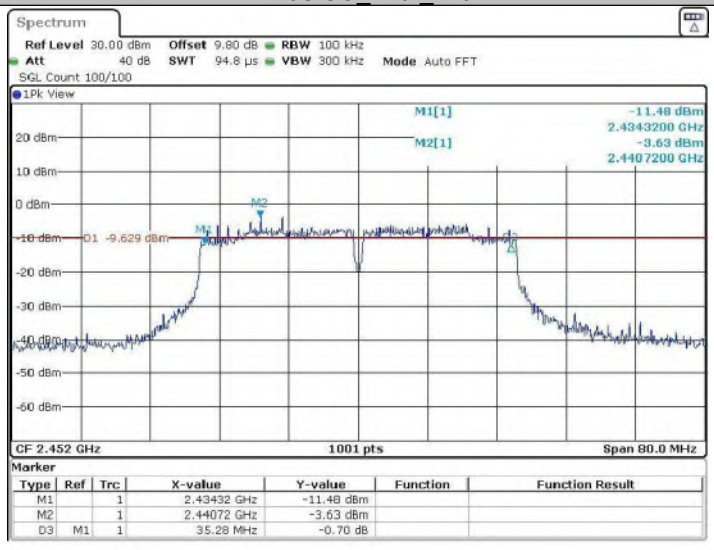
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



11B_Ant1_2412

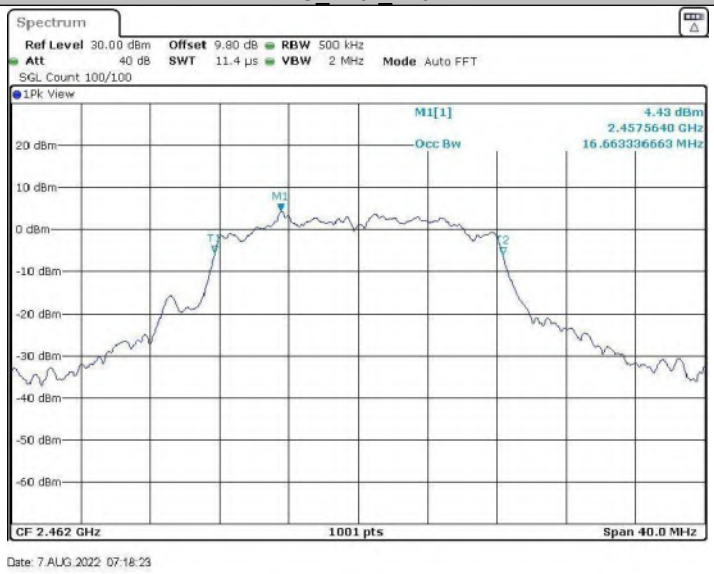
11B_Ant1_2437

11B_Ant1_2462

11G_Ant1_2412


11G_Ant1_2437

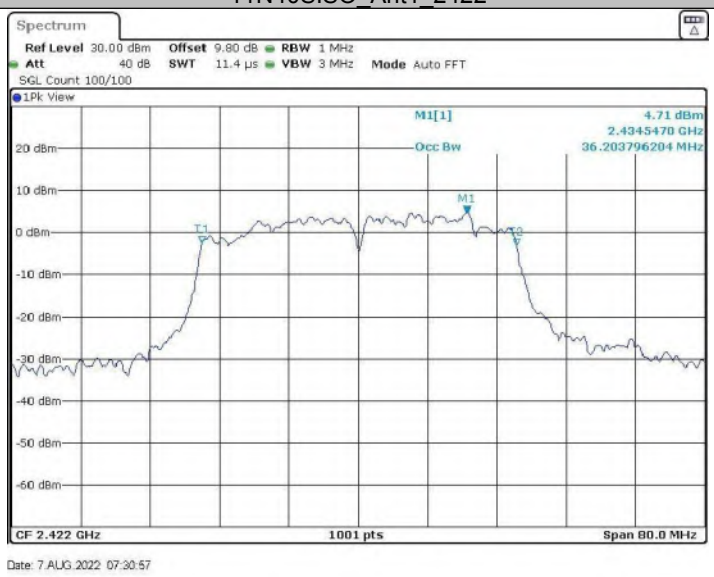
11G_Ant1_2462



11N20SISO_Ant1_2412

11N20SISO_Ant1_2437

11N20SISO_Ant1_2462

11N40SISO_Ant1_2422


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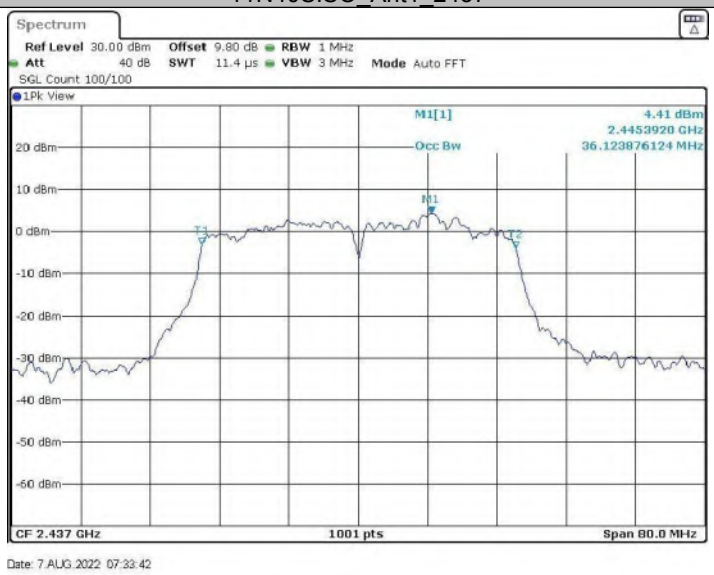
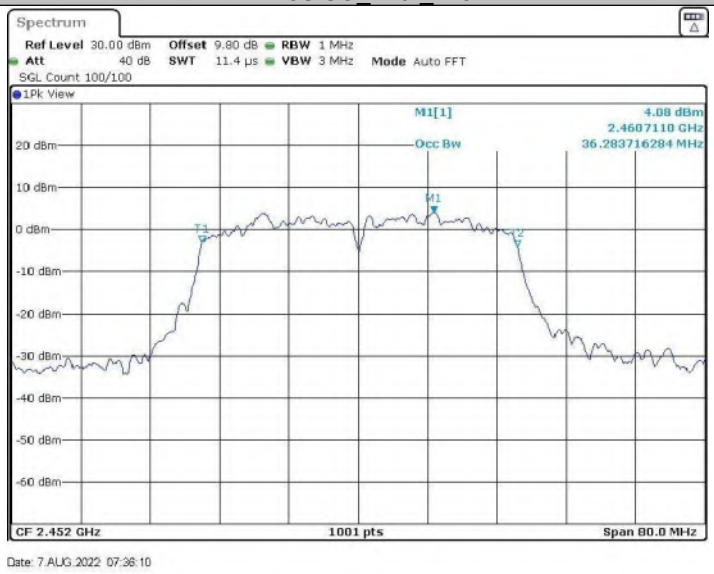
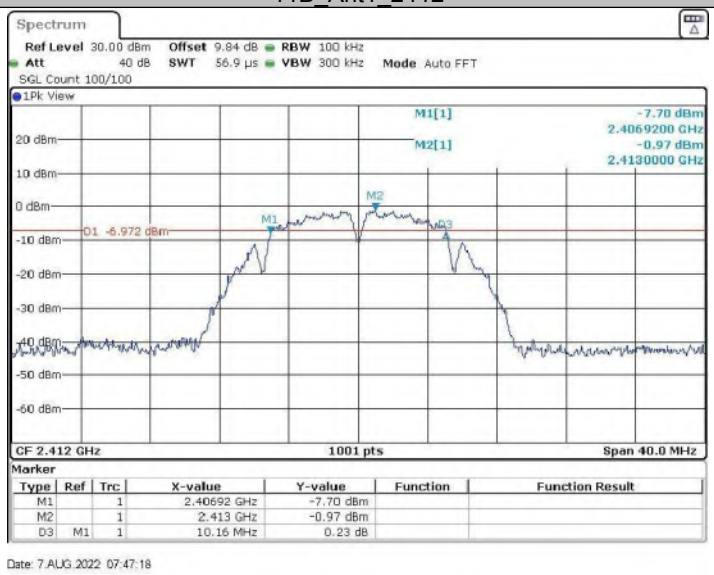


11N40SISO_Ant1_2452

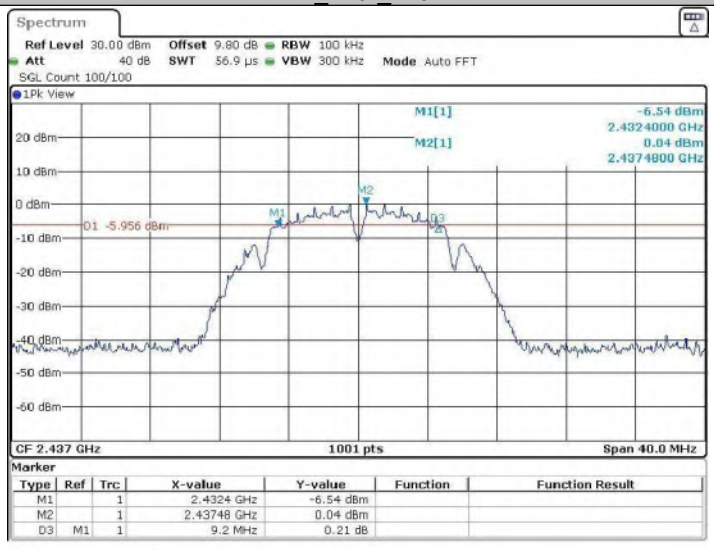


Ant2

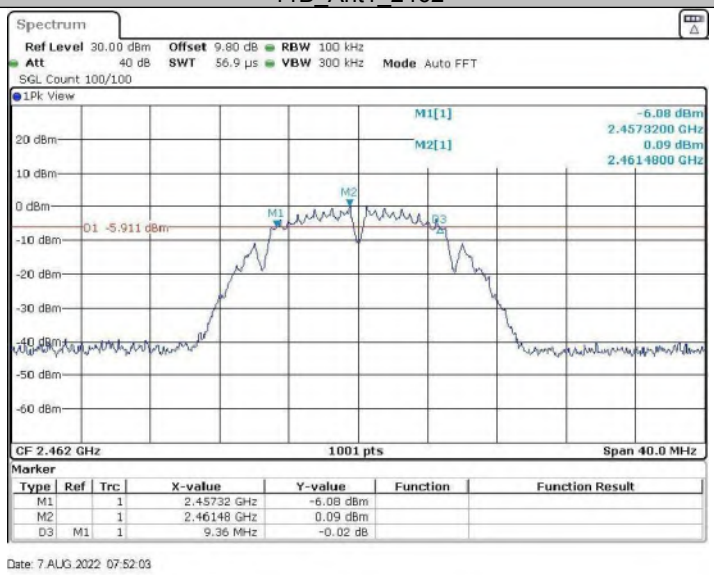
11B_Ant1_2412



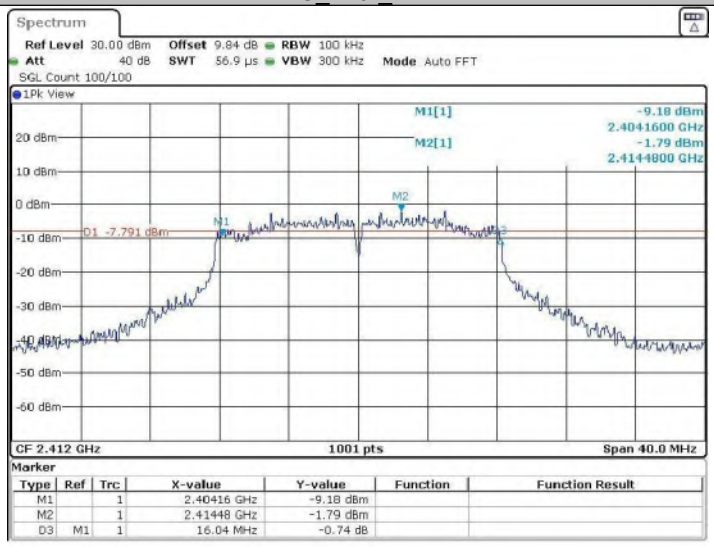
11B_Ant1_2437



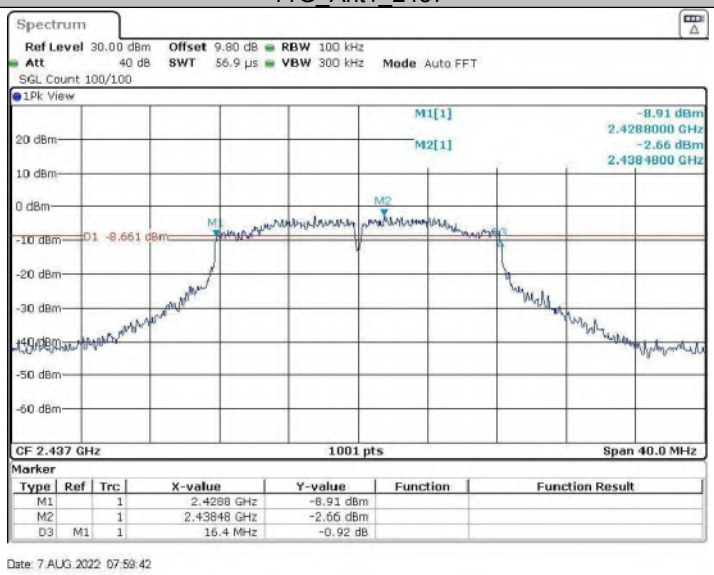
11B_Ant1_2462



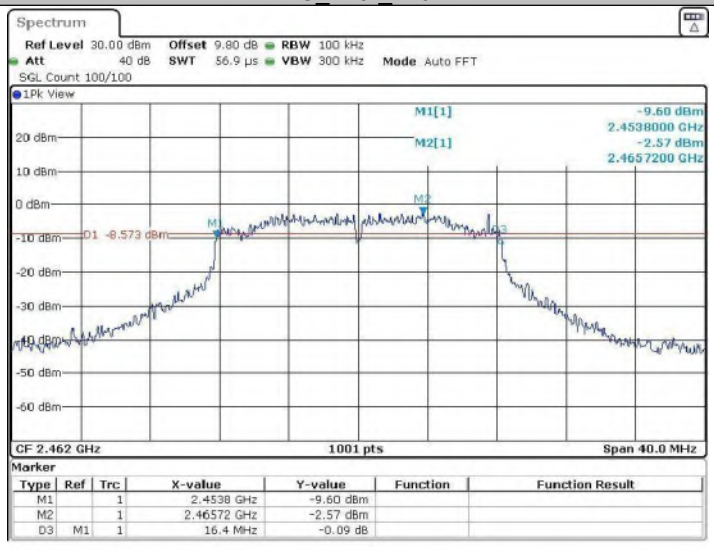
11G_Ant1_2412



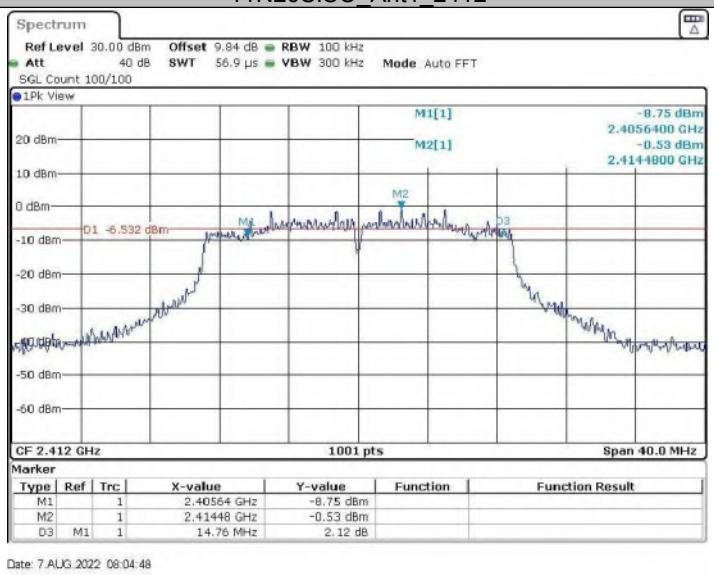
11G_Ant1_2437



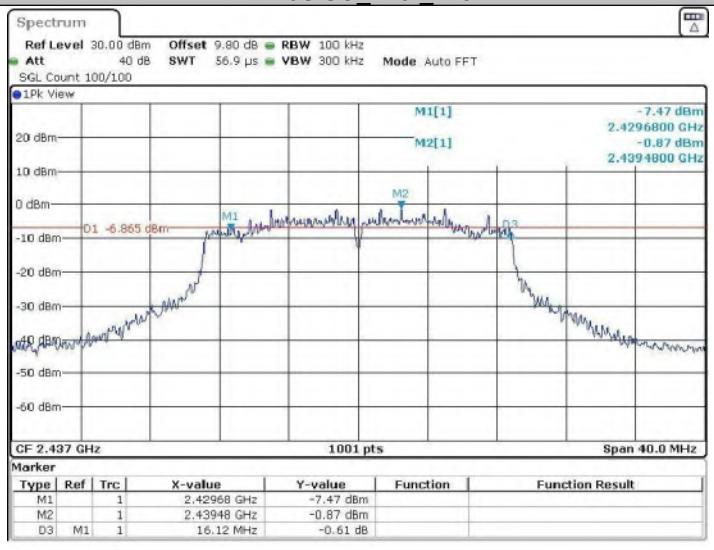
11G_Ant1_2462



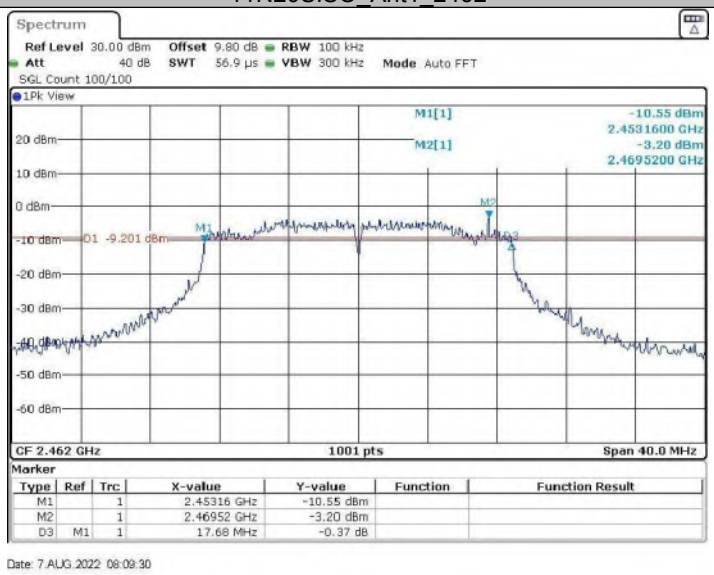
11N20SISO_Ant1_2412



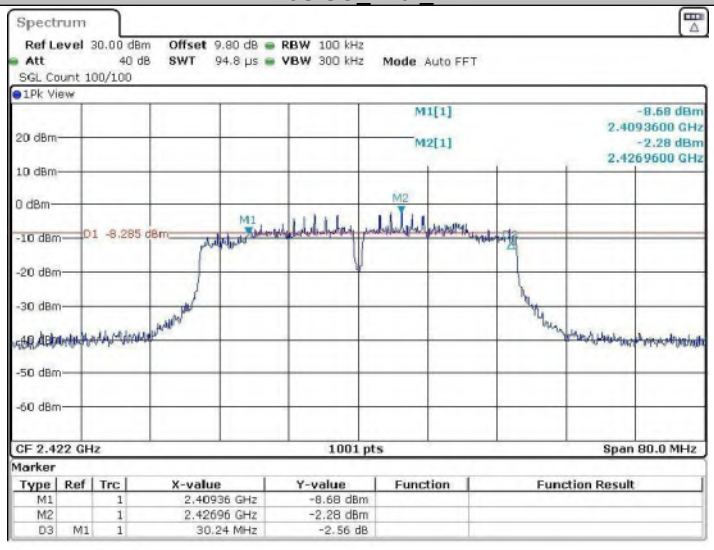
11N20SISO_Ant1_2437



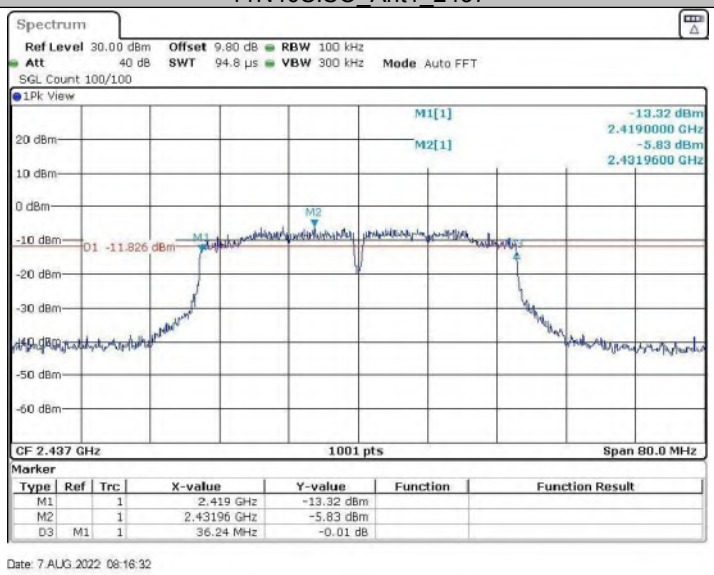
11N20SISO_Ant1_2462



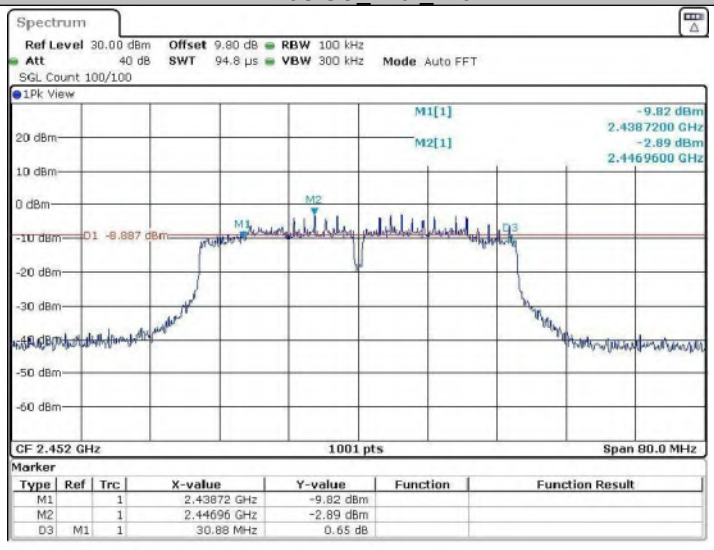
11N40SISO_Ant1_2422



11N40SISO_Ant1_2437

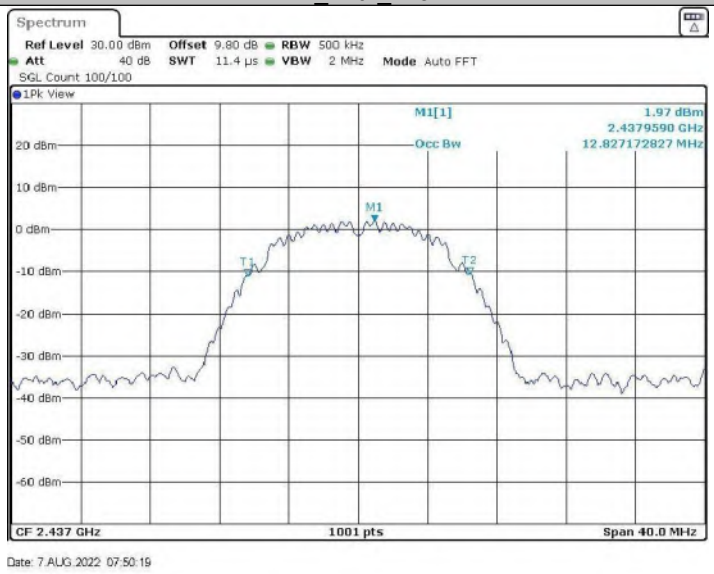


11N40SISO_Ant1_2452



11B_Ant1_2412

11B_Ant1_2437



11B_Ant1_2462

11G_Ant1_2412

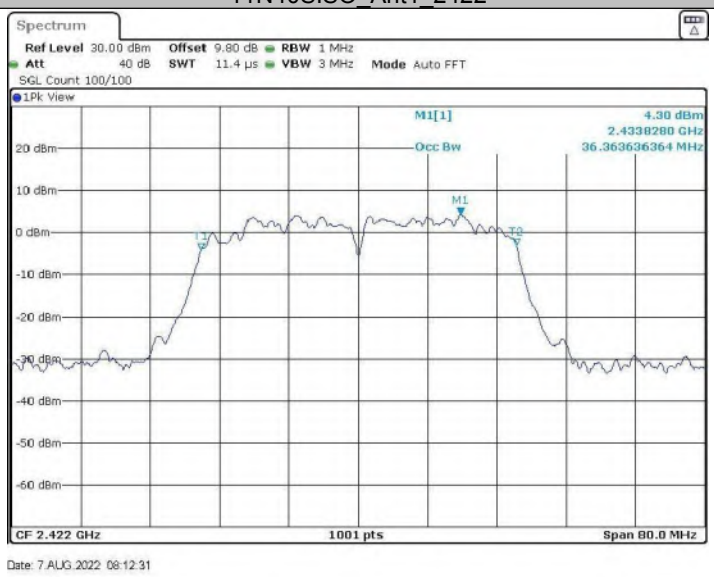
11G_Ant1_2437

11G_Ant1_2462

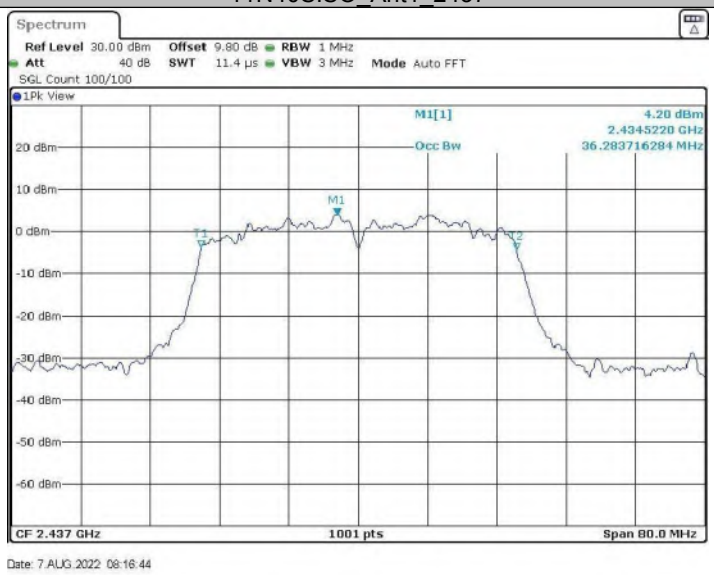
11N20SISO_Ant1_2412

11N20SISO_Ant1_2437

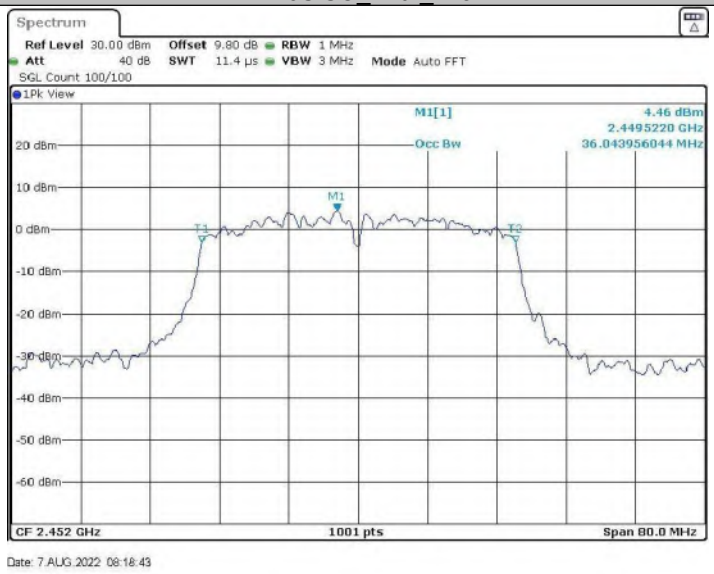
11N20SISO_Ant1_2462

11N40SISO_Ant1_2422


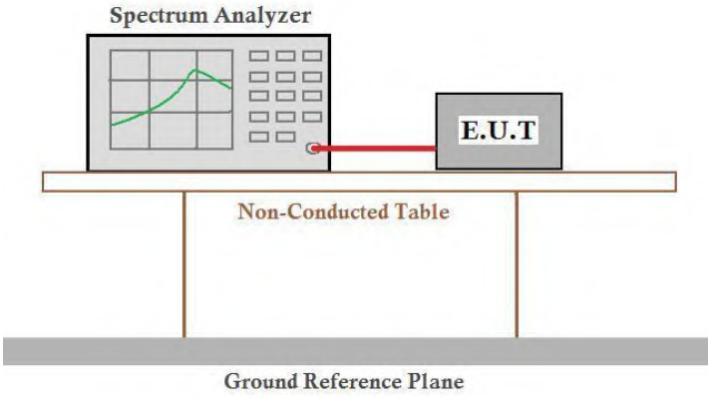
11N40SISO_Ant1_2437



11N40SISO_Ant1_2452



5.5 Power Spectral Density

Test Requirement:	47 CFR Part 15C Section 15.247 (e)
Test Method:	ANSI C63.10: 2013
Test Setup:	 Offset=cable loss+ attenuation factor
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40). Only the worst case is recorded in the report.
Limit:	≤8.00dBm/3kHz
Test Results:	Pass

Measurement Data

Ant1

802.11b mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-19.36	≤8.00	Pass
Middle	-19.23	≤8.00	Pass
Highest	-19.06	≤8.00	Pass
802.11g mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-22.77	≤8.00	Pass
Middle	-22.48	≤8.00	Pass
Highest	-22.35	≤8.00	Pass
802.11n(HT20) mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-23.1	≤8.00	Pass
Middle	-22.58	≤8.00	Pass
Highest	-22.72	≤8.00	Pass
802.11n(HT40) mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-21.69	≤8.00	Pass
Middle	-22.66	≤8.00	Pass
Highest	-22.21	≤8.00	Pass

Ant2

802.11b mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-19.69	≤8.00	Pass
Middle	-19.51	≤8.00	Pass
Highest	-19.56	≤8.00	Pass
802.11g mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-23.19	≤8.00	Pass
Middle	-21.8	≤8.00	Pass
Highest	-22.62	≤8.00	Pass
802.11n(HT20) mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-22.84	≤8.00	Pass
Middle	-23	≤8.00	Pass
Highest	-23.36	≤8.00	Pass
802.11n(HT40) mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-21.72	≤8.00	Pass
Middle	-21.27	≤8.00	Pass
Highest	-21.72	≤8.00	Pass

Ant1+Ant2

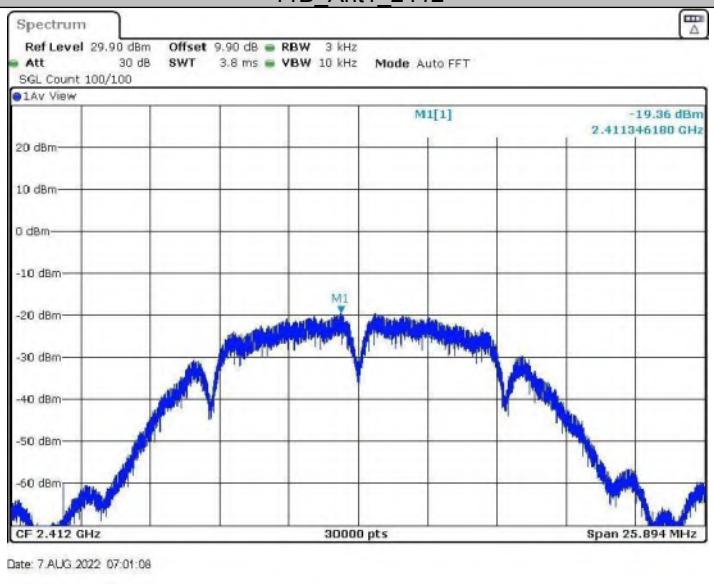
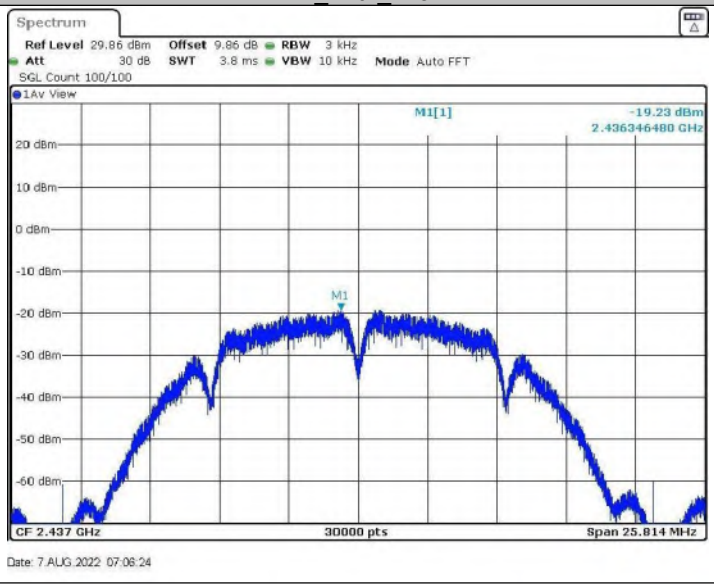
802.11n(HT20) mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-19.96	≤8.00	Pass
Middle	-19.79	≤8.00	Pass
Highest	-20.04	≤8.00	Pass
802.11n(HT40) mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-18.70	≤8.00	Pass
Middle	-18.89	≤8.00	Pass
Highest	-18.96	≤8.00	Pass

Note: The EUT supports MIMO and transmit signals are correlated with each other, then

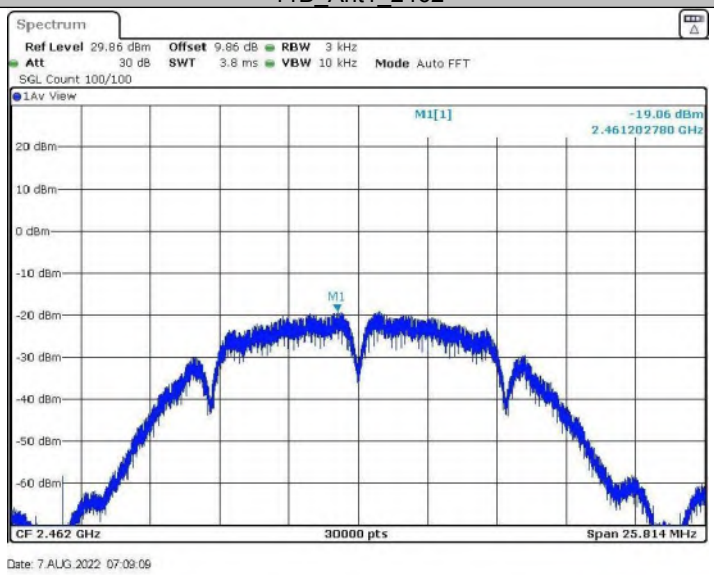
Directional gain = 10 log$[(10^{G1/20}+10^{G2/20}+\ldots+10^{GN/20})^2/N_{ANT}]$ dBi = 5.22 dBi<6dBi

Test plot as follows:

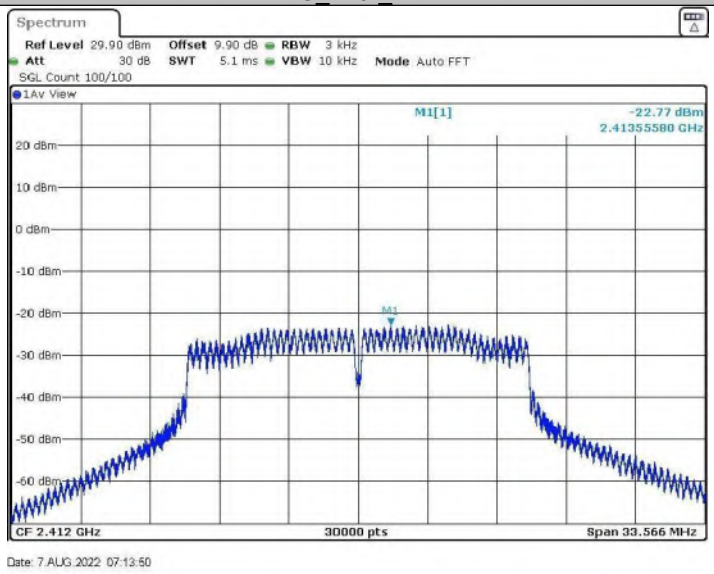
Ant1

11B_Ant1_2412

11B_Ant1_2437


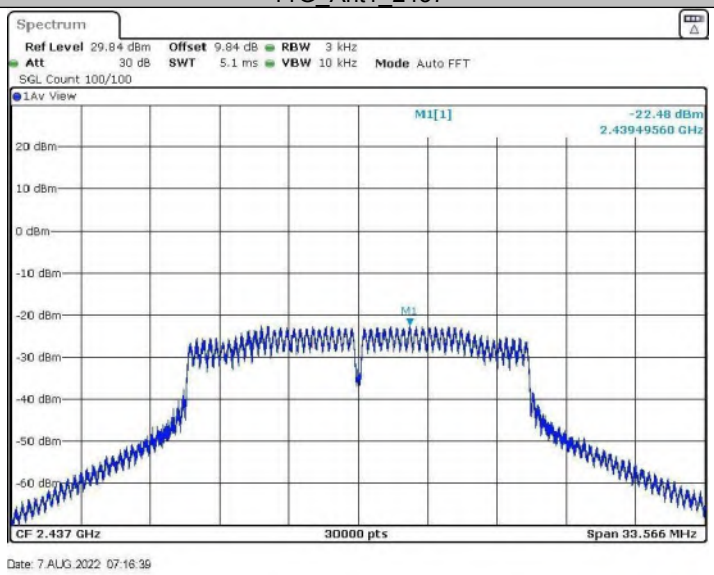
11B_Ant1_2462



11G_Ant1_2412



11G_Ant1_2437



11G_Ant1_2462