FCC TEST REPORT

Product Name:	LTE Desk Router
Trade Mark:	Eltel
Model No.:	R520
Add. Model No.:	N/A
Report Number:	180905005RFC-1
Test Standards:	FCC 47 CFR Part 15 Subpart C
FCC ID:	2AQ5T-R520
Test Result:	PASS
Date of Issue:	October 12, 2018

Prepared for:

Eltel Group Inc.
19 Calle 5-65 Zona 10, Guatemala

Prepared by:

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Date: October 12, 2018

UnionTrust Laboratories * Certified *

Version

Version No.	Date	Description
V1.0	October 12, 2018	Original

CONTENTS

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Eltel Group Inc.
Address of Applicant:	19 Calle 5-65 Zona 10, Guatemala
Manufacturer:	Shanghai BroadMobi Communication Technology Co., Ltd
Address of Manufacturer:	15F,Building9,No99.Tianzhou Rd.,Xuhui District,Shanghai,P.R.China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	LTE Desk Router	
Model No.:	R520	
Add. Model No.:	N/A	
Trade Mark:	Eltel	
DUT Stage:	Identical Prototype	
EUT Supports Function:	GSM Bands:	GSM850/1900
	UTRA Bands:	Band II/ Band V
	E-UTRA Bands:	FDD Band 4/ Band 7/ Band 66
	2.4 GHz ISM Band:	IEEE 802.11b/g/n
Software Version:	1.01	
Hardware Version:	2.0	
Sample Received Date:	September 5, 2018	
Sample Tested Date:	September 5, 2018 to September 24, 2018	

1.2.2 Description of Accessories

Adapter 1	
Trade Mark:	AMIGO
Model No.:	AMS159A-1201000FU
Input:	100-240 V~50/60 Hz 0.5 A
Output:	12.0 V ⎓ 1.0 A
DC Cable:	1.20 Meter, Shielded without ferrite
Manufacturer:	GLOBAL YEOU DIANN ELECTRIC INDUSTRIAL CO., LTD.

Adapter 2	
Trade Mark:	GANGQI
Model No.:	GQ12-120100-HU
Input:	100-240V~50/60Hz 0.4A
Output:	12.0 V ⎓ 1.0 A
DC Cable:	1.20 Meter, Shielded without ferrite
Manufacturer:	DONGGUAN GANGQI ELECTRONICS CO.,LTD

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Band:	2400 MHz to 2483.5 MHz
Frequency Range:	2412 MHz to 2462 MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20, IEEE 802.11n-HT40
Type of Modulation:	IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM(64-QAM, 16-QAM, QPSK, BPSK)

	IEEE 802.11n-HT40: OFDM(64-QAM, 16-QAM, QPSK, BPSK)	
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS15 IEEE 802.11n-HT40: Up to MCS15	
Number of Channels:	IEEE 802.11b: 11 IEEE 802.11g: 11 IEEE 802.11n-HT20: 11 IEEE 802.11n-HT40: 7	
Channel Separation:	5 MHz	
Antenna Type:	Chain 0	Integral Antenna
	Chain 1	Integral Antenna
Antenna Gain:	Chain 0	0.5 dBi
	Chain 1	0.5 dBi
Directional gain:	3.51 dBi	
Maximum Peak Power:	SISO_ Chain 0	IEEE 802.11b: 17.85 dBm IEEE 802.11g: 20.83 dBm IEEE 802.11n-HT20: 14.61 dBm IEEE 802.11n-HT40: 15.32 dBm
	SISO_ Chain 1	IEEE 802.11b: 16.67 dBm IEEE 802.11g: 17.45 dBm IEEE 802.11n-HT20: 13.54 dBm IEEE 802.11n-HT40: 14.12 dBm
	MIMO_ Chain 0+1	IEEE 802.11n-HT20: 16.89 dBm IEEE 802.11n-HT40: 17.36 dBm
Normal Test Voltage:	12 Vdc	

1.4 OTHER INFORMATION

Operation Frequency Each of Channel	
IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20	**f = 2407 + 5k MHz, k = 1,…,11**
IEEE 802.11n-HT40	**f = 2407 + 5k MHz, k = 3,…,9**
Note: **f** is the operating frequency (MHz); **k** is the operating channel.	

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	E450	SL10G10780	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.30 Meter	UnionTrust

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.7 TEST FACILITY

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

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1
The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart C Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203/15.247 (c)	N/A	PASS
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013 Clause 6.2	PASS
Conducted Peak Output Power	FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013 Clause 11.9.1.3	PASS
6dB Bandwidth	FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(2)	ANSI C63.10-2013 Clause 11.8.1	PASS
Power Spectral Density	FCC 47 CFR Part 15 Subpart C Section 15.247 (e)	ANSI C63.10-2013 Clause 11.10.2	PASS
Conducted Out of Band Emission	FCC 47 CFR Part 15 Subpart C Section 15.247(d)	ANSI C63.10-2013 Clause 11.11	PASS
Radiated Spurious Emissions	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013 Clause 11.11 & Clause 11.12	PASS
Band Edge Measurements (Radiated)	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013 Clause 11.13	PASS
Note: 1) N/A: In this whole report not application.			

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 20, 2015	Dec. 19, 2018
☑	Receiver	R&S	ESIB26	100114	Dec. 10, 2017	Dec. 10, 2018
☑	Loop Antenna	ETS-LINDGREN	6502	00202525	Dec. 22, 2017	Dec. 22, 2018
☑	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 17, 2017	Dec. 17, 2018
☑	Preamplifier	HP	8447F	2805A02960	Dec. 10, 2017	Dec. 10, 2018
☑	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 22, 2018	May 22, 2019
☑	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Dec. 17, 2017	Dec. 17, 2018
☑	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☑	Band Rejection Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50702	G248	June 06, 2018	June 06, 2019
☑	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Dec. 10, 2017	Dec. 10, 2018
☑	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Dec. 10, 2017	Dec. 10, 2018
☑	LISN	R&S	ESH2-Z5	860014/024	Dec. 10, 2017	Dec. 10, 2018
☑	Test Software	Audix	e3	Software Version: 9.160323		

Conducted RF test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec.10, 2017	Dec. 10, 2018
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Dec. 10, 2017	Dec. 10, 2018
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430023	Dec. 10, 2017	Dec. 10, 2018

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (Vdc)	Relative Humidity (%)
NT/NV	+15 to +35	12	20 to 75

Remark:
1) NV: Normal Voltage; NT: Normal Temperature

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11b	2412 MHz to 2462 MHz	Channel 1	Channel 7	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11g	2412 MHz to 2462 MHz	Channel 1	Channel 7	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n-HT20	2412 MHz to 2462 MHz	Channel 1	Channel 7	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n-HT40	2422 MHz to 2452 MHz	Channel 3	Channel 7	Channel 9
		2422 MHz	2437 MHz	2452 MHz

4.3 EUT TEST STATUS

Mode	Tx Function	Description
IEEE 802.11b IEEE 802.11g IEEE 802.11n-HT20 IEEE 802.11n-HT40	1Tx	1. Keep the EUT in continuously transmitting with modulation test single.
IEEE 802.11n-HT20 IEEE 802.11n-HT40	2Tx	2. Keep the EUT in continuously transmitting with modulation test single.

Power Setting	
	Channel 1 -11
IEEE 802.11b	39
IEEE 802.11g	35
IEEE 802.11n-HT20	28
IEEE 802.11n-HT40	31

Test Software
Test software name: Cmd command

4.4 PRE-SCAN

4.4.1 Pre-scan under all rates

Mode and Frequency	Maximum Conducted Average Power (dBm)_Chain 0							
	1		2		5.5		11	
IEEE 802.11b 2437 MHz	**15.44**		15.42		15.32		15.21	
IEEE 802.11g 2437 MHz	6	9	12	18	24	36	48	54
	11.04	10.91	10.98	10.96	10.94	10.95	10.98	10.94
IEEE 802.11n-HT20 2437 MHz	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	5.04	4.75	4.68	4.64	4.57	4.55	4.49	4.31
IEEE 802.11n-HT40 2437 MHz	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
	5.37	5.24	5.22	5.23	5.19	5.17	5.15	5.18

4.4.2 Worst-case data rates

Mode	Worst-case data rates
IEEE 802.11b	1 Mbps
IEEE 802.11g	6 Mbps
IEEE 802.11n-HT20	MCS0
IEEE 802.11n-HT40	MCS0

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

Figure 1. Below 30MHz

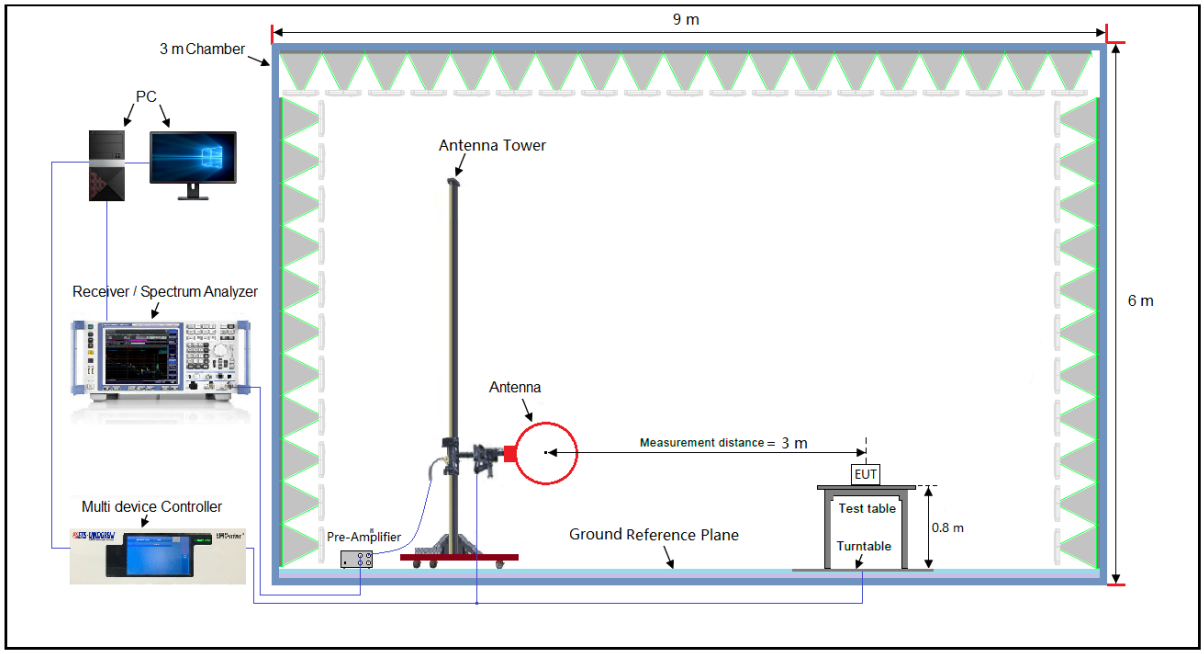


Figure 2. 30MHz to 1GHz

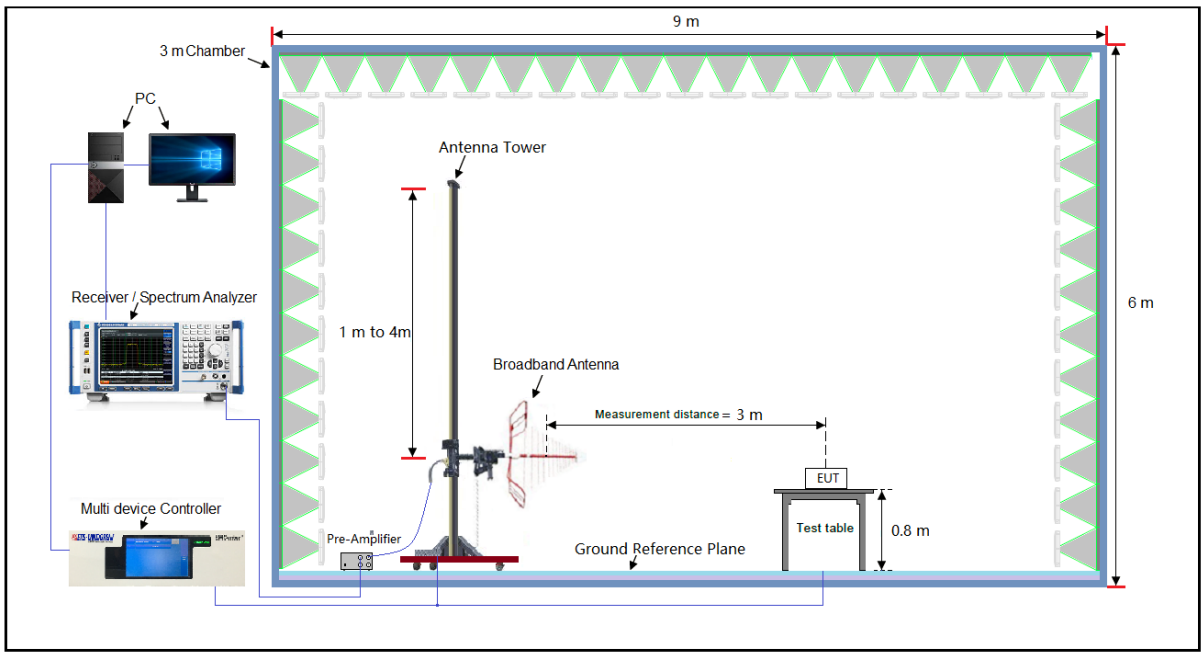
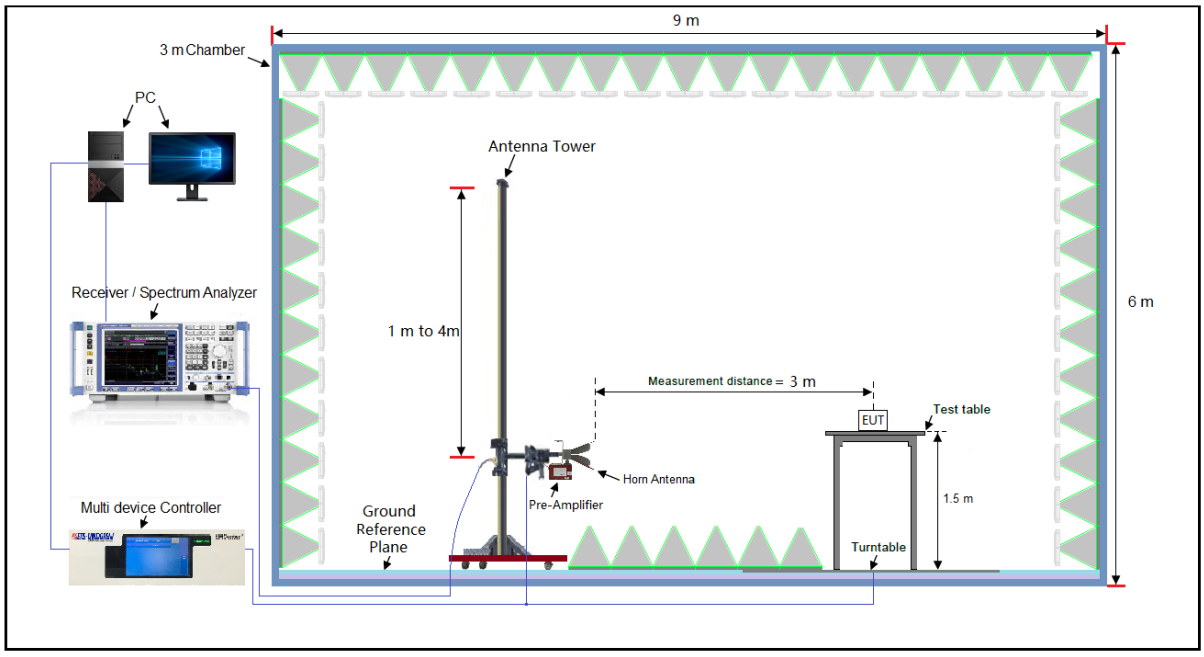
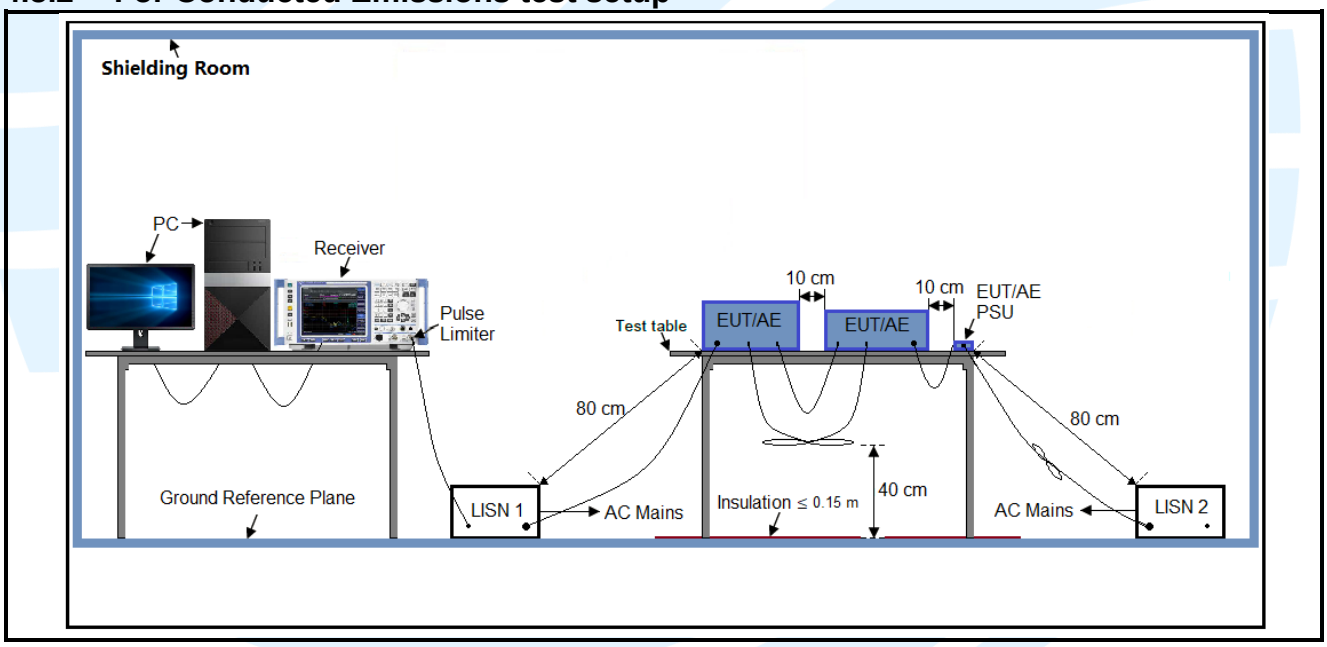


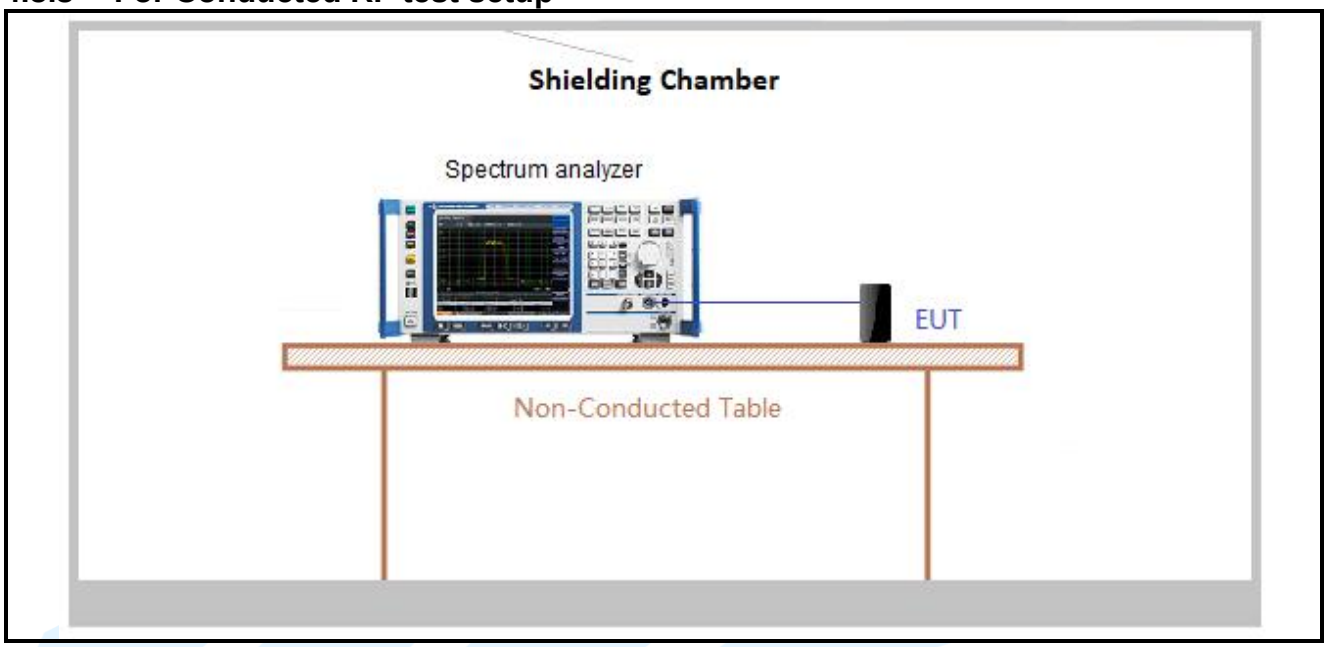
Figure 3. Above 1GHz



4.5.2 For Conducted Emissions test setup



4.5.3 For Conducted RF test setup



4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It was powered by a 12Vdc adapter. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

Frequency	Mode	Antenna Port	Worst-case axis positioning
Above 1GHz	1TX	Chain 0	Y axis
	1TX	Chain 1	Y axis
	2TX	Chain 0+1	Y axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.7 DUTY CYCLE

Test Procedure: ANSI C63.10-2013 Clause 11.6.

Test Results

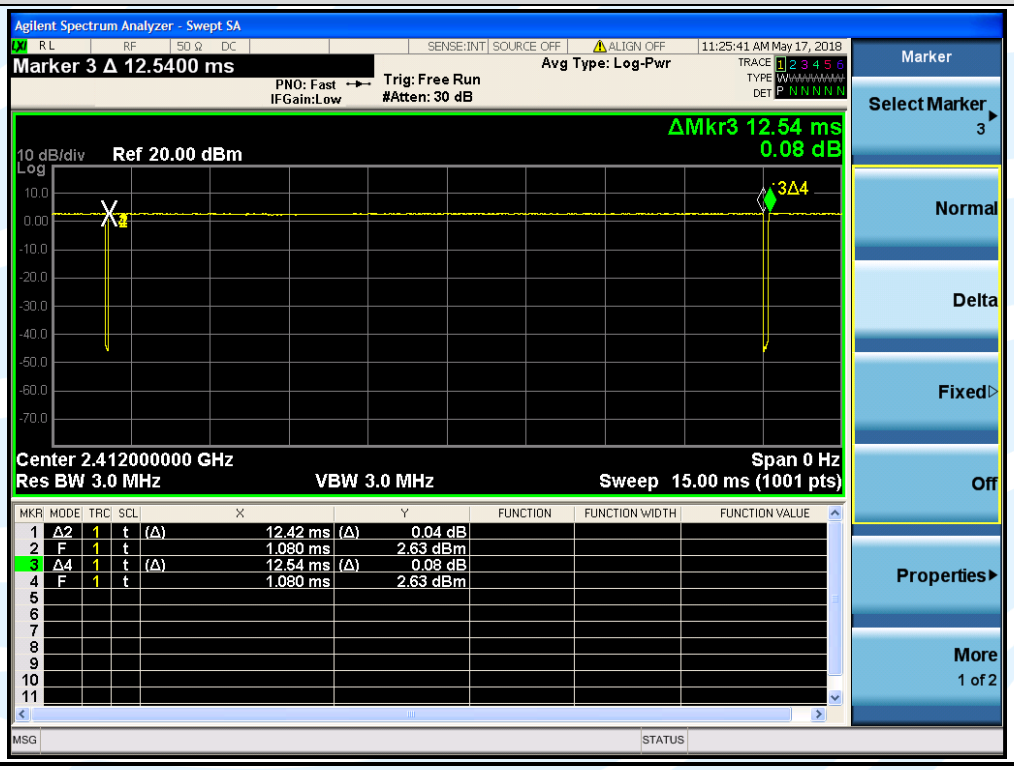
Mode	Data rates (Mbps)	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11b	1	12.420	12.540	0.99	99.04	0.00	0.01	-0.08
IEEE 802.11g	6	2.065	2.115	0.98	97.64	0.10	0.48	-0.21
IEEE 802.11n-HT20	MCS0	1.908	1.986	0.96	96.07	0.17	0.52	-0.35
IEEE 802.11n-HT40	MCS0	0.942	1.040	0.91	90.58	0.43	1.06	-0.86

Remark:

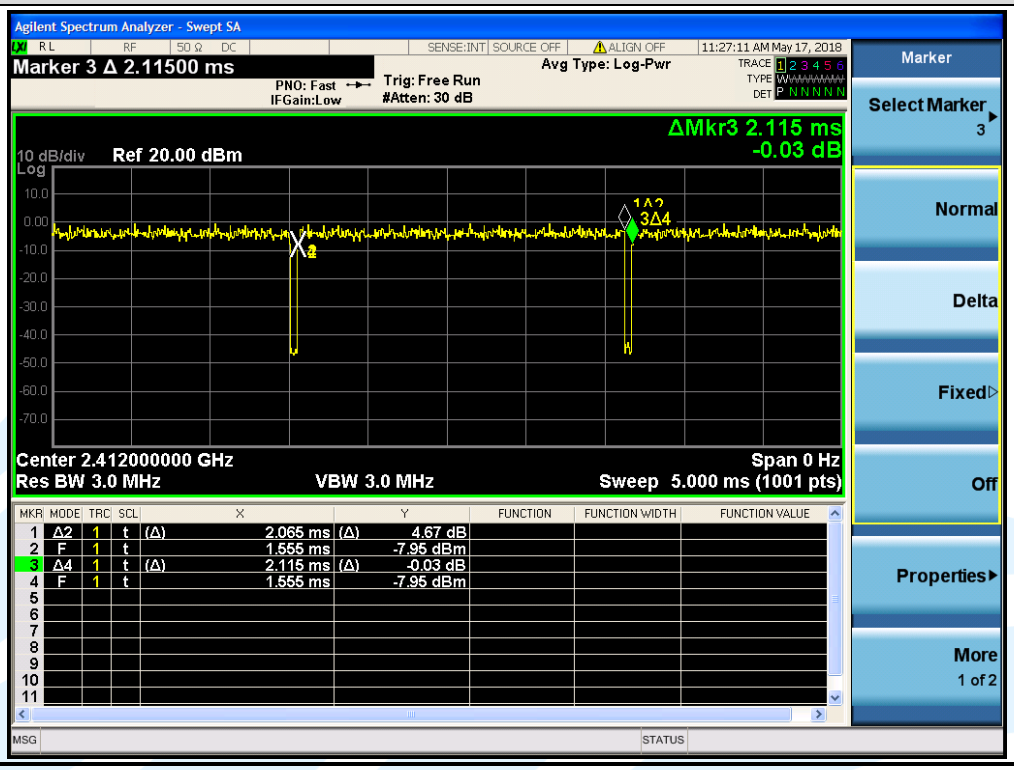
1) Duty cycle= On Time/ Period;
2) Duty Cycle factor = 10 * log(1/ Duty cycle);
3) Average factor = 20 $\log_{10}$ Duty Cycle.

The test plots as follows

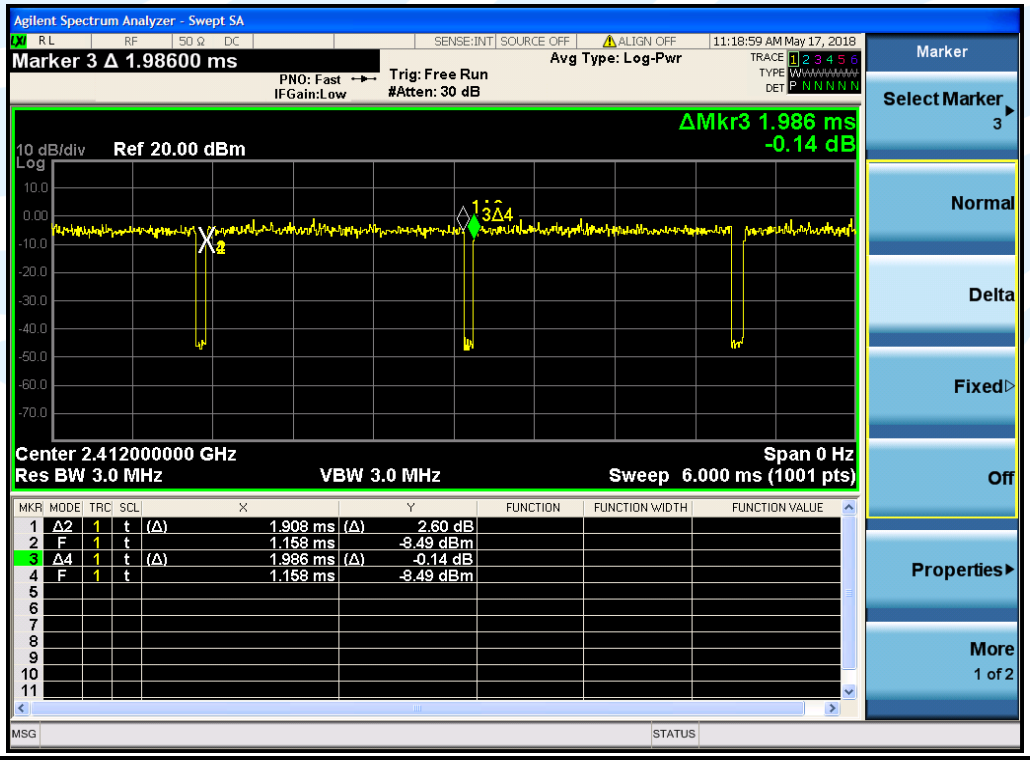
IEEE 802.11b



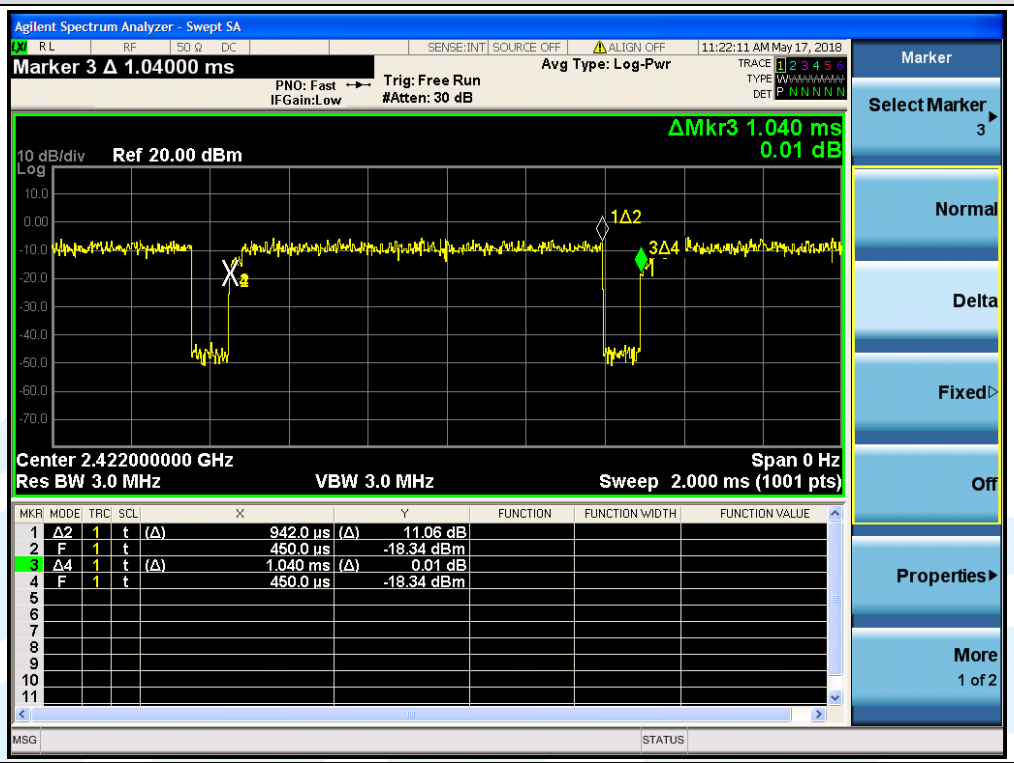
IEEE 802.11g



IEEE 802.11n-HT20



IEEE 802.11n-HT40



5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicesed Wireless Devices
4	KDB 558074 D01 15.247 Meas Guidance v05	Guidance for compliance measurements on Digital Transmission Systems, Frequency Hopping Spread Spectrum system, and Hybrid system devices operating under Section 15.247 of the FCC rules
5	KDB 662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

5.2 ANTENNA REQUIREMENT

Standard Requirement
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(b) (4) requirement:** The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
EUT Antenna:
Both antenna in the interior of the equipment and no consideration of replacement. The transmit signals are correlated with each other and the antenna gain of both chains is completely consistent, the best case directional gain of the antenna is 3.51 dBi (See section 5.3).

5.3 CONDUCTED PEAK OUTPUT POWER

Test Requirement: FCC 47 CFR Part 15 Subpart C Section15.247 (b)(3)

Test Method: ANSI C63.10-2013 Clause 11.9.1.3

Limit: For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

Test Procedure:
1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter.
2. Measure out each test modes' peak or average output power, record the power level.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Results: Pass

Mode	Channel/ Frequency (MHz)	Maximum Conducted Peak Output Power (dBm)				
		SISO_ Chain 0	SISO_ Chain 1	Total Power MIMO_ Chain 0+1	Limit (dBm)	Pass / Fail
IEEE 802.11b	1(2412)	15.97	15.77	---	30	Pass
	6(2437)	17.85	15.88	---	30	Pass
	11(2462)	16.54	16.67	---	30	Pass
IEEE 802.11g	1(2412)	19.35	16.48	---	30	Pass
	6(2437)	20.83	16.57	---	30	Pass
	11(2462)	19.99	17.45	---	30	Pass
IEEE 802.11n-HT20	1(2412)	12.71	12.95	15.84	30	Pass
	6(2437)	14.61	12.99	16.89	30	Pass
	11(2462)	13.88	13.54	16.72	30	Pass
IEEE 802.11n-HT40	3(2422)	14.49	13.97	17.25	30	Pass
	6(2437)	15.32	13.18	**17.39**	30	Pass
	9(2452)	14.08	14.12	17.11	30	Pass

Remark:
1. Power with Duty Factor = Measured Power + Duty Cycle Factor
2. Total (Chain 0+1) = $10*\log[(10^{\text{Chain 0/10}})+(10^{\text{Chain 1/10}})]$
3. Directional gain and the maximum conducted output power limit see table below:

Frequency Band	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated chains directional gain (dBi)	Peak Power Limit (dBm)
2400 MHz to 2483.5 MHz	0.50	0.50	3.51	30.00
Unequal antenna gains, with equal transmit powers. Directional gain is to be computed as follows:				
If transmit signals are correlated, then				
Directional gain = 10 log[(10^G1 /20 + 10^G2 /20 + … + 10^GN /20)^2 /NANT] dBi [Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]				

5.46 DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(2)

Test Method: ANSI C63.10-2013 Clause 11.8.1

Limit: For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 x RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) 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.
Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

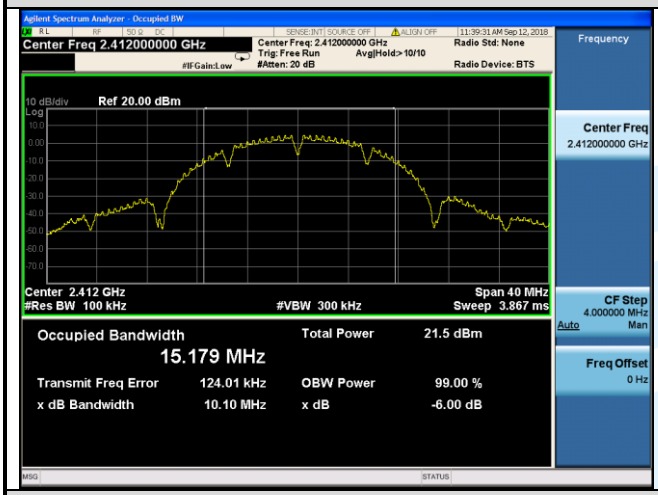
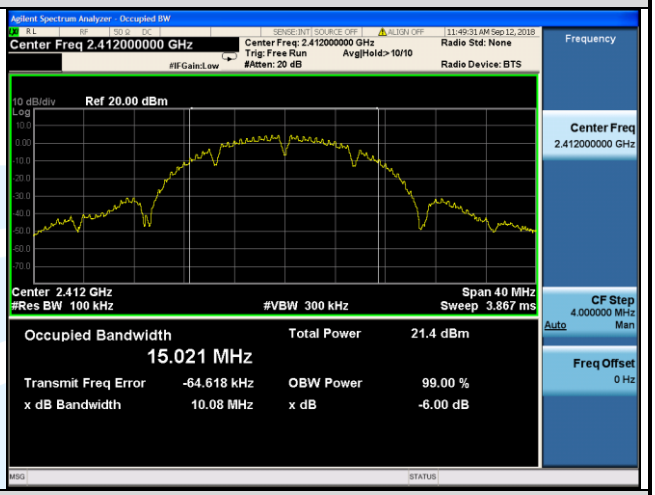
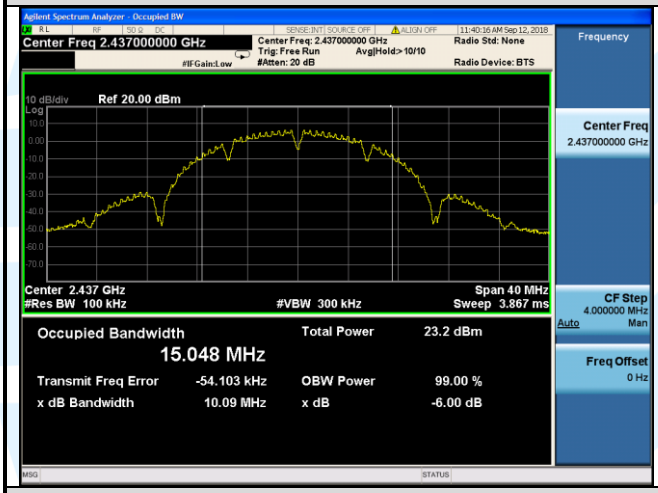
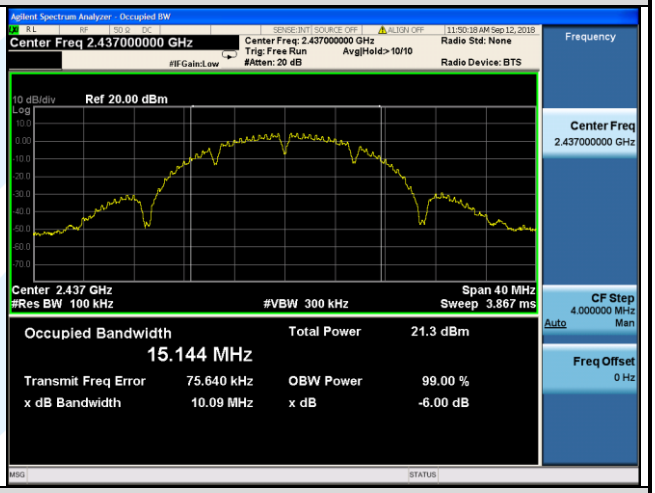
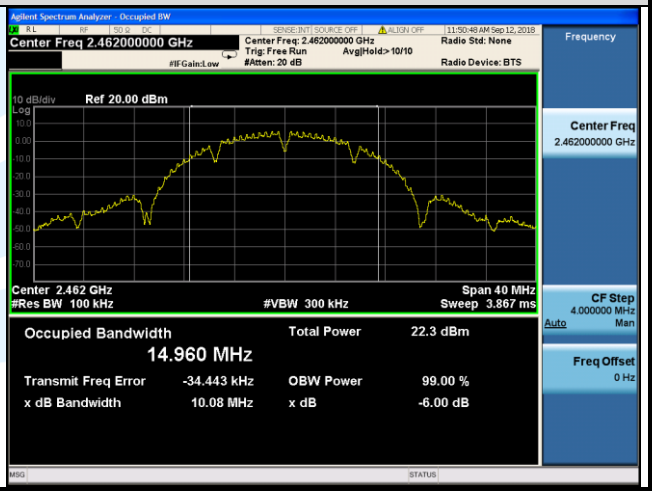
Test Setup: Refer to section 4.5.3 for details.

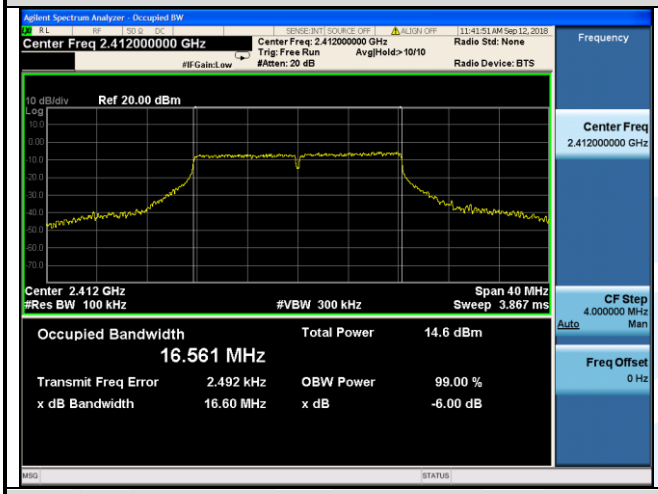
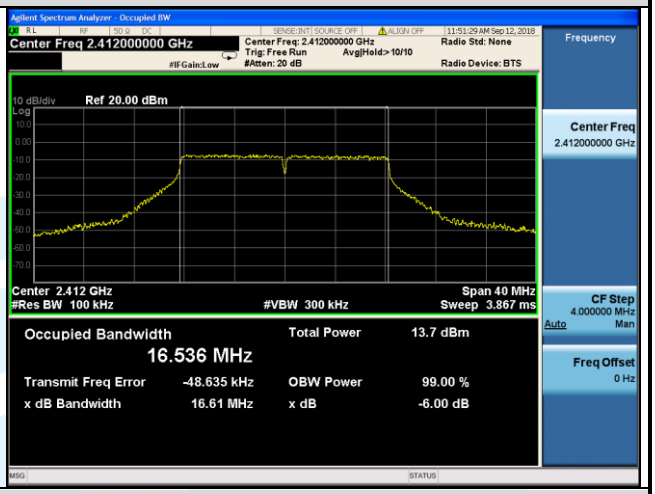
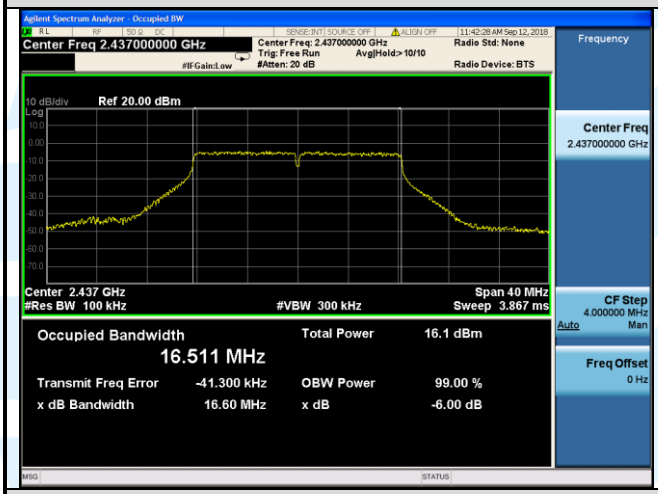
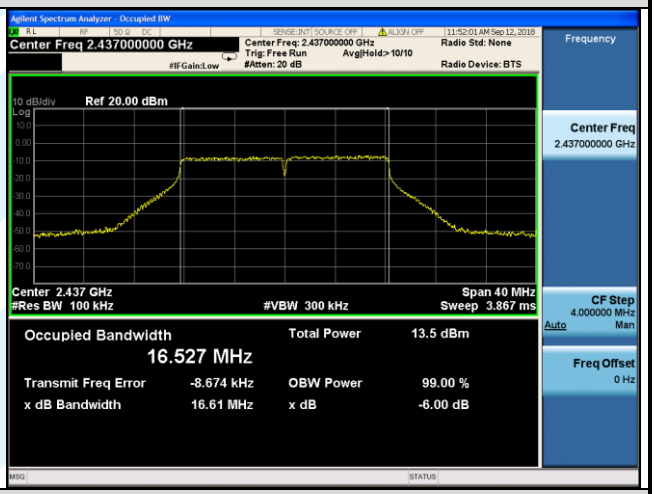
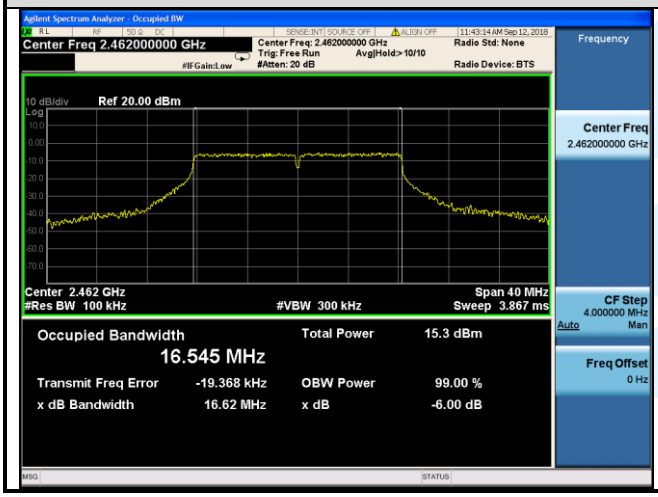
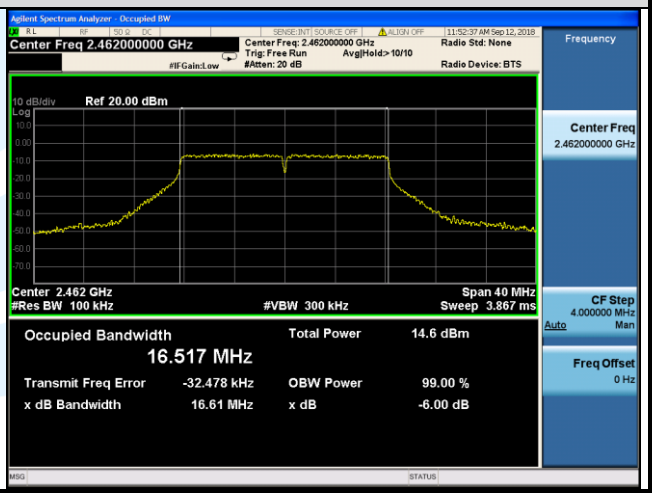
Instruments Used: Refer to section 3 for details

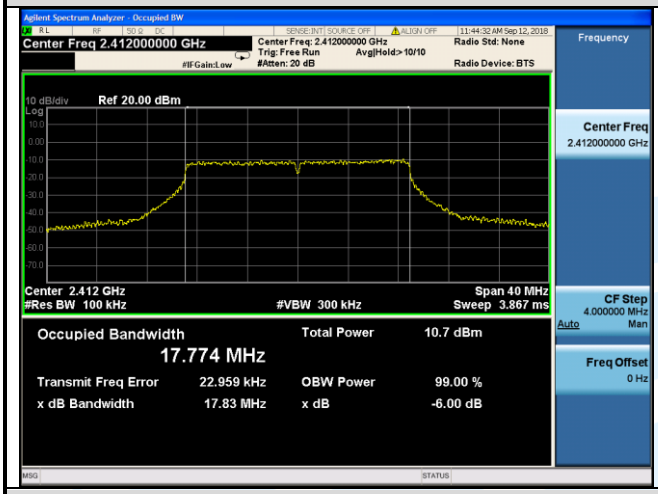
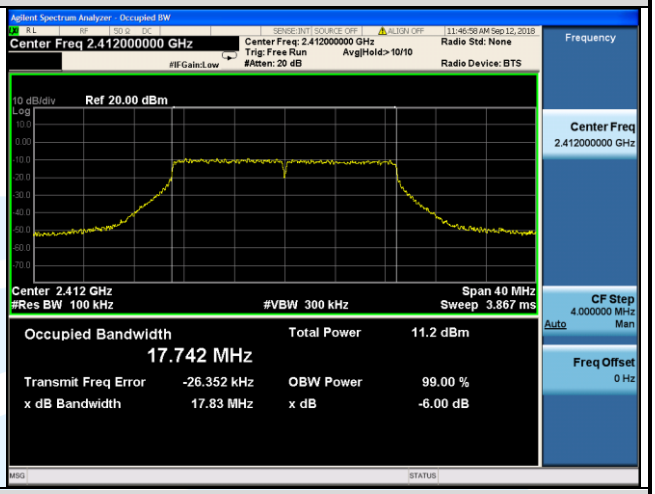
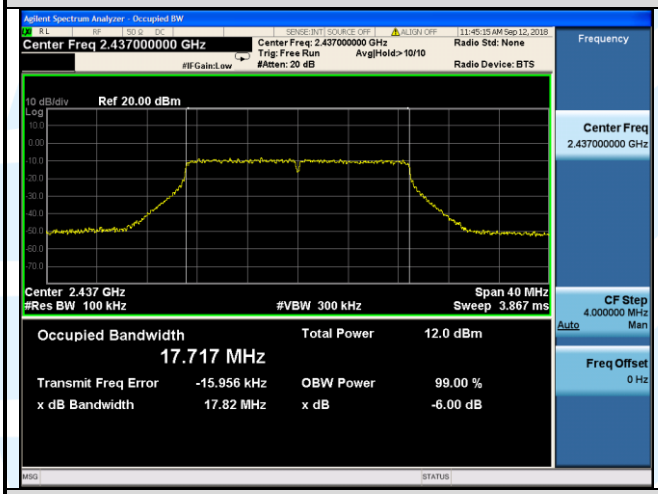
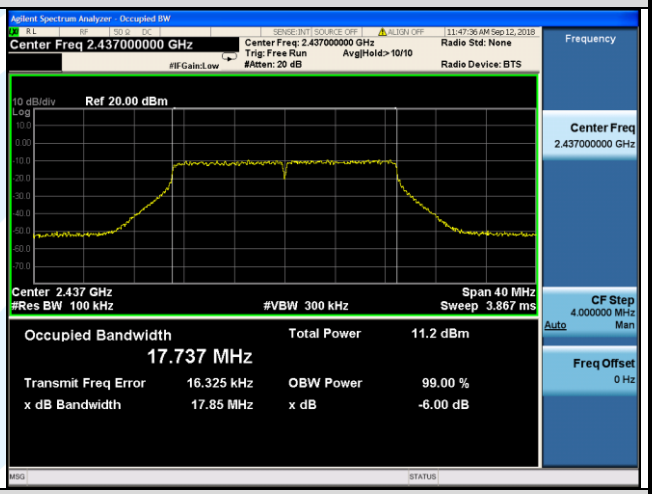
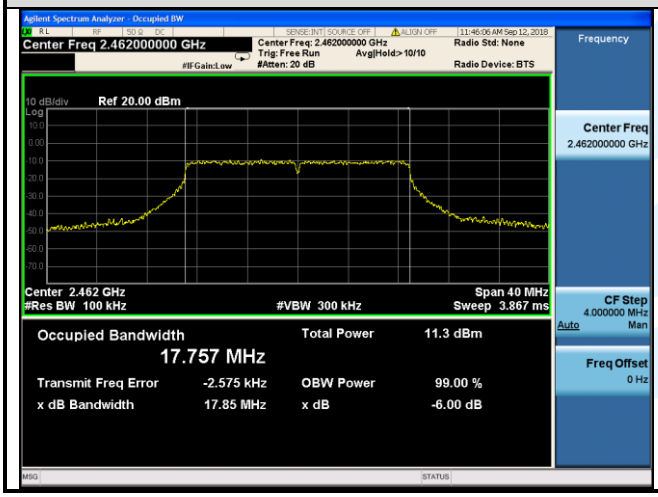
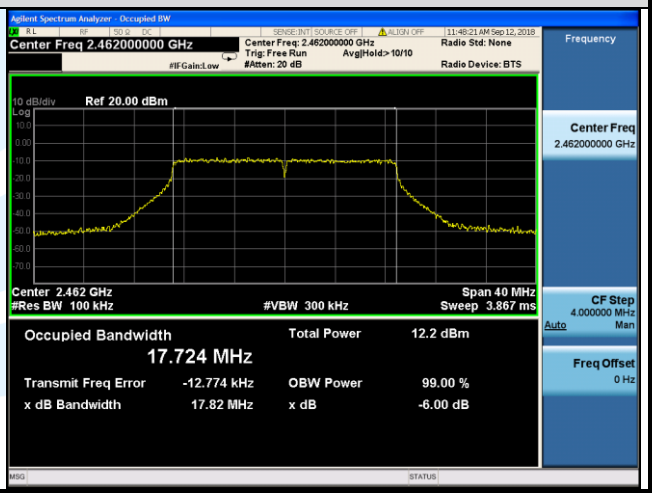
Test Results:

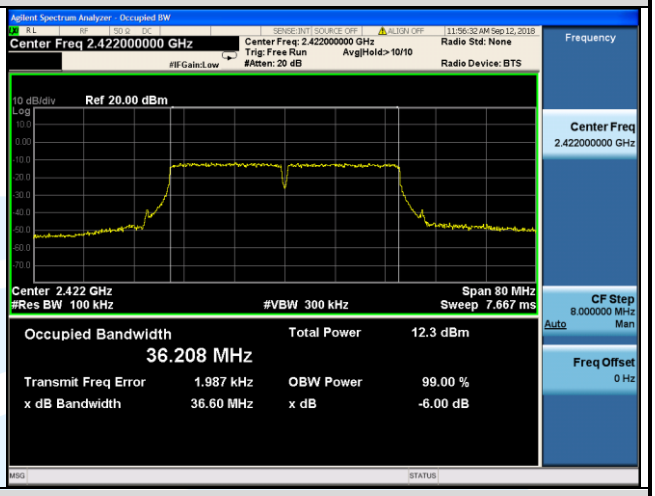
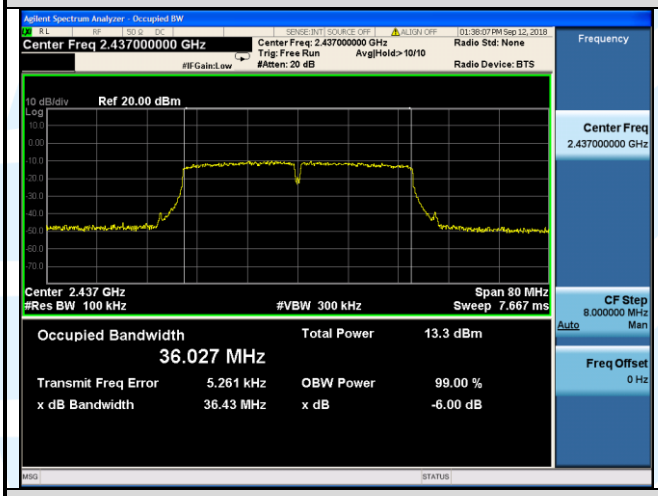
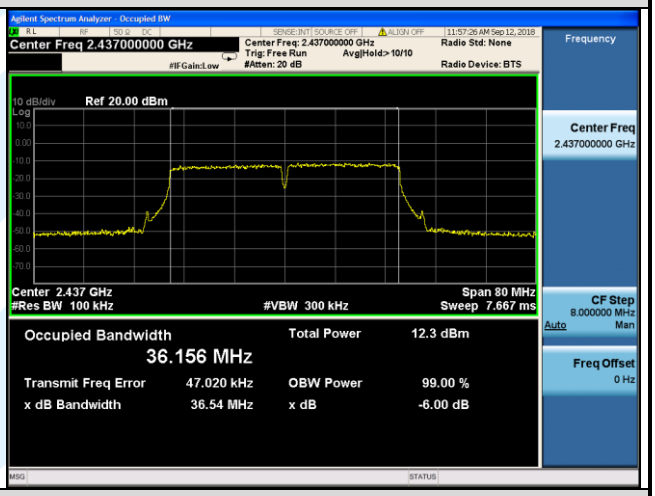
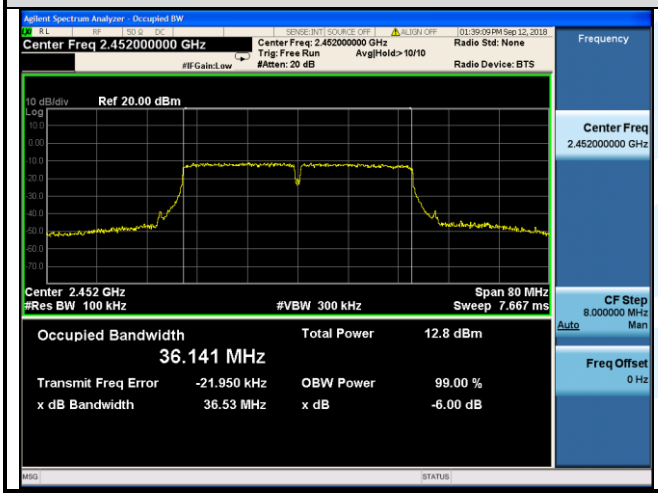
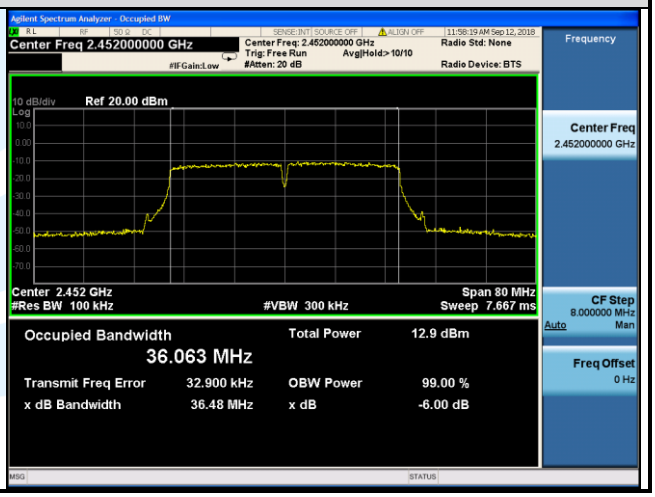
Mode	Channel/ Frequency (MHz)	6 dB Bandwidth (MHz)	99% Bandwidth (MHz)	6 dB Bandwidth Limit	Pass / Fail
Chain 0					
IEEE 802.11b	1(2412)	10.10	15.179	> 500 kHz	Pass
	6(2437)	10.09	15.048	> 500 kHz	Pass
	11(2462)	10.10	15.060	> 500 kHz	Pass
IEEE 802.11g	1(2412)	16.60	16.561	> 500 kHz	Pass
	6(2437)	16.60	16.511	> 500 kHz	Pass
	11(2462)	16.62	16.545	> 500 kHz	Pass
IEEE 802.11n-HT20	1(2412)	17.83	17.774	> 500 kHz	Pass
	6(2437)	17.82	17.717	> 500 kHz	Pass
	11(2462)	17.85	17.757	> 500 kHz	Pass
IEEE 802.11n-HT40	3(2422)	36.43	36.041	> 500 kHz	Pass
	6(2437)	36.43	36.027	> 500 kHz	Pass
	9(2452)	36.53	36.141	> 500 kHz	Pass
Chain 1					
IEEE 802.11b	1(2412)	10.08	15.021	> 500 kHz	Pass
	6(2437)	10.09	15.144	> 500 kHz	Pass
	11(2462)	10.08	14.960	> 500 kHz	Pass
IEEE 802.11g	1(2412)	16.61	16.536	> 500 kHz	Pass
	6(2437)	16.61	16.527	> 500 kHz	Pass
	11(2462)	16.61	16.517	> 500 kHz	Pass
IEEE 802.11n-HT20	1(2412)	17.83	17.742	> 500 kHz	Pass
	6(2437)	17.85	17.737	> 500 kHz	Pass
	11(2462)	17.82	17.724	> 500 kHz	Pass
IEEE 802.11n-HT40	3(2422)	36.60	36.208	> 500 kHz	Pass
	6(2437)	36.54	36.156	> 500 kHz	Pass
	9(2452)	36.48	36.063	> 500 kHz	Pass

The test plots as follows:

IEEE 802.11b	
SISO_ Chain 0	SISO_ Chain 1
Channel 1	
	
Channel 6	
	
Channel 11	
	

IEEE 802.11g	
SISO_ Chain 0	SISO_ Chain 1
Channel 1	
	
Channel 6	
	
Channel 11	
	

IEEE 802.11n-HT20	
MIMO_ Chain 0	MIMO_ Chain 1
Channel 1	
	
Channel 6	
	
Channel 11	
	

IEEE 802.11n-HT40	
MIMO_ Chain 0	MIMO_ Chain 1
Channel 3	
	
Channel 6	
	
Channel 9	
	

5.5 POWER SPECTRAL DENSITY

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.247 (e)

Test Method: ANSI C63.10-2013 Clause 11.10.2

Limit: For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

Test Procedure: Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Use the following spectrum analyzer settings:

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d) Set the VBW ⩾ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.5.3 for details.

Instruments Used: Refer to section 3 for details

Test Results:

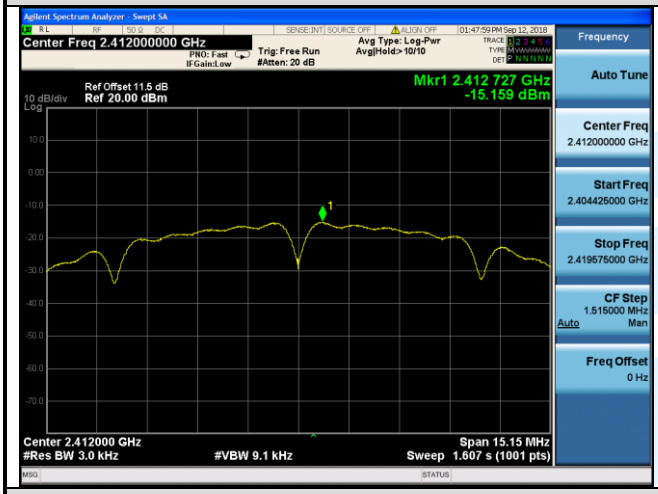
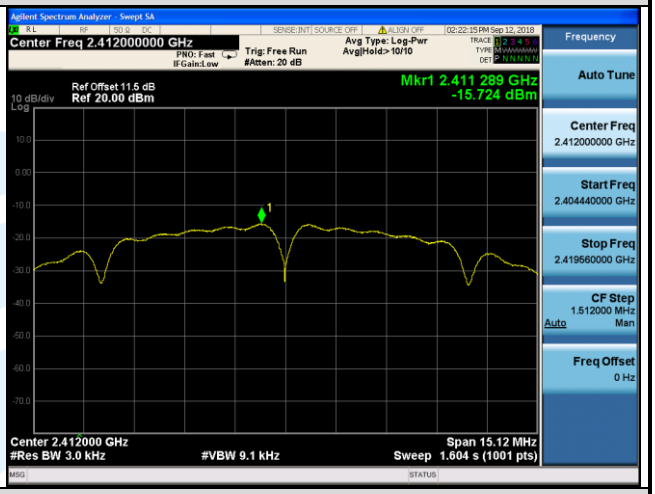
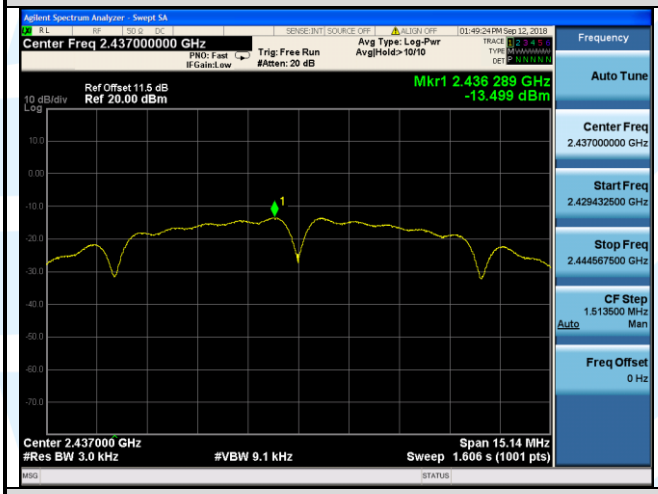
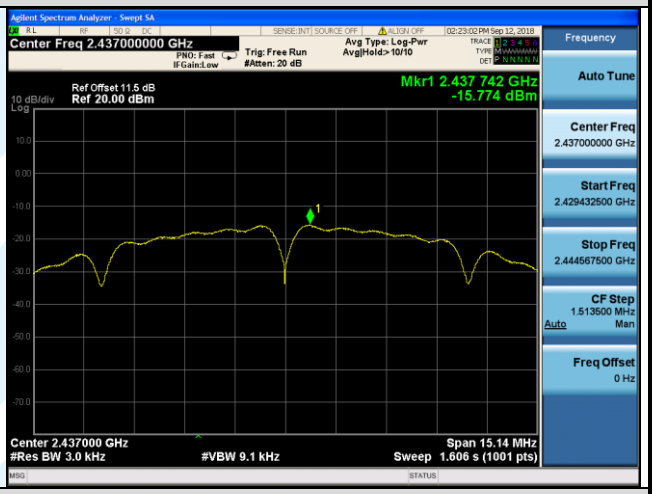
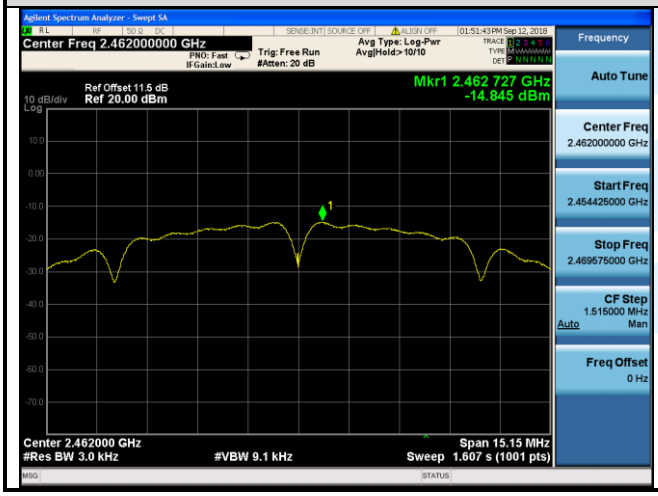
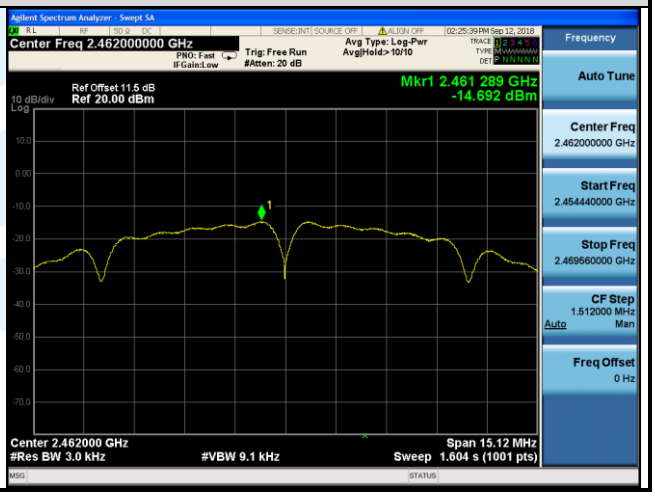
Mode	Channel/ Frequency (MHz)	Power spectral density (dBm/3kHz)				
		SISO_ Chain 0	SISO_ Chain 1	Total Power MIMO_ Chain 0+1	Limit @3kHz (dBm)	Pass / Fail
IEEE 802.11b	1(2412)	-15.159	-15.724	---	8	Pass
	6(2437)	-13.499	-15.774	---	8	Pass
	11(2462)	-14.845	-14.692	---	8	Pass
IEEE 802.11g	1(2412)	-20.095	-21.224	---	8	Pass
	6(2437)	-18.501	-21.501	---	8	Pass
	11(2462)	-19.490	-20.268	---	8	Pass
IEEE 802.11n-HT20	1(2412)	-23.934	-23.007	-20.44	8	Pass
	6(2437)	-22.236	-23.558	-19.84	8	Pass
	11(2462)	-23.289	-22.133	-19.66	8	Pass
IEEE 802.11n-HT40	3(2422)	-22.208	-23.967	-19.99	8	Pass
	6(2437)	-22.830	-23.048	-19.93	8	Pass
	9(2452)	-22.290	-22.304	**-19.29**	8	Pass

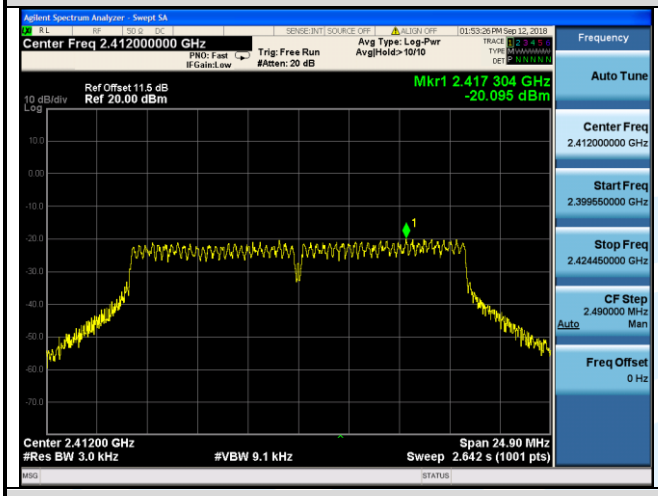
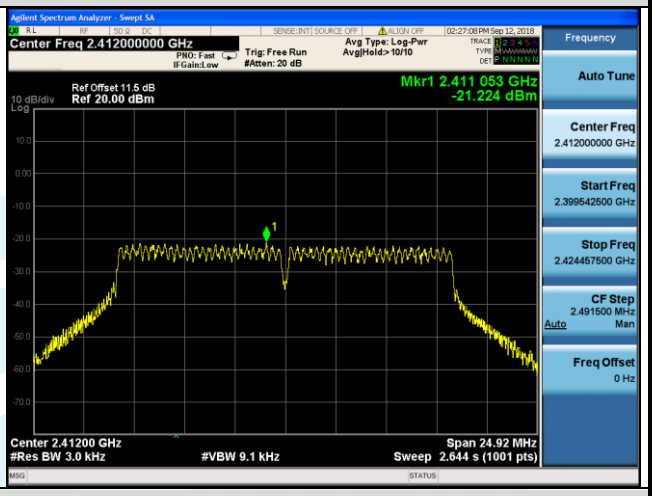
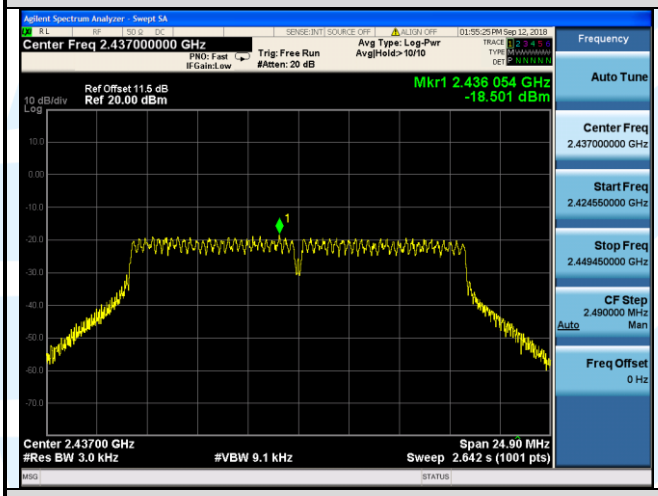
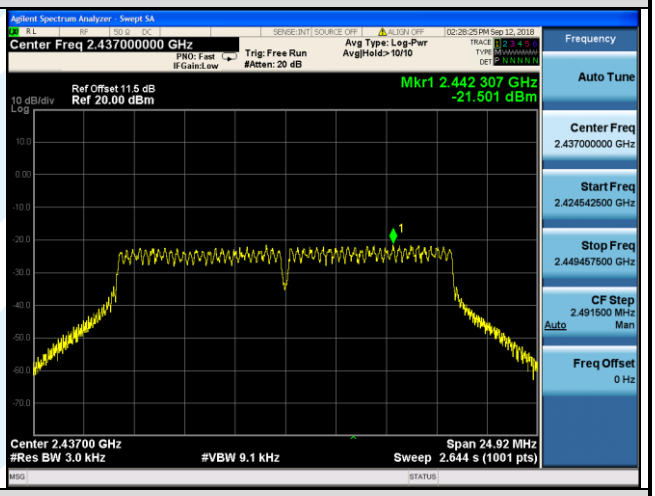
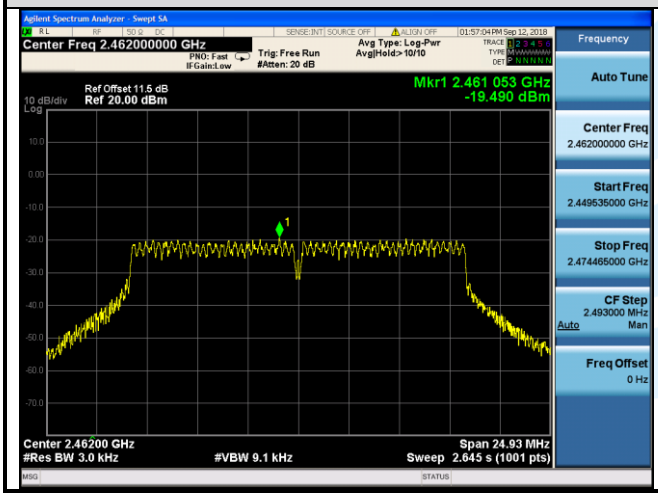
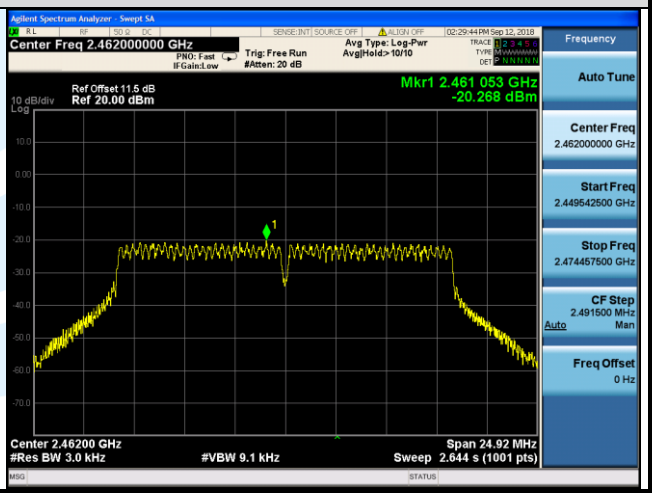
Remark:

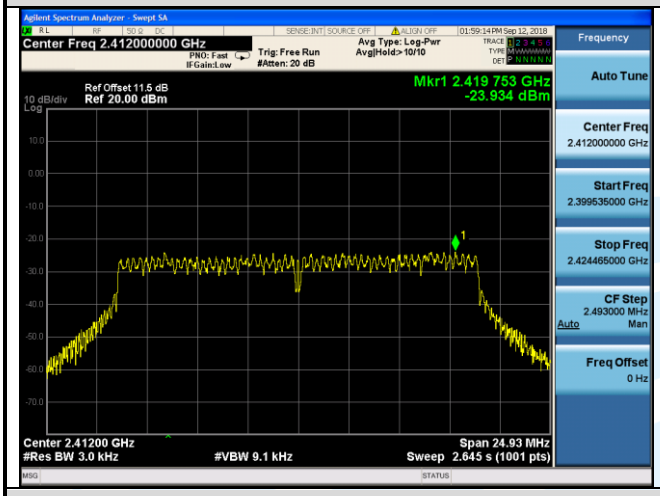
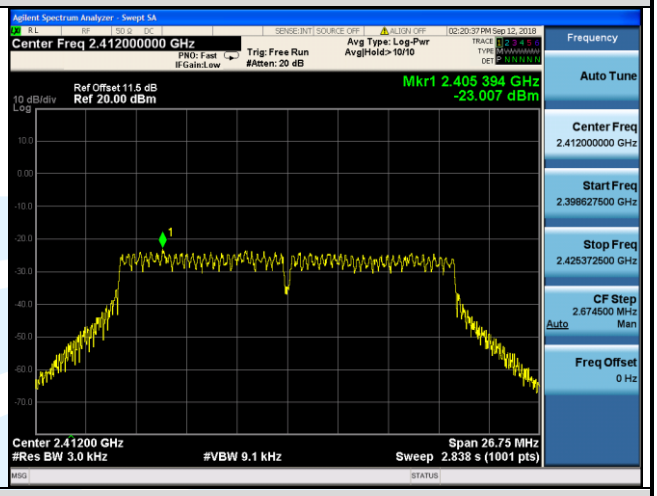
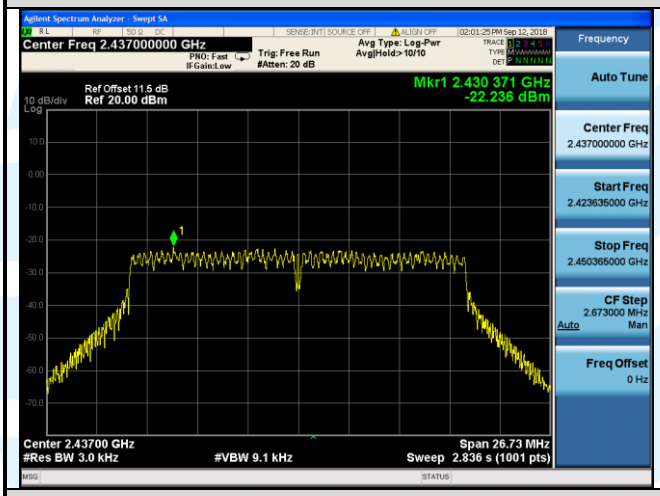
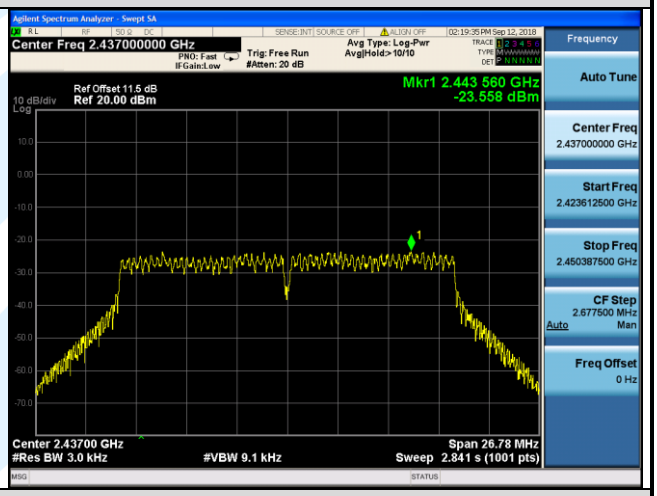
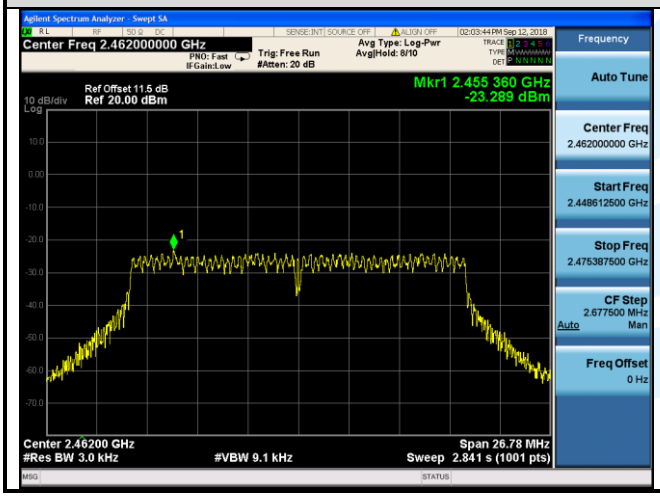
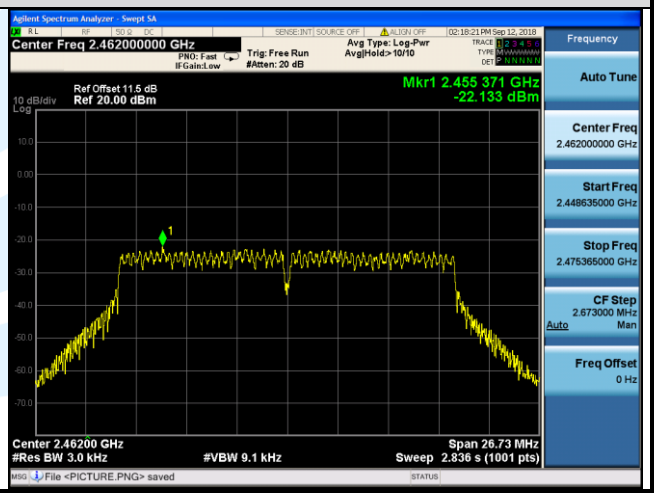
1. Total (Chain 0+1) = $10*\log[(10^{\text{Chain 0/10}})+(10^{\text{Chain 1/10}})]$
2. Directional gain and the maximum conducted power spectral density limit see table below:

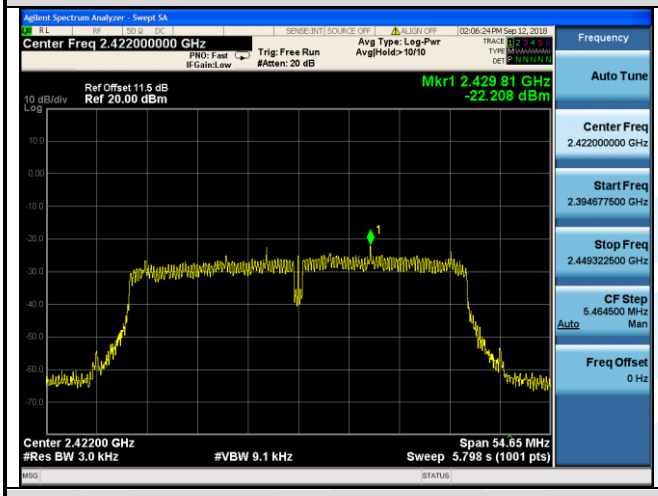
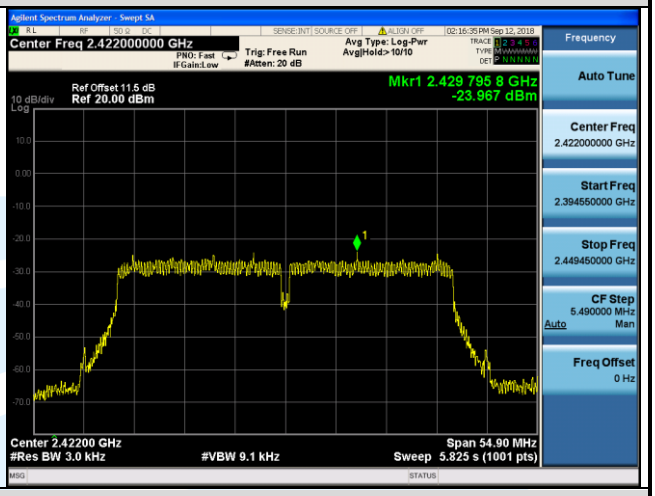
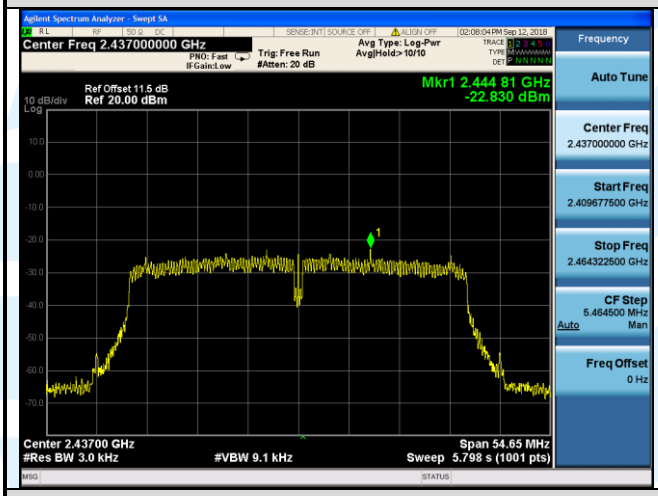
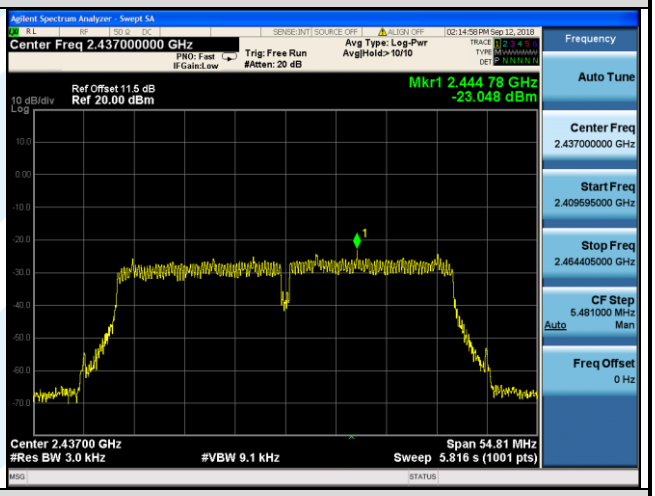
Frequency Band	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated chains directional gain (dBi)	Peak Power Limit (dBm)
2400 MHz to 2483.5 MHz	0.50	0.50	3.51	8.00
Unequal antenna gains, with equal transmit powers. Directional gain is to be computed as follows:				
If transmit signals are correlated, then				
Directional gain = 10 log[(10^G1 /20 + 10^G2 /20 + … + 10^GN /20)^2 /NANT] dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]				

The test plots as follows:

IEEE 802.11b	
SISO_ Chain 0	SISO_ Chain 1
Channel 1	
	
Channel 6	
	
Channel 11	
	

IEEE 802.11g	
SISO_ Chain 0	SISO_ Chain 1
Channel 1	
	
Channel 6	
	
Channel 11	
	

IEEE 802.11n-HT20	
MIMO_ Chain 0	MIMO_ Chain 1
Channel 1	
	
Channel 6	
	
Channel 11	
	

IEEE 802.11n-HT40	
MIMO_ Chain 0	MIMO_ Chain 1
Channel 3	
	
Channel 6	
	
Channel 9