

# TEST REPORT

**Reference No.** ..... : WTS16S0652789-1E  
**FCC ID**..... : 2AF9R-WETEKHUB  
**Applicant**..... : WeTek Electronics Limited  
**Address** ..... : Level 10, Central Building, 1-3 Pedder Street, Central, Hong Kong.  
**Manufacturer** ..... : WeTek Electronics Limited  
**Address** ..... : Level 10, Central Building, 1-3 Pedder Street, Central, Hong Kong.  
**Product Name** ..... : Android TV BOX  
**Model No.** ..... : Wetek Hub, Wetek Cube, Wetek Nano, Wetek Core, Wetek Play, Wetek play2, Wetek Play2S, Wetek Streamer, Wetek Streamer 4K  
**Brand** ..... : N/A  
**Standards**..... : FCC CFR47 Part 15 C Section 15.247:2015  
**Date of Receipt sample**..... : Jun. 08, 2016  
**Date of Test**..... : Jun. 09 – Jul. 05, 2016  
**Date of Issue** ..... : Jul. 06, 2016  
**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:**

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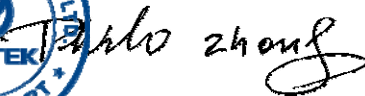
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Compiled by:



Zero Zhou / Test Engineer

Approved by:



Philo Zhong / Manager

## 2 Test Summary

<b>Test Items</b>	<b>Test Requirement</b>	<b>Result</b>
Conducted Emissions	15.207(a)	PASS
Radiated Emissions	15.247 15.205(a) 15.209(a)	PASS
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

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## 4 General Information

### 4.1 General Description of E.U.T.

Product Name:	Android TV BOX
Model No.:	Wetek Hub, Wetek Cube, Wetek Nano, Wetek Core, Wetek Play, Wetek play2, Wetek Play2S, Wetek Streamer, Wetek Streamer 4K
Model Description:	Only the appearance is different. The model Wetek Hub is the tested sample.
Operation Frequency:	IEEE 802.11b/g/n(HT20):2412MHz ~ 2462MHz IEEE 802.11a/ n(HT20)/ac(HT20/40/80): 5150MHz to 5250MHz IEEE 802.11a/ n(HT20)/ac(HT20/40/80): 5725MHz to 5850MHz BT: 2402-2480MHz
The Lowest Oscillator:	12MHz
Antenna Gain:	2.4GHz WIFI:2.0 dBi 5.2GHz WIFI:2.0 dBi 5.8GHz WIFI:2.0 dBi 2.4GHz BT:2.0 dBi
Type of modulation:	IEEE 802.11b DSSS(CCK/QPSK/BPSK) IEEE 802.11g OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11n OFDM(BPSK/QPSK/16QAM/64QAM) IEEE for 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE for 802.11n : OFDM(BPSK/QPSK/16QAM/64QAM) IEEE for 802.11ac : OFDM (BPSK/QPSK/16QAM/64QAM/256QAM) BT: GFSK,PI/4-DQPSK,8DPSK
Number of transmitter chains:	BT/ WIFI: 1

### 4.2 Details of E.U.T.

Technical Data:	Input: DC5V powered by adapter adapter input: 100-240V 50/60Hz, 0.35A outup: 5V, 2000mA adapter manufacturer: SHEN ZHEN KEYU POWER SUPPLY TECHNOLOGY CO.,LTD
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### 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	-

#### 4.4 Test Mode

Test Mode Description:

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Transmitting duty cycle is no less 98%.

The software is installed in operation system, named "RFTestTool.apk", Version 1, date 20160518.

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
	802.11n HT40	150 Mbps	3/6/9	/
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	/
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	3/9	/
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
	802.11n HT40	150 Mbps	3/6/9	/

Table 2 Tests Carried Out Under FCC part 15.207 & FCC part 15.209

Test Item	Test Mode
Conduction Emission, 0.15MHz to 30MHz	Communication

#### 4.5 Test Facility

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

- **IC – Registration No.: 7760A-1**

Waltek Services(Shenzhen) 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-1, July 12, 2012.

- **FCC Test Site 1#– Registration No.: 880581**

Waltek Services(Shenzhen) 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 880581, April 29, 2014.

- **FCC Test Site 2#– Registration No.: 328995**

Waltek Services(Shenzhen) 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 328995, December 3, 2014.

## 5 Equipment Used during Test

### 5.1 Equipments List

Conducted Emissions Test Site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.14,2015	Sep.13,2016
2.	LISN	R&S	ENV216	101215	Sep.14,2015	Sep.13,2016
3.	Cable	Top	TYPE16(3.5M)	-	Sep.14,2015	Sep.13,2016
Conducted Emissions Test Site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.14,2015	Sep.13,2016
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.14,2015	Sep.13,2016
3.	Limitter	York	MTS-IMP-136	261115-001-0024	Sep.14,2015	Sep.13,2016
4.	Cable	LARGE	RF300	-	Sep.14,2015	Sep.13,2016
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.14,2015	Sep.13,2016
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.14,2015	Sep.13,2016
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Sep.14,2015	Sep.13,2016
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.14,2015	Sep.13,2016
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Sep.14,2015	Sep.13,2016
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Sep.14,2015	Sep.13,2016
7	Broadband Preampfier	COMPLIANCE DIRECTION	PAP-1G18	2004	Sep.14,2015	Sep.13,2016
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Sep.14,2015	Sep.13,2016
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	Sep.14,2015	Sep.13,2016
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Sep.14,2015	Sep.13,2016
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	Sep.14,2015	Sep.13,2016
4	Cable	HUBER+SUHNER	CBL2	525178	Sep.14,2015	Sep.13,2016
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	Sep.14,2015	Sep.13,2016
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.14,2015	Sep.13,2016
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Sep.14,2015	Sep.13,2016

## 5.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

## 5.3 Measurement Uncertainty

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

## 5.4 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.



## 6 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.10:2009
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dB $\mu$ V between 0.15MHz & 0.5MHz 56 dB $\mu$ V between 0.5MHz & 5MHz 60 dB $\mu$ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

### 6.1 E.U.T. Operation

Operating Environment :

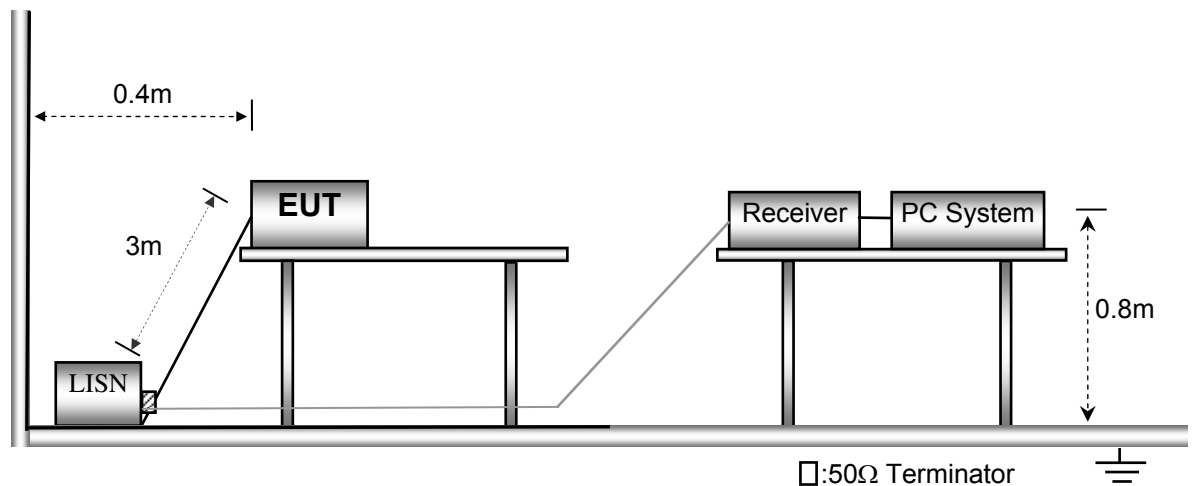
Temperature:	21.5 °C
Humidity:	51.9 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation :

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

### 6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2009.



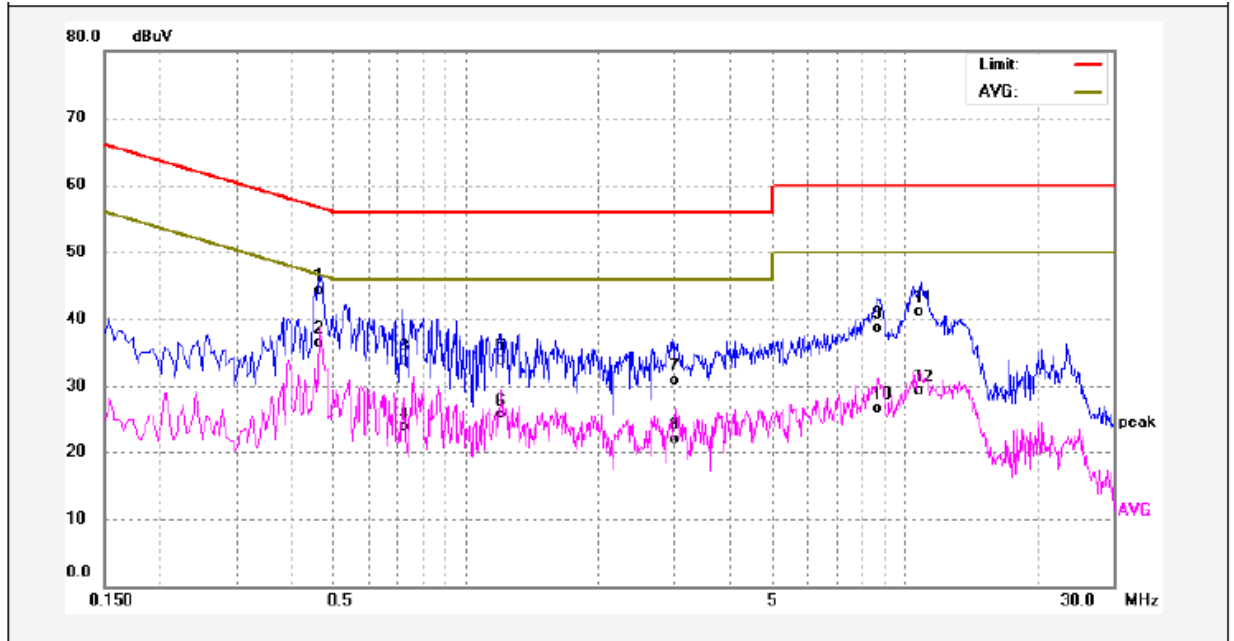
### 6.3 Measurement Description

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.

### 6.4 Conducted Emission Test Result

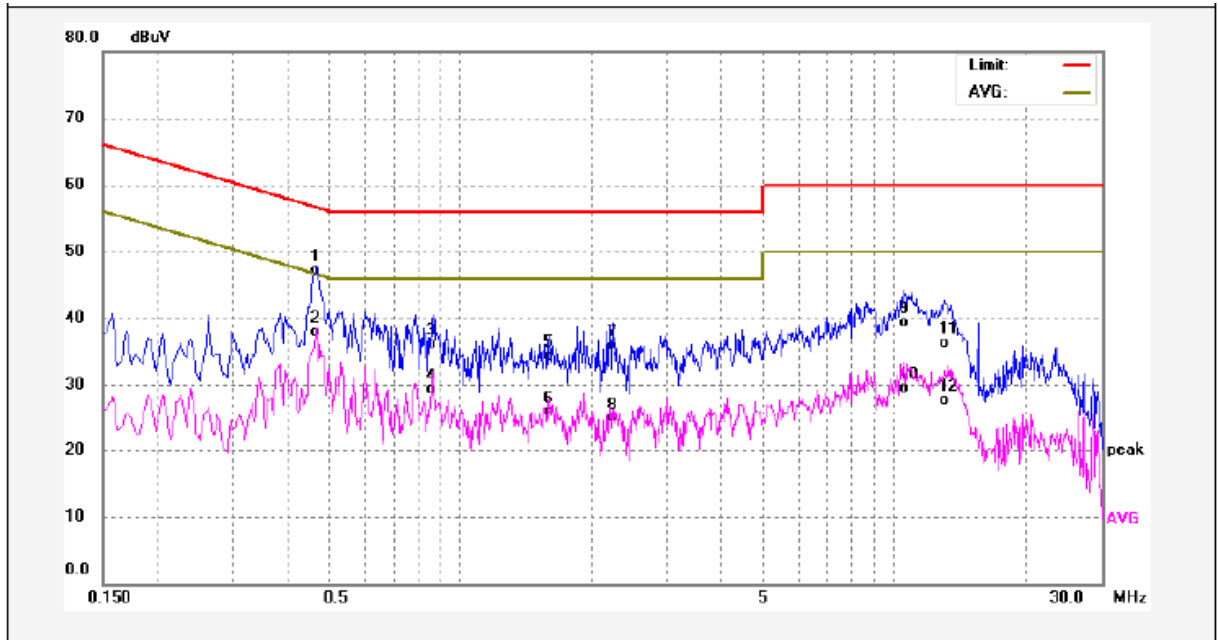
An initial pre-scan was performed on the live and neutral lines.

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.4620	34.12	10.26	44.38	56.66	-12.28	QP	
2	0.4620	26.24	10.26	36.50	46.66	-10.16	AVG	
3	0.7180	23.57	10.36	33.93	56.00	-22.07	QP	
4	0.7180	13.41	10.36	23.77	46.00	-22.23	AVG	
5	1.2059	23.50	10.41	33.91	56.00	-22.09	QP	
6	1.2059	15.39	10.41	25.80	46.00	-20.20	AVG	
7	2.9739	20.37	10.50	30.87	56.00	-25.13	QP	
8	2.9739	11.38	10.50	21.88	46.00	-24.12	AVG	
9	8.6860	27.94	10.67	38.61	60.00	-21.39	QP	
10	8.6860	16.00	10.67	26.67	50.00	-23.33	AVG	
11	10.9300	30.34	10.74	41.08	60.00	-18.92	QP	
12	10.9300	18.56	10.74	29.30	50.00	-20.70	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.4660	36.80	10.26	47.06	56.58	-9.52	QP	
2	0.4660	27.69	10.26	37.95	46.58	-8.63	AVG	
3	0.8660	25.66	10.37	36.03	56.00	-19.97	QP	
4	0.8660	18.85	10.37	29.22	46.00	-16.78	AVG	
5	1.5940	23.84	10.44	34.28	56.00	-21.72	QP	
6	1.5940	15.47	10.44	25.91	46.00	-20.09	AVG	
7	2.2380	25.41	10.47	35.88	56.00	-20.12	QP	
8	2.2380	14.44	10.47	24.91	46.00	-21.09	AVG	
9	10.5540	28.56	10.72	39.28	60.00	-20.72	QP	
10	10.5540	18.74	10.72	29.46	50.00	-20.54	AVG	
11	13.0260	25.56	10.84	36.40	60.00	-23.60	QP	
12	13.0260	16.93	10.84	27.77	50.00	-22.23	AVG	

## 7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2009

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	$20\log^{(500)}$

### 7.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

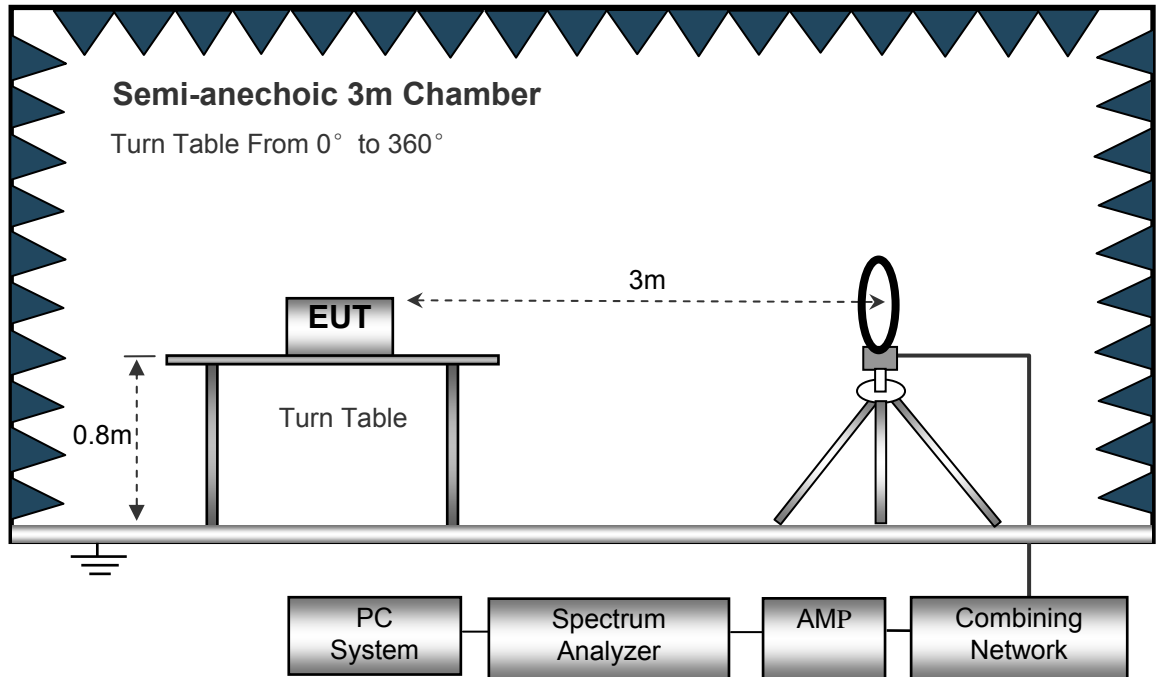
EUT Operation :

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

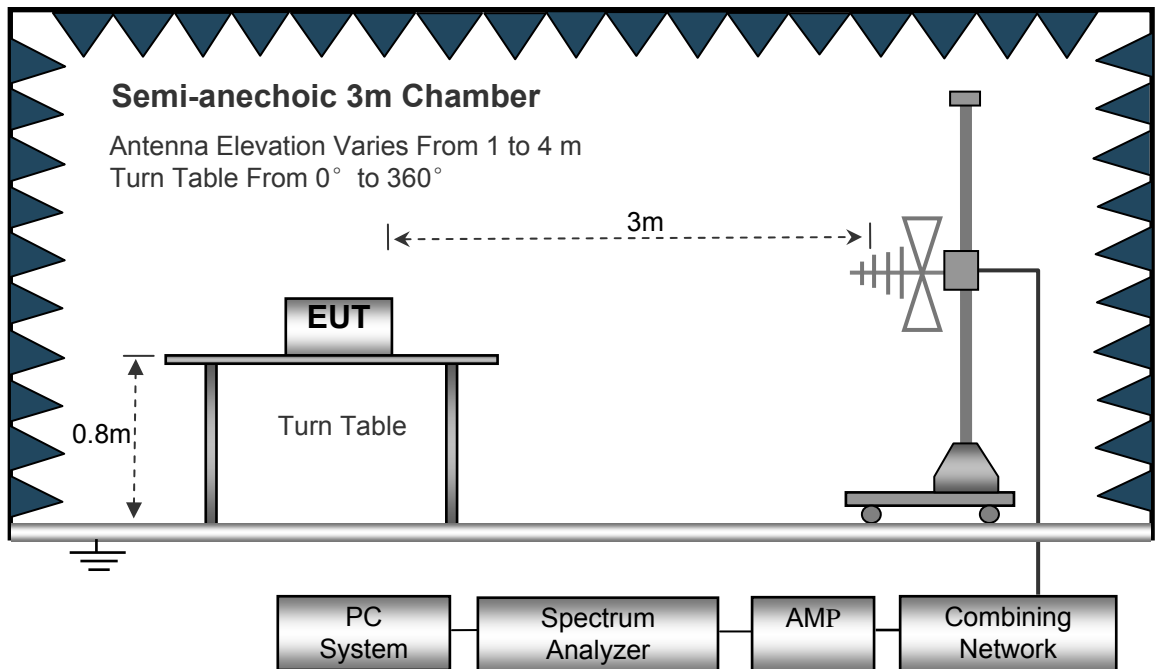
## 7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10: 2009.

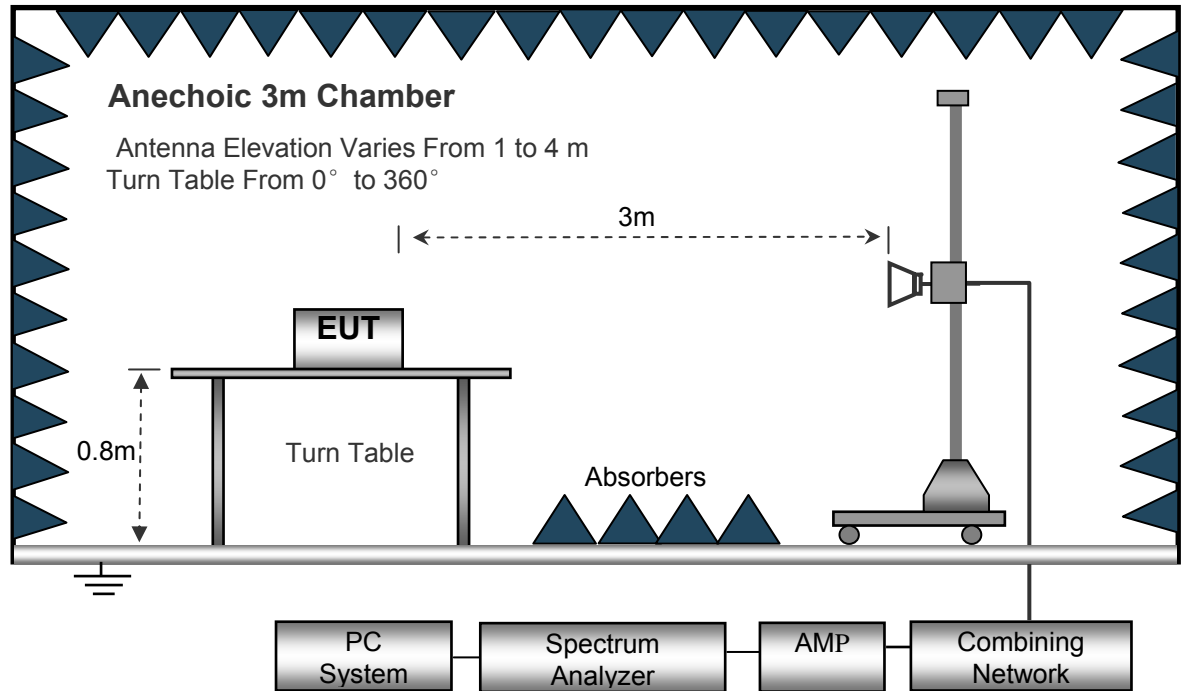
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



### 7.3 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

## 7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m 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 druing radiated emissions above 1GHz measurement.

## 7.5 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:

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

## 7.6 Summary of Test Results

Test Frequency: 12MHz~30MHz

Frequency (MHz)	Measurement results		Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
	dB $\mu$ V	@3m	PK/QP	dB/m	dB	dB $\mu$ V/m @30m	dB $\mu$ V/m @30m	dB
25.952	26.31		QP	19.90	40.00	6.21	29.54	-23.33

Test Frequency : 30MHz ~ 18GHz

Frequency (MHz)	Receiver Reading (dB $\mu$ V)	Detector (PK/QP/Ave)	Turn table Angle Degree	RX Antenna		Corrected Factor (dB)	Corrected Amplitude (dB $\mu$ V/m)	FCC Part 15.247/209/205	
				Height (m)	Polar (H/V)			Limit (dB $\mu$ V/m)	Margin (dB)
11b: Low Channel 2412MHz									
223.45	41.05	QP	27	1.7	H	-11.62	29.43	46.00	-16.57
223.45	36.26	QP	110	1.6	V	-11.62	24.64	46.00	-21.36
4824.00	50.44	PK	62	1.2	V	-1.06	49.38	74.00	-24.62
4824.00	46.32	Ave	62	1.2	V	-1.06	45.26	54.00	-8.74
7236.00	41.08	PK	152	1.4	H	1.33	42.41	74.00	-31.59
7236.00	41.96	Ave	152	1.4	H	1.33	43.29	54.00	-10.71
2348.17	46.04	PK	136	1.3	V	-13.19	32.85	74.00	-41.15
2348.17	38.23	Ave	136	1.3	V	-13.19	25.04	54.00	-28.96
2369.26	43.83	PK	251	1.8	H	-13.14	30.69	74.00	-43.31
2369.26	38.62	Ave	251	1.8	H	-13.14	25.48	54.00	-28.52
2499.38	42.50	PK	357	1.7	V	-13.08	29.42	74.00	-44.58
2499.38	36.27	Ave	357	1.7	V	-13.08	23.19	54.00	-30.81



Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
11b: Middle Channel 2437MHz									
223.45	39.72	QP	162	1.9	H	-11.62	28.10	46.00	-17.90
223.45	36.52	QP	198	1.1	V	-11.62	24.90	46.00	-21.10
4874.00	49.95	PK	120	1.9	V	-0.62	49.33	74.00	-24.67
4874.00	47.38	Ave	120	1.9	V	-0.62	46.76	54.00	-7.24
7311.00	42.38	PK	198	1.3	H	2.21	44.59	74.00	-29.41
7311.00	41.94	Ave	198	1.3	H	2.21	44.15	54.00	-9.85
2336.14	46.51	PK	221	1.5	V	-13.19	33.32	74.00	-40.68
2336.14	39.42	Ave	221	1.5	V	-13.19	26.23	54.00	-27.77
2375.47	42.50	PK	290	1.1	H	-13.14	29.36	74.00	-44.64
2375.47	36.33	Ave	290	1.1	H	-13.14	23.19	54.00	-30.81
2494.75	44.87	PK	236	1.9	V	-13.08	31.79	74.00	-42.21
2494.75	37.82	Ave	236	1.9	V	-13.08	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)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
11b: High Channel 2462MHz									
223.45	38.60	QP	231	1.9	H	-11.62	26.98	46.00	-19.02
223.45	35.72	QP	15	1.5	V	-11.62	24.10	46.00	-21.90
4924.00	49.84	PK	227	1.2	V	-0.24	49.60	74.00	-24.40
4924.00	48.52	Ave	227	1.2	V	-0.24	48.28	54.00	-5.72
7386.00	43.10	PK	322	1.6	H	2.84	45.94	74.00	-28.06
7386.00	41.23	Ave	322	1.6	H	2.84	44.07	54.00	-9.93
2345.35	45.75	PK	105	1.7	V	-13.19	32.56	74.00	-41.44
2345.35	37.89	Ave	105	1.7	V	-13.19	24.70	54.00	-29.30
2365.55	43.45	PK	20	1.7	H	-13.14	30.31	74.00	-43.69
2365.55	37.19	Ave	20	1.7	H	-13.14	24.05	54.00	-29.95
2493.85	44.10	PK	112	1.2	V	-13.08	31.02	74.00	-42.98
2493.85	37.78	Ave	112	1.2	V	-13.08	24.70	54.00	-29.30

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
11g: Low Channel 2412MHz									
223.45	37.85	QP	138	1.6	H	-11.62	26.23	46.00	-19.77
223.45	34.48	QP	308	1.6	V	-11.62	22.86	46.00	-23.14
4824.00	49.53	PK	232	1.5	V	-1.06	48.47	74.00	-25.53
4824.00	47.57	Ave	232	1.5	V	-1.06	46.51	54.00	-7.49
7236.00	42.43	PK	187	1.3	H	1.33	43.76	74.00	-30.24
7236.00	40.60	Ave	187	1.3	H	1.33	41.93	54.00	-12.07
2328.31	46.52	PK	359	1.7	V	-13.19	33.33	74.00	-40.67
2328.31	39.12	Ave	359	1.7	V	-13.19	25.93	54.00	-28.07
2367.19	44.33	PK	88	1.5	H	-13.14	31.19	74.00	-42.81
2367.19	37.54	Ave	88	1.5	H	-13.14	24.40	54.00	-29.60
2493.34	42.22	PK	260	1.7	V	-13.08	29.14	74.00	-44.86
2493.34	36.71	Ave	260	1.7	V	-13.08	23.63	54.00	-30.37

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
11g: Middle Channel 2437MHz									
223.45	36.69	QP	327	1.8	H	-11.62	25.07	46.00	-20.93
223.45	35.70	QP	183	1.6	V	-11.62	24.08	46.00	-21.92
4874.00	50.03	PK	308	1.5	V	-0.62	49.41	74.00	-24.59
4874.00	47.00	Ave	308	1.5	V	-0.62	46.38	54.00	-7.62
7311.00	42.43	PK	3	1.3	H	2.21	44.64	74.00	-29.36
7311.00	39.80	Ave	3	1.3	H	2.21	42.01	54.00	-11.99
2331.89	46.85	PK	212	1.7	V	-13.19	33.66	74.00	-40.34
2331.89	37.34	Ave	212	1.7	V	-13.19	24.15	54.00	-29.85
2362.08	43.53	PK	71	1.2	H	-13.14	30.39	74.00	-43.61
2362.08	38.29	Ave	71	1.2	H	-13.14	25.15	54.00	-28.85
2491.50	42.39	PK	19	1.5	V	-13.08	29.31	74.00	-44.69
2491.50	36.21	Ave	19	1.5	V	-13.08	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)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
11g: High Channel 2462MHz									
223.45	36.27	QP	109	1.4	H	-11.62	24.65	46.00	-21.35
223.45	34.29	QP	284	1.4	V	-11.62	22.67	46.00	-23.33
4924.00	49.08	PK	156	1.3	V	-0.24	48.84	74.00	-25.16
4924.00	47.92	Ave	156	1.3	V	-0.24	47.68	54.00	-6.32
7386.00	42.66	PK	324	1.7	H	2.84	45.50	74.00	-28.50
7386.00	38.51	Ave	324	1.7	H	2.84	41.35	54.00	-12.65
2322.86	46.11	PK	102	1.6	V	-13.19	32.92	74.00	-41.08
2322.86	39.54	Ave	102	1.6	V	-13.19	26.35	54.00	-27.65
2357.43	44.72	PK	346	1.5	H	-13.14	31.58	74.00	-42.42
2357.43	36.53	Ave	346	1.5	H	-13.14	23.39	54.00	-30.61
2495.46	44.07	PK	178	2.0	V	-13.08	30.99	74.00	-43.01
2495.46	38.78	Ave	178	2.0	V	-13.08	25.70	54.00	-28.30

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
n20: Low Channel 2412MHz									
223.45	35.07	QP	277	1.7	H	-11.62	23.45	46.00	-22.55
223.45	33.60	QP	274	1.1	V	-11.62	21.98	46.00	-24.02
4824.00	49.77	PK	164	1.4	V	-1.06	48.71	74.00	-25.29
4824.00	48.24	Ave	164	1.4	V	-1.06	47.18	54.00	-6.82
7236.00	41.52	PK	52	2.0	H	1.33	42.85	74.00	-31.15
7236.00	39.30	Ave	52	2.0	H	1.33	40.63	54.00	-13.37
2345.34	46.60	PK	81	1.8	V	-13.19	33.41	74.00	-40.59
2345.34	38.84	Ave	81	1.8	V	-13.19	25.65	54.00	-28.35
2385.50	44.39	PK	2	1.6	H	-13.14	31.25	74.00	-42.75
2385.50	36.95	Ave	2	1.6	H	-13.14	23.81	54.00	-30.19
2493.69	43.02	PK	79	2.0	V	-13.08	29.94	74.00	-44.06
2493.69	36.14	Ave	79	2.0	V	-13.08	23.06	54.00	-30.94

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
n20: Middle Channel 2437MHz									
223.45	36.37	QP	200	1.7	H	-11.62	24.75	46.00	-21.25
223.45	34.57	QP	314	1.7	V	-11.62	22.95	46.00	-23.05
4874.00	49.21	PK	225	1.5	V	-0.62	48.59	74.00	-25.41
4874.00	47.40	Ave	225	1.5	V	-0.62	46.78	54.00	-7.22
7311.00	41.09	PK	130	1.6	H	2.21	43.30	74.00	-30.70
7311.00	40.00	Ave	130	1.6	H	2.21	42.21	54.00	-11.79
2326.73	46.26	PK	325	1.5	V	-13.19	33.07	74.00	-40.93
2326.73	38.50	Ave	325	1.5	V	-13.19	25.31	54.00	-28.69
2389.44	43.42	PK	2	1.7	H	-13.14	30.28	74.00	-43.72
2389.44	36.81	Ave	2	1.7	H	-13.14	23.67	54.00	-30.33
2493.62	42.97	PK	331	1.6	V	-13.08	29.89	74.00	-44.11
2493.62	38.49	Ave	331	1.6	V	-13.08	25.41	54.00	-28.59

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
n20: High Channel 2462MHz									
223.45	37.23	QP	179	1.3	H	-11.62	25.61	46.00	-20.39
223.45	34.66	QP	17	1.6	V	-11.62	23.04	46.00	-22.96
4924.00	49.62	PK	261	1.4	V	-0.24	49.38	74.00	-24.62
4924.00	48.35	Ave	261	1.4	V	-0.24	48.11	54.00	-5.89
7386.00	39.90	PK	240	1.2	H	2.84	42.74	74.00	-31.26
7386.00	40.39	Ave	240	1.2	H	2.84	43.23	54.00	-10.77
2348.12	46.65	PK	217	1.1	V	-13.19	33.46	74.00	-40.54
2348.12	37.45	Ave	217	1.1	V	-13.19	24.26	54.00	-29.74
2364.11	42.61	PK	167	1.6	H	-13.14	29.47	74.00	-44.53
2364.11	36.44	Ave	167	1.6	H	-13.14	23.30	54.00	-30.70
2486.87	43.67	PK	150	1.3	V	-13.08	30.59	74.00	-43.41
2486.87	38.10	Ave	150	1.3	V	-13.08	25.02	54.00	-28.98

**Test Frequency: 18GHz~25GHz**

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



## 8 Band Edge Measurement

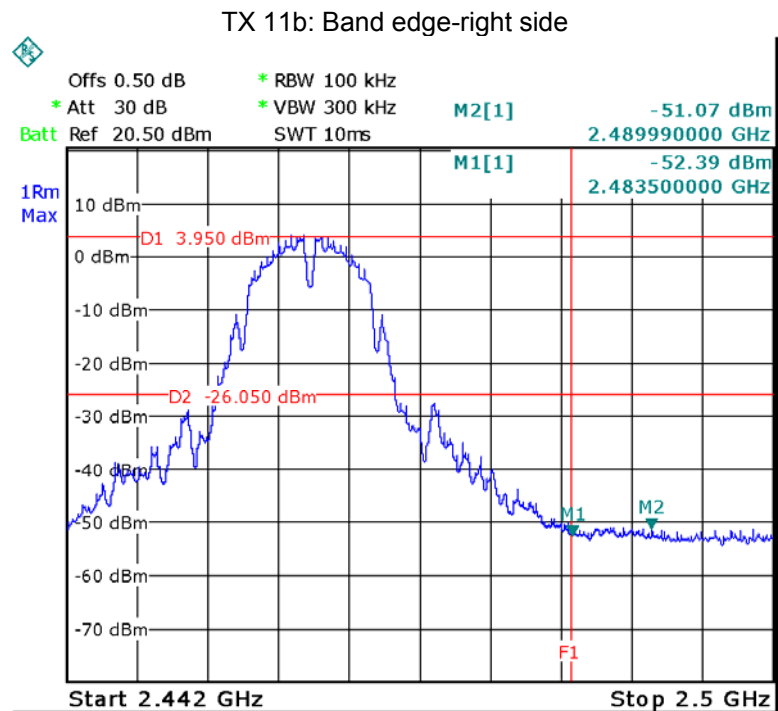
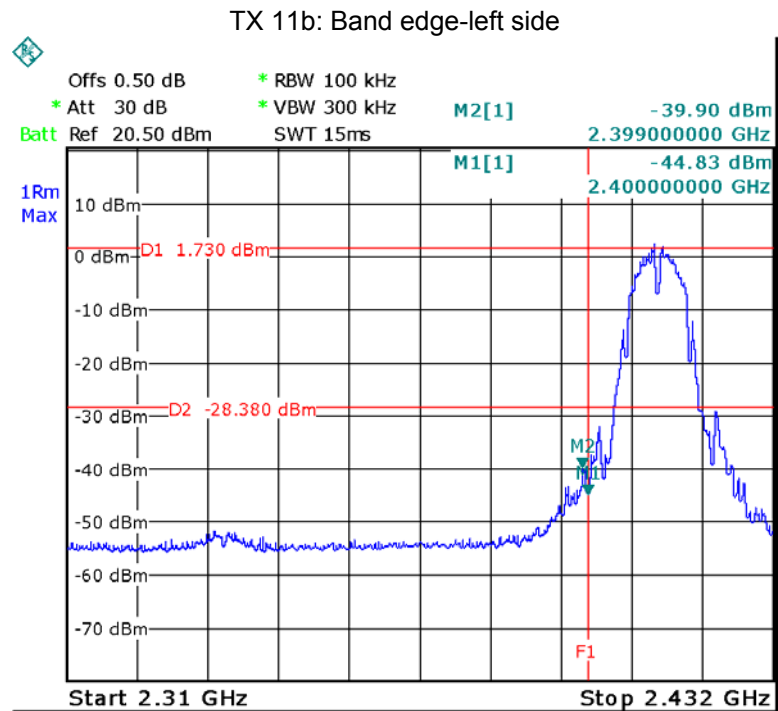
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	KDB558074 D01 DTS Meas Guidance v03r05
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power 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

### 8.1 Test Procedure

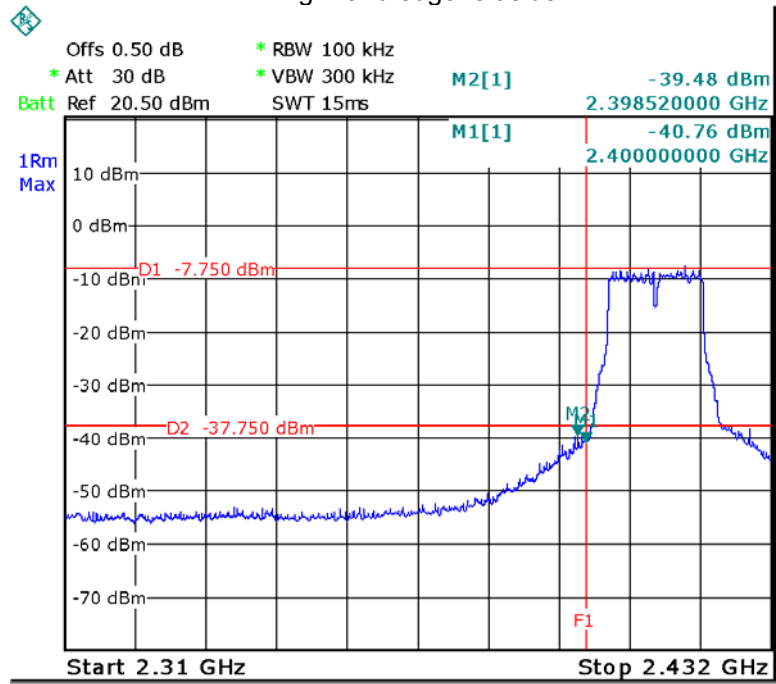
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then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

## 8.2 Test Result

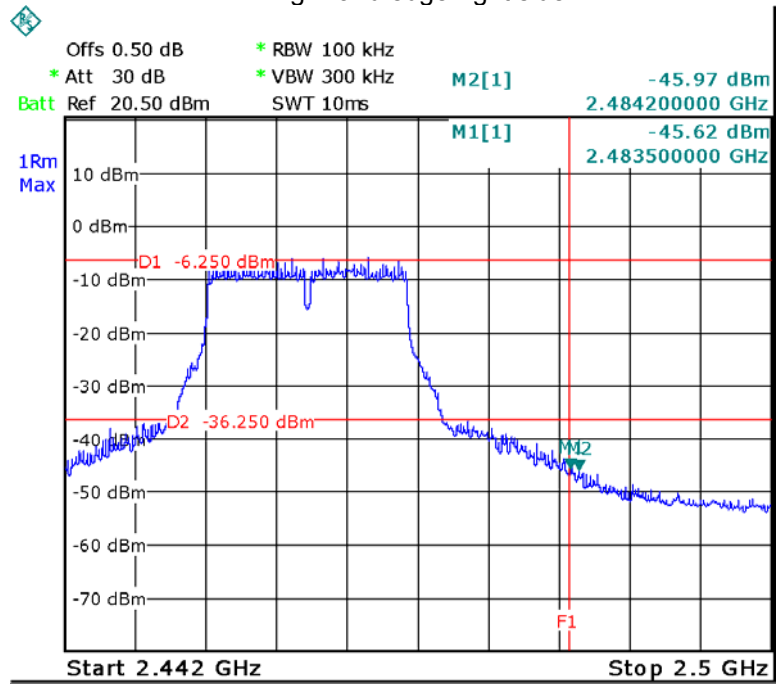
Test result plots shown as follows:



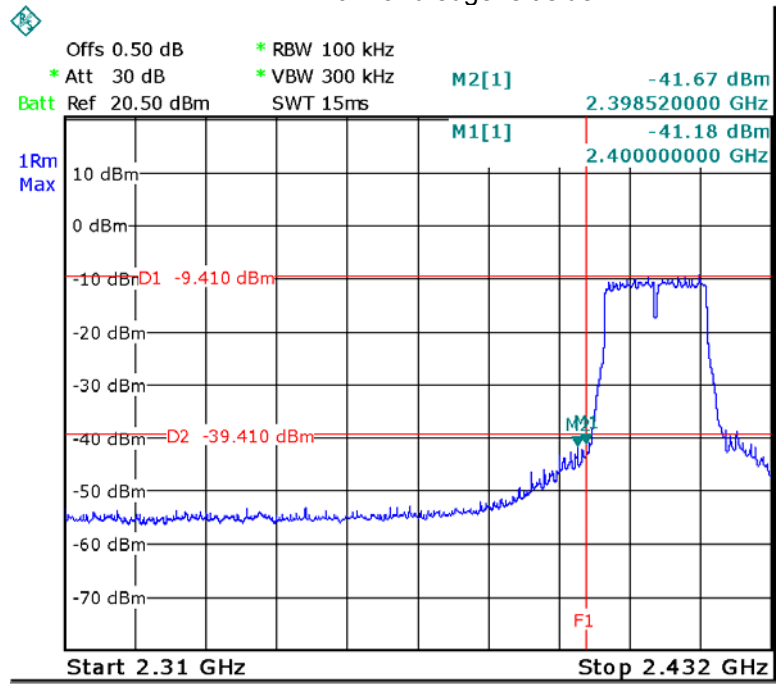
TX 11g: Band edge-left side



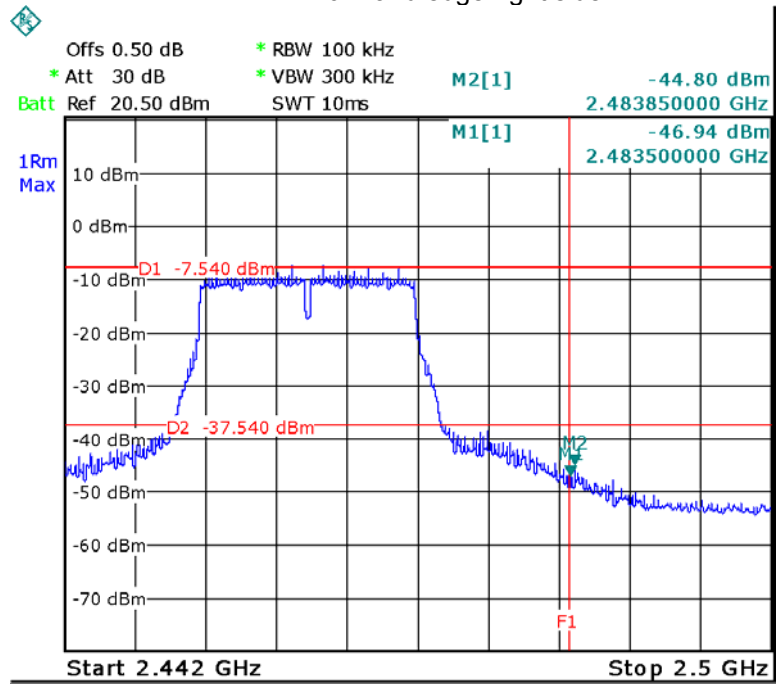
TX 11g: Band edge-right side



TX 11n HT20: Band edge-left side



TX 11n HT20: Band edge-right side



## 9 6 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB558074 D01 DTS Meas Guidance v03r05

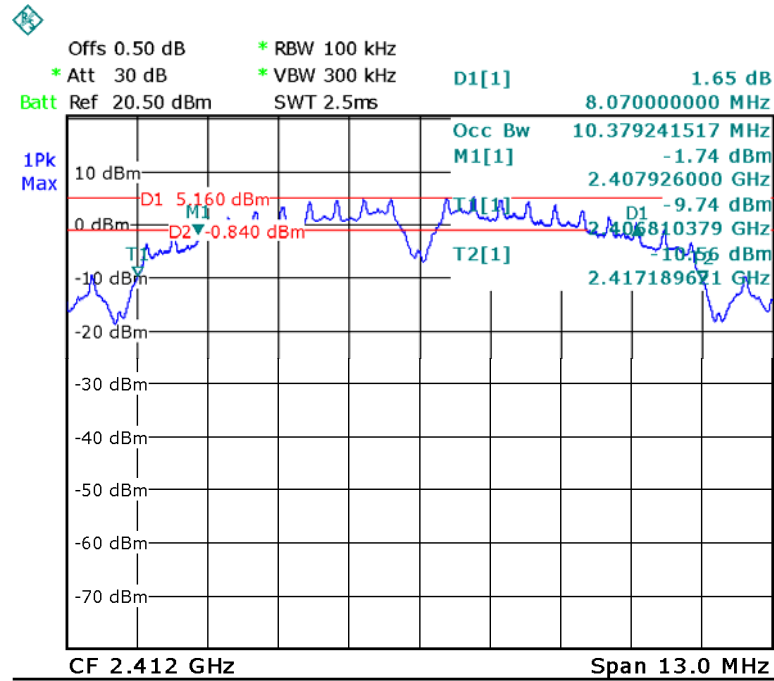
### 9.1 Test Procedure:

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

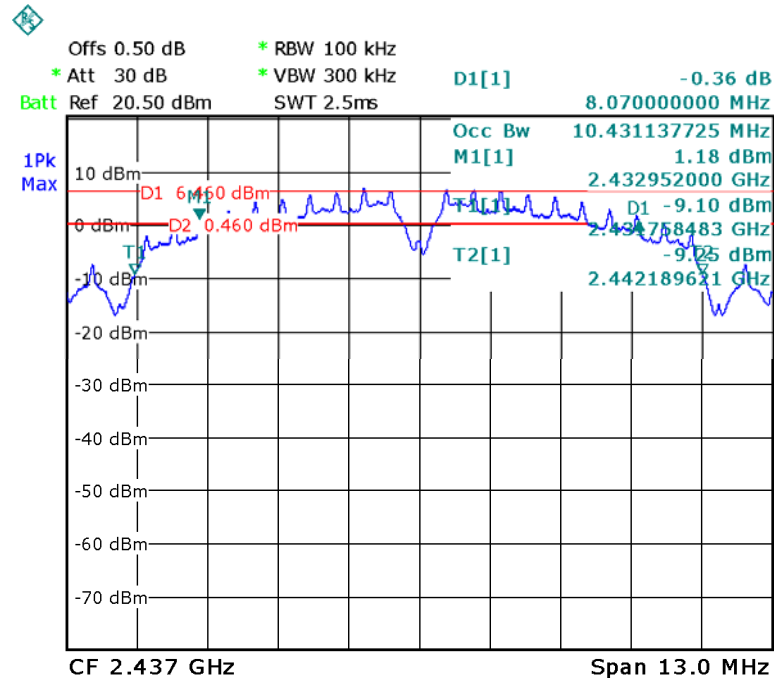
### 9.2 Test Result:

Operation mode	Bandwidth (MHz)		
	Low	Middle	High
11b	8.070	8.070	8.070
11g	16.417	16.417	16.417
11n HT20	17.623	17.623	17.623

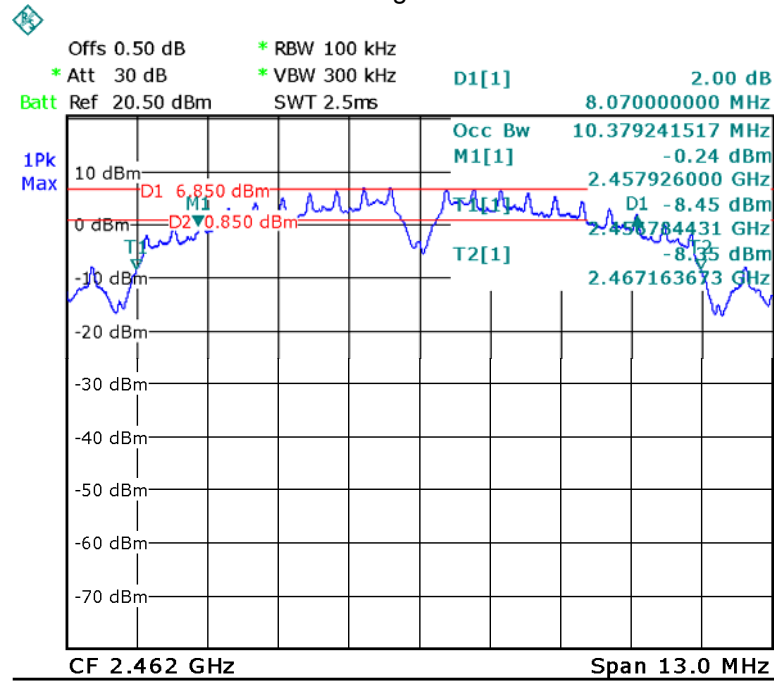
TX 11b Low channel



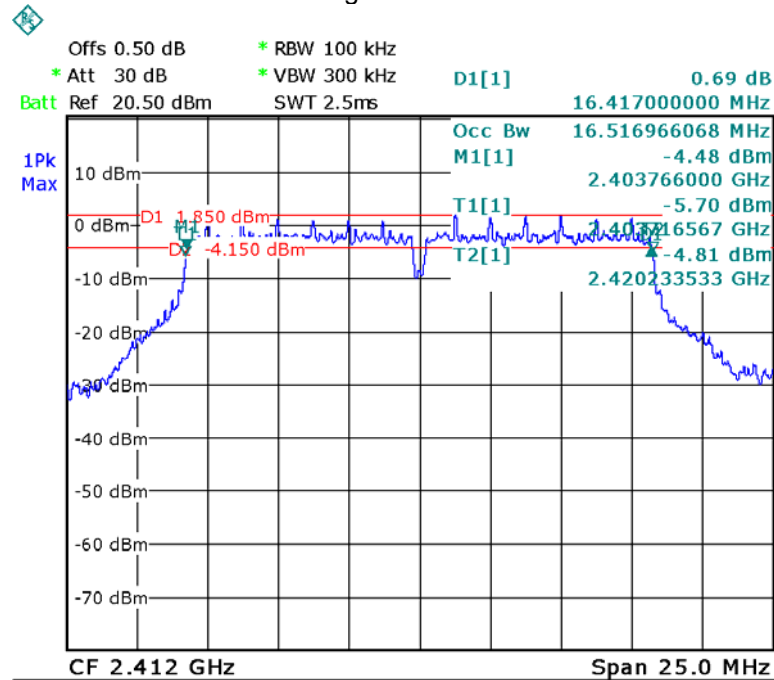
TX 11b Middle channel



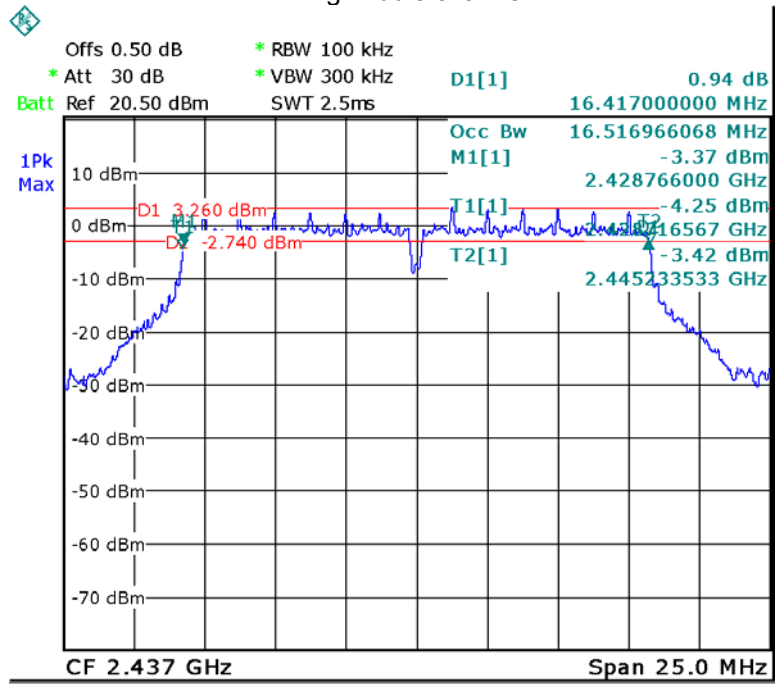
### TX 11b High channel



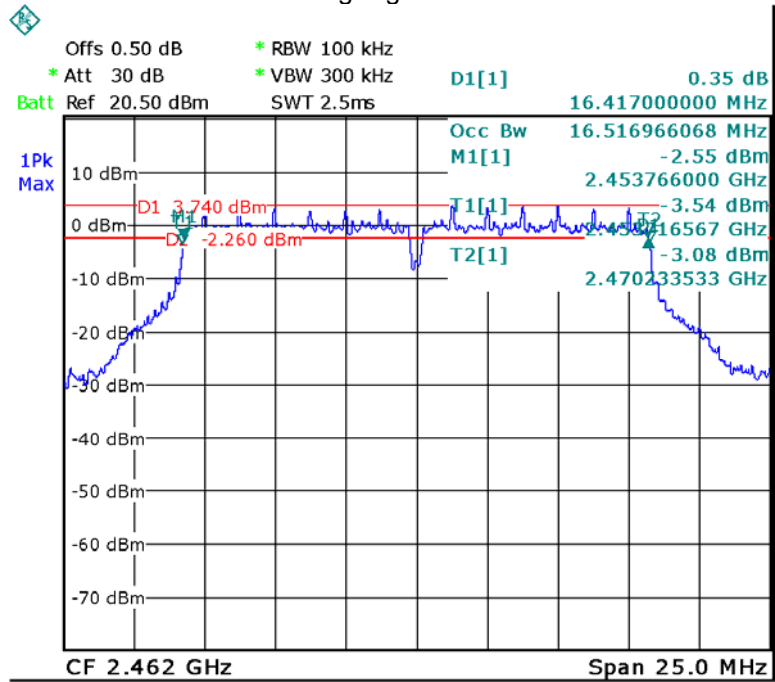
### TX 11g Low channel



TX 11g Middle channel

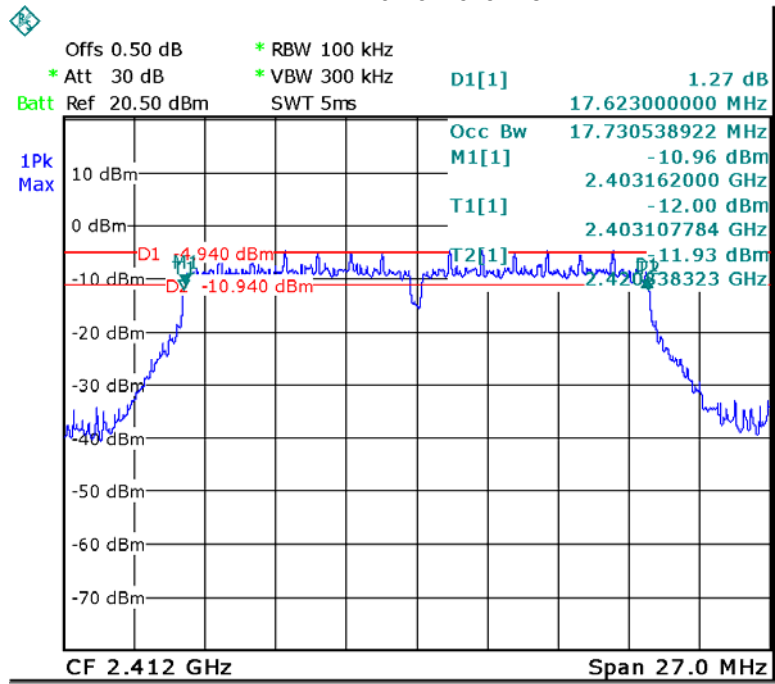


TX 11g High channel

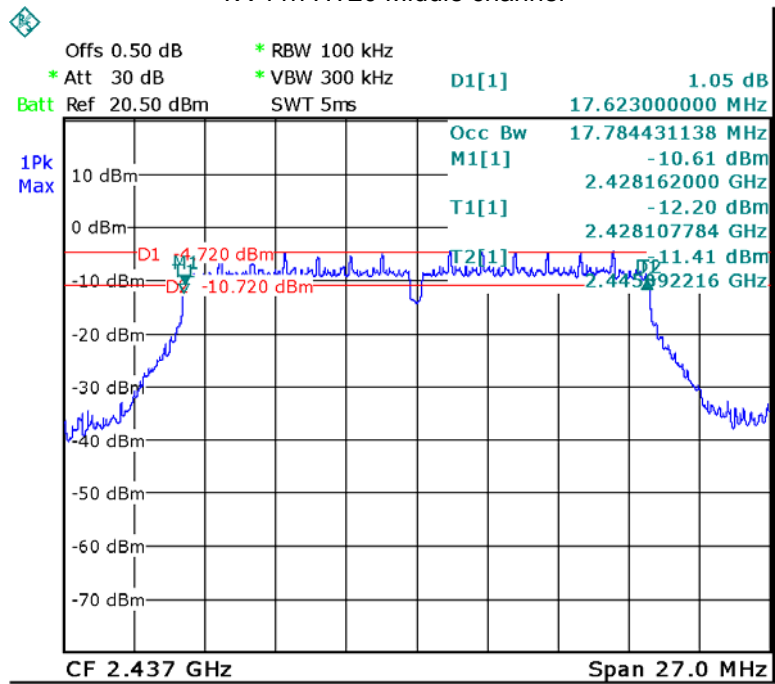


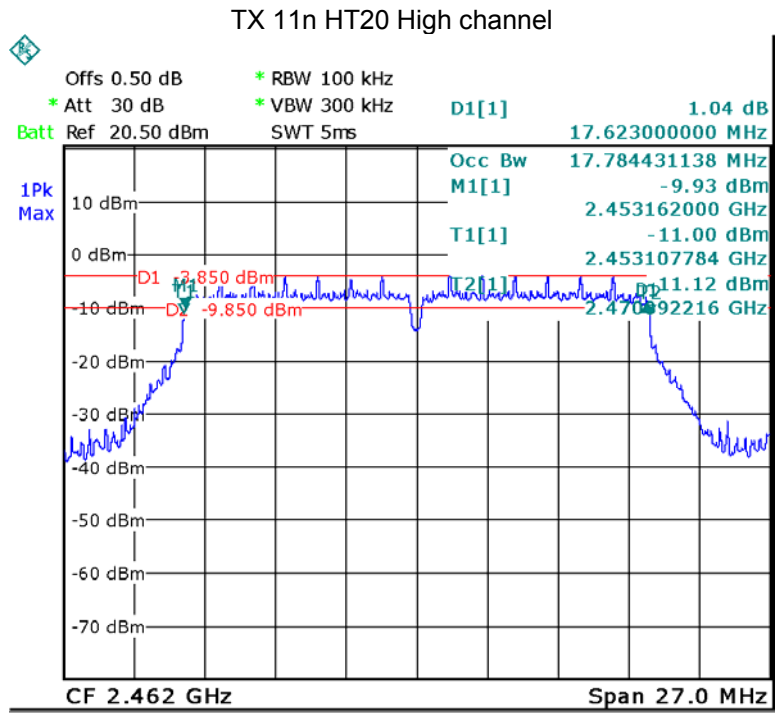


TX 11n HT20 Low channel



TX 11n HT20 Middle channel





## 10 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB558074 D01 DTS Meas Guidance v03r05

### 10.1 Test Procedure:

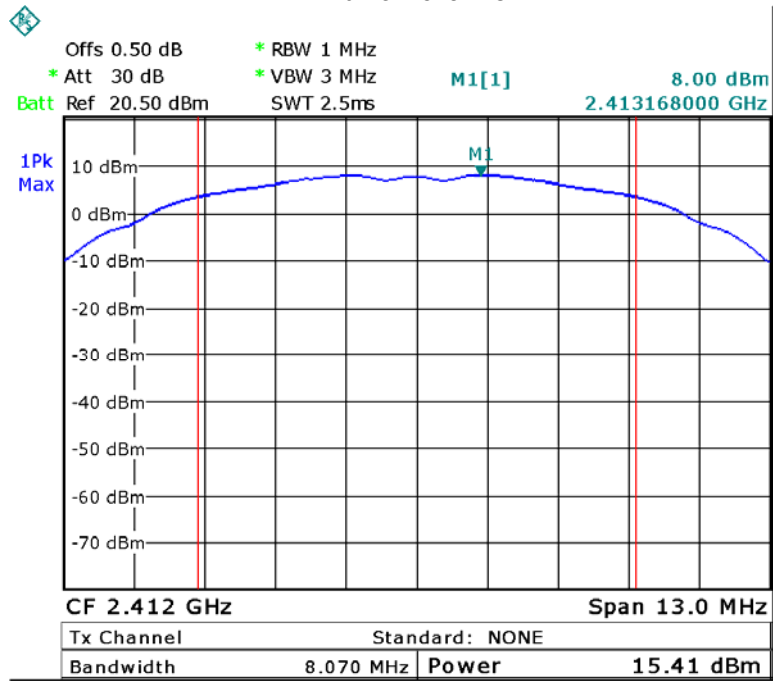
KDB558074 D01 DTS Meas Guidance v03r05 section 9.1.2

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 = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, 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.

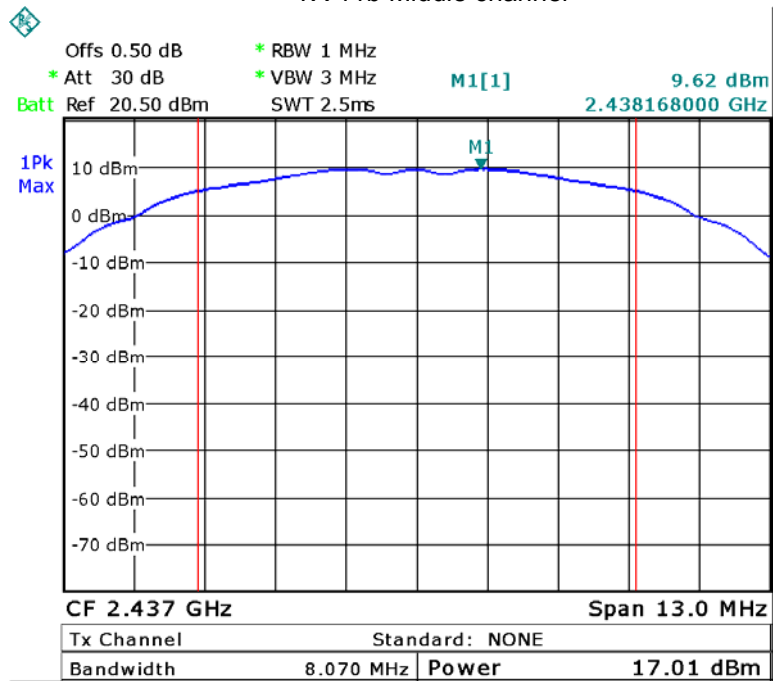
### 10.2 Test Result:

Operation mode	Maximum Peak Output Power (dBm)		
	Low	Middle	High
11b	15.41	17.01	17.17
11g	15.96	16.15	16.80
11n HT20	14.43	14.90	15.70

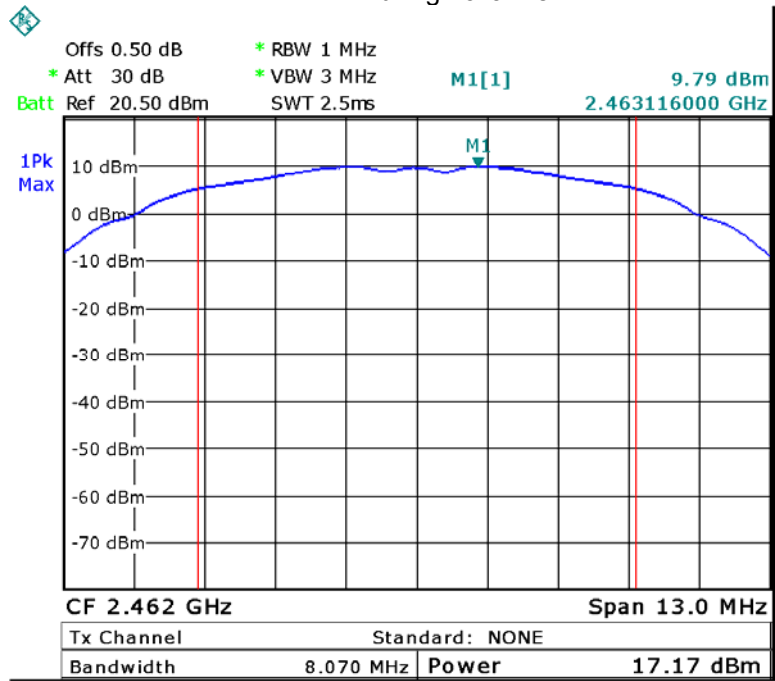
TX 11b Low channel



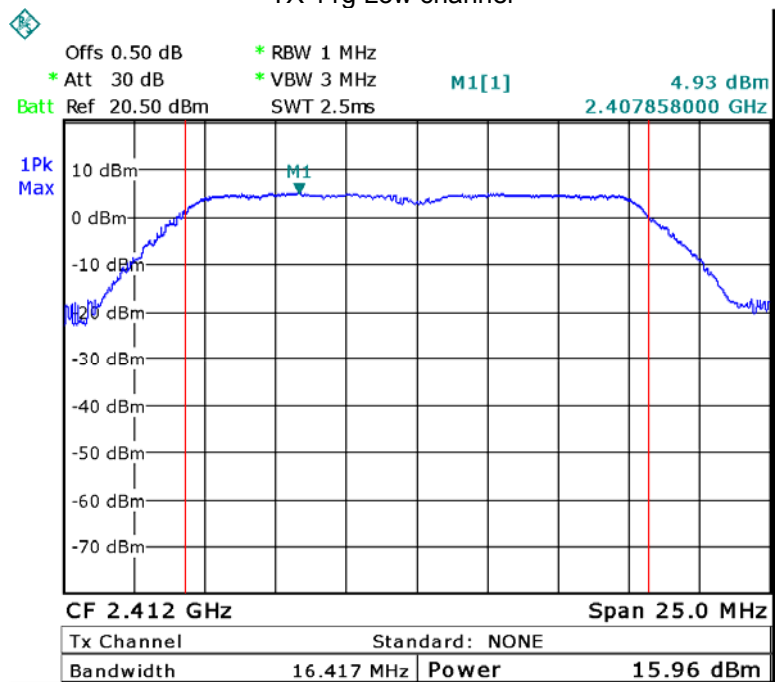
TX 11b Middle channel



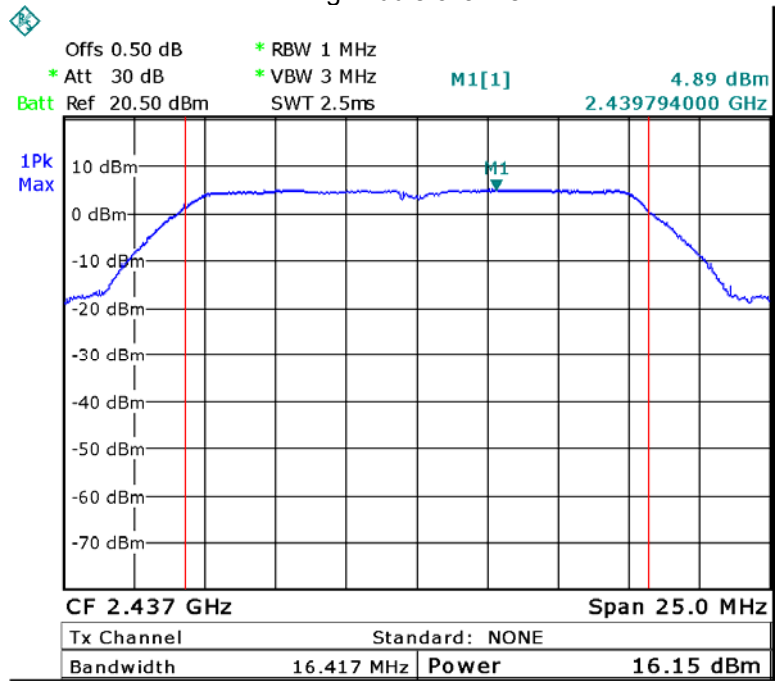
TX 11b High channel



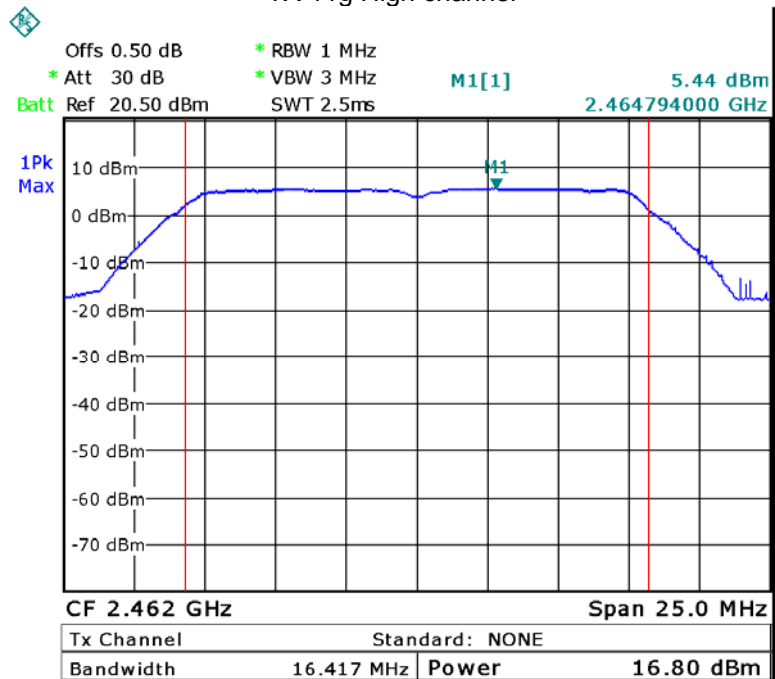
TX 11g Low channel



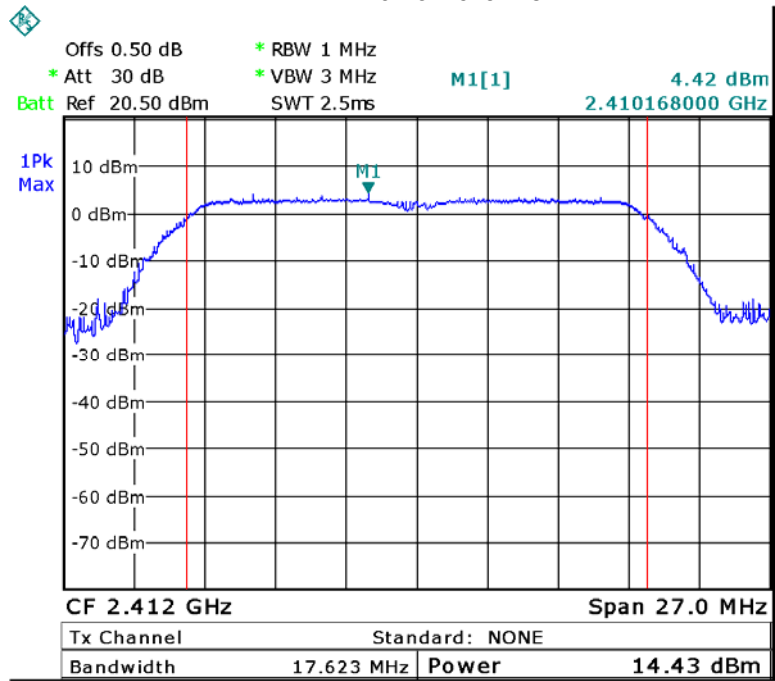
TX 11g Middle channel



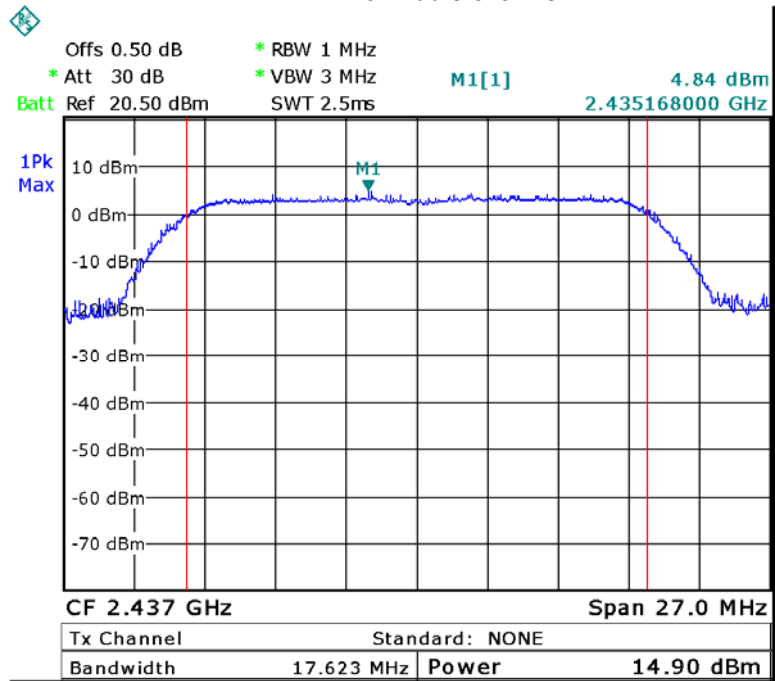
TX 11g High channel

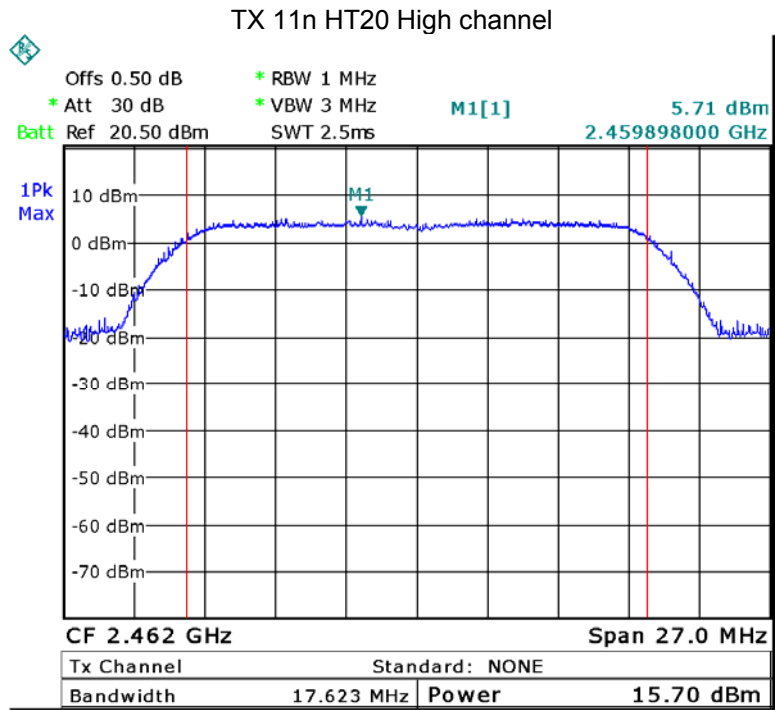


TX 11n HT20 Low channel



TX 11n HT20 Middle channel







## 11 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB558074 D01 DTS Meas Guidance v03r05

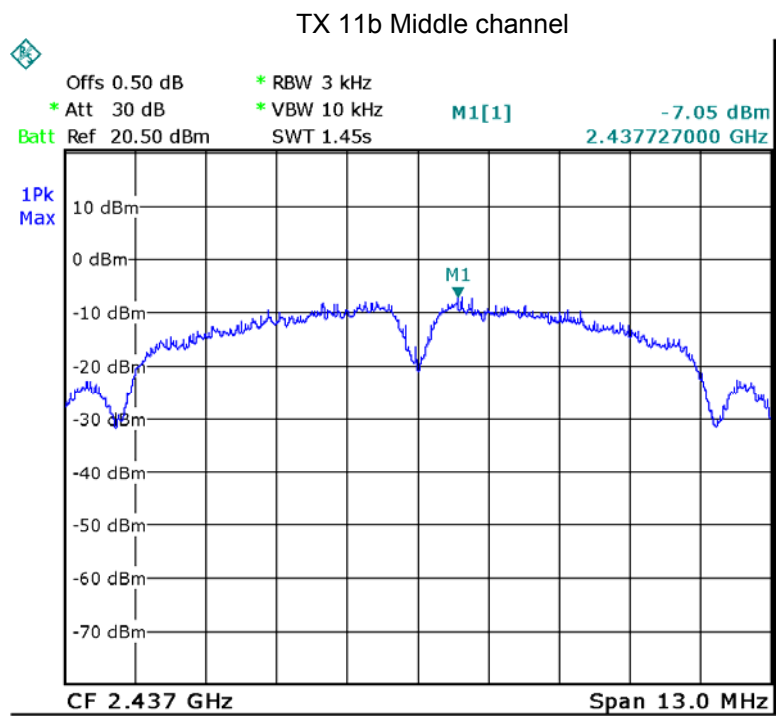
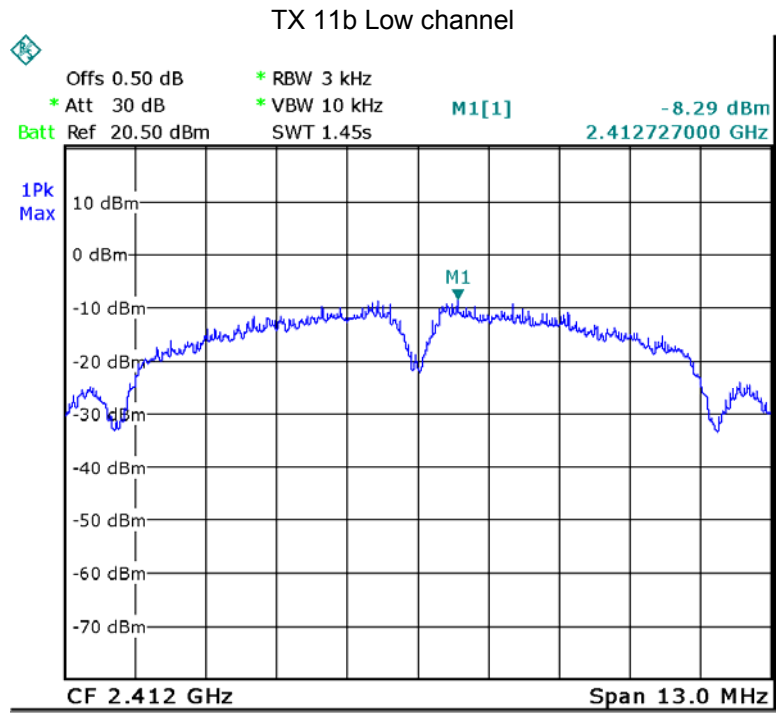
### 11.1 Test Procedure:

KDB558074 D01 DTS Meas Guidance v03r05 section 10.2

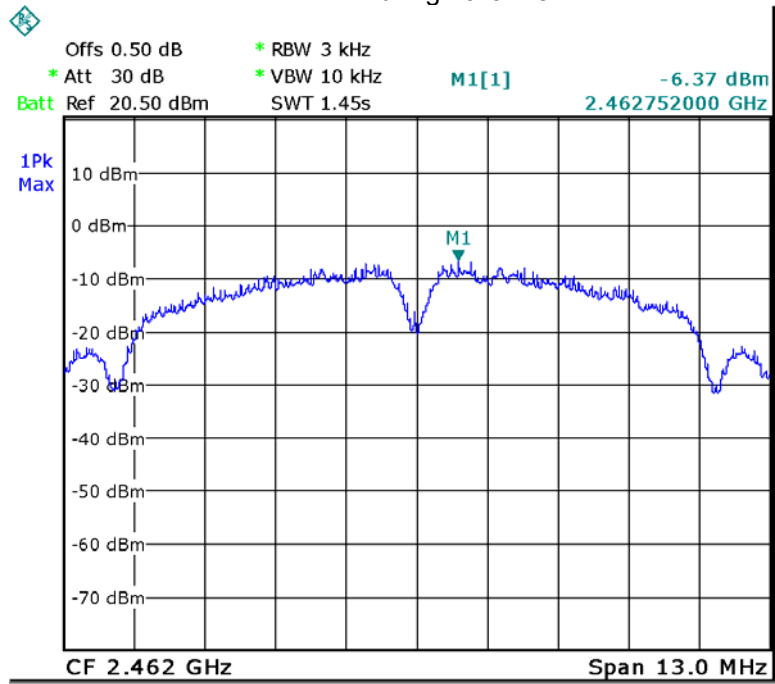
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to 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.

### 11.2 Test Result:

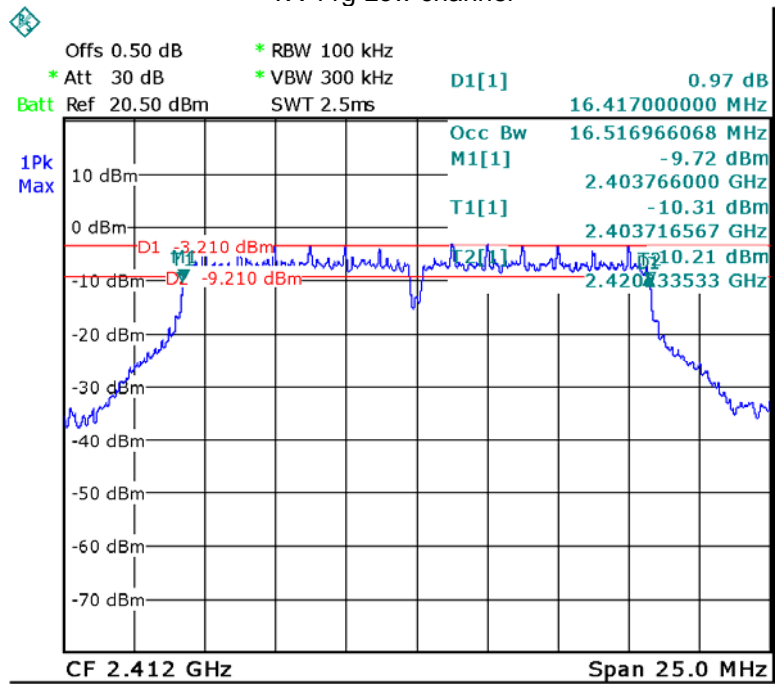
Operation mode	Maximum Peak Output Power (dBm per 3kHz)		
	Low	Middle	High
11b	-8.29	-7.05	-6.37
11g	0.97	0.85	0.39
11n HT20	-18.08	-17.60	-17.82

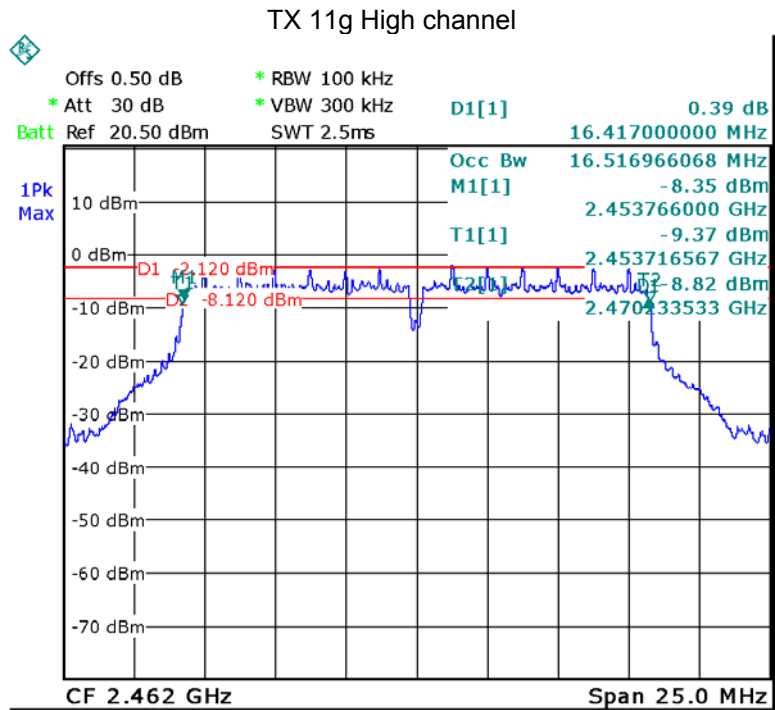
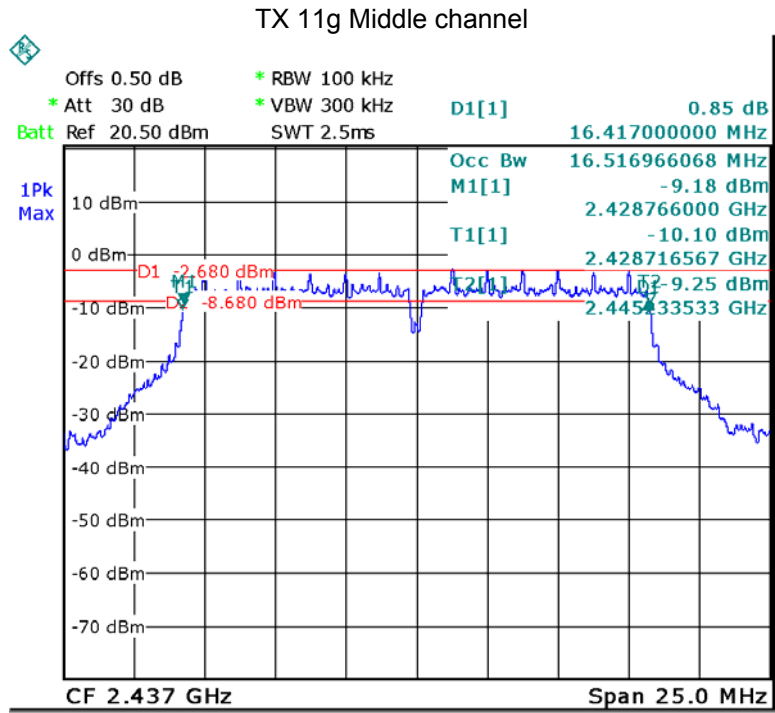


### TX 11b High channel

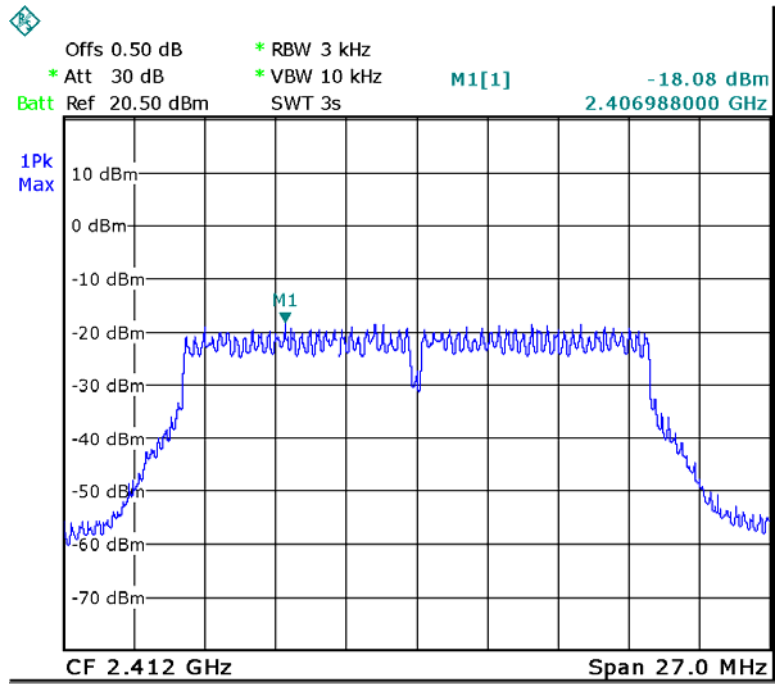


### TX 11g Low channel

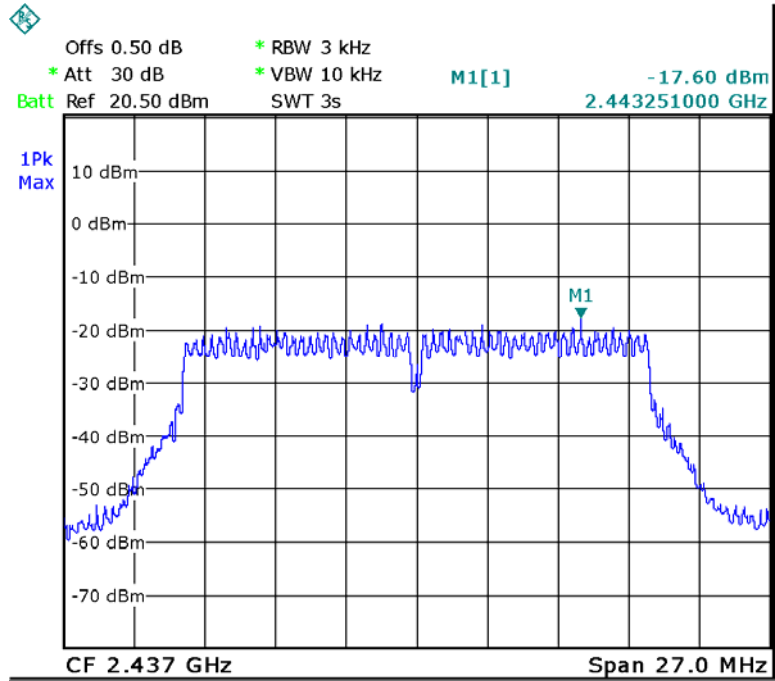


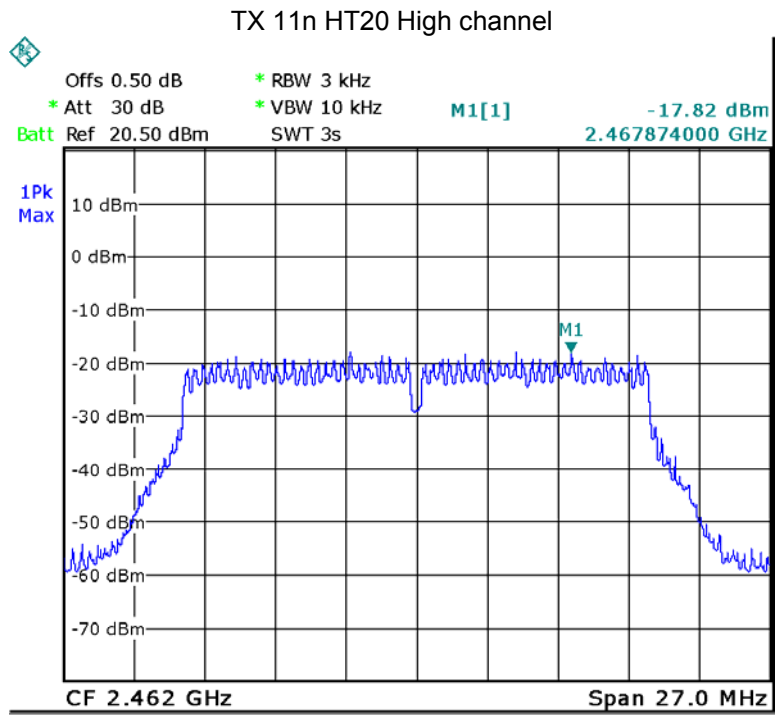


### TX 11n HT20 Low channel



### TX 11n HT20 Middle channel





## 12 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.

This device uses of an antenna that uses a specified coupling to the intentional radiator. Antenna connectors complied with the requirement.

## 13 RF Exposure

Test Requirement: FCC Part 1.1307

Evaluation Method: FCC Part 2.1091

### 13.1 Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

### 13.2 The procedures / limit

#### (A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

#### (B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; \*Plane-wave equivalent power density



### 13.3 MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = Peak RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

ANT. gain (dBi)	ANT. gain (numeric)	Max. Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
2.00	1.585	17.17	52.12	0.016433	1

====End of Report====