Shenzhen Huatongwei International Inspection Co., Ltd.
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TEST REPORT

Report No..... :	**CHTEW19070053**	Report verification :
Project No..... :	**SHT1906073903EW**	
FCC ID..... :	**2ATV2-WMBR-1**	
Applicant's name..... :	**Walmart, Inc. on behalf of its affiliate Project Franklin, LLC**	
Address.....:	74 Kent St #2, Brooklyn, NY 11222	
Manufacturer.....:	Shenzhen ChampOn Technology Co. Ltd	
Address.....:	628 Yi Ben BLDG, No.1063 Cha Guang rd, Xili, Nanshan, Shenzhen	
Test item description ..... :	**Walmart WiFi Bridge**	
Trade Mark .....:	Walmart	
Model/Type reference.....:	WMBR-1	
Listed Model(s) .....:	-	
Standard ..... :	**FCC CFR Title 47 Part 15 Subpart C Section 15.247**	
Date of receipt of test sample.....:	Jul.05, 2019	
Date of testing.....:	Jul.05, 2019- Jul.15, 2019	
Date of issue.....:	Jul.16, 2019	
Result.....:	**PASS**	

Compiled by (position+printedname+signature)...:	File administrators Echo Wei	Echo Wei
Supervised by (position+printedname+signature)....:	Project Engineer Edward Pan	Edward Pan
Approved by (position+printedname+signature)....:	RF Manager Hans Hu	Hans Hu

Testing Laboratory Name ..... :	**Shenzhen Huatongwei International Inspection Co., Ltd.**
Address.....:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

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The test report merely correspond to the test sample.

Contents

1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

ANSI C63.10:2013: American National Standard forTesting Unlicensed Wireless Devices

KDB 558074 D01 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

KDB662911 D01 Multiple Transmitter Output v02r01: Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)

KDB662911 D02 MIMO with Cross-Polarized Antennas v01: MIMO with Cross-Polarized Antenna

1.2. Report Version

Version No.	Date of issue	Description
N/A	2019-07-16	Original

2. TEST DESCRIPTION

Test Item	FCC Rule	Result	Test Engineer
Antenna requirement	15.203/15.247(c)	Pass	JiongSheng.Feng
Line Conducted Emissions (AC Main)	15.207	Pass	Zhiwei Liu
Conducted Peak Output Power	15.247(b)(3)	Pass	JiongSheng.Feng
Power Spectral Density	15.247(e)	Pass	JiongSheng.Feng
6dB Bandwidth	15.247(a)(2)	Pass	JiongSheng.Feng
Restricted band	15.247(d)/15.205	Pass	JiongSheng.Feng
Spurious Emissions	15.247(d)/15.209	Pass	Xu Yang

Note: The measurement uncertainty is not included in the test result.

3. SUMMARY

3.1. Client Information

Applicant:	Walmart, Inc. on behalf of its affiliate Project Franklin, LLC
Address:	74 Kent St #2, Brooklyn, NY 11222
Manufacturer:	Shenzhen ChampOn Technology Co. Ltd
Address:	628 Yi Ben BLDG, No.1063 Cha Guang rd, Xili, Nanshan, Shenzhen

3.2. Product Description

Name of EUT:	Walmart WiFi Bridge
Trade Mark:	Walmart
Model No.:	WMBR-1
Listed Model(s):	-
Power supply:	DC 5V
Hardware version:	V2
Software version:	V1
WIFI	
Supported type:	802.11b/802.11g/802.11n(HT20)/802.11n(HT40)
Modulation:	DSSS for 802.11b OFDM for 802.11g/802.11n(HT20)/802.11n(HT40)
Operation frequency:	2412MHz~2462MHz for 802.11b/802.11g/802.11n(HT20) 2422MHz~2452MHz for 802.11n(HT40)
Channel number:	11 for 802.11b/802.11g/802.11n(HT20) 7 for 802.11n(HT40)
Channel separation:	5MHz
Antenna number:	2 Transmit 2 Receive
Antenna gain:	2dBi

3.3. Operation State

➢ **Test frequency list**

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

802.11b/g/n(HT20)		802.11n(HT40)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	01	-
02	2417	02	-
03	2422	03	2422
04	2427	04	2427
05	2432	05	2432
06	2437	06	2437
07	2442	07	2442
08	2447	08	2447
09	2452	09	2452
10	2457	10	-
11	2462	11	-

➢ **Test mode**

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit (duty cycle>98%).
For AC power line conducted emissions:
The EUT was set to connect with the WLAN AP under large package sizes transmission.
For RF test axis
EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data Recorded in the report.

3.4. EUT Configuration

The following peripheral devices and interface cables were connected during the measurement:

- ● - supplied by the manufacturer
- ○ - supplied by the lab

○	/	Manufacturer:	/
		Model No.:	/
○	Notebook	Manufacturer:	TOSHIBA
		Model No.:	Satellite M800

3.5. Modifications

No modifications were implemented to meet testing criteria.

4. TEST ENVIRONMENT

4.1. Address of the test laboratory

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

4.2. Test Facility

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 3902.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory 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-Registration No.: 762235

Shenzhen Huatongwei International Inspection Co., Ltd. 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.

IC-Registration No.:5377A

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377A.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

4.3. Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

4.4. 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 in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 “Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1” and TR-100028-02 “Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2” and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd. quality system according to 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.

Here after the best measurement capability for Shenzhen Huatongwei International Inspection Co., Ltd. is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.39 dB	(1)
Radiated Emissions 30~1000MHz	4.24 dB	(1)
Radiated Emissions 1~18GHz	5.16 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.5. Equipments Used during the Test

● Conducted Emission						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Shielded Room	Albatross projects	N/A	N/A	2018/09/28	2023/09/27
●	EMI Test Receiver	R&S	ESCI	101247	2018/10/27	2019/10/26
●	Artificial Mains	SCHWARZBECK	NNLK 8121	573	2018/10/27	2019/10/26
●	Pulse Limiter	R&S	ESH3-Z2	100499	2018/10/27	2019/10/26
●	RF Connection Cable	HUBER+SUHNER	EF400	N/A	2018/11/15	2019/11/14
●	Test Software	R&S	ES-K1	N/A	N/A	N/A
○	Single Balanced Telecom Pair ISN	FCC	FCC-TLISN-T2-02	20371	2018/10/28	2019/10/27
○	Two Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T4-02	20373	2018/10/28	2019/10/27
○	Four Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T8-02	20375	2018/10/28	2019/10/27
○	V-Network	R&S	ESH3-Z6	100211	2018/10/27	2019/10/26
○	V-Network	R&S	ESH3-Z6	100210	2018/10/27	2019/10/26
○	2-Line V-Network	R&S	ESH3-Z5	100049	2018/10/27	2019/10/26
●	**Radiated Emission-6th test site**					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-02	N/A	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	ESCI	100900	2018/10/28	2019/10/27
●	Loop Antenna	R&S	HFH2-Z2	100020	2017/11/20	2020/11/19
●	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	546	2017/04/05	2020/04/04
●	Pre-Amplifer	SCHWARZBECK	BBV 9742	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	N/A	N/A	2018/09/28	2019/09/27
●	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	2018/09/28	2019/09/27
●	Test Software	R&S	ES-K1	N/A	N/A	N/A
●	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
●	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A
●	**Radiated emission-7th test site**					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-01	N/A	2018/09/30	2021/09/29
●	Spectrum Analyzer	R&S	FSP40	100597	2018/10/27	2019/10/26
●	Horn Antenna	SCHWARZBECK	9120D	1011	2017/03/27	2020/03/26
●	Pre-amplifier	BONN	BLWA0160-2M	1811887	2018/11/14	2019/11/13
●	Pre-amplifier	CD	PAP-0102	12004	2018/11/14	2019/11/13
●	Broadband Pre-amplifier	SCHWARZBECK	BBV 9718	9718-248	2019/04/26	2020/04/25
●	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	2018/11/15	2019/11/14
●	Test Software	Audix	E3	N/A	N/A	N/A
●	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
●	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

● RF Conducted Method						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	FSV40	100048	2018/10/28	2019/10/27
●	Spectrum Analyzer	Agilent	N9020A	MY50510187	2018/09/29	2019/09/28
○	Radio communication tester	R&S	CMW500	137688-Lv	2018/09/29	2019/09/28
○	Test software	Tonscend	JS1120-1(LTE)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-2(WIFI)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-3(WCDMA)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-4(GSM)	N/A	N/A	N/A

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

REQUIREMENT:

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of anantenna 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.

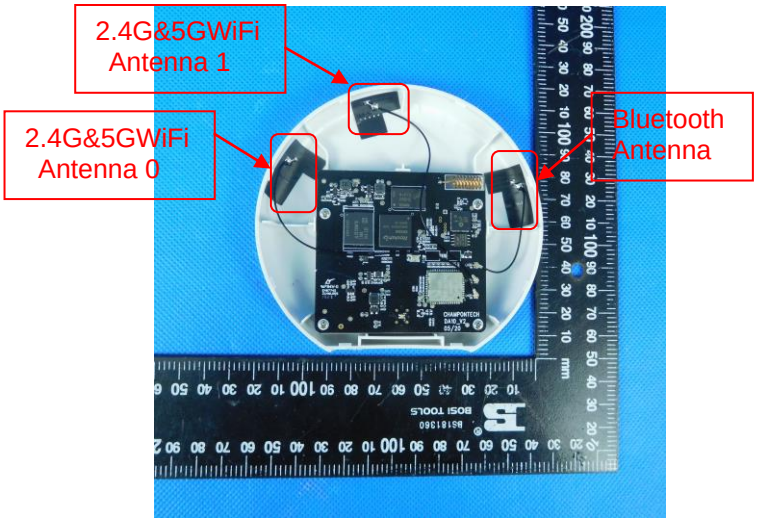
FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

The directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



5.2. Conducted Emissions (AC Main)

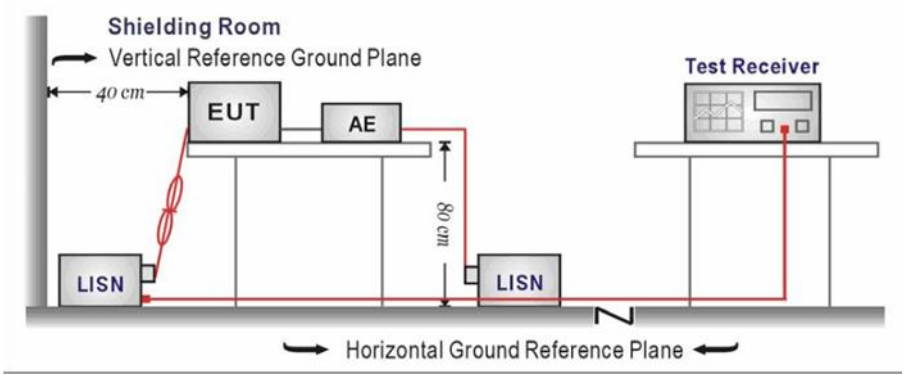
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor,was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE:

Please refer to the clause 3.3

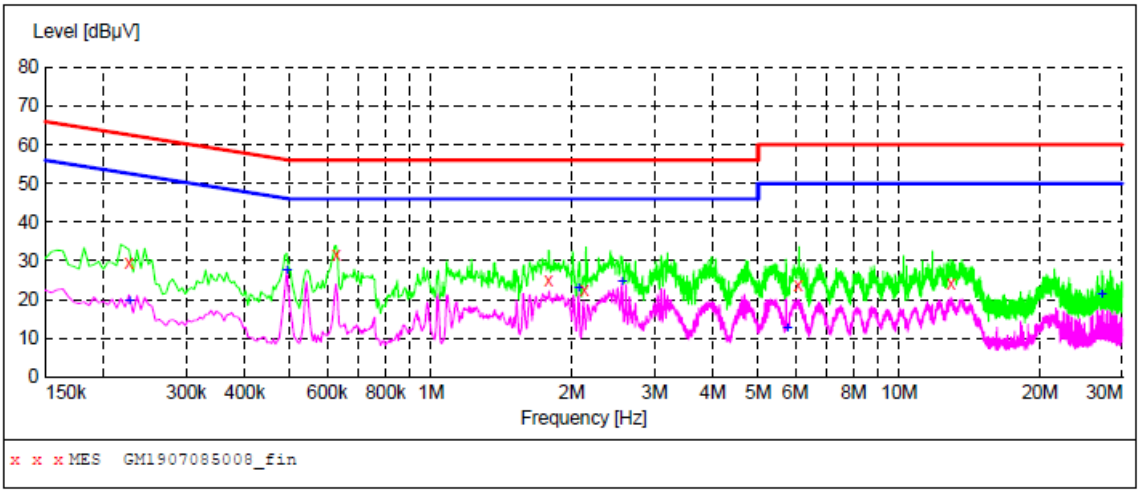
TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Note:

1) Transd=Cable lose+ Pulse Limiter Factor + Artificial Mains Factor
2) Margin= Limit -Level

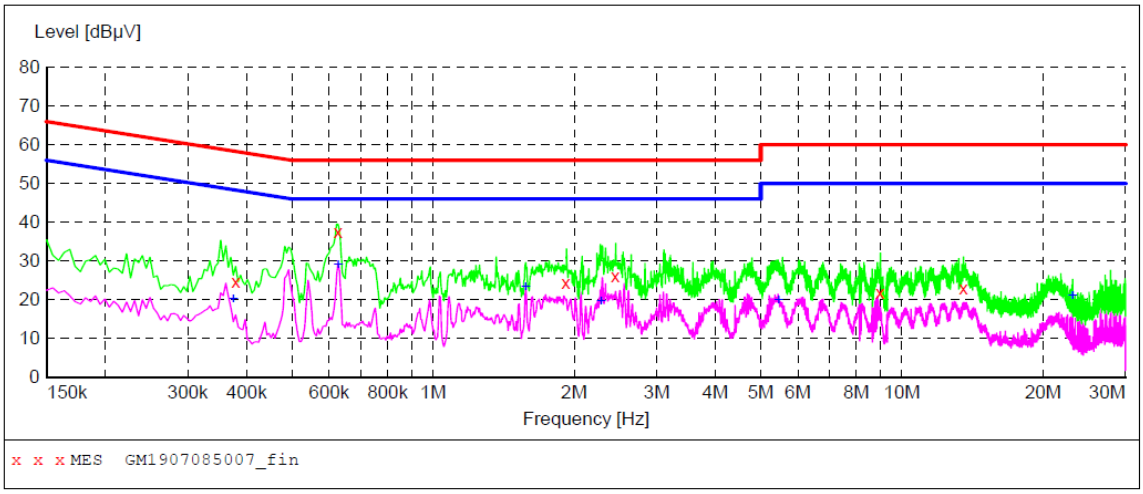
Test Line:	L



Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.226500	29.40	9.9	63	33.2	QP	L1	GND
0.627000	31.80	9.9	56	24.2	QP	L1	GND
1.783500	24.90	9.9	56	31.1	QP	L1	GND
2.125500	22.70	9.9	56	33.3	QP	L1	GND
6.090000	23.80	10.0	60	36.2	QP	L1	GND
12.925500	24.00	10.1	60	36.0	QP	L1	GND

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.226500	19.60	9.9	53	33.0	AV	L1	GND
0.492000	27.60	9.9	46	18.5	AV	L1	GND
2.067000	22.80	9.9	46	23.2	AV	L1	GND
2.557500	24.60	9.9	46	21.4	AV	L1	GND
5.779500	12.60	10.0	50	37.4	AV	L1	GND
27.159000	21.30	10.3	50	28.7	AV	L1	GND

Test Line:	N



Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.379500	24.60	9.9	58	33.7	QP	N	GND
0.627000	37.60	9.9	56	18.4	QP	N	GND
1.918500	24.30	9.9	56	31.7	QP	N	GND
2.445000	26.20	9.9	56	29.8	QP	N	GND
8.983500	21.90	10.1	60	38.1	QP	N	GND
13.533000	22.90	10.1	60	37.1	QP	N	GND

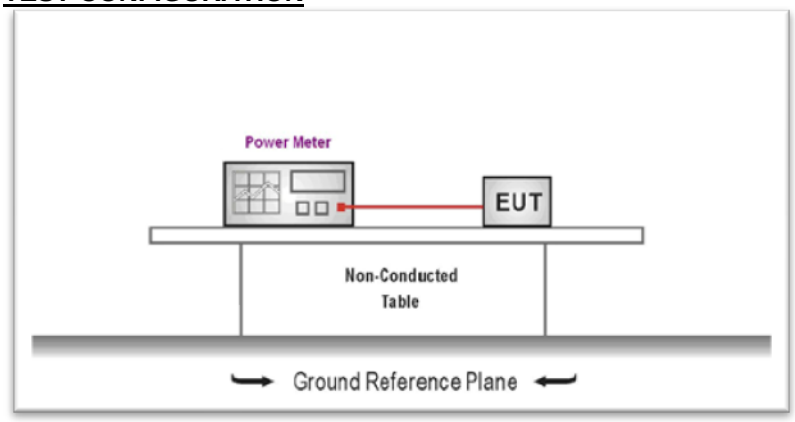
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.375000	20.00	9.9	48	28.4	AV	N	GND
0.627000	29.00	9.9	46	17.0	AV	N	GND
1.576500	23.20	9.9	46	22.8	AV	N	GND
2.283000	19.60	9.9	46	26.4	AV	N	GND
5.455500	19.90	10.0	50	30.1	AV	N	GND
23.127000	20.90	10.3	50	29.1	AV	N	GND

5.3. Conducted Peak Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(3): **30dBm**:

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was tested according to ANSI C63.10: 2013 and KDB 558074 D01 for compliance to FCC 47 CFR 15.247 requirements.
2. The maximum peak conducted output power may be measured using a broadband peak RF power meter.
3. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector
4. Record the measurement data.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

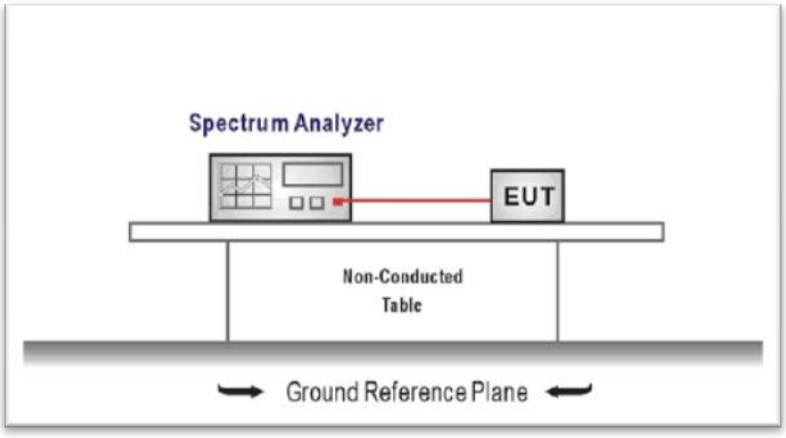
Type	Channel	Output power (dBm)		Total Power (dBm)	Limit (dBm)	Result
		Antenna 0	Antenna 1			
802.11b	01	16.66	16.76	-	≤30.00	Pass
	06	16.37	16.93	-		
	11	17.01	17.29	-		
802.11g	01	16.80	17.19	-	≤30.00	Pass
	06	15.81	16.51	-		
	11	16.71	16.92	-		
802.11n(HT20)	01	16.89	17.00	19.96	≤30.00	Pass
	06	16.28	16.93	19.62		
	11	16.32	16.08	19.21		
802.11n(HT40)	03	16.49	16.77	19.66	≤30.00	Pass
	06	16.44	16.22	19.31		
	09	16.35	16.32	19.36		

5.4. Power Spectral Density

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input,
2. Configure the spectrum analyzer as shown below:
   Center frequency=DTS channel center frequency
   Span =1.5 times the DTS bandwidth
   RBW = 3 kHz ≤ RBW ≤ 100 kHz, VBW ≥ 3 × RBW
   Sweep time = auto couple
   Detector = peak
   Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
4. Use the peak marker function to determine the maximum amplitude level within the RBW.
5. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST MODE:

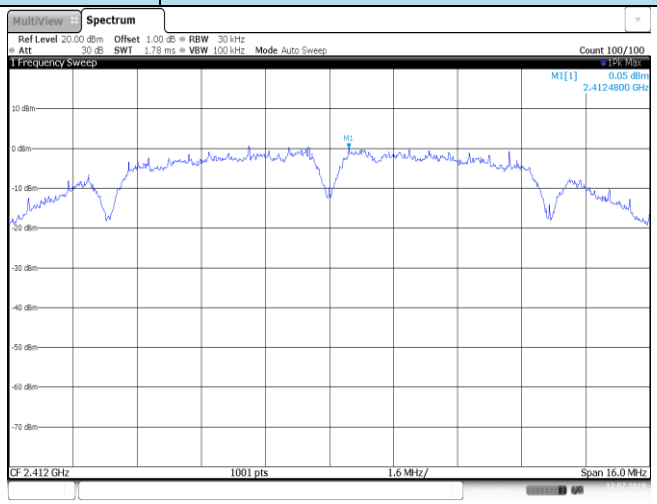
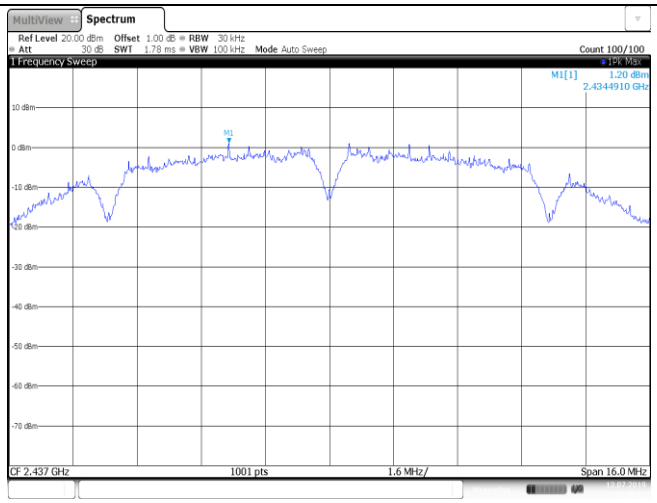
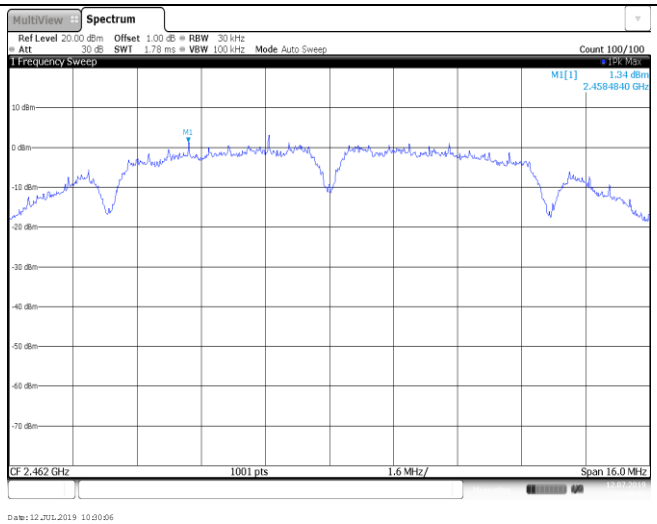
Please refer to the clause 3.3

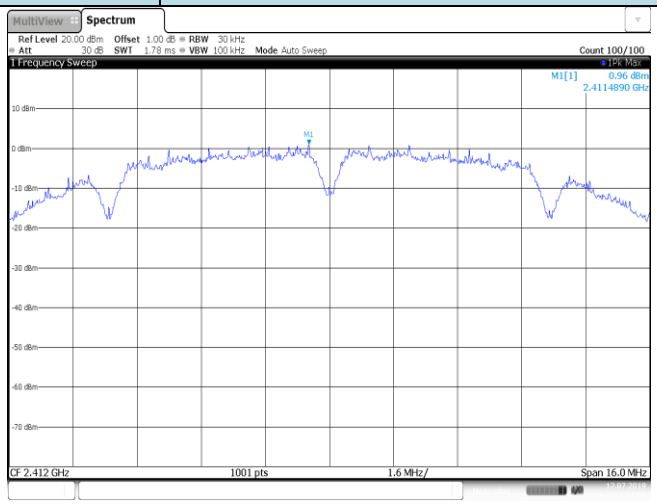
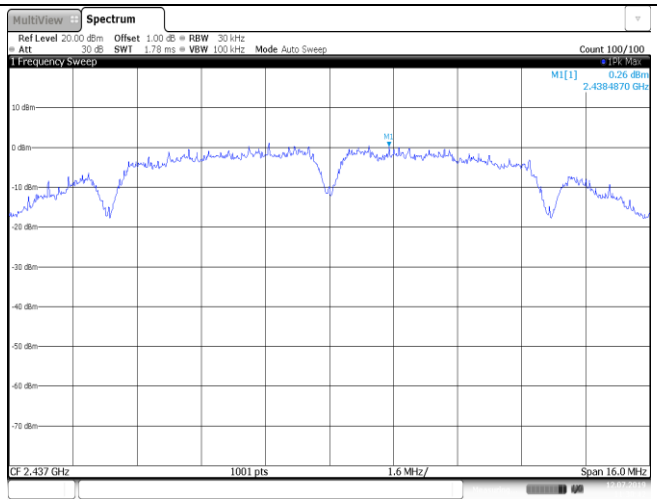
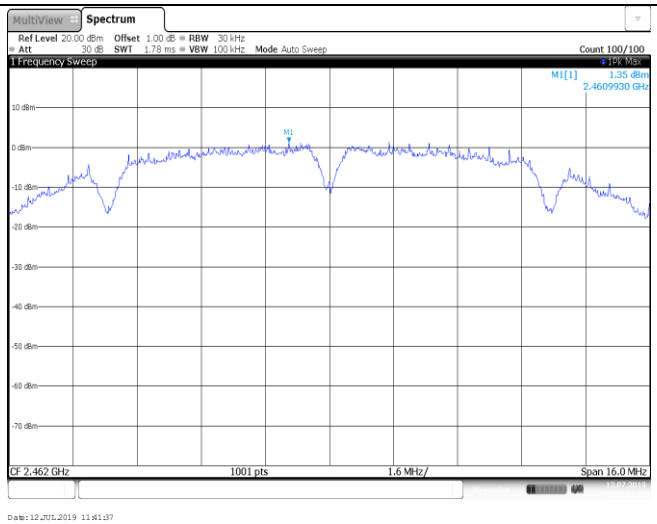
TEST RESULTS

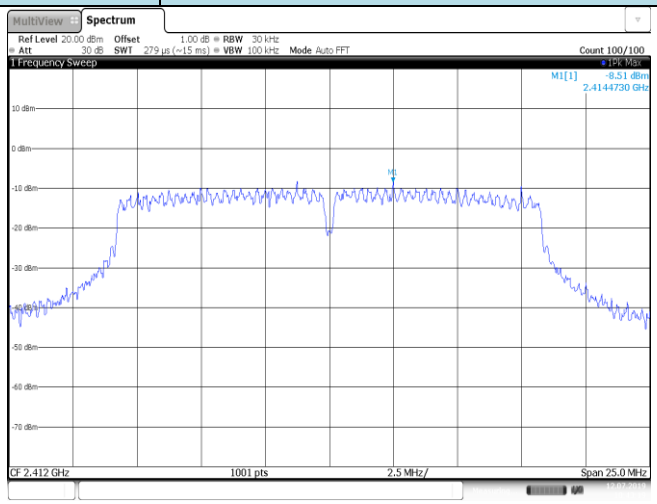
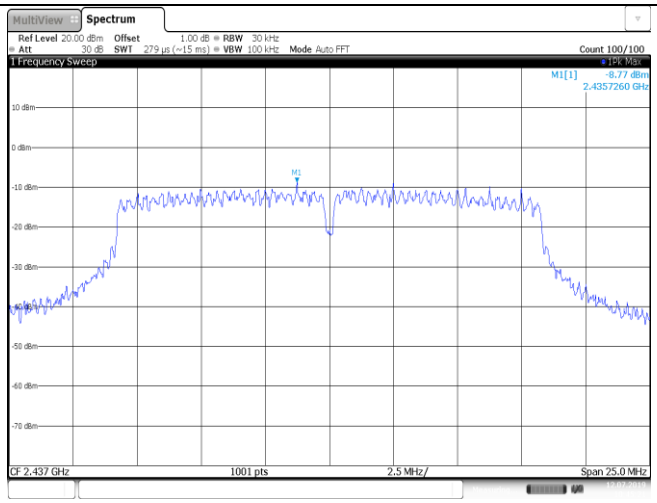
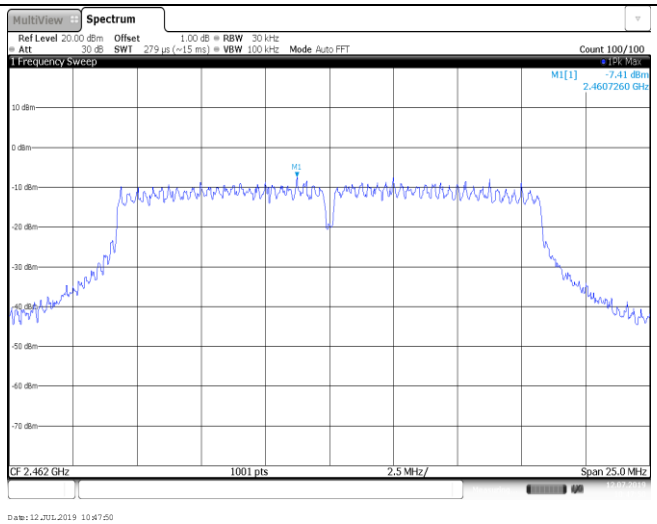
☒ **Passed** ☐ **Not Applicable**

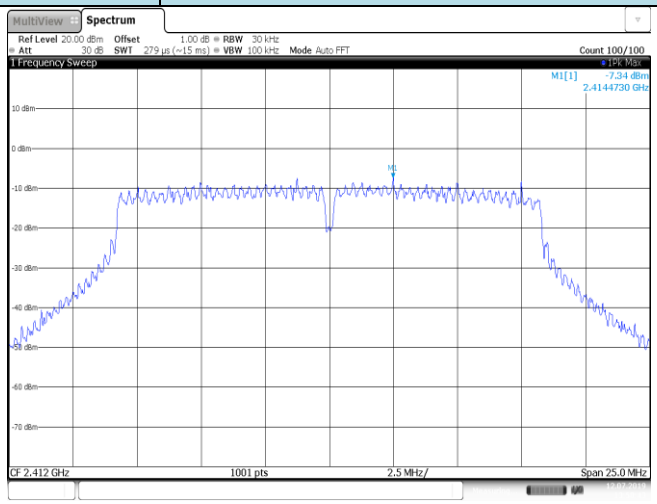
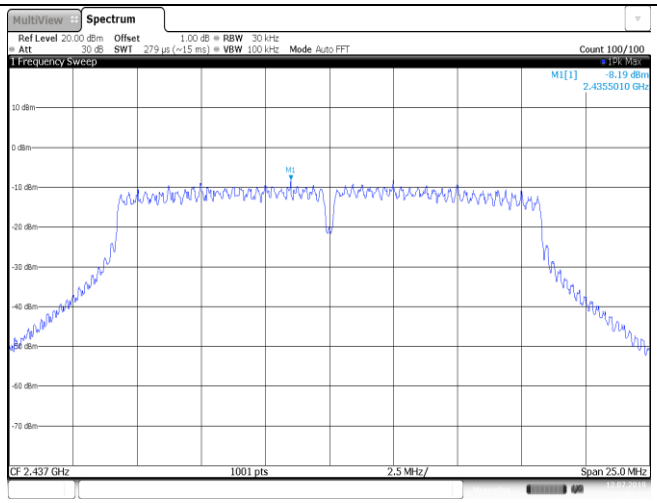
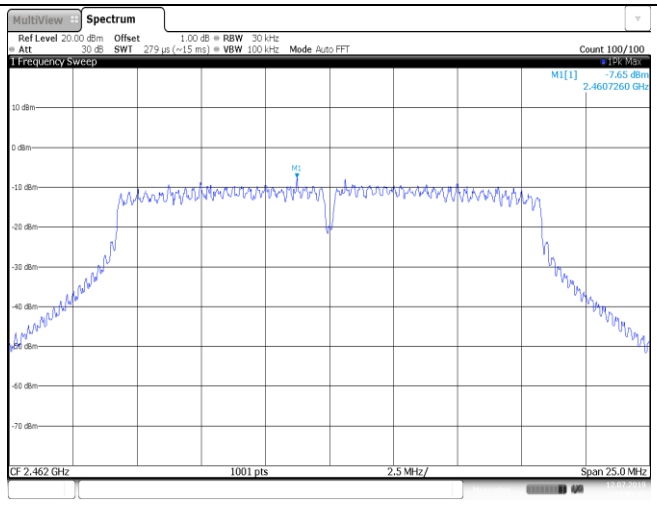
Type	Channel	Power Spectral Density (dBm/30KHz)		Total Power Spectral Density (dBm/30KHz)	Limit (dBm/ 3KHz)	Result
		Antenna 0	Antenna 1			
802.11b	01	0.05	0.96	-	≤8.00	Pass
	06	1.20	0.26	-		
	11	1.34	1.35	-		
802.11g	01	-8.51	-7.34	-	≤8.00	Pass
	06	-8.77	-8.19	-		
	11	-7.41	-7.65	-		
802.11n(HT20)	01	-9.78	-8.75	-6.22	≤8.00	Pass
	06	-8.42	-7.32	-4.82		
	11	-8.88	-9.56	-6.20		
802.11n(HT40)	03	-12.15	-12.08	-9.10	≤8.00	Pass
	06	-11.86	-11.54	-8.69		
	09	-12.07	-11.80	-8.92		

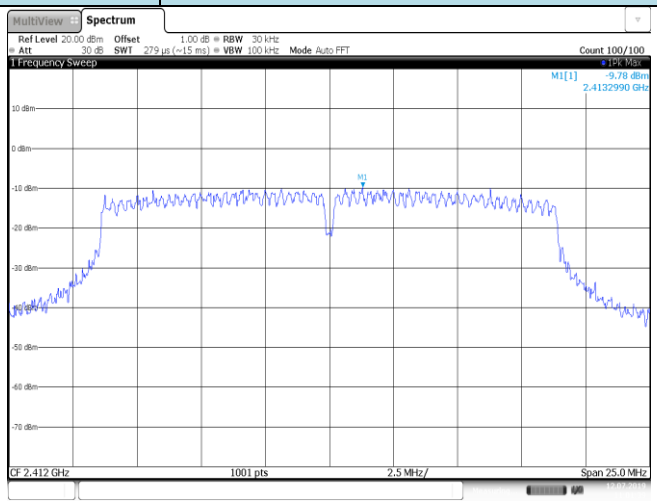
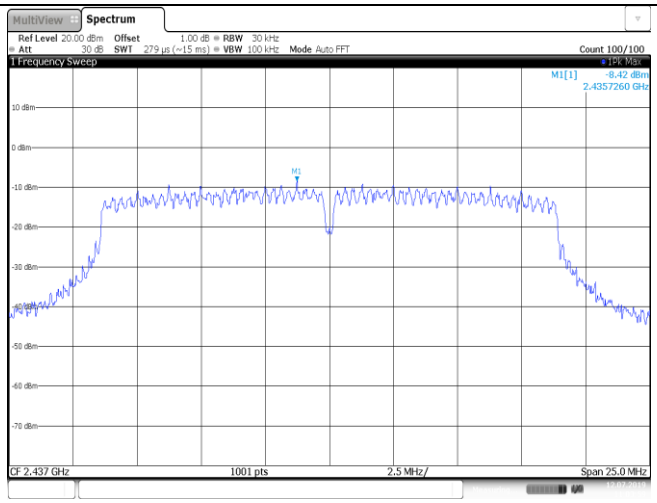
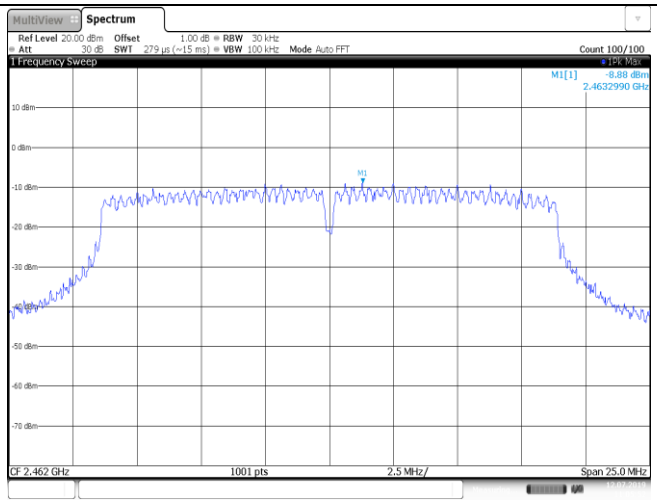
Test plot as follows:

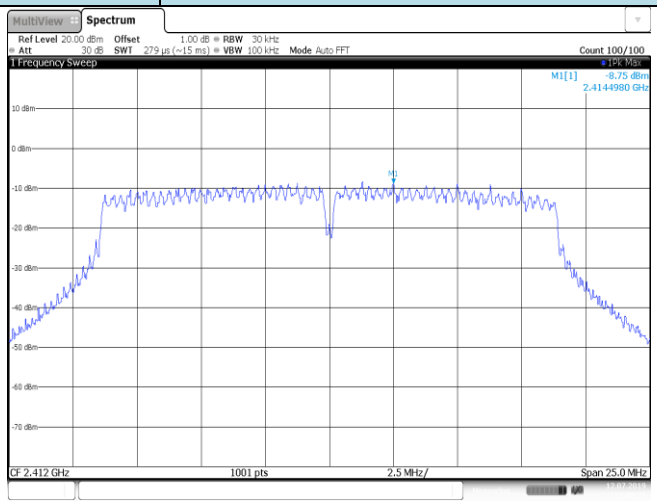
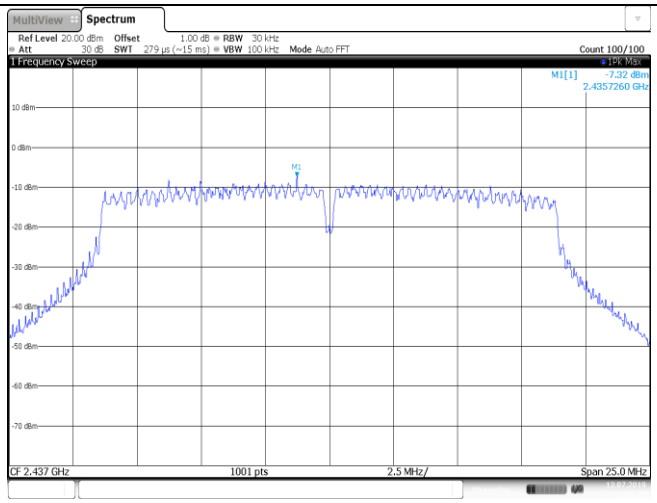
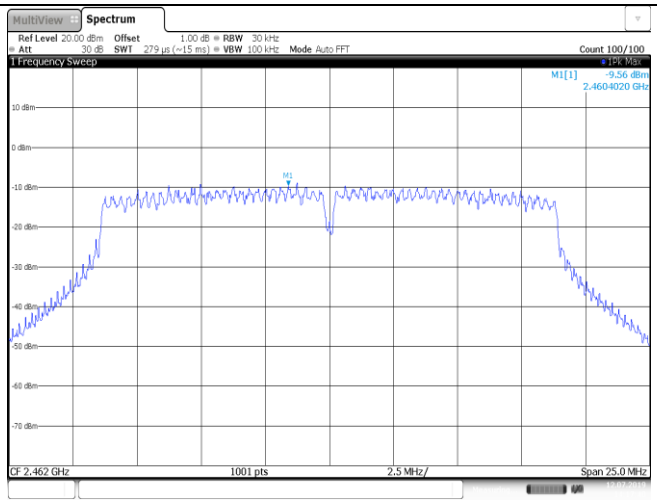
802.11 b	Antenna 0
CH01	
CH06	
CH11	

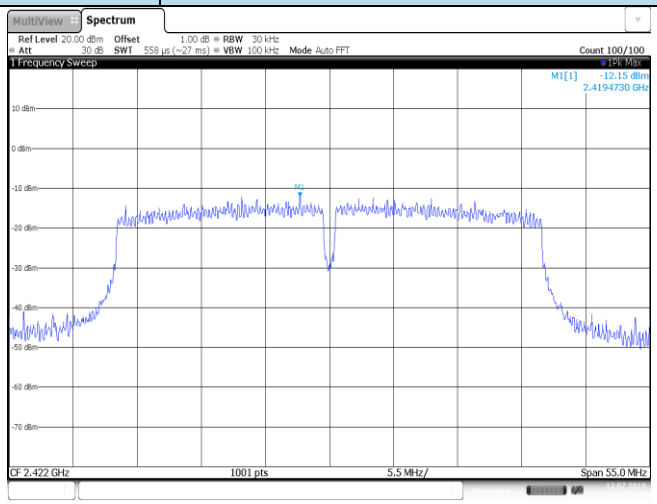
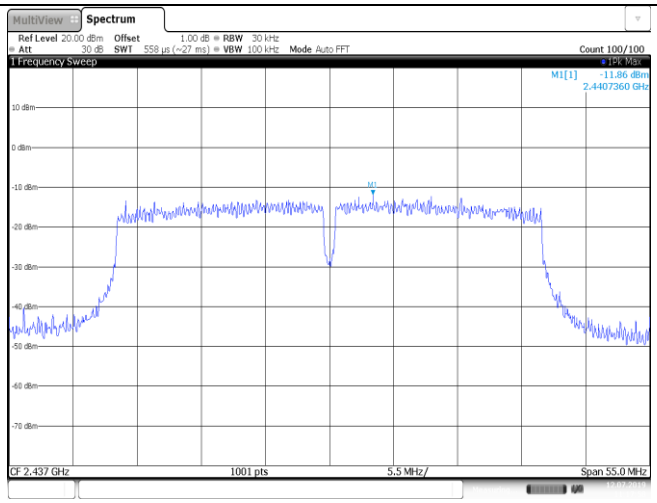
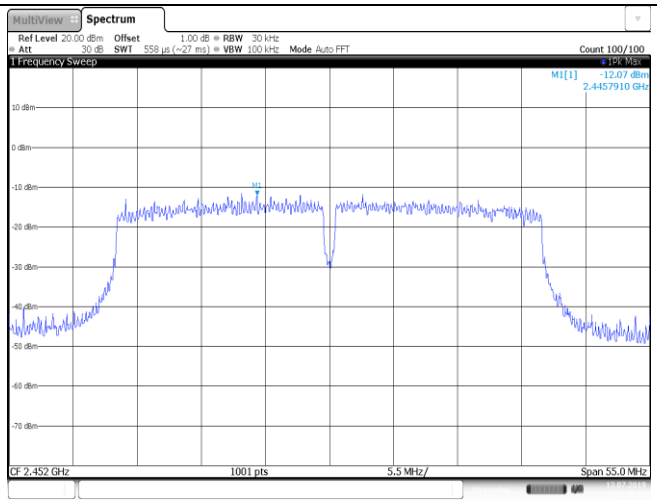
802.11 b	Antenna 1
CH01	
CH06	
CH11	

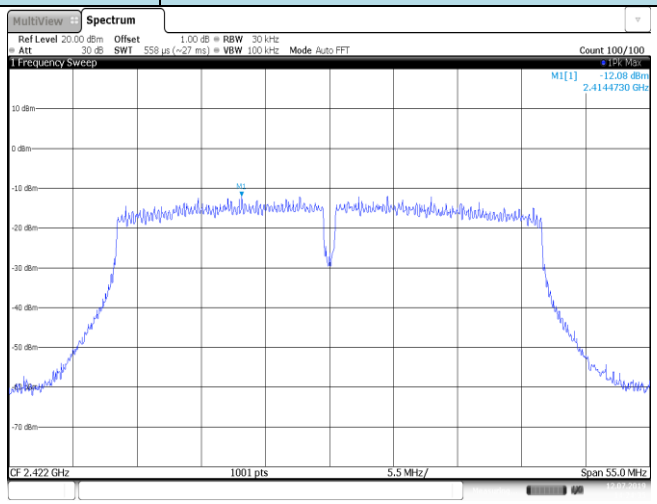
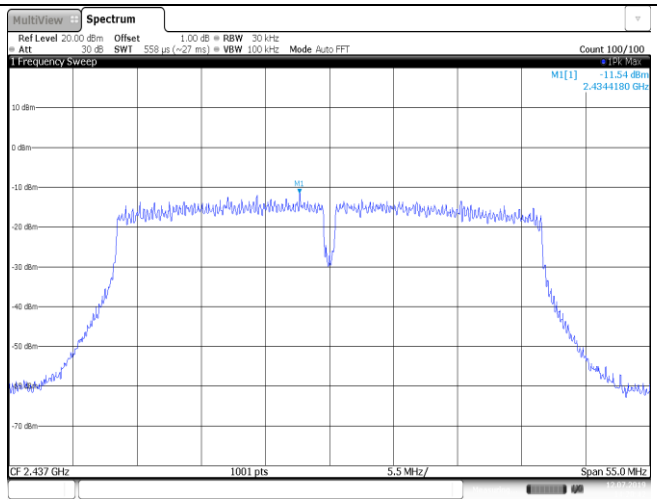
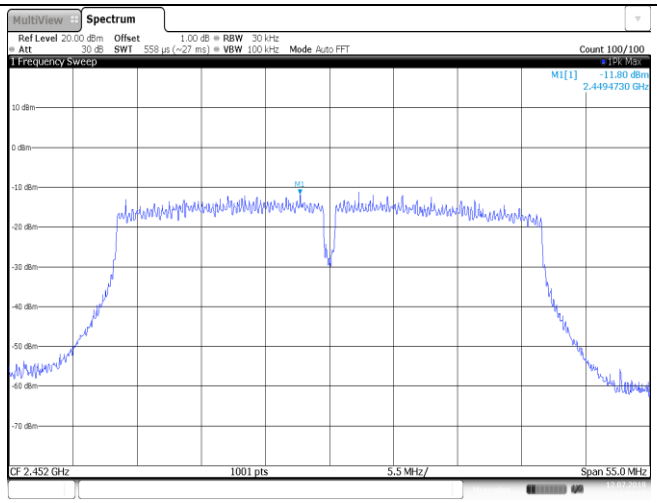
802.11 g	Antenna 0
CH01	
CH06	
CH11	

802.11 g	Antenna 1
CH01	
CH06	
CH11	

802.11 n(H20)	Antenna 0
CH01	
CH06	
CH11	

802.11 n(H20)	Antenna 1
CH01	
CH06	
CH11	

802.11 n(H40)	Antenna 0
CH03	
CH06	
CH09	

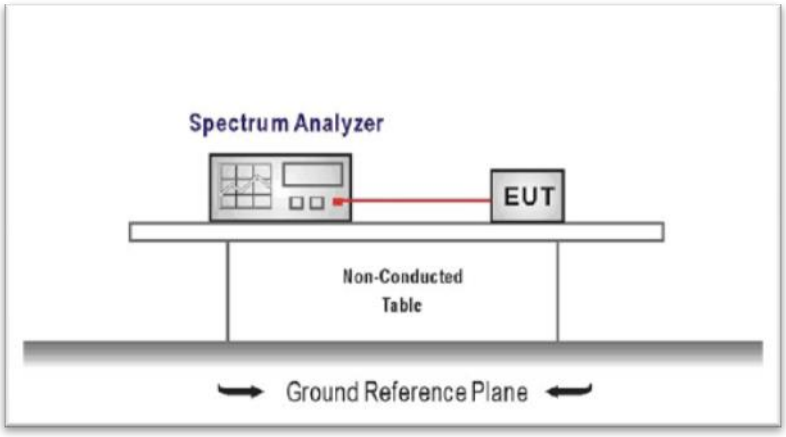
802.11 n(H40)	Antenna 1
CH03	
CH06	
CH09	

5.5. 6dB Bandwidth

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2): For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
   Center Frequency =DTS channel center frequency
   Span=2 x DTS bandwidth
   RBW = 100 kHz, VBW ≥ 3 × RBW
   Sweep time= auto couple
   Detector = Peak
   Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
4. 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, and record the pertinent measurements.

TEST MODE:

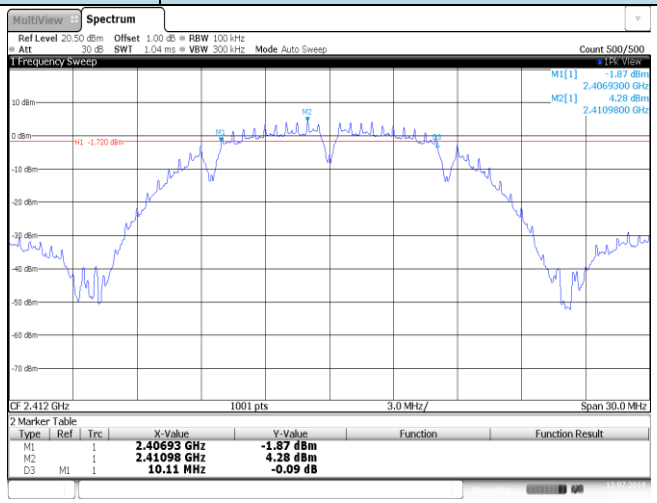
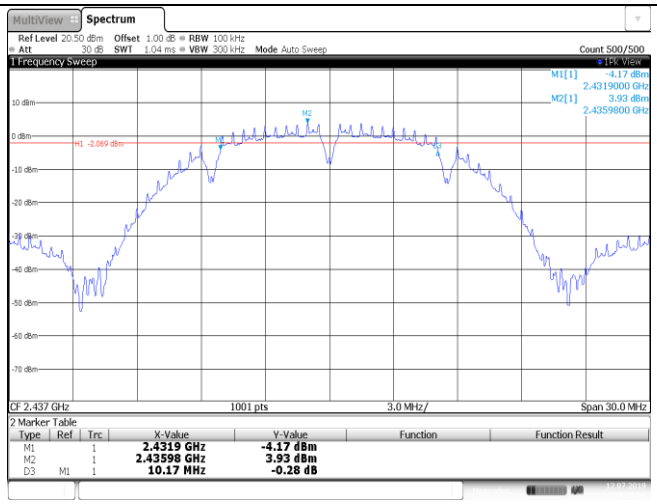
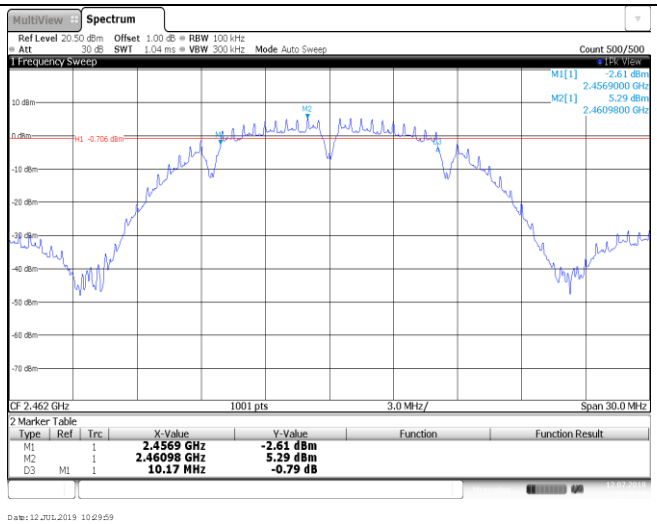
Please refer to the clause 3.3

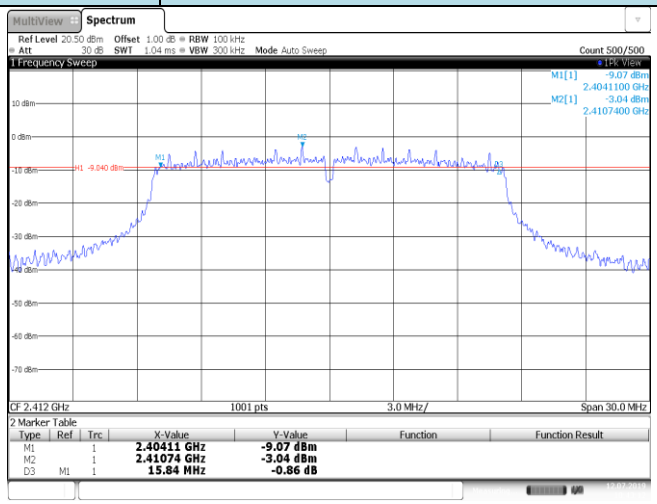
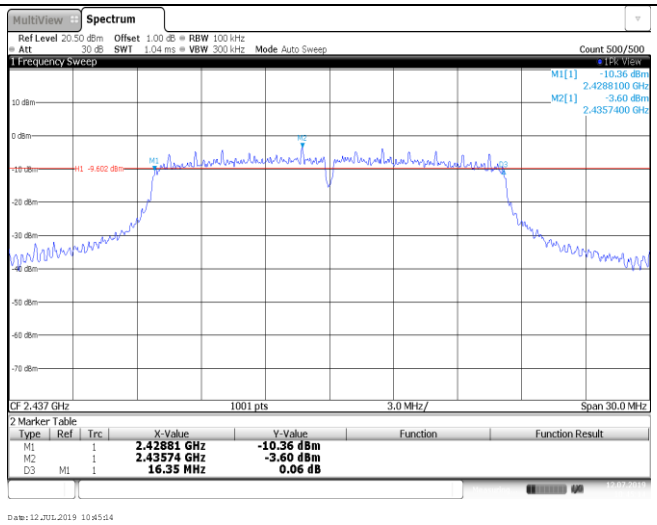
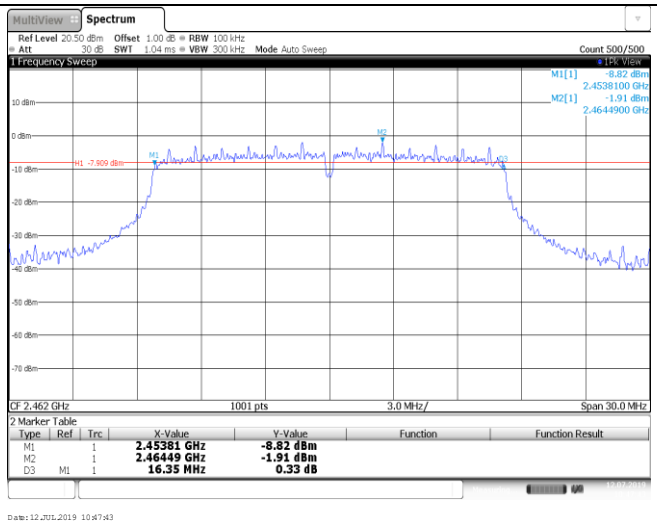
TEST RESULTS

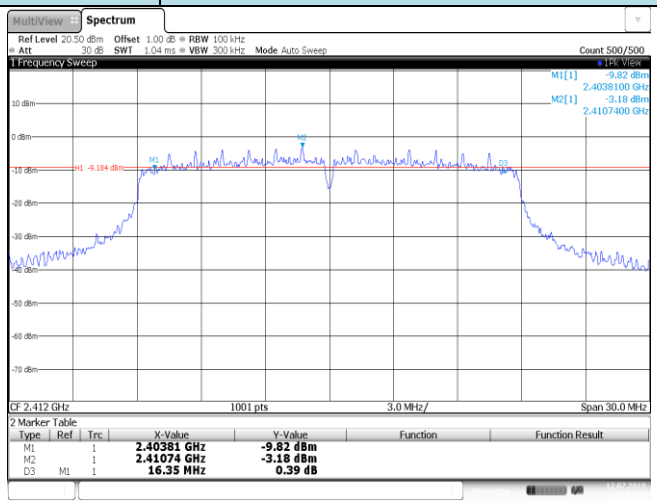
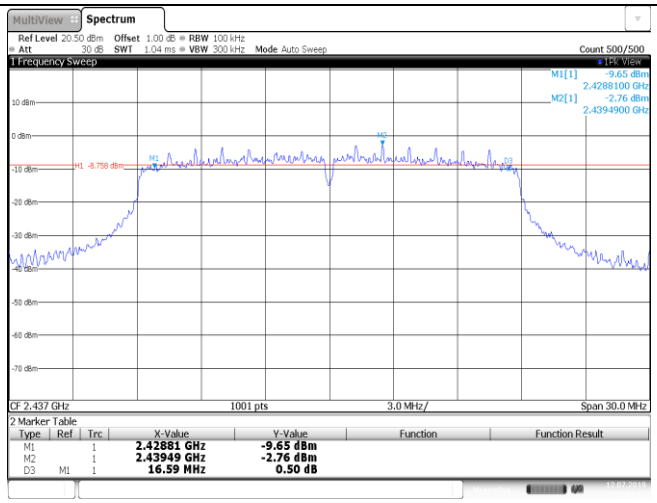
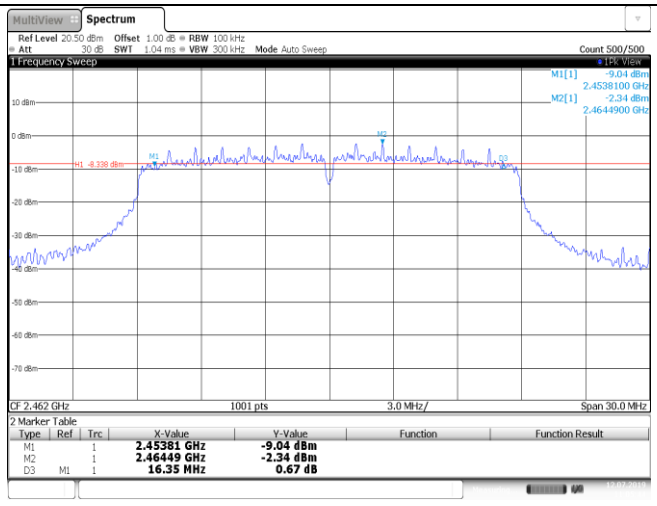
☒ **Passed** ☐ **Not Applicable**

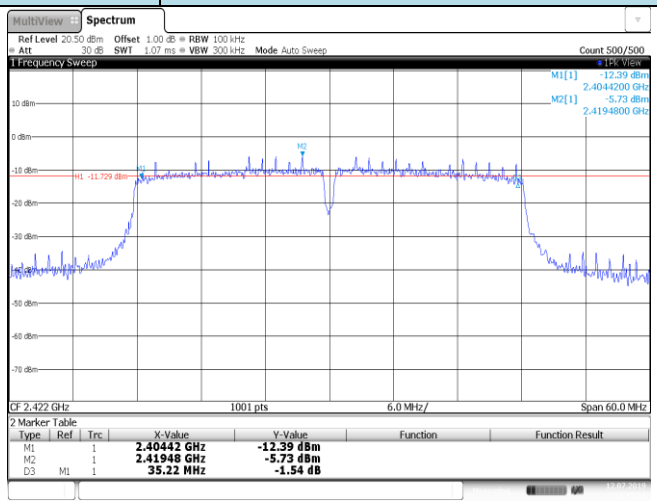
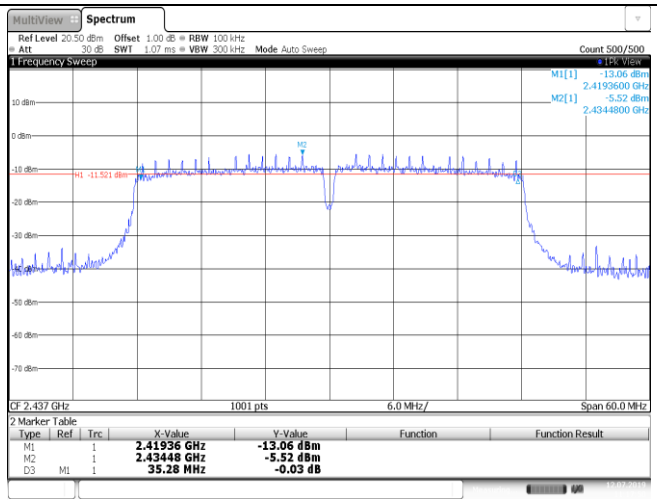
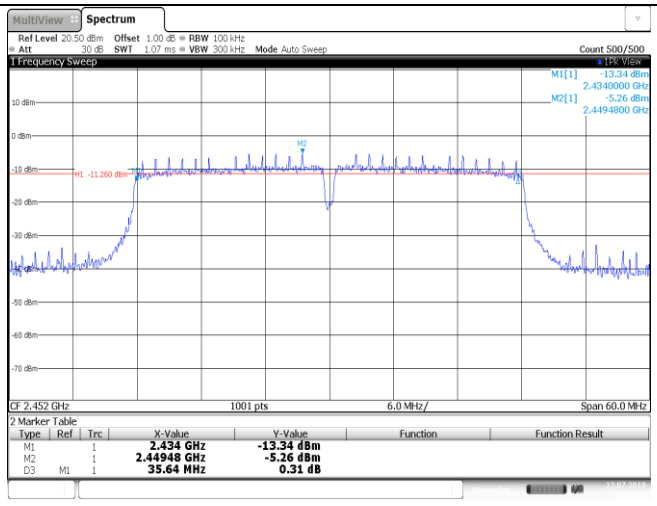
Type	Channel	6dB Bandwidth (MHz)		Limit (kHz)	Result
		Antenna 0	Antenna 1		
802.11b	01	10.11	10.11	≥500	Pass
	06	10.17	10.17		
	11	10.17	10.14		
802.11g	01	15.84	15.75	≥500	Pass
	06	16.35	15.72		
	11	16.35	15.72		
802.11n(HT20)	01	16.35	16.74	≥500	Pass
	06	16.59	16.59		
	11	16.35	16.59		
802.11n(HT40)	03	35.22	35.28	≥500	Pass
	06	35.28	35.28		
	09	35.64	35.28		

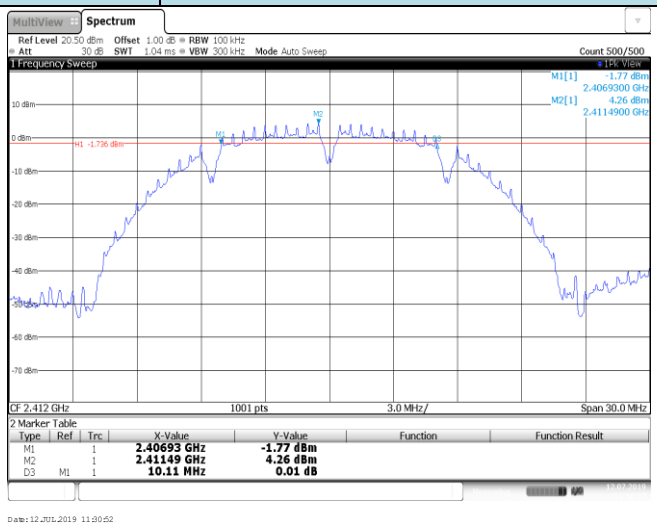
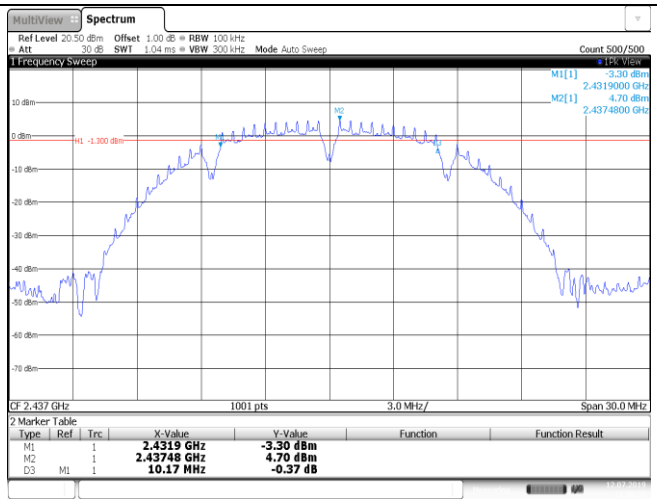
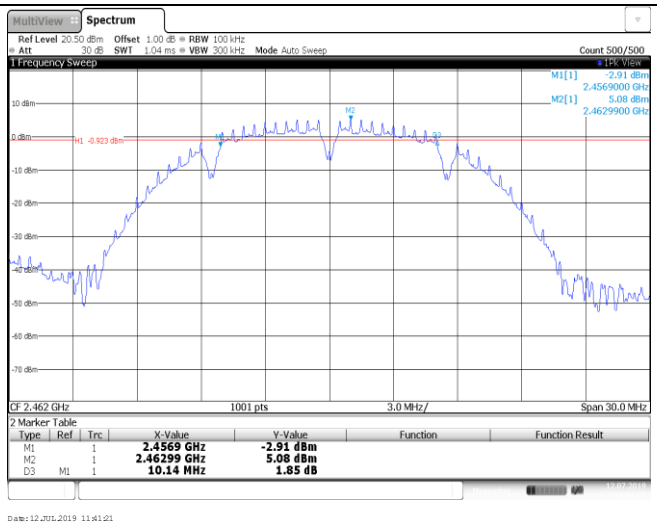
Test plot as follows:

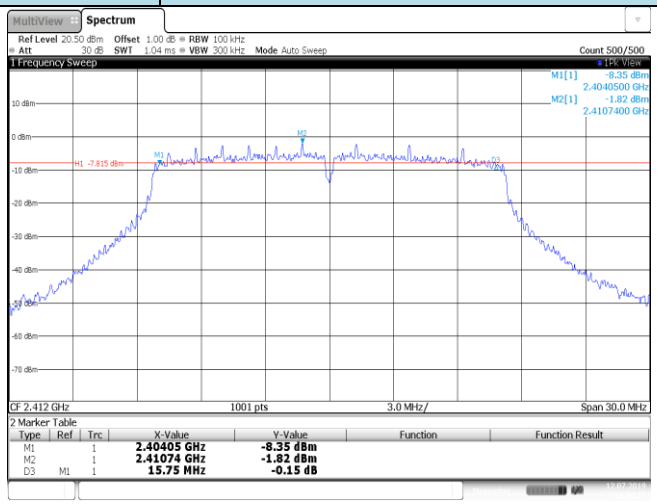
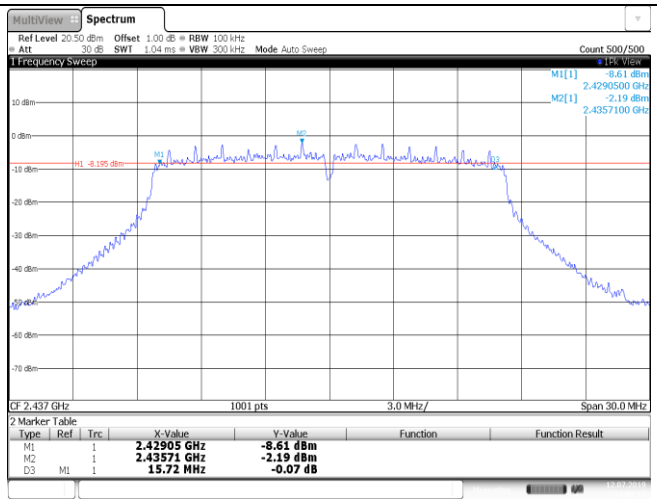
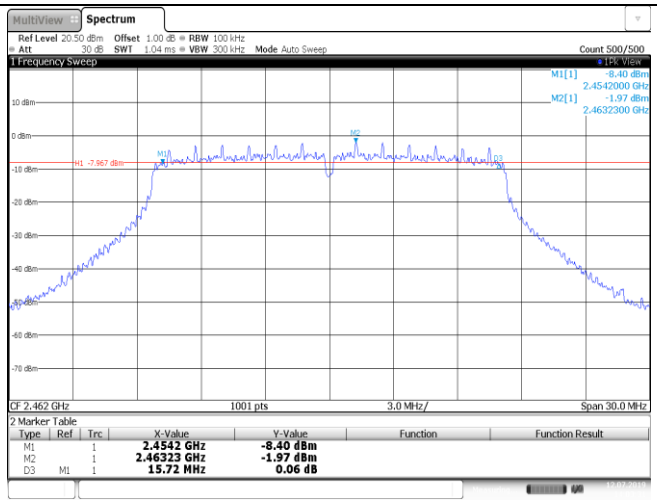
802.11 b	Antenna 0
CH01	
CH06	
CH11	

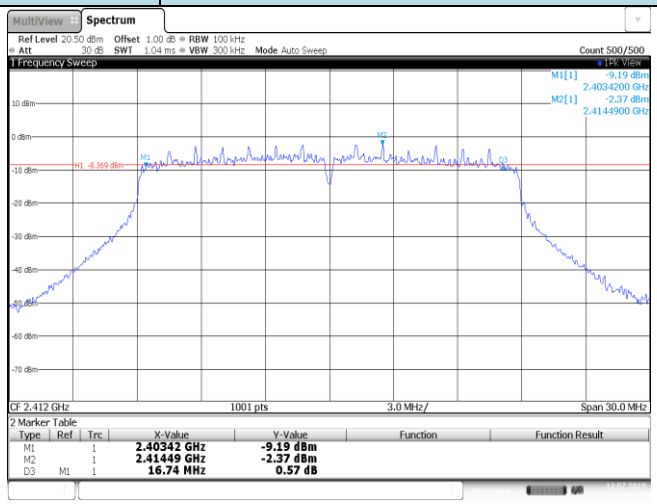
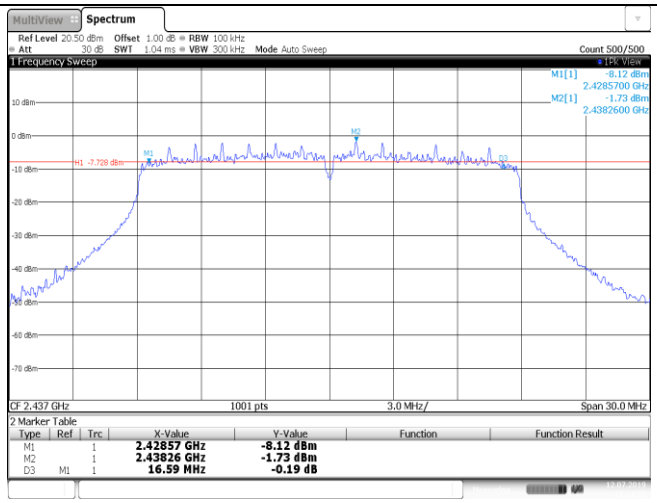
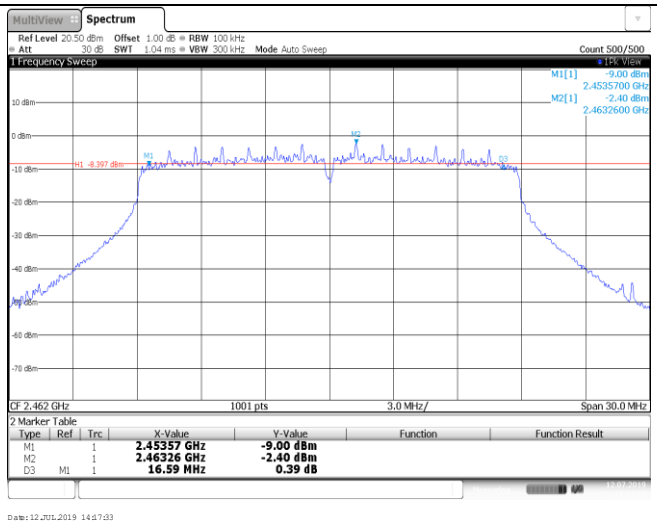
802.11 g	Antenna 0
CH01	
CH06	
CH11	

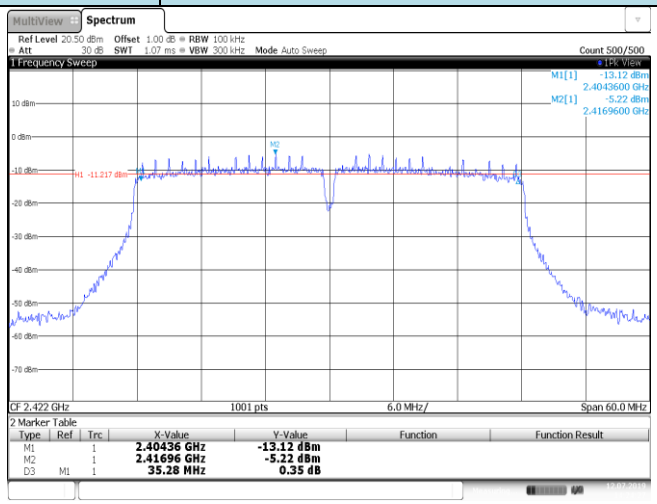
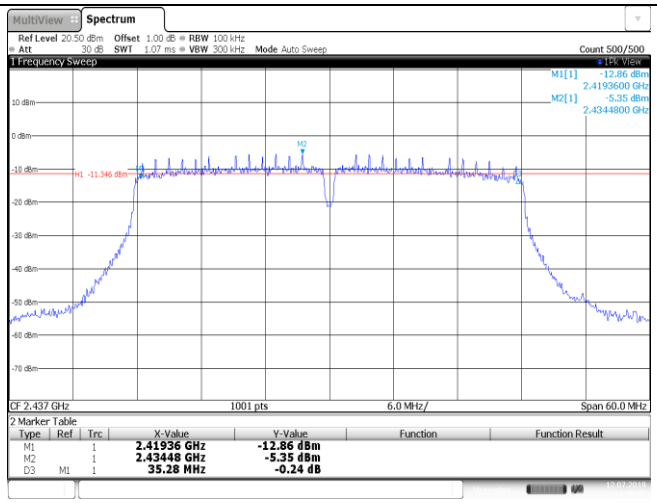
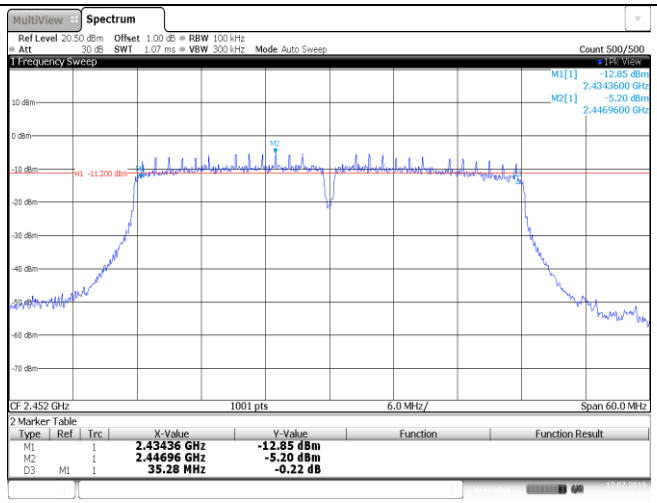
802.11n(HT20)	Antenna 0
CH01	
CH06	
CH11	

802.11n(HT40)	Antenna 0
CH03	
CH06	
CH09	

802.11 b	Antenna 1
CH01	
CH06	
CH11	

802.11 g	Antenna 1
CH01	
CH06	
CH11	

802.11n(HT20)	Antenna 1
CH01	
CH06	
CH11	

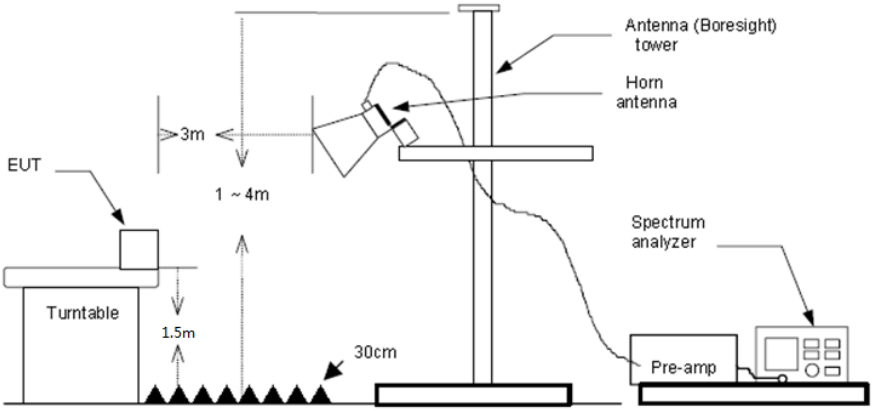
802.11n(HT40)	Antenna 1
CH03	
CH06	
CH09	

5.6. Restricted Band

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

1) The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
2) The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3) The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4) The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5) The receiver set as follow:
   RBW=1MHz, VBW=3MHz PEAK detector for Peak value.
   RBW=1MHz, VBW=3MHz RMS detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Note:
1) Final level= Read level + Antenna Factor+ Cable Loss- Preamp Factor
2) Both ANT0 and ANT1 are test for 802.11b/g mode, only show the worst test data of ANT1 on the report. 802.11n(HT20)/n(HT40) mode are test at MIMO TX status.

802.11b(ANT1)				CH01			
Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
2310.0181	14.04	35.78	49.82	74.00	24.18	Vertical	Peak
2310.0181	12.55	35.78	48.33	54.00	5.67	Vertical	Average
2390.0023	13.96	35.50	49.46	74.00	24.54	Vertical	Peak
2390.0023	13.56	35.50	49.06	54.00	4.94	Vertical	Average
2310.0181	14.02	35.78	49.80	74.00	24.20	Horizontal	Peak
2310.0181	12.80	35.78	48.58	54.00	5.42	Horizontal	Average
2390.0169	14.31	35.50	49.81	74.00	24.19	Horizontal	Peak
2390.0169	11.88	35.50	47.38	54.00	6.62	Horizontal	Average

802.11b(ANT1)				CH11			
Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
2483.5041	18.89	35.31	54.20	74.00	19.80	Vertical	Peak
2483.5041	14.32	35.31	49.63	54.00	4.37	Vertical	Average
2500.0000	14.76	35.28	50.04	74.00	23.96	Vertical	Peak
2500.0000	13.82	35.28	49.10	54.00	4.90	Vertical	Average
2483.5041	15.30	35.31	50.61	74.00	23.39	Horizontal	Peak
2483.5041	14.15	35.31	49.46	54.00	4.54	Horizontal	Average
2500.0000	15.41	35.28	50.69	54.00	3.31	Horizontal	Peak
2500.0000	16.58	35.28	51.86	74.00	22.14	Horizontal	Average

802.11g(ANT1)				CH01			
Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
2310.0181	16.23	35.78	52.01	74.00	21.99	Horizontal	Peak
2310.0181	15.14	35.78	50.92	54.00	3.08	Horizontal	Average
2390.0023	14.58	35.50	50.08	74.00	23.92	Horizontal	Peak
2390.0023	13.84	35.50	49.34	54.00	4.66	Horizontal	Average
2310.0181	14.67	35.78	50.45	74.00	23.55	Vertical	Peak
2310.0181	13.92	35.78	49.70	54.00	4.30	Vertical	Average
2390.0023	14.32	35.50	49.82	74.00	24.18	Vertical	Peak
2390.0023	12.80	35.50	48.30	54.00	5.70	Vertical	Average

802.11g(ANT1)				CH11			
Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
2483.5041	15.48	35.31	50.79	74.00	23.21	Horizontal	Peak
2483.5041	12.94	35.31	48.25	54.00	5.75	Horizontal	Average
2500.0000	13.86	35.28	49.14	74.00	24.86	Horizontal	Peak
2500.0000	11.89	35.28	47.17	54.00	6.83	Horizontal	Average
2483.5041	13.59	35.31	48.90	74.00	25.10	Vertical	Peak
2483.5041	12.91	35.31	48.22	54.00	5.78	Vertical	Average
2500.0000	15.80	35.28	51.08	74.00	22.92	Vertical	Peak
2500.0000	15.10	35.28	50.38	54.00	3.62	Vertical	Average

802.11n(HT20)(MIMO)				CH01			
Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
2310.0620	14.07	35.78	49.85	74.00	24.15	Vertical	Peak
2310.0620	12.68	35.78	48.46	54.00	5.54	Vertical	Average
2390.0023	13.52	35.50	49.02	74.00	24.98	Vertical	Peak
2390.0023	12.66	35.50	48.16	54.00	5.84	Vertical	Average
2310.0181	16.08	35.78	51.86	74.00	22.14	Horizontal	Peak
2310.0181	14.89	35.78	50.67	54.00	3.33	Horizontal	Average
2390.0023	15.74	35.50	51.24	74.00	22.76	Horizontal	Peak
2390.0023	14.16	35.50	49.66	54.00	4.34	Horizontal	Average

802.11n(HT20)(MIMO)				CH11			
Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
2483.5041	15.55	35.31	50.86	74.00	23.14	Vertical	Peak
2483.5041	14.58	35.31	49.89	54.00	4.11	Vertical	Average
2500.0000	16.55	35.28	51.83	74.00	22.17	Vertical	Peak
2500.0000	15.46	35.28	50.74	54.00	3.26	Vertical	Average
2483.5041	15.36	35.31	50.67	74.00	23.33	Horizontal	Peak
2483.5041	14.13	35.31	49.44	54.00	4.56	Horizontal	Average
2500.0000	14.46	35.28	49.74	74.00	24.26	Horizontal	Peak
2500.0000	13.37	35.28	48.65	54.00	5.35	Horizontal	Average

802.11n(HT40)(MIMO)				CH03			
Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
2310.0330	14.76	35.78	50.54	74.00	23.46	Horizontal	Peak
2310.0330	12.96	35.78	48.74	54.00	5.26	Horizontal	Average
2390.0271	18.74	35.50	54.24	74.00	19.76	Horizontal	Peak
2390.0113	13.05	35.50	48.55	54.00	5.45	Horizontal	Average
2310.0330	14.71	35.78	50.49	74.00	23.51	Vertical	Peak
2310.0330	12.77	35.78	48.55	54.00	5.45	Vertical	Average
2390.0113	14.44	35.50	49.94	74.00	24.06	Vertical	Peak
2390.0113	13.08	35.50	48.58	54.00	5.42	Vertical	Average

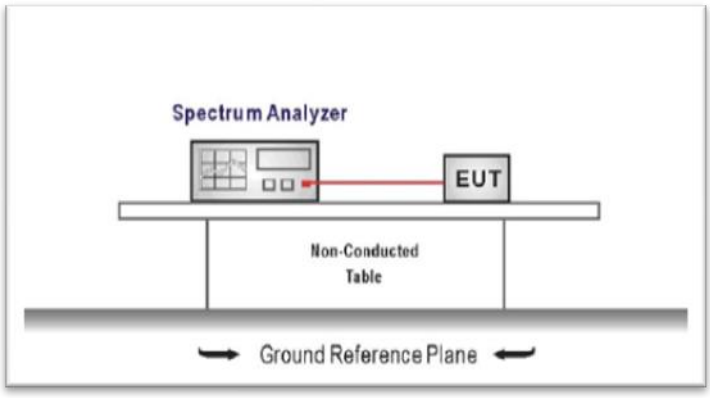
802.11n(HT40)(MIMO)				CH09			
Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity	Detector
2483.5038	17.47	35.31	52.78	74.00	21.22	Horizontal	Peak
2483.5038	15.51	35.31	50.82	54.00	3.18	Horizontal	Average
2500.0000	14.67	35.28	49.95	74.00	24.05	Horizontal	Peak
2500.0000	13.43	35.28	48.71	54.00	5.29	Horizontal	Average
2483.5038	18.41	35.31	53.72	74.00	20.28	Vertical	Peak
2483.5038	13.26	35.31	48.57	54.00	5.43	Vertical	Average
2500.0000	14.92	35.28	50.20	74.00	23.80	Vertical	Peak
2500.0000	13.22	35.28	48.50	54.00	5.50	Vertical	Average

5.7. Band Edge and Spurious Emissions (Conducted)

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Establish a reference level by using the following procedure
   Center frequency=DTS channel center frequency
   The span = 1.5 times the DTS bandwidth.
   RBW = 100 kHz, VBW ≥ 3 x RBW
   Detector = peak, Sweep time = auto couple, Trace mode = max hold
   Allow trace to fully stabilize
   Use the peak marker function to determine the maximum PSD level

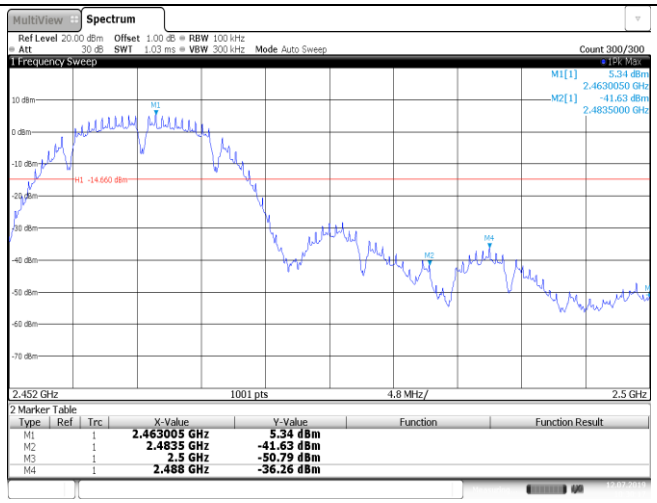
   Note: the channel found to contain the maximum PSD level can be used to establish the reference level.
3. Emission level measurement
   Set the center frequency and span to encompass frequency range to be measured
   RBW = 100 kHz, VBW ≥ 3 x RBW
   Detector = peak, Sweep time = auto couple, Trace mode = max hold
   Allow trace to fully stabilize
   Use the peak marker function to determine the maximum amplitude level.
4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
5. Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the minimum requirements specified (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emission relative to the limit.

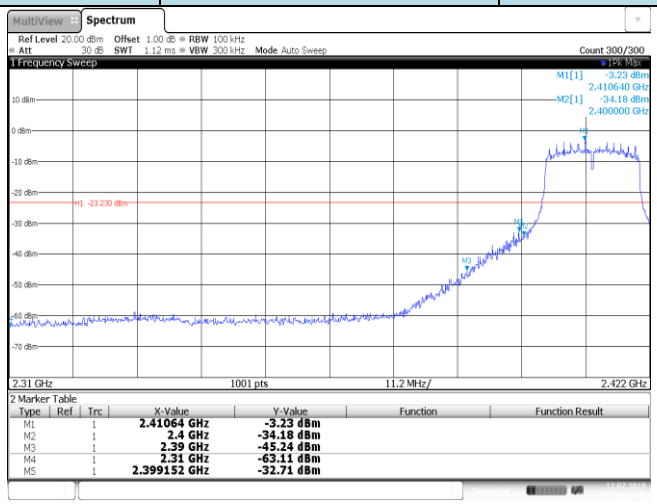
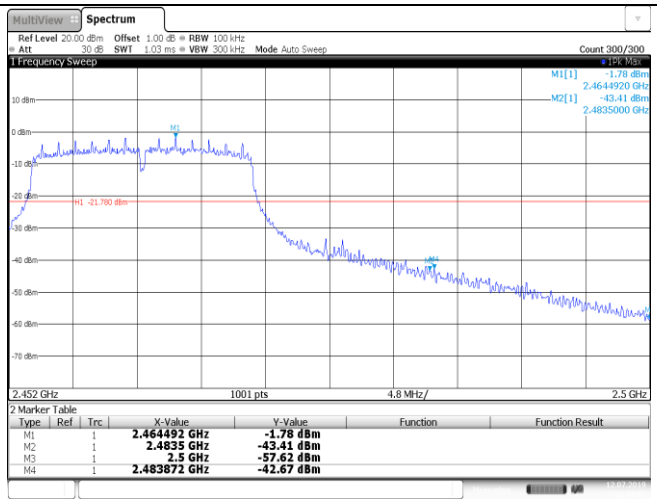
TEST MODE:

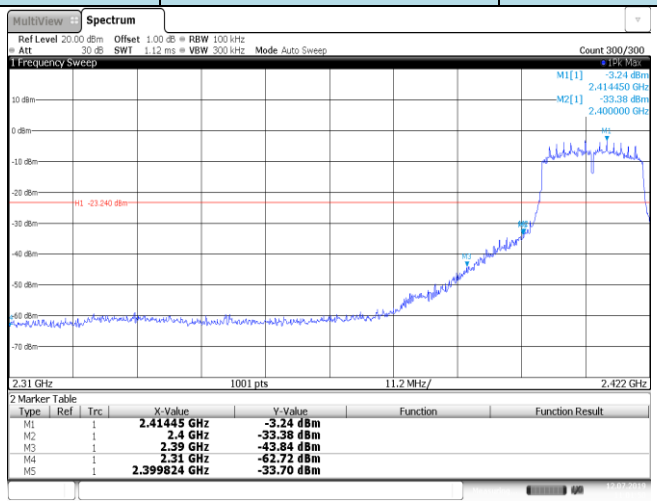
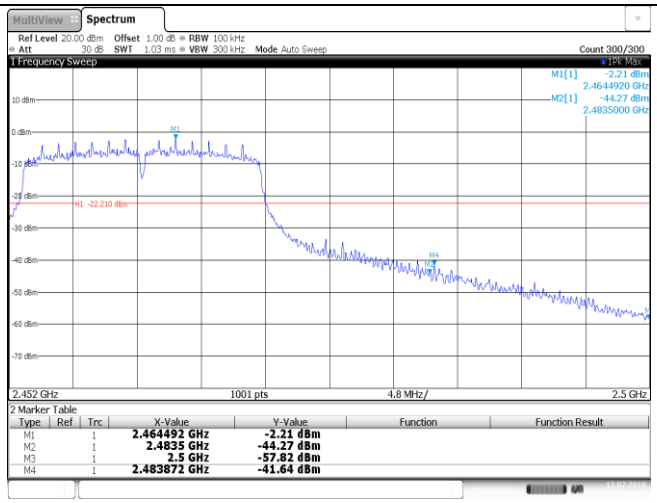
Please refer to the clause 3.3

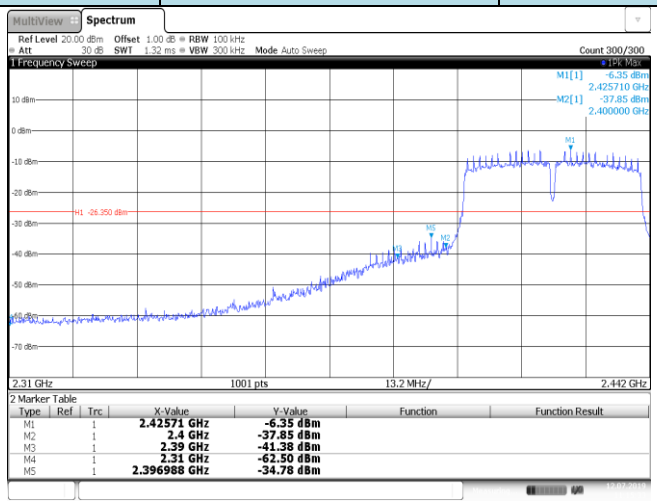
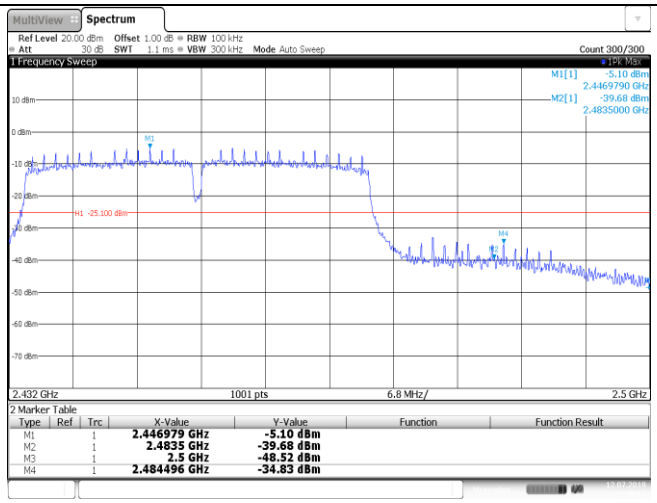
TEST RESULTS

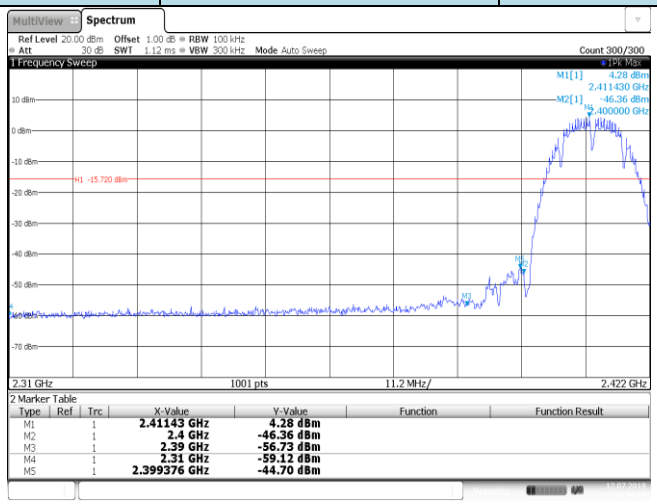
☒ **Passed** ☐ **Not Applicable**

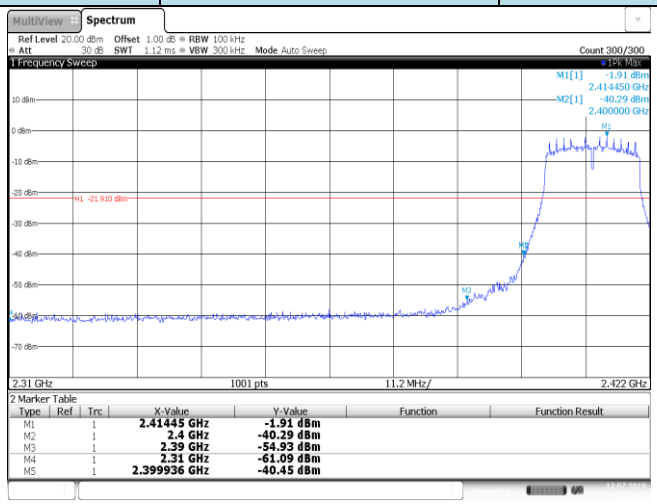
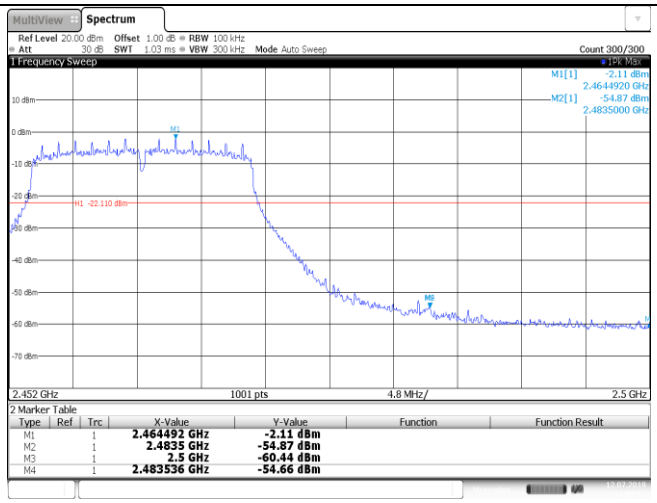
Test Item:	Bandedge	802.11 b	Antenna 0
CH01			
CH11			

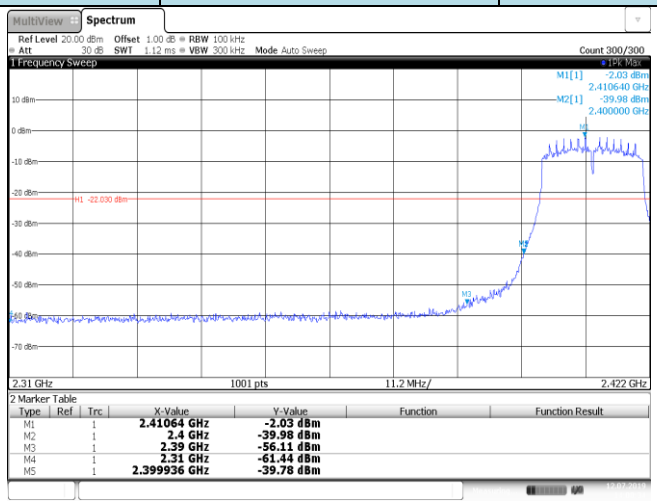
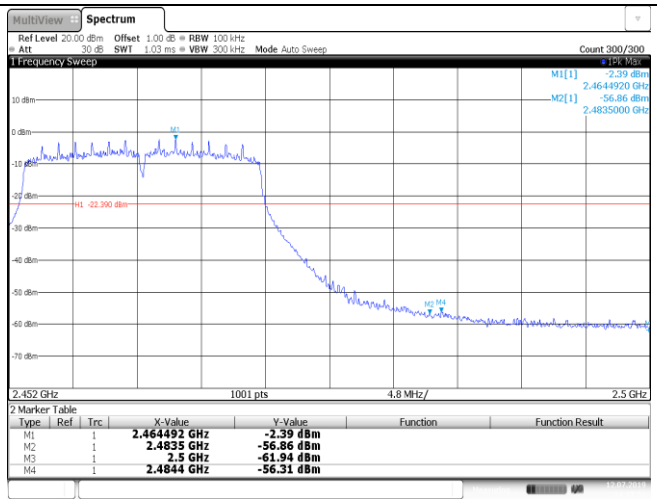
Test Item:	Bandedge	802.11 g	Antenna 0
CH01			
CH11			

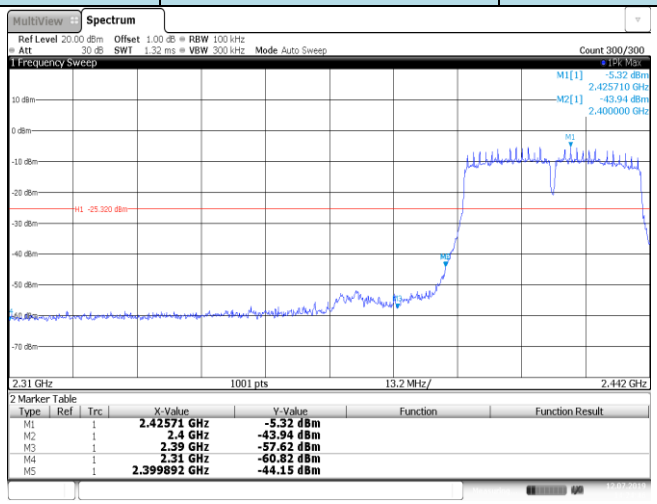
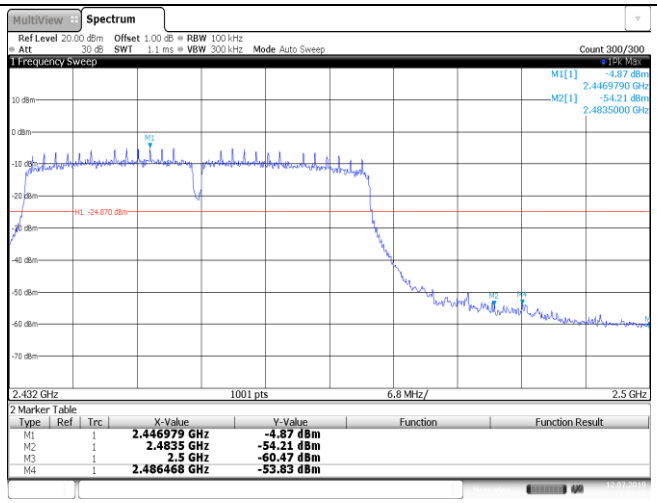
Test Item:	Bandedge	802.11 n(HT20)	Antenna 0
CH01			
CH11			

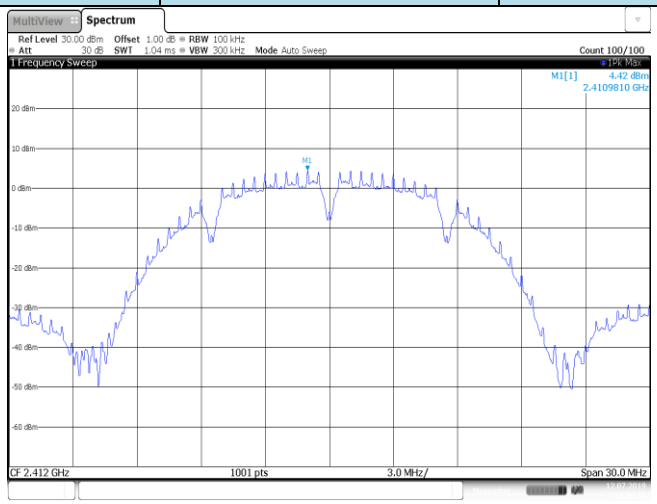
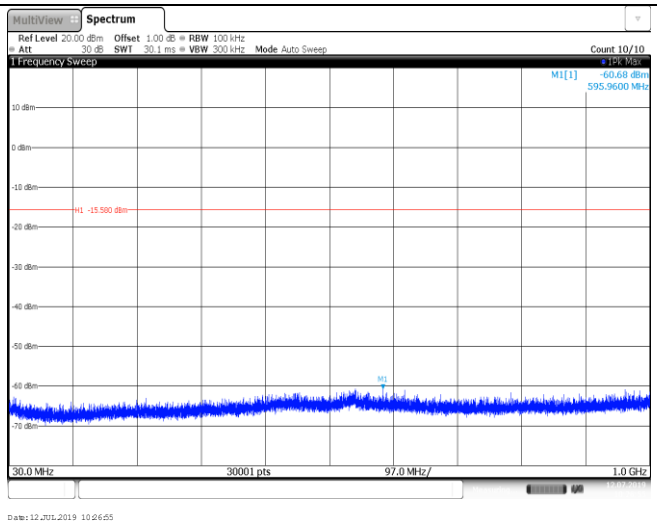
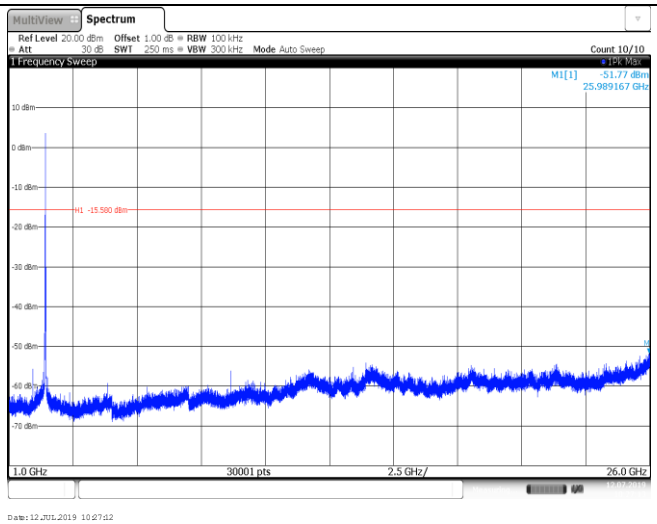
Test Item:	Bandedge	802.11 n(HT40)	Antenna 0
CH03			
CH09			

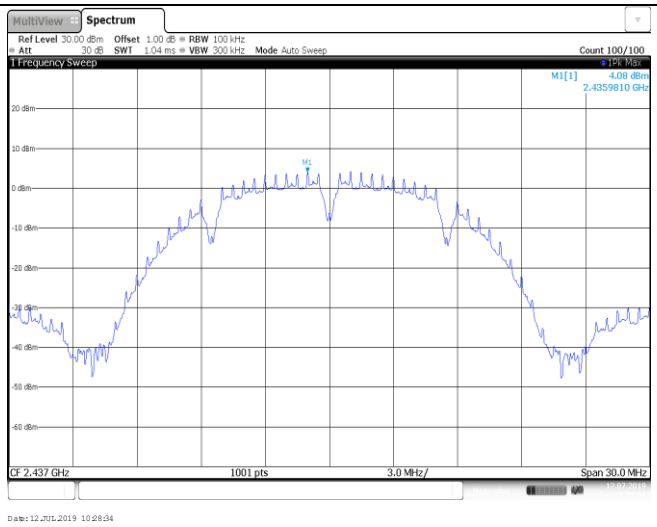
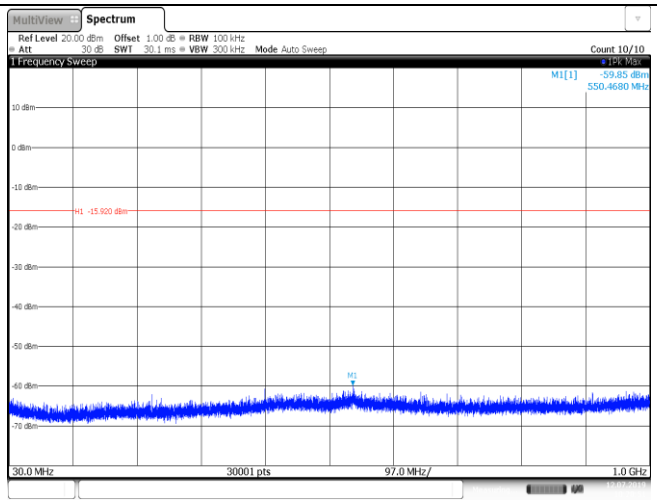
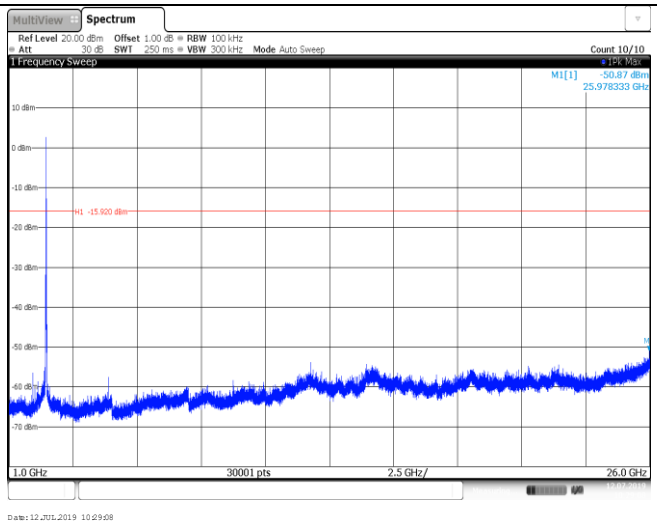
Test Item:	Bandedge	802.11 b	Antenna 1
CH01			
CH11			

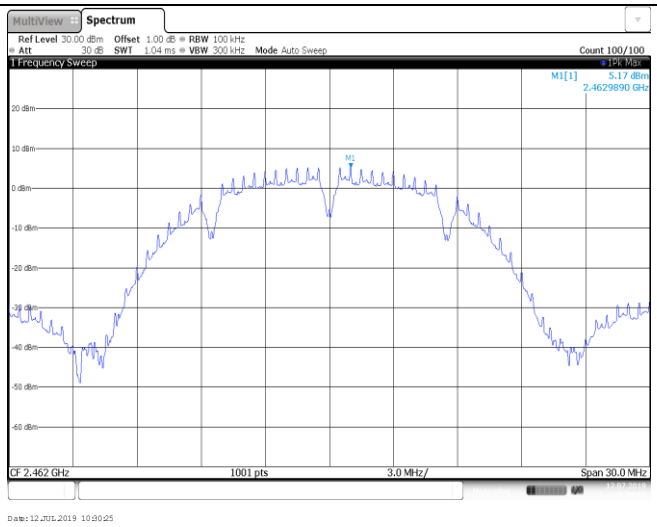
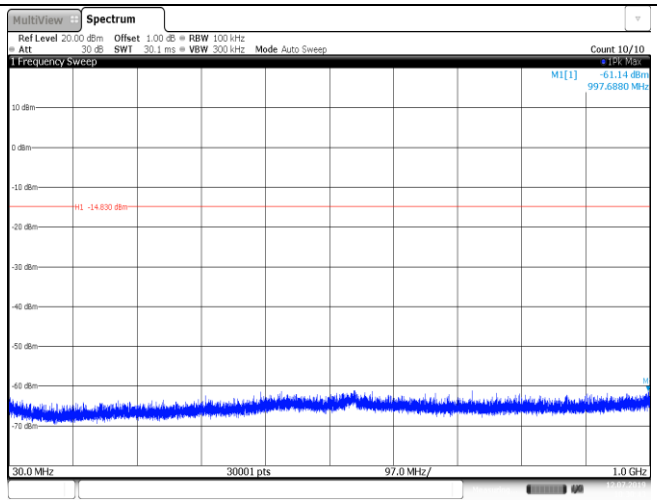
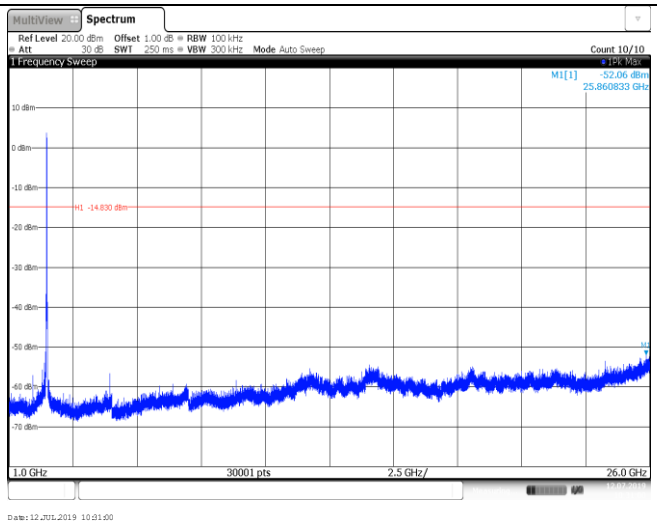
Test Item:	Bandedge	802.11 g	Antenna 1
CH01			
CH11			

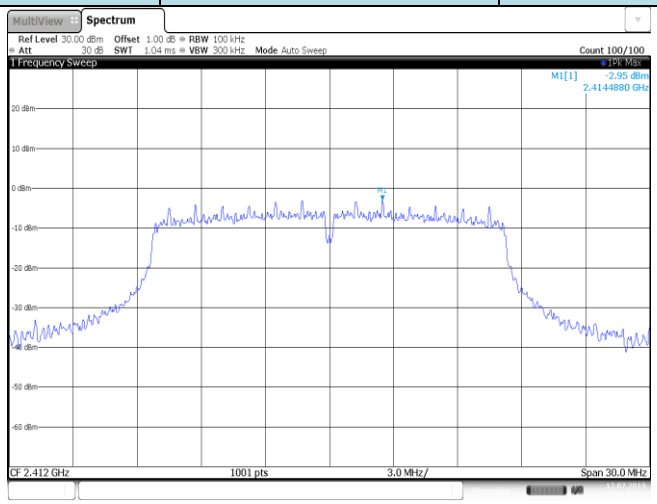
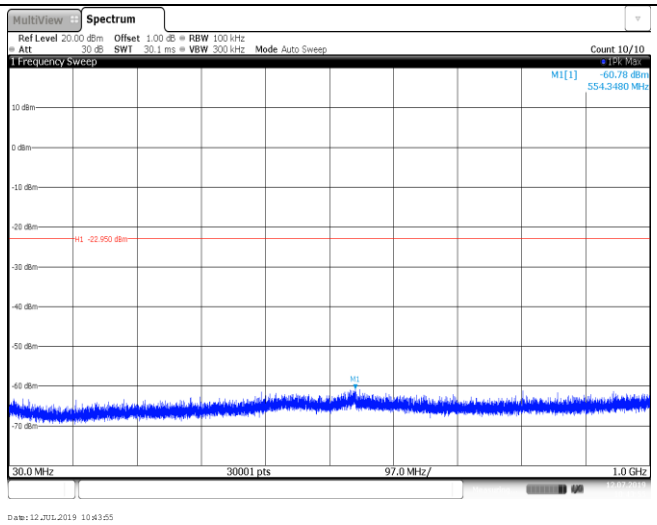
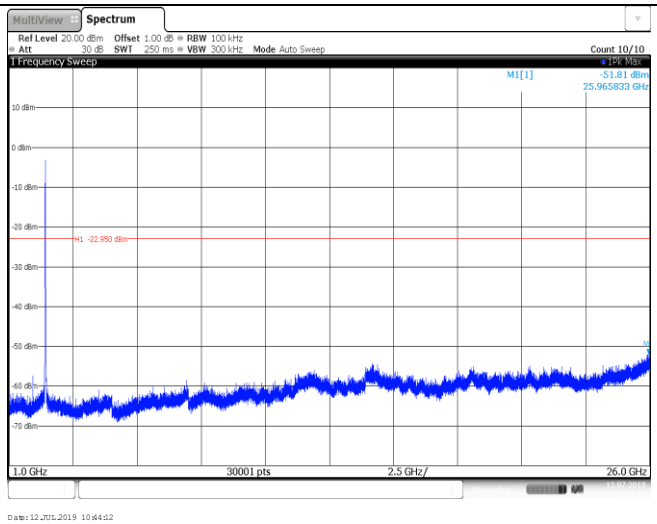
Test Item:	Bandedge	802.11 n(HT20)	Antenna 1
CH01			
CH11			

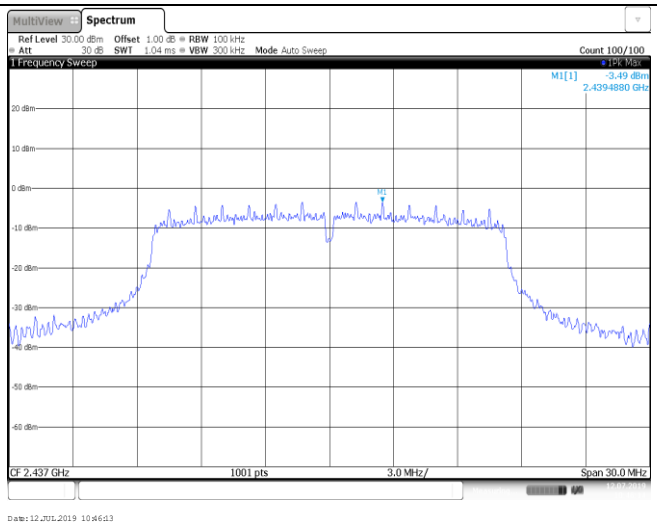
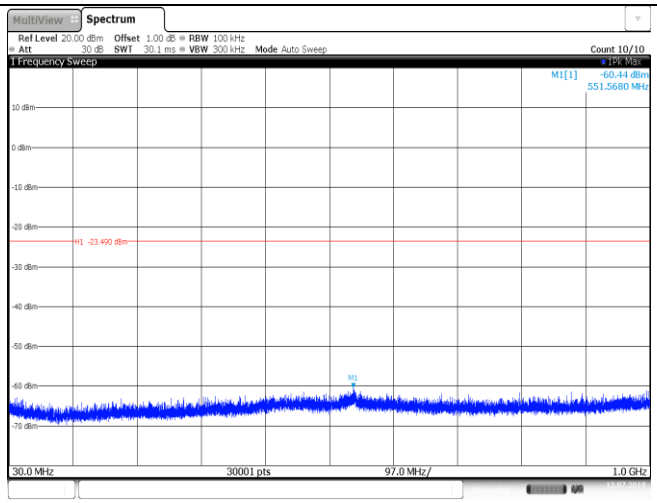
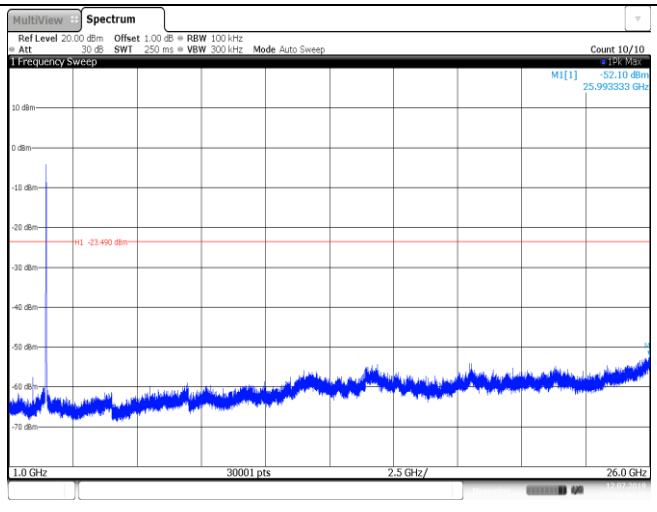
Test Item:	Bandedge	802.11 n(HT40)	Antenna 1
CH03			
CH09			

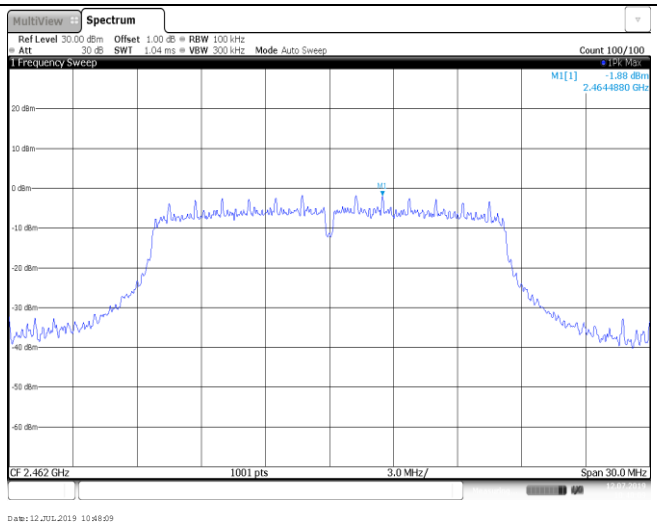
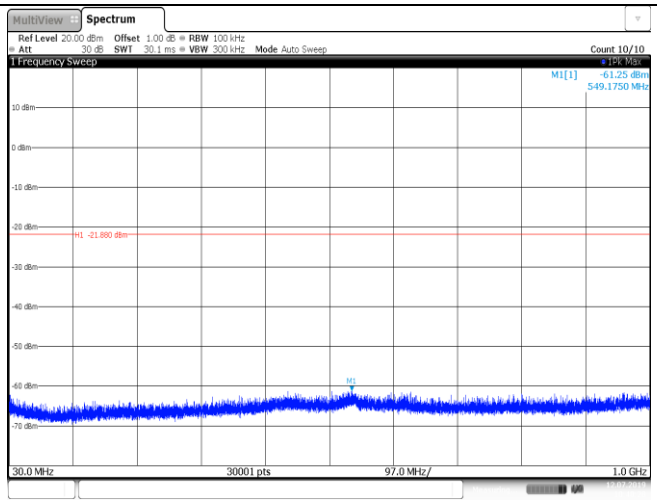
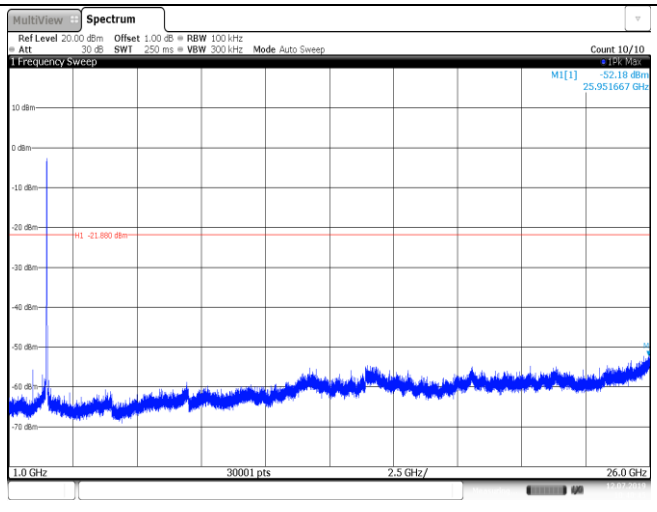
Test Item:	SE	802.11 b	Antenna 0
Reference level CH01			
CH01			
			

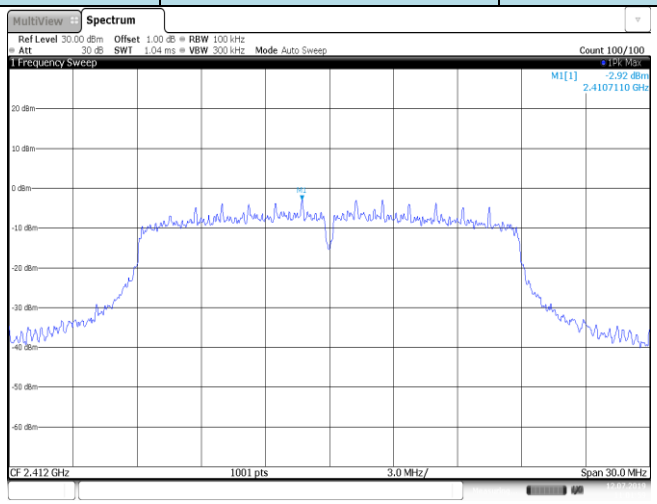
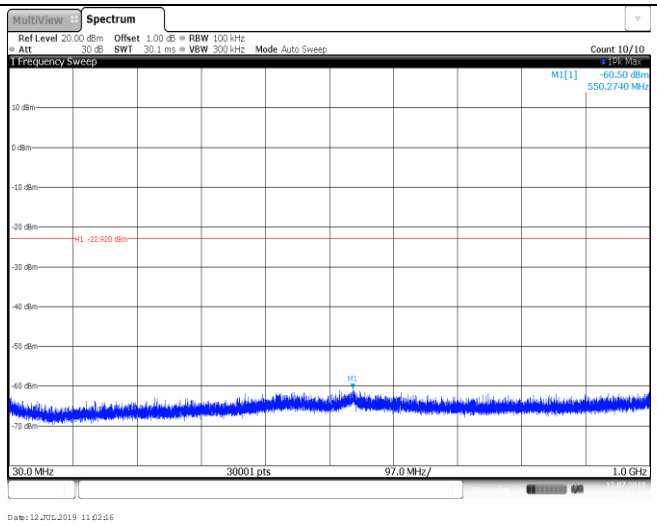
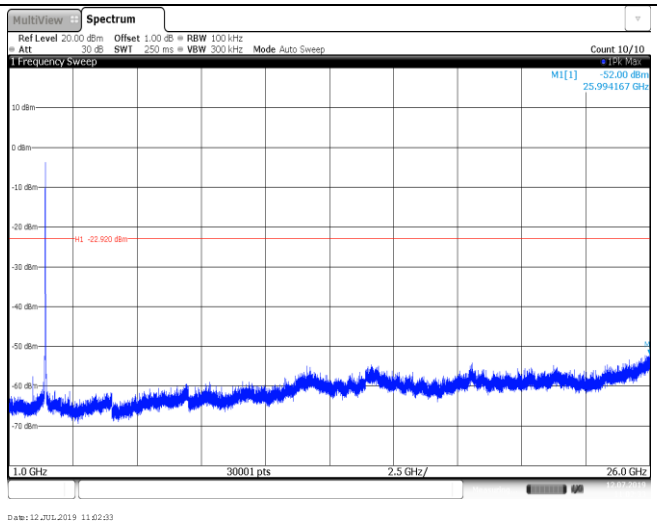
Reference level CH06	
CH06	
	

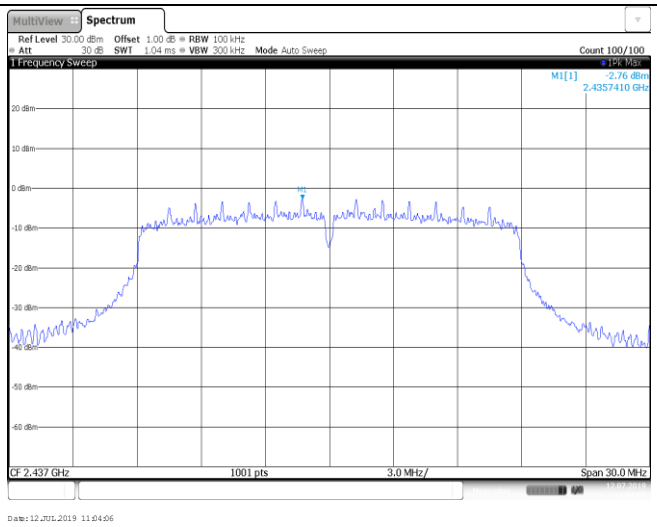
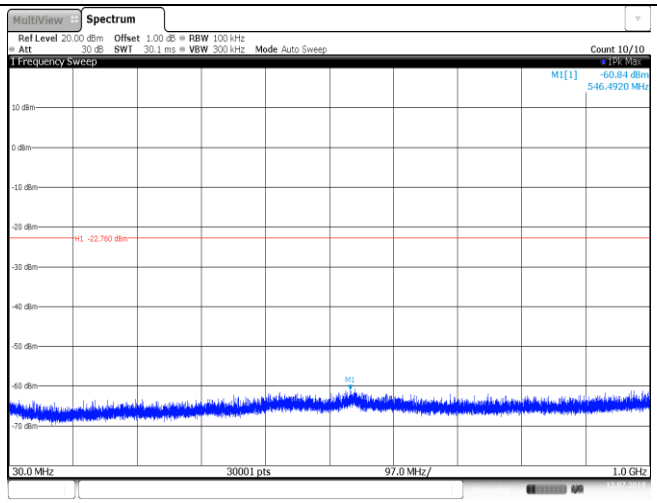
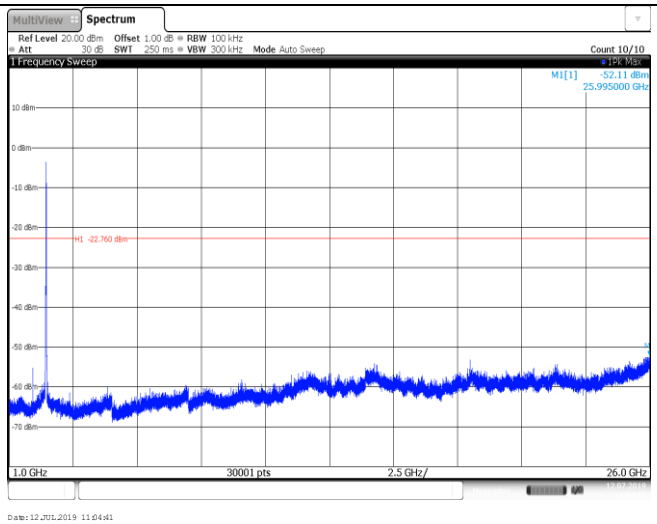
Reference level CH11	
CH11	
	

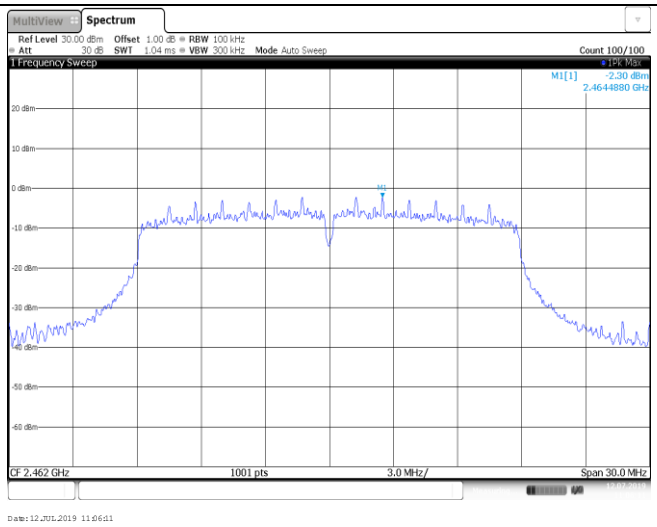
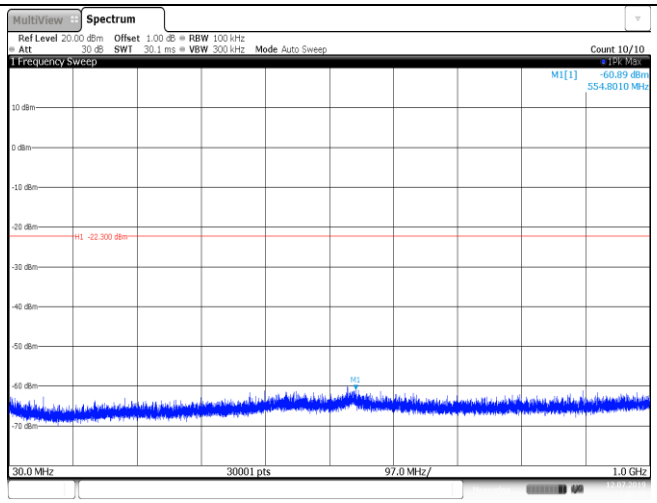
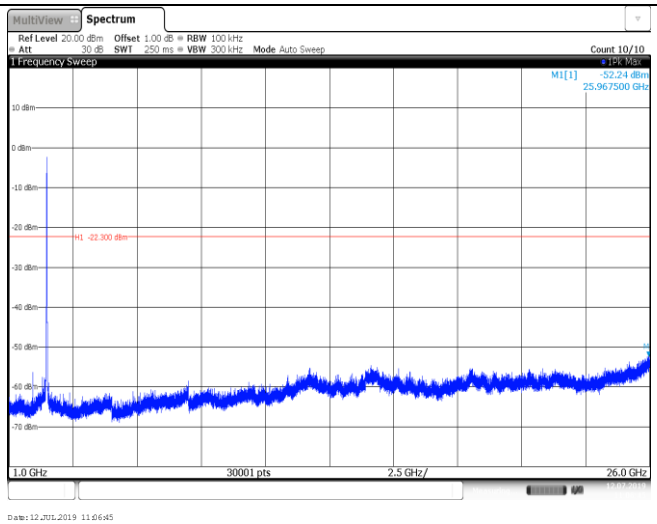
Test Item:	SE	802.11 g	Antenna 0
Reference level CH01			
CH01			
			

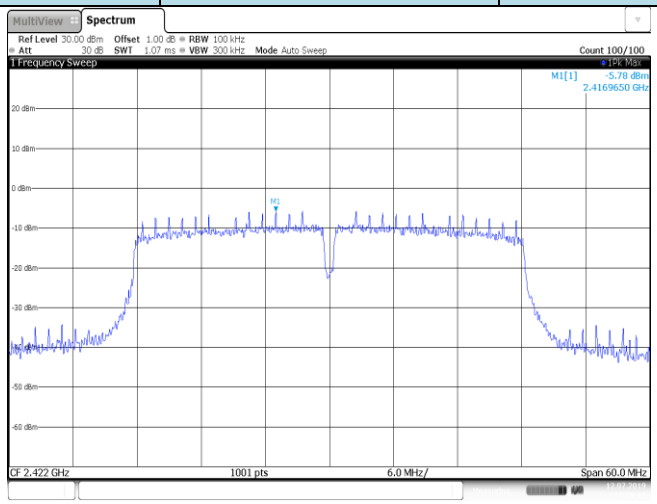
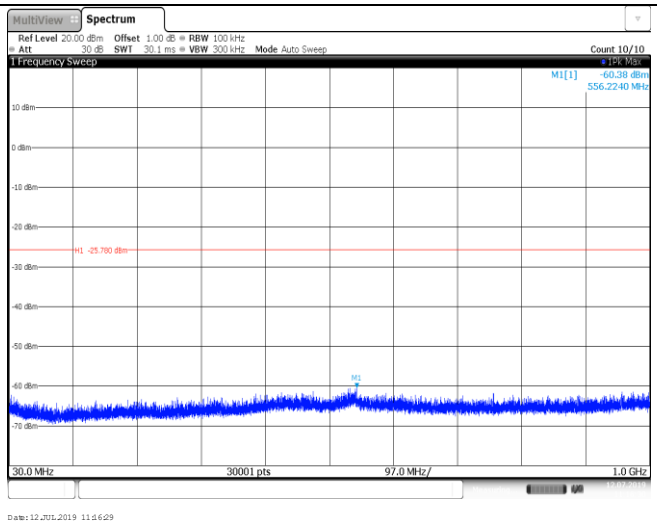
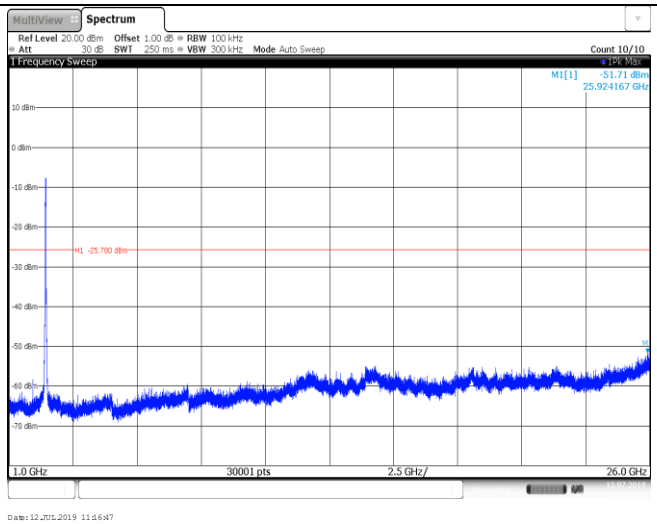
Reference level CH06	
CH06	
	

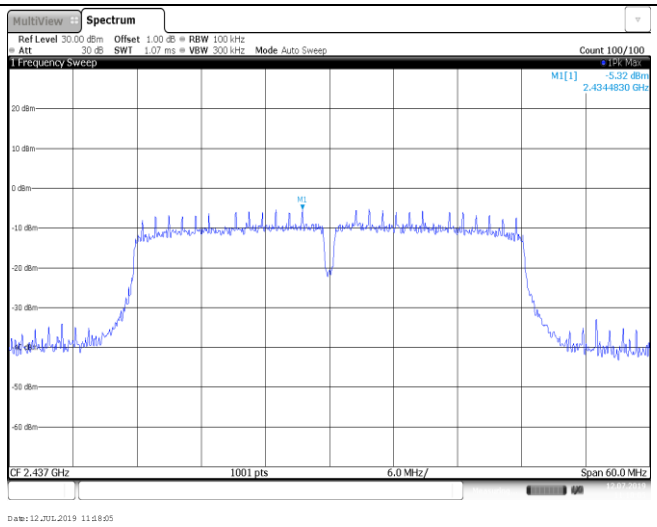
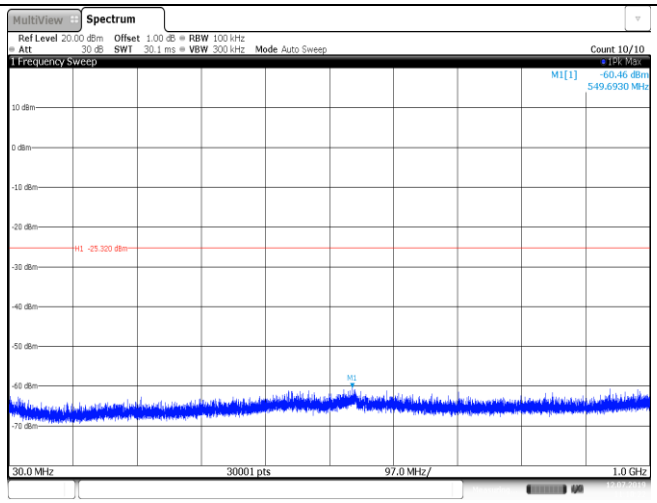
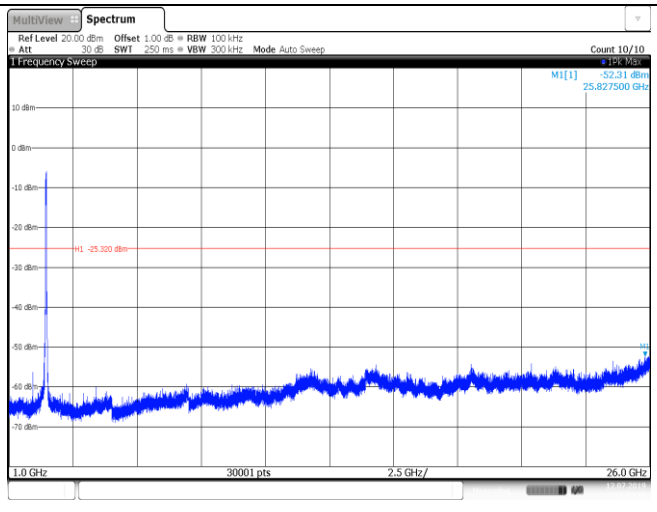
Reference level CH11	
CH11	
	

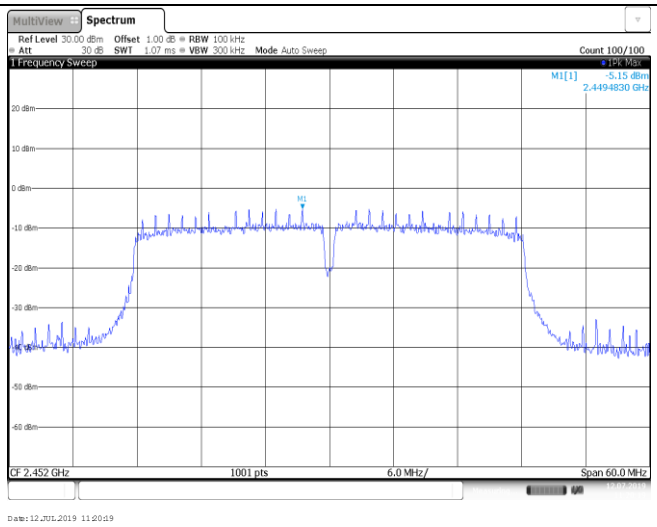
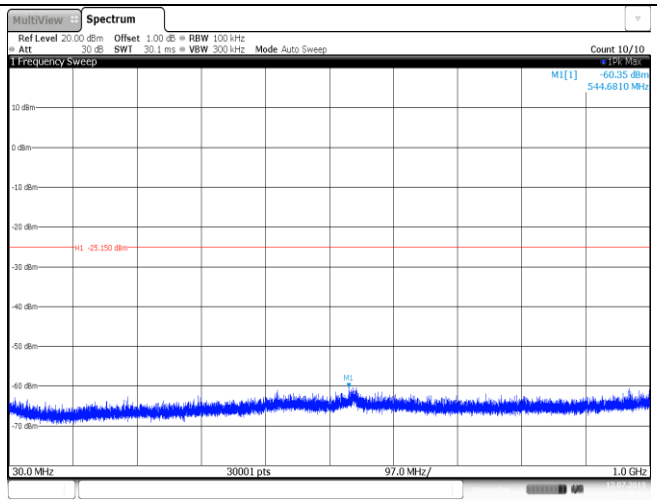
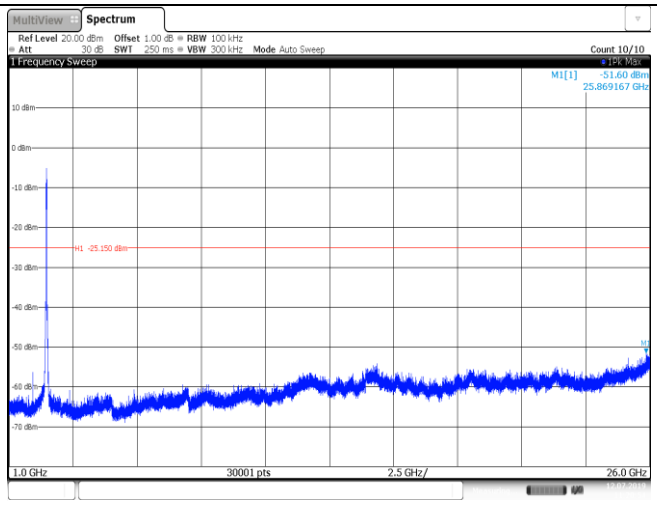
Test Item:	SE	802.11 n(HT20)	Antenna 0
Reference level CH01			
CH01			
			

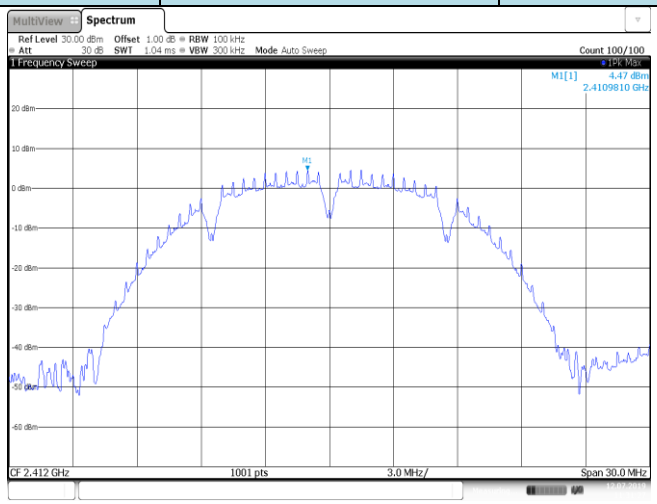
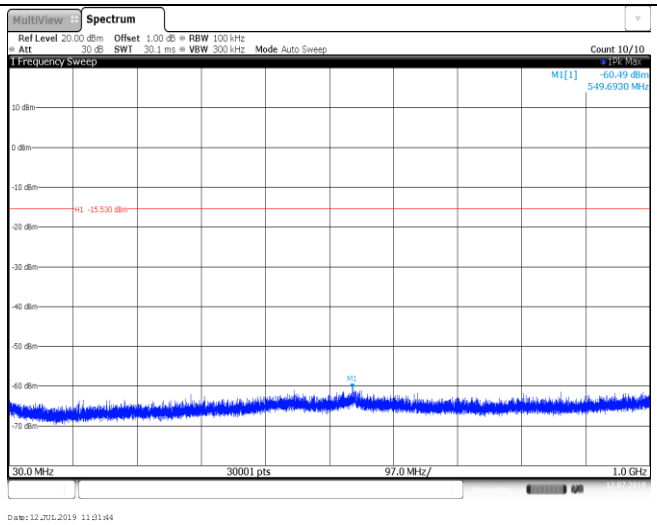
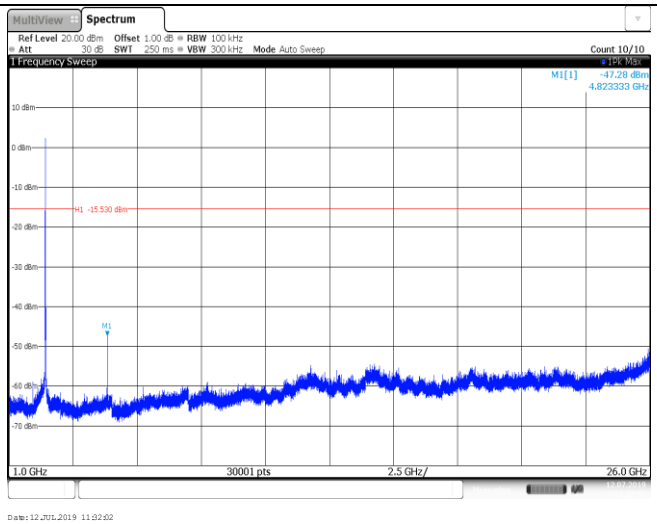
Reference level CH06	
CH06	
	

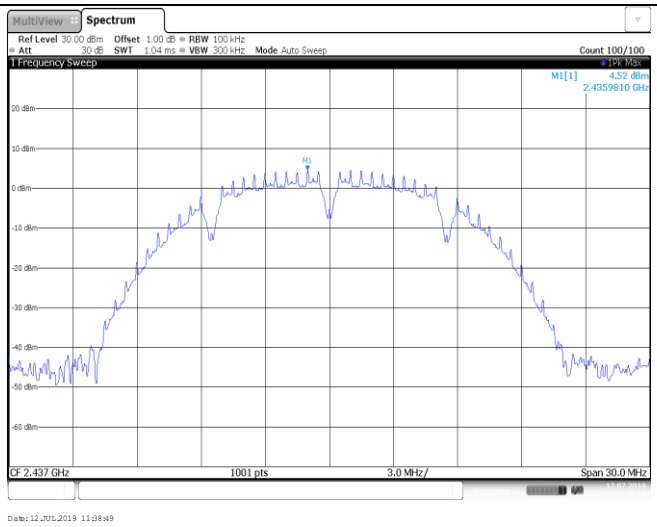
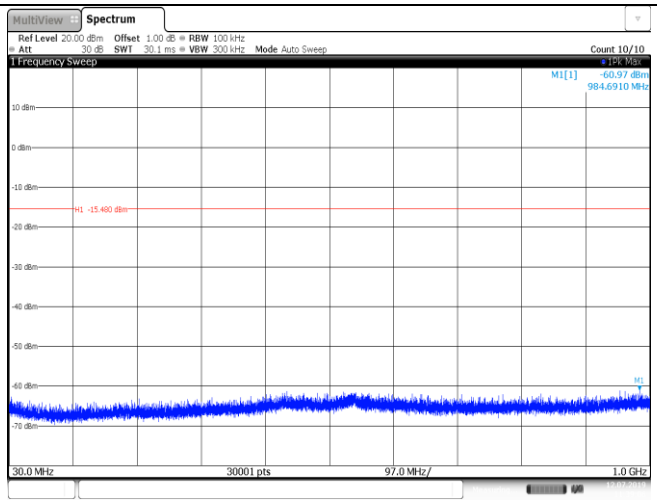
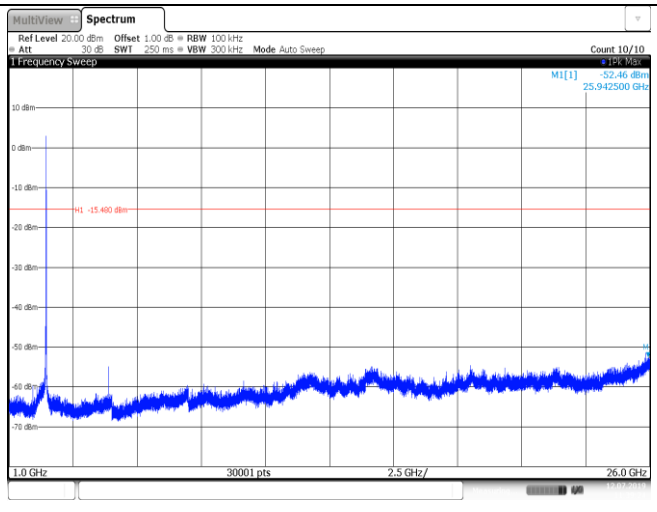
Reference level CH11	
CH11	
	

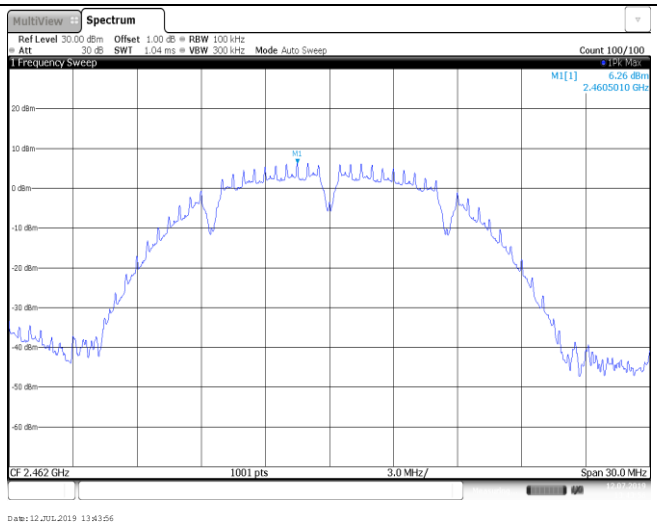
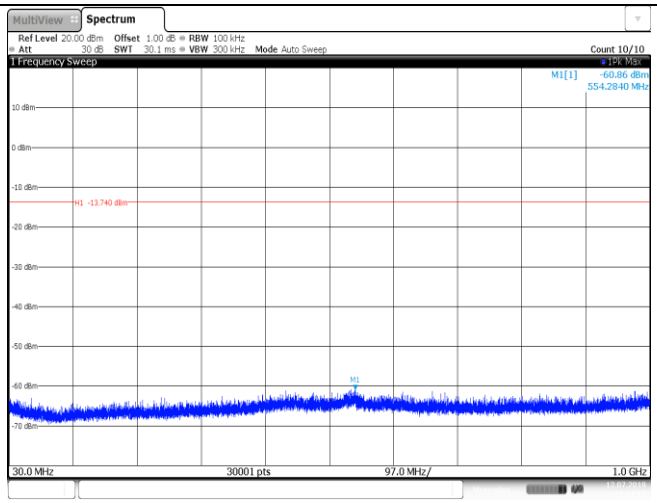
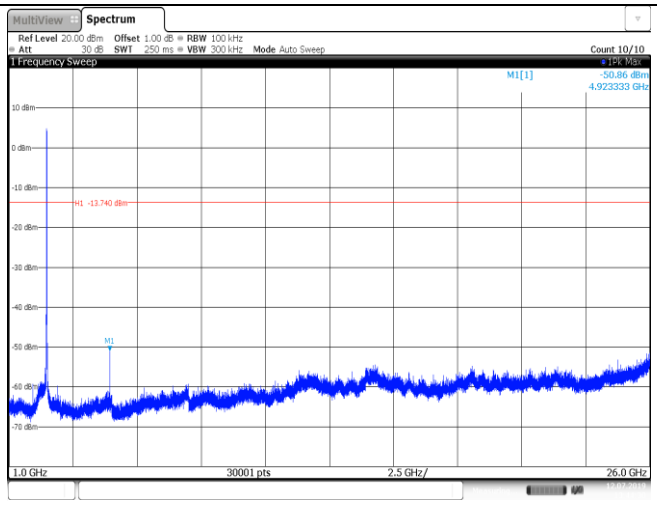
Test Item:	SE	802.11 n(HT40)	Antenna 0
Reference level CH03			
CH03			
			

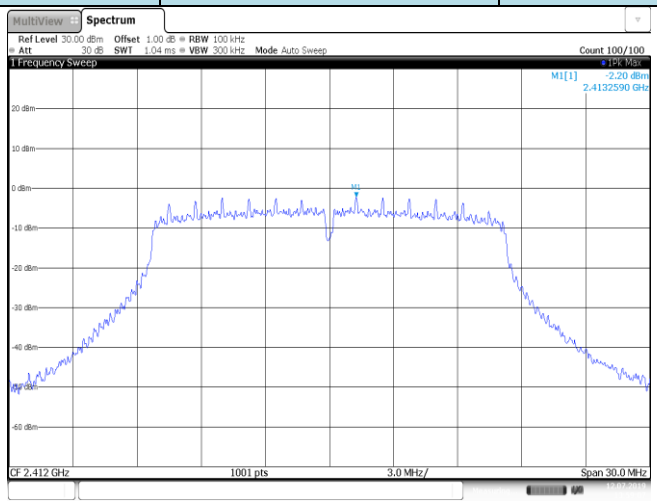
Reference level CH06	
CH06	
	

Reference level CH09	
CH09	
	

Test Item:	SE	802.11 b	Antenna 1
Reference level CH01			
CH01			
			

Reference level CH06	
CH06	
	

Reference level CH11	
CH11	
	

Test Item:	SE	802.11 g	Antenna 1
Reference level CH01		
CH01