

TEST REPORT

Reference No..... : WTS15S0934544-2E
FCC ID : O55L501X5
Applicant..... : SWAGTEK
Address..... : 10205 NW 19th St. Suite 101, Miami, FL, 33172, United States
Manufacturer : SWAGTEK
Address..... : 10205 NW 19th St. Suite 101, Miami, FL, 33172, United States
Product Name..... : Mobile Phone
Model No : X5 U, UW5002K-80
Brand..... : Logic
Standards..... : FCC CFR47 Part 15C Section 15.247:2014
Date of Receipt sample : Oct. 08, 2015
Date of Test : Oct. 09 – 20, 2015
Date of Issue..... : Oct. 21, 2015
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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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 General Information

4.1 General Description of E.U.T.

Product Name	: Mobile Phone
Model No.	: X5 U, UW5002K-80
Model Description	: Only model number are different
GSM Band(s)	: GSM 850/900/1800/1900MHz
GPRS/EGPRS Class	: 12
WCDMA Band(s)	: FDD Band I/II/V
LTE Band(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	: ZH010-MB-V1.0
Software Version	: LOGIC_X5U_WW_20151022_V06_R06

4.2 Details of E.U.T.

Operation Frequency	: GSM/GPRS/EGPRS 850: 824~849MHz PCS/GPRS/EGPRS1900: 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: 32.72dBm EGPRS 850: 27.10dBm PCS1900:29.44dBm EGPRS 1900:25.55dBm WCDMA Band II: 22.74dBm WCDMA Band V: 22.72dBm WiFi(2.4G): 8.83dBm Bluetooth: 2.25dBm
Type of Modulation	: GSM,GPRS: GMSK EGPRS: GMSK, 8PSK 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: 1.0dBi

	PCS1900: 1.0dBi
	WCDMA Band II: 1.0dBi
	WCDMA Band V: 1.0dBi
	WiFi: 1.0dBi
	Bluetooth: 1.0dBi
Technical Data	:Battery DC 3.7V, 1700mAh
	DC 5V,1000mA, Charging form adapter
	(Adapter Input:100-240V~50/60Hz, 0.15A)
Adapter	:Manufacture: Logic

4.3 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

4.4 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 .

4.5 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.

5 Equipment Used during Test

5.1 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.18,2015	Apr.17,2016
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.18,2015	Apr.17,2016
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	669	Apr.18,2015	Apr.17,2016
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.17,2015	Mar.16,2016
8	Coaxial Cable (above 1GHz)	Top	1000MHz-25GHz	EW02014-7	Apr.10,2015	Apr.09,2016
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.10,2015	Apr.09,2016
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

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	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 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 C63.4:2009
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

6.1 E.U.T. Operation

Operating Environment :

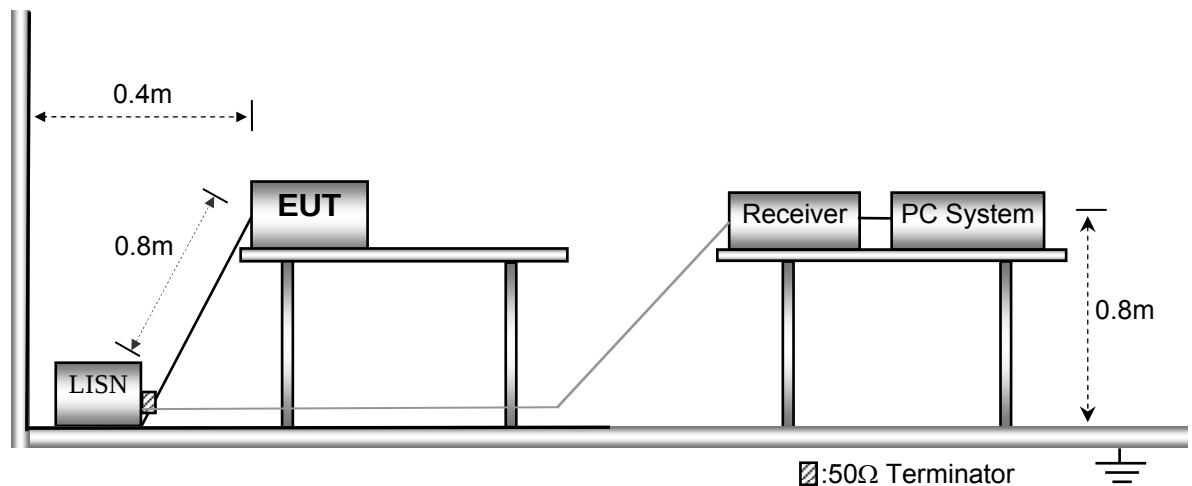
Temperature:	21.5 °C
Humidity:	51.9 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation :

The test was performed in WIFI link mode(Wifi /BT BLE), the worst data were shown in the report.

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.4.



6.3 Measurement Description

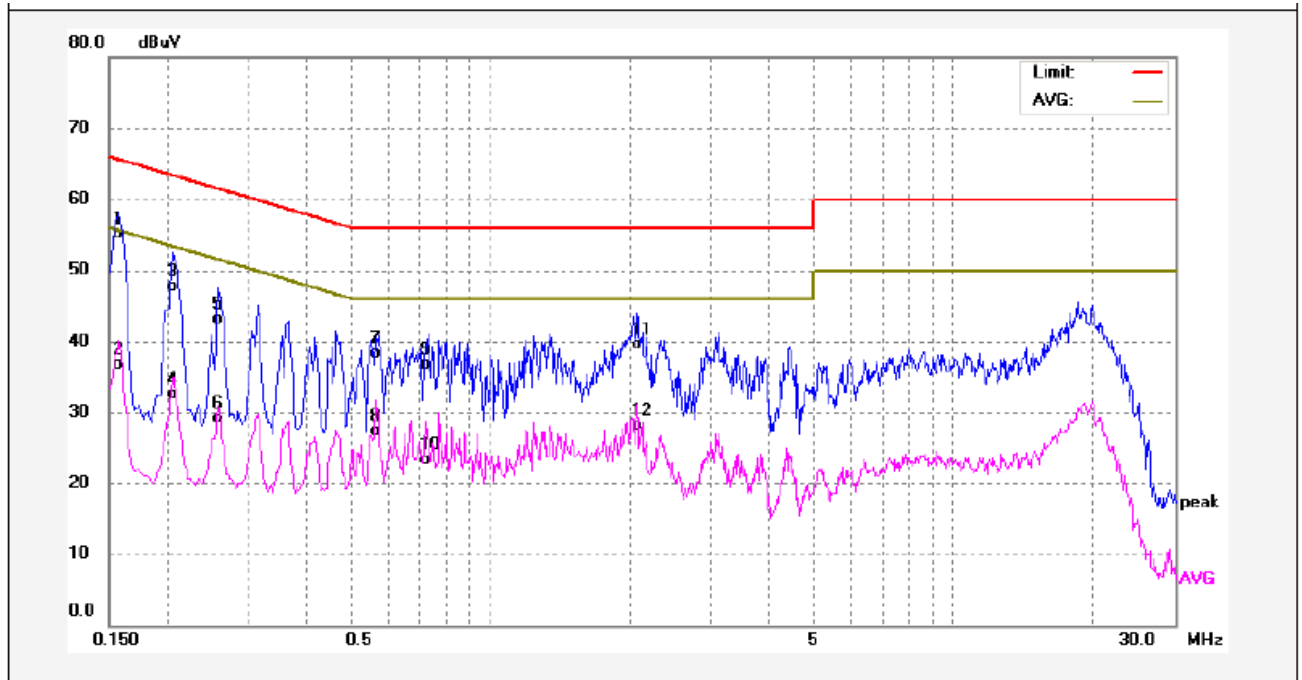
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.4 Conducted Emission Test Result

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

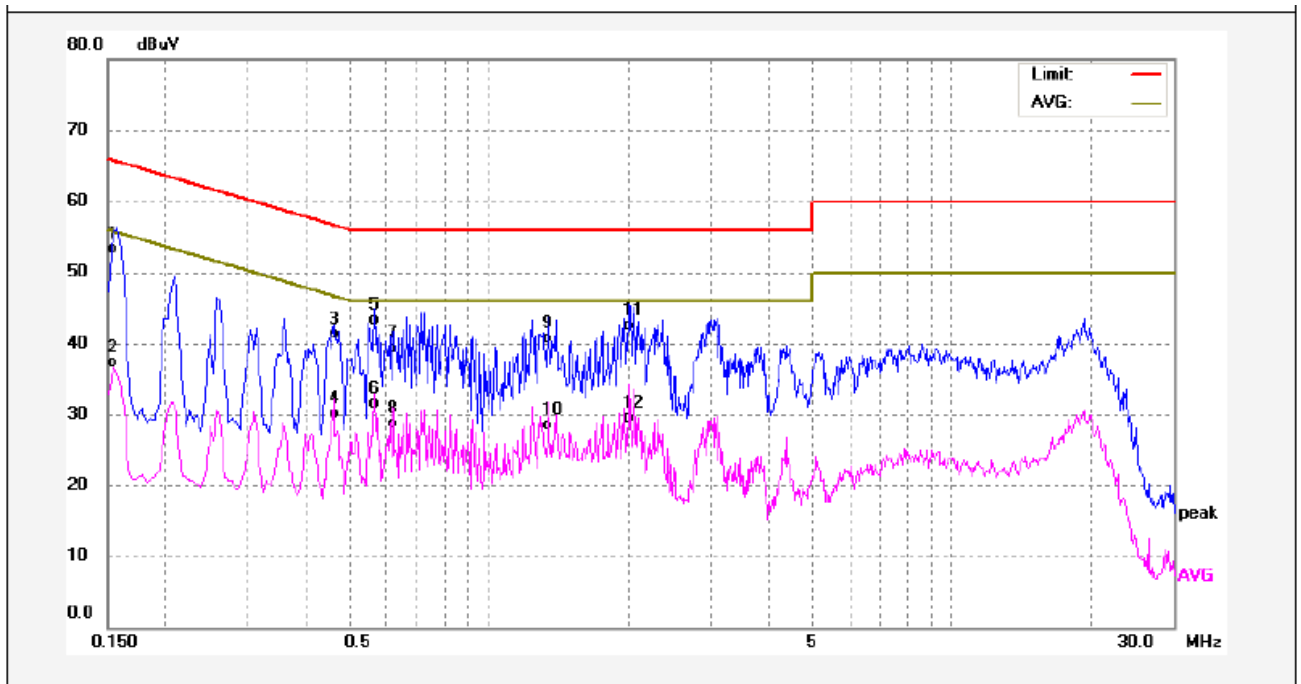
Worst Mode: BT+WIFI mode (Wifi)

Live line:



No.	Freq. (MHz)	Reading (dBμV)	Factor (dB)	Result (dBμV)	Limit dBμV	Margin (dB)	Detector	Remark
1	0.1580	45.01	10.10	55.11	65.56	-10.45	QP	
2	0.1580	26.52	10.10	36.62	55.56	-18.94	AVG	
3	0.2060	37.67	10.10	47.77	63.36	-15.59	QP	
4	0.2060	22.47	10.10	32.57	53.36	-20.79	AVG	
5	0.2580	33.08	10.10	43.18	61.49	-18.31	QP	
6	0.2580	18.92	10.10	29.02	51.49	-22.47	AVG	
7	0.5740	28.12	10.14	38.26	56.00	-17.74	QP	
8	0.5740	17.15	10.14	27.29	46.00	-18.71	AVG	
9	0.7340	26.50	10.17	36.67	56.00	-19.33	QP	
10	0.7340	13.20	10.17	23.37	46.00	-22.63	AVG	
11	2.0700	29.38	10.19	39.57	56.00	-16.43	QP	
12	2.0700	17.96	10.19	28.15	46.00	-17.85	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1539	43.16	10.10	53.26	65.78	-12.52	QP	
2	0.1539	27.15	10.10	37.25	55.78	-18.53	AVG	
3	0.4620	31.10	10.12	41.22	56.66	-15.44	QP	
4	0.4620	20.00	10.12	30.12	46.66	-16.54	AVG	
5	0.5660	33.13	10.14	43.27	56.00	-12.73	QP	
6	0.5660	21.34	10.14	31.48	46.00	-14.52	AVG	
7	0.6180	29.17	10.15	39.32	56.00	-16.68	QP	
8	0.6180	18.55	10.15	28.70	46.00	-17.30	AVG	
9	1.3420	30.44	10.20	40.64	56.00	-15.36	QP	
10	1.3420	18.24	10.20	28.44	46.00	-17.56	AVG	
11	2.0100	32.41	10.19	42.60	56.00	-13.40	QP	
12	2.0100	19.24	10.19	29.43	46.00	-16.57	AVG	

7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.4:2009

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

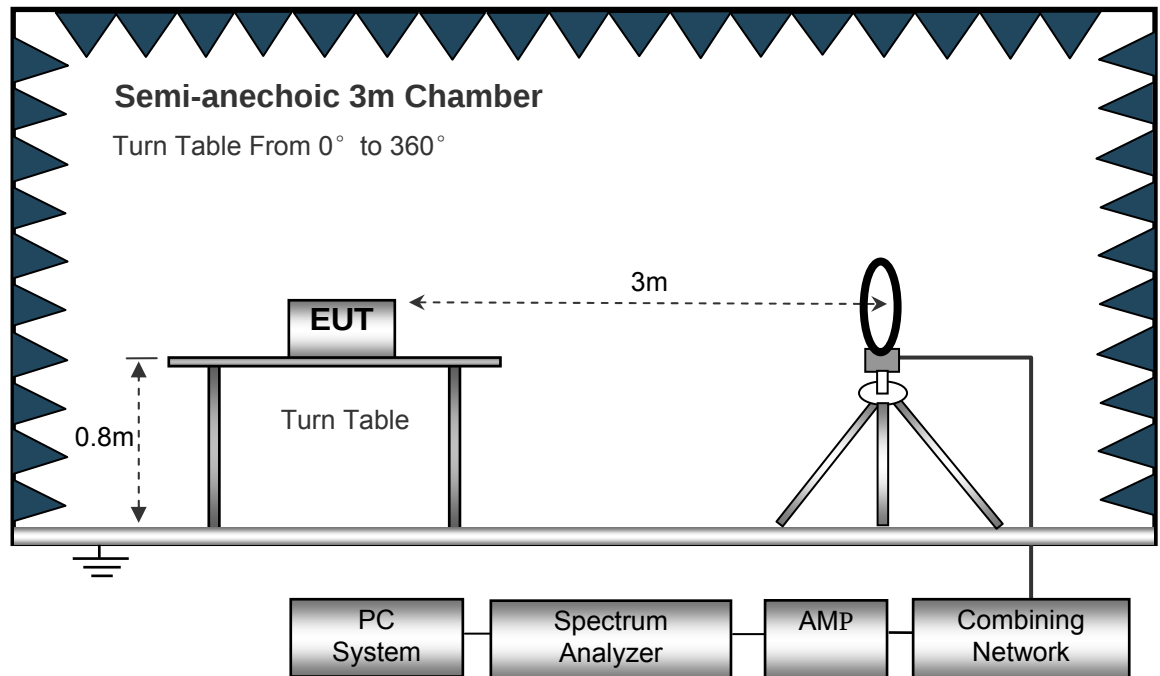
EUT Operation :

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

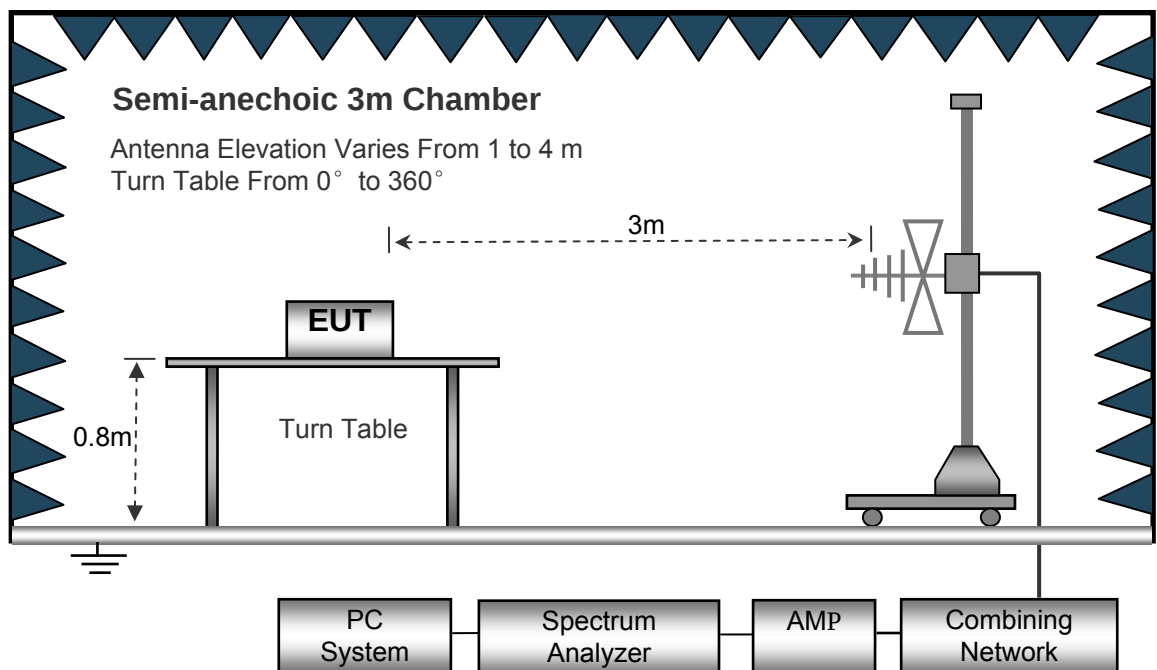
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4.

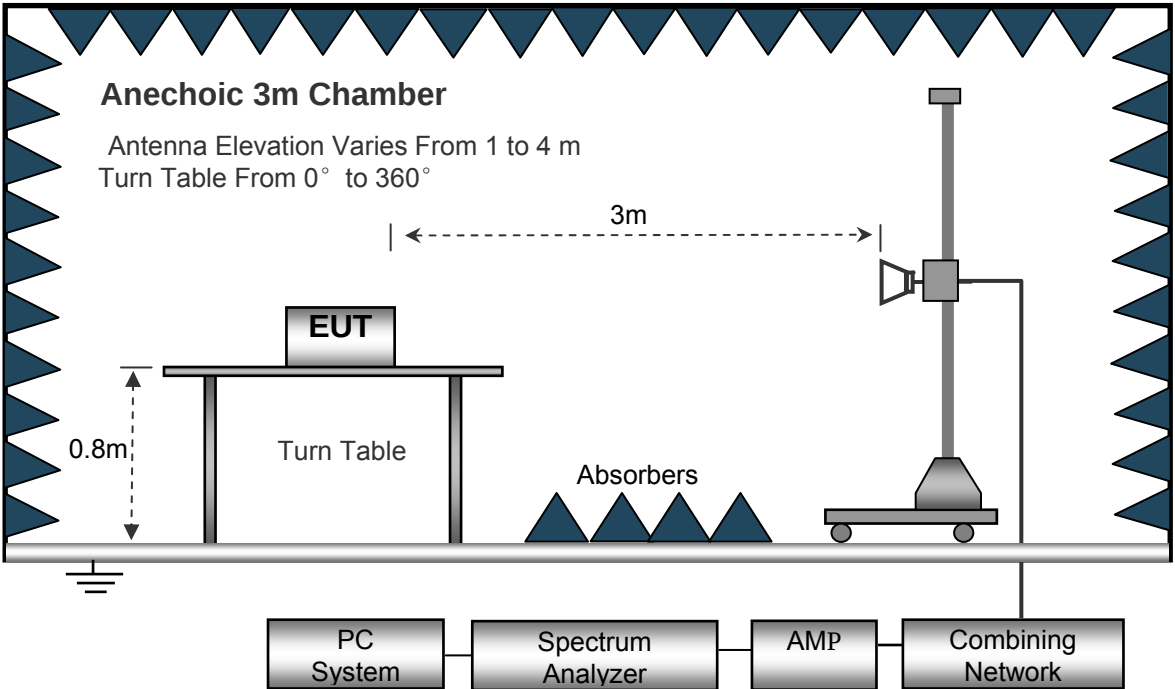
The test setup for emission measurement below 30MHz.



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
DetectorPK
Resolution Bandwidth.....100kHz
Video Bandwidth.....300kHz

Above 1GHz

Sweep Speed Auto
DetectorPK
Resolution Bandwidth.....1MHz
Video Bandwidth.....3MHz
DetectorAve.
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 during 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

Wifi:

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									
225.12	40.15	QP	235	1.8	H	-11.62	28.53	46.00	-17.47
225.12	37.56	QP	81	2.0	V	-11.62	25.94	46.00	-20.06
4824.00	50.46	PK	83	1.5	V	-1.06	49.40	74.00	-24.60
4824.00	44.37	Ave	83	1.5	V	-1.06	43.31	54.00	-10.69
7236.00	42.05	PK	328	2.0	H	1.33	43.38	74.00	-30.62
7236.00	41.86	Ave	328	2.0	H	1.33	43.19	54.00	-10.81
2311.14	45.10	PK	356	1.1	V	-13.19	31.91	74.00	-42.09
2311.14	37.59	Ave	356	1.1	V	-13.19	24.40	54.00	-29.60
2388.10	43.99	PK	128	1.5	H	-13.14	30.85	74.00	-43.15
2388.10	36.33	Ave	128	1.5	H	-13.14	23.19	54.00	-30.81
2499.09	42.75	PK	52	1.3	V	-13.08	29.67	74.00	-44.33
2499.09	36.67	Ave	52	1.3	V	-13.08	23.59	54.00	-30.41

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									
225.12	41.39	QP	358	1.2	H	-11.62	29.77	46.00	-16.23
225.12	36.65	QP	352	1.7	V	-11.62	25.03	46.00	-20.97
4874.00	51.14	PK	133	1.5	V	-0.62	50.52	74.00	-23.48
4874.00	44.36	Ave	133	1.5	V	-0.62	43.74	54.00	-10.26
7311.00	40.90	PK	311	1.6	H	2.21	43.11	74.00	-30.89
7311.00	42.77	Ave	311	1.6	H	2.21	44.98	54.00	-9.02
2324.72	46.05	PK	100	1.5	V	-13.19	32.86	74.00	-41.14
2324.72	39.82	Ave	100	1.5	V	-13.19	26.63	54.00	-27.37
2377.49	43.28	PK	69	1.2	H	-13.14	30.14	74.00	-43.86
2377.49	36.20	Ave	69	1.2	H	-13.14	23.06	54.00	-30.94
2493.21	42.37	PK	247	1.7	V	-13.08	29.29	74.00	-44.71
2493.21	37.27	Ave	247	1.7	V	-13.08	24.19	54.00	-29.81

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: High Channel 2462MHz									
225.12	42.60	QP	246	1.6	H	-11.62	30.98	46.00	-15.02
225.12	37.77	QP	175	1.8	V	-11.62	26.15	46.00	-19.85
4924.00	50.75	PK	239	1.9	V	-0.24	50.51	74.00	-23.49
4924.00	45.59	Ave	239	1.9	V	-0.24	45.35	54.00	-8.65
7386.00	41.85	PK	225	1.1	H	2.84	44.69	74.00	-29.31
7386.00	43.17	Ave	225	1.1	H	2.84	46.01	54.00	-7.99
2346.50	45.22	PK	133	1.7	V	-13.19	32.03	74.00	-41.97
2346.50	39.61	Ave	133	1.7	V	-13.19	26.42	54.00	-27.58
2357.52	43.05	PK	228	1.5	H	-13.14	29.91	74.00	-44.09
2357.52	36.70	Ave	228	1.5	H	-13.14	23.56	54.00	-30.44
2494.53	43.16	PK	132	1.0	V	-13.08	30.08	74.00	-43.92
2494.53	36.92	Ave	132	1.0	V	-13.08	23.84	54.00	-30.16

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)
11g: Low Channel 2412MHz									
225.12	42.58	QP	351	1.7	H	-11.62	30.96	46.00	-15.04
225.12	36.79	QP	195	1.6	V	-11.62	25.17	46.00	-20.83
4824.00	51.85	PK	100	1.4	V	-1.06	50.79	74.00	-23.21
4824.00	44.33	Ave	100	1.4	V	-1.06	43.27	54.00	-10.73
7236.00	42.51	PK	314	1.8	H	1.33	43.84	74.00	-30.16
7236.00	42.34	Ave	314	1.8	H	1.33	43.67	54.00	-10.33
2342.07	46.95	PK	231	1.8	V	-13.19	33.76	74.00	-40.24
2342.07	38.17	Ave	231	1.8	V	-13.19	24.98	54.00	-29.02
2369.48	44.98	PK	198	1.8	H	-13.14	31.84	74.00	-42.16
2369.48	37.50	Ave	198	1.8	H	-13.14	24.36	54.00	-29.64
2499.71	42.28	PK	310	1.5	V	-13.08	29.20	74.00	-44.80
2499.71	37.32	Ave	310	1.5	V	-13.08	24.24	54.00	-29.76

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									
225.12	43.01	QP	6	1.6	H	-11.62	31.39	46.00	-14.61
225.12	37.58	QP	201	1.7	V	-11.62	25.96	46.00	-20.04
4874.00	50.44	PK	356	1.3	V	-0.62	49.82	74.00	-24.18
4874.00	43.88	Ave	356	1.3	V	-0.62	43.26	54.00	-10.74
7311.00	41.04	PK	279	1.6	H	2.21	43.25	74.00	-30.75
7311.00	42.93	Ave	279	1.6	H	2.21	45.14	54.00	-8.86
2314.07	46.24	PK	35	1.2	V	-13.19	33.05	74.00	-40.95
2314.07	39.50	Ave	35	1.2	V	-13.19	26.31	54.00	-27.69
2385.71	42.36	PK	280	1.1	H	-13.14	29.22	74.00	-44.78
2385.71	37.92	Ave	280	1.1	H	-13.14	24.78	54.00	-29.22
2490.27	44.53	PK	98	1.2	V	-13.08	31.45	74.00	-42.55
2490.27	38.76	Ave	98	1.2	V	-13.08	25.68	54.00	-28.32

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									
225.12	43.52	QP	357	1.1	H	-11.62	31.90	46.00	-14.10
225.12	36.31	QP	203	1.1	V	-11.62	24.69	46.00	-21.31
4924.00	49.95	PK	197	2.0	V	-0.24	49.71	74.00	-24.29
4924.00	44.52	Ave	197	2.0	V	-0.24	44.28	54.00	-9.72
7386.00	40.06	PK	177	1.1	H	2.84	42.90	74.00	-31.10
7386.00	43.60	Ave	177	1.1	H	2.84	46.44	54.00	-7.56
2336.26	45.02	PK	8	1.5	V	-13.19	31.83	74.00	-42.17
2336.26	39.58	Ave	8	1.5	V	-13.19	26.39	54.00	-27.61
2388.83	43.78	PK	333	1.2	H	-13.14	30.64	74.00	-43.36
2388.83	38.37	Ave	333	1.2	H	-13.14	25.23	54.00	-28.77
2497.25	42.98	PK	205	1.4	V	-13.08	29.90	74.00	-44.10
2497.25	36.59	Ave	205	1.4	V	-13.08	23.51	54.00	-30.49

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									
225.12	44.83	QP	256	1.3	H	-11.62	33.21	46.00	-12.79
225.12	36.19	QP	322	2.0	V	-11.62	24.57	46.00	-21.43
4824.00	50.40	PK	340	1.1	V	-1.06	49.34	74.00	-24.66
4824.00	43.21	Ave	340	1.1	V	-1.06	42.15	54.00	-11.85
7236.00	38.90	PK	95	1.9	H	1.33	40.23	74.00	-33.77
7236.00	43.07	Ave	95	1.9	H	1.33	44.40	54.00	-9.60
2318.41	45.79	PK	56	1.3	V	-13.19	32.60	74.00	-41.40
2318.41	39.95	Ave	56	1.3	V	-13.19	26.76	54.00	-27.24
2362.34	42.42	PK	283	1.8	H	-13.14	29.28	74.00	-44.72
2362.34	38.78	Ave	283	1.8	H	-13.14	25.64	54.00	-28.36
2496.83	42.76	PK	259	1.6	V	-13.08	29.68	74.00	-44.32
2496.83	36.48	Ave	259	1.6	V	-13.08	23.40	54.00	-30.60

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									
225.12	46.07	QP	329	1.1	H	-11.62	34.45	46.00	-11.55
225.12	35.75	QP	109	1.4	V	-11.62	24.13	46.00	-21.87
4874.00	49.17	PK	79	1.0	V	-0.62	48.55	74.00	-25.45
4874.00	43.84	Ave	79	1.0	V	-0.62	43.22	54.00	-10.78
7311.00	39.40	PK	112	1.2	H	2.21	41.61	74.00	-32.39
7311.00	42.94	Ave	112	1.2	H	2.21	45.15	54.00	-8.85
2326.13	46.16	PK	11	1.3	V	-13.19	32.97	74.00	-41.03
2326.13	37.41	Ave	11	1.3	V	-13.19	24.22	54.00	-29.78
2358.72	42.63	PK	182	1.7	H	-13.14	29.49	74.00	-44.51
2358.72	38.66	Ave	182	1.7	H	-13.14	25.52	54.00	-28.48
2492.52	43.08	PK	3	1.8	V	-13.08	30.00	74.00	-44.00
2492.52	38.61	Ave	3	1.8	V	-13.08	25.53	54.00	-28.47

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
n20: High Channel 2462MHz									
225.12	46.24	QP	171	1.5	H	-11.62	34.62	46.00	-11.38
225.12	34.27	QP	11	1.6	V	-11.62	22.65	46.00	-23.35
4924.00	49.68	PK	339	1.2	V	-0.24	49.44	74.00	-24.56
4924.00	44.61	Ave	339	1.2	V	-0.24	44.37	54.00	-9.63
7386.00	40.83	PK	163	1.6	H	2.84	43.67	74.00	-30.33
7386.00	41.55	Ave	163	1.6	H	2.84	44.39	54.00	-9.61
2344.09	45.31	PK	303	1.2	V	-13.19	32.12	74.00	-41.88
2344.09	37.98	Ave	303	1.2	V	-13.19	24.79	54.00	-29.21
2369.76	43.36	PK	54	1.2	H	-13.14	30.22	74.00	-43.78
2369.76	36.86	Ave	54	1.2	H	-13.14	23.72	54.00	-30.28
2489.05	44.35	PK	138	1.7	V	-13.08	31.27	74.00	-42.73
2489.05	36.13	Ave	138	1.7	V	-13.08	23.05	54.00	-30.95

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									
264.35	37.56	QP	78	1.7	H	-13.35	24.21	46.00	-21.79
264.35	40.85	QP	96	1.5	V	-13.35	27.50	46.00	-18.50
4804.00	45.23	PK	88	1.8	V	-1.06	44.17	74.00	-29.83
4804.00	42.81	Ave	88	1.8	V	-1.06	41.75	54.00	-12.25
7206.00	41.05	PK	169	1.2	H	1.33	42.38	74.00	-31.62
7206.00	39.54	Ave	169	1.2	H	1.33	40.87	54.00	-13.13
2336.41	45.80	PK	360	1.1	V	-13.19	32.61	74.00	-41.39
2336.41	37.77	Ave	360	1.1	V	-13.19	24.58	54.00	-29.42
2376.82	44.41	PK	281	1.2	H	-13.14	31.27	74.00	-42.73
2376.82	37.96	Ave	281	1.2	H	-13.14	24.82	54.00	-29.18
2494.04	42.48	PK	320	1.8	V	-13.08	29.40	74.00	-44.60
2494.04	38.12	Ave	320	1.8	V	-13.08	25.04	54.00	-28.96

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									
264.35	38.59	QP	326	1.6	H	-13.35	25.24	46.00	-20.76
264.35	40.50	QP	262	1.9	V	-13.35	27.15	46.00	-18.85
4880.00	45.29	PK	126	1.5	V	-0.62	44.67	74.00	-29.33
4880.00	41.63	Ave	126	1.5	V	-0.62	41.01	54.00	-12.99

7320.00	40.54	PK	63	1.3	H	2.21	42.75	74.00	-31.25
7320.00	39.46	Ave	63	1.3	H	2.21	41.67	54.00	-12.33
2313.60	45.10	PK	78	1.3	V	-13.19	31.91	74.00	-42.09
2313.60	38.42	Ave	78	1.3	V	-13.19	25.23	54.00	-28.77
2381.67	44.25	PK	281	1.6	H	-13.14	31.11	74.00	-42.89
2381.67	38.33	Ave	281	1.6	H	-13.14	25.19	54.00	-28.81
2491.39	44.16	PK	217	1.8	V	-13.08	31.08	74.00	-42.92
2491.39	38.47	Ave	217	1.8	V	-13.08	25.39	54.00	-28.61

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									
264.35	39.31	QP	145	1.5	H	-13.35	25.96	46.00	-20.04
264.35	41.55	QP	109	1.9	V	-13.35	28.20	46.00	-17.80
4960.00	44.98	PK	257	2.0	V	-0.24	44.74	74.00	-29.26
4960.00	41.73	Ave	257	2.0	V	-0.24	41.49	54.00	-12.51
7440.00	41.78	PK	42	1.6	H	2.84	44.62	74.00	-29.38
7440.00	39.17	Ave	42	1.6	H	2.84	42.01	54.00	-11.99
2322.79	46.72	PK	337	1.7	V	-13.19	33.53	74.00	-40.47
2322.79	37.27	Ave	337	1.7	V	-13.19	24.08	54.00	-29.92
2370.58	44.98	PK	181	1.4	H	-13.14	31.84	74.00	-42.16
2370.58	37.34	Ave	181	1.4	H	-13.14	24.20	54.00	-29.80
2489.33	42.08	PK	20	1.4	V	-13.08	29.00	74.00	-45.00
2489.33	37.59	Ave	20	1.4	V	-13.08	24.51	54.00	-29.49

Test Frequency: 18GHz~25GHz

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

8 Conducted Spurious Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.247
Test Method: KDB 558074 D01 DTS Meas Guidance v03r03 06/09/2015
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



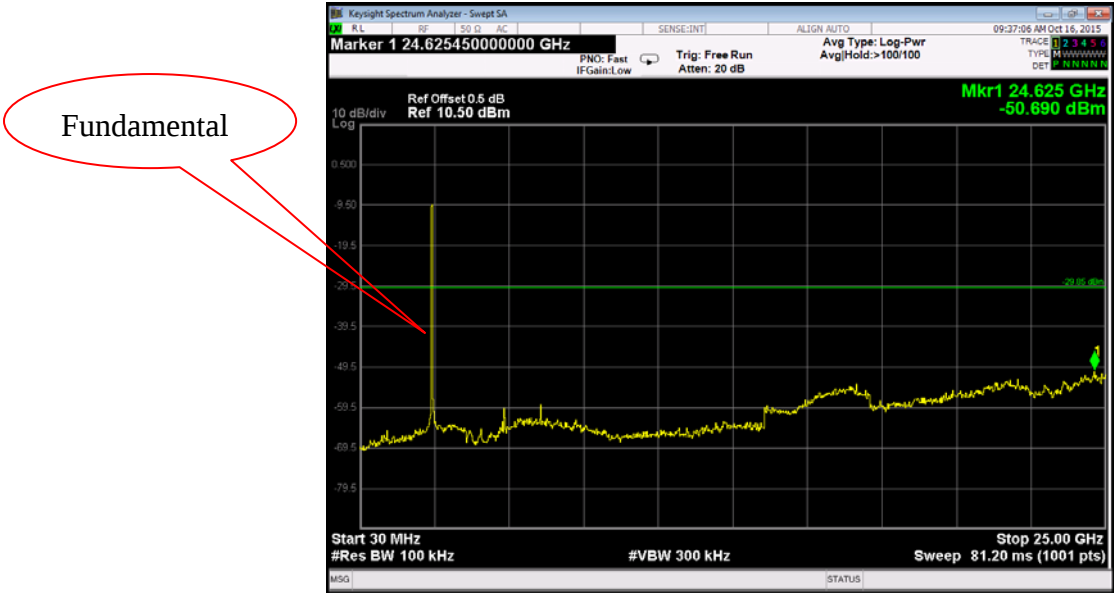
802.11g

Low Channel

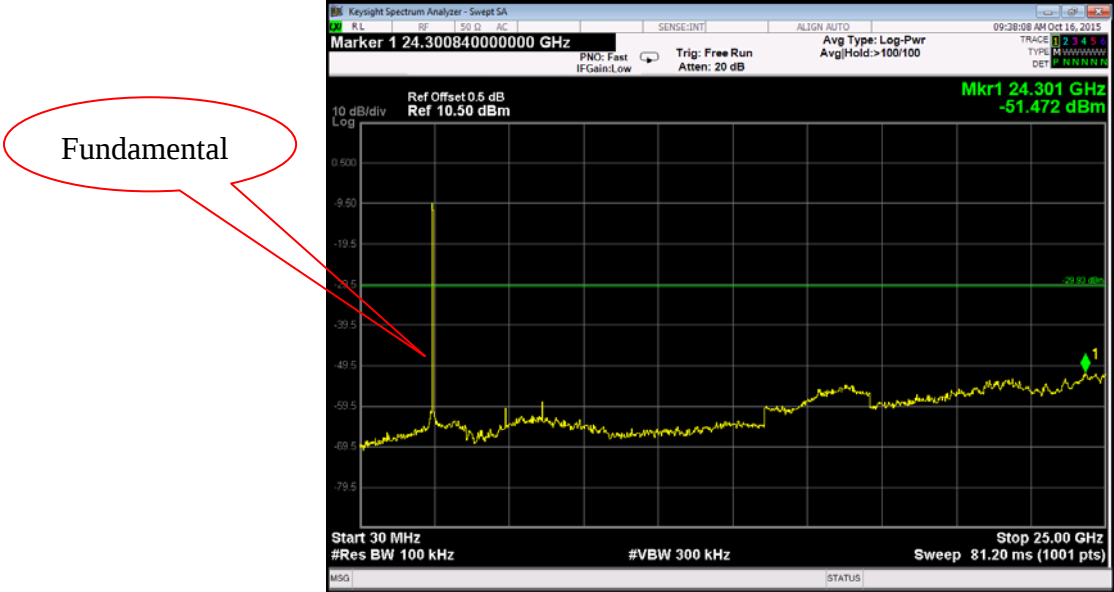
Fundamental



Middle Channel



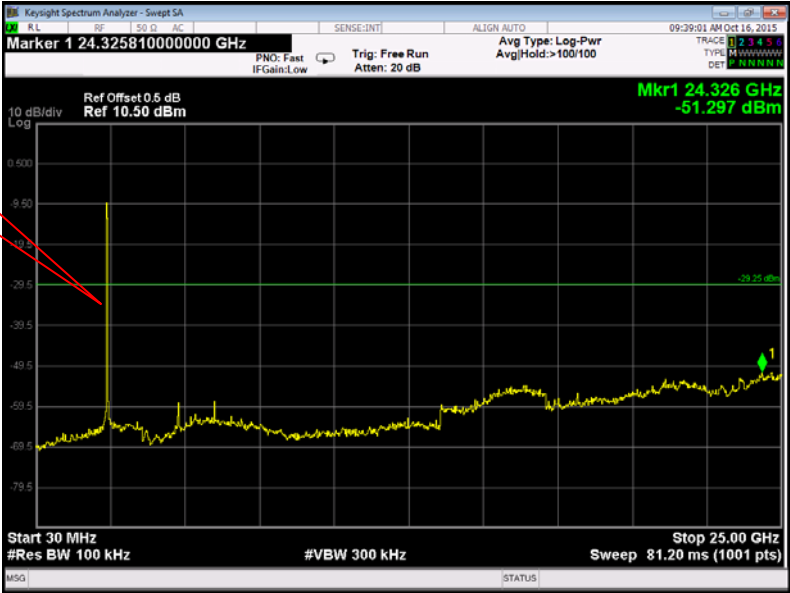
High Channel



802.11n HT20

Low Channel

Fundamental



Middle Channel

Fundamental



High Channel

Fundamental



BEL GFSK

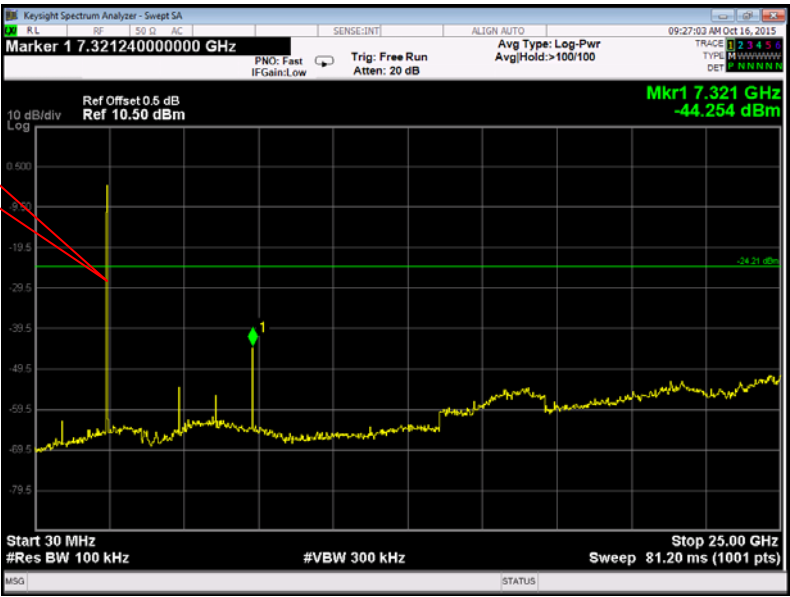
Low Channel

Fundamental



Middle Channel

Fundamental



High Channel

Fundamental



9 Band Edge Measurement

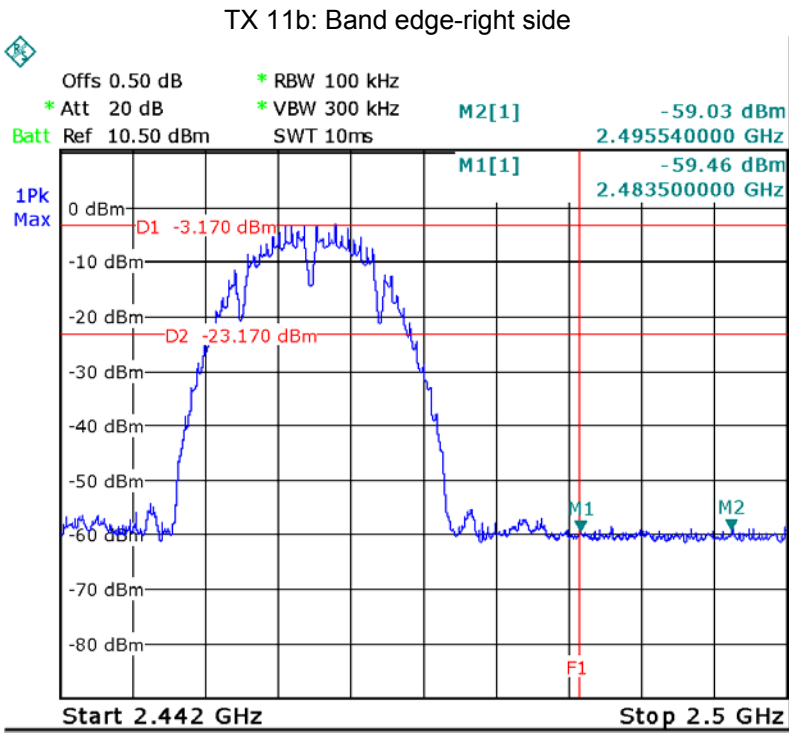
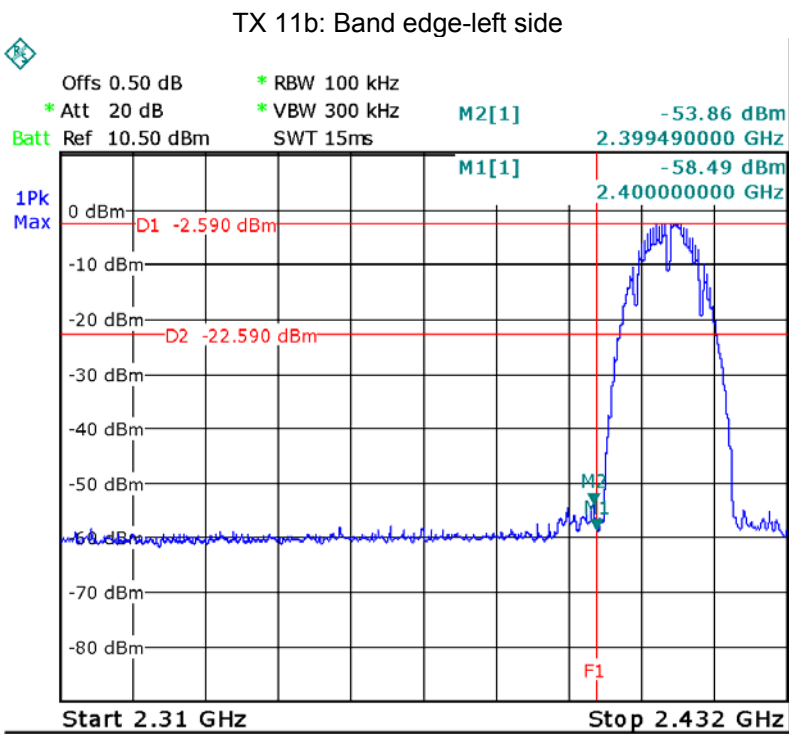
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r03 06/09/2015
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency 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

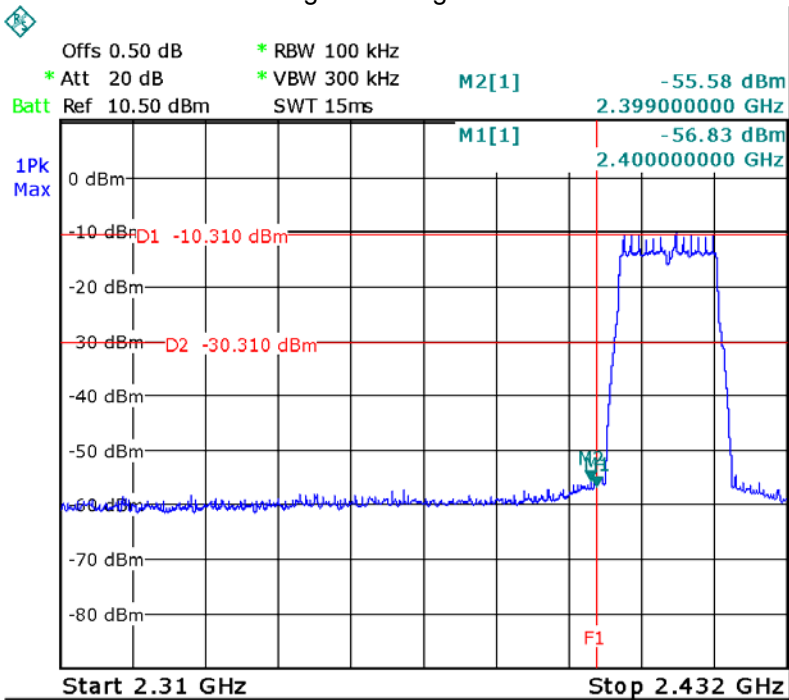
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then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

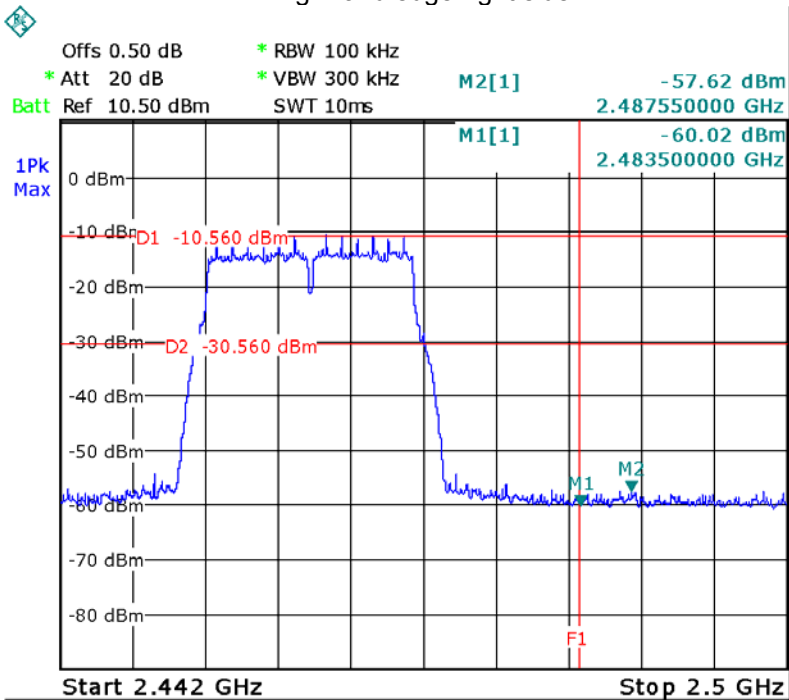
Test result plots shown as follows:

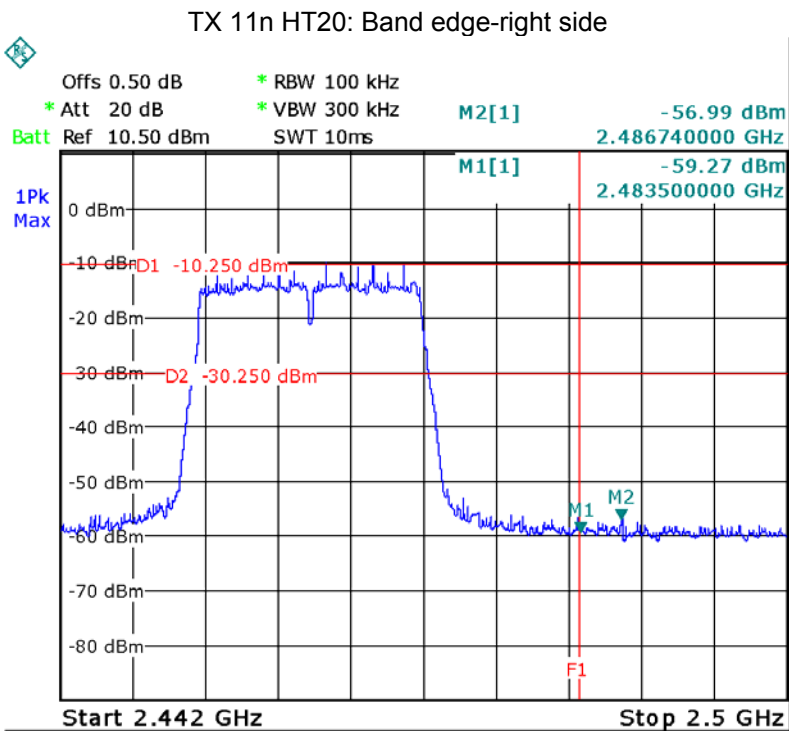
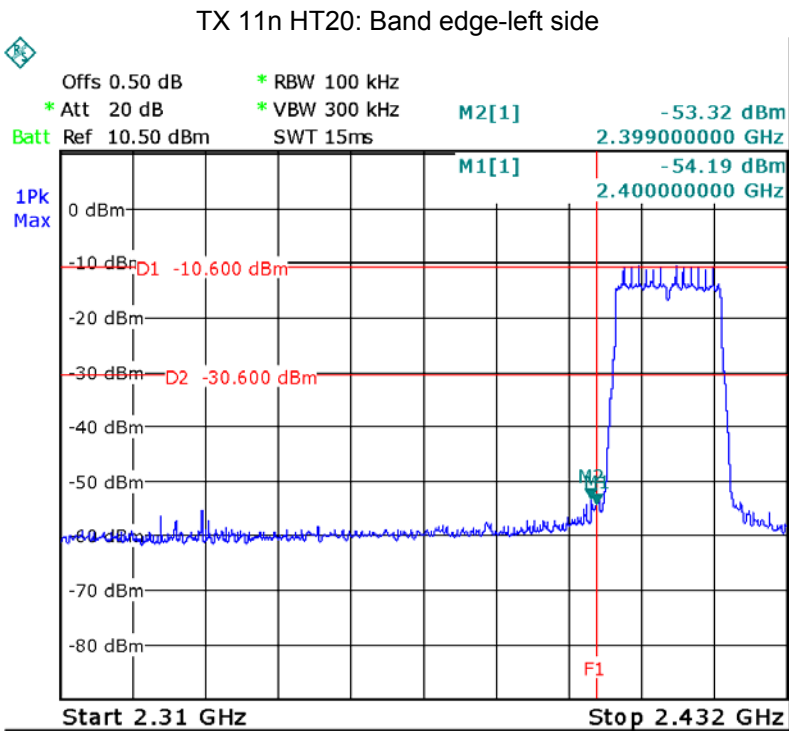


TX 11g: Band edge-left side

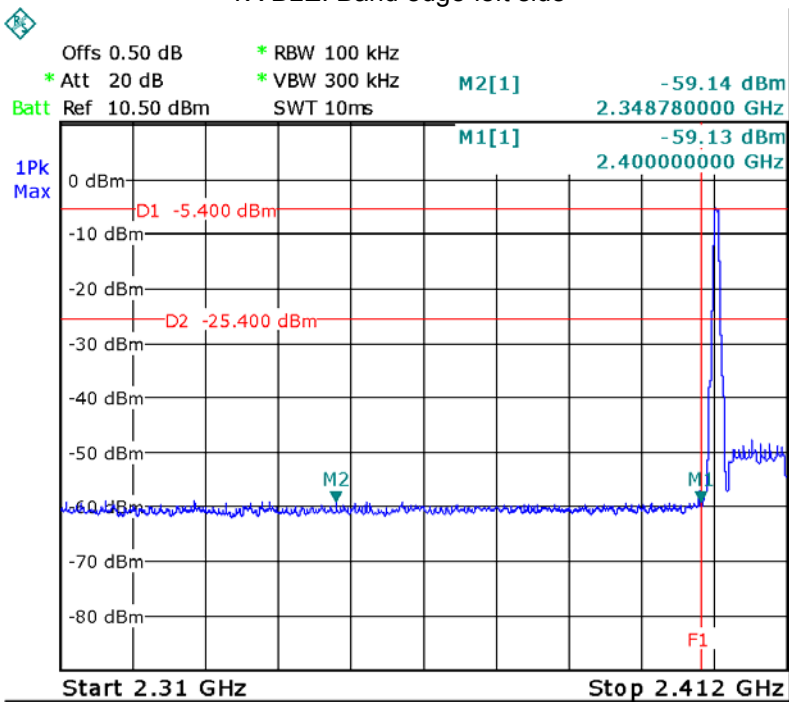


TX 11g: Band edge-right side

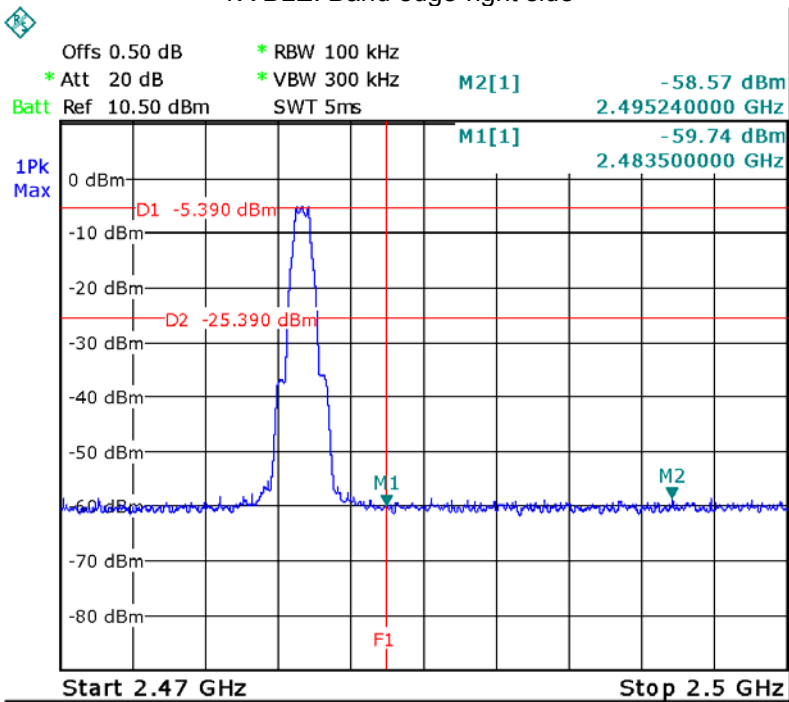




TX BLE: Band edge-left side



TX BLE: Band edge-right side



10 6 dB Bandwidth Measurement

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB 558074 D01 DTS Meas Guidance v03r03 06/09/2015

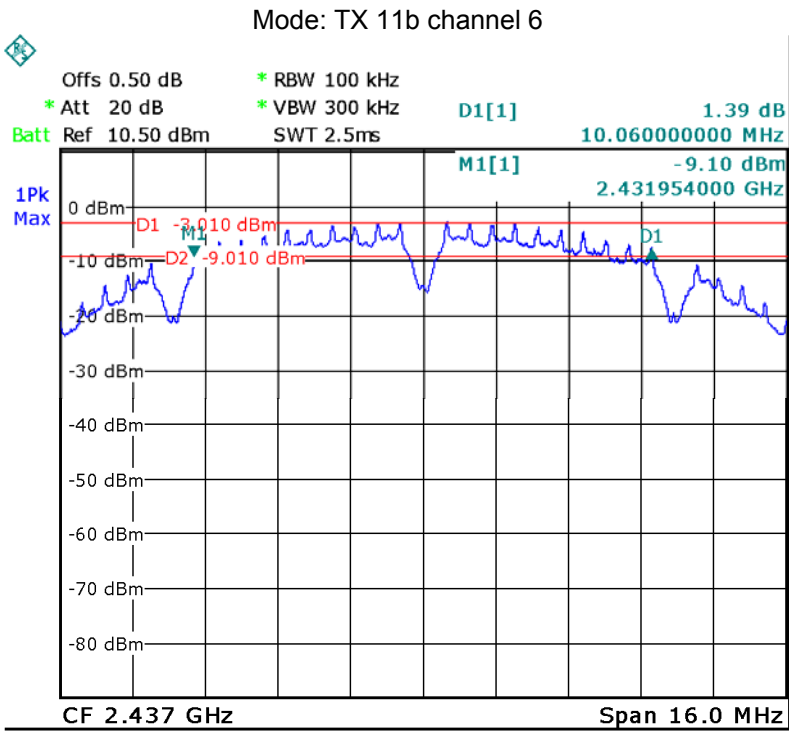
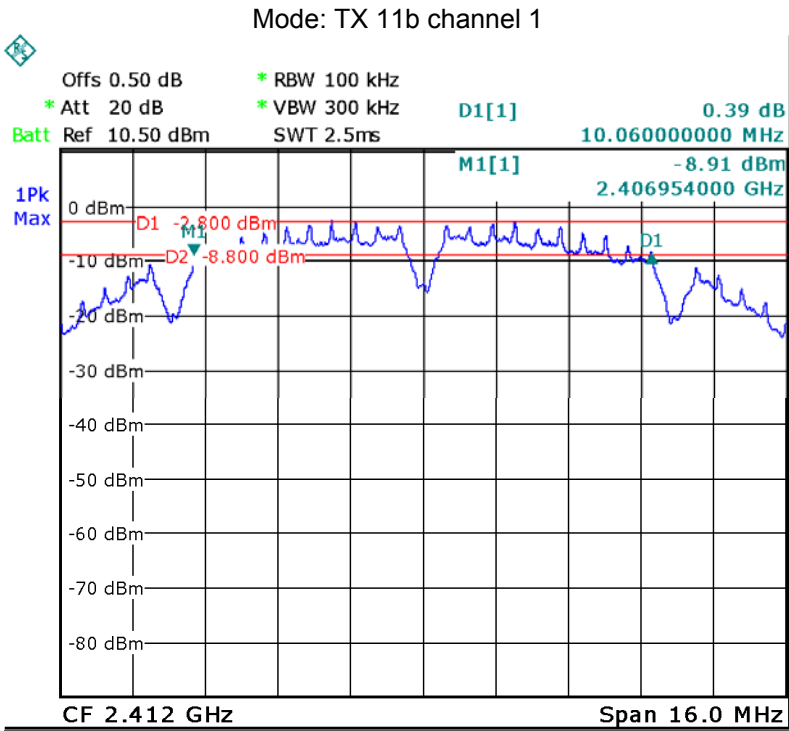
10.1 Test Procedure:

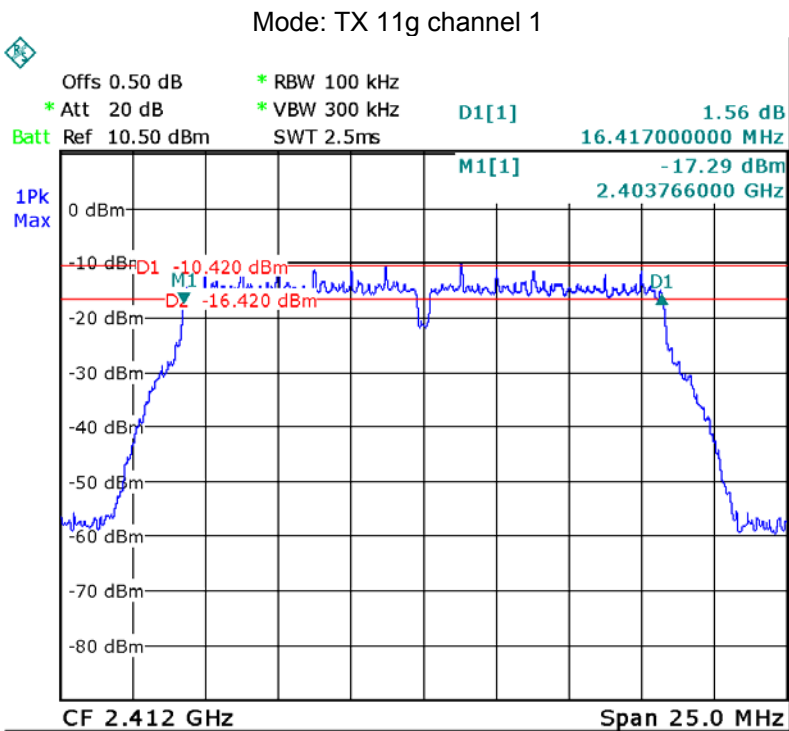
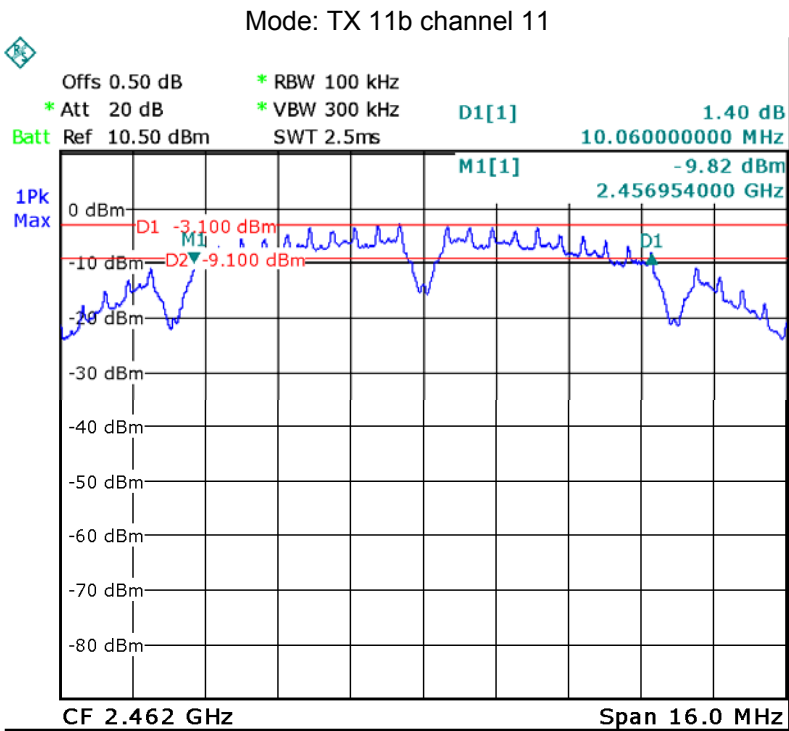
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

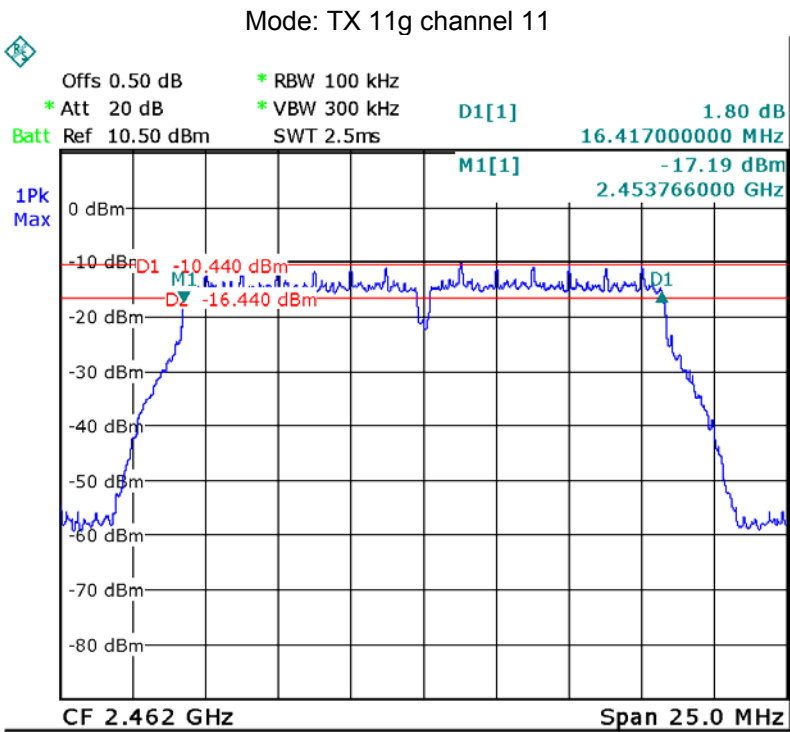
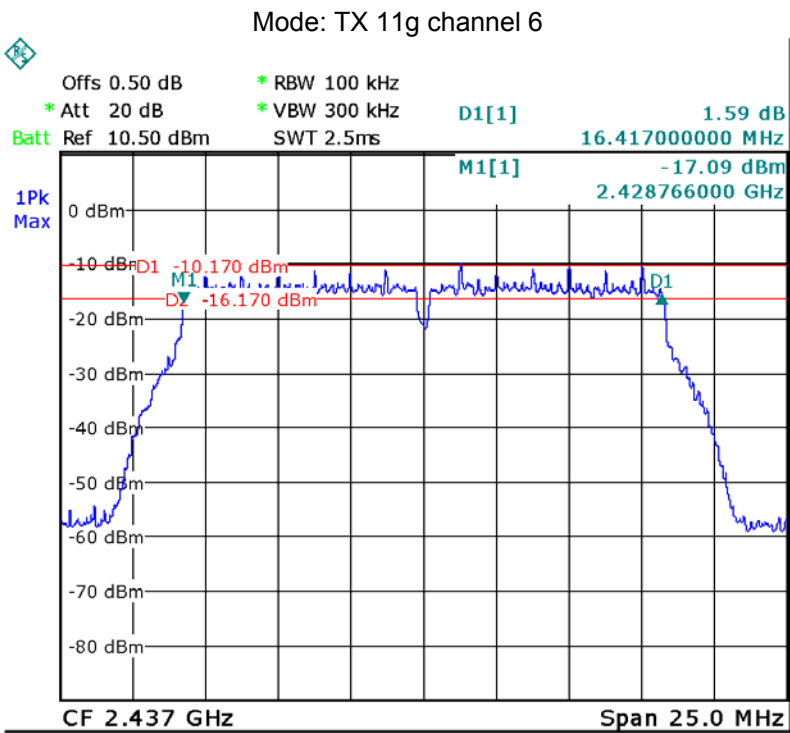
10.2 Test Result:

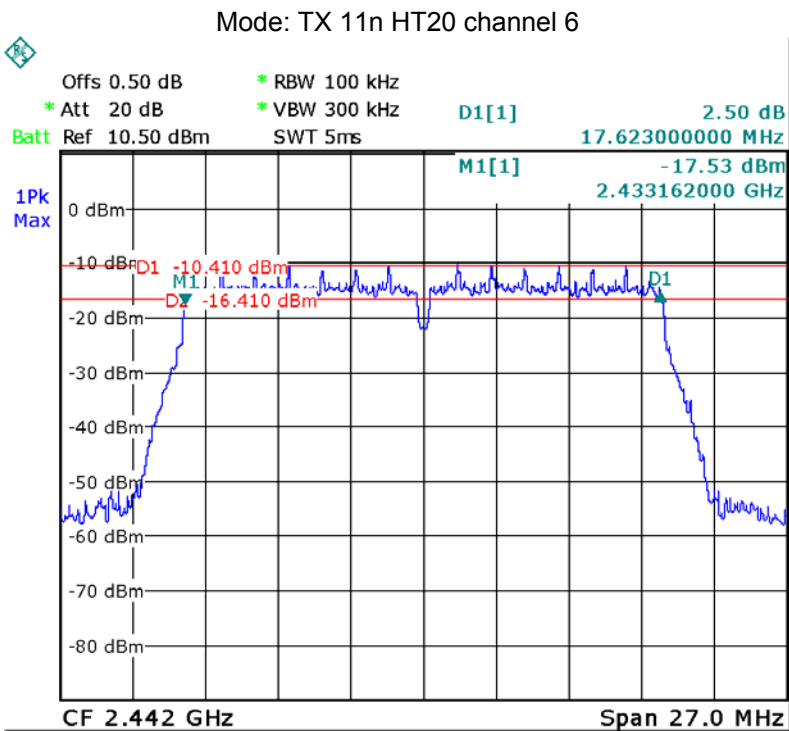
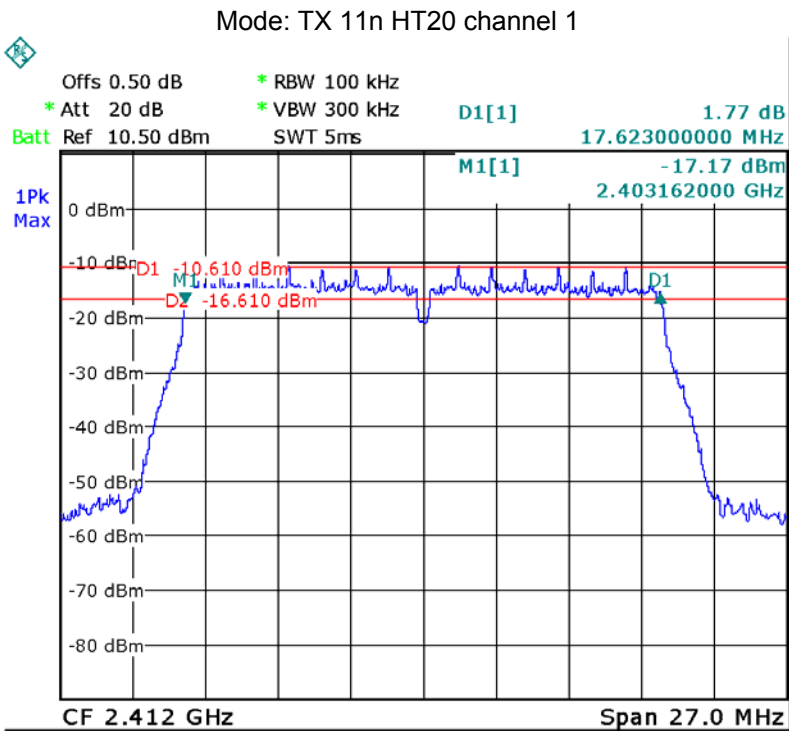
Operation mode	Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11
	10.060	10.060	10.060
TX 11g	Channel 1	Channel 6	Channel 11
	16.417	16.417	16.417
TX 11n HT20	Channel 1	Channel 6	Channel 11
	17.623	17.623	17.623
BT BLE	Channel 0	Channel 19	Channel 39
	0.695	0.695	0.695

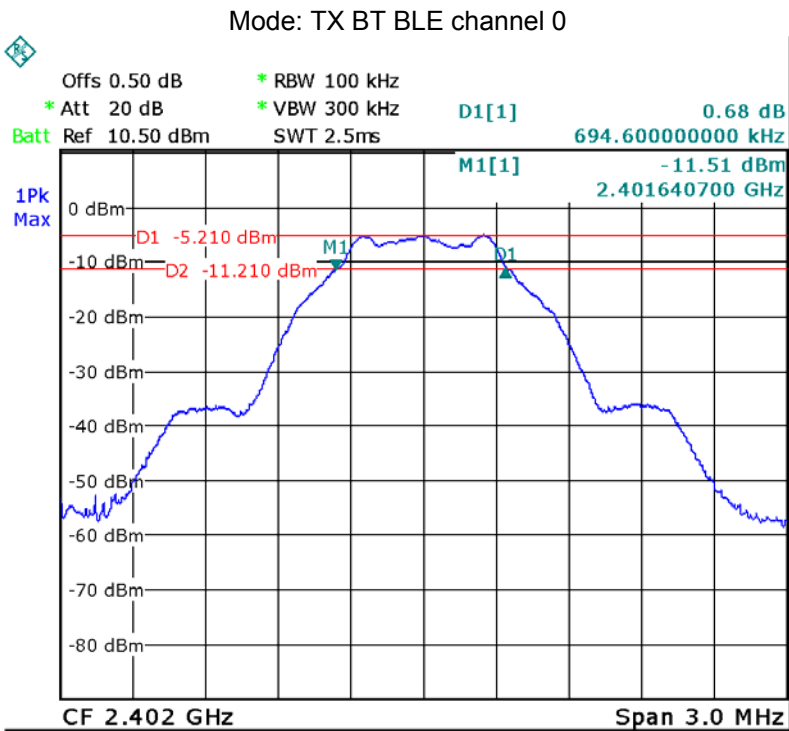
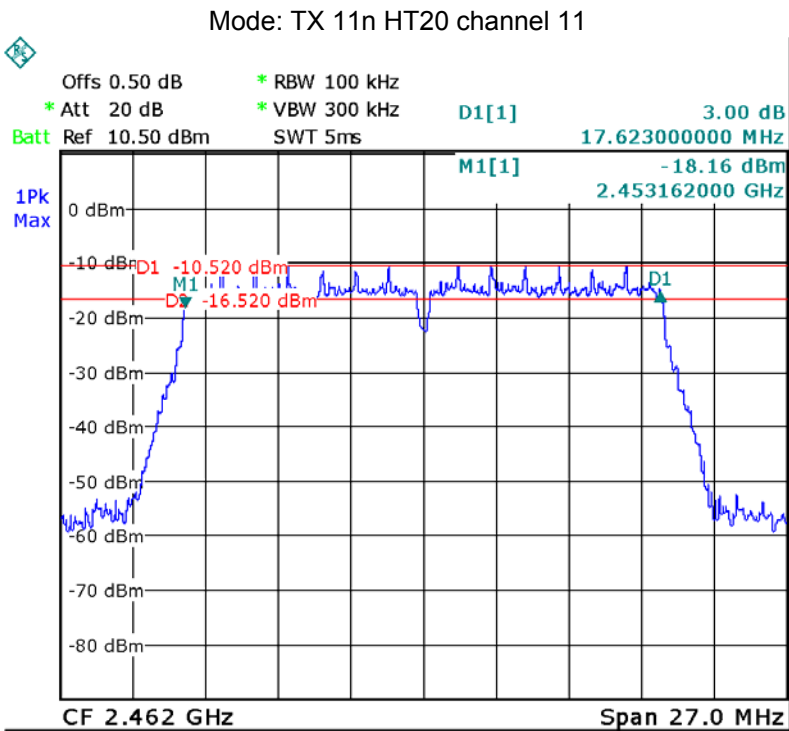
Test result plot as follows:

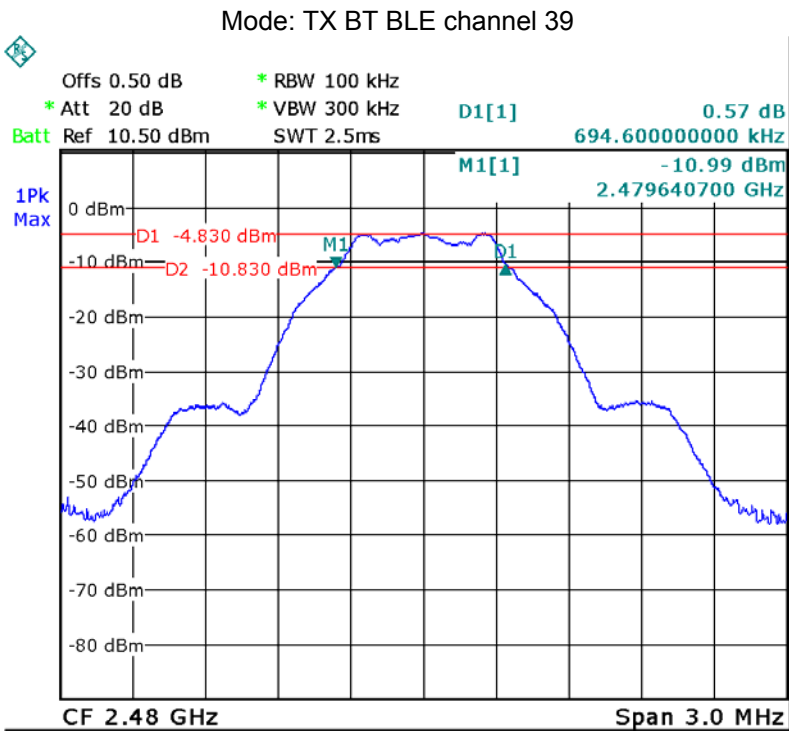
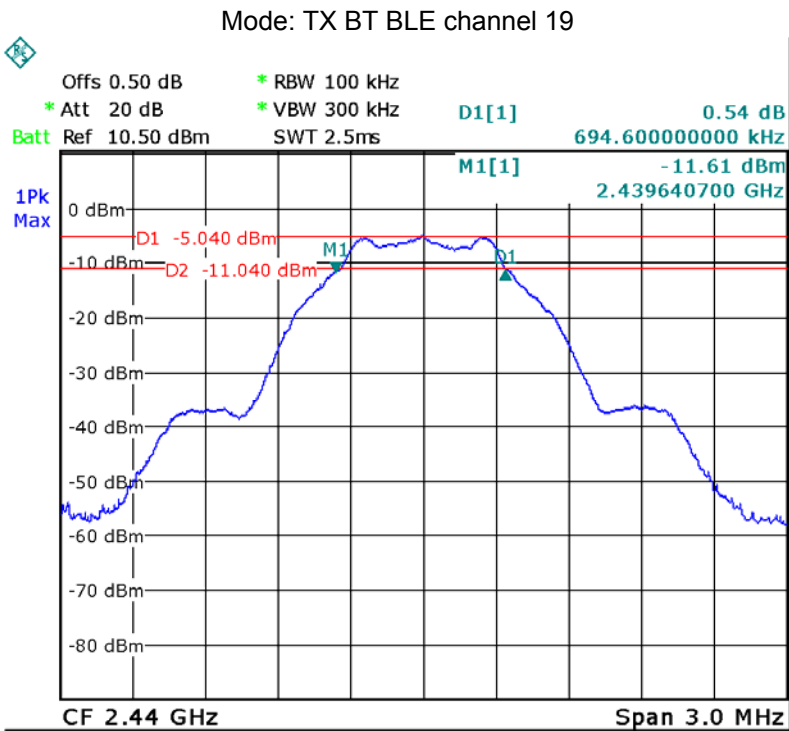












11 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB 558074 D01 DTS Meas Guidance v03r03 06/09/2015

11.1 Test Procedure:

KDB 558074 D01 DTS Meas Guidance v03r03 06/09/2015

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.

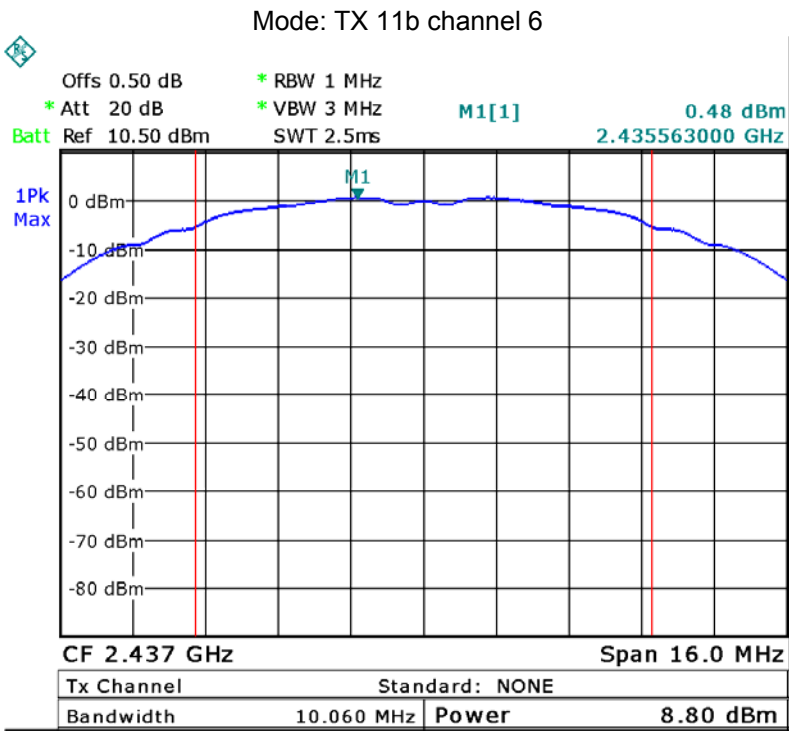
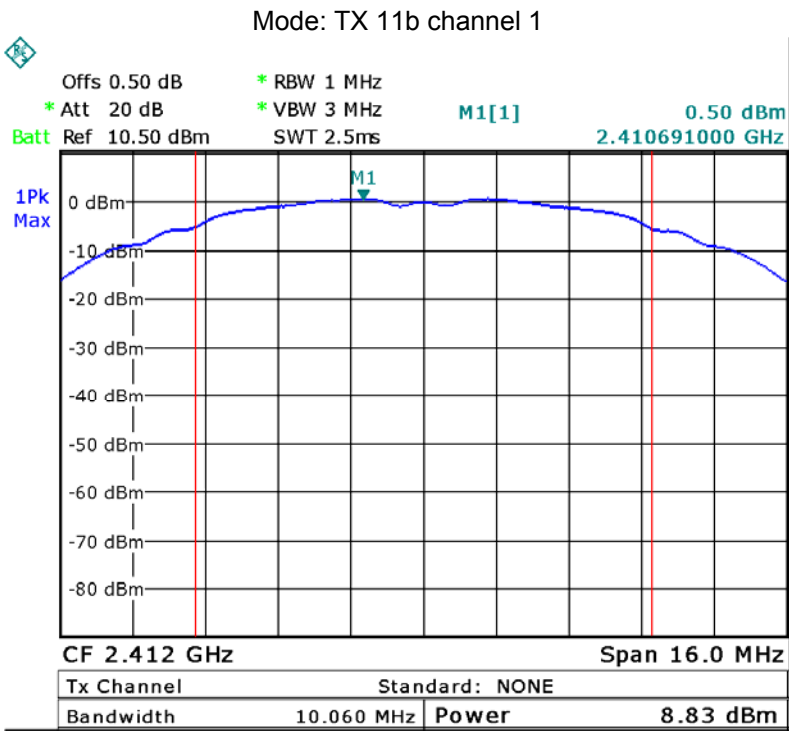
11.2 Test Result:

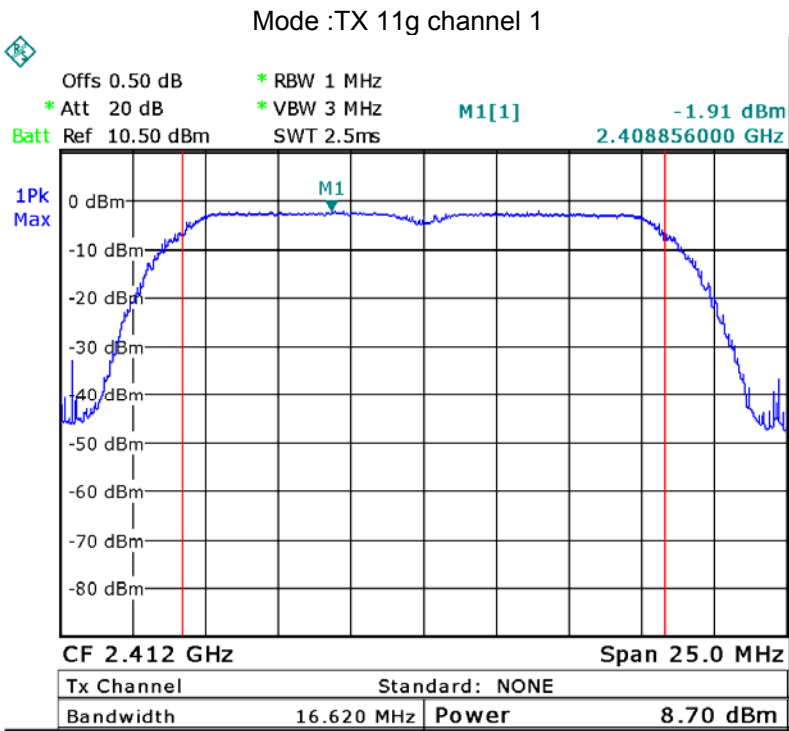
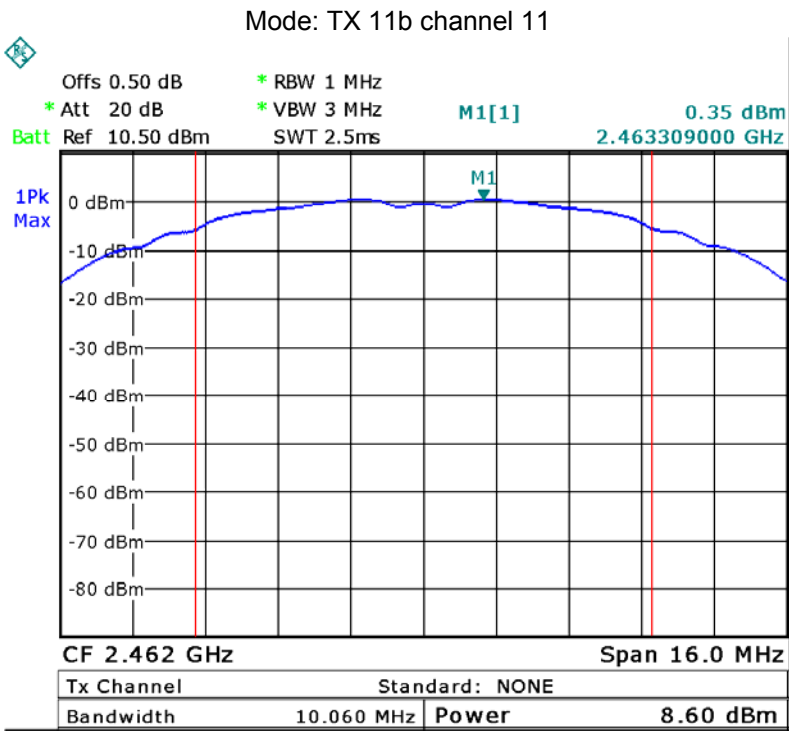
Test mode :TX 11b		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
8.83	8.80	8.60
Limit: 1W/30dBm		

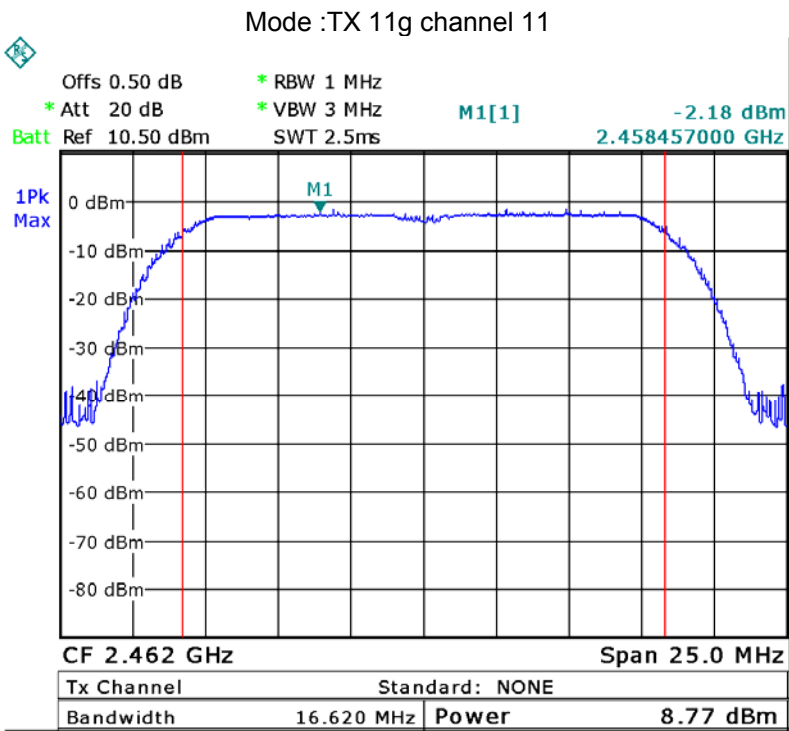
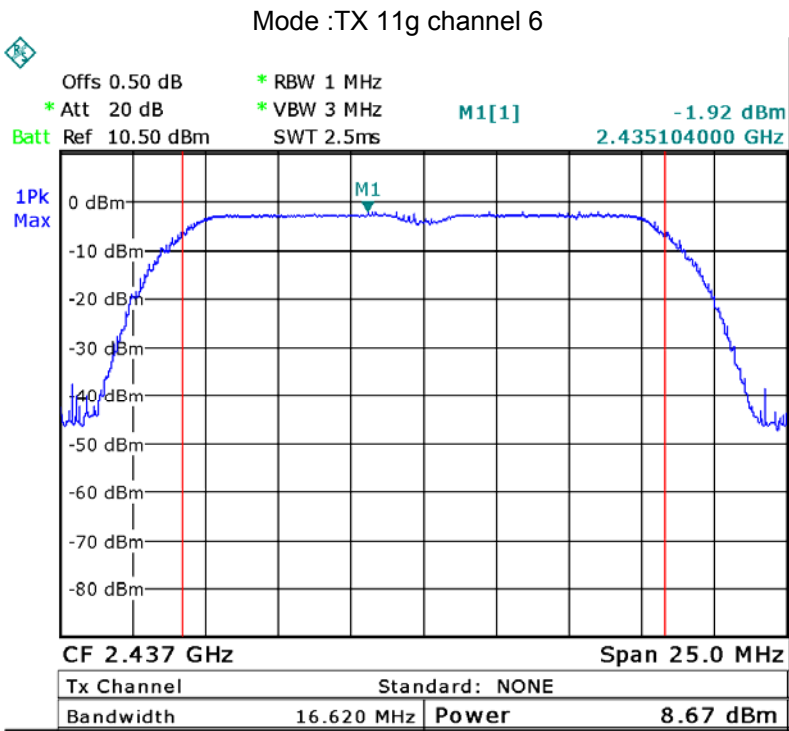
Test mode :TX 11g		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
8.70	8.67	8.77
Limit: 1W/30dBm		

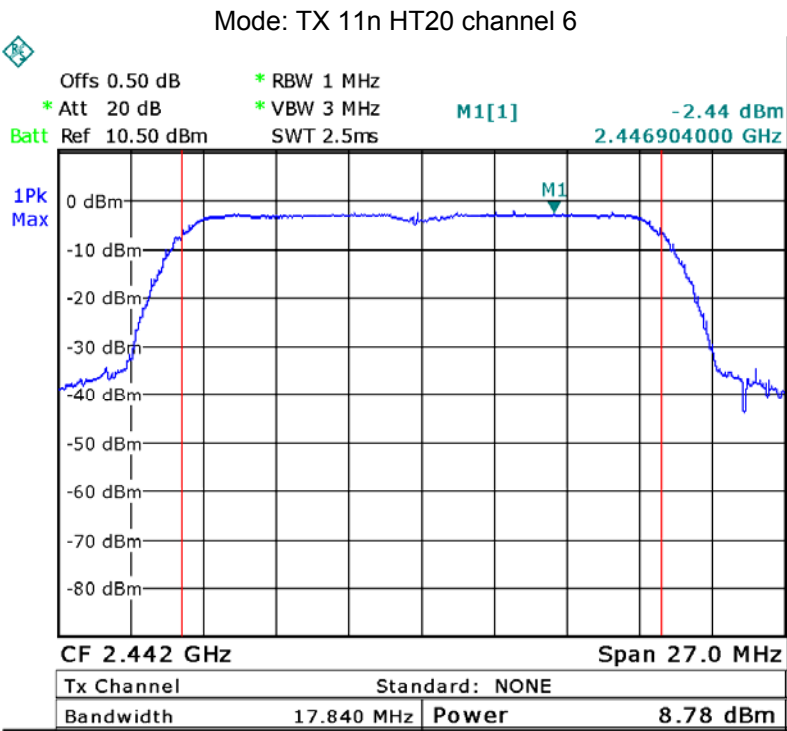
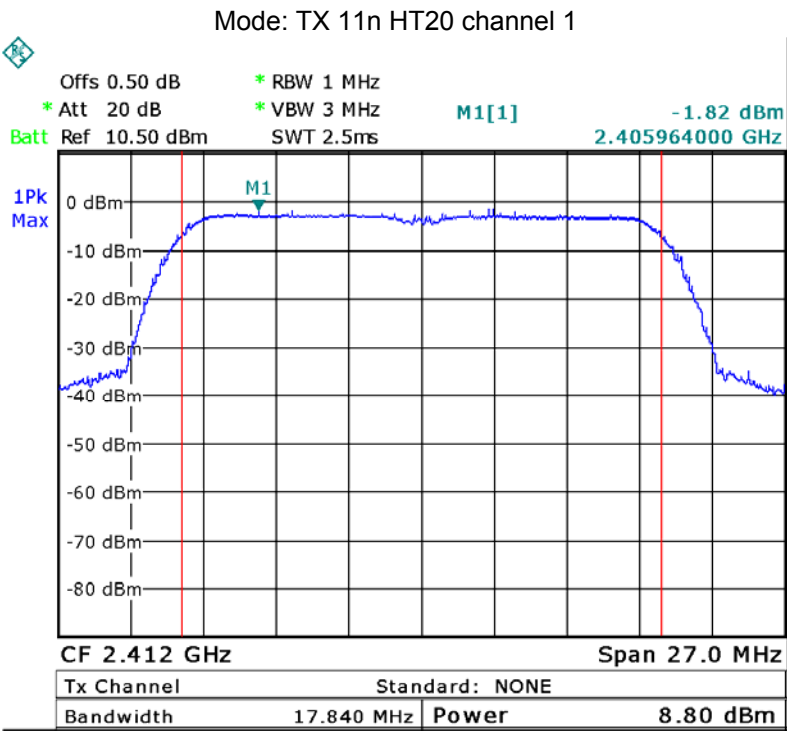
Test mode :TX 11n HT20		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
8.80	8.78	8.62
Limit: 1W/30dBm		

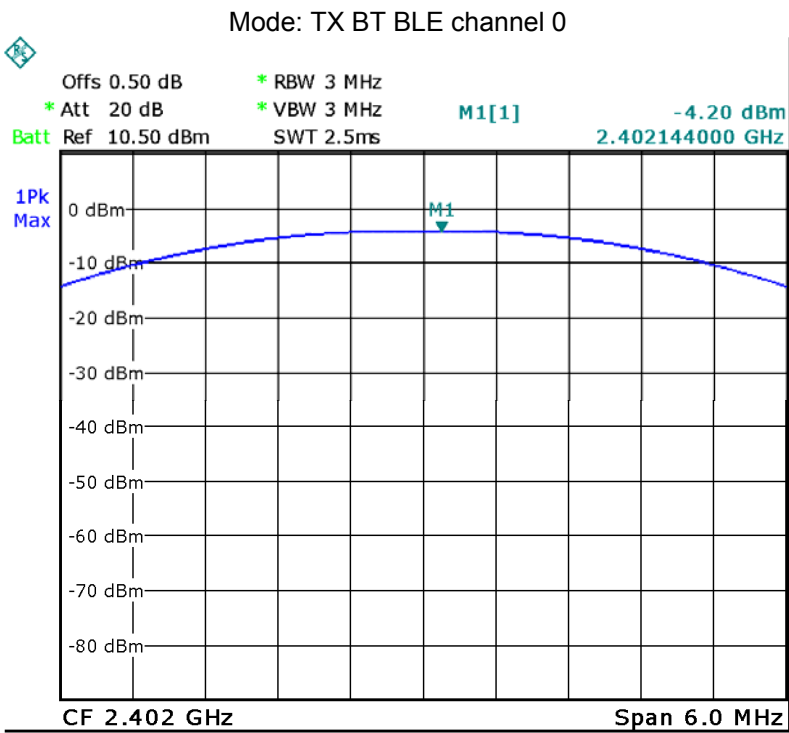
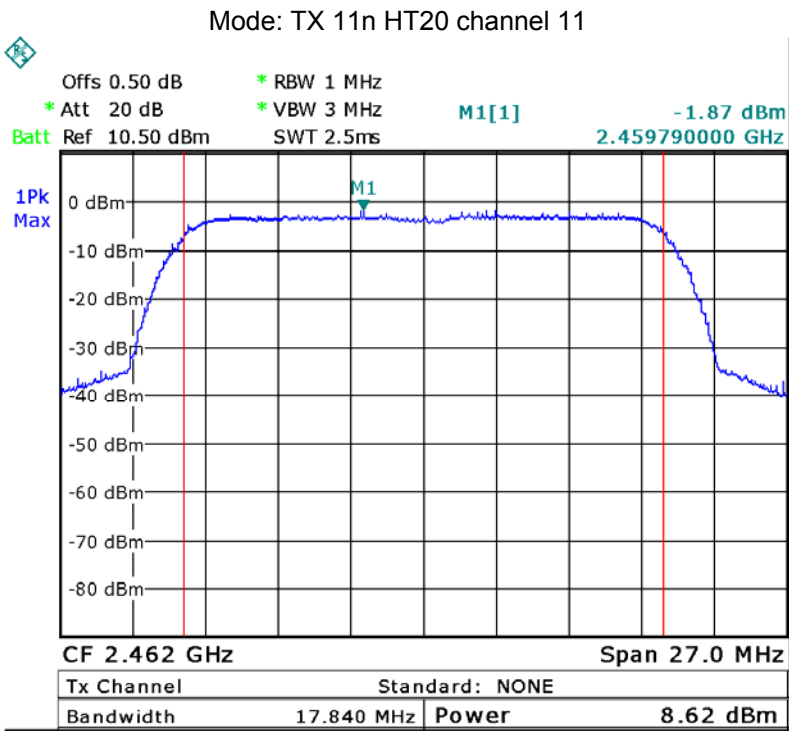
Test mode : TX BT BLE		
Maximum Peak Output Power (dBm)		
2402MHz	2440MHz	2480MHz
-4.20	-4.14	-3.83
Limit: 1W/30dBm		

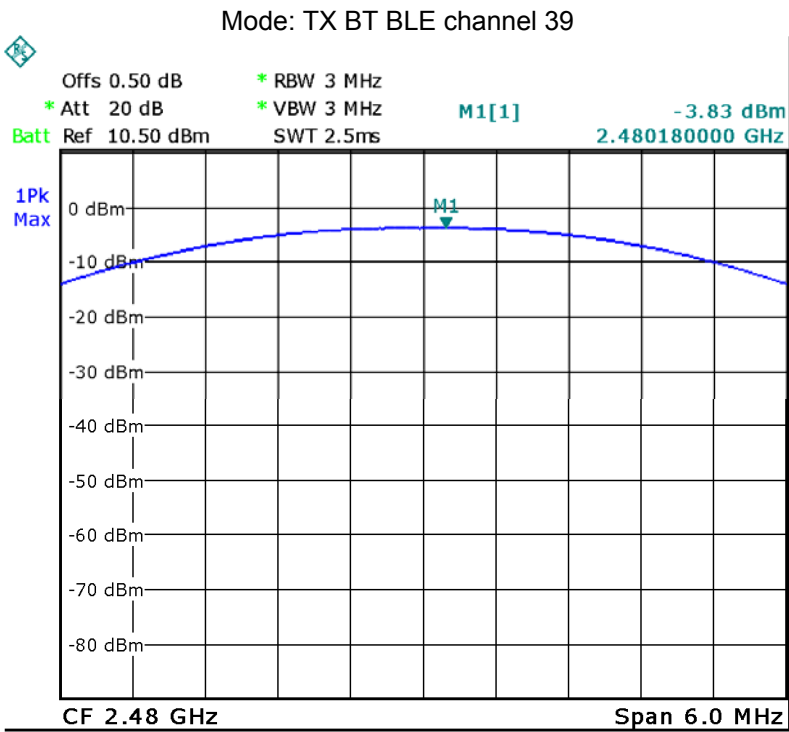
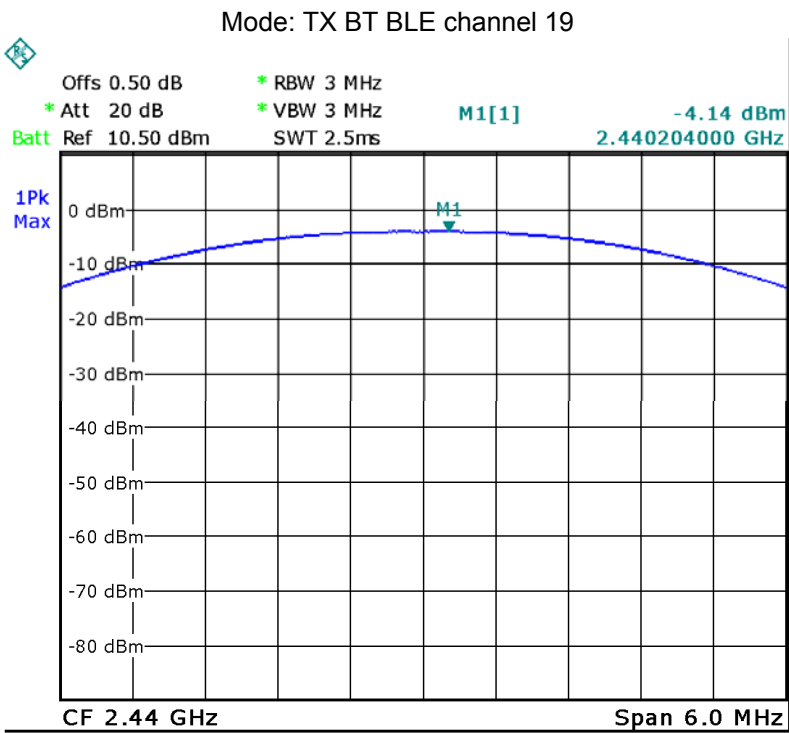












12 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v03r03 06/09/2015

12.1 Test Procedure:

KDB 558074 D01 DTS Meas Guidance v03r03 06/09/2015 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.

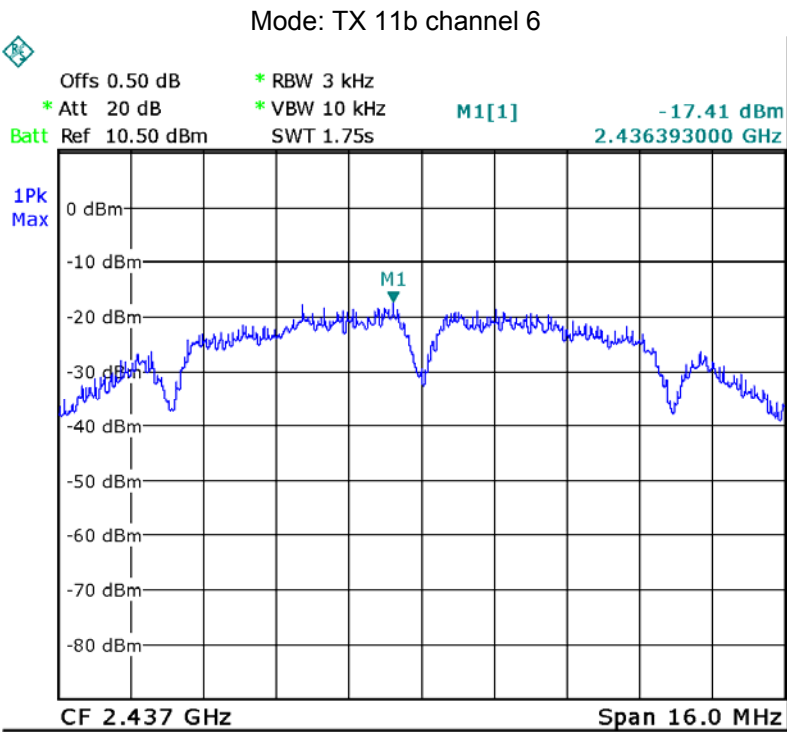
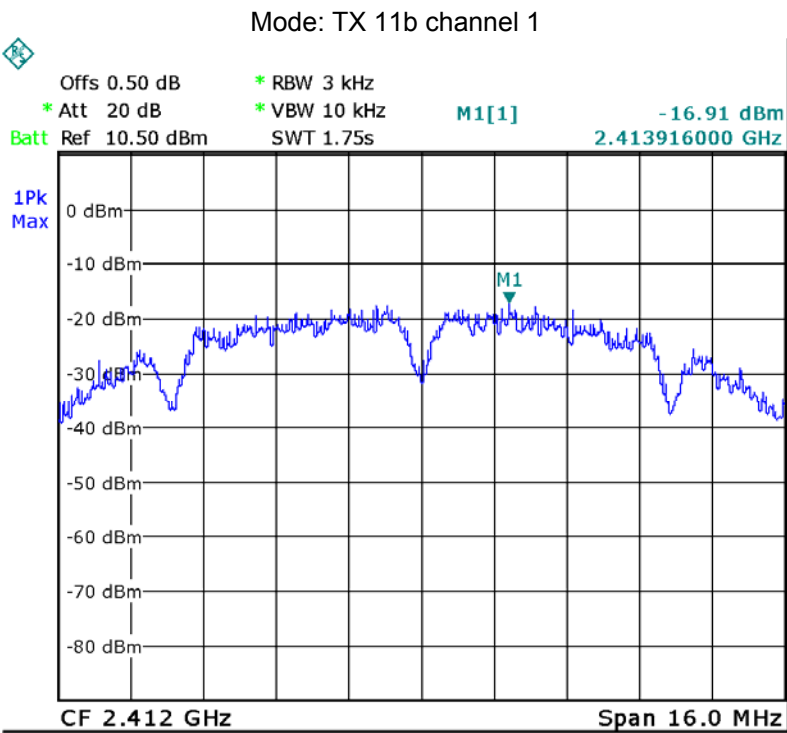
12.2 Test Result:

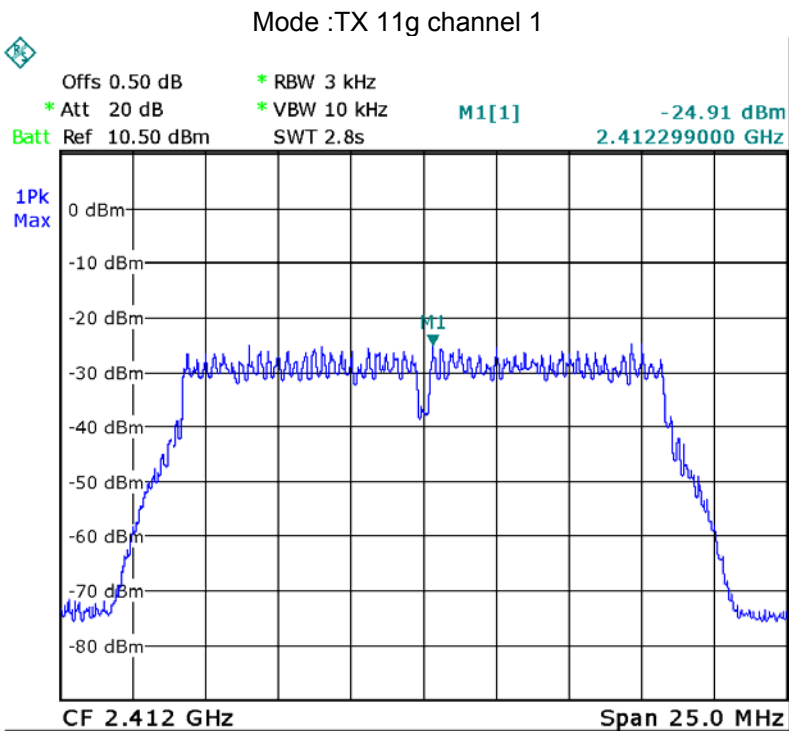
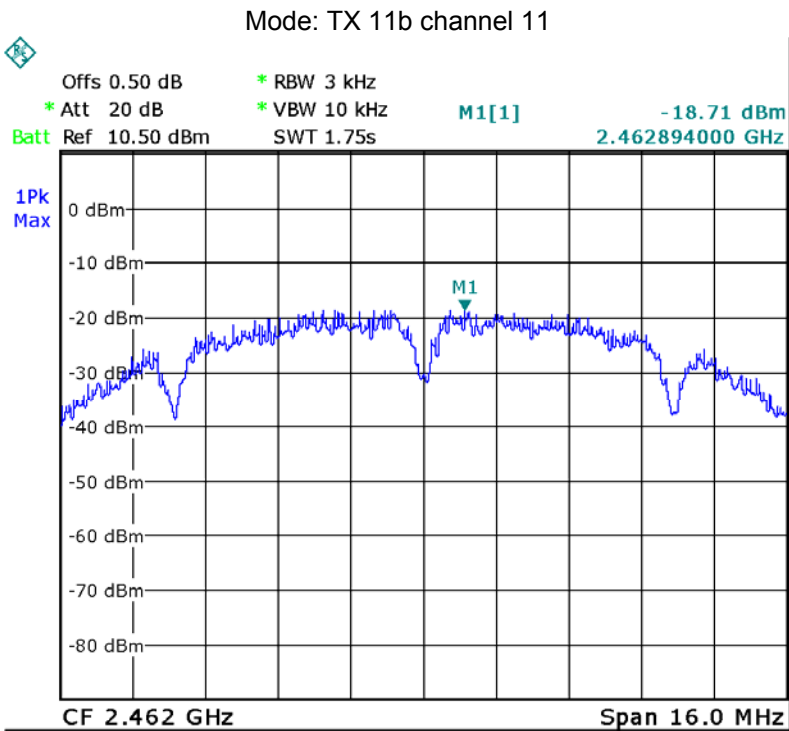
Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-16.91	-17.41	-18.71
Limit: 8dBm per 3kHz		

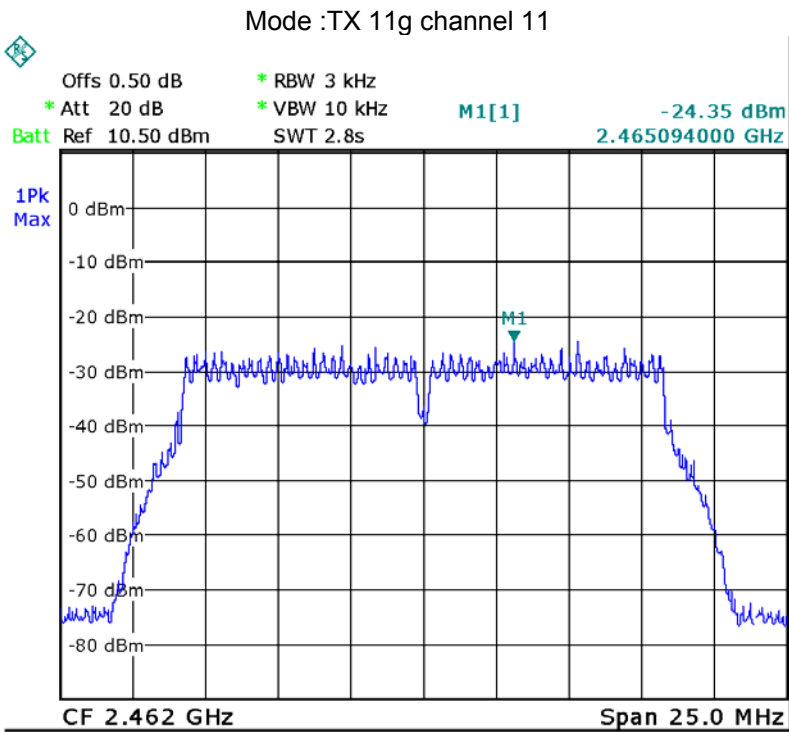
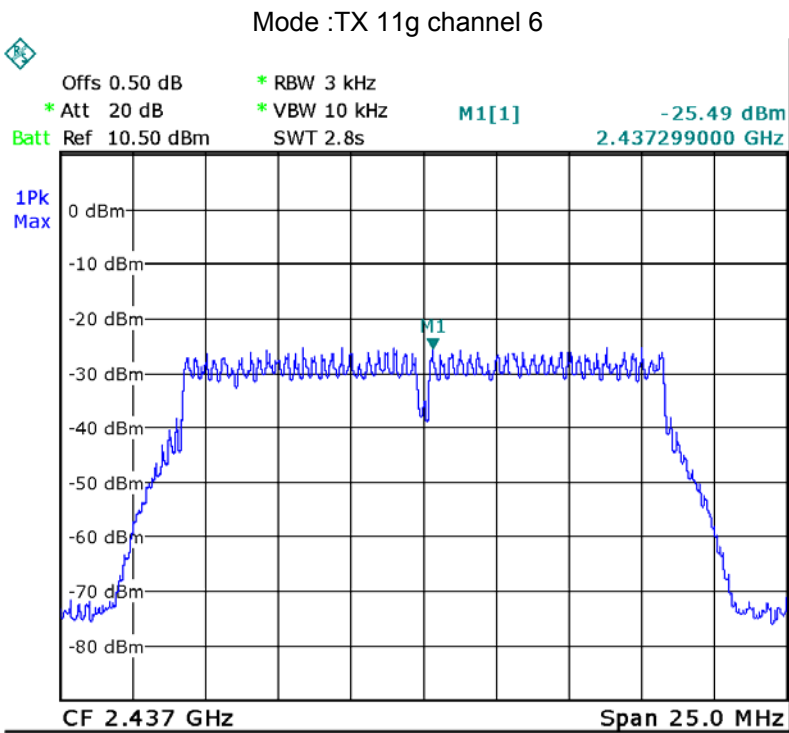
Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-24.91	-25.49	-24.35
Limit: 8dBm per 3kHz		

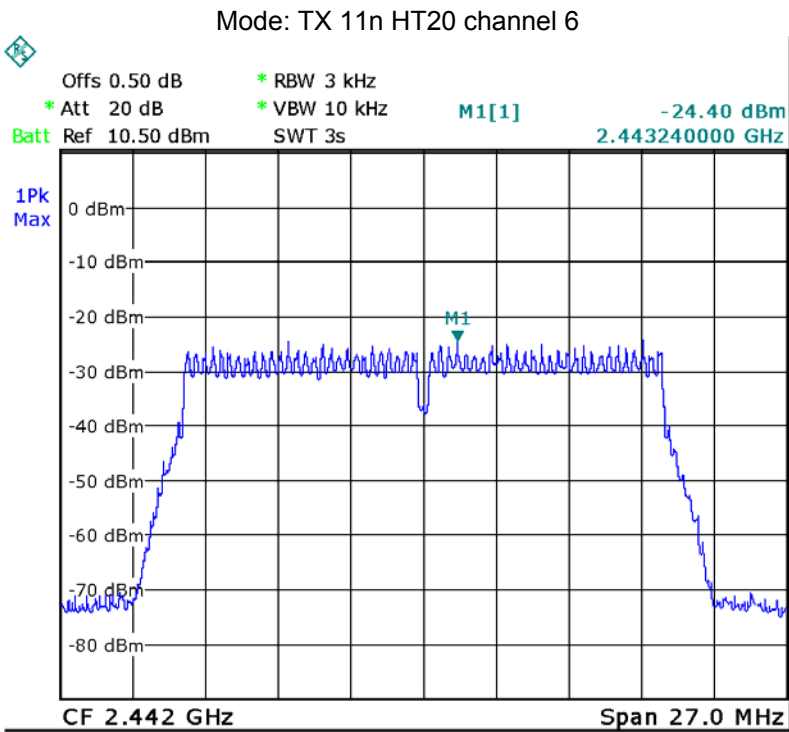
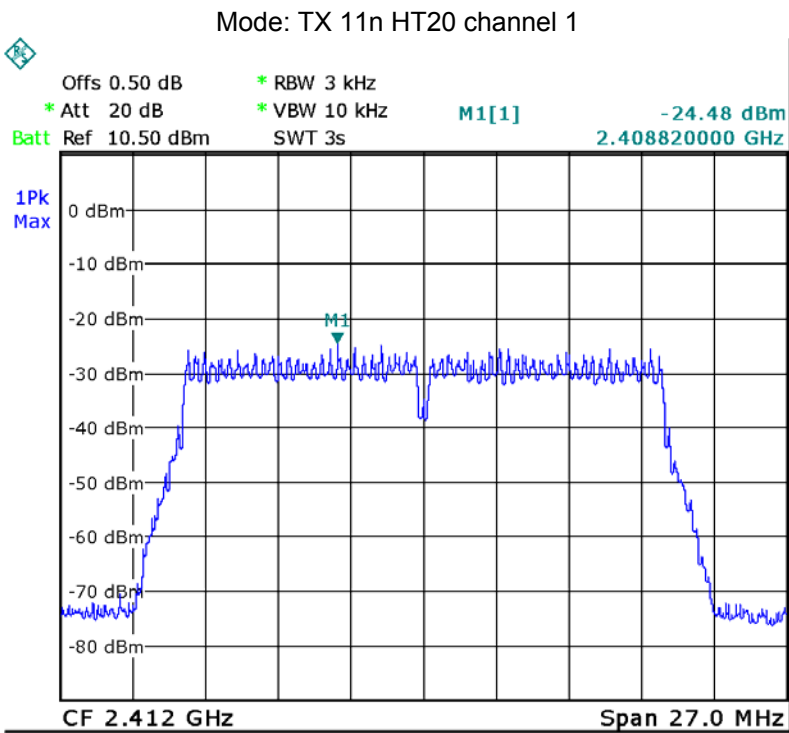
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-24.48	-24.40	-24.68
Limit: 8dBm per 3kHz		

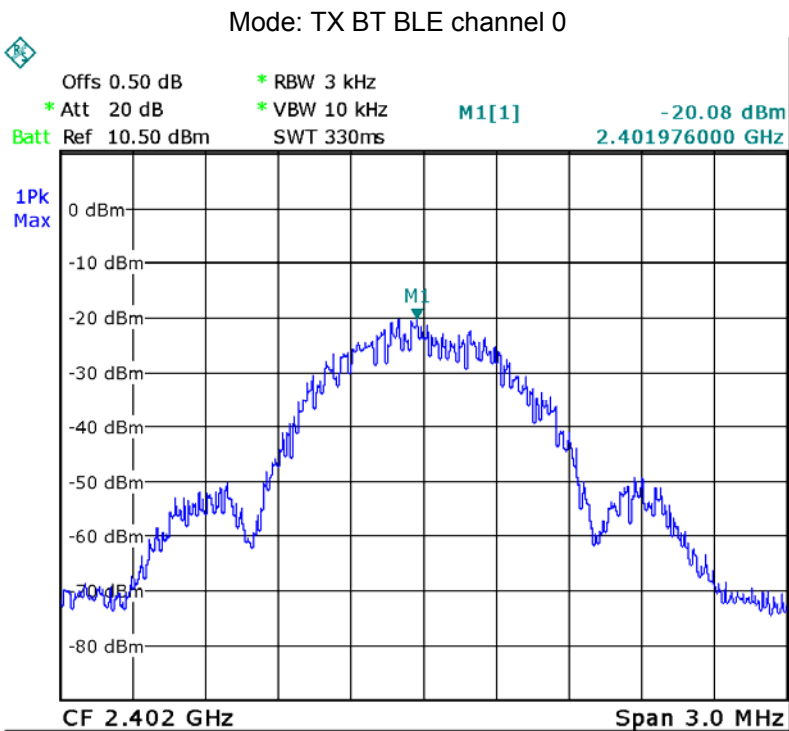
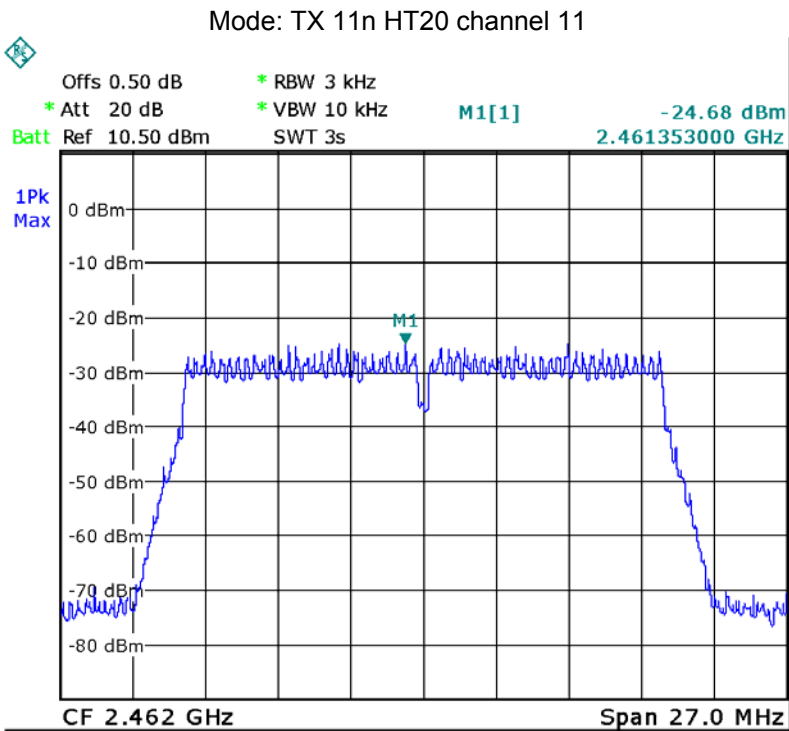
Test mode : TX BT BLE		
Power Spectral (dBm per 3kHz)		
2402MHz	2440MHz	2480MHz
-20.08	-19.85	-19.70
Limit: 8dBm per 3kHz		

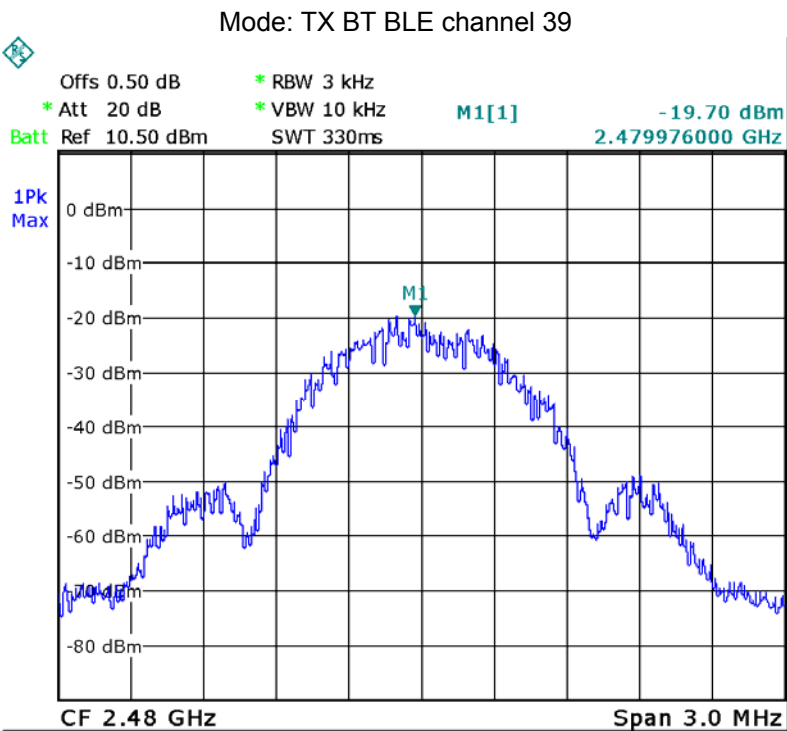
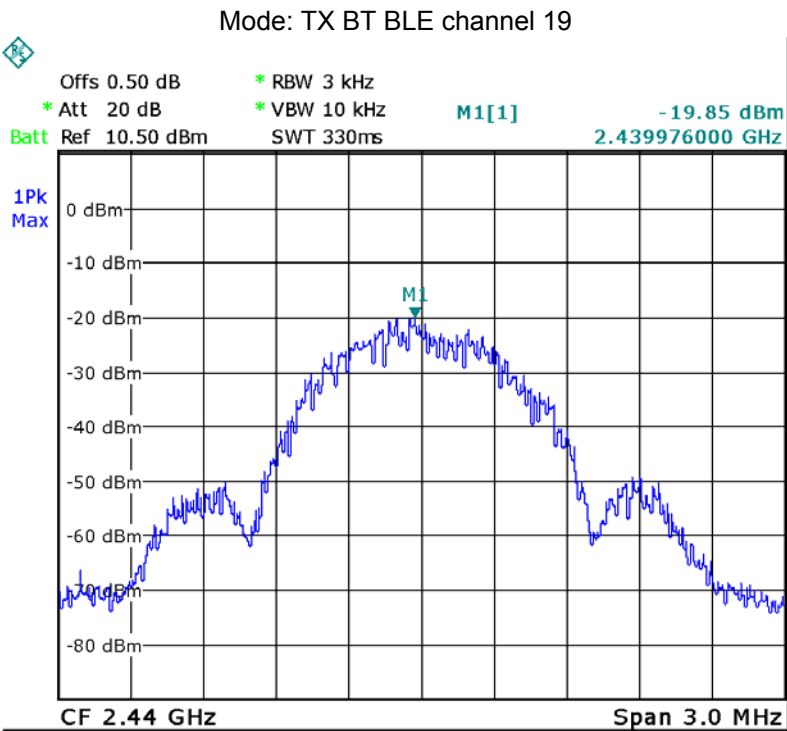












13 Antenna Requirement

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.

14 RF Exposure

Remark: refer to SAR test report: WTS15S0934545E.

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