

TEST REPORT

Reference No. : WTS18S01100299-1W
FCC ID..... : 2AOT9-NBDVR512GW
Applicant..... : Portable Multimedia Limited
Address : Unit 2,Caerphilly Business Park, Caerphilly, Mid Glamorgan CF833ED,
United Kingdom
Manufacturer : Shenzhen Samoon technology Co.,Ltd
Address : 9th Floor, Block 7, Zhongyuntai Industrial Park, Songbai Road, Shiyan
Town, Bao'an District, Shenzhen, China.
Product..... : 512GW Ultra Dash Cam
NBDVR512GW, FE-NBDVR512GW, NBDVR512G, FE-NBDVR512G
Model(s)..... : NBDVR512GW-W, FE-NBDVR512GW-W, VYDVR512GW,
FE-VYDVR512GW
Standards..... : FCC CFR47 Part 15 C Section 15.247:2017
Date of Receipt sample.. : 2018-01-11
Date of Test..... : 2018-01-12 to 2018-03-27
Date of Issue..... : 2018-03-28
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.

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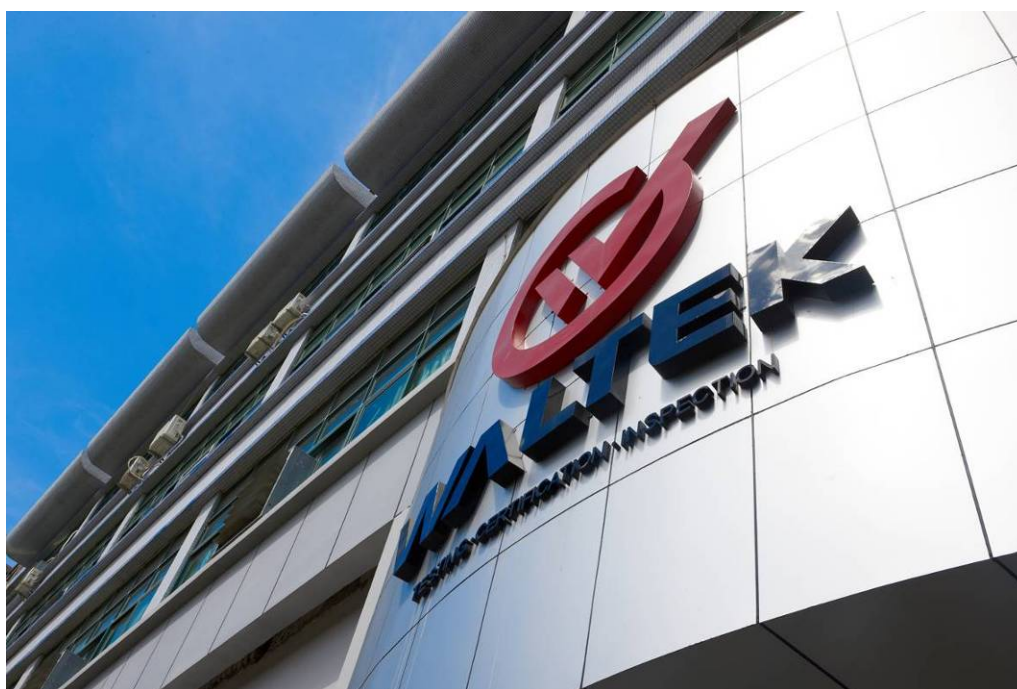


Philo Zhong

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1 Laboratories Introduction

Waltek Services (Shenzhen) Co., Ltd is a professional third-party testing and certification laboratory with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by ILAC (International Laboratory Accreditation Cooperation) member. A2LA (American Association for Laboratory Accreditation) of USA, Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CEC(California energy efficiency), IC(Industry Canada). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as Intertek(ETL-SEMKO), TÜV Rheinland, TÜV SÜD, etc.



Waltek Services (Shenzhen) Co., Ltd is one of the largest and the most comprehensive third party testing laboratory in China. Our test capability covered four large fields: safety test. ElectroMagnetic Compatibility(EMC), and energy performance, wireless radio. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

1.1 Test Facility

A. Accreditations for Conformity Assessment (International)

Accreditation for Conformity Assessment (International)			
Country/Region	Accreditation Body	Scope	Note
USA	A2LA (Certificate No.: 4243.01)	FCC ID \ DOC \ VOC	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India		International Services	WPC
Thailand	NTC		-
Singapore	IDA		-
Note:			
1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.			
2. IC Canada Registration No.: 7760A			

B.TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of ...	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

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3 Report Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS18S01100299-1W	2018-01-11	2018-01-12 to 2018-03-27	2018-03-28	original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	512GW Ultra Dash Cam
Model(s)	NBDVR512GW, FE-NBDVR512GW, NBDVR512G, FE-NBDVR512G NBDVR512GW-W, FE-NBDVR512GW-W, VYDVR512GW, FE-VYDVR512GW
Model Difference	Only the appearance and brand name is different. The model NBDVR512GW is the tested sample.

4.2 Details of E.U.T.

Operation Frequency:	802.11b/g/n HT20: 2412MHz ~ 2462MHz, 802.11n HT40: 2422MHz~2452MHz
Antenna installation:	Wire Antenna
Antenna Gain:	0dBi
Type of modulation:	IEEE 802.11b (CCK/QPSK/BPSK, 11Mbps max.) IEEE 802.11g (BPSK/QPSK/16QAM/64QAM, 54Mbps max.) IEEE 802.11n (BPSK/QPSK/16QAM/64QAM, HT20: 72Mbps max., HT40: 150Mbps max.)
Ratings:	DC 5V from Car Charger or DC 5V by USB from PC

4.3 Channel List

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	12	N/A

4.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum conducted (average) 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
	802.11n HT40	150 Mbps	3/6/9	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
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
	802.11n HT40	150 Mbps	3/6/9	TX
Band Edge	802.11b	11 Mbps	1/11	TX
	802.11g	54 Mbps	1/11	TX
	802.11n HT20	108 Mbps	1/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
Radiated 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
	802.11n HT40	150 Mbps	3/6/9	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 .

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.

5 Equipment Used during Test

5.1 Equipment's List

Conducted Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	2017-09-12	2018-09-11
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	2017-09-12	2018-09-11
3.	Limiter	York	MTS-IMP-136	261115-001-0024	2017-09-12	2018-09-11
3m Semi-anechoic Chamber for Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP30	100091	2017-04-29	2018-04-28
2	Broad-band Horn Antenna(1-18GHz)	SCHWARZBECK	BBHA 9120 D	667	2017-04-09	2018-04-08
3	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2017-04-13	2018-04-12
4	Coaxial Cable (above 1GHz)	Top	1GHz-18GHz	EW02014-7	2017-04-13	2018-04-12
5	Spectrum Analyzer	R&S	FSP40	100501	2017-10-20	2018-10-19
6	Broad-band Horn Antenna(18-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170651	2017-10-25	2018-10-24
7	Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	100472	2017-10-25	2018-10-24
8	Cable	Top	18-40GHz	-	2017-10-25	2018-10-24
3m Semi-anechoic Chamber for Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2017-04-13	2018-04-12
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2017-04-13	2018-04-12
3	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	2017-04-09	2018-04-08
4	Amplifier	ANRITSU	MH648A	M43381	2017-04-13	2018-04-12
5	Cable	HUBER+SUHNER	CBL2	525178	2017-04-13	2018-04-12
6	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2017-09-12	2018-09-11
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSL6	100959	2017-09-12	2018-09-11
2	Coaxial Cable	Top	10Hz-30GHz	-	2017-09-12	2018-09-11
3	Antenna Connector*	Realacc	45RSm	-	2017-09-12	2018-09-11
*: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.						

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

5.3 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

FCC Designation No.: N/A. Test Firm Registration No.: N/A

Test items: N/A

6 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.247(d) 15.205(a) 15.209(a)	Pass
Conducted Emissions	15.207(a)	Pass
Bandwidth	15.247(a)(2)	Pass
Maximum conducted (average) 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
RF Exposure	1.1307(b)(1)	Pass
Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

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

Class/Severity: Class B

Limit:

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

7.1 E.U.T. Operation

Operating Environment :

Temperature: 21.5 °C

Humidity: 51.9 % RH

Atmospheric Pressure: 101.2kPa

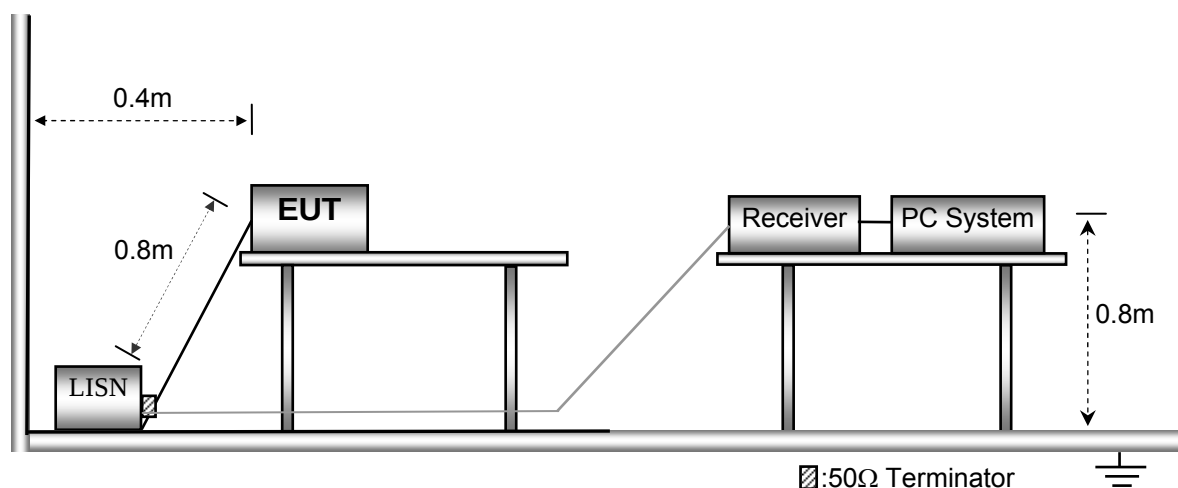
Test Voltage: DC 5V by USB from PC

EUT Operation :

The test was performed in Wi-Fi Transmitting mode, the worst data (Wi-Fi b mode low 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.



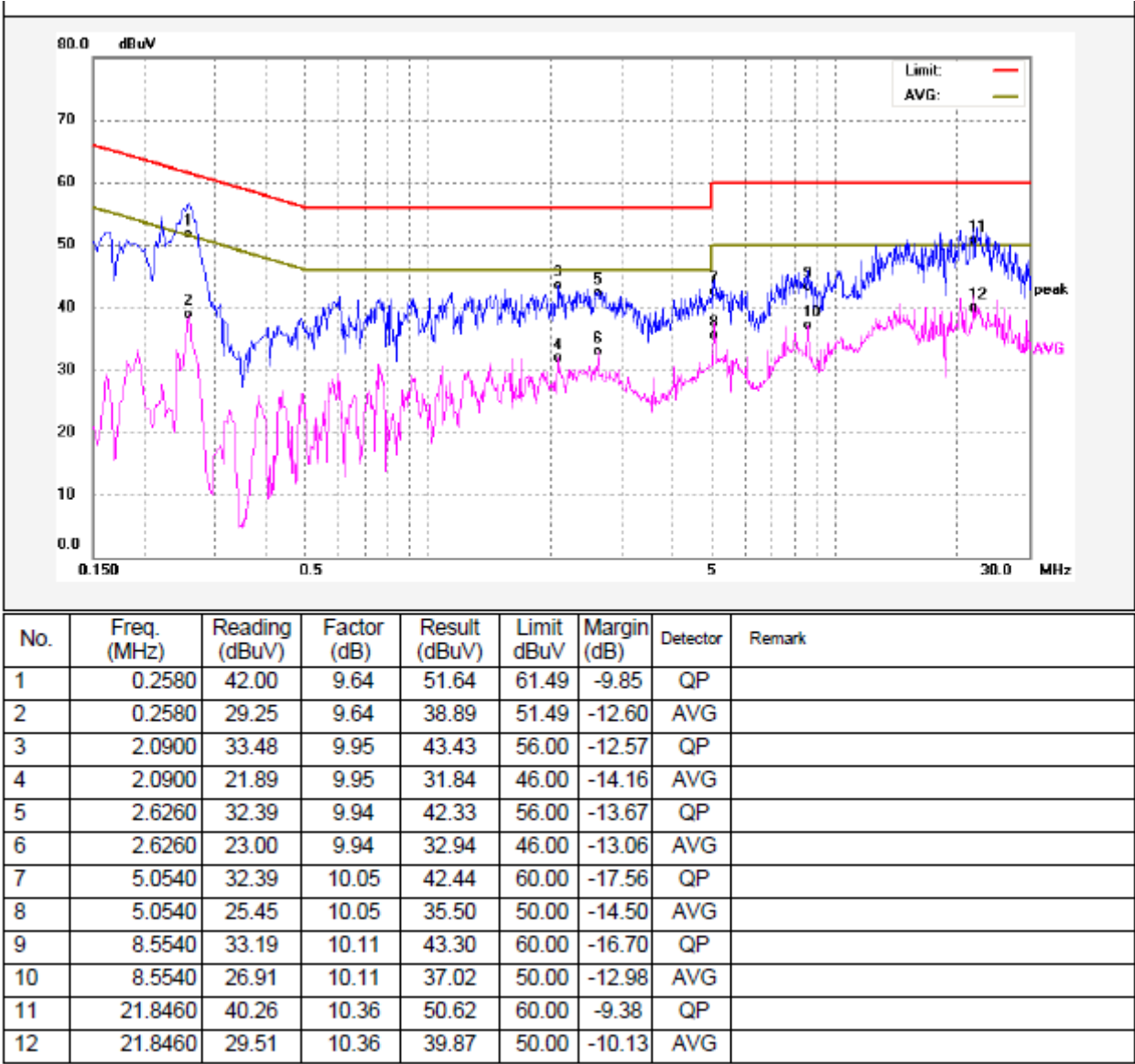
7.3 Measurement Description

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.

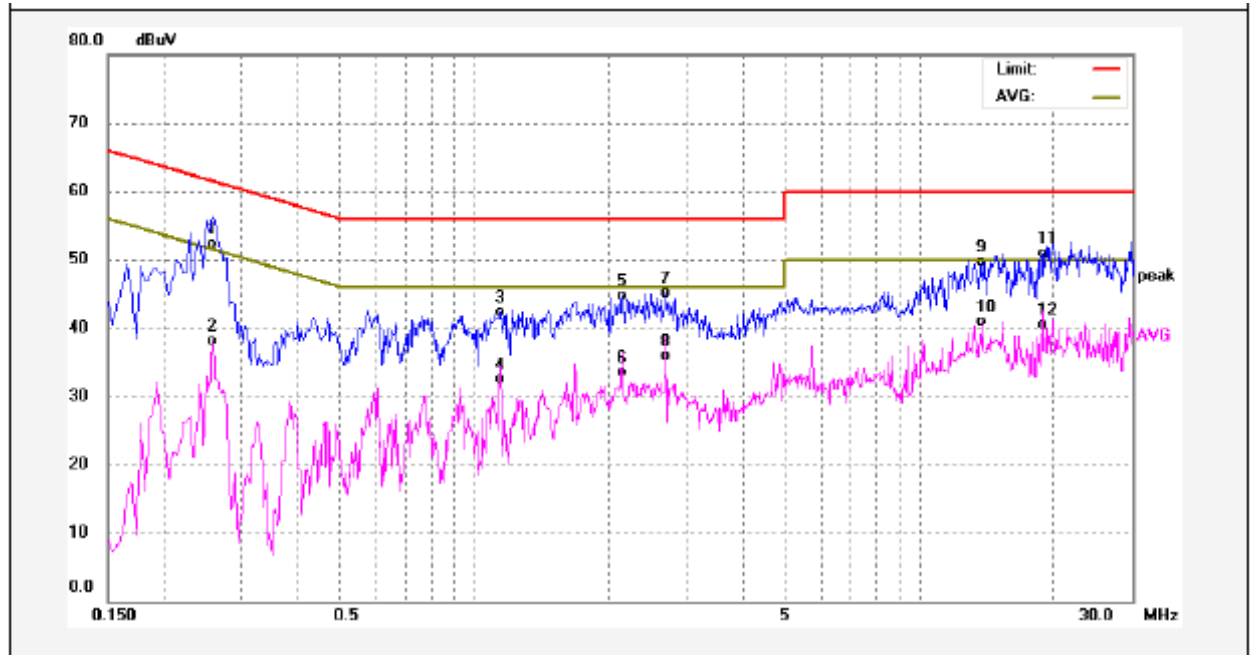
7.4 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

Live line:



Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.2580	42.75	9.64	52.39	61.49	-9.10	QP	
2	0.2580	28.54	9.64	38.18	51.49	-13.31	AVG	
3	1.1460	32.47	9.86	42.33	56.00	-13.67	QP	
4	1.1460	22.62	9.86	32.48	46.00	-13.52	AVG	
5	2.1540	34.75	9.95	44.70	56.00	-11.30	QP	
6	2.1540	23.53	9.95	33.48	46.00	-12.52	AVG	
7	2.6940	35.23	9.94	45.17	56.00	-10.83	QP	
8	2.6940	25.93	9.94	35.87	46.00	-10.13	AVG	
9	13.7939	39.45	10.22	49.67	60.00	-10.33	QP	
10	13.7939	30.76	10.22	40.98	50.00	-9.02	AVG	
11	18.9019	40.67	10.32	50.99	60.00	-9.01	QP	
12	18.9019	30.23	10.32	40.55	50.00	-9.45	AVG	

8 Radiated Spurious 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	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
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

Test Voltage: DC 5V from Car Charger

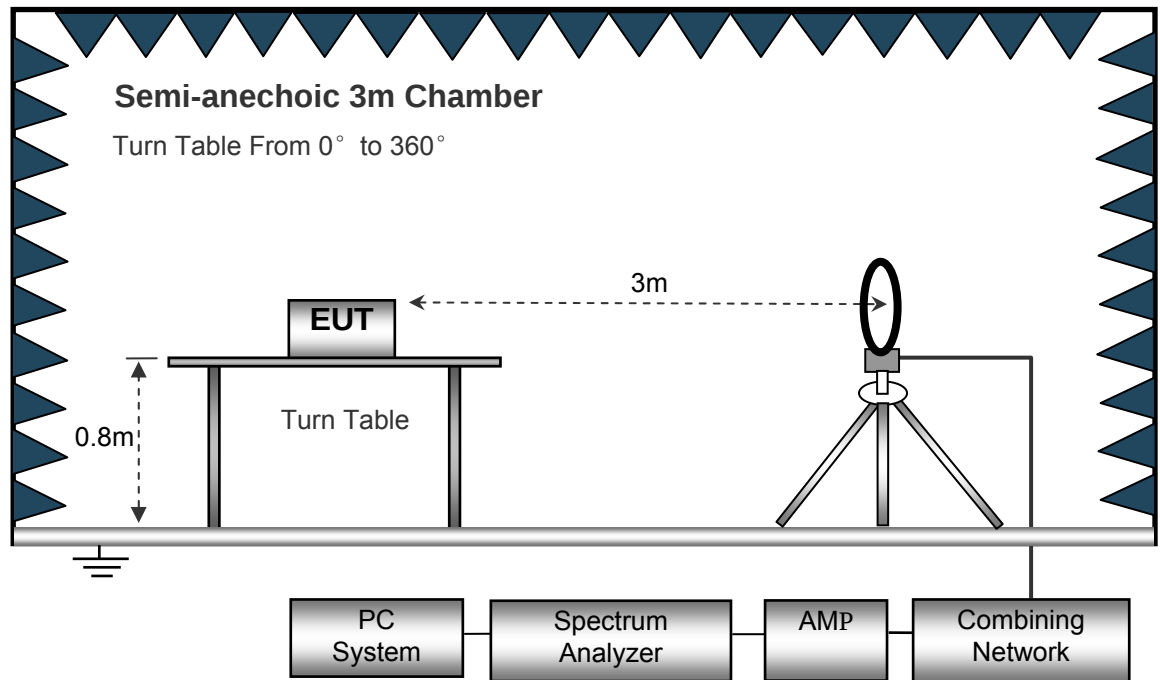
EUT Operation :

The test was performed in Wi-Fi Transmitting mode. the test data were shown in the report.

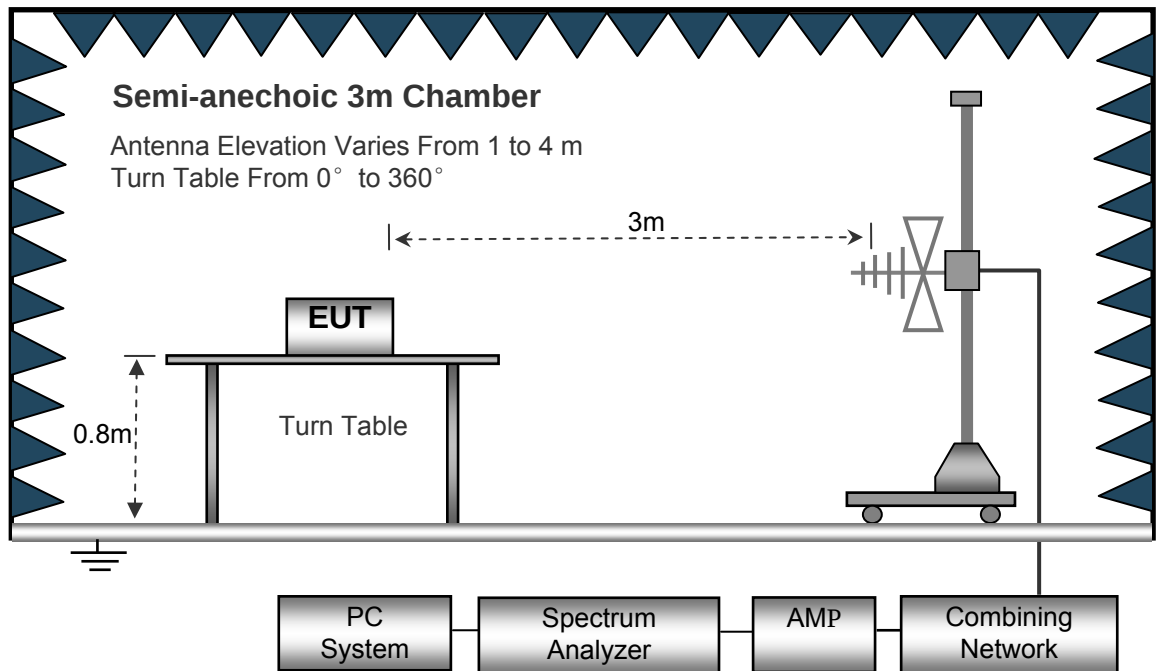
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10:2013.

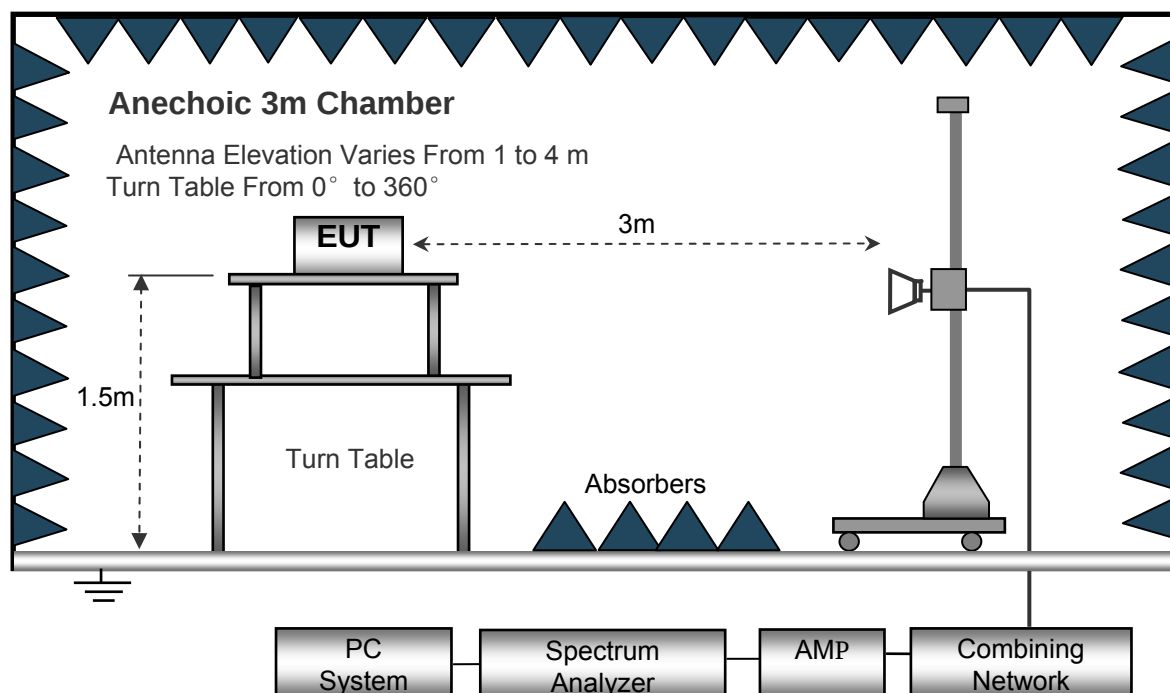
The test setup for emission measurement below 30MHz.



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. For below 1GHz, the EUT is 0.8m above ground plane;
For above 1GHz, the EUT is 1.5m above ground plane.
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 X axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used during 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

8.6 Summary of Test Results

Test Frequency : 9 kHz to 30 MHz

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

Test Frequency : 30 MHz ~ 18 GHz

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									
225.89	41.15	QP	222.44	1.08	H	-11.02	30.13	46.00	-15.87
225.89	39.61	QP	223.56	1.20	V	-11.02	28.59	46.00	-17.41
4824.00	57.44	PK	238.78	1.87	V	-1.08	56.36	74.00	-17.64
4824.00	41.66	Ave	238.78	1.87	V	-1.08	40.58	54.00	-13.42
7236.00	52.88	PK	177.52	1.90	H	1.33	54.21	74.00	-19.79
7236.00	38.94	Ave	177.52	1.90	H	1.33	40.27	54.00	-13.73
2325.87	45.23	PK	22.44	1.35	V	-13.11	32.12	74.00	-41.88
2325.87	38.12	Ave	22.44	1.35	V	-13.11	25.01	54.00	-28.99
2371.87	44.86	PK	353.26	1.91	H	-13.06	31.80	74.00	-42.20
2371.87	38.64	Ave	353.26	1.91	H	-13.04	25.60	54.00	-28.40
2489.89	43.22	PK	291.14	1.83	V	-13	30.22	74.00	-43.78
2489.89	36.04	Ave	291.14	1.83	V	-13	23.04	54.00	-30.96

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									
225.89	41.95	QP	202.67	1.97	H	-11.02	30.93	46.00	-15.07
225.89	39.56	QP	343.07	1.48	V	-11.02	28.54	46.00	-17.46
4874.00	56.32	PK	245.12	1.54	V	-1.08	55.24	74.00	-18.76
4874.00	41.95	Ave	245.12	1.54	V	-1.08	40.87	54.00	-13.13
7311.00	52.16	PK	137.71	1.81	H	2.21	54.37	74.00	-19.63
7311.00	38.64	Ave	137.71	1.81	H	2.21	40.85	54.00	-13.15
2321.65	45.11	PK	163.95	1.72	V	-13.19	31.92	74.00	-42.08
2321.65	38.50	Ave	163.95	1.72	V	-13.19	25.31	54.00	-28.69
2385.14	44.11	PK	245.70	1.97	H	-13.14	30.97	74.00	-43.03
2385.14	36.50	Ave	245.70	1.97	H	-13.14	23.36	54.00	-30.64
2487.70	42.80	PK	357.09	1.74	V	-13.08	29.72	74.00	-44.28
2487.70	37.60	Ave	357.09	1.74	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)
11b: High Channel 2462MHz									
225.89	43.04	QP	57.58	1.69	H	-11.02	32.02	46.00	-13.98
225.89	39.29	QP	32.28	1.99	V	-11.02	28.27	46.00	-17.73
4924.00	57.29	PK	188.67	1.34	V	-1.08	56.21	74.00	-17.79
4924.00	42.54	Ave	188.67	1.34	V	-1.08	41.46	54.00	-12.54
7386.00	53.16	PK	53.34	1.77	H	2.84	56.00	74.00	-18.00
7386.00	37.64	Ave	53.34	1.77	H	2.84	40.48	54.00	-13.52
2310.55	46.17	PK	41.34	1.86	V	-13.11	33.06	74.00	-40.94
2310.55	37.15	Ave	41.34	1.86	V	-13.11	24.04	54.00	-29.96
2389.60	43.80	PK	74.80	1.62	H	-13.06	30.74	74.00	-43.26
2389.60	36.78	Ave	74.80	1.62	H	-13.04	23.74	54.00	-30.26
2487.22	44.13	PK	8.59	1.05	V	-13	31.13	74.00	-42.87
2487.22	37.28	Ave	8.59	1.05	V	-13	24.28	54.00	-29.72

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									
225.89	41.79	QP	357.83	1.28	H	-11.02	30.77	46.00	-15.23
225.89	38.73	QP	6.38	1.65	V	-11.02	27.71	46.00	-18.29
4824.00	57.87	PK	179.72	1.48	V	-1.08	56.79	74.00	-17.21
4824.00	42.98	Ave	179.72	1.48	V	-1.08	41.90	54.00	-12.10
7236.00	53.29	PK	55.31	1.40	H	1.33	54.62	74.00	-19.38
7236.00	38.18	Ave	55.31	1.40	H	1.33	39.51	54.00	-14.49
2345.55	46.71	PK	41.03	1.57	V	-13.11	33.60	74.00	-40.40
2345.55	39.30	Ave	41.03	1.57	V	-13.11	26.19	54.00	-27.81
2354.46	43.54	PK	228.33	1.25	H	-13.06	30.48	74.00	-43.52
2354.46	36.83	Ave	228.33	1.25	H	-13.04	23.79	54.00	-30.21
2498.47	43.92	PK	54.55	1.57	V	-13	30.92	74.00	-43.08
2498.47	36.31	Ave	54.55	1.57	V	-13	23.31	54.00	-30.69

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									
225.89	40.68	QP	126.42	1.19	H	-11.02	29.66	46.00	-16.34
225.89	39.82	QP	164.89	1.44	V	-11.02	28.80	46.00	-17.20
4874.00	57.61	PK	351.03	1.40	V	-1.08	56.53	74.00	-17.47
4874.00	43.10	Ave	351.03	1.40	V	-1.08	42.02	54.00	-11.98
7311.00	53.11	PK	105.43	1.46	H	2.21	55.32	74.00	-18.68
7311.00	36.72	Ave	105.43	1.46	H	2.21	38.93	54.00	-15.07
2343.54	46.53	PK	321.78	1.12	V	-13.11	33.42	74.00	-40.58
2343.54	37.55	Ave	321.78	1.12	V	-13.11	24.44	54.00	-29.56
2376.61	43.34	PK	161.55	1.32	H	-13.06	30.28	74.00	-43.72
2376.61	38.59	Ave	161.55	1.32	H	-13.04	25.55	54.00	-28.45
2488.25	44.09	PK	34.32	1.01	V	-13	31.09	74.00	-42.91
2488.25	36.13	Ave	34.32	1.01	V	-13	23.13	54.00	-30.87

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									
225.89	41.70	QP	301.89	1.41	H	-11.02	30.68	46.00	-15.32
225.89	38.59	QP	222.88	1.33	V	-11.02	27.57	46.00	-18.43
4924.00	59.07	PK	351.35	1.75	V	-1.08	57.99	74.00	-16.01
4924.00	42.79	Ave	351.35	1.75	V	-1.08	41.71	54.00	-12.29
7386.00	51.79	PK	142.14	1.57	H	2.84	54.63	74.00	-19.37
7386.00	37.68	Ave	142.14	1.57	H	2.84	40.52	54.00	-13.48
2321.31	45.98	PK	165.24	1.84	V	-13.11	32.87	74.00	-41.13
2321.31	38.63	Ave	165.24	1.84	V	-13.11	25.52	54.00	-28.48
2387.84	42.89	PK	72.30	1.58	H	-13.06	29.83	74.00	-44.17
2387.84	38.76	Ave	72.30	1.58	H	-13.04	25.72	54.00	-28.28
2490.25	44.84	PK	30.53	1.82	V	-13	31.84	74.00	-42.16
2490.25	37.95	Ave	30.53	1.82	V	-13	24.95	54.00	-29.05

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)
n20: Low Channel 2412MHz									
225.89	40.61	QP	22.01	1.31	H	-11.02	29.59	46.00	-16.41
225.89	39.19	QP	99.38	1.64	V	-11.02	28.17	46.00	-17.83
4824.00	59.50	PK	173.37	1.17	V	-1.08	58.42	74.00	-15.58
4824.00	41.86	Ave	173.37	1.17	V	-1.08	40.78	54.00	-13.22
7236.00	53.10	PK	306.90	1.31	H	1.33	54.43	74.00	-19.57
7236.00	36.18	Ave	306.90	1.31	H	1.33	37.51	54.00	-16.49
2329.57	46.89	PK	133.71	1.31	V	-13.11	33.78	74.00	-40.22
2329.57	37.60	Ave	133.71	1.31	V	-13.11	24.49	54.00	-29.51
2367.02	43.48	PK	330.64	1.54	H	-13.06	30.42	74.00	-43.58
2367.02	36.81	Ave	330.64	1.54	H	-13.04	23.77	54.00	-30.23
2496.46	44.03	PK	271.09	1.22	V	-13	31.03	74.00	-42.97
2496.46	37.63	Ave	271.09	1.22	V	-13	24.63	54.00	-29.37

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)
n20: Middle Channel 2437MHz									
225.89	39.89	QP	113.23	1.07	H	-11.02	28.87	46.00	-17.13
225.89	39.51	QP	269.82	1.61	V	-11.02	28.49	46.00	-17.51
4874.00	60.89	PK	86.37	1.17	V	-1.08	59.81	74.00	-14.19
4874.00	40.77	Ave	86.37	1.17	V	-1.08	39.69	54.00	-14.31
7311.00	52.59	PK	347.36	1.24	H	2.21	54.80	74.00	-19.20
7311.00	34.94	Ave	347.36	1.24	H	2.21	37.15	54.00	-16.85
2313.22	45.10	PK	39.89	1.64	V	-13.11	31.99	74.00	-42.01
2313.22	39.80	Ave	39.89	1.64	V	-13.11	26.69	54.00	-27.31
2386.89	42.11	PK	344.85	1.15	H	-13.06	29.05	74.00	-44.95
2386.89	37.85	Ave	344.85	1.15	H	-13.04	24.81	54.00	-29.19
2490.35	43.50	PK	175.54	1.73	V	-13	30.50	74.00	-43.50
2490.35	37.74	Ave	175.54	1.73	V	-13	24.74	54.00	-29.26

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)
n20: High Channel 2462MHz									
225.89	38.86	QP	40.35	1.01	H	-11.02	27.84	46.00	-18.16
225.89	39.14	QP	205.57	1.44	V	-11.02	28.12	46.00	-17.88
4924.00	60.79	PK	305.10	1.63	V	-1.08	59.71	74.00	-14.29
4924.00	39.70	Ave	305.10	1.63	V	-1.08	38.62	54.00	-15.38
7386.00	53.00	PK	2.07	1.07	H	2.84	55.84	74.00	-18.16
7386.00	33.61	Ave	2.07	1.07	H	2.84	36.45	54.00	-17.55
2349.38	46.87	PK	96.20	1.76	V	-13.11	33.76	74.00	-40.24
2349.38	39.95	Ave	96.20	1.76	V	-13.11	26.84	54.00	-27.16
2369.96	42.22	PK	108.70	1.26	H	-13.06	29.16	74.00	-44.84
2369.96	38.33	Ave	108.70	1.26	H	-13.04	25.29	54.00	-28.71
2484.79	44.39	PK	354.40	1.62	V	-13	31.39	74.00	-42.61
2484.79	38.23	Ave	354.40	1.62	V	-13	25.23	54.00	-28.77

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)
n40: Low Channel 2422MHz									
225.89	38.85	QP	309.25	1.74	H	-11.02	27.83	46.00	-18.17
225.89	37.69	QP	130.90	1.57	V	-11.02	26.67	46.00	-19.33
4844.00	59.28	PK	305.00	1.62	V	-1.08	58.20	74.00	-15.80
4844.00	37.45	Ave	305.00	1.62	V	-1.08	36.37	54.00	-17.63
7266.00	50.83	PK	124.29	1.27	H	1.33	52.16	74.00	-21.84
7266.00	31.01	Ave	124.29	1.27	H	1.33	32.34	54.00	-21.66
2337.66	46.97	PK	92.65	1.51	V	-13.11	33.86	74.00	-40.14
2337.66	39.10	Ave	92.65	1.51	V	-13.11	25.99	54.00	-28.01
2361.49	42.04	PK	275.99	1.05	H	-13.06	28.98	74.00	-45.02
2361.49	37.12	Ave	275.99	1.05	H	-13.04	24.08	54.00	-29.92
2497.57	44.27	PK	211.88	1.03	V	-13	31.27	74.00	-42.73
2497.57	38.84	Ave	211.88	1.03	V	-13	25.84	54.00	-28.16

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)
n40: Middle Channel 2437MHz									
225.89	39.04	QP	163.09	1.70	H	-11.02	28.02	46.00	-17.98
225.89	37.63	QP	335.36	1.60	V	-11.02	26.61	46.00	-19.39
4874.00	59.29	PK	204.45	1.48	V	-1.08	58.21	74.00	-15.79
4874.00	37.15	Ave	204.45	1.48	V	-1.08	36.07	54.00	-17.93
7311.00	50.35	PK	259.04	1.32	H	2.21	52.56	74.00	-21.44
7311.00	30.64	Ave	259.04	1.32	H	2.21	32.85	54.00	-21.15
2317.87	45.04	PK	305.76	1.19	V	-13.11	31.93	74.00	-42.07
2317.87	38.06	Ave	305.76	1.19	V	-13.11	24.95	54.00	-29.05
2372.21	44.73	PK	286.56	1.10	H	-13.06	31.67	74.00	-42.33
2372.21	38.58	Ave	286.56	1.10	H	-13.04	25.54	54.00	-28.46
2485.24	43.89	PK	352.32	1.59	V	-13	30.89	74.00	-43.11
2485.24	37.29	Ave	352.32	1.59	V	-13	24.29	54.00	-29.71

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)
n40: High Channel 2452MHz									
225.89	39.48	QP	109.11	1.19	H	-11.02	28.46	46.00	-17.54
225.89	38.06	QP	192.91	1.27	V	-11.02	27.04	46.00	-18.96
4904.00	58.51	PK	299.06	1.58	V	-1.08	57.43	74.00	-16.57
4904.00	37.75	Ave	299.06	1.58	V	-1.08	36.67	54.00	-17.33
7356.00	50.74	PK	138.61	1.20	H	2.84	53.58	74.00	-20.42
7356.00	30.83	Ave	138.61	1.20	H	2.84	33.67	54.00	-20.33
2319.18	45.67	PK	256.22	1.65	V	-13.11	32.56	74.00	-41.44
2319.18	39.03	Ave	256.22	1.65	V	-13.11	25.92	54.00	-28.08
2373.69	42.82	PK	334.46	1.89	H	-13.06	29.76	74.00	-44.24
2373.69	36.54	Ave	334.46	1.89	H	-13.04	23.50	54.00	-30.50
2487.93	44.57	PK	46.05	1.88	V	-13	31.57	74.00	-42.43
2487.93	36.28	Ave	46.05	1.88	V	-13	23.28	54.00	-30.72

Test Frequency: 18 GHz~25 GHz

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

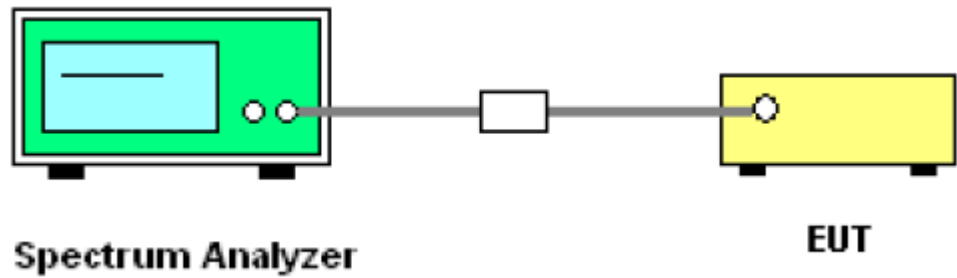
9 Band Edge Measurement

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	558074 D01 DTS Meas Guidance v04, April 5, 2017
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in 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

9.1 Test Produce

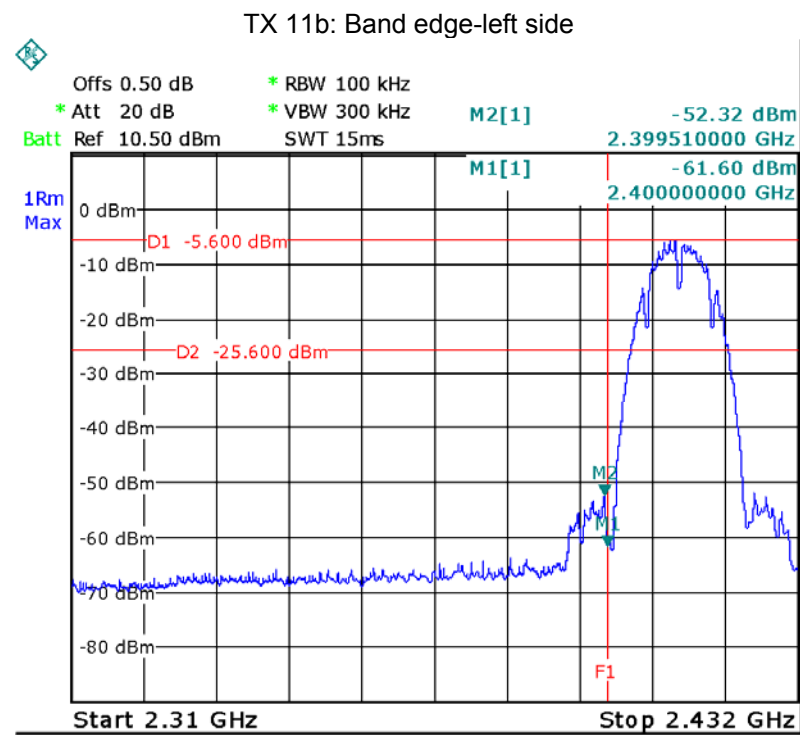
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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.

9.2 Test Setup

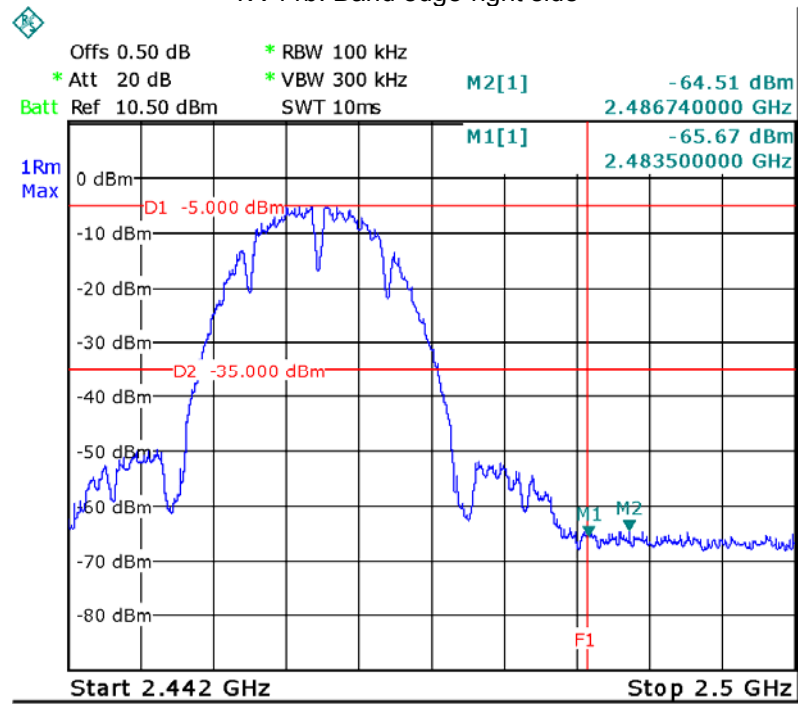


9.3 Test Result

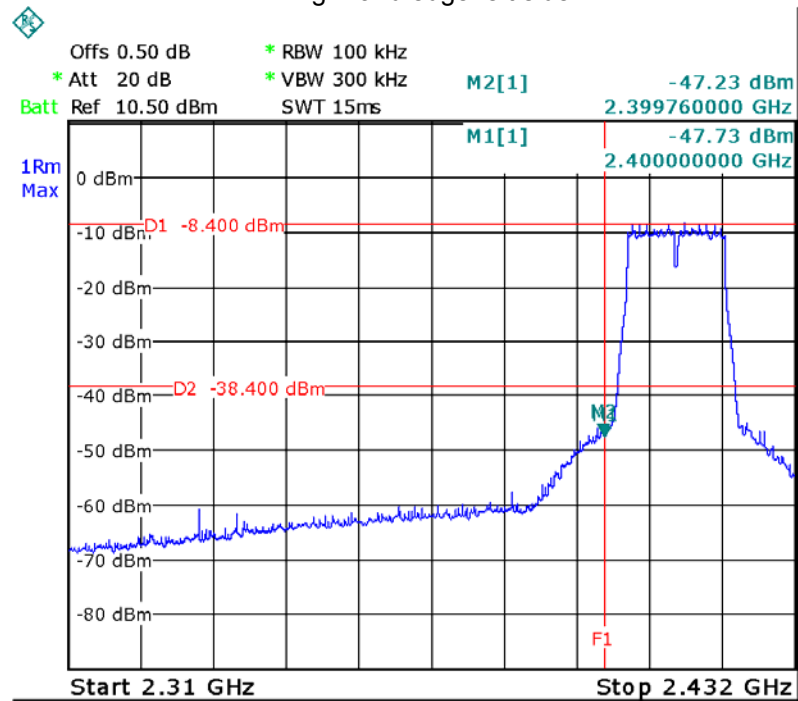
Test result plots shown as follows:

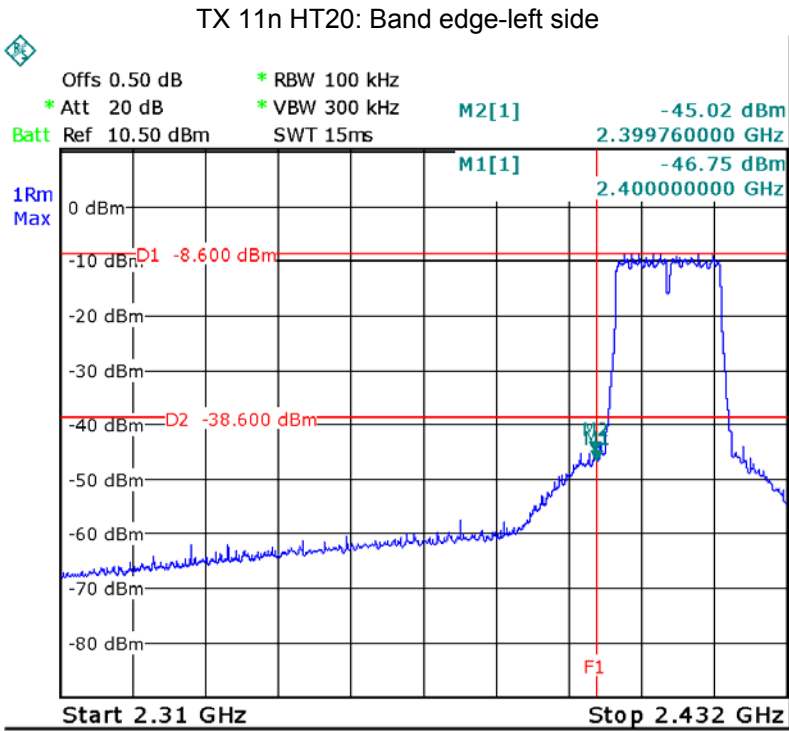
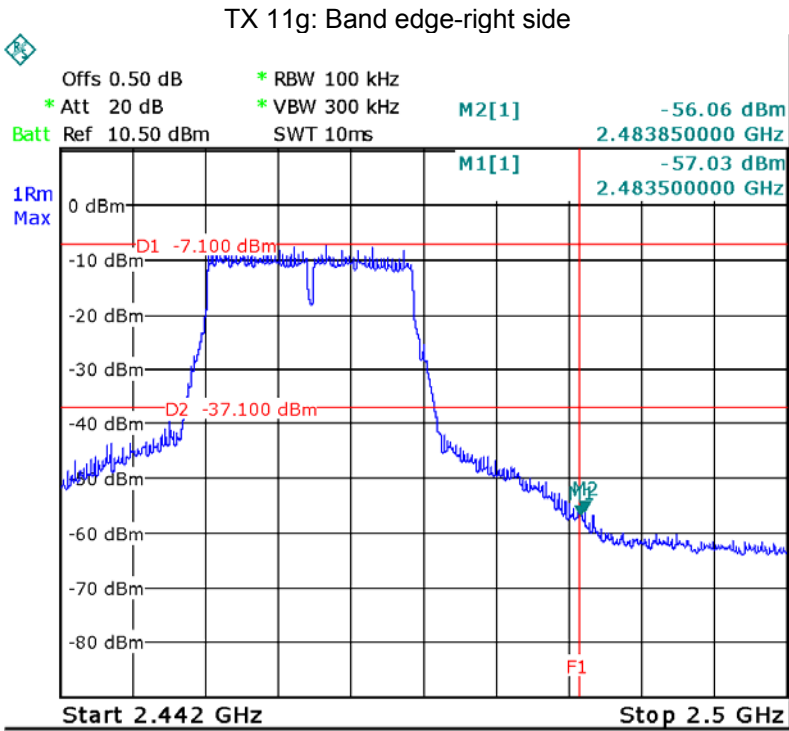


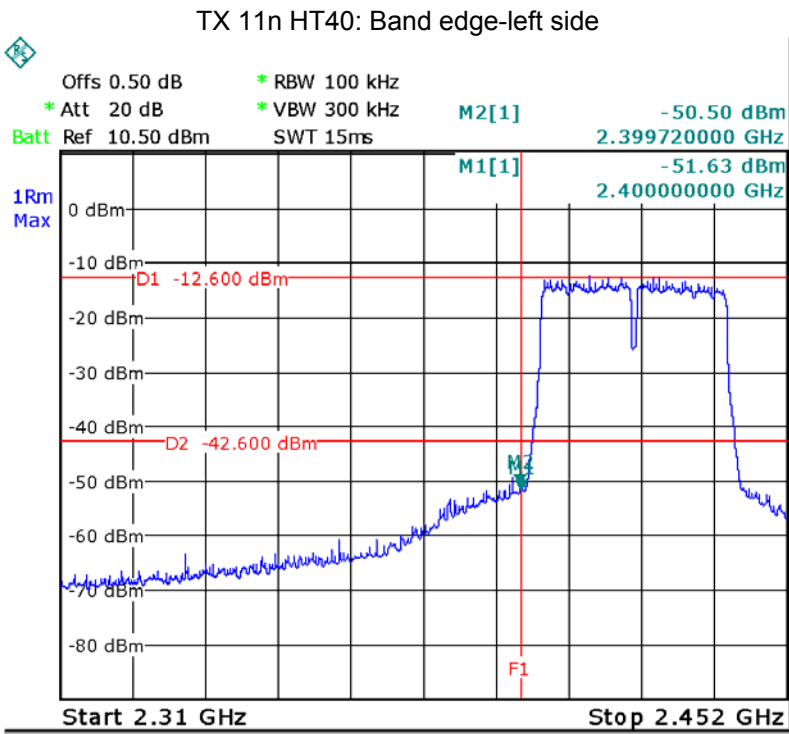
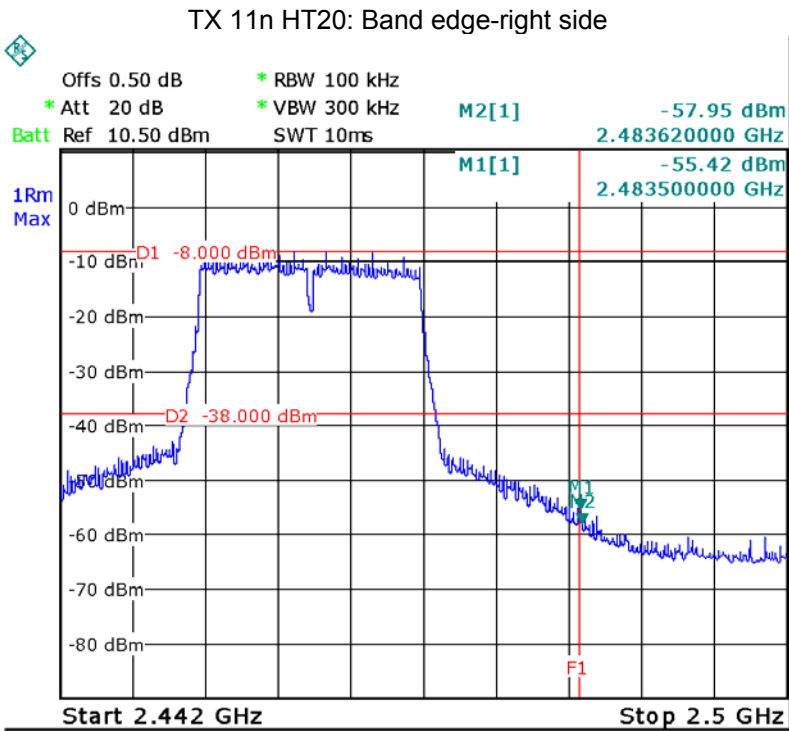
TX 11b: Band edge-right side

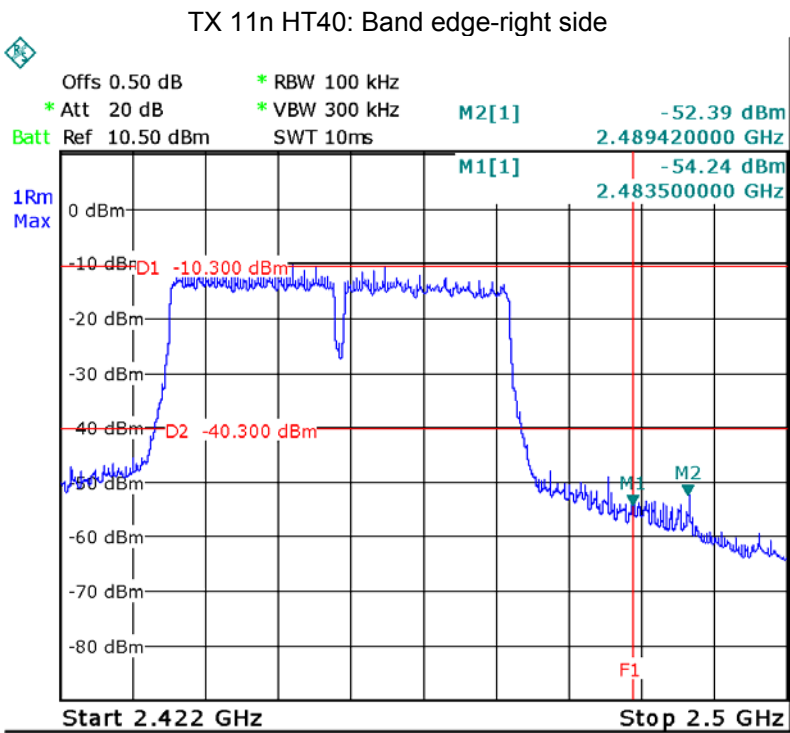


TX 11g: Band edge-left side









10 Bandwidth Measurement

Test Requirement:

FCC CFR47 Part 15 Section 15.247

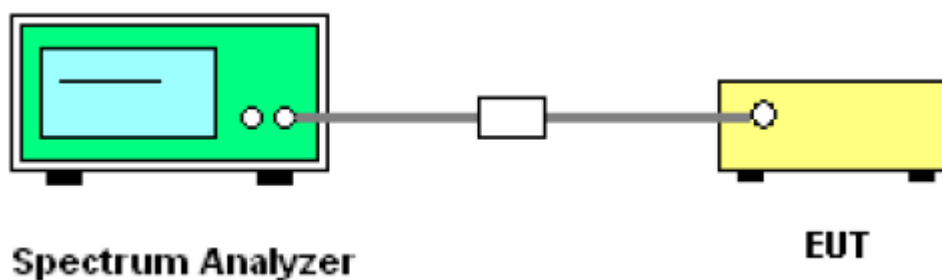
Test Method:

558074 D01 DTS Meas Guidance v04, April 5, 2017

10.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

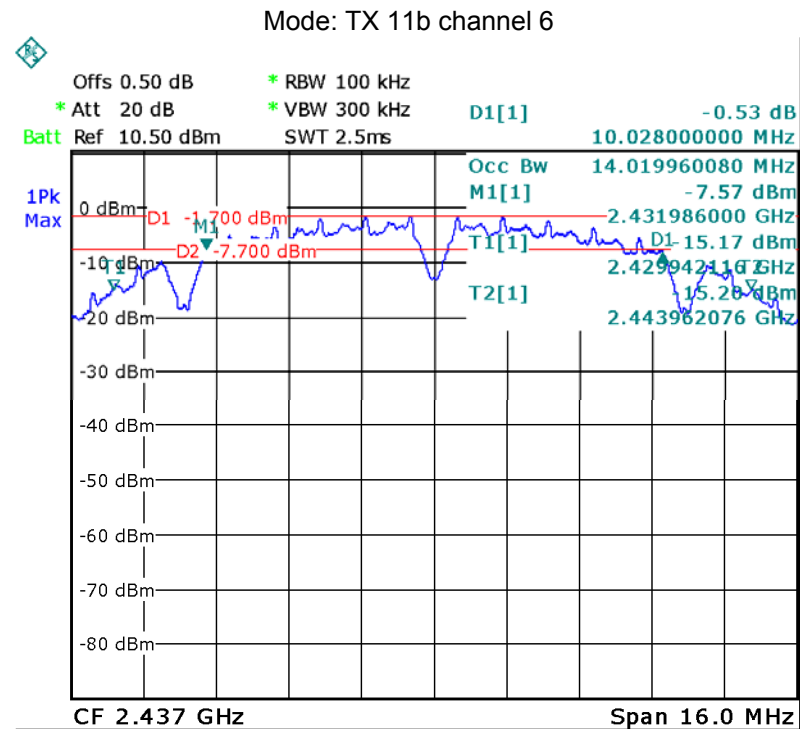
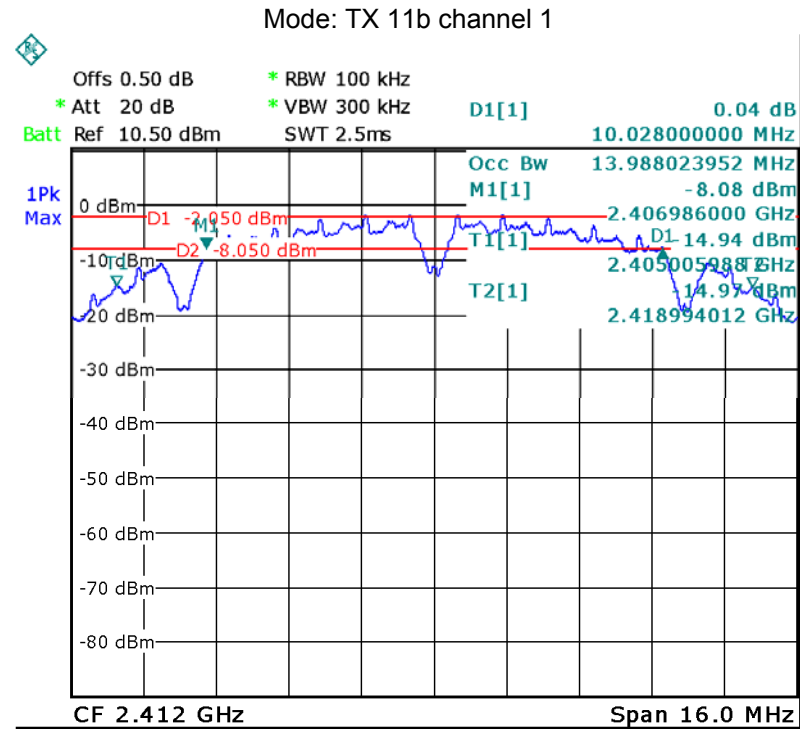
10.2 Test Setup

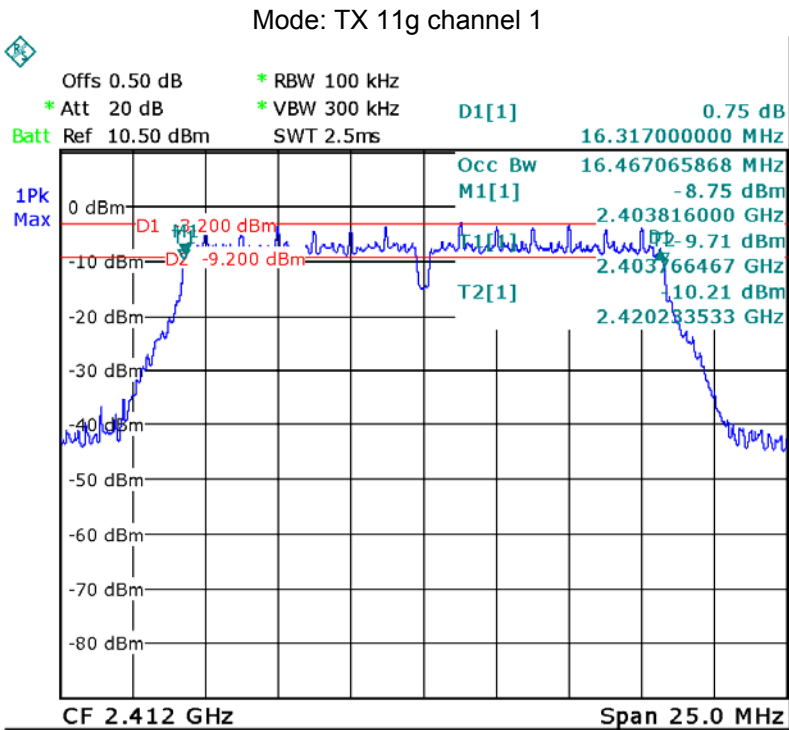
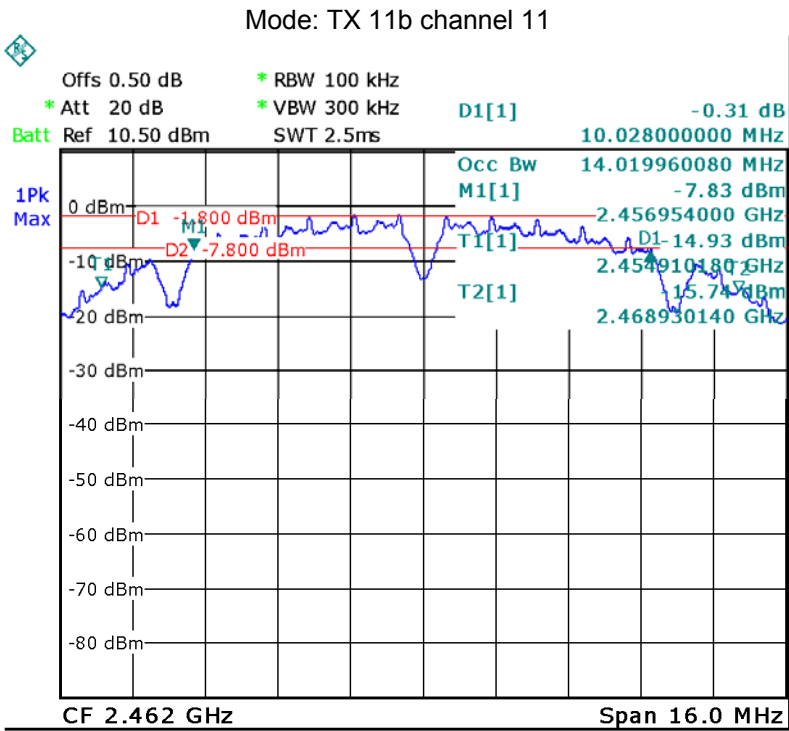


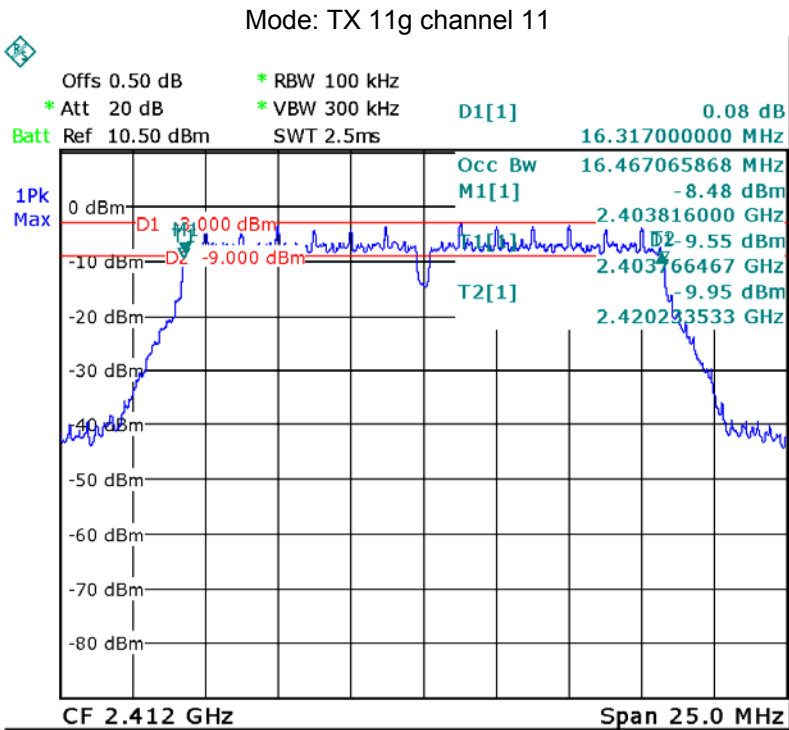
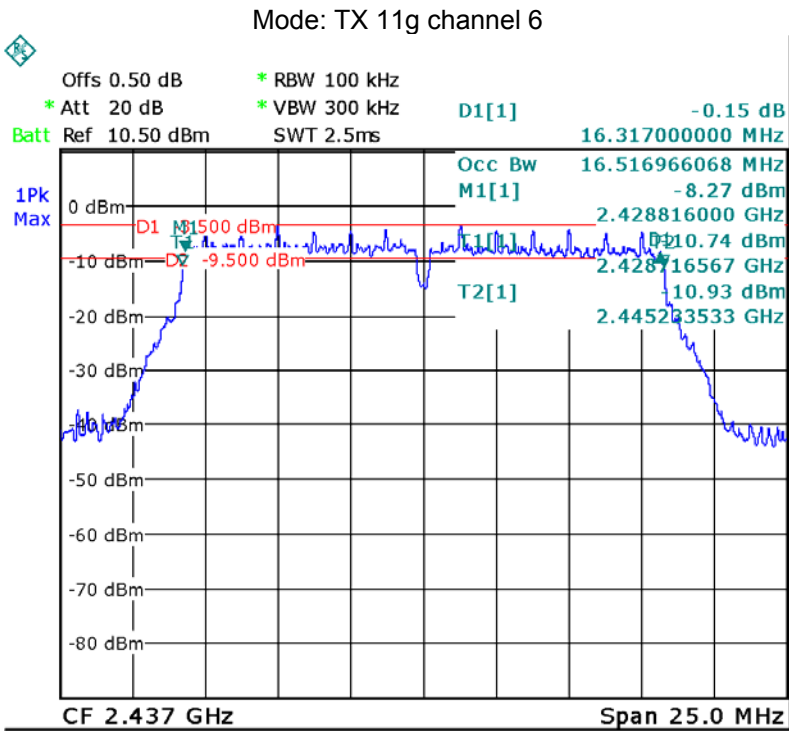
10.3 Test Result:

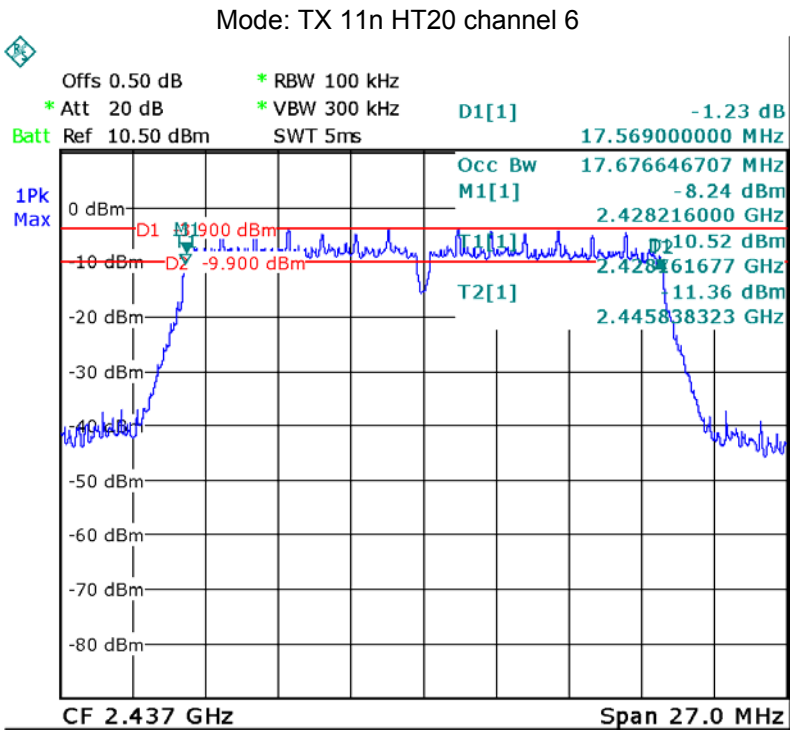
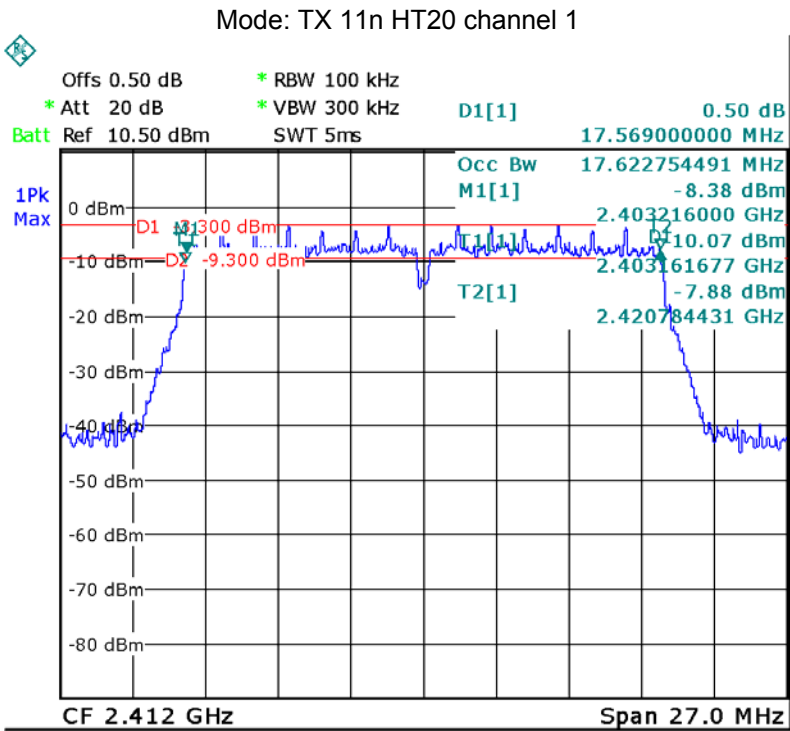
Operation mode	6dB Bandwidth (MHz)			99% Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	10.028	10.028	10.028	13.988	14.020	14.020
TX 11g	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	16.317	16.317	16.317	16.467	16.517	16.467
TX 11n HT20	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	17.569	17.569	17.569	17.623	17.677	17.623
TX 11n HT40	Channel 3	Channel 6	Channel 9	Channel 3	Channel 6	Channel 9
	35.460	35.460	35.460	35.898	36.008	36.008

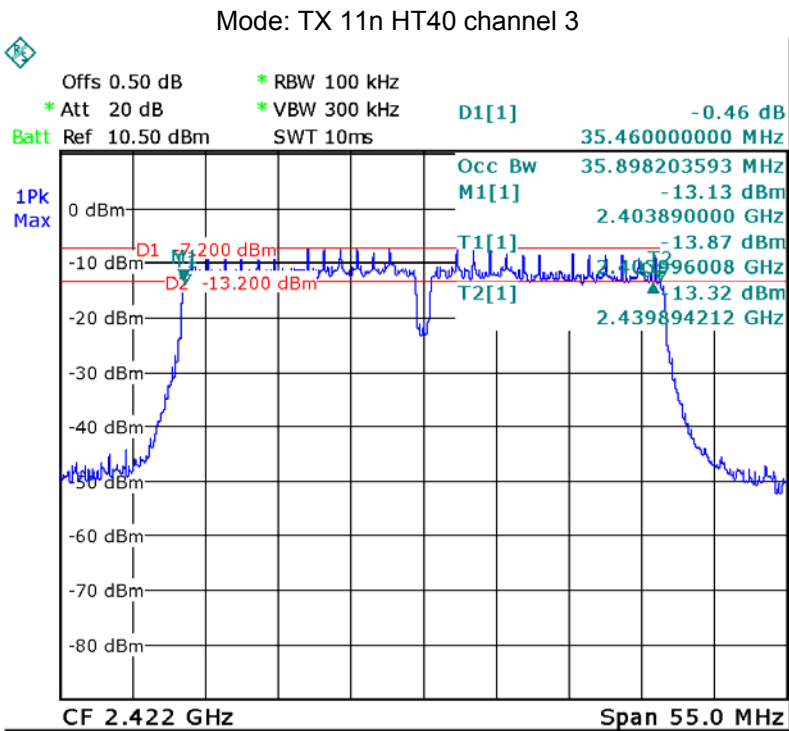
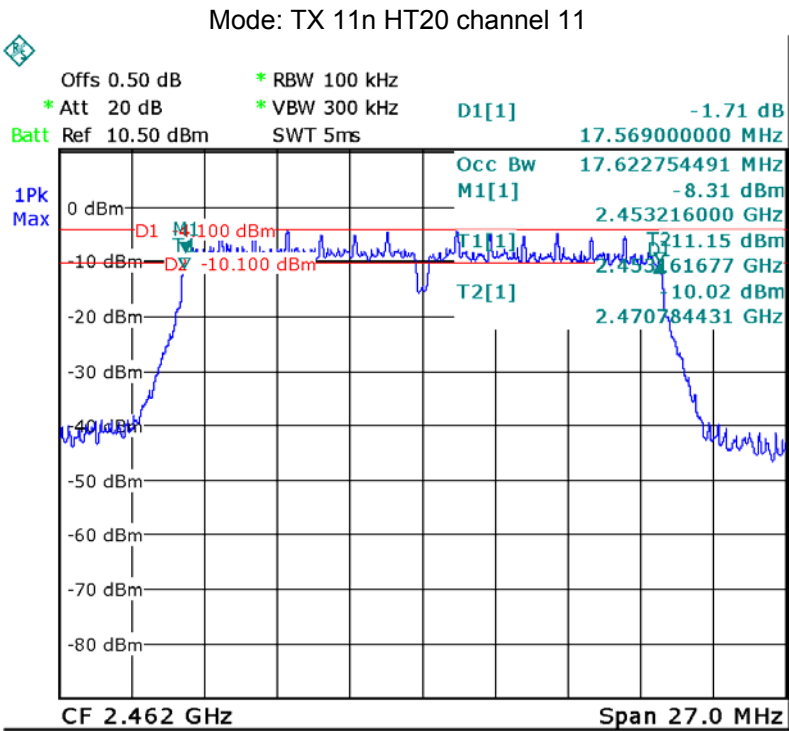
Test result plot as follows:

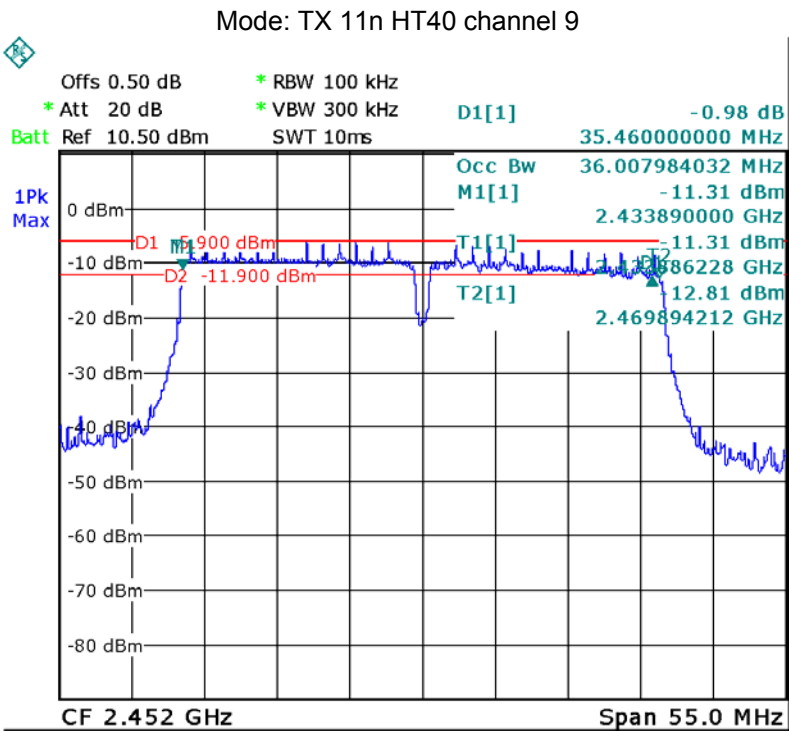
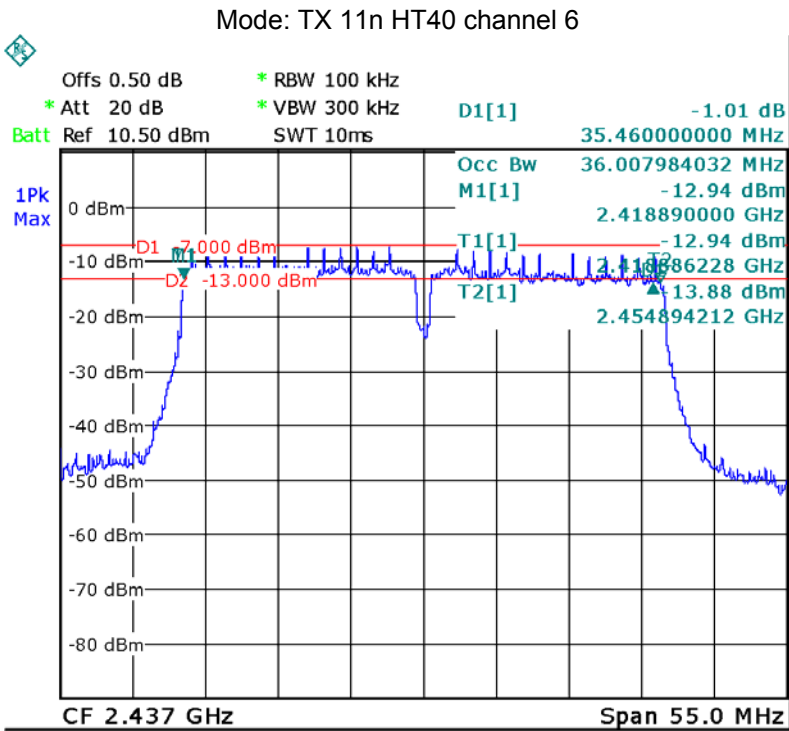












11 Maximum conducted (average) Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

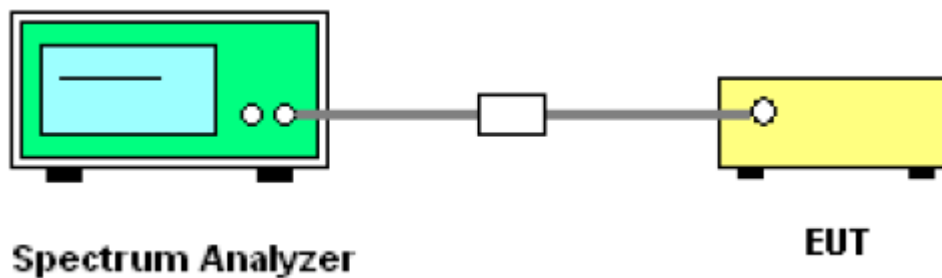
558074 D01 DTS Meas Guidance v04, April 5, 2017

11.1 Test Procedure:

558074 D01 DTS Meas Guidance v04, April 5, 2017

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 = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = RMS, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

11.2 Test Setup



11.3 Test Result:

Test mode :TX 11b		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
8.66	8.93	8.99
Limit: 1W/30dBm		

Test mode :TX 11g		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.15	9.03	9.01
Limit: 1W/30dBm		

Test mode :TX 11n HT20		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.32	9.10	9.01
Limit: 1W/30dBm		

Test mode :TX 11n HT40		
Maximum Peak Output Power (dBm)		
2422MHz	2437MHz	2452MHz
8.96	9.15	9.17
Limit: 1W/30dBm		

12 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

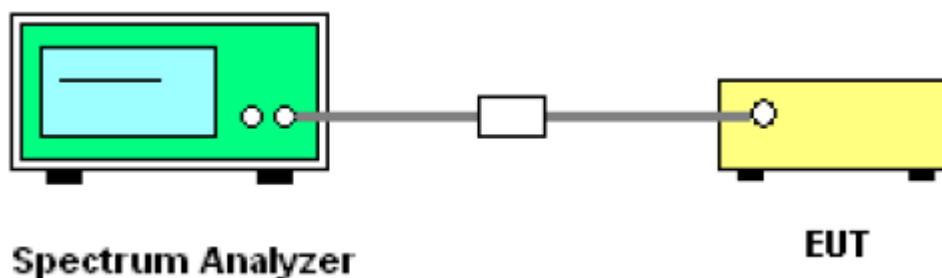
Test Method: 558074 D01 DTS Meas Guidance v04, April 5, 2017

12.1 Test Procedure:

558074 D01 DTS Meas Guidance v04, April 5, 2017

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.

12.2 Test Setup



12.3 Test Result:

Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-20.68	-20.13	-20.25
Limit: 8dBm per 3kHz		

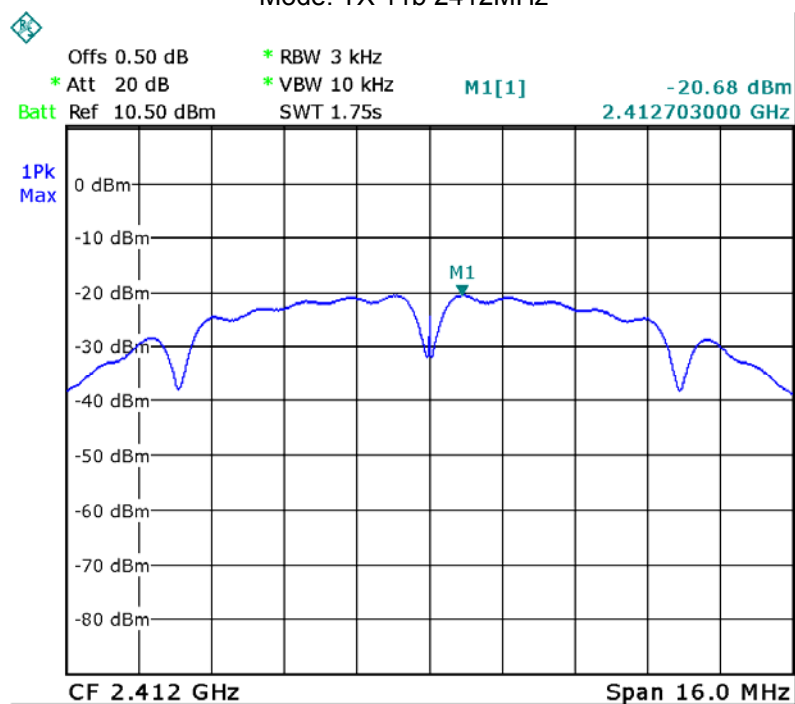
Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-18.68	-18.70	-19.14
Limit: 8dBm per 3kHz		

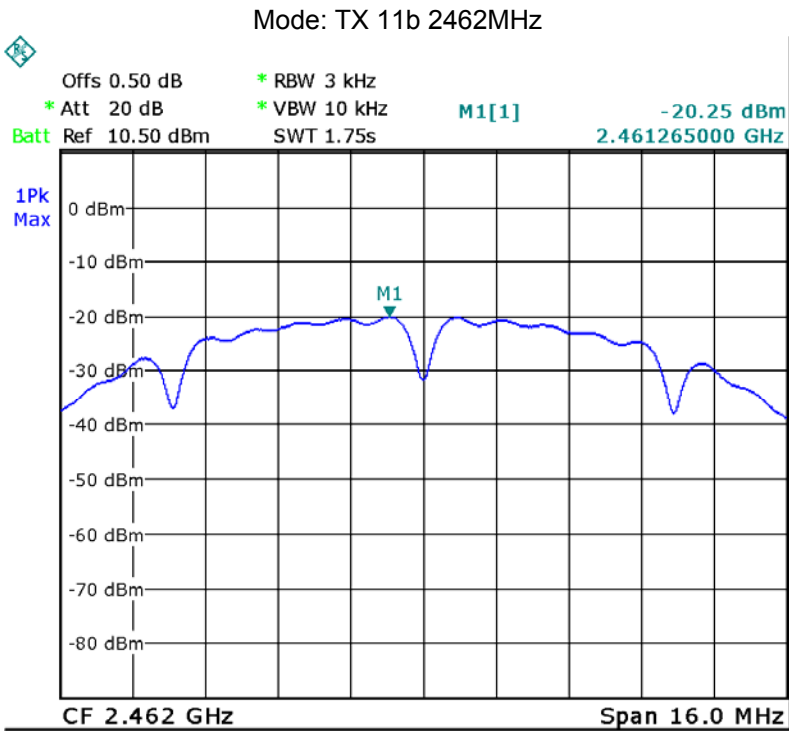
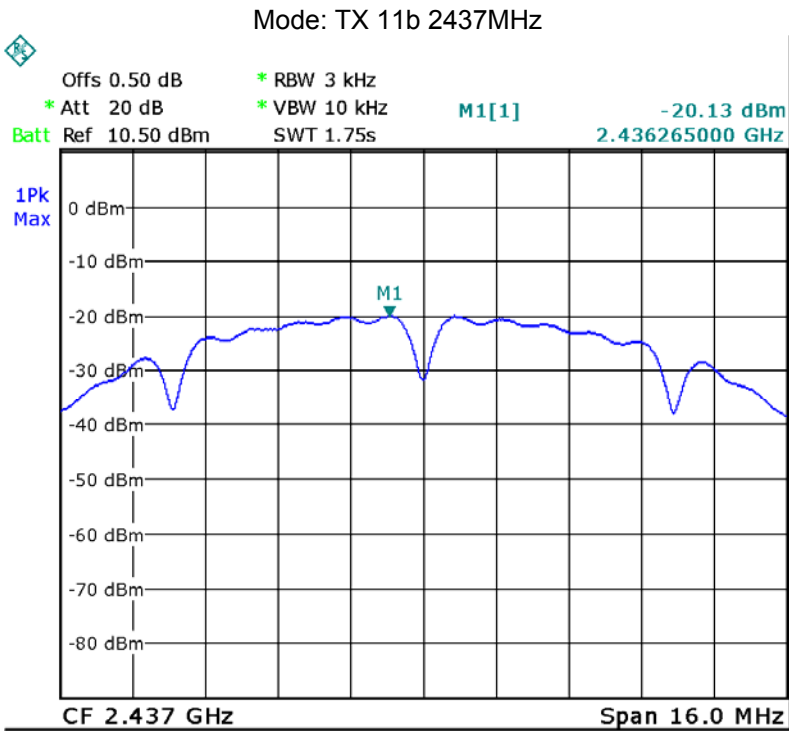
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-18.45	-17.08	-18.47
Limit: 8dBm per 3kHz		

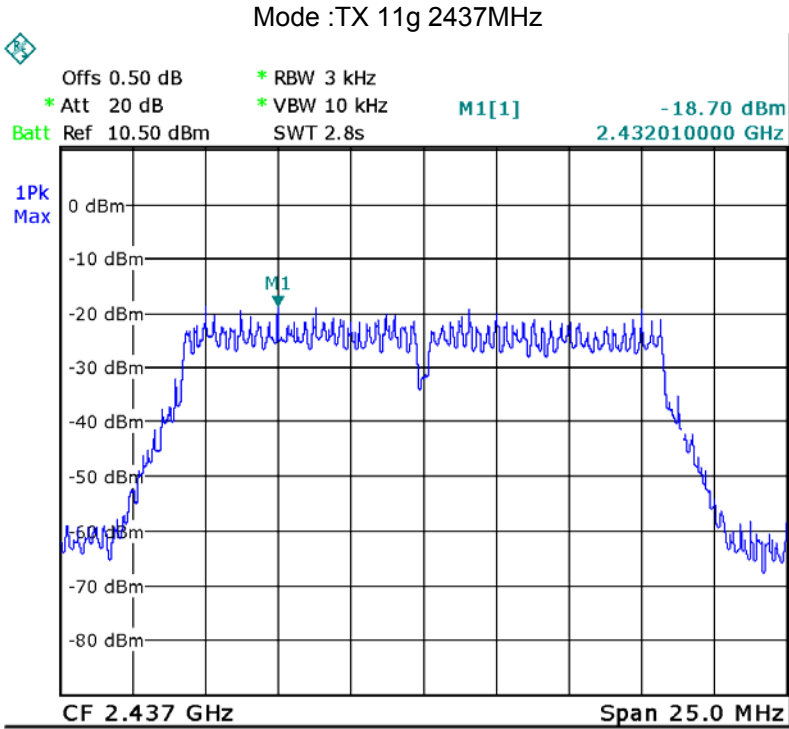
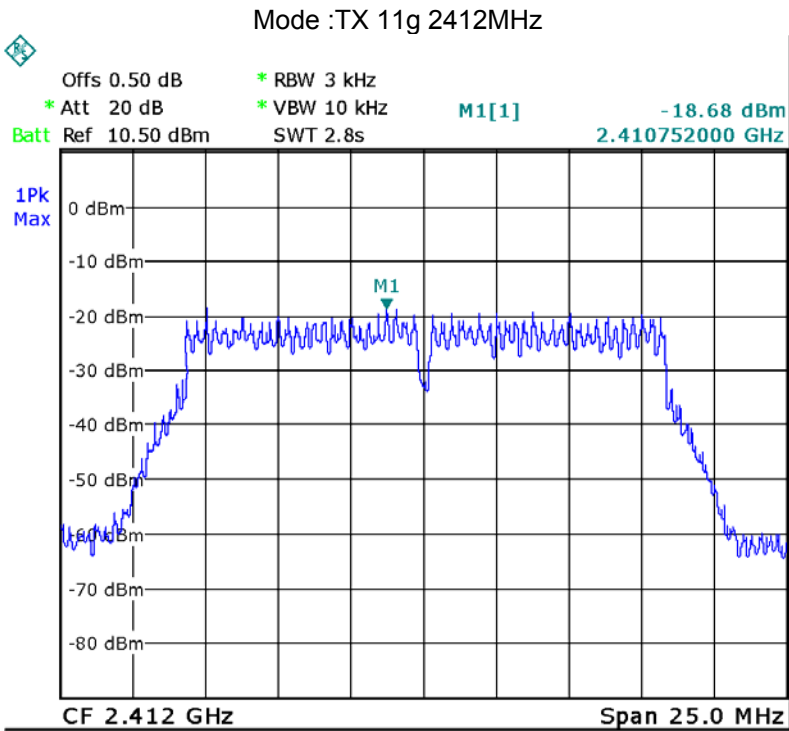
Test mode :TX 11n HT40		
Power Spectral (dBm per 3kHz)		
2422MHz	2437MHz	2452MHz
-21.52	-19.19	-20.64
Limit: 8dBm per 3kHz		

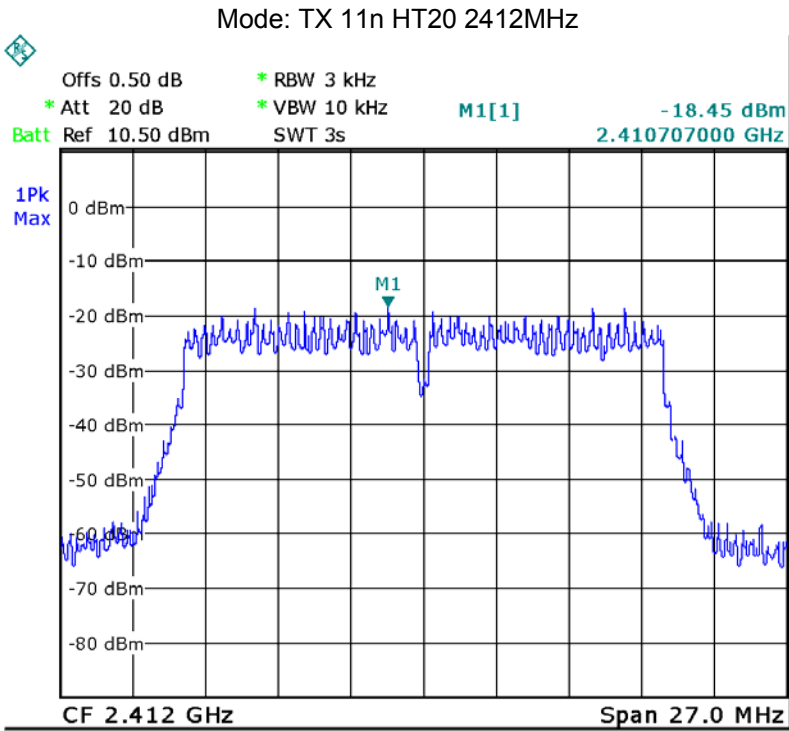
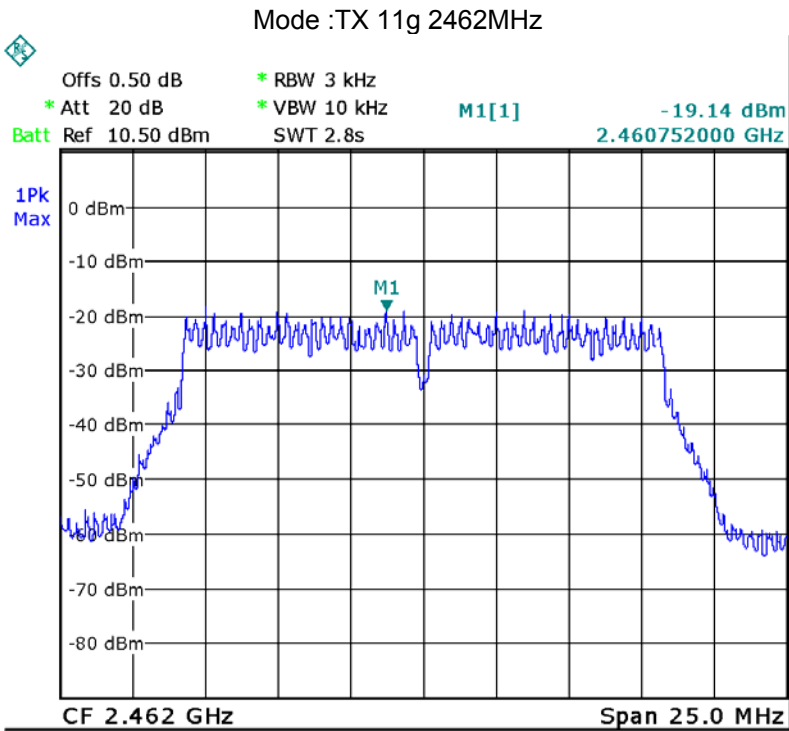
Test Plot

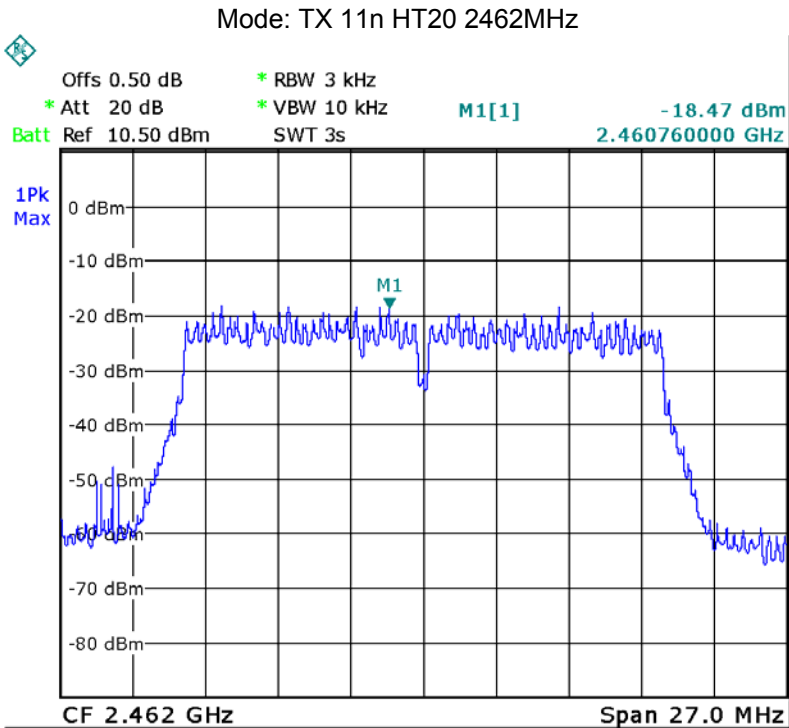
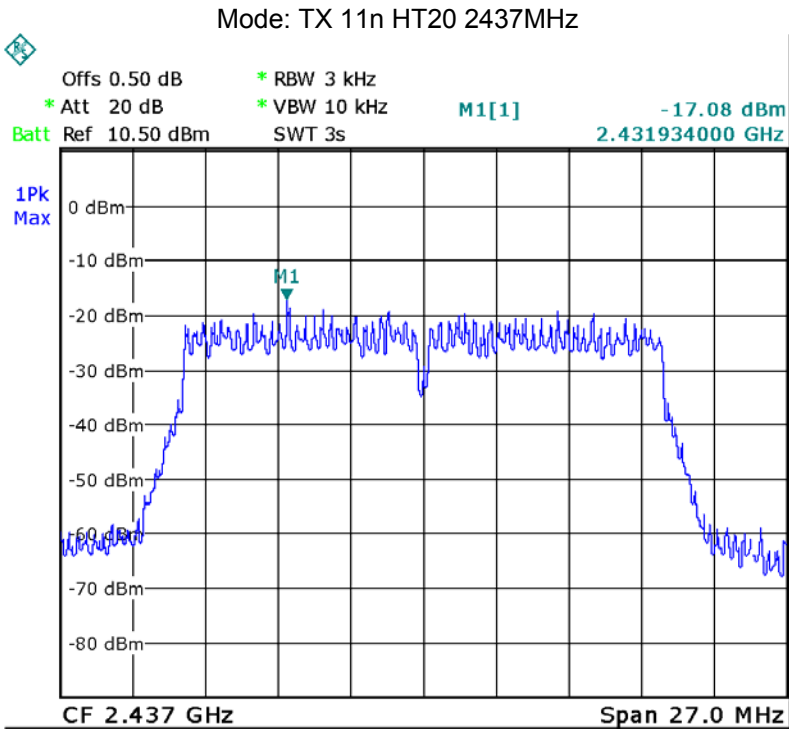
Mode: TX 11b 2412MHz

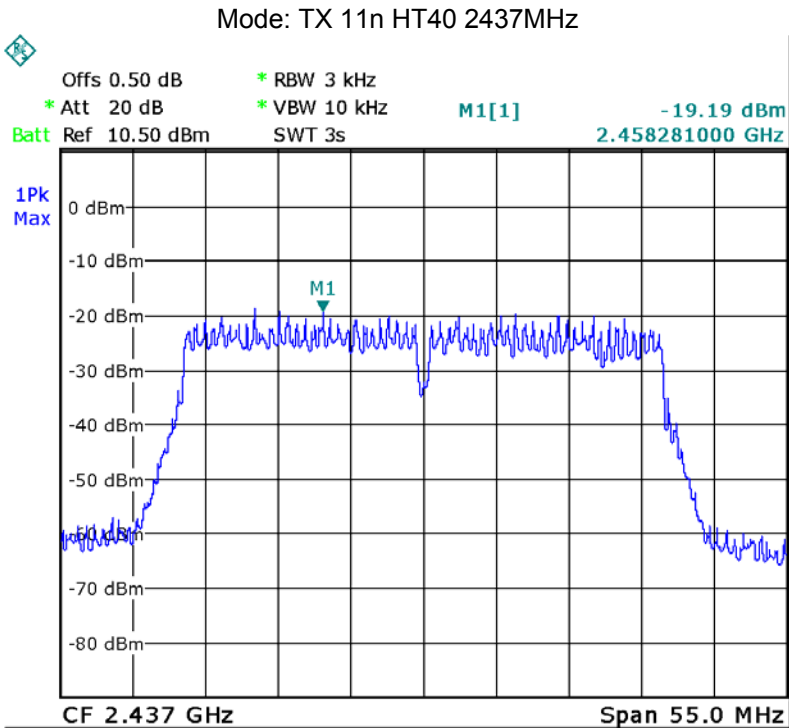
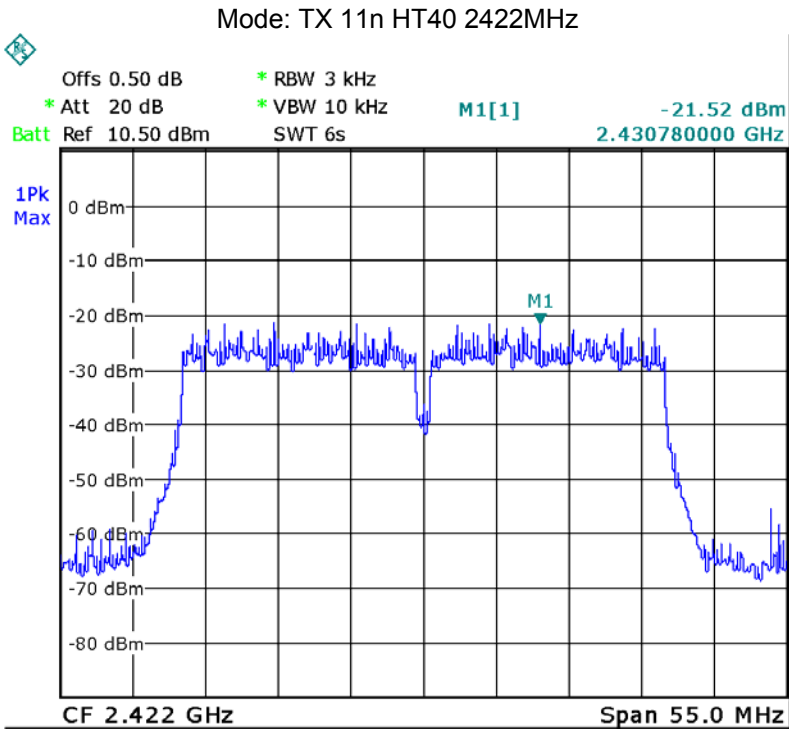


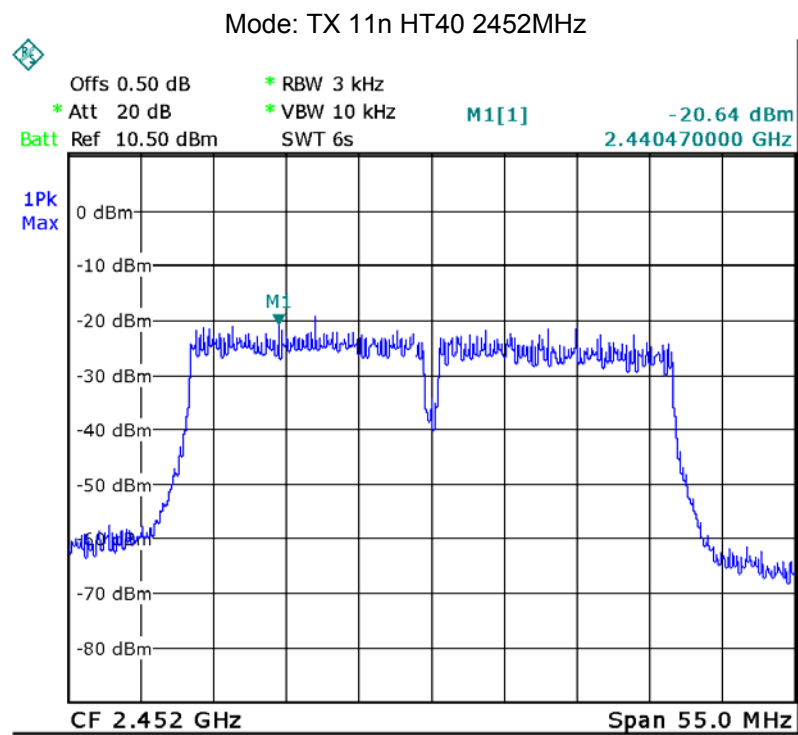












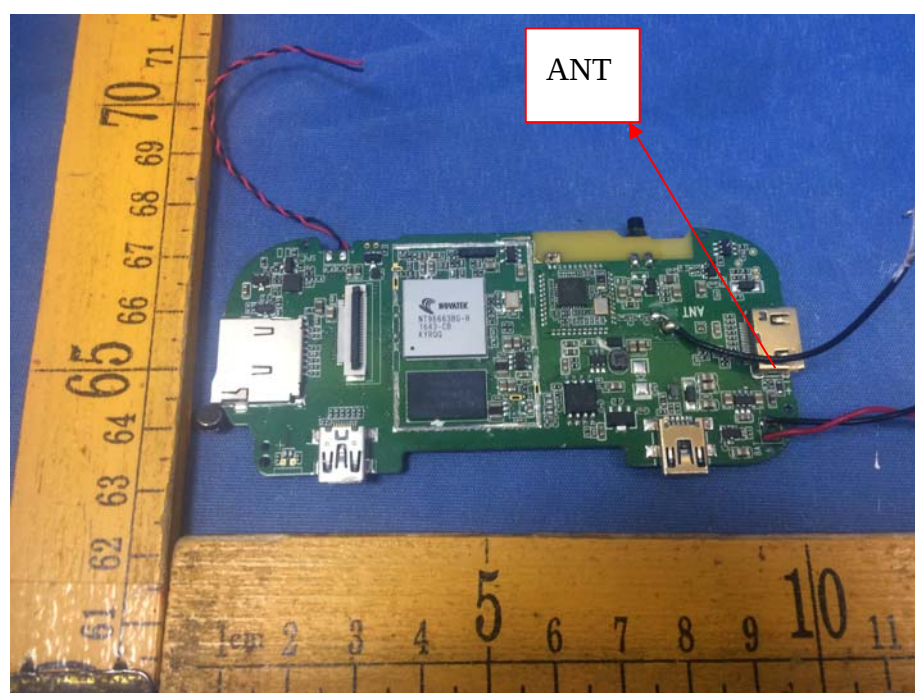
13 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR 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.

Result:

The EUT has one wire antenna, the gain is 0dBi. meets the requirements of FCC 15.203.



14 FCC ID: 2AOT9-NBDVR512GW RF Exposure Report

Note: Please refer to RF Exposure Report: WTS18S01100299-2W.

15 Photographs – Model NBDVR512GW Test Setup Photos

Note: Please refer to Photos: WTS18S01100299-3W.

16 Photographs - Constructional Details

16.1 EUT- Model NBDVR512GW External Photos

Note: Please refer to Photos: WTS18S01100299-3W.

16.2 EUT- Model NBDVR512GW Internal Photos

Note: Please refer to Photos: WTS18S01100299-3W.

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