

# TEST REPORT

Reference No..... : WTS16S0448141-2E V1  
FCC ID ..... : 2ADTE-T7  
Applicant..... : Shenzhen KVD Communication Equipment  
Address..... : 13C, Block C, Shenzhen Electronic Technology Building, Shennan Middle Road, Futian District, Shenzhen, China  
Manufacturer ..... : Shenzhen KVD Communication Equipment Co., Ltd  
Address..... : Lenovo R&D Center 2F-B, South First Road, High-tech Park, Nanshan District, Shenzhen, Guangdong, China  
Product Name..... : Mobile phone  
Model No..... : T7  
Brand..... : DOOGEE  
Standards..... : FCC CFR47 Part 15.247:2015  
Date of Receipt sample .... : Apr. 18, 2016  
Date of Test ..... : Apr. 21– May 31, 2016  
Date of Issue..... : May 31, 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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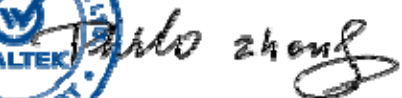
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Compiled by:



Zero Zhou / Test Engineer

Approved by:



Philo Zhong / Manager

## 2 Test Summary

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)	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 Report Revision History

Report No.	Report Version	Description	Issue Date
WTS16S0448141-2E	NONE	Original	May 11, 2016
WTS16S0448141-2E	V1	Version 1	May 31, 2016

## 5 General Information

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

Product Name	: Mobile phone
Model No.	: T7
Model Description	: N/A
GSM Band(s)	: GSM 850/900/1800/1900MHz
GPRS Class	: 12
WCDMA Band(s)	: FDD Band I/II/V
LTE Bnad(s)	: N/A
Wi-Fi Specification	: 2.4G: 802.11b/g/n HT20
Bluetooth Version	: Bluetooth v4.0 with BLE
GPS	: Support
NFC	: N/A
Hardware Version	: Y970_MB_V1.1
Software Version	: DOOGEE-T7-Android5.1-20160506
Storage Location	: Internal Storage

### 5.2 Details of E.U.T.

Operation Frequency	: GSM/GPRS 850: 824~849MHz PCS/GPRS1900: 1850~1910MHz WCDMA Band II: 1850~1910MHz WCDMA Band V: 824~849MHz WiFi: 802.11b/g/n HT20: 2412~2462MHz Bluetooth: 2402~2480MHz
Max. RF output power	: GSM 850: 32.84dBm PCS1900:29.82dBm WCDMA Band II: 22.60dBm WCDMA Band V: 22.52dBm WiFi(2.4G): 9.36dBm Bluetooth:4.95dBm
Type of Modulation	: GSM,GPRS: GMSK WCDMA: BPSK WiFi: CCK, OFDM Bluetooth: GFSK, Pi/4 DQPSK,8DPSK
Antenna installation	: GSM/WCDMA: internal permanent antenna WiFi/Bluetooth: internal permanent antenna

Antenna Gain	GSM 850: 0.5dBi PCS1900: 0.7dBi WCDMA Band II: 0.7dBi WCDMA Band V: 0.7dBi WiFi(2.4G): 0.5dBi Bluetooth: 0.5dBi
Technical Data	: Battery DC 3.7V 2000mAh DC 5V, 1A, charging from adapter (Adapter Input: 100-240V~50/60Hz, 0.15A)
Adapter	: Manufacture: Shenzhen Huajin Electronics Co.,Ltd. Model No.: TN-05010QU2

### 5.3 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	12	-

#### BT BLE

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404	2	2406	3	2408
4	2410	5	2412	6	2414	7	2416
8	2418	9	2420	10	2422	11	2424
12	2426	13	2428	14	2430	15	2432
16	2434	17	2436	18	2438	19	2440
20	2442	21	2444	22	2446	23	2448
24	2450	25	2452	26	2454	27	2456
28	2458	29	2460	30	2462	31	2464
32	2466	33	2468	34	2470	35	2472
36	2474	37	2476	38	2478	39	2480

## 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
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

Table 2 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	BT BLE	1 Mbps	0/19/39	TX
Power Spectral Density	BT BLE	1 Mbps	0/19/39	TX
6dB Bandwidth	BT BLE	1 Mbps	0/19/39	TX
Band Edge	BT BLE	1 Mbps	0/19/39	TX
Transmitter Spurious Emissions	BT BLE	1 Mbps	0/19/39	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 .

## 5.4 Test Facility

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

- **IC – Registration No.: 7760A**

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, October 15, 2015.

- **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.



## 6 Equipment Used during Test

### 6.1 Equipments List

Conducted Emissions at Mains Terminals Disturbance Voltage						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.15,2015	Sep.14,2016
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.15,2015	Sep.14,2016
3.	Limiter	York	MTS-IMP-136	261115-001-0024	Sep.15,2015	Sep.14,2016
4.	Cable	LARGE	RF300	-	Sep.15,2015	Sep.14,2016
3m Semi-anechoic Chamber for Radiation						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.15,2015	Sep.14,2016
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.15,2015	Sep.14,2016
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.18,2016	Apr.17,2017
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.15,2015	Sep.14,2016
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.18,2016	Apr.17,2017
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	669	Apr.18,2016	Apr.17,2017
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.17,2016	Mar.16,2017
8	Coaxial Cable (above 1GHz)	Top	1000MHz-25GHz	EW02014-7	Apr.10,2016	Apr.09,2017
9	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Sep.15,2015	Sep.14,2016
10	Universal Radio Communication Tester	R&S	CMU 200	112461	Apr.10,2016	Apr.09,2017
11	Signal Generator	R&S	SMR20	100046	Sep.15,2015	Sep.14,2016
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	Aug. 15,2015	Aug.14,2016
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Aug. 15,2015	Aug.14,2016
3.	Humidity Chamber	GF	GTH-225-40-1P	IAA061213	Aug. 15,2015	Aug.14,2016

## 6.2 Description of Support Units

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

## 6.3 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)

## 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 C63.10:2009
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)

### 7.1 E.U.T. Operation

Operating Environment :

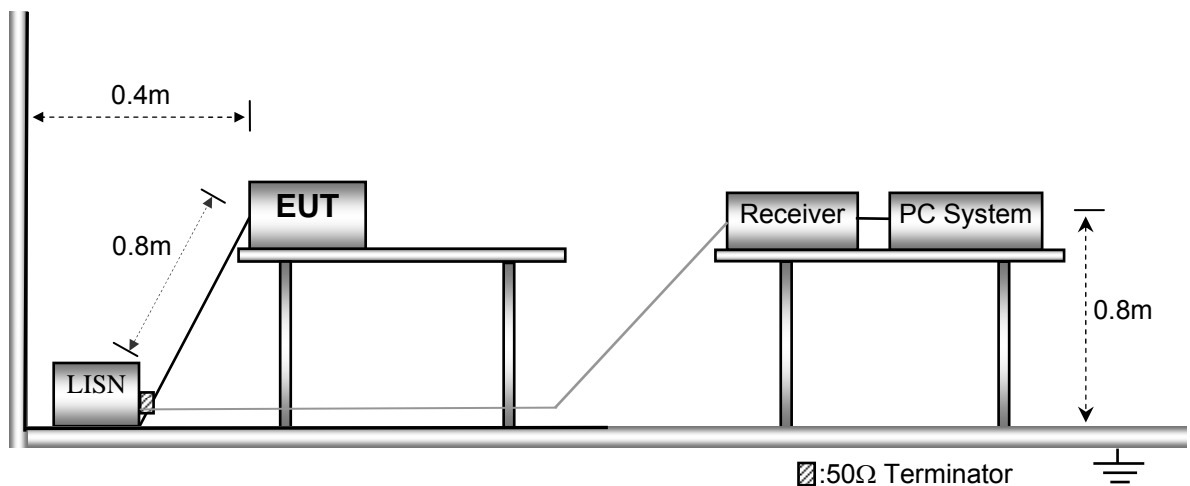
Temperature:	21.5 °C
Humidity:	51.9 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation :

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

### 7.2 EUT Setup

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



### 7.3 Measurement Description

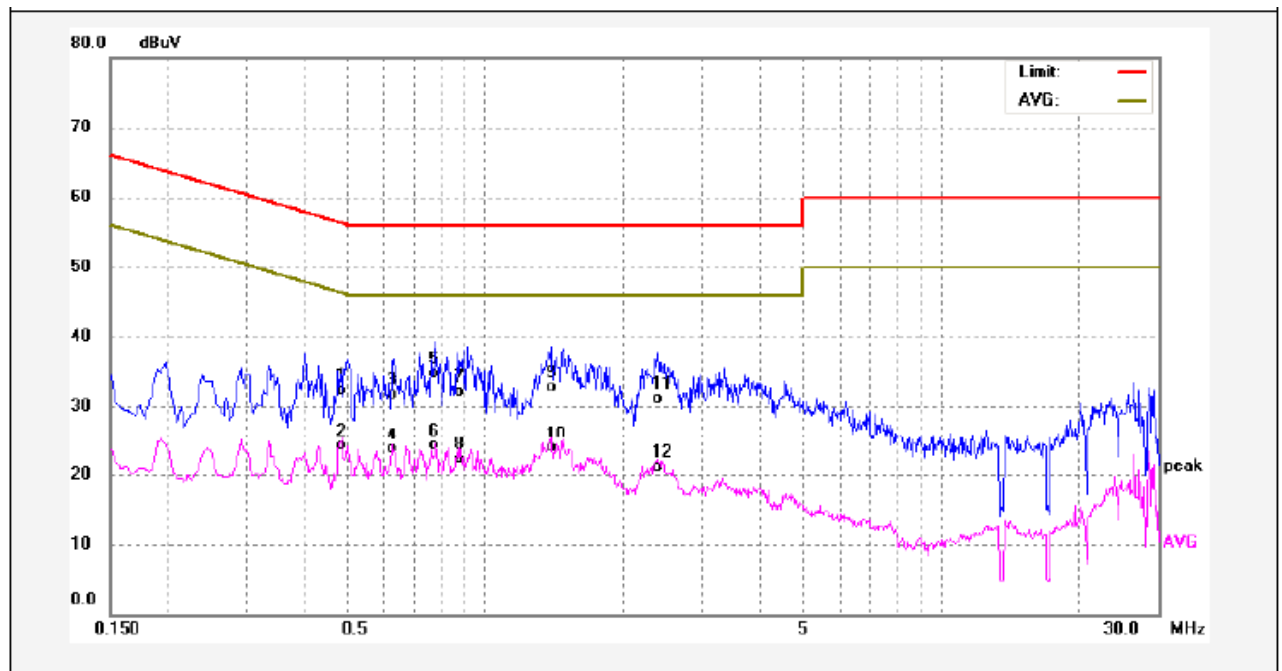
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

## 7.4 Conducted Emission Test Result

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

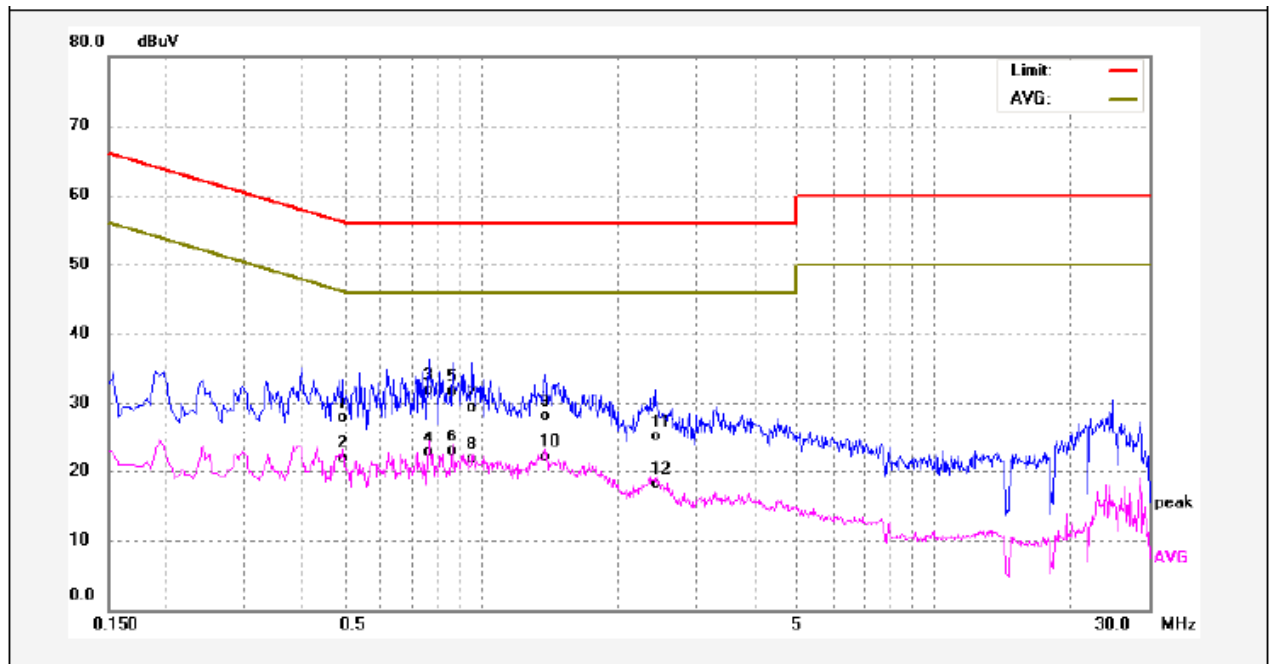
Worst Mode: WIFI mode

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.4820	22.13	10.25	32.38	56.30	-23.92	QP	
2	0.4820	13.96	10.25	24.21	46.30	-22.09	AVG	
3	0.6220	21.47	10.31	31.78	56.00	-24.22	QP	
4	0.6220	13.32	10.31	23.63	46.00	-22.37	AVG	
5	0.7780	24.31	10.36	34.67	56.00	-21.33	QP	
6	0.7780	13.94	10.36	24.30	46.00	-21.70	AVG	
7	0.8740	21.68	10.37	32.05	56.00	-23.95	QP	
8	0.8740	11.98	10.37	22.35	46.00	-23.65	AVG	
9	1.3900	22.33	10.42	32.75	56.00	-23.25	QP	
10	1.3900	13.52	10.42	23.94	46.00	-22.06	AVG	
11	2.3900	20.71	10.48	31.19	56.00	-24.81	QP	
12	2.3900	10.65	10.48	21.13	46.00	-24.87	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.4940	17.68	10.25	27.93	56.10	-28.17	QP	
2	0.4940	11.56	10.25	21.81	46.10	-24.29	AVG	
3	0.7660	21.56	10.36	31.92	56.00	-24.08	QP	
4	0.7660	12.37	10.36	22.73	46.00	-23.27	AVG	
5	0.8620	21.36	10.37	31.73	56.00	-24.27	QP	
6	0.8620	12.44	10.37	22.81	46.00	-23.19	AVG	
7	0.9620	18.99	10.39	29.38	56.00	-26.62	QP	
8	0.9620	11.25	10.39	21.64	46.00	-24.36	AVG	
9	1.3860	17.74	10.42	28.16	56.00	-27.84	QP	
10	1.3860	11.60	10.42	22.02	46.00	-23.98	AVG	
11	2.4460	14.61	10.48	25.09	56.00	-30.91	QP	
12	2.4460	7.58	10.48	18.06	46.00	-27.94	AVG	

## 8 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	$20\log^{(500)}$

### 8.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

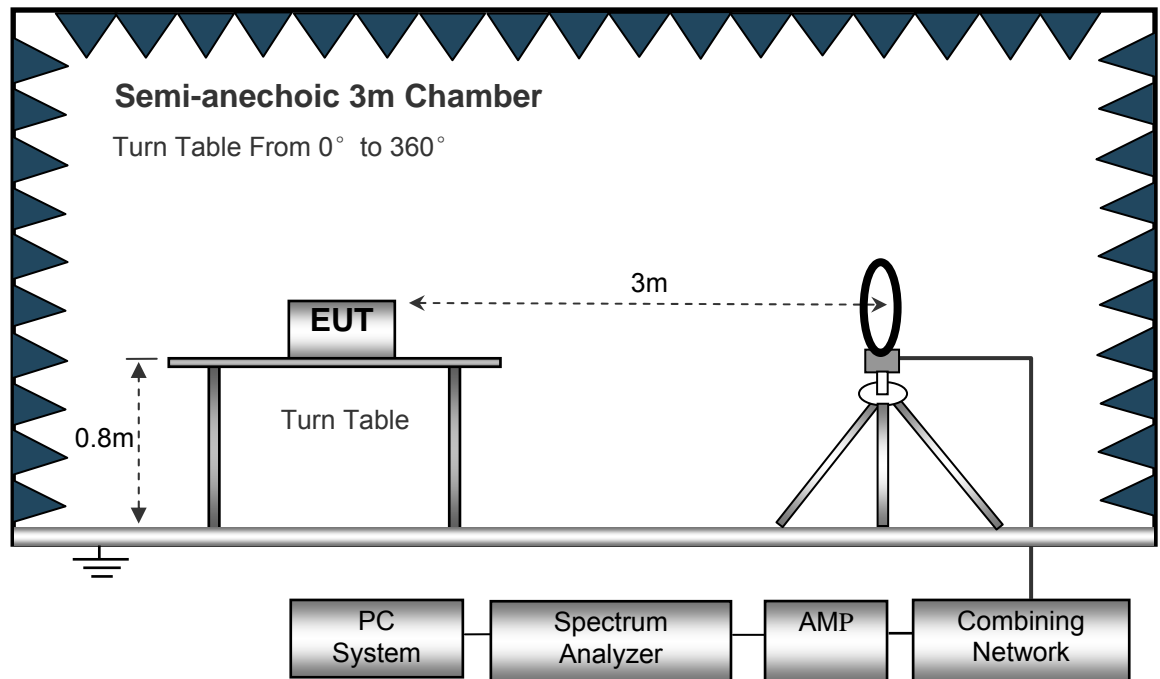
EUT Operation :

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

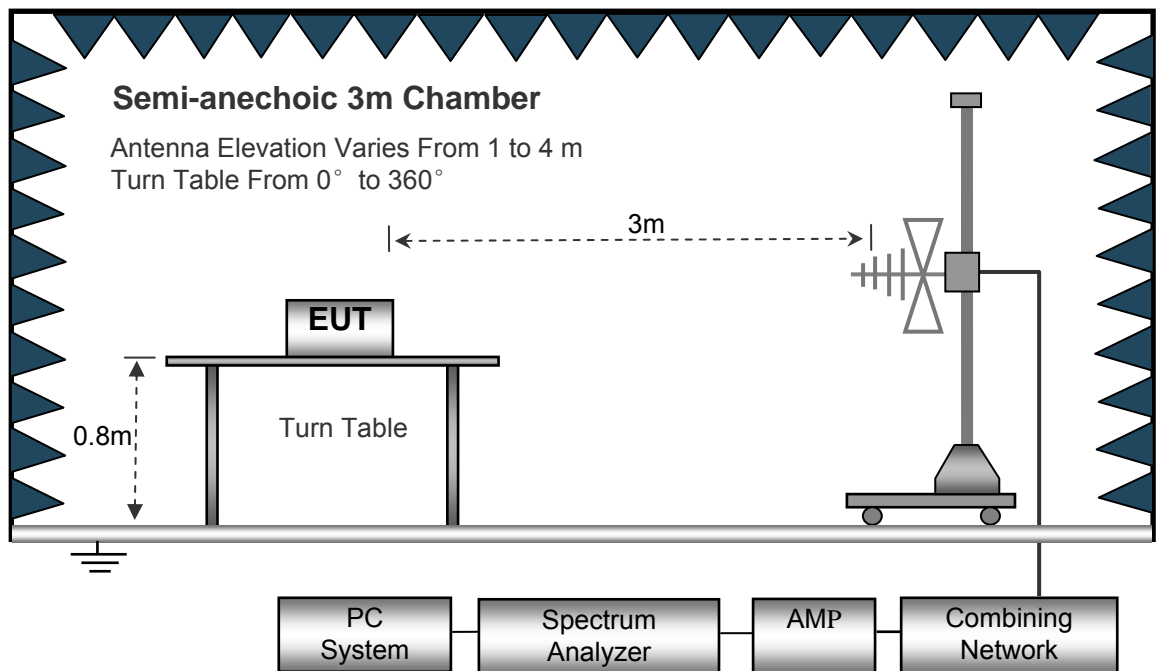
## 8.2 Test Setup

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

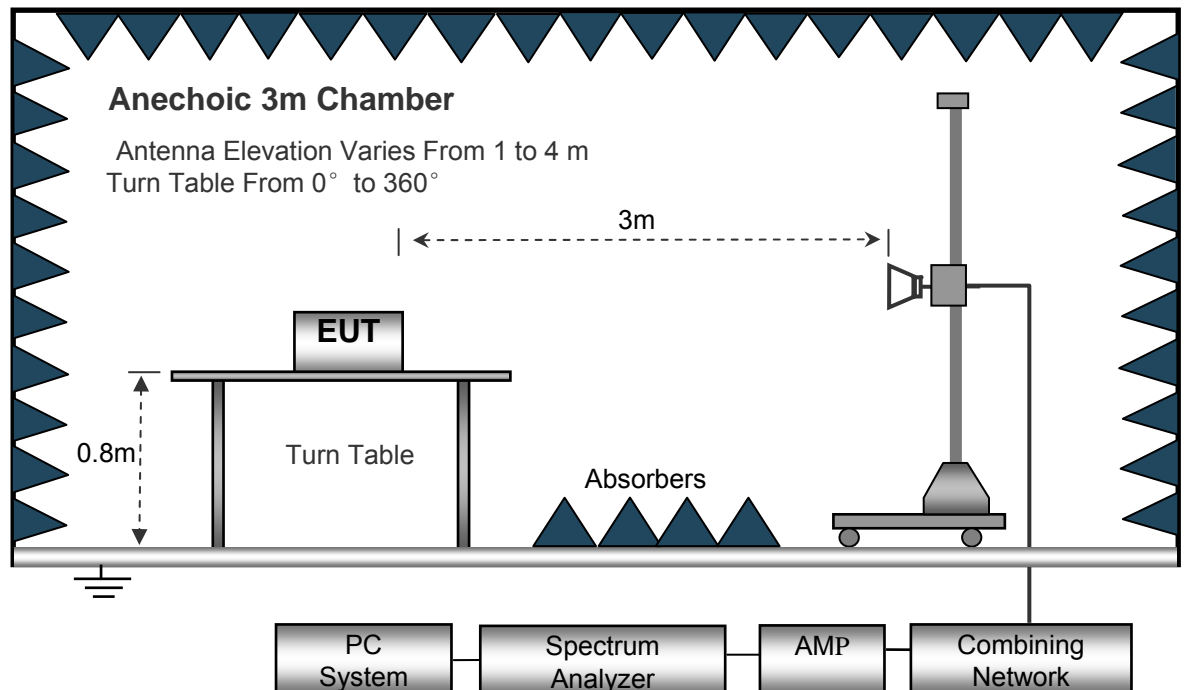
The test setup for emission measurement below 30MHz.



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.
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

**Worst Mode: WIFI mode**

**Test Frequency : 26MHz ~ 30MHz**

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

**Test Frequency : 30MHz ~ 18GHz**

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	41.05	QP	103	1.5	H	-11.62	29.43	46.00	-16.57
223.45	40.62	QP	27	2.0	V	-11.62	29.00	46.00	-17.00
4824.00	50.44	PK	19	1.1	V	-1.06	49.38	74.00	-24.62
4824.00	49.02	Ave	19	1.1	V	-1.06	47.96	54.00	-6.04
7236.00	43.25	PK	104	1.4	H	1.33	44.58	74.00	-29.42
7236.00	41.96	Ave	104	1.4	H	1.33	43.29	54.00	-10.71
2316.40	46.92	PK	200	1.9	V	-13.19	33.73	74.00	-40.27
2316.40	37.82	Ave	200	1.9	V	-13.19	24.63	54.00	-29.37
2367.76	42.97	PK	277	1.5	H	-13.14	29.83	74.00	-44.17
2367.76	38.28	Ave	277	1.5	H	-13.14	25.14	54.00	-28.86
2485.29	42.51	PK	291	1.8	V	-13.08	29.43	74.00	-44.57
2485.29	36.12	Ave	291	1.8	V	-13.08	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									
223.45	41.14	QP	66	1.9	H	-11.62	29.52	46.00	-16.48
223.45	39.74	QP	188	1.3	V	-11.62	28.12	46.00	-17.88
4874.00	49.09	PK	64	1.4	V	-0.62	48.47	74.00	-25.53
4874.00	47.70	Ave	64	1.4	V	-0.62	47.08	54.00	-6.92
7311.00	42.88	PK	249	1.0	H	2.21	45.09	74.00	-28.91
7311.00	41.74	Ave	249	1.0	H	2.21	43.95	54.00	-10.05
2311.42	46.23	PK	197	1.0	V	-13.19	33.04	74.00	-40.96
2311.42	38.71	Ave	197	1.0	V	-13.19	25.52	54.00	-28.48
2364.88	43.84	PK	185	1.7	H	-13.14	30.70	74.00	-43.30
2364.88	37.01	Ave	185	1.7	H	-13.14	23.87	54.00	-30.13
2489.88	44.76	PK	59	1.5	V	-13.08	31.68	74.00	-42.32
2489.88	37.78	Ave	59	1.5	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)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: High Channel 2462MHz									
223.45	39.88	QP	72	1.8	H	-11.62	28.26	46.00	-17.74
223.45	39.54	QP	21	1.7	V	-11.62	27.92	46.00	-18.08
4924.00	49.33	PK	357	1.9	V	-0.24	49.09	74.00	-24.91
4924.00	48.94	Ave	357	1.9	V	-0.24	48.70	54.00	-5.30
7386.00	43.51	PK	195	1.9	H	2.84	46.35	74.00	-27.65
7386.00	41.36	Ave	195	1.9	H	2.84	44.20	54.00	-9.80
2341.39	46.89	PK	89	1.6	V	-13.19	33.70	74.00	-40.30
2341.39	39.27	Ave	89	1.6	V	-13.19	26.08	54.00	-27.92
2373.15	42.37	PK	232	1.2	H	-13.14	29.23	74.00	-44.77
2373.15	37.83	Ave	232	1.2	H	-13.14	24.69	54.00	-29.31
2485.03	43.50	PK	147	1.8	V	-13.08	30.42	74.00	-43.58
2485.03	38.46	Ave	147	1.8	V	-13.08	25.38	54.00	-28.62

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	39.67	QP	101	1.4	H	-11.62	28.05	46.00	-17.95
223.45	39.91	QP	246	1.5	V	-11.62	28.29	46.00	-17.71
4824.00	50.28	PK	48	1.8	V	-1.06	49.22	74.00	-24.78
4824.00	48.79	Ave	48	1.8	V	-1.06	47.73	54.00	-6.27
7236.00	43.14	PK	75	1.4	H	1.33	44.47	74.00	-29.53
7236.00	42.64	Ave	75	1.4	H	1.33	43.97	54.00	-10.03
2319.75	45.86	PK	25	1.2	V	-13.19	32.67	74.00	-41.33
2319.75	38.60	Ave	25	1.2	V	-13.19	25.41	54.00	-28.59
2353.97	44.73	PK	78	1.4	H	-13.14	31.59	74.00	-42.41
2353.97	36.98	Ave	78	1.4	H	-13.14	23.84	54.00	-30.16
2489.24	43.25	PK	222	1.0	V	-13.08	30.17	74.00	-43.83
2489.24	37.95	Ave	222	1.0	V	-13.08	24.87	54.00	-29.13

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	39.84	QP	153	1.9	H	-11.62	28.22	46.00	-17.78
223.45	41.06	QP	18	1.1	V	-11.62	29.44	46.00	-16.56
4874.00	48.90	PK	9	1.8	V	-0.62	48.28	74.00	-25.72
4874.00	49.47	Ave	9	1.8	V	-0.62	48.85	54.00	-5.15
7311.00	41.76	PK	257	1.6	H	2.21	43.97	74.00	-30.03
7311.00	43.77	Ave	257	1.6	H	2.21	45.98	54.00	-8.02
2335.43	45.32	PK	292	1.1	V	-13.19	32.13	74.00	-41.87
2335.43	37.90	Ave	292	1.1	V	-13.19	24.71	54.00	-29.29
2363.73	42.51	PK	20	1.4	H	-13.14	29.37	74.00	-44.63
2363.73	36.79	Ave	20	1.4	H	-13.14	23.65	54.00	-30.35
2496.22	44.41	PK	340	2.0	V	-13.08	31.33	74.00	-42.67
2496.22	37.99	Ave	340	2.0	V	-13.08	24.91	54.00	-29.09

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	40.62	QP	164	1.5	H	-11.62	29.00	46.00	-17.00
223.45	41.27	QP	247	1.6	V	-11.62	29.65	46.00	-16.35
4924.00	48.89	PK	97	1.6	V	-0.24	48.65	74.00	-25.35
4924.00	50.96	Ave	97	1.6	V	-0.24	50.72	54.00	-3.28
7386.00	40.44	PK	145	1.5	H	2.84	43.28	74.00	-30.72
7386.00	42.98	Ave	145	1.5	H	2.84	45.82	54.00	-8.18
2337.46	46.12	PK	13	1.9	V	-13.19	32.93	74.00	-41.07
2337.46	37.59	Ave	13	1.9	V	-13.19	24.40	54.00	-29.60
2368.72	44.66	PK	112	1.2	H	-13.14	31.52	74.00	-42.48
2368.72	38.00	Ave	112	1.2	H	-13.14	24.86	54.00	-29.14
2486.39	42.10	PK	349	1.5	V	-13.08	29.02	74.00	-44.98
2486.39	37.44	Ave	349	1.5	V	-13.08	24.36	54.00	-29.64

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									
223.45	41.36	QP	218	1.7	H	-11.62	29.74	46.00	-16.26
223.45	41.76	QP	323	1.3	V	-11.62	30.14	46.00	-15.86
4824.00	49.89	PK	249	1.8	V	-1.06	48.83	74.00	-25.17
4824.00	51.11	Ave	249	1.8	V	-1.06	50.05	54.00	-3.95
7236.00	39.25	PK	196	1.4	H	1.33	40.58	74.00	-33.42
7236.00	42.61	Ave	196	1.4	H	1.33	43.94	54.00	-10.06
2348.86	45.20	PK	15	1.6	V	-13.19	32.01	74.00	-41.99
2348.86	39.84	Ave	15	1.6	V	-13.19	26.65	54.00	-27.35
2366.59	43.85	PK	43	1.7	H	-13.14	30.71	74.00	-43.29
2366.59	36.25	Ave	43	1.7	H	-13.14	23.11	54.00	-30.89
2484.34	42.73	PK	64	1.8	V	-13.08	29.65	74.00	-44.35
2484.34	38.73	Ave	64	1.8	V	-13.08	25.65	54.00	-28.35



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									
223.45	42.07	QP	296	1.9	H	-11.62	30.45	46.00	-15.55
223.45	40.33	QP	339	1.6	V	-11.62	28.71	46.00	-17.29
4874.00	48.43	PK	137	1.9	V	-0.62	47.81	74.00	-26.19
4874.00	51.20	Ave	137	1.9	V	-0.62	50.58	54.00	-3.42
7311.00	39.33	PK	98	1.2	H	2.21	41.54	74.00	-32.46
7311.00	41.69	Ave	98	1.2	H	2.21	43.90	54.00	-10.10
2345.39	46.02	PK	287	1.6	V	-13.19	32.83	74.00	-41.17
2345.39	39.94	Ave	287	1.6	V	-13.19	26.75	54.00	-27.25
2367.01	44.85	PK	179	1.9	H	-13.14	31.71	74.00	-42.29
2367.01	37.63	Ave	179	1.9	H	-13.14	24.49	54.00	-29.51
2489.35	43.18	PK	274	1.1	V	-13.08	30.10	74.00	-43.90
2489.35	37.98	Ave	274	1.1	V	-13.08	24.90	54.00	-29.10

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									
223.45	41.48	QP	64	1.9	H	-11.62	29.86	46.00	-16.14
223.45	41.10	QP	251	2.0	V	-11.62	29.48	46.00	-16.52
4924.00	47.80	PK	57	1.8	V	-0.24	47.56	74.00	-26.44
4924.00	50.70	Ave	57	1.8	V	-0.24	50.46	54.00	-3.54
7386.00	39.24	PK	240	1.8	H	2.84	42.08	74.00	-31.92
7386.00	42.62	Ave	240	1.8	H	2.84	45.46	54.00	-8.54
2328.09	45.82	PK	103	1.2	V	-13.19	32.63	74.00	-41.37
2328.09	37.66	Ave	103	1.2	V	-13.19	24.47	54.00	-29.53
2390.00	44.67	PK	18	1.5	H	-13.14	31.53	74.00	-42.47
2390.00	37.57	Ave	18	1.5	H	-13.14	24.43	54.00	-29.57
2494.23	44.65	PK	120	1.9	V	-13.08	31.57	74.00	-42.43
2494.23	37.20	Ave	120	1.9	V	-13.08	24.12	54.00	-29.88

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

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

**BT BLE:****Test Frequency : 26MHz ~ 30MHz**

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

**Test Frequency : 30MHz ~ 18GHz**

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Low Channel 2402MHz									
266.52	37.12	QP	290	1.0	H	-13.35	23.77	46.00	-22.23
266.52	42.59	QP	267	1.4	V	-13.35	29.24	46.00	-16.76
4804.00	47.23	PK	160	1.3	V	-1.06	46.17	74.00	-27.83
4804.00	44.06	Ave	160	1.3	V	-1.06	43.00	54.00	-11.00
7206.00	40.62	PK	39	1.7	H	1.33	41.95	74.00	-32.05
7206.00	36.48	Ave	39	1.7	H	1.33	37.81	54.00	-16.19
2328.91	45.81	PK	295	1.5	V	-13.19	32.62	74.00	-41.38
2328.91	39.86	Ave	295	1.5	V	-13.19	26.67	54.00	-27.33
2374.04	44.22	PK	173	1.5	H	-13.14	31.08	74.00	-42.92
2374.04	37.37	Ave	173	1.5	H	-13.14	24.23	54.00	-29.77
2485.97	42.32	PK	196	1.4	V	-13.08	29.24	74.00	-44.76
2485.97	38.35	Ave	196	1.4	V	-13.08	25.27	54.00	-28.73

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Middle Channel 2440MHz									
266.52	36.82	QP	350	1.0	H	-13.35	23.47	46.00	-22.53
266.52	41.56	QP	231	1.1	V	-13.35	28.21	46.00	-17.79
4880.00	47.30	PK	145	1.7	V	-0.62	46.68	74.00	-27.32
4880.00	45.53	Ave	145	1.7	V	-0.62	44.91	54.00	-9.09
7320.00	41.13	PK	40	1.1	H	2.21	43.34	74.00	-30.66
7320.00	35.84	Ave	40	1.1	H	2.21	38.05	54.00	-15.95
2311.26	45.00	PK	270	2.0	V	-13.19	31.81	74.00	-42.19
2311.26	39.50	Ave	270	2.0	V	-13.19	26.31	54.00	-27.69
2364.94	42.13	PK	280	1.3	H	-13.14	28.99	74.00	-45.01
2364.94	37.20	Ave	280	1.3	H	-13.14	24.06	54.00	-29.94
2485.17	44.68	PK	131	2.0	V	-13.08	31.60	74.00	-42.40
2485.17	38.30	Ave	131	2.0	V	-13.08	25.22	54.00	-28.78

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
High Channel 2480MHz									
266.52	37.53	QP	147	1.4	H	-13.35	24.18	46.00	-21.82
266.52	41.38	QP	26	1.6	V	-13.35	28.03	46.00	-17.97
4960.00	48.04	PK	229	1.3	V	-0.24	47.80	74.00	-26.20
4960.00	44.11	Ave	229	1.3	V	-0.24	43.87	54.00	-10.13
7440.00	40.30	PK	122	1.7	H	2.84	43.14	74.00	-30.86
7440.00	34.48	Ave	122	1.7	H	2.84	37.32	54.00	-16.68
2330.88	45.27	PK	264	1.2	V	-13.19	32.08	74.00	-41.92
2330.88	37.89	Ave	264	1.2	V	-13.19	24.70	54.00	-29.30
2372.69	42.34	PK	341	1.2	H	-13.14	29.20	74.00	-44.80
2372.69	36.75	Ave	341	1.2	H	-13.14	23.61	54.00	-30.39
2497.70	43.42	PK	292	2.0	V	-13.08	30.34	74.00	-43.66
2497.70	38.93	Ave	292	2.0	V	-13.08	25.85	54.00	-28.15

## 9 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247  
Test Method: KDB 558074 D01 DTS Meas Guidance v03r05 April 08, 2016  
Test Result: PASS  
Limit:

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 Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 2.1 Test Procedure

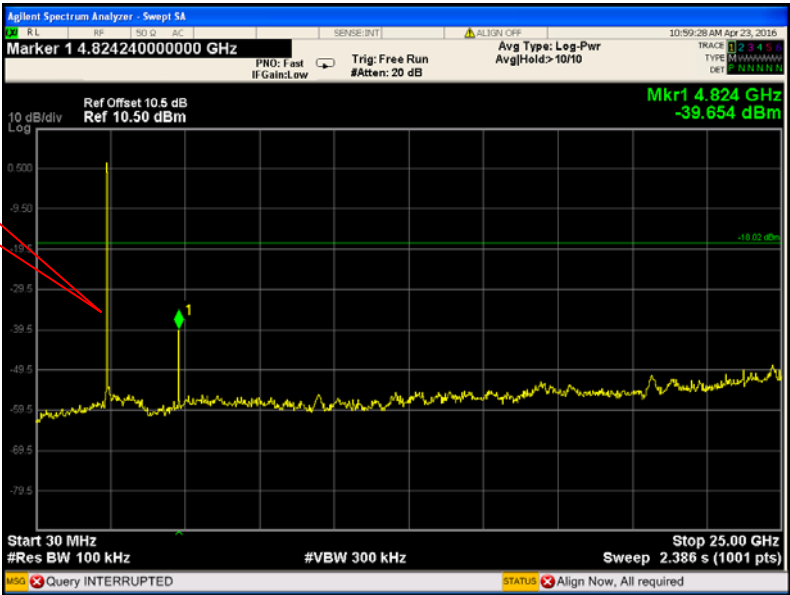
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:  
RBW = 100kHz, VBW = 300kHz, Sweep = auto  
Detector function = peak, Trace = max hold

2.2 Test Result

802.11b

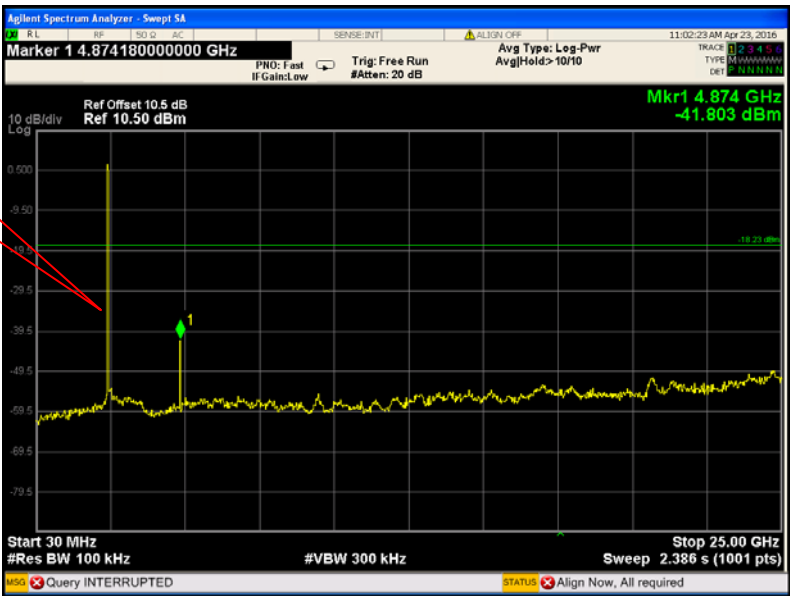
Low Channel

Fundamental



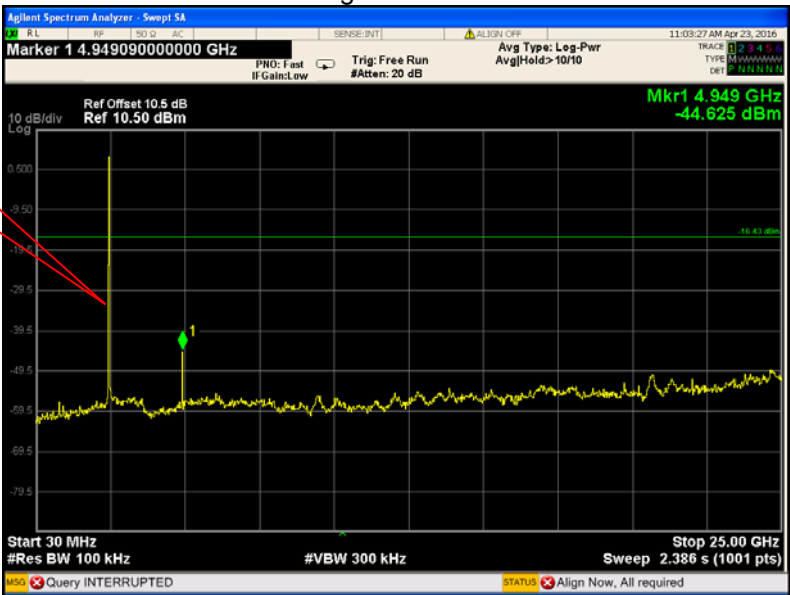
Middle Channel

Fundamental



High Channel

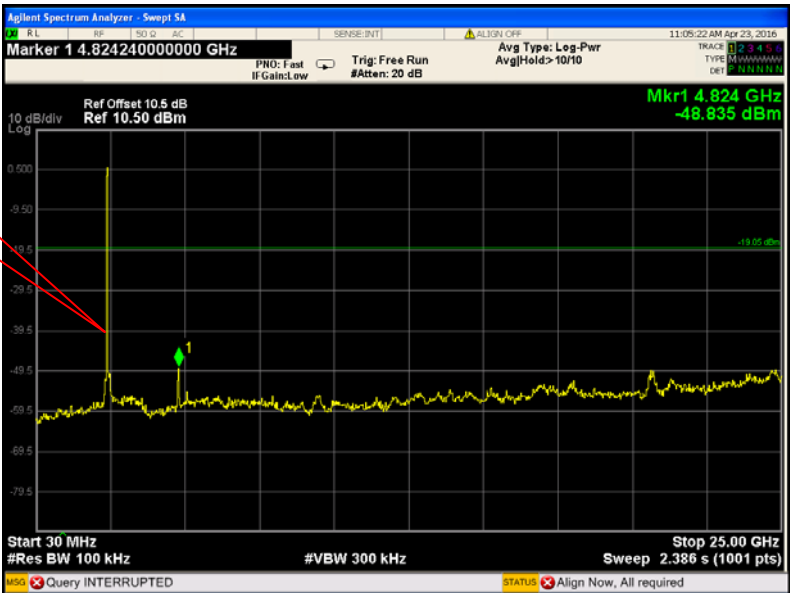
Fundamental



802.11g

Low Channel

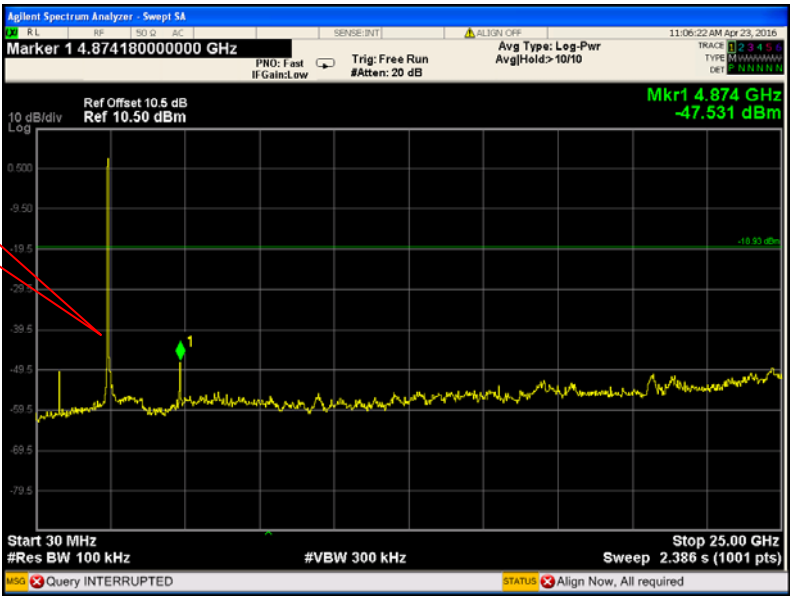
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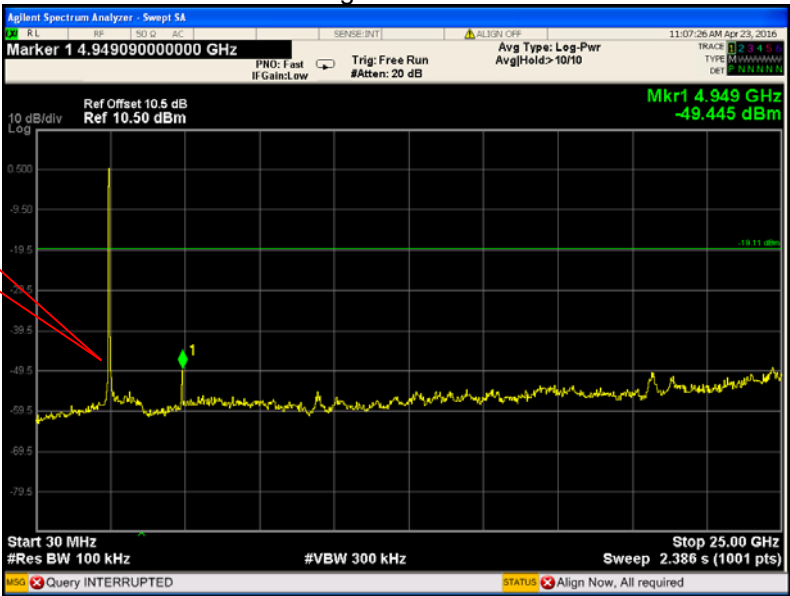
Middle Channel

Fundamental



High Channel

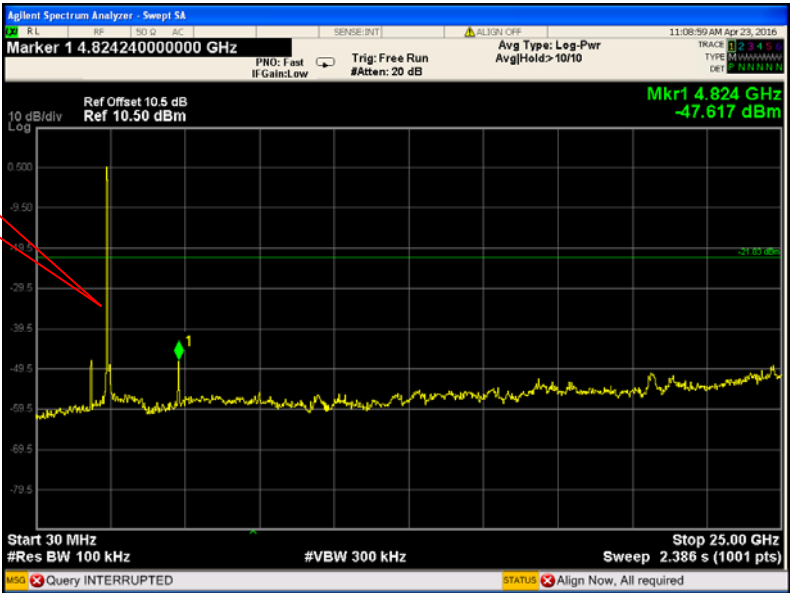
Fundamental



802.11n HT20

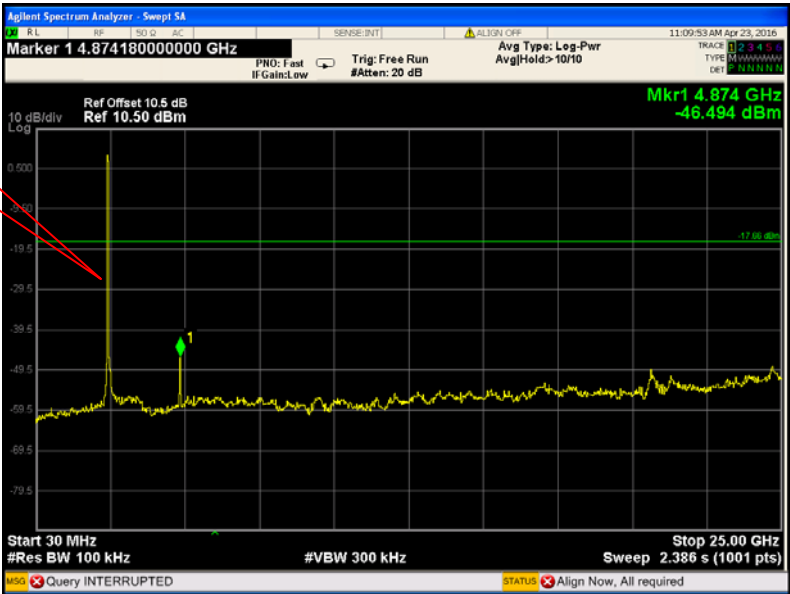
Low Channel

Fundamental



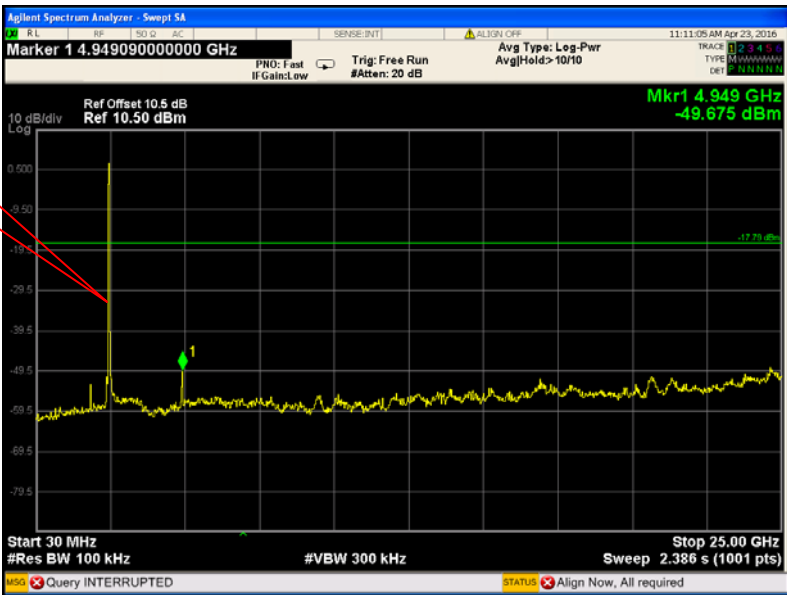
Middle Channel

Fundamental



High Channel

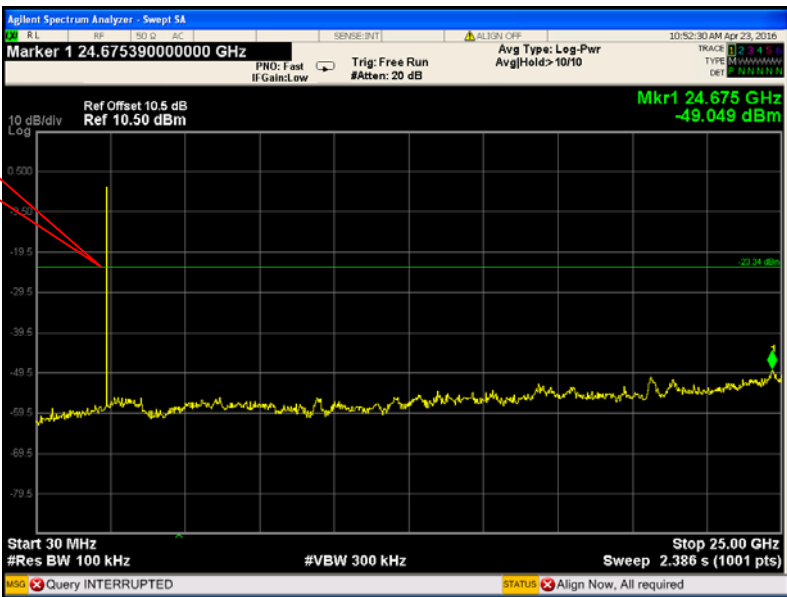
Fundamental



BLE

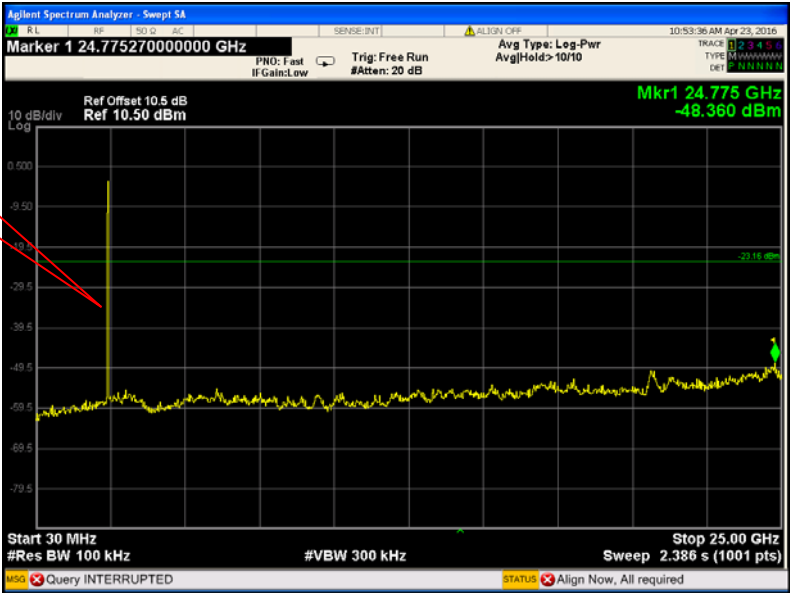
Low Channel

Fundamental



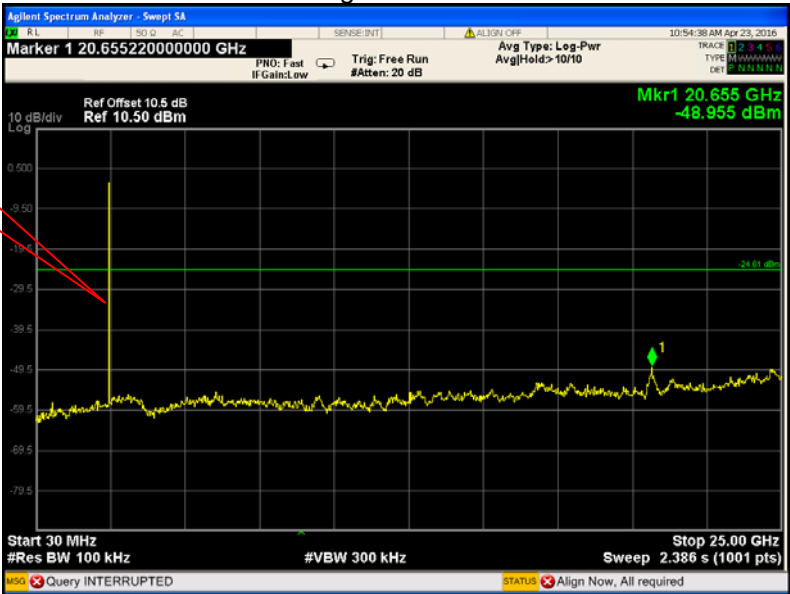
Middle Channel

Fundamental



High Channel

Fundamental



## 10 Band Edge Measurement

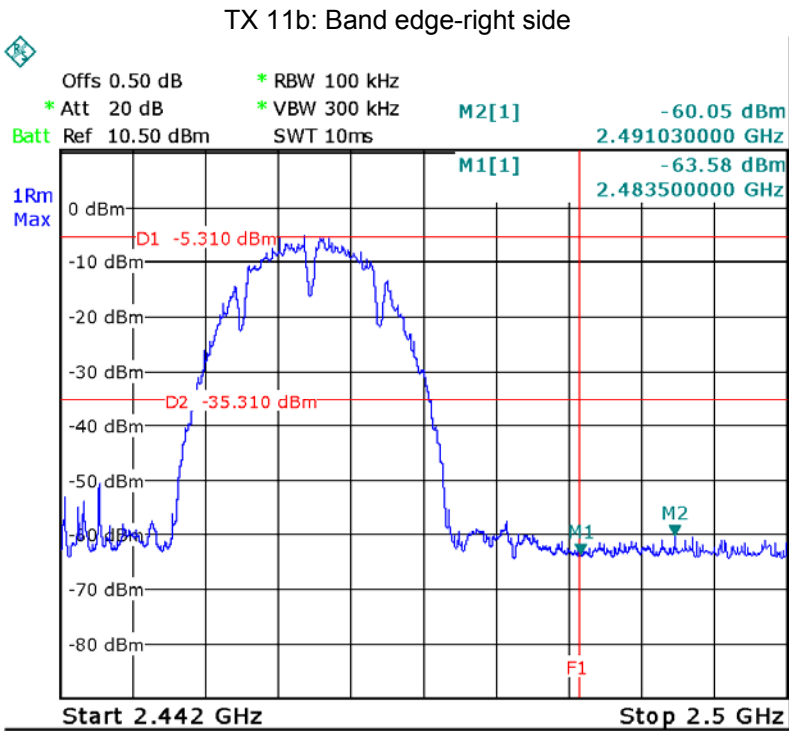
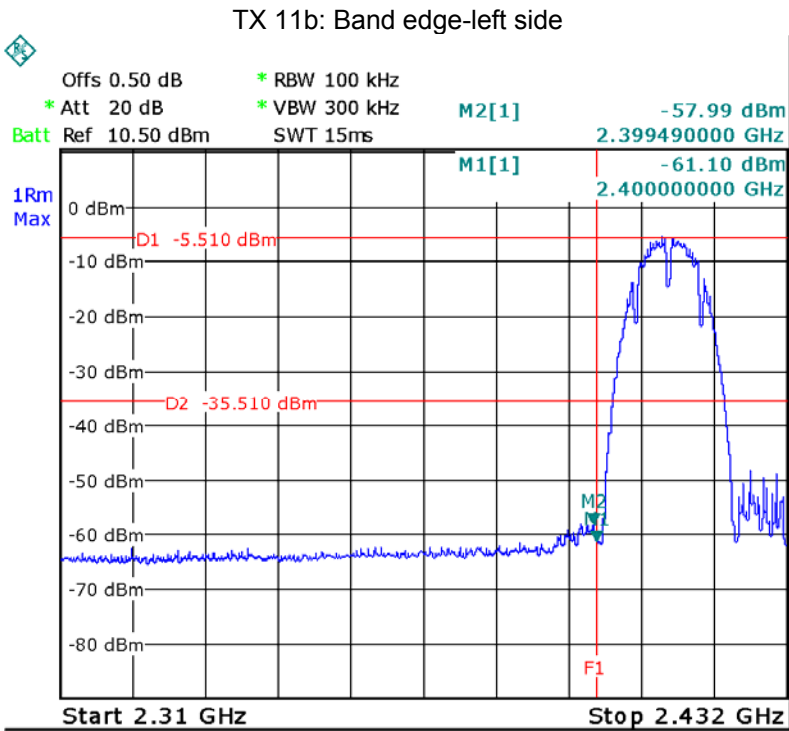
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r05 April 08, 2016
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio 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

### 10.1 Test Produce

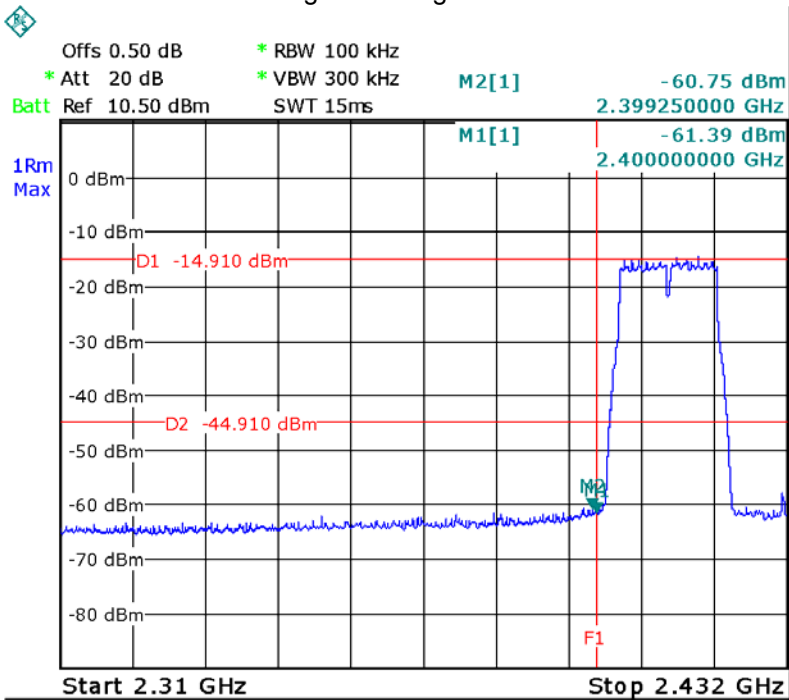
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then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

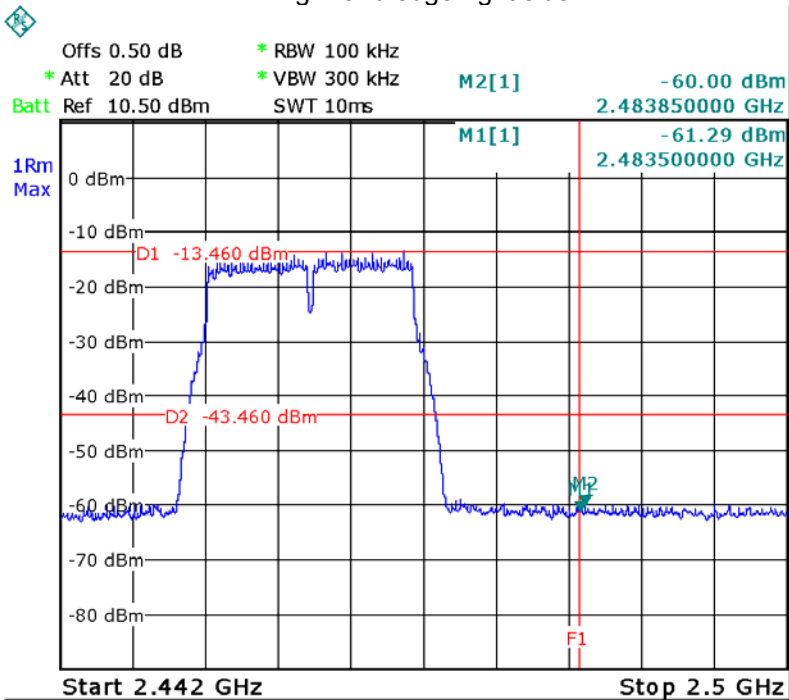
Test result plots shown as follows:

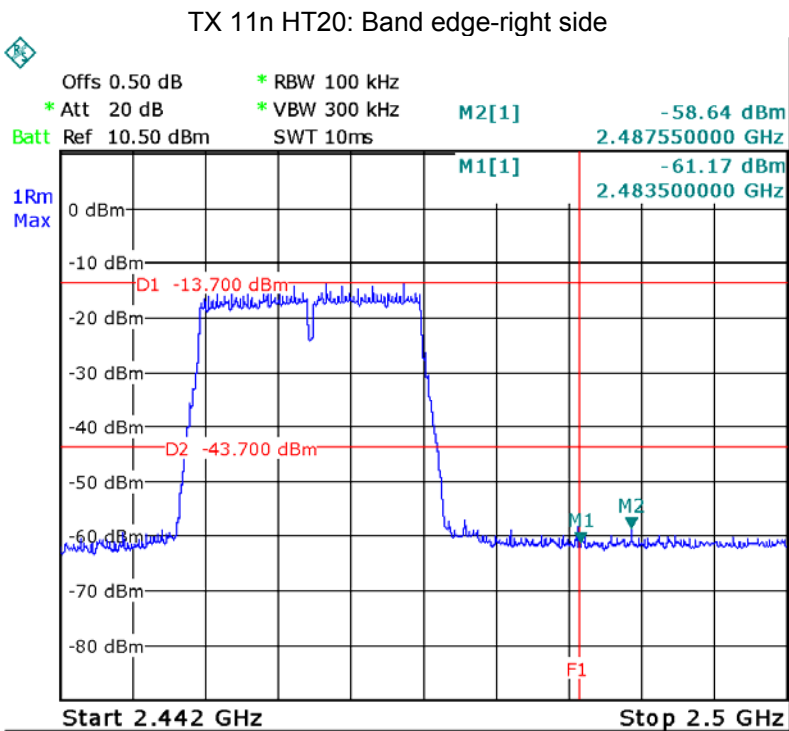
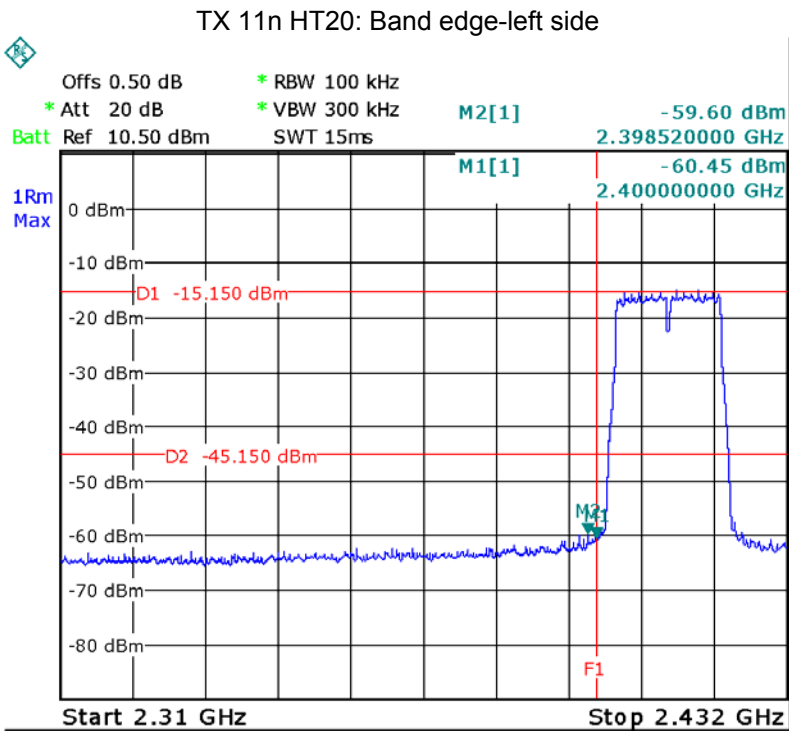


TX 11g: Band edge-left side



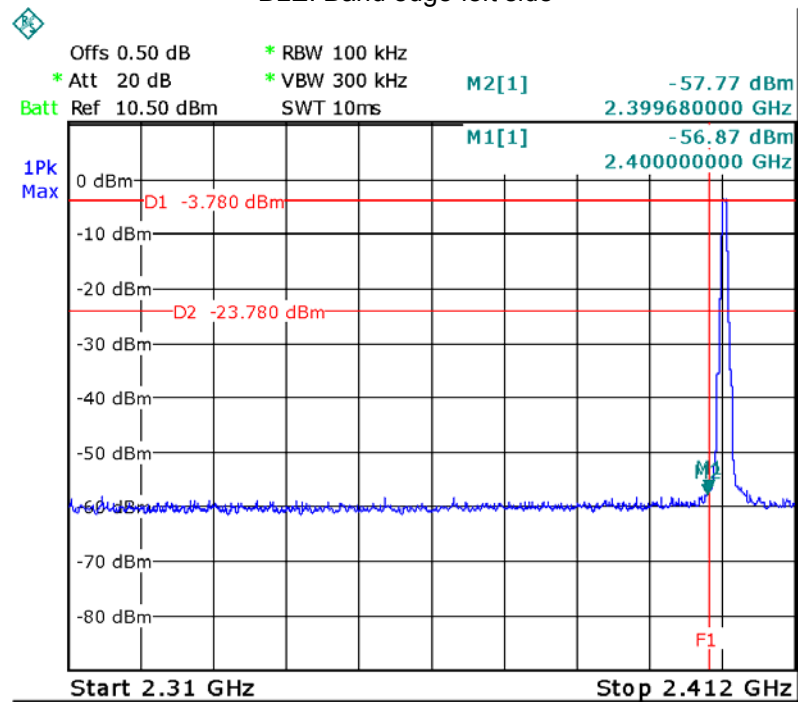
TX 11g: Band edge-right side



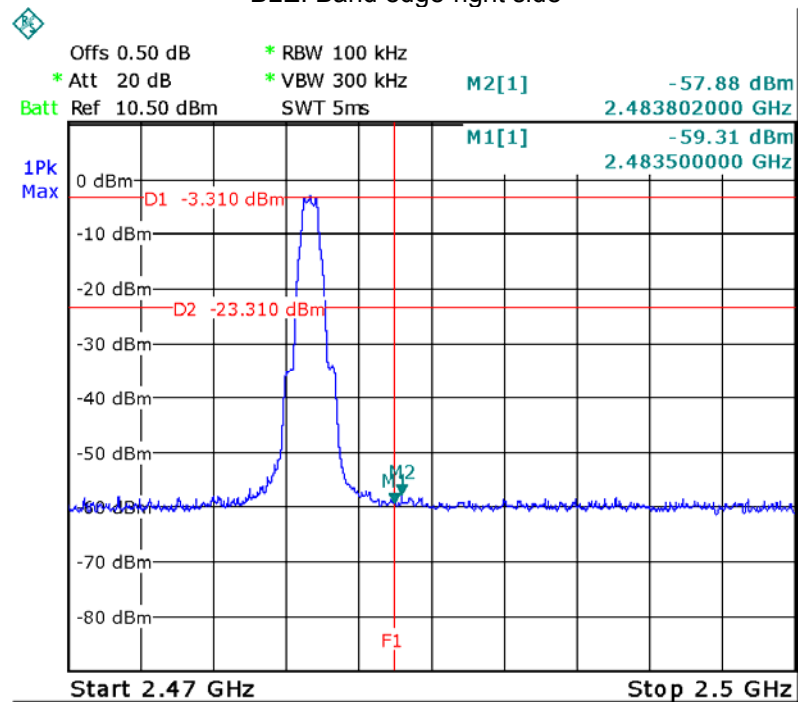




BLE: Band edge-left side



BLE: Band edge-right side



## 11 6 dB Bandwidth Measurement

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB 558074 D01 DTS Meas Guidance v03r05 April 08, 2016

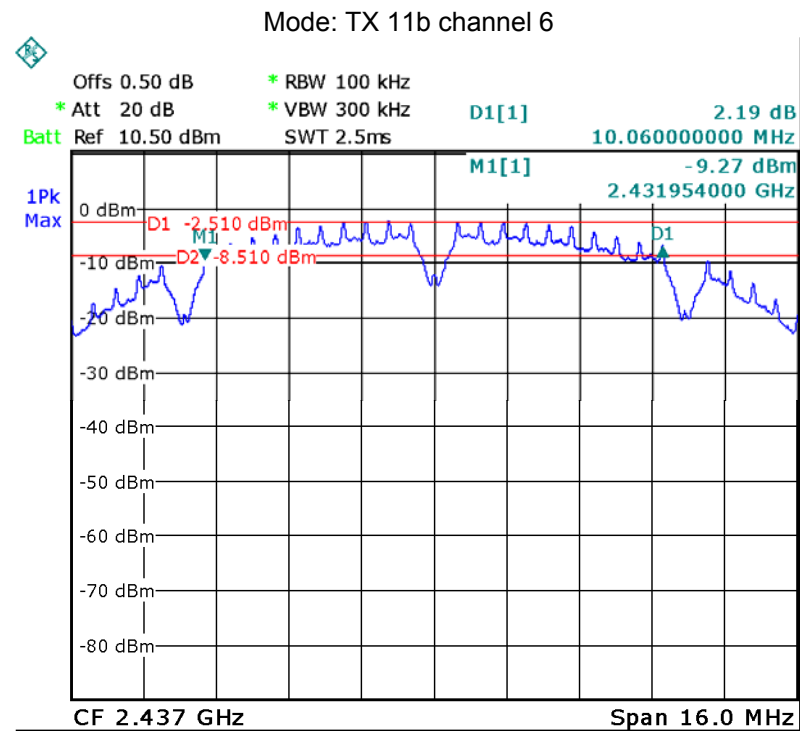
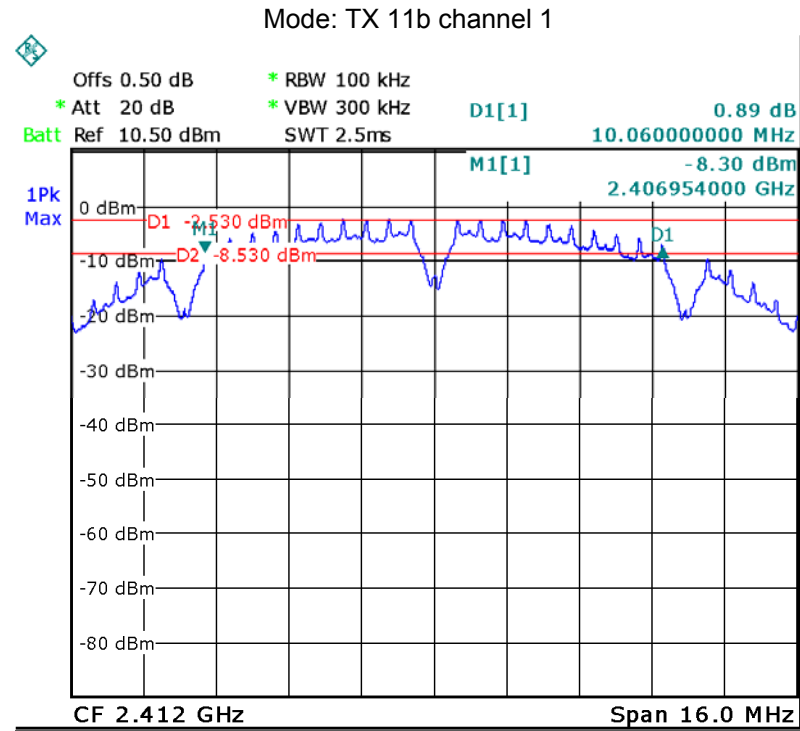
### 11.1 Test Procedure:

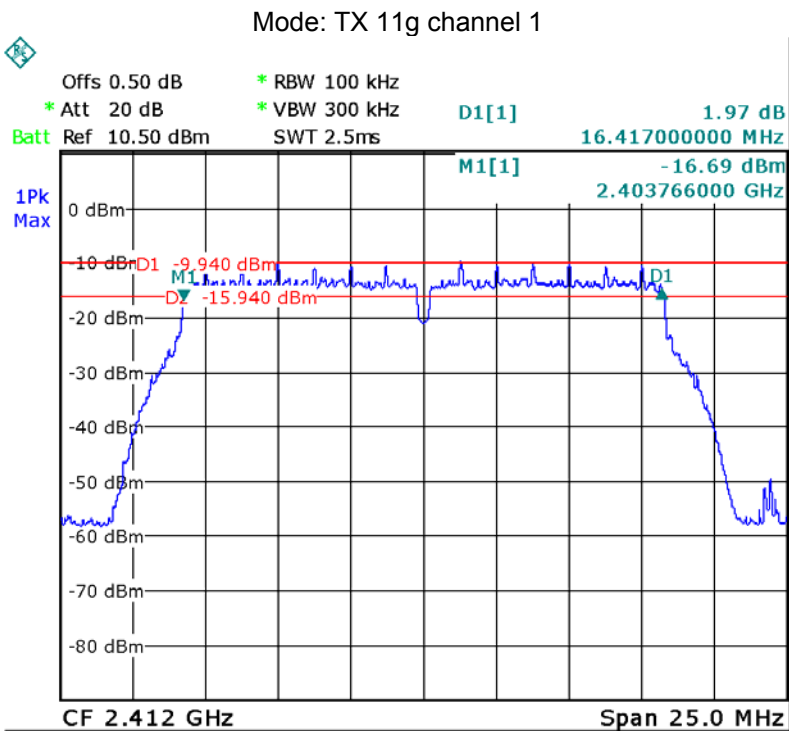
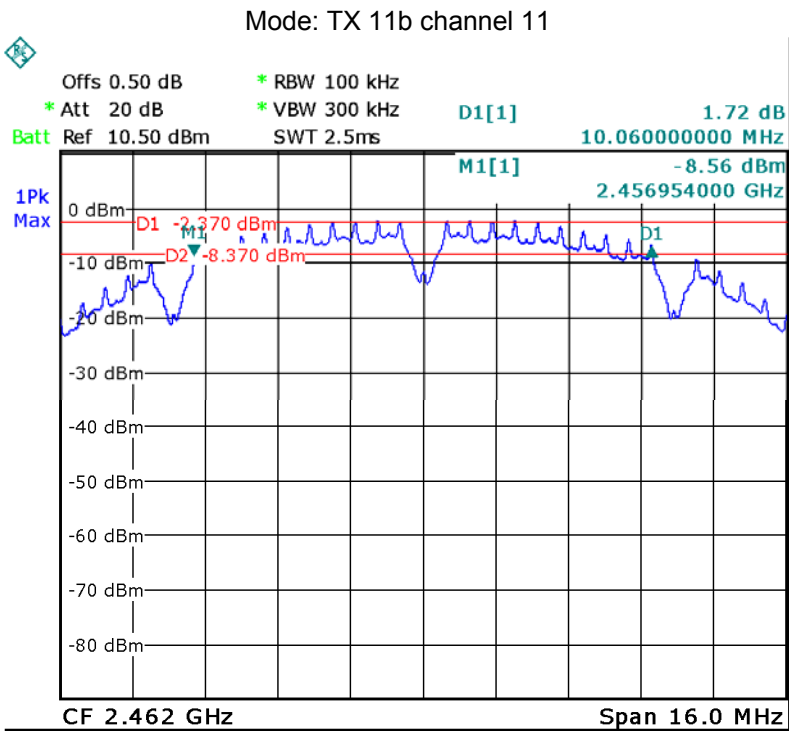
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

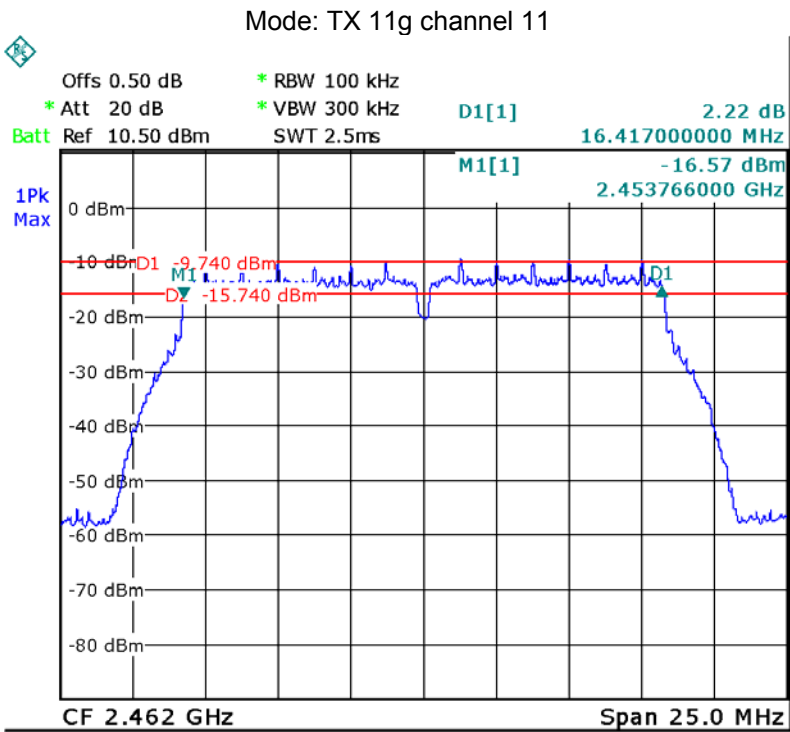
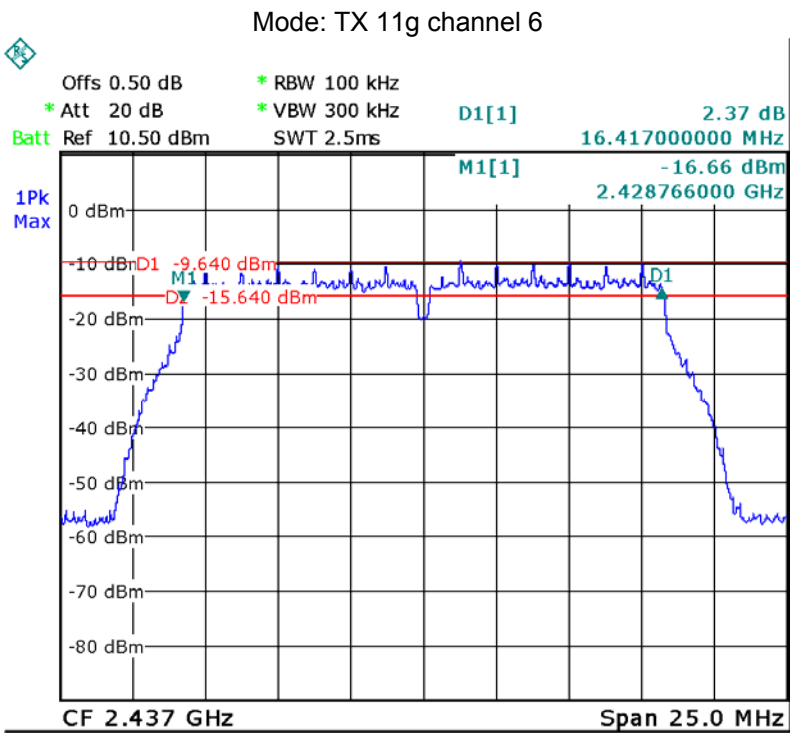
### 11.2 Test Result:

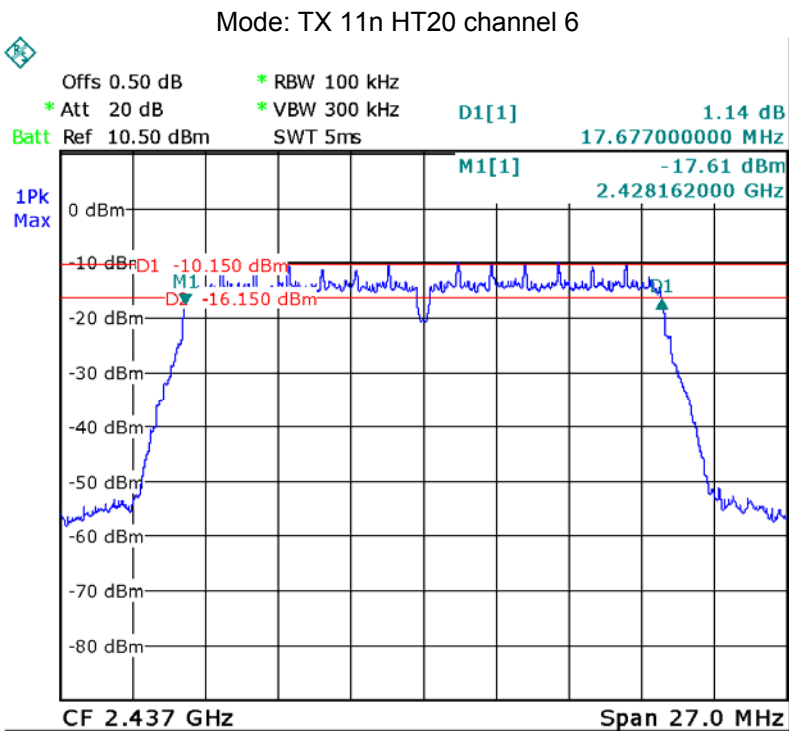
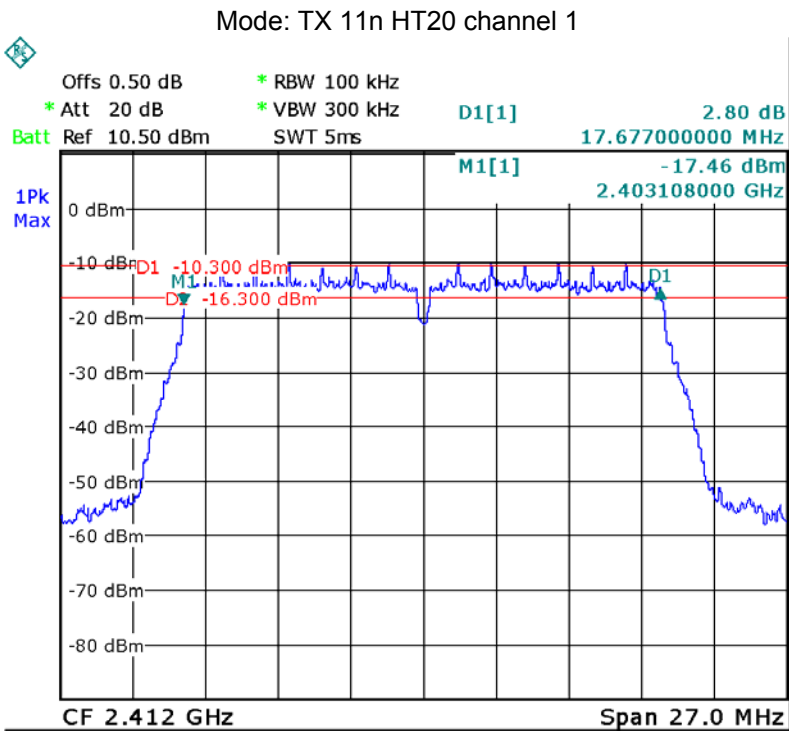
Operation mode	Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11
	10.060	10.060	10.060
TX 11g	Channel 1	Channel 6	Channel 11
	16.417	16.417	16.417
TX 11n HT20	Channel 1	Channel 6	Channel 11
	17.677	17.677	17.677
BLE	Channel 0	Channel 19	Channel 39
	0.713	0.707	0.713

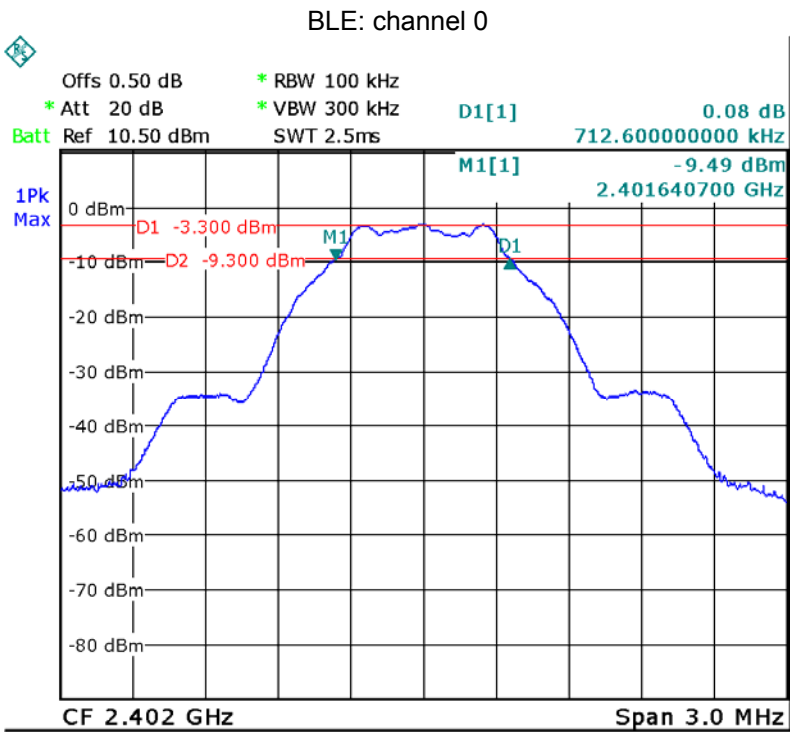
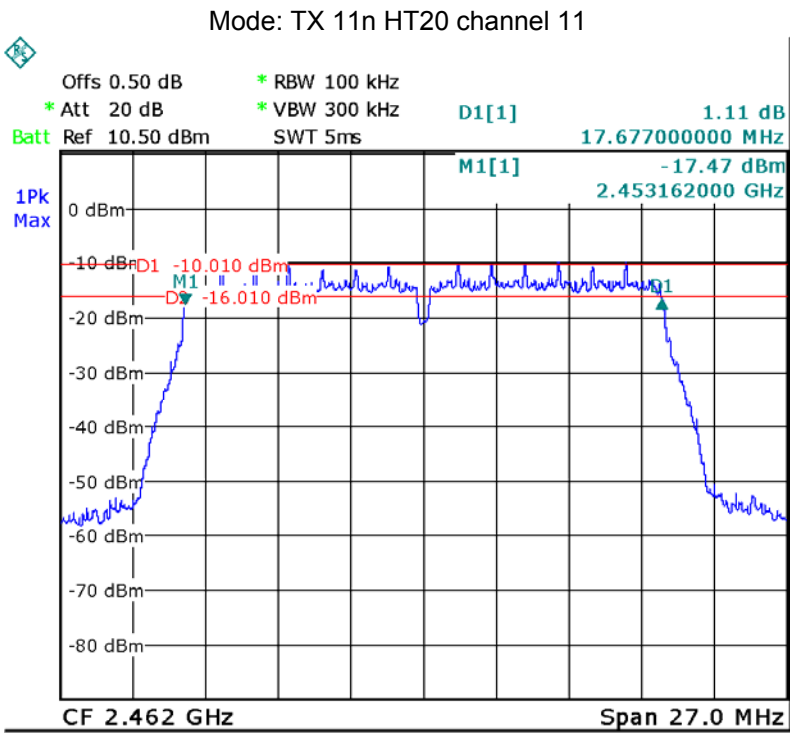
Test result plot as follows:

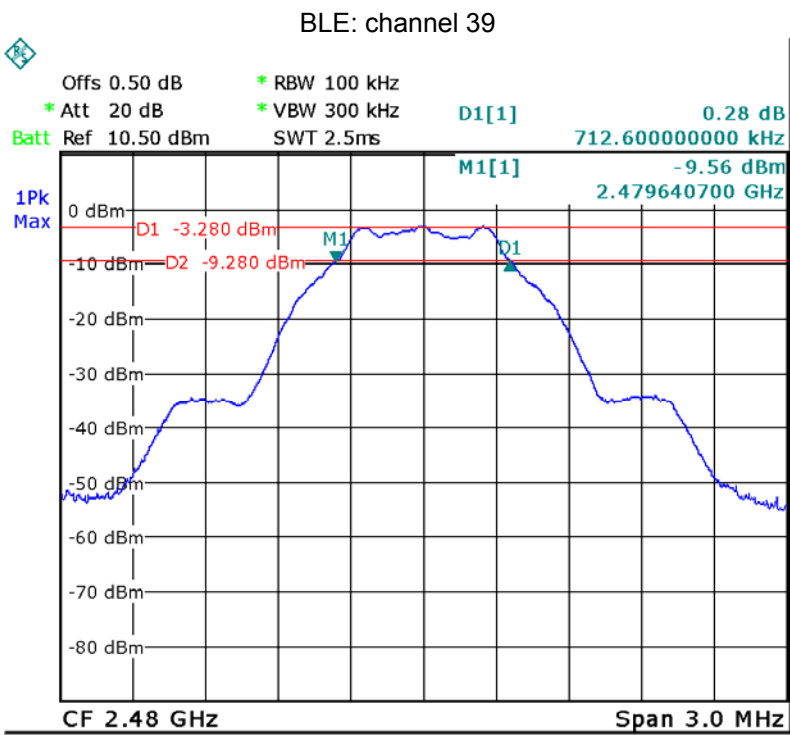
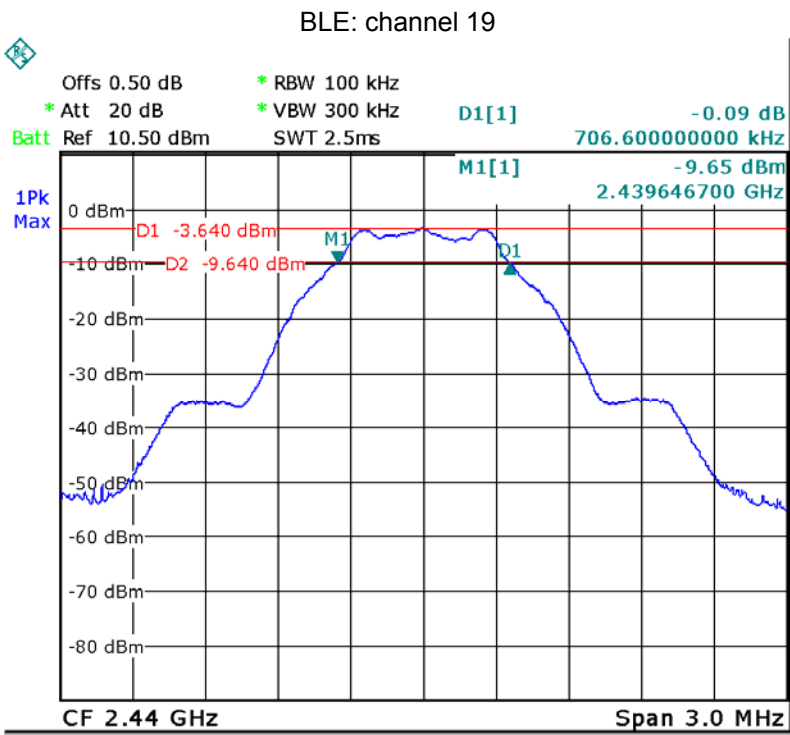














## 12 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB 558074 D01 DTS Meas Guidance v03r05 April 08, 2016

### 12.1 Test Procedure:

KDB 558074 D01 DTS Meas Guidance v03r05 April 08, 2016

section 9.1.1 (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  $RBW \geq DTS \text{ bandwidth}$ .
- b) Set  $VBW \geq 3 \text{ } RBW$ .
- c) Set  $span \geq 3 \times RBW$
- 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 9.1.2 (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  $RBW = 1 \text{ MHz}$ .
- b) Set the  $VBW \geq 3 \text{ } RBW$
- c) Set the  $span \geq 1.5 \times DTS \text{ bandwidth}$ .
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select peak detector). If the instrument does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS bandwidth.

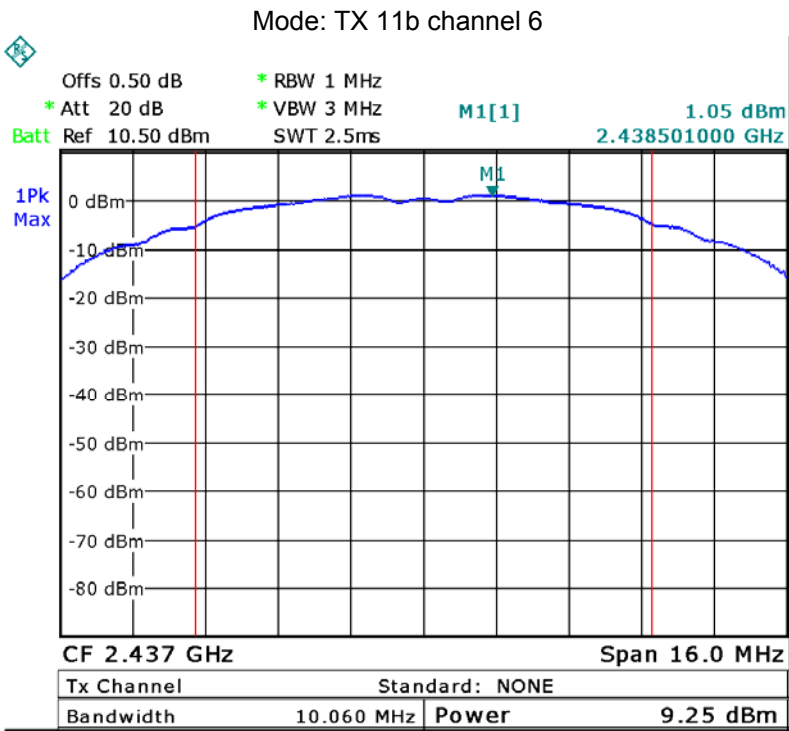
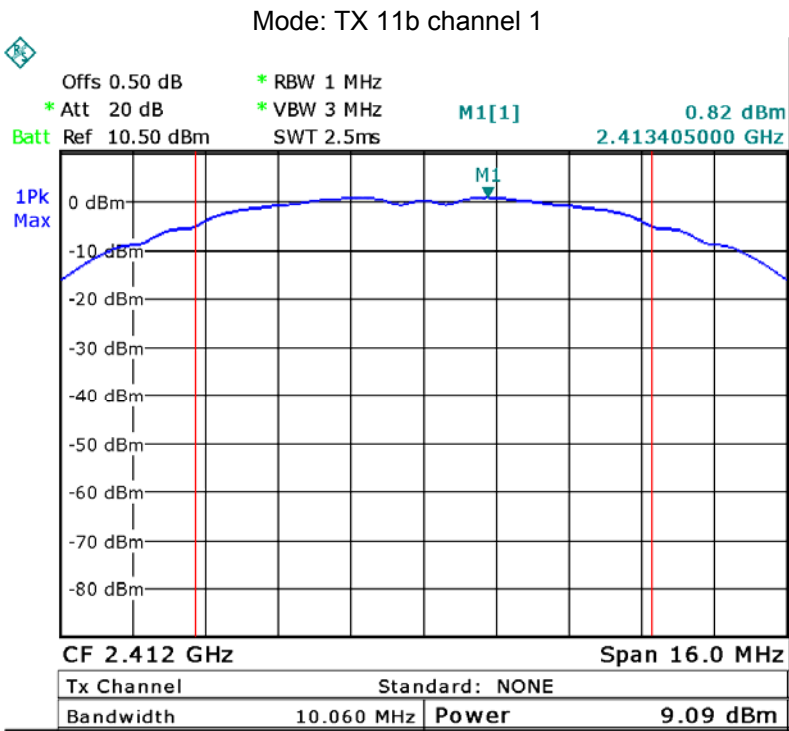
**12.2 Test Result:**

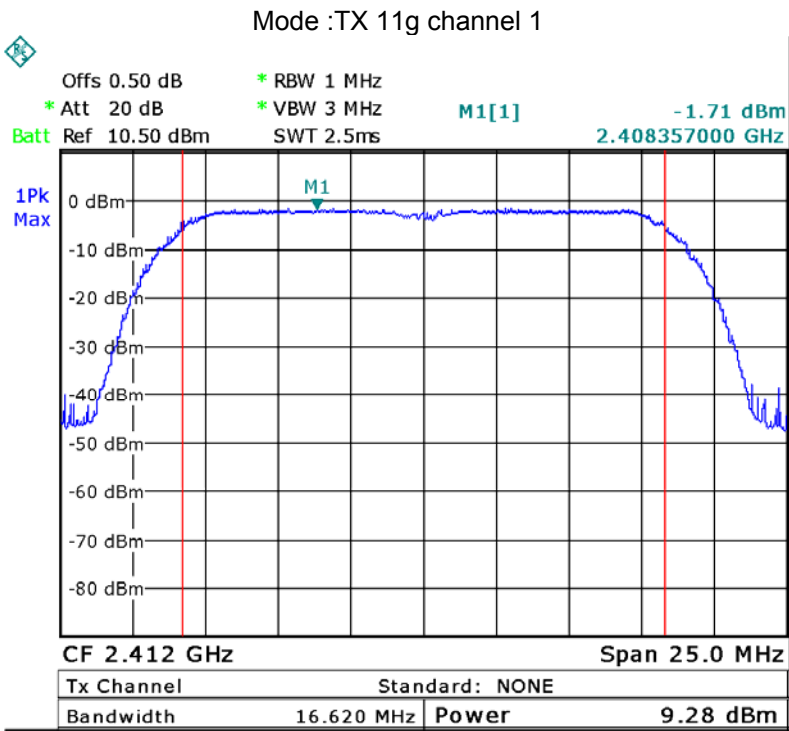
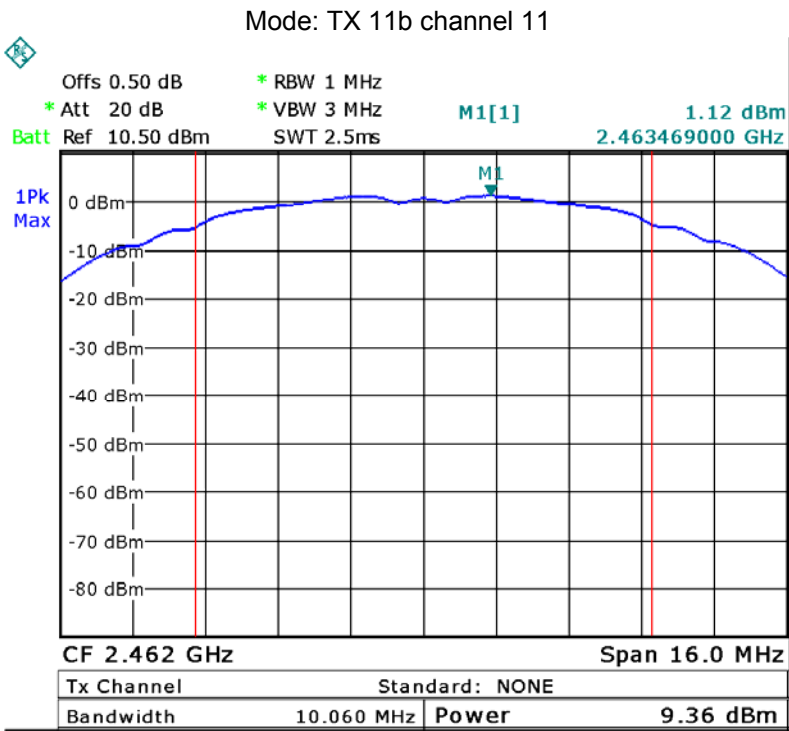
Test mode :TX 11b		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.09	9.25	9.36
Limit: 1W/30dBm		

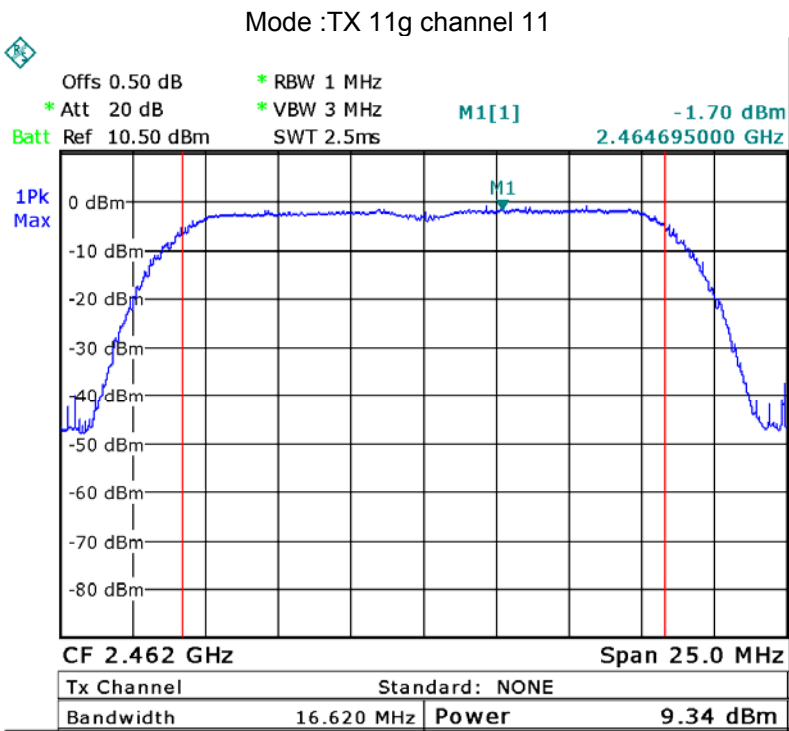
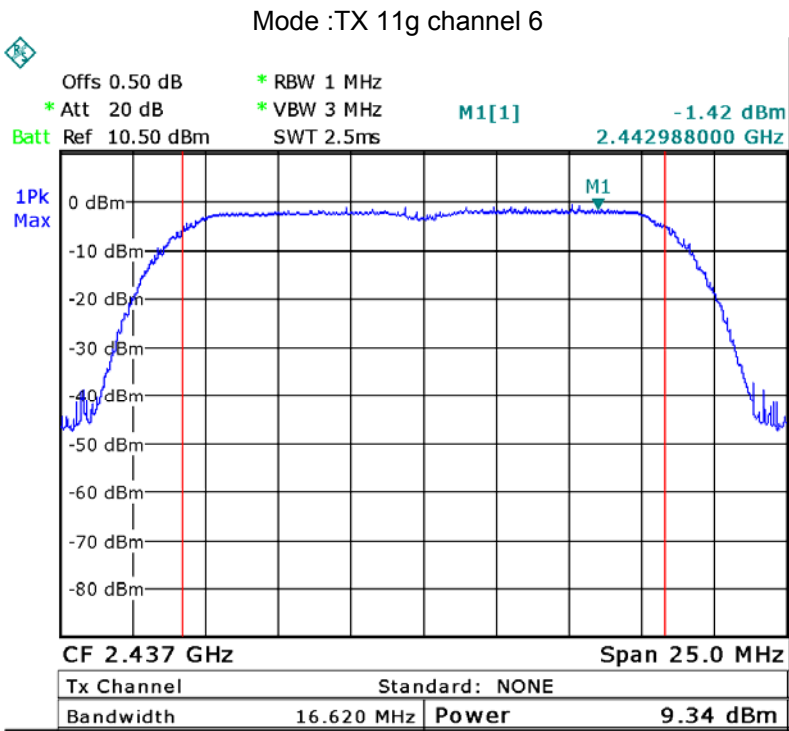
Test mode :TX 11g		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.28	9.34	9.34
Limit: 1W/30dBm		

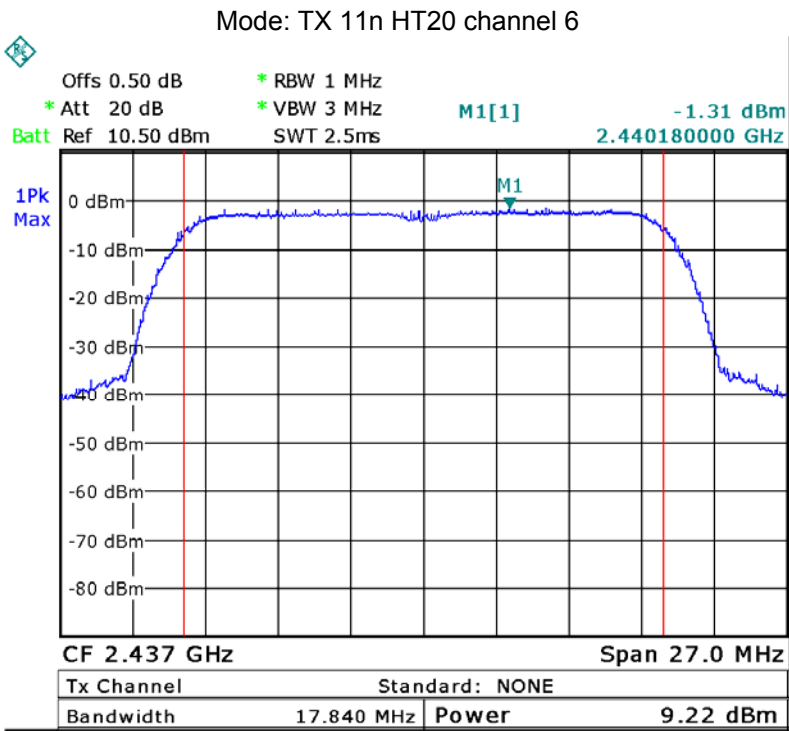
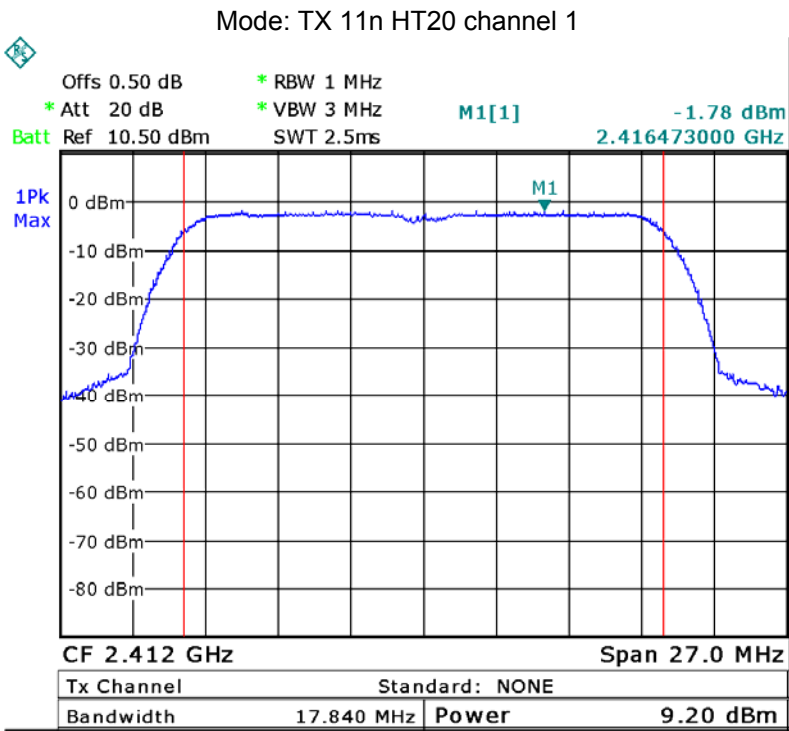
Test mode :TX 11n HT20		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.20	9.22	9.27
Limit: 1W/30dBm		

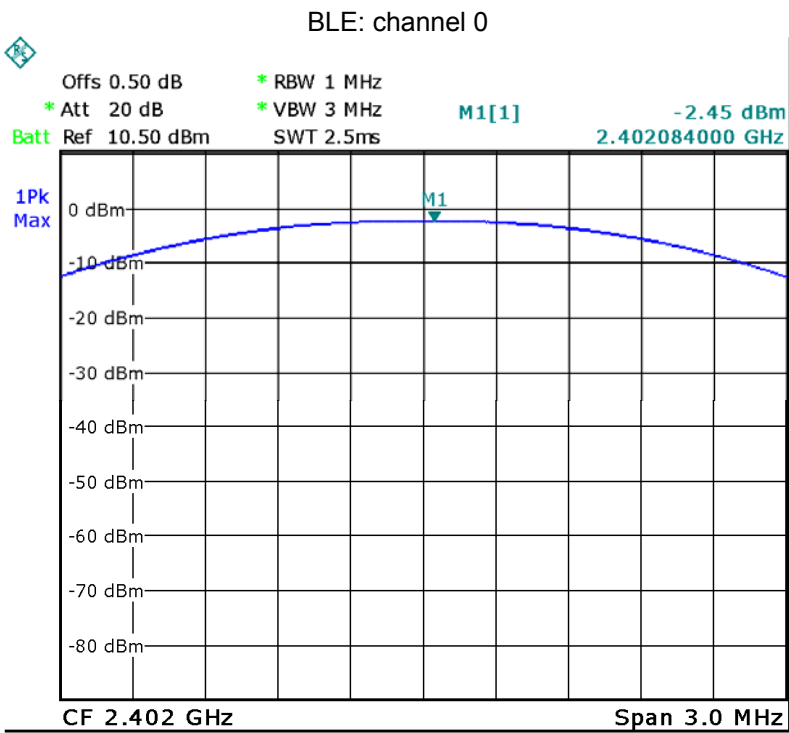
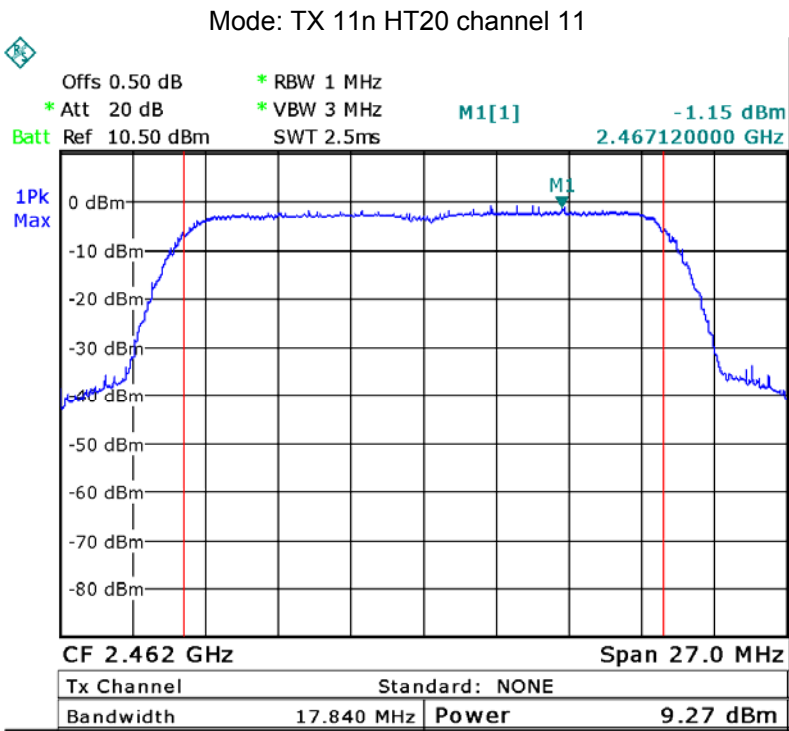
BLE		
Maximum Peak Output Power (dBm)		
2402MHz	2440MHz	2480MHz
-2.45	-2.76	-2.36
Limit: 1W/30dBm		

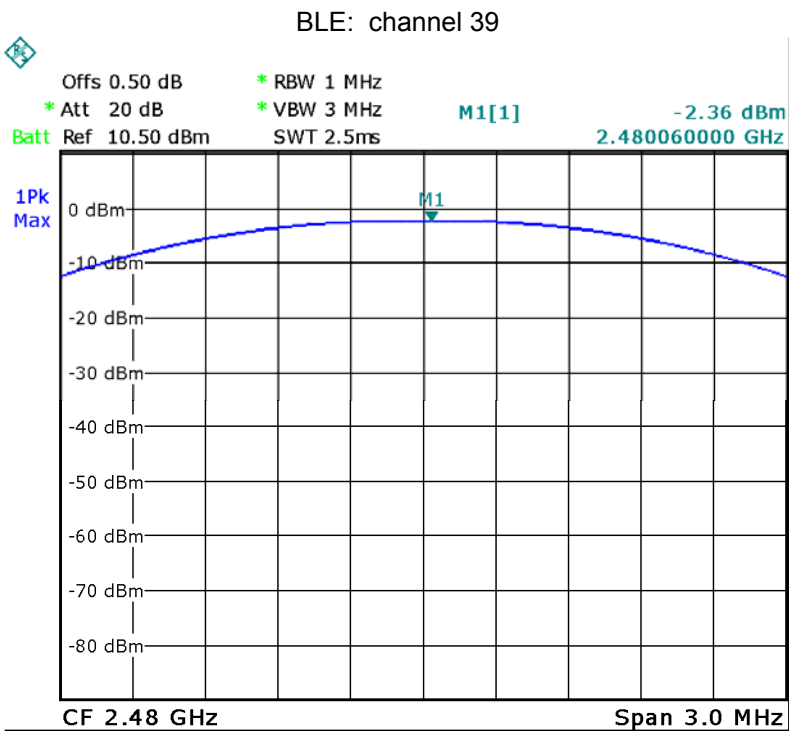
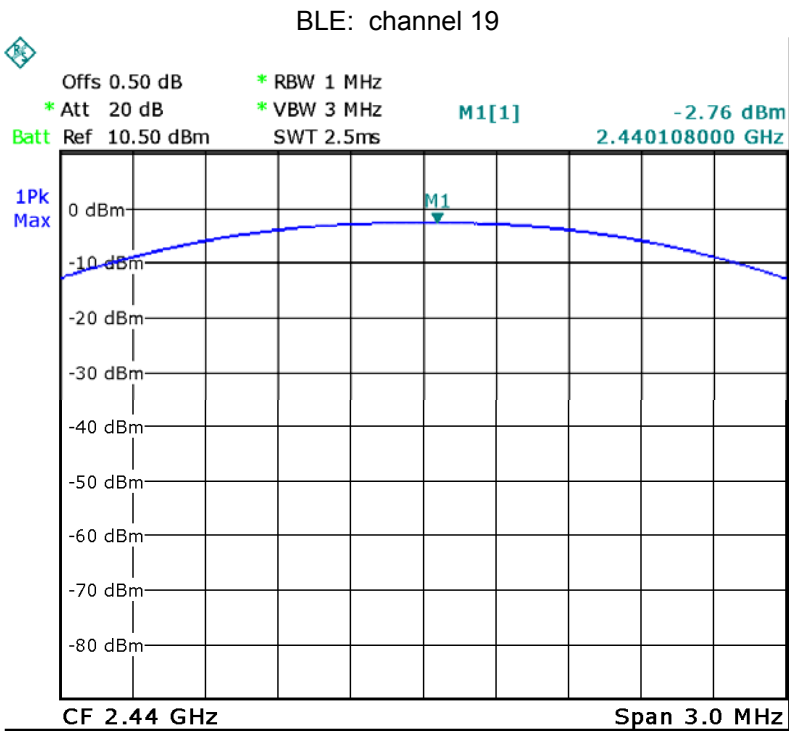














## 13 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v03r05 April 08, 2016

### 13.1 Test Procedure:

KDB 558074 D01 DTS Meas Guidance v03r05 April 08, 2016 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.

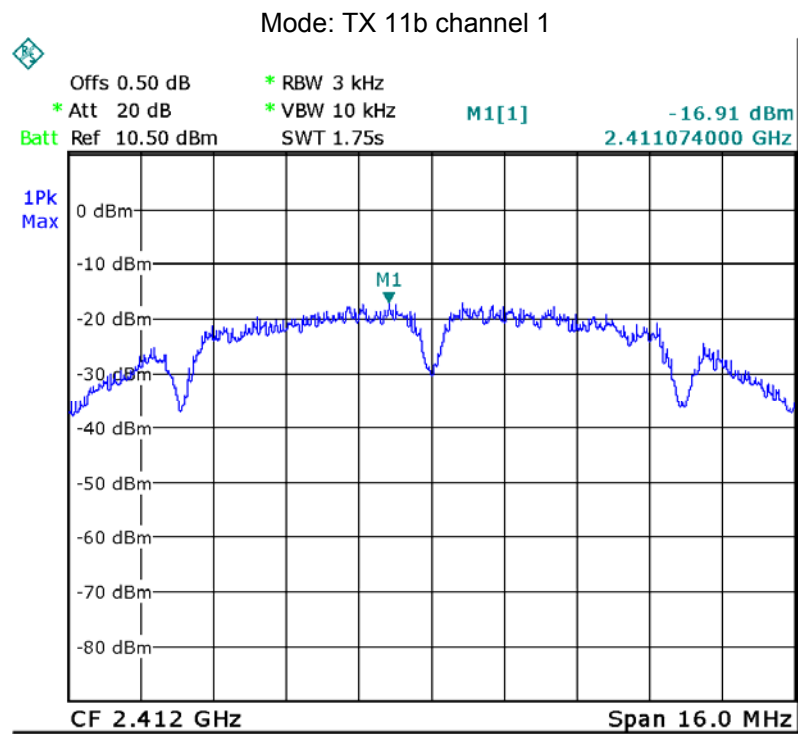
### 13.2 Test Result:

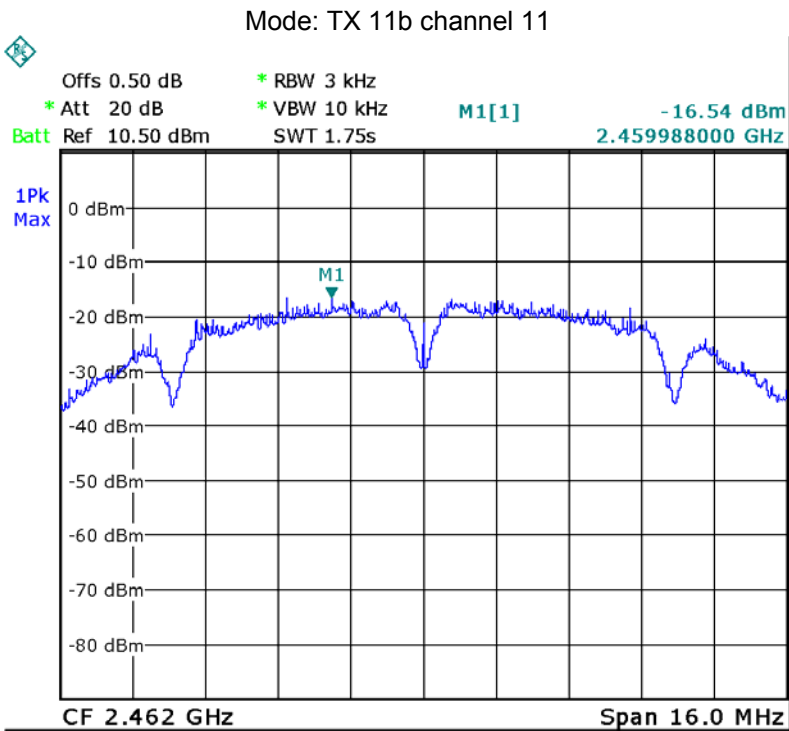
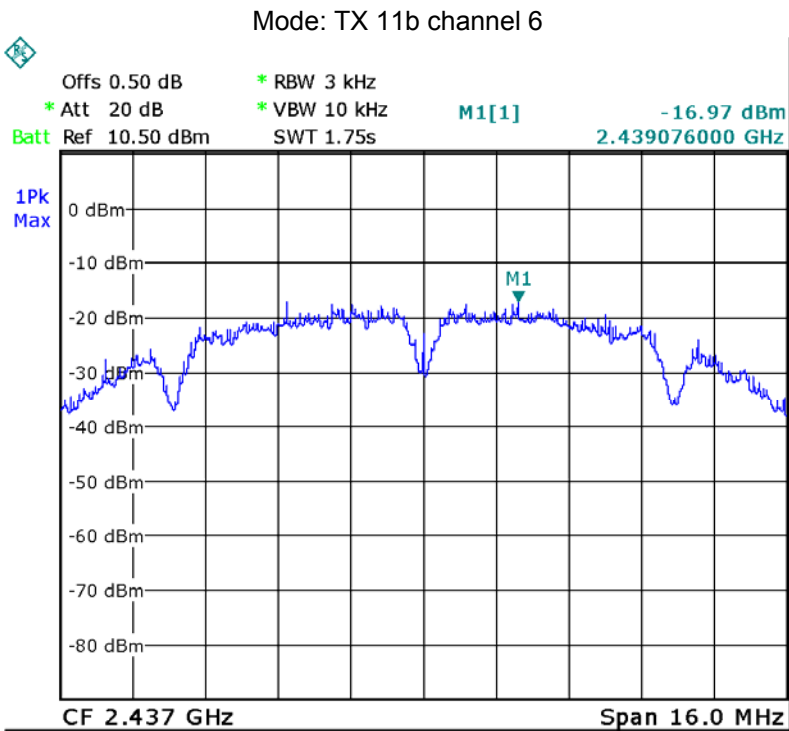
Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-16.91	-16.97	-16.54
Limit: 8dBm per 3kHz		

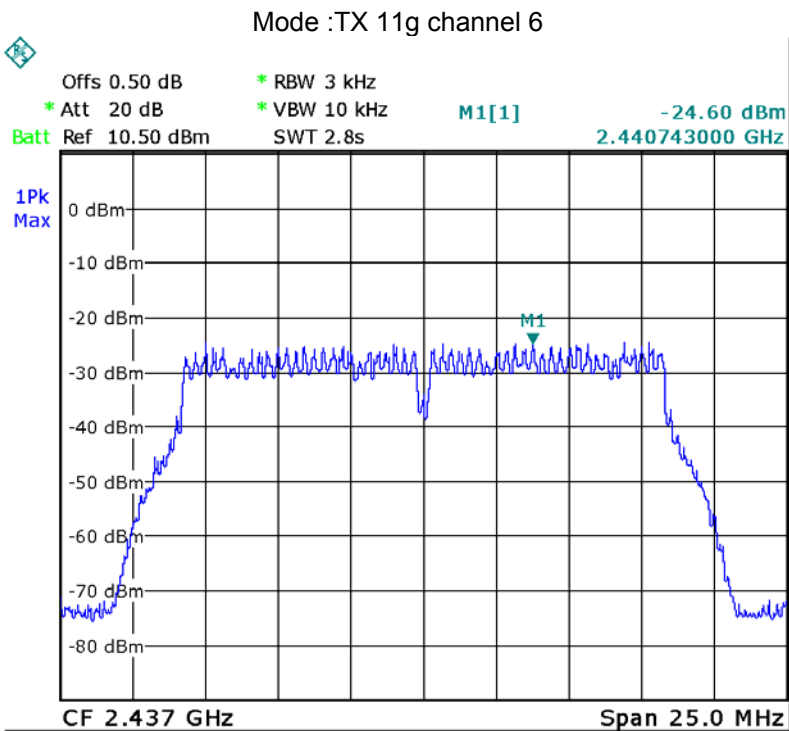
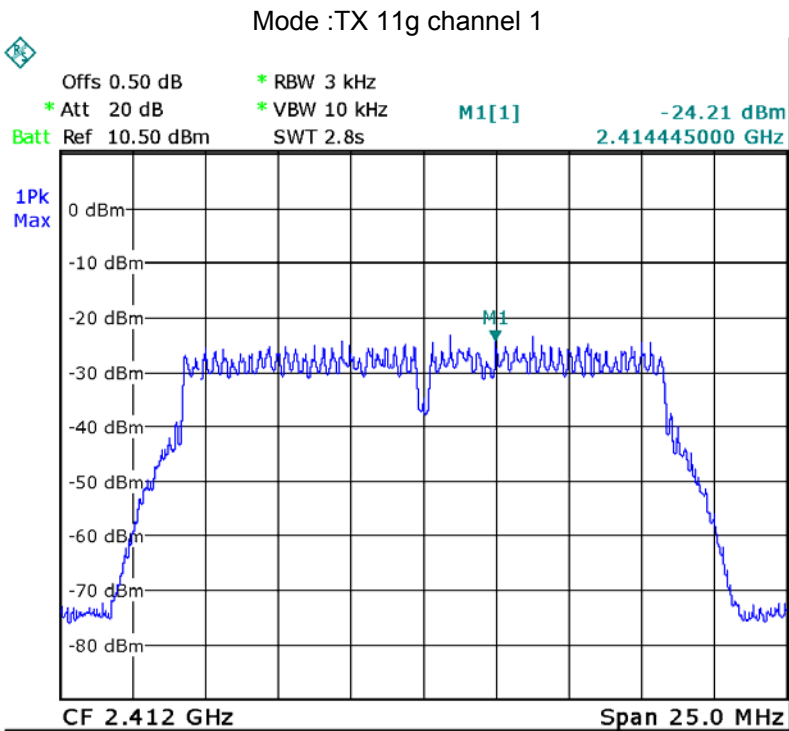
Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-24.21	-24.60	-21.88
Limit: 8dBm per 3kHz		

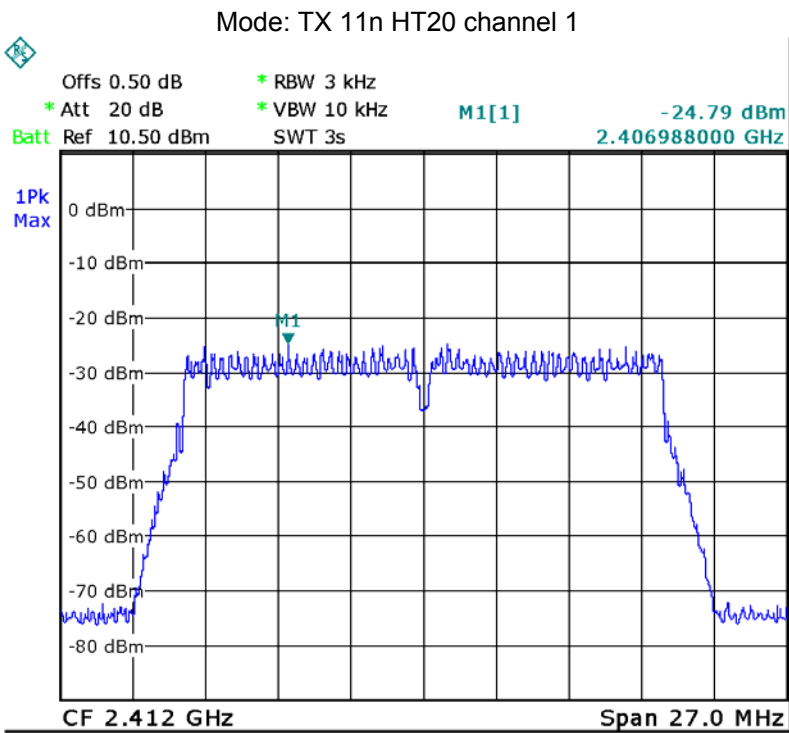
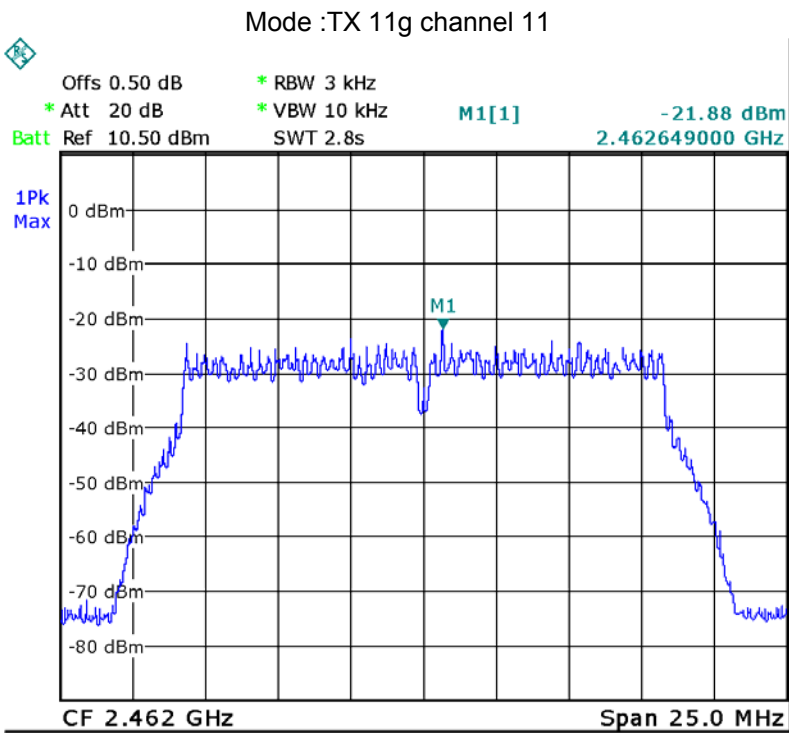
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-24.79	-24.20	-25.30
Limit: 8dBm per 3kHz		

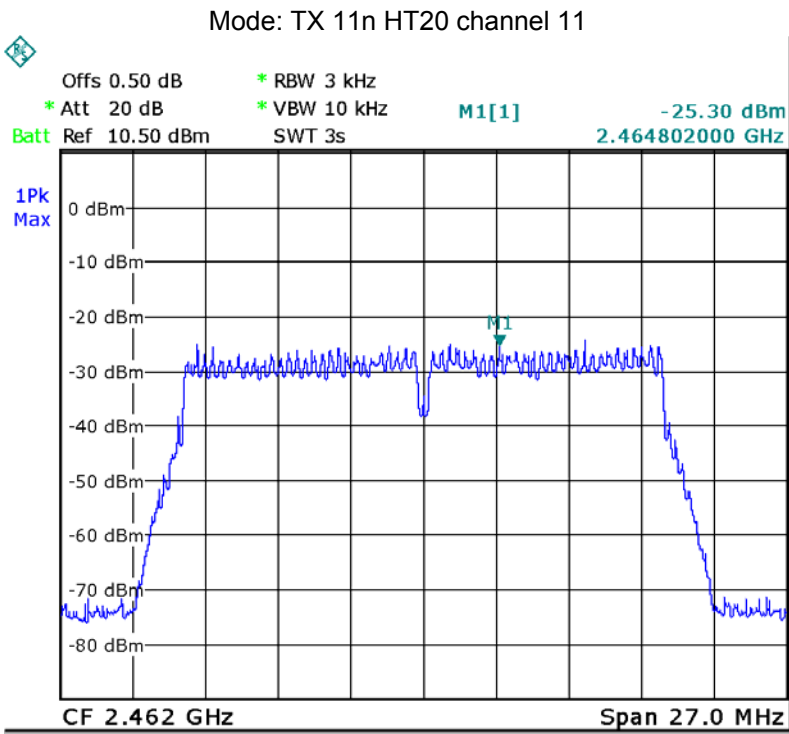
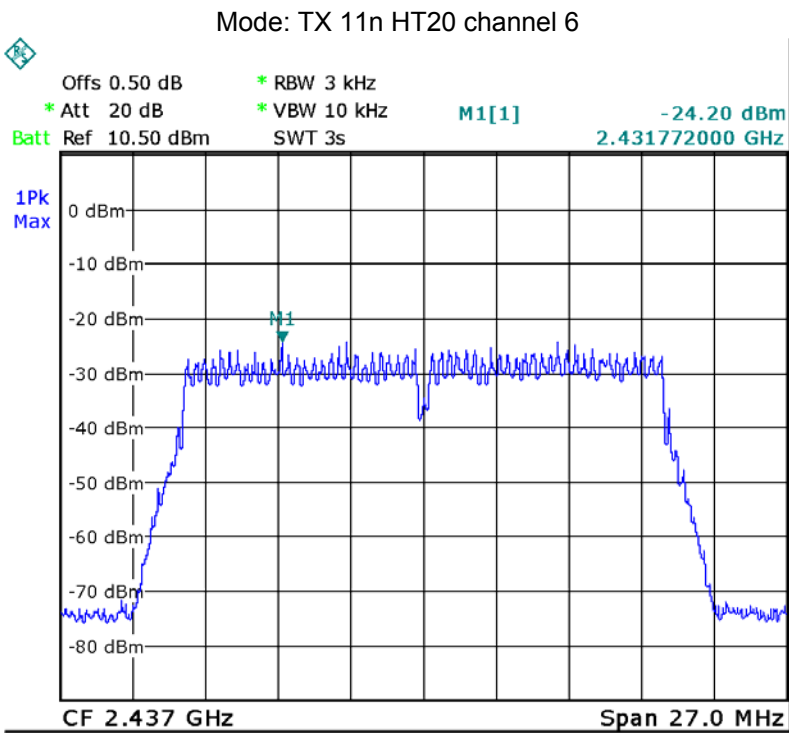
BLE		
Power Spectral (dBm per 3kHz)		
2402MHz	2440MHz	2480MHz
-18.63	-18.34	-17.93
Limit: 8dBm per 3kHz		

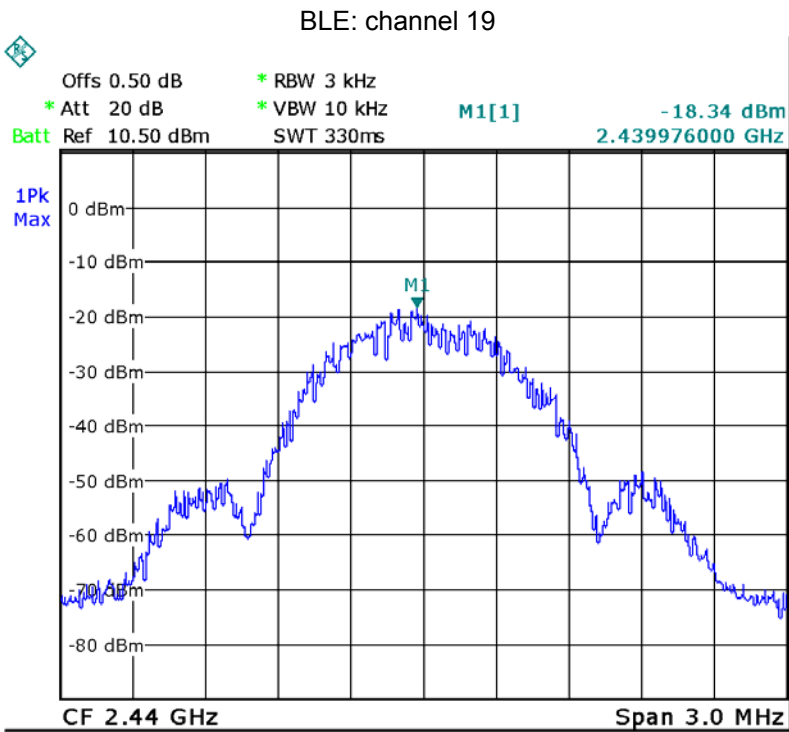
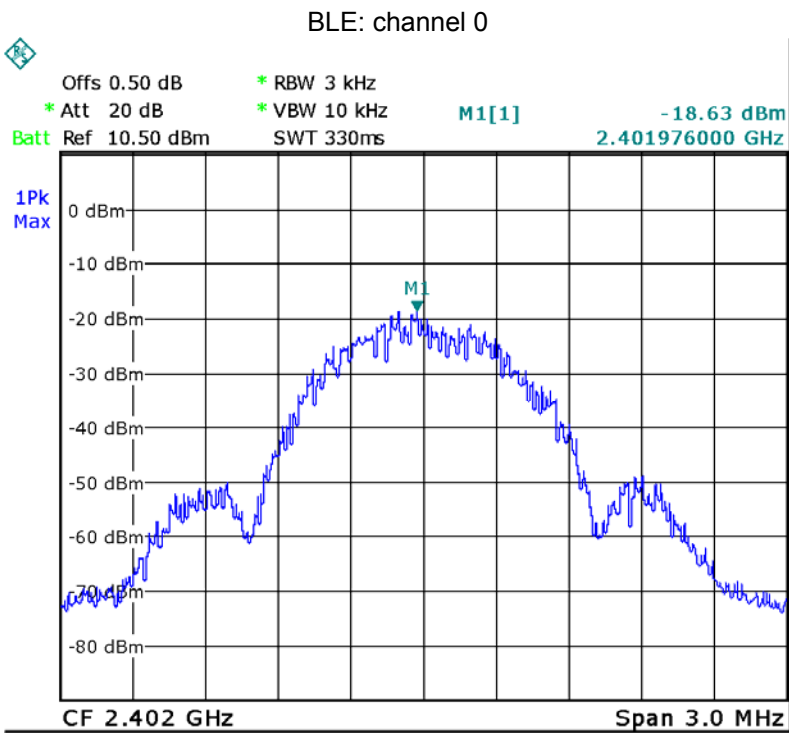


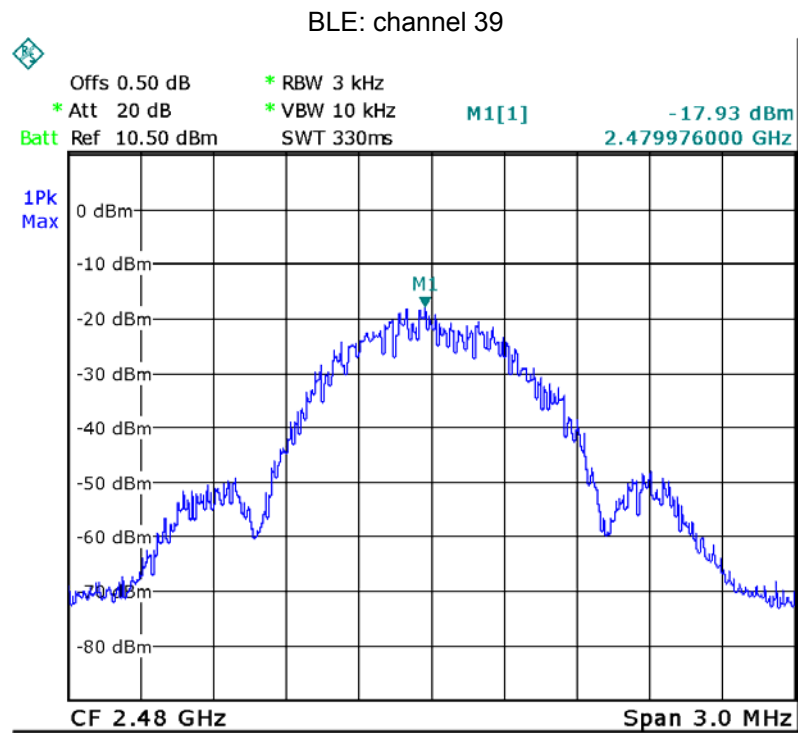














## **14 Antenna Requirement**

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 fulfill the requirement of this section.

## 15 RF Exposure

Remark: refer to SAR test report: WTS16S0448138E

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