

TEST REPORT

Product Name: 802.11ac Wave-2 3×3:3 Enterprise Wi-Fi
Access Point
Trade Mark: GRANDSTREAM
Model No. / HVIN: GWN7615
Report Number: 200108012RFC-1
Test Standards: FCC 47 CFR Part 15 Subpart C
FCC ID: YZZGWN7615
Test Result: PASS
Date of Issue: March 25, 2020

Prepared for:

Grandstream Networks, Inc.
126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

Prepared by:

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Date: March 25, 2020

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UTTR-RF-FCCPART15.247-V1.0

Version

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V1.0	March 25, 2020	Original



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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Grandstream Networks, Inc.
Address of Applicant:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA
Manufacturer:	Grandstream Networks, Inc.
Address of Manufacturer:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	802.11ac Wave-2 3x3:3 Enterprise Wi-Fi Access Point		
Model No. / HVIN:	GWN7615		
Trade Mark:	GRANDSTREAM		
DUT Stage:	Identical Prototype		
EUT Supports Function:	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac
Software Version:	1.0.0.2		
Hardware Version:	V1.1B		
Sample Received Date:	January 9, 2020		
Sample Tested Date:	January 9, 2020 to March 24, 2020		

1.2.2 Description of Accessories

None.

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 MCS23 IEEE 802.11n-HT40: Up to MCS23	
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	PIFA Antenna
	Chain 1	PIFA Antenna
	Chain 2	PIFA Antenna
Antenna Gain:	Chain 0	3.0 dBi
	Chain 1	3.0 dBi
	Chain 2	3.0 dBi
Directional gain:	7.77 dBi	

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Maximum output power:	Conducted	MIMO_ Chain 0+1+2	IEEE 802.11b: 28.10Bm IEEE 802.11g: 25.01 dBm IEEE 802.11n-HT20:24.77dBm IEEE 802.11n-HT40: 24.36 dBm
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1.4 OTHER INFORMATION

Operation Frequency Each of Channel	
IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20	$f = 2407 + 5k \text{ MHz}, k = 1, \dots, 11$
IEEE 802.11n-HT40	$f = 2407 + 5k \text{ MHz}, k = 3, \dots, 9$
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
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust
POE Adapter	TP-LINK	TL-POE160S	N/A	UnionTrust
POE Adapter	GOSPELL	G0720-480-050	N/A	Applicant

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.3 Meter	UnionTrust
1	Lan*2	RJ-45	1.5 Meter	UnionTrust

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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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.

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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.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

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 output power	FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(3)	ANSI C63.10-2013 Clause 11.9.2.2.2	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

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. 03, 2018	Dec. 03, 2021
☒	Receiver	R&S	ESIB26	100114	Nov. 24, 2019	Nov. 23, 2020
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 24, 2019	Nov. 23, 2020
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 16, 2019	Nov. 15, 2020
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 16, 2019	Nov. 15, 2020
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 16, 2019	Nov. 15, 2020
☒	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2019	Nov. 23, 2020
☐	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	Nov. 24, 2019	Nov. 23, 2020
☐	6dB Attenuator	Talent	RA6A5-N-18	18103002	Nov. 24, 2019	Nov. 23, 2020
☐	Horn Antenna	ETS-LINDGREN	3117	00164202	Nov. 16, 2019	Nov. 15, 2020
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 18, 2019	May 18, 2020
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	Jun. 23, 2019	Jun. 23, 2020
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 16, 2019	Nov. 15, 2020
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	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	Nov. 24, 2019	Nov. 23, 2020
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 24, 2019	Nov. 23, 2020
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2019	Nov. 23, 2020
☐	LISN	ETS-Lindgren	3816/2SH	00201088	Nov. 24, 2019	Nov. 23, 2020
☒	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	Nov. 24, 2019	Nov. 23, 2020
☒	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Nov. 24, 2019	Nov. 23, 2020
☐	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430023	Nov. 24, 2019	Nov. 23, 2020
☒	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	Nov. 24, 2019	Nov. 23, 2020

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	Relative Humidity (%)
NT/NV	+15 to +35	48Vdc	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
AC Power Line Conducted Emission	22.9	46	100.43	Bert Xiong
Conducted Peak Output Power	23.4	49	99.80	Swift Liu
6dB Bandwidth & Occupied Bandwidth	23.4	49	99.80	Swift Liu
Power Spectral Density	23.4	49	99.80	Swift Liu
Conducted Out of Band Emission	23.4	49	99.80	Swift Liu
Radiated Spurious Emissions	25.6	52	100.33	Andy Lin
Band Edge Measurements (Radiated)	25.6	52	100.33	Andy Lin

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/Rx Function	Description
IEEE 802.11b IEEE 802.11g IEEE 802.11n-HT20 IEEE 802.11n-HT40	3Tx/3Rx	1. Keep the EUT in continuously transmitting or receiving with modulation test single.

Power Setting						
Mode	Channel 1 -11					
	Chain 0 L&H	Chain 0 M	Chain 1 L&H	Chain 1 M	Chain 2 L&H	Chain 2 M
IEEE 802.11b	20	24	20	24	20	24
IEEE 802.11g	17.5	24	17.5	24	17.5	24
IEEE 802.11n-HT20	18.5	24	18.5	24	18.5	24
IEEE 802.11n-HT40	16.5	24	16.5	24	16.5	24

Test Software
Test software name: MT7615QA;

4.4 PRE-SCAN

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Following data rate was (were) selected for the final test as listed below

Mode	Worst-case data rates
IEEE 802.11b	1 Mbps
IEEE 802.11g	6 Mbps
IEEE 802.11n-HT20	MCS16
IEEE 802.11n-HT40	MCS16

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

Figure 1. Below 30MHz

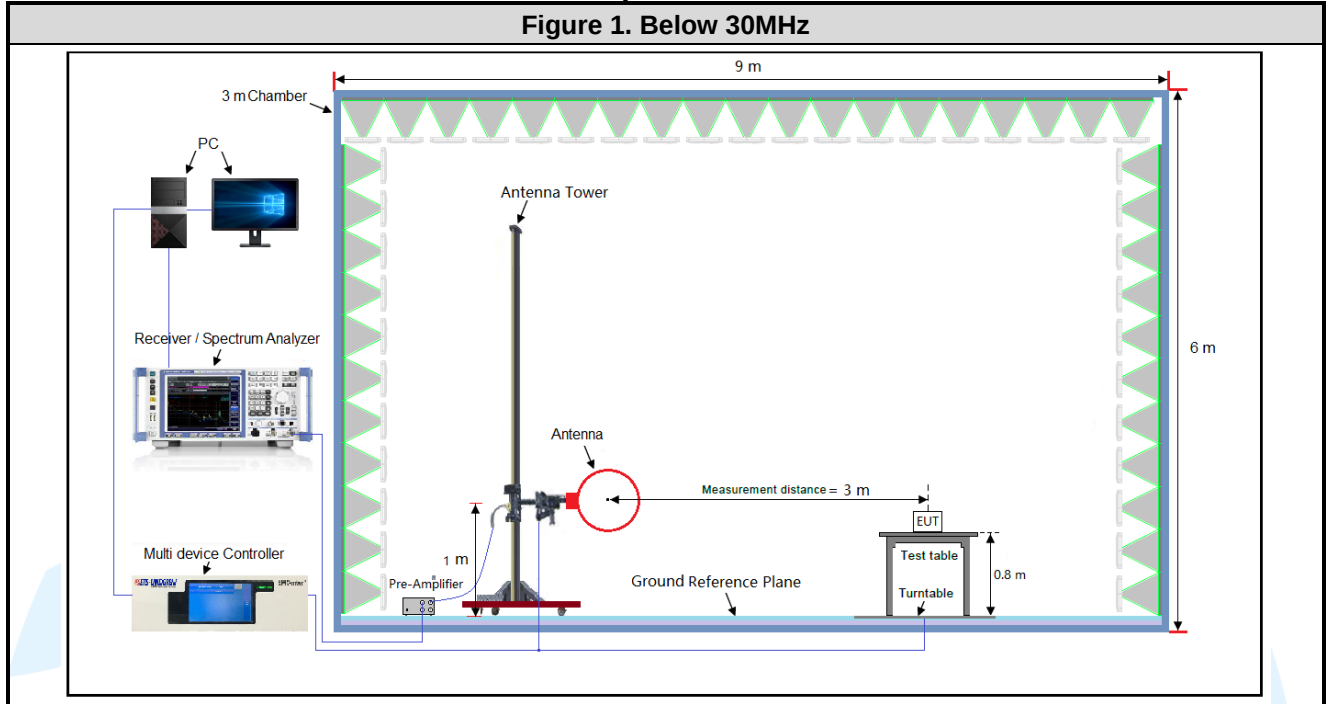
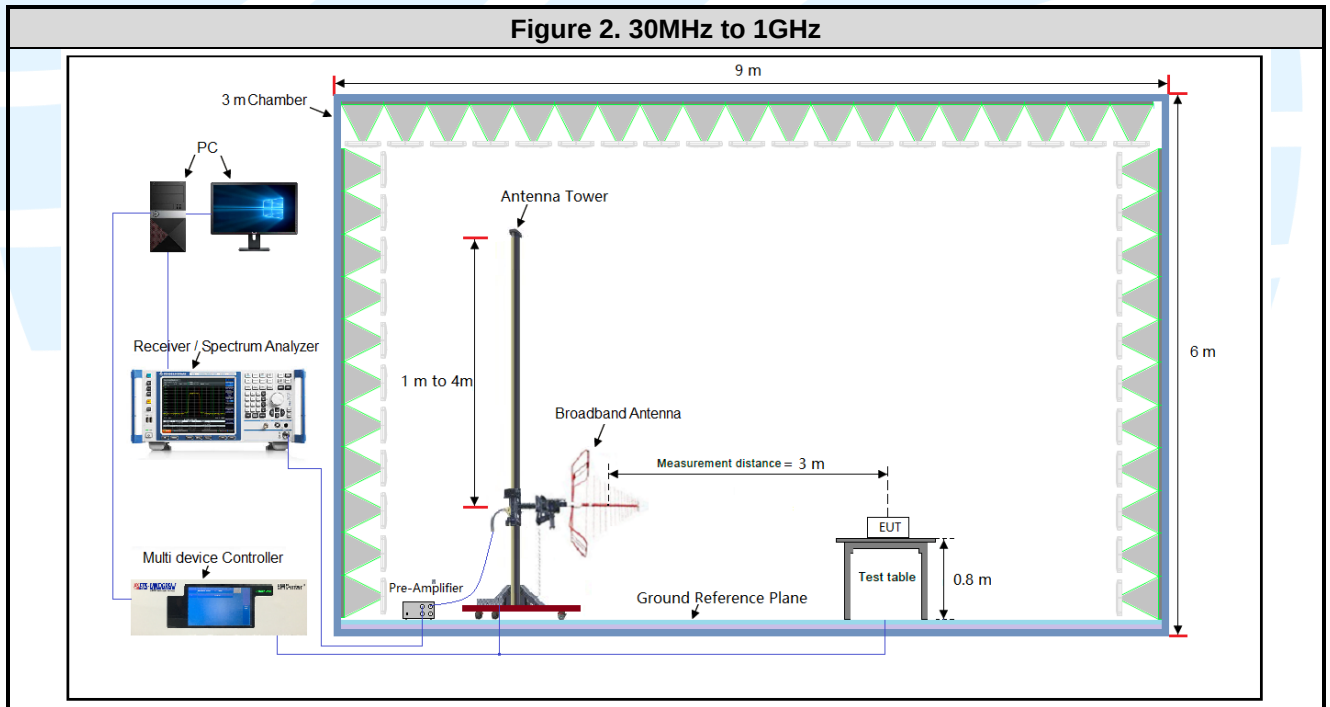
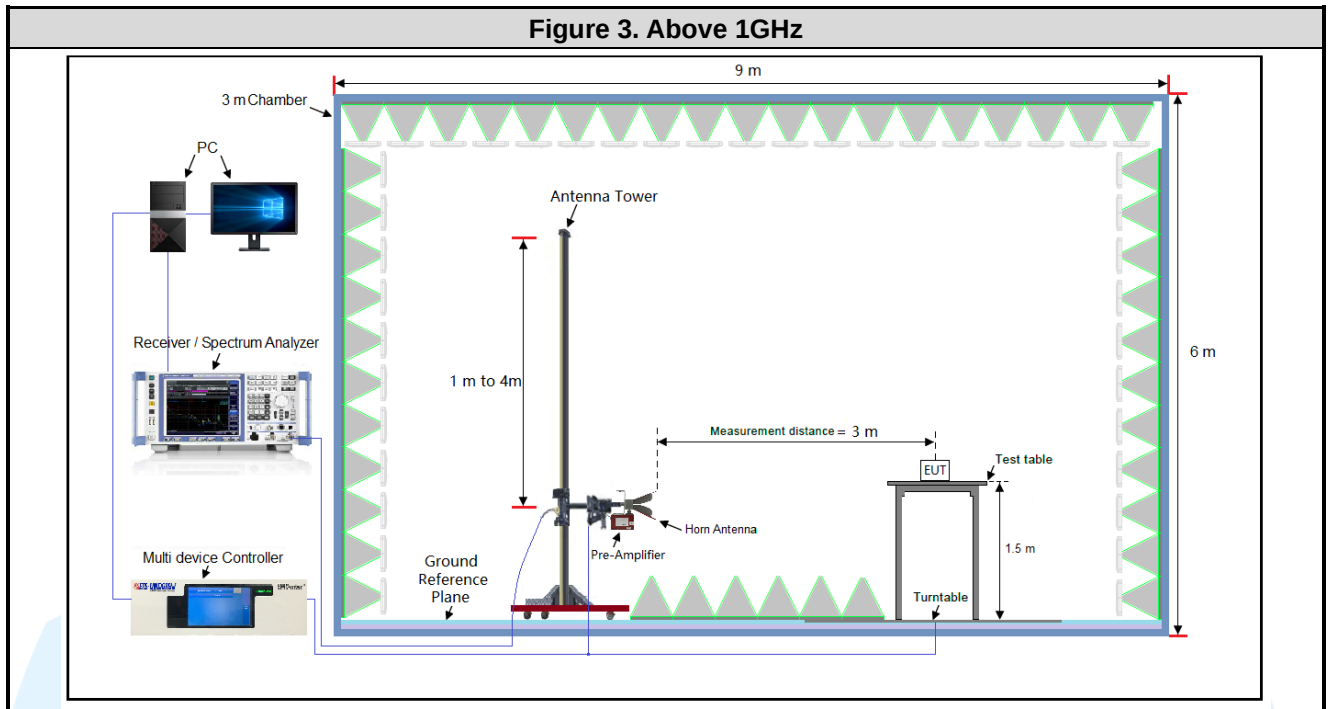
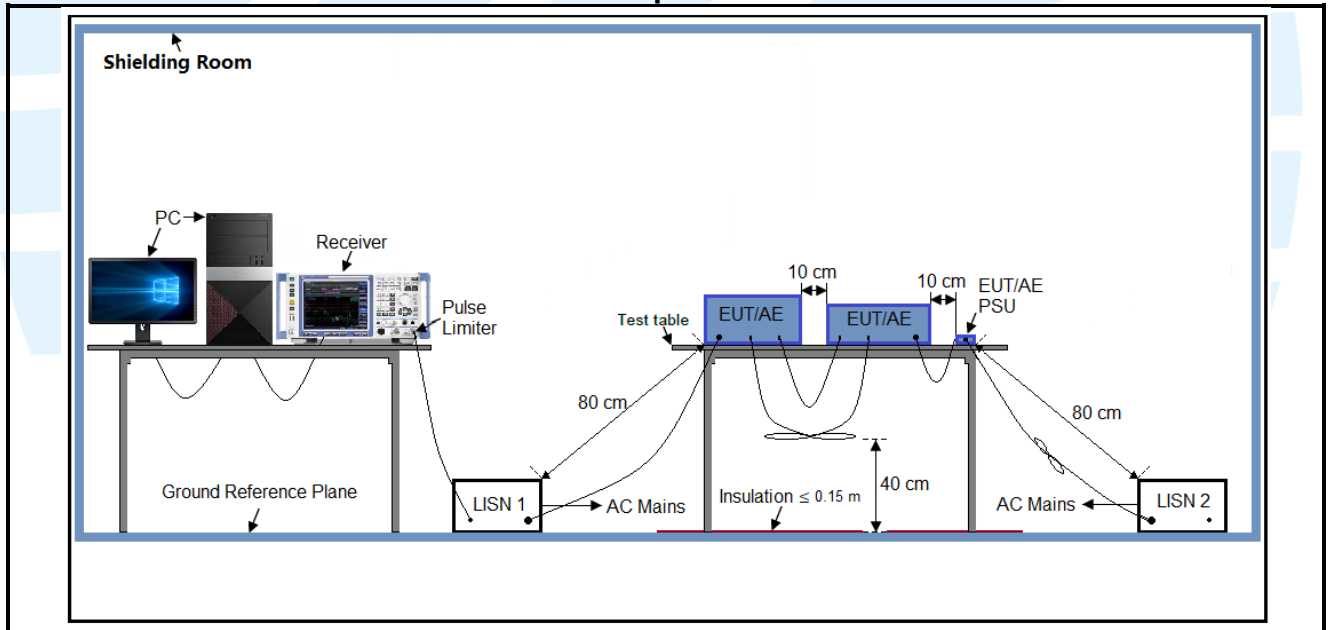


Figure 2. 30MHz to 1GHz

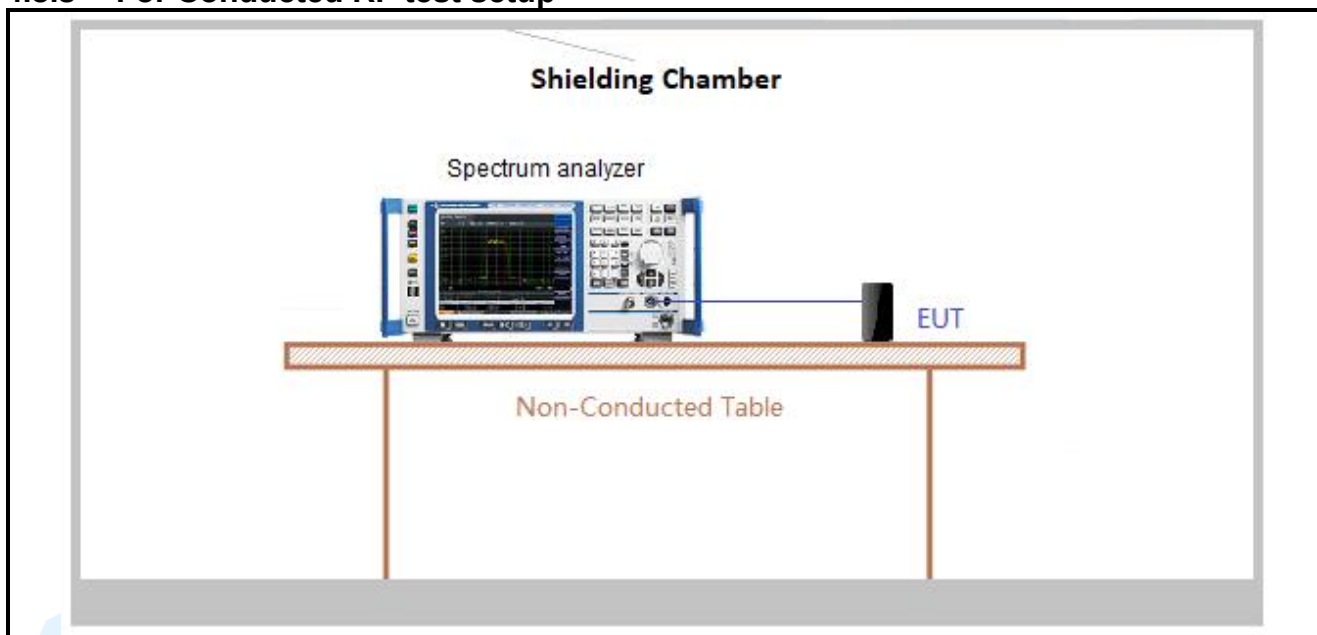




4.5.2 For Conducted Emissions test setup



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. 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	3TX	Chain 0+1+2	Z 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.

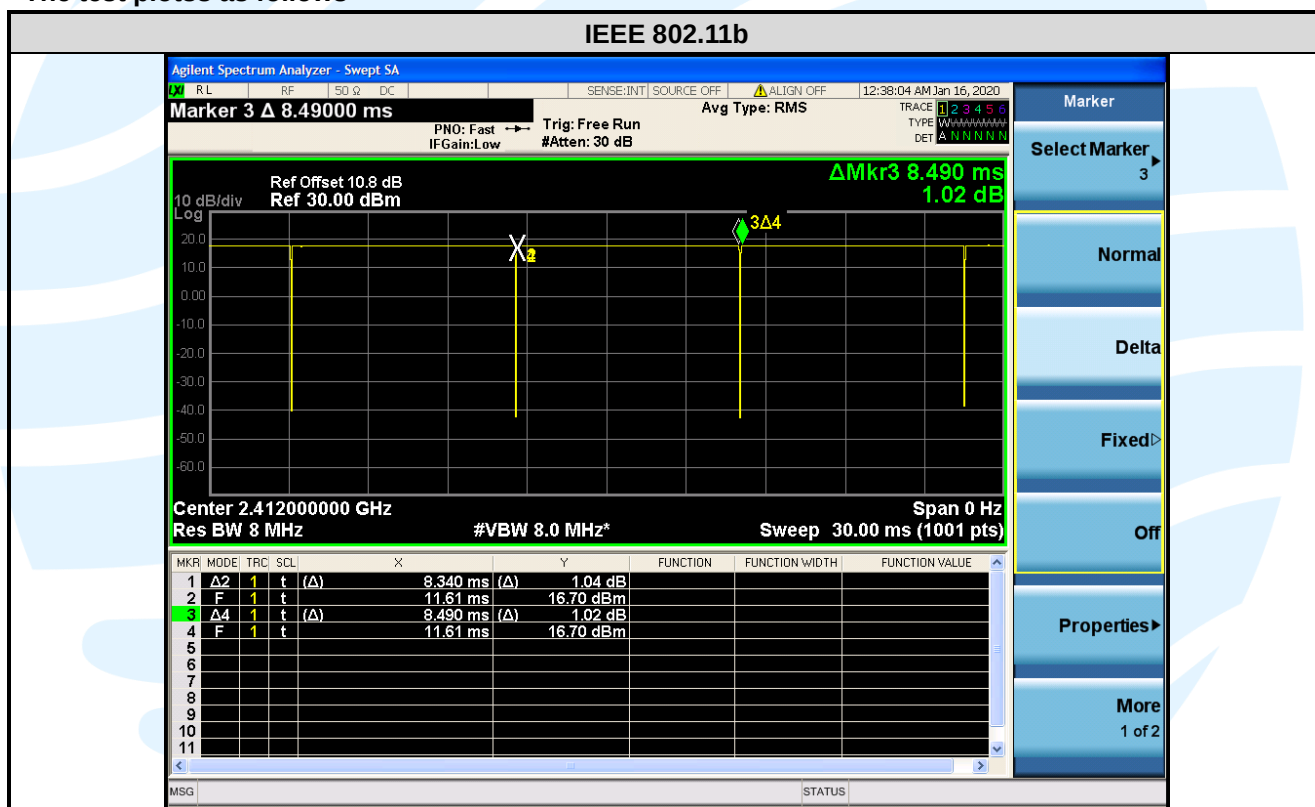
Test Results

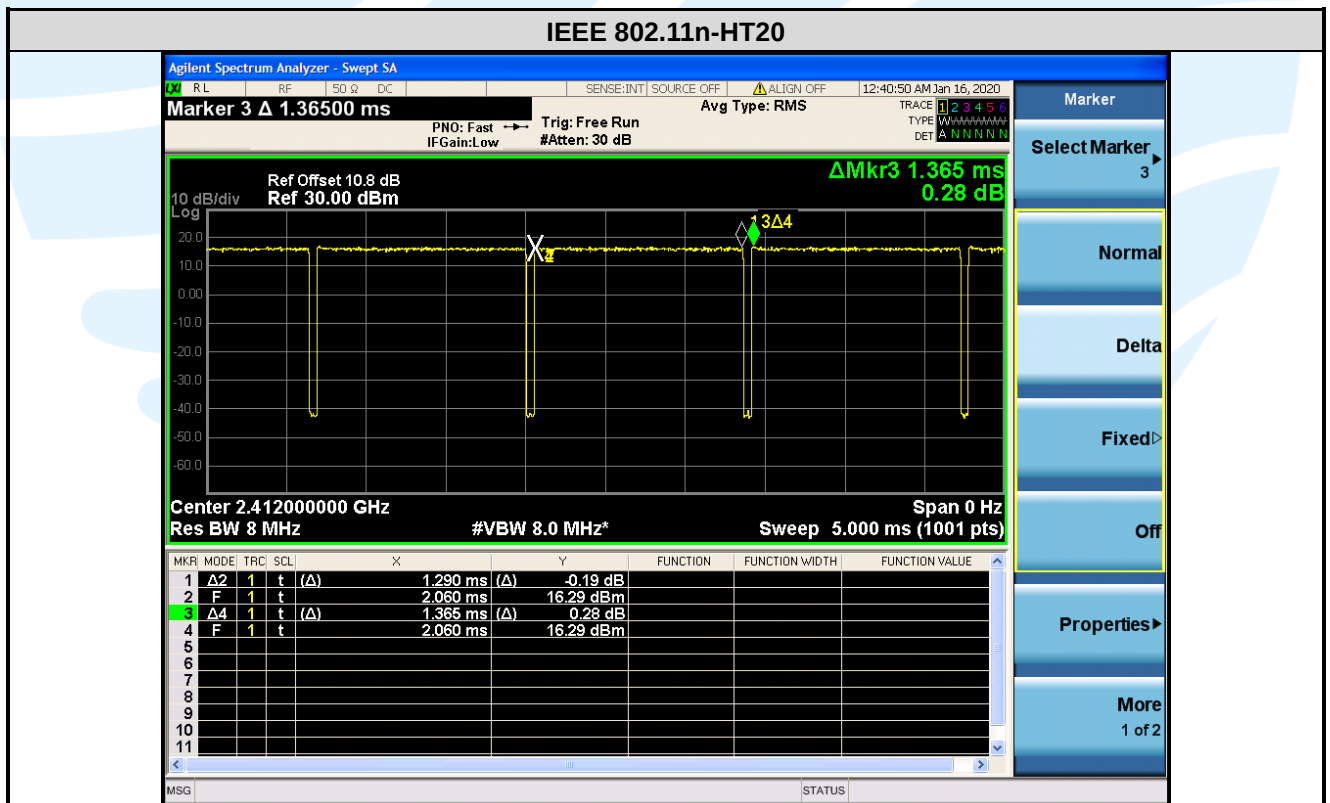
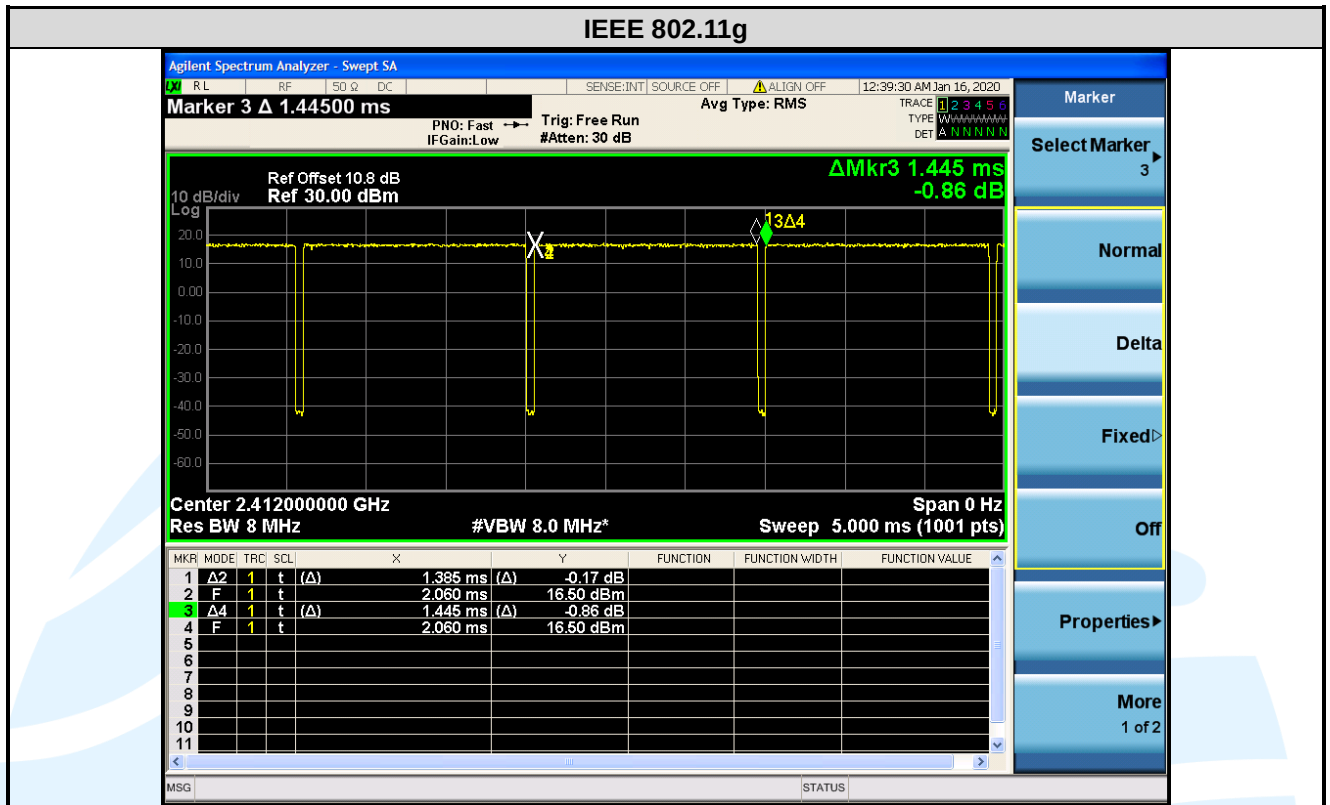
Mode	Data rates (Mbps)	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11b	1	8.34	8.49	0.98	98.23	0.00	0.01	-0.15
IEEE 802.11g	6	1.385	1.445	0.96	95.85	0.18	0.72	-0.37
IEEE 802.11n-HT20	MCS0	1.29	1.365	0.95	94.51	0.25	0.78	-0.49
IEEE 802.11n-HT40	MCS0	1.305	1.36	0.96	95.96	0.18	0.77	-0.36

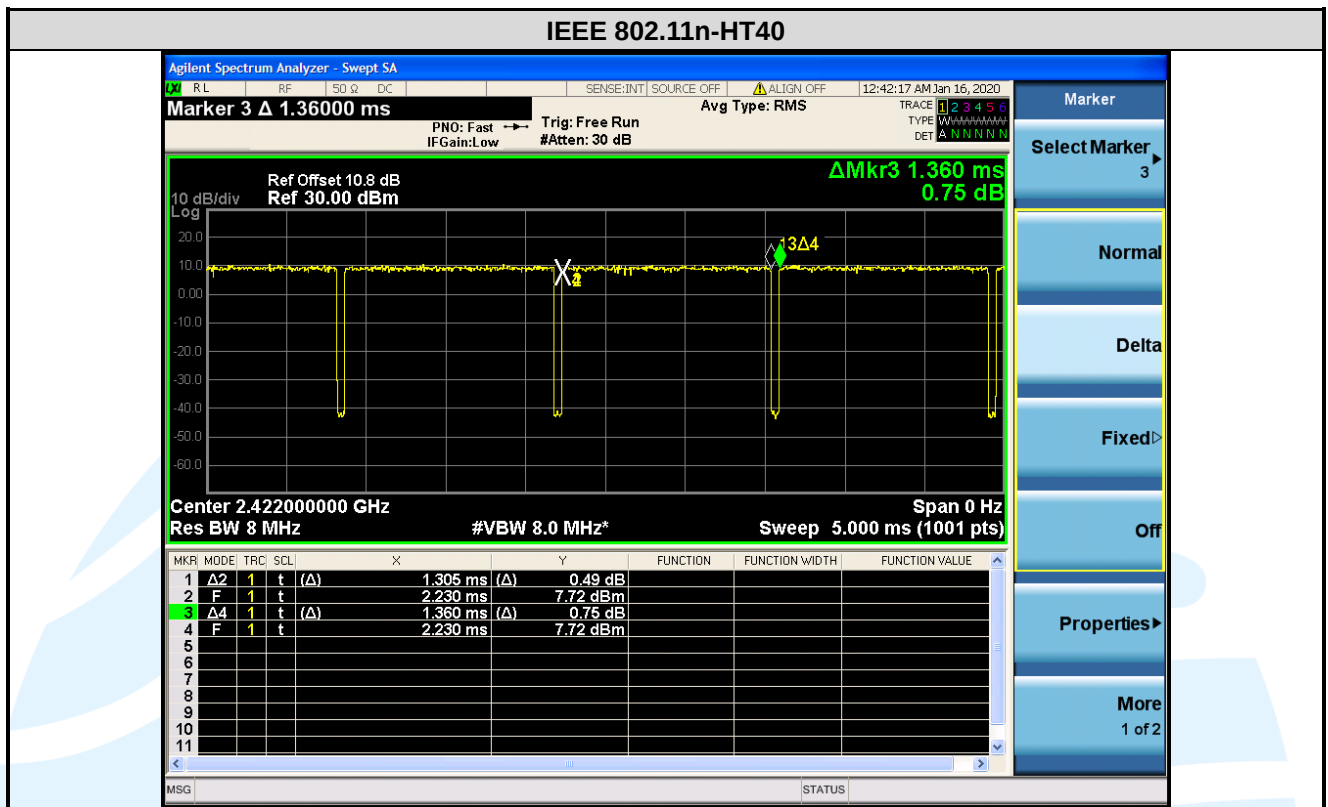
Remark:

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

The test plots as follows







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 Unlicensed Wireless Devices
4	KDB 558074 D01 15.247 Meas Guidance v05r02	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: Three 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 no consistent, the best case directional gain of the antenna is 7.77 dBi (See section 5.3).

5.3 CONDUCTED OUTPUT POWER

Test Requirement:	FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(3)
Test Method:	ANSI C63.10-2013 Clause 11.9.2.2.2
Limit:	For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.
Test Procedure:	Method AVGSA-1 uses trace averaging with the EUT transmitting at full power throughout each sweep. The procedure for this method is as follows: a) Set span to at least 1.5 times the OBW. b) Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz c) Set VBW $\geq [3 \times \text{RBW}]$. d) Number of points in sweep $\geq [2 \times \text{span} / \text{RBW}]$. (This gives bin-to-bin spacing $\leq \text{RBW} / 2$, so that narrowband signals are not lost between frequency bins.) e) Sweep time = auto. f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode. g) If transmit duty cycle < 98%, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at the maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle $\geq 98\%$, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run." h) Trace average at least 100 traces in power averaging (rms) mode. i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
Test Setup:	Refer to section 4.5.3 for details.
Instruments Used:	Refer to section 3 for details
Test Results:	

Mode	Channel/ Frequency (MHz)	Maximum Conducted AVG Output Power (dBm)					Pass / Fail
		SISO_Chain 0	SISO_Chain 1	SISO_Chain 2	Total Power MIMO_ Chain 0+1+2	Limit (dBm)	
IEEE 802.11b	1(2412)	23.03	22.96	23.23	27.85	28.23	Pass
	6(2437)	23.70	22.81	23.43	28.10	28.23	Pass
	11(2462)	22.95	22.57	23.30	27.72	28.23	Pass
IEEE 802.11g	1(2412)	19.25	18.50	19.06	23.72	28.23	Pass
	6(2437)	21.09	19.30	20.13	25.01	28.23	Pass
	11(2462)	19.01	18.59	19.22	23.72	28.23	Pass
IEEE 802.11n- HT20	1(2412)	18.85	18.97	18.87	23.67	28.23	Pass
	6(2437)	20.84	19.30	19.71	24.77	28.23	Pass
	11(2462)	18.83	18.56	18.82	23.51	28.23	Pass
IEEE 802.11n- HT40	3(2422)	16.74	17.06	16.83	21.65	28.23	Pass
	6(2437)	20.46	18.91	19.24	24.36	28.23	Pass
	9(2452)	16.66	17.01	17.24	21.75	28.23	Pass

Remark:

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

Frequency Band	Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Chain 2 Antenna Gain (dBi)	Correlated chains directional gain (dBi)	Peak Power Limit (dBm)
2400 MHz to 2483.5 MHz	3.00	3.00	3.00	7.77	28.23
Basic methodology with N_{ANT} transmit antennas, each with the same directional gain G_{ANT} dBi, being driven by N_{ANT} transmitter outputs of equal power. Directional gain is to be computed as follows:					
If any transmit signals are <i>correlated</i> with each other,					
Directional gain = $G_{ANT} + 10 \log(N_{ANT})$ dBi					









5.46 DB BANDWIDTH & OCCUPIED 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:

6dB Bandwidth

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ 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)	9.095	13.440	> 500 kHz	Pass
	6(2437)	9.092	13.451	> 500 kHz	Pass
	11(2462)	9.090	13.489	> 500 kHz	Pass
IEEE 802.11g	1(2412)	15.13	16.341	> 500 kHz	Pass
	6(2437)	15.08	16.337	> 500 kHz	Pass
	11(2462)	15.16	16.345	> 500 kHz	Pass
IEEE 802.11n-HT20	1(2412)	15.15	17.507	> 500 kHz	Pass
	6(2437)	15.16	17.497	> 500 kHz	Pass
	11(2462)	15.16	17.508	> 500 kHz	Pass
IEEE 802.11n-HT40	3(2422)	35.15	35.725	> 500 kHz	Pass
	6(2437)	35.15	35.715	> 500 kHz	Pass
	9(2452)	35.15	35.698	> 500 kHz	Pass
Chain 1					
IEEE 802.11b	1(2412)	9.099	13.649	> 500 kHz	Pass
	6(2437)	9.099	13.631	> 500 kHz	Pass
	11(2462)	9.104	13.547	> 500 kHz	Pass
IEEE 802.11g	1(2412)	15.10	16.332	> 500 kHz	Pass
	6(2437)	15.15	16.323	> 500 kHz	Pass
	11(2462)	15.14	16.320	> 500 kHz	Pass
IEEE 802.11n-HT20	1(2412)	15.16	17.556	> 500 kHz	Pass
	6(2437)	15.16	17.554	> 500 kHz	Pass
	11(2462)	15.16	17.554	> 500 kHz	Pass
IEEE 802.11n-HT40	3(2422)	35.16	35.830	> 500 kHz	Pass
	6(2437)	35.15	35.771	> 500 kHz	Pass
	9(2452)	35.15	35.770	> 500 kHz	Pass
Chain 2					
IEEE 802.11b	1(2412)	9.101	13.459	> 500 kHz	Pass
	6(2437)	9.102	13.456	> 500 kHz	Pass
	11(2462)	9.104	13.466	> 500 kHz	Pass
IEEE 802.11g	1(2412)	15.16	16.334	> 500 kHz	Pass
	6(2437)	15.16	16.333	> 500 kHz	Pass
	11(2462)	15.14	16.330	> 500 kHz	Pass
IEEE 802.11n-HT20	1(2412)	15.16	17.516	> 500 kHz	Pass
	6(2437)	15.15	17.494	> 500 kHz	Pass
	11(2462)	15.16	17.497	> 500 kHz	Pass
IEEE 802.11n-HT40	3(2422)	35.14	35.737	> 500 kHz	Pass
	6(2437)	35.14	35.743	> 500 kHz	Pass
	9(2452)	35.14	35.766	> 500 kHz	Pass

The test plots as follows:
6 dB Bandwidth



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