TEST REPORT

Reference No.	:	WTD22D04066978W001
FCC ID	:	2AZDF-R9052
Applicant	:	Shenzhen Venz Technology Co., Ltd
Address	:	905, 9/F, Jinqizhigu building, 1 road Tangling, NanShan District, Shenzhen, China
Manufacturer	:	Shenzhen Venz Technology Co., Ltd
Address	:	905, 9/F, Jinqizhigu building, 1 road Tangling, NanShan District, Shenzhen, China
Product	:	Floodlight Security Camera
Model(s)	:	R9052
Standards	:	CFR47 Part15 Subpart B §15 15.247
Date of Receipt sample	:	2022-04-13
Date of Test	:	2022-04-13 to 2022-04-22
Date of Issue	:	2022-04-25
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:
Waltek Testing Group Co., Ltd.
Address: No. 77, Houjie Section, Guantai Road, Houjie Town, Dongguan City, Guangdong, China
Tel: +86-769-2267 6998
Fax: +86-769-2267 6828

Compiled by:

Estel Qian / Project Engineer

Approved by:

Daniel Liu / Designated Reviewer

2 Contents

Page

1 COVER PAGE 1
2 CONTENTS 2
3 REVISION HISTORY 4
4 GENERAL INFORMATION 5
4.1 GENERAL DESCRIPTION OF E.U.T. 5
4.2 DETAILS OF E.U.T. 5
4.3 SUBCONTRACTED 5
4.4 ABNORMALITIES FROM STANDARD CONDITIONS 5
4.5 TEST FACILITY 6
4.6 CHANNEL LIST 6
4.7 TEST MODE 7
5 TEST SUMMARY 8
6 EQUIPMENT USED DURING TEST 9
6.1 EQUIPMENTS LIST 9
6.2 DESCRIPTION OF SUPPORT UNITS 10
6.3 MEASUREMENT UNCERTAINTY 10
6.4 TEST EQUIPMENT CALIBRATION 10
7 CONDUCTED EMISSION 11
7.1 E.U.T. OPERATION 11
7.2 EUT SETUP 11
7.3 MEASUREMENT DESCRIPTION 11
7.4 CONDUCTED EMISSION TEST RESULT 12
8 RADIATED EMISSIONS 14
8.1 EUT OPERATION 14
8.2 TEST SETUP 15
8.3 SPECTRUM ANALYZER SETUP 16
8.4 TEST PROCEDURE 17
8.5 CORRECTED AMPLITUDE & MARGIN CALCULATION 17
8.6 SUMMARY OF TEST RESULTS 18
9 DUTY CYCLE 27
10 BAND EDGE MEASUREMENT 28
10.1 TEST PRODUCE 28
10.2 TEST RESULT 29
11 6 DB BANDWIDTH AND 99% BANDWIDTH MEASUREMENT 32
11.1 TEST PROCEDURE: 32
11.2 TEST RESULT: 32
12 MAXIMUM PEAK OUTPUT POWER 42
12.1 TEST PROCEDURE: 42
12.2 TEST RESULT: 43
13 POWER SPECTRAL DENSITY 49
13.1 TEST PROCEDURE: 49
13.2 TEST RESULT: 49
14 ANTENNA REQUIREMENT 55

15 RF EXPOSURE..... 55
16 PHOTOGRAPHS OF TEST SETUP AND EUT. 55

3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD22D04066978 W001	2022-04-13	2022-04-13 to 2022-04-22	2022-04-25	Original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	Floodlight Security Camera
Model(s):	R9052
Model Description:	N/A
Hardware Version:	N/AL19-T31-V1.1
Software Version:	3.3.52
Note:	N/A

4.2 Details of E.U.T.

Operation Frequency:	802.11b/g/n HT20: 2412~2462MHz
Max. RF output power:	15.63dBm
Type of Modulation:	BPSK, DQPSK, CCK, OFDM
Antenna installation:	internal permanent antenna
Antenna Gain:	2.5dBi
Ratings:	DC 5V from Micro-USB port or DC 3.7V from battery
Battery:	Lithium battery DC 3.7V 10400mAh 48Wh

4.3 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

4.4 Abnormalities from Standard Conditions

None.

4.5 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group 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. Registration number 523476, September 10, 2019.

4.6 Channel List

WIFI

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462	-	-

4.7 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
Power Spectral Density	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
6dB Bandwidth	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
Band Edge	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
Transmitter Spurious Emissions	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX

Note: Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product.

5 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.247(d) 15.205(a) 15.209(a)	PASS
Conducted Spurious Emissions	15.247(d)	PASS
Conducted Emissions	15.207(a)	N/A
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(3),(4)	PASS
Power Spectral Density	15.247(e)	PASS
Band Edge	15.247(d)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

6 Equipment Used during Test

6.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Spectrum Analyzer	R&S	FSP30	100091	2021-04-26	2022-04-25
2	Amplifier	Agilent	8447D	2944A10178	2021-07-26	2022-07-25
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2021-08-21	2022-08-20
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2021-04-26	2022-04-25
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2021-04-30	2022-04-29
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2021-07-26	2022-07-25
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2021-04-26	2022-04-25
8	Coaxial Cable (above 1GHz)	ZT26-NJ-NJ-8M/FA	1GHz-18GHz	NA	2021-04-30	2022-04-29
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No**	**Last Calibration Date**	**Calibration Due Date**
1	Test Receiver	R&S	ESCI	101296	2021-04-26	2022-04-25
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2021-04-26	2022-04-25
3	Active Loop Antenna	Com-Power Corp.	AL-130R	10160007	2021-04-29	2022-04-28
4	Amplifier	ANRITSU	MH648A	M43381	2021-04-26	2022-04-25
5	Cable	HUBER+SUHNER	CBL2	525178	2021-04-26	2022-04-25
RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	2021-04-26	2022-04-25
2.	Spectrum Analyzer	R&S	FSP30	100091	2021-04-26	2022-04-25
3.	EXA Signal Analyzer	Malaysia Keysight	N9010A	MY50520207	2021-04-26	2022-04-25

6.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
Adapter	MI	AD07ZM	AD0719043000000816

6.3 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-6}
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Conducted Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)
Conducted Spurious Emissions test	± 3.12 dB (9kHz~30MHz)
	± 4.21 dB (30M~1000MHz)
	± 5.14 dB (1000M~26500MHz)

6.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

7 Conducted Emission

Test Requirement: FCC CFR 47 Part 15 Section 15.207

Test Method: ANSI C63.10:2013

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Limit:

Frequency (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5.0	56	46
5.0 to 30	60	50
*Decreases with the logarithm of the frequency.		

7.1 E.U.T. Operation

Operating Environment:

Temperature: 22.4 °C

Humidity: 53.7 % RH

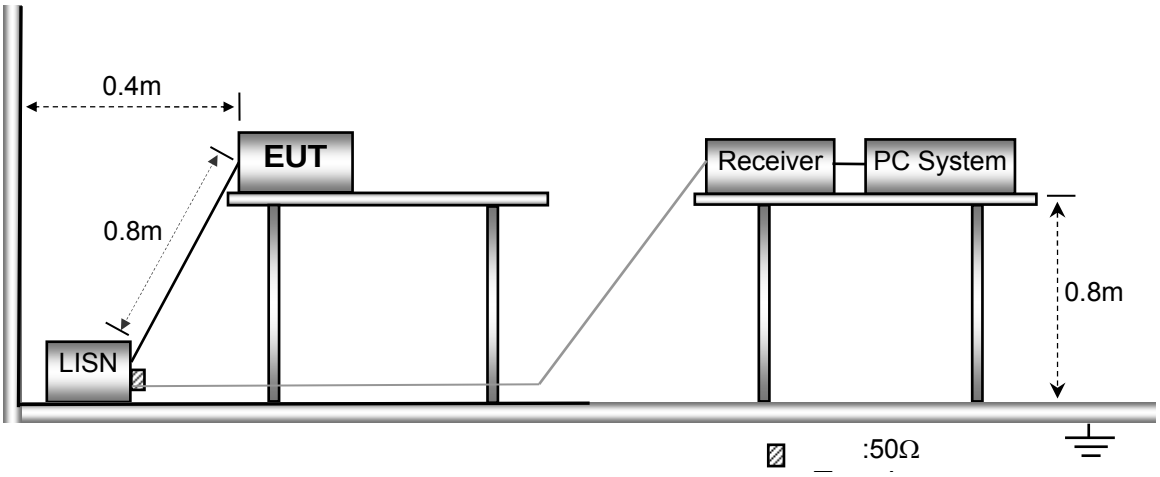
Atmospheric Pressure: 101.8kPa

Test Voltage: AC 120V, 60Hz

EUT Operation:
The test was performed in Transmitting mode, the worst test data (GFSK modulation Low channel, 802.11b mode high channel) were shown in the report.

7.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.

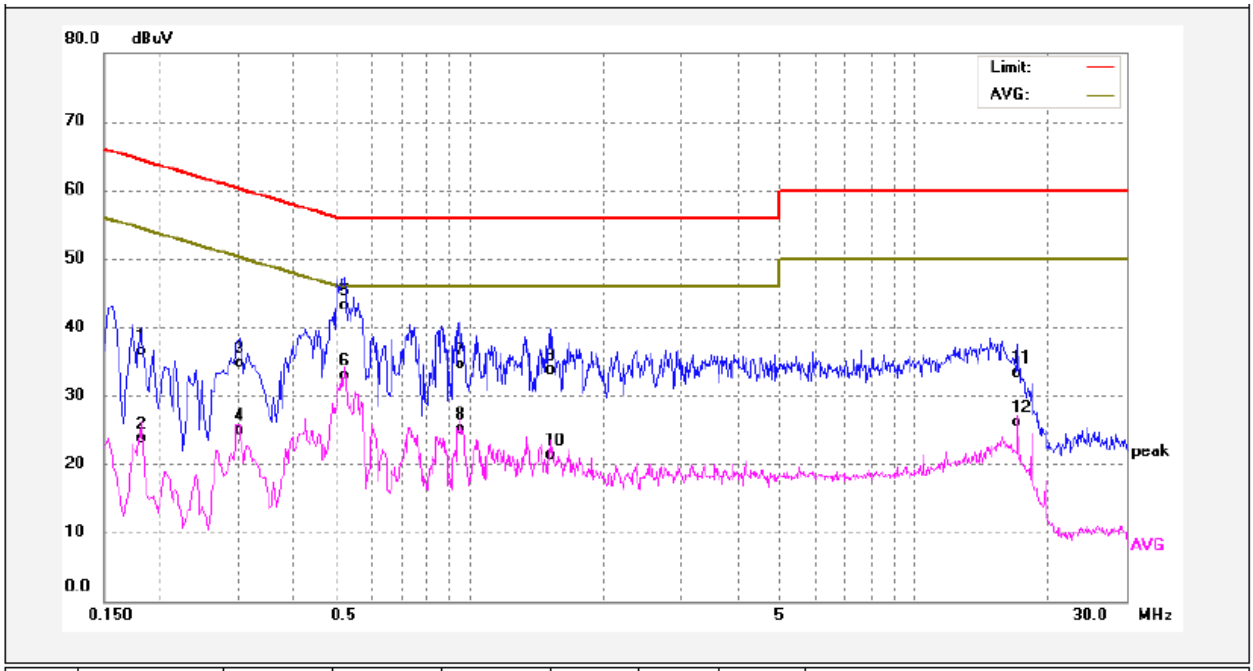


7.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

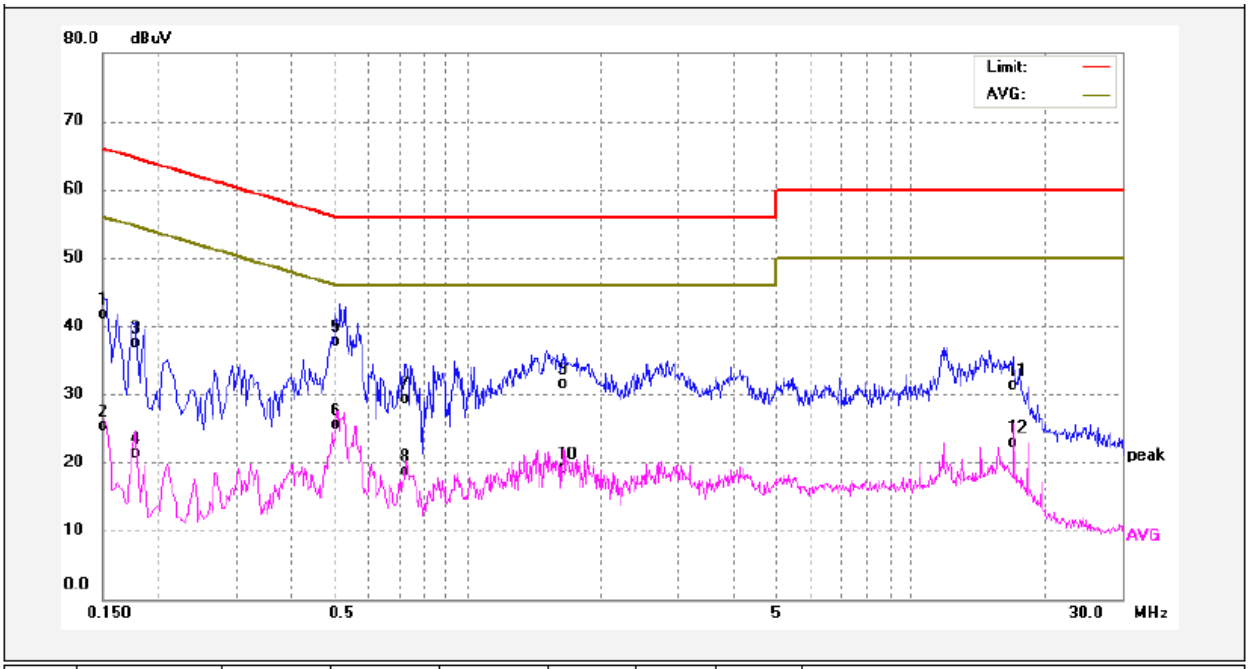
7.4 Conducted Emission Test Result

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1819	24.62	11.98	36.60	64.39	-27.79	QP	
2	0.1819	11.80	11.98	23.78	54.39	-30.61	AVG	
3	0.3020	22.92	11.74	34.66	60.19	-25.53	QP	
4	0.3020	13.09	11.74	24.83	50.19	-25.36	AVG	
5	0.5220	31.25	11.76	43.01	56.00	-12.99	QP	
6	0.5220	21.22	11.76	32.98	46.00	-13.02	AVG	
7	0.9540	22.66	11.90	34.56	56.00	-21.44	QP	
8	0.9540	13.23	11.90	25.13	46.00	-20.87	AVG	
9	1.5220	21.75	11.90	33.65	56.00	-22.35	QP	
10	1.5220	9.38	11.90	21.28	46.00	-24.72	AVG	
11	17.0500	21.74	11.62	33.36	60.00	-26.64	QP	
12	17.0500	14.44	11.62	26.06	50.00	-23.94	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	30.23	11.54	41.77	65.99	-24.22	QP	
2	0.1500	13.67	11.54	25.21	55.99	-30.78	AVG	
3	0.1780	26.04	11.43	37.47	64.57	-27.10	QP	
4	0.1780	9.79	11.43	21.22	54.57	-33.35	AVG	
5	0.5100	26.63	11.14	37.77	56.00	-18.23	QP	
6	0.5100	14.40	11.14	25.54	46.00	-20.46	AVG	
7	0.7300	18.04	11.30	29.34	56.00	-26.66	QP	
8	0.7300	7.44	11.30	18.74	46.00	-27.26	AVG	
9	1.6420	20.17	11.30	31.47	56.00	-24.53	QP	
10	1.6420	7.87	11.30	19.17	46.00	-26.83	AVG	
11	17.0579	19.85	11.40	31.25	60.00	-28.75	QP	
12	17.0579	11.52	11.40	22.92	50.00	-27.08	AVG	

8 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment**:**

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

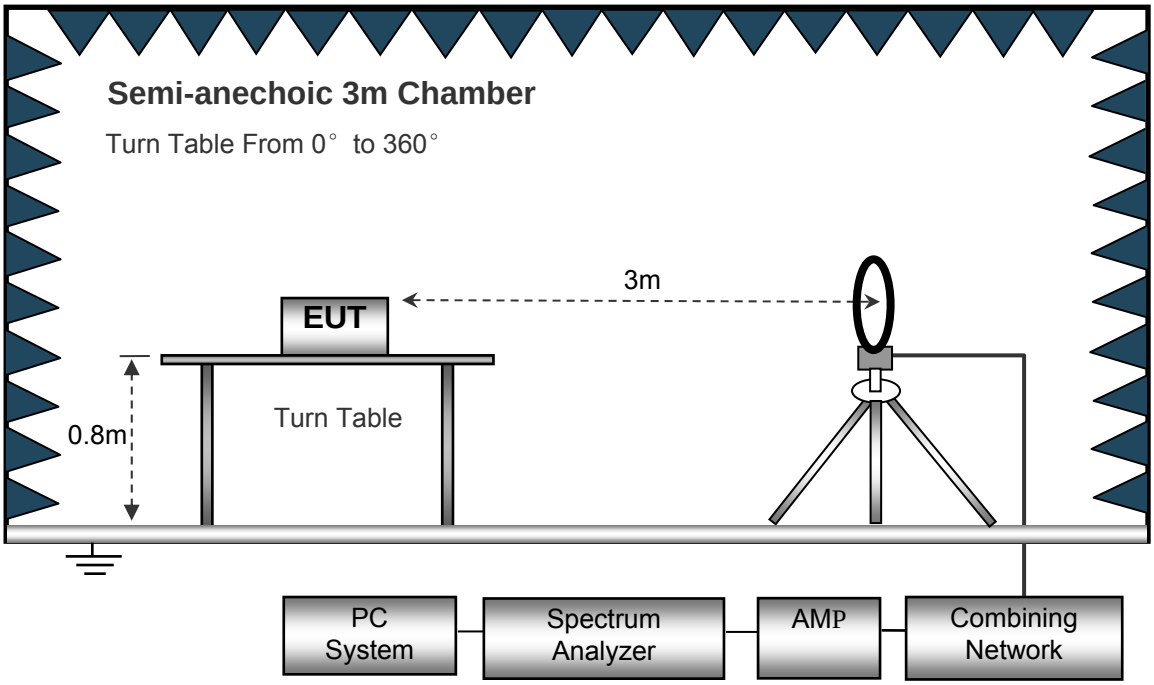
EUT Operation**:**

The test was performed in WIFI link mode, the test data were shown in the report.

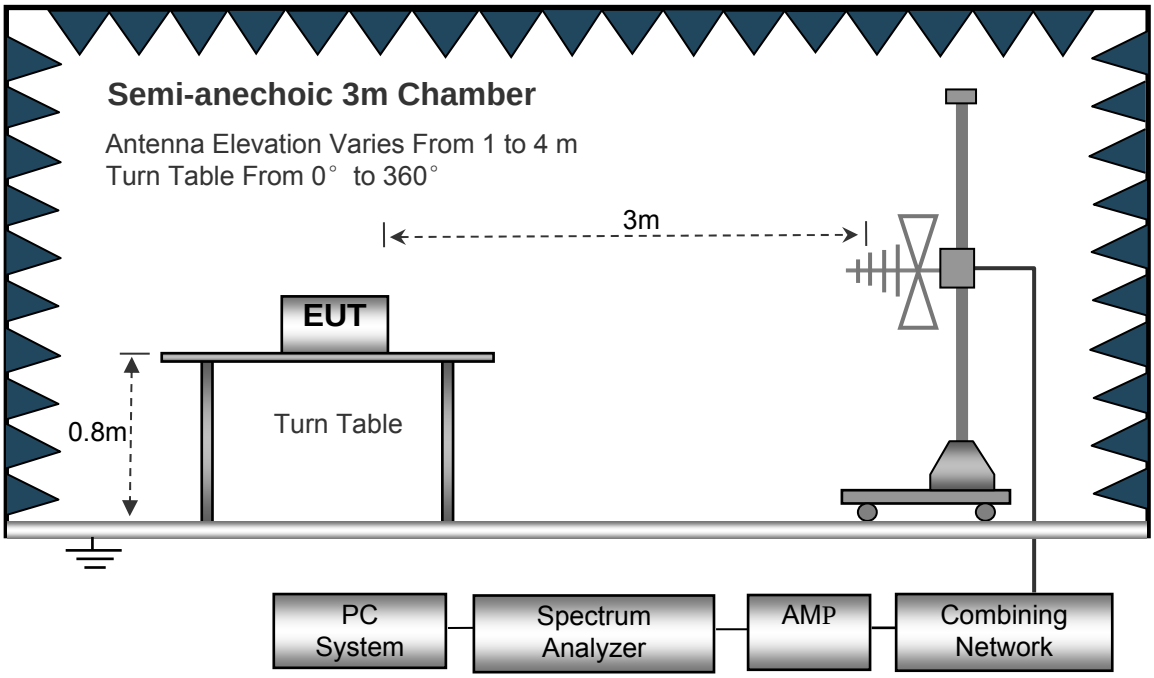
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

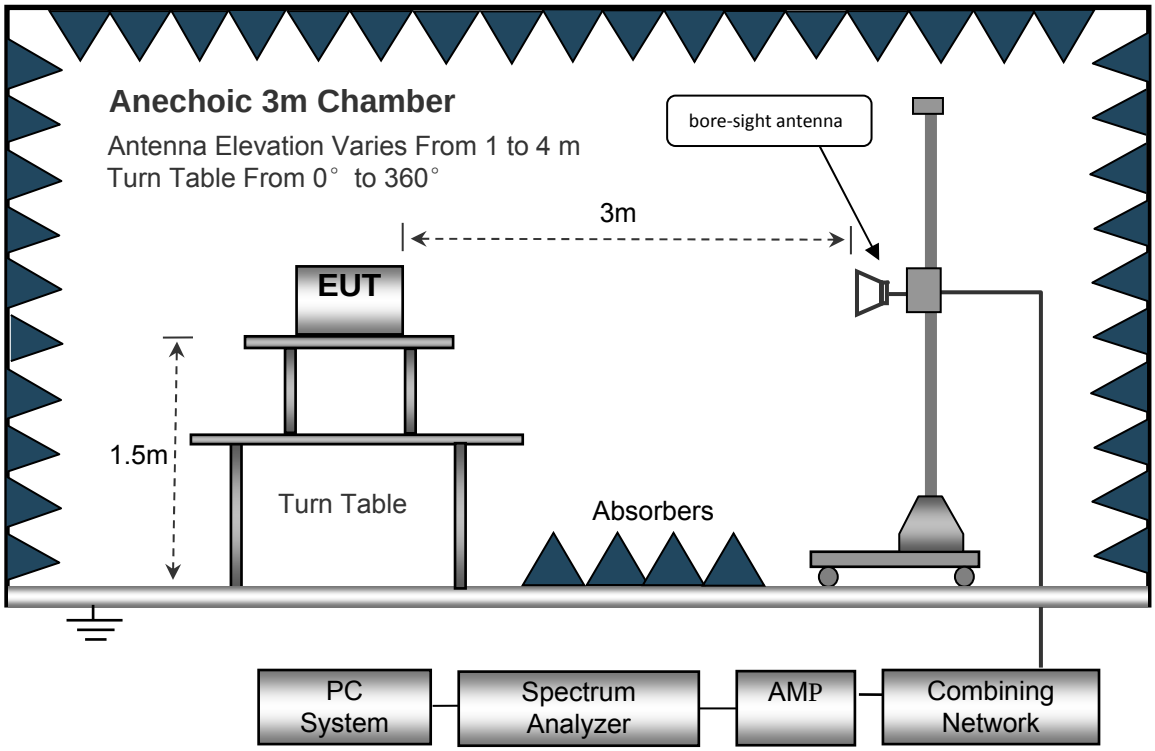
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



8.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector ..... Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

8.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used druing radiated emissions above 1GHz measurement.

8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

8.6 Summary of Test Results

Wifi:
Test Frequency: 9kHz ~ 30MHz

The measurements were more than 20 dB below the limit and not recorded

Test Frequency: 30MHz ~ 8GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Low Channel 2412MHz									
223.45	40.01	QP	211	1.8	H	-11.62	28.39	46.00	-17.61
223.45	30.58	QP	230	1.6	V	-11.62	18.96	46.00	-27.04
4824.00	53.12	PK	342	1.4	V	-1.06	52.06	74.00	-21.94
4824.00	38.49	Ave	342	1.4	V	-1.06	37.43	54.00	-16.57
7236.00	45.94	PK	122	1.9	H	1.33	47.27	74.00	-26.73
7236.00	41.79	Ave	122	1.9	H	1.33	43.12	54.00	-10.88
2336.58	46.53	PK	279	1.3	V	-13.19	33.34	74.00	-40.66
2336.58	39.39	Ave	279	1.3	V	-13.19	26.20	54.00	-27.80
2367.23	42.52	PK	27	1.8	H	-13.14	29.38	74.00	-44.62
2367.23	36.82	Ave	27	1.8	H	-13.14	23.68	54.00	-30.32
2493.77	42.10	PK	350	1.5	V	-13.08	29.02	74.00	-44.98
2493.77	36.91	Ave	350	1.5	V	-13.08	23.83	54.00	-30.17

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Middle Channel 2437MHz									
223.45	40.01	QP	243	1.4	H	-11.62	28.39	46.00	-17.61
223.45	29.88	QP	326	1.6	V	-11.62	18.26	46.00	-27.74
4874.00	52.99	PK	222	1.4	V	-0.62	52.37	74.00	-21.63
4874.00	37.68	Ave	222	1.4	V	-0.62	37.06	54.00	-16.94
7311.00	45.43	PK	47	1.4	H	2.21	47.64	74.00	-26.36
7311.00	41.68	Ave	47	1.4	H	2.21	43.89	54.00	-10.11
2338.83	45.12	PK	231	1.4	V	-13.19	31.93	74.00	-42.07
2338.83	38.30	Ave	231	1.4	V	-13.19	25.11	54.00	-28.89
2360.05	44.10	PK	359	1.1	H	-13.14	30.96	74.00	-43.04
2360.05	36.10	Ave	359	1.1	H	-13.14	22.96	54.00	-31.04
2490.95	44.20	PK	353	1.8	V	-13.08	31.12	74.00	-42.88
2490.95	37.52	Ave	353	1.8	V	-13.08	24.44	54.00	-29.56

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: High Channel 2462MHz									
223.45	39.74	QP	18	1.2	H	-11.62	28.12	46.00	-17.88
223.45	29.65	QP	59	1.3	V	-11.62	18.03	46.00	-27.97
4924.00	51.51	PK	193	1.3	V	-0.24	51.27	74.00	-22.73
4924.00	37.60	Ave	193	1.3	V	-0.24	37.36	54.00	-16.64
7386.00	44.14	PK	281	1.7	H	2.84	46.98	74.00	-27.02
7386.00	43.09	Ave	281	1.7	H	2.84	45.93	54.00	-8.07
2346.11	46.10	PK	319	1.4	V	-13.19	32.91	74.00	-41.09
2346.11	37.32	Ave	319	1.4	V	-13.19	24.13	54.00	-29.87
2380.67	44.44	PK	300	1.8	H	-13.14	31.30	74.00	-42.70
2380.67	38.55	Ave	300	1.8	H	-13.14	25.41	54.00	-28.59
2496.15	44.13	PK	37	1.1	V	-13.08	31.05	74.00	-42.95
2496.15	36.96	Ave	37	1.1	V	-13.08	23.88	54.00	-30.12

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Low Channel 2412MHz									
223.45	40.27	QP	254	1.6	H	-11.62	28.65	46.00	-17.35
223.45	31.10	QP	208	2.0	V	-11.62	19.48	46.00	-26.52
4824.00	51.46	PK	339	1.5	V	-1.06	50.40	74.00	-23.60
4824.00	37.42	Ave	339	1.5	V	-1.06	36.36	54.00	-17.64
7236.00	43.27	PK	317	1.1	H	1.33	44.60	74.00	-29.40
7236.00	42.54	Ave	317	1.1	H	1.33	43.87	54.00	-10.13
2334.55	45.66	PK	191	1.4	V	-13.19	32.47	74.00	-41.53
2334.55	37.37	Ave	191	1.4	V	-13.19	24.18	54.00	-29.82
2355.02	44.51	PK	225	1.6	H	-13.14	31.37	74.00	-42.63
2355.02	38.39	Ave	225	1.6	H	-13.14	25.25	54.00	-28.75
2490.45	42.76	PK	54	1.2	V	-13.08	29.68	74.00	-44.32
2490.45	38.39	Ave	54	1.2	V	-13.08	25.31	54.00	-28.69

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: Middle Channel 2437MHz									
223.45	38.94	QP	0	1.2	H	-11.62	27.32	46.00	-18.68
223.45	30.41	QP	116	1.5	V	-11.62	18.79	46.00	-27.21
4874.00	50.25	PK	11	1.3	V	-0.62	49.63	74.00	-24.37
4874.00	36.07	Ave	11	1.3	V	-0.62	35.45	54.00	-18.55
7311.00	43.21	PK	209	1.1	H	2.21	45.42	74.00	-28.58
7311.00	42.90	Ave	209	1.1	H	2.21	45.11	54.00	-8.89
2332.24	45.53	PK	285	1.7	V	-13.19	32.34	74.00	-41.66
2332.24	37.87	Ave	285	1.7	V	-13.19	24.68	54.00	-29.32
2369.52	44.58	PK	34	1.3	H	-13.14	31.44	74.00	-42.56
2369.52	37.51	Ave	34	1.3	H	-13.14	24.37	54.00	-29.63
2497.51	43.77	PK	178	1.8	V	-13.08	30.69	74.00	-43.31
2497.51	38.61	Ave	178	1.8	V	-13.08	25.53	54.00	-28.47

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11g: High Channel 2462MHz									
223.45	40.29	QP	151	1.5	H	-11.62	28.67	46.00	-17.33
223.45	29.70	QP	279	1.3	V	-11.62	18.08	46.00	-27.92
4924.00	49.77	PK	150	1.2	V	-0.24	49.53	74.00	-24.47
4924.00	35.96	Ave	150	1.2	V	-0.24	35.72	54.00	-18.28
7386.00	43.90	PK	46	1.9	H	2.84	46.74	74.00	-27.26
7386.00	41.72	Ave	46	1.9	H	2.84	44.56	54.00	-9.44
2311.85	46.81	PK	16	1.1	V	-13.19	33.62	74.00	-40.38
2311.85	39.50	Ave	16	1.1	V	-13.19	26.31	54.00	-27.69
2382.57	43.93	PK	158	1.1	H	-13.14	30.79	74.00	-43.21
2382.57	38.12	Ave	158	1.1	H	-13.14	24.98	54.00	-29.02
2485.78	44.41	PK	274	1.7	V	-13.08	31.33	74.00	-42.67
2485.78	38.80	Ave	274	1.7	V	-13.08	25.72	54.00	-28.28

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n20: Low Channel 2412MHz									
223.45	39.73	QP	139	1.8	H	-11.62	28.11	46.00	-17.89
223.45	28.31	QP	218	1.7	V	-11.62	16.69	46.00	-29.31
4824.00	48.41	PK	216	1.8	V	-1.06	47.35	74.00	-26.65
4824.00	36.72	Ave	216	1.8	V	-1.06	35.66	54.00	-18.34
7236.00	43.12	PK	271	1.2	H	1.33	44.45	74.00	-29.55
7236.00	43.18	Ave	271	1.2	H	1.33	44.51	54.00	-9.49
2328.46	46.70	PK	333	1.7	V	-13.19	33.51	74.00	-40.49
2328.46	39.54	Ave	333	1.7	V	-13.19	26.35	54.00	-27.65
2369.66	44.67	PK	265	1.6	H	-13.14	31.53	74.00	-42.47
2369.66	37.79	Ave	265	1.6	H	-13.14	24.65	54.00	-29.35
2495.27	42.57	PK	18	2.0	V	-13.08	29.49	74.00	-44.51
2495.27	37.60	Ave	18	2.0	V	-13.08	24.52	54.00	-29.48

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n20: Middle Channel 2437MHz									
223.45	40.62	QP	333	1.3	H	-11.62	29.00	46.00	-17.00
223.45	26.89	QP	27	2.0	V	-11.62	15.27	46.00	-30.73
4874.00	48.19	PK	223	1.3	V	-0.62	47.57	74.00	-26.43
4874.00	37.02	Ave	223	1.3	V	-0.62	36.40	54.00	-17.60
7311.00	43.54	PK	2	1.9	H	2.21	45.75	74.00	-28.25
7311.00	42.36	Ave	2	1.9	H	2.21	44.57	54.00	-9.43
2326.96	46.04	PK	275	1.8	V	-13.19	32.85	74.00	-41.15
2326.96	38.86	Ave	275	1.8	V	-13.19	25.67	54.00	-28.33
2374.68	42.39	PK	129	2.0	H	-13.14	29.25	74.00	-44.75
2374.68	37.02	Ave	129	2.0	H	-13.14	23.88	54.00	-30.12
2489.26	43.36	PK	271	1.9	V	-13.08	30.28	74.00	-43.72
2489.26	38.50	Ave	271	1.9	V	-13.08	25.42	54.00	-28.58

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11n20: High Channel 2462MHz									
223.45	39.38	QP	333	1.7	H	-11.62	27.76	46.00	-18.24
223.45	25.41	QP	218	1.0	V	-11.62	13.79	46.00	-32.21
4924.00	47.02	PK	194	1.6	V	-0.24	46.78	74.00	-27.22
4924.00	35.95	Ave	194	1.6	V	-0.24	35.71	54.00	-18.29
7386.00	44.03	PK	257	1.5	H	2.84	46.87	74.00	-27.13
7386.00	41.15	Ave	257	1.5	H	2.84	43.99	54.00	-10.01
2331.04	46.82	PK	20	1.3	V	-13.19	33.63	74.00	-40.37
2331.04	39.05	Ave	20	1.3	V	-13.19	25.86	54.00	-28.14
2356.54	42.21	PK	175	1.5	H	-13.14	29.07	74.00	-44.93
2356.54	37.30	Ave	175	1.5	H	-13.14	24.16	54.00	-29.84
2493.09	42.11	PK	315	1.4	V	-13.08	29.03	74.00	-44.97
2493.09	36.82	Ave	315	1.4	V	-13.08	23.74	54.00	-30.26

Test Frequency: 8GHz~25GHz

The measurements were more than 20 dB below the limit and not reported.

9 Duty Cycle

Type of Modulation	On time ms	Period ms	Duty Cycle linear	Duty Cycle %	Duty Cycle Factor(dB)	Average Factor(dB)
802.11b	100.0000	100.0000	1.00	100.00	0.00	0.00
802.11g	100.0000	100.0000	1.00	100.00	0.00	0.00
802.11n-HT20	100.0000	100.0000	1.00	100.00	0.00	0.00

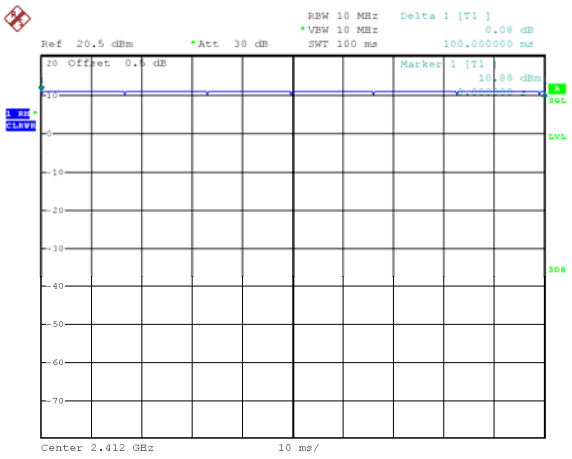
Remark:

Duty cycle=On Time/period;

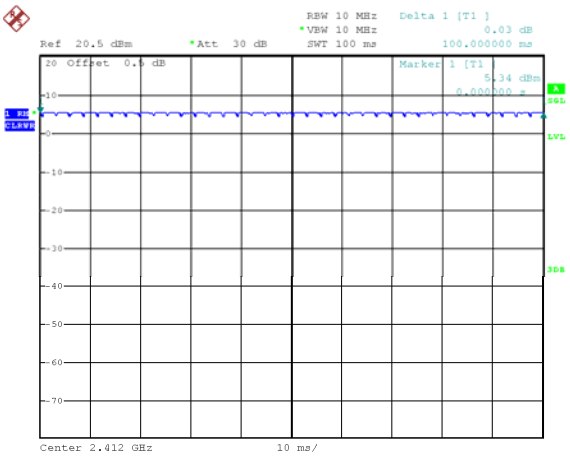
Duty cycle factor=10*log (1/Duty cycle);

Average factor=20log$_{10}$Duty cycle

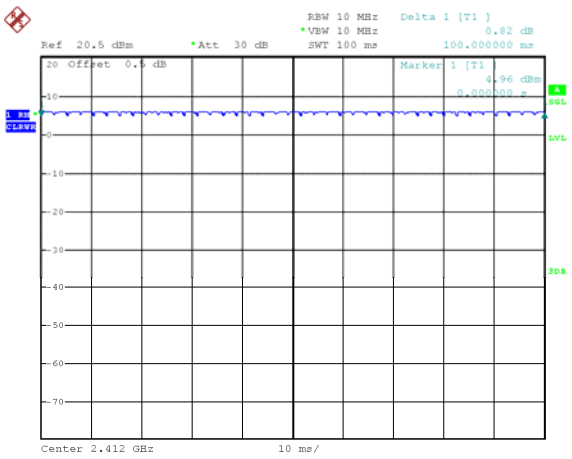
Wi-Fi 802.11b



Wi-Fi 802.11g



Wi-Fi 802.11n-HT20



10 Band Edge Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

Test Limit: Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Mode: Transmitting

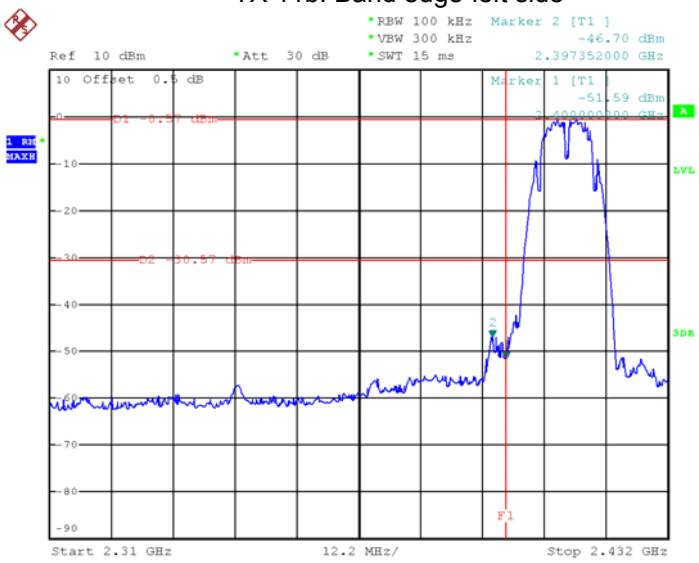
10.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

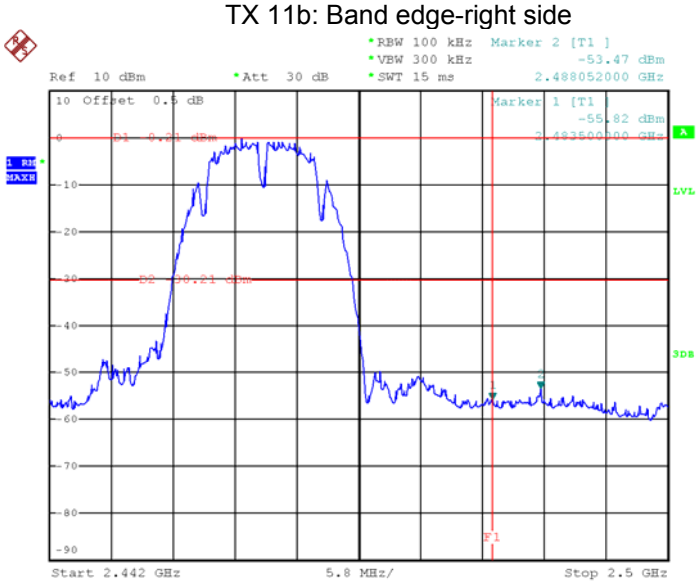
10.2 Test Result

Test result plots shown as follows:

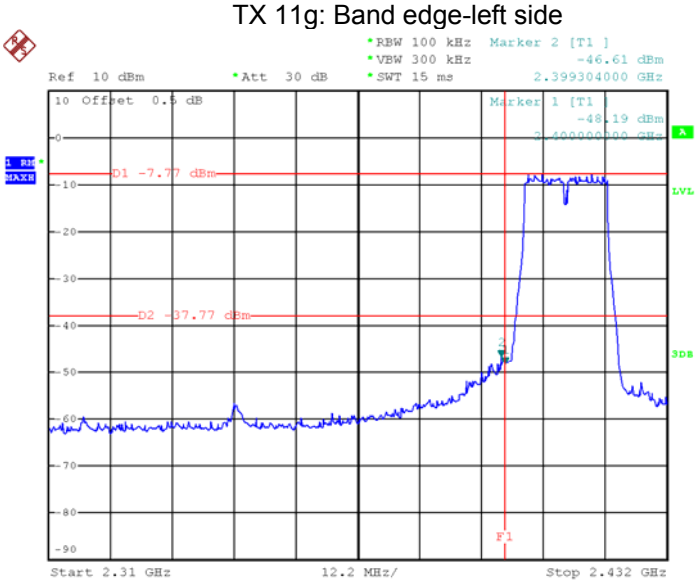
TX 11b: Band edge-left side



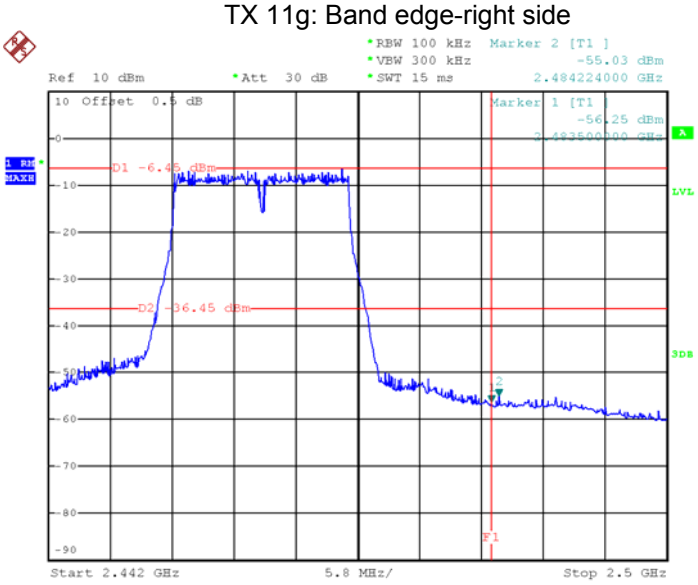
TX 11b: Band edge-right side



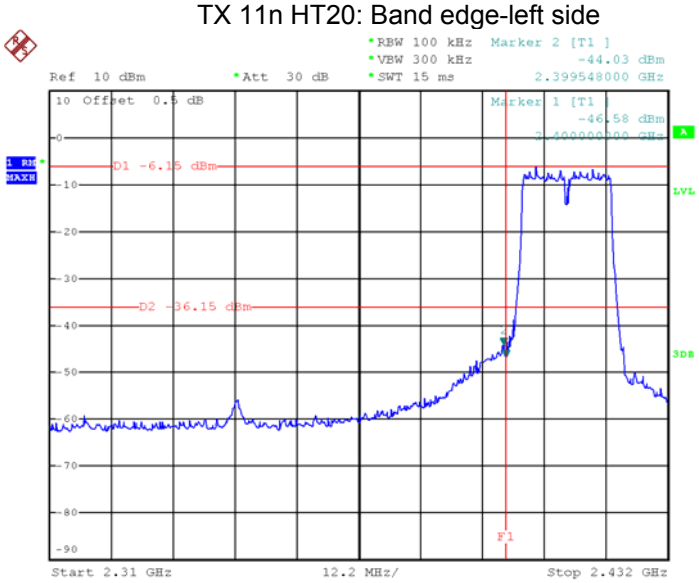
TX 11g: Band edge-left side



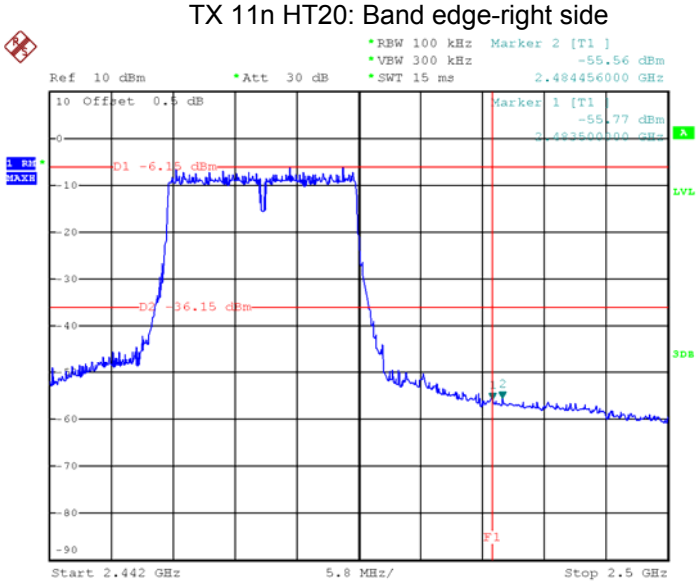
TX 11g: Band edge-right side



TX 11n HT20: Band edge-left side



TX 11n HT20: Band edge-right side



11 6 dB Bandwidth and 99% Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

11.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. 6dB Bandwidth Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

99% Bandwidth Set the spectrum analyzer : RBW = 1~5% DTS OBW, VBW = 3 RBW

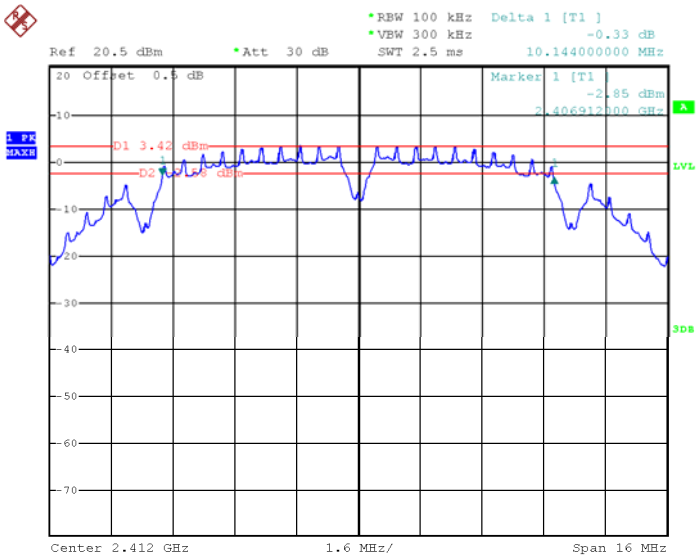
11.2 Test Result:

Operation mode	Test Channel	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
TX 11b	Channel 1	10.144	13.120
	Channel 6	10.144	13.120
	Channel 11	10.144	13.120
TX 11g	Channel 1	16.500	16.800
	Channel 6	16.500	16.800
	Channel 11	16.500	16.800
TX 11n HT20	Channel 1	17.684	17.766
	Channel 6	17.712	17.820
	Channel 11	17.712	17.820

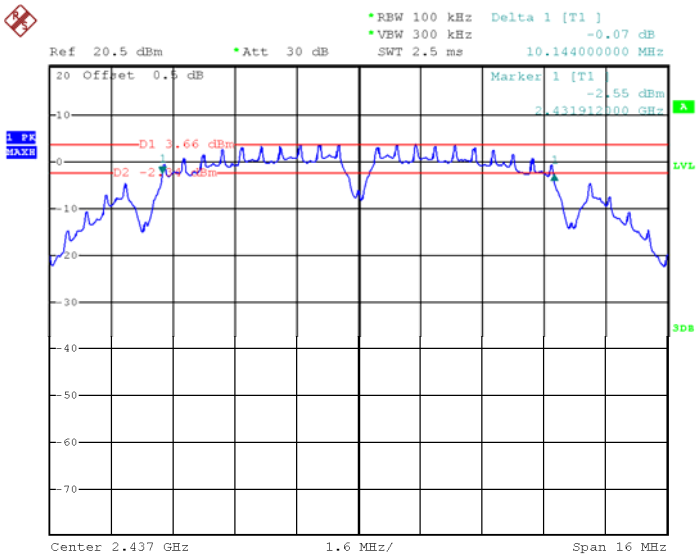
Test result plot:

6dB Bandwidth

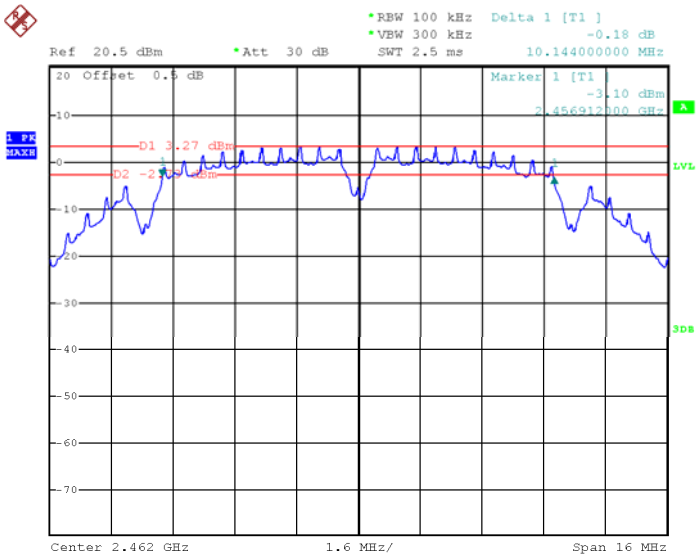
Mode: TX 11b channel 1



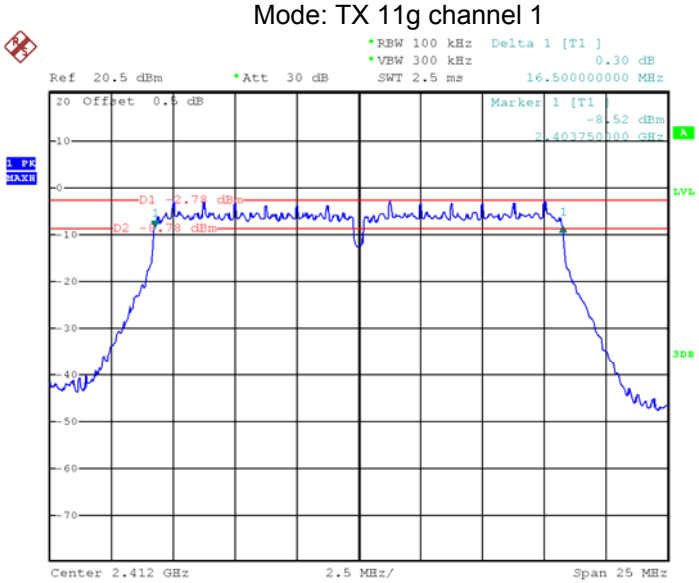
Mode: TX 11b channel 6



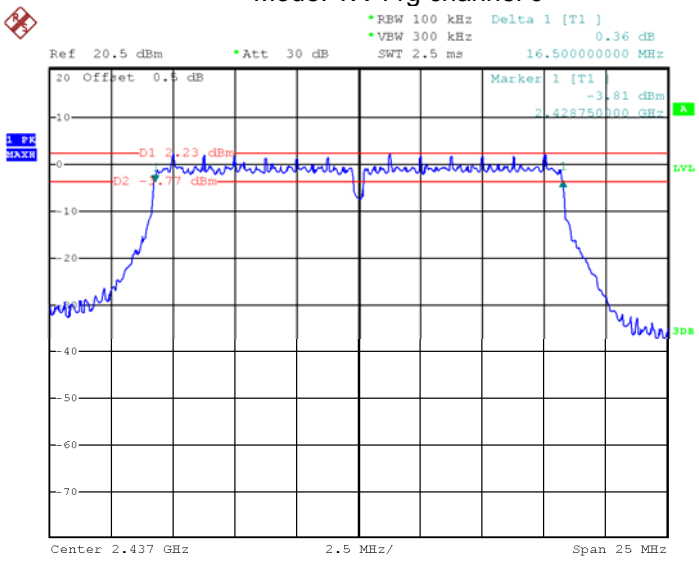
Mode: TX 11b channel 11



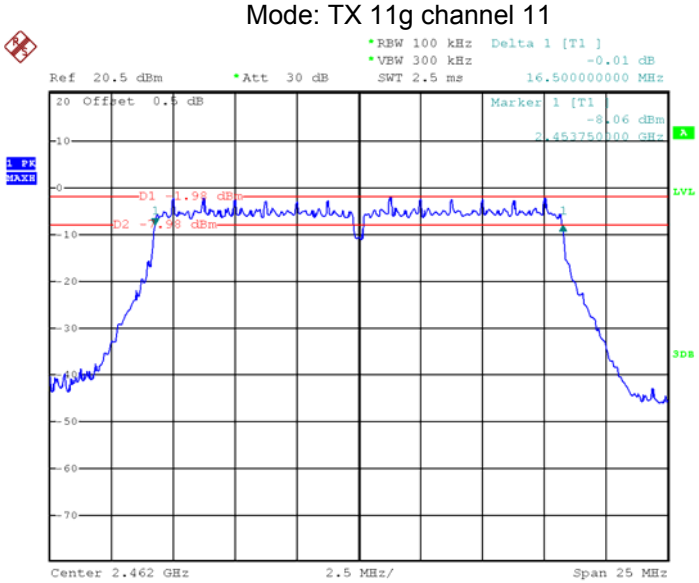
Mode: TX 11g channel 1



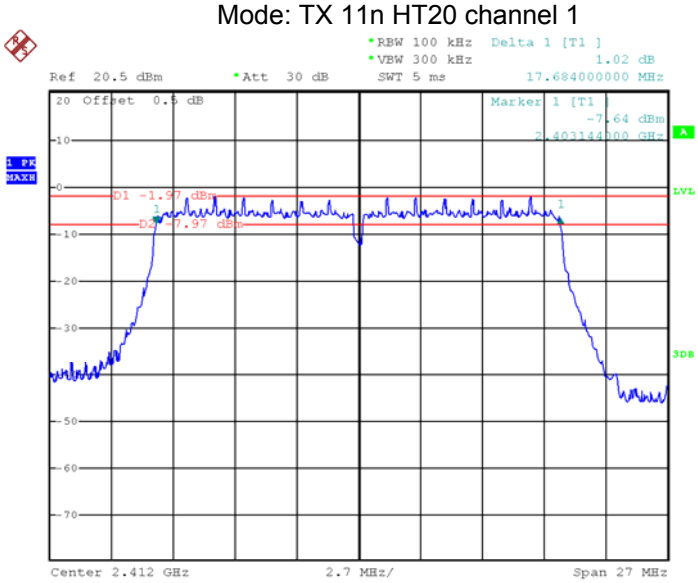
Mode: TX 11g channel 6



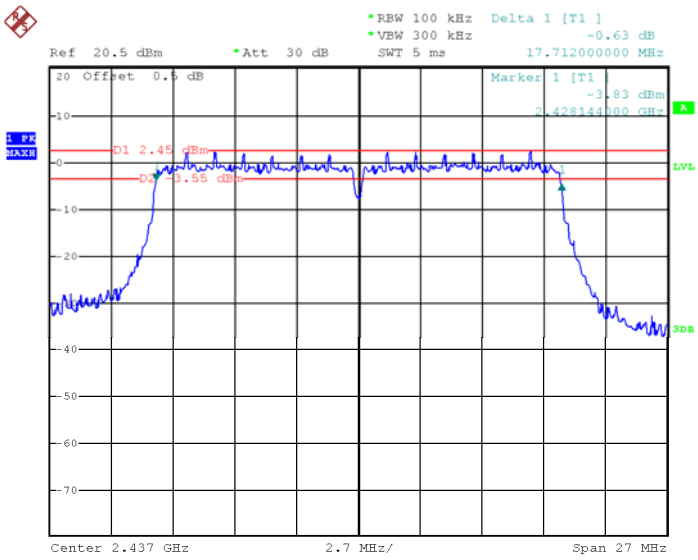
Mode: TX 11g channel 11



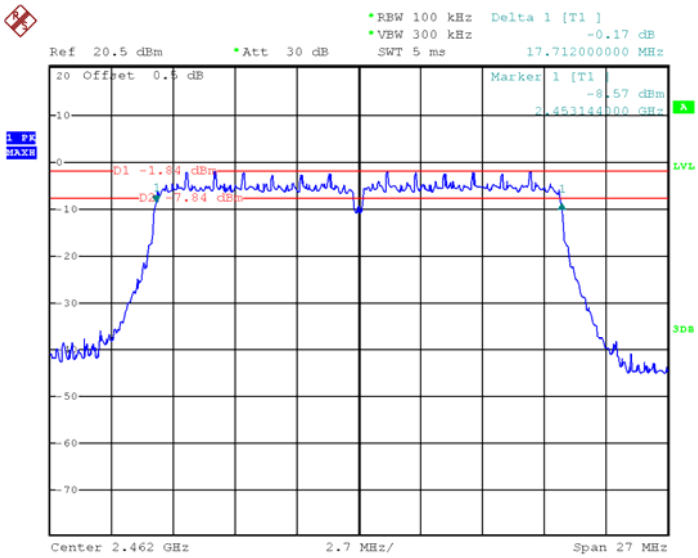
Mode: TX 11n HT20 channel 1



Mode: TX 11n HT20 channel 6

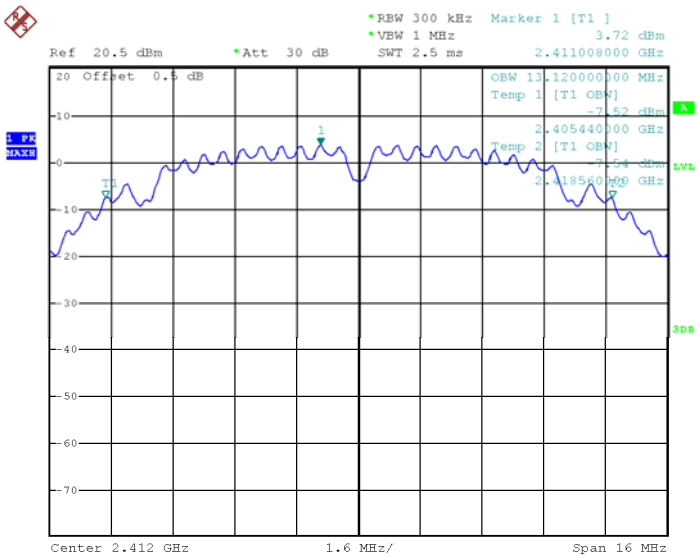


Mode: TX 11n HT20 channel 11

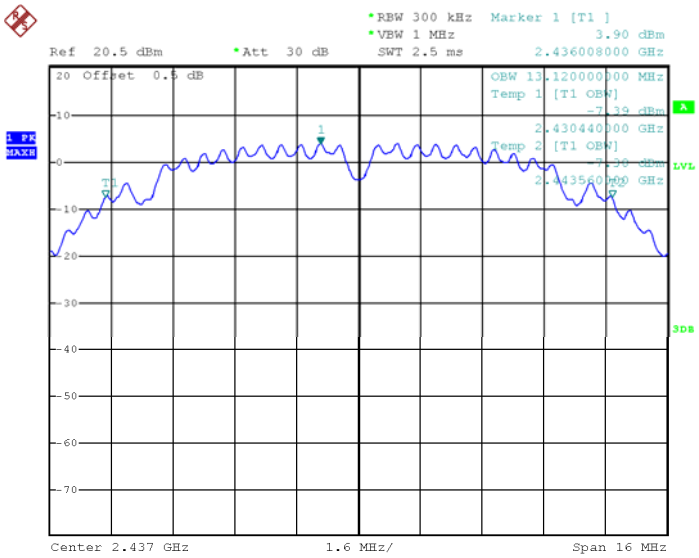


99% Bandwidth

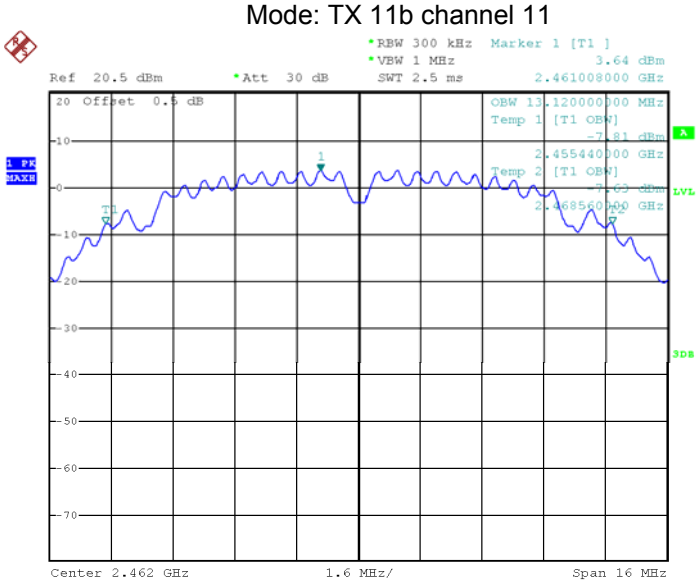
Mode: TX 11b channel 1



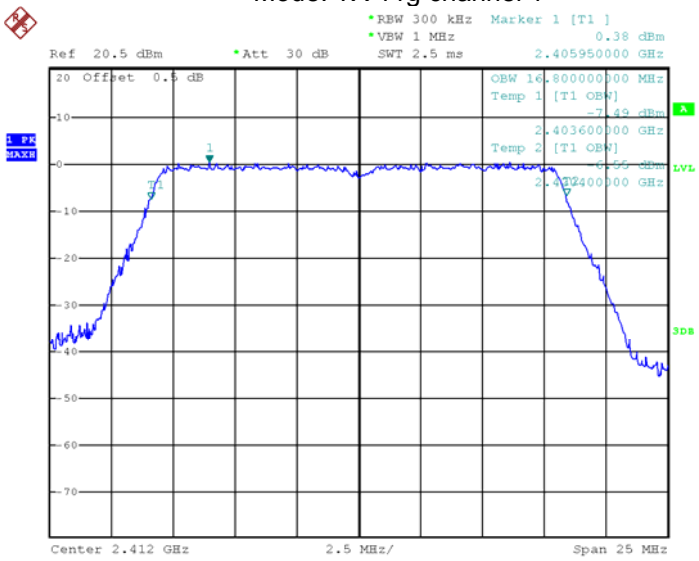
Mode: TX 11b channel 6



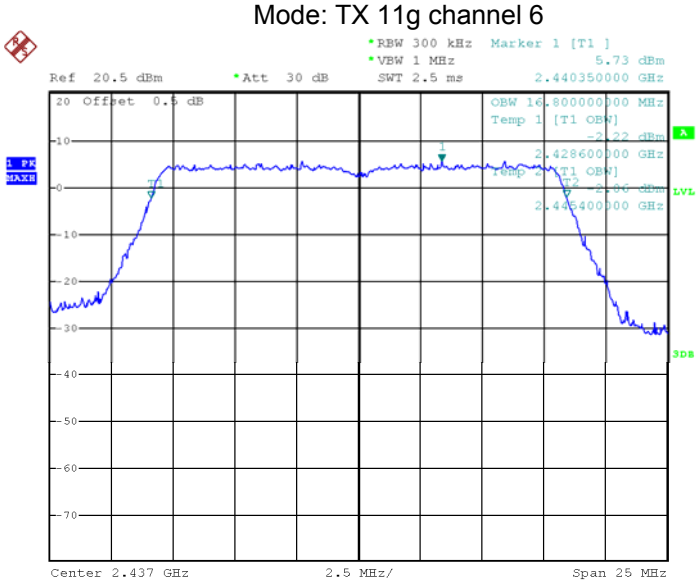
Mode: TX 11b channel 11



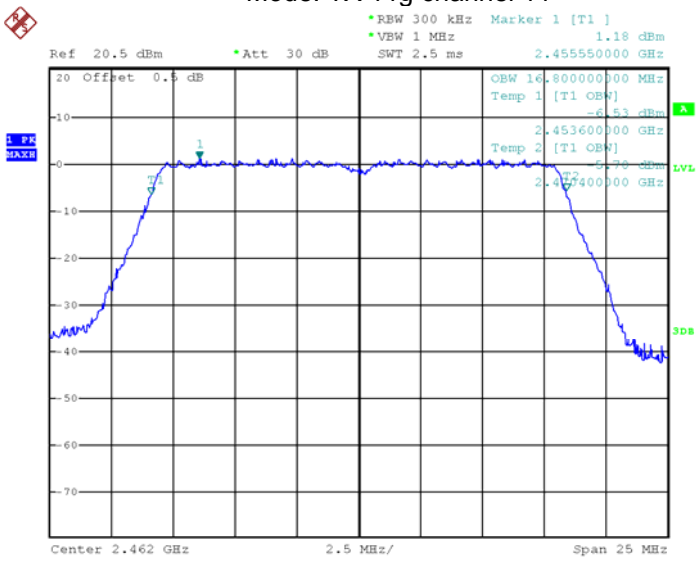
Mode: TX 11g channel 1



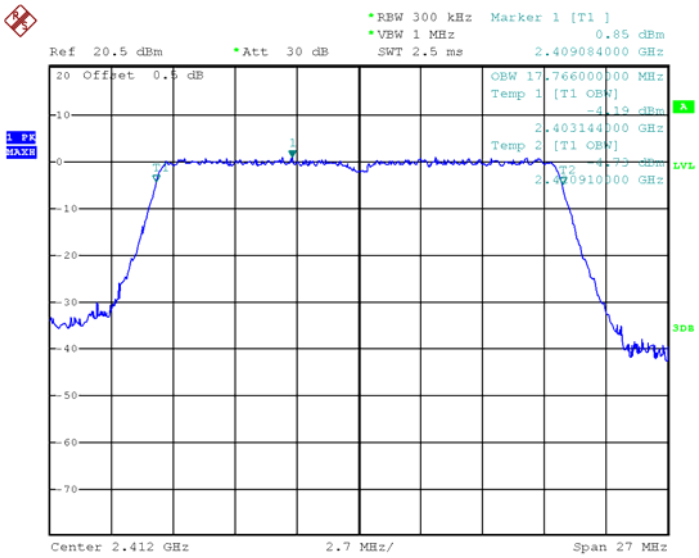
Mode: TX 11g channel 6



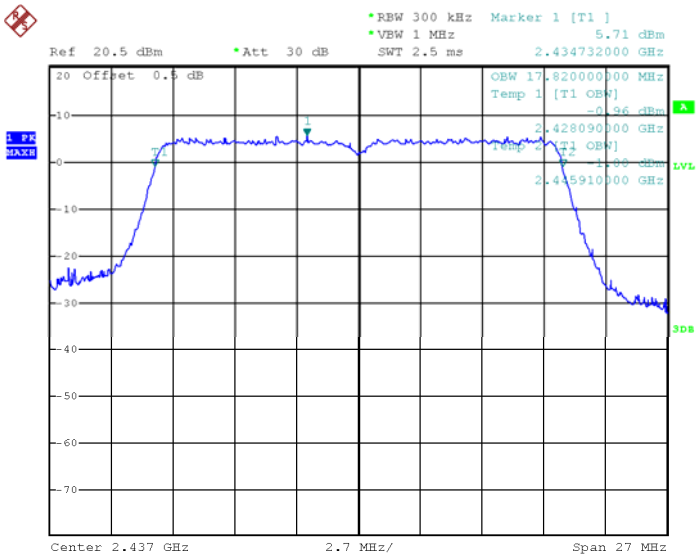
Mode: TX 11g channel 11



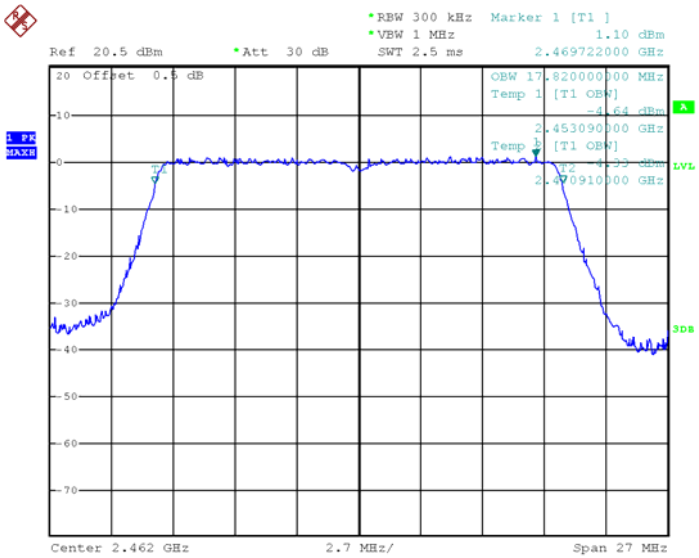
Mode: TX 11n HT20 channel 1



Mode: TX 11n HT20 channel 6



Mode: TX 11n HT20 channel 11



12 Maximum Peak Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

12.1 Test Procedure:

KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019

section 8.3.1.1 (For BLE)

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

a)Set the RBW ≥ DTS bandwidth.

b)Set VBW ≥ 3 RBW.

c)Set span ≥ 3 x RBW

d)Sweep time = auto couple.

e)Detector = peak.

f)Trace mode = max hold.

g)Allow trace to fully stabilize.

h)Use peak marker function to determine the peak amplitude level.

section 8.3.1.2 (For WIFI)

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

a)Set the RBW = 1% to 5% of the OBW, not to exceed 1 MHz..

b)Set the VBW ≥ 3 x RBW

c)Set the span ≥ 1.5 x OBW.

d)Detector = RMS.

e)Sweep time = auto couple.

f) trigger = free run.

g) Number of points in sweep _ [2 × span / RBW]. (This gives bin-to-bin spacing _ RBW / 2, so that narrowband signals are not lost between frequency bins.)

h) Trace average at least 100 traces in power averaging (rms) mode.

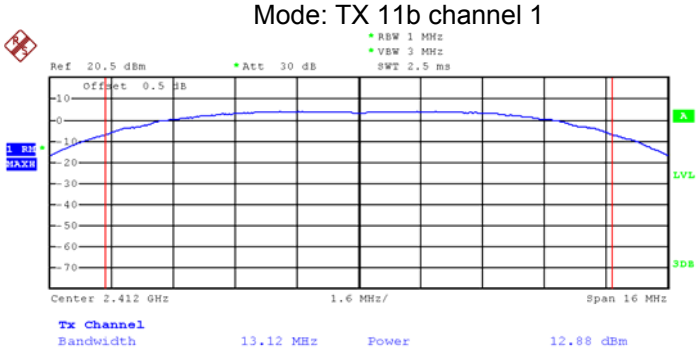
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument' s band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

12.2 Test Result:

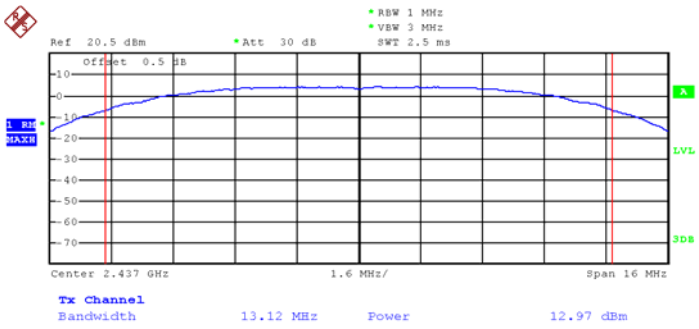
Operation mode	Channel Frequency (MHz)	Maximum Peak Output Power (dBm)	Limit
TX 11b	Low-2412	12.88	1W/30dBm
	Middle-2437	12.97	1W/30dBm
	High-2462	12.72	1W/30dBm
TX 11g	Low-2412	10.44	1W/30dBm
	Middle-2437	15.47	1W/30dBm
	High-2462	11.04	1W/30dBm
TX 11n HT20	Low-2412	11.26	1W/30dBm
	Middle-2437	**15.63**	1W/30dBm
	High-2462	11.16	1W/30dBm

Test Plot

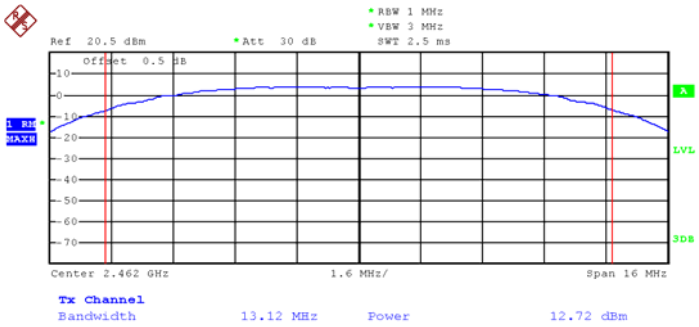
Mode: TX 11b channel 1



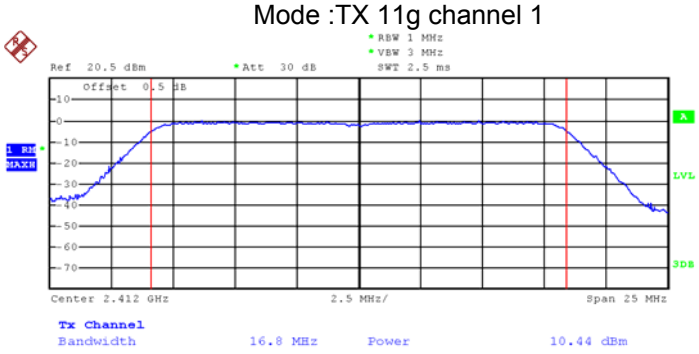
Mode: TX 11b channel 6



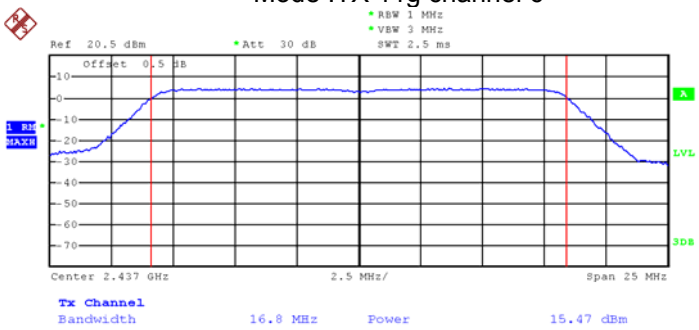
Mode: TX 11b channel 11



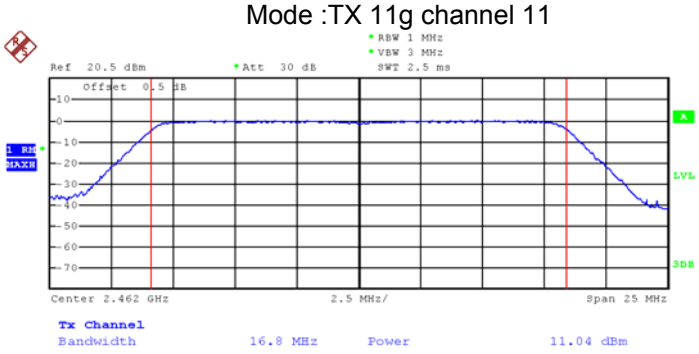
Mode :TX 11g channel 1



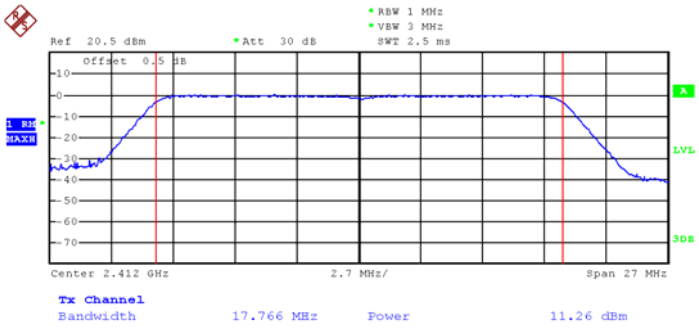
Mode :TX 11g channel 6



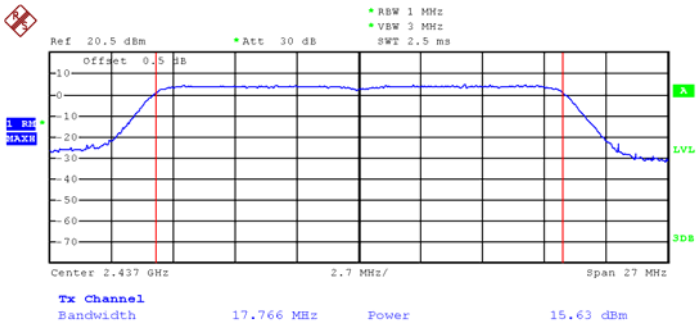
Mode :TX 11g channel 11



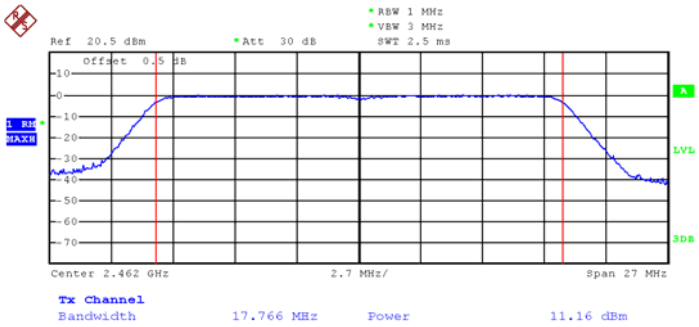
Mode: TX 11n HT20 channel 1



Mode: TX 11n HT20 channel 6



Mode: TX 11n HT20 channel 11



13 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019;
ANSI C63.10:2013

13.1 Test Procedure:

KDB 558074 D01 15.247 Meas Guidance v05r02 April 2, 2019 section 10.2

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz, Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.

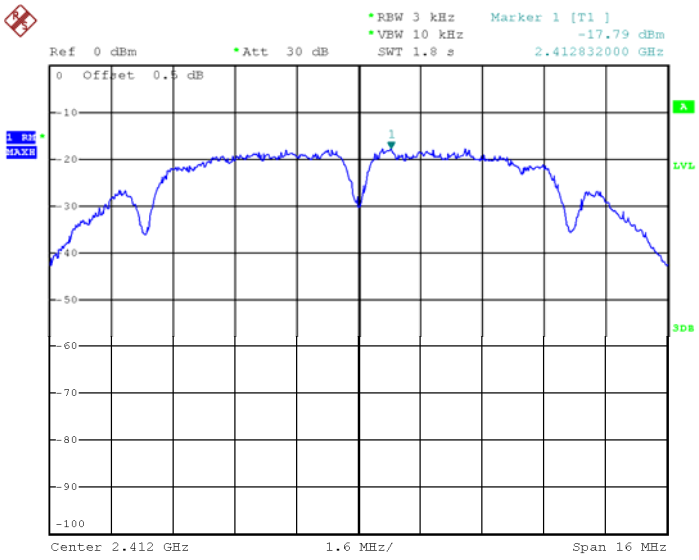
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

13.2 Test Result:

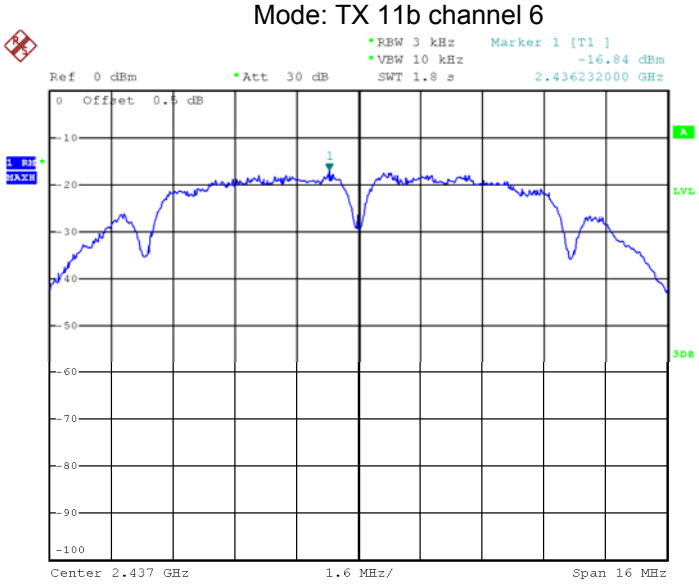
Operation mode	Channel Frequency (MHz)	Power Spectral (dBm per 3kHz)	Limit
TX 11b	Low-2412	-17.79	8dBm per 3kHz
	Middle-2437	-16.84	8dBm per 3kHz
	High-2462	-18.45	8dBm per 3kHz
TX 11g	Low-2412	-24.60	8dBm per 3kHz
	Middle-2437	-19.15	8dBm per 3kHz
	High-2462	-23.51	8dBm per 3kHz
TX 11n HT20	Low-2412	-24.19	8dBm per 3kHz
	Middle-2437	-19.71	8dBm per 3kHz
	High-2462	-23.60	8dBm per 3kHz

Test Plot

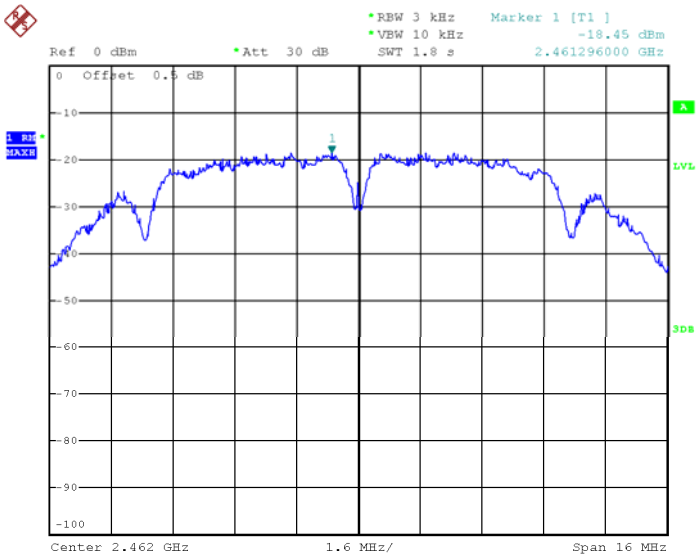
Mode: TX 11b channel 1



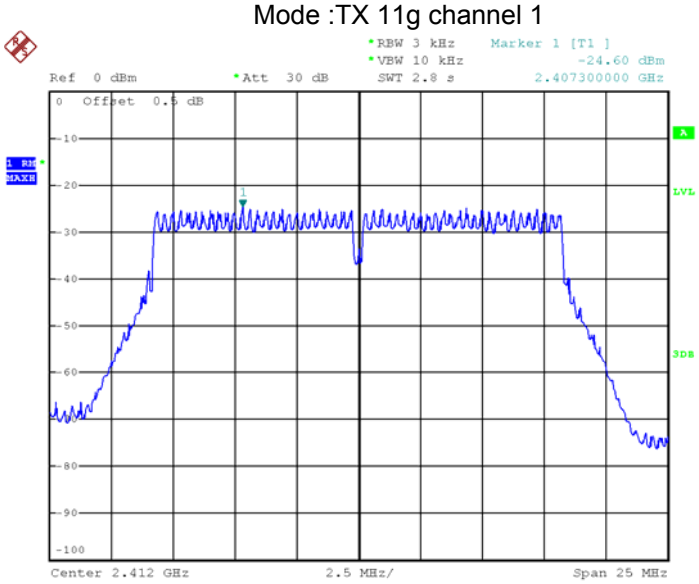
Mode: TX 11b channel 6



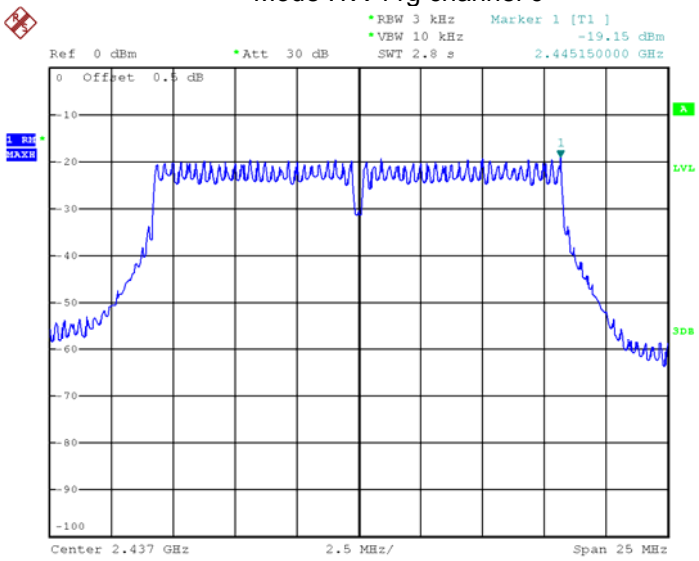
Mode: TX 11b channel 11



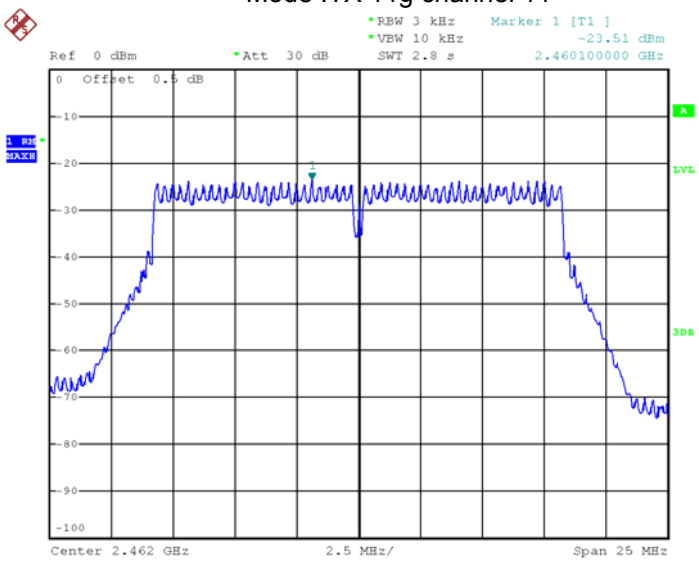
Mode :TX 11g channel 1



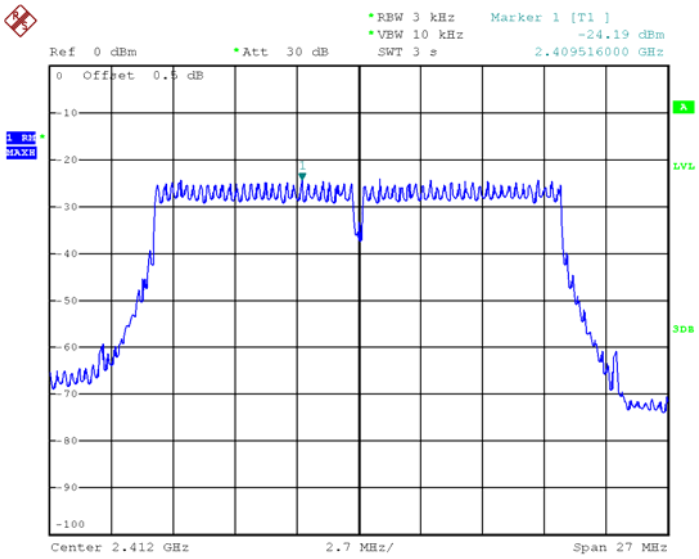
Mode :TX 11g channel 6



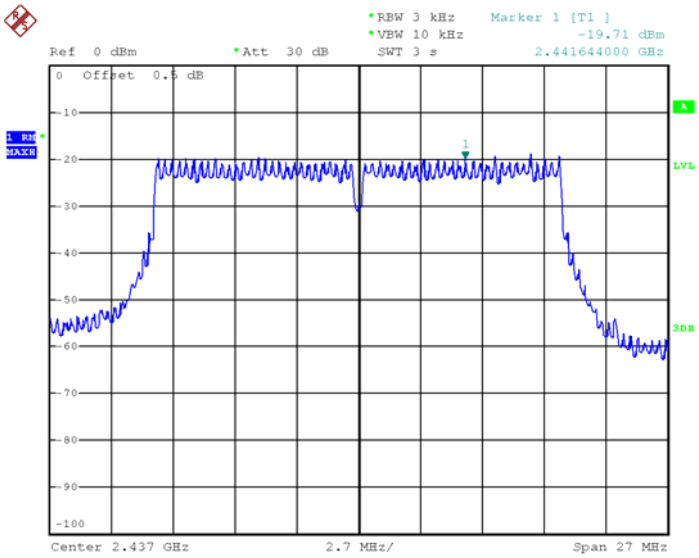
Mode :TX 11g channel 11



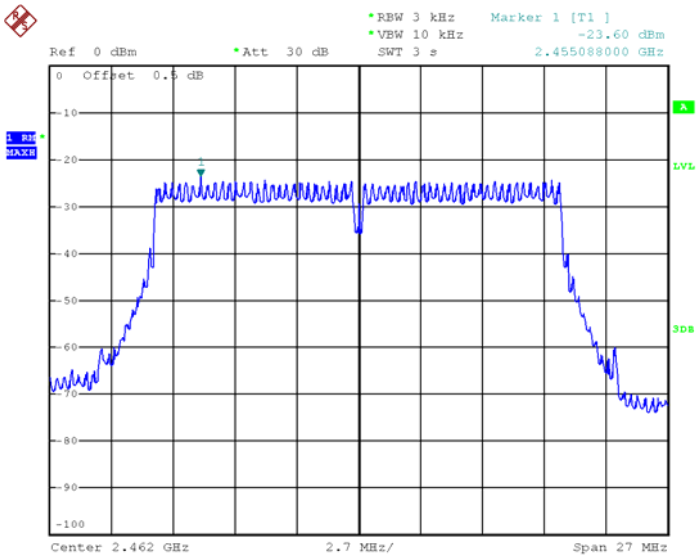
Mode: TX 11n HT20 channel 1



Mode: TX 11n HT20 channel 6



Mode: TX 11n HT20 channel 11



14 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has an integrated antenna fulfil the requirement of this section.

15 RF Exposure

Remark: refer to MPE test report: WTD22D04066978W002.

16 Photographs of test setup and EUT.

Note: Please refer to appendix: Appendix- R9052-Photos.

======End of Report======